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DEPARTMENT OF THE ARMY TECHNICAL MANUAL

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OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL

CRANE, WHEEL MOUNTED: 20 TON AT 10 FOOT RADIUS, 2 ENGINES,  
DIESEL ENGINE DRIVEN, 4 X 4 AIR TRANSPORTABLE, PHASE III;  
W/BLADE, BULLDOZER, EARTHMOVING; W/BLOCK, TACKLE, 20-TON;  
W/BOOM, CRANE, 30-FOOT (AMERICAN HOIST AND DERRICK MODEL 2380)  
FSN 3810-763-7728 (AMERICAN HOIST AND DERRICK MODEL 2385)  
FSN 3810-043-5354

This copy is a reprint which includes current  
pages from Change in force: C 5.

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HEADQUARTERS, DEPARTMENT OF THE ARMY  
SEPTEMBER 1970

**WARNING**  
**DANGEROUS CHEMICALS**

Exercise care  
when filling the batteries with electrolyte  
to prevent splashing or spilling the acid on clothing or body.  
Do not smoke or use open flame in the vicinity,  
as batteries generate explosive gas during charging.

**WARNING**  
**DANGEROUS GASES**

Do not operate the equipment in an enclosed area,  
unless the exhaust gases are piped to the outside.  
Inhalation of exhaust fumes will result  
in illness or death.



**Changes in force: C 5 and C 6**

**TM 5-3810-232-12  
C6**

CHANGE  
No. 6

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
Washington D.C., 28 December 1990

**Operator's and Organizational Maintenance Manual**

**CRANE, WHEEL MOUNTED: 20-TON AT 10-FOOT RADIUS; 2 ENGINES,  
DIESEL ENGINE DRIVEN, 4 x 4; AIR TRANSPORTABLE,  
PHASE III W/BLADE, BULLDOZER, EARTHMOVING;  
W/BLOCK, TACKLE, 20-TON; W/BOOM, CRANE, 30-FOOT  
(AMERICAN HOIST AND DERRICK MODEL 2380)  
NSN 3810-00-763-7728 AND  
(AMERICAN HOIST AND DERRICK MODEL 2385)  
NSN 3810-00-043-5354**

TM 5-3810-232-12, 10 September 1970, is changed as follows: Page i. Table of Contents, Chapter 3. Section VII is rescinded.

Page ii, Table of Contents, Chapter 4.

Add "Section XIII.I, Carrier propeller shafts, page 4-112".

Add "Section XXVI.I, Crane hoist drum shaft, page 4-130".

Page iii, List of Illustrations. Delete entries for Numbers 3-11 through 3-13.

Page iv, List of Illustrations.

Delete entries for Number 3-13.

Add "Number 4-38.1, Carrier engine oil cooler, removal and installation, page 4-45".

Add "Number 4-38.2, Carrier engine oil cooler, disassembly and assembly, page 4-45".

Page v, List of Illustrations.

Add "Number 4-40.1, Carrier engine V-belt adjustments (Model 2380), page 4-46".

Add "Number 4-40.2, Carrier engine V-belt adjustments (Model 2385), page 4-46".

Add "Number 4-40.3, Crane engine V-belt adjustments, Sheets 1, 2, 3, page 4-46".

Add "Number 4-40.4, Crane engine oil cooler, removal and installation, page 4-46".

Add "Number 4-40.5, Crane engine oil cooler, disassembly and reassembly, page 4-46".

Add "Number 4-47.1, Carrier radiator, removal and installation (Model 2380), page 4-53".

Add "Number 4-47.2, Carrier radiator, removal and installation (Model 2385), Sheet 1 of 2 and Sheet 2 of 2, page 4-53".

Delete entry for Number 4-56.

Delete "Sheet 1 of 3" from Number 4-78.

Page vi, List of Illustrations.

Add "Number 4-101.1, A frame, removal and installation, page 4-107".

Add "Number 4-101.2, A frame, disassembly and reassembly, page 4-107".

Add "Number 4-105.1, Tool box, removal and installation, page 4-109".

Add "Number 4-107.1, Propeller shaft and universal joint, removal disassembly, exploded view, page 4-112".

Delete entry for Number 4-116.

Add "Number 4-117.1, Outrigger hydraulic cylinders, removal and installation, page 4-122".

Page vii, List of Illustrations.

Add "Number 4-129.1, Air intake, removal and installation, page 4-130".

Add "Number 4-129.2, Crane hoist drum shaft assembly, removal and installation, page 4-130".

Add "Number 4-129.3, Crane hoist drum shaft assembly, exploded view, page 4-130".

Add "Number 4-129.4, Clutch band, main and auxiliary hoist, page 4-130".

Add "Number 4-137.1, Data, identification, and instruction plates, removal and installation, page 4-138".

Page 3-11.

Change "Section VII" to "Section XIII.1" and move to Chapter 4, ORGANIZATIONAL MAINTENANCE INSTRUCTIONS, page 4-46.

Change paragraph "3-15" to "4-46.1" and move to page 4-46.

Change figure "3-11" to "4-40.1 " and move to page 4-46.

Page 3-12.

Change paragraph "3-16" to "4-46.2" and move to page 4-46.

Change figure "3-12" to "4-40.2" and move to page 4-46.

Page 3-13.

Change paragraph "3-17" to "4-46.3" and move to page 4-46.

Change figure "3-13" to "4-40.3" and move to page 4-46.

Page 3-14. Change figure "3-13" to "4-40.3" and move to page 4-46.

Page 4-6, Table 4-4, malfunction 5.

Probable cause c, Corrective action c. Change "Replace brushes (para 4-62)." to "Replace starter (para 4-62).".

Add "Probable cause d. Batteries discharged, Corrective action d. Change/Replace batteries".

Page 4-45. Add paragraph 4-43.1 as follows:

**4-43.1.Oil Cooler**

a. Removal. Remove the oil cooler as illustrated in figure 4-38.1.

b. Disassembly. Disassemble the oil cooler as illustrated in figure 4-38.2.

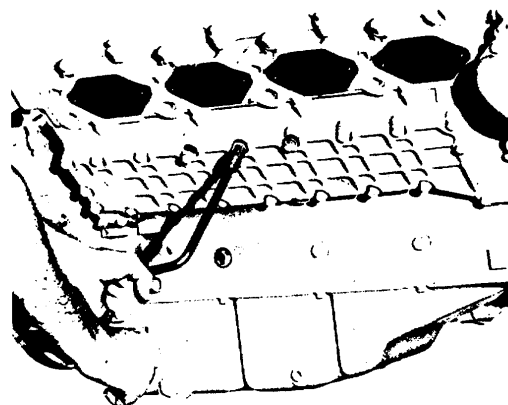
c. Cleaning, Inspection, and Repair.

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

(2) Inspect cooler housing and connectors for cracks, breaks or worn condition. Repair or replace a damaged or defective part.

d. Reassembly and Installation. Refer to figures 4-38.1 and 4-38.2 and proceed as follows:

(1) Position the cooler element with a new gasket to the side of the cylinder block.

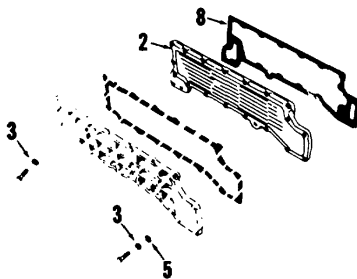


**NOTE:**

1. REMOVE CAPSCREWS, LOCKWASHERS, AND FLATWASHERS OR LOCKPLATES SECURING COVERS AND ELEMENTS TO CYLINDER BLOCK.
2. REMOVE COVER AND ELEMENT FROM CYLINDER BLOCK.
3. SEPARATE COVERS AND ELEMENTS.
4. DISCARD ALL GASKETS AND LOCKPLATES.

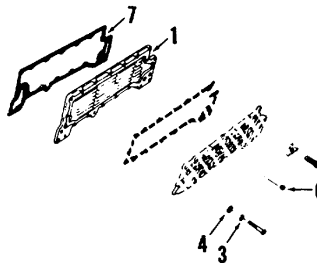
ME 3810-232-34/3-38

4-38. 1. Carrier engine oil cooler, removal and installation.



- 1. Element
- 2. Element

- 3. Washer
- 4. Washer



- 5. Washer
- 6. Plug

- 7. Gasket
- 8. Gasket

4-38.2. Carrier engine oil cooler, disassembly and assembly.

(2) Hold it in place by installing the flatwashers, lockwashers, and capscrews in the two holes that go through the element only.

(3) Position the cooler cover with a new gasket to the element.

(4) Secure the cover with flatwashers, lockwashers, and capscrews. Torque the capscrews alternately to 30/35 ft-lbs.

Page 4-46. After paragraph 4-46.3 add paragraph 4-46.4 as follows:

**4-46.4.Oil Cooler**

a. Removal. Remove cooler assembly and gaskets from engine block (fig. 4-40.4).

b. Disassembly.

(1) Remove cooler cover (3, fig. 4-40.5) and gasket (5).

(2) Remove exposed top O-ring packing (9) under brass retainer (11).

**CAUTION**

**Do not scratch or mar sealing surface on element.**

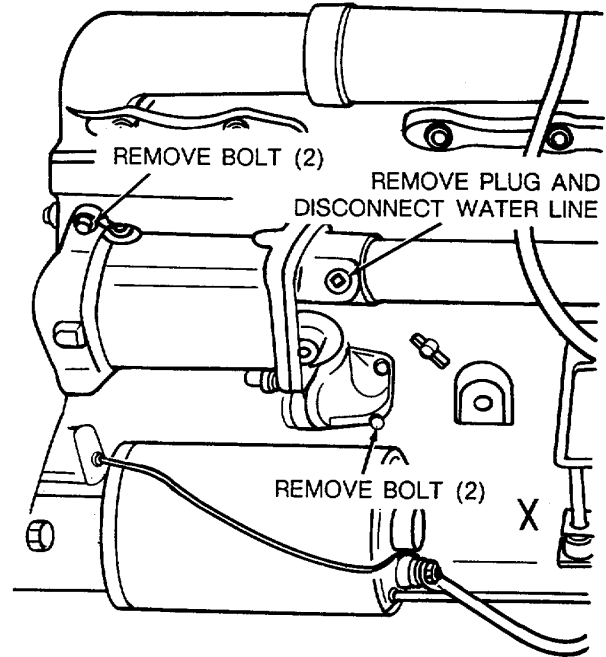
(3) To remove the element (4) from the housing (6) insert two 7/32 in. dia. rods 8 in. long into the outside row of tubes opposite each other.

**NOTE**

**The rods should not drag bottom of housing.**

(4) Place a flat bar between rods and rotate element in housing to unseat lower O-ring packing (9).

(5) Grasp rods and while rotating elements lift gradually to free O-ring packing. When up about 3/8 in., lift element from housing.

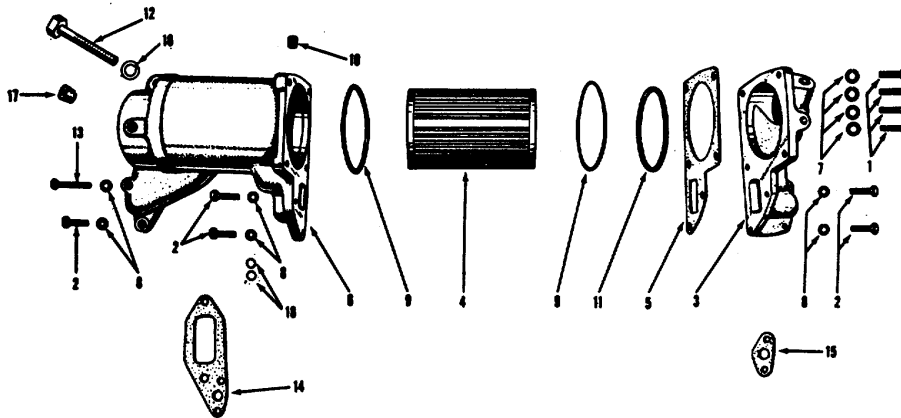


**NOTE:**

1. REMOVE CAPSCREWS AND LOCKWASHERS SECURING COOLER HOUSING AND COVER ASSEMBLY TOWARD REAR OF ENGINE DISENGAGING WATER TUBE AND O-RING.
2. DISCARD GASKET AND O-RING.

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Figure 4-40.4 Crane engine oil cooler, removal and installation.



- 1.Screw
- 2. Bolt
- 3. Cover
- 4.Filter
- 5. Gasket

- 6.Housing
- 7. Washer
- 8. Washer
- 9. Packing
- 10. Plug

- 11. Retainer
- 12. Bolt
- 13. Screw
- 14. Gasket

- 15. Gasket
- 16. Washer
- 17. Plug
- 18. Washer

Figure 4-40.5. Crane engine oil cooler, disassembly and reassembly.

*c. Repair.*

(1) Repair defective or damaged parts.

(2) Repair damaged tubes by inserting smaller O. D. tube inside damaged tube. Cut and flair ends, then solder securely. If more than 5% of tubes are defective, discard element.

*d. Reassembly.*

(1) Lubricate O-ring packing (9) and place in groove at bottom of housing (6).

(2) Push element (4) into housing (6) aligning index marks on element and housing.

(3) Press second O-ring packing (9) around top of element with a wooden block to assure equal pressure around ring circumference.

(4) Place new retainer ring (11) over O-ring packing.

(5) Assemble new gasket (5) and front cover (3) to housing.

*e. Installation.*

(1) Place oil cooler assembly and new gasket in

position on engine block. Align bolt holes (fig.4-40.4).

(2) Secure the cooler housing and cover assembly to block with bolts and washers.

(3) Connect external oil and water lines to cooler. Page 4-48, paragraph 4-48c(1). Change figure "3-11" to "4-40.1".

Page 4-49, paragraph 4-49c(1). Change figure "3-12" to "4-40.2".

Page 4-53. Add paragraph 4-53.1 as follows:

**4-53.1. Radiator**

**a. Removal (Model 2380).**

(1) Drain the cooling system.

(2) Remove cover assembly and deck plates.

(3) Disconnect radiator hoses (para 4-50).

(4) Remove radiator as shown on figure 4-47.1.

**b. Removal (Model 2385).** Perform steps (1), (2), and (3) in subparagraph a above and remove the radiator as shown on figure 4-47.2.

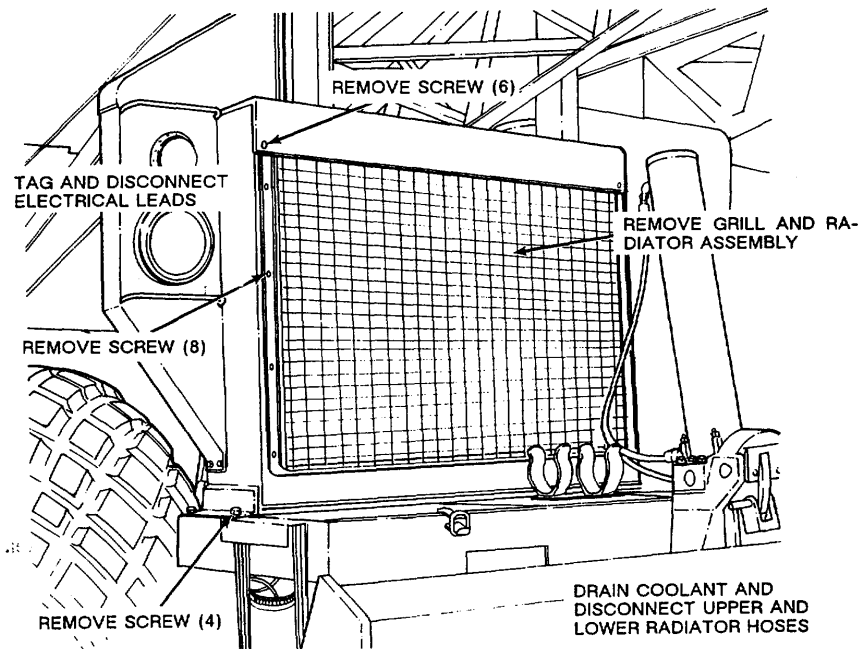


Figure 4-47. 1. Carrier radiator, removal and installation (Model 2380).

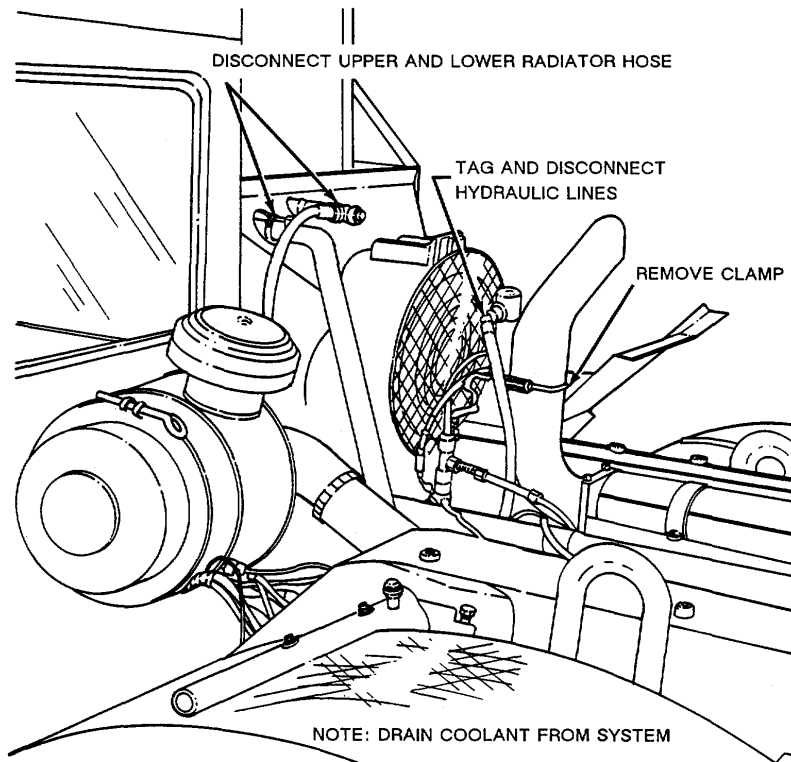


Figure 4-47.2. Carrier radiator, removal and installation (Model 2385) (Sheet 1 of 2).

*c. Installation (Model 2380).*

- (1) Install radiator as shown on figure 4-47.1.
- (2) Install radiator hoses (para 4-50).
- (3) Install deck plates and cover assembly.
- (4) Refill cooling system.

*d. Installation (Model 2385).* Install radiator as illustrated on figure 4-47.2 and perform steps (2), (3), and (4) of subparagraph b above.

Page 4-58, paragraph 4-58e(2). Change figure "3-13" to "4-40.3".

Page 4-61. Paragraph 4-61d(3) is superseded as follows: (3) Replace or repair a damaged battery box or battery box parts (fig. 4-53).

Page 4-62.

Paragraph 4-61h(3). Change to read "Replace or repair a damaged battery box."

Paragraph 4-62c is superseded as follows:

c. Replacement. Replace defective wires or defective starter. Refer all other maintenance to direct support.

Figure 4-56 is rescinded.

Page 4-82. Figure 4-78, sheets 2 of 3 and 3 of 3 are rescinded.

Page 4-83.

Paragraph 4-83c is superseded as follows: c. Replacement. Replace defective wires or starter. Refer all other maintenance to direct support.

Paragraph 4-83d(2) is changed to read "Install starter and solenoid as illustrated in figure 4-78."

Paragraph 4-84d(3) is rescinded.

USING SUITABLE LIFTING DEVICE REMOVE  
RADIATOR FAN DRIVE ASSEMBLY

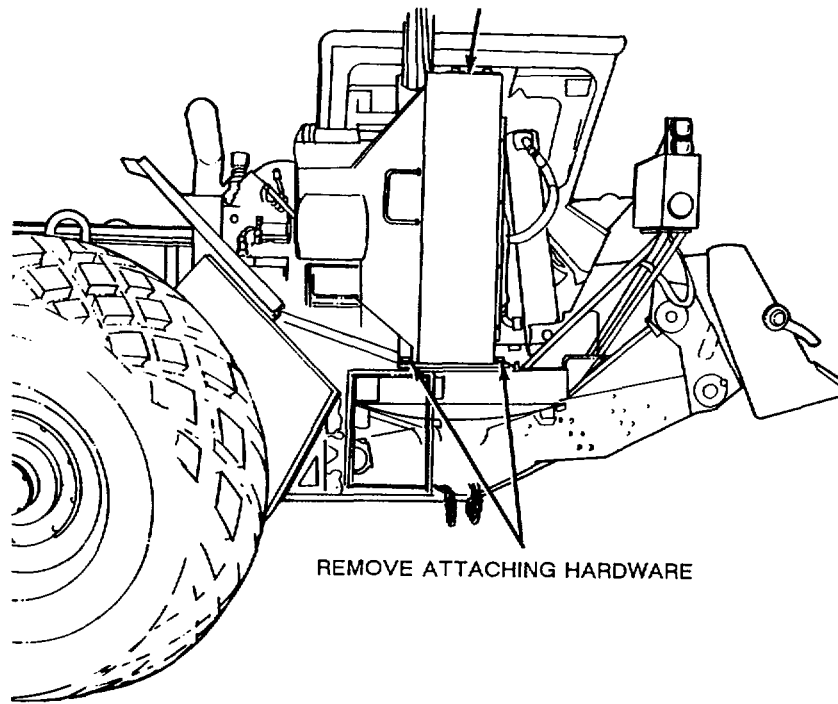


Figure 4-47.2. Carrier radiator, removal and installation (Model 2385) (Sheet 2 of 2).

Page 4-84. Paragraph 4-85b is superseded as follows:

b. Cleaning and Inspection.

- (1) Wipe exterior of generator with a damp cloth.
- (2) Inspect for cracks or other damage. Refer repairs to direct support maintenance.
- (3) Replace a defective generator.

Page 4-90. Paragraph 4-97 is superseded as follows:

**4-97. Master Clutch Control Assembly**

a. Adjustment.

- (1) When clutch is disengaged, the hand lever must fall back of vertical position.
- (2) Adjustment is performed by loosening clevis lock nut (4 or 11, fig. 4-87) and rotating clevis (3) or (10) as required.

b. Removal and Disassembly. Remove and disassemble master clutch control assembly as shown on figure 4-87.

c. Cleaning, Inspection, and Repair.

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

(2) Inspect all parts for cracks, damage, and stripped threads.

(3) Replace all cracked and damaged parts.

d. Reassembly and Installation.

(1) Reassemble and install master clutch control assembly as shown in figure 4-87.

(2) Adjust master clutch control assembly.

Page 4-107.

Add paragraph 4-115.1 as follows:

**4-115.1. A Frame**

a. General. The A frame is a supporting device used to support the boom. It is mounted on the crane frame by means of pins and is constructed of heavy steel.

b. Removal.

(1) Remove the crane gantry sheave block by reversing installation procedure (para 2-2).

- (2) Remove the crane cab assembly.
- (3) Remove the A frame from the revolving frame as instructed on figure 4-101.1.
- c. Disassembly. Disassemble A frame as shown on figure 4-101.2.
- d. Cleaning, Inspection, and Repair.
  - (1) Clean the A frame with an approved cleaning solvent and dry thoroughly.
  - (2) Inspect the A frame parts and pins for

- cracks, breaks, bends, and excessive wear. Replace defective parts as necessary. Replace cotter pins.
- e. Reassembly. Reassemble A frame as shown on figure 4-101.2.
- f. Installation.
  - (1) Install the A frame on the revolving frame as shown on figure 4-101.1.
  - (2) Install the crane cab assembly.
  - (3) Install the crane gantry sheave block (para 2-2).

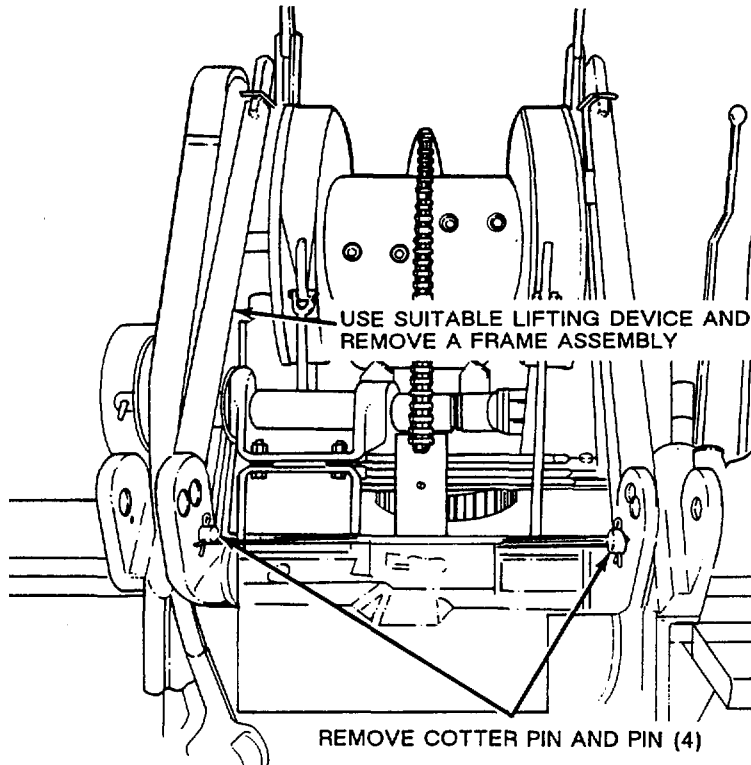


Figure 4-101.1. A frame, removal and installation.

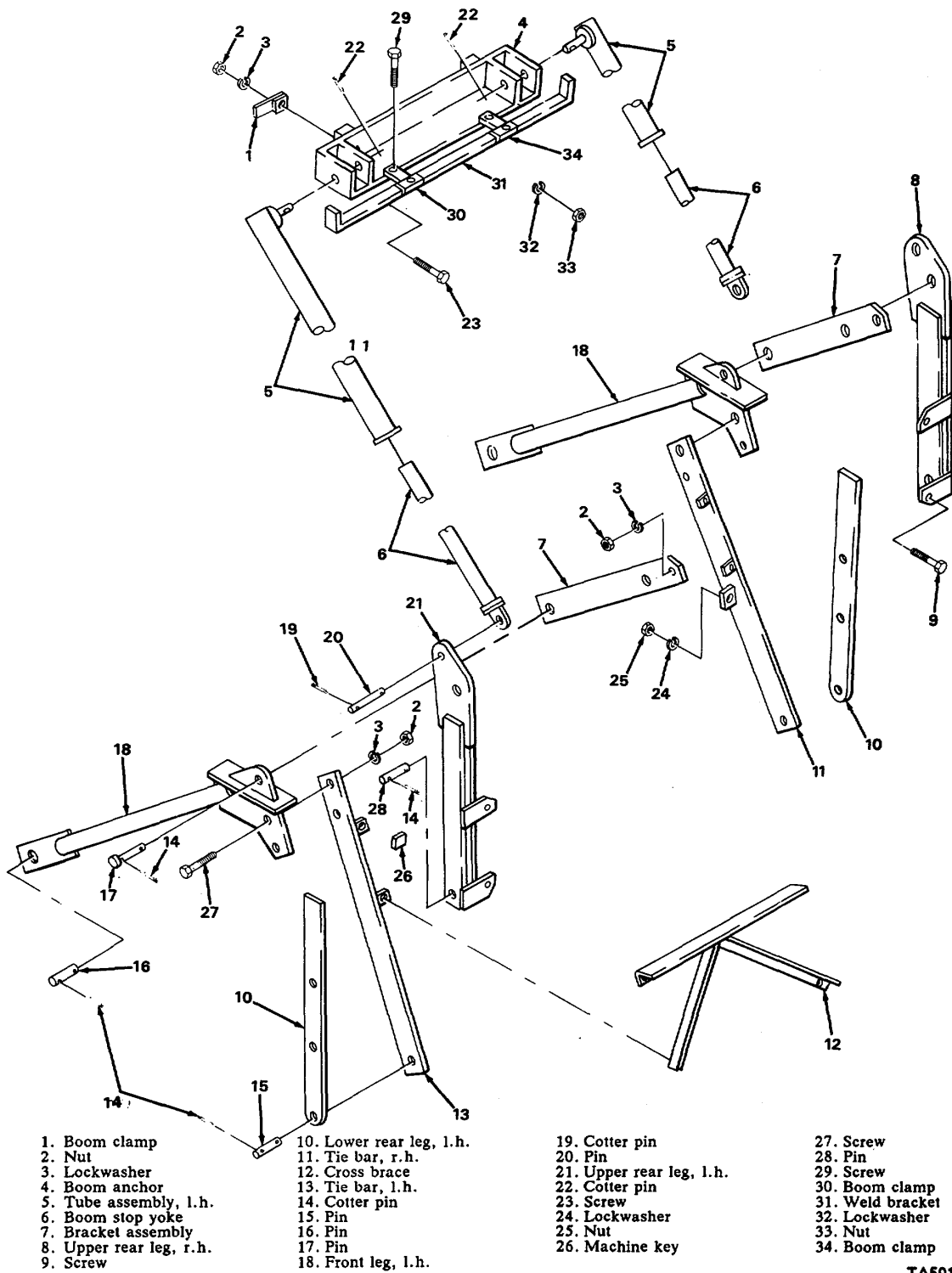


Figure 4-101.2. A frame, disassembly and reassembly.



Page 4-109. Add paragraph 4-119.1 as follows:

#### 4-119.1. Tool Box

- a. Removal. Remove tool box as shown in figure 4-105.1.
- b. Installation. Install tool box as shown in figure 4-105.1.

Page 4-112. Add Section XIII.I as follows:

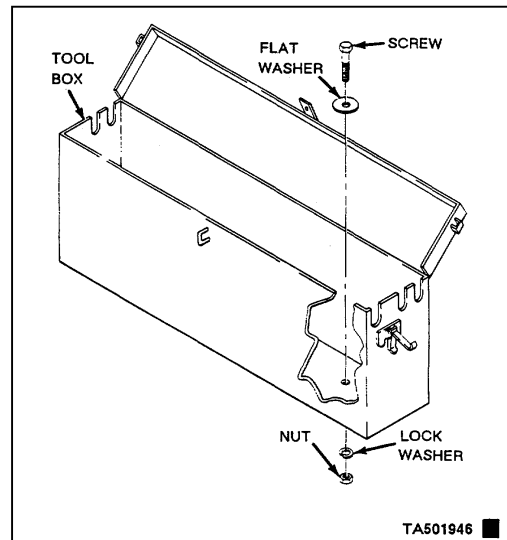


Figure 4-105.1. Tool box, removal and installation

### Section XIII.I CARRIER PROPELLER SHAFTS

#### 4-121.1. 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.

#### 4-121.2. Propeller Shafts

##### a. Removal.

- (1) Remove the torque converter to transmission propeller shaft in the numerical sequence as instructed on figure 4-107.1.
- (2) Remove the rear axle, the front axle and the

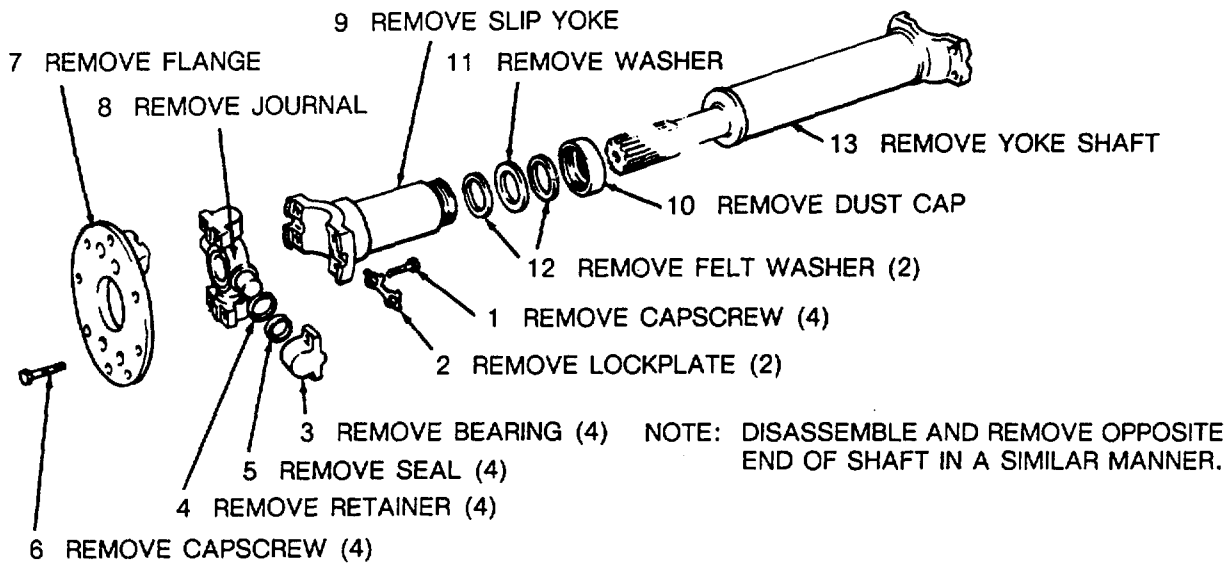
fan drive propeller shafts in a similar manner.

##### 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.

##### c. Installation.

- (1) Install the torque converter transmission propeller shaft in the reverse of the numerical sequence as illustrated on figure 4-107.1.
- (2) Install the front axle, the rear axle, and the fan drive propeller shafts in a similar manner.



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Figure 4-107.1 Propeller shaft and universal joint, removal and disassembly, exploded view.

Page 4-119. Paragraph 4-127c is rescinded.

Page 4-120. Figure 4-116 is rescinded.

Page 4-121.

Paragraph 4-127d(3) is superseded as follows:  
 (3) Replace all damaged and defective parts.

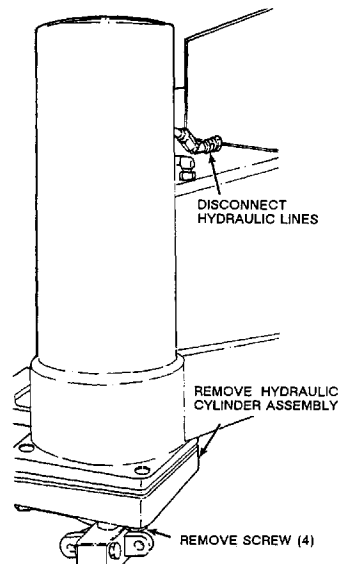
Paragraph 4-127e is rescinded.

Page 4-122. Add paragraph 4-129.1 as follows:

**4-129.1. Outrigger Hydraulic Cylinders**

a. Removal. Remove outrigger hydraulic cylinders as shown in figure 4-117.1.

b. Installation. Install outrigger hydraulic cylinders as shown in figure 4-117.1.



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Figure 4-117. 1. Outrigger hydraulic cylinders, removal and installation.

Add paragraph 4-143.1 as follows:

#### 4-143.1. Air Compressor Air Inlet

##### a. Removal.

- (1) Drain cooling system.
- (2) Clean area around the air compressor and fuel pump b
- (3) Remove air inlet as shown in figure 4-129.1.

##### b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent and c
- (2) Inspect all parts for cracks, damage, and stripped threa
- (3) Replace cracked or damaged parts.

##### c. Installation.

- (1) Install air inlet as shown on figure 4-129.1.

Use a new gasket.

- (2) Refill cooling system.

Add Section XXVI.I as follows:

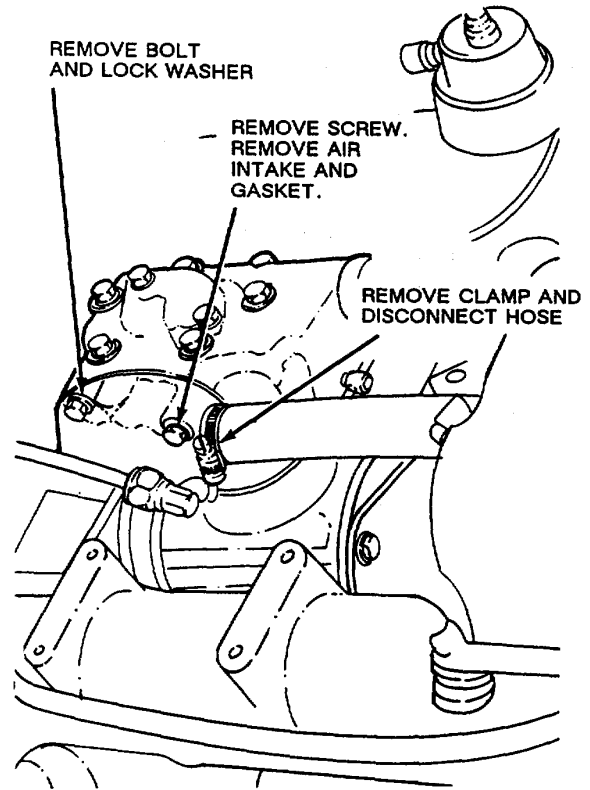


Figure 4-129. 1. Air intake, removal and installation.

### Section XXVI.I CRANE HOIST DRUM SHAFT

#### 4-143.2. General

The crane hoist drum shaft is mounted uppermost on the revolving frame between the countershaft and the horizontal reversing shaft and is gear driven from the horizontal reversing shaft. It is secured to the frame by two bearing assemblies which are bolted to the frame. The cable drums are held stationary by the brakes until the individual clutch assembly is engaged, which in turn rotates the clutch and brake drum. The hoist drum shaft assembly can be removed as a unit without

disturbing the counter-shaft or horizontal reversing shaft.

#### 4-143.3. Crane Hoist Drum Shaft Assembly

##### a. Removal.

- (1) Remove the main drive gear guards.
- (2) Remove the brake band assemblies.
- (3) Disconnect hoses to rotation joints.
- (4) Remove the hoist drum shaft assembly as instructed in figure 4-129.2.

b. *Disassembly.* Disassemble the hoist drum shaft assembly in numerical sequence as illustrated on figures 4-129.3 and 4-129.4.

c. *Cleaning, Inspection, and Repair.*

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

(2) Inspect all parts for excessive wear or damage. Replace or repair worn or damaged parts.

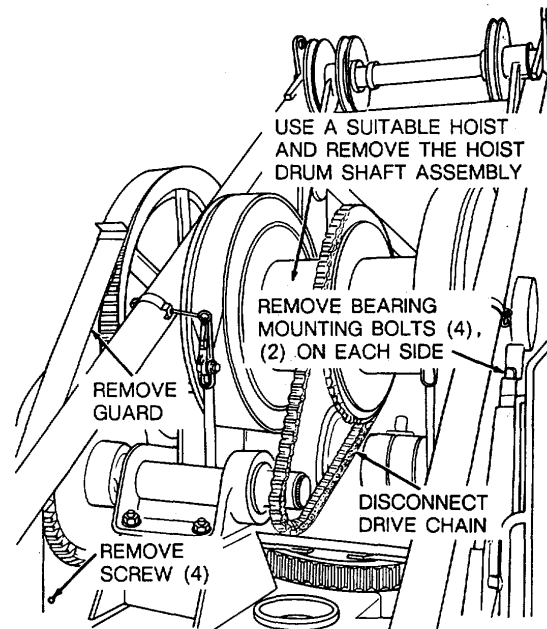
d. *Reassembly.* Reassemble the crane hoist drum shaft assembly in the reverse of the numerical sequence as illustrated on figures 4-129.3 and 4-129.4.

e. *Installation.*

(1) Install the hoist drum shaft assembly as illustrated on figure 4-129.2.

(2) Install the brake band assemblies.

(3) Install the main drive gear guard.



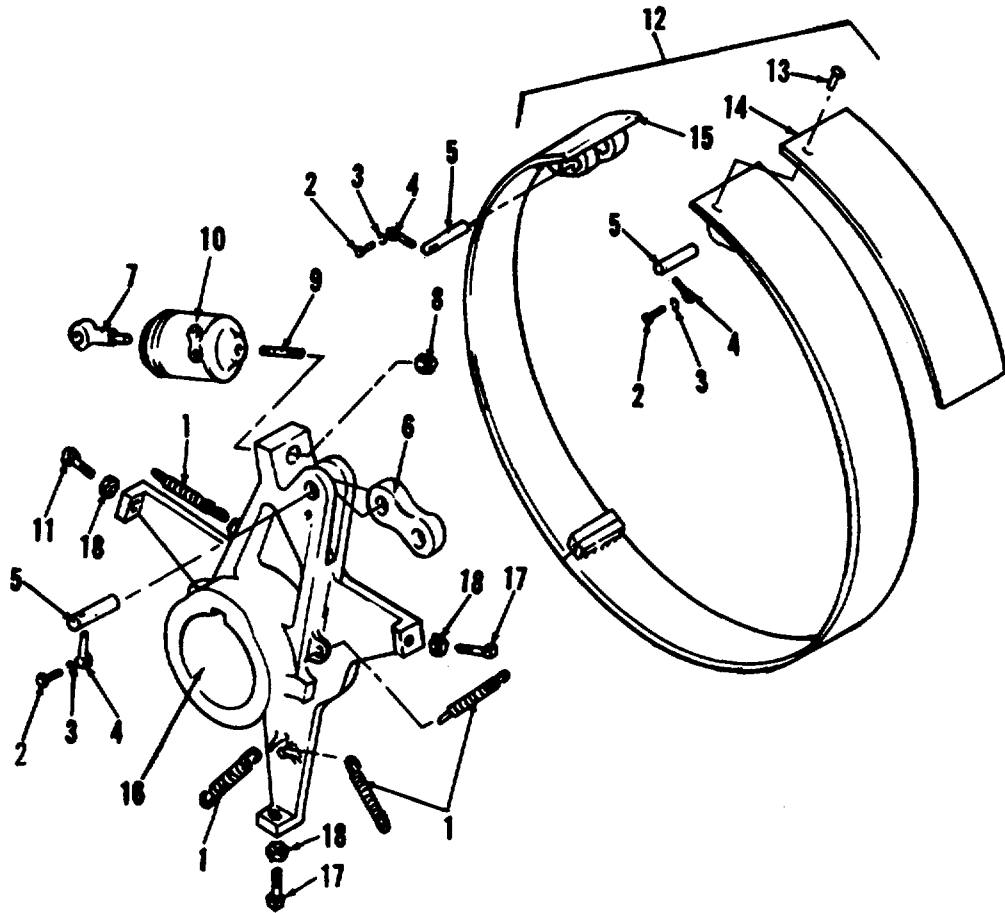
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Figure 4-129.2. Crane hoist drum shaft assembly, removal and installation.

|                     |                           |                        |                           |
|---------------------|---------------------------|------------------------|---------------------------|
| 1. Elastic stop nut | 12. Gear, drum shaft      | 22. Bearing, ball      | 32. Spacer                |
| 2. Screw, cap       | 13. Key                   | 23. Bearing, ball      | 33. Clutch assembly, l.h. |
| 3. Screw, cap       | 14. Pillow block, r.h.    | 24. Fitting, relief    | 34. Drum                  |
| 4. Tube assembly    | 15. Fitting, lube         | 25. Fitting, lube      | 35. Seal, oil             |
| 5. Connector        | 16. Ring, retaining       | 26. Ring, retaining    | 36. Bearing, ball         |
| 6. Gasket, copper   | 17. Bearing, ball         | 27. Ring, retaining    | 37. Bearing, ball         |
| 7. Connector, bolt  | 18. Spacer                | 28. Ring, retaining    | 38. Key                   |
| 8. Connector        | 19. Clutch assembly, r.h. | 29. Ring, retaining    | 39. Center ring           |
| 9. Gasket, copper   | 20. Drum                  | 30. Pillow block, L.h. | 40. Shaft                 |
| 10. Joint, rotating | 21. Seal, oil             | 31. Bearing, ball      | 41. Dowel                 |
| 11. Ring, retaining |                           |                        |                           |

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Figure 4-129.3. Crane hoist drum shaft assembly, exploded view.



- 1. Spring
- 2. Screw, cap
- 3. Washer lock
- 4. Lock pin
- 5. Pin
- 6. Link, dead end

- 7. Push rod
- 8. Nut, self-locking
- 9. Stud
- 10. Cylinder, slave
- 11. Screw, set
- 12. Clutch band assembly

- 13. Rivet, semi-tubular
- 14. Lining kit, clutch
- 15. Band
- 16. Spider, hoist clutch, r.h.
- 17. Screw, set
- 18. Nut

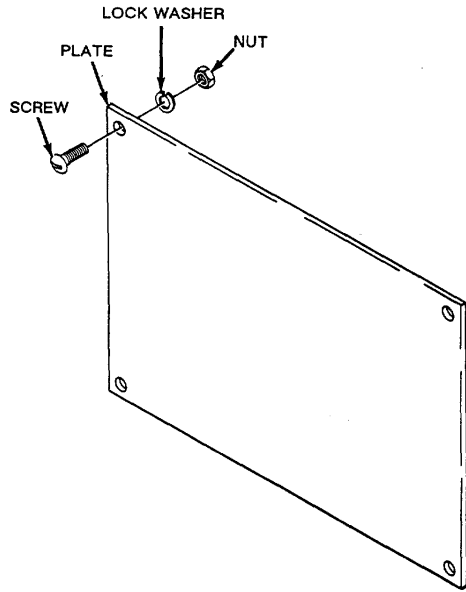
TA506072 1

Figure 4-129.4. Clutch band, main, and auxiliary hoist.

Page 4-138. Add paragraph 4-152.1 as follows: 4-

**152.1.Data, Instruction, and Identification Plates**

- a. Removal. Remove plate as shown on figure 4-137.1.
- b. Installation. Install plate as shown on figure 4-137.1.



TA501953 ■

Figure 4-137.1. Data, identification, and instruction plates, removal and installation.

Page I-1.

Before Accumulator, add "A frame, paragraph 4-115.1, page 4-107".

Before Crankcase breather, carrier, add "Crane hoist drum shaft assembly, paragraph 4-143.3, page 4-130".

Before Defroster fan, add "Data, instruction, and identification plates, paragraph 4-152.1, page 4-138".

Page 1-2. Before Hydraulic oil filter, carrier (Model 2380), add "Hydraulic cylinders, outrigger, paragraph 4-129.1, page 4-122".

Page 1-3.

After Operation under sandy or dusty conditions, add "Outrigger hydraulic cylinders, paragraph 4-129.1, page 4-122".

After Pintle hook, add "Plates, data, instruction, and identification, paragraph 4-152.1, page 4-138".

After Primary drive chain case cover, add "Propeller shafts, paragraph 4-121.2, page 4-112".

Before Radiator, add "Radiator, carrier, paragraph 4-53.1, page 4-53".

Change "Radiator" to "Radiator, crane".

By Order of the Secretary of the Army:

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

Official:

THOMAS F. SIKORA  
Brigadier General, United States Army  
The Adjutant General

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Washington D.C., 7 December 1990

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PHASE III W/BLADE, BULLDOZER, EARTHMOVING;  
WIBLOCK, TACKLE, 20-TON; W/BOOM, CRANE, 30-FOOT  
(AMERICAN HOIST AND DERRICK MODEL 2380)  
NSN 3810-00-763-7728 AND  
(AMERICAN HOIST AND DERRICK MODEL 2385)  
NSN 3810-00-043-5354**

TM 5-3810-232-12, 10 September 1970, is changed as follows:

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

*Inside front cover.* The following warnings are added:

**WARNING**

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

**WARNING**

**Dry cleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Do not use it near an open flame or excessive heat. The flash point of solvent is 100°F-138°F.**

Page i. The manual title is changed to read as shown above.

Page iii, List of Illustrations.

Add "Number 2-5.1, Jib boom assembly, installed, page 2-6".

Add "Number 2-28, Engine oil cooler bypass circuit (Model 2385), page 2-44".

Add "Number 3-5.1, Measuring gradual bends in bent lacing, page 3-6".

Page iv, List of Illustrations.

Add "Number 4-13.1, Engine 1-6 valve set marks, page 4-22".

Add "Number 4-13.2, Engine firing order diagram, page 4-22".

Page v, List of Illustrations. Add "Number 4-63.1, Solid state directional indicator assembly wiring diagram, page 4-71".

Page vi, List of Illustrations.

Add "Number 4-100.1, Boom stop safety bracket (Model 2385), removal and installation, page 4-106".

Add "Number 4-110.1, Measuring alignment of centering cylinder between the front and rear wheels, page 4-115".

Add "Number 4-110.2, Turning stop clearance, page 4-115".

Add "Number 4-110.3, Steering turning stop clearance, page 4-115".

Add "Number 4-116.1, Tilt lock valve, page 4-121".  
Page I-1.

Paragraph 1-2 is superseded as follows:

\* This change supersedes C 1, 31 January 1972, C 3, 18 July 1974, and C 4, 24 October 1980.



## 1-2. Maintenance Forms, Records and Reports

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

Add paragraph 1-2.1 as follows:

### 1-2.1. Reporting Errors and Recommending Improvements

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to: Commander, U.S.

Tank-Automotive Command, AMSTA-MB, Warren, MI 48397-5000. A reply will be furnished to you.

Paragraph 1-5. Change "TM 750-244-3" to "TM 750-244-6".

Page 1-7, paragraph 1-8b(12)(a). Change "27 gal" to "57 gal" for Hydraulic system.

Page 1-9. Paragraph 1-8c(5) is added after paragraph 1-8c(4).

(5) Hydraulic circuit pressure check points (fig. FO-1).

Page 2-1, paragraph 2-1b(3). Change "TB ORD 651" to "TB 750-651".

Page 2-4.

Add the following to paragraph 2-2b:

Build up cribbing to support crane boom upper and lower sections. Lower boom until both sections rest on the cribbing. Pay off boom suspension and hoist ropes until there is sufficient slack to permit the insertion of the additional sections. Remove splice bolts that attach the upper and lower sections of the boom. By slowly moving the machine backwards, separate the boom halves to permit the addition of additional boom sections (brace cribbing against drag of lower section of boom before moving). Bolt new section to the upper end lower sections of the boom. Add compatible pendants cable to boom. Raise boom to position with boom hoist.

Following paragraph 2-2c(2), add the following CAUTION

#### CAUTION

**Be sure that cable does not drag on the inside rear of the boom point cable guards. Position cable outside the guards when reeving a three or more part line.**

Page 2-6. Paragraph 2-2d is superseded as follows:

### d. Other Equipment Cable Reeving.

(1) Clamshell.

(a) General. The truck crane may be converted to clamshell operation by installing the crane boom and a clamshell bucket. The following components are necessary for the equipment conversion: the crane boom components, clamshell bucket, bucket holding and closing lines, tagline winder, and tagline. The crane hoist cable may be used for the bucket holding line, but if additional depth below ground level is desired, longer holding and closing lines must be installed.

(b) Installation. Install the crane boom, backstops, and boom hoist as described.

(c) Reeving the Clamshell.

1. Swing the crane boom over the clamshell bucket. Lower the boom to approximately six feet above the ground beside the clamshell bucket.

2. Refer to figure 2-5 and reeve the closing line on the clamshell, around the right boom point sheave, and to the right hoist drum. Secure the line to the drum and wrap sufficient line on the drum to close the clamshell bucket.

3. Reeve the holding line around the center boom point sheave, and the left hoist drum. Secure the line to the drum, and wrap line on the drum until the same number of turns are on both drums. Attach the holding line loosely to the clamshell bucket.

4. Raise the boom to the working angle.

Raise the clamshell bucket, using both lines, until the second layer begins on the right (closing line) drum. The second layer should begin on the left drum at the same time. If it does not, adjust the point of attachment of the holding line to the bucket.

5. Cut both lines and secure them to the bucket.

(d) Tagline Winder.

1. With a suitable lifting device, lift the tagline winder into position between the chords of the boom base section, near the upper end of the section.

#### NOTE

**Where there is no interference with machine operation, mount the tagline winder with the cable drum on the side away from the operator, to reduce interference with the operator's vision.**

2. Position the tagline winder at an angle on the boom so that the tagline drum is in line with the boom point, and so that the tagline will reel straight off the drum when the clamshell bucket is at half the height of the boom point.

3. Secure the tagline winder to the boom, using wood filler blocks as necessary.

4. The tension on the tagline winder cable may be increased or decreased as necessary to keep the clamshell bucket from oscillating. To adjust the tension initially, place four or five wraps on the drum, and secure the tagline to the bridle chain. Additional wraps on the tagline drum will increase cable tension; fewer wraps will decrease cable tension.

(e) Unreeving the Tagline Winder.

1. Raise the boom until the clamshell bucket can be placed on the ground approximately 10 feet from the base of the boom, to relieve the spring tension on the tagline winder. If necessary, lower the boom to further reduce the tension.

2. Remove the cable from the bridle chain.

**CAUTION**

**If there is tension on the tagline, do not release the tagline suddenly; to do so may cause damage to the tagline winder.**

3. Release the tagline slowly by holding a slight tension on it until all of the cable is taken up on the reel and the end is fastened to prevent the reel from unwinding.

**NOTE**

**The tagline winder should be left on the boom when not in use.**

(f) Unreeving the Clamshell.

1. Release the drum brakes, and unspool the holding and closing cables from the front and rear drums.

2. Remove the cable wedges from the deadend sockets on the clamshell, and remove the closing and holding cables.

3. Remove the cable wedges from both cable drums, and free the closing and holding cables.

4. Pull the cables free of the drums and the boom point sheaves, and lay them out straight on the ground.

5. Roll the cables into a coil and secure them with wire. Label the cables for future use.

6. Remove the boom hoist cable and boom.

(2) Dragline.

(a) General. The truck crane may be converted to Dragline operation by installing the crane boom and a Dragline bucket. The following components are necessary for the equipment conversion: the crane boom components, drag bucket, bucket hoist and drag lines, and fairlead. The crane hoist cable may be used for the bucket hoist line, but if additional reach and depth are desired, a longer cable must be installed.

(b) Installation and Reeving.

1. Install the crane boom, backstops, and boom hoist cable as described.

2. Install the fairlead.

3. Reeve the hoist cable over the center boom point sheave and secure it to the left drum. Secure the remaining free end to the cable socket on the dump sheave chain (fig. 2-5).

**NOTE**

**When inserting the cable end back into the cable socket, do not let it protrude on the opposite side more than one inch.**

4. Reeve the drag cable through the fairlead and secure it to the right drum. Reeve the remaining free end through the three-way socket and secure it.

5. Insert one end of the bucket dump cable through the three-way socket and secure it with the cable wedge. Reeve the remaining free end over the dump sheave, down to the bucket arch, and deadend the cable.

6. The bucket teeth should be approximately 12 inches higher than the heel of the bucket when the bucket is suspended in midair and the drag cable is pulled tight. Remove the dump cable from the deadend socket at the top of the bucket arch and lengthen or shorten it if necessary.

(c) Removing and Unreeving.

1. Lower the Dragline bucket onto wood blocking in the desired location.

2. Remove the cable wedges from the three-way socket and the deadend socket on the bucket arch. Unreeve the bucket dump cable from the dump sheave.

3. Pull the hoist and drag cables free of the drag bucket, and unspool the cables from the right and left drums.

4. Remove the cable wedges from both drums, and free the hoist and draglines. Pull the cables free of the drums and the boom point sheaves.

5. Lay the hoist, drag, and bucket dump cables straight on the ground. Roll the cables into coils and secure them with wire. Label the cables for future use.

6. Remove the fairlead.

7. Remove the boom hoist cable and boom.

(3) Piledriver.

(a) General. The truck crane may be converted to piledriver operation by installing the crane boom and the piledriver. The piledriver consists of the catwalk, piledriver guides, hammer, and leads.

(b) Installation.

1. Install the crane boom, backstops, and boom hoist cable as described.

2. Place the lead sections on a flat surface in a horizontal position. Bolt one top lead section and four lower lead sections together.

3. Lower the boom to horizontal position in line with the upper end of lead assembly, and bolt securely to the outside of adapter plates on the boom point.

4. Install the hammer cable in the drum socket in the left cable drum and secure with the cable wedge. Lead the hammer cable from the drum out over the center boom point sheave.

5. Install the pile hoist cable in the drum socket in the right cable drum and secure with the ca

ble wedge. Lead the pile hoist cable from the drum out over the right boom point sheave.

6. Install a thimble and the pile hoist cable through the pile hook, and secure with three cable clamps.

7. Back the truck crane slowly toward the piledriver leads, at the same time hoisting the boom until the leads are vertical.

8. Raise the boom until the bottom of the leads clear the hammer, and position the leads over the hammer.

9. Secure the piledriver hammer cable to the eye on the top of the hammer with a cable wedge, pin, and cotter pins, and raise the hammer into the leads.

10. Swing the boom into position over the pile cap. Lower the hammer and secure the pile cap to the hammer with the wire rope sling. Raise the hammer and lift the cap into the leads.

11. Install the catwalk to the foot of the boom and the leads. Adjust the catwalk so the leads are vertical, and bolt the catwalk sections together.

(c) Removing the Piledriver.

1. Lower the hammer enough to allow slack in the wire rope sling. Remove the sling and move the piledriver clear of the cap.

2. Remove the bolts and nuts securing the catwalk sections. Raise the boom enough to clear the hammer and lower the hammer to the ground. Remove the cable from the hammer.

3. Remove the bolts securing the catwalk to the leads and the boom, and lower the catwalk to the ground.

4. Lower the leads to the ground and slowly drive the carrier forward. At the same time, lower the boom to the wood blocks.

5. Remove the piledriver lead adapters and leads. Secure the pile lead adapters to the leads.

6. Remove the boom hoist cable and boom.

(4) Jib Boom.

(a) *General.* The equipment used to convert the unit for jib boom operation consists of a 30-foot boom, boom extension, jib strut, jib boom, and jib boom suspension cables.

(b) *Jib Boom Installation.*

1. Install the crane boom and hook block.

2. Secure the jib strut to the jib boom with pin and cotter pins. Refer to figure 2-5.1 for a general view of the installation.

3. Position the jib boom in the boom point supports, and secure with two pins, rod ends, lock washers, and capscrews.

(c) *Cable Reeving.*

1. Secure the lower jib support cable in the dead end socket into the boom cable support. Reeve the cable to the jib boom strut and secure it to the dead end socket on the jib boom strut. Position in the proper hole to give the desired jib boom angle.

2. Reeve the upper jib boom point support cable from the jib boom strut to the dead end socket on the jib boom point.

3. Reeve the jib boom cable by securing one end of the secondary drum with the wedge. Reeve the cable between the boom pendant cables and the lower jib support cable, over the jib strut sheave between the upper jib support cables and over the jib boom point sheave.

4. Secure the weight hook to the cable with the cable clamps.

(d) Jib Boom Removal.

1. Lower the boom and build up cribbing beneath the jib boom.

2. Remove the jib lower support cables from the cable supports; allow the jib boom strut (fig.2-5.1) to face back on the jib boom.

3. Remove the weight hook from the cable.

4. Remove the jib cable from the jib boom and the right-hand drum.

5. Remove the two cotter pins, capscrews, lock washers, jib boom pin, and the jib boom from the crane boom. Remove the two rod ends from the jib boom pins.

6. Remove the crane boom and cables and move the crane away from the crane and jib booms.

7. Clean, lubricate, identify, and store cables.

Page 2-6. Figure 2-5 is superseded as shown on page 6. Page 2-9. Following paragraph 2-3a, add the following NOTE

#### NOTE

**For towing, see cautions and instructions. page 2-39, paragraph 2-15c.**

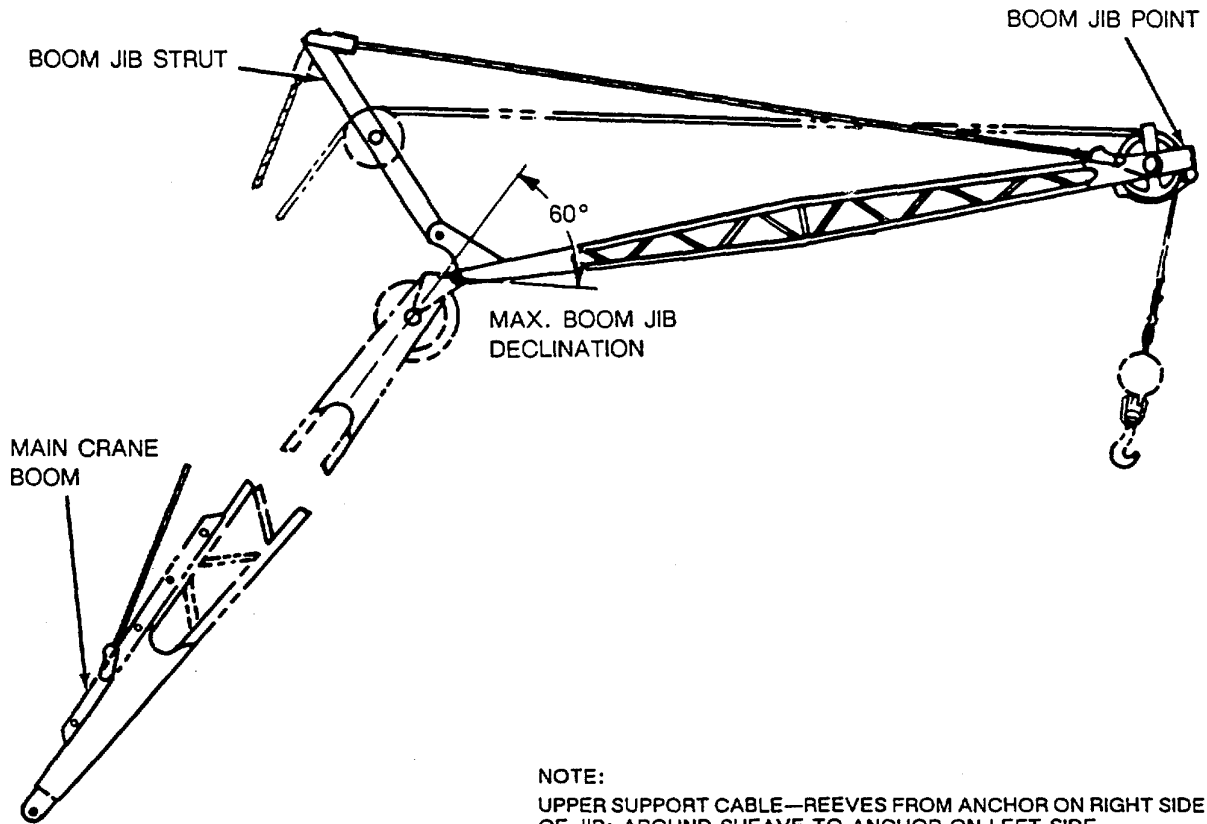
Page 2-13. Figure 2-12 is superseded as shown on the following page.

Page 2-18.

Paragraph 2-6a(7). Change the last sentence to read "It is used to raise and lower the right front outrigger."

Paragraph 2-6a(26). Delete all but the first sentence and insert the following after the first sentence: "Gage reading at normal operating temperature and speed is 30-45 psi (with a cold engine the gage reading may be higher). As soon as the engine is started, the gage should read 10 psi at idle speed."

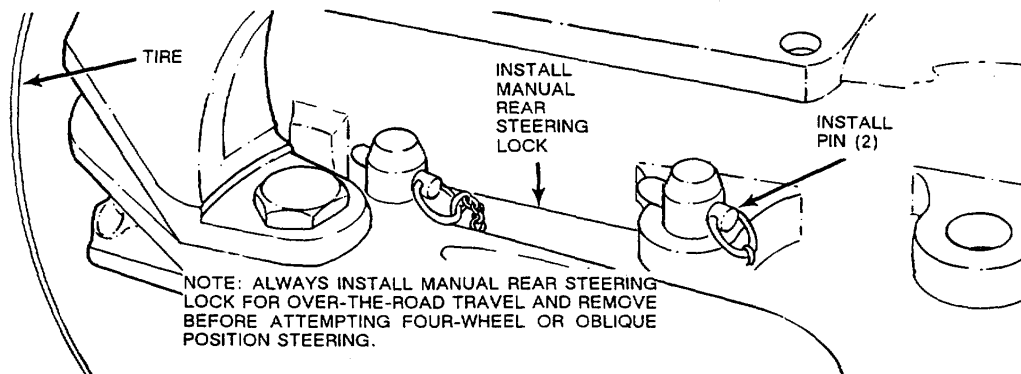
Page 2-19, paragraph 2-6a(35). Change "25 pounds per square inch" to "60 pounds per square inch".



NOTE:  
 UPPER SUPPORT CABLE—REEVES FROM ANCHOR ON RIGHT SIDE OF JIB; AROUND SHEAVE TO ANCHOR ON LEFT SIDE.  
 LOWER SUPPORT CABLE—REEVES FROM RIGHT ANCHOR; AROUND LOWER SUPPORT CABLE SHEAVE; TO LEFT ANCHOR.

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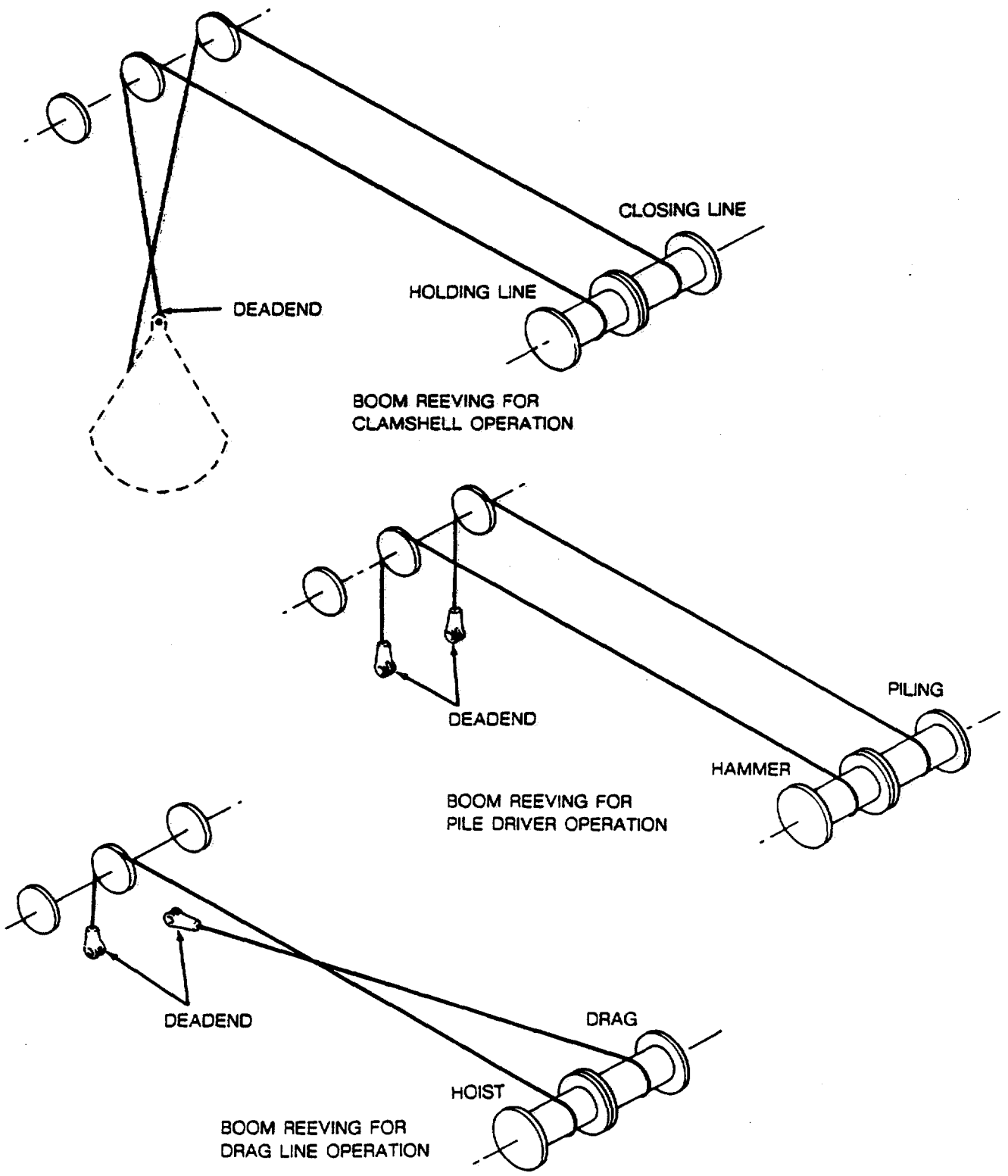
Figure 2-5.1. Jib boom assembly, installed.



NOTE: ALWAYS INSTALL MANUAL REAR STEERING LOCK FOR OVER-THE-ROAD TRAVEL AND REMOVE BEFORE ATTEMPTING FOUR-WHEEL OR OBLIQUE POSITION STEERING.

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Figure 2-12. Manual rear steering lock, installation.



ME 3810-232-12/2-5 C1

Figure 2-5. Crane boom reeving for clamshell, piledriver and dragline.

Page 2-21. Following paragraph 2-7a, add the following **CAUTION**

**CAUTION**

The battery disconnect switch (21, fig. 2-16) and the main switch (27) must both be in the ON position when operating the carrier electrical components. If lighting is not required, place the top lever of the main switch (27) in the stoplight position.

Page 2-25, paragraph 2-7a(44). Change "crab" to "oblique".

Page 2-30. Following paragraph 2-10e, add the following **NOTE**

**NOTE**

The engine is equipped with an electric shutdown valve located on the PT fuel pump. The shutdown valve is provided with a knurled knob that may be turned to allow operation of the engine by opening the shutdown valve manually in event of electrical failure. This knob should normally be kept in a full counterclockwise position. Turn the knob fully clockwise to open the valve manually.

Page 2-31.

Following paragraph 2-1lf, add the following **NOTE**

**NOTE**

The engine is equipped with an electric shutdown valve located on the PT fuel pump. The shutdown valve is provided with a knurled knob that may be turned to allow operation of the engine by opening the shutdown valve manually in event of electrical failure. This knob should normally be kept in a full counterclockwise position. Turn the knob fully clockwise to open the valve manually.

Paragraph 2-14a(2), **NOTE**

Line 3. Change "falls between 40 psi" to "falls below 40 psi".

Line 4. Change "emergency-part" to "emergency-park".

Line 6. Change "emergency part" to "emergency park".

Following paragraph 2-14a(2), add a second **NOTE**

**NOTE**

On level surfaces the carrier parking brakes are set without first applying the service brakes. However, on a longitudinal grade the carrier is first stopped and held by the service brakes. Then the parking brakes are set. When the parking brakes are set under this condition, the brake foot pedal must be held in the applied position for approximately 15 seconds after the parking brakes are set. This time interval may vary; however, it should be of sufficient duration to permit the automatic components of the brake system to react and exhaust the air from the service brake system. Maximum effect of the parking brake will not be obtained if the foot pedal is released immediately after the parking brakes are set.

Page 2-32.

Paragraph 2-14b(4), in line 2. Change "crab" to "oblique".

In line 3 of the **CAUTION**

following paragraph 2-14b(4), change "crab" to "oblique".

Page 2-39. Following paragraph 2-15a(2), add a second

**NOTE**

**NOTE**

On level surfaces the carrier parking brakes are set without first applying the service brakes. However, on a longitudinal grade the carrier is first stopped and held by the service brakes. Then the parking brakes are set. When the parking brakes are set under this condition, the brake foot pedal must be held in the applied position for approximately 15 seconds after the parking brakes are set. This time interval may vary; however, it should be of sufficient duration to permit the automatic components of the brake system to react and exhaust the air from the service brake system. Maximum effect of the parking brake will not be obtained if the foot pedal is released immediately after the parking brakes are set.

Page 2-40, paragraph 2-15d(5) lines 1 and 2. Delete "and no hydraulic accumulator pressure".

Page 2-41. Following paragraph 2-16e, add the following **NOTE**

**NOTE**

The engine is equipped with an electric shutdown valve located on the PT fuel pump. The shutdown valve is provided with a knurled knob that may be turned to allow operation of the engine by opening the shutdown valve manually in event of electrical failure. This knob should normally be kept in a full counterclockwise position. Turn the knob fully clockwise to open the valve manually.

Page 2-42. Change paragraph "2-18d" to "2-18e".

Page 2-43, figure 2-27.

Change "BOOM HOIST SAFETY PAWL LEVER" to "THROTTLE".

Change "BOOM HOIST JAW CLUTCH LEVER" to "BOOM HOIST JAW CLUTCH AND BOOM HOIST RATCHET (SAFETY PAWL) LEVER".

Page 2-44.

Following paragraph 2-19b(1), add the following **NOTE**

**NOTE**

The carrier engine on the Model 2385 is equipped with an oil cooler bypass valve. The bypass circuit is provided to prevent low engine oil pressure when operating in cold weather. Refer to figure 2-28. The valve is located on the rear of the carrier engine oil filter. There is high resistance to the flow of cold oil through the oil cooler, and this resistance causes a pressure drop in the engine during cold weather operation. The operator must open the valve manually, using a wrench. When the ambient temperature reaches 700F, the valve must be closed to divert oil through the oil cooler.

Paragraph 2-19c(4). Change "7", ORD 651" to "TB 750-751".

Figure 2-28 is added as shown on the following page.

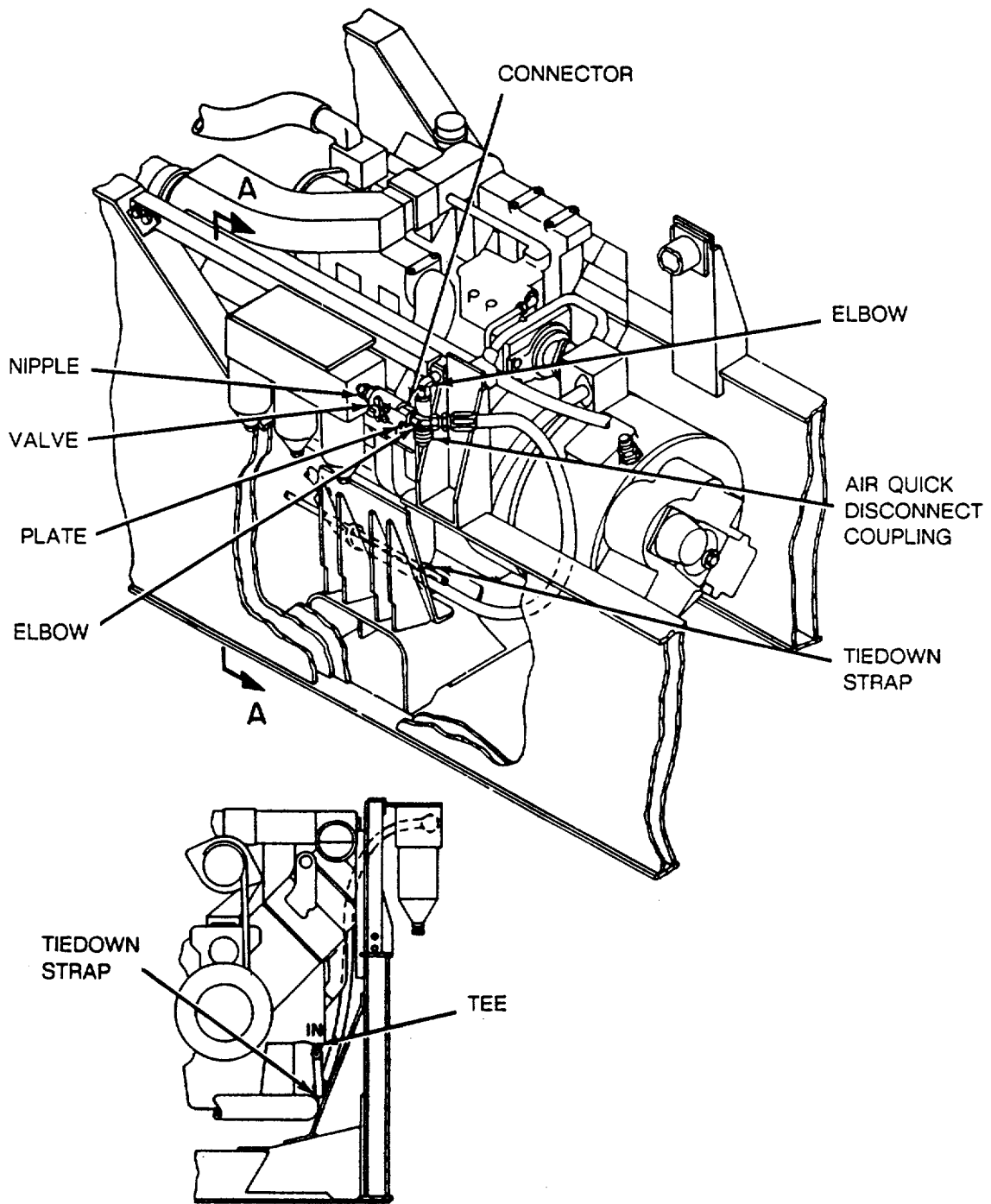


Figure 2-28. Engine oil cooler bypass circuit (Model 2385).

Page 2-46. Paragraph 2-23.1 is added after paragraph 2-23.

### **2-23.1. Forging (Model 2385)**

The Model 2385 crane is capable of forging to a maximum depth of 48 inches without prior preparation. However, before forging, the following services are recommended:

- a. Lubricate all components that will be submerged, especially the drive shaft universal joints, pillow block bearings and the steering trunnions.
- b. Pressurize the hydraulic oil reservoir (see the instruction plate on the reservoir).

c. Tighten the cap on the transmission filling tube. After forging, check all housings that contain lubricating or hydraulic oils for the presence of water. Drain and refill any component in which water is found. Page 2-47, paragraph 2-29c. Change "TB 5-4200200-10" to "TB 4200-200-100".

Page 3-1.

Paragraph 3-3. Change "LO 5-3810-232-12-1, -2, -3, -4, -5 and -6" to "LO 5-3810-232-12".

Paragraph 3-4c. Change "LO 5-3810-232-12-1, -2, -3, -4, -5 and -6" to "LO 5-3810-232-12".

Page 3-3. Section III is superseded as follows:

## **Section III. OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES**

### **3-5. General**

Preventive maintenance is detecting/correcting problems before they happen, or fixing little problems before they become big problems. Tables 3-1 and 3-2 contain lists of preventive maintenance checks and services to be performed by the operator/crew. Attention to these checks and services will increase the useful life of the equipment, but every possible problem cannot be covered in the PMCS. You need to be alert to anything that might cause a problem.

### **3-6. Maintenance Forms and Records**

Every mission begins and ends with the paperwork. There isn't much of it, but you have to keep it up. The forms and records you fill out have several uses. They are a permanent record of the services, repairs, and modifications made on your equipment. They are reports to organizational maintenance and to your commander. They are a checklist for you when you want to know what is wrong with the equipment after its last use, and whether those faults have been fixed. For the information you need on forms and records, see DA Pam 738-750.

#### **3-6.1. Preventive Maintenance Checks and Services**

a. Do your (B) PREVENTIVE MAINTENANCE just before you operate the equipment. Pay attention to the CAUTIONs and WARNINGs.

b. Do your (D) PREVENTIVE MAINTENANCE during operation. (During operation means to monitor the crane, carrier, and their related components while they are actually being operated.)

c. Do your (A) PREVENTIVE MAINTENANCE right after operating the equipment. Pay attention to the CAUTIONs and WARNINGs.

d. Do your (W) PREVENTIVE MAINTENANCE weekly.

e. Do your (M) PREVENTIVE MAINTENANCE once a month.

f. If something doesn't work, troubleshoot it with the instructions in this manual or notify your supervisor.

g. Always do your PREVENTIVE MAINTENANCE in the same order, so it gets to be a habit. Once you've had some practice, you'll spot anything wrong in a hurry.

h. If anything looks wrong and you can't fix it, write it on your DA Form 2404. If you find something seriously wrong, report it to organizational maintenance RIGHT NOW.

i. When you do your PREVENTIVE MAINTENANCE, take along the tools you need to make all the checks. You'll always need a rag or two.

### **WARNING**

**Dry cleaning solvent, SD-2, used to clean parts, is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100°F-138°F.**

(1) Keep it clean: Dirt, grease, oil, and debris only get in the way and may cover up a serious problem. Clean as you work and as needed. Use dry cleaning solvent (SD-2) to clean metal surfaces. Use soap and water when you clean rubber or plastic materials.

(2) Bolts, nuts, and screws. Check them all for obvious looseness, missing, bent, or broken condition. You can't try them all with a tool, of course. But look for chipped paint, bare metal, or rust around bolt heads. If you find one you think is loose, tighten it or report it to organizational maintenance if you can't tighten it.

(3) Welds. Look for loose or chipped paint, rust, or gaps where parts are welded. Together. If you find a bad weld, report it to organizational maintenance.

(4) Electric wires and connectors. Look for cracked or broken insulation, bare wires; and loose or



broken connectors. Tighten loose connectors and make sure the wires are in good shape.

(5) Hoses and fluid lines. Look for wear, damage, and leaks, and make sure clamps and fittings are tight. Wet spots show leaks, of course. But a stain around a fitting or connector can also mean a leak. If a leak comes from a loose fitting or connector, tighten it. If something is broken or worn out, report it to organizational maintenance.

j. It is necessary for you to know how fluid leakage affects the status of your equipment. The following are definitions of the types/classes of leakage you need to know to be able to determine the status of your equipment. Learn, then be familiar with them and REMEMBER-WHEN IN DOUBT, NOTIFY YOUR SUPERVISOR!

Leakage Definitions for Operator/Crew PMCS

CLASS I Seepage of fluid (as indicated by wetness

or discoloration) not great enough to form drops.

CLASS II Leakage of fluid great enough to form drops but not great enough to cause drops to drip from item being checked/ inspected.

CLASS III Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

**CAUTION**

**Equipment operation is allowable with minor leakage (Class I or II). Of course, consideration must be given to the fluid capacity in the item/system being checked/inspected. When in doubt, notify your supervisor.**

**When operating with Class I or II leaks, continue to check the fluid levels as required in your PMCS.**

**Class III Leaks should be reported to your supervisor or to organizational maintenance.**

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services (CARRIER)

| ITEM NO. | INTERVAL |   |   |   |   | ITEM TO BE INSPECTED<br>Procedure: Check for and have repaired, filled, or adjusted as needed.   | EQUIPMENT IS NOT READY/AVAILABLE IF   |
|----------|----------|---|---|---|---|--|---|
|          | B        | D | A | W | M |  |   |
| 1        | •        |   |   |   | * | <p><b>NOTE</b><br/>PERFORM WEEKLY AS WELL AS BEFORE PMCS IF:<br/>a. You are the assigned operator but have not operated the carrier since the last weekly.<br/>b. You are operating the carrier for the first time.<br/>MAKE THE FOLLOWING WALK AROUND CHECKS:<br/>EXTERIOR OF VEHICLE<br/>a. Check for evidence of leakage (oil, fuel, hydraulic fluid or coolant) on or under the carrier<br/>b. Check tires for cracks, cuts, gouges or low pressure (correct pressure is 55 psi)<br/>c. Check that fire extinguisher is in its proper place and has proper pressure (125 psi).<br/>d. Visually check for loose, missing, or damaged parts.<br/>ALCOHOL EVAPORATOR (Freezing Temperatures Only):<br/>Keep jar 2/3 full, using pure methyl 188 proof alcohol. Alcohol should be free of any inhibitors.<br/>AIR CLEANER<br/>Check oil level. Add as required clogged or missing.</p> | <p>Class III leakage is evident.<br/>No fuel leakage allowed.<br/>One or more tires missing or unserviceable.</p> |
| 2        | •        |   |   |   | * |  |   |
| 3        | •        |   |   |   | * |  |   |
| 4        |          |   |   | • |   |  |   |
|          |          |   |   |   |   | <p><b>RADIATOR</b></p> <p><b>WARNING</b><br/>Servicing of radiator should only be performed on a cool engine. Never remove radiator cap when engine is hot. Pressurized steam or hot water serious burns.<br/>Check coolant level. Fill to the overflow with water.</p>  | <p>Air cleaner filter element</p>   |

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services (CARRIER)

B-Before

D-During

A-After

W-Weekly

M-Monthly

| ITEM NO. | INTERVAL                        |   |   |   |   | ITEM TO BE INSPECTED<br>Procedure: Check for and have repaired, filled, or adjusted as needed.  | EQUIPMENT IS NOT READY/AVAILABLE IF  |
|----------|---------------------------------|---|---|---|---|---|--|
|          | B                               | D | A | W | M |   |  |
| 5        |                                 |   |   | • |   | BELTS<br>Inspect fan, generator, and air compressor belts for frayed condition, or deterioration.   | Belt is missing or broken.   |
| 6        |                                 |   |   | • |   | FUEL FILTERS<br>Drain water and sediment, using suitable container for convenient disposal.   |  |
| 7        |                                 |   |   |   |   | BATTERIES<br><br><b>WARNING</b><br><ul style="list-style-type: none"> <li>Battery acid (electrolyte) is extremely dangerous. Always wear goggles and rubber gloves when performing battery checks or inspections. Serious Injury to personnel will result if battery acid contacts skin or eyes.</li> <li>DO NOT perform battery system checks or inspections while smoking or near fire, flames, or sparks. Batteries may explode, causing serious injury or death to personnel. Remove all jewelry such as dog tags, rings, bracelets, etc. If jewelry or disconnected battery ground cable contacts battery terminal, a direct short will result.</li> </ul> Check level of electrolyte. If low, notify organizational maintenance. Check for looseness or damage to battery cables. |  |
| 8        | •<br>•<br>•<br>•<br>•<br>•<br>• |   |   | - |   | CONTROLS AND INSTRUMENTS<br>Check for normal operating readings for the instruments as follows:<br>a. AIR PRESSURE gage<br>b. BATTERY-GENERATOR<br>c. ENGINE TEMP °F gage<br>d. HIGH TEMP warning light<br>e. ENGINE PRESSURE gage<br>f. OIL PRESSURE warning light<br>g. TORQUE CONVERTER LUBRICATION OIL PRESSURE gage<br>h. TORQUE CONVERTER TEMP gage   | Gages not within ranges specified.<br>90-129 psi<br>Green area<br>165°F to 195°F out<br>30-40 psi<br>: out<br>25 psi max at high free idle |
| 9        | •                               |   |   |   |   | LIGHTS<br>Check for proper operation.   |  |
| 10       | •                               |   |   |   |   | BRAKES<br>Check for proper operation evident or any air is leaking.   | Improper operation is  |
| 11       | •                               |   |   |   |   | AIR RESERVOIRS<br>Check for cracks, dents, or other damage that would cause air to leak from reservoir.   | Air reservoir leaking air.   |
| 12       |                                 | • |   |   |   | WINDSHIELD WIPER<br>Check windshield wiper operation.   |  |
| 13       |                                 | • |   |   |   | OUT RIGGERS<br>Inspect for free movement, breaks and cracks evident.  | Improper operation is  |

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services (CARRIER)

B-Before

D-During

A-After

W-Weekly

M-Monthly

| ITEM NO. | INTERVAL |   |   |   |   | ITEM TO BE INSPECTED<br>Procedure: Check for and have repaired, filled, or adjusted as needed.  | EQUIPMENT IS NOT READY/AVAILABLE IF   |
|----------|----------|---|---|---|---|---|---|
|          | B        | D | A | W | M |   |   |
| 1        | •        |   |   |   |   | <p><b>NOTE</b><br/>PERFORM WEEKLY AS WELL AS BEFORE PMCS IF:<br/>a. You are the assigned operator but have not operated the crane since the last weekly.<br/>b. You are operating the crane for the first time.<br/>MAKE THE FOLLOWING WALK AROUND CHECKS:<br/>EXTERIOR OF VEHICLE<br/>a. Check for evidence of leakage (oil, fuel, hydraulic fluid or coolant) on or under the crane<br/>b. Check that fire extinguisher is in its proper place and has proper pressure (125 psi).<br/>c. Visually check for loose, missing, or damaged parts.<br/>RADIATOR<br/><b>WARNING</b><br/><b>Servicing of radiator should only be performed on a cool engine. Never remove radiator cap when engine is hot. Pressurized steam or hot water will cause serious burns.</b></p> <p>Check coolant level. Fill to the overflow with water.<br/><b>BELTS</b><br/>Inspect fan and generator belts for frayed condition, or deterioration.<br/><b>BATTERIES</b><br/><b>WARNING</b><br/>•Battery acid (electrolyte) is extremely dangerous. Always wear goggles and rubber gloves when performing battery checks or inspections. Serious injury to personnel will result if battery acid contacts skin or eyes.<br/>•DO NOT perform battery system checks or inspections while smoking or near fire, flames, or sparks. Batteries may explode, causing serious injury or death to personnel. Remove all jewelry such as dog tags, rings, bracelets, etc. If jewelry or disconnected battery ground cable contacts battery terminal, a direct short will result.<br/>Check level of electrolyte. If low, notify organizational maintenance. Check for looseness or damage to battery cables.<br/><b>INSTRUMENTS</b><br/>Check for normal operating readings for the instruments as follows:<br/>a. BATTERY-GENERATOR indicator Green area<br/>b. ENGINE PRESSURE gage 40-75 psi<br/>c. OIL PRESSURE warning light out<br/>d. ENGINE TEMP°F gage 165°F-195°F<br/>e. HIGH TEMP warning light out<br/><b>LIGHTS</b><br/>Check for proper operation.</p> <p style="text-align: center;"><b>12</b></p> | <p>Class III leakage is evident. No fuel leakage allowed.</p> <p>Belt is missing or broken.</p> <p>Gages not within ranges specified.</p> |
| 2        | •        |   |   |   |   |   |   |
| 3        | •        |   |   | • |   |   |   |
| 4        |          |   |   | • |   |   |   |
| 5        |          | • |   |   |   |   |   |
| 6        |          | • |   |   |   |   |   |

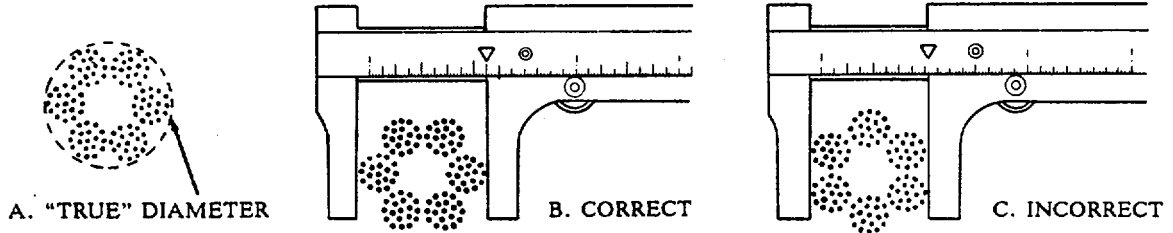
Table 3-2.1. Wire rope Inspection and Lubrication Criteria

| Item no. | Interval |   |   |   |   | ITEM TO BE INSPECTED<br>Procedure: Check for and have repaired, filled, or adjusted as needed  | Equipment is not ready/ available if:   |
|----------|----------|---|---|---|---|--|---|
|          | B        | D | A | W | M |  |   |
| 7        |          |   |   | • |   | <b>CONTROL LEVERS AND PEDALS</b><br>Check for proper operation.  | Evidence of improper operation, binding, sticking or not holding.   |
| 8        |          | • |   |   |   | <b>CLUTCHES AND BRAKES</b> (hoist, swing, and crowd)<br>Check for proper operation.  | Improper operation is evident.  |
| 9        |          |   |   | • |   | <b>LOAD ROLLERS</b><br>Inspect for obvious breaks and cracks.  |   |
| 10       | •        |   |   |   |   | <b>HOIST CABLES</b><br><i>a.</i> Inspect for obviously frayed, broken, or flattened cable.<br><br><i>b.</i> Assist organizational maintenance and inspect entire wire rope IAW TM 5-725, OSHA Regulation 1910.180 and Table 3-2.1. Inspection will be requested on DA Form 2407 and results recorded on DA Form 2404. The records will be maintained for two years from date of inspection. DA Form 2407 will be signed by organizational maintenance in Block 27 to verify serviceability of wire rope. | See Table 3-2.1. Six broken wires in one rope lay, or three wires in one strand of one rope lay (TB 43-0142). |
| 11       | •        |   |   |   | • | <b>BOOM ASSEMBLY</b><br><i>a.</i> Inspect for cracks and other obvious damage. Check for damaged or missing boom stop safety bracket (Model 2385).<br><i>b.</i> Assist organizational maintenance and inspect lattice crane boom sections for bends.   | Bent or broken boom.<br><br>See Table 3-2.2.  |
| 12       | •        |   |   |   |   | <b>HOOK BLOCK</b><br>Inspect for cracks and damaged sheaves.   | Cracked or deformed sheaves.  |

Table 3-2.1. Wire Rope Inspection and Lubrication Criteria

a. Any of the following conditions will render the wire rope unserviceable. Replace the wire rope if these conditions exist:

- (1) Crushing - Because of loose windings on a drum, wire rope was pulled between laying wraps of wire rope and crushed when the loose wraps were tightened.
- (2) Birdcaging - Sudden release of a load causing birdcaging. Birdcaging is strands open/pulled away from each other displaying the core.
- (3) Locking, Corrosion, Pitting and Abrasion - Lack of lubrication, premature breaking of wires, excessive dirt, sand or gravel embedded in the strands of the wire rope.
- (4) Reverse Bending - Caused by running the rope over one sheave and under another sheave.
- (5) Pinch - Caused by undersized sheave grooves; breaking wire strands.
- (6) Wear - Wear of 1/3 the original diameter of outside individual wires. Reduction from nominal diameter of more than 1/32 inch for 1/2 inch wire. To measure wire rope correctly, always measure the larger dimension.



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\*Measurement methods are for 1/4" (6.35 mm) and larger wire rope

b. Consult the manufacturer's lube chart for lubrication instructions. When local climatic conditions dictate, U.S. Army and local commanders may prescribe lubrication policies for wire rope.

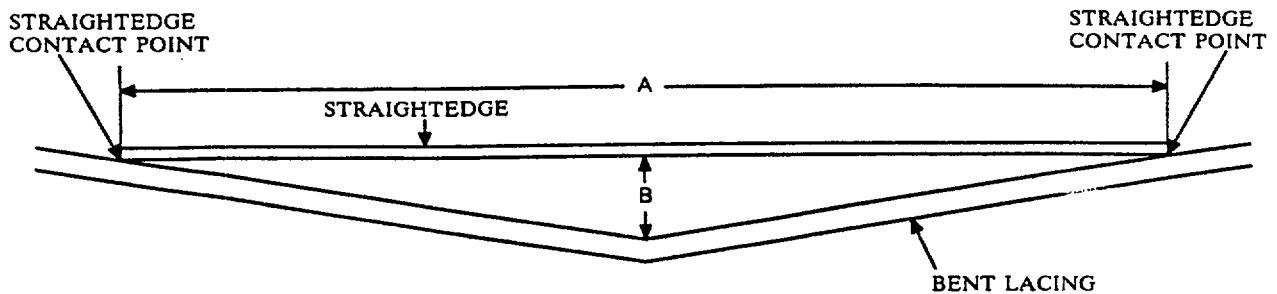
Table 3-2.2. Boom Assembly Inspection and Repair Criteria

a. The only repair to lattice crane boom sections (including jibs) authorized at the Intermediate Direct/General Support maintenance levels are the cold straightening of gradual bends in the lattice.

b. A "gradual bend" is defined as a bend that does not indicate a kink or crease in the angle iron/lacing, and is determined to be gradual using the formula below:

c. To determine the severity of the bend, lay a straightedge across the bend, measure the length of the straightedge between both points of contact (a). See figure below. The straightedge must be centered across the center (most extreme/deepest part) of the bend. Measure the distance from the center of the bend to the bottom surface of the straightedge (b).

- A = Distance between straight edge contact points.
- B = Maximum distance between straight edge and bent lacing.
- C =  $A \times 0.025$
- If C is equal to or less than B, the bend may be cold straightened.
- If C is greater than B, the lacing should be replaced by depot level maintenance.



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Figure 3-5.1. Measuring gradual bends in bent lacing.

Table 3-2.2. Boom Assembly Inspection and Repair Criteria - Continued.

d.. Use the following formula to determine if the bend is repairable. Multiply the distance between the contact points (length of the straightedge) (a) by 0.025 ( $a \times 0.025 = c$  (product)). If the product (c) is equal to or less than the maximum gap (b), the bend is "gradual" and may be cold straightened. If the product exceeds the maximum gap (b), the boom section must be evacuated/sent to depot for repair/disposition.

Example:

a = 18 inches

b = 2 inches

$a \times 0.025 = c$

$18 \times 0.025 = .45$

e. In the example, b is greater than c, therefore the boom section must be sent to depot. Intermediate Direct/General Support will not attempt repair.

f. Absolutely no repairs to the chord angles will be attempted below depot level. A civilian lattice boom manufacturer may repair a boom section only with prior written approval from the U.S. Army Tank-Automotive Command (TACOM), Directorate for Maintenance, AMSTA-M. Warren, MI 48397-5000. When repairs are accomplished by a civilian firm, the boom section must be certified as fully serviceable, meeting military specifications. If more than 1/3 of the lattice on any one side of the boom section is damaged, or if three adjacent lattice around the boom are bent, repairs have been accomplished at depot level. Replacing lattice is authorized at depot level only. Replacing sheaves, nuts, bolts, etc. is authorized at Organization or Intermediate Direct/General Support. Absolutely no welding is permitted below depot level.

Page 3-14. Paragraph 3-18b is rescinded.

Page 3-15. Change all references to "TB ORD 651" to "TB 750-651".

Page 4-1, Table 4-1, FSN or Ref. No. column.

Line 1. Change "912903" to "812903" and add

"NSN 5120-00-176-8619" for the item on line 2.

Line 6. Add "NSN 5120-00-176-8619".

Page 4-2. Change all references to "LO 5-3810-232-12-1, -2, -3, -4, -5 and -6" to "LO 5-3810-232-12".

Section V is superseded as follows:

## Section V. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

### 4-9. General

Preventive maintenance is detecting/correcting problems before they happen, or fixing little problems before they become big problems. Tables 4-2 and 4-3 contain lists of preventive maintenance checks and services to be performed by organizational maintenance personnel. Attention to these checks and services will increase the useful life of the equipment, but every possible problem cannot be covered in the PMCS. You need to be alert to anything that might cause a problem. If anything does look wrong, and you can't fix it, write it on a DA Form 2404 and report it to your supervisor. Be sure to record any corrective action taken.

### 4-10. Organizational Preventive Maintenance Checks and Services

a. Perform the checks and services at the intervals shown in Tables 4-2' and 4-3.

(1) Do the (Q) checks and services once every three months.

(2) Do the (S) checks and services twice a year, or each six months.

(3) Do the (A) checks and services once each year.

(4) Do the (B) checks and services once each two years.

(5) Do the (H) checks and services at the hour interval listed.

(6) Do the (MI) checks and services when the mileage of the vehicle reaches the amount listed.

b. If the crane or carrier doesn't work properly and you can't see what is wrong, refer to table 4-4 for troubleshooting instructions.

### WARNING

**Dry cleaning solvent, SD-2, used to clean parts, is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 138°F.**

c. Make cleanup a part of your preventive maintenance. Dirt, grease, oil, and debris may cover up a serious problem. Use dry cleaning solvent (SD-2) to clean metal surfaces. Wipe off excess grease and spilled oil. Use soap and water when you clean rubber or plastic material.

d. Watch for and correct anything that might cause a problem with the equipment. Some things to watch for are:

(1) Bolts, nuts, and screws that are loose, missing, bent, or broken.

- (2) Welds that are bad or broken.
- (3) Electric wires that are bare, broken, or loose.
- (4) Hoses and fluid lines that leak, or show signs of damage or wear.

e. You should know how fluid leaks affect the status of your equipment. Learn and be familiar with the following definitions of the types/classes of leakage. Remember-when in doubt, notify your supervisor!

*Leakage Definitions for Organizational PMCS*

CLASS I Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.

- CLASS II Leakage of fluid great enough to form drops but not great enough to cause drops to drip from item being checked/ inspected.
- CLASS III Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

**CAUTION**

**Equipment operation is allowable with minor leakage (Class I or II). Of course, consideration must be given to the fluid capacity in the item/system being checked/inspected. When in doubt, notify your supervisor. Class III leaks should be corrected before releasing equipment for operation.**

Table 4-3. Organizational Preventive Maintenance Checks and Services (CARRIER)

| Item No. | Interval |   |   |   |   |     | Item to be inspected Procedure   |
|----------|----------|---|---|---|---|-----|--|
|          | Q        | S | A | B | H | MI  |  |
| 1        |          |   |   |   |   |     | <p align="center"><b>NOTE</b></p> <p>PERFORM OPERATOR/CREW PMCS PRIOR TO OR IN CONJUNCTION WITH ORGANIZATIONAL PMCS.</p> <p><b>COOLING SYSTEM</b></p> <p align="center"><b>WARNING</b></p> <p>Inspection of cooling system should only be performed on a cool engine. Never remove radiator cap when engine is hot. Pressurized steam or hot water will cause serious burns.</p> <p>a. Inspect hoses and lines for evidence of leaks, abrasions, kinks, and insecure mounting.</p> <p>b. Use hydrometer to measure coolant systems freezing point. Add antifreeze as required to protect coolant system to lowest ambient temperature (See TB 750-651).</p>  |
| 2        |          |   |   |   |   | 400 | <p><b>WATER FILTER</b></p> <p>Replace cartridge every 400 hours. Check for leaks after replacing cartridge.</p>  |
| 3        |          |   |   |   |   |     | <p><b>FUEL FILTERS (Model 2380 Only)</b></p> <p>Replace fuel filter element, clean primary filter element. Clean float tank filter screen.</p>   |
| 4        |          |   |   |   |   | *   | <p><b>BRAKES</b></p> <p>Check air system for leaks and damage. Check brakes for proper operation. Adjust brakes as necessary.</p>  |
| 5        |          |   |   |   |   |     | <p><b>MOISTURE EJECTOR DRAIN VALVE</b></p> <p>a Inspect ejector drain valve for proper operation.</p>  |
| 6        |          |   |   |   |   |     | <p><b>ALCOHOL EVAPORATOR</b></p>   |
| 7        |          |   |   |   |   | *   | <p>Disassemble alcohol evaporator and clean all parts. Replace all gaskets.</p> <p><b>BATTERIES</b></p> <p><b>WARNING</b></p> <p>Battery acid (electrolyte) is extremely dangerous. Always wear goggles and rubber gloves when performing battery checks or inspections. Serious injury to personnel will result if battery acid contacts skin or eyes. DO NOT perform battery system checks or inspections while smoking or near fire, flames, or sparks. Batteries may explode, causing serious injury or death to personnel. Remove all Jewelry such as do , tags, rings, bracelets, etc. If Jewelry or disconnected battery ground 4;sole contacts battery terminal, a direct short will result.</p> <p>a. Check level of electrolyte. If low, fill with clean water (distilled if possible) to the split ring. In freezing weather, run engine at least 15 minutes after -ding water.</p> |

Table 4-3. Organizational Preventive Maintenance Checks and Services (CARRIER) - Continued

| Item No. | Interval |        |   |   |   |    | Item to be inspected<br>Procedure  |
|----------|----------|--------|---|---|---|----|--|
|          | Q        | S      | A | B | H | MI |  |
| 8        | •        | •<br>• |   |   |   |    | b. Remove corrosion from connectors and posts.<br>c. Check specific gravity of electrolyte in each cell (See TM 9-6140-200 14).<br><b>UTILITY BLADE</b><br>Inspect for wear and damage. Cutting edge should never be allowed to wear to a point where blade is doing the cutting. If cutting edge is excessively worn, it should be replaced (para 4-154). If end bits are excessively worn, they should be replaced (para 4-154). |

Table 4-3. Organizational Preventive Maintenance Checks and Services (CRANE)

| Item No. | Interval |   |   |   |   |    | Item to be inspected<br>Procedure   |
|----------|----------|---|---|---|---|----|---|
|          | Q        | S | A | B | H | MI |   |
| 1        |          | • |   |   |   |    | <p style="text-align: center;"><b>NOTE</b></p> PERFORM OPERATOR/CREW PMCS PRIOR TO OR IN CONJUNCTION WITH ORGANIZATIONAL PMCS.<br><b>COOLING SYSTEM</b>   |
| 2        |          |   | • |   |   |    | <p style="text-align: center;"><b>WARNING</b></p> Inspection of cooling system should only be performed on a cool engine. Never remove radiator cap when engine is hot Pressurized steam or hot water will cause serious burns.<br>a Inspect hoses and lines for evidence of leaks, abrasions, kinks, insecure mounting, and cracks.<br>b Use hydrometer to measure coolant systems freezing point Add antifreeze as required to protect coolant system to lowest ambient temperature (See TB 750-651)  |
| 3        |          |   | • |   |   |    | <b>FUEL FILTER</b>  |
| 4        |          |   | • |   |   |    | Replace filter element.   |
| 5        |          |   | • |   |   |    | <b>ENGINE CLUTCH</b>  |
| 6        |          |   | • |   |   |    | Adjust or replace as necessary.   |
| 7        |          |   | • |   |   |    | <b>AUXILIARY SHAFT CLUTCH BANDS</b>   |
| 8        |          |   | • |   |   |    | Adjust or replace as necessary.   |
| *        |          |   | • |   |   |    | <b>SWING SHAFT CLUTCH BANDS</b><br>Adjust or replace as necessary.<br><b>BOOM HOIST BRAKE BANDS</b><br>Adjust or replace as necessary.<br><b>CLUTCHES AND BRAKES (Hoist, Swing, and Crowd)</b><br>Check for proper operation Adjust as necessary.   |
|          |          |   | • |   |   |    | <b>BATTERIES</b>  |
|          |          |   |   |   |   |    | <p style="text-align: center;"><b>WARNING</b></p> Battery acid (electrolyte) is extremely dangerous Always wear goggles and rubber gloves when performing battery checks or Inspections Serious Injury to personnel will result If battery acid contacts skin or eyes. DO NOT perform battery system checks or Inspections while smoking or near fire, flames, or sparks Batteries may explode, causing serious injury or death to personnel Remove all Jewelry such as dog tags, rings, bracelets, etc. If Jewelry or disconnected battery ground cable contacts battery terminal, a direct short will result.<br>a Check level of electrolyte If low, fill with clean water (distilled if possible) to the split ringing freezing weather, run engine at least 15 minutes after adding water. |



Table 4-3. Organizational Preventive Maintenance Checks and Services (CRANE)

Q-Quarterly

S-Semiannually

A-Annually

B-Biennially

H-Hours

MI-Miles

| Item No. | Interval |             |   |   |     |    | Item to be inspected Procedure   |
|----------|----------|-------------|---|---|-----|----|--|
|          | Q        | S           | A | B | H   | MI |  |
| 9        |          | •<br>•<br>• |   |   | 100 |    | b Remove corrosion from connectors and posts.<br>c Check specific gravity of electrolyte in each cell (See TM 9-6140-200-14).<br><b>HOIST CABLE</b><br>Inspect for broken wires or badly worn condition Every 100 hours or monthly, unroll and inspect entire wire rope IAW TM 5-725, OSHA Regulation 1910.180 and Table 3-2.1.<br>Inspection will be requested on DA Form 2407 and results recorded on DA Form 2404 The records will be maintained for two years from date of inspection DA Form 2407 will be signed by organizational maintenance in Block 27 to verify serviceability of wire rope.<br>Replace worn, frayed or damaged cable. |

Page 4-7. Table 4-4. Items 15 and 16 are superseded, and items 17 through 28 are added as follows:

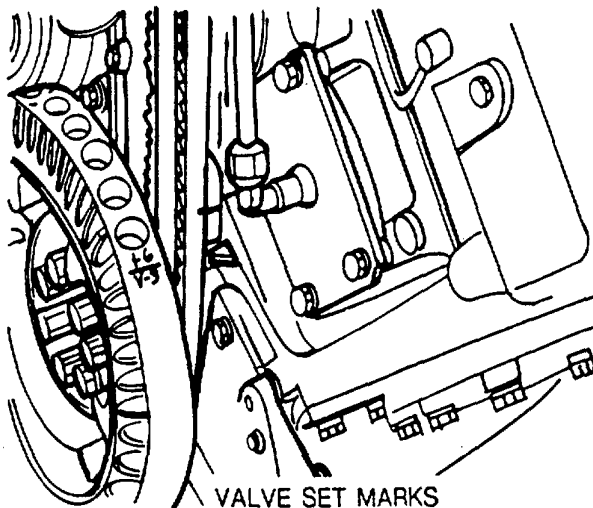
| Malfunction                                     | Probable Cause   | Corrective Action  |
|---|--|--|
| 15. Steering hard to operate                    | a. Loss of hydraulic<br><br>b. Inline filter clogged at centering cylinder<br>c. Relief valve setting too low.<br>d. Linkage at housing to steering control valve improper<br>e. Bind in steering<br>f. Steering gear adjustment too tight.<br>g. Air in steering system.  | a. Tighten all lines and fittings. Fill reservoir as specified in LO 5-3810-232-12.<br>b. Clean or replace.<br><br>c. Notify support maintenance.<br>d. Notify support maintenance.<br><br>e. Check steering alignment.<br>f. Notify support maintenance.<br>g. Notify support maintenance.  |
| 16. Carrier has no brake action or brakes slow. | a. Brake shoes out of adjustment.<br>b. Air pressure in system is above normal.<br><br>c. Defective air lines to air tank.<br><br>d. Blocked, bent, or broken tubing or hose.<br>e. Brake valve delivery pressure is below normal.<br>f. Defective brake valve or quick release valve<br>a. Broken centering cylinder spring.<br>b. Broken retaining ring(s) in cylinder.<br><br>Centering cylinder out of adjustment. | a. Adjust brake shoes.<br>b. Check compressor governor setting. Adjust air compressor unloading valve (para 4-139). Replace governor if necessary (para 4-139)<br>c. Tighten connections or replace air lines (para 4-131)<br>d. Replace defective tube or hose (para 4-131).<br>e. Replace defective valve (para 4-132).<br><br>f. Replace quick release or brake valve (para 4-143).<br>a. Notify support maintenance.<br>b. Notify support maintenance. |
| 17. Wheels will not return to center.           | a. Steering selector spool valve out of adjustment.<br>b. Hoses for tandem unit to separate cylinders reversed.<br>c. Pressure and return hoses reversed.  | Notify support maintenance.<br><br>a. Notify support maintenance.  |
| 18. Rear wheels do not track front wheels.      | c. Pressure and return hoses reversed.   | b. Reinstall hoses in proper position (para 4-131).<br>c. Reinstall hoses in proper position (para 4-131).   |
| 19. Unable to get rear wheel steering.          | a. Hoses to rear control cylinder reversed.  | a. Reinstall hoses in proper position (para 4-131).  |
| 20. Rear axle steers wrong way.                 |  |  |

| Malfunction   | Probable Cause   | Corrective Action   |
|---|--|---|
| 21. Front axle will not steer                           | <ul style="list-style-type: none"> <li>b. Pressure and return hoses reversed</li> <li>a. Pressure and return lines reversed to tandem unit.</li> <li>b. Steering gear adjustment too tight.</li> <li>c. Air in steering system.</li> <li>d. Broken hoses or lines.</li> <li>e. Binding steering column.</li> </ul> | <ul style="list-style-type: none"> <li>b. Reinstall hoses in proper position (para 4-131).</li> <li>a. Reverse hoses position (para 4-131).</li> <li>b. Notify support maintenance.</li> <li>c. Notify support maintenance.</li> <li>d. Replace hoses or lines (para 4-131).</li> <li>e. Notify support maintenance.</li> </ul> |
| 22. Steering misalignment between front and rear axles. | <ul style="list-style-type: none"> <li>a. Control cylinder offset mounting out of adjustment.</li> <li>b. Steering gear out of adjustment.</li> </ul>  | <ul style="list-style-type: none"> <li>a. Notify support maintenance.</li> <li>b. Notify support maintenance.</li> </ul>  |
| 23. Steering gear cannot complete a full turn.          | <ul style="list-style-type: none"> <li>a. Pitman arm not correctly rotated on spline.</li> <li>b. Pitman arm stops out of adjustment.</li> </ul>   | <ul style="list-style-type: none"> <li>a. Notify support maintenance.</li> <li>b. Notify support maintenance.</li> </ul>  |
| 24. Steering is loose.                                  | <ul style="list-style-type: none"> <li>a. Air in system.</li> <li>b. Steering gear out of adjustment.</li> </ul>   | <ul style="list-style-type: none"> <li>a. Notify support maintenance.</li> <li>b. Notify support maintenance.</li> </ul>  |
| 25. Unloader relief valve recycling too often           | Internal leakage at outrigger control valve.   | Notify support maintenance.   |
| 26. Outriggers will not raise                           | <ul style="list-style-type: none"> <li>a. Plugged orifice in pilot operated check valve.</li> <li>b. Broken spring in tilt lock valve</li> <li>c. Frozen piston in tilt lock valve.</li> </ul>   | <ul style="list-style-type: none"> <li>a. Notify support maintenance.</li> <li>b. Notify support maintenance.</li> <li>c. Notify support maintenance.</li> </ul>  |
| 27. Outriggers will not lower                           | <ul style="list-style-type: none"> <li>a. Low or no fluid pressure.</li> <li>b. Loose quick disconnect at inlet side.</li> <li>c. Improper spool valve operation at outrigger control valve.</li> </ul>  | <ul style="list-style-type: none"> <li>a. Notify support maintenance.</li> <li>b. Connect properly.</li> <li>c. Notify support maintenance.</li> </ul>  |
| 28. Brakes fail to release.                             | <ul style="list-style-type: none"> <li>a. Insufficient air pressure</li> <li>b. Release procedure not followed.</li> <li>c. Push rod in air chamber stuck.</li> <li>d. Broken spring in air chamber.</li> </ul>  | <ul style="list-style-type: none"> <li>a. Check for leaks. Build up to proper psi (120 lb).</li> <li>b. Refer to para 2-14.</li> <li>c. Refer to para 2-14.</li> <li>d. Notify support maintenance.</li> </ul>  |

**ME 3810-232-12-4-13.1 C1**

Page 4-22. Add figures 4-13.1 and 4-13.2 after paragraph 4-26b.

Figure 4-13.1. Engine 1-6 valve Jet marks.

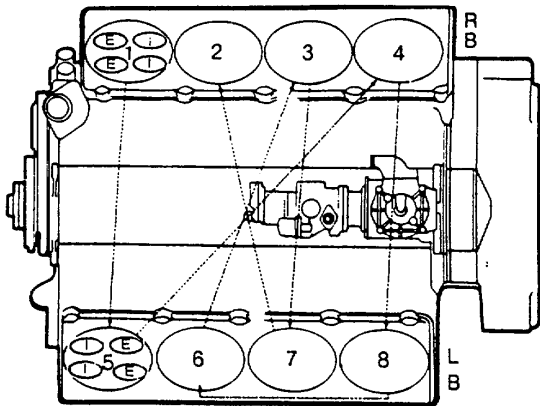


Page 4-19. Figure 4-11 is superseded as shown below.  
 Page 4-22. Figure 4-14 is superseded as shown on the following page.  
 Page 4-23. Figure 4-15 is superseded as shown on the following page.  
 Page 4-24. Figure 4-16 is superseded as shown on page 22.  
 Page 4-35, paragraph 4-34b. Delete reference to "TB ORD 1031".  
 Page 4-36, figure 4-27. Add figure title as follows:

Figure 4-27. Crane engine fuel line strainer service.  
 Page 4-52. Following paragraph 4-53b(9), the NOTE is superseded as follows:

**NOTE**

**Change corrosion resistant cartridge every time the coolant is changed or every 400 hours**



ME 3810-232-12-4-13.2 C1

Figure 4-13.2. Engine firing order diagram.

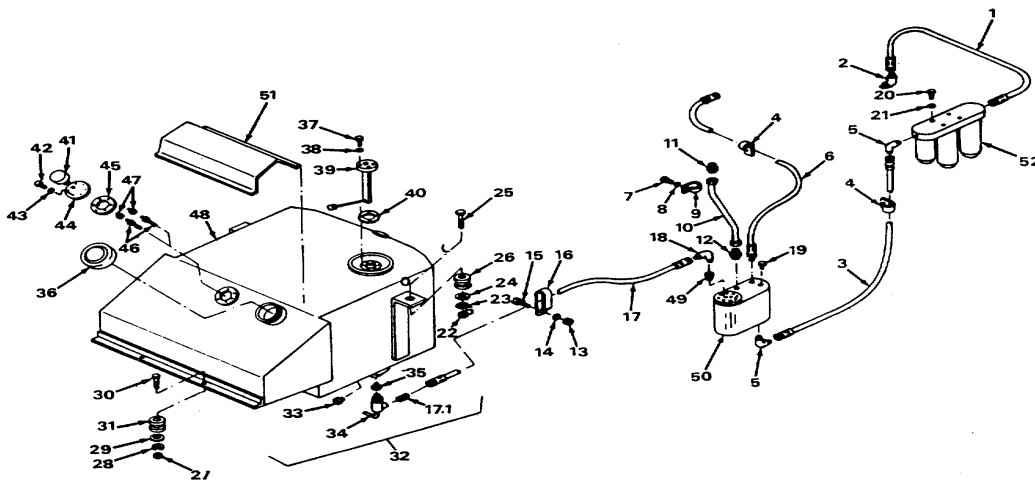
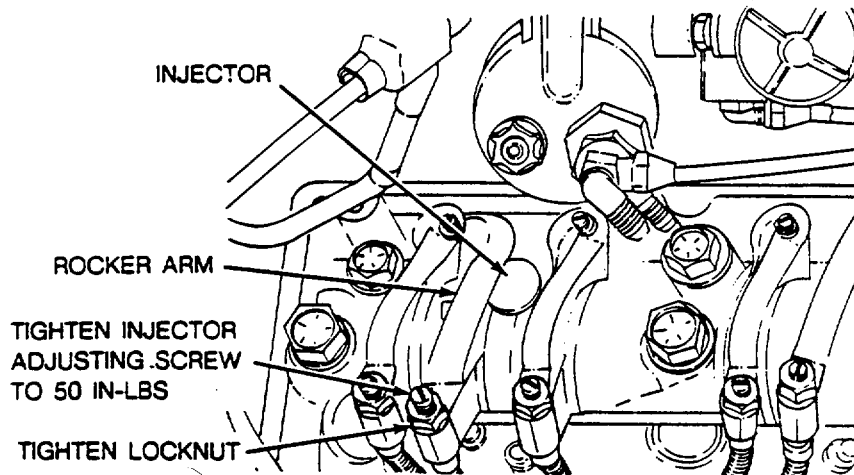


Figure 4-11. Carrier fuel tanks, lines, and fittings, disassembly and reassembly (Model 2)

- |               |                    |                      |                 |                       |
|---------------|--------------------|----------------------|-----------------|-----------------------|
| 1. Hose       | 12. Connector      | 22. Nut              | 33. Plug        | 43. Washer            |
| 2. Elbow      | 13. Nut            | 23. Washer           | 34. Cock        | 44. Cover             |
| 3. Hose       | 14. Washer         | 24. Washer           | 35. Pipe        | 45. Gasket            |
| 4. Clamp      | 15. Screw          | 25. Screw            | 36. Cap         | 46. Tube              |
| 5. Elbow      | 16. Clamp          | 26. Mount            | 37. Screw       | 47. Connector         |
| 6. Hose       | 17. Hose           | 27. Nut              | 38. Washer      | 48. Supply tank       |
| 7. Screw      | 17.1 Filter Screen | 28. Washer           | 39. Fuel sender | 49. Filter screen     |
| 8. Washer     | 18. Elbow          | 29. Washer           | 40. Gasket      | 50. Transfer tank     |
| 9. Clamp      | 19. Plug           | 30. Screw            | 41. Breather    | 51. Guard             |
| 10. Tube      | 20. Screw          | 31. Mount            | 42. Screw       | 52. Fuel Filter assy. |
| 11. Connector | 21. Washer         | 32. Supply tank assy |                 |                       |



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Figure 4-14. Carrier engine fuel injector adjustment.

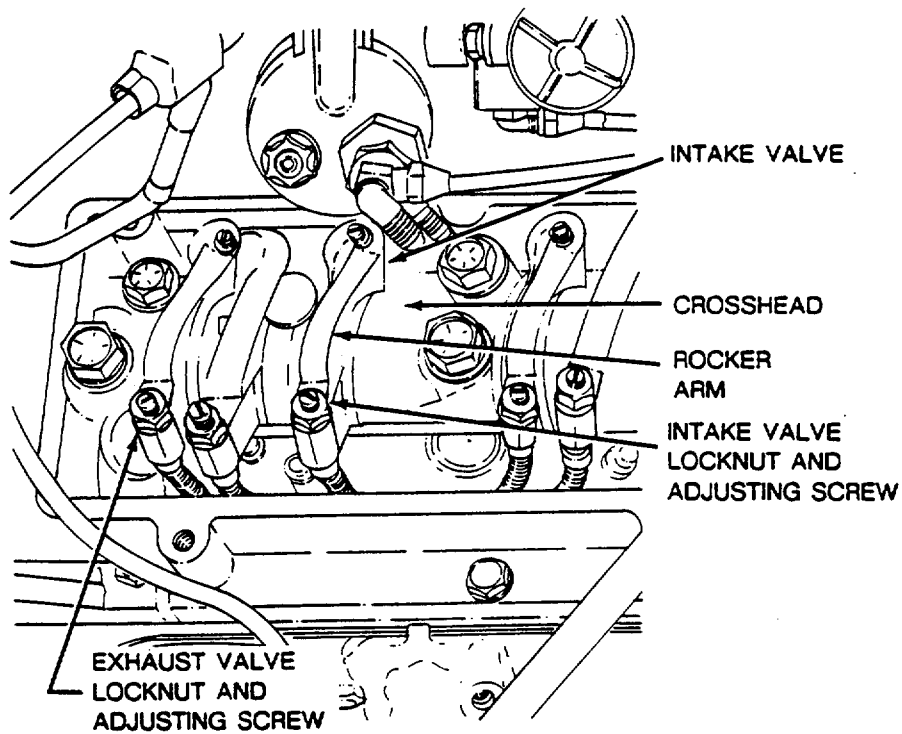


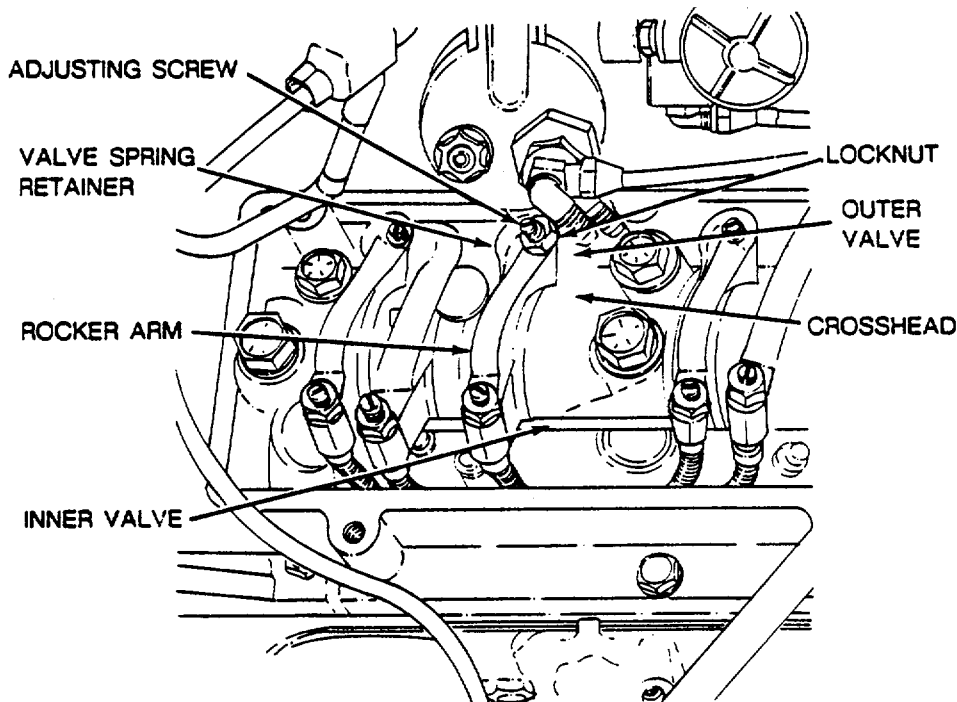
Figure 4-15. Carrier engine valve crosshead adjustment.

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Page 4-59, paragraph 4-61a. Change "TM 9-6140-200-15" to "TM 9-6140-200-14".

Page 4-60, figure 4-53. Add it.-ms 13 and 14 to the legend as follows:

- 13. Screw
- 14. Box



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Figure 4-16. Carrier engine valve adjustment.

Page 4-70. Add paragraph 4-66.1 as follows:

**4-66.1. Solid State Directional Indicator Assembly**

a. *General.* The directional control arm, part number 11613632-1; cable assembly, power, part number 11630528; and flasher thermal unit, part number 11613631 (19207) are all components for the new solid state directional indicator assembly. Components of the solid state unit are not interchangeable with the original equipment fielded with the Model 2380 and Model 2385 cranes. Therefore, if a component of the original equipment becomes unserviceable, the system must be changed over to the new solid state system.

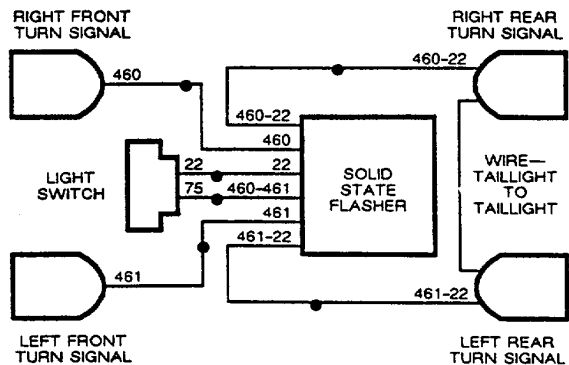
b. *Installation.* Hook-up instructions for the new solid state directional indicator assembly are illustrated in figure 4-63.1.

Page 4-80, paragraph 4-82a. Change "paragraph 4-60" to "paragraph 4-61".

Page 4-89. Following paragraph 4-95c, add paragraph 4-95d.

d. *Adjustment.*

- (1) With the actuating lever in neutral position, adjust the roller of the master cylinder to 1/32 inch maximum clearance from the actuating lever.



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Figure 4-63.1. Solid state directional indicator wiring diagram.

(2) The reservoir must be filled with military specification fluid.

(3) The slave cylinder bleeder valve must be set at the eleven o'clock position. Bleeder screw open and directed to reservoir.

(4) Open the hand valve between the reservoir and master cylinder and operate the actuator lever with short strokes until air is removed.

(5) Tighten the slave cylinder bleeder screw and actuate lever. The system should be solid. Refill reservoir.

Page 4-96, figure 4-92. Add figure title as follows:

Figure 4-92. Boom hoist brake band adjustment.

Page 4-101. Following paragraph 4-107c(1), add the following NOTE:

**NOTE**

Proper adjustment of the chain can be measured by placing a straightedge across the top of the chain from the pinion to the sprocket. The proper clearance between the straight-edge and the chain, measured at the lowest point is 3/4 to 7/8 inch.

Page 4-104. Section XXI. Change word "CRAME" to "CRANE".

Page 4-105. Before paragraph 4-112c(l), add the following WARNING:

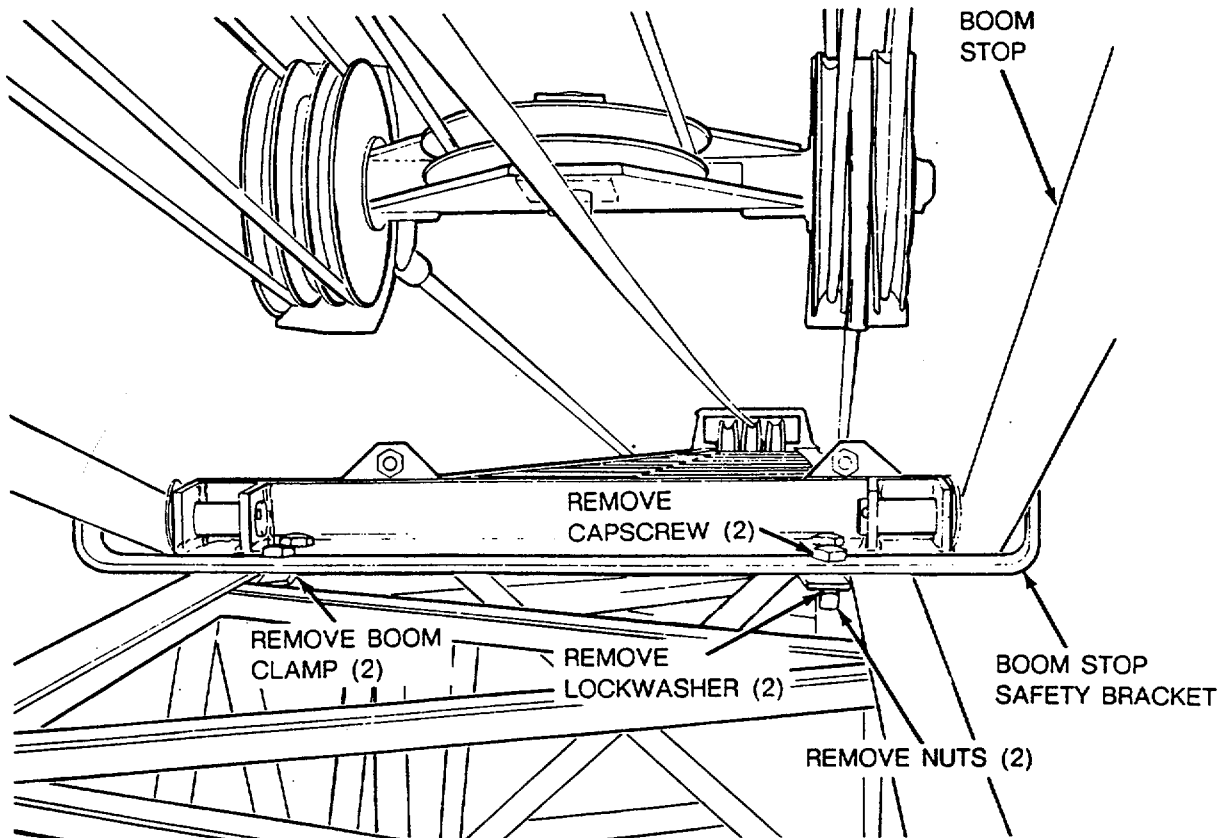
**WARNING**

Main chord angles shall not be repaired or straightened below depot level. Lacing members may be cold straightened at direct support level; cutting and welding of lacing and chord angles is permitted at depot level only. See Table 3-2.2 for criteria.

Page 4-106. Add paragraph 4-113.1 as follows:

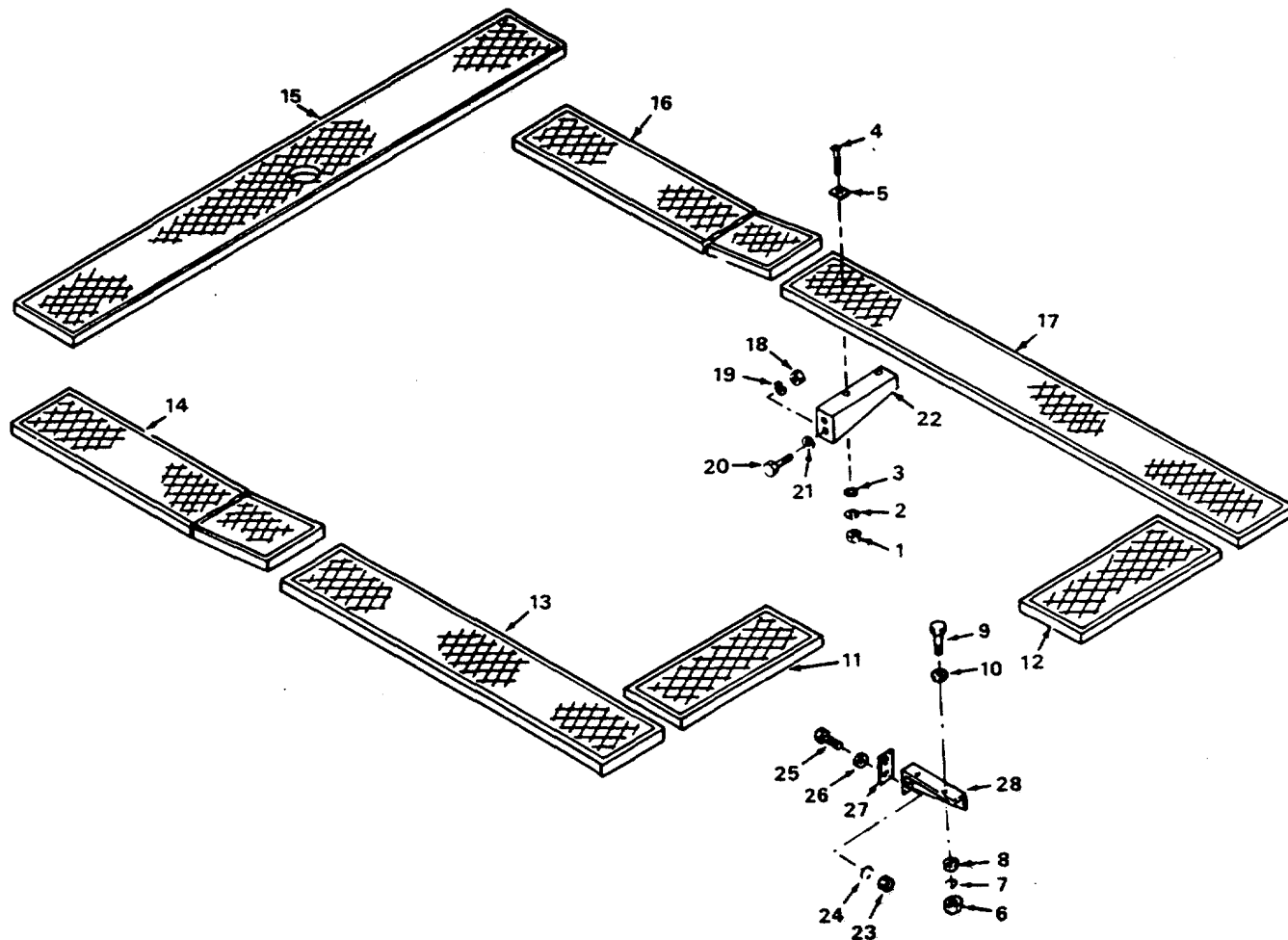
**4-113.1. Boom Stop Safety Bracket (Model 2385)**

- a. Removal. Remove boom stop safety bracket as illustrated in figure 4-100.1.
- b. Cleaning and Inspection.
  - (1) Clean all parts.
  - (2) Inspect bracket for cracks or bends.
- c. Reassembly and Installation. Reassemble and install boom safety bracket as illustrated in figure 4-100.1.



TA504942

Figure 4-100.1. Boom stop safety bracket (Model 2385). removal and installation.



- |     |               |     |             |     |             |
|-----|---------------|-----|-------------|-----|-------------|
| 1.  | Nut           | 11. | Walkway     | 20. | Capscrew    |
| 2.  | Lock washer   | 12. | Walkway     | 21. | Flat washer |
| 3.  | Flat washer   | 13. | Walkway     | 22. | Bracket     |
| 4.  | Bolt          | 14. | Walkway     | 23. | Nut         |
| 5.  | Anchor device | 15. | Walkway     | 24. | Lock washer |
| 6.  | Nut           | 16. | Walkway     | 25. | Capscrew    |
| 7.  | Lock washer   | 17. | Walkway     | 26. | Flat washer |
| 8.  | Flat washer   | 18. | Nut         | 27. | Spacer      |
| 9.  | Bolt          | 19. | Lock washer | 28. | Bracket     |
| 10. | Anchor device |     |             |     |             |

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Figure 4-102. Crane walkway assembly, removal and installation.

Page 4-115. Add paragraph 4-123.1 as follows:

**4-123.1. Carrier Steering Gear Alignment**

*a. Centering Cylinders (Front and Rear).*

(1) Inflate the carrier tires to 55 psi and place the carrier on a level area.

(2) Position steering selector control valve (10, fig. 2-14) to the front wheel steering position.

(3) Move the carrier forward 10 to 15 feet to allow the steering system to center itself.

(4) Inspect the rear axle to see if the locknut bar pins will drop into holes (fig. 2-12). If the pins drop in, consider the rear wheels to be in the straight forward position.

(5) If pins do not drop in, loosen socket head screw on the centering cylinder and rotate outside tube to increase or decrease total length as required.

(6) Repeat steps (3), (4), and (5) above until pins drop into holes.

(7) Measure the alignment by holding the spacer bars at points A and A-1 as shown in figure 4-110.1.

(8) Hold one end of piano wire or chalk line at point A. Move the other end of the wire or line towards the carrier until it just touches the spacer bar at point A-1.

(9) Read dimensions at points B and B-1; these dimensions should be within  $\pm 1/16$  in. of each other.

**NOTE**

**Dimensions are taken to the wheel, not to the outer locking.**

(10) If the dimensions are not within tolerance, repeat the adjustment in step (5) above as required.

(11) Tighten socket head screws in each cylinder.

*b. Wheel Turning Stop Adjustment.*

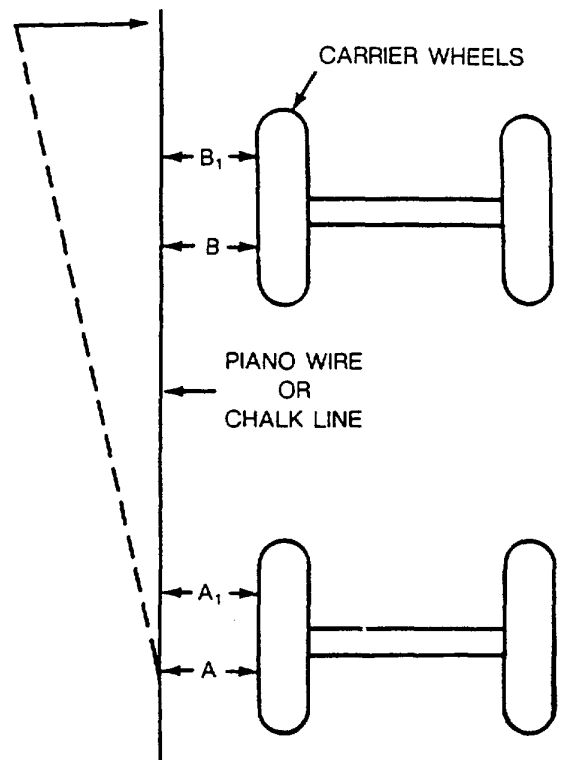
(1) Position the outrigger floats as shown in figure 2-24. Operate the outriggers and raise the carrier off the ground.

(2) Place the steering selector control (10, fig. 2-14) in the four-way steering position and turn the steering wheel as far as possible in either direction.

(3) Measure the clearance between the turning stops as illustrated in figure 4-110.2.

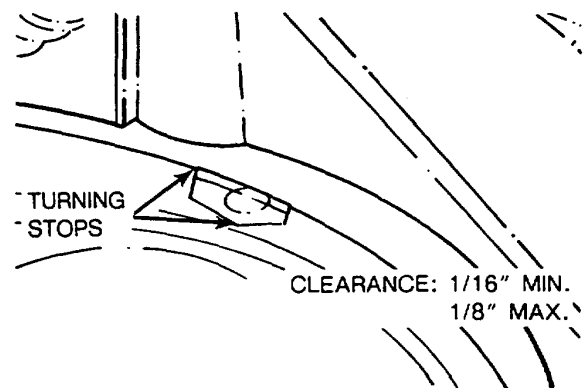
(4) If the clearance is not within tolerance, decrease or increase travel of steering by adjusting screws as illustrated in figure 4-110.3.

(5) Make sure the adjusting screw locknuts are securely tightened after completing the adjustment.



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Figure 4-110.1. Measuring alignment of centering cylinder between the front and rear wheels.

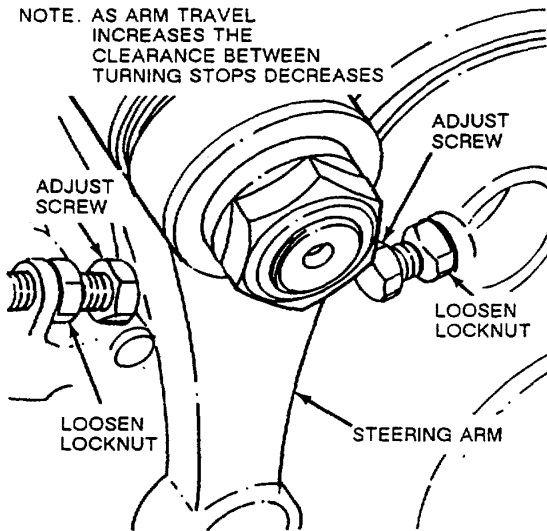


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Figure 4-110.2. Turning stop clearance.



NOTE. AS ARM TRAVEL INCREASES THE CLEARANCE BETWEEN TURNING STOPS DECREASES



TA50194R

Figure 4-110.3. Steering turning stop clearance.

Page 4-121. Paragraph 4-127h is added as follows:

*h. Tilt Lock Valve.*

*(1) Operation of the Tilt Lock Valve.*

*(a) Tilt Lock Valve (Down).* Oil going in the top of the tilt lock valve housing (15, fig. 4-116.1) around the plunger (9) and pushing the plunger (9) back against the spring (5), allows oil to flow out of the center side hole to the cylinder, pushing the ram downward. The outrigger control valve lever in neutral will relieve the oil pressure on the plunger (9), allowing the spring (5) to push the plunger (9) to the forward position.

*(b) Tilt Lock Valve (Hold).* When heavy weight is picked up by the crane, it will cause high oil pressure in the cylinder on top of the ram. This oil is held in the cylinder by oil going in the orifice of the plunger (9, fig. 5-34.1.) and pushing out the plunger (6) against the stop plug (3), forcing the plunger (9) forward to the lock position. The heavier the weight on the outrigger, the tighter the plunger (9) is in the lock position.

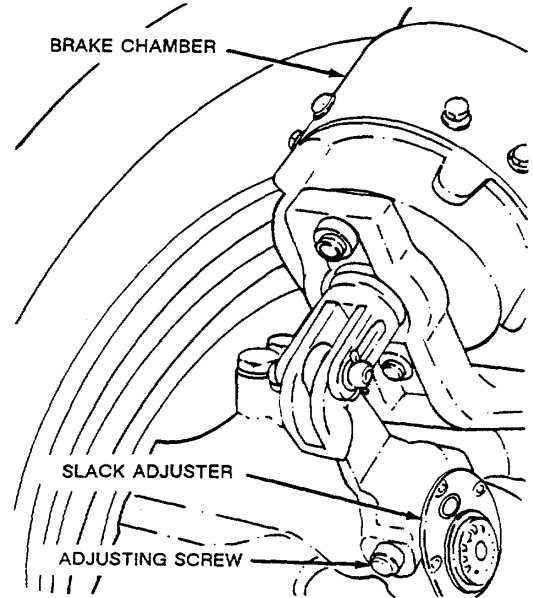
*(c) Tilt Lock Valve (Up).* To raise the ram oil flow to the bottom of the cylinder and in the orifice (14), push plunger (9) back, allowing oil trapped on top of ram to return to the hydraulic reservoir. This now allows the ram to push oil up.

Page 4-122.

Paragraph 4-129. The title is changed to read "Accumulator (Model 2380)".

Paragraph 4-130, end of first sentence. Change "and fan drive clutch." to "fan drive clutch, and pressurized hydraulic tank."

Page 4-130. Figure 4-129 is superseded as shown below.



1. WITH THE AIR CHAMBER IN A RELEASED POSITION AND WITH THE WHEEL ELEVATED, PUSH IN ON THE LOCKING COLLAR AND TURN THE ADJUSTING SCREW TO THE RIGHT UNTIL THE BRAKE BEGINS TO DRAG.
2. BACK OFF THREE CLICKS OR ONE-HALF TURN, JUST ENOUGH TO ALLOW FREE ROTATION OF THE WHEEL.

NOTE: MAKE ADJUSTMENT TO OTHER BRAKES IN A SIMILAR MANNER

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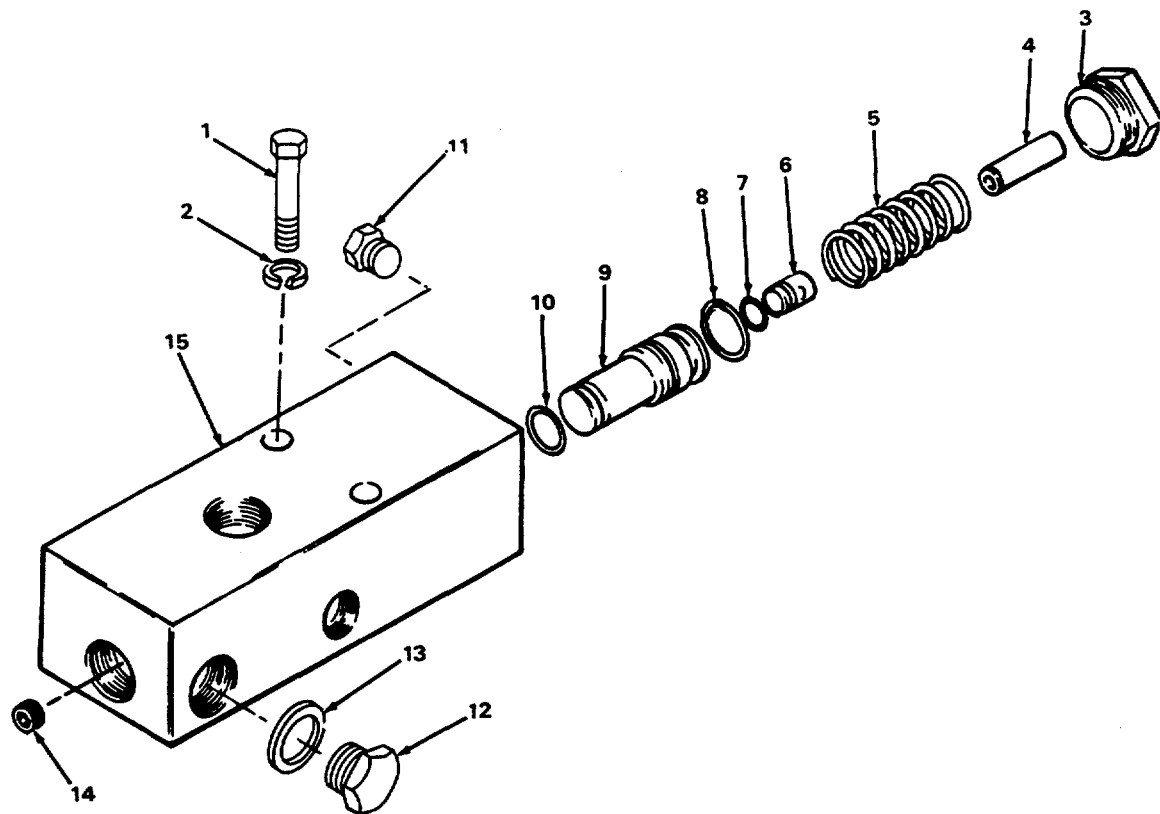
Figure 4-129. Brake adjustment.

Page 4-131. The legend for figure 4-130 is superseded as follows:

|   |                     |    |            |
|---|---------------------|----|------------|
| 1 | Lubrication fitting | 9  | Pin        |
| 2 | Cotter pin          | 10 | Latch      |
| 3 | Nut                 | 11 | Spring     |
| 4 | Boll                | 12 | Lock       |
| 5 | Drive screw         | 13 | Cotter pin |
| 6 | Chain               | 14 | Nut        |
| 7 | "S" link            | 15 | Pintie     |
| 8 | Cotter pin          |    |            |

Page 4-139.

Paragraph 4-153, last sentence. Delete "6 November 1967."



- |                        |                      |
|------------------------|----------------------|
| 1 Hex head capscrew    | 9 Plunger            |
| 2 Lock washer          | 10 Plunger seal      |
| 3 Stop plug            | 11 Pipe plug         |
| 4 Stroke stop          | 12 Pipe plug         |
| 5 Helical spring       | 13 Preformed packing |
| 6 Power assist plunger | 14 Valve orifice     |
| 7 Preformed packing    | 15 Valve housing     |
| 8 Plunger seal         |                      |

ME 3810-232-12/4-116.1 C3

Figure 4-116.1. Tilt lock valve.

Page A-1.

Paragraph A-1. Change "TB 5-4200-200-10" and its title to "TB 5-4200-200-100, Hand Portable Fire Extinguishers Approved for Army Users".

Paragraph A-2. Change "LO 5-3810-232-12-1, -2, -3, -4, -5, & -6" and its title to "LO 5-3810-232-12, Crane, Wheel Mounted: 20-Ton at 10-Foot Radius; 2 Engines, Diesel Engine Driven, 4 x 4; Air Transportable, Phase III w/Blade, Bulldozer, Earthmoving; w/Block, Tackle, 20-Ton; w/Boom Crane, 30-Foot (American Hoist and Derrick Model 2380) NSN 3810-00-763-7728 and (American Hoist and Derrick Model 2385) NSN 3810-00-043-5354".

Paragraph A-3. Change "TM 9-213" to "TM 43-0139".

Paragraph A-4. Change "TM 1 L-483" to "FM 11-65".

Paragraph A-5.

Add "TM 5-725, Rigging".

Change "TM 38-750" to "DA Pam 738-750".

Change title of TM 5-3810-232-20P to

"Organizational Maintenance Repair Parts and Special Tools Lists, Crane, Wheel Mounted: 20-Ton at 10-Foot Radius; 2 Engines, Diesel Engine Driven, 4 x 4; Air Transportable, Phase III w/Blade, Bulldozer, Earthmoving; w/Block, Tackle, 20-Ton w/Boom; Crane, 30-Foot (American Hoist and Derrick Model 2380) NSN 3810-00-763-7728 and (American Hoist and Derrick Model 2385) NSN 3810-00-043-5354".

Change "TM 9-6140-200-15" and its title to "TM 9-6140-200-14, Operator's, Organizational, Direct Support and General Support Maintenance Manual for Lead-Acid Storage Batteries".

Change "MT-9-237" and its title to "TM 9-237, Operator's Manual for Welding Theory and Application". Delete "TM 9-1870-1" and its title.

Paragraph A-7. Change 'TM 750-244-3' and its title to "TM 750-244-6, Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use".

Page B-1. Appendix B is superseded as follows:

**APPENDIX B  
BASIC ISSUE ITEMS LIST**

**Section I. INTRODUCTION**

**B-1. Scope**

This appendix lists items required by the operator for operation of the crane.

**B-2. General**

This list is divided into the following sections:

a. Basic Issue Items List-Section II. A list of items which accompany the crane and are required by the operator/crew for installation, operation, or maintenance.

b. Maintenance and Operating Supplies-Section III. A listing of maintenance and operating supplies required for initial operation.

**B-3. Explanation of Columns-Section II**

The following provides an explanation of columns in the tabular list of Basic Issue Items, Section II.

a. *National Stock Number.* This column indicates the National stock number assigned to the item and will be used for requisitioning purposes.

b. *Description.* This column indicates the Federal item name and any additional description of the item required.

c. *Unit of Measure (U/M).* A two-character alphabetic abbreviation indicating the amount or

quantity of the item upon which the allowances are based (e.g., ft, pr, ea, etc.).

d. *Quantity Authorized.* This column indicates the quantity of the item authorized to be used with the equipment.

**B-4. Explanation of Columns-Section III**

a. *Component Application.* This column identifies the component application of each maintenance or operating supply item.

b. *National Stock Number.* This column indicates the National stock number assigned to the item and will be used for requisitioning purposes.

c. *Description.* This column indicates the item and name and brief description.

d. *Quantity Required for Initial Operation.* This column indicates the quantity of each maintenance or operating supply item required for initial operation of the equipment.

e. *Quantity Required for 8 Hours Operation.* This column indicates the estimated quantities required for an average of 8 hours operation.

f. *Notes.* This column indicates informative notes keyed to data appearing in a preceding column.

**Section II. BASIC ISSUE ITEMS LIST**

| (1)<br>National Stock<br>number | (2)<br>Description<br>Ref. No. & Mfr.<br>Code | (3)<br>Unit<br>of<br>meas | (4)<br>Qty<br>ath |
|---------------------------------|---|---------------------------|-------------------|
| 2590-00-505-6736                | Bracket, Rifle                                | EA                        | 1                 |
| 7520-00-559-9618                | Case, Maintenance and Operating Manuals       | EA                        | 1                 |
| 4210-00-889-2221                | Extinguisher, Fire                            | EA                        | 1                 |

**Section III. MAINTENANCE AND OPERATING SUPPLIES**

| (1)<br>Component application | (2)<br>National stock number   | (3)<br>Description   | (4)<br>Quantity required for initial operation | (5)<br>Quantity required for 8 hours operation | (6)<br>Notes   |  |
|------------------------------|--|--|--|--|--|--|
| CRANKCASE                    | 9150-00-188-9858 (2)<br>9150-00-186-6668 (2)<br>9150-00-402-2372 (2) | OIL, LUBRICATING<br>HDO-30<br>HDO-10<br>OEA  | (1)<br>(1)<br>(1)                              | (3)<br>(3)<br>(3)                              | (1) Includes quantity of oil to fill engine oil system as follows:<br>Carrier engine:<br>26-qt crankcase w/filters Mdl 2380, 18 qt-crankcase Mdl 2385, 5 qt-air cleaner<br>Mdl 2380, 2 qt-air<br><br>Mdl 2385<br>Crane engine:<br>21 qt-crankcase w/filters<br>5 qt-air cleaner. |  |
| ALCOHOL EVAPORATOR CHAINCASE | 6810-00-753-4783   | METHYLALCOHOL (186 proof)  | 1 pt   | (12)   |  |  |
| POWER TRANSFER               | 9150-00-188-9858<br>9150-00-186-6668<br>9150-00-402-2372             | OILLUBRICATING<br>OE-30<br>OE-10<br>OES  | 3 qt (13)<br>3 qt (13)<br>3 qt (13)<br>cleaner | (3)<br>(3)<br>(3)                              |  |  |
| CLUTCH, CRANE                | 9150-01-102-9455   | HBA  | 2 qt   |  |  |  |
| UPPER WORKS                  | 9150-00-223-4129   | OAI  | 2 oz   | (3)  |  |  |
| AIR CLEANER                  |  | OIL, LUBRICATING (4)   | (1)  | (3)  |  |  |
| ENGINE STARTING AID          | 2910-00-646-9727   | (CARRIER AND CRANE)<br>FSC 9100.   | 1 ea.  |  |  | (2) See C9100-IL for additional data and procedures on   |
| EXPOSED GEARS                |  | LUBRICATION OIL<br>CHAINWIRE<br>ROPE-EXPOSED GEAR,<br>5-lb can as follows:<br>CW-IIB                     | 1 ea.<br><br>intervals.                        |  |  | (3) See current LO for grade application and replenishment   |
| FUEL TANK                    | 9150-00-234-5199   | FUEL OIL, DIESEL,<br>Bulk as follows:<br>DF-2, regular grade<br>DF-I, winter grade<br>DF-A, Arctic grade |  |  |  | (4) Use oil as prescribed for air cleaner.   |
|                              | 9140-00-286-5294<br>9140-00-286-5287<br>9140-00-286-5283             |  | (5)<br>(5)<br>(5)                              | (6)<br>(6)<br>(6)                              |  | (5) Tank capacity is as follows:<br>Carrier:<br>110 gal Mdl 2380<br>130 gal Mdl 2385<br>Crane: 50 gal. |
| GREASE POINTS                |  | GREASE,<br>AUTOMOTIVE AND ARTILLERY,<br>35-lb pail as follows:<br>GAA                                    |  |  | (6) Average fuel consumption per hour of continuous operation is as follows:<br>Carrier: 16.0 gal<br>Crane: 6.5 gal  |  |
|                              | 9150-00-190-0907   |  |  |  |  |  |
| PLANETARY, FRONT AND REAR    | 9150-01-035-5393<br>9150-00-257-5440                                 | LUBRICATING OIL,<br>GEAR<br>5-gal pail as follows:<br>GO-90<br>GOS                                       | 8 qt ea.<br>8 qt ea.                           | (3)<br>(3)                                     | (7) Radiator capacity is as follows:<br>Carrier:<br>72 qt Mdl 2380<br>60 qt Mdl 2385<br>Crane: 30 qt   |  |

**Section III. MAINTENANCE AND OPERATING SUPPLIES**

| (1)<br>Component application      | (2)<br>National stock number | (3)<br>Description                | (4)<br>Quantity required for initial operation | (5)<br>Quantity required for 8 hours operation | (6)<br>Notes   |
|-----------------------------------|------------------------------|-----------------------------------|--|--|--|
| RADIATOR                          | 6580-00-181-7933             | ANTIFREEZE, 5-gal can as follows: | (7)  |  | (8) Maximum protection is obtained at 50% water to 50% ethylene glycol.                                  |
|                                   | 6850-00-174-1806             | ANTIFREEZE, ethylene glycol       | (8)  |  |  |
| RESERVOIR, HYDRAULIC              | 9150-00-186-6668             | OIL, LUBRICATING OE-10            | 228 qt   | (3)  | Antifreeze capacity is as follows:<br>Carrier:<br>36 qt Mdl 2380<br>30 qt Mdl 2385<br>Crane: 15 qt       |
| STEERING GEAR BOX ARTILLERY       | 9150-00-402-2372             | OES GREASE, AUTOMOTIVE AND        | 228 qt   | (3)  |  |
|                                   | 9150-00-190-0907             | GAA                               | 1 qt ea.                                       | (3)  | (10) Use oil as prescribed for planetary gear.   |
| TRANSMISSION AND TORQUE CONVERTER |                              | OIL, LUBRICATING (11)             | 26 qt  | (3)  | (11) Use oil as prescribed for transmission.   |
| DIFFERENTIAL, FRONT AND REAR      |                              | LUBRICATING OIL, GEAR (10)        | 22 qt ea.                                      | (3)  | (12) Fill reservoir two-thirds full.<br><br>(13) 3 qt for plastic chain case, 4 qt for metal chain case. |

Page C-1

Appendix C is superseded as follows:

**APPENDIX C  
MAINTENANCE ALLOCATION CHART  
Section I. INTRODUCTION**

**C-1. General**

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

b. The Maintenance Allocation Chart (MAC) in Section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance levels.

c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from Section II.

d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

**C-2. Maintenance Functions**

Maintenance functions will be limited to and defined as follows:

a. *Inspect.* To determine the serviceability of an item by comparing its physical, mechanical, and/or

electrical characteristics with established standards through examination (e.g., by sight, sound, or feel).

b. *Test.* To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. *Service.* Operations required periodically to keep an item in proper operating condition, i.e., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

d. *Adjust.* To maintain or regulate, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. *Aline.* To adjust specified variable elements of an item to bring about optimum or desired performance.

f. *Calibrate.* To determine and cause corrections to be made or to be adjusted on instruments or test, measuring, and diagnostic equipments used in precision measurement. Consists of 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.

g. *Remove/Install.* To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. *Replace.* To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and is shown as the third position of the SMR code.

i. *Repair.* The application of maintenance services, including fault location/troubleshooting, removal/installation, and disassembly/assembly procedures, and maintenance actions to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. *Overhaul.* That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. *Rebuild.* Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with

original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/ miles, etc.) considered in classifying Army equipment/components.

### C-3. Explanation of Columns in the MAC, Section II

a. *Column 1, Group Number.* Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly. End item group number shall be "00."

b. *Column 2, Component/Assembly.* Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. *Column 3, Maintenance Function.* Column 3 lists the functions to be performed on the item listed in Column 2. (For a detailed explanation of these functions, see paragraph C-2.)

d. *Column 4, Maintenance Level.* Column 4 specifies, by the listing of a work time figure in the appropriate subcolumn(s), the level of maintenance authorized to perform the function listed in Column 3.

This figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance levels, appropriate work time figures will be shown for each level. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/ fault location time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the Maintenance Allocation Chart. 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

e. *Column 5, Tools and Equipment.* Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, TMDE, and support equipment required to perform the designated function.

f. *Column 6, Remarks.* This column shall, when applicable, contain a letter code, in alphabetic

order, which shall be keyed to the remarks contained in Section IV.

C-4. Explanation of Columns in Tool and Test Equipment Requirements, Section III

a. Column I, Reference Code. The code recorded in Column 6, Section II.

b. Column 2, Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

**Section II. MAINTENANCE ALLOCATION CHART**

| (1)<br>GROUP<br>NUMBER | (2)<br>COMPONENT<br>ASSEMBLY   | (3)<br>MAINTENANCE<br>FUNCTION   | (4)<br>MAINTENANCE LEVEL |            |                   |                                    |              | (5)<br>TOOLS AND TEST<br>EQUIPMENT | (6)<br>REMARKS |
|------------------------|--|--|--------------------------|------------|-------------------|------------------------------------|--------------|------------------------------------|----------------|
|                        |  |  | C                        | O          | F                 | H                                  | D            |                                    |                |
| 01<br>0100             | ENGINE<br>Engine Assembly<br>Engine, Diesel  | Inspect<br>Test<br>Service<br>Replace<br>Repair<br>Overhaul                          | 0.1<br>1.0               | 2.0<br>1.0 | 3.0<br>16.5       | 4.0<br>24.0                        | 4.0<br>60.0  |                                    |                |
| 0101                   | Crankcase, Block, and<br>Cylinder Head<br>Block Assembly<br>Block Assembly<br>Head, Cylinder | Inspect<br>Replace<br>Repair<br>Overhaul<br>Inspect<br>Replace<br>Repair<br>Overhaul |                          |            | 16.0              | 1.0<br>12.0<br>16.0<br>1.0<br>12.0 | 16.0<br>16.0 |                                    |                |
| 0102                   | Crankshaft   | Inspect<br>Replace<br>Repair<br>Overhaul   |                          |            |                   | 2.0<br>5.7<br>6.0                  | 16.0         |                                    | A              |
| 0103                   | Flywheel Assembly  | Inspect<br>Replace<br>Repair   |                          |            | 0.1<br>4.0<br>2.0 |                                    |              |                                    | B              |
| 0104                   | Pistons and Connecting<br>Rods   | Inspect<br>Replace<br>Repair   |                          |            |                   | 0.8<br>0.8<br>0.9                  |              |                                    |                |
| 0105                   | Valves, Camshafts, and<br>Timing System<br>Valves, Rocker Arm<br>Assembly                    | Inspect<br>Adjust<br>Replace<br>Repair   |                          | 0.5<br>1.2 | 6.0<br>4.0        | C                                  |              |                                    |                |
|                        |  |  |                          | <b>32</b>  |                   |                                    |              |                                    |                |

**Section II. MAINTENANCE ALLOCATION CHART - Continued**

| (1)<br>GROUP<br>NUMBER | (2)<br>COMPONENT<br>ASSEMBLY   | (3)<br>MAINTENANCE<br>FUNCTION | (4)<br>MAINTENANCE LEVEL |     |     |     |     | (5)<br>TOOLS AND TEST<br>EQUIPMENT | (6)<br>REMARKS |
|------------------------|--|--------------------------------|--------------------------|-----|-----|-----|-----|------------------------------------|----------------|
|                        |  |                                | C                        | O   | F   | H   | D   |                                    |                |
| 0106                   | Engine Lubrication System<br>Pump, Oil, Adapter<br>Assembly<br>Filter, Oil<br><br>Cooler, Oil<br><br>Lines, External<br>Pan, Oil | Replace                        |                          |     | 2.1 |     |     |                                    |                |
|                        |  | Repair                         |                          |     | 1.5 |     |     |                                    |                |
|                        |  | Replace                        |                          | 1.0 |     |     |     |                                    |                |
|                        |  | Repair                         |                          | 0.9 |     |     |     |                                    |                |
|                        |  | Replace                        |                          | 2.0 |     |     |     |                                    |                |
|                        |  | Repair                         |                          | 1.0 |     |     |     |                                    |                |
| 0108                   | Manifolds<br>Exhaust Manifold<br><br>Intake Manifold<br>(Carrier)<br>Air Intake Manifold<br>(Crane)                              | Replace                        |                          | 1.0 |     |     |     |                                    |                |
|                        |  | Replace                        |                          |     | 6.0 |     |     |                                    |                |
|                        |  | Inspect                        |                          | 0.2 |     |     |     |                                    |                |
|                        |  | Replace                        |                          | 2.0 | 1.2 |     |     |                                    |                |
| 02<br>0207             | CLUTCH<br>Hydraulic Clutch System<br>Clutch (Crane)<br><br>Master Cylinder   | Replace                        |                          |     |     |     |     |                                    |                |
|                        |  | Repair                         |                          |     | 2.0 |     |     |                                    |                |
| 03<br>0301             | FUEL SYSTEM<br>Carburetor, Fuel Injector<br>Injector, Fuel   | Replace                        |                          |     | 0.3 |     |     |                                    |                |
|                        |  | Repair                         |                          |     | 4.0 |     |     |                                    |                |
|                        |  | Replace                        |                          |     | 2.0 |     |     |                                    |                |
| 0302                   | Fuel Pump<br>Pump, Fuel and<br>Governor(Carrier)   | Repair                         |                          |     | 3.0 |     |     |                                    |                |
|                        |  | Adjust                         |                          | 0.9 |     |     |     |                                    |                |
|                        |  | Test                           |                          |     | 0.5 |     |     |                                    |                |
|                        |  | Replace                        |                          |     | 1.2 |     |     | 4 and 5<br>11                      |                |
|                        |  | Repair                         |                          |     |     | 1.8 |     |                                    |                |
|                        |  | Service                        |                          | 1.5 |     |     |     |                                    |                |
|                        |  | Test                           |                          |     |     |     | 2.0 |                                    |                |
|                        |  | Adjust                         |                          | 1.2 |     |     |     |                                    |                |
|                        |  | Replace                        |                          |     | 3.3 |     |     |                                    |                |
|                        |  | Repair                         |                          |     |     |     | 4.0 |                                    |                |
|                        |  |                                | <b>33</b>                |     |     |     |     |                                    |                |



**Section II. MAINTENANCE ALLOCATION CHART - Continued**

| (1)<br>GROUP<br>NUMBER | (2)<br>COMPONENT<br>ASSEMBLY   | (3)<br>MAINTENANCE<br>FUNCTION          | (4)<br>MAINTENANCE LEVEL |                   |     |   |            | (5)<br>TOOLS AND TEST<br>EQUIPMENT | (6)<br>REMARKS |
|------------------------|--|---|--------------------------|-------------------|-----|---|------------|------------------------------------|----------------|
|                        |  |   | C                        | O                 | F   | H | D          |                                    |                |
| 0302                   | Fuel Pump (Con't)<br>Pump, Fuel (Crane)                                    | Replace<br>Test<br>Repair               |                          |                   | 3.3 |   | 2.0<br>4.0 |                                    |                |
|                        | Governor, Engine<br>(Crane)  | Adjust<br>Replace<br>Repair             |                          | 1.2               | 2.1 |   | 4.0        |                                    |                |
| 0304                   | Air Cleaner  | Inspect<br>Service<br>Replace<br>Repair | 0.2<br>0.6               | 1.0<br>0.5        |     |   |            |                                    |                |
| 0306                   | Tanks, Lines, Fittings,<br>Headers<br>Tank, Fuel                           | Inspect<br>Service<br>Replace<br>Repair | 0.1<br>0.3               | 2.0<br>0.5        | 2.0 |   |            |                                    |                |
| 0309                   | Lines and Fittings<br>Fuel Filters   | Replace<br>Service<br>Replace<br>Repair | 0.3                      | 0.8<br>1.2<br>1.2 |     |   |            |                                    |                |
| 0311                   | Engine Starting Aids<br>Engine Starting Aids                               | Replace<br>Repair                       |                          | 0.5<br>0.8        |     |   |            | E                                  |                |
| 0312                   | Accelerator, Throttle<br>Choke Controls<br>Controls, Throttle<br>(Carrier) | or<br>Replace<br>Repair                 |                          | 1.5<br>0.9        |     |   |            |                                    |                |
|                        | Controls, Throttle<br>(Crane)  | Replace<br>Repair                       |                          | 1.0<br>0.9        |     |   |            |                                    |                |
| 04<br>0401             | EXHAUST SYSTEM<br>Muffler and Pipes  | Inspect<br>Replace                      |                          | 0.3<br>1.5        |     |   |            |                                    |                |
|                        |  |   |                          | <b>34</b>         |     |   |            |                                    |                |

**Section II. MAINTENANCE ALLOCATION CHART - Continued**

| (1)<br>GROUP<br>NUMBER | (2)<br>COMPONENT<br>ASSEMBLY   | (3)<br>MAINTENANCE<br>FUNCTION                     | (4)<br>MAINTENANCE LEVEL |                          |            |   |   | (5)<br>TOOLS AND TEST<br>EQUIPMENT | (6)<br>REMARKS |
|------------------------|--|--|--------------------------|--------------------------|------------|---|---|------------------------------------|----------------|
|                        |  |  | C                        | O                        | F          | H | D |                                    |                |
| 05<br>0501             | COOLING SYSTEM<br>Radiator, Evaporative<br>Cooler or Heat Ex-<br>changer<br>Radiator       | Inspect<br>Test<br>Service<br>Replace<br>Repair    | 0.3                      | 0.5<br>0.5<br>2.0        | 4.0        |   |   |                                    |                |
| 0502                   | Cowling, Deflectors, Air<br>Ducts, Shrouds, Etc.<br>Radiator Shroud                        | Replace<br>Repair                                  |                          | 0.8<br>0.4               |            |   |   |                                    |                |
| 0503                   | Water Manifolds, Head-<br>ers, Thermostats and<br>Housing Gasket<br>Hoses, Pipes, Manifold | Inspect<br>Replace<br>Test<br>Replace              |                          | 0.3<br>2.1<br>0.3<br>1.5 |            |   |   |                                    |                |
| 0504                   | Water Pump<br>Pump, Water<br>Belts   | Inspect<br>Replace<br>Inspect<br>replace           | 0.1                      | 1.0                      | 2.1        |   |   |                                    |                |
| 0505                   | Fan Assembly<br>Fan Guard<br>Belts   | Inspect<br>Replace<br>Inspect<br>Adjust<br>Replace | 0.1<br>0.1               | 0.8<br>0.9<br>1.0        |            |   |   |                                    |                |
|                        | Fan and Mounts<br>(Carrier)  | Inspect<br>Replace<br>Repair                       | 0.3                      |                          | 2.0<br>3.0 |   |   |                                    |                |
|                        | Bracket Assembly<br>(Crane)  | Inspect<br>Replace<br>Repair                       | 0.3                      | 1.5                      | 0.9        |   |   |                                    |                |
| 0508                   | Water Filter   | Replace<br>Repair                                  |                          | 1.2<br>1.2               |            |   |   |                                    |                |
|                        |  |  |                          | <b>35</b>                |            |   |   |                                    |                |

**Section II. MAINTENANCE ALLOCATION CHART - Continued**

| (1)<br>GROUP<br>NUMBER | (2)<br>COMPONENT<br>ASSEMBLY  | (3)<br>MAINTENANCE<br>FUNCTION                              | (4)<br>MAINTENANCE LEVEL |            |                   |   |   | (5)<br>TOOLS AND TEST<br>EQUIPMENT | (6)<br>REMARKS |
|------------------------|---|---|--------------------------|------------|-------------------|---|---|------------------------------------|----------------|
|                        |   |   | C                        | O          | F                 | H | D |                                    |                |
| 06<br>0601             | <b>ELECTRICAL SYSTEM</b><br>Generator<br>Generator (Model 2380<br>Carrier)<br>Alternator (Model 2385<br>Carrier)<br>Generator (Crane) | Replace<br>Repair<br>Replace<br>Repair<br>Replace<br>Repair |                          | 1.5        | 1.5               |   |   |                                    | F              |
|                        | Brushes<br>Brushes (Model 2380<br>Carrier)  | Replace<br>Replace  |                          |            | 0.9<br>0.9        |   |   |                                    |                |
|                        | Belts (Carrier)   | Adjust<br>Replace   |                          | 0.9<br>1.2 |                   |   |   |                                    |                |
| 0602                   | Generator Regulator<br>(Voltage)  |   | Adjust                   |            | 0.6               |   |   |                                    |                |
|                        |   | Regulator<br>Replace<br>Repair                              |                          | 1.5        | 2.0               |   |   |                                    |                |
| 0603                   | Starting Motor<br>Motor, Starting   | Replace<br>Repair   |                          | 1.2        | 1.8               |   |   |                                    |                |
|                        | G<br>Brushes<br>Solenoid  | Replace<br>Replace<br>Repair                                |                          |            | 0.9<br>1.5<br>1.0 |   |   |                                    |                |
| 0606                   | Engine Safety Controls<br>Circuit Breakers,<br>Switches (Carrier)   | Inspect<br>Replace  |                          | 0.1<br>1.5 |                   |   |   |                                    |                |
| 0607                   | Instrument or Engine<br>Control Panel<br>Instrument Panel,<br>Switches and Gages<br>(Electrical Gages Only)                           | Replace   |                          | 0.8        | 4.0               |   |   |                                    |                |
| 0608                   | Miscellaneous Items<br>Bus Bar and Receptacle<br>(Crane)  | Replace<br>Repair   |                          | 1.2<br>1.2 |                   |   |   |                                    |                |
| 0609                   | Lights<br>Headlights, Taillights,<br>and Floodlights  | Replace<br>Repair   |                          | 0.9<br>0.4 |                   |   |   |                                    |                |
|                        |   |   |                          | <b>36</b>  |                   |   |   |                                    |                |

**Section II. MAINTENANCE ALLOCATION CHART - Continued**

| (1)<br>GROUP<br>NUMBER | (2)<br>COMPONENT<br>ASSEMBLY  | (3)<br>MAINTENANCE<br>FUNCTION        | (4)<br>MAINTENANCE LEVEL |                   |            |      |      | (5)<br>TOOLS AND TEST<br>EQUIPMENT | (6)<br>REMARKS |
|------------------------|---|---------------------------------------|--------------------------|-------------------|------------|------|------|------------------------------------|----------------|
|                        |   |                                       | C                        | O                 | F          | H    | D    |                                    |                |
| 0610                   | Sending Units and<br>Warning Switches   | Replace                               |                          | 1.2               |            |      |      |                                    |                |
| 0611                   | Warning Switches and<br>Sending Units<br>Horn, Siren<br>Horn and Wiring<br>Assembly | Replace                               |                          | 1.0               |            |      |      |                                    |                |
| 0612                   | Batteries, Storage  | Inspect<br>Test<br>Service<br>Replace | 0.3                      | 0.6<br>0.6<br>0.9 |            |      |      |                                    |                |
|                        | Cables  | Inspect<br>Replace                    | 0.3                      | 0.6               |            |      |      |                                    |                |
|                        | Box   | Replace<br>Repair                     |                          | 1.5<br>1.0        |            |      |      |                                    |                |
| 0613                   | Hull or Chassis Wiring<br>Harness   |                                       |                          |                   |            |      |      |                                    |                |
|                        | Harness, Wiring (Carrier)   | Replace<br>Repair                     | 1.0                      | 15.0<br>4.0       |            |      |      |                                    |                |
|                        | Harness, Wiring (Crane)   | Replace<br>Repair                     | 1.0                      | 10.0<br>4.0       |            |      |      |                                    |                |
| 07<br>0705             | TRANSMISSION<br>Transmission Shifting<br>Components<br>Gearshift Assembly           | Replace<br>Repair                     |                          |                   | 1.2<br>1.2 |      |      |                                    |                |
| 0708                   | Torque Converter or<br>Fluid Coupling   | Replace<br>Repair                     |                          | 8.4               |            | 6.0  |      |                                    |                |
| 0710                   | Transmission Assembly<br>and Associated Parts<br>Transmission (Carrier)             | Service<br>Replace<br>Repair          | 1.2                      |                   | 5.7        | 12.0 | 24.0 |                                    |                |
| 0713                   | Overhaul<br>Intermediate Clutch<br>Clutches (Carrier)                               | Replace<br>Repair                     |                          |                   | 4.0        | 4.0  |      |                                    |                |
|                        | Overhaul  |                                       |                          |                   |            | 4.0  |      |                                    |                |
|                        |   |                                       |                          | <b>37</b>         |            |      |      |                                    |                |

**Section II. MAINTENANCE ALLOCATION CHART - Continued**

| (1)<br>GROUP<br>NUMBER | (2)<br>COMPONENT<br>ASSEMBLY  | (3)<br>MAINTENANCE<br>FUNCTION | (4)<br>MAINTENANCE LEVEL |            |            |                    |   | (5)<br>TOOLS AND TEST<br>EQUIPMENT | (6)<br>REMARKS |
|------------------------|---|--------------------------------|--------------------------|------------|------------|--------------------|---|------------------------------------|----------------|
|                        |   |                                | C                        | O          | F          | H                  | D |                                    |                |
| 0714                   | Servo Unit<br>Control Valve Assembly  | Replace<br>Repair              |                          |            | 2.7        | 2.4                |   |                                    |                |
| 0721                   | Coolers, Pumps, Motors<br>Filters   | Service<br>Replace<br>Repair   | 0.6                      | 0.6<br>0.6 |            |                    |   |                                    |                |
| 08                     | TRANSFER AND FINAL<br>DRIVE ASSEMBLIES  |                                |                          |            |            |                    |   |                                    |                |
| 0801                   | Final Drive Assembly<br>Drive Adapter (Model<br>2380 Carrier)   | Replace<br>Repair              |                          |            | 2.1<br>1.2 |                    |   |                                    |                |
| 09                     | PROPELLER, PROPEL-<br>LER SHAFTS, UNIVER-<br>SAL JOINTS, COUPLER,<br>AND CLAMP ASSEMBLY                       |                                |                          |            |            |                    |   |                                    |                |
| 0900                   | Propeller Shafts<br>Shafts, Universal Joints<br>(Carrier)   | Service<br>Replace<br>Repair   | 0.3                      | 2.0<br>1.5 |            |                    |   |                                    |                |
| 10                     | FRONT AXLE  |                                |                          |            |            |                    |   |                                    |                |
| 1000                   | Front Axle Assembly<br>Axle, Front (Carrier)  | Replace<br>Repair<br>Overhaul  |                          |            | 2.4        | 1.8<br>3.0         |   |                                    |                |
| 1002                   | Differential<br>Differential (Carrier)  | Replace<br>Repair<br>Replace   |                          |            |            | 8.0<br>10.0<br>3.9 |   |                                    |                |
| 1003                   | Gears, Bearings<br>(Carrier)<br>Planetary or Final Drive<br>Front Axle Planetary and<br>Final Drive (Carrier) | Replace<br>Repair              |                          |            | 3.0        | 1.2                |   |                                    |                |
| 1004                   | Steering and Leaning<br>Wheel Mechanism<br>Front Axle Steering<br>Parts (Carrier)                             | Replace<br>Repair              |                          |            |            | 1.8<br>1.8         |   |                                    |                |
|                        |   |                                |                          | <b>38</b>  |            |                    |   |                                    |                |

**Section II. MAINTENANCE ALLOCATION CHART - Continued**

| (1)<br>GROUP<br>NUMBER | (2)<br>COMPONENT<br>ASSEMBLY   | (3)<br>MAINTENANCE<br>FUNCTION         | (4)<br>MAINTENANCE LEVEL |                          |            |            |   | (5)<br>TOOLS AND TEST<br>EQUIPMENT | (6)<br>REMARKS |
|------------------------|--|--|--------------------------|--------------------------|------------|------------|---|------------------------------------|----------------|
|                        |  |  | C                        | O                        | F          | H          | D |                                    |                |
| <b>11</b>              | <b>REAR AXLE</b>   |  |                          |                          |            |            |   |                                    |                |
| 1100                   | Rear Axle Assembly<br>Axle, Rear (Carrier)   | Replace<br>Repair<br>Overhaul          |                          |                          | 6.0        | 4.0<br>8.0 |   |                                    |                |
| 1102                   | Differential   |  |                          |                          |            |            |   |                                    |                |
| 2380                   | Differential and Carrier<br>Assembly (Model<br>Carrier)  | Replace<br>Repair                      |                          |                          | 10.0       | 8.0        |   |                                    |                |
| 2385                   | Differential and Carrier<br>Assembly (Model<br>Carrier)  | Replace<br>Repair                      |                          |                          | 10.0       | 8.0        |   |                                    |                |
| 1103                   | No Spin Assembly<br>(Model 2385 Carrier)<br>Planetary or Final Drive   | Replace<br>Repair                      |                          |                          | 10.0       | 8.0        |   |                                    |                |
| 1104                   | Rear Axle Planetary and<br>Final Drive (Carrier)<br>Steering, Sideshift, and<br>Wheel Leaning Mechan-<br>ism | Replace<br>Repair                      |                          |                          | 6.0        | 4.0        |   |                                    |                |
|                        | Rear Axle Steering<br>(Carrier)  | Replace<br>Repair                      |                          |                          | 6.0<br>2.0 |            |   |                                    |                |
|                        | Rear Axle Steering Lock<br>(Carrier)   | Replace<br>Repair                      |                          | 1.0<br>0.5               |            |            |   |                                    |                |
| <b>12</b>              | <b>BRAKES</b>  |  |                          |                          |            |            |   |                                    |                |
| 1202                   | Service Brakes<br>Brakeshoes (Carrier)   | Inspect<br>Adjust<br>Replace<br>Repair |                          | 0.9<br>0.9<br>2.0<br>2.0 |            |            |   |                                    |                |
| 1208                   | Air Brake System<br>Emergency Valve<br>(Model 2385 Carrier)  | Replace                                |                          | 2.0                      |            |            |   |                                    |                |
| 2385                   | Control Valve (Model<br>Carrier)<br>Safety Valve, Relief<br>(Model 2385 Carrier)                             | Replace<br>Replace                     |                          | 2.0<br>2.0               |            |            |   |                                    |                |
|                        |  |  |                          | <b>39</b>                |            |            |   |                                    |                |

**Section II. MAINTENANCE ALLOCATION CHART - Continued**

| (1)<br>GROUP<br>NUMBER | (2)<br>COMPONENT<br>ASSEMBLY  | (3)<br>MAINTENANCE<br>FUNCTION | (4)<br>MAINTENANCE LEVEL |           |     |   |     | (5)<br>TOOLS AND TEST<br>EQUIPMENT | (6)<br>REMARKS |
|------------------------|---|--------------------------------|--------------------------|-----------|-----|---|-----|------------------------------------|----------------|
|                        |   |                                | C                        | O         | F   | H | D   |                                    |                |
| 1208                   | Air Brake System<br>(Con't)<br>Valve, Air Start (Model<br>2385 Carrier)<br>Valves (Carrier) | Replace                        |                          | 2.0       |     |   |     |                                    |                |
|                        |   | Inspect                        |                          | 0.2       |     |   |     |                                    |                |
|                        |   | Replace                        |                          | 2.0       |     |   |     |                                    |                |
|                        | Chamber, Brake<br>(Carrier)   | Replace                        |                          | 1.2       |     |   |     |                                    |                |
|                        | Tank, Air   | Repair                         |                          |           | 1.2 |   |     |                                    |                |
|                        |   | Inspect                        | 0.3                      |           |     |   |     |                                    |                |
|                        |   | Service                        | 0.6                      |           |     |   |     |                                    |                |
|                        |   | Replace                        |                          |           | 2.1 |   |     | 7 thru 10                          |                |
| 1209                   | Air Compressor Assem-<br>bly  | Service                        | 0.6                      |           |     |   |     |                                    |                |
|                        | Air Compressor<br>(Carrier)   | Replace                        |                          | 3.0       |     |   |     |                                    |                |
|                        |   | Repair                         |                          | 4.0       |     |   |     |                                    |                |
|                        | Overhaul  |                                |                          |           | 8.0 |   |     |                                    |                |
| 13                     | WHEELS AND TRACKS   |                                |                          |           |     |   |     |                                    |                |
| 1311                   | Wheel Assembly  |                                |                          |           |     |   |     |                                    |                |
|                        | Wheels (Carrier)  | Replace                        |                          |           | 1.5 |   |     | 6                                  |                |
|                        |   | Repair                         |                          |           | 0.6 |   |     |                                    |                |
|                        | Bearings (Carrier)  | Service                        |                          | 0.3       |     |   |     |                                    |                |
|                        |   | Replace                        |                          |           | 1.8 |   |     |                                    |                |
| 1313                   | Tires, Tubes, Tire<br>Chains  |                                |                          |           |     |   |     |                                    |                |
|                        | Tires (Carrier)   | Service                        | 0.3                      |           |     |   |     | 2                                  |                |
|                        |   | Replace                        |                          | 2.0       |     |   |     |                                    |                |
|                        |   | Repair                         |                          | 1.0       |     |   | 8.0 | 3                                  |                |
| 14                     | STEERING  |                                |                          |           |     |   |     |                                    |                |
| 1401                   | Mechanical Steering<br>Gear Assembly  |                                |                          |           |     |   |     |                                    |                |
|                        | Steering Assembly<br>(Carrier)  | Inspect                        | 0.3                      |           |     |   |     |                                    |                |
|                        |   | Adjust                         |                          | 0.9       |     |   |     |                                    |                |
|                        |   | Replace                        |                          |           | 4.0 |   |     |                                    |                |
|                        |   | Repair                         |                          |           | 1.8 |   |     |                                    | H              |
|                        |   |                                |                          | <b>40</b> |     |   |     |                                    |                |

**Section II. MAINTENANCE ALLOCATION CHART - Continued**

| (1)<br>GROUP<br>NUMBER | (2)<br>COMPONENT<br>ASSEMBLY  | (3)<br>MAINTENANCE<br>FUNCTION | (4)<br>MAINTENANCE LEVEL |           |   |   |   | (5)<br>TOOLS AND TEST<br>EQUIPMENT | (6)<br>REMARKS |
|------------------------|---|--------------------------------|--------------------------|-----------|---|---|---|------------------------------------|----------------|
|                        |   |                                | C                        | O         | F | H | D |                                    |                |
| 1407                   | Power Steering Gear As-<br>sembly<br>Gear Box (Carrier)                     | Service<br>Replace<br>Repair   | 2.0<br>3.6<br>3.0        |           |   |   |   |                                    |                |
| 1410                   | Hydraulic Pump or Fluid<br>Motor Assembly<br>Pumps                          | Replace<br>Repair              | 4.0<br>3.0               |           |   |   |   |                                    |                |
| 1411                   | Hoses, Lines, Fittings<br>Hoses, Fittings (Carrier)                         | Inspect<br>Replace             | 0.3<br>3.3               |           |   |   |   |                                    |                |
| 1412                   | Hydraulic or Air Cylin-<br>ders<br>Steering Cylinders<br>(Carrier)          | Replace<br>Repair              | 4.0<br>4.0               |           |   |   |   |                                    |                |
| 1414                   | Steering System Valves<br>Valves (Carrier)                                  | Replace<br>Repair              | 2.4<br>1.8               |           |   |   |   |                                    |                |
|                        | Steering Cylinder Valves<br>(Carrier)                                       | Replace                        | 2.4                      |           |   |   |   |                                    |                |
| 15                     | FRAME, TOWING AT-<br>TACHMENTS, DRAW-<br>BARS AND ARTICULA-<br>TION SYSTEMS |                                |                          |           |   |   |   |                                    |                |
| 1501                   | Frame Assembly<br>Frame, Main (Carrier)                                     | Replace<br>Repair              | 9.6<br>5.7               |           |   |   |   |                                    |                |
| 1503                   | Pintles and Towing At-<br>tachments<br>Pintle Assembly, Towing<br>(Carrier) | Replace<br>Repair              | 1.5<br>0.8               |           |   |   |   |                                    |                |
| 18                     | BODY, CAB, HOOD,<br>AND HULL  |                                |                          |           |   |   |   |                                    |                |
| 1801                   | Body, Cab, Hood, and<br>Hull Assemblies<br>Cab                              | Replace<br>Repair              | 24.0<br>8.0              |           |   |   |   |                                    |                |
|                        |   |                                |                          | <b>41</b> |   |   |   |                                    |                |



**Section II. MAINTENANCE ALLOCATION CHART - Continued**

| (1)<br>GROUP<br>NUMBER | (2)<br>COMPONENT<br>ASSEMBLY                    | (3)<br>MAINTENANCE<br>FUNCTION | (4)<br>MAINTENANCE LEVEL |           |     |   |   | (5)<br>TOOLS AND TEST<br>EQUIPMENT | (6)<br>REMARKS |
|------------------------|---|--------------------------------|--------------------------|-----------|-----|---|---|------------------------------------|----------------|
|                        |   |                                | C                        | O         | F   | H | D |                                    |                |
| 1801                   | Body, Cab, Hood, and<br>Hull Assemblies (Con't) | Replace                        |                          | 1.2       |     |   |   |                                    |                |
|                        | Doors (Carrier)                                 | Repair                         |                          | 1.2       |     |   |   |                                    |                |
|                        | Doors, Side (Crane)                             | Replace                        |                          | 1.5       |     |   |   |                                    |                |
| 1802                   | Doors, Rear (Crane)                             | Replace                        |                          | 1.0       |     |   |   |                                    |                |
|                        | Fenders and Running<br>Boards                   |                                |                          |           |     |   |   |                                    |                |
|                        | Glass   | Replace                        |                          | 1.8       |     |   |   |                                    |                |
|                        |   | Repair                         |                          | 1.8       |     |   |   |                                    |                |
|                        | Outriggers (Carrier)                            | Inspect                        | 0.3                      |           |     |   |   |                                    |                |
|                        |   | Replace                        |                          |           | 2.4 |   |   |                                    |                |
|                        |   | Repair                         |                          |           | 2.7 |   |   |                                    |                |
|                        | Cylinder, Outrigger<br>(Carrier)                | Replace                        |                          | 2.0       |     |   |   |                                    |                |
| 1806                   | Upholstery, Seats and<br>Carpets                | Repair                         |                          |           | 6.0 |   |   |                                    |                |
|                        | Seat Assemblies<br>(Carrier)                    | Replace                        |                          | 1.0       |     |   |   |                                    |                |
| 1808                   | Stowage Racks and<br>Boxes                      | Repair                         |                          | 1.8       |     |   |   |                                    |                |
| 22                     | Tool Box (Crane)                                | Replace                        |                          | 1.5       |     |   |   |                                    |                |
|                        | BODY, CHASSIS AND<br>HULL ACCESSORY<br>ITEMS    |                                |                          |           |     |   |   |                                    |                |
| 2202                   | Accessory Items                                 |                                |                          |           |     |   |   |                                    |                |
|                        | Defroster Fan (Carrier)                         | Replace                        |                          | 0.9       |     |   |   |                                    |                |
|                        | Heaters (Carrier)                               | Replace                        |                          | 1.5       |     |   |   |                                    |                |
|                        |   | Repair                         |                          | 1.5       |     |   |   |                                    |                |
|                        | Heaters (Crane)                                 | Replace                        |                          | 1.5       |     |   |   |                                    |                |
|                        |   | Repair                         |                          | 1.2       |     |   |   |                                    |                |
|                        | Wiper Motor (Carrier)                           | Replace                        |                          | 0.6       |     |   |   |                                    |                |
|                        |   | Repair                         |                          | 0.9       |     |   |   |                                    |                |
| 2210                   | Data Plates and Instruc-<br>tion Holders        |                                |                          |           |     |   |   |                                    |                |
|                        | Data Plates (Carrier)                           | Replace                        |                          | 0.3       |     |   |   |                                    |                |
|                        |   |                                |                          | <b>42</b> |     |   |   |                                    |                |

**Section II. MAINTENANCE ALLOCATION CHART - CONTINUED**

| (1)<br>GROUP<br>NUMBER | (2)<br>COMPONENT ASSEMBLY  | (3)<br>MAINTENANCE<br>FUNCTION                               | (4)<br>MAINTENANCE CATEGORY |                                 |            |   |   | (5)<br>TOOLS AND<br>EQUIPMENT | (6)<br>REMARKS |
|------------------------|--|--|-----------------------------|---------------------------------|------------|---|---|-------------------------------|----------------|
|                        |  |  | C                           | O                               | F          | H | D |                               |                |
| <b>24</b>              | <b>HYDRAULIC AND FLUID SYSTEMS</b>   |  |                             |                                 |            |   |   |                               |                |
| 2401                   | <i>Pump and Motor</i><br>Motor, Hydraulic<br>(Model 2385)  | Replace<br>Repair  |                             |                                 | 2.4<br>2.1 |   |   |                               |                |
| 2402                   | <i>Manifold and Control</i><br>Valves<br>Valve Fan Drive (Model<br>2385)<br>Relief and Check Valves<br>(Carrier)<br>Valves, Unloader, Linear<br>Direct, Tilt Lock<br>(Carrier)<br>Levers, Rods (Carrier) | Replace<br>Repair<br>Replace<br>Replace<br>Repair<br>Replace |                             | 1.5<br>1.5<br>1.5               | 1.8<br>1.8 |   |   |                               |                |
| 2406                   | <i>Strainers, Filters, Lines<br/>and Fittings</i><br>Hoses, Fittings   | Inspect<br>Replace<br>Repair<br>Replace<br>Repair            |                             | 0.3<br>3.3<br>2.4<br>0.9<br>0.3 |            |   |   |                               |                |
| 2408                   | <i>Liquid Tanks or Reser-<br/>voirs</i><br>Tank, Supply and<br>Hydraulic   | Replace  |                             |                                 | 3.0        |   |   |                               |                |
| <b>47</b>              | <b>GAGES (NONELECTRI-<br/>CAL), WEIGHING AND<br/>MEASURING DEVICES</b>   |  |                             |                                 |            |   |   |                               |                |
| 4701                   | <i>Instruments</i><br>Speedometer and<br>Tachometer  | Inspect<br>Replace   | 0.1                         | 1.5                             |            |   |   |                               |                |
| 4702                   | <i>Gages, Mountings,<br/>Lines, and Fittings</i><br>Gages  | Inspect<br>Replace   | 0.1                         | 1.5                             |            |   |   |                               |                |
|                        |  | <b>43</b>  |                             |                                 |            |   |   |                               |                |

**Section II. MAINTENANCE ALLOCATION CHART - CONTINUED**

| (1)<br>GROUP<br>NUMBER | (2)<br>COMPONENT ASSEMBLY   | (3)<br>MAINTENANCE<br>FUNCTION              | (4)<br>MAINTENANCE CATEGORY |     |            |   |                           | (5)<br>TOOLS AND<br>EQUIPMENT | (6)<br>REMARKS  |
|------------------------|---|---|-----------------------------|-----|------------|---|---------------------------|-------------------------------|---|
|                        |   |   | C                           | O   | F          | H | D                         |                               |   |
| <b>50</b>              | <b>PNEUMATIC EQUIP-<br/>MENT</b>  |   |                             |     |            |   |                           |                               |   |
| 5000                   | <i>Air Compressor Assem-<br/>bly</i>  |   |                             |     |            |   |                           |                               |   |
| 5001                   | Mounting Hardware<br><i>Crankcase, Block, Cylin-<br/>der Head</i>                       | Replace                                     |                             |     | 1.0        |   |                           |                               |   |
| 5002                   | Crankcase and Head,<br>Air Compressor   | Replace                                     |                             |     | 2.7        |   |                           |                               |   |
| 5004                   | <i>Crankshaft</i><br><i>Pistons, Connecting<br/>Rods and Rotors</i>                     | Replace<br>Replace                          |                             |     | 4.2        |   |                           |                               |   |
| 5006                   | Air Compressor<br>Piston and Connecting<br>Rod  | Replace<br>Repair                           |                             |     | 2.0<br>1.0 |   |                           |                               |   |
| 5008                   | <i>Lubrication System</i><br>Air Compressor<br>Lines and Fittings<br><i>Air Intakes</i> | Replace<br>Repair                           |                             |     | 0.9<br>0.9 |   |                           |                               |   |
| 5009                   | Air Inlet<br><br><i>Unloader System Com-<br/>ponents</i><br>Valve, Unloader             | Inspect<br>Replace<br><br>Replace<br>Repair | 0.1                         | 1.2 |            |   |                           |                               |   |
| <b>74</b>              | <b>CRANES, SHOVELS<br/>AND EARTHMOVING<br/>EQUIPMENT COMPO-<br/>NENTS</b>               |   |                             |     |            |   |                           |                               |   |
| 7411                   | <i>Crane, Dragline or<br/>Clamshell Attachments</i><br>Boom, Jib, and Insert            | Inspect<br>Test<br>Replace<br>Repair        | 0.3                         | 0.8 |            |   | 2.0<br>2.0<br>2.0<br>24.0 |                               | Weld at<br>Depot<br>only.<br>Cold<br>repair<br>at DS. |

**Section II. MAINTENANCE ALLOCATION CHART - CONTINUED**

| (1)<br>GROUP<br>NUMBER | (2)<br>COMPONENT ASSEMBLY  | (3)<br>MAINTENANCE<br>FUNCTION | (4)<br>MAINTENANCE CATEGORY |     |     |   |   | (5)<br>TOOLS AND<br>EQUIPMENT | (6)<br>REMARKS |
|------------------------|--|--------------------------------|-----------------------------|-----|-----|---|---|-------------------------------|----------------|
|                        |  |                                | C                           | O   | F   | H | D |                               |                |
| 7411                   | <i>Crane, Dragline or<br/>Clamshell Attachments<br/>(Con 't)</i><br>Clamshell Bucket | Inspect                        | 0.2                         |     |     |   |   |                               |                |
|                        |  | Service                        | 0.2                         |     |     |   |   |                               |                |
|                        | Replace  |                                | 2.0                         |     |     |   |   |                               |                |
|                        | Repair   |                                | 2.0                         | 6.0 |     |   |   |                               |                |
|                        | Tagline  | Inspect                        |                             | 0.1 |     |   |   |                               |                |
|                        |  | Replace                        |                             | 1.5 |     |   |   |                               |                |
|                        | Dragline Bucket  | Repair                         |                             | 1.0 |     |   |   |                               |                |
|                        |  | Inspect                        | 0.2                         |     |     |   |   |                               |                |
|                        |  | Service                        | 0.2                         |     |     |   |   |                               |                |
|                        |  | Replace                        |                             | 1.0 |     |   |   |                               |                |
|                        | Bucket Teeth   | Repair                         |                             | 2.0 | 6.0 |   |   |                               |                |
|                        |  | Replace                        |                             | 2.0 |     |   |   |                               |                |
|                        | Fairlead   | Inspect                        |                             | 0.1 |     |   |   |                               |                |
|                        |  | Replace                        |                             | 2.0 |     |   |   |                               |                |
|                        | Sheaves  | Repair                         |                             | 1.0 |     |   |   |                               |                |
|                        |  | Inspect                        | 0.1                         |     |     |   |   |                               |                |
|                        |  | Service                        | 0.1                         |     |     |   |   |                               |                |
|                        |  | Replace                        |                             | 1.5 |     |   |   |                               |                |
|                        | Hook Block   | Repair                         |                             | 1.0 |     |   |   |                               |                |
|                        |  | Inspect                        | 0.1                         |     |     |   |   |                               |                |
|                        |  | Service                        | 0.1                         |     |     |   |   |                               |                |
|                        |  | Replace                        |                             | 0.5 |     |   |   |                               |                |
|                        | Boom Stop  | Repair                         |                             | 2.0 |     |   |   |                               |                |
| Inspect                |  |                                | 0.1                         |     |     |   |   |                               |                |
| Wire Rope              | Replace  |                                | 0.8                         |     |     |   |   |                               |                |
|                        | Repair   |                                | 1.0                         |     |     |   |   |                               |                |
|                        | Inspect  | 0.5                            |                             |     |     |   |   |                               |                |
|                        | Replace  | 2.0                            | 2.0                         |     |     |   |   |                               |                |
| 7413                   | <i>Pile Drive Attachment</i><br>Pile Drive Leads                                     | Inspect                        | 0.2                         |     |     |   |   |                               |                |
|                        |  | Replace                        |                             | 2.0 |     |   |   |                               |                |
| Catwalk                | Repair   |                                | 0.8                         | 4.0 |     |   |   |                               |                |
|                        | Replace  | 0.5                            |                             |     |     |   |   |                               |                |
|                        |  | Repair                         |                             | 0.5 |     |   |   |                               |                |
|                        |  | <b>45</b>                      |                             |     |     |   |   |                               |                |

**Section II. MAINTENANCE ALLOCATION CHART - CONTINUED**

| (1)<br>GROUP<br>NUMBER | (2)<br>COMPONENT ASSEMBLY                   | (3)<br>MAINTENANCE<br>FUNCTION | (4)<br>MAINTENANCE CATEGORY |      |      |   |   | (5)<br>TOOLS AND<br>EQUIPMENT | (6)<br>REMARKS |
|------------------------|---|--------------------------------|-----------------------------|------|------|---|---|-------------------------------|----------------|
|                        |   |                                | C                           | O    | F    | H | D |                               |                |
| 7414                   | Base Deck<br>Revolving Base (Crane)         | Inspect                        | 0.2                         |      |      |   |   |                               |                |
|                        |   | Service                        | 0.1                         |      |      |   |   |                               |                |
|                        |   | Replace                        |                             |      | 8.0  |   |   |                               |                |
|                        | Bushing, Pivot (Crane)                      | Repair                         |                             |      | 7.0  |   |   |                               |                |
|                        |   | Service                        |                             | 0.1  |      |   |   |                               |                |
| 7415                   | Clutch<br>Clutch Assembly<br>(Crane)        | Replace                        |                             |      | 5.0  |   |   |                               |                |
|                        |   | Inspect                        |                             | 0.2  |      |   |   |                               |                |
|                        |   | Service                        | 0.1                         |      |      |   |   |                               |                |
|                        | Clutch Assembly,<br>Auxiliary Shaft         | Adjust                         | 0.5                         |      |      |   |   |                               |                |
|                        |   | Replace                        | 2.0                         |      |      |   | 1 | I                             |                |
|                        |   | Repair                         | 2.0                         |      |      |   |   |                               |                |
|                        |   | Inspect                        | 0.2                         |      |      |   |   |                               |                |
|                        |   | Service                        | 0.4                         |      |      |   |   |                               |                |
|                        |   | Adjust                         | 1.0                         |      |      |   |   |                               |                |
|                        | Brake Assembly, Boom<br>(Crane)             | Replace                        | 9.0                         |      |      |   |   |                               |                |
|                        |   | Repair                         | 2.0                         |      |      |   |   |                               |                |
|                        |   | Inspect                        | 0.2                         |      |      |   |   |                               |                |
|                        |   | Service                        | 0.1                         |      |      |   |   |                               |                |
|                        |   | Adjust                         | 1.0                         |      |      |   |   |                               |                |
|                        | Brake Assembly, Swing<br>(Crane)            | Replace                        | 2.0                         |      |      |   |   |                               |                |
| Repair                 |   | 2.0                            |                             |      |      |   |   |                               |                |
| Inspect                |   | 0.2                            |                             |      |      |   |   |                               |                |
| Service                |   | 0.1                            |                             |      |      |   |   |                               |                |
| Adjust                 |   | 1.0                            |                             |      |      |   |   |                               |                |
| 7416                   | Shafts<br>Counter Shaft Assembly<br>(Crane) | Replace                        | 2.0                         |      |      |   |   |                               |                |
|                        |   | Service                        | 0.1                         |      |      |   |   |                               |                |
|                        |   | Replace                        |                             | 12.0 |      |   |   |                               |                |
|                        | Shaft Assembly, Swing<br>(Crane)            | Repair                         |                             |      | 15.0 |   |   |                               |                |
|                        |   | Inspect                        | 0.2                         |      |      |   |   |                               |                |
|                        |   | Service                        | 0.1                         |      |      |   |   |                               |                |
|                        | Shaft Assembly, Drum<br>(Crane)             | Replace                        |                             | 10.0 |      |   |   |                               |                |
|                        |   | Repair                         |                             |      | 12.0 |   |   |                               |                |
|                        |   | Inspect                        | 0.2                         |      |      |   |   |                               |                |
|                        |   | Service                        | 0.1                         |      |      |   |   |                               |                |
|                        |   | Replace                        |                             | 10.5 |      |   |   |                               |                |
|                        |   | Repair                         |                             |      | 15.0 |   |   |                               |                |



**Section II. MAINTENANCE ALLOCATION CHART - CONTINUED**

| (1)<br>GROUP<br>NUMBER | (2)<br>COMPONENT ASSEMBLY   | (3)<br>MAINTENANCE<br>FUNCTION                    | (4)<br>MAINTENANCE CATEGORY |            |                          |   |   | (5)<br>TOOLS AND<br>EQUIPMENT | (6)<br>REMARKS |
|------------------------|---|---|-----------------------------|------------|--------------------------|---|---|-------------------------------|----------------|
|                        |   |   | C                           | O          | F                        | H | D |                               |                |
| 7419                   | Turntable<br>Lock, Cab Assembly<br>(Crane)  | Service<br>Replace<br>Repair                      | 0.2                         | 2.0        | 4.5                      |   |   |                               |                |
| 7420                   | Machinery Gear Case or<br>Frame<br>Gear Guard Assembly<br>(Crane)                                     | Replace<br>Repair                                 |                             | 2.0<br>2.0 |                          |   |   |                               |                |
| 7422                   | Machinery Mechanism<br>Controls<br>Lever Assemblies, Main,<br>Roller Clutch and Main<br>Hoist (Crane) | Inspect<br>Service<br>Replace<br>Repair           | 0.2<br>0.2                  | 2.0<br>1.0 |                          |   |   |                               |                |
| 7435                   | Master Clutch Control<br>(Crane)<br>Moldboard Assembly<br>Utility Blade Assembly                      | Replace<br>Repair                                 |                             | 2.0<br>1.0 |                          |   |   |                               |                |
|                        | Cylinder, Dozer Blade   | Inspect<br>Replace<br>Repair<br>Replace<br>Repair |                             | 0.2        | 4.0<br>2.0<br>4.0<br>1.0 |   |   |                               |                |

**SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS FOR AN/GRC-240**

| (1)<br>TOOL OR TEST<br>EQUIPMENT<br>Reference CODE | (2)<br>MAINTENANCE<br>LEVEL | (3)<br>NOMENCLATURE  | (4)<br>NATIONAL/NATO<br>STOCK NUMBER | (5)<br>TOOL<br>NUMBER |
|--|-----------------------------|----------------------|--------------------------------------|-----------------------|
| 1  | O                           | Wrench               | 812903 (93389)                       |                       |
| 2  | O                           | Inflator-Gage Pneum  | 4910-00-157-1353                     | 13213E9570            |
| 3  | O                           | RPR KT Tubeless TIR  | 2640-00-922-6921                     | M100                  |
| 4  | O                           | Wrench, Torque       | 5120-00-293-2365                     | GGGW686               |
| 5  | O                           | Adapter              | 5120-00-103-4687                     | ST 669                |
| 6  | F                           | Wrench, Socket       | 13216E4620 (97403)                   |                       |
| 7  | F                           | Charging Assembly, A | 4931-00-471-0559                     | 30011-300             |
| 8  | F                           | Gasket, Connector    | 5330-00-235-5720                     | 6070-20               |
| 9  | F                           | Connector            | 4730-00-401-3741                     | 6070X1                |
| 10   | F                           | Connector            | 1394 (58553)                         |                       |
| 11   | H                           | Cutter, Ball Set     | 5110-00-981-3106                     | ST 955                |

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|----------------|-----|---|
|                | A   | Repair includes metalizing and resizing.      |
|                | B   | Repair includes replacement of the ring gear. |
|                | C   | Replacement includes refacing.                |
|                | D   | Service includes cleaning filter.             |
|                | E   | Includes replacement of cartridge.            |
|                | F   | Repair includes installing repair kit.        |
|                | G   | Repair includes installing repair kit.        |
|                | H   | Repair includes installing repair kit.        |
|                | I   | Adjust swing clutch.                          |

*Page FP-II(FP-2Blank). Figure FO-1 is added after page 1-5 as shown.*



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Distribution:

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Technical Manual  
 No. 5-3810-232-12 }  
 }  
 }

HEADQUARTERS  
 DEPARTMENT OF THE ARMY  
 Washington, D. C. 10 September 1970

**OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL  
 CRANE, WHEEL MOUNTED: 20-TON AT 10 FOOT RADIUS,  
 2 ENGINES, DIESEL ENGINE DRIVEN 4 X 4 AIR  
 TRANSPORTABLE, PHASE III; W/BLADE BULLDOZER,  
 EARTHMOVING; W/BLOCK, TACKLE, 20-TON; w/BOOM  
 CRANE, 30-FOOT (AMERICAN HOIST AND DERRICK MODEL 2380)  
 FSN 3810-763-7728  
 (AMERICAN HOIST AND DERRICK MODEL 2385) FSN 3810-043-5354**

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# CHAPTER 1 INTRODUCTION

---

## Section I. GENERAL

### 1-1. Scope

a. These instructions are published for the use of the personnel maintaining the Rough Terrain Crane (American Hoist and Derrick Models 2380 and 2385) as allocated by the Maintenance Allocation Chart. It provides information on operational and organizational maintenance of the equipment, its accessories, and auxiliaries. The organizational maintenance repair parts and special tools list are in TM 5-3810-232-20P.

b. Numbers in parentheses on illustrations indicate the quantity. Numbers preceding nomenclature call-outs on illustrations indicate the preferred maintenance sequence.

### 1-2. Forms and Records

a. DA Forms and records used for equipment maintenance will be only those prescribed in TM 8-750.

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

### 1-3. Equipment Serviceability Criteria

Refer to TM 5-3810-232-ESC for equipment serviceability criteria.

### 1-4. Administrative Storage

Refer to TM 740-90-1 for administrative storage.

### 1-5. Demolition to Prevent Enemy Use

Refer to TM 750-244-3 for demolition to prevent enemy use.

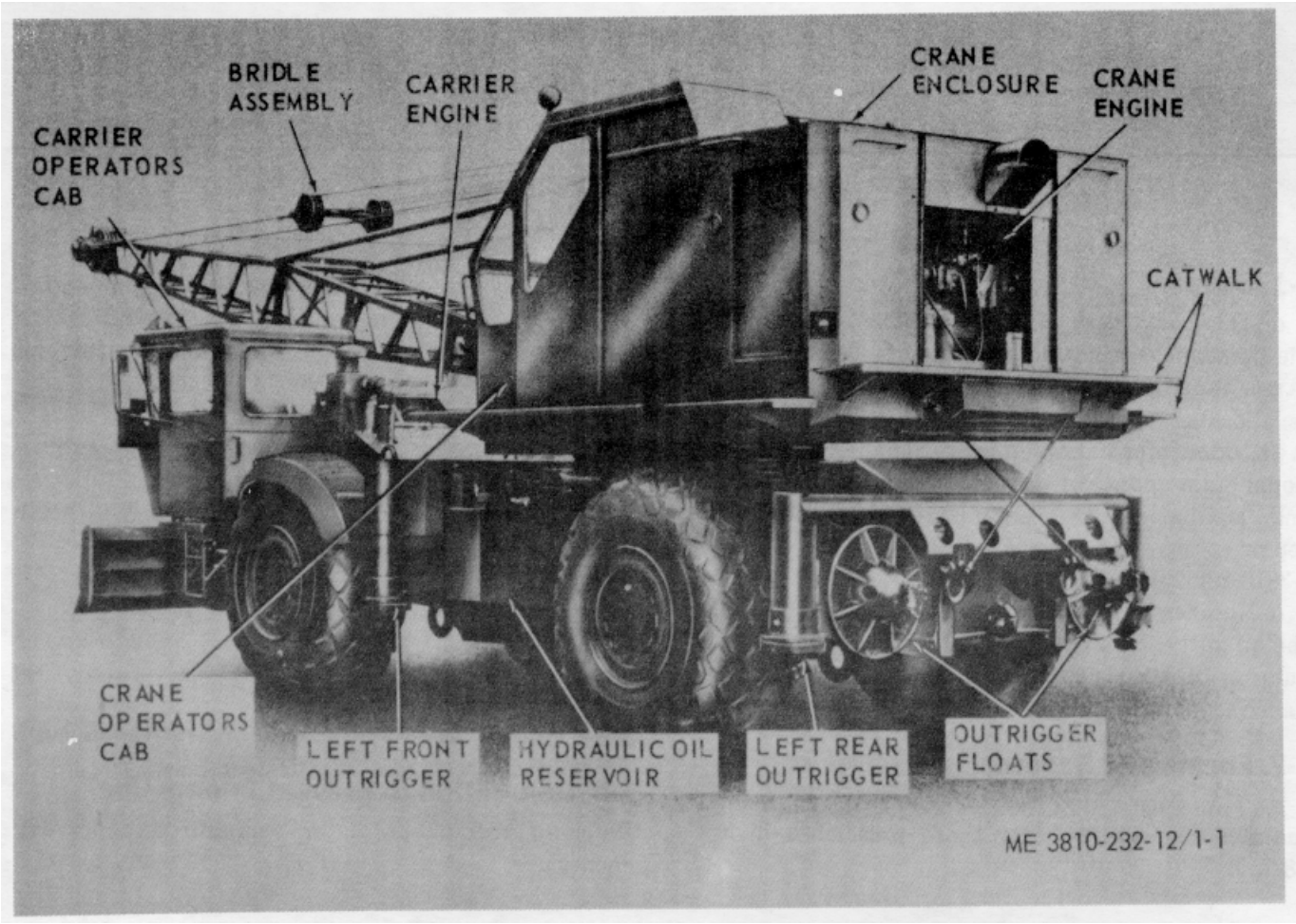
## Section II. DESCRIPTION AND DATA

### 1-6. Description

#### a. General

(1) *Crane and carrier.* The crane (fig. 11, 12, 13, and 14) is a diesel engine driven, 20-ton lift

capacity crane equipped with a 30-foot boom; and a utility blade; and 20-ton block and tackle. It is wheel mounted and is designed for operation in rough terrain. This crane is air transportable by segmentation of components.



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Figure 1-1. Crane, left rear, three-quarter view (model 2380).

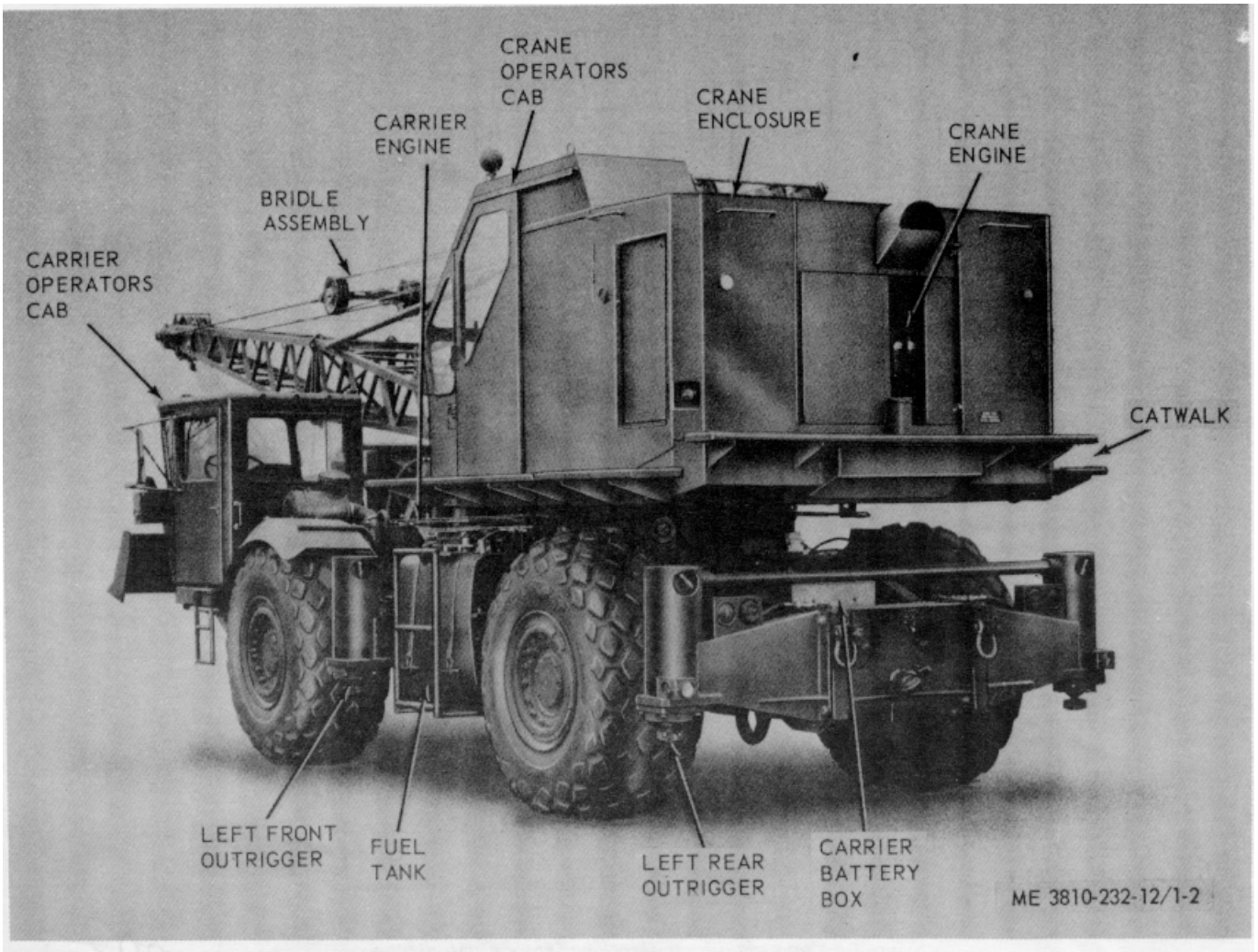


Figure 1-2. Crane, left rear, three-quarter view (model 2385).

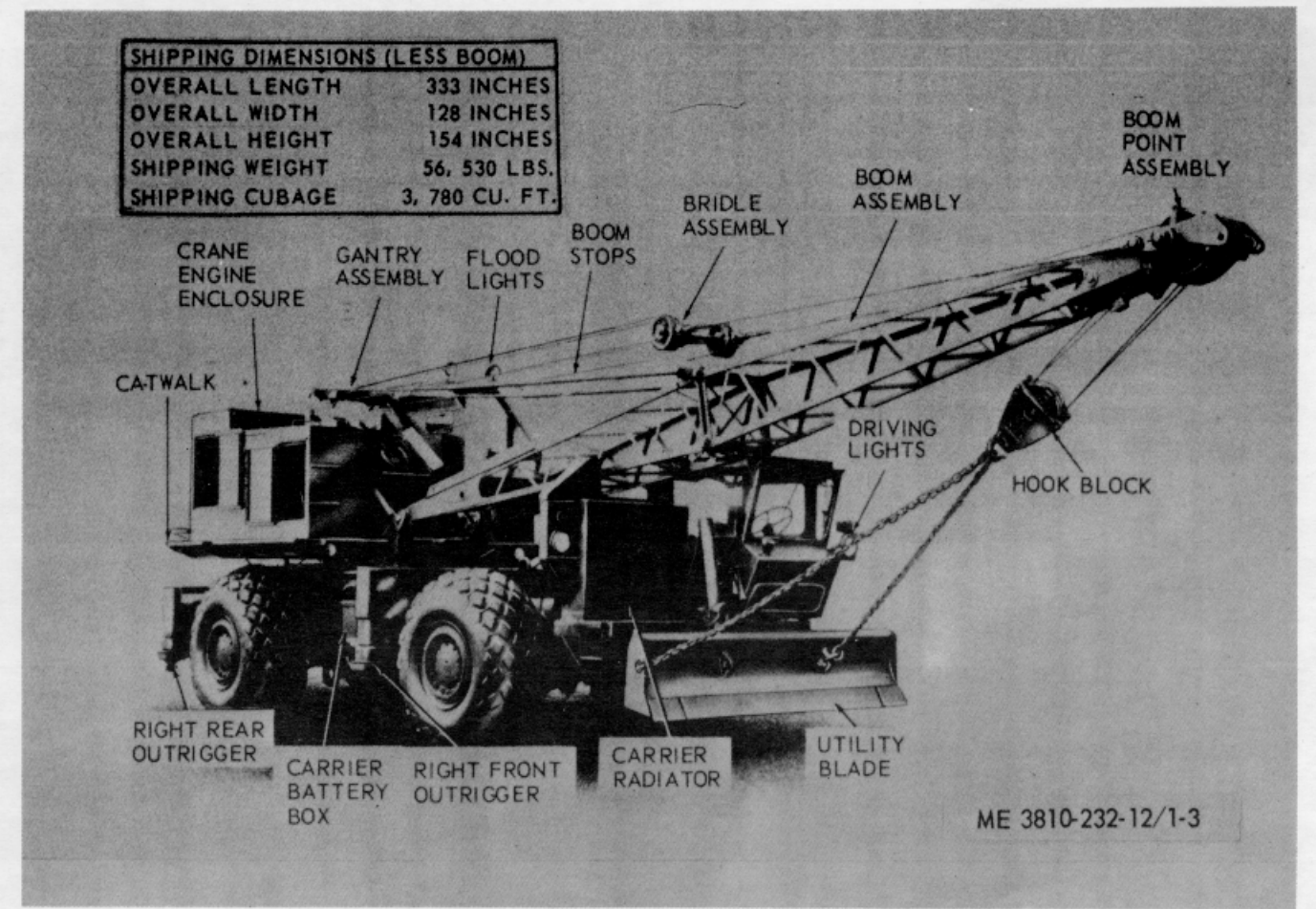


Figure 1-3. Crane, , right. front, three-quarter view, with shipping dimensions (model 2880).

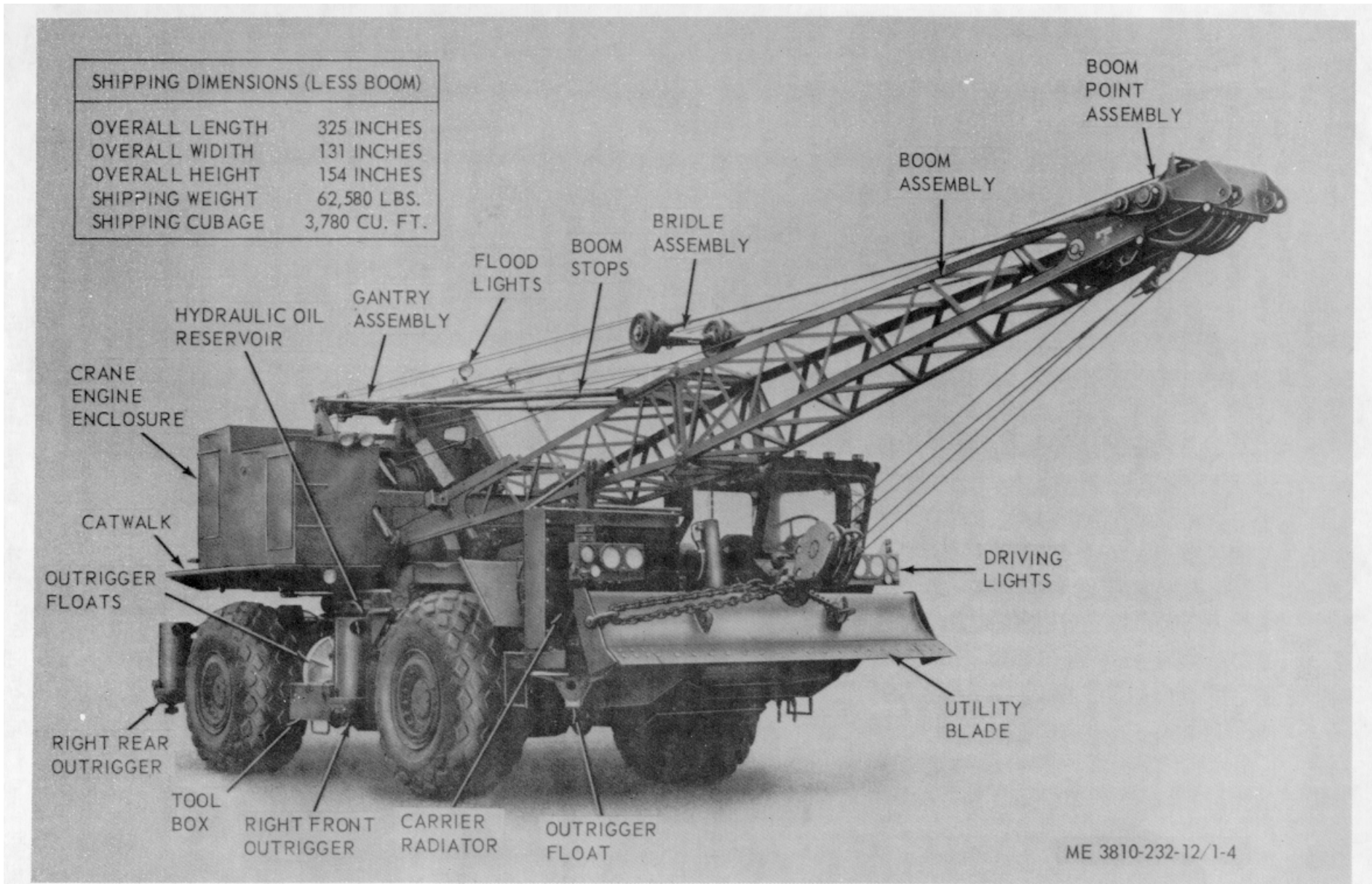


Figure 1-4. Crane, right front, three-quarter view with shipping dimensions (model 2385).

(2) *Crane*. The crane is powered by a 6-cylinder Cummins Model JN-6 naturally aspirated diesel engine. It is mounted at the rear of the revolving upper structure. The cab provides an enclosure for the operator, controls, and instruments. The upper structure revolves on rollers around a center pin. The crane cab has a personnel heater for crew comfort.

(3) *Carrier*. The crane carrier is a heavy-duty 4-wheel drive unit with both front and rear steerable wheels. The carrier is powered by an 8-cylinder Cummins Model V8-265 naturally aspirated diesel engine. The carrier is equipped with hydraulic operated outriggers mounted on each side of the carrier frame to stabilize the equipment when in use. The carrier is equipped with a hydraulically operated utility blade for clearing a path for the crane to travel and to clear suitable operating areas for the outriggers to be positioned. The carrier cab is equipped with a personnel heater.

b. *Terms*. In this manual, the terms "left" and "right" are used with respect to the carrier operator's seat. "Front" is the end of the crane where the boom is mounted. "Rear" is the end of the crane which contains the engine.

#### **1-7. Difference in Models**

This manual covers the American Hoist and Derrick Models 2380 and 2385 Rough Terrain Crane. Where differences exist, each model is covered separately in the applicable portions of this manual.

#### **1-8. Identification and Tabulated Data**

a. *Identification*. The models 2380 and 2385 cranes have 16 each identification plates. Plates with different locations and data are indicated by model no. The information on these plates is listed below.

(1) *Corps of Engineers identification plate*.

Located on the left side of the revolving super-structure frame of the crane. It gives the nomenclature, Federal stock number, manufacturer, model, serial number, date of manufacturer, contract number, and USA registration number. It also gives the make, model and serial number of the crane engine.

(2) *Transportation data instruction plates*.

(a) *Crane*. Located on the left side of the crane revolving superstructure for the combined crane and carrier. It gives data on the length, height, width, and weight of the crane. It also shows the lifting sling positions.

(b) *Carrier (model 2380 only)*. Located on the left side of the carrier main frame. It gives data on the length, width, height, and weight of the carrier.

(3) *Carrier information data plate (model 2385 only)*. Located on the carrier main frame to the rear

of the fuel tank. It shows nominal weight and dimensions for locating center of gravity.

(4) *Carrier attachment data plate (model 2385 only)*. Located on the carrier main frame to the fuel tank next to the information data plate. It shows size, capacity and location for attaching lifting slings. It also shows tiedown locations.

(5) *Crane control lever instruction plate*. Located inside the cab to the right of the operators controls. It gives instructions on the use of levers, pedals, and other controls.

(6) *Crane lifting capacities, boom angle, and height instruction plate*. Located to operator's left on rear of door. It shows lifting capacities of the crane at different radii and boom lengths, both with and without outriggers.

(7) *Power line caution plates*. There are two power line caution plates. One located in each of the operator's cabs, to the right of the operator's controls. It cautions the operator to keep boom away from the power lines.

(8) *Brake caution plate (model 2380 only)*. Located inside of the operator's cab of the carrier. It gives instructions on the use of the brakes.

(9) *Boom caution plate*. Located on the outside of the back of the carrier operator's cab. It gives instructions on supporting the boom with cables when traveling.

(10) *Front axle instruction plate (model 2380 only)*. Located on the floor, beside the shift lever. It shows the position of the declutch control.

(11) *Boom hoist jaw clutch and ratchet instruction plate*. Located in the crane operator's cab, behind and to the right of the operator's seat. It shows shifting position of the jaw clutch lever and the safety pawl (boom hoist ratchet) control lever.

(12) *Engine clutch instruction plate (model 2380 only)*. Located in the crane operator's cab, behind and to the right of the operator's seat. It shows shifting position of the engine clutch lever.

(13) *Antirotation device instruction plate (model 2380 only)*. Located on the rear of revolving super-structure frame of the crane. It gives instructions on the use of the antirotation device.

(14) *Carrier diesel fuel tank capacity plate (model 2380 only)*. Located on the rear of the carrier main frame near the fuel tank filler. It gives capacity of the fuel tank.

(15) *Crane diesel fuel tank capacity plate (model 2385 only)*. Located just above the rear walkway at the right rear corner of the crane cab near the fuel tank filler. It gives the capacity of the fuel tank.

(16) *Ring gear data plate*. Located on top of one of the ring gear spokes on the carrier. It shows nominal weight of the ring gear.



(17) *Inner boom data plate.* Located on the left side of the boom near the lower end. It shows nominal weight and dimensions for locating the center of gravity for transportation of boom.

(18) *Outer boom data plate.* Located on the left side of the outer boom near the sheave point. It shows nominal weight of the outer boom and dimensions for locating the center of gravity for transportation of boom.

(19) *Crane (upper works) attachment data plate (model 2385 only).* Located on the left side at the front of the revolving superstructure frame. It shows nominal crane weight and dimensions for locating center of gravity.

(20) *Crane engine clutch instruction plate.* Located on the clutch housing. It provides information for lubrication and adjustment of the clutch.

(21) *Crane house lock instruction plate (model 2385 only).* There are two crane house lock instruction plates. One located inside the cab on the operator's right, down near the hoist brake pedal, and one located on the outside of the operator's cab door. They give instructions for engaging and disengaging the house lock.

b. *Tabulated Data.*

(1) *General.*

Manufacturer ..... American Hoist and Derrick Co.  
 Model no ..... 2380 and 2385  
 Design ..... Rough terrain

(2) *Carrier.*

Manufacturer ..... American Hoist and Derrick Co.  
 Designed use ..... Rough terrain

(3) *Engine (carrier).*

Manufacturer ..... Cummins  
 Model ..... V8-265 (model 2380)  
 V8-265BI (model 2385)  
 Type ..... Diesel  
 Bore ..... 5.5 in (inches)  
 Stroke ..... 4.125 in.  
 Total displacement ..... 785 cubic in.  
 Governor speed ..... 2600 rpm, full load  
 Horsepower ..... 265  
 Number of cylinders ..... 8  
 Compression ..... 15:1  
 Cooling ..... Liquid  
 Rotation at flywheel end ..... Right hand  
 Firing order ..... 1-54-8-6-3-7-2

(4) *Starting motor (carrier).*

Manufacturer ..... Delco-Remy  
 Model no ..... 1113925  
 Volts ..... 24

(5) *Battery charging generator (carrier) (model 2380).*

Manufacturer ..... Delco-Remy  
 Model no ..... 1117478  
 Volts ..... 24

(6) *Battery charging alternator (carrier) (model 2385).*

Manufacturer ..... Leece-Neville  
 Type no ..... A0013002AC

Order no ..... 10929868

(7) *Generator regulator (carrier) (model 2380).*

Manufacturer ..... Delco-Remy  
 Model ..... 1118558  
 Volts ..... 24

(8) *Air cleaner (carrier).*

(a) *Model 2380.*

Manufacturer ..... Donaldson Co.  
 Model ..... MS-35875-8  
 Type ..... Oil bath

(b) *Model 2385.*

Model ..... Dry type

(9) *Lubrication oil filter (carrier).*

Manufacturer ..... Fram Corp.  
 Model ..... 170760  
 Cartridge ..... 2107 (CH-33PL)

(10) *Batteries (carrier).*

Type ..... Dry charge (MS35001-5)  
 Volts ..... 12

(11) *Personnel heater (carrier).*

Manufacturer ..... Kysor Heater Co.  
 Model ..... K-695-24  
 Volts ..... 24

Type of control ..... Manual

(12) *Capacities (carrier).*

(a) *Model 2380.*

Engine crankcase with oil ..... 26 qts (quarts)  
 filters /3).  
 Engine air cleaner ..... 5 qt  
 Fuel tank ..... 110 gal (gallons)  
 Radiator ..... 72qt  
 Transmission and torque converter ..... 26 qt  
 Hydraulic system ..... 27 gal.  
 Front axle differential ..... 22 qt.  
 Rear axle differential ..... 22 qt  
 Wheel planetaries (4) ..... 8 qt ea (each)  
 Steering gear boxes (3) ..... 1 qt ea

(b) *Model 2385.*

Engine crankcase ..... 18qts  
 Fuel tank ..... 130 gal  
 Radiator ..... 60 qts  
 Transmission and torque converter ..... 26 qts  
 Hydraulic system ..... 57 gal  
 Front axle differential ..... 22 qts  
 Rear axle differential ..... 22 qts  
 Wheel planetaries (4) ..... 8 qts ea  
 Steering gear boxes (3) ..... 2 lb (pounds) ea

(13) *Engine (crane).*

Manufacturer ..... Cummins  
 Model no ..... JN-6  
 Type ..... Diesel  
 Number of cylinders ..... 6  
 Firing order ..... 1-5-3--2-4  
 Governor speed ..... 1,800 rpm at full load  
 Horsepower ..... 100 at 1,800 rpm  
 Cooling ..... Liquid  
 Bore ..... 4.125in.  
 Stroke ..... 5in.  
 Displacement ..... 401 cubic in.

(14) *Starting motor (crane).*

Manufacturer ..... Prestolite  
 Model MFY-8002AT

Volts..... 24  
 (15) *Battery charging generator (crane).*  
 Manufacturer ..... Prestolite  
 Model..... MS13804-1  
 Volts..... 24  
 (16) *Generator regulator (crane).*  
 Manufacturer ..... Prestolite  
 Model..... MS13803-1  
 Volts..... 24  
 (17) *Clutch (crane).*,  
 Manufacturer ..... Twin Disc Clutch Co.  
 Model..... SPI11HP2  
 Adjustment ..... Adjust to contact  
 (18) *Air cleaner (crane).*  
 Manufacturer ..... Donaldson Co.  
 Model..... FGA09-00-3  
 Type..... Oil bath  
 (19) *Lubrication oil filter (crane).*  
 Manufacturer ..... Fram  
 Model..... 143146  
 Cartridge..... 2107 (CH-33-PL)  
 (20) *Batteries (crane).*  
 Type..... Dry charge (MS35000-3)  
 Volts..... 12  
 (21) *Personnel heater (crane).*  
 Manufacturer ..... Perfection  
 Model..... Ord. No. 8682953  
 Volts..... 24  
 (22) *Capacities (crane).*  
 Engine crankcase with  
 filter (2) ..... 21 qt  
 Air cleaner ..... 2 qt  
 Fuel tank..... 50 gal.  
 Radiator..... 30qt  
 Main drive chain case  
 (model 2380) ..... 3 qt  
 Main drive chain case  
 (model 2385) ..... 4 qt  
 Hydraulic control cylinder..... 2 qt ea  
 (23) *Cable specifications.*  
 (a) *Boom hoist data.*  
 1/2 in dia. (diameter)  
 6 x 19 right reg. lay..... 240 ft lg  
 (b) *Primary hoist cable.*  
 5/8 in. dia. reg. lay ..... 335 ft lg  
 (c) *Clamshell*  
 1. *Holding cable for 40ft boom.*  
 5/8 in. dia. 6 x 19 ..... 110 ft  
 2. *Closing cable for 40ft boom.*  
 5/8 in. dia. 6 x 19 ..... 140 ft  
 (d) *Dragline.*  
 1. *Hoist cable for 40ft boom.*  
 5/8 in. dia. 6 x 19 ..... 125 ft  
 2. *Drag cable for 40ft boom.*  
 3/4 in. 6x19 ..... 65ft  
 (e) *Pile driver.*  
 1. *Hammer hoist for 35ft leads.*  
 5/8 in. dia ..... 110 ft  
 2. *Pile hoist for 35ft leads.*  
 5/8 in. dia ..... 125 ft

**NOTE**

All the above wire rope shall conform to Federal Specifications RR-W410, type 1, class 2, 6 x 19 construction 3,

INCR improved plow steel, uncoated, preformed, regular lay.

(24) *Nut and bolt torque data.*

| Bolt body size (inches)     | Torque Foot- Pounds |         |         |
|-----------------------------|---------------------|---------|---------|
|                             | Standard            | Grade 5 | Grade 8 |
| 1/4-20 Coarse Thread (N.C.) | 5                   | 5-10    | 10-15   |
| 1/4-28 Fine Thread (N.F.)   | 6                   | 10-15   | 15-20   |
| 5/16-18 N.C                 | 11                  | 15-20   | 20-30   |
| 5/16-24 N.F                 | 13                  | 15-20   | 25-30   |
| 3/8-16 N.C                  | 18                  | 25-35   | 40-50   |
| 3/8-24 N.F                  | 20                  | 30-4    | 45-55   |
| 7/16-14 N.C                 | 28                  | 45-55   | 60-80   |
| 7/16-20 N.F                 | 30                  | 50-60   | 70-90   |
| 1/2-13 N.C                  | 39                  | 65-85   | 100-120 |
| 1/2-20 N.F                  | 41                  | 80-100  | 110-130 |
| 9/16-12 N.C                 | 15                  | 100-120 | 136-165 |
| 9/16-18 N.F                 | 55                  | 110-130 | 155-190 |
| 5/8-11 N.C                  | 83                  | 135-165 | 200-240 |
| 5/8-18 N.F                  | 95                  | 10-200  | 215-265 |
| 3/4-10 N.C                  | 105                 | 235-285 | 340-420 |
| 3/4-16 N.F                  | 115                 | 270-330 | 380-460 |
| 7/8-9 N.C                   | 160                 | 360-440 | 540-660 |
| 7/8-14 N.F                  | 175                 | 395-490 | 595-725 |
| 1-8 N.C                     | 235                 | 520-640 | 810-990 |
| 1-12 N.F                    | 250                 | 575-705 | 900-    |
| 1,100                       |                     |         |         |

(25) *Valve adjustment data.*

(a) *Carrier Engine.*

*Intake valves:*

Cold ..... 0.016 in.  
 Hot ..... 0.014 in.

*Exhaust valves:*

Cold ..... 0.029 in.  
 Hot ..... 0.027 in.

(b) *Crane engine.*

*Intake valves:*

Cold ..... 0.017 in.  
 Hot ..... 0.015 in.

*Exhaust valves:*

Cold ..... 0.027 in.  
 Hot ..... 0.025 in.

(26) *Belt tensions.*

Belt ..... Deflection per ft of span  
 Carrier engine fan drive ..... / in.  
 Carrier engine generator and  
 water pump drive ..... 7/16 in.  
 Crane engine generator ..... 7/16 in.  
 Crane engine fan drive ..... 7/16 in.  
 Crane engine water pump drive .13/32 in.

(27) *Tires.*

Size ..... 26.5 x 25, 26 ply  
 Pressure ..... 55 psi

(28) *Overall dimensions and weights.*

(a) *Model 2380 (fig. 1-3 for reduced shipping*

*dimensions)*  
 Overall length (with 30  
 ft boom) ..... 521-1/2 in.  
 Overall height ..... 154 in.  
 Overall width with utility  
 blade ..... 128 in.  
 Shipping volume ..... 3,780 cuft

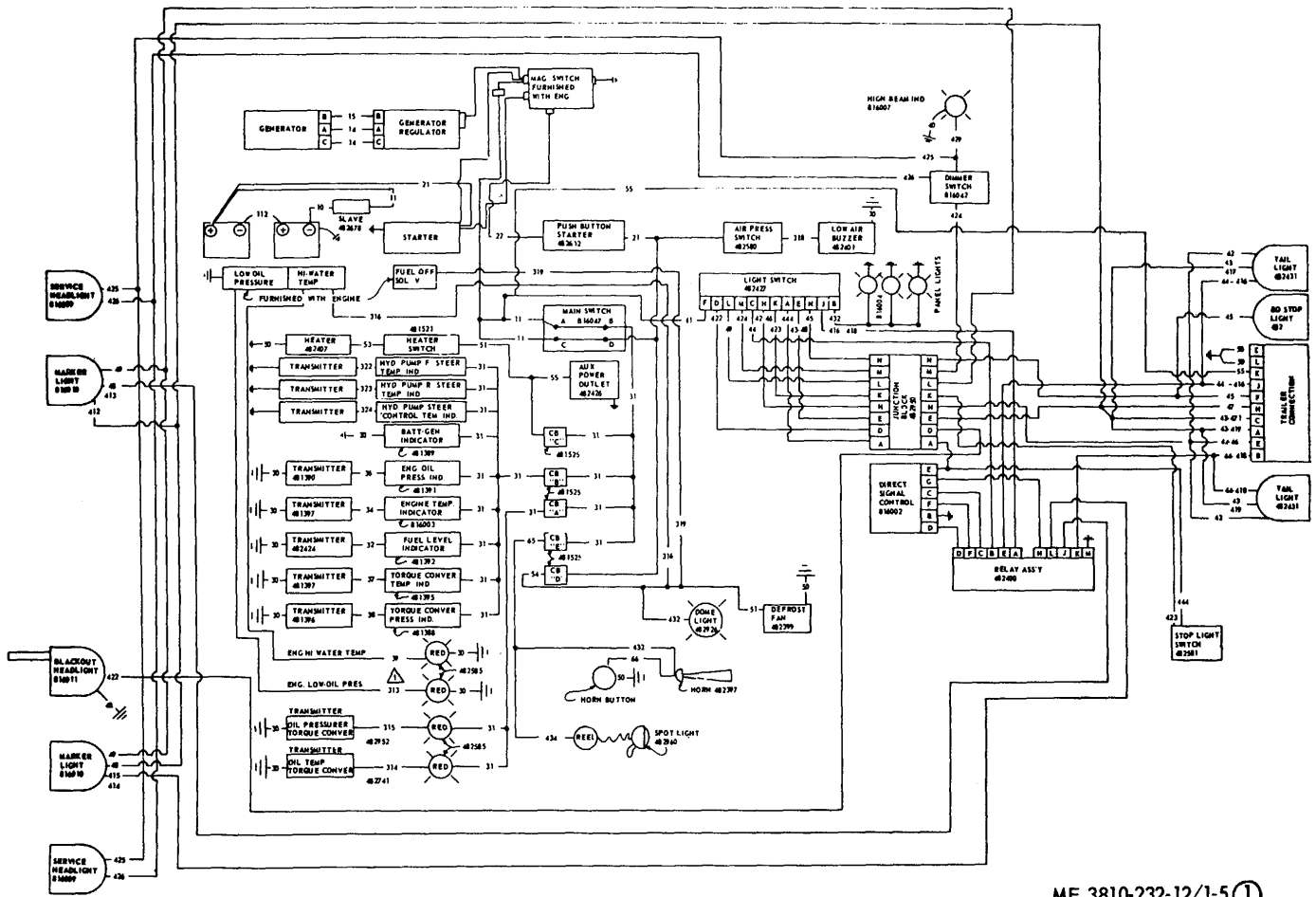


Shipping weight (with boom  
and hook block) .....61,500 lb  
Shipping tonnage.....32 ton  
*(b) Model 2385 (fig. 1-4 for reduced shipping  
dimensions)*  
Overall length (carrier only  
with utility blade).....325 in.  
Overall width with utility  
blade ..... 131 in.

Weight (with boom and hook  
block) .....62,560 lb  
Front axle .....31,270 lb  
Rear axle.....31,290 lb

*c Diagrams.*

- (1) Model 2380 wiring diagram (fig. 1-5).*
- (2) Model 2385 wiring diagram (fig. 1-6).*
- (3) Model 2380 hydraulic diagram (fig. 1-7).*
- (4) Model 2385 hydraulic diagram (fig. 1-8).*



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Figure 1-5. Wiring diagram (model 2380 carrier)  
sheet 1 of 2.

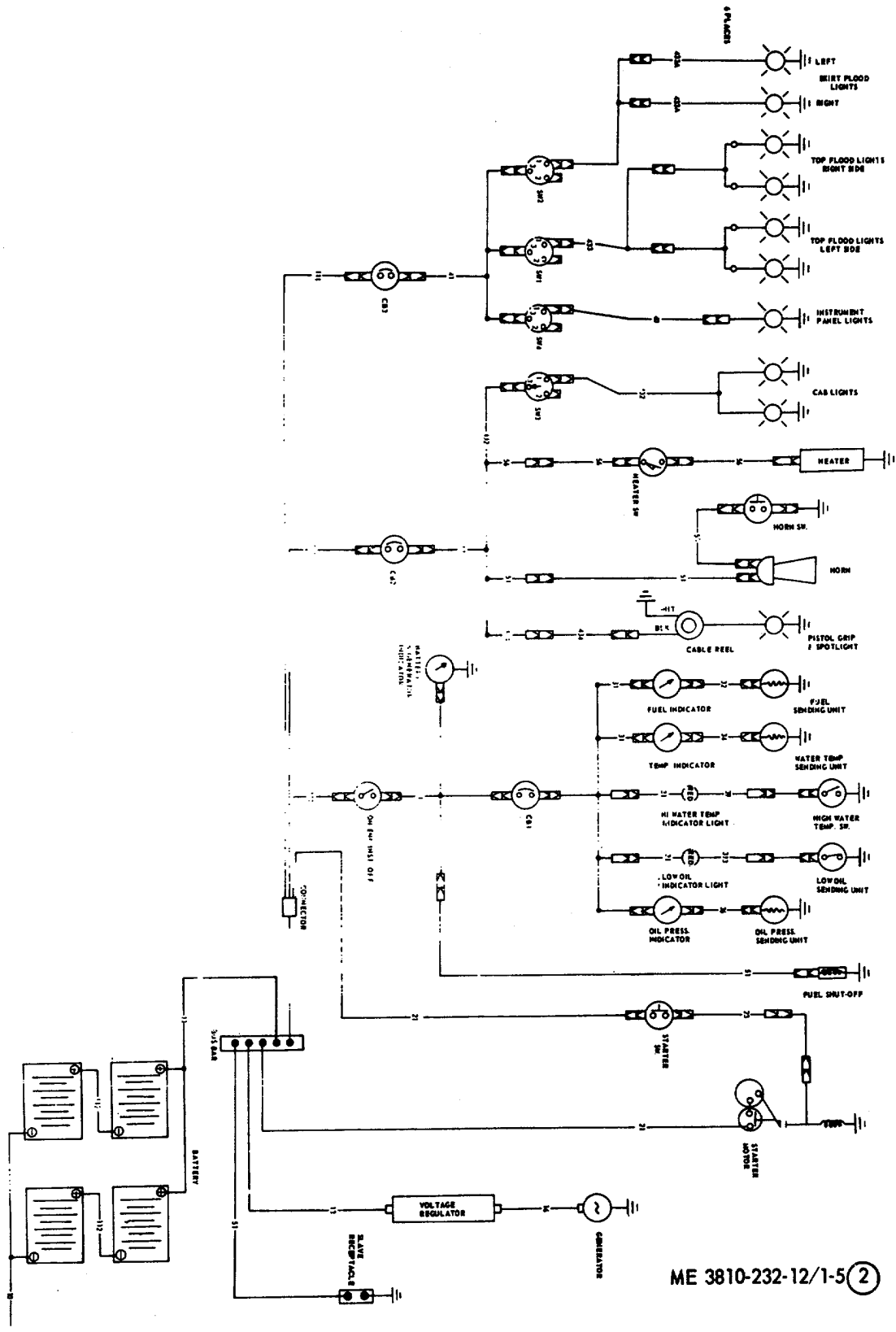


Figure 1-5. Wiring diagram (model S80 crane).  
Sheet 2 of 2.

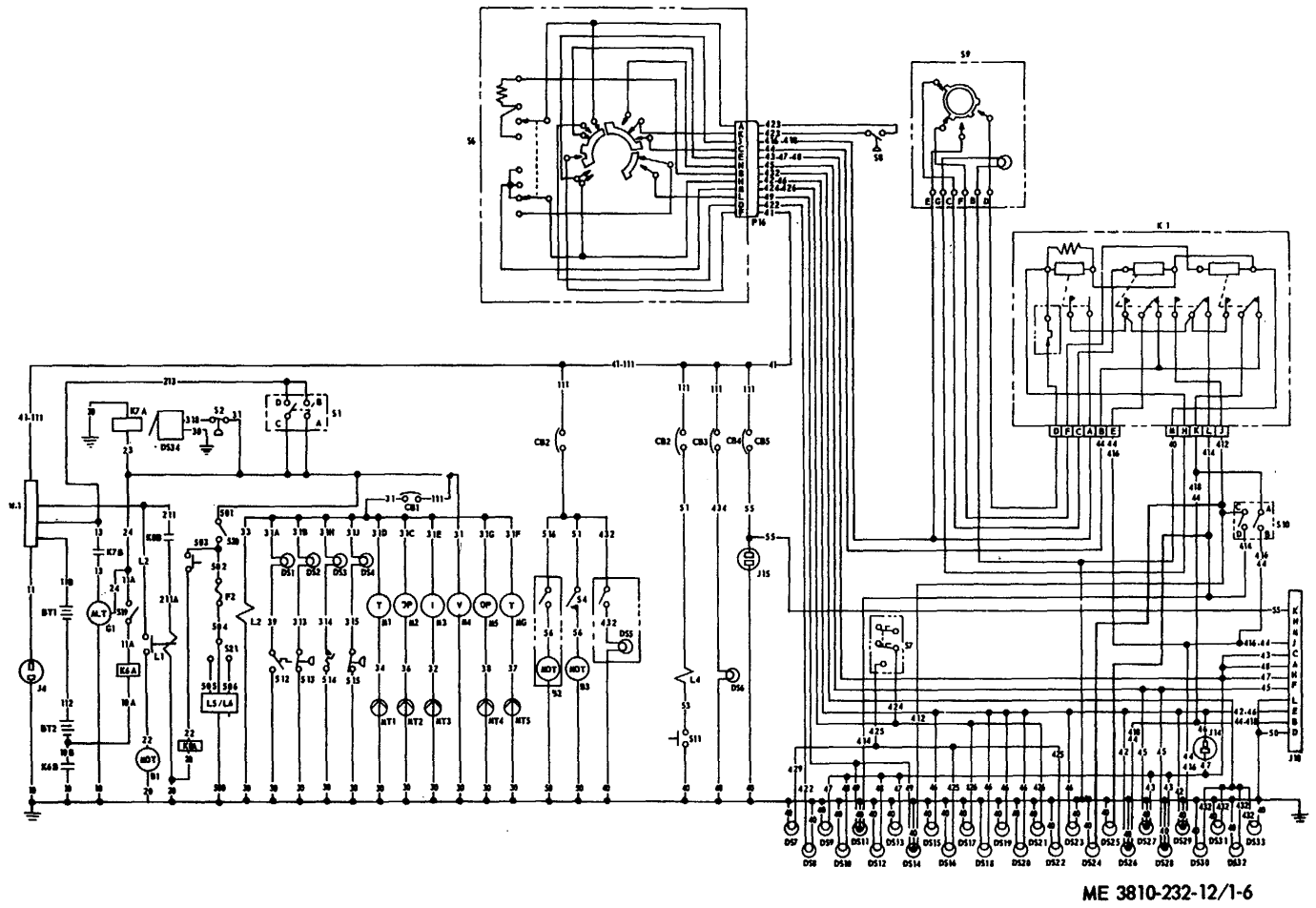


Figure 1-6. Wiring diagram (model 2385).

| Electrical Reference Designation | Description                    |
|----------------------------------|--------------------------------|
| S1, S10.....                     | Rotary switches                |
| S2 .....                         | Pressure warning switch        |
| S3 .....                         | Push switch                    |
| S4 .....                         | Toggle switch                  |
| S6 .....                         | Vehicular light switch         |
| S7 .....                         | Beam selecting switch          |
| S8 .....                         | Pressure switch, stoplight     |
| S9 .....                         | Signal light control           |
| S11 .....                        | Horn button                    |
| S12 .....                        | Temperature switch             |
| S13, S15.....                    | Pressure warning switches      |
| S14 .....                        | Thermostatic switch            |
| S20 .....                        | Neutral-start switch           |
| S21 .....                        | Lockout switch                 |
| S19 .....                        | Toggle switch                  |
| MT1, MT5 .....                   | Temperature transducers        |
| MT2, MT4 .....                   | Pressure transducers           |
| MT3 .....                        | Liquid quantity transducer     |
| L1.....                          | Starter solenoid               |
| L2.....                          | Fuel solenoid                  |
| L5, L6.....                      | Solenoid valve                 |
| M1.....                          | Temperature indicator          |
| M2, M5.....                      | Pressure indicators            |
| M3.....                          | Liquid quantity indicator      |
| M4.....                          | Battery-alternator indicator   |
| M6.....                          | Temperature indicator          |
| DS1, 2, 3, 24, 25.....           | Lampholders, lights and lenses |
| DS5.....                         | Dome light                     |

| Electrical Reference Designation | Description          |
|----------------------------------|----------------------|
| DS6 .....                        | Trouble light        |
| DS7 .....                        | Lamp                 |
| DS8 .....                        | Blackout headlight   |
| DS9, DS13 .....                  | Marker lights        |
| DS10,DS12 .....                  | Marker lights        |
| DS11,14, 26,29 .....             | Turn signal lights   |
| DS15,18,19, 20, 23 .....         | Marker lights        |
| DS16, 17, 21, 22 .....           | Headlamps            |
| DS27, DS28 .....                 | Stoplight-Taillights |
| DS30, 31, 32, 33 .....           | Lamp assemblies      |
| DS34 .....                       | Indicator            |
| F2 .....                         | Fuse(2amp,125 volts) |
| K1 .....                         | Relay assembly       |
| BT1, BT2 .....                   | Storage batteries    |
| B1 .....                         | Starter motor        |
| B2 .....                         | Defroster fan        |
| BS .....                         | Heater fan           |
| GI .....                         | Alternator           |
| J4 .....                         | Slave receptacle     |
| J10 .....                        | Receptacle connector |
| J14 .....                        | Receptacle connector |
| J15 .....                        | Utility outlet       |
| K6 .....                         | Magnetic contactor   |
| K?.....                          | Relay                |
| W1 .....                         | Bus bar              |
| L4 .....                         | Horn solenoid        |
| K8.....                          | Magnetic switch      |

(3) Model 2380 hydraulic diagram (fig. 1-7).

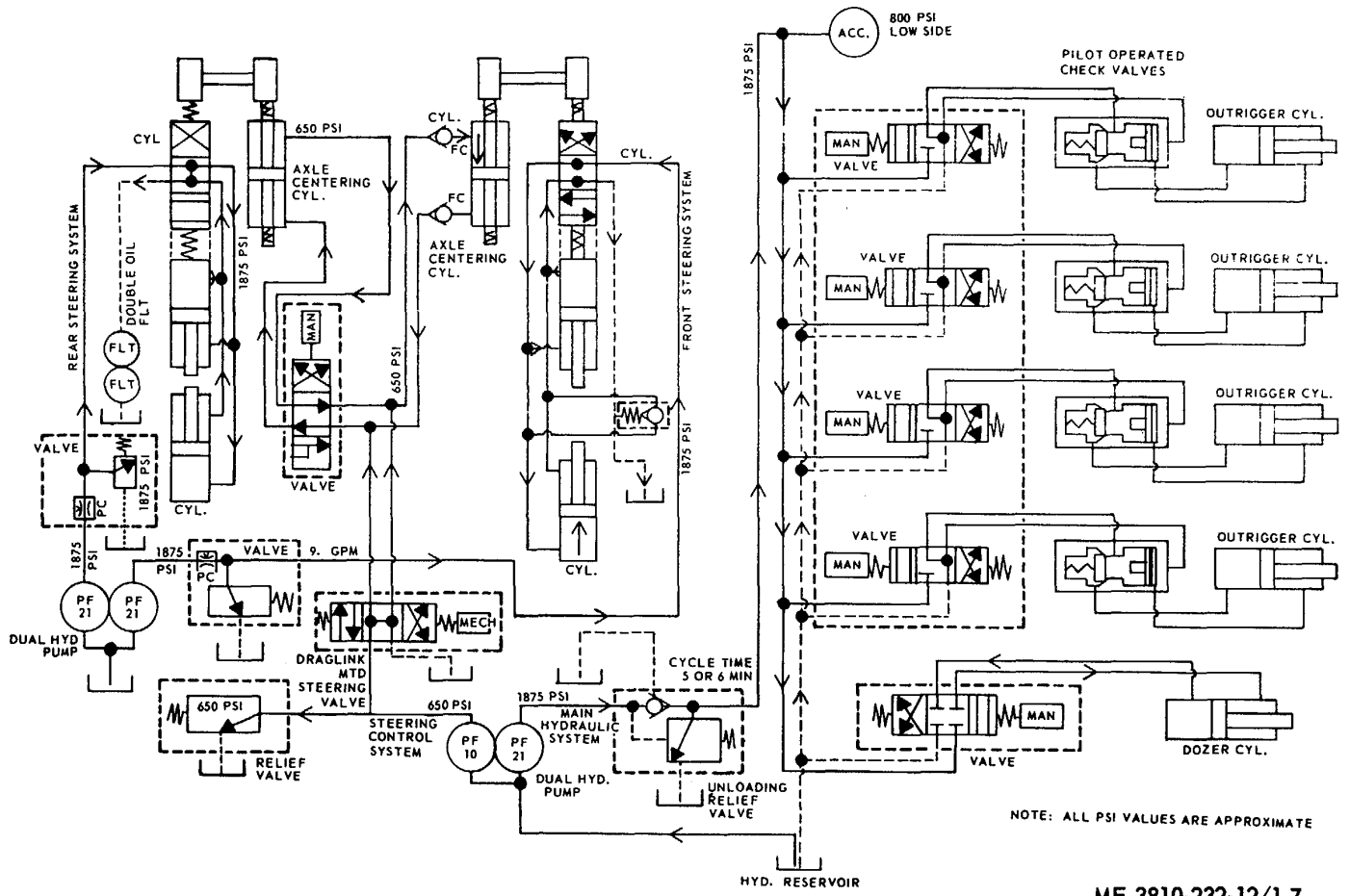
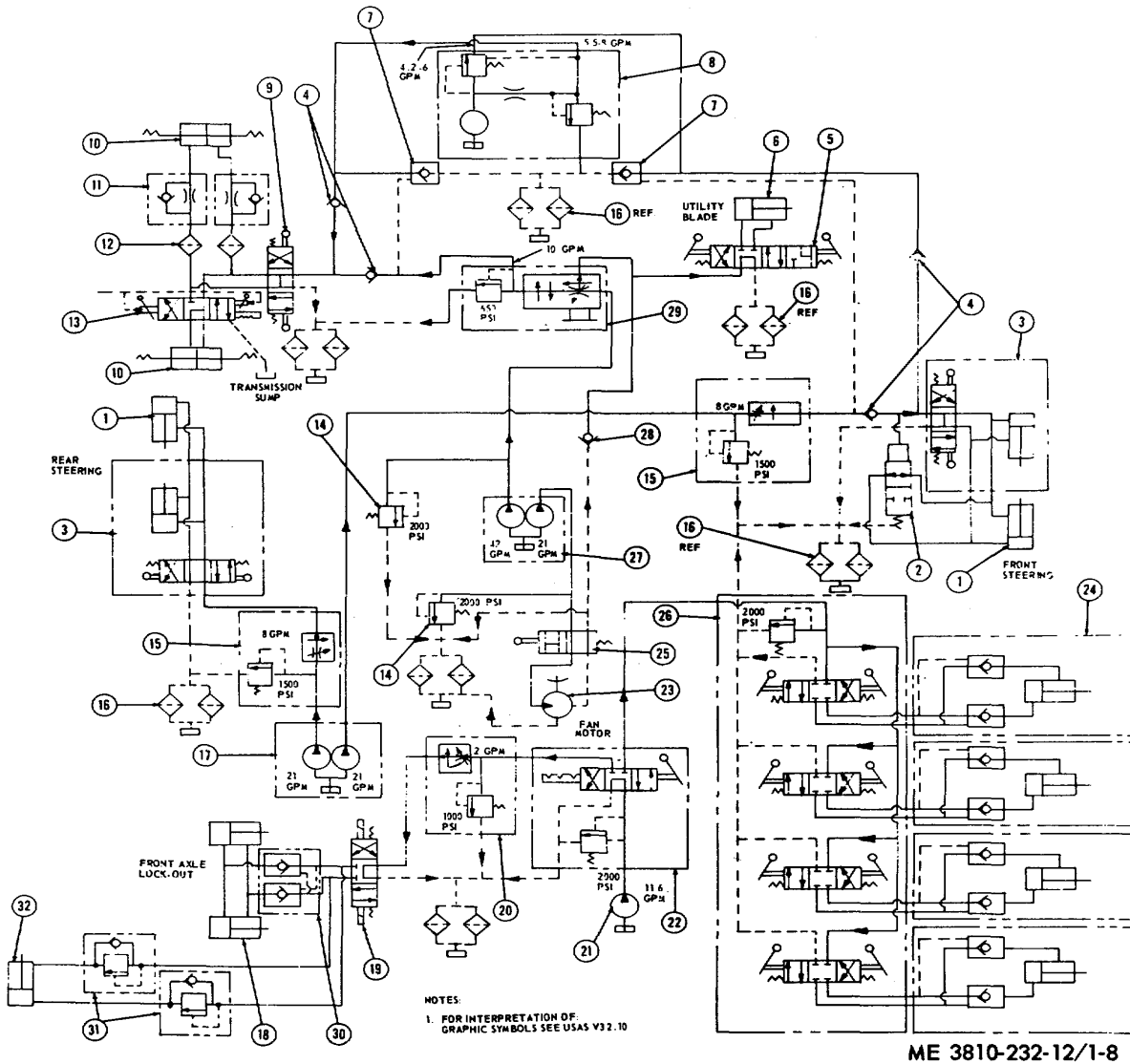


Figure 1-7. Hydraulic diagram (model 2380)

(4) Model 2385 hydraulic diagram (fig. 1-8).



- |   |   |   |
|---|---|---|
| 1 Cylinder, steering, front                 | 12 Filter, strainer, steering line                            | 23 Hydraulic fan drive motor                              |
| 2 Valve, control front axle                 | 13 Valve, hand and pilot operated                             | 24 Cylinder, outrigger                                    |
| 3 Cylinder, steering rear                   | 14 Relief valve   | 25 Control valve, fan drive                               |
| 4 Check valve                               | 15 Flow control and relief valve                              | 26 Directional control valve                              |
| 5 Control valve, utility blade              | 16 Oil filter, hydraulic                                      | 27 Dual hydraulic pump, utility blade and fan drive motor |
| 6 Cylinder, utility blade                   | 17 Dual hydraulic pump, front and rear steering               | 28 Check valve, right angle                               |
| 7 Check valve                               | 18 Lockout cylinder, front axle oscillate                     | 29 Flow divider valve                                     |
| 8 Hydraulic pump, emergency steering        | 19 Double solenoid valve                                      | 30 Double check valve                                     |
| 9 Control valve, steering                   | 20 Flow control and relief valve                              | 31 Relief and check valve                                 |
| 10 Cylinder, centering, front and rear axle | 21 Hydraulic pump, outrigger and front axle oscillate lockout | 32 Cylinder, lockout-trans. Gear range selector           |
| 11 Check valve                              |   |   |

Figure 1-8. Hydraulic diagram (model 2385).

**CHAPTER 2**  
**OPERATING INSTRUCTIONS**  
**Section I. SERVICE UPON RECEIPT OF MATERIEL**

**2-1. Inspecting and Servicing the Equipment**

*a. Inspection.*

(1) Make a complete visual inspection to ensure the required tools, repair parts, and publications are with the equipment.

(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.

(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.

(4) Inspect the drain plugs, breathers, filler caps, and drain cocks to be sure they are secured and not leaking or damaged.

(5) Inspect the tires, air brake hoses, and electrical leads, for cuts, breaks, cracks, or signs of deterioration.

*b. Servicing.*

(1) Perform the necessary daily preventive maintenance services (para 3-6).

(2) When the crane is received with new dry charge batteries, and electrolyte is packed separately, perform the following:

(a) Remove the battery box cover.

(b) Remove or destroy any sealing devices which may have been used to close or restrict the vent openings.

(c) Install batteries for the carrier and crane as illustrated in figures 1-5, 1-6, 4-45 and 4-77.

**WARNING**

Exercise care when filling the batteries with electrolyte to prevent splashing or spilling the acid on clothing or body. Do not smoke or use open flame in the vicinity as batteries generate explosive gas during charging.

(d) Fill cells to bottom of square or 3/8 inch above separators.

(e) Install the filler caps and battery box covers.

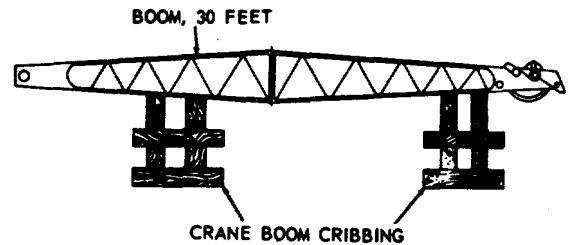
(3) Service the cooling system of both engines as Described in TB ORD 651.

**2-2. Installation**

*a. Crane Boom Installation.*

(1) Place crane boom or cribbing as illustrated in figure 2-1.

figure 2-1. Crane boom cribbing.



**WARNING: MAKE SURE CRIBBING IS SET ON FIRM GROUND TO AVOID UPSETTING OF BOOM, CAUSING INJURY TO PERSONNEL AND DAMAGE TO ATTACHMENT.**

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Figure 2-1. Crane boom cribbing.



(2) With the crane facing toward the rear of the carrier, back the unit into position, aligning the main frame boom support holes with the crane boom holes.

(3) Using a suitable lifting device, lift the boom into position, align the bottom holes of the main

frame boom support with the holes in the boom (fig 2-2) and install the boom foot pins, screws and washers.

(4) Refer to figure 2-3 and install telescoping pipes of boom stops to top of gantry, and install pins.

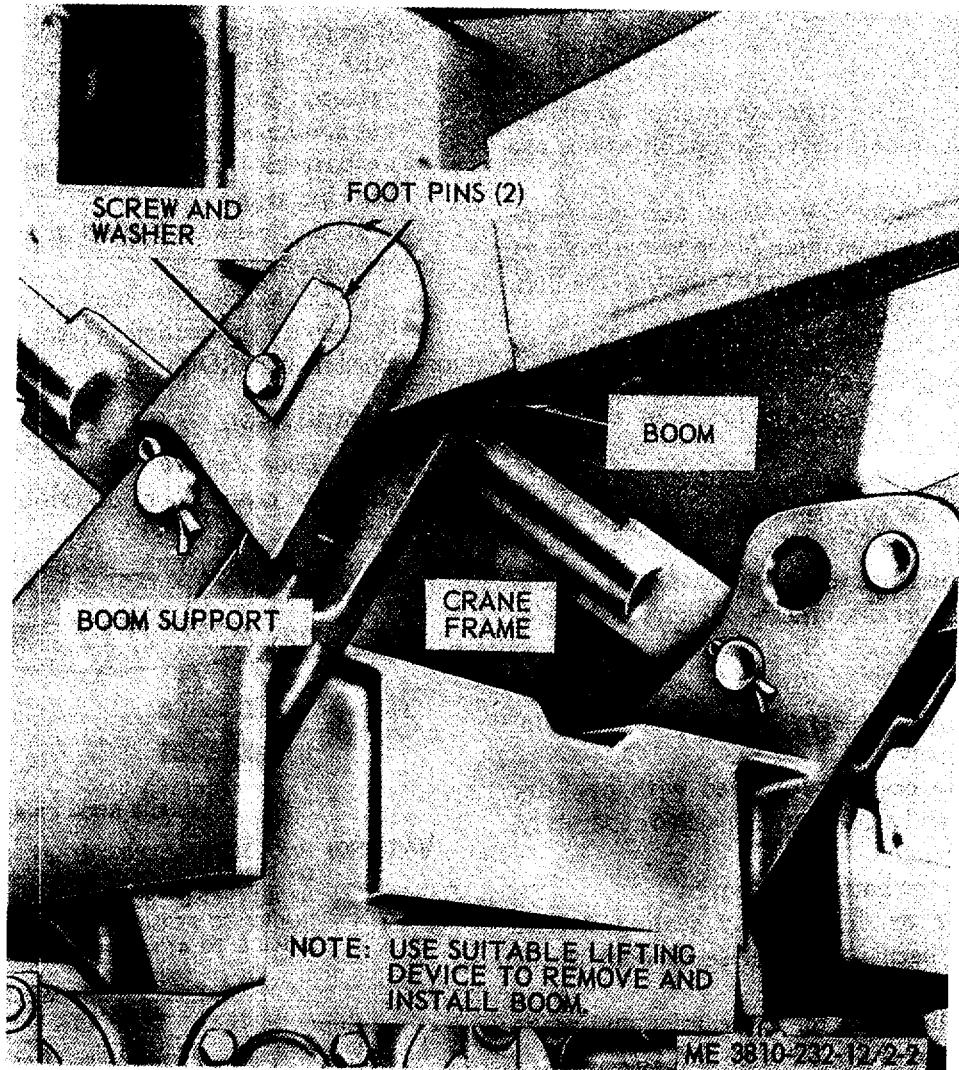


Figure 2-2. Crane boomfoot pins, installation.

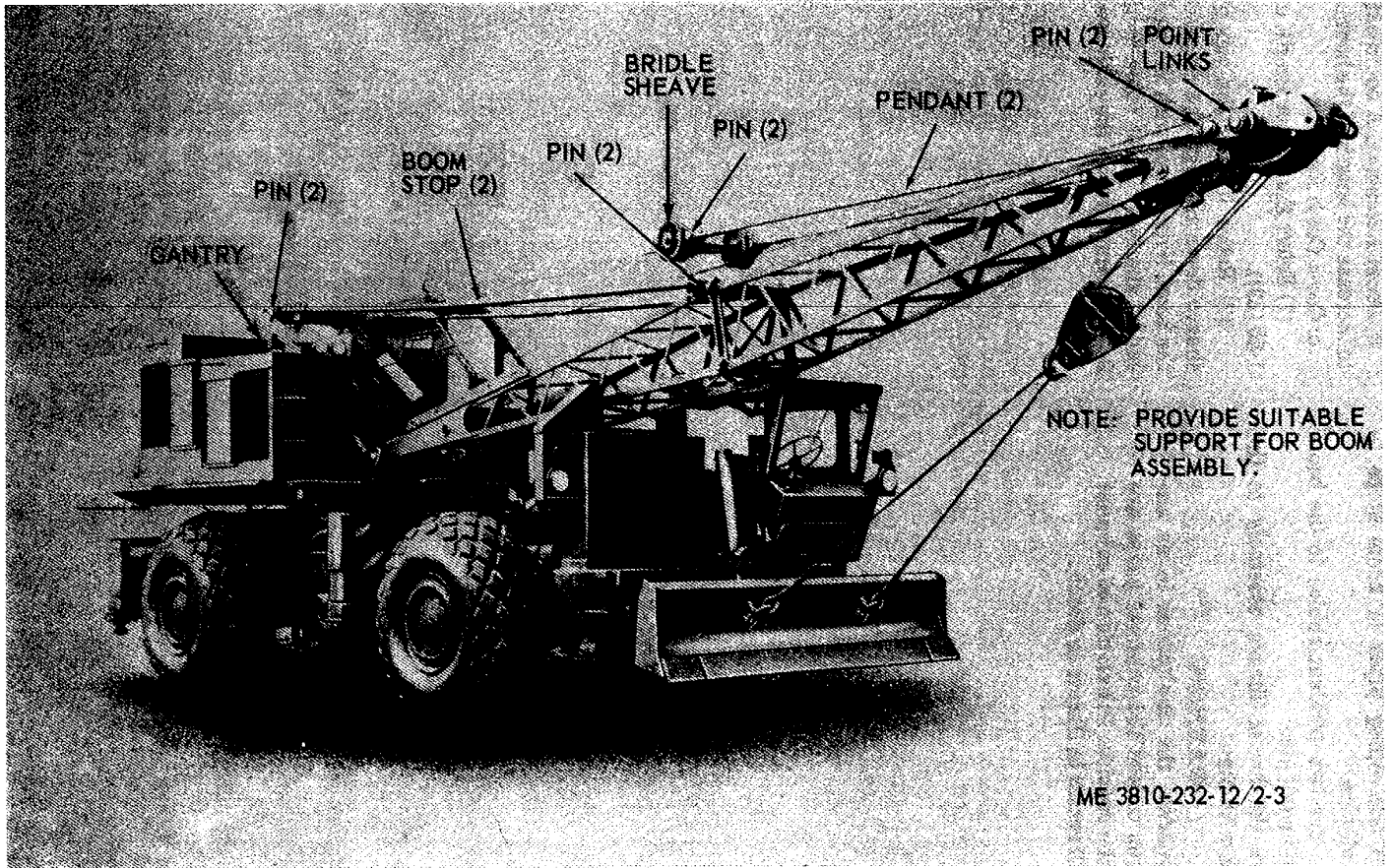


Figure 2-3. Crane boom installations.

(5) Install telescoping pipes of boom stops to boom and install pins.

(6) Secure the two pendant cables to the boom point links and install pins.

(7) Secure the bridal sheave assembly to the pendant cables with pins.

**WARNING**

**Do not operate the equipment in an enclosed area unless the exhaust gases are piped to the outside. Inhalation of exhaust fumes will result in illness or death.**

b. *Boom Extension.* A boom extension may be used to increase the length of the boom.

c. *Boom Cable Reeving.*

(1) Select the proper length and size cables (para 1-8b (23)).

(2) Reeve it over the top gantry center guide sheave down through the crane cab, and secure it to the boom hoist drum with the wedge. Reeve the other end of the boom hoist cable as illustrated in figure 2-4 and secure it with the cable wedge.

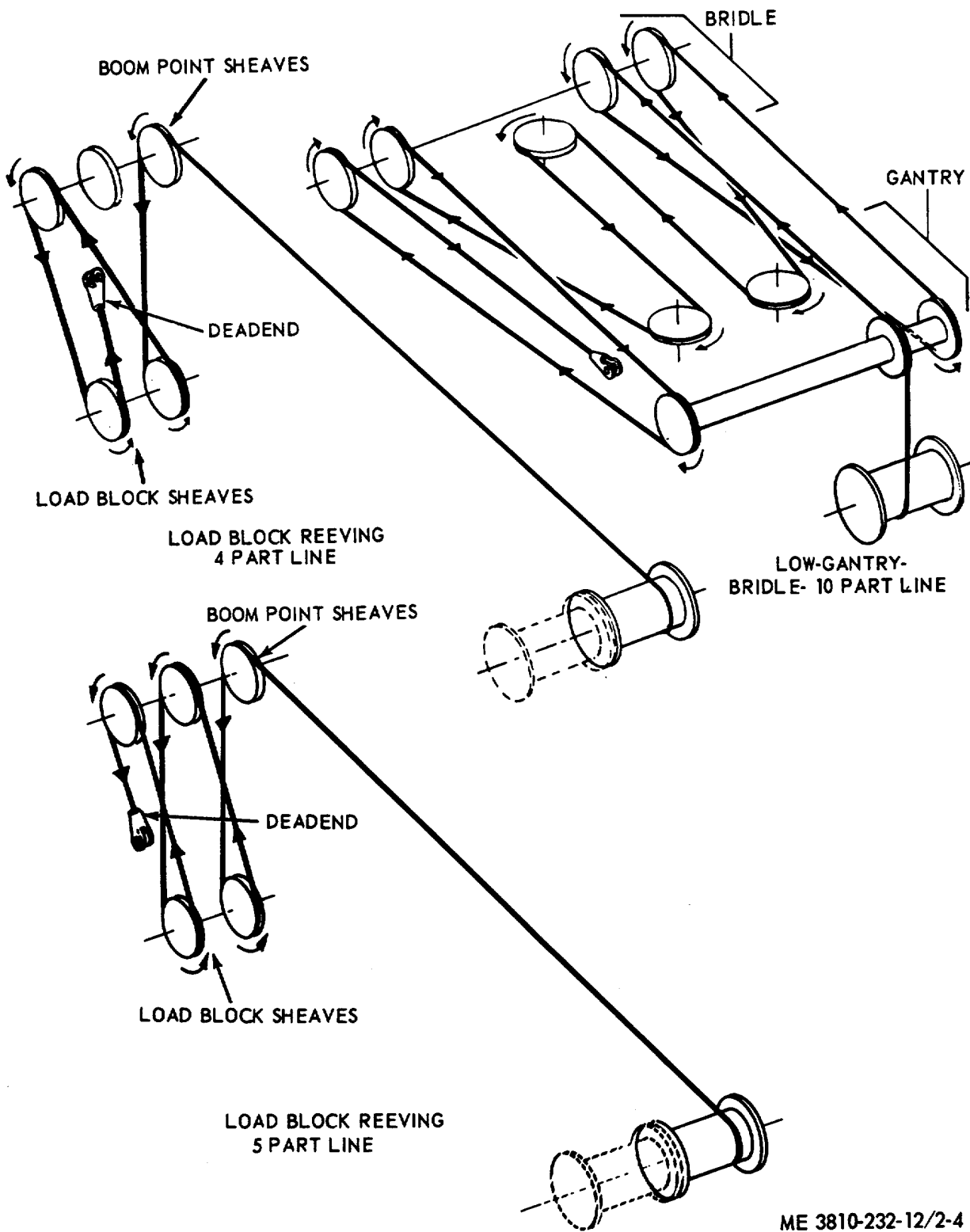
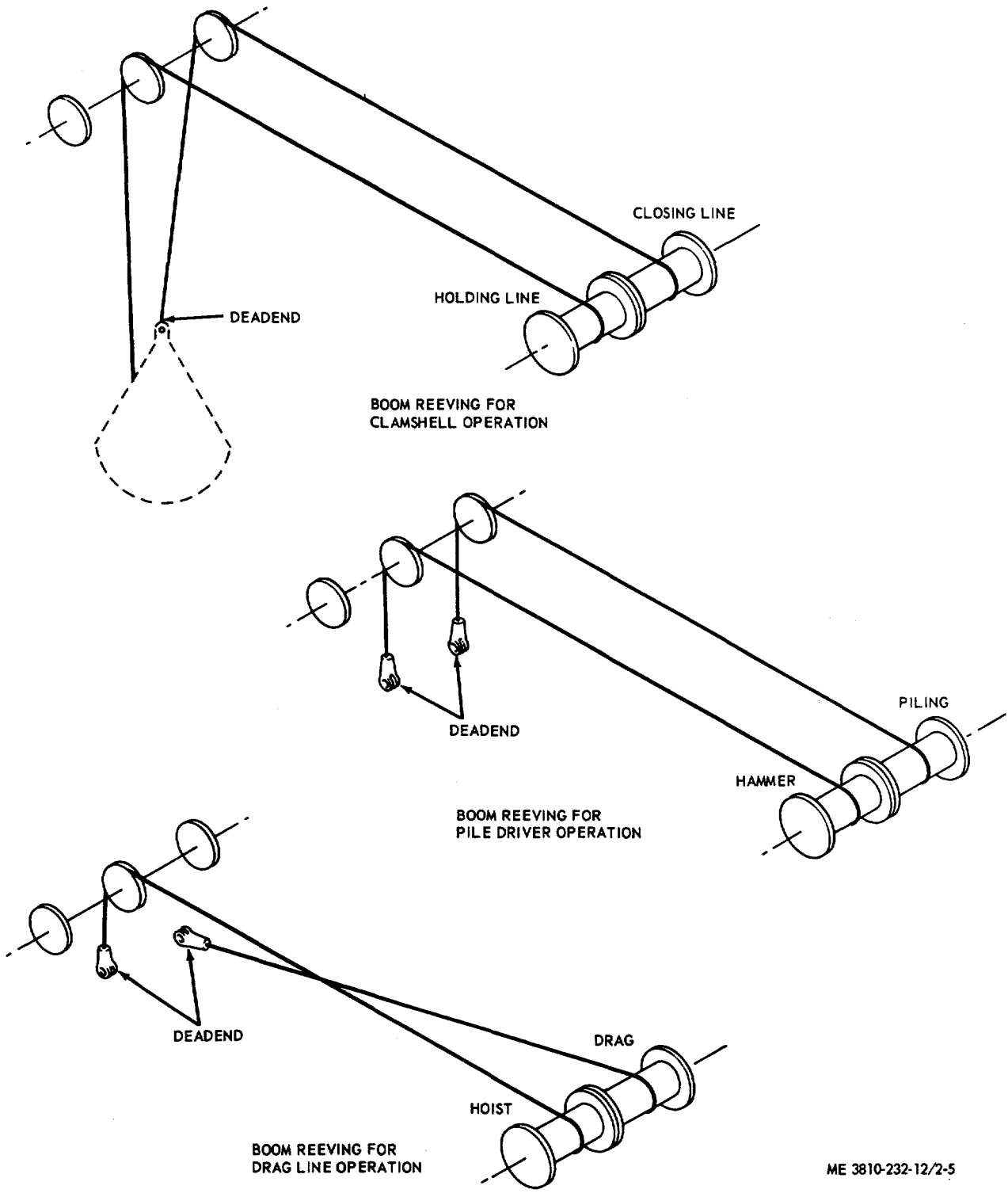


Figure 2-4. Crane boom reeving diagram.

d. Other Equipment Cable Reeving. Instructions for other equipment, i.e., clam, drag, pile-driver, etc., are illustrated in figure 2-5.

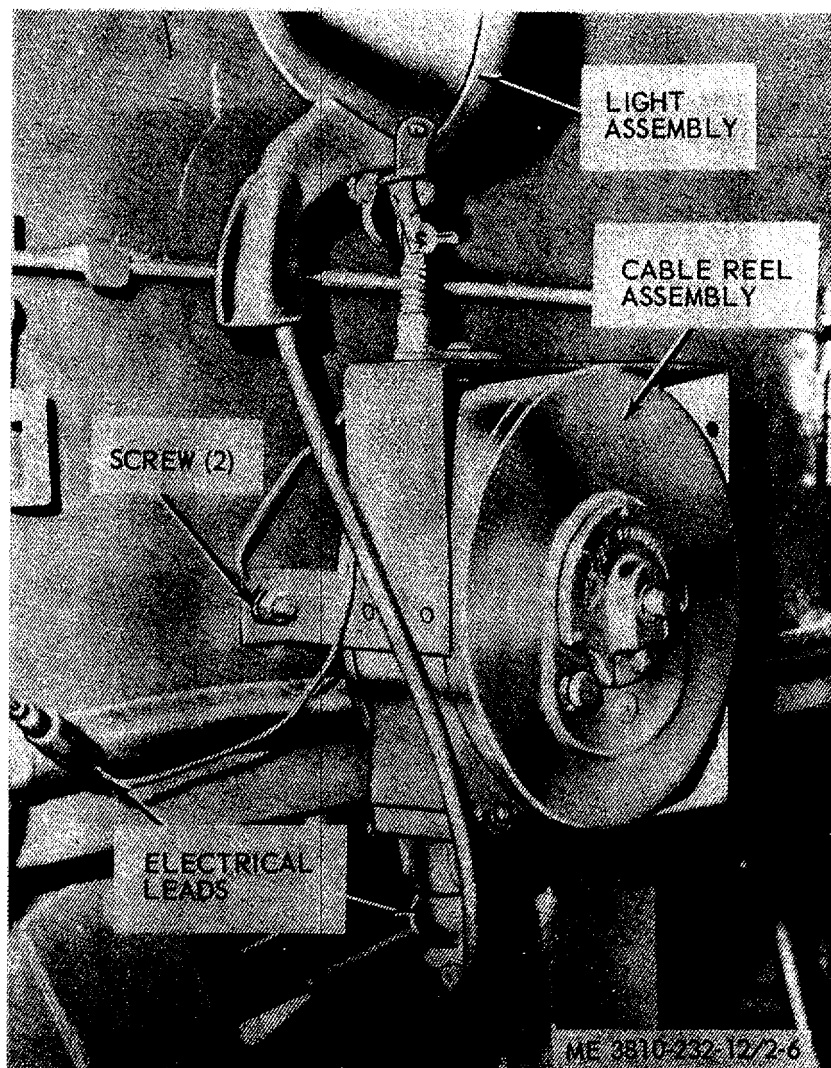


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Figure 2-5. Crane boom reeving, clamshell piledriver and dragline.  
2-6

e. *Crane Trouble Light and Reel Assembly.*

(1) Refer to figure 2-6 and install cable reel assembly with screws.



*Figure 2-6. Crane trouble light and reel assembly.*

(2) Install light assembly, and connect electrical leads.

f. *Carrier Trouble Light and Reel Assembly (Model 2380)*

(1) Refer to figure 2-7 and install reel assembly with nuts.



Figure 2-7. Carrier trouble light and reel assembly (Model 2380).

(2) Install light assembly, and connect electrical leads.  
g. Carrier Trouble Light and Reel Assembly (Model 2385).

(1) Refer to figure 2-8 and install reel assembly with nuts.  
(2) Install light assembly and connect electrical leads.

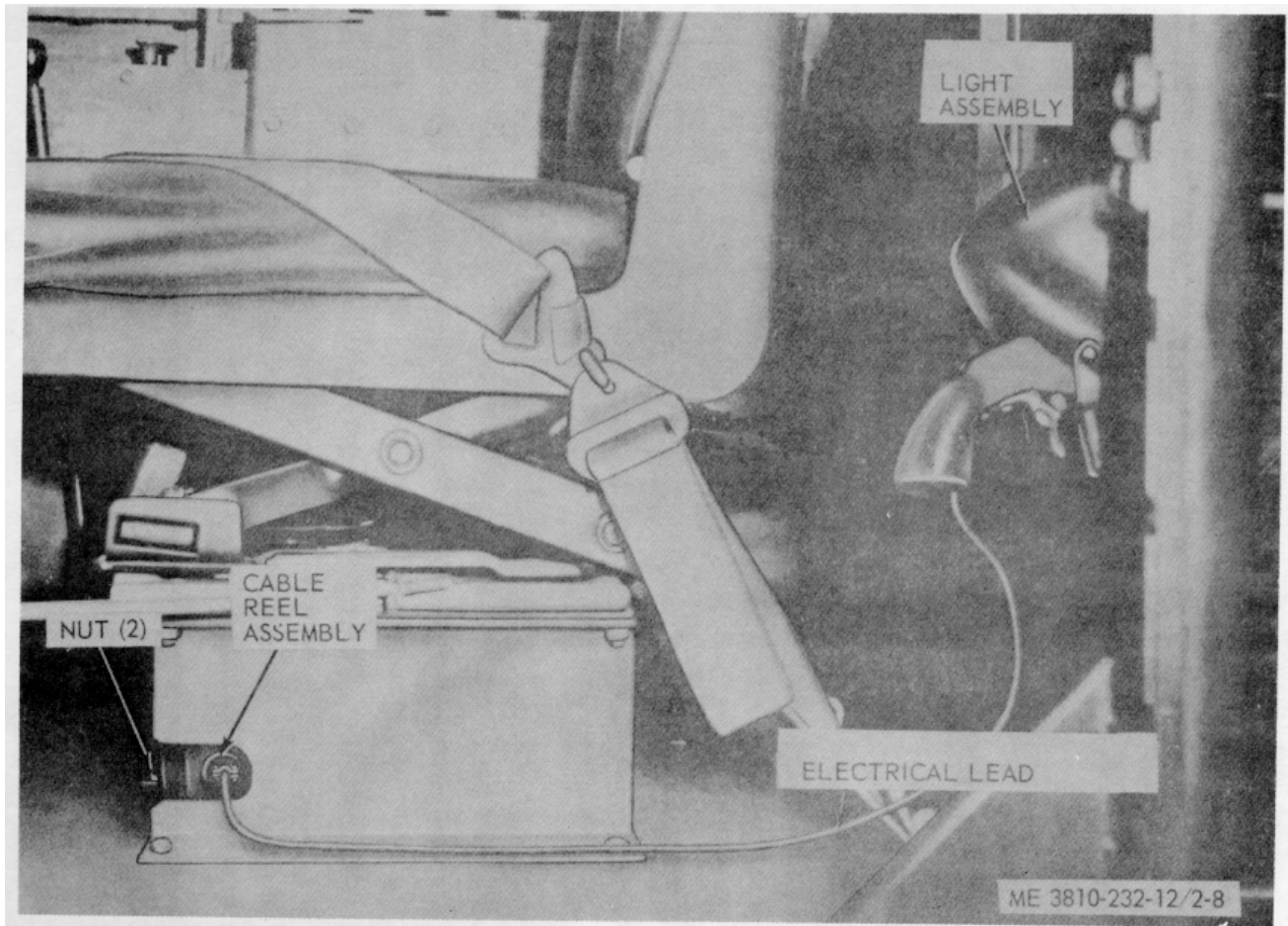


Figure 2-8. Carrier trouble light and reel assembly (model 2385).

## Section II. MOVEMENT TO A NEW WORKSITE

### 2-3. Dismantling for Movement

a. *General* The crane may be moved to a new work-site by driving under its own power or by towing.

#### **NOTE**

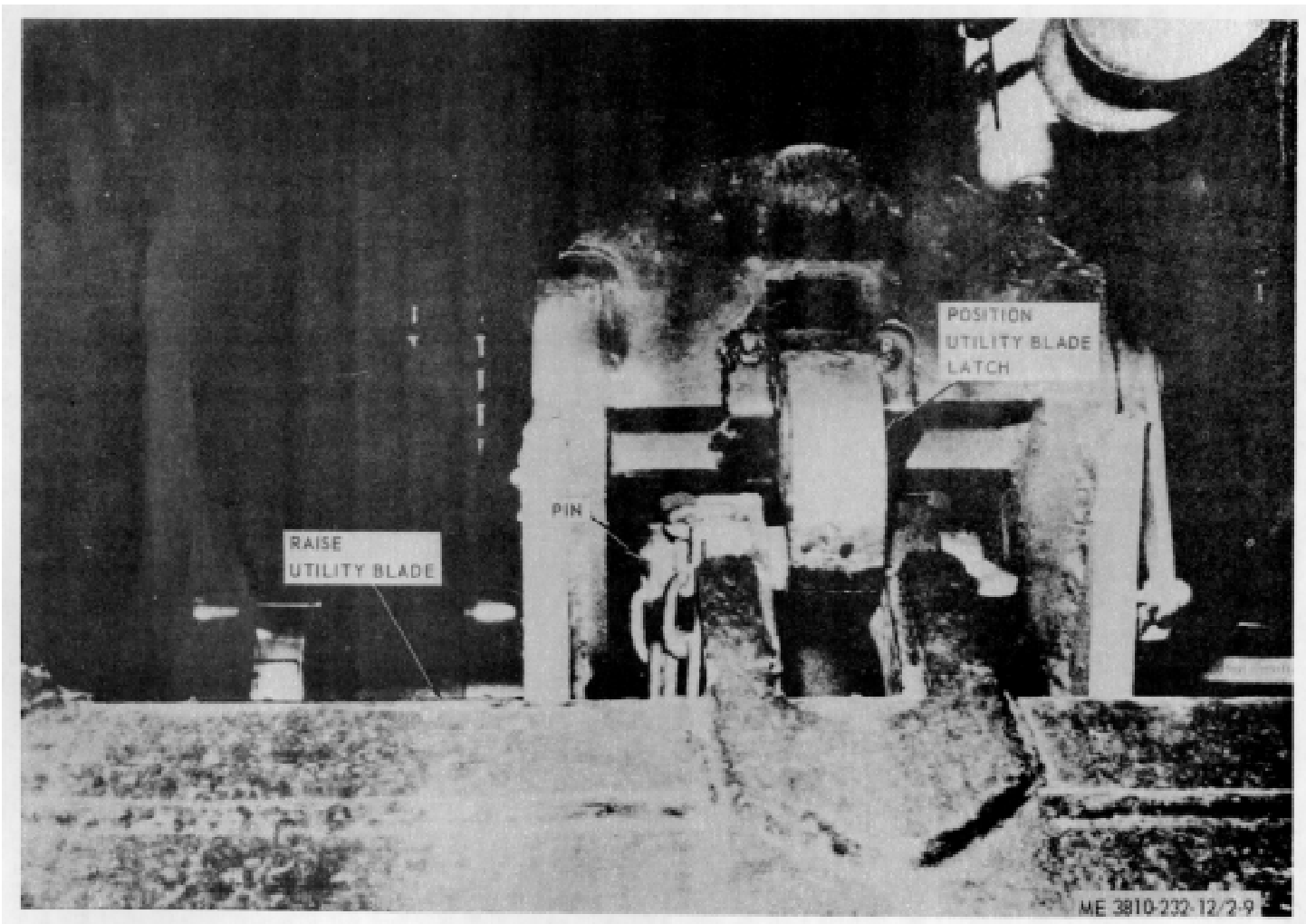
Before moving the equipment over the road, obtain information on road conditions and possible restrictions along the route.

### b. *Preparation for Movement.*

(1) Retract and stow the outriggers or remove the stabilizer wedges.

(2) Secure the utility blade with the blade latch as shown in figure 2-9, or use the utility blade brace (only when the carrier is towed) as illustrated in figure 2-10.





*Figure 2-9. Utility blade secured with blade latch*

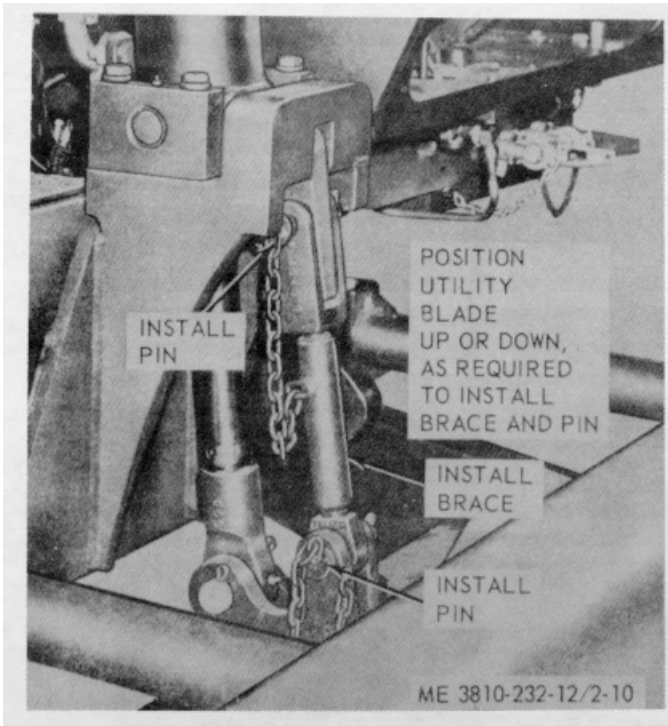


Figure 2-10. Utility blade secured with blade brace

(3) Swing the revolving frame until the boom front end attachment extends over the boom cradle and engage the swing brake.

(4) Lower the boom into the cradle centering it between upright posts. The bottom of the boom must remain at least 8 inches above the cradle after the boom is tied down tightly to the blade.

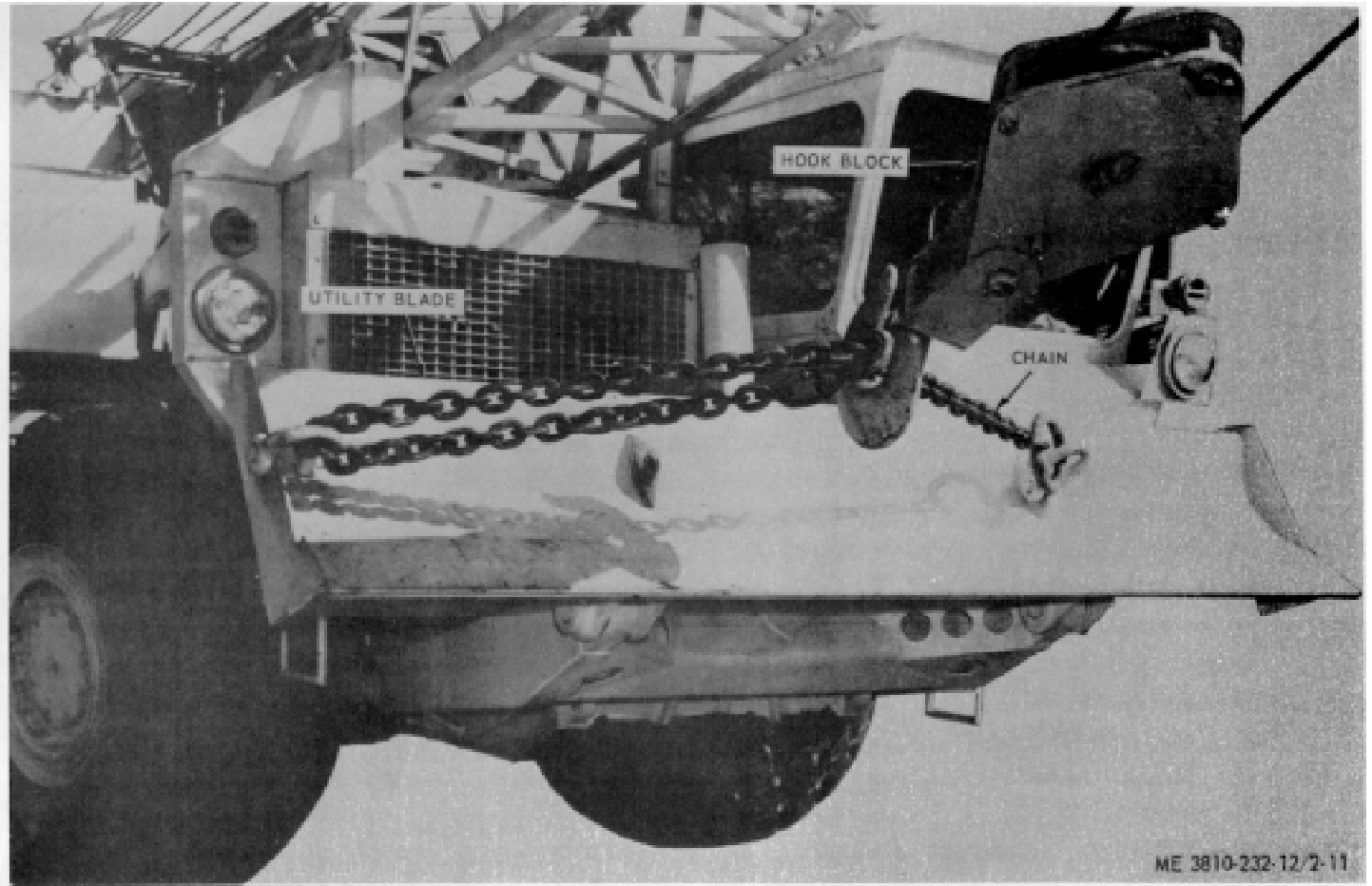
**CAUTION**

**Do not allow the boom to rest in the boom cradle at any time.**

(5) Use only the hook block snubbed with chain to secure the boom to the utility blade as illustrated in figure 2-11.

**NOTE**

**Draw the hook block hoist cable as tight as possible to minimize bouncing and to provide better handling characteristics for operator while traveling.**



*Figure 2-11. Boom secured to utility blade.*

**CAUTION**

Boom must be secured to utility blade with hook block and chain when traveling. Offset chain to be sure direct pull is exerted on the boom by the chain. Ensure

brakes -are adjusted and set sufficiently tight to prevent the hoist cable from becoming loose from bouncing during travel.

(6) Install manual rear steering lock for over the road travel as illustrated in figure 2-12.

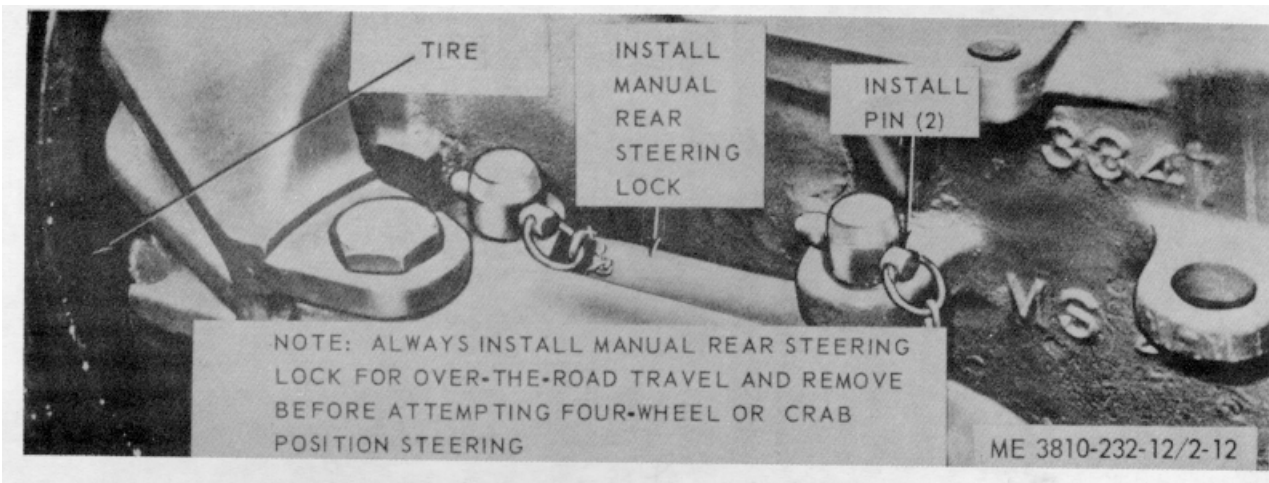


Figure 2-12. Manuel rear steering lock, installation

(7) Secure the crane cab.

- (a) Disengage all clutches,
- (b) Set all brakes

(c) Engage the crane cab lock (fig. 2-19).

(d) For model 2380 position the anti-rotation rod the secured position (fig. 2-13)

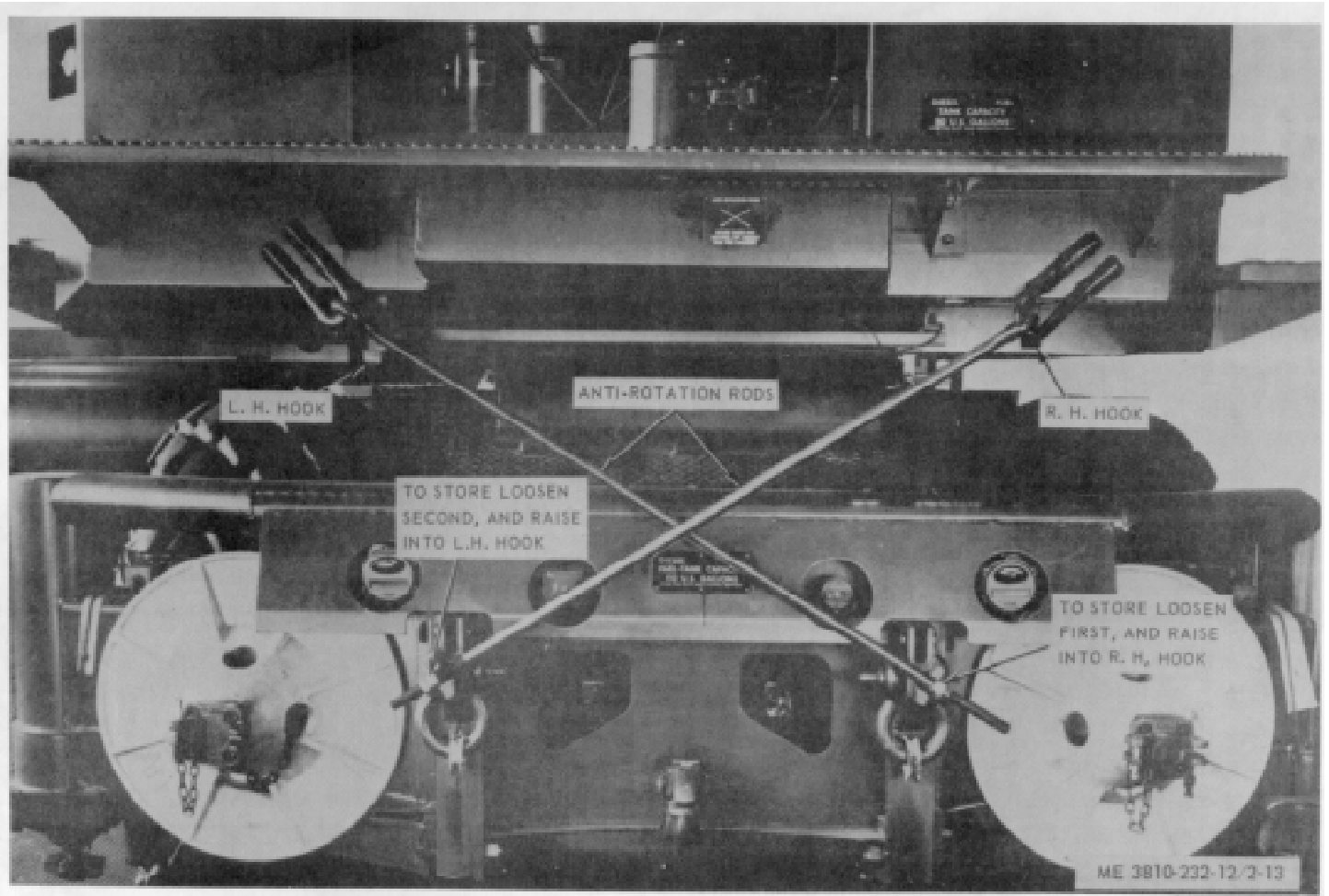


Figure 2-13. Anti-rotation rods in the secured position (model 2380)

(e) For model 2385 engage house lock (fig. 2-19).

**NOTE**

**For long distance moves, the crane boom may remain installed but it may be desirable to remove it. If a clamshell or dragline bucket is used, it must be removed and transported by truck or trailer.**

*c. Crane Boom Removal.*

(1) Lower the boom to a horizontal position and build up cribbing under the boom as illustrated in figure 2-1.

(2) Use wedges or jacks to relieve weight from the boom footpins. Remove the boom footpins (fig. 2-2).

(3) Remove cables; clean, lubricate, and identify the cables and store.

(4) Move the crane away from the crane boom attachment.

*d. Utility Blade Removal.* Upon occasion the utility blade assembly may be removed to facilitate handling or clearances. Refer to figure 1-3.

**2-4. Reinstallation After Movement**

*a. Crane Boom Installation.* Install crane boom if applicable (para 2-2).

*b. Utility Blade Installation.* Install utility blade if applicable.

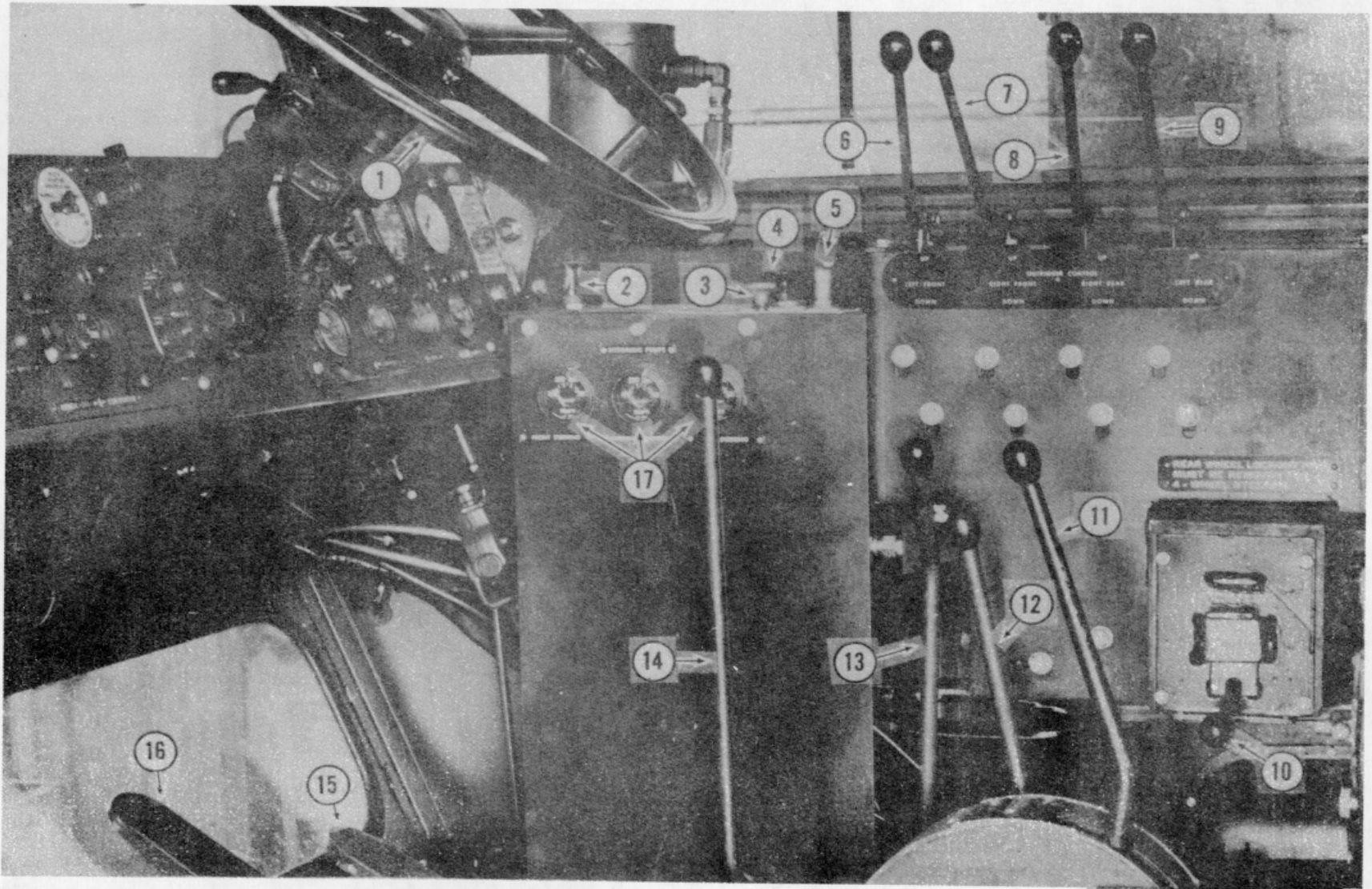
**Section III. CONTROLS AND INSTRUMENTS**

**2-5. General**

This section describes, locates, illustrates, and furnishes the operator/crew sufficient information about the controls and instruments for proper operation of the carrier and crane. Paragraph 2-6 list the carrier controls and instruments for the model 2380, paragraph 2-7 list the carrier controls and instruments for the model 2385, and the crane controls and instruments for both models are listed in paragraph 2-8.

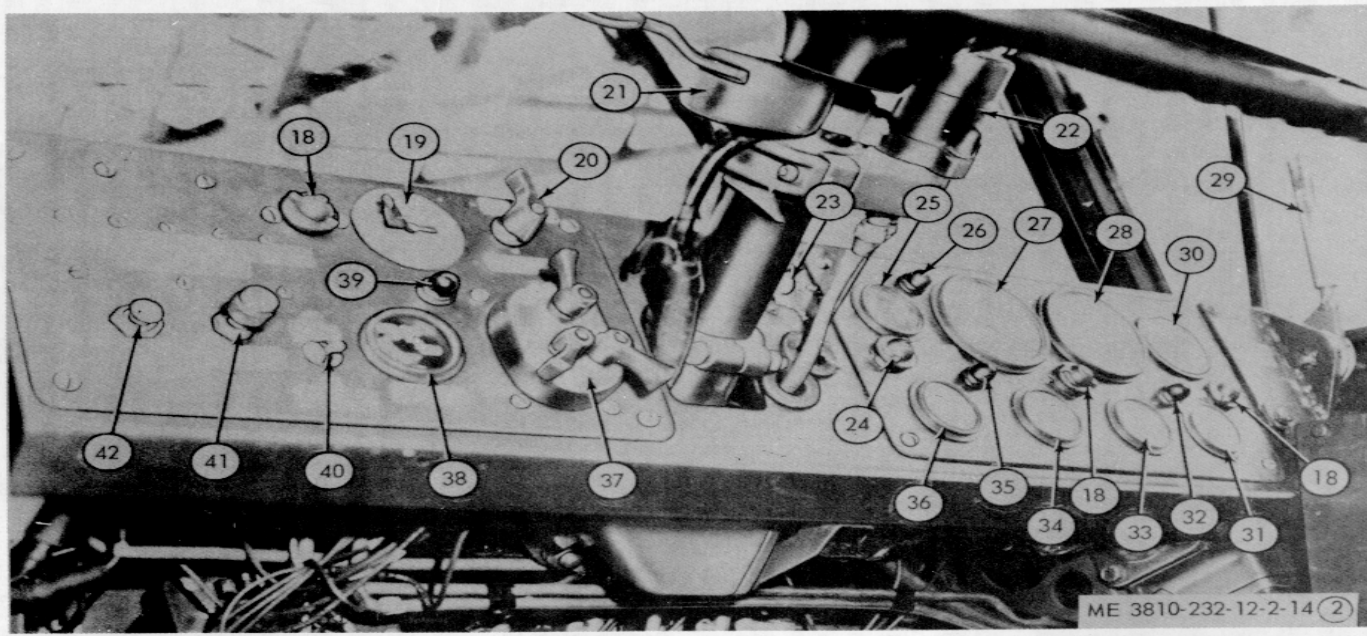
**2-6. Carrier Controls and Instruments (Model 2380)**

*a.* The controls and instruments for the model 2380 carrier are illustrated in figure 2-14, sheets 1 and 2.



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Figure 2-14. Carrier controls and instruments (model 2380) (sheet 1 of 2).



- |   |   |  |
|---|---|--|
| 1 Steering wheel                          | 18 Dash panel light                       | 29 Hand throttle                               |
| 2 Air reservoir drain control             | 19 Tractor protection brake control valve | 30 Air pressure gage                           |
| 3 Quick-start control                     | 20 Main switch                            | 31 Engine temperature gage                     |
| 4 Emergency-park brake control            | 21 Turn signal control                    | 32 Engine temperature warning light            |
| 5 Utility blade lock control              | 22 Trailer brake lever                    | 33 Fuel tank level gauge                       |
| 6 Left front outrigger control            | 23 Utility outlet receptacle              | 34 Torque converter oil pressure gage          |
| 7 Right front outrigger control           | 24 High beam indicator light              | 35 Torque converter oil pressure warning light |
| 8 Right rear outrigger control            | 25 Engine oil pressure gage               | 36 Battery-generator indicator                 |
| 9 Left rear outrigger control             | 26 Engine oil pressure warning light      | 37 Vehicle light switch                        |
| 10 Steering selector control              | 27 Speedometer                            | 38 Torque converter temperature                |
| 11 Transmission gear range selector       | 28 Tachometer-hourmeter                   | 39 Torque converter temperature warning light  |
| 12 Front axle declutch control            |   | 40 Heater switch                               |
| 13 Transmission directional control lever |   | 41 Windshield wiper control                    |
| 14 Utility blade control                  |   | 42 Starter motor switch                        |
| 15 Foot throttle                          |   |  |
| 16 Foot brake pedal                       |   |  |
| 17 Hydraulic pump temperature gages       |   |  |

Figure 2-14. Carrier controls and instruments (model 2380). (Sheet 2 of 2).



(1) *Carrier steering wheel* (1). This wheel is a four spoke heavy duty type, used to steer the carrier.

(2) *Air reservoir drain control* (2). This is a push-type control located to the operator's right, near the dash panel. It is used to drain moisture from air reservoir tanks.

(3) *Quick-start control* (3). Located to the operator's right. It is used to inject quick-starting vapor into the air intake for cold weather starting of the engine.

(4) *Emergency-park brake control* (4). This is a push-type control located next to the quick-start control. It is used to set the brakes for parking or in the case of an emergency.

(5) *Utility blade lock control* (5). This push-pull type control is located to the right of the operator. It is used to engage and release the utility blade safety lock.

(6) *Left-front outrigger control* (6). Located to the right, behind the utility blade lock control. It is a rod-type lever with a ball knob. It is used to raise and lower the left-front outrigger.

(7) *Right-front outrigger control* (7). Located to the right of the left front outrigger control. It is a rod-type lever with a ball knob. It is used to raise and lower the right-rear outrigger.

(8) *Right-rear outrigger control* (8). Located to the right of the right-front outrigger control. It is a rod-type lever with a ball knob. It is used to raise and lower the right-rear outrigger.

(9) *Left-rear outrigger control* (9). Located to the right of the right-rear outrigger control. It is a rod-type lever with a ball knob. It is used to raise and lower the left-rear outrigger.

(10) *Steering selector control* (10). Located to the right of the operator's seat. It is a rod-type lever, and is used to select front steer-four-wheel steer, or crab position steering.

(11) *Transmission gear range selector* (11). Located to the right of the operator's seat. It is a rod-type lever mounted in a shifting quadrant which selects desired gear ratio to operate the transmission.

(12) *Front axle declutch control* (12). Located to the right of the operator's seat. It is a rod-type lever used to engage and disengage the front axle drive.

(13) *Transmission directional control lever* (13). Located to the right of the operator's seat. It is a rod-type lever and has 3 positions; forward, neutral, and reverse. It is used to engage the transmission for the desired direction of travel.

(14) *Utility blade control* (14). Located to the right, next to the transmission gear range selector. It is a rod-type lever and is used to raise and lower the utility blade.

(15) *Foot throttle* (15). Located on the cab floor. It regulates the amount of fuel flow to the fuel injectors

(16) *Foot brake pedal* (16). Located on the cab floor. It operates the metering air valve that regulates the flow of air to the carrier wheel brakes for stopping the carrier and to release the emergency-park brake.

(17) *Hydraulic pump temperature gages* (17). Located on the support panel to the operator's right. The three gages indicate hydraulic oil temperature, one each for the front and rear steering pumps and the steering control pump. During operation the normal temperature range is 0° to 2600 maximum.

(18) *Driving light dimmer switch*. Located on the cab floor at the extreme left. The dimmer switch is a foot operated switch that controls the high and low beam of the driving lights.

(19) *Dash panel lights* (18). One is located near the center of the left dash panel and two on the right dash panel. They are used to illuminate the dash panels for night operation.

(20) *Tractor protection brake control valve* (19). Located right-center on the left dash panel. This control permits selecting service or emergency operation for the carrier brakes.

(21) *Main switch* (20): Located at the top right corner of the left dash panel. It is used to turn ignition and electrical system on and off.

(22) *Turn signal control* (21). This is a three-position control lever located on the left side of the steering column under the steering wheel. It is used to actuate the turn signal lights on the front and rear of the carrier.

(23) *Trailer brake lever* (22). Located on the right side of the steering column under the steering wheel. It is used to control the air braking pressure to a trailer or similar towed vehicle.

(24) *Utility outlet receptacle* (23). Located to the right of the steering column. It is used to plug in and operate accessory equipment.

(25) *High beam indicator light* (24). Located at the center, extreme left side of the right dash panel. It gives a red light when the driving lights are high beam.

(26) *Engine oil pressure gage* (25). Located at the top left corner of the right dash panel and indicates the engine lubricating oil pressure. Normal gage reading may exceed this. This gage should show an idle gage reading of 10 pounds as soon as the engine is started.

#### **CAUTION**

**Low or zero gage reading is a danger signal. Stop the engine immediately and check for the cause.**

(27) Engine oil pressure warning light (26). Located to the right, above the engine oil pressure gage, indicates by a red light that the oil pressure is below the operating minimum, or when the oil pressure falls below 10 psig at low engine idle speed.

**CAUTION**

**Do not operate engine if this light is illuminated.**

(28) Speedometer (27). Located to the right of the engine oil pressure gage. It is a needle-type indicator calibrated from 0 to 60. It indicates the speed in miles per hour the vehicle is traveling and the odometer registers the miles traveled.

(29) Tachometer-hourmeter (28). Located to the right of the speedometer. It indicates the engine speed in revolutions per minute and registers the number of hours the engine operates.

(30) Air pressure gage (29). Located to the right of the tachometer-hourmeter. It is calibrated from 0 to 160 pounds. It indicates the air pressure in the air brake system. The normal operating air pressure range is from 80 to 120 pounds per square inch.

(31) Hand throttle (30). Located at the extreme right of the right dash panel. It is a lever-type control used to maintain a fixed engine speed.

(32) Engine temperature gage (31). Located on the right dash panel directly below the air pressure gage. It is a calibrated needle-type gage that indicates engine coolant temperature. The normal operating temperature is 1650 to 1950 F.

**CAUTION**

**If the temperature exceeds 1950 F., stop the engine and correct the cause.**

(33) Engine temperature warning light (32). Located to the left, and above the engine temperature gage, indicates by a red light that the coolant temperature is above the safe operating range.

**CAUTION**

**If this light illuminates, stop the engine immediately and correct cause.**

(34) Fuel tank level gage (33). Located to the left of the engine temperature gage. It is a calibrated needle-type gage that indicates the amount of fuel in the fuel tank.

(35) Torque converter oil pressure gage (34). Located to the left of the fuel tank level gage and indicates the torque converter oil pressure. Normal oil pressure at operating temperature and high free idle speed is 25 pounds per square inch, maximum.

**CAUTION**

**Failure of the torque converter pressure**

**gage to operate is a danger signal. Stop the engine immediately and check for the cause.**

(36) Torque converter oil pressure warning light (35). Located to the left above the torque converter oil pressure gage illuminates when the oil pressure is below the minimum operating pressure.

(37) Battery-generator indicator (36). Located at the lower left corner of the right dash panel next to the torque converter oil pressure gage. This instrument indicates the condition of the batteries when the engine is running or stopped. The main switch must be in the ON position before the indicator will show battery condition.

(38) Vehicular light switch (37). Located at the lower right of the left dash panel and is used to control the lights on the carrier. The switch assembly has three lever-type switches. The lower left controls the instrument panel lights and parking lights. The lower right lever is a two-position lock lever. The top control lever controls the service and black-out lights. Lever positions are marked on the switch cover.

(39) Torque converter temperature gage (38). Located to the left of the vehicular light switch. It is a calibrated needle-type gage which indicates the oil temperature in the torque converter. During operation the normal temperature is 180° to 200° F.

(40) Torque converter temperature warning light (39). Located directly above the torque converter temperature gage, indicates by a red light when the torque converter oil temperature is above the safe operating temperature.

(41) Heater switch (40). Located to the left of the torque converter temperature gage. It is a toggle-type switch used to operate the carrier cab personnel heater.

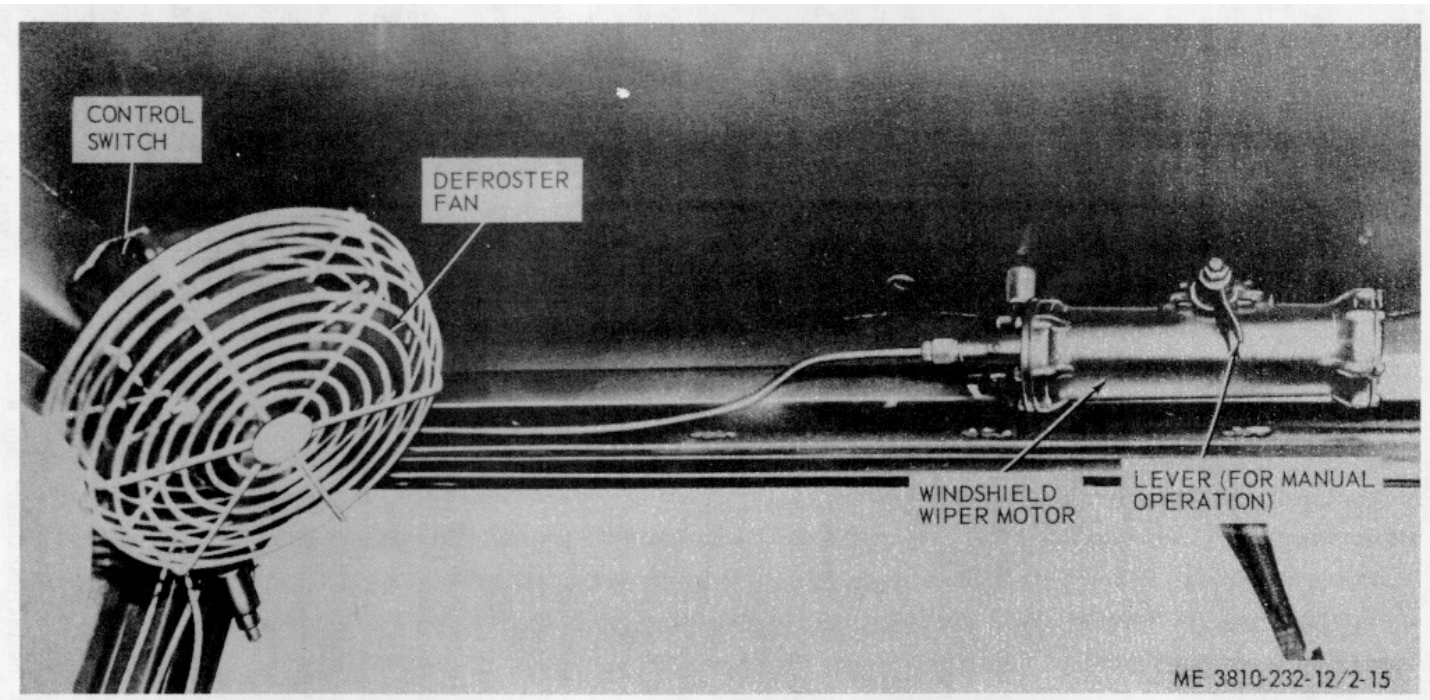
(42) Windshield wiper control (41). Located to the left of the heater switch, at the lower left of the left dash panel. The control is a metering valve that is used to turn the windshield wipers on and off.

(43) Starter motor switch (42). Located at the lower left corner of the left dash panel. It is a push-type switch used to operate the engine starter motor.

b. Accessory Controls (Model 2380).

(1) Manual wiper control. The manual windshield wiper control (fig. 2-15) is located on the wiper motor at the top of the operator's cab. It is a flat lever used to actuate the wiper blade manually in event of vacuum failure.

(2) Defroster fan (fig. 2-15). Located at the top left corner of the windshield. It is an electric motor driven, self-contained fan used to clear fog from the inside of the windshield. A control switch mounted on the motor mounting bracket controls operation.

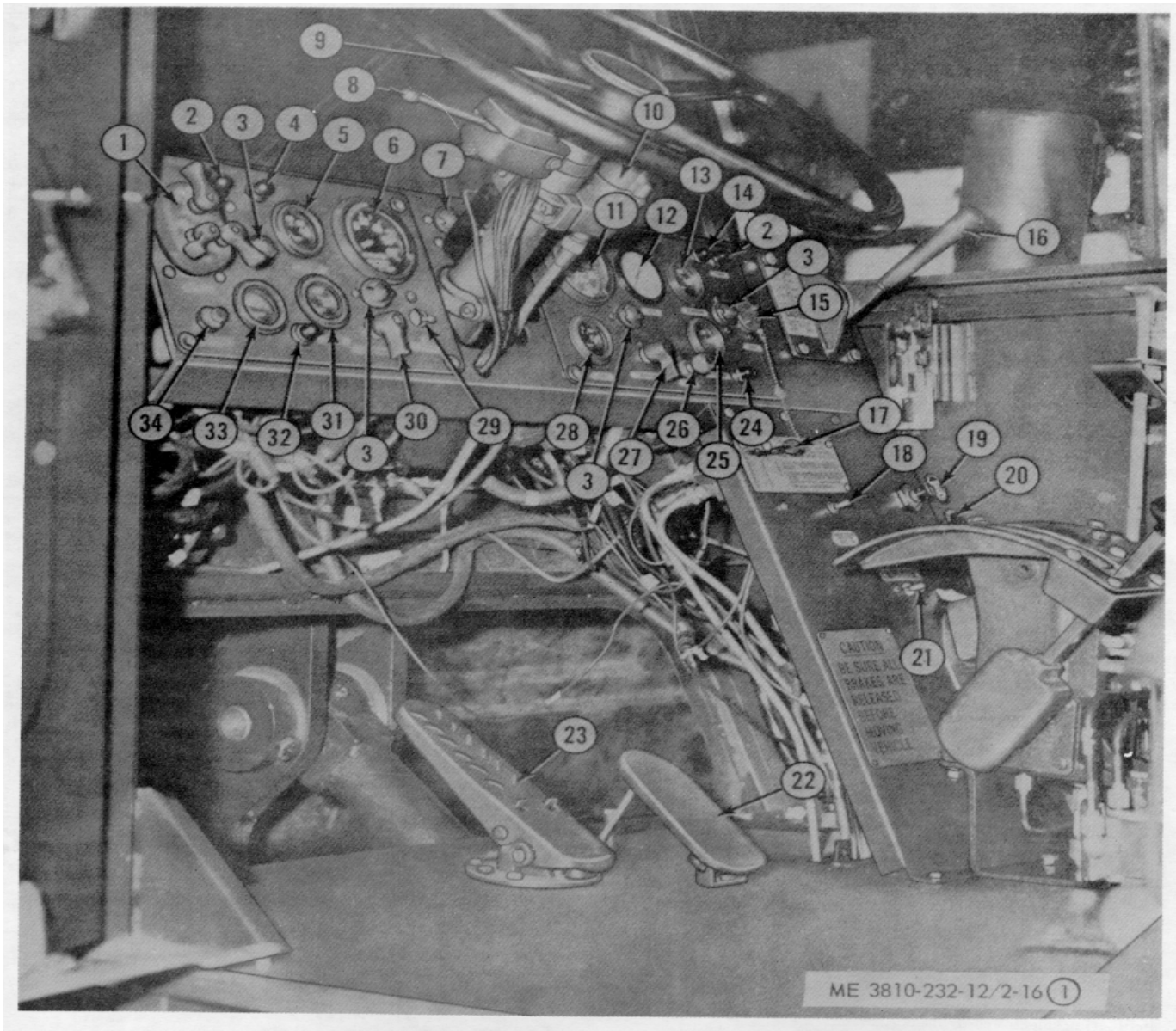


*Figure 2-15. Defroster fan and wind shield wiper (model 2380).*

**2-7. Carrier Controls and Instruments  
(Model 2385)**

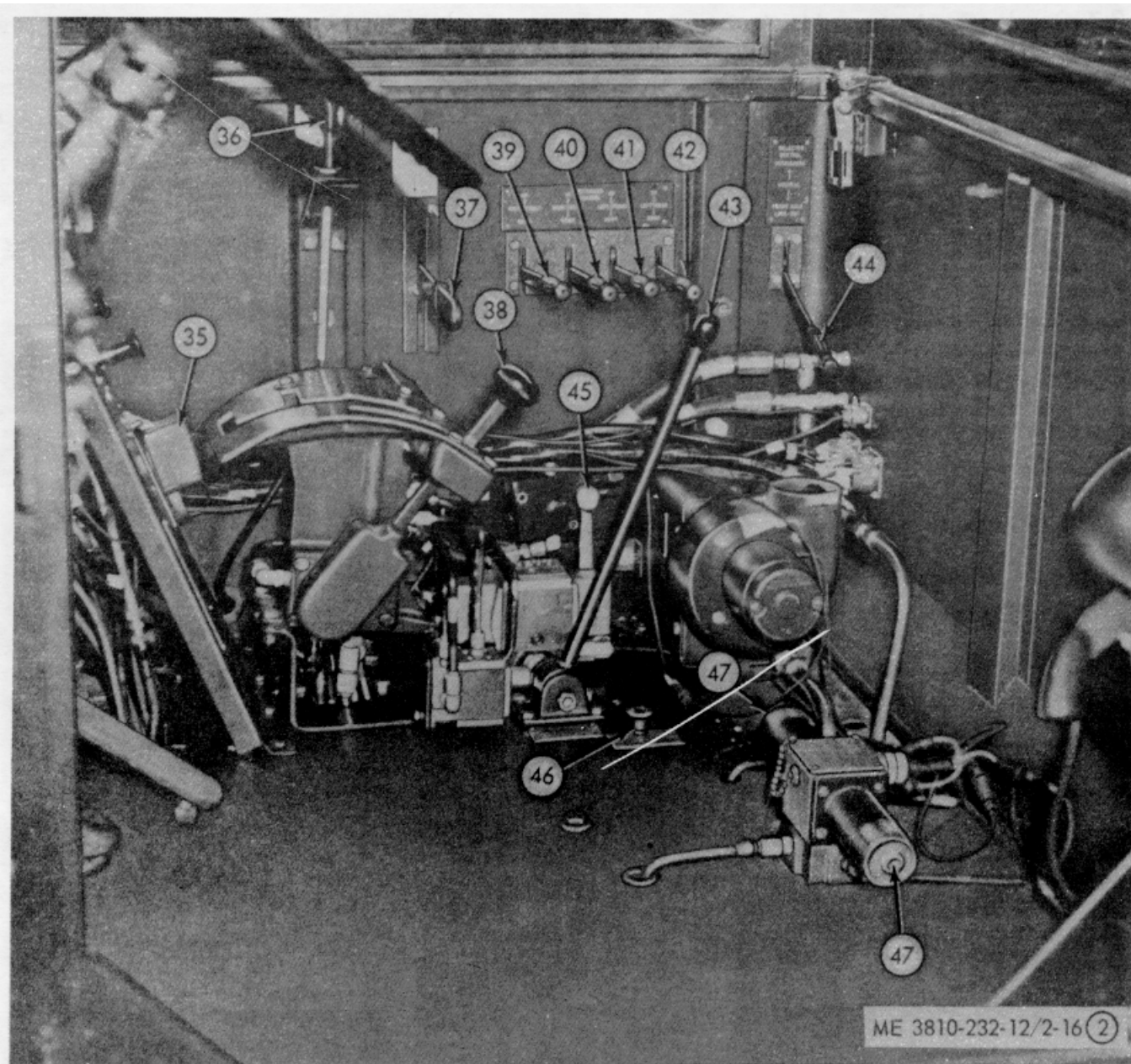
model 2385 carrier are illustrated in figure 2-16, sheets 1 and 2.

a. The carrier controls and instruments for the



- |                                     |                                      |                                       |                                     |
|-------------------------------------|--------------------------------------|---------------------------------------|-------------------------------------|
| 1 Vehicular light switch            | 11 Tachometer-hourmeter              | 19 Emergency-park brake control       | 29 Heater switch                    |
| 2 Turn indicator light              | 12 Air pressure gage                 | 20 Air reservoir drain control        | 30 Hazard warning switch            |
| 3 Dash panel lights                 | 13 Torque converter temperature gage | 21 Battery disconnect switch          | 31 Engine temperature gage          |
| 4 Engine oil pressure warning light | warning light                        | 22 Foot throttle                      | 32 Engine temperature warning light |
| 5 Engine oil pressure gage          | 14 Torque converter temperature      | 23 Foot brake pedal                   | 33. Battery - Alternator indicator  |
| 6 Speedometer                       | warning light                        | 24 Torque converter oil pressure      | 34 Starter motor switch             |
| 7 High beam indicator light         | 16 Hand throttle                     | warning light                         |                                     |
| 8 Turn signal control               | 17 Tractor protection brake          | 25 Torque converter oil pressure gage |                                     |
| 9 Carrier steering wheel            | control                              | 26 Windshield wiper control           |                                     |
| 10 Trailer brake level              | 18 Front axle oscillate lockout      | 27 Main switch                        |                                     |
|                                     | switch                               | 28 Fuel tank level gage               |                                     |

Figure 2-16 Carrier controls and instruments (model 2385). Sheet 1 of 2



- 35 Park-abort control
- 36 Utility blade lock control
- 37 Utility blade control
- 38 Transmission gear range selector control
- 39 Right-front outrigger control
- 40 Right-rear outrigger control
- 41 Left-front outrigger control
- 42 Left-rear outrigger control
- 43 Front axle declutch control
- 44 Hydraulic selector control
- 45 Steering selector control
- 46 Quick start control
- 47 Manual release button

Figure 2-16. Carrier controls and instruments (model 2385).  
Sheet 2 of 2

(1) *Vehicular light switch* (1). The vehicular light switch is located at the extreme left-hand side of the dash panel and is used to control the lights on the carrier. The switch assembly has three lever-type switches. The lower left controls the instrument panel lights and parking lights. The lower right lever is a two position lock lever. The top lever controls the service and blackout lights. Lever positions are marked on the switch cover.

(2) *Turn indicator lights* (2). The turn indicator lights are located at the upper corners of the dash panel. One, on the left side, to indicate the left turn signal lights are operating when the turn signal control is actuated for a left turn. When the turn signal control is actuated for a right turn, the indicator light on the right of the panel functions, indicating the right turn signal lights are operating.

(3) *Dash panel lights* (3). The dash panel lights located midway on the dash panels, two on the right and two on the left. These lights are used to illuminate the dash panels for night operation.

(4) *Engine oil pressure warning light* (4). The engine oil pressure warning light located at the top, near the center of the left dash panel, indicates by a red light that the oil pressure is below the operating minimum, or when the oil pressure falls below 10 psi at low engine idle speed.

#### **CAUTION**

**Shut the engine down immediately if this light is illuminated during operation.**

(5) *Engine oil pressure gage* (5). The engine oil pressure gage located at the top center of the left panel, indicates the engine lubricating oil pressure. Normal gage reading at operating temperature and speed is 30-45 pounds per square inch. With a cold engine, the gage reading may exceed this. This gage should show an idle gage reading of 10 lbs as soon as the engine is started.

#### **CAUTION**

**Low or zero gage reading is a danger signal. Stop the engine immediately and check for the cause.**

(6) *Speedometer* (6). The speedometer is located to the right of the engine oil pressure gage. It is a needle-type indicator calibrated from 0 to 60. It indicates the speed in miles per hour the vehicle is traveling and the odometer registers the miles traveled.

(7) *High beam indicator light* (7). The high beam indicator light is located at the center of the dash panel, above the steering column. It gives a red light when the driving lights are on high beam.

(8) *Turn signal control* (8). The turn signal control is a three-position control lever located on the left side of the steering column under the steering wheel. It is used to actuate the turn signal lights on

the front and rear of the carrier.

(9) *Carrier steering wheel* (9). The carrier steering wheel is a four-spoke, heavy-duty type, used to steer the carrier.

(10) *Trailer brake lever* (10). The trailer brake lever is located on the right side of the steering column under the steering wheel. It is used to control the air braking pressure to a trailer or similar towed vehicle.

(11) *Tachometer-hourmeter* (11). The tachometer-hourmeter is located next to the steering column at the left upper corner of the right dash panel. It indicates the engine speed in revolutions per minute and records the number of hours the engine has operated.

(12) *Air pressure gage* (12). The air pressure gage is located to the right of the tachometer-hourmeter. It is calibrated from 0 to 160 pounds. It indicates the air pressure in the airbrake system. The normal operating air pressure range is from 90 to 120 pounds per square inch.

(13) *Torque converter temperature gage* (13). The torque converter temperature gage is located to the left of the air pressure gage. It is a calibrated needle-type gage which indicates the oil temperature in the torque converter. During operation of the normal temperature is 1800 to 2000F.

(14) *Torque converter temperature warning light* (14). The torque converter temperature warning light located to the right, and slightly above the torque converter temperature gage, indicates by a red light when the torque converter oil temperature is above the safe operating temperature.

(15) *Utility outlet receptacle* (15). The utility outlet receptacle located at the extreme right end of the right dash panel. It is used to plug in and operate accessory equipment.

(16) *Hand throttle* (16). The hand throttle is located at the extreme right of the right dash panel. It is a lever-type control used to maintain a fixed engine speed.

(17) *Tractor protection brake control* (17). The tractor protection brake control valve is located at the top of the auxiliary dash panel, to the operator's right. This control permits selecting service or emergency operation for the carrier brakes.

(18) *Front axle oscillate lockout (switch and system)*(18). The front axle oscillate lockout switch is located below the tractor protection brake control on the auxiliary dash panel. The axle oscillate lockout system was designed to allow the lifting of light loads without setting the outriggers. The toggle switch (mentioned above) energizes the electric hydraulic valve located on the cab floor just behind the operator's seat which, in turn, causes two hydraulic cylinders



to extend locking devices between the main frame and the front axle housing, thus preventing oscillating or tilting. The engagement of both locks can only be achieved when the main frame and the axle housing are relatively parallel (within 5/8"). As pressure is built up in axle oscillate lockout system (900 psi), the double acting cylinder mounted on the transmission shift gage tower is actuated, locking out the transmission control. To retract the axle oscillate lockout, hold the toggle switch in the "off" position until the transmission shift lock is released. The electric control described above is fused. Fuse location is behind the dash panel. In the event an electrical failure occurs, which cannot be corrected by a fuse re-placement, the system can be retracted and the transmission shift lever released manually by depressing the recessed release button (47) in the two-way valve located behind the drivers seat.

#### NOTE

The transmission shift control must be in neutral to operate the oscillate lockout.

#### WARNING

**Do not attempt to lift heavy loads with only the use of the axle oscillate lockout. Only very limited stability can be achieved with this equipment while operating on rubber tires.**

(19) *Emergency-park-brake control* (19). The emergency-park brake control is a push-type control located on the auxiliary dash panel to the right of the front axle oscillate lockout switch. It is used to set the brakes for parking or in the case of an emergency.

(20) *Air reservoir drain control* (20). The air reservoir drain control is a push-type control located directly below the emergency-park brake control on the auxiliary dash panel. It is used to drain moisture from the air reservoir tanks.

(21) *Battery disconnect switch* (21). The battery disconnect switch is located below the air reservoir drain control at the center of the auxiliary dash panel. It is a toggle-type switch that provides a positive disconnect for the electrical system.

(22) *Foot throttle* (22). The foot throttle is located on the cab floor and regulates the amount of fuel flow to the fuel injectors.

(23) *Foot brake pedal* (23). The foot brake pedal is located on the cab floor. It operates the metering air valve that regulates the flow of air to the carrier wheel brakes for stopping the carrier and to release the emergency-park brake.

(24) *Torque converter oil pressure warning light* (24). The torque converter oil pressure warning light, located at the bottom right corner of the right dash panel, indicates by a red light when the oil pressure is below the minimum operating pressure.

(25) *Torque converter oil pressure gage* (25). The torque converter oil pressure gage, located to the left of the torque oil pressure warning light, indicates the torque converter oil pressure. Normal oil pressure at operating temperature and high free idle speed is 180 to 220 pounds per square inch.

#### CAUTION

**Failure of the torque converter pressure gage to operate is a danger signal. Stop the engine immediately and check for the cause.**

(26) *Windshield wiper control* (26). The windshield wiper control is located to the left of the torque converter pressure gage. The control is a metering valve that is used to turn the windshield wipers on and off.

(27) *Main switch* (27). The main switch is located to the left of the windshield wiper control, lower left side of right dash panel. It is used to turn the electrical system on and off, including the fuel shutoff.

(28) *Fuel tank level gage* (28). The fuel tank level gage is located at the lower left corner of the right dash panel. It is calibrated needle-type gage that indicates the amount of fuel in the fuel tank.

(29) *Heater switch* (29). The heater switch is located at the lower right corner of the left dash panel. It is a toggle-type switch used to operate the carrier cab personnel heater.

(30) *Hazard warbling switch* (30). The hazard warning switch is located at the lower right corner of the left dash panel, to the left of the heater switch. This switch is used when the vehicle is parked and allows the turn signal lights, both front and rear, to be turned on and keeps them flashing intermittently.

(31) *Engine temperature gage* (31). The engine temperature gage is located lower center of the left dash panel. It is a calibrated needle-type gage that indicates engine coolant temperature. The normal operating temperature is 165° to 195°F.

#### CAUTION

**Do not allow the coolant to boil away. The boiling point of the coolant will vary with altitude, strength of the antifreeze solution, and the condition of the pressure cap. If boiling occurs stop the engine and correct the cause. Do not add water (or anti-freeze solution) to an over-heated engine; allow a cooling-off period to avoid engine damage.**

(32) *Engine temperature warning light* (32). The engine temperature warning light, located to the left and below the engine temperature gage, indicates by a red light, that the coolant temperature is above safe operating range.

## CAUTION

**If this light illuminates, stop the engine immediately and correct the cause.**

(33) *Battery-alternator indicator* (33). The battery-alternator indicator is located at the lower-left corner of the left dash panel, to the left of the engine temperature warning light. This instrument indicates the condition of the batteries when the engine is running or stopped. The main switch must be in the ON position before the indicator will show battery condition.

(34) *Starter-motor switch* (34). The starter-motor switch is located at the extreme lower left corner of the left dash panel. It is a push-type switch used to operate the engine starter-motor.

(35) *Utility Blade Lock Control* (36). The utility blade lock control is a push-pull-type control located to right of the operator. It is used to engage and re-lease the utility blade safety lock. Turn the control 1/4 turn to the right to lock. Turn 1/4 turn to the left to unlock the control.

(36) *Utility blade control* (37). The utility blade control is located to the right, next to the transmission gear range selector. It is a bar-type lever and is used to raise and lower the utility blade.

(37) *Transmission gear range selector control*

(38). The transmission gear range selector is located to the right of the operator's seat. It is a rod-type lever mounted in a shifting quadrant providing hydraulic shift control to the transmission for selecting the desired gear ratio and direction of travel. Four forward speeds and two reverse speeds are provided. In 3rd and 4th speed range, the torque converter can be locked up by pressing the shift selector to the right. This is desirable in over the road travel at speeds over 20 mph.

(38) *Right-front outrigger control* (39). The right-front outrigger control is located to the right of the utility blade control. It is a rod-type lever used to raise and lower the right-front outrigger.

(39) *Right-rear outrigger control* (40). The right-rear outrigger control is located to the right of the

right-front outrigger control. It is rod-type lever used to raise and lower the left-rear outrigger.

(40) *Left-front outrigger control* (41). The left-front outrigger control is located to the right-of the right-rear outrigger control. It is rod-type lever used to raise and lower the left-front outrigger.

(41) *Left-rear outrigger control* (42). The left-rear outrigger control is located to the right of the left-front outrigger control. It is a rod-type lever used to raise and lower the left-rear outrigger.

(42) *Front axle declutch control* (43). The front axle declutch control is located to the right of the operator's seat. It is a rod-type lever, floor-mounted, used to engage and disengage the front axle drive.

## CAUTION

**Do not engage the front axle drive with the vehicle in motion.**

(43) *Hydraulic selector control* (44). The hydraulic selector control is located at the extreme right rear corner of the cab. It is a rod-type lever used to actuate the hydraulic system for outrigger operation or front axle oscillate lockout, as desired.

(44) *Steering selector control* (45). The steering selector control is located to the operator's right, on the cab floor to the right of the front axle declutch control. It is used to select front steer, four-wheel steer; or crab position steering.

(45) *Quick-start control* (46). The quick-start control is located on the cab floor, to the operator's right, near the front axle declutch control. It is used to inject quick-starting vapor into the air intake for cold weather starting of the engine.

(46) *Driving light dimmer switch*. The driving light dimmer switch is located on the cab floor at the extreme left. The dimmer switch is a foot-operated switch that controls the high beam driving lights.

(47) *Park-abort brake control* (35). The park-abort brake control is located just below the battery disconnect switch on the auxiliary dash panel. It is a push-type control used to release the parking brakes when the machine is parked, to prevent freeze-up in cold weather. Refer to figure 2-17 for detail view and data.



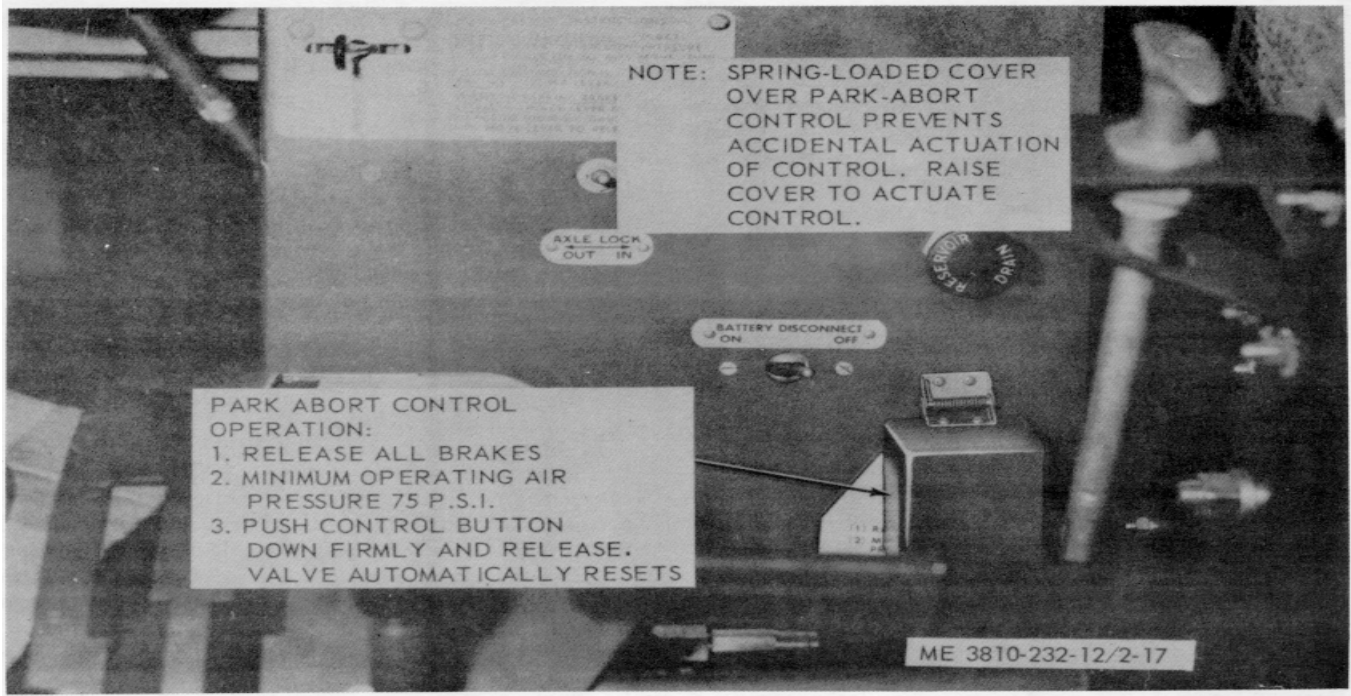


Figure 2-17. Park-abort control (model 2385).

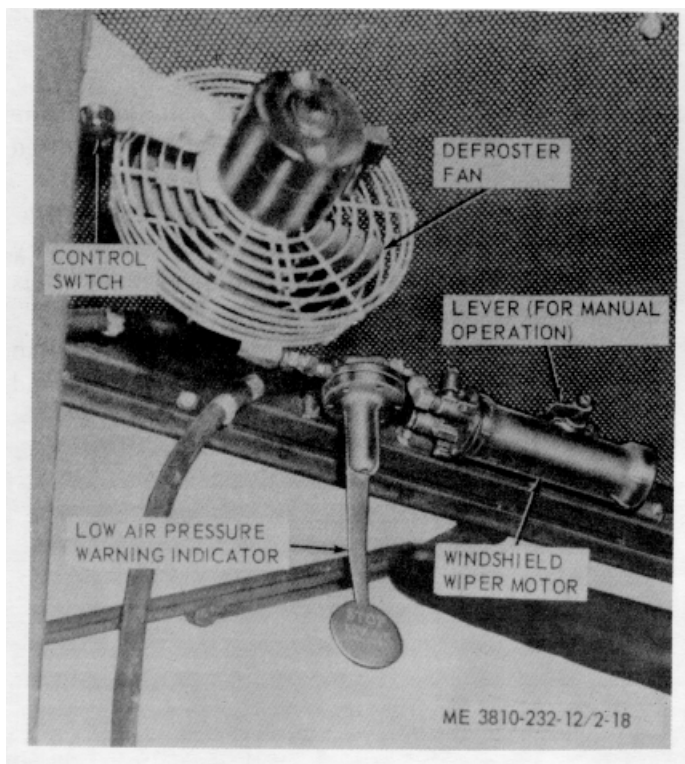


Figure 2-18. Defroster fan windshield wiper and low air pressure warning indicator (model 2385)

b. Accessory Controls (Model 2385).

(1) *Manual wiper control (fig. 2-18)*. The manual windshield wiper control is located on the wiper motor at the top of the operator's cab. It is a flat lever used to actuate the wiper blade manually in event of vacuum failure.

(2) *Defroster fan (fig. 2-18)*. Located at the top left corner of the windshield. It is an electric motor driven, self-contained fan used to clear fog from the inside of the windshield. A control switch mounted on the motor mounting bracket controls operation.

(3) *Low air pressure warning indicator (fig. 2-18)*. The low pressure warning indicator is located in the operator's cab next to the wiper motor. When the air pressure drops to a low level the arm will swing back and forth. Stop operations and allow pressure to rebuild to operating pressure.

**2-8. Crane Controls and Instruments**

a. Controls. The crane controls are illustrated in figure 2-19.

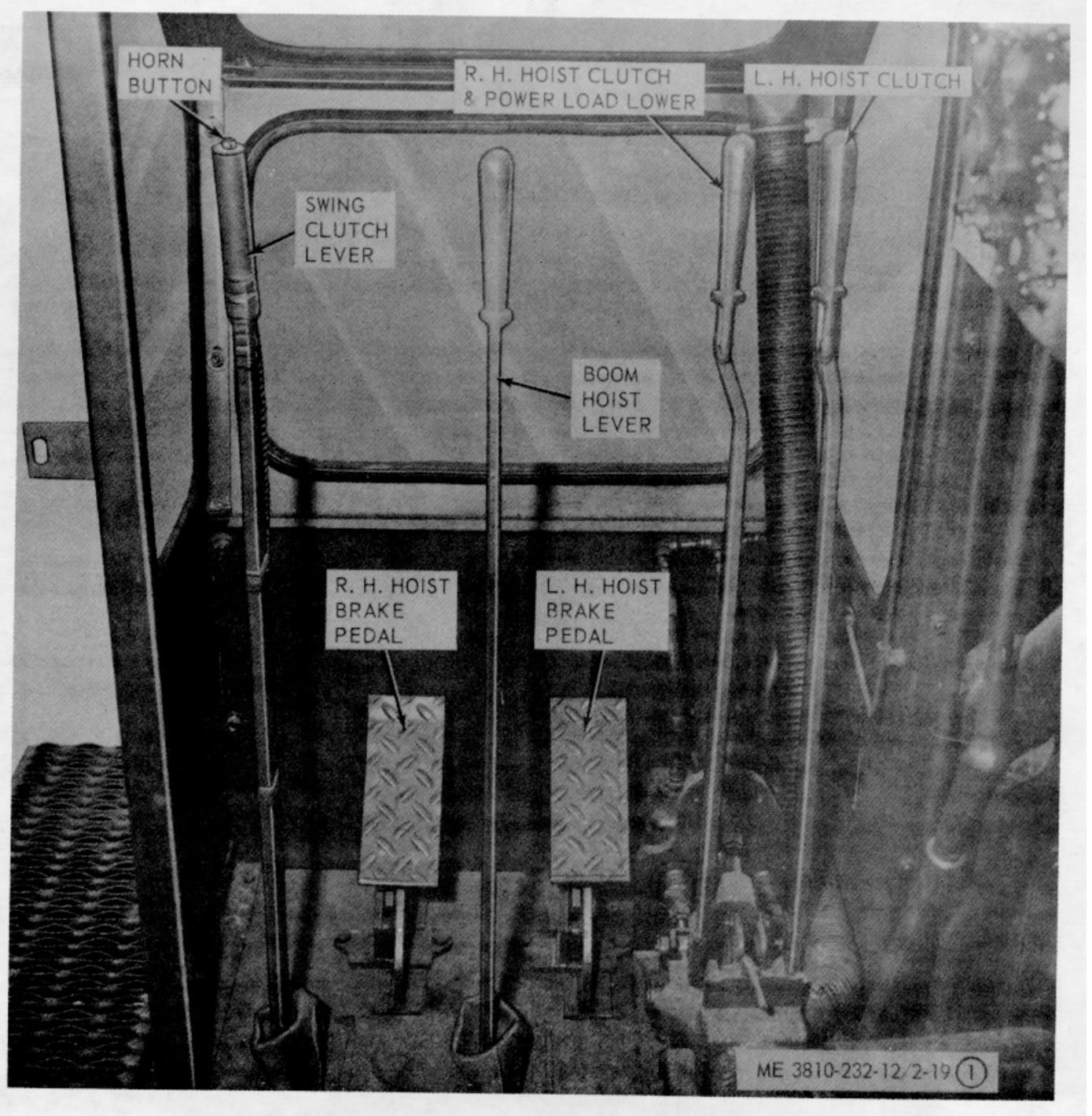


Figure 2-19. Crane Controls (Sheet 1 of 2).

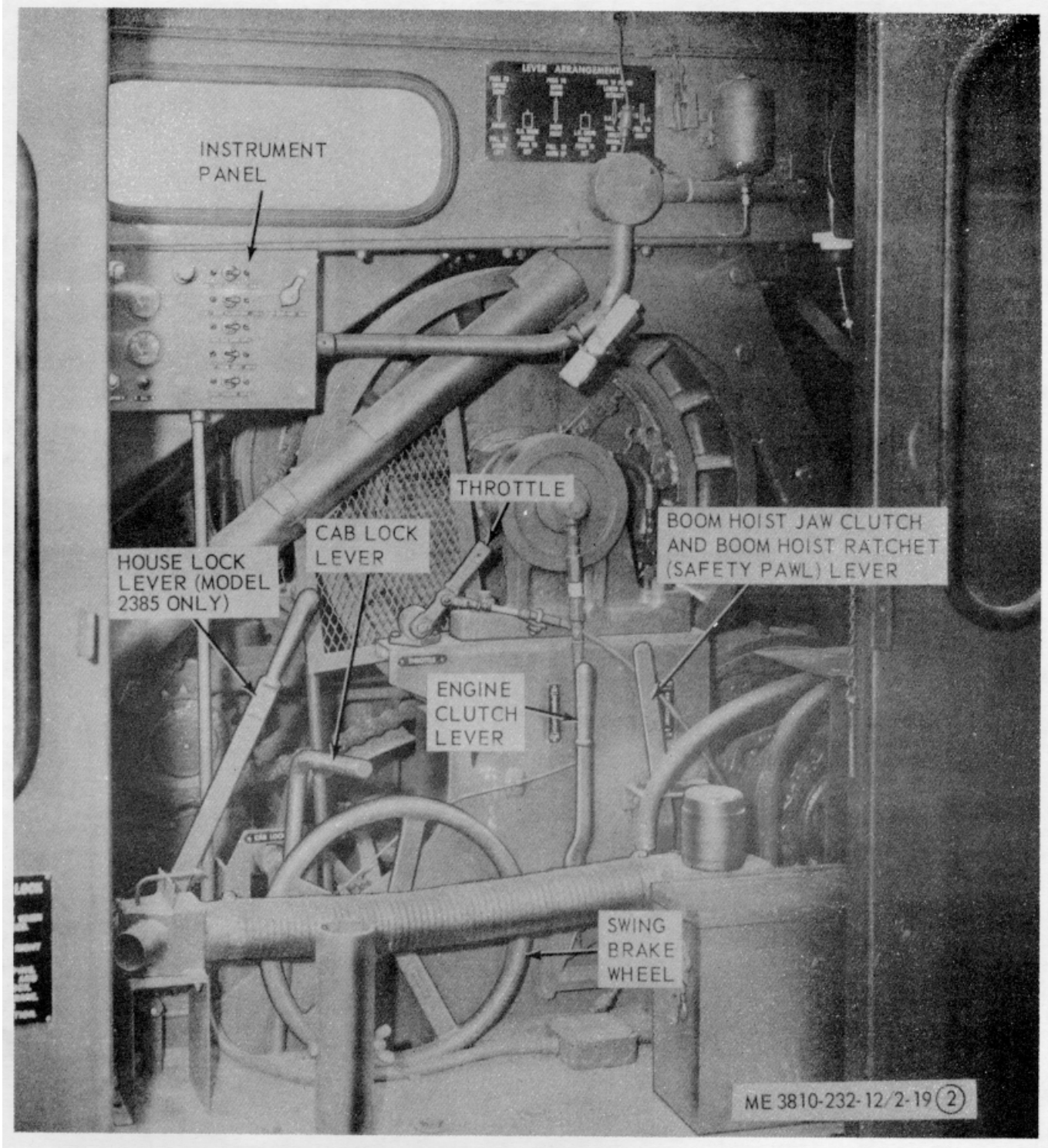


Figure 2-19. Crane controls. (Sheet 2 of 2).

(1) Swing clutch lever. The swing clutch lever is located in front of the operator and to the left. This lever

controls the direction of the swing motion of the revolving superstructure.

(2) *Horn button.* The horn button is mounted at the handle end of the swing clutch lever. Press button to sound crane horn.

(3) *Boom hoist lever.* Located directly in front of the operator to the right of the swing clutch lever and controls the boom hoist clutch.

(4) *Right-hand hoist drum clutch and power load lowering lever.* Located in front of the operator and to the right. This lever controls the right-hand hoist drum clutch and is also used for power load lowering.

(5) *Left-hand hoist drum clutch lever.* Located in front of the operator and to the right of the right-hand hoist drum clutch lever. This lever controls the left-hand hoist drum clutch.

(6) *Left-hand hoist drum brake pedal.* Located on the floor in front of the operator between the right-hand hoist drum clutch lever and boom hoist lever. It is a toe heel pedal that controls the left-hand hoist drum brake and is used in conjunction with the left-hand hoist clutch drum lever.

(7) *Right-hand hoist drum brake pedal.* Located on the floor in front of the operator between the boom hoist lever and swing clutch lever. It is a toe release, heel lock pedal that controls the right-hand hoist drum brake and is used in conjunction with the right-hand hoist drum clutch lever.

(8) *Throttle.* The engine throttle is mounted on

the structural frame to the right of the operator's seat. It is used to increase and decrease the engine speed.

(9) *Boom hoist jaw clutch and boom hoist ratchet (safety pawl) lever.* This dual control lever is mounted on the structural frame aft of the engine clutch lever. This lever is used to engage and disengage the jaw clutch and ratchet (safety pawl) on the boom hoist shaft.

(10) *Cab lock lever.* Located to the right and slightly behind the operator's seat. This lever is used to lock the revolving superstructure in position and prevent it from turning.

(11) *House lock lever (model 2385).* The house lock lever is located to the right just forward of the cab lock lever. This lever is used to provide a positive lock to the revolving superstructure for over the road travel.

(12) *Engine clutch lever.* Located to the right and behind the operator's seat and is connected to the engine clutch through linkage.

(13) *Swing brake wheel.* Located to the right and below the operator's seat and is used to engage and disengage the swing brake.

b. *Instruments.* The crane instruments panel is illustrated in figure 2-20.

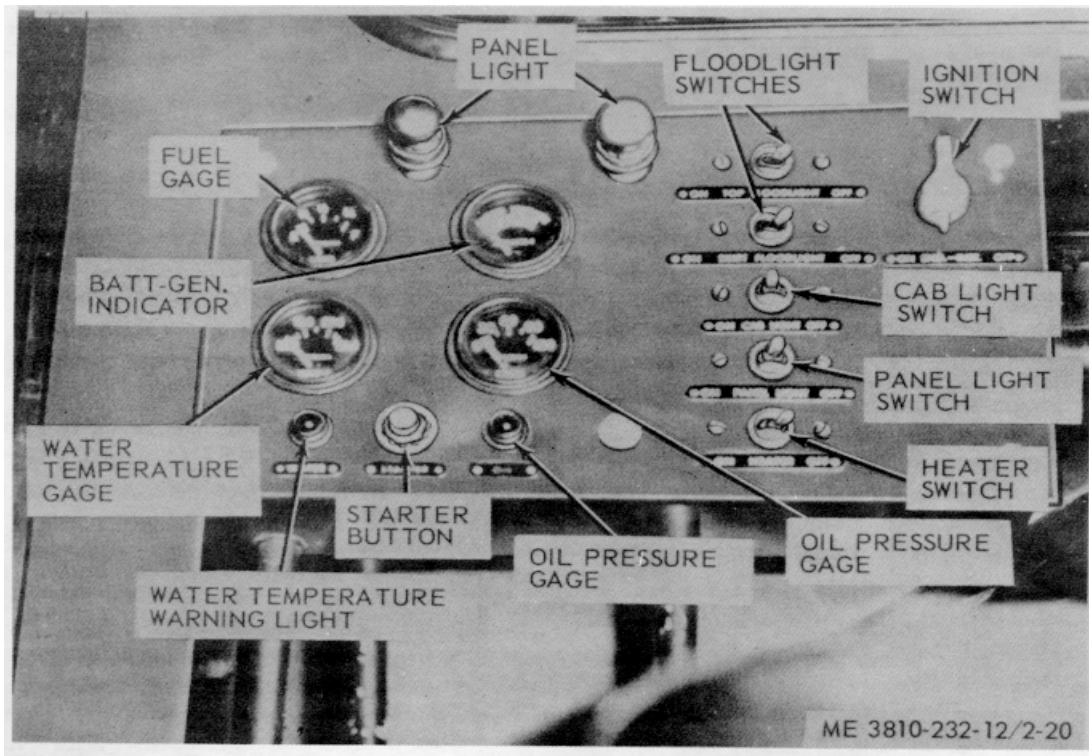


Figure 2-20. Crane instrument panel.

(1) *Starter button.* Located at the lower edge of the instrument panel is a push-type button. It is used in conjunction with the ignition switch to start the crane engine.

(2) *Ignition switch.* Located at the top right corner of the instrument panel. Turn key clockwise to stop engine.

(3) *Oil pressure gage.* Located at the lower left of the instrument panel and indicates the engine lubricating oil pressure. Normal oil pressure at operating temperature and speed is 40 to 75 pounds per square inch. With a cold engine, the pressure will exceed this. The gage should show pressure as soon as the engine is started.

#### **CAUTION**

**Failure of the oil pressure gage to operate is a danger signal. Stop the engine immediately and check for the cause.**

(4) *Water temperature gage.* Located to the left of the oil pressure gage. This gage indicates the temperature of liquid in the cooling system and should show a gradual increase in temperature during engine warm up to a normal operating temperature of 165° o to 195° It regulates the amount of fuel flow to the fuel in-

#### **CAUTION**

**If temperature of 195 F. is exceeded, stop the engine and correct the cause.**

(5) *Battery-generator indicator.* Located at the top of the instrument panel directly above the oil pressure gage. This instrument indicates the condition of the batteries when the engine is running or

stopped. The ignition switch must be in the ON position before the indicator will show battery condition. If the needle is in the RED part of the dial, batteries are low and need immediate attention. If the needle is in the YELLOW area, the batteries are in a weakened condition and should be serviced or charged. When the needle is in the GREEN part of the dial, the batteries are properly charged.

(6) *Warning lights.* There are two warning lights on the crane instrument panel. The red light below the oil pressure gage indicates the oil pressure is below operating minimum. The red light below the water temperature gage indicates water temperature is above the safe operating temperature.

#### **CAUTION**

**Do not operate engine if either of these lights are illuminated.**

(7) *Heater switch.* This switch is the bottom switch in the row of switches of the right-hand side of the instrument panel and controls the cab heater.

(8) *Light switches.* The first three switches in the row of switches on the instrument panel control the cab and floodlights on the crane. They are a toggle ON-OFF switch.

c. *Quick-Start System Control* The crane engine quick-start control is located on the left side of the crane cab and to the rear of the operator's seat.

d. *Anti-Rotation Rods (Model 2380).* The anti-rotation rods are used to secure the crane cab to the carrier when moving the vehicle and for shipment. Refer to figure 213 for the secured position.

### **Section IV. OPERATION UNDER USUAL CONDITIONS**

#### **2-9. General**

a. The instructions in this section are published for the information and guidance of the personnel responsible for the operation of the crane.

b. The operator must know how to perform every operation of which the crane is capable. This section gives instructions on starting and stopping the crane and carrier and the basic motions of the crane, and on coordinating the basic motions to perform the specific tasks for which the equipment is designed. Since nearly every job presents a different problem, the operator may have to vary the given procedures to fit the individual job.

c. Prior to operating the equipment perform the daily preventive maintenance services (para 3-6).

#### **2-10. Starting the Carrier Engine (Model 2380)**

a. Place transmission directional control lever (13, fig. 2-14) in the NEUTRAL position.

b. Turn all electrical accessory and light switches to OFF position.

c. Turn main switch (20, fig. 2-14) to the ON position.

d. Push the hand throttle (29) forward to the MID position.

e. Press starter motor switch (42).

#### **CAUTION**

**Do not operate the cranking motor more than 30 seconds at one time. Allow at least 2 minutes for cranking motor to cool.**



When the engine starts, release the starter switch and pull throttle back to idle speed. Let engine idle until the engine temperature reaches 160°F. Do not allow the engine to exceed 2,700 rpm at any time.

**NOTE**

For starting the engine in ambient temperatures below 40 F., use the quick starting aid (3, fig. 2-14).

**2-11. Starting the Carrier Engine (Model 2385)**

- a. Place transmission gear range selector control (fig. 2-16, (38)) in NEUTRAL position.
- b. Turn all electrical accessory and light switches to OFF position.
- c. Turn battery disconnect switch (21) to ON position.
- d. Turn main switch (27), to ON position.
- e. Push hand throttle (16), forward to MID position.
- f. Press starter switch (34).

**CAUTION**

**Do not operate the cranking motor more than 30 seconds at one time. Allow at least 2 minutes for cranking motor to cool.**

**When the engine starts, release the starter switch and pull the throttle back to idle speed. Let the engine idle until the engine temperature reaches 1600F.**

**NOTE**

**For starting the engine in ambient temperature below 40 F, use the quick-starting aid (fig. 2-16, (46)).**

**2-12. Stopping the Carrier Engine (Model 2380)**

- a. Pull hand throttle (fig. 2-16, (16)) back to IDLE position. and allow engine to run for 5 minutes to cool before stopping.
- b. Turn off main switch to stop engine.

**2-13. Stopping the Carrier Engine (Model 2385)**

- a. Pull hand throttle (fig. 2-16, (16)) back to IDLE position and allow engine to run for 5 minutes to cool before stopping.
- b. Turn off main switch to stop engine.
- c. Turn battery disconnect switch to OFF position.

**2-14. Operating the Crane Carrier (Model 2380)**

- a. *Operating the Crane Carrier Over the Road.*
  - (1) Start the carrier engine (para 2-10) and allow brake air pressure to reach 120 psi.
  - (2) Push down emergency brake park control (4, fig. 2-14) and make a pedal brake application; hold for 4 seconds, release brake pedal, and allow the air pressure to build up to 120 psi once more. Repeat this procedure once more. This procedure is necessary to insure positive release of the park brakes.

**NOTE**

The air brake system is so designed that an automatically brake application is made when the service reservoir pressure falls between 40 psi. If the emergency pressure should drop below 60 psi, the emergency- part situation results automatically. This same situation can be produced by actuating the emergency part brake control manually. A brake application may also occur on a vehicle being towed. Be sure the towing vehicles air brake pressure has sufficient pressure and capacity (120 psi) to release the emergency park brake before attempting towing operation.

**CAUTION**

**Do not attempt to move the equipment until the air pressure gage indicates sufficient air pressure (120 psi) to operate the brakes. Partial release of the emergency brake will generate heat and could cause tire and axle failure.**

(3) If the utility blade is down, pull the utility blade control lever (14) back and lock the blade by pulling up on the utility blade lock control (5), and turning 1/4 turn counterclockwise.

(4) Position the front axle declutch control (12) in the two-wheel drive position by pushing the control lever forward.

**NOTE**

**The crane carrier should not be operated in four wheel drive at high speeds, over the road. The front axle may be engaged for mud, snow, or on ice or rough terrain to afford more traction.**

(5) Position the directional control lever (13) in the direction desired (forward or reverse) and the transmission gear range selector (11) in number one position and depress the foot throttle (15) slowly. Shift the transmission through all four gear ratios. Do not skip shift the transmission.

**NOTE**

**The lockout position of the transmission gear range selector (11) provides means to lock the transmission and torque converter in third and fourth gears only. Do not attempt to shift transmission on down grades. Do not use lockup (third and fourth gears) on off-road travel).**

- b. *Operating the Crane Carrier Over Rough Terrain,.*
  - (1) Start the carrier engine (para 2-10).
  - (2) Raise the utility blade and lock in TRAVEL position.
  - (3) Release the parking brake control as described in a above.
  - (4) The carrier is equipped with a three-position steering selector control (10, fig. 2-14) which can be used to place the crane carrier in a precise position. Placing the steering selector control in four-wheel steer position provides steering on both front and back wheels, allowing a reduced turning radius. When moving the steering selector control back to

front-wheel steer position, the rear wheels will center automatically. The crab position of the steering selector control allows both front and rear wheels to be turned in the same direction, allowing the machine to be moved at an angle, sideways for precise positioning. Moving the steering selector control back to front-wheel steer position will automatically center the rear wheels. A lock is provided that must be released to move the steering selector control. The front-wheel steer position of the steering selector control provides conventional front wheel steering for normal operation. A manual rear steering lock is provided for the rear axle and should be installed for over-the-road travel (fig. 2-12).

**CAUTION**

**Install rear steering lock for over-the-road travel and do not forget to remove this lock when four-wheel or the crab position steer is desired.**

(5) If the terrain to be traveled is very rough, it may be desirable to operate the carrier in four-wheel drive. If so, pull the front axle declutch control (12, fig. 1-14) back to engage the front axle drive.

**CAUTION**

**Do not engage the front axle drive at high speed.**

(6) Position the transmission gear selector lever (11) in number one position and accelerate the carrier slowly. Shift the transmission to the desired running gear ratio, one position at a time.

**CAUTION**

**Do not skip shift the transmission.**

*c.. Towing.*

(1) Use a vehicle with an air brake system capable of producing 120 psi air in the system.

(2) Use medium tank tow-bar, "V" type, 8-1/2 feet long, heavy duty, FSN 4910-378-2012 for towing.

(3) If possible, place the boom over the front which is the most stable position for towing.

(4) If towing is to be for more than 1/4 mile or at speeds in excess of 5 miles per hour, disconnect the propeller shafts from the front and rear axles as shown in figure 2-21.

(5) Install the rear wheel steer lock.

(6) Install the utility blade brace as illustrated in figure 2-10.

(7) Connect the tow-bar and jumper air hoses as illustrated in figure 2-22.

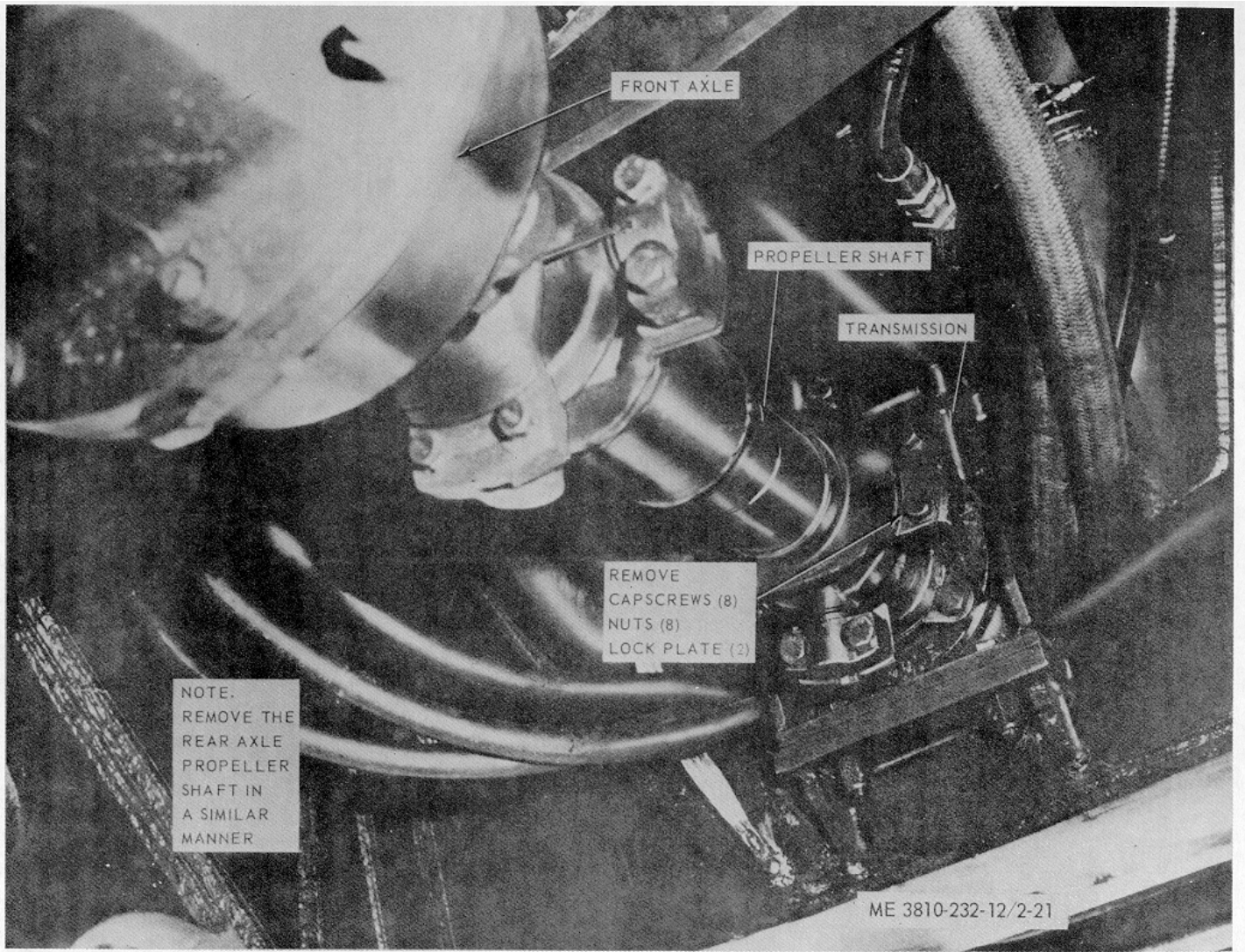
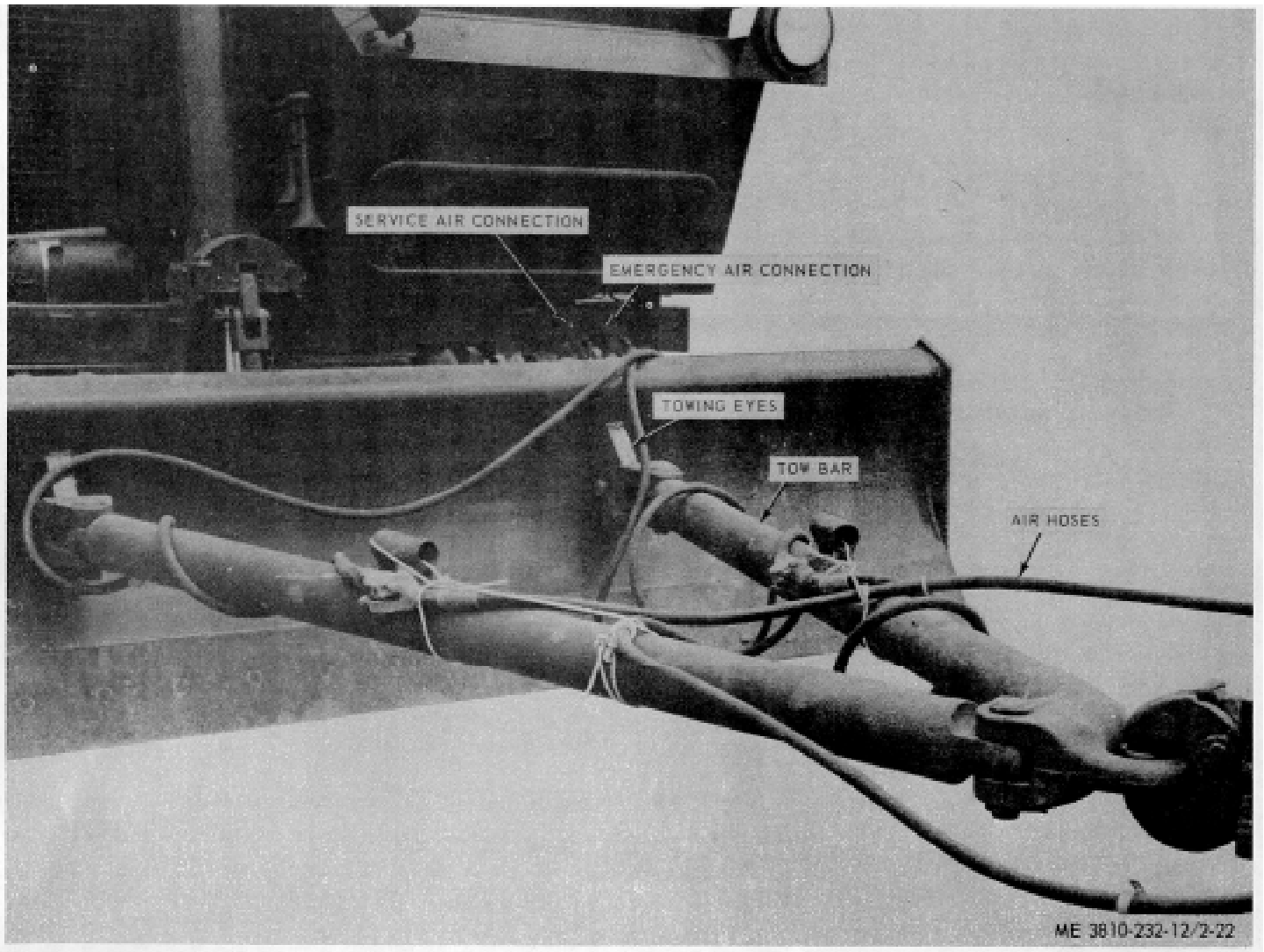


Figure 2-21. Propeller., shafts, removal.





*Figure 2-22. Tow-bar and air hoses connected.*

#### NOTE

**Ensure that air hoses are connected to the correct connection, which is "Emergency" on carrier to "Emergency" on prime mover and "Service" on carrier to "Service" on primer mover.**

(8) Place the tractor protection brake control valve (19, fig. 2-14) to the "Emergency" position, raise air pressure in carrier to 120 psi, and release brakes as directed in a above.

#### *d. Retrieving.*

(1) Install the utility blade brace as illustrated in figure 2-10.

(2) Attach chains or wire rope slings to the towing eyes (fig. 2-22) on the dozer blade.

(3) If the carrier has a live engine, release the brakes as directed in a above.

(4) If the carrier has a dead engine, slave air to the carrier and release the brakes as directed in c above.

(5) If the carrier has a dead engine and no hydraulic accumulator pressure, place a man in the carrier cab to hold the dozer control lever in the down position. This permits the hydraulic oil to by-pass and allows the dozer blade to float thus, relieving strain on the dozer cylinder mounting bracket.

(6) Retrieving the carrier from the rear should be accomplished by attaching a chain or wire rope sling to the pintle hook.

#### CAUTION

**Do not attempt to retrieve the carrier without the brakes released.**

e. Utility Blade Operation. To operate the utility blade, perform the following:

(1) Pull the utility blade control lever (14, fig. 2-14) back and raise the blade enough to release the blade lock (5). Remove utility blade brace as shown in figure 2-10 and store in toolbox.

#### NOTE

**When using the utility blade, always engage the four wheel drive.**

(2) Turn the utility blade lock control (5, fig 2-14) 1/4 turn clockwise, and push down on the control handle.

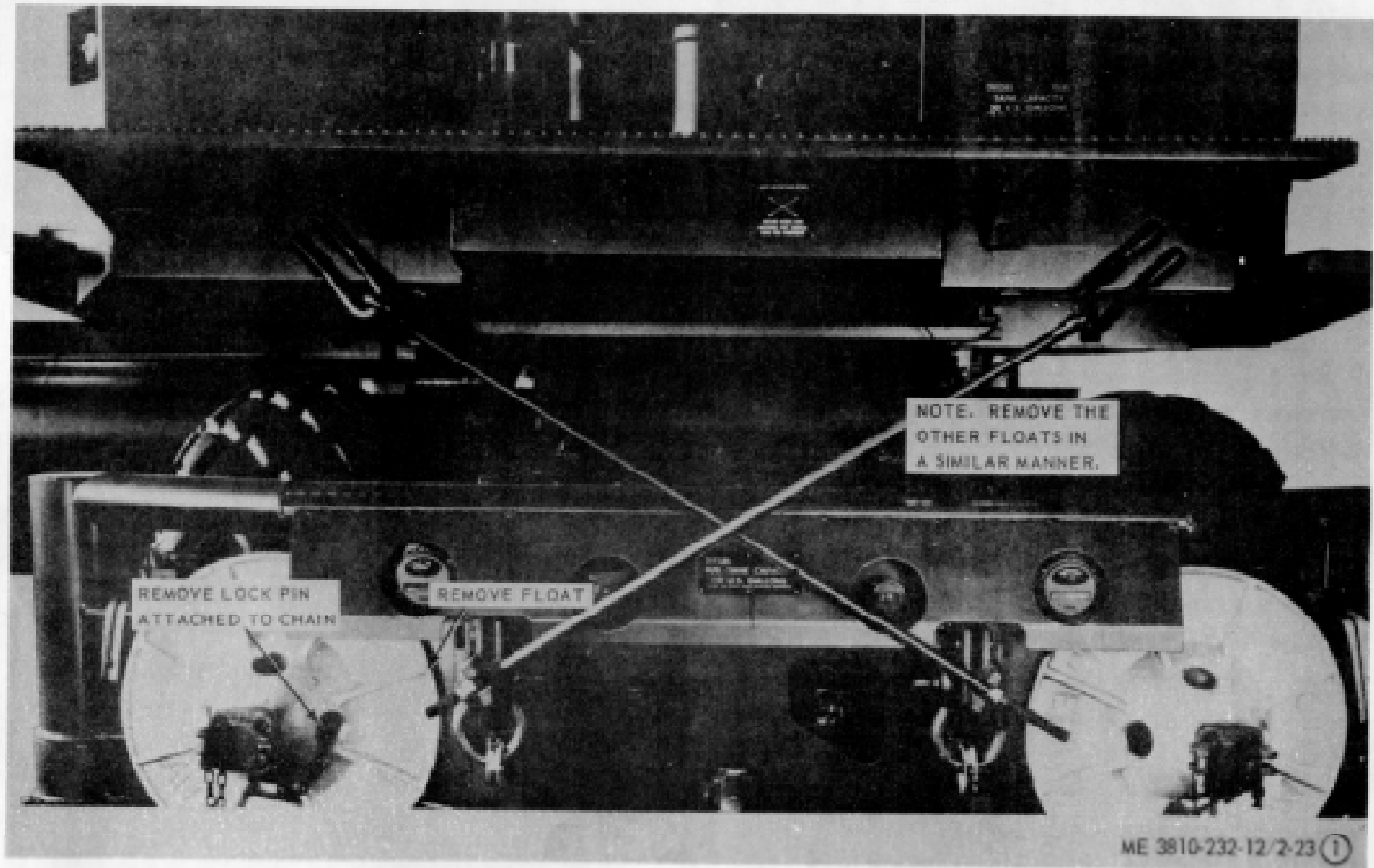
(3) The utility blade can be lowered by pushing the utility blade control lever (14) forward. The blade is raised by pulling the lever back.

#### *f. Positioning Outrigger Floats or Installing Stabilizer Wedges.*

The crane carrier is equipped with four hydraulically controlled outriggers and two front axle stabilizing wedges. Each of the four outriggers may be raised or lowered separately by operating their respective control (6, 7, 8, 9, fig. 2-14).

(1) Outrigger floats are removed or installed in the stowed position as illustrated in figure 2-23.

(2) Position the outrigger float on the ram and secure with lock pin, or install the stabilizer wedges as illustrated in figure 2-24.



*Figure 2-23. Stowed outrigger floats, removal aid installation.  
(model 2380) sheet 1 of 2.*

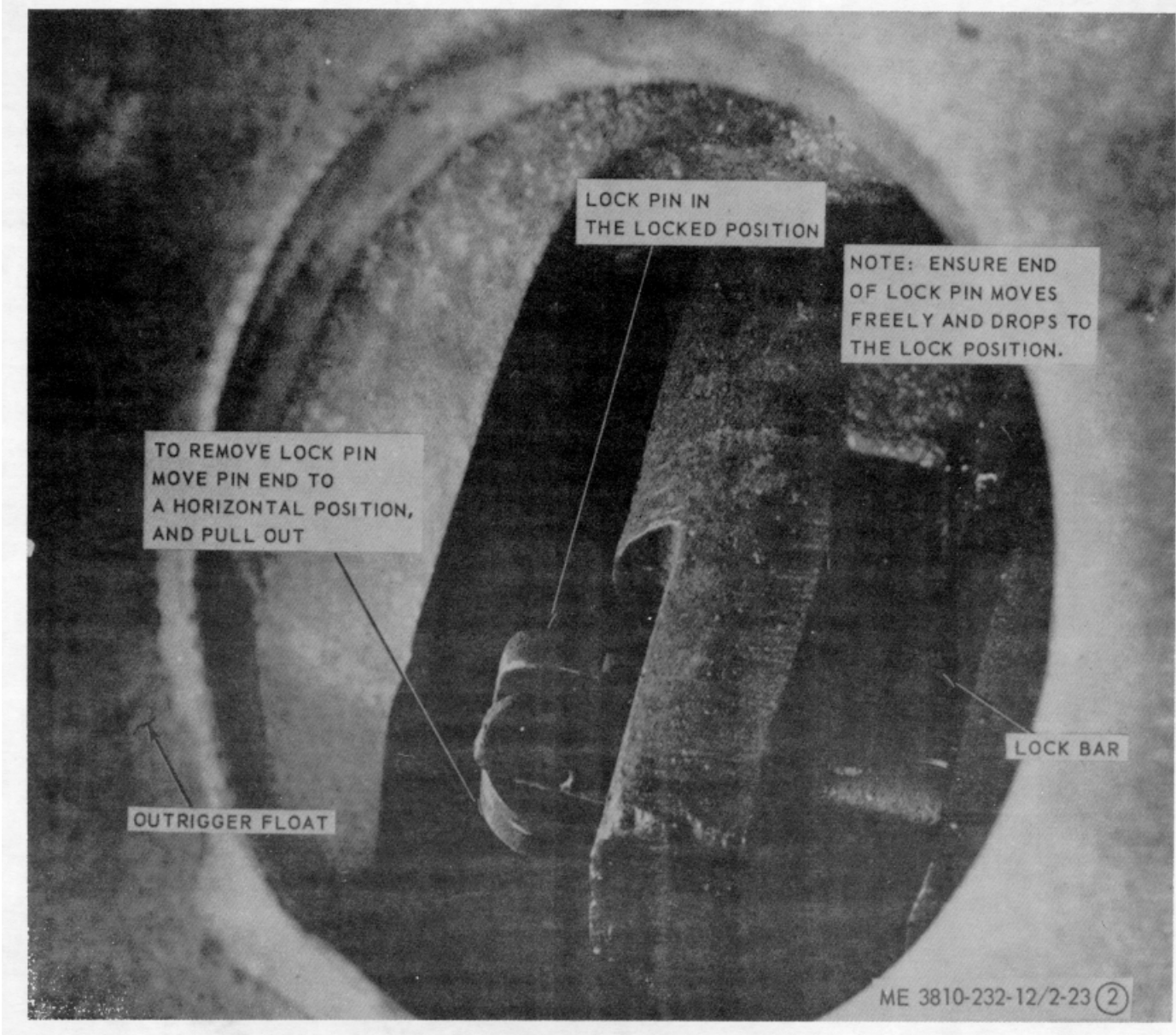


Figure 2-23. Stowed outrigger floats, removal and installation (model 2380) Sheet 2 of 2.

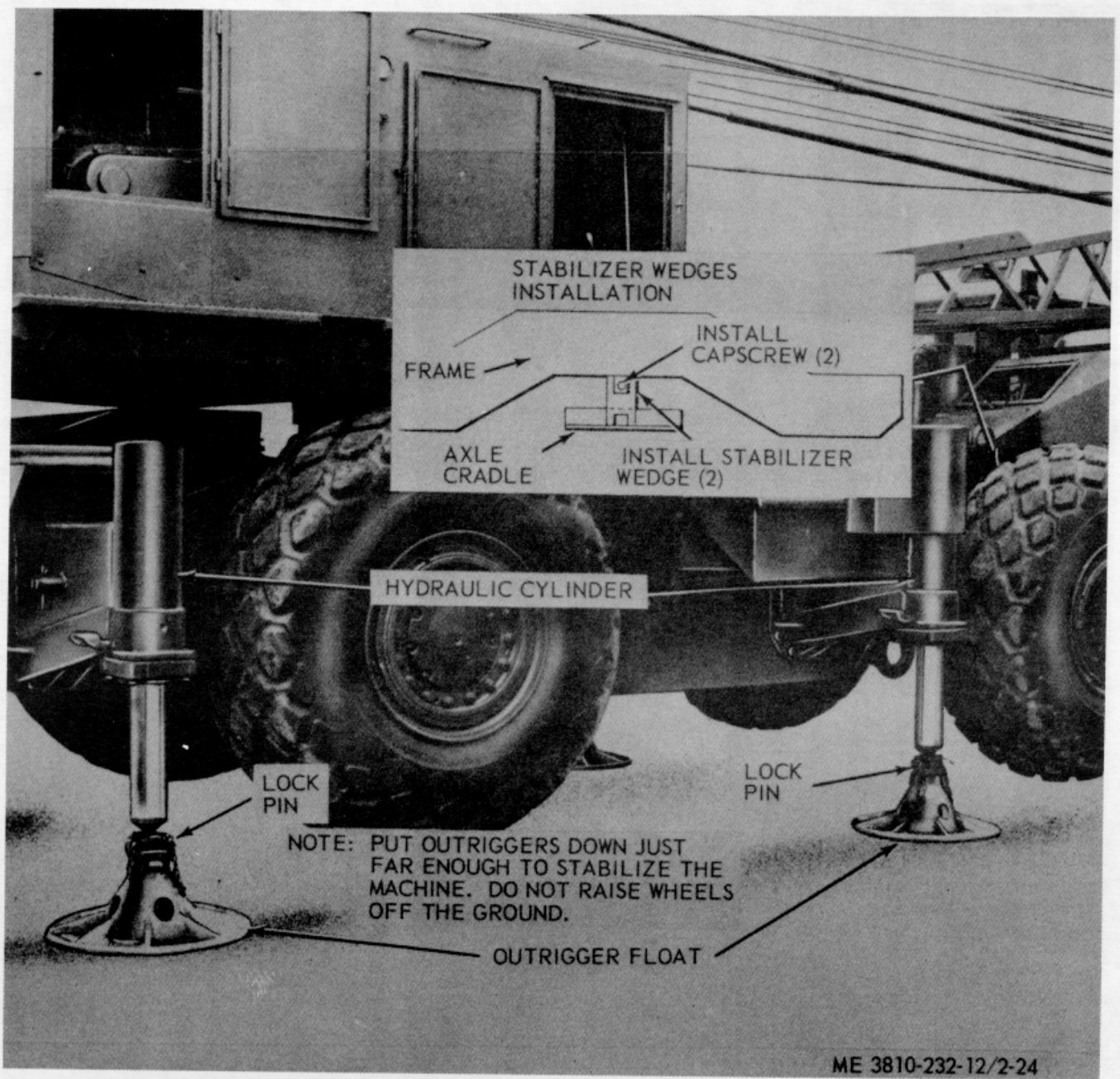


Figure 2-24. Outrigger floats in in operating position or stabilizer wedges, installation.

(3) Position the outriggers in working position by operating their respective controls.

## 2-15. Operating the Crane Carrier (Model 2385)

### a. Operating the Crane Carrier Over the Road.

(1) Start the carrier engine (para 2-11) and allow brake air pressure to reach 120 psi.

(2) Place tractor protection brake control (fig. 2-16, (17)), in EMERGENCY position and charge system to 120 psi gage pressure; then, move tractor protection brake control to RELEASE position. Make a pedal brake application; hold for 4 seconds, release brake pedal and allow the air pressure to build up to 120 psi once more. This procedure is necessary to insure positive release of the park brakes.

#### NOTE

The air brake system is so designed that an automatic brake application is made when the service reservoir pressure falls below 40 psi. If the emergency pressure should drop below 60 psi, the emergency-park situation results automatically. This same situation can be produced by actuating the emergency-park brake control manually. A brake application may also occur on a vehicle being towed. Be sure the towing vehicles air brake pressure has sufficient pressure and capacity (120 psi) to release the emergency-park brake before attempting towing operation.

#### CAUTION

Do not attempt to move the equipment until the air pressure gage indicates sufficient air pressure (120 psi) to operate the brakes. Partial release of the emergency brake will generate heat and could cause tire and axle failure.

(3) If the utility blade is down, pull the utility blade control lever (37) up, and lock the blade by pulling up on the utility blade lock control (36) and turning 1/4 turn clockwise.

(4) Position the front axle declutch control (9) in the two-wheel drive position by pushing the control lever forward.

#### NOTE

The crane carrier should not be operated in four wheel drive at high speeds, over the road. The front axle may be engaged for mud, snow, or on ice or rough terrain to afford more traction.

(5) Position the transmission gear range selector control (38) in number one position and depress the foot throttle slowly. Shift the transmission through all four gear ratios. Do not skip shift the transmission.

#### NOTE

The lockup position of the transmission gear range selector control (38) provides a means to lockup the torque converter in order to eliminate slippage in the converter while in 3rd and 4th speed range only. Do not attempt to down-shift transmission going down grades. Do not use the converter lockup feature (in 3rd and 4th speed range) during off the road travel.

*b. Operating the Crane Carrier Over Rough Terrain.*

(1) Start the carrier engine (para 2-12).

(2) Raise the utility blade and lock in TRAVEL position.

(3) Release parking brake control as described above.

(4) The carrier is equipped with a three-position steering selector control (fig. 2-16, (45)) which can be used to place the crane carrier in a precise position. Placing the steering selector control in fourwheel steer position provides steering on both front and back wheels, allowing a reduced turning radius (but only in 1st and 2nd speed ranges). (If shifted to 3rd or 4th gear range, the steering selector will automatically return to neutral or

front steer only). When moving the steering selector control back to front wheel steer position, the rear wheels will center automatically. The crab position of the steering selector control allows both front and rear wheels to be turned in the same direction, allowing the machine to be moved at an angle, sideways, or precise positioning. Moving the steering selector control back to front wheel steer will automatically center the rear wheels. The front wheel steer position of the steering selector control provides conventional front wheel steering for normal operation. A manual steering lock is provided for the rear axle and should be installed for over-the-road travel (fig. 2-12).

(5) If the terrain to be traveled is very rough, it may be desirable to operate the carrier in fourwheel drive. To engage the front wheel drive, stop the vehicle and pull the front axle declutch control (fig. 2-16, (43)) back, to engage the front axle drive.

#### CAUTION

Do not engage the front axle drive with the vehicle in motion.

(6) Position the transmission gear range selector control (38), in number one position and accelerate the carrier slowly. Shift the transmission to the desired speed range one position at a time.

#### CAUTION

Do not skip shift the transmission.

*c. Towing.*

(1) Use a vehicle with an air brake system capable of producing 120 psi air in the system.

(2) Use medium tank tow-bar, "V" type, 8-1/2 feet long, heavy duty, FSN 4910-378-2012 for towing.

(3) If possible, place the boom over the front which is the most stable position for towing.

(4) If towing is to be for more than 1/4 mile or at speeds in excess of 5 miles per hour, disconnect the propeller shafts from the front and rear axles as shown in figure 2-21.

(5) Install the rear wheel steer lock.

(6) Install the utility blade brace as illustrated in figure 2-10.

(7) Connect the tow-bar and jumper air hoses as illustrated in figure 2-21.

#### NOTE

Ensure that air hoses are connected to the correct connection, which is "Emergency" on carrier to "Emergency" on prime mover and "Service" on carrier to "Service" on primer mover.

(8) Place the tractor protection brake control valve (17, fig. 2-16) to the EMERGENCY position: raise air pressure in carrier to 120 psi, and release brakes as directed in a above.

*d. Retrieving.*

(1) Install the utility blade brace as illustrated in figure 2-10.

(2) Attach chains or wire rope slings to the towing eyes (fig. 2-21) on the dozer blade.

(3) If the carrier has a live engine, release the brakes as directed in a above.

(4) If the carrier has a dead engine, slave air to the carrier and release the brakes as directed in c above.

(5) If the carrier has a dead engine and no hydraulic accumulator pressure, place a man in the carrier cab to hold the dozer control lever in the down position. This permits the hydraulic oil to by-pass and allows the dozer blade to float thus relieving strain

on the dozer cylinder mounting bracket.

(6) Retrieving the carrier from the rear should be accomplished by attaching a chain or wire rope sling to the pintle hook.

### CAUTION

**Do not attempt to retrieve the carrier without the brakes released.**

(7) Should the crane carrier brake system be damaged and inoperative (hole in reservoir, broken lines, etc.), an emergency measure to release the brakes, after all other known methods have failed, may be followed as illustrated in figure 2-25.

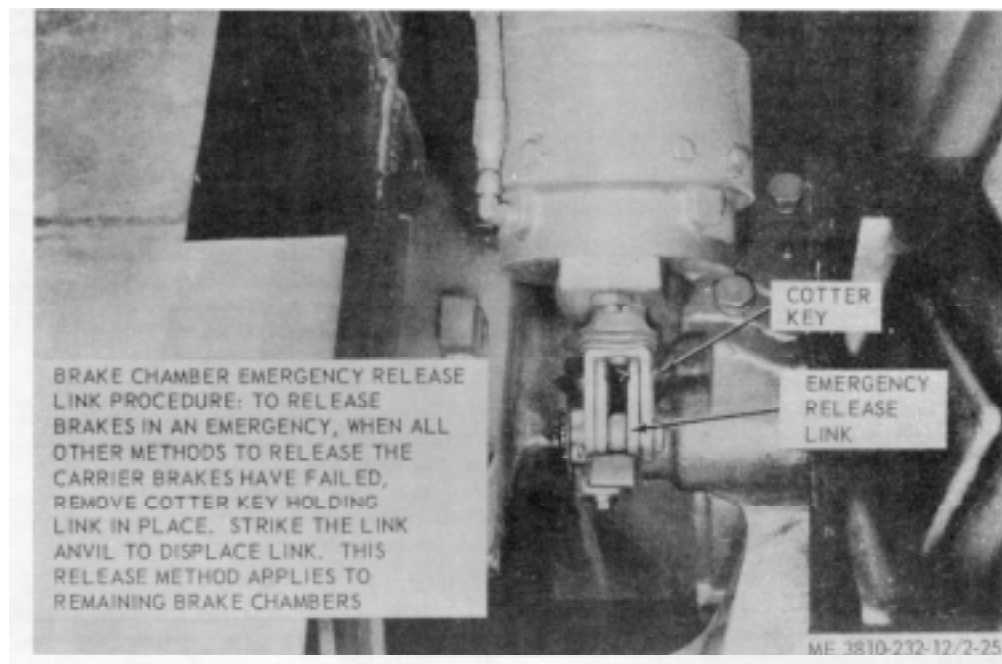


Figure 2-25. Brake chamber emergency release link (model 2385).

#### e. Utility Blade Operation.

(1) Pull the utility blade control lever (fig. 2-16, (37)) up, and raise the blade enough to release the utility blade lock (36). Remove utility blade brace as shown in figure 2-10 and store in toolbox.

#### NOTE

**When using the utility blade, always engage the fourwheel drive.**

(2) Turn the utility blade lock control (36, fig. 2-16) 1/4 turn clockwise, and push down on the control handle.

(3) The utility blade can be lowered by pushing the utility

blade control lever (37) down. The blade is raised by pulling the lever up.

*f Positioning Outrigger Floats.* The crane carrier is equipped with four hydraulically-controlled outriggers. Each of the four outriggers may be raised or lowered individually by operating their respective controls (fig. 2-16, (39), (40), (41), and (42)).

(1) Outrigger floats are removed or installed in the stowed position as illustrated in figure 2-26.

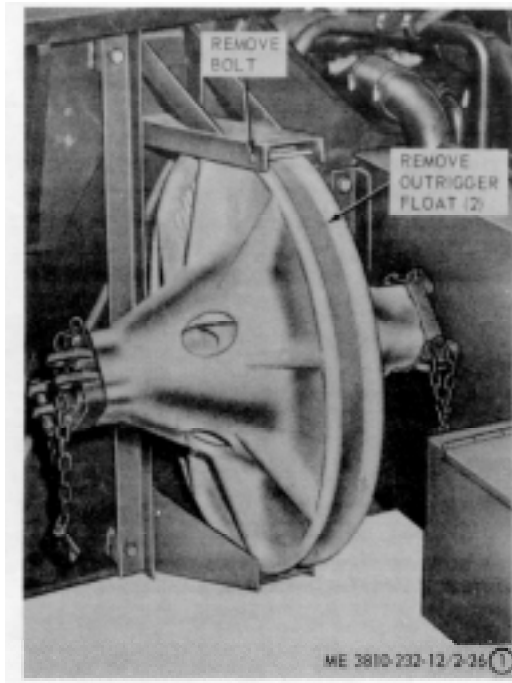


Figure 2-26. Stowed outrigger floats, removal and installation (model 238.5). Sheet 1 of 2.

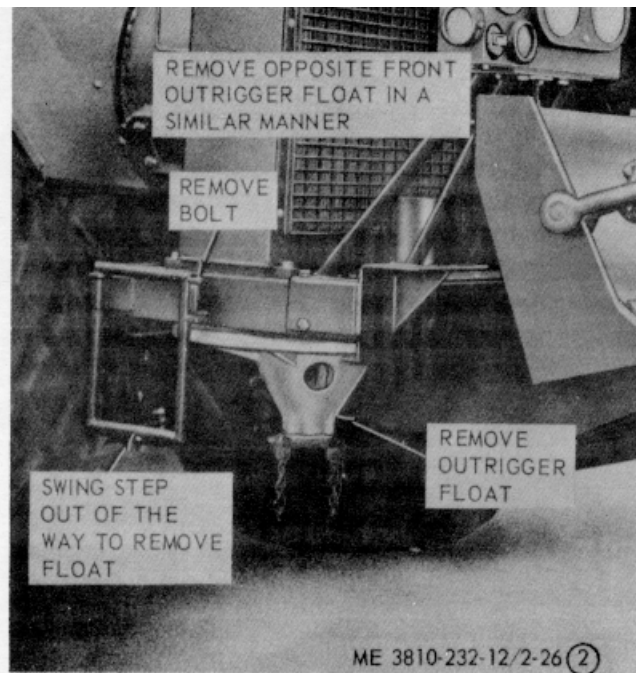


Figure 2-26. Stowed outrigger (floats removal and installation (model 2385). (Sheet 2 of 2).

(2) Position the outrigger float on the ram and secure with lock pin as illustrated in figure 2-24.

(3) Position the outriggers in working position by operating their respective controls.

*g. Cradle Operation Without Outriggers, Using Front Axle Oscillate Lockout.* The front axle oscillate lockout provides stability to the front axle for lifting light loads only, over the side.

(1) Place hydraulic selector control (fig. 2-16, (44)) in front axle lockout position.

(2) Place transmission gear range selector control (38) in NEUTRAL position.

(3) Push front axle oscillate lockout switch to IN position and hold until transmission shift lever lock is in position.

(4) To disengage front axle oscillate lockout, push front axle lockout switch to OUT position. Hold until transmission shift lever lock is released.

**NOTE**

**Front axle oscillate lockout cannot be engaged unless transmission gear range selector control is in neutral, and when the front axle lockout is engaged, the transmission gear range selector cannot be shifted.**

**2-16. Starting Crane Engine**

a. Ensure that the daily preventive maintenance services have been performed (para 3-6).

b. Disengage the engine clutch by pushing control lever rearward (fig. 2-19)

c. Ensure boom hoist safety pawl (B.H. ratchet) lever is in the locked position (fig. 2-19).

d. Place the throttle control level (fig. 2-19), in FAST IDLE position.

e. Turn the ignition switch to the ON position and push in on starter button (fig. 2-20).

**CAUTION**

**Do not operate the cranking motor more than 30 seconds at one time. Allow at least 2 minutes for cranking motor to cool.**

f. When the engine starts, release the starter button and adjust the throttle control to idle speed. Let the engine idle until the engine temperature reaches 160°F.

**NOTE**

**For starting the engine in ambient temperature below 40°F., use the quick starting aid.**

**2-17. Stopping Crane Engine**

a. After operating the crane engine position the hand throttle (fig. 2-19) in idle position, and allow the engine to run for 5 minutes to cool before stopping.

b. Stop the engine by turning the ignition switch to the OFF position.

c. Perform the daily preventive maintenance services.

**2-18. Crane Operation**

a. *General.* The crane is used primarily for raising



and lowering heavy loads. It is capable of operating through a wide range of conditions.

*b. Positioning the Carrier (Model 2380).* Back the carrier up to the working site so that the major portion of the work will be performed off the rear of the carrier. Dumping or unloading should be done off the sides. Set the carrier parking brake (4, fig. 2-14).

**NOTE**

**When the crane is being operated, the transmission directional control lever (13, fig. 2-14) on carrier should be moved to neutral position and the parking brake set. Position outriggers or install stabilizer wedges (fig. 2-24).**

*c. Positioning the Carrier (Model 2385).* Back the carrier up to the working site so that the major portion of the lifts will be from the rear of the carrier. Unloading should be off either side. Set the carrier parking brake (fig. 2-16 (19)).

**NOTE**

**When the crane is being operated the transmission gear range selector control lever (fig. 2-16, (38)) on the carrier should be moved to NEUTRAL position and the parking brake set. Position outriggers (fig.**

**2-24).**

*d. Boom and Crane Operations.*

(1) Start engine (para 2-16).

(2) Engage the engine clutch by pulling the engine clutch lever (fig. 2-19) forward.

**WARNING**

**Boom hoist safety pawl should be engaged at all times except when lowering boom.**

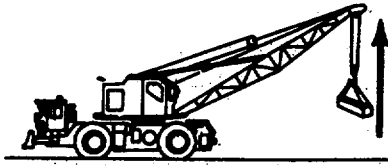
(3) Operate the crane as instructed in figure 2-27.

(4) Spotting the load requires accurate control of the hoist and swing movements to locate the load at the exact spot without hunting or overshooting. If it is necessary to relocate the carrier, be sure that the swing lock lever is engaged.

(5) When work is complete and boom is positioned for travel, disengage the engine clutch by pushing clutch lever rearward.

(6) Stop the crane engine (para 2-17).

*d. Dragline and Clamshell Operation.* Refer to figure 2-27 for these instructions.



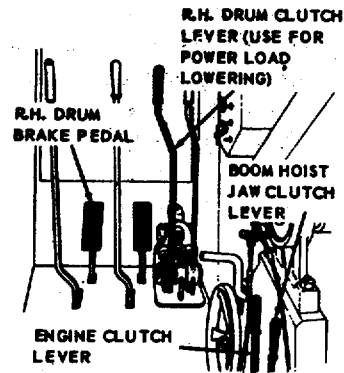
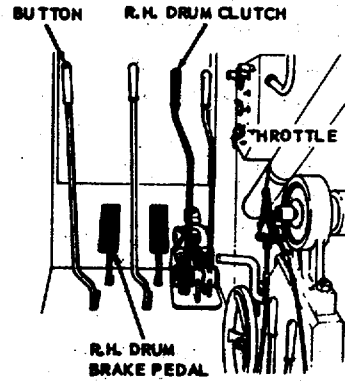
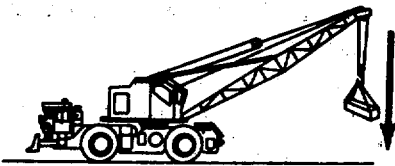
**HOISTING**  
 PULL R.H. DRUM CLUTCH LEVER AND AT THE SAME TIME RELEASE R.H. DRUM BRAKE PEDAL. AFTER LOAD IS LIFTED TO DESIRED HEIGHT APPLY R.H. DRUM BRAKE AND AT SAME TIME PUSH THE R.H. DRUM CLUTCH LEVER TO THE NEUTRAL POSITION.

**WARNING**  
 NEVER LEAVE THE CRANE WITH A LOAD IN THE RAISED POSITION. THE BRAKES MAY LOOSEN ENOUGH TO PERMIT THE LOAD TO FALL.

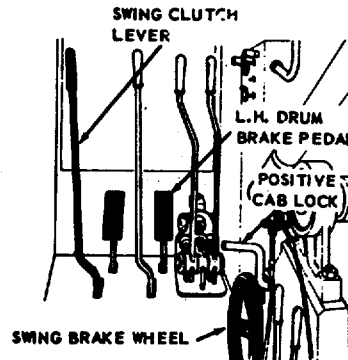
**LOWERING THE LOAD**

PUSH POWER LOAD LOWERING CLUTCH LEVER FORWARD AND AT THE SAME TIME RELEASE R.H. BRAKE PEDAL. CONTROL SPEED OF DESCENT BY SPEED OF ENGINE. TO STOP DESCENT, APPLY R.H. BRAKE PEDAL AND ALLOW POWER LOAD LOWERING LEVER TO RETURN TO NEUTRAL POSITION.

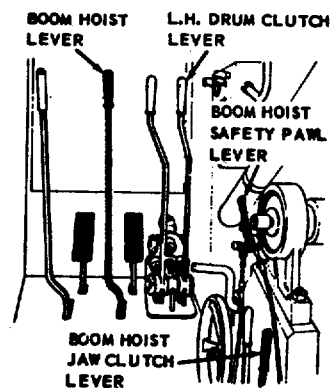
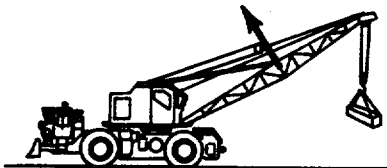
ALTERNATE METHOD: DISENGAGE BOOM HOIST JAW CLUTCH. ENGAGE HOIST CLUTCH AND DISENGAGE ENGINE CLUTCH. SLOWLY RELEASE FOOT BRAKE AND LOAD WILL LOWER OF ITS OWN ACCORD WHILE RUNNING MACHINERY BACKWARDS. THE INTERLOCK WILL PREVENT RELEASING THE BOOM HOIST JAW CLUTCH AND BRAKE AT THE SAME TIME.



**SWINGING**  
 PUSH THE SWING CLUTCH LEVER TO SWING TO THE LEFT, PULL TO GO TO THE RIGHT. WHEN THE LOAD HAS REACHED THE DESIRED POSITION, MOVE THE SWING CLUTCH LEVER TO THE NEUTRAL POSITION. TO STOP SWING ENGAGE CLUTCH LIGHTLY IN OPPOSITE DIRECTION, OR APPLY SWING BRAKE WHEEL.



**RAISING OR LOWERING THE BOOM**  
 BE SURE JAW CLUTCH IS ENGAGED. TO RAISE BOOM, PULL BOOM HOIST LEVER BACK. WHEN BOOM REACHES DESIRED HEIGHT, RETURN BOOM HOIST LEVER TO NEUTRAL POSITION TO LOWER THE BOOM, DISENGAGE SAFETY PAWL LEVER BY PUSHING IT FORWARD. THEN PUSH BOOM HOIST LEVER FORWARD. WHEN BOOM REACHES DESIRED POSITION, RETURN BOOM HOIST LEVER TO NEUTRAL POSITION AND RESET SAFETY PAWL BY PULLING ITS LEVER TO THE REAR.



ME 3810-232-12/2-27 ①

Figure 2-27. Crane operating instructions, Sheet 1 of 2.

## DRAGLINE OPERATION

DRAGLINE OPERATION REQUIRES A HOISTING AND AN INHAUL CABLE. THE INHAUL CABLE IS ON THE R.H. DRUM THE HOISTING CABLE ISON THE L.H. DRUM. LIFT THE BUCKET BY ENGAGING THE L.H. CLUTCH LEVER AND RELEASING L.H. BRAKE AND AT THE SAME TIME RELEASING R.H. BRAKE PEDAL TO ALLOW BUCKET TO SWING OUT UNDER THE BOOM POINT AS IT IS BEING LIFTED. AFTER BUCKET IS IN DESIRED POSITION, SET BOTH BRAKES AND DISENGAGE L.H. CLUTCH. TO DROP BUCKET FOR DIGGING,-RELEASE THE L.H. BRAKE. TO DIG WITH THE BUCKET, ENGAGE THE RH. CLUTCH AND RELEASE THE RH. BRAKE AS THE BUCKET IS BEING PULLED TOWARD THE MACHINE. IT WILL NOT FILL UNLESS ADDITIONAL CABLE IS RELEASED FROM L.H. DRUM. THIS IS ACCOMPLISHED BY RELEASING L.H BRAKE. WHEN BUCKET IS FILLED, DISENGAGE RL. CLUTCH WHILE SETTING R.. BRAKE. ENGAGE L.H. CLUTCH AND RELEASE L.H. BRAKE TO HOIST BUCKET FROM THE CUT AND TO RAISE BUCKET TO THE DUMPING POSITION. HOWEVER. TOO MUCH SLACK WILL ALLOW BUCKET TO DUMP EARLY. TO DUMP BUCKET COMPLETELY, RELEASE RH. BRAKE PEDAL.

## CLAMSHELL OPERATION

TO RAISE BUCKET, ENGAGE BOTH R.H. AND L.H. CLUTCH LEVERS AND SIMULTANEOUSLY RELEASE R.H. AND L.H. BRAKE PEDALS WHEN BUCKET REACHES DESIRED POSITION, SET R.H. AND L.H. BRAKE PEDALS WHILE DIS ENGAGING CLUTCHES AT THE SAME TIME. TO OPEN AND LOWER BUCKET, RELEASE R.H. BRAKE PEDAL FOR OPENING AS THE BUCKET IS OPENING, RELEASE L.H BRAKE PEDAL FOR LOWERING. THE RATE OF OPENING AND LOWERING OF BUCKET IS CONTROLLED BY PRESSURE APPLIED TO BRAKE PEDALS AFTER THE BUCKET HAS BEEN SET IN THE GROUND, ENGAGE R.H. DRUM CLUTCH THIS WILL CLOSE BUCKET. IF ADDITIONAL CABLE IS NOT LET OUT FROM L.H. DRUM THE BUCKET WILL RAISE AS IT CLOSSES AFTER BUCKET HAS CLOSED, ENGAGE L.H. DRUM CLUTCH TO RAISE. WHEN BUCKET HAS RAISED TO DESIRED HEIGHT, SET BOTH BRAKES AND AT THE SAME TIME, DISENGAGE BOTH CLUTCHES TO OPEN BUCKET RELEASE L.H. BRAKE PEDAL.

NOTE: TO REMOVE POWER LOAD LOWERING DRIVE CHAIN REFER TO PAR. 4-108.

ME 3810-232-12/2-27(2)

*Figure 2-27. Crane operating instructions. Sheet 2 of 2.*

## Section V. OPERATION UNDER UNUSUAL CONDITIONS

**2-19. Operation in Extreme Cold** a. General. Special precautions must be taken when operating the crane and carrier in the extremely cold temperatures. As temperatures drop below the freezing point metal and rubber parts become progressively more brittle and a relatively minor shock or jar may cause them to crack or break. Warm the machine slowly and start all operations in low gear. Avoid jerky handling and sharp impacts.

### WARNING

**Personnel should use care to keep from spilling fuel, coolant, or other liquids upon themselves. Exposed parts of the body should not come in contact with metal during cold weather as serious and painful injury may result.**

b. Lubrication.

(1) Refer to the Lubrication Order for special lubricants to use below -10°F.

(2) When using OES oil in the crankcase the oil level must be checked frequently as oil consumption may increase.

(3) Oil may require changing more frequently than usual because contamination, dilution, and sludge formation will increase under cold weather operating conditions.

c. Cooling Systems. Before pouring antifreeze solution into the radiator, observe these precautions.

(1) Drain the cooling systems by opening all cocks.

(2) Drain and flush the radiator with clean water.

(3) Inspect the entire system for leaks. Make sure that all clamps are tight and the draincocks closed.

(4) Add antifreeze as necessary. Refer to TB ORD 651 when filling the radiator with antifreeze solution.

d. Electrical System.

(1) Keep the batteries fully charged at all times.

### CAUTION

**Unless the engines are running, or the batteries are immediately charged, do not add water in subzero temperatures.**

(2) Keep all wiring connections and battery terminals tight and free from snow and ice.

(3) In extremely low temperatures, remove the batteries and place in a heated shelter when not in use.

*e. Controls and instruments.* Due to congealing properties of lubricants in cold weather, operation of controls may be sluggish when first used. Do not force levers in an attempt to put them in operation. Allow the engine to warm up slowly. This will allow the lubricants to thin.

*f. Fuel Systems.* Fuel tanks should be kept full as possible at all times to minimize condensation. If the presence of water is noted in the fuel supply, drain and refill with clean fuel.

*g. Brakes.* Drain air reservoirs after operation to remove condensation and prevent freezing.

*h. Extreme Cold Weather Starting Carrier Engine.*

(1) Before attempting to start the carrier engine in extremely cold weather, prime engine using quickstart system as directed in paragraph 2-28.

(2) Start the engine (para 2-10 or 2-11).

### CAUTION

**If any instruments indicate dangerously abnormal conditions when the crane carrier engine starts, stop the engine at once and inspect for deficiencies, and report them to Organizational Maintenance.**

*i. Extreme Cold Weather Starting Crane Engine.*

(1) Prime engine as directed in paragraph 2-28.

(2) Start the engine (para 2-16).

### 2-20. Operation in Extreme Heat

a. Cooling System.

(1) Make sure the system is clean and free flowing.

(2) Keep the coolant level in the radiator as high as possible.

(3) Keep the water pump and its drive well lubricated.

(4) Keep the fan belt adjusted properly. Be sure there is no obstruction of air to the fan.

(5) If the engines become overheated from lack of water, let the engine run at a fast idle and add water slowly.

(6) Drain the cooling system by opening the drain-cocks on the radiator and the engine block.

Flush out system.

(7) Use only clean water when filling the radiator.

Do not use salt or mineral water solutions in the system.

(8) Keep all leaves, insects, dirt, and other obstructions out of the radiator core and fins.

(9) If the engine continues to overheat, report to organizational maintenance personnel.

b. Engines.

(1) Use only the crankcase oil recommended in the lubrication order.

(2) Open all sliding panels in the cab to provide as much ventilation for the engines as possible.

(3) Keep the engine clean. Accumulations of dust and oil form an insulation against cooling air from the fan.

c. Electrical System.

(1) Check batteries at frequent intervals and fill to proper level with water.

(2) Never allow batteries to overheat in service. Guard against this by opening the battery box and allowing air to circulate around the batteries.

### 2-21. Operation Under Sandy or Dusty Conditions

*a. Inspection and Lubrication.* Fine sand or dust has a tendency to penetrate into bushings and bearings. Because of this, the unit must be inspected, lubricated, and cleaned at more frequent intervals. Remove accumulations of sand or dirt and clean all lubrication fittings thoroughly before attaching the grease gun.

*b. Fuel System.* Keep fuel tank filler caps tight to prevent sand or dust from entering fuel tank. Service fuel filters frequently to keep them free of sand and grit.

*c. Revolving Frame Roller Path.* Operating under extreme sandy or dusty conditions will require frequent inspections of the revolving frame roller path. Never allow lubricant to collect on the roller path as it will collect sand and cause rollers to wear excessively.

*d. Clutches and Brakes.* Inspect clutch and brake bands frequently and blow out or wipe off accumulation of sand and dirt. Failure to keep bands clean will result in worn bands, scored drums, and unsatisfactory operation.

*e. Cables.* Keep all unused cables in boxes. Clean operating cables frequently to prevent excessive cable wear and to insure satisfactory operation.

*f. Open Gears.* Check open gears frequently to see that they are free of sand and dirt which will cause gears to wear rapidly. Wash lubricant and foreign matter from gears and apply new lubricant. Application of new lubricant is important to prevent wear and maintain satisfactory operation.

*g. Cooling System.* Any signs of overheating may indicate sand or dust has clogged the system passages. Flush the system with clean water. Clean radiator cases and fins of foreign matter with compressed air.

#### **NOTE**

**If it is necessary to use air pressure to clean obstructions from the lines, use a reverse flow of air to flush the system. Too much air pressure will rupture the flues in the radiator.**

*h. Air Cleaners.* Check the air cleaner more often than under normal conditions.

### **2-22. Operation in High Humidity and Salt Water Areas**

*a. General* Prevention of rust and deterioration of

electrical insulation in high humidity or salt water areas requires constant exercise of preventive measures. Although the wiring on the crane and the carrier has been specially treated to resist fungus and rot, frequent inspections are necessary to find worn spots in the insulation which, unless repaired, would allow short-circuit conditions to develop.

*b. Protection from Rust and Corrosion.* Rust and corrosive conditions at any point on the unit must be corrected immediately. Clean all rust and paint the bare surfaces. Place a light film of lubricant on polished or machined metal surfaces.

### **2-23. Operation at High Altitudes**

The crane-shovel will operate satisfactorily at high altitudes without special attention.

## **Section VI. OPERATION OF AUXILIARY MATERIEL USED IN CONJUNCTION WITH THE CRANE AND CARRIER**

**2-24. General** This section covers the description and operation of auxiliary equipment supplied for use with the carrier and crane but not necessary for the basic functioning of the carrier and crane.

### **2-25. Carrier Cab Personnel Heater**

*a. General* The carrier cab is equipped with a heating system that provides heat for the interior of the operator's cab. The heater is the circulating hot water type and is mounted beside the operator's seat.

*b. Operation.* To operate the personnel heater, place the heater switch (40, fig. 2-14) in the ON position. Make sure shut-off cock on engine is open so coolant can circulate.

### **2-26. Crane Cab Personnel Heater**

*a. Description.* The crane cab is equipped with a heating system that provides heat for the interior of the operator's cab. The heater is the circulating hot water type and is mounted on the cab floor behind the operator's seat.

*b. Operation.* To operate the personnel heater, place the heater switch (fig. 2-20) in the ON position. Make sure shut-off cock on engine is open.

### **2-27. Carrier Quick-Start System**

*a. Description.* The quick-start system consists of

a pressurized cylinder valve assembly, manifold and fittings, and control cable assembly. The quick-start control is located in the operator's cab of the crane carrier, and is mounted on the right side of the cab near the operator's seat.

*b. Operation.* The quick-start is operated by placing a fuel cylinder, on the valve assembly head. With the fuel cylinder in position, pull control lever (3, fig.2-14) up for 1 or 2 seconds filling chamber in the valve body. Push down on control, releasing shot into manifold. Wait 3 seconds and engage starter. Release second shot while engine is turning. When started and engine falters or is dying out, give extra shots to keep engine running.

*c. Maintenance.* Check cylinder (Full cylinder weight 37 ounces, empty cylinder weight 17 ounces). Check all connections and mounting for tightness. Clean filter screen at 1/8-inch pipe thread opening and orifices periodically.

### **2-28. Crane Quick-Start System**

*a. Description.* The quick-start system consists of a pressurized cylinder, valve assembly, tube and fittings, release lever, and control cable. It is located in the left rear corner of the crane cab above the battery box.

*b. Operation.* To operate the quick-start system assembly, pull out the control knob and push in as directed in paragraph 2-27b.

**2-29. Crane Carrier Fire Extinguisher (Dry Chemical Type)**

*a. Descriptions.* The dry chemical type fire extinguisher is suitable for use on all types of fire and is effective in areas where ambient temperature is -25° F. and above. If winterized (pressurized with nitrogen) the fire extinguisher may be used in temperatures below -250 F. The fire extinguisher is a 21/2 pound, stored-pressure, lever-operated extinguisher.

*b. Operations.* Remove the fire extinguisher from its location, lift the handle, press lever, and direct the powder at the base of the flame using a side-to-side sweeping motion.

*c. Maintenance.* Weigh the fire extinguisher every 6 months and replace the extinguisher if weight is less than 4 1/2 pounds or if pressure is below 125 pounds. The dry chemical fire extinguishers will be serviced at installation level through repair and utilities facilities, with filling agent supplied by procurement through troop supply channels (TB 5-4200-200-10).

**2-30. Crane Fire Extinguisher**

*a. Descriptions.* The crane fire extinguisher is mounted on a bracket in the cab of the crane near the operator's seat.

*b. Operation.* Refer to paragraph 2-29 for operating instructions for the fire extinguisher.

**CHAPTER 3  
OPERATOR'S MAINTENANCE INSTRUCTIONS**

**Section I. BASIC ISSUE ITEMS**

**3-1. General**

Tools, equipment and repair parts issued with or authorized for the crane are listed in the basic issue items list, appendix B of this manual.

**3-2. Special Tools**

No special tools are required to perform operator maintenance on the crane.

**Section II. LUBRICATION INSTRUCTIONS**

**3-3. General Lubrication Information**

This section contains lubrication instructions which are supplemental to and not specifically covered in the lubrication order LO 5-3810-232-12-1, -2, -3, -4, -5 and -6.

**3.4. Detailed Lubrication Information**

*a. General* Keep all lubricants in closed containers and store in a clean, dry place, away from external heat. Allow no dust, dirt, or other foreign material to mix with the lubricants. Keep all lubrication equipment clean and ready for use.

*b. Cleaning.* Keep all external parts not requiring lubrication clean of lubricants. Before lubricating the equipment, wipe all lubrication points free of dirt and grease. Clean all lubrication points after lubricating to prevent accumulation of foreign matter.

*c. Points of Lubrication.* Service the lubrication points at proper intervals as illustrated on LO 53810-232-12-1, -2, -3, -4, -5 and -6.

**CAUTION**

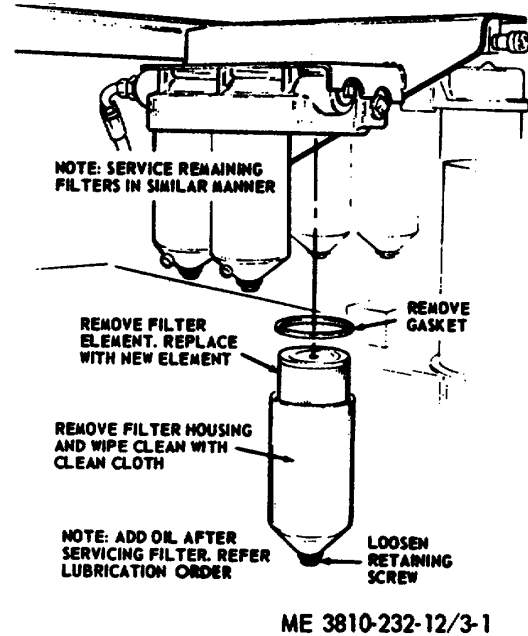
**Overlubrication may cause equipment failure or damage to working parts**

*d. OES Oil*

(1) The crankcase oil level must be checked frequently, as oil consumption may increase.

(2) The oil may require changing more frequently than usual because contamination by dilution and sludge formation will increase under cold weather operation conditions.

*e. Carrier Engine Oil Filter Service.* The carrier engine oil filter assembly is the replaceable filter element type. Service the oil filter as illustrated in figure 3-1.



*Figure 3-1. Carrier engine oil filter service.*

*f. Carrier Transmission and Torque Converter Oil Filter Service.* The carrier transmission and torque converter oil filter assembly is a twin filter assembly with replaceable filter elements. Service the oil filter assembly as illustrated in figure 3-2.

**NOTE**

**Check level of fluid in transmission with directional lever in the neutral position and engine running idle (500-600 RPM. Level should be on full mark. Recheck when oil is hot (180 °-200° F).**

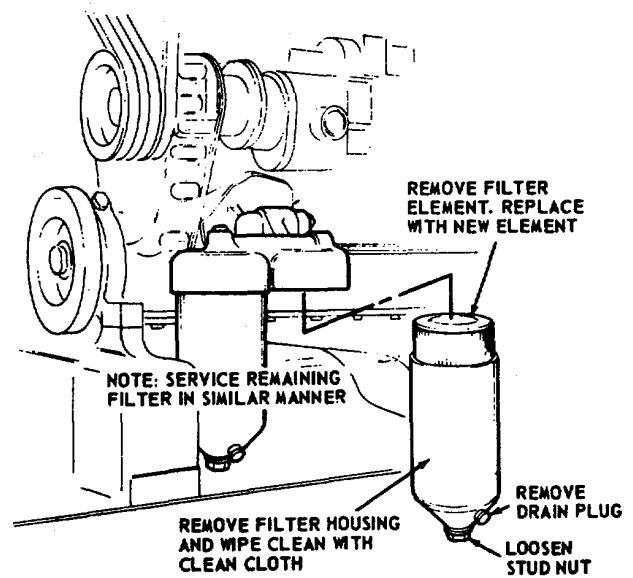
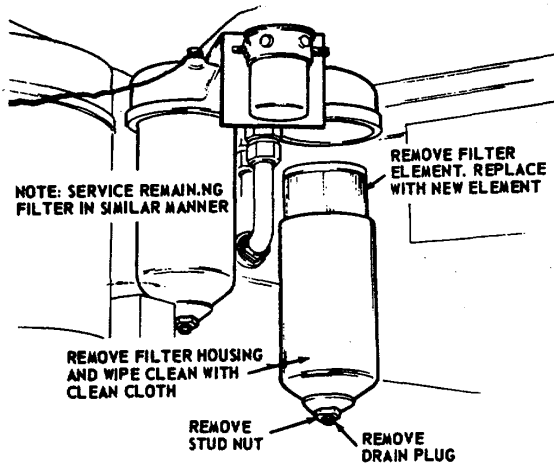


Figure 3-2. Carrier transmission and torque converter oil filter service.

Figure 3-4. Crane Engine oil filter service.

g. *Carrier Engine Air Cleaner Service (Model 2880).* The carrier engine air cleaner is the oil bath type. Service the air cleaner as illustrated in figure 3-3.

i. *Crane Engine Air Cleaner Service.* The crane engine air cleaner is the oil bath type. Service the air cleaner as illustrated in figure 3-5.

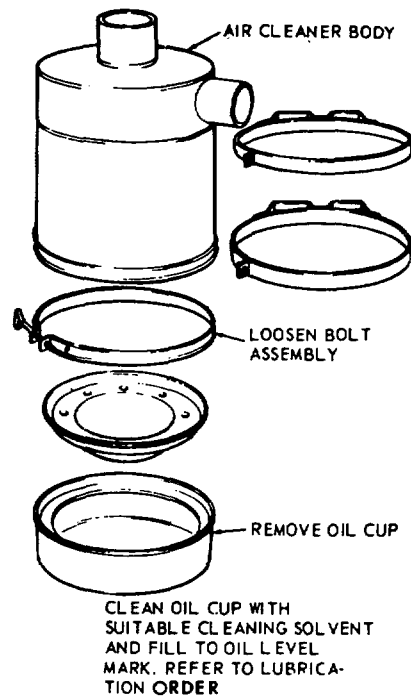
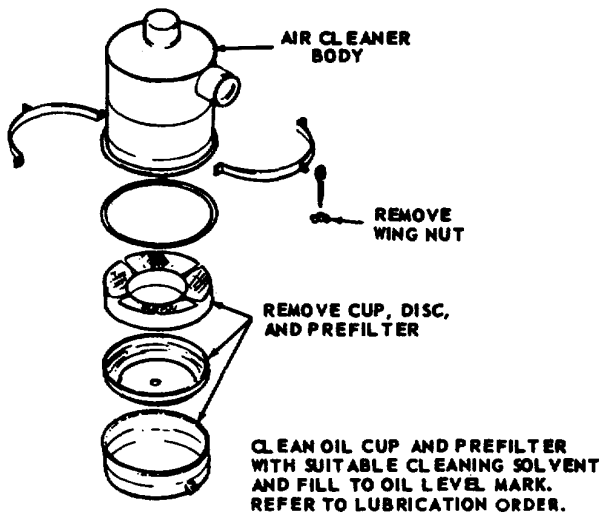


Figure 3-3. Carrier engine air cleaner service (model 2380).

Figure 3-5. Crane engine air cleaner service.

h. *Crane Engine Oil Filter Service.* The crane engine oil filter is the replaceable element type. Service the oil filter as illustrated in figure 3-4.



### Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

#### 3-5. General

To insure that the crane is ready for operation at all times it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure. The preventive maintenance services to be performed are listed and described in paragraph 3-6. The item numbers indicate the sequence of minimum inspection requirements. Defects discovered during operation of the unit shall be noted for future correction, to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noticed during operation which would damage the equipment if operation were continued. All deficiencies and

shortcomings will be recorded together with the corrective action taken on DA Form 2404 at the earliest possible opportunity.

#### 3-6. Preventive Maintenance Checks and Services

Table 3-1 and 3-2 contain a listing of the minimum inspection requirements for operators preventive maintenance checks and services. This table indicates, by an X in the appropriate column (before, during, after, weekly) when the inspection should be performed.

Table 3-1. Preventive Maintenance Checks and Services Carrier

| Item number | Interval |   |   |   |      |   | B — Before operation<br>D — During operation | A — After operation<br>W — Weekly   | M — Monthly<br>Q — Quarterly                           |
|-------------|----------|---|---|---|------|---|--|---|--|
|             | Operator |   |   |   | Org. |   |  |   |  |
|             | Daily    |   |   |   | M    | Q | Item to be inspected                         | Procedure   | Reference  |
|             | B        | D | A | W |      |   |  |   |  |
| 1           | X        |   |   |   |      |   | Radiator                                     | Inspect for leaks and maintain coolant level of 3/4 inch above baffle.  | TB ORD 651   |
| 2           |          |   |   | X |      |   | Drive Belts, Generator, Water Pump and Fan   | Inspect belt deflections, adjust as required.   | Para 1-8b(27)  |
| 3           |          |   |   | X |      |   | Fuel Filters                                 | Drain water and sediment. Inspect for leaks; clean float tank filter screen.  | Para 3-9<br>Para 3-12                                  |
| 4           | X        |   |   |   |      |   | Oil Level                                    | Check oil level gage. Add oil as necessary.   | LO 5-3810-232-12-2                                     |
| 5           | X        |   |   | X |      |   | Batteries                                    | Tighten loose cables and mountings. Remove corrosion. Inspect for cracks and leaks. Clean vent caps. Add water to 3/8 inch above plates as required.  | Para 3-19  |
| 6           | X        |   |   | X |      |   | Tires and Wheels                             | Check tire pressure. Correct pressure is 55 psi. Inspect for excessive wear, cuts, breaks, embedded foreign matter and missing valve caps.  | TM 9-6140-200-15<br>TM 9-1870-1                        |
| 7           | X        |   |   |   |      |   | Fuel Tank                                    | Add fuel as required.   |  |
| 8           | X        |   |   |   |      |   | Air Cleaner                                  | Add oil as required.  | LO 5-3810-232-12-1                                     |
| 9           |          | X |   |   |      |   | Transmission Speed Ranges                    | Check all speed ranges noticing if shifts are smooth and without excessive vibration or unusual noise.  | Report all deficiencies to direct support maintenance. |
| 10          | X        | X |   |   |      |   | Controls and Instruments                     | Inspect for damage and loose mounting. Check for proper operation. Normal operating readings are as follows:<br>Air pressure gage 120 psi<br>Battery-generator in green area<br>Coolant temperature gage 165°F. to 195°F.<br>High temperature warning light out when engine is running.<br>Oil pressure gage 30–45 psi.<br>Oil pressure warning light out when engine is running.<br>Torque converter oil pressure gage 25 psi<br>Torque converter temperature gage 180°F to 200°F. |  |
| 11          | X        | X |   |   |      |   | Lights                                       | Inspect for burned out lamps, and replace as necessary.   |  |
| 12          |          | X |   |   |      |   | Brakes                                       | Inspect for proper operation.   | Report all deficiencies to organizational maintenance. |
| 13          |          | X |   |   |      |   | Steering                                     | Check for proper operation  | Report all deficiencies to organizational maintenance. |
| 14          |          | X |   |   |      |   | Windshield Wiper                             | Inspect wiper blade and arm for damage  | Report all deficiencies to organizational maintenance. |
| 15          | X        |   |   |   |      |   | Fire Extinguisher                            | Check for broken seal   |  |
| 16          |          | X |   |   |      |   | Outriggers                                   | Inspect for proper operation, cracks and damage.  | Report all deficiencies to direct support maintenance. |
| 17          |          | X |   |   |      |   | Generator                                    | Inspect for proper operation.   | Report all deficiencies to direct support maintenance. |
| 18          | X        |   |   |   |      |   | Utility Blade                                | Inspect for cracked or broken welds and damage.   | Report all deficiencies to organizational maintenance. |
| 19          | X        |   |   |   |      |   | Utility Blade<br>Hydraulic Cylinder          | Inspect for leaks, and secure mounting.   | Report all deficiencies to direct support maintenance. |

| Item number | Interval |   |   |   |      | B — Before operation<br>D — During operation | A — After operation<br>W — Weekly             | M — Monthly<br>Q — Quarterly   |  |
|-------------|----------|---|---|---|------|--|---|--|--|
|             | Operator |   |   |   | Org. |  |   |  |  |
|             | Daily    |   |   |   | M    | Q  | Item to be inspected                          | Procedure  | Reference  |
|             | B        | D | A | W |      |  |   |  |  |
| 20          |          |   |   | X |      |  | Torque Converter and Transmission Oil Filters | Service in accordance with the lubrication order.<br>Inspect for leaks and loose mounting. | LO 5-3810-232-12-2   |
| 21          |          |   |   | X |      |  | Propeller Shafts                              | Inspect for loose mounting bolts.  | Report all deficiencies to organizational maintenance.<br>Report all deficiencies to direct support maintenance. |
| 22          |          |   |   | X |      |  | Crankcase Breather                            | Service breather every 250 hours.  | Para 3-11  |

Table 3-2. Preventive Maintenance Checks and services  
(Crane)

| Item number | Interval |   |   |   | Operator |                  | Org.  |   | B — Before operation | A — After operation | M — Monthly  |
|-------------|----------|---|---|---|----------|------------------|---|---|----------------------|---------------------|--|
|             |          |   |   |   |          |                  |   |   | D — During operation | W — Weekly          | Q — Quarterly  |
|             | Daily    |   |   |   | M        | Q                | Item to be Inspected                        | Procedure   | Reference            |                     |  |
|             | B        | D | A | W |          |                  |   |   |                      |                     |  |
| 1           | X        |   |   |   |          |                  | Radiator                                    | Inspect for leaks and maintain coolant level 3/4 inch above baffle.   |                      |                     | TB ORD 651   |
| 2           | X        |   |   |   |          | X                | Fuel Filter                                 | Inspect for leaks or damage   |                      |                     | Report all deficiencies to organizational maintenance. |
| 3           | X        |   |   |   |          |                  | Air Cleaner                                 | Add oil as required   |                      |                     | LO 5-3810-232-12-5                                     |
| 4           | X        |   |   |   |          |                  | Oil Level                                   | Check oil level gage, add oil as required.  |                      |                     | LO 5-3810-232-12-5                                     |
| 5           | X        |   |   |   |          |                  | Drive Belts, Generator, Water Pump, and Fan | Check belt deflections. Adjust as required.   |                      |                     | Para 1-8b(27)  |
| 6           | X        |   |   |   |          |                  | Fuel Tank                                   | Add fuel as required.<br>Inspect for leaks.   |                      |                     |  |
| 7           | X        |   |   |   |          | X<br>X<br>X<br>X | Batteries                                   | Inspect filler cap for missing gasket.<br>Check fuel tank strainer<br>Tighten loose cables and mountings.<br>Remove corrosion. Inspect for cracks and leaks.<br>Add water to 3/8 inch above plates as required.               |                      |                     | Para 3-13<br>TM 9-6140-200-15                          |
| 8           |          |   |   |   |          | X                | Swing Brake                                 | Check for proper operation.   |                      |                     | Report all deficiencies to organizational maintenance. |
| 9           |          | X |   |   |          |                  | Generator                                   | Check for proper operation.   |                      |                     | Report all deficiencies to organizational maintenance. |
| 10          | X        |   |   |   |          |                  | Fire Extinguisher                           | Check for broken seal   |                      |                     |  |
| 11          | X        |   |   |   |          |                  | Controls and Instruments                    | Inspect for damage and loose mounting   |                      |                     | Report all deficiencies to organizational maintenance. |
|             |          | X |   |   |          |                  |   | Check proper operation. Normal operating readings are as follows:<br>Battery-generator indicator in green area.<br>Oil pressure gage 40-75 psi<br>Oil pressure warning light out<br>Coolant temperature gage 165°F. to 195°F. |                      |                     |  |
| 12          |          | X |   |   |          |                  | Control Levers and Pedals                   | High temperature warning light out<br>Inspect for proper operation  |                      |                     | Report all deficiencies to organizational maintenance. |
| 13          | X        |   |   |   |          |                  | Hoisting Cables                             | Inspect for frays, damage, or breaks.   |                      |                     | Report all deficiencies to organizational maintenance. |
| 14          | X        | X |   |   |          |                  | Lights                                      | Inspect for burned out bulbs. Replace as necessary.   |                      |                     |  |
| 15          | X        |   |   |   |          |                  | Operator's Cap                              | Inspect glass and doors for damage.   |                      |                     | Report all deficiencies to organizational maintenance. |
| 16          | X        |   |   |   |          |                  | Load Rollers                                | Inspect for breaks, cracks, and wear.   |                      |                     | Report all deficiencies to organizational maintenance. |
| 17          | X        |   |   |   |          |                  | Boom Assembly                               | Inspect for cracks and other damage.  |                      |                     | Report all deficiencies to organizational maintenance. |
| 18          | X        |   |   |   |          |                  | Hook Block                                  | Inspect for cracks and damaged sheaves  |                      |                     | Report all deficiencies to organizational maintenance. |

## Section IV. TROUBLESHOOTING

### 3-7. General

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the crane, or any of its components. Each malfunction is followed by a list of probable causes of the trouble. The corrective action recommended is described opposite the probable cause. Any trouble

beyond the scope of operators maintenance shall be reported to organizational maintenance.

### 3-8. Operator/Crew Maintenance Troubleshooting

Refer to table 3-3 for operator/crew troubleshooting.

*Table 3-3. Troubleshooting*

| Malfunction  | Probable cause  | Corrective action  |
|--|---|--|
| 1. Engine overheats  | <ul style="list-style-type: none"> <li>a. Radiator coolant level low</li> <li>b. V-belt loose or slipping</li> <li>c. Air lock in header</li> </ul>                           | <ul style="list-style-type: none"> <li>a. Inspect coolant level and rill</li> <li>b. Adjust V-belt (para -15, 8-16, and 3-17).</li> <li>e. Bleed air from header (para 3-20).</li> </ul> |
| 2. Engine lacks power  | <ul style="list-style-type: none"> <li>a. Dirty fuel filters</li> <li>b. Restricted air intake</li> </ul>   | <ul style="list-style-type: none"> <li>a. Service fuel filters (para 3-9).</li> <li>b. Inspect and service air cleaner (pr 3-4 (model 2880)) and (para 3-10 (model 2895)).</li> </ul>    |
| 3. Cold engine hard to start or fails to start                 | <ul style="list-style-type: none"> <li>a. Dirty fuel transfer filter</li> <li>a. Out of fuel</li> <li>b. Fuel shut-off valve closed</li> <li>a. Dirty fuel filters</li> </ul> | <ul style="list-style-type: none"> <li>a. Service fuel transfer filter (para 3-12).</li> <li>a. Add fuel</li> <li>b. Open valve</li> <li>c. Service fuel filters (para 3).</li> </ul>    |
| 4. Carrier engine has excessive fuel consumption (model 2385). | Restricted air intake   | Service air cleaner (para 3-4 (model 2880)) (para 3-10   |
| 5. Excessive oil consumption                                   | Wrong grade of oil for weather conditions.  | Refer to current lubrication order   |
| 6. Starter fails to crank engine electrical connections.       | Poor electrical connections   | Clean tighten battery cables and other   |
| 7. Battery charging generator not charging.                    | <ul style="list-style-type: none"> <li>a V-belt loom 3-15 thru 3-17).</li> <li>b loose wiring wiring connections</li> </ul>   | <ul style="list-style-type: none"> <li>Tighten V-belt (para</li> <li>b. Inspect and tighten</li> </ul>   |
| 8. Light failure or lights dim                                 | Loose wiring connections  | Check wiring connections   |
| 9. Cables tend to flatten                                      | <ul style="list-style-type: none"> <li>a Defective cables 2-2).</li> <li>b. Incorrect cable size</li> </ul>   | <ul style="list-style-type: none"> <li>a. Replace cables (para</li> <li>b. Install correct cables (para2-2).</li> </ul>  |
| 10. Steering assembly cracks when turning.                     | Stabilizing wedges not resolved   | Remove stabilizing wedes (para 2-14)   |
| 11. Steering hard to operate                                   | <ul style="list-style-type: none"> <li>a Tires not properly inflated</li> <li>b. Stabilizing wedge not removed</li> </ul>   | <ul style="list-style-type: none"> <li>a. Check and inflate tires to 55 psi.</li> <li>b. Remove stabilizing wedges (para 2-14).</li> </ul>   |

## Section V. MAINTENANCE OF ENGINE FUEL FILTERS AND CRANKCASE BREATHER

### 3-9. Engine Fuel Filters Service

Drain and clean primary and secondary engine fuel filters as illustrated in figure 3-6.

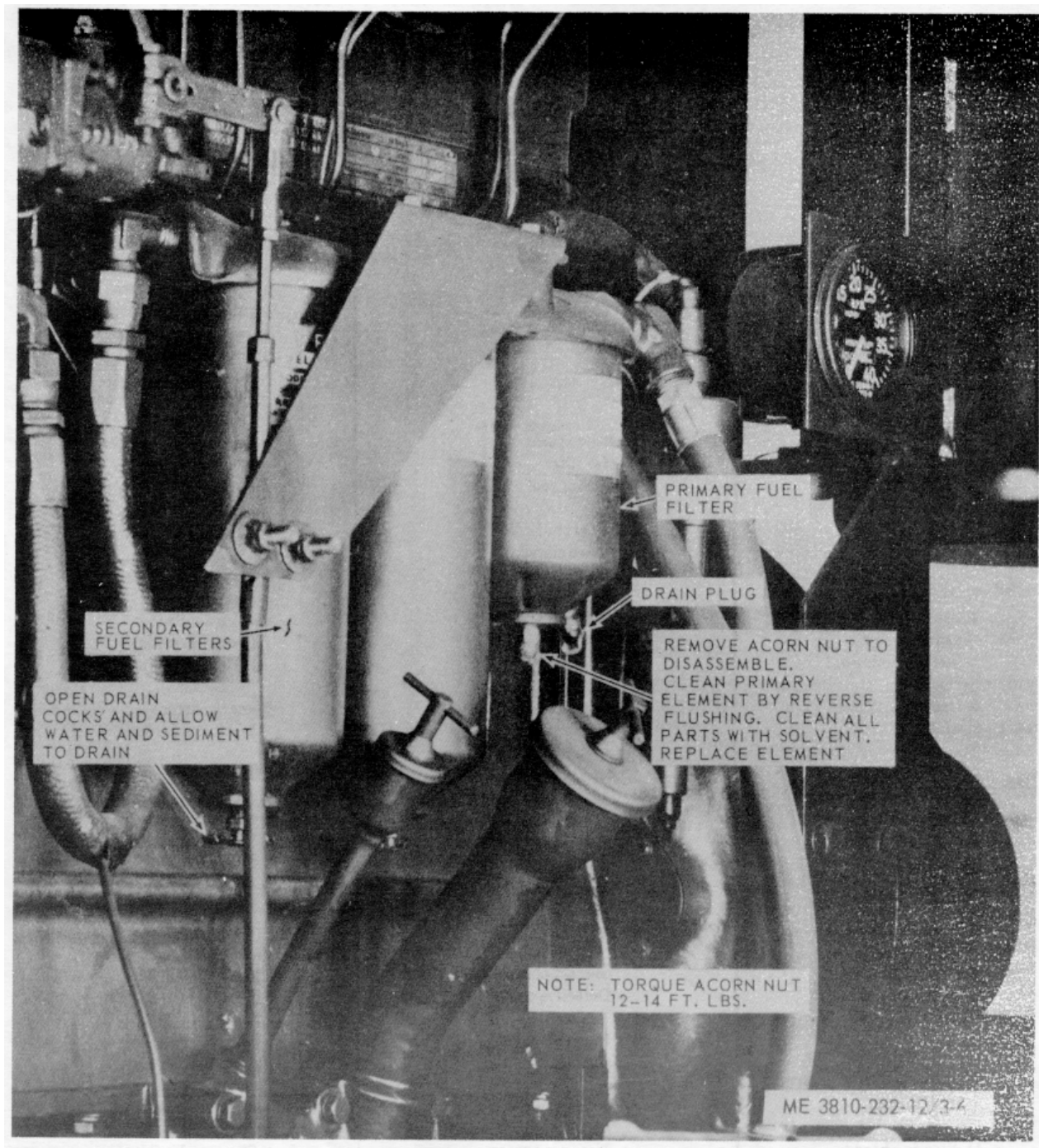


Figure 3-6. Engine fuel filter service.

### 3-10. Air Cleaner Service

#### a. Carrier Engine Air Cleaner Service (Model 2385).

The carrier engine air cleaner is the dry-type. Periodically inspect the air cleaner body for dents, cracks or similar damage. Check for damaged hoses, loose hose clamps, damaged gaskets or any kind of leak that allows air to enter the engine without first passing through the air cleaner. If any of the above conditions exist, corrective action must be taken immediately. The paper element in a dry-type air cleaner may be cleaned several times by using an air jet to blow off dirt or by washing with non-sudsing household detergent and

warm water, then drying with compressed air of approximately 40 psi. Do not hold air jet too close to paper element or damage to the element may result. Elements that have been cleaned several times will finally clog and air flow to the engine will be restricted and a new element must be installed. Holes, loose end seals, dented sealing surfaces, and other forms of damage require immediate element replacement.

#### b. Air Cleaner Service.

(1) Loosen clamp assembly (1, fig. 3-7) and remove dust cap (4).

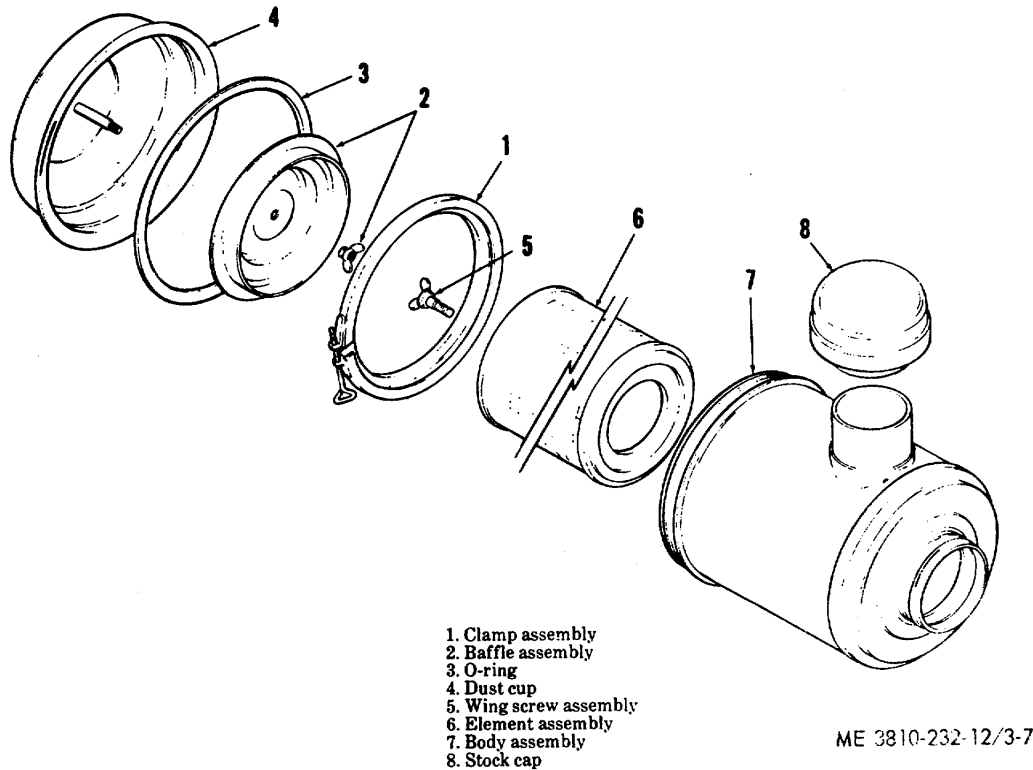


Figure 3-7. Carrier air cleaner service (model 2385).

- (2) Remove wing nut and baffles (2) from dust cup.
- (3) Empty dirt from cup, air cleaner body, and baffle. Clean cup and baffle.
- (4) Remove wing screw assembly (5) and remove element (6).
- (5) Inspect O-ring and element gasket. Replace O-ring as needed.

- (6) Install a new element or one that has been cleaned. Make sure that it seats on the gasket at the air cleaner outlet end.
- (7) Assemble baffle (2) to dust cup (4). Tighten wing nut.
- (8) Install dust cup on air cleaner body (7) making sure it seats properly to prevent unfiltered air leakage.

### CAUTION

A hole in the element of a dry-type air cleaner will destroy the effectiveness of the air cleaner. Do not use damaged cleaner element. Do not operate the engine without an element in the air cleaner.

### 3-11. Crankcase Breather Service

Service crankcase breather as illustrated in figure 3-8.

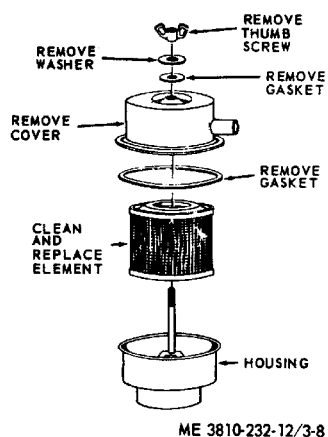


Figure 3-8. Crankcase breather service.

## Section VI. MAINTENANCE OF FUEL TANKS AND STARTING AIDS

### 3-12. Fuel Transfer Tank Service.

Service fuel transfer tank as follows:

- Disconnect hose (1) figure 3-9 from elbow (2) below tank (3) and allow to drain.
- Disconnect fuel hose (5) and elbow (6) connected to float assembly.
- Remove and clean float tank filter screen (4).
- Install filter (4) e. Install elbow (6) and connect hoses (1) and (5).

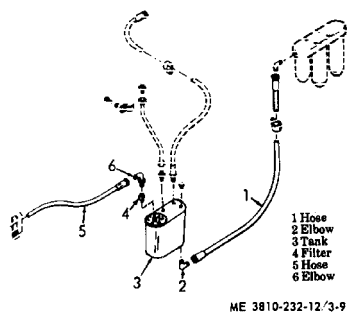


Figure 3-9. Fuel transfer tank, exploded view.

### 3-13. Fuel Tanks Strainer Service.

Service fuel tank strainers on carrier and crane as illustrated in figure 3-10.

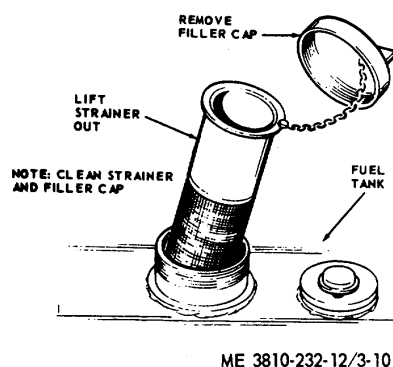


Figure 3-10. Fuel tank strainer service.

### 3-14. Engine Starting Aids Service

Service the quick-start systems by checking all connections for tightness and cleaning filter screen at 1/8-inch pipe thread opening.



## Section VII. MAINTENANCE OF ENGINE V-BELTS

### 3-15. Carrier Engine V-Belt Adjustment (Model 2380)

Adjust carrier engine V-belts as illustrated in figure 3-11.

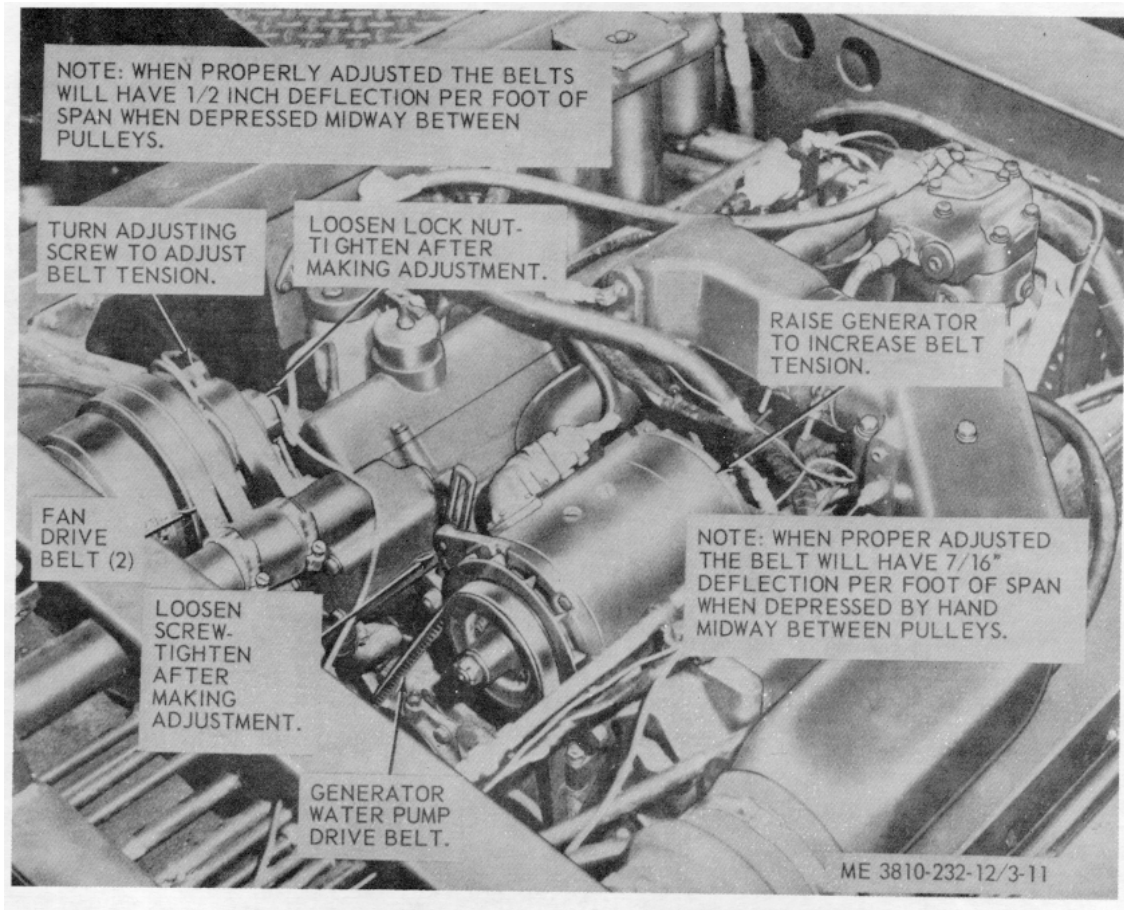
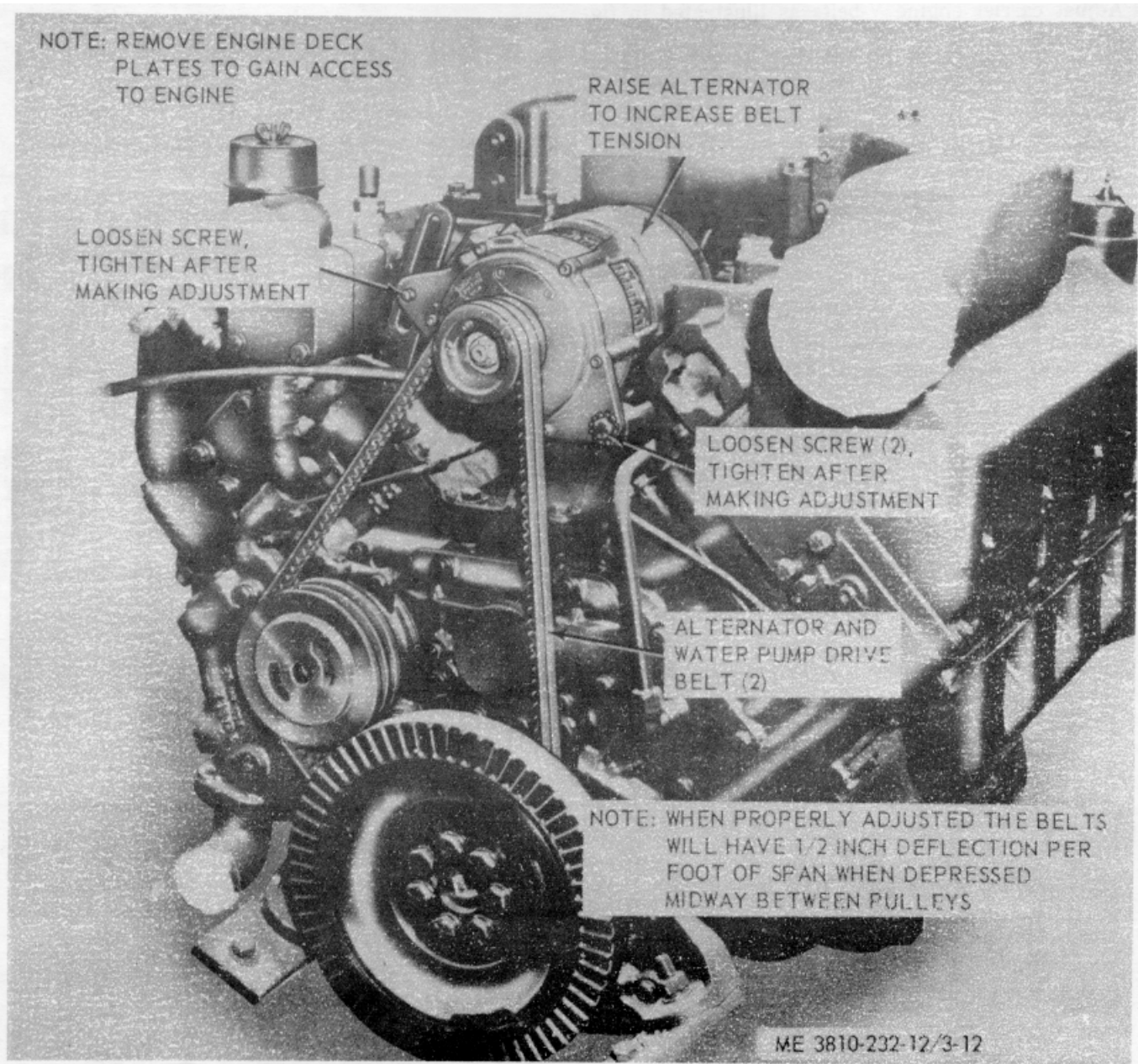


Figure 3-11. Carrier engine V-belt adjustments (model 2380).

**3-16. Carrier Engine V-Belt Adjustment  
(Model 2385)**

Adjust carrier engine V-belts as illustrated in figure 3-12.



*Figure 3-12. Carrier engine V-belt adjustments (model 22385)*

### 3-17. Crane Engine V-Belt Adjustment

Adjust crane engine V-belts as illustrated in figure 3-13.

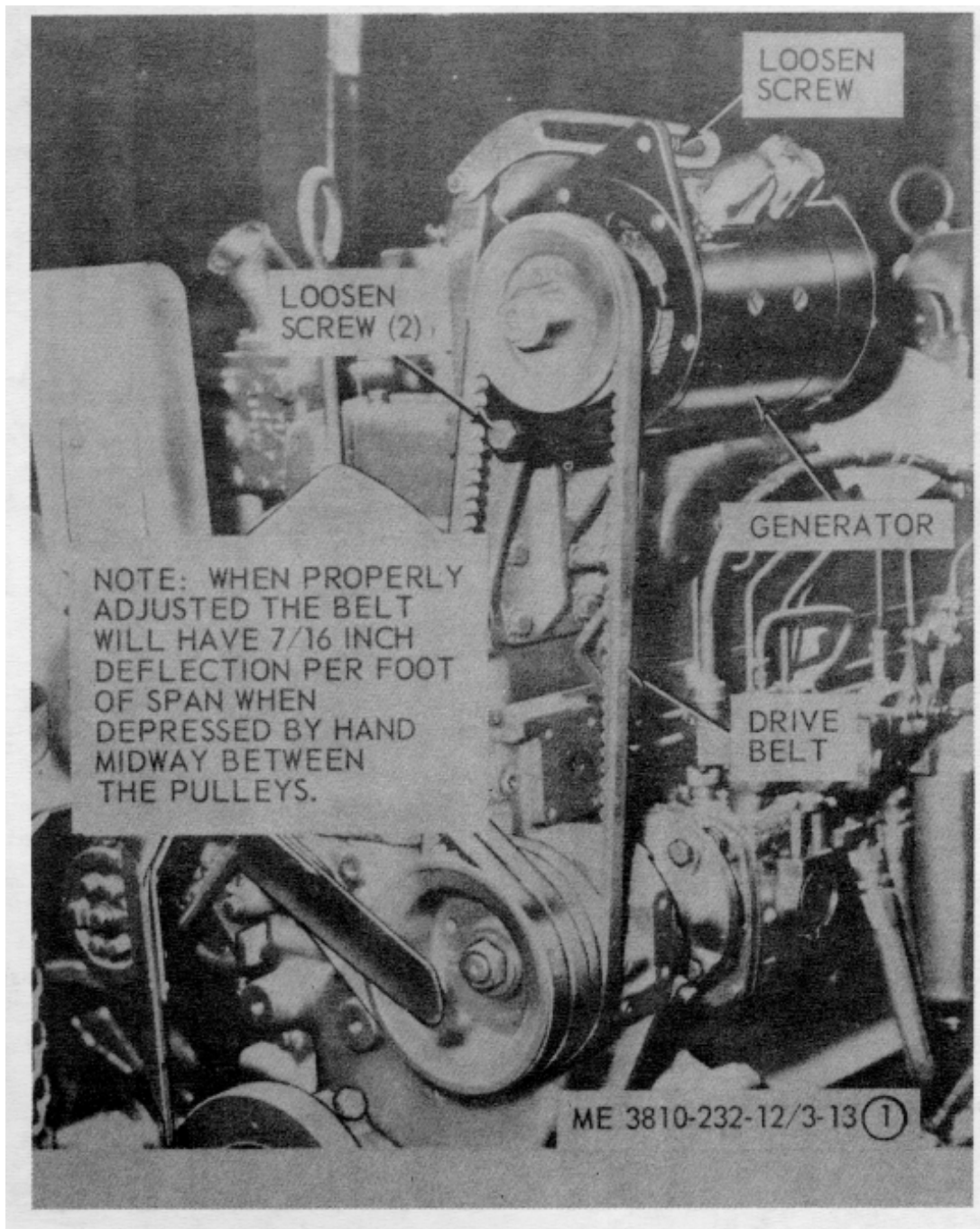


Figure 3-13. Crane engine V-belt adjustments. Sheet 1 of 3

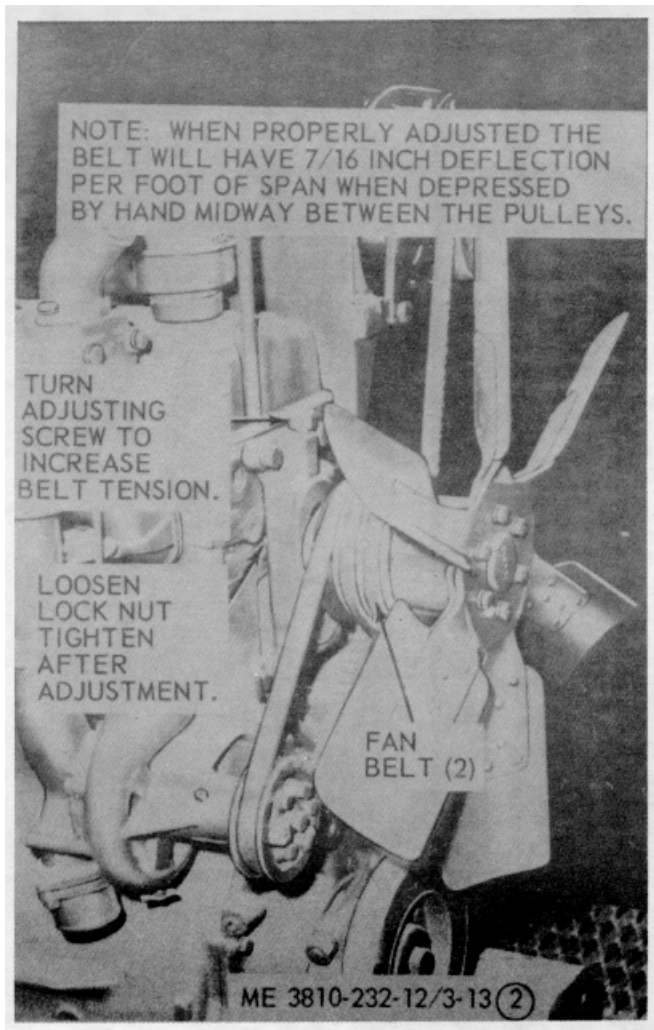


Figure 3-13. Crane engine V-belt adjustment.  
Sheet 2 of 3.

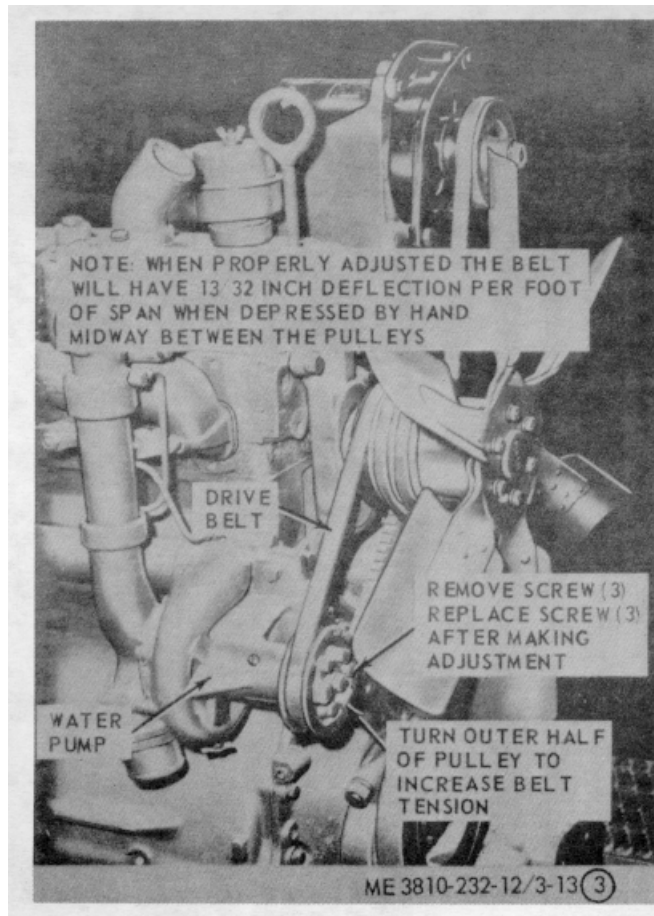


Figure 3-13. Crane engine V-belt adjustment.  
Sheet 3 of 3

### Section VIII. MAINTENANCE OF TIRES AND BATTERIES

#### 3-18. Tire Service

- a. Inspection. Inspect for excessive wear, cuts, breaks, embedded foreign matter and missing valve caps. Add air as required to maintain tire pressure of 55 psi.
- b. Repairs. Perform repairs as directed in TM 9-

1870-1.

#### 3-19. Battery Service

Tighten loose cables and mounting. Remove corrosion. Clean vent hole in filler caps before installing. Service batteries as described in TM 9-6140-200-15.

## Section IX. MAINTENANCE OF COOLANT SYSTEMS

### 3-20. Carrier Coolant System Service

#### a. Drain.

- (1) Remove belly pan.
- (2) Open drain cock.

b. *Cleaning.* Clean carrier cooling system as specified in TB ORD 651.

#### c. Fill

- (1) Remove the radiator cap.
- (2) Ensure the drain cock has been closed.
- (3) Remove the deck plate over the engine.
- (4) Add water and antifreeze solution as specified in TB ORD 651 until the coolant level is 3/4 inch above baffle in radiator.

(5) Open and close bleed cock in crossover pipe to bleed air from system as illustrated in figure 3-14.

(6) Re-inspect coolant level in radiator and add coolant as required (7) Install radiator cap, deck plate, and belly pan.

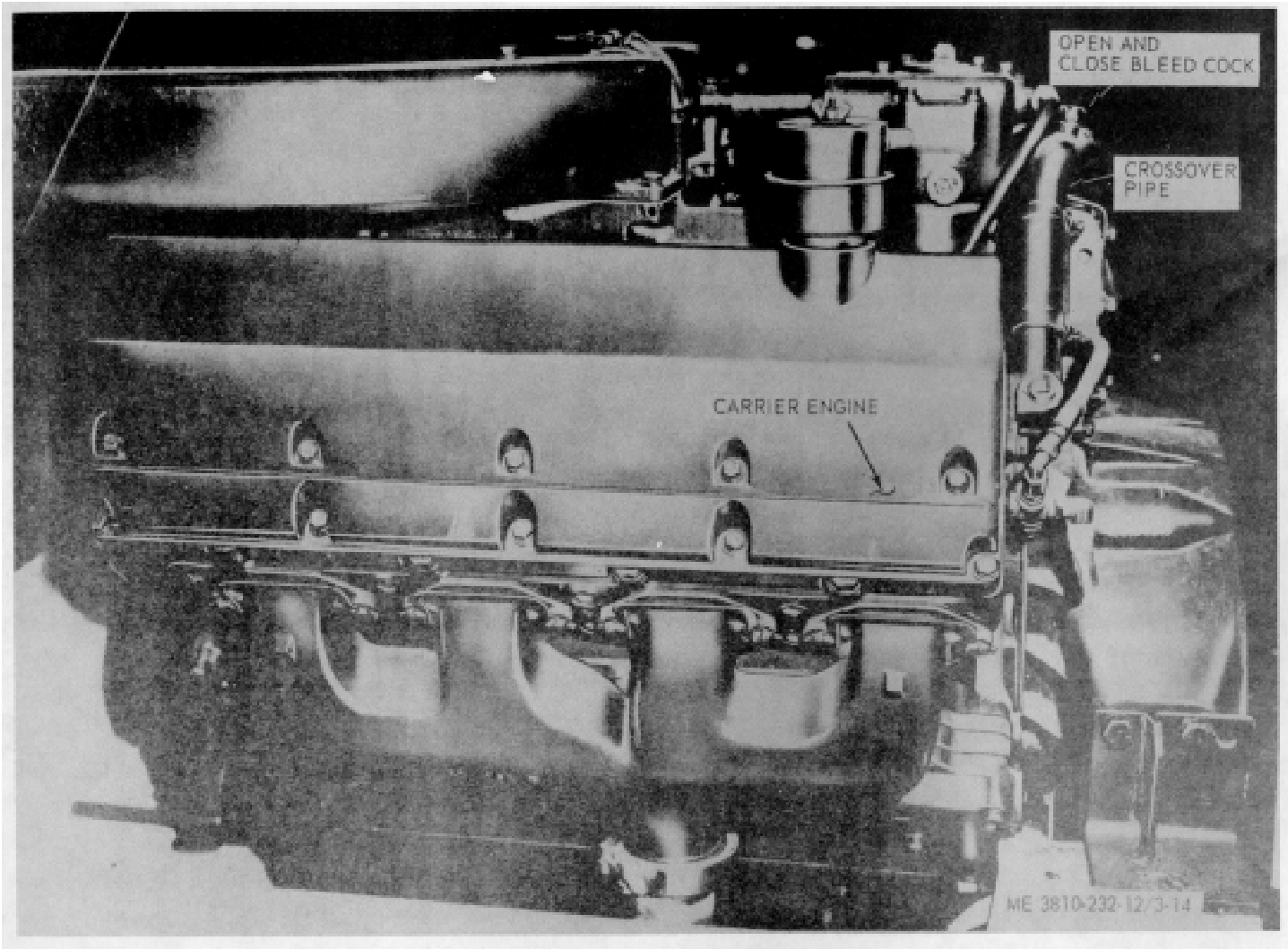
### 3-21. Crane Coolant System Service

a. *Drain* The cooling system is drained by opening drain cock located under the radiator.

b. *Cleaning.* Clean cooling system as specified in TB ORD 651.

#### c. Fill

- (1) Remove radiator cap.
- (2) Ensure that drain plug is tight.
- (3) Add a water and antifreeze solution as specified in TB ORD 651 until coolant level is 3/4 inch above baffle.
- (4) Install radiator cap.



*Figure 3-14. Bleeding carrier coolant system.*

**CHAPTER 4  
ORGANIZATIONAL MAINTENANCE INSTRUCTIONS**

**Section I. SERVICE UPON RECEIPT OF EQUIPMENT**

**4-1. Inspecting and Servicing the Equipment**

Instructions for inspecting and servicing the equipment are described in paragraph 2-1.

**4-2. Installation**

Organizational maintenance personnel will assist the operator in installing the crane as described in paragraph 2-2.

**Section II. MOVEMENT TO A NEW WORKSITE**

**4-3. General**

Movement to a new work-site is described in paragraphs 2-3 and 24. Organizational maintenance will

assist the operator in preparing equipment for administrative storage when movement is one of distance.

**Section III. REPAIR PARTS, SPECIAL TOOLS AND EQUIPMENT**

**4-4. Tools and Equipment**

Tools, equipment, and repair parts issued with or authorized for the crane are listed in the basic issue items list, appendix B.

**4-5. Special Tools and Equipment**

The special tools required to perform organizational maintenance on the crane are listed in table 4-1 and appendix B. The five digit number following the part number is the Federal Supply Code Number for the manufacturer of the tools. No special equipment is required by organizational maintenance personnel for performing maintenance on the crane.

*Table 4-1. Special Tools*

| Item                      | FSN or Ref. No     | Rd. Para No | Use                                |
|---------------------------|--------------------|-------------|------------------------------------|
| Wrench                    | 912903<br>(933989) | 4-98        | Adjust swing                       |
| Wrench                    | 5120-818-<br>4500  | 4-26        | clutch<br>Torque fuel<br>Injectors |
| Adapter,<br>torque wrench | (15434)<br>ST669   | 4-26        | Torque fuel<br>injectors           |

**4-6. Maintenance Repair Parts**

Repair parts and equipment required for organizational maintenance of the crane are listed and illustrated in TM 5-3810-232-20P.

## Section IV. LUBRICATION INSTRUCTIONS

### 4-7. General Lubrications Information

This section contains lubrication instructions which are supplemental to and not specifically covered in the lubrication order LO 5-3810-232-12-1, -2, -3, -4, -5 and -6.

### 4-8. Detailed Lubrication Information

a. General. Keep all lubricants in closed containers and store in a clean, dry place, away from external heat. Allow no dust, dirt, or other foreign material to mix with the lubricants. Keep all lubrication equipment clean and ready for use.

b. Cleaning. Keep all external parts not requiring lubrication clean of lubricants. Before lubricating the equipment, wipe all lubrication points free of dirt and grease. Clean all lubrication points after lubricating to prevent accumulation of foreign matter.

c. Points of Lubrication. Service the lubrication points at proper intervals as illustrated on LO 5-3810-232-12, -1, -2, -3, -4, -5, and -6.

#### CAUTION

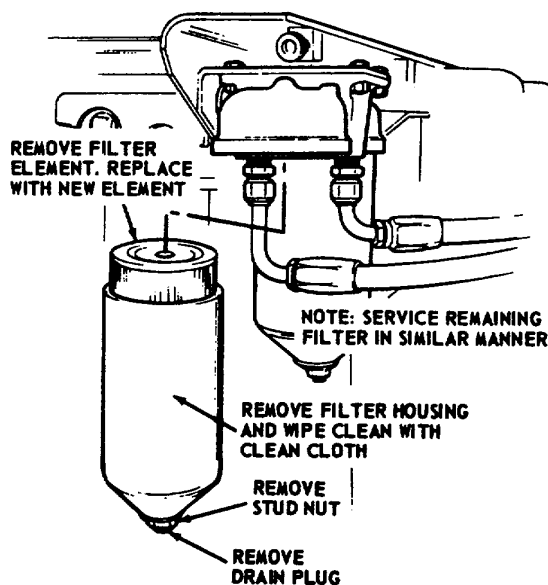
Over lubrication may cause equipment failure or damage to working parts.

#### d. OES Oil

(1) The crankcase oil level must be checked frequently, as oil consumption may increase.

(2) The oil may require changing more frequently than usual because contamination by dilution and sludge formation will increase under cold weather operation conditions.

e. Carrier Hydraulic Oil Filter Service. The-carrier hydraulic oil filter assembly is the replaceable filter element type. Service the oil filter as illustrated in figure 4-1.



ME 3810-232-12/4-1

Figure 4-1. Carrier hydraulic oil filter replacement.

## Section V. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

### 4-9. General

To insure that the crane is ready for operation at all times it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure. The preventive maintenance services to be performed are listed and described in paragraph 4-10. The item numbers indicate the sequence of minimum inspection requirements. Defects discovered during operation of the unit shall be noted for future correction, to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noticed during operation which would damage the equipment if

operation were continued. All deficiencies and shortcomings will be recorded together with the corrective action taken on DA Form 2404 (Equipment Inspection and Maintenance Worksheet) at the earliest possible opportunity.

### 4-10. Preventive Maintenance Checks and Services

Table 4-2 and 4-3 contain a listing of the minimum inspection requirements for organizational preventive maintenance checks and services. This table indicates by an X in the appropriate column monthly, quarterly) when the inspection should be performed.



Table 4-2 preventative Maintenance Check and Services

| Item number | Interval |   |   |   |      |   | B - Before operation<br>D - During operation | A - After operation<br>W - Weekly  | M - Monthly<br>O - Quarterly |
|-------------|----------|---|---|---|------|---|--|--|------------------------------|
|             | Operator |   |   |   | Org. |   |  |  |                              |
|             | Daily    |   |   |   | M    | Q | Item to be inspected                         | Procedure  | Reference                    |
|             | B        | D | A | W |      |   |  |  |                              |
| 1           | X        |   |   |   |      | X | Radiator                                     | Inspect for leaks and maintain coolant level a4 inch above baffle.<br>Use hydrometer to measure coolant system's freezing point. Add antifreeze as required to protect coolant system to lowest ambient temperature.             | TB ORD 651                   |
| X<br>2      | X        |   |   |   |      | X | Water filter                                 | Replace worn hoses<br>Replace cartridge every 400 hours<br>Polish plates, and if less than half of metal can be exposed, replace them. Check for leaks after replacing cartridge.  | Para 4-50<br>Para 4-51       |
| 3           |          |   |   | X |      | X | Drive belts, generator, water pump and fan   | Inspect belt deflection  | Fig 3-11                     |
| 4           |          |   |   | X |      | X | Fuel filters                                 | Inspect belts for cracks and frays<br>Replace as necessary.<br>Drain water and sediment. Inspect for leaks. Replace secondary filter element, clean primary filter element and clean float tank filter screen every 250 hours.   | Para 4-48<br>Para 4-23       |
| 5           | X        |   |   |   |      | X | Oil level                                    | Check oil level. Add oil as necessary  | LO 5-3810-232-12             |
| 6           | X        |   |   | X | X    |   | Batteries                                    | Tighten loose cables and mounting<br>Remove corrosion. Inspect for cracks and leaks. Clean filler cap vent holes.<br>Add water to 3/8 inch above plates as required. In freezing weather operate engine for a minimum of 1 hour. | TM 9-6120-200-15             |
| 7           | X        |   |   | X |      | X | Tires and wheels                             | Test specific gravity of battery solution and recharge or replace as required.<br>Check tire pressure. Correct pressure is 55 psi. Inspect for excessive wear, cuts, breaks, embedded foreign matter and missing valve caps.     | Para 4-61<br>TM 9-1870-1     |
| 8           |          |   |   |   |      | X | Fuel tank                                    | Tighten loose mounting. Replace leaking fuel tank. Replace a defective cap gasket.   |                              |
| 9           | X        | X |   |   |      |   | Air cleaner                                  | Add oil as required  | LO 5-3810-232-12             |
| 10          | X        | X |   |   |      |   | Hydraulic reservoir                          | Add oil as required. Service filter  | LO 5-3810-232-12             |
| 11          | X        |   |   |   |      |   | Lights                                       | Inspect wiring for damage and loose connections. Repair or replace as required.  | Para 4-69                    |
| 12          | X        | X |   |   |      |   | Brakes                                       | Inspect for proper operation. Check air system for leaks and damage. Adjust brakes as necessary.   | Para 4-143                   |
| 13          | X        | X |   |   |      |   | Windshield wiper                             | Inspect wiper blade and arm for damage. Replace defective parts as required.   | Para 4-152                   |
| 14          | X        | X |   |   |      |   | Fire extinguisher                            | Inspect for broken seal  | Para 2-29                    |
| 15          | X        |   |   |   |      |   | Operator's cab                               | Inspect for damage. Replace a cracked glass. Repair or replace a damaged door.   | Para 4-151<br>Para 4-148     |

Table 4-2 preventative Maintenance Check and Services

| Item number | Interval |   |   |   |      |   | B - Before operation<br>D - During operation | A - After operation<br>W - Weekly  | M - Monthly<br>Q - Quarterly              |
|-------------|----------|---|---|---|------|---|--|--|---|
|             | Operator |   |   |   | Org. |   |  |  |   |
|             | Daily    |   |   |   | M    | Q | Item to be inspected                         | Procedure  | Reference                                 |
|             | B        | D | A | W |      |   |  |  |   |
| 16          |          |   |   |   |      | X | Moisture ejector drain valve                 | Inspect ejector drain valve for proper operation, replace defective valve. Inspect receiver for leaks and damage.  | Para 4-133                                |
| 17          | X        |   |   |   |      | X | Utility blade                                | Inspect for cracked or broken welds, bent or damaged mounting brackets, and worn pivot pins and bushings. Inspect cutting edge for wear and missing or loose mounting bolts. Cutting edge should never be allowed to wear to point where blade is doing cutting. If cutting edge is excessively worn, it should be reversed. Inspect end bits for cracks, breaks and wear. If end bits are excessively worn, replace them. | Para 4-154                                |
| 18          |          |   |   |   |      | X | Differential assemblies                      | Check for proper oil level and lubricate   | LO 5-3810-232-12                          |
| 19          |          |   |   |   |      | X | Frame  | Inspect for breaks and loose or missing hardware. Inspect cradle for visible damage, worn pivot pins, and secure maintenance mounting  | Refer all deficiencies to General Support |
| 20          |          |   |   |   |      | X | Crankcase breather and valve covers          | Inspect for visible leaks and secure mounting. Service breather every 250 hours.   | Para 4-42<br>Para 3-11                    |
| 21          |          |   |   |   |      | X | Torque converter                             | Service in accordance with current lubrication order. Inspect for leaks and secure mounting.   | LO 5-3810-232-12                          |
| 22          |          |   |   |   | X    |   | Alcohol evaporator                           | Keep jar 2/3 full, using pure methyl 188 proof alcohol. Alcohol should be free of any inhibitor.<br>Every 900 operating hours remove strainer in bottom of body near mounting flange and clean thoroughly using cleaning solvent. Yearly, disassemble alcohol evaporator and clean all parts   | Para 4-140<br><br>Replace all gaskets.    |

Table 4-2 preventative Maintenance Check and Services (Crane)

| Item number | Interval |   |   |   |      |   | B - Before operation<br>D - During operation | A - After operation<br>W - Weekly  | M - Monthly<br>Q - Quarterly |
|-------------|----------|---|---|---|------|---|--|--|------------------------------|
|             | Operator |   |   |   | Org. |   |  |  |                              |
|             | Daily    |   |   |   | M    | Q | Item to be inspected                         | Procedure  | Reference                    |
|             | B        | D | A | W |      |   |  |  |                              |
| 1           | X        |   |   | X |      |   | Radiator                                     | Inspect for leaks and maintain coolant level of 3 inch above baffle. Use hydrometer to measure coolant system's freezing point. Add anti-freeze as required to protect coolant system to lowest expected ambient temp. | TB ORD 651                   |
| 2           | X        |   |   | X | X    | X | Fuel filter                                  | Replace worn hoses. Drain water and sediment. Replace filter element every 500 hours.  | Para 4-33                    |

| Item number | Interval |   |   |   |      |   | B - Before operation<br>D - During operation | A - After operation<br>W - Weekly  | M - Monthly<br>O - Quarterly                         |
|-------------|----------|---|---|---|------|---|--|--|--|
|             | Operator |   |   |   | Org. |   |  |  |  |
|             | Daily    |   |   |   | M    | Q | Item to be inspected                         | Procedure  | Reference  |
|             | B        | D | A | W |      |   |  |  |  |
| 3           | X        |   |   |   |      | X | Engine clutch                                | Inspect for proper operation, adjust as required.  | Para 4-98  |
| 4           | X        | X |   |   |      | X | Drive belts, generator, water pump and fan   | Inspect belt deflections<br>Inspect belts for cracks, and frays<br>Replace as necessary  | Para 3-17<br>Para 4-58<br>Para 4-98                  |
| 5           | X        |   |   | X |      | X | Auxiliary shaft clutch bands                 | Inspect for proper operation, adjust as necessary.   | Para 4-101   |
| 6           | X        |   |   | X |      | X | Hoist drum shaft clutch bands                | Inspect for proper operation, adjust as necessary.   | Para 4-102   |
| 7           | X        |   |   | X |      | X | Swing shaft clutch bands                     | Inspect for proper operation, adjust as necessary.   | Para 4-99  |
| 8           | X        |   |   | X |      | X | Boom hoist brake bands                       | Inspect for proper operation, adjust as necessary.   | Para 4-103   |
| 9           |          |   |   | X |      | X | Fuel tank                                    | Inspect for leaks<br>Tighten loose mounting.<br>Replace leaking fuel tank.<br>Inspect filler cap for damage and missing gasket.<br>Check fuel strainer   | Para 4-34  |
| 10          | X        |   |   | X | X    | X | Batteries                                    | Tighten loose cables and mountings, remove corrosion. Inspect for cracks and leaks<br>Clean vent holes.<br>Add water to 3/8 inch above plates as required<br>In freezing weather, operate engine for a minimum of 1 hour<br>Test specific gravity of battery solution and recharge or replace as required. | TM 9-6120-200-15<br>Para 4-61                        |
| 11          |          | X |   |   |      | X | Generator                                    | Inspect for proper operation. Replace worn generator brushes.  | Para 4-85  |
| 12          |          |   |   |   |      | X | Primary drive chain                          | Inspect drive chain for wear and proper tension. Adjust chain eccentric.   | Para 4-107   |
| 13          | X        |   |   |   |      | X | Fire extinguisher                            | Inspect for broken seal.   |  |
| 14          |          | X |   |   |      | X | Control levers and pedals                    | Inspect for proper operation   | Refer all deficiencies to Direct Support Maintenance |
| 15          | X        |   |   |   |      | X | Hoisting cables                              | Inspect master cylinders for leaks.<br>For service, reference current lubrication order.<br>Inspect cables for frayed, brakes or damage. Replace defective cables.   | Para 2-30  |
| 16          | X        | X |   |   |      | X | Lights                                       | Inspect for burned out lamps and replace as required.<br>Inspect wiring for loose connections or damage  | Para 4-92<br>Para 4-93                               |
| 17          | X        |   |   |   |      | X | Operator's cab                               | Inspect glass and door for damage<br>Replace cracked glass or damaged door.  | Para 4-117<br>Para 4-118                             |
| 18          | X        | X |   |   |      |   | Load rollers                                 | Inspect for wear, breaks, cracks<br>For service reference current lubrication order  | Refer all deficiencies to Direct Support Maintenance |
| 19          | X        |   |   |   |      | X | Boom Assembly                                | Inspect boom assembly for cracks, and other damage. Repair defective boom.   | Para 4-112   |
| 20          | X        |   |   |   |      | X | Hook block                                   | Inspect for cracks and damaged sheaves.<br>Replace damaged block<br>accordance with current lubrication order  | Service in   |

## Section VI. TROUBLESHOOTING

### 4-11. General

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the crane or any of its components. Each malfunction is followed by a list of probable causes of the trouble. The corrective action recommended is described opposite the probable cause. Any trouble beyond the scope of

organizational maintenance shall be reported to Direct Support Maintenance.

### 4-12. Organizational Maintenance Troubleshooting

Refer to table 4-4 for organizational maintenance troubleshooting.

*Table 4-4. Troubleshooting*

| Malfunction   | Probable cause   | Corrective action   |
|---|--|---|
| 1. Engine overheats                                     | V-belt broken  | Replace V-belt (para 4-48).   |
| 2 Cold engine hard to start or fails to start lines     | a Dead or weak batteries<br>b Restricted fuel lines<br><br>c Loose injector inlet or drain connection            | a. Charge or replace batteries (para 4-61).<br>b Clean fuel lines.<br><br>c Inspect and tighten as necessary (para 4-35).         |
| 3 Carrier engine has excessive fuel consumption         | a External or internal fuel leak<br><br>b. Engine overloaded   | a. Inspect, tighten and replace fuel line as necessary.<br>b. Reduce load.  |
| 4. Excessive oil consumption necessary (para 4-43)      | External oil leak lines and tighten as   | Inspect external oil  |
| 5 Starter fails to crank                                | a Poor electrical connections<br>b Defective starter switch<br>c Starter brushes worn                            | a. Replace as necessary (para 4-61).<br>b Replace starter switch (para 4-62).<br>c Replace brushes (para 4-62).                   |
| 6 Battery charging generator (crane) not charging       | a, Faulty generator<br><br>b V-belt broken   | a Replace generator (para 4-64).<br>b Replace V-belt (para 4-48).   |
| 7 Crane engine clutch slips or will not engage properly | a Incorrect clutch adjustment<br>b Control linkage loose or out of adjustment                                    | a Adjust clutch (para 4-98).<br>b Tighten or adjust control linkage (para 4-97).  |
| 8 Light failure   | a Defective or burned out lamps<br>b Short in wiring<br><br>c Defective switch<br><br>d Loose wiring connections | a Replace lamps (para 4-70 thru 4-75).<br>b Repair wiring (para 4-69).<br>c Replace switch (para 4-66).<br>d Tighten connections. |
| 9 Dim lights  | a Weak or dead batteries<br>b Loose wiring connections.  | a Charge or replace batteries (para 4-61).<br>b Check and tighten   |

| Malfunction  | Probable cause  | Corrective action  |
|--|---|--|
| <p>10. Main chain drive excessively noisy</p> <p>c. Improper adjustment</p> <p>11. Chain hoist gear noisy</p> <p>12. Crane boom or hoist operation rough or inoperative</p> <p>c. Boom hoist brake band loose</p> <p>d. Grease on clutch or brake bands (para 4-104).</p> <p>13. Revolving frame teeters or will not swing</p> <p>14. Continuous humming noise or noisy front axle when driving</p> <p>15. Steering hard to operate</p> <p>16. Improper air pressure</p> | <p>a. Defective chain</p> <p>b. Improper or insufficient lubrication</p> <p>c. Adjust main chain drive (para 4-107).<br/>Improper insufficient lubrication</p> <p>a. Hoist clutch slips (para 4-102).</p> <p>b. Hoist brake bands loose</p> <p>c. Adjust boom hoist brake (para 4-103).</p> <p>d. Clean and inspect (para 4-98 thru</p> <p>Swing clutches out of adjustment</p> <p>Lack of lubrication or use of improper grade of lubricant in wheel bearing</p> <p>Loss of hydraulic fluid</p> <p>a. Air pressure in system is above normal (4-139)</p> <p>b. Air reservoir damaged</p> | <p>a. Replace chain (para 4-107).</p> <p>b. Refer to LO 5-3810-232-12</p> <p>Refer to LO 5-3810-232-12.</p> <p>a. Adjust hoist clutch</p> <p>b. Adjust brake bands (para 4-104).</p> <p>Adjust swing clutches (para 4-99).</p> <p>Check lubricant for correct amount and grade Refer to LO 5-3810-232-12.</p> <p>Tighten all lines and fittings Fill reservoir as specified in LO 5-3810-232-12.</p> <p>o. Check governor settings. Adjust air compressor unloading valve (para 4-139). Replace governor if necessary (para 4-139).</p> <p>b. Inspect air reservoir.</p> |

## Section VII. RADIO INTERFERENCE SUPPRESSION

### 4-13. 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 and grounding the frame with bonding straps.

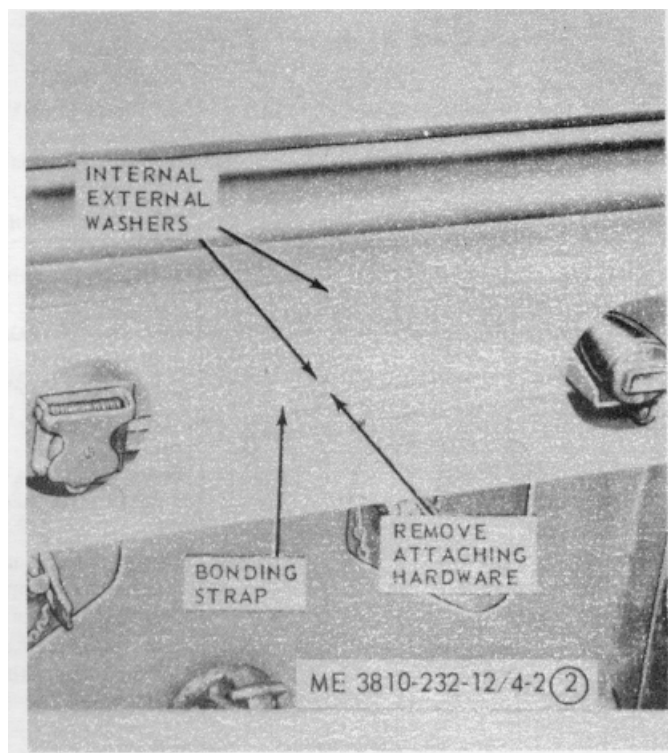
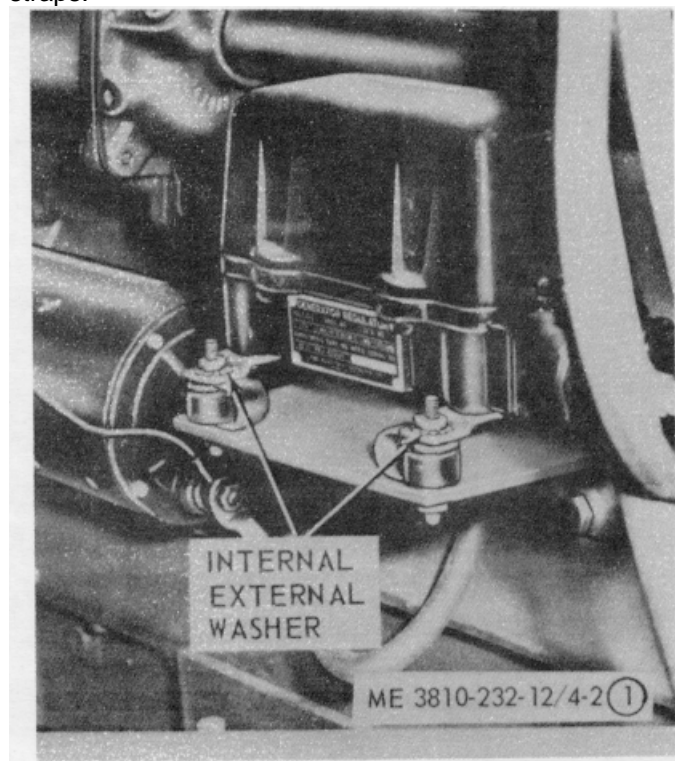


Figure 4-2 . Interference suppression components, location and removal.

### 4-14. Interference Suppression Components

Suppression components are those whose function is to suppress radio interference. These components are described and located in figure 4-2.

### 4-15. Replacement of Suppression Components

Refer to figure 4-2 for replacement of suppression components.

## Section VIII. MAINTENANCE OF EXHAUST SYSTEM

### 4-16. Carrier Engine Exhaust Assembly (Model 2380)

a. *Removal.* Remove exhaust assembly as illustrated in figure 4-3.

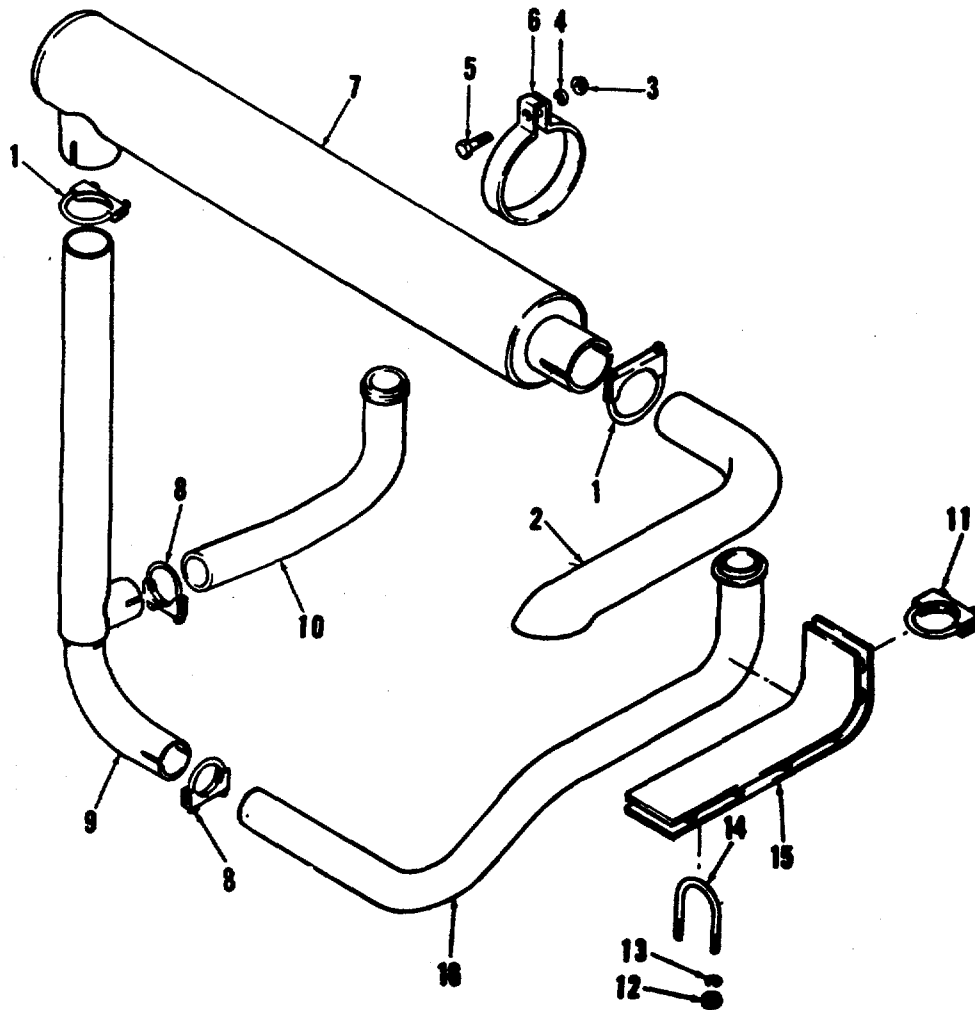
b. *Cleaning and Inspection.*

(1) Clean exhaust assembly with a wire brush.

(2) Inspect for cracks, breaks, or other damage.

Replace all defective parts.

c. *Installation.* Install exhaust assembly as illustrated in figure 4-3.



- |              |             |
|--------------|-------------|
| 1. Clamp     | 9. Weldment |
| 2. Tail pipe | 10. Clamp   |
| 3. Nut       | 11. Pipe    |
| 4. Washer    | 12. Nut     |
| 5. Screw     | 13. Washer  |
| 6. Strap     | 14. U-bolt  |
| 7. Muffler   | 15. Shield  |
| 8. Clamp     | 16. Pipe    |

Figure 4-3. Carrier engine exhaust assembly, removal add installation, (Model 2380).

#### 4-17. Carrier Engine Exhaust System (Model 2385)

##### a. Removal.

- (1) Remove engine deck plate.
- (2) Refer to figure 4-4 and remove muffler mounting bracket screws and exhaust pipe clamps.

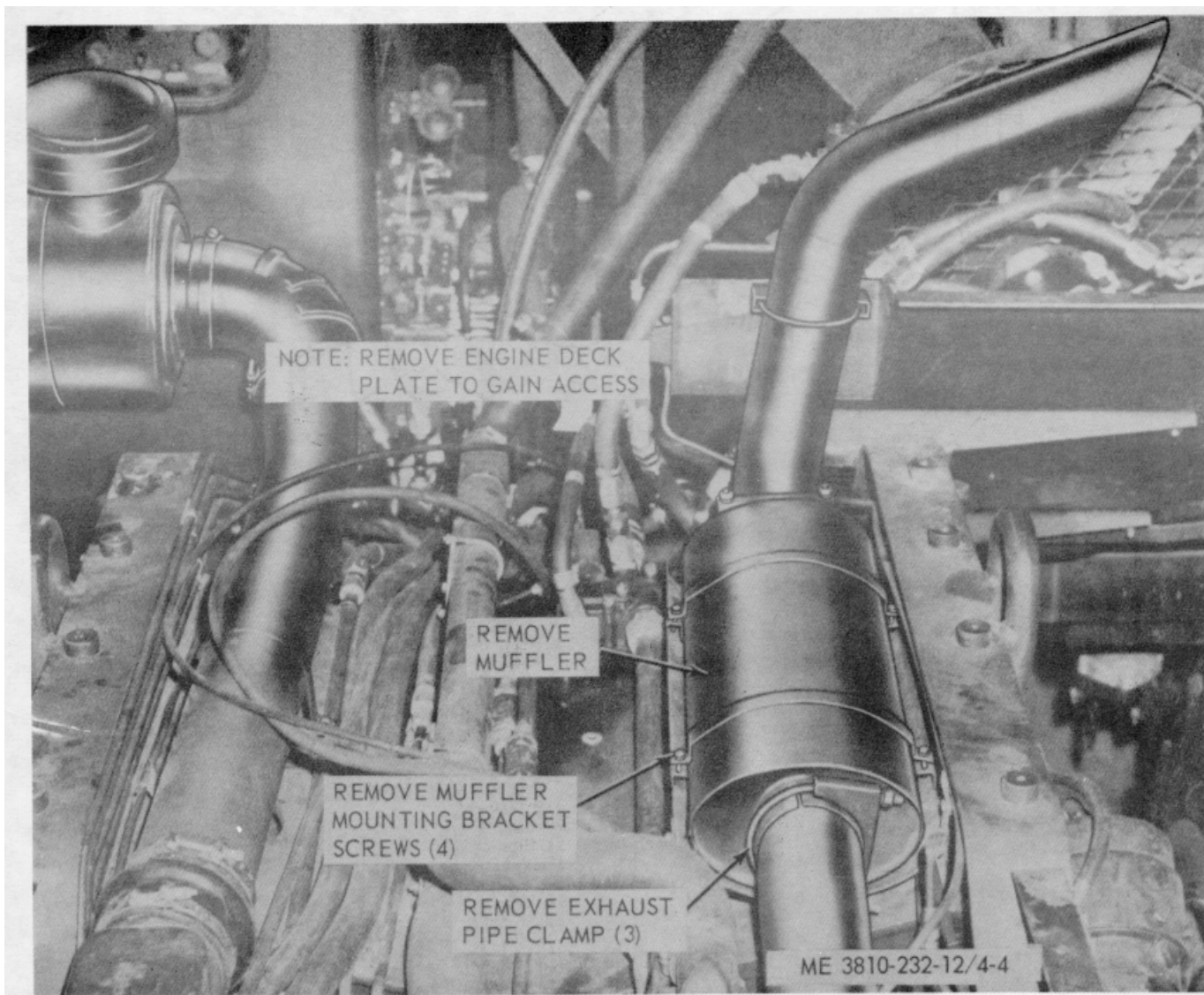


Figure 4-4. Carrier engine exhaust assembly, removal and installation (Model 2385)

- (3) Remove muffler.

##### b. Cleaning and Inspection?

- (1) Clean exhaust assembly with a wire brush.
- (2) Inspect for cracks, breaks, or other damage. Replace all defective parts.

##### c. Installations.

- (1) Install muffler and secure exhaust pipe clamps (fig. 4-4).

- (2) Install muffler mounting bracket screws and replace engine deck plates.

#### 4-18. Crane Engine Exhaust Assembly and Intake and Exhaust Manifolds

- ##### a. Removal.
- Remove exhaust assembly and intake and exhaust manifolds as illustrated in figure 4-5.



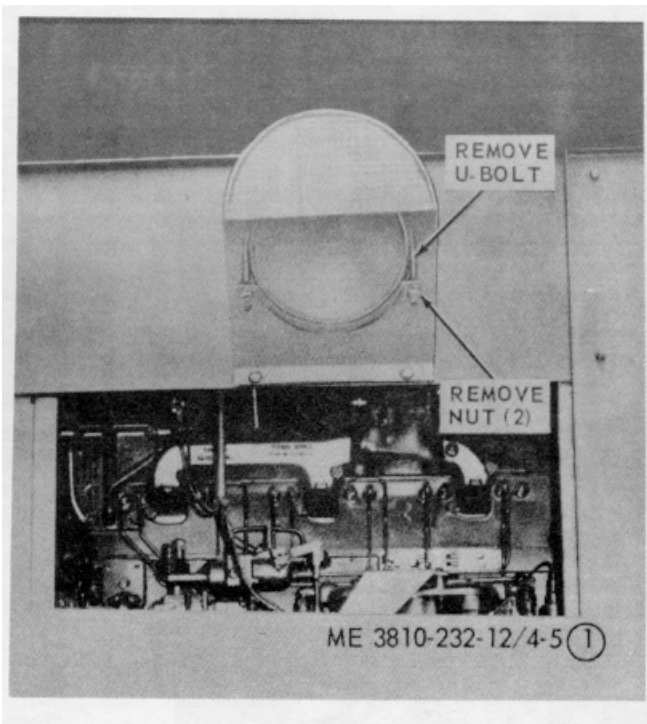


Figure 4-5. Crane engine exhaust assembly, intake and exhaust manifolds, removal and installation.  
Sheet 1 of 4.

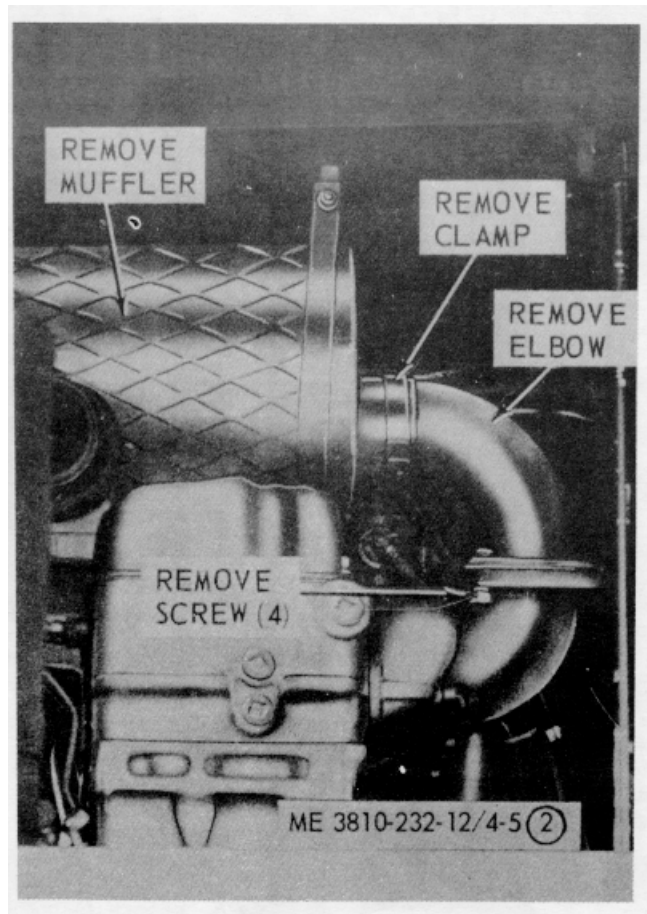


Figure 4-5. Crane engine exhaust assembly, intake and exhaust manifolds, removal and installation.  
Sheet 2 of 4

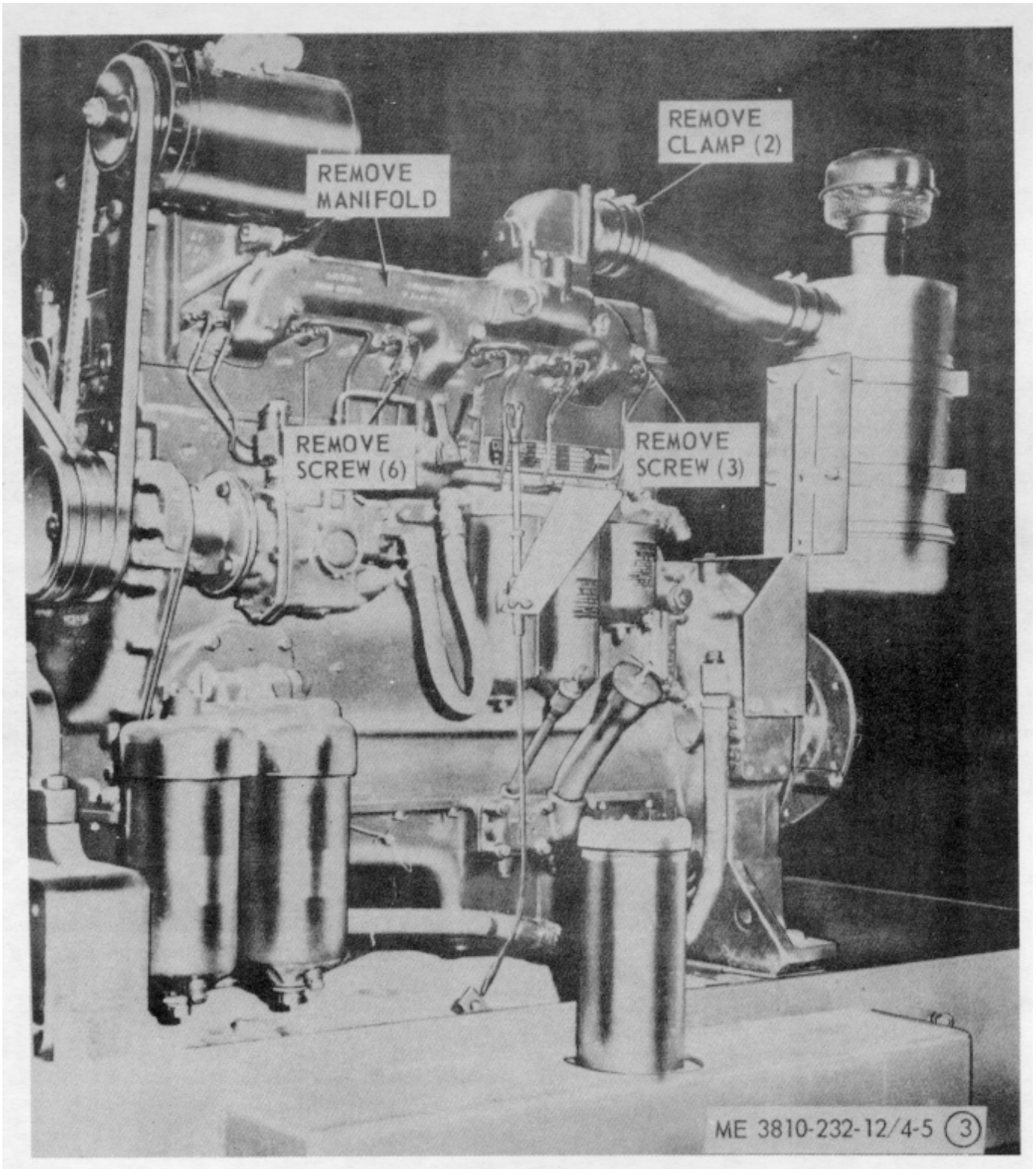


Figure 4-5. Crane engine exhaust assembly, intake and exhaust manifolds, removal and installation.  
Sheet 3 of 4.

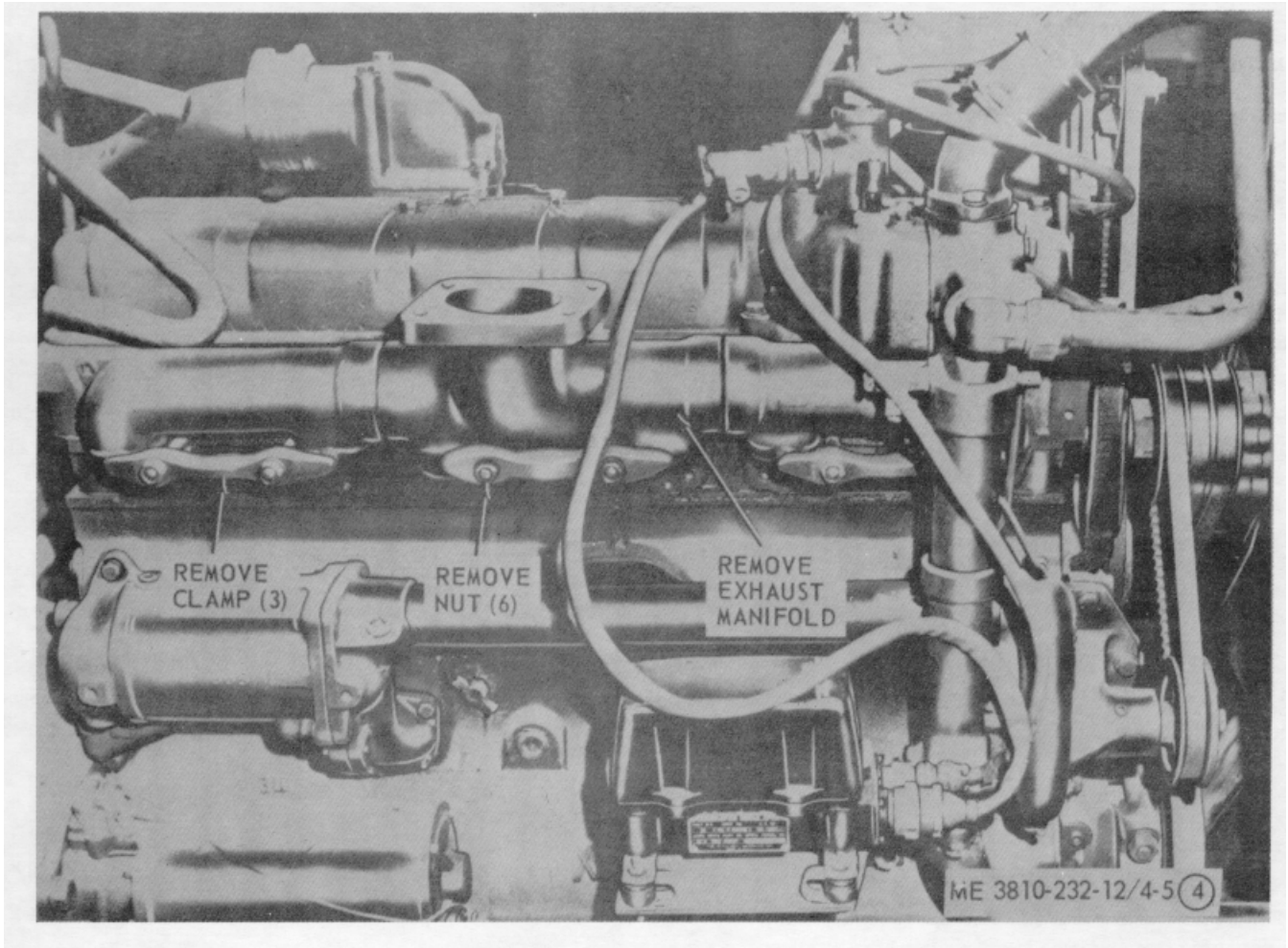


Figure 4-5. Crane engine, exhaust assembly, intake ad exhaust manifolds, removal and installation.  
Sheet 4 of 4.

b. Cleaning acid Inspection.

- (1) Clean exhaust assembly and manifolds with a wire brush.
- (2) Inspect exhaust assembly and manifolds

for breaks, burned out condition, or other damage. Replace all defective parts.

c. Installation. Install exhaust assembly and manifolds as illustrated in figure 4-5.

## Section IX. MAINTENANCE OF ROCKER ARM COVERS

### 4-19. General

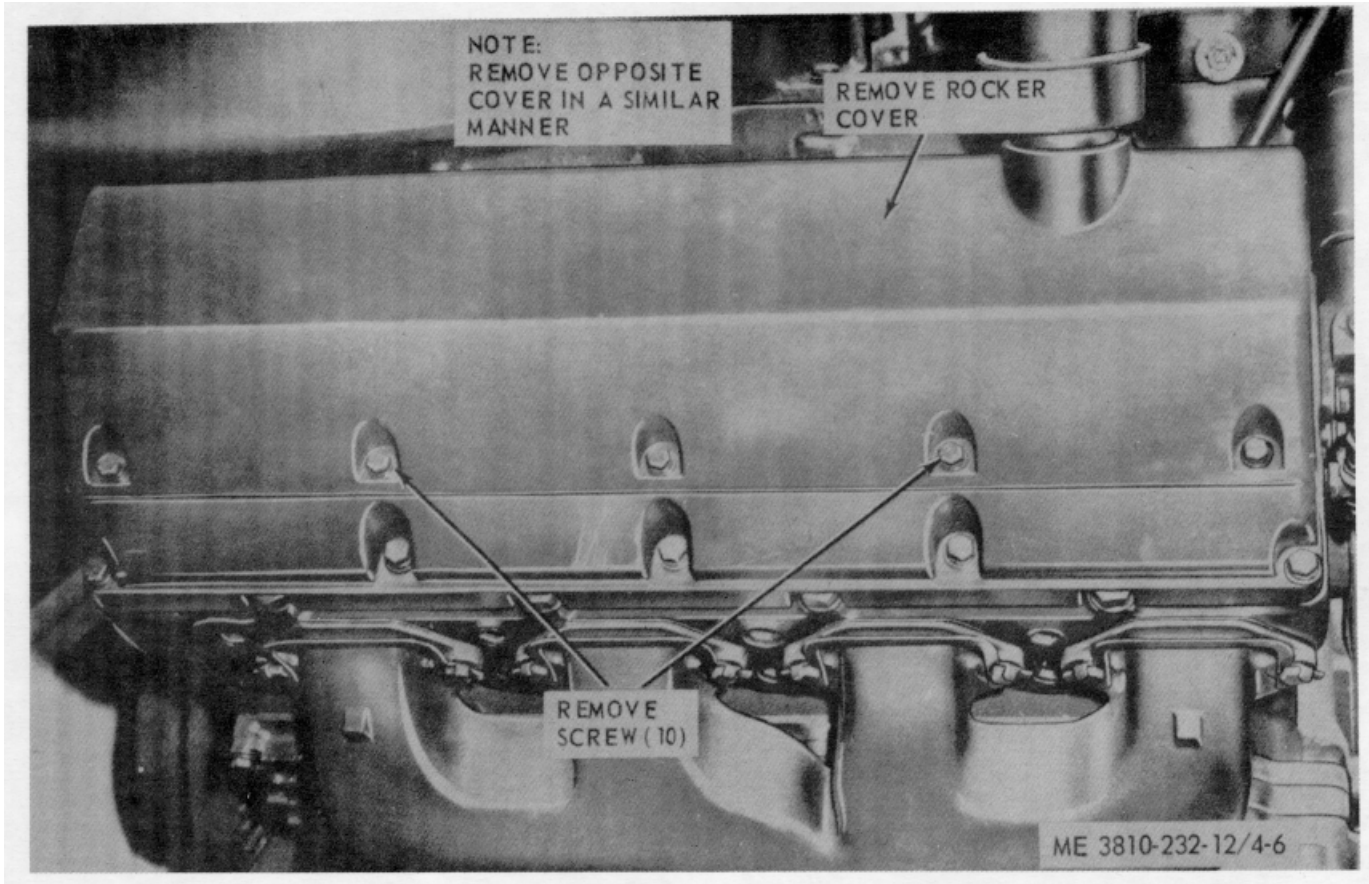
The carrier engine has two rocker arm covers. The right cover contains an oil filler cap, and a crankcase breather is provided in the left cover. The crane engine has one rocker arm cover with a crankcase breather.

### 4-20. Carrier Engine Rocker Arm Covers

a. Removal.

- (1) Remove carrier deck plate over engine.
- (2) Disconnect or remove and cap all hoses, tubes, and connectors that interfere with the removal of carrier engine rocker arm covers.

(3) Remove carrier engine rocker arm covers as illustrated in figure 4-6.



*Figure 4-6. Carrier engine rocker arm cover, removal and installation*

*b. Installation.*

(1) Install carrier engine rocker arm covers as illustrated in figure 4-6.

(2) Install or connect all connectors, tubes and hoses that were removed or disconnected.

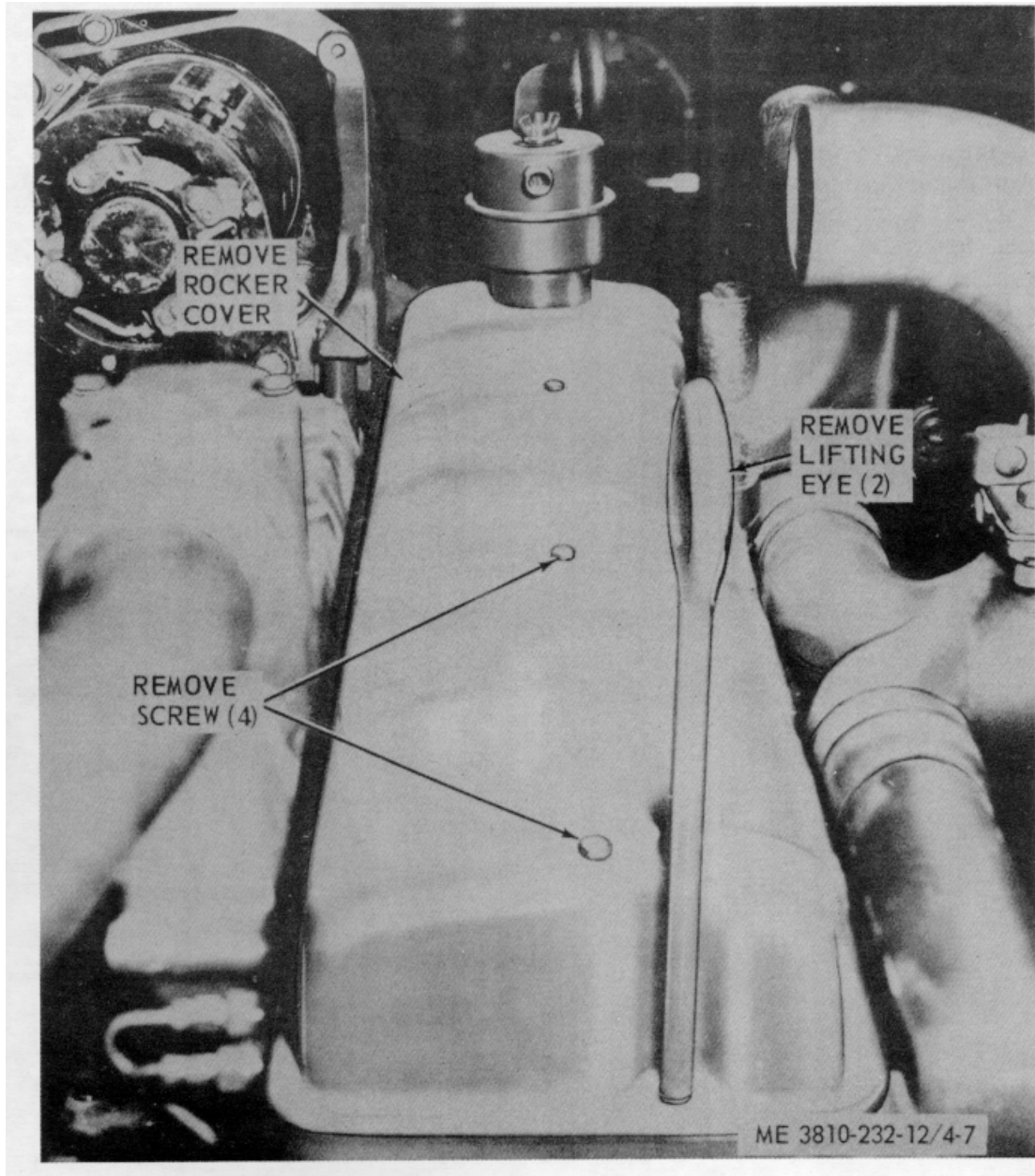
(3) Install carrier deck plate over engine.

**4-21. Crane Engine Rocker Arm Cover**

*a. Removal.*

(1) Remove crane engine exhaust assembly as instructed in paragraph 4-18.

(2) Remove crane engine rocker arm cover as illustrated in figure 4-7.



*Figure 4-7. Crane engine rocker arm cover, removal and installation.*

*b. Installation.*

(1) Install crane engine rocker arm cover as illustrated in figure 4-7.

(2) Install crane engine exhaust assembly as instructed in paragraph 4-18.

## Section X. MAINTENANCE OF CARRIER ENGINE FUEL SYSTEM

### 4-22. General

The carrier engine fuel system consists of the fuel tank, fuel transfer tank assembly, fuel filters, fuel pump, injector supply and drain lines, and injectors. Fuel flows from the fuel tank to the fuel transfer tank where the fuel level is controlled by a float and valve to prevent flooding of the engine when the start switch is in the "ON" position and the engine not running, or if the solenoid controlled fuel shut-down valve should leak. The fuel pump draws fuel from the fuel transfer tank through the fuel filter and delivers it to the injectors under controlled pressure. The injectors receive the low-pressure fuel from the pump and deliver it into the combustion chambers.

### 4-23. Fuel Filters

#### a. Removal and Disassembly.

(1) Remove carrier engine fuel filters as illustrated in figure 4-8.

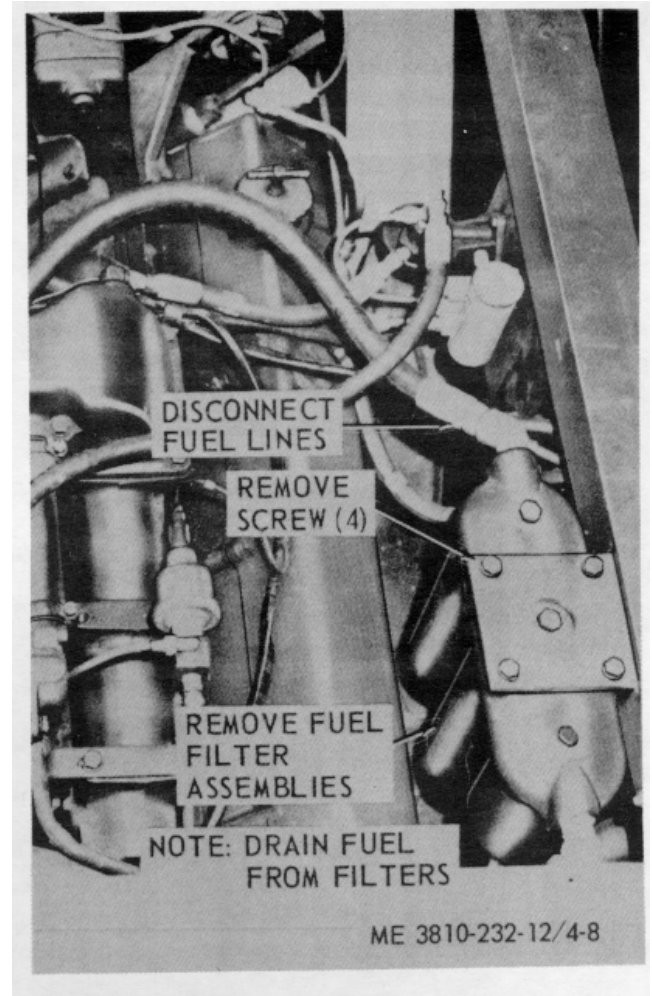
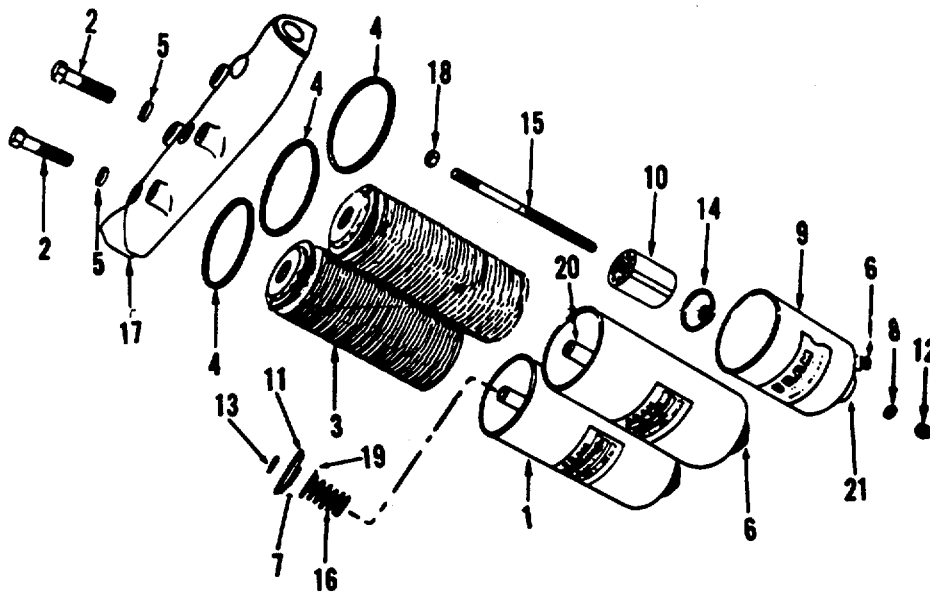


Figure 4-8. Carrier engine fuel filters, removal and installation.



(2) Disassemble fuel filters as illustrated in figure 4-9.



ME 3810-232-12/4-9

- |              |             |
|--------------|-------------|
| 1. Body      | 12. Nut     |
| 2. Screw     | 13. Ring    |
| 3. Element   | 14. Plunger |
| 4. Gasket    | 15. Stud    |
| 5. Washer    | 16. Spring  |
| 6. Plug      | 17. Head    |
| 7. Washer    | 18. Nut     |
| 8. Washer    | 19. Washer  |
| 9. Body      | 20. Tube    |
| 10. Strainer | 21. Washer  |
| 11. Plate    |             |

Figure 4-9. Fuel filters, disassembly and reassembly.

*b. Cleaning and Inspection.*

- (1) Discard elements and gaskets.
- (2) Clean strainer by reverse flushing.
- (3) Clean all other parts and dry thoroughly.
- (4) Inspect all parts for damage or defects.

Replace gaskets and filter elements and damaged or defective parts.

*c. Reassembly and Installation.*

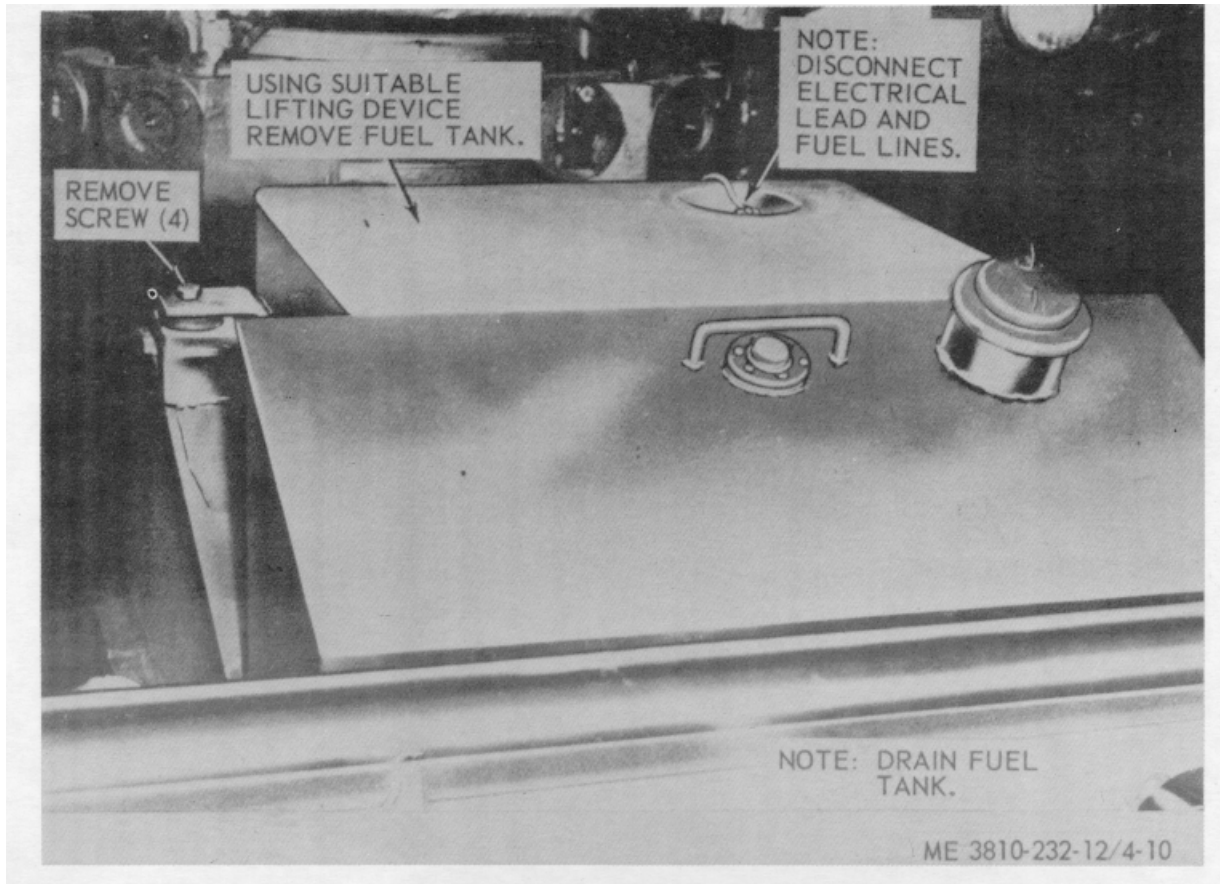
- (1) Reassemble fuel filters as illustrated in figure 4-9.

- (2) Install fuel filters as illustrated in figure 4-8.

**4-24. Fuel Tanks, Lines and Fittings (Model 2380)**

*a. Removal and Disassembly.*

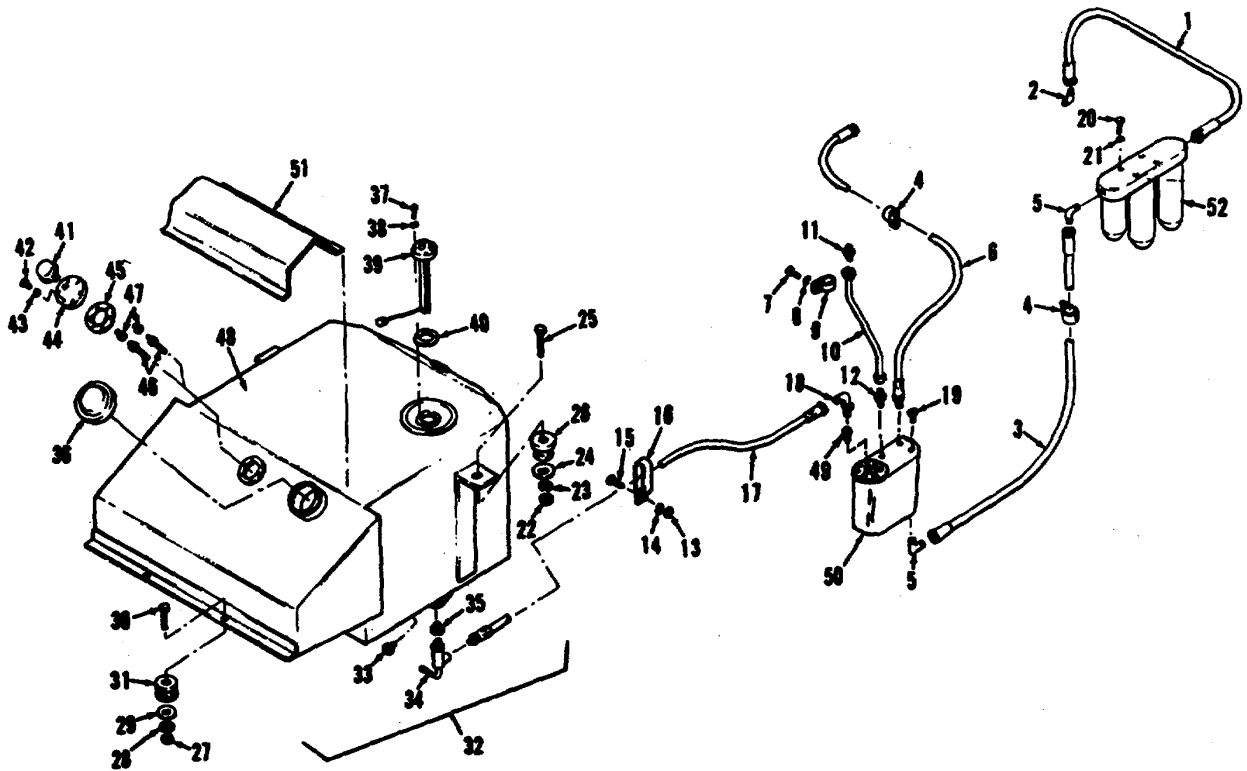
- (1) Remove carrier fuel tank as illustrated in figure 4-10.



*Figure 4-10. Carrier fuel tank, removal and installation (Model 2380)*



(2) Disassemble fuel tanks, lines and fittings as illustrated in figure 4-11.



ME 3810-232-12/4-11

- |               |                      |                      |
|---------------|----------------------|----------------------|
| 1. Hose       | 19. Plug             | 37. Screw            |
| 2. Elbow      | 20. Screw            | 38. Washer           |
| 3. Hose       | 21. Washer           | 39. Fuel sender      |
| 4. Clamp      | 22. Nut              | 40. Gasket           |
| 5. Elbow      | 23. Washer           | 41. Breather         |
| 6. Hose       | 24. Washer           | 42. Screw            |
| 7. Screw      | 25. Screw            | 43. Washer           |
| 8. Washer     | 26. Mount            | 44. Cover            |
| 9. Clamp      | 27. Nut              | 45. Gasket           |
| 10. Tube      | 28. Washer           | 46. Tube             |
| 11. Connector | 29. Washer           | 47. Connector        |
| 12. Connector | 30. Screw            | 48. Supply tank      |
| 13. Nut       | 31. Mount            | 49. Filter screen    |
| 14. Washer    | 32. Supply tank assy | 50. Transfer tank    |
| 15. Screw     | 33. Plug             | 51. Guard            |
| 16. Clamp     | 34. Cock             | 52. Fuel filter assy |
| 17. Hose      | 35. Pipe             |                      |
| 18. Elbow     | 36. Cap              |                      |

Figure 4-11. Carrier fuel tanks, lines and fittings, disassembly and reassembly (Model 2380).

*b. Cleaning and Inspection.*

(1) Clean all parts and dry thoroughly. Ensure to remove all sludge, deposits and water (TB ORD 1031).

(2) Inspect for leaks and defective parts. Replace defective parts as required.

*c. Reassembly and Installation.*

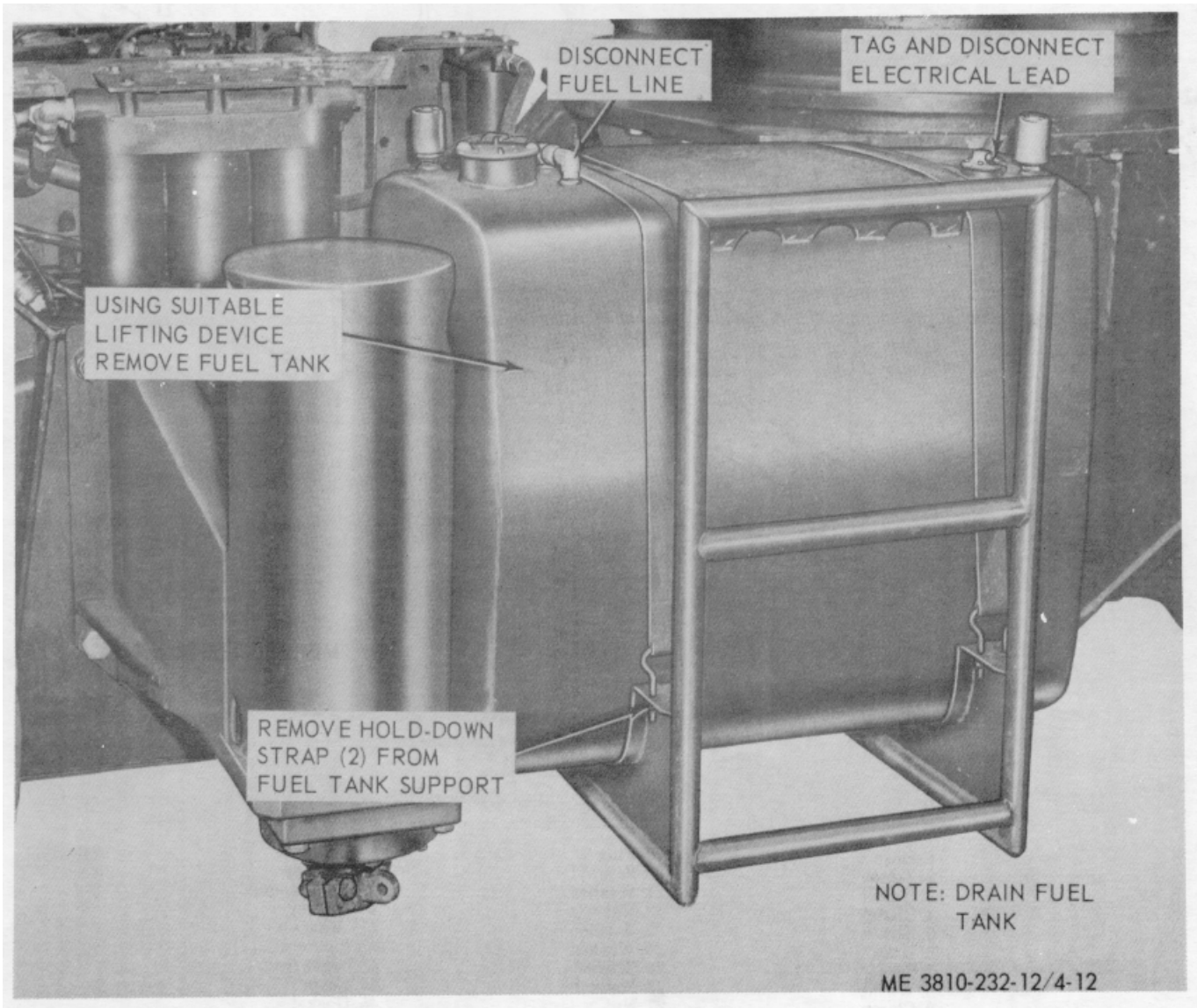
(1) Reassemble fuel tanks, lines and fittings as illustrated in figure 4-10.

(2) Install the carrier fuel tank as illustrated in figure 4-11.

**4-25. Fuel Tanks, Lines and Fittings (Model 2385)**

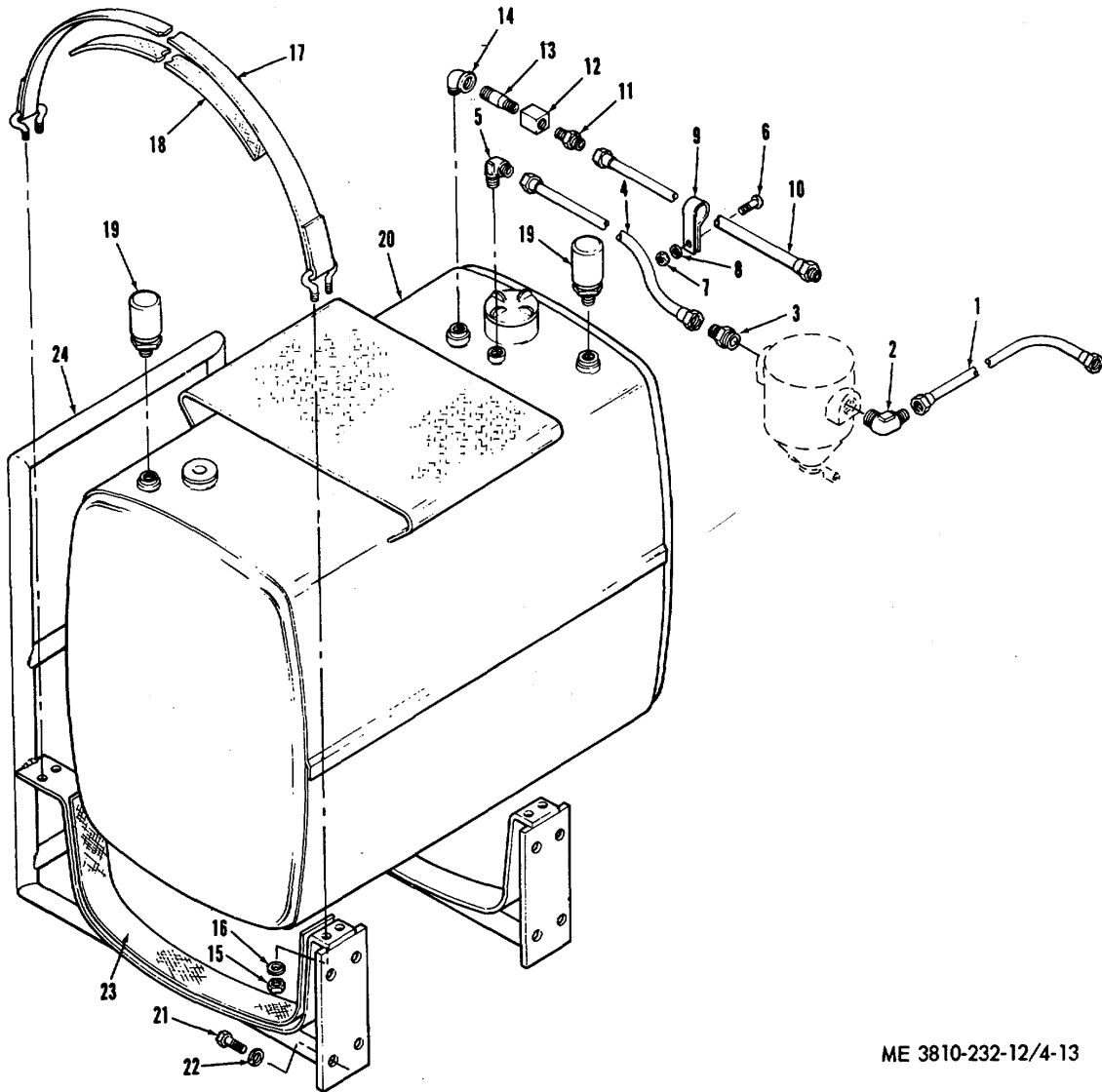
*a. Removal and disassembly.*

(1) Remove carrier fuel tank as illustrated in figure 4-12.



*Figure 4-12. Carrier fuel tank, removal and installation (Model 2385)*

(2) Disassemble fuel tanks, lines and fittings as illustrated in figure 4-13.



ME 3810-232-12/4-13

- |               |                |
|---------------|----------------|
| 1. Hose       | 13. Nipple     |
| 2. Elbow      | 14. Elbow      |
| 3. Connector  | 15. Nut        |
| 4. Hose       | 16. Lockwasher |
| 5. Elbow      | 17. Strap      |
| 6. Screw      | 18. Strip      |
| 7. Nut        | 19. Valve      |
| 8. Lockwasher | 20. Tank       |
| 9. Clamp      | 21. Bolt       |
| 10. Hose      | 22. Lockwasher |
| 11. Connector | 23. Strip      |
| 12. Valve     | 24. Bracket    |

Figure 4-13. Carrier fuel tanks, lines and fittings, disassembly and reassembly (Model 2385).

*b. Cleaning and Inspection.*

(1) Clean all parts and dry thoroughly. Ensure to remove all sludge deposits and water (TB ORD 1031).

(2) Inspect for leaks and defective parts. Replace defective parts as required.

*c. Reassembly and Installation.*

(1) Reassemble fuel tanks, lines and fittings as illustrated in figure 4-13.

(2) Install the carrier fuel tank as illustrated in figure 4-12.

#### 4-26. Fuel Injectors and Valves Adjustments

##### NOTE

For maximum engine efficiency, always keep the fuel injectors and valves in correct adjustment. The injectors must be adjusted at the same time. Never

adjust one without the other.

##### NOTE

The engine timing marks are stamped into the crankshaft vibration damper at the front of the engine. These timing marks must be aligned with the mark on engine front cover whenever the injectors and valves are adjusted.

a. Remove rocker arm covers, paragraph 4-20.

b. Bar engine in direction of rotation until "1-6/ vs" mark on the vibration damper is in line with timing mark on engine front cover and both intake and exhaust valves for No. 1 cylinder are closed.

c. *Adjust fuel injector as follows:*

(1) Loosen locknut and turn adjusting screw clockwise, illustrated in figure 4-14, until plunger contacts the injector cup.

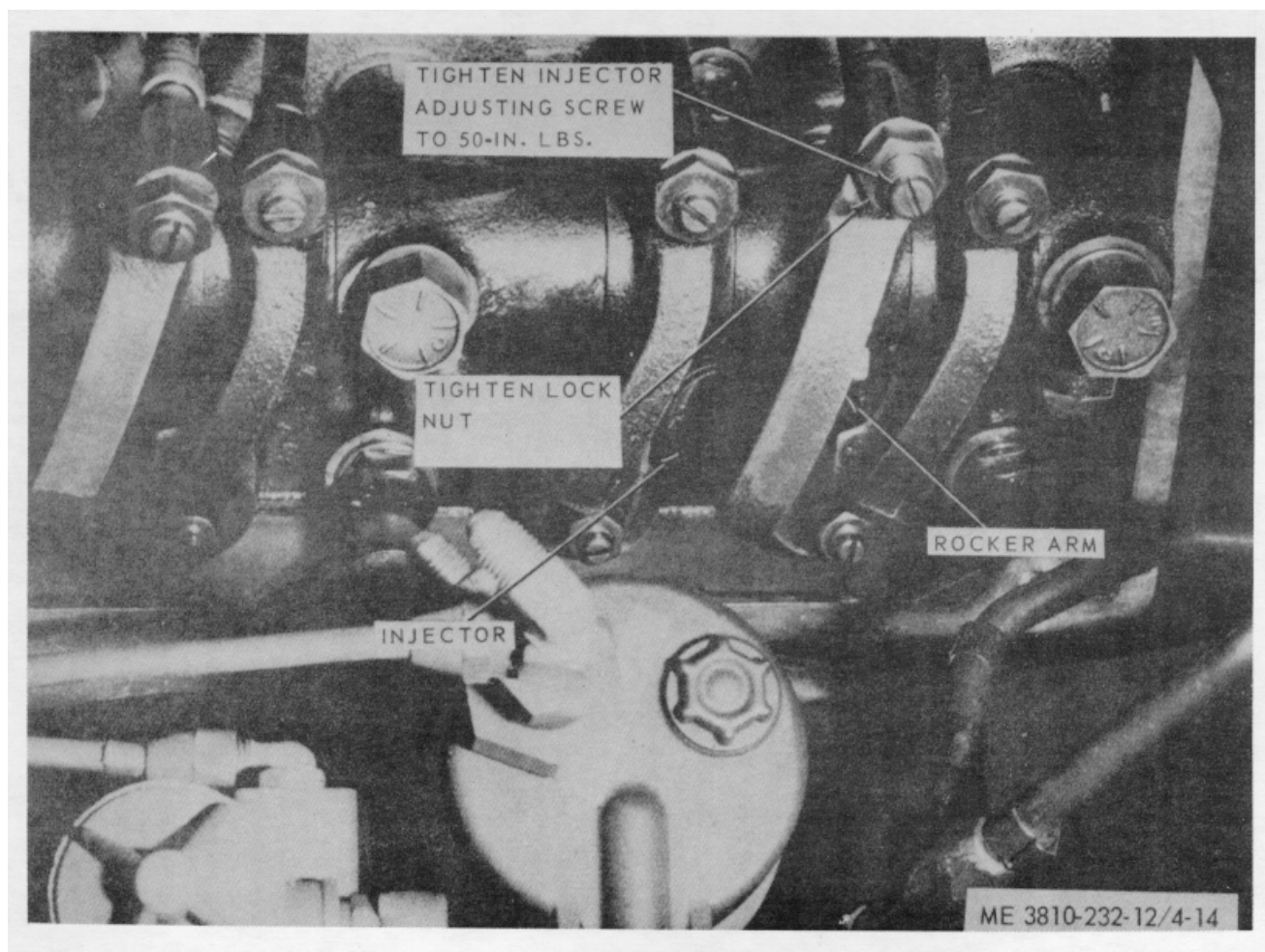


Figure 4-14. Carrier engine fuel injector adjustment.

**NOTE**

A slight resistance to turning the adjusting screw will be felt at this point.

(2) Turn adjusting screw an additional 15°.

(3) Loosen adjusting screw one turn; then using a torque wrench calibrated in inch-pounds and a screw-

driver adapter, tighten adjusting screw to 50 inch-pounds.

(4) Tighten locknut.

d. *Adjust the valve crossheads as follows:*

(1) Loosen valve crosshead adjusting screw lock-nut, illustrated in figure 4-15 and back off screw two to three turns.

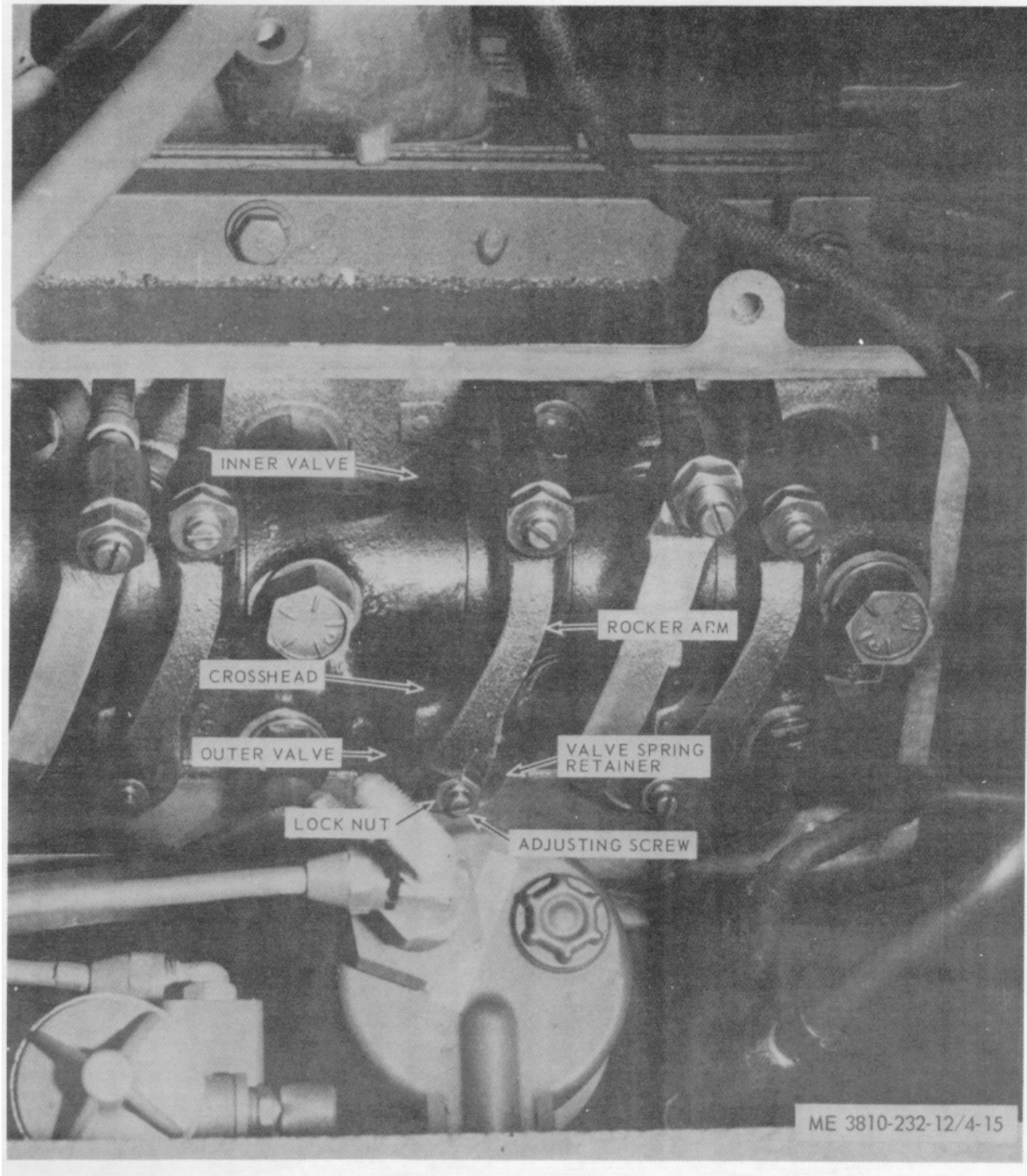


Figure 4-15. Carrier engine valve crosshead adjustment.

(2) Use light finger pressure at rocker lever contact surface to hold crosshead in contact with valve stem nearest the push rod.

(3) Turn adjusting screw down until it contacts

its mating valve stem.

(4) Hold adjusting screw in this position and tighten locknut (fig. 4-15).

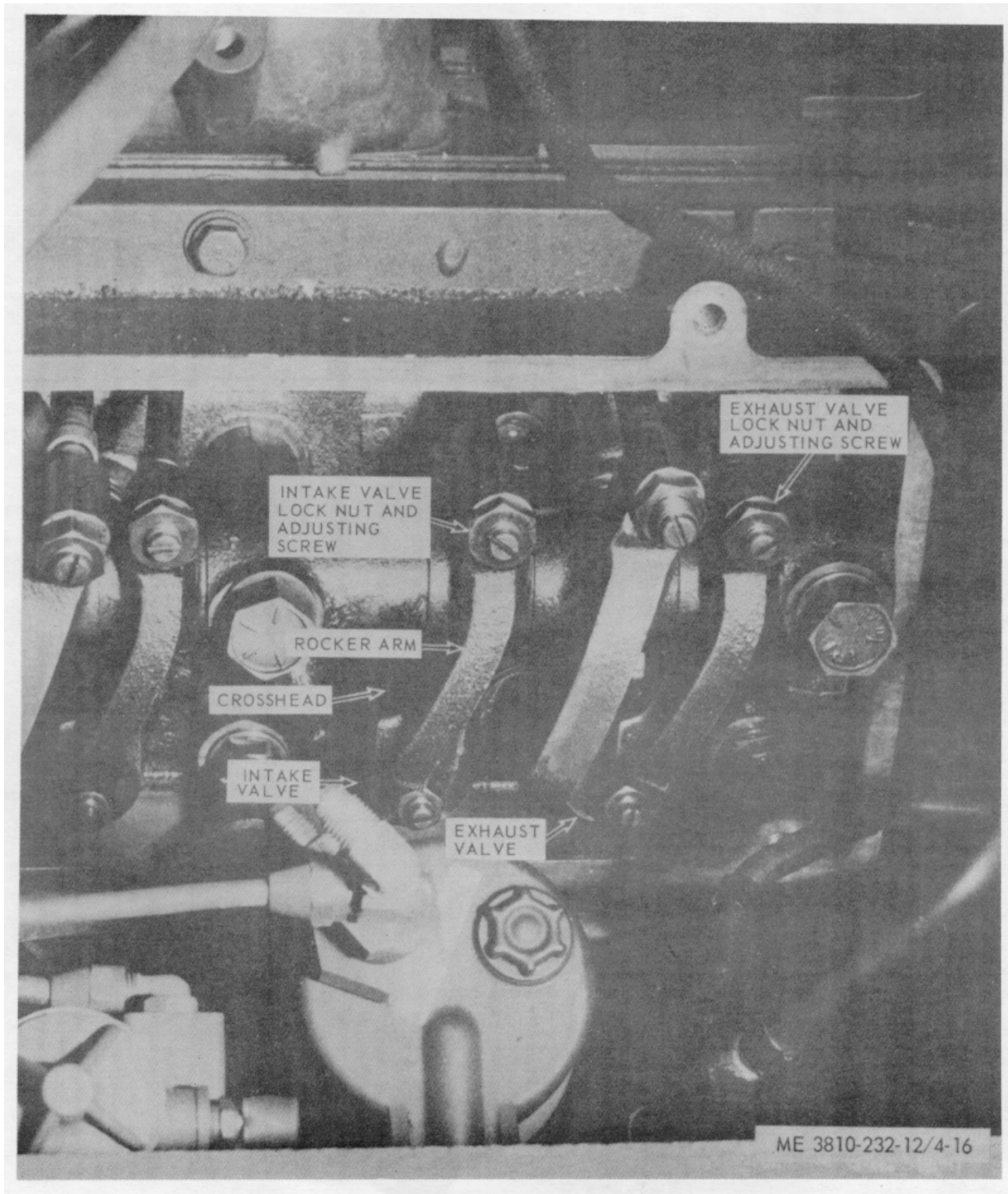


Figure 4-16. Carrier engine valve adjustment.



(5) Check clearance between crosshead and valve spring retainer with a wire gage.

**NOTE**

Clearance should be 0.020 - 0.025 inch.

*e. Adjust valves as follows:*

(1) Loosen intake valve locknut, illustrated in figure 4-16, and turn adjusting screw to obtain clearance of 0.016 inch (cold) or 0.014 inch (hot) between rocker arm and top of crosshead.

(2) Tighten locknut.

(3) Loosen exhaust valve locknut, and turn adjusting screw to obtain clearance of 0.029 inch (cold),

or 0.027 inch (hot) between rocker arm and top of crosshead.

(4) Tighten locknut.

*f.* Turn crankshaft in direction of rotation to next "VS" mark corresponding to firing order (1-5-4-8-6-3-7-2) of engine. Perform the injector, crosshead, and valve adjustments for corresponding cylinder.

*g.* Install rocker arm covers (para 4-20).

**4-27. Air Cleaner (Model 2380)**

*a. Removal and Disassembly.*

(1) Remove the carrier engine air cleaner as illustrated in figure 4-17.

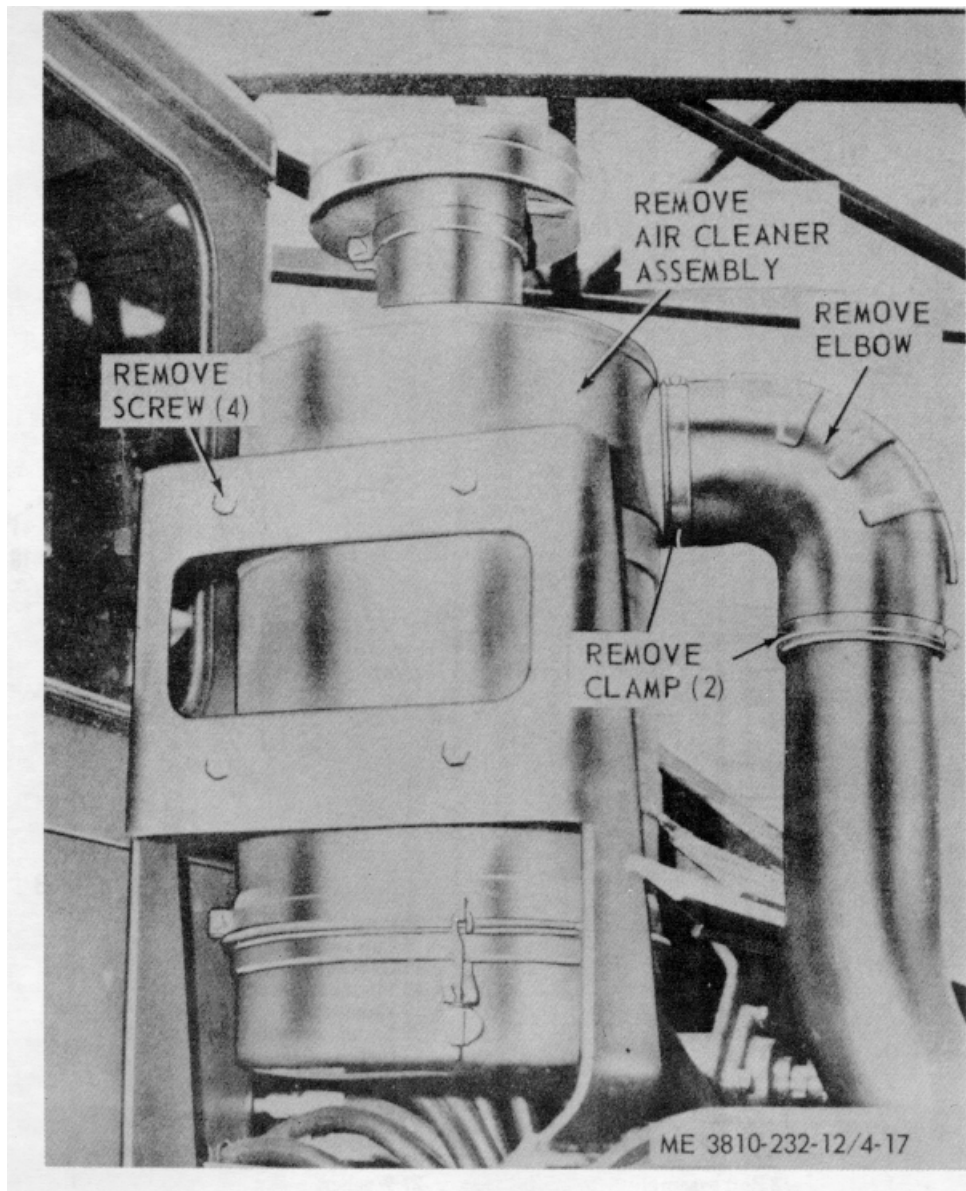
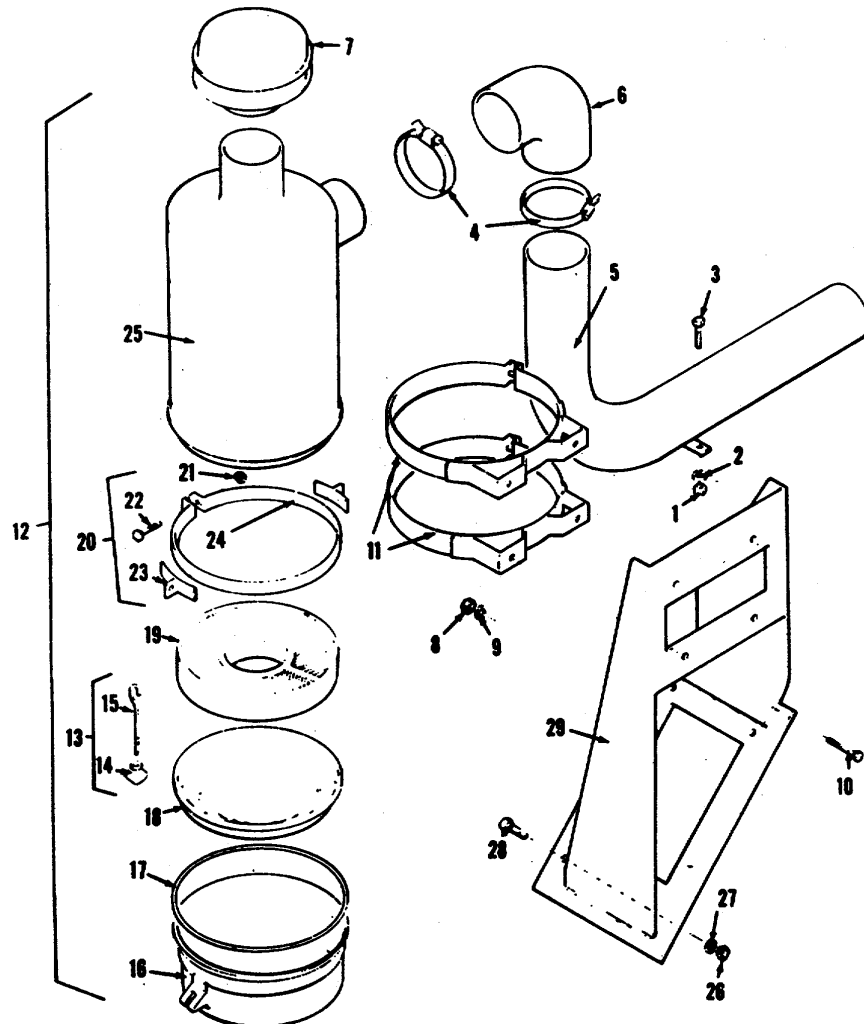


Figure 4-17. Carrier engine air cleaner, removal and installation (Model 2380)

(2) Disassemble the air cleaner as illustrated in figure 4-18.



ME 3810-232-12/4-18

- |    |               |    |                    |
|----|---------------|----|--------------------|
| 1  | Nut           | 15 | Bolt               |
| 2  | Washer        | 16 | Cup assembly       |
| 3  | Screw         | 17 | Gasket             |
| 4  | Clamp         | 18 | Inner cup assembly |
| 5  | Tube          | 19 | Element            |
| 6  | Elbow         | 20 | Band assembly      |
| 7  | Cap           | 21 | Nut                |
| 8  | Nut           | 22 | Bolt               |
| 9  | Washer        | 23 | Clips              |
| 10 | Screw         | 24 | Band               |
| 11 | Band assembly | 25 | Body assembly      |
| 12 | Air cleaner   | 26 | Nut                |
| 13 | Bolt assembly | 27 | Washer             |
| 14 | Nut           | 28 | Screw              |
|    |               | 29 | Mounting bracket   |

Figure 4-18. Carrier engine air cleaner, disassembly and reassembly. (Model 2380)



*b. Cleaning, Inspection and Repair.*

(1) Clean all parts and dry thoroughly.

(2) Inspect all parts for damage. Replace damaged or defective parts.

*c. Reassembly and Installation.*

(1) Reassemble air cleaner as illustrated in figure 4-18.

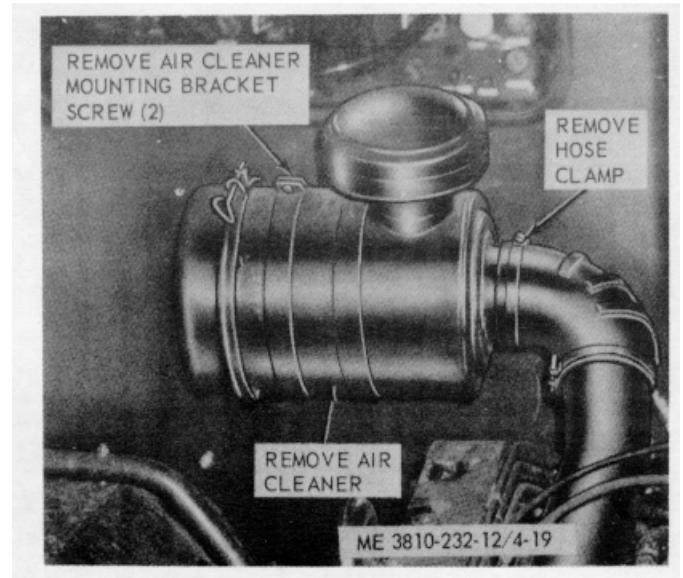
(2) Install the air cleaner as illustrated in figure 4-17.

**4-28. Air Cleaner (Model 2385)**

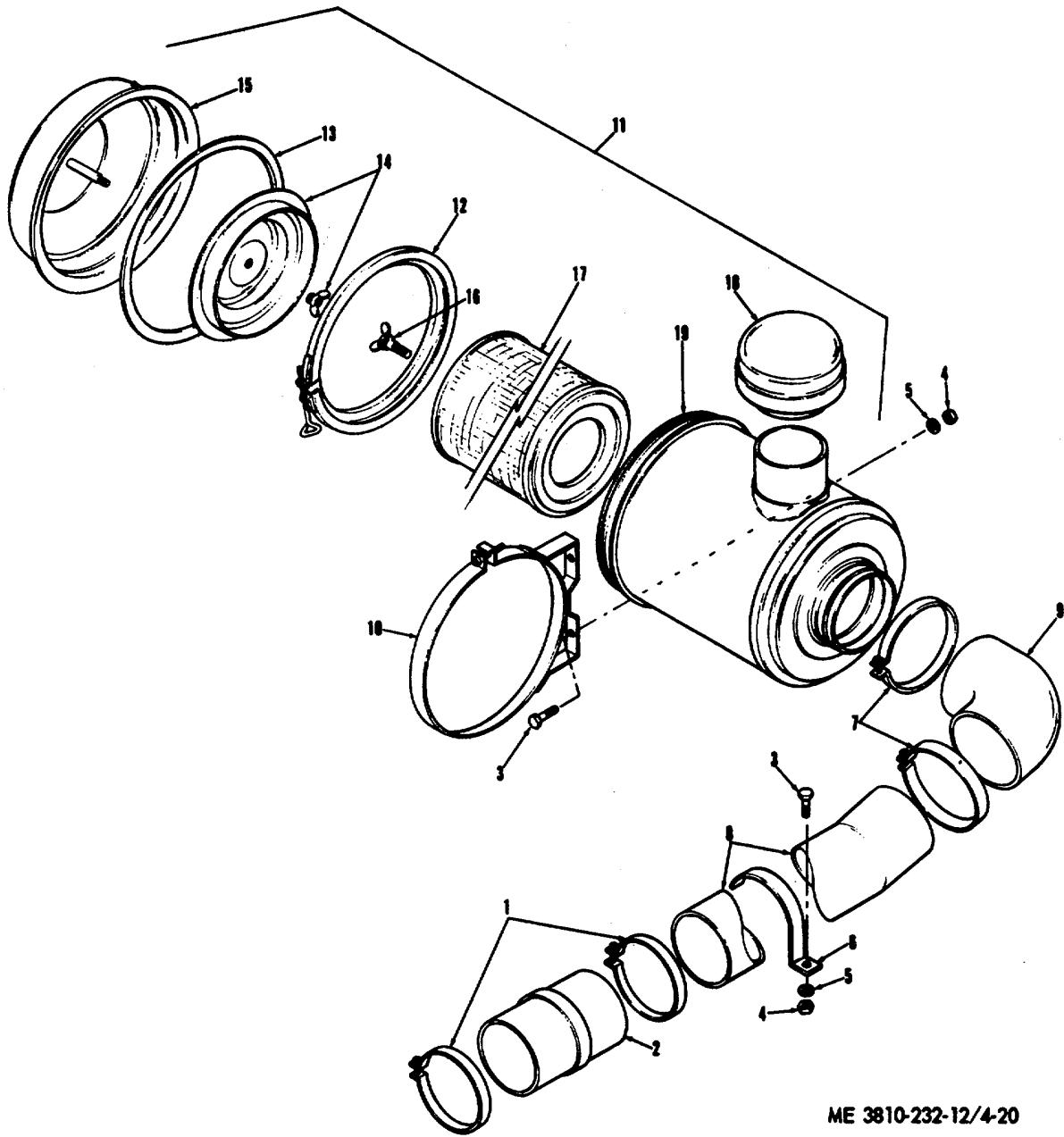
*a. Removal and Disassembly.*

(1) Remove the carrier engine air cleaner as illustrated in figure 4-19.

(2) Disassemble the air cleaner as illustrated in figure 4-20.



*Figure 4-19. Carrier engine air cleaner, removal and installation (model 2385).*



- |     |            |     |                 |
|-----|------------|-----|-----------------|
| 1.  | Clamp      | 11. | Air cleaner     |
| 2.  | Coupling   | 12. | Clamp           |
| 3.  | Screw      | 13. | O-ring          |
| 4.  | Nut        | 14. | Baffle assembly |
| 5.  | Lockwasher | 15. | Cup             |
| 6.  | Bracket    | 16. | Bolt            |
| 7.  | Clamp      | 17. | Element         |
| 8.  | Duct       | 18. | Cap             |
| 9.  | Elbow      | 19. | Body            |
| 10. | Band       |     |                 |

Figure 4-20. Carrier engine air cleaner, disassembly and reassembly (model 2385).

*b. Cleaning, Inspection and Repair*

(1) Clean all parts and dry thoroughly.

(2) Inspect all parts for damage. Replace damaged or defective parts.

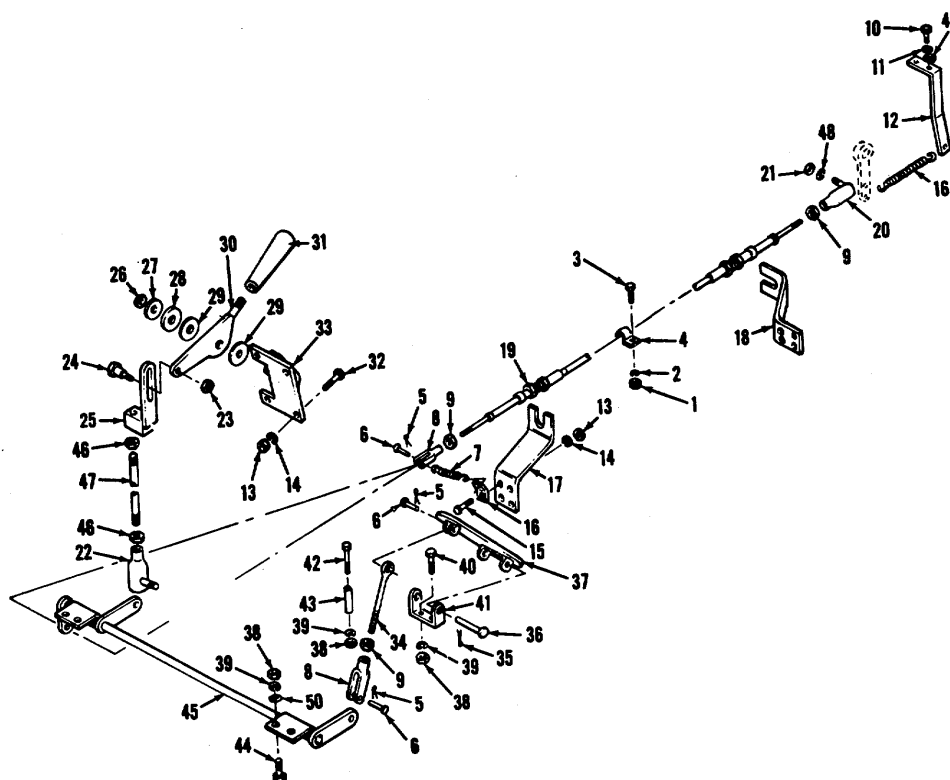
*c. Reassembly and Installation.*

(1) Reassemble air cleaner as illustrated in figure 4-20.

(2) Install the air cleaner as illustrated in figure 4-19.

**4-29. Throttle Controls**

*a. Removal.* Remove carrier engine throttle control components as illustrated in figure 4-21.



ME 3810-232-12/4-21

- |             |                   |                       |
|-------------|-------------------|-----------------------|
| 1. Nut      | 18. Bracket       | 34. Rod               |
| 2. Washer   | 19. Cable control | 35. Cotter pin        |
| 3. Screw    | 20. Ball joint    | 36. Clevis pin        |
| 4. Clip     | 21. Nut           | 37. Accelerator pedal |
| 5. Pin      | 22. Ball joint    | 38. Nut               |
| 6. Pin      | 23. Nut           | 39. Washer            |
| 7. Spring   | 24. Screw         | 40. Screw             |
| 8. Clevis   | 25. Link          | 41. Bracket           |
| 9. Nut      | 26. Nut           | 42. Screw             |
| 10. Screw   | 27. Washer        | 43. Pedal stop        |
| 11. Washer  | 28. Washer        | 44. Screw             |
| 12. Bracket | 29. Washer        | 45. Bellcrank         |
| 13. Nut     | 30. Lever         | 46. Nut               |
| 14. Washer  | 31. Handle        | 47. Rod               |
| 15. Screw   | 32. Screw         | 48. Washer            |
| 16. Spring  | 33. Bracket       | 49. Washer            |
| 17. Bracket |                   | 50. Washer            |

Figure 4-21. Carrier engine throttle controls, removal and installation.

*b. Cleaning, Inspection and Repair.*

- (1) Clean all parts and dry thoroughly.
- (2) Inspect all parts for wear and damage.

Replace damaged or defective parts.

*c. Installation and Adjustment.*

(1) Install the carrier engine throttle control (fig. 4-21), components and adjust the cable as required.

(2) Idle speed adjustments are performed at the engine governor.

#### 4-30. Fuel Pump

*a. General.* The fuel pump incorporates the governor assembly and is flange-mounted to the rear of the air compressor. It is gear driven from the engine gear train.

*b. Service.*

(1) Remove fuel pump filter as illustrated in figure 4-22.

(2) Clean filter and dry thoroughly.

(3) Install fuel pump filter as illustrated in figure 4-22.

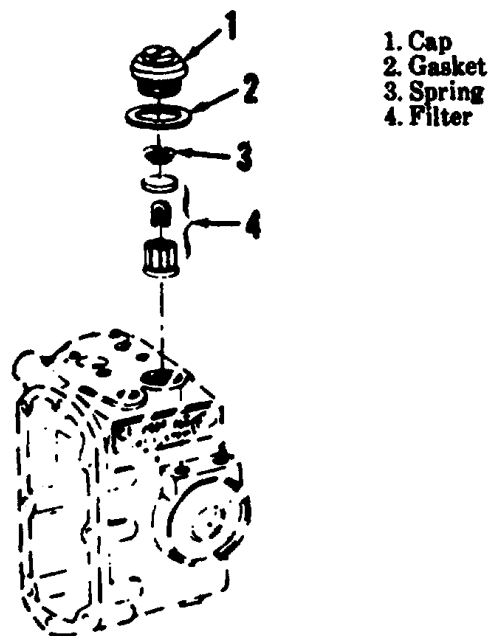
#### 4-31. Governor

*a. General.* The engine governor is an integral part of the fuel pump with maximum engine speed adjusted when the fuel pump is rebuilt or calibrated.

*b. Adjustment.*

(1) Operate engine until the engine's oil temperature is 140°F.

(2) Shut off engine or let it idle.



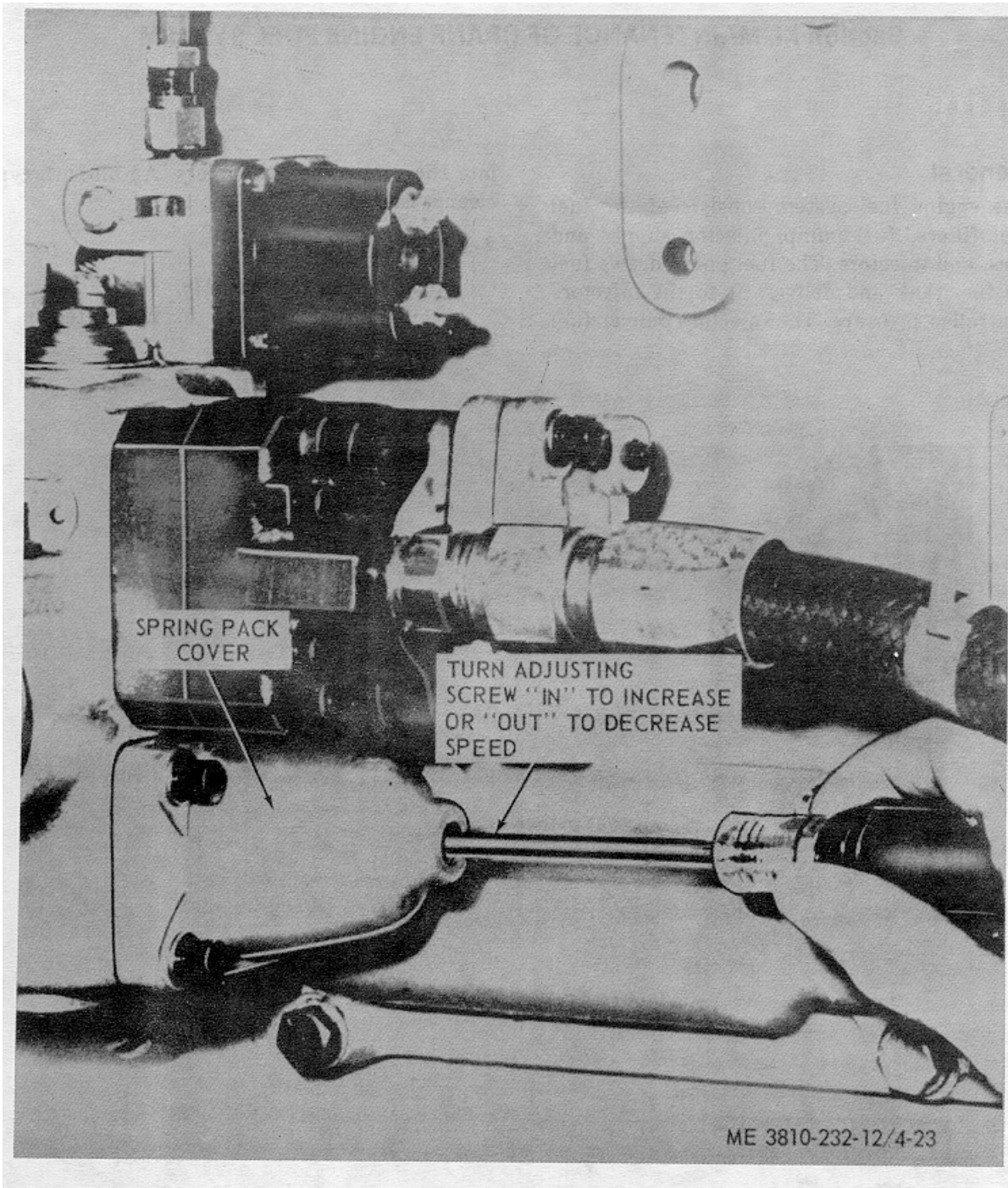
**ME 3810-232-12/4-22**

*Figure 4-22. Fuel pump filter, removal and installation.*

(3) Remove pipe plug from spring pack cover and perform adjustment as shown in figure 4-23.

**NOTE**

Normal rpm of the carrier engine is 700 rpm for low idle speed and 2770 rpm for high no-load speed. Idle speed should be set 40 to 50 rpm lower than desired if adjustment is made with engine running since air collects in spring pack housing and speed change results when housing fills with fuel.



*Figure 4-23. Carrier engine governor adjustment.*

## Section XI. MAINTENANCE OF CRANE ENGINE FUEL SYSTEM

### 4-32. General

The crane engine fuel system consists of the fuel tank, fuel filters, fuel pump, injector supply and drain lines, and injectors. The fuel pump draws fuel from the fuel tank and delivers it to the injectors under controlled pressure. The injectors deliver fuel

into the combustion chambers. An oil-bath type air cleaner is used.

### 4-33. Fuel Filters

a. *Removal and Disassembly.*

(1) Remove fuel filters as illustrated in figure 4-24.

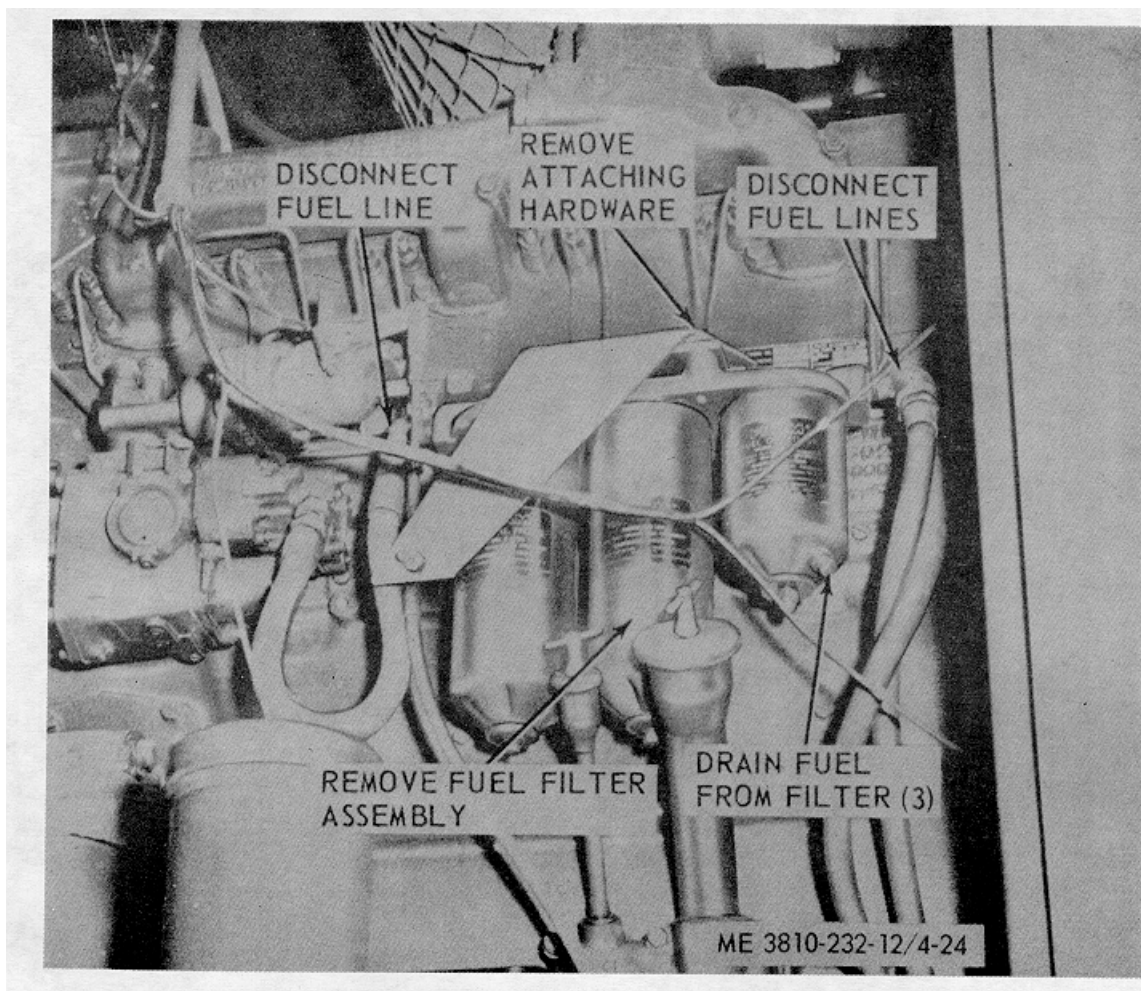


Figure 4-24. Crane engine fuel filters, removal and installation.

- (2) Disassemble fuel filters as illustrated in figure 4-9.
- b. Cleaning and Inspection. See paragraph 4-23 for cleaning and inspection of fuel filters.
- c. Reassembly and Installation.
- (1) Reassemble fuel filters as illustrated in figure 4-9.
- (2) Install fuel filters as illustrated in figure 4-24.

#### 4-34. Fuel Tank, Lines and Fittings

- a. *Removal and Disassembly.*
- (1) Remove crane engine fuel tank as illustrated in figure 4-25.

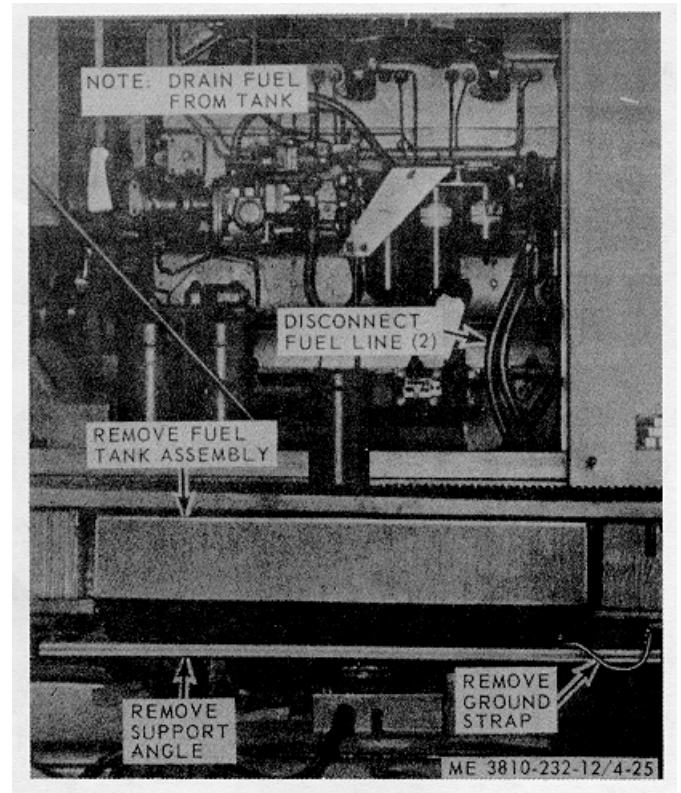


Figure 4-25. Cradle engine fuel tank, removal and installation.

(2) Disassemble the crane engine fuel tank, lines and fittings as illustrated in figure 4-26.

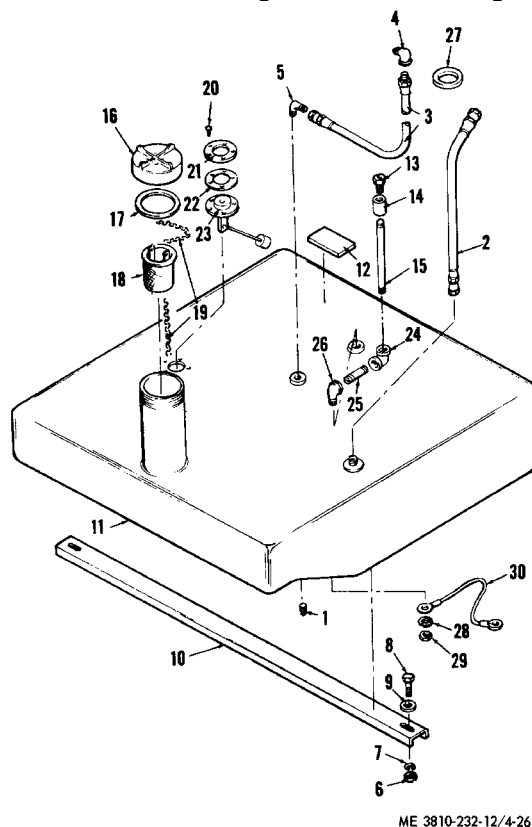


Figure 4-26. Crane fuel tank, lines and fittings, disassembly and reassembly.

- |              |                 |
|--------------|-----------------|
| 1. Plug      | 16. Cap         |
| 2. Hose      | 17. Gasket      |
| 3. Hose      | 18. Screen      |
| 4. Elbow     | 19. Chain       |
| 5. Elbow     | 20. Screw       |
| 6. Nut       | 21. Gage flange |
| 7. Washer    | 22. Gasket      |
| 8. Screw     | 23. Gage        |
| 9. Washer    | 24. Elbow       |
| 10. Support  | 25. Nipple      |
| 11. Tank     | 26. Elbow       |
| 12. Strip    | 27. Strap       |
| 13. Vent     | 28. Washer      |
| 14. Coupling | 29. Nut         |
| 15. Nipple   | 30. Ground wire |



*b. Cleaning, Inspection and Replacement.*

(1) Clean, being sure to remove all sludge, deposits and water (TB ORD 1031).

(2) Inspect for damage and leaks.

(3) Replace defective parts.

*c. Reassembly and Installation.*

(1) Reassemble fuel tank, lines, and fittings as

illustrated in figure 4-26.

(2) Install fuel tank as illustrated in figure 4-25.

**4-35. Fuel Inlet and Drain Connectors**

*a. Service.*

(1) Remove inlet screen from each inlet fuel connector as illustrated in figure 4-27.

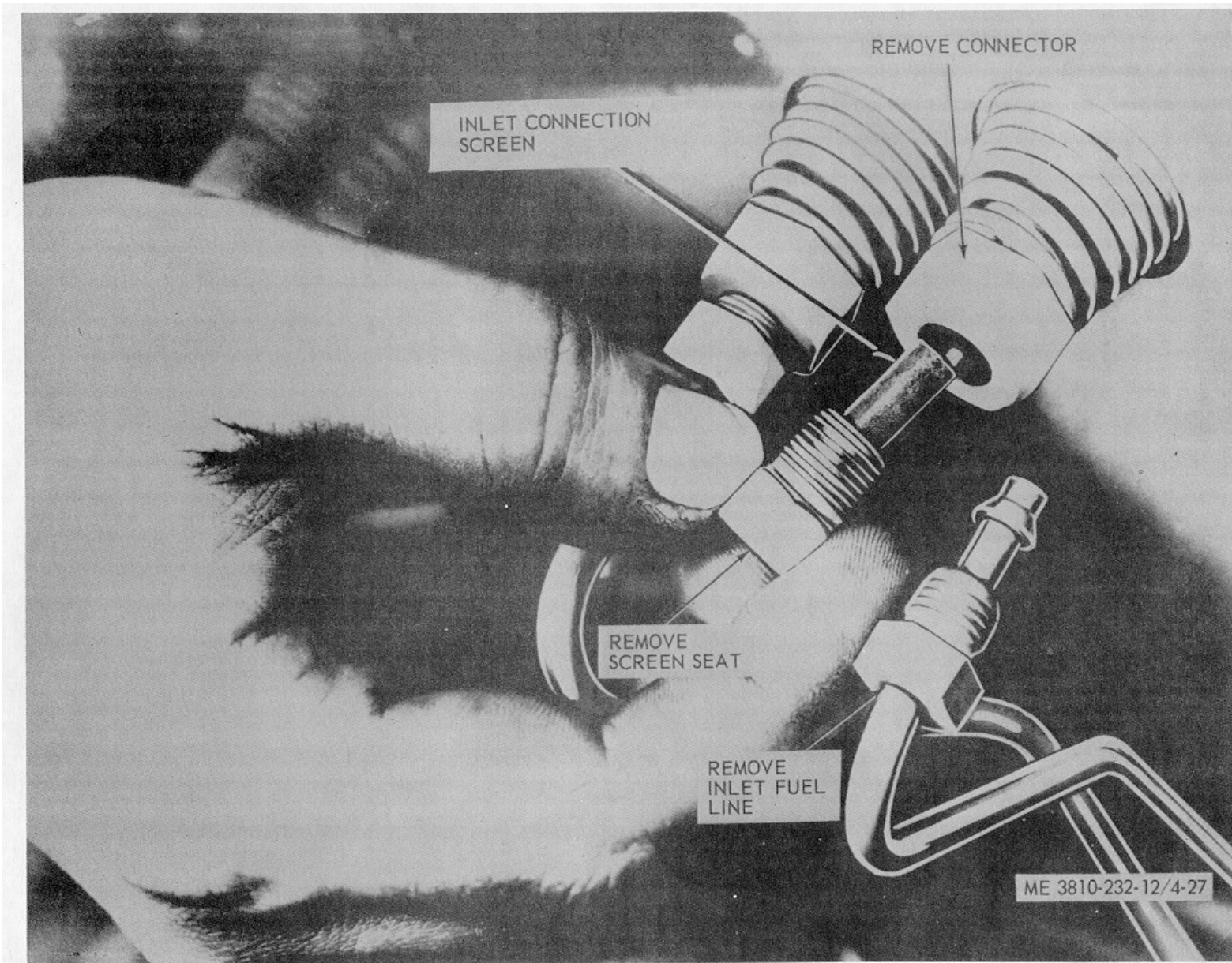


Figure 4-27. Fuel inlet connector screen, removal and installation.

(2) Clean screens and dry thoroughly.

(3) Install screen as illustrated in figure 4-27.

b. Removal and Disassembly. Remove and disassemble fuel inlet and drain connectors as illustrated in figures 4-27 and 4-28.

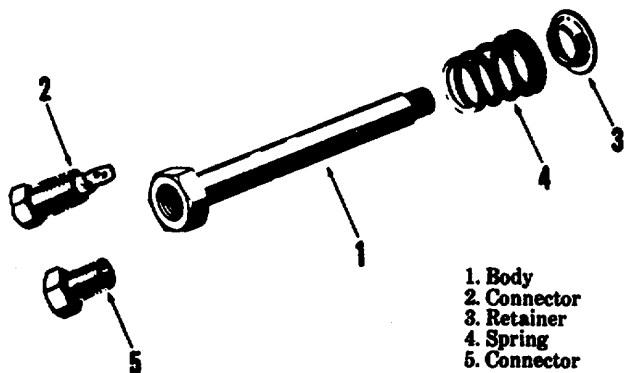


Figure 4-28. Fuel inlet and drain connectors, removal and installation.

c. Cleaning and Inspection.

(1) Clean all parts and dry thoroughly.

(2) Inspect for cracks, breaks, or other damage.

Replace defective parts.

d. Reassembly and Installation. Reassemble and install fuel inlet and drain connectors as illustrated in figures 4-27 and 4-28.

#### 4-36. Fuel Injectors and Valve Adjustment

##### NOTE

For maximum engine efficiency, always keep fuel injectors and valves in correct adjustment. The injectors and valves must be adjusted at the same time. Never adjust one without the other.

##### NOTE

The engine timing marks are stamped on the accessory drive pulley. These timing marks must be aligned with the mark on the gear case cover whenever the injectors and valves are adjusted.

a. Remove rocker arm cover as instructed in paragraph 4-21.

b. Bar crane engine in direction of rotation until "1-6/VS" mark on the accessory drive pulley is aligned with the mark on the gear case cover and the intake and exhaust valves for No. 1 cylinder are closed.

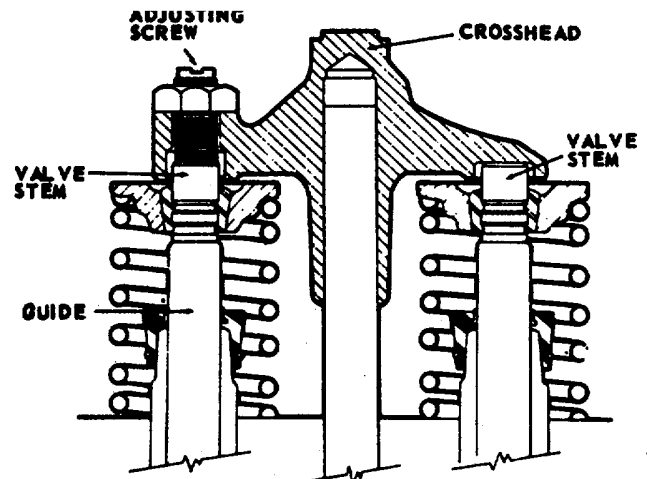
c. Adjust the fuel injectors as follows:

(1) Loosen locknut and turn adjusting screw clockwise until plunger contacts the injector cup, then advance an additional 150

(2) Loosen adjusting screw one complete turn, then tighten it to 48 inch-pounds. Tighten locknut.

d. Adjust Valve Crossheads as Follows:

(1) Loosen valve crosshead adjusting screw lock-nut, illustrated in figure 4-29 and back off one turn.



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Figure 4-29. Valve crosshead adjusting screw.

(2) Use light finger pressure at the rocker lever contact surface to hold crosshead in contact with valve stem nearest push rod.

(3) Turn adjusting screw down until it contacts its mating valve stem.

(4) Advance adjusting screw one-third of one hex (200) to straighten stem in its guide and to compensate for slack in threads. With worn crossheads and guides, it may be necessary to advance screw as much as 30°.

(5) Tighten locknut.

(6) Measure clearance between crosshead and valve spring retainer.

**NOTE**

**There must be a minimum of 0.020 inch clearance.**

e. Adjust Valves as Follows:

(1) Loosen intake valve adjusting screw locknut, illustrated in figure 4-30, and turn adjusting screw to obtain clearance of 0.017 inch (cold), or 0.015 inch (hot).

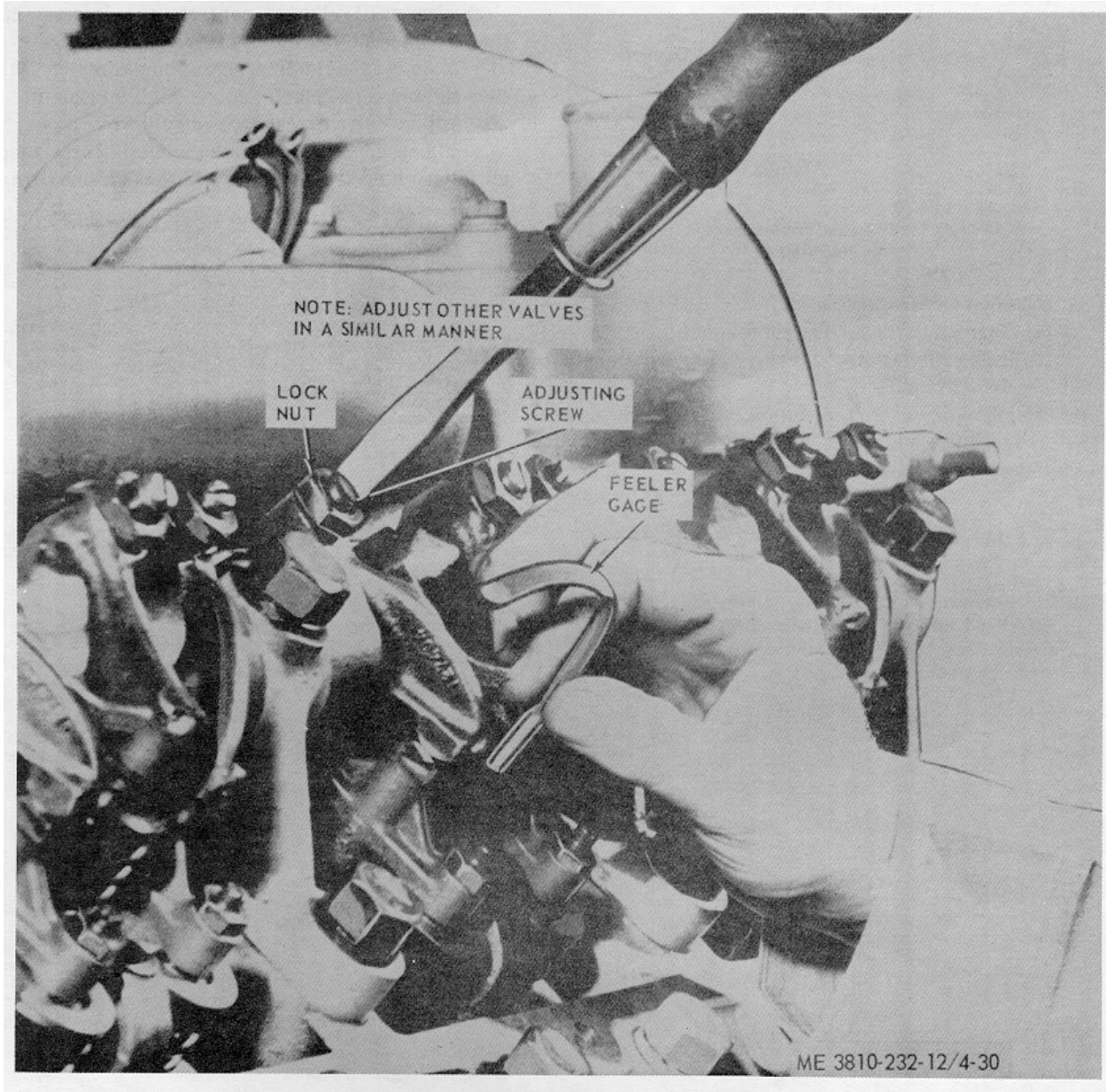


Figure 4-30. Valve adjustment.

(2) Tighten locknut.

(3) Loosen exhaust valve adjusting screw locknut illustrated in figure 4-30, and turn adjusting screw to obtain clearance of 0.027 inch (cold), or 0.025 inch (hot).

(4) Tighten locknut.

f. Turn crankshaft in direction of rotation to next "VS" mark corresponding to firing order (1-5-3-6-2-4) of engine. Perform the injector, crosshead, and valve adjustments for corresponding cylinder.

g. After all injectors and valves have been adjusted, operate the engine until the oil temperature reaches 140 °F.

h. Loosen each injector adjusting screw locknut and reset the adjusting screw to 60-inch-pounds.

i. Tighten locknut.

j. Install rocker arm cover as instructed in paragraph 4-21.

#### 4-37. Air Cleaner

a. *Removal and Disassembly.*

(1) Remove crane engine air cleaner as illustrated in figure 4-31.

(2) Disassemble air cleaner as illustrated in figure 4-32.

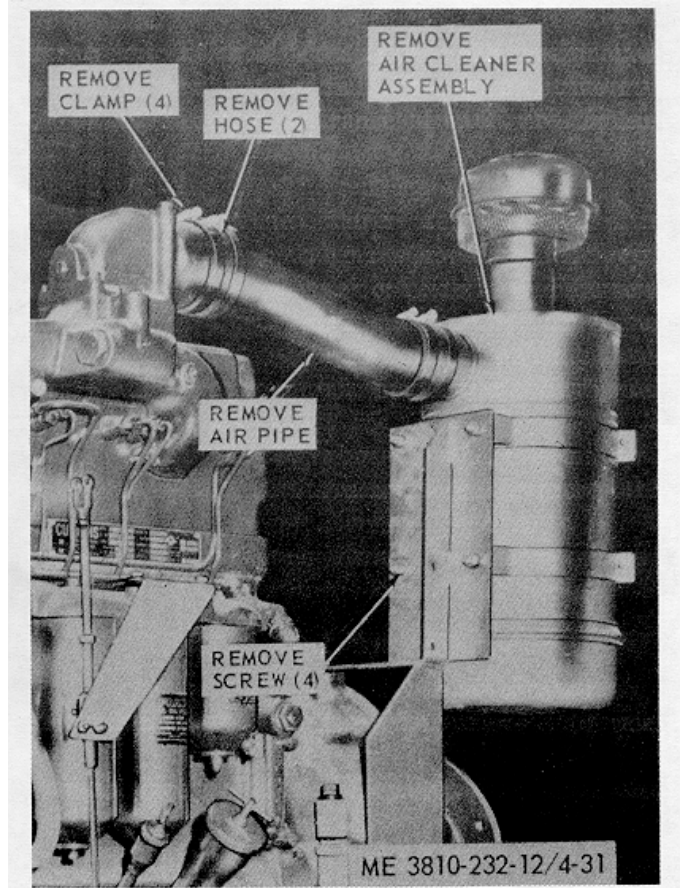
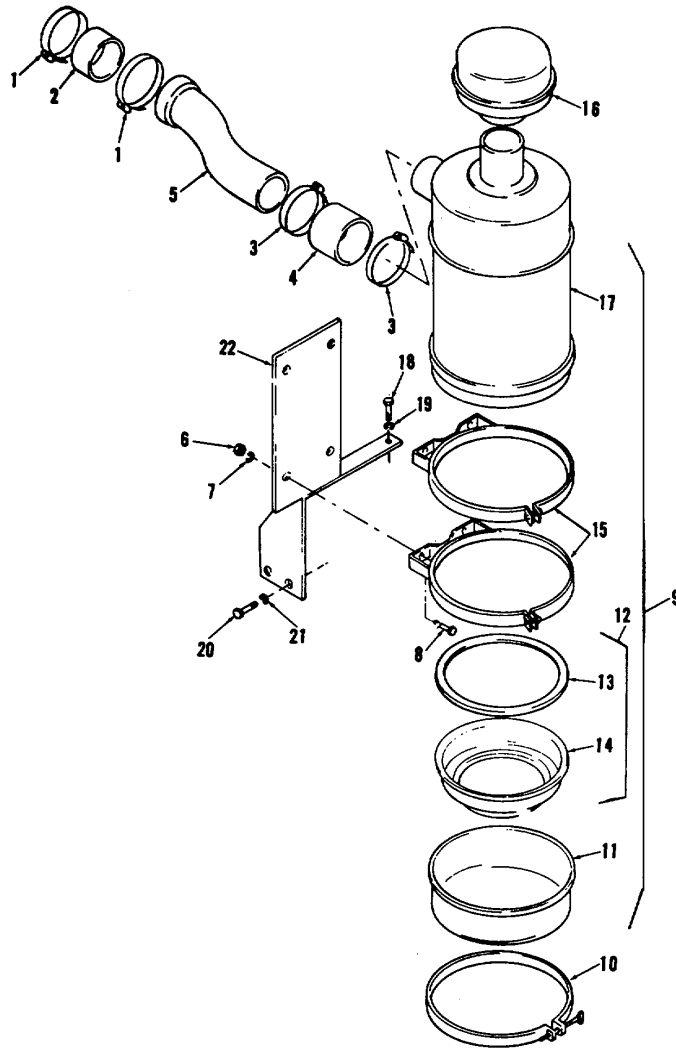


Figure 4-31. Crane engine air cleaner, removal and installation.



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- |                |                    |
|----------------|--------------------|
| 1. Clamp       | 12. Inner cup assy |
| 2. Sleeve      | 13. Gasket         |
| 3. Clamp       | 14. Inner cup      |
| 4. Sleeve      | 15. Band           |
| 5. Tubing      | 16. Screen         |
| 6. Nut         | 17. Body           |
| 7. Washer      | 18. Screw          |
| 8. Screw       | 19. Washer         |
| 9. Air cleaner | 20. Screw          |
| 10. Clamp      | 21. Washer         |
| 11. Cup        | 22. Support        |

Figure 4-32. Crane engine air cleaner, disassemble and reassembly.

b. *Cleaning and Inspection.*

(1) Clean all parts and dry thoroughly.

(2) Inspect for cracks, or other damage.

Replace all defective parts.

c. *Reassembly and Installation.*

(1) Reassemble air cleaner as illustrated in figure 4-32.

(2) Install air cleaner as illustrated in figure 4-31.

**4-38. Throttle Control Assembly**

a. *Removal* Remove the crane engine throttle control assembly as illustrated in figure 4-33.

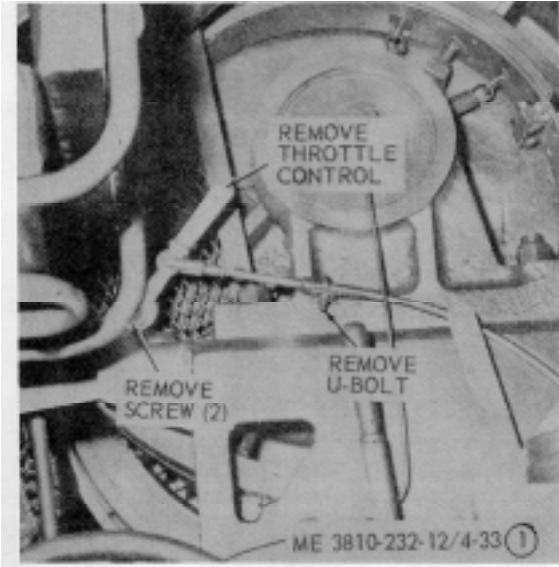


Figure 4-33. Crane engine throttle control assembly removal and installation. Sheet 1 of 2.

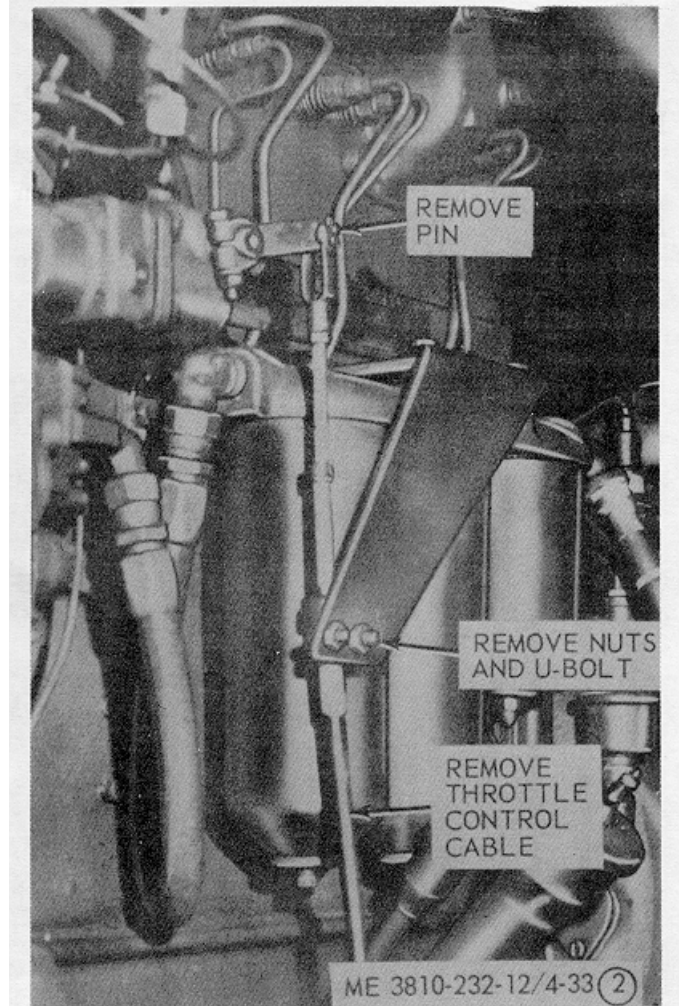


Figure 4-33. Crane engine throttle control assembly removal and installation. Sheet 2 of 2.

*b. Cleaning and inspection.*

- (1) Clean all parts and dry thoroughly.
- (2) Inspect for cracks, breaks, or other damage.

Replace defective parts.

*c. Installation and Adjustment.*

(1) Install the throttle controls as illustrated in figure 4-33

(2) Adjust cable control. Speed adjustments are performed on the engine governor (para 4-39).

**4-39. Governor Adjustments**

Perform the maximum and idle speed adjustment as instructed in figure 4-34.

**NOTE**

**Normal rpm of the crane engine at full load governed speed is 1,900 rpm and 750 rpm at low idle.**

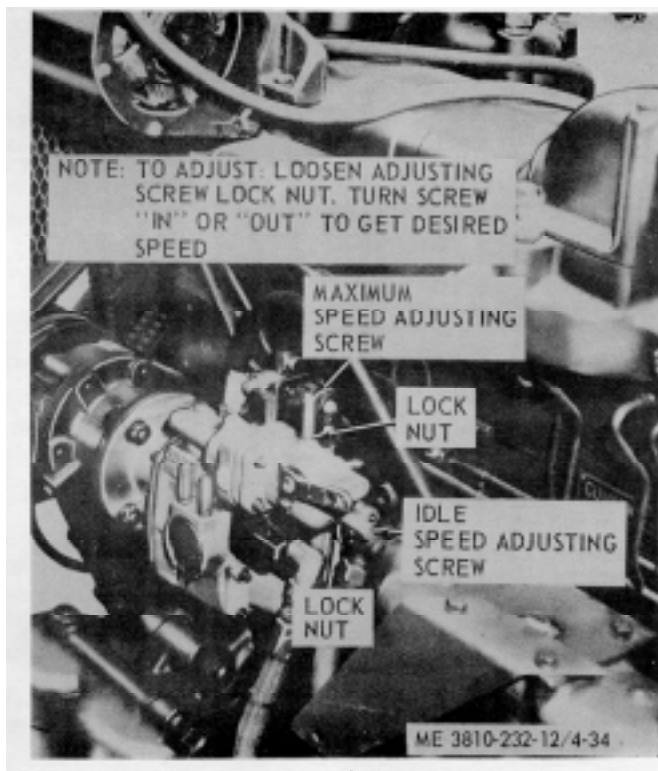


Figure 4-34. Crane engine governor adjustment.

**Section XII. MAINTENANCE OF CARRIER ENGINE LUBRICATION SYSTEM**

**4-40. General**

The carrier engine lubrication system maintains the proper oil pressure required at the various operating units, filters the oil, maintains the oil at a proper temperature, and provides facilities for draining, replenishing, and measuring lubricating oil in crankcase.

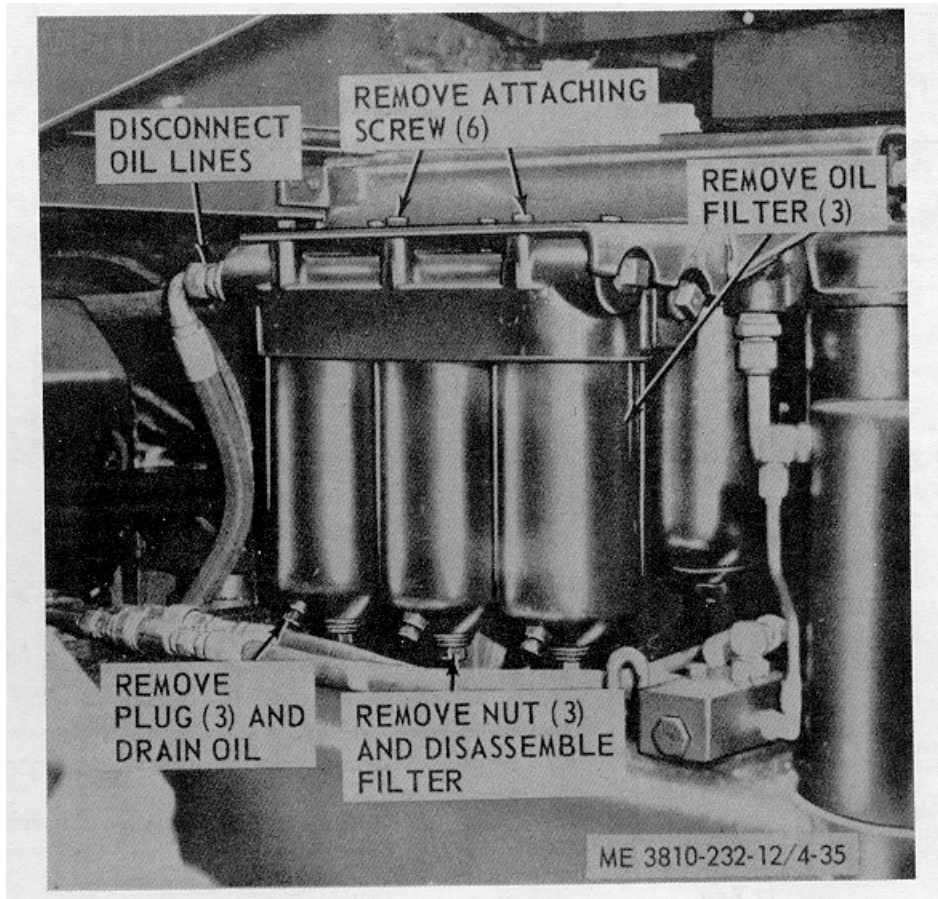
**4-41. Oil Filters**

*a. Removal and Disassembly.*

(1) Remove engine oil filters as illustrated in figure 4-35.

(2) Disassemble carrier engine oil filters as illustrated in figure 4-36.





*Figure 4-35. Carrier engine oil filters removal and installation.*

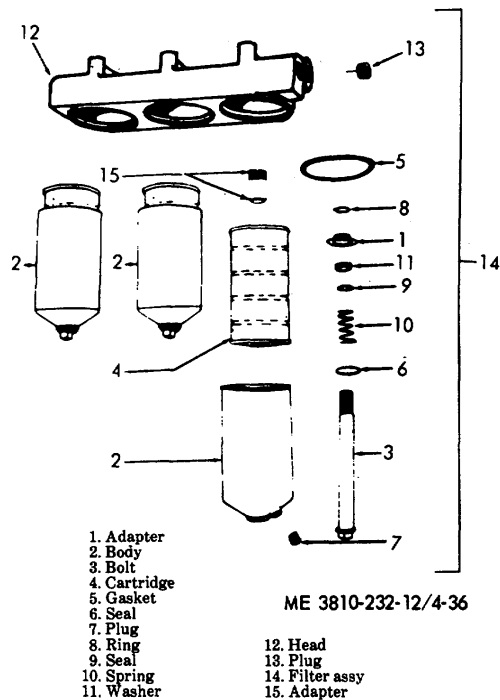


Figure 4-36. Carrier engine oil filter, disassembly and reassembly.

b. Cleaning and Inspection.

- (1) Discard cartridge, gasket and seals.
- (2) Clean all parts and dry thoroughly.
- (3) Inspect for cracks or other defects. Replace cartridge, gasket, seals, and defective parts.

c. Reassembly and Installation.

- (1) Reassemble engine oil filters as illustrated in figure 4-36.
- (2) Install the oil filters as illustrated in figure 4-35.

**4-42. Crankcase Breather**

a. *Removal and Disassembly.* Remove and disassemble crankcase breather as shown in figure 4-37.

g. Cleaning and Inspection.

- (1) Clean all parts and dry thoroughly.
- (2) Inspect for cracks, breaks, or other damage.

Replace defective parts.

c. *Reassembly and Installation.* Reassemble and install crankcase breather as shown in figure 4-37.

**4-43. External Oil Lines and Fittings**

a. *Removal.* Remove carrier engine external oil lines and fittings as illustrated in figure 4-38.

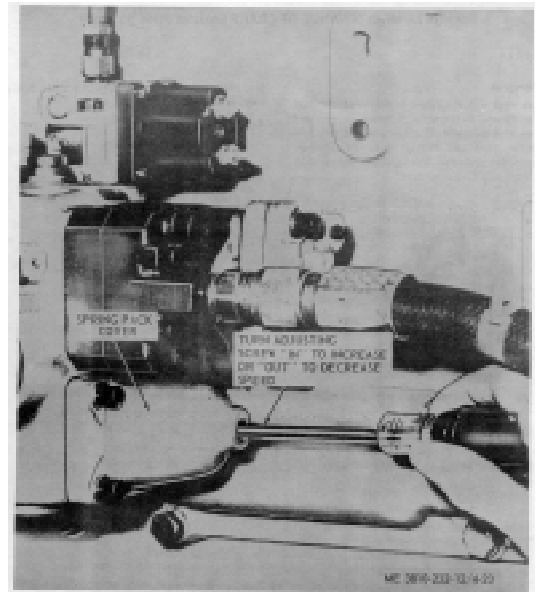


Figure 4-37. Crankcase, breather, removal and installation.



Figure 4-38. Carrier engine oil lines and fittings, removal and installation.

*b. Cleaning and Inspection.*

(1) Clean all parts and dry thoroughly.

(2) Inspect for cracks, breaks, and other damage.

Replace damaged or defective parts.

*c. Installation.* Install engine external oil lines and fittings as illustrated in figure 4-38.

### Section XIII. MAINTENANCE OF CRANE ENGINE LUBRICATION SYSTEM

#### 4-44. General

The engine lubrication oil system maintains the oil pressure required at the various operating units, filters the oil, maintains oil at the proper operating temperature, and provides facilities for draining, replenishing, and measuring lubricating oil in the crankcase.

#### 4-45. Oil Filter and External Lines

a. Removal and Disassembly.

(1) Remove crane engine oil filter and external lines as illustrated in figure 4-39

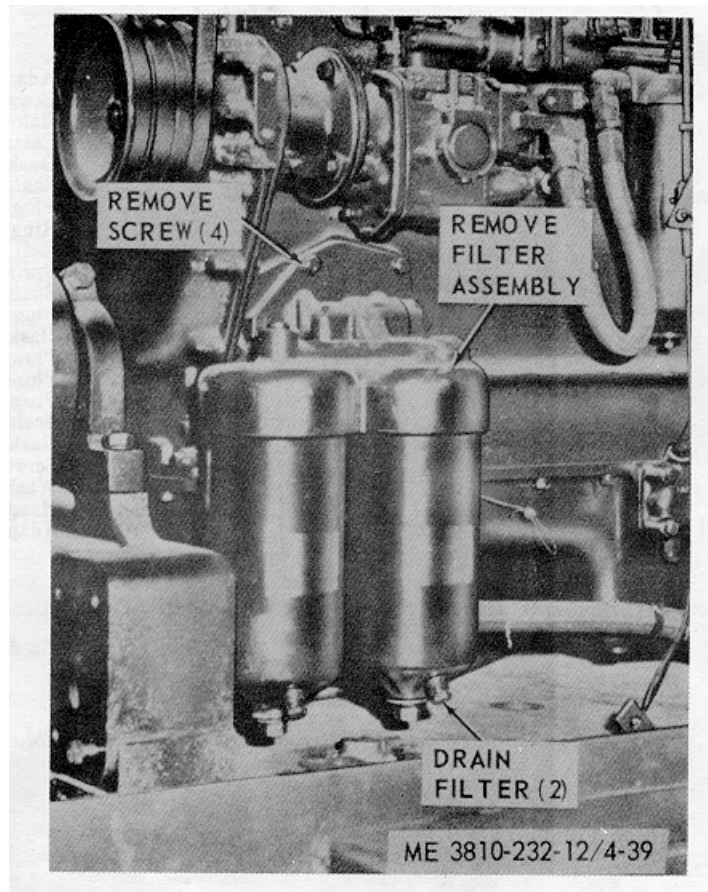


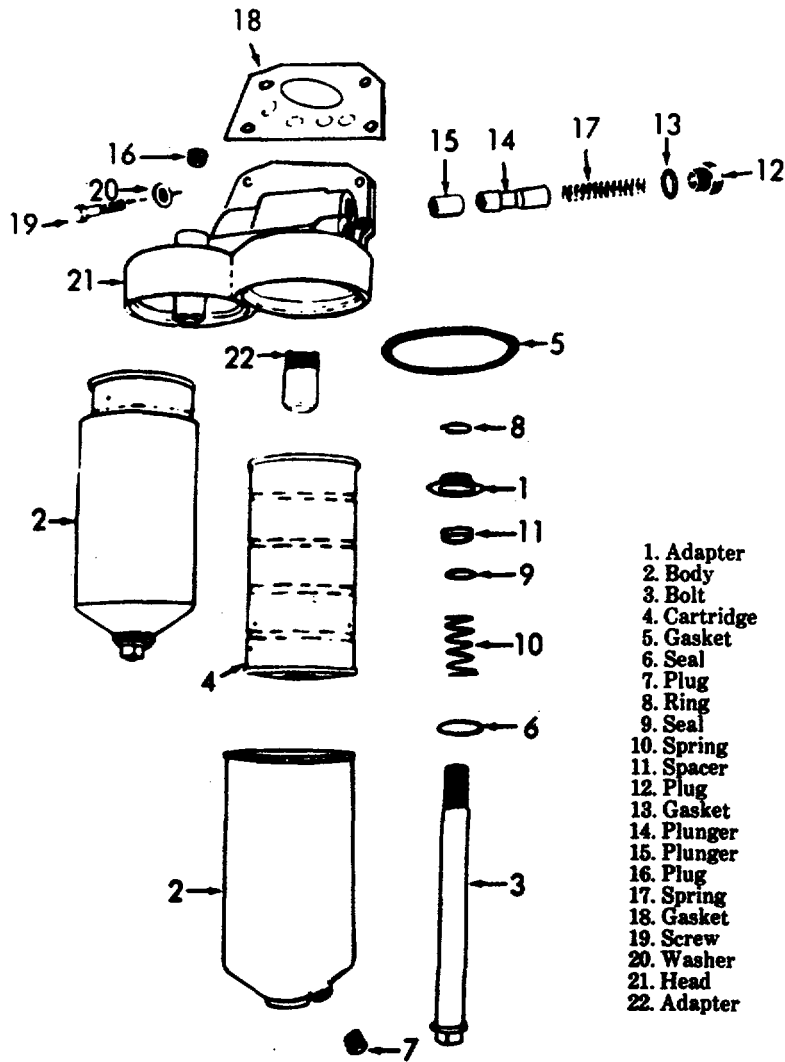
Figure 4-39. Crane engine oil filter and external lines, removal and installations.

40. (2) Disassemble oil filter as illustrated in figure 4-40.
- b. Cleaning and Inspection.
- (1) Discard cartridge, gasket and seals.
  - (2) Clean all parts and dry thoroughly.
  - (3) Inspect for cracks, or other defects. Replace cartridge, gasket, seals, and defective parts.
- c. Reassembly and Installation.
- (1) Reassemble oil filter as illustrated in figure 4-40.

(2) Install the oil filter and external lines as illustrated in figure 4-39.

#### 4-46. Crankcase Breather

The crane engine crankcase breather is removed and disassembled in the same manner as the carrier crankcase breather (para 4-42).



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Figure 4-40. Crane engine oil filters, disassembly and reassembly.

## Section XIV. MAINTENANCE OF CARRIER ENGINE COOLING SYSTEM

### 4-47. General

The carrier engine temperature is controlled by the circulation of coolant through the engine water passages by the water pump. A radiator is used to cool the circulating coolant. A thermostat is used to bypass all or part of the coolant to the radiator until the normal operating temperature is reached.

### 4-48. Fan Belts, and Water Pump and Generator Drive Belt (Model 2380)

#### a. Removal.

(1) Remove deck plate.

(2) Remove belts in numerical sequence as illustrated in figure 4-41.

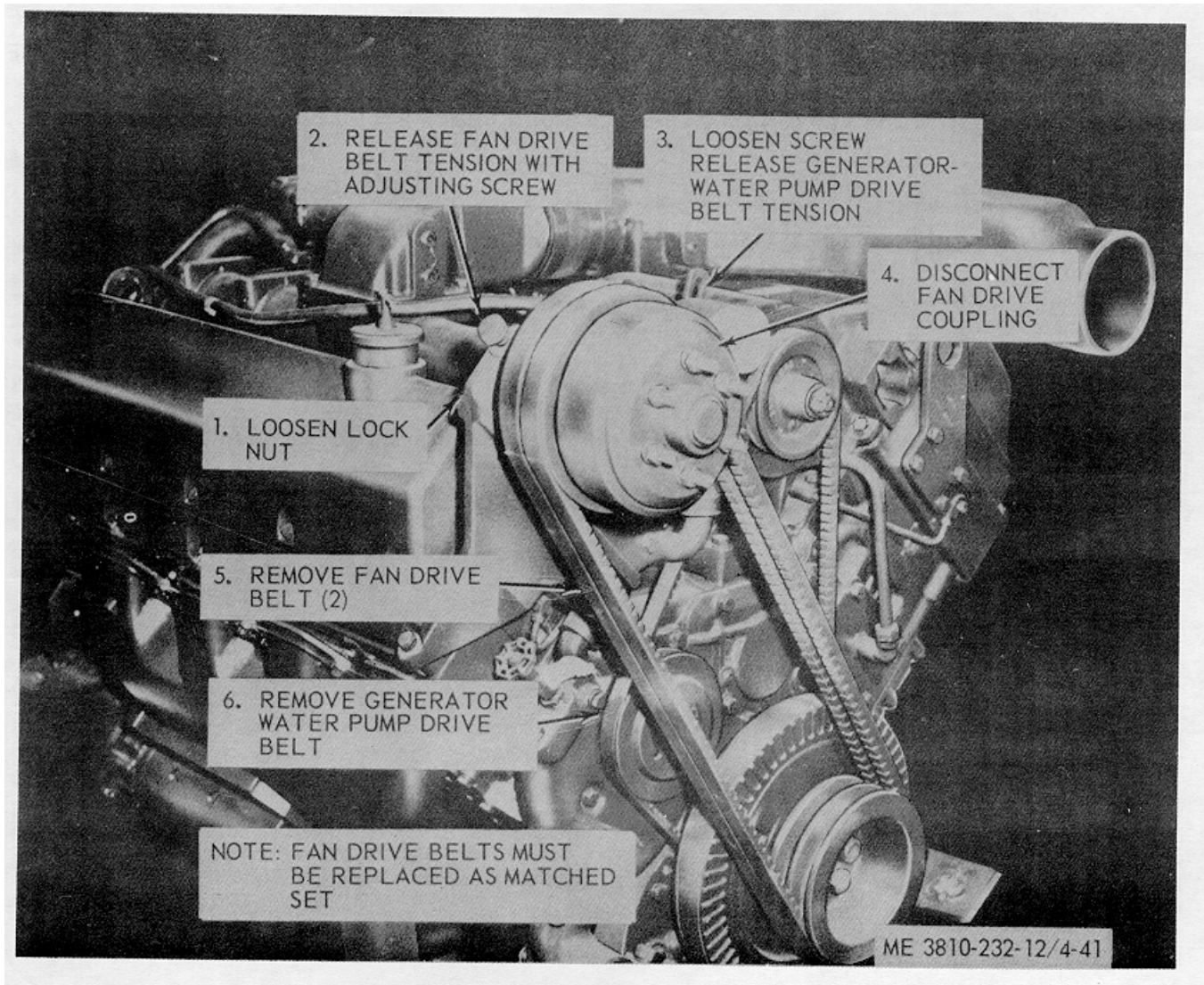


Figure 4-41. Fan belts and water pump and generator drive belt, removal and installation (model 2380).

b. *Cleaning and Inspection.*

(1) Clean belts with a damp cloth.

(2) Inspect belts for fraying, cracks, or other damage. Replace damaged belts.

c. *Installation.*

(1) Install belts in reverse of sequence illustrated in figure 4-41 and adjust belt tension as instructed in figure 3-11.

(2) Install deck plate.

**4-49. Fan Belts, and Water Pump and Alternator Drive Belt (Model 2385)**

a. *Removal.*

(1) Remove deck plate.

(2) Refer to figure 4-42 and remove belts.

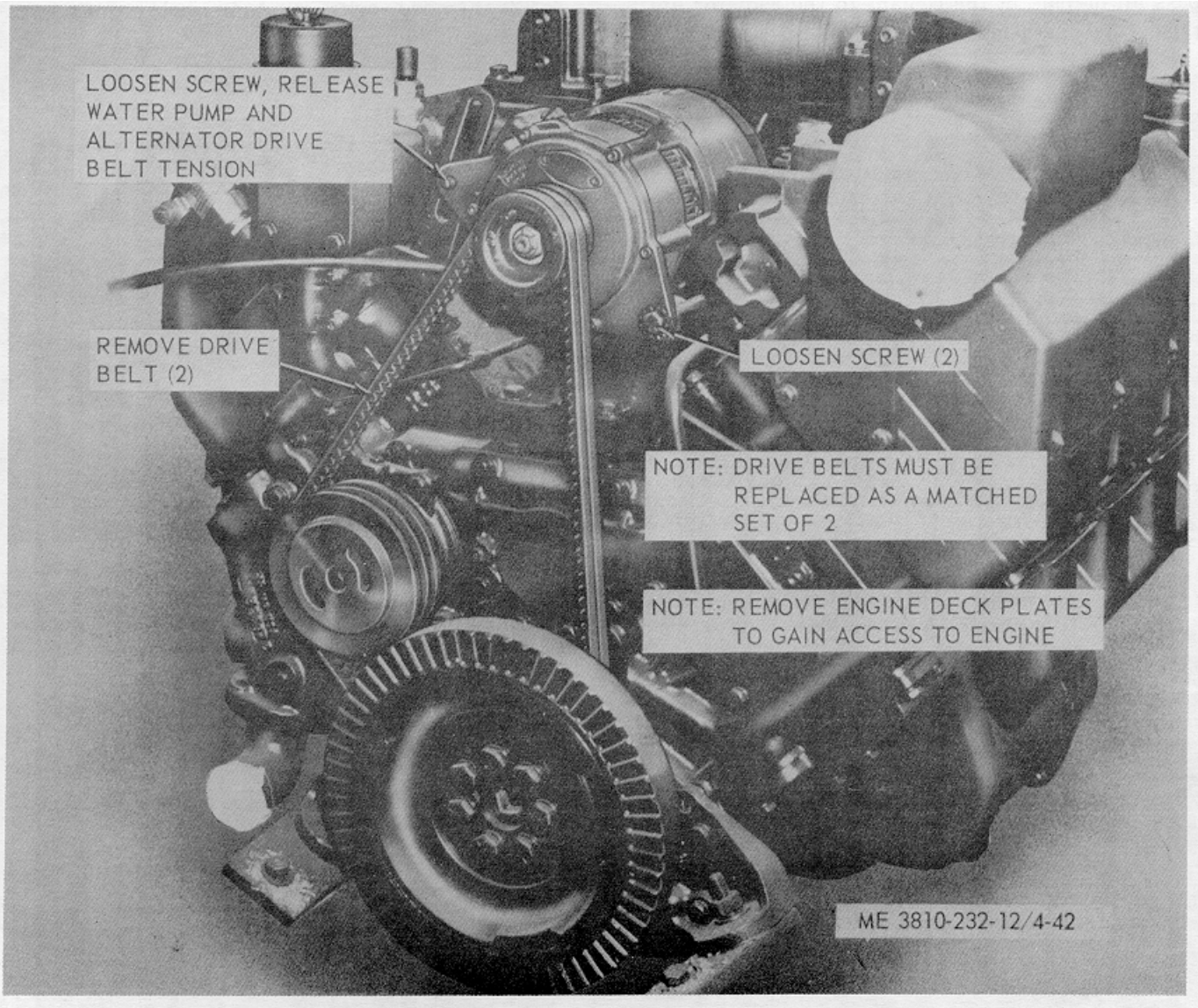


Figure 4-42. Fan belts and water pump and alternator drive belts removal and installation (model 2385)

b. *Cleaning and Inspection.*

(1) Clean belts with a damp cloth.

(2) Inspect belts for fraying, cracks, or other damage. Replace damaged belts.

c. *Installation.*

(1) Refer to figure 4-42 and install belts and adjust belt tension as instructed in figure 3-12.

(2) Install deck plate.

**4-50. Lines and Fittings (Model 2380)**

a. *Removal.*

(1) Remove all deck plates.

(2) Drain the cooling system (para 3-20).

(3) Remove the coolant system lines and fittings as illustrated in figure 4-43.

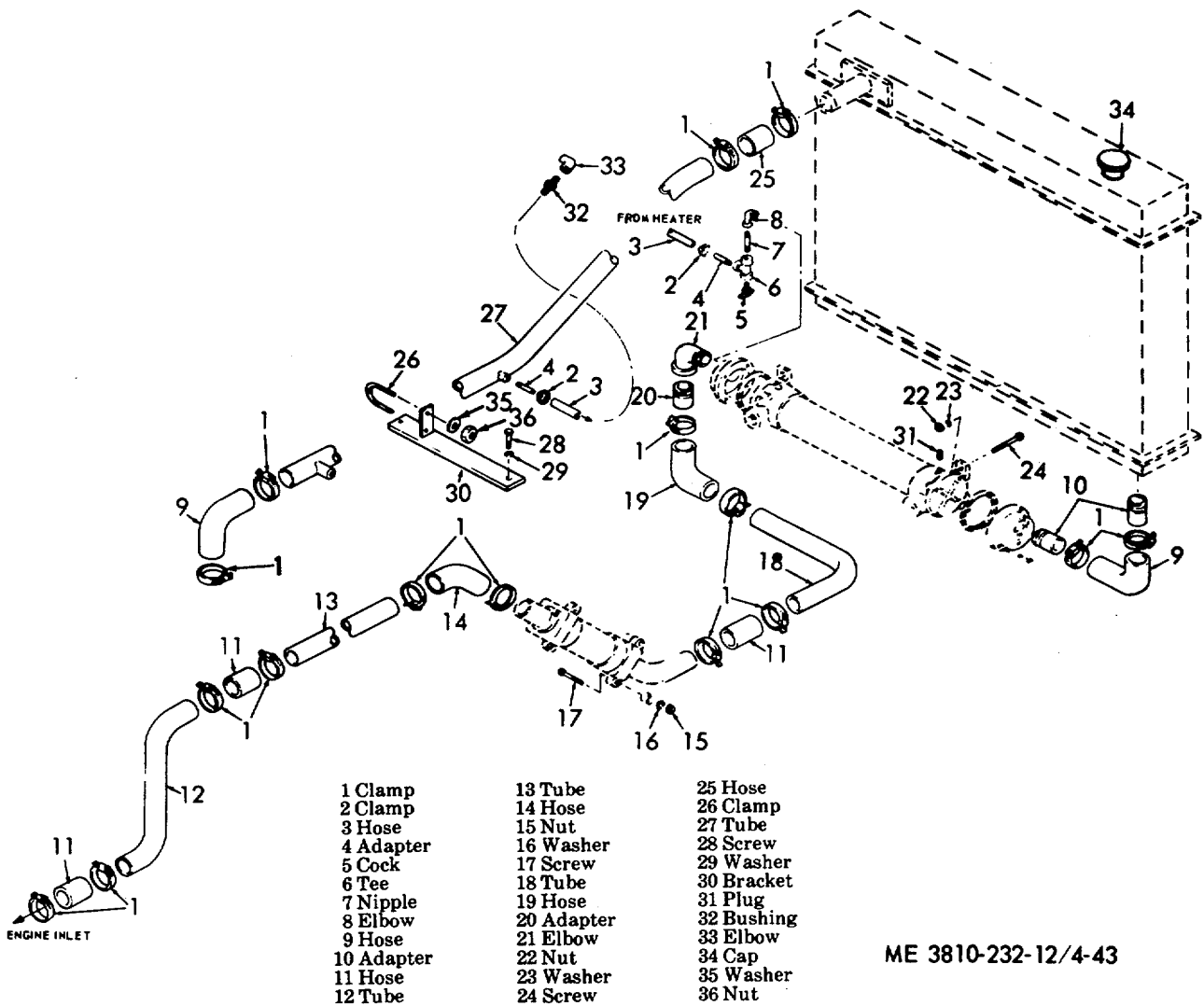


Figure 4-43. Carrier engine coolant lines, and fittings, removal and installation (Model 2385).

b. *Cleaning and Inspection.*

(1) Clean all parts and dry thoroughly.

(2) Inspect all parts for defects. Replace defective parts.

c. *Installation.* Install coolant lines and fittings as illustrated in figure 4-43.

d. *Service.* Fill the cooling system (para 3-20).

**4-51. Lines and Fittings (Model 2385)**

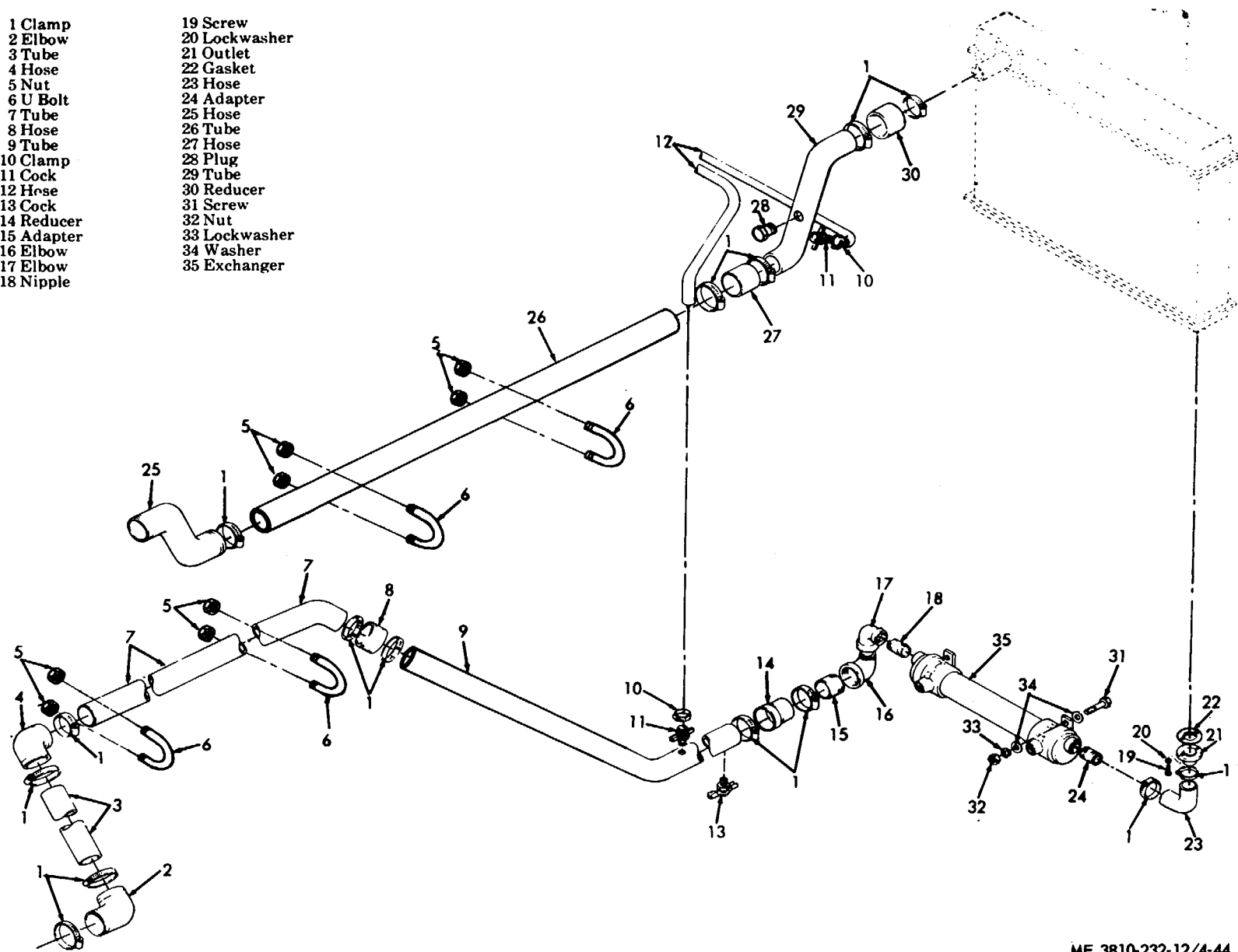
a. *Removal.*

(1) Remove all deck plates.

(2) Drain the cooling system (para 3-20).

(3) Remove the coolant system lines and fittings as illustrated in figure 4-44.

- |            |               |
|------------|---------------|
| 1 Clamp    | 19 Screw      |
| 2 Elbow    | 20 Lockwasher |
| 3 Tube     | 21 Outlet     |
| 4 Hose     | 22 Gasket     |
| 5 Nut      | 23 Hose       |
| 6 U Bolt   | 24 Adapter    |
| 7 Tube     | 25 Hose       |
| 8 Hose     | 26 Tube       |
| 9 Tube     | 27 Hose       |
| 10 Clamp   | 28 Plug       |
| 11 Cock    | 29 Tube       |
| 12 Hose    | 30 Reducer    |
| 13 Cock    | 31 Screw      |
| 14 Reducer | 32 Nut        |
| 15 Adapter | 33 Lockwasher |
| 16 Elbow   | 34 Washer     |
| 17 Elbow   | 35 Exchanger  |
| 18 Nipple  |               |



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Figure 4-44. Carrier engine coolant lines and fittings. Removal and installation (Model 2385).



*b. Cleaning and Inspections.*

(1) Clean all parts and dry thoroughly.

(2) Inspect all parts for defects. Replace defective parts.

*c. Installation.* Install coolant lines and fittings as illustrated in figure 4-44.

*d. Service.* Fill the cooling system (para 3-20).

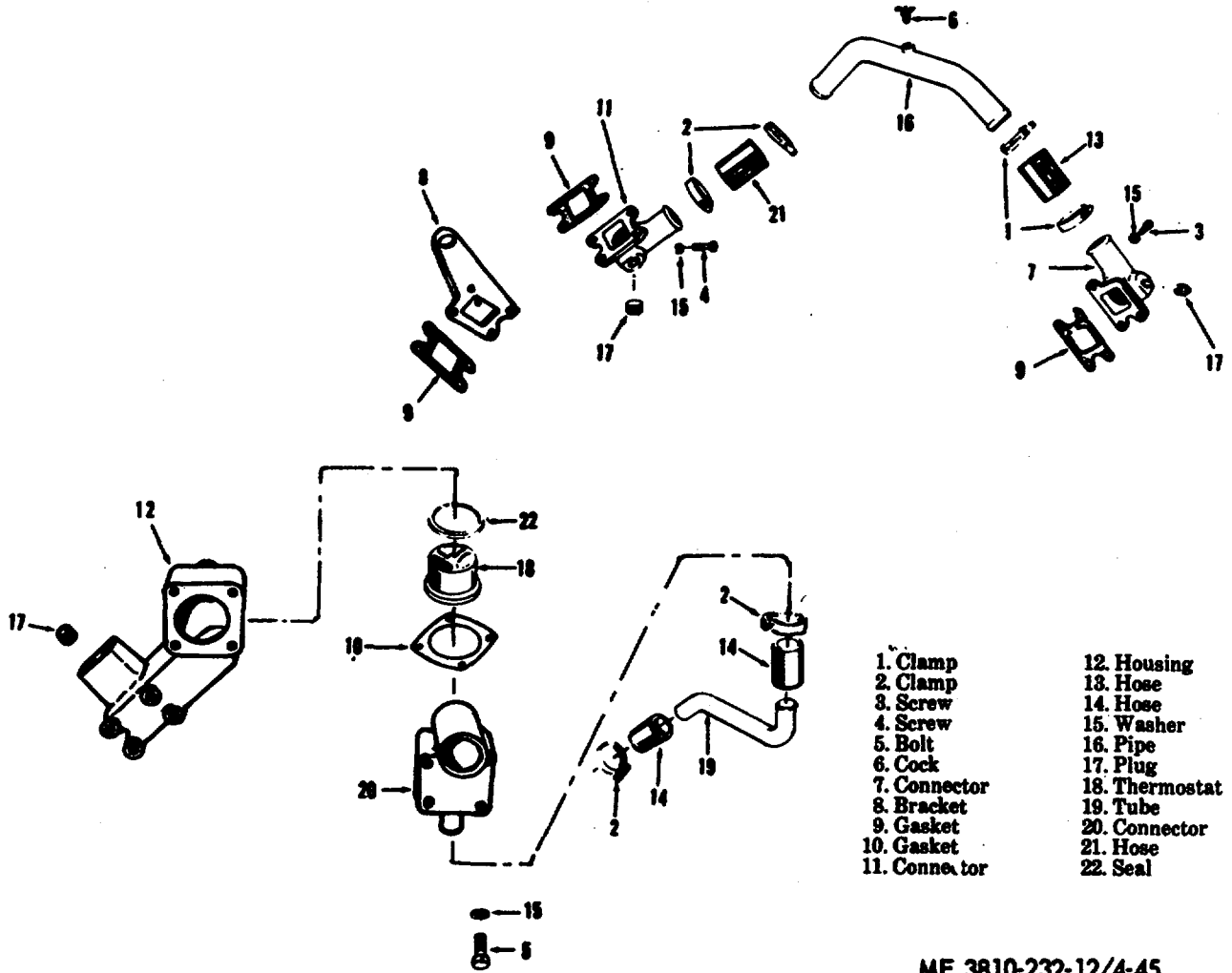
**4-52. Thermostat, Thermostat Housing and Related Parts**

*a. Removal*

(1) Drain cooling system (para 3-20).

(2) Remove deck plate over engine.

(3) Remove carrier engine thermostat, thermostat housing, and related parts as illustrated in figure 4-45.



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*b. Cleaning.* Clean all parts and dry thoroughly.

*c. Inspection.* Inspect all parts for damage.

*d. Test.* Test thermostat for proper operation by suspending it and a thermometer in a container of water. Heat the container and monitor the temperature on the thermostat. The thermostat should start to open when temperature reaches 165° F. and be completely open at 180 °F. Remove thermostat from

container and observe its closing action. It should close completely when cooled.

*e. Replacement.* Replace damaged or defective parts.

*f. Installation.* Install the thermostat, thermostat housing, and related parts as illustrated in figure 4-45

g. Service. Service cooling system as instructed in paragraph 3-20.

#### 4-53. Water Filter

a. *General.* The water filter softens water, neutralizes acidity, and protects the cooling system against corrosion by use of a chemically activated filtering element. In addition the unit contains a sacrificial metal plate which arrests pitting of metals in the system by electro-chemical action.

b. *Service.* Change cartridge as follows:

- (1) Close shutoff valve on inlet line. Unscrew drain plug at bottom of housing.
- (2) Remove cover bolts and cover.
- (3) Remove plate securing cartridge, lift cartridge from housing and discard. Remove plate below element.
- (4) Lift spring from housing.
- (5) Polish plates. If less than half of metal plates

can be exposed by polishing, install new plates.

(6) Install spring and lower plate.

(7) Install new cartridge in housing.

(8) Install upper plate, gasket, and cover.

(9) Replace drain plug and open shutoff valve in inlet line.

#### NOTE

**Change corrosion resistant cartridge every time the coolant is changed or every 7,500 miles or 200 hours.**

#### CAUTION

**When using antifreeze in the cooling system, corrosion resistant winter cartridge should be used. If water only is used, corrosion resistant summer cartridge should be used. Refer to TM 5-3810-232-20P for proper cartridge.**

c. *Removal and Disassembly.*

- (1) Remove water filter as illustrated in figure 4-

46.

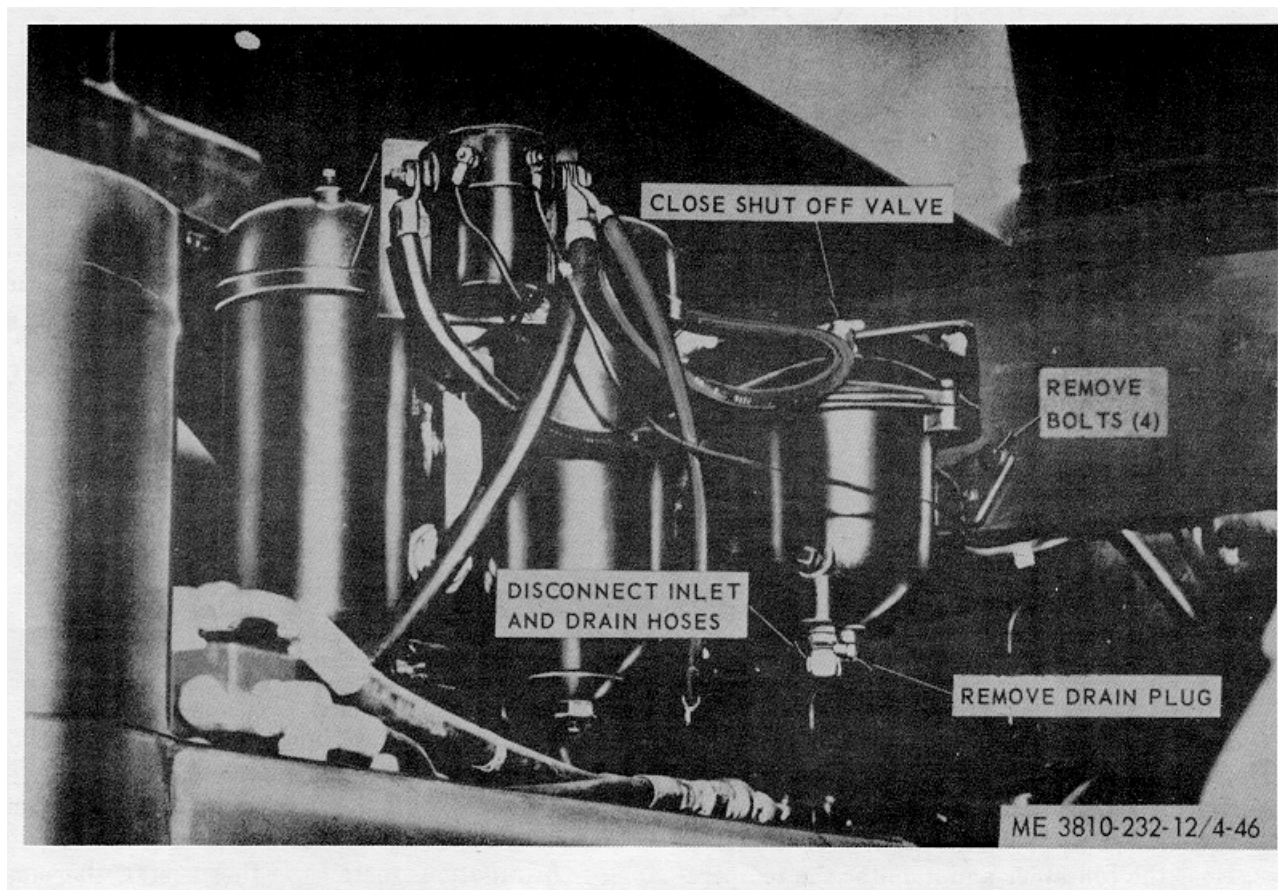


Figure 4-46. Carrier engine cooling system water filter removal and installation.

(2) Disassemble the water filter as illustrated in figure 4-47.

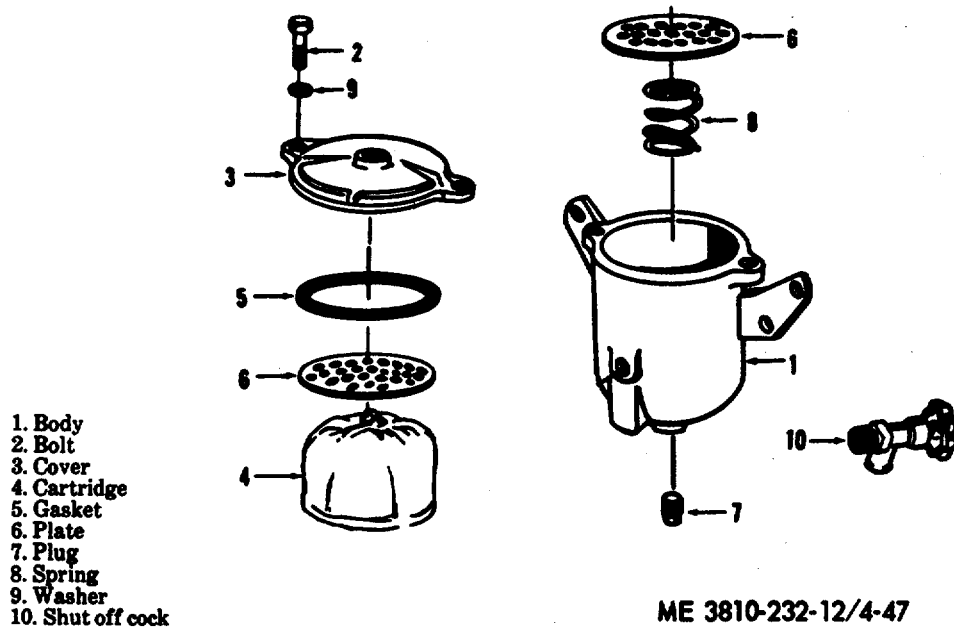


Figure 4-47. Carrier engine cooling system water filter, disassembly and reassembly.

(3) Discard cartridge.

(4) Polish plates. If less than half of metal plates can be exposed by polishing, install new plates.

*d. Cleaning.* Clean all parts and dry thoroughly.

*e. Inspection.* Inspect all parts for defects.

*f. Replacement.* Replace defective parts and cartridge.

*g. Reassembly and Installation*

(1) Reassemble water filter as illustrated in figure 4-47.

(2) Install water filter as illustrated in figure 4-46.

(3) Open the shut-off cock.

## Section XV. MAINTENANCE OF CRANE ENGINE COOLING SYSTEM

### 4-54. General

The crane engine temperature is controlled by the circulation of coolant through the engine water passages by the water pump. A radiator is used to cool the circulating coolant. A thermostat is used to bypass all or part of the coolant to the radiator until

the normal operating temperature is reached.

### 4-55. Hoses, Lines, and Fittings

*a. Removal*

(1) Drain the cooling system (para 3-21).

(2) Remove hoses, lines, and fittings as illustrated in figure 4-48.

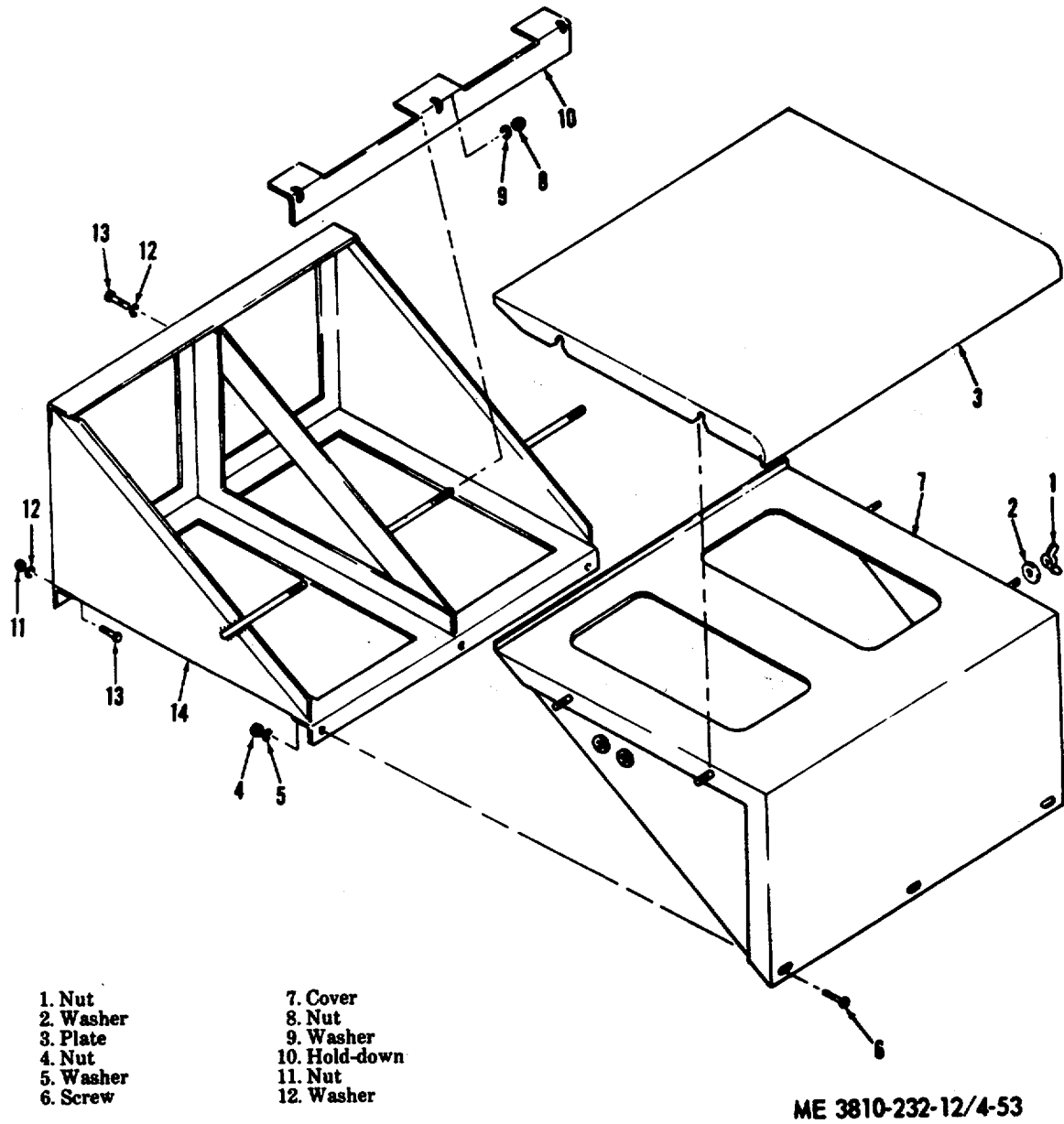


Figure 4-48. Crane engine coolant hoses, lines and fittings, removal and installation.

- b. *Cleaning.* Clean all parts and dry thoroughly.
- c. *Inspection.* Inspect all parts for damage and replace damaged parts.
- d. *Installation.* Install the hoses, lines, and fittings as illustrated in figure 4-48.
- e. *Service.* Service the coolant system as instructed in paragraph 3-21.

#### 4-56. Thermostat Housing and Thermostat

- a. *Removal*
  - (1) Drain cooling system (para 3-21).
  - (2) Remove thermostat housing as illustrated in figure 4-49.

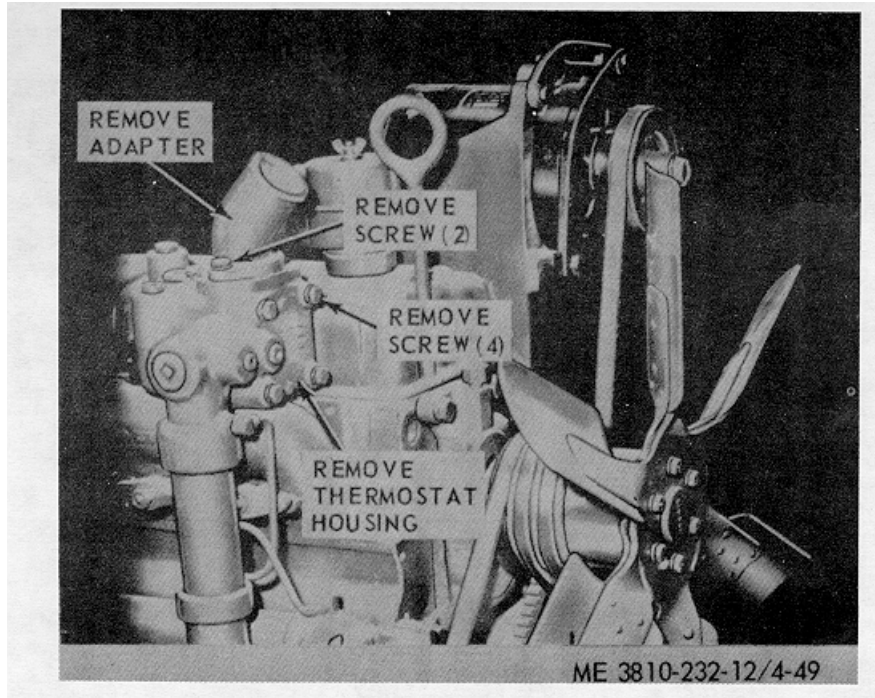


Figure 4-49. Crane engine thermostat housing, removal and installation.

- (3) Remove thermostat from housing.
- b. *Cleaning.* Clean all parts in an approved cleaning solvent and dry thoroughly.
- c. *Inspection.* Inspect all parts for damage.
- d. *Test.* Test thermostat as instructed in paragraph 4-52.
- e. *Replacement.* Replace damaged or defective parts.
- f. *Installation.*

- (1) Install thermostat in housing.
- (2) Install thermostat housing as illustrated in figure 4-49.
- g. *Service.* Service cooling system as instructed in paragraph 3-21.

#### 4-57. Radiator Fan Guards

- a. *Removal.* Remove radiator fan guards as illustrated in figure 4-50.

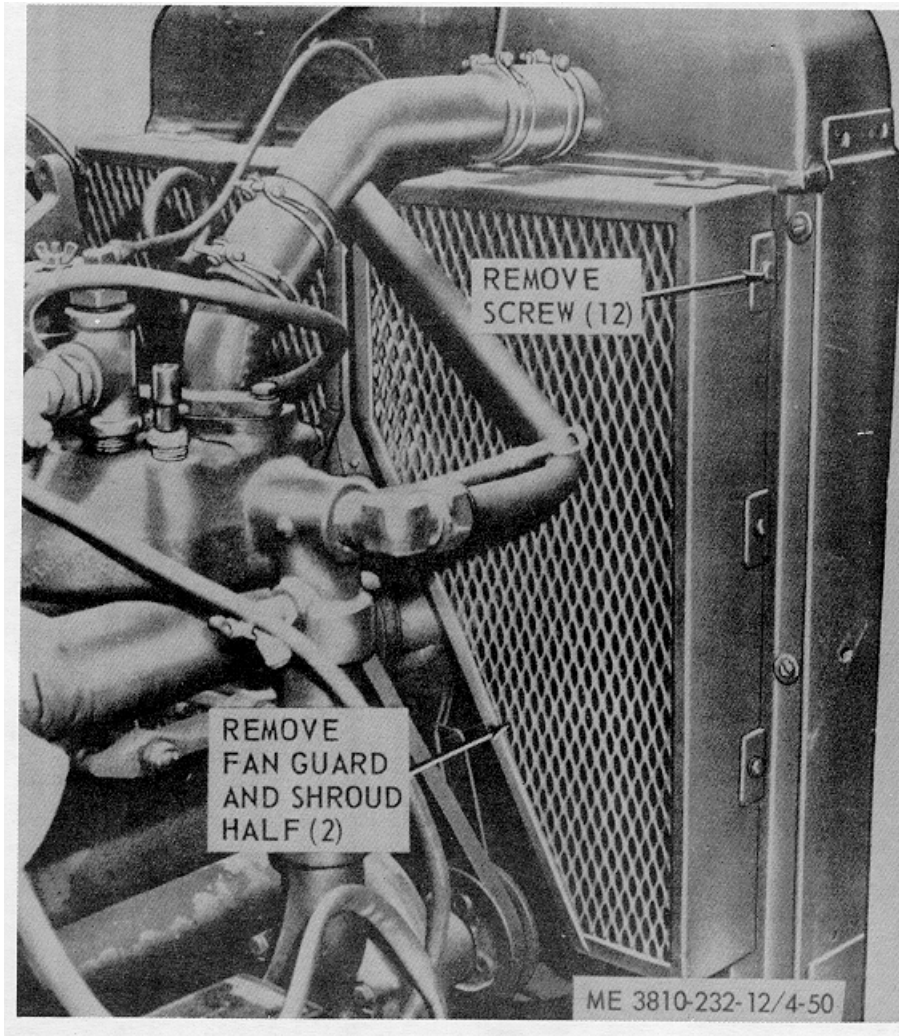


Figure 4-50. Crane engine radiator fan guards, removal and installation.

b. *Cleaning, Inspection and Replacement.*

(1) Clean the radiator fan guards with a damp cloth.

(2) Inspect parts for defects. Replace defective parts.

c. *Installation?.* Install radiator fan guards as illustrated in figure 4-50.

#### 4-58. Fan Belts and Fan

a. *Removal.*

(1) Remove radiator fan guards (para 4-57).

(2) Remove fan belts and fan as illustrated in figure 4-51.

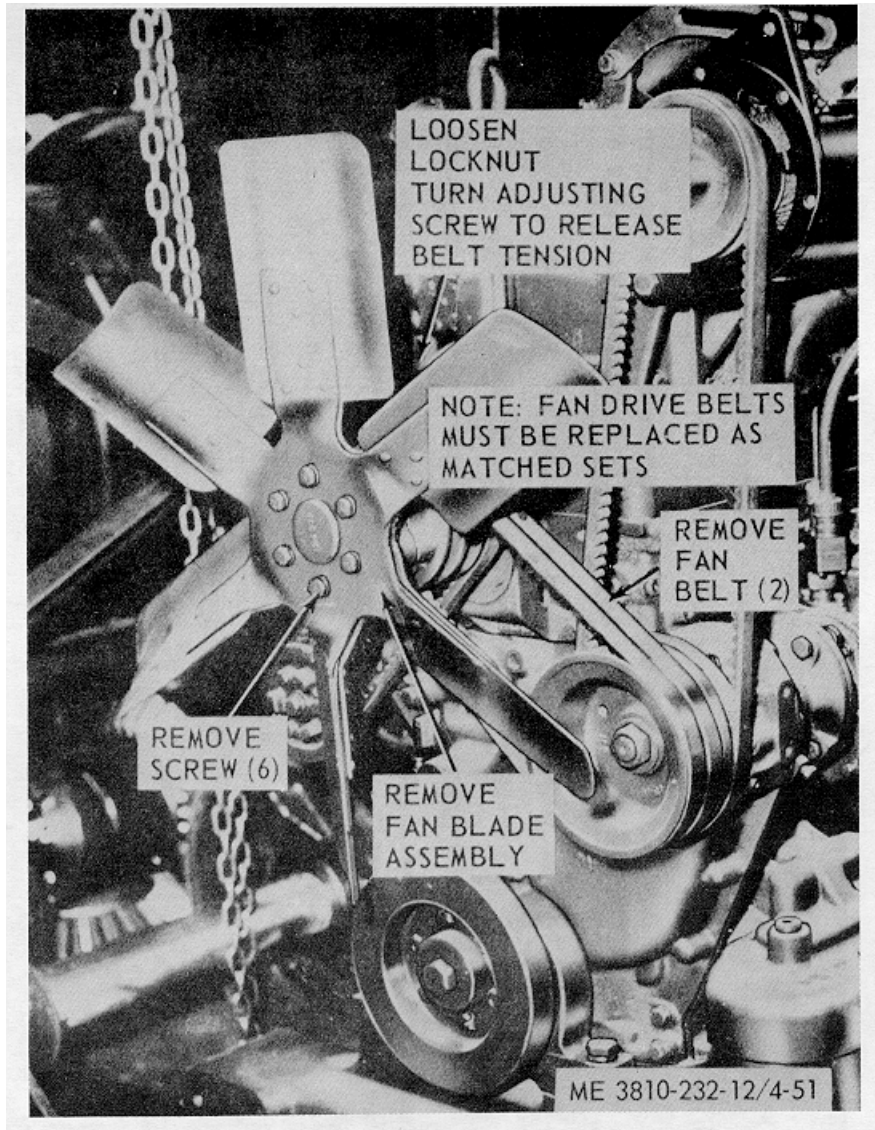


Figure 4-51. Crane engine fan belts and fan removal and installation.

- b. *Cleaning.* Clean all parts and wipe thoroughly.
- c. *Inspection.*
  - (1) Inspect fan belts for breaks, fraying, cracks and other damage.
  - (2) Inspect fan for cracks, bends, and other damage.
- d. *Replacement.* Replace defective or damaged parts.
- e. *Installation.*
  - (1) Install fan belts and fan as illustrated in figure 4-51.

- (2) Adjust belt tension as illustrated in figure 3-13.
- (3) Install radiator fan guards as instructed in paragraph 4-57.

#### 4-59. Radiator

- a. *Removal.*
  - (1) Drain radiator.
  - (2) Remove radiator fan guards as instructed in paragraph 4-57.

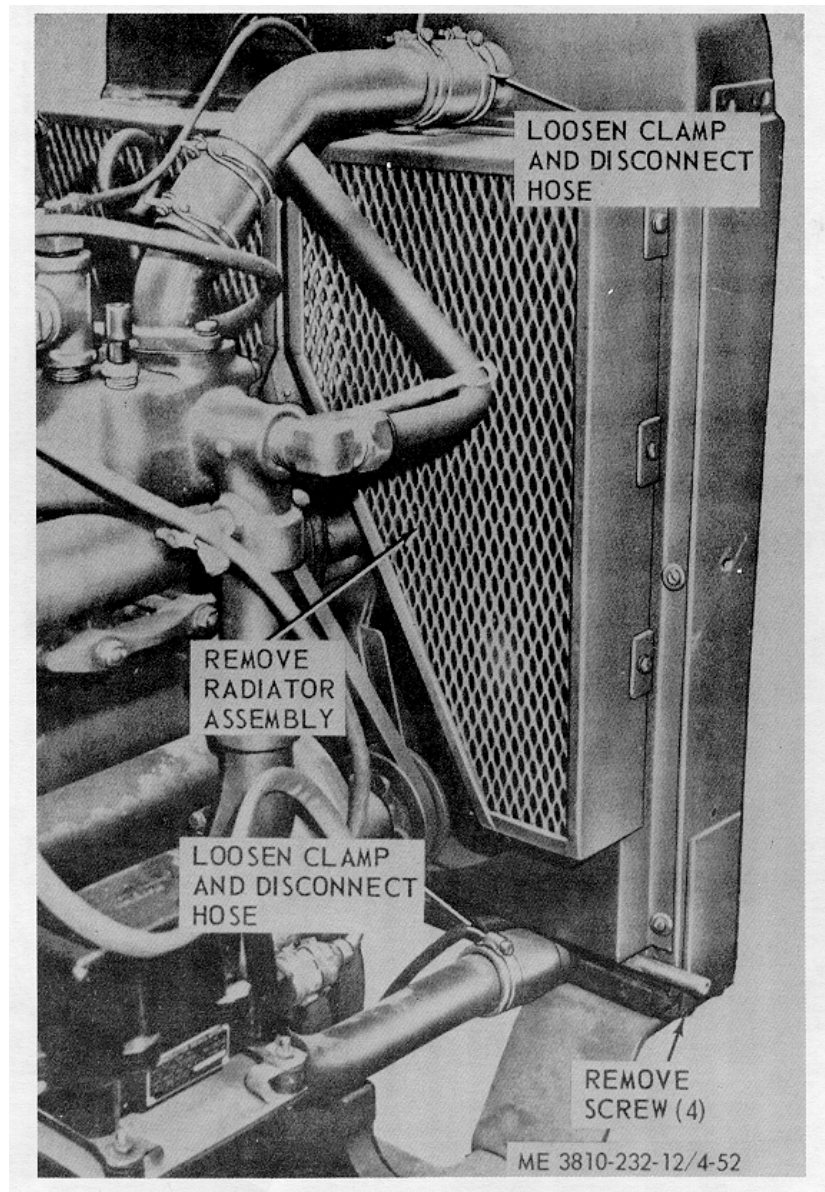


Figure 4-52. Crane engine radiator, removal and disassembly.



(3) Remove radiator as illustrated in figure 4-52.

b. Cleaning.

(1) Flush inside of radiator with an approved cleaning solvent (TB ORD 651).

**CAUTION**

Do not use high pressure air or water that could damage the radiator core.

(2) Clean radiator core with compressed air or water under pressure from fan side of core.

(3) Clean overflow line with compressed air.

c. Inspection and Testing.

(1) Inspect radiator for damage and leaks.

(2) Test for leaks as follows:

(a) Insert air hose in radiator outlet pipe and caulk around the base.

(b) Plug all other openings and install the radiator cap.

(c) Immerse radiator in water and apply air pressure of 5 psi to radiator.

(d) Look for leaks as indicated by air bubbles.

(e) Remove the radiator, plugs and air hose.

d. Replacement. Replace a damaged or defective radiator.

e. Installation.

(1) Install radiator as illustrated in figure 4-52.

(2) Install radiator fan guards as instructed in paragraph 4-57.

(3) Service cooling system as instructed in paragraph 3-21.

## **Section XVI. CARRIER ENGINE ELECTRICAL SYSTEM CONTROLS AND INSTRUMENTS**

### **4-60. General**

The carrier electrical system is a 24-volt system and consists of four 12-volt batteries, a generator, generator regulator, starter and starter solenoid, lighting system, panel switches and gages, and connecting wires and cables.

**CAUTION**

**Remove ground cable from battery before servicing or removing any electrical component.**

### **4-61. Batteries, Cables, and Battery Box**

a. Service and Testing.

(1) Fill cells to bottom of square or 3/8 inch above separators with sulfuric acid of 1.280 + 0.005 specific gravity at 77°F. Battery and acid must be at a temperature above 60 F., but preferably not above 100°F.

Let battery stand 30 minutes after filling; then check

electrolyte specific gravity of each cell; correcting readings to 77°F., by using TM 9-6140-200-15.

(2) The battery is now ready for use unless one or more of the following conditions exist. The specific gravity is below 1.250 after the 30-minute stand, the battery will not be used within 12 hours after filling, or the battery is going into service in temperature below "0" degree F. If one or more of the above conditions exist, the battery should be charged until the specific gravity becomes constant after three consecutive 30-minute readings. Battery electrolyte shall then be adjusted to 1.280 ± 0.010. Constant-current charging should always be used if available, but constant potential may be used if temperature is controlled below 130 °F. by interrupted charging.

b. Removal (Model 2380).

(1) Remove box top plate, inner cover and battery hold-down bracket as illustrated in figure 4-53.

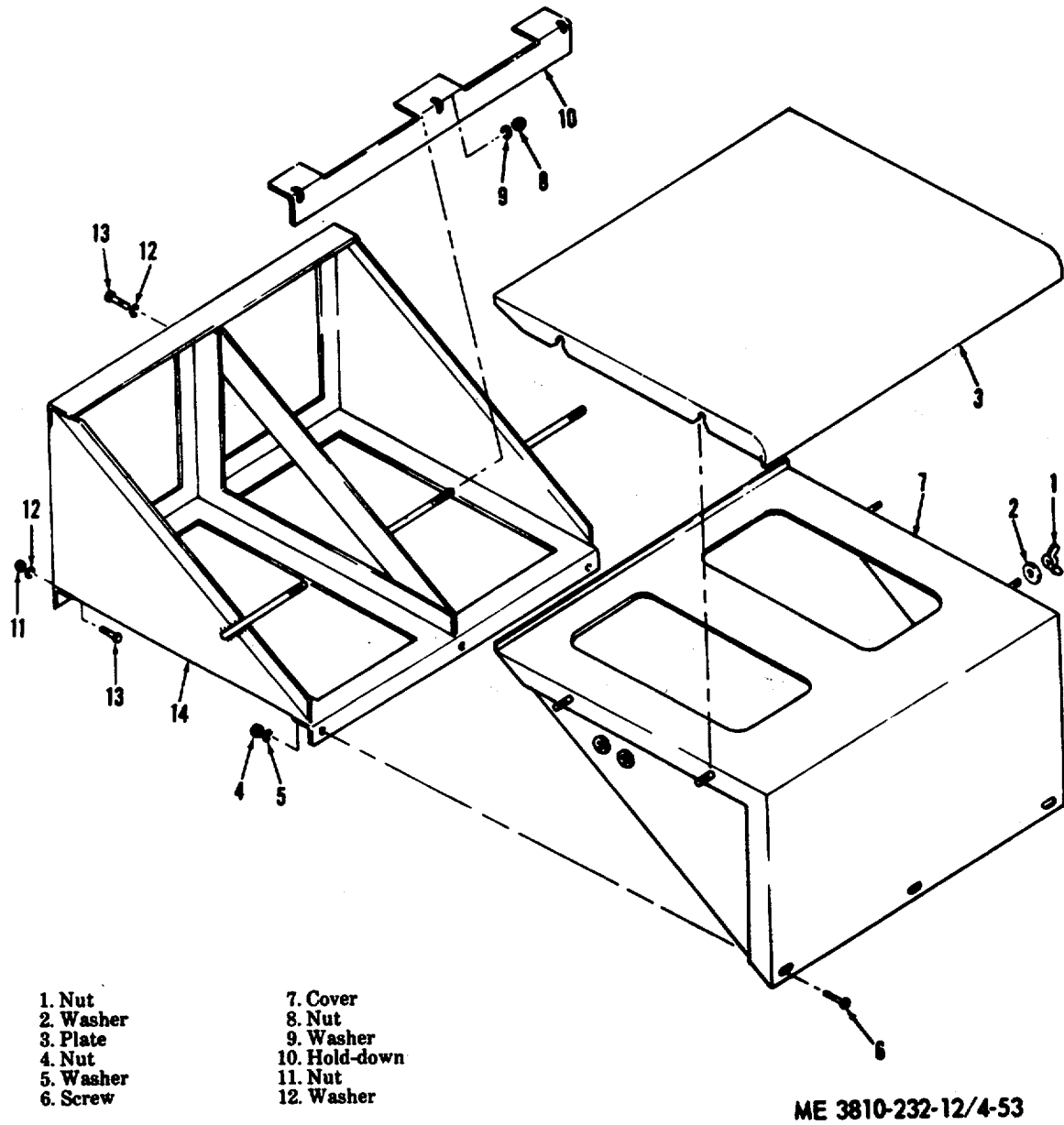


Figure 4-53. Carrier battery box, removal and installation (model 2380)

- (2) Remove batteries and cables.
- (3) Remove battery box (fig. 4-53).
- c. Cleaning and Inspection (Model 2380).
  - (1) Remove corrosion from battery terminals, cables, and box.
  - (2) Use water to wash sides and top of battery.
  - (3) Clean vent openings in filler caps.
  - (4) Clean cables and battery box.
  - (5) Inspect batteries for cracks, leaks, broken terminals or other defects.
  - (6) Inspect cables for defective insulation or broken strands and terminals.
  - (7) Inspect battery box for cracks or other damage.

- d. Replacement (Model 2380).
  - (1) Replace battery that will not hold or take a charge.
  - (2) Replace damaged cables.
  - (3) Replace a damaged battery box.
- e. Installation (Model 2380).
  - (1) Install battery box (fig. 4-53).
  - (2) Install batteries and cables.
  - (3) Install battery hold-down brackets, battery box inner cover and top plate.
- f. Removal (Model 2385). Refer to figure 4-54 and remove batteries.

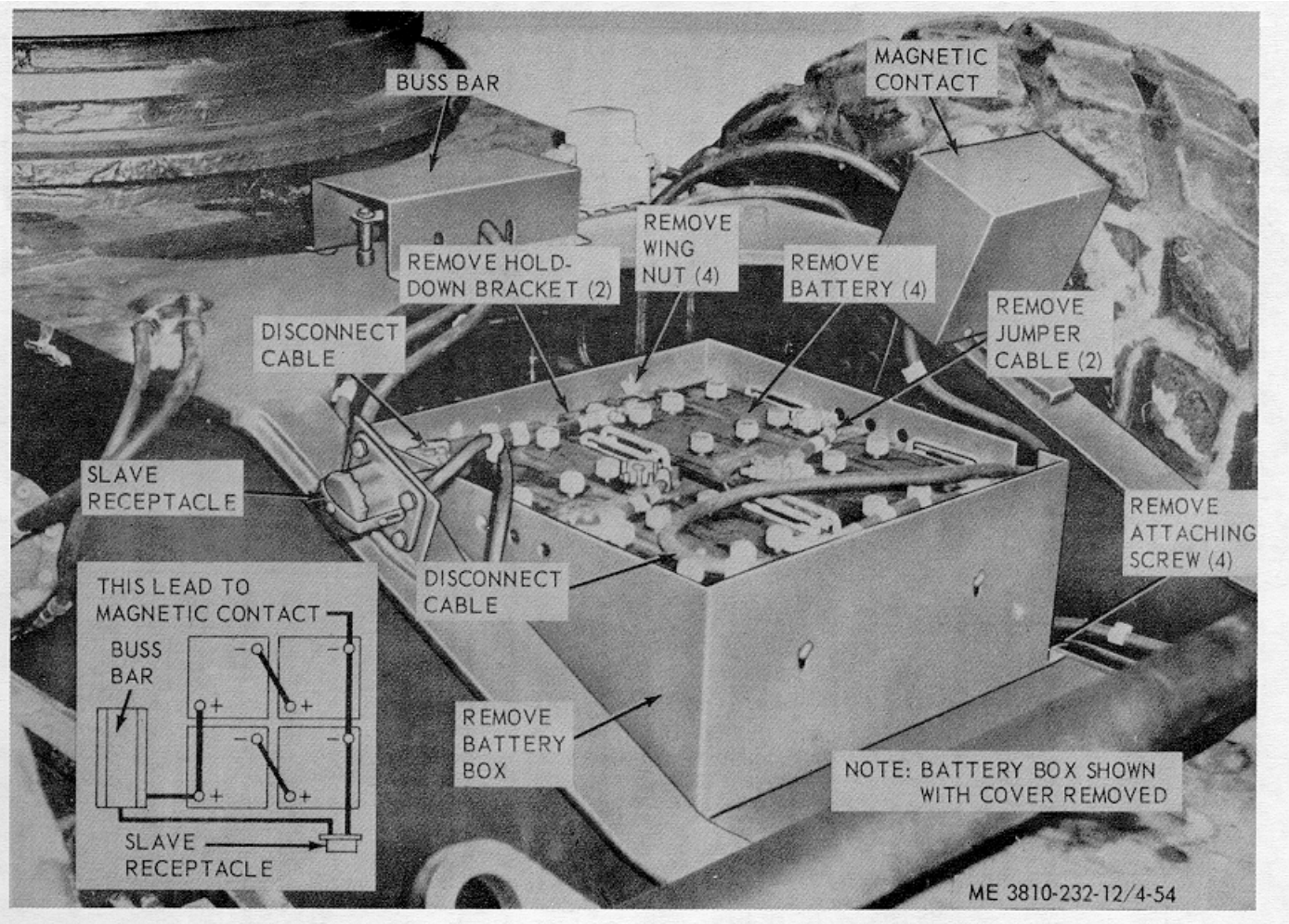


Figure 4-54. Carrier battery box, batteries and cables, removal and installation (model 2885).

- g. Cleaning and Inspection (Model 2385).
  - (1) Remove corrosion from battery terminals, cables and box.
  - (2) Use water to wash sides and top of battery.
  - (3) Clean vent openings in filler caps.
  - (4) Clean cables and battery box.
  - (5) Inspect batteries for cracks, leaks, broken terminals and other defects.
  - (6) Inspect cables for defective insulation or broken strands and terminals.
  - (7) Inspect battery box for cracks and other damage.
- h. Replacement (Model 2385).
  - (1) Replace battery that will not hold or take charge.
  - (2) Replace damaged cables.
  - (3) Replace a damaged battery box.
- i.. Installation (Model 2385). Install batteries and cables as shown in figure 4-54.

**4-62. Starter and Solenoid Relay**

- a. Removal.
  - (1) Remove right-hand exhaust pipe (para 4-16).
  - (2) Remove starter and solenoid relay as illustrated in figure 4-55.
- b.. Cleaning and Inspection.
  - (1) Wipe starter and solenoid relay with a damp cloth.
  - (2) Inspect solenoid relay for damage or defects.
  - (3) Inspect wires for frayed, or broken condition.
  - (4) Rotate starter drive pinion to be sure that the armature turns freely and does not bind.
  - (5) Inspect starter commutator for pits, burns, and other damage.
  - (6) Inspect starter brushes for excessive wear.
- c.. Replacement.
  - (1) Replace a defective solenoid relay.
  - (2) Replace defective wires.
  - (3) Replace starter brushes as illustrated in figure 4-56.
  - (4) Replace defective starter.
- d.. Installation.
  - (1) Install solenoid relay and starter as illustrated in figure 4-55.
  - (2) Install right hand exhaust pipe (para 4-16).

**4-63. Magnetic Switch**

- a. Removal. Remove magnetic switch as illustrated in figure 4-57.

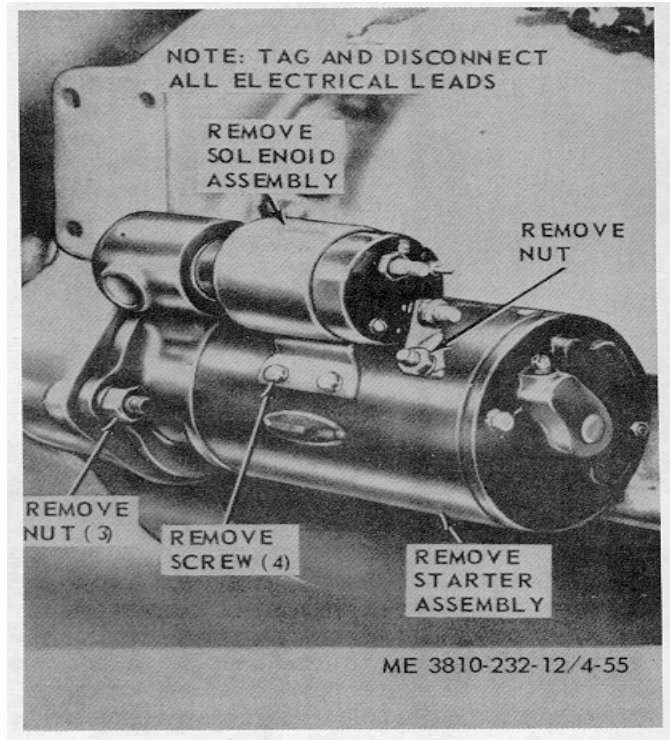


Figure 4-55. Carrier engine s tarter and solenoid relay, removal and installation.

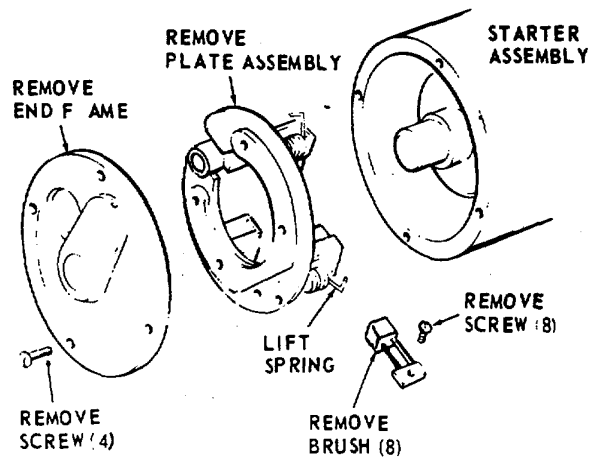


Figure 4-56. Carrier starter brush replacement.

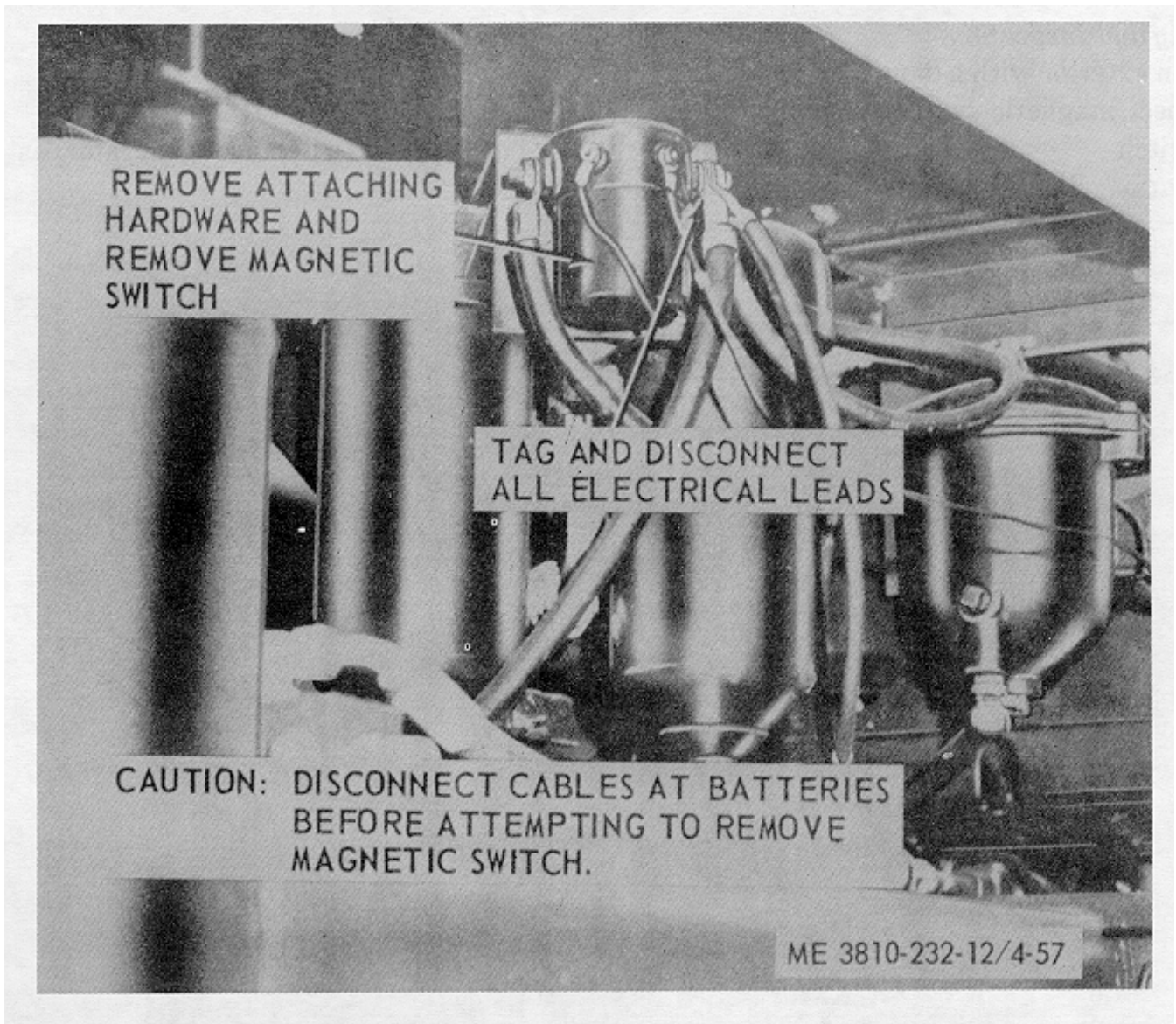


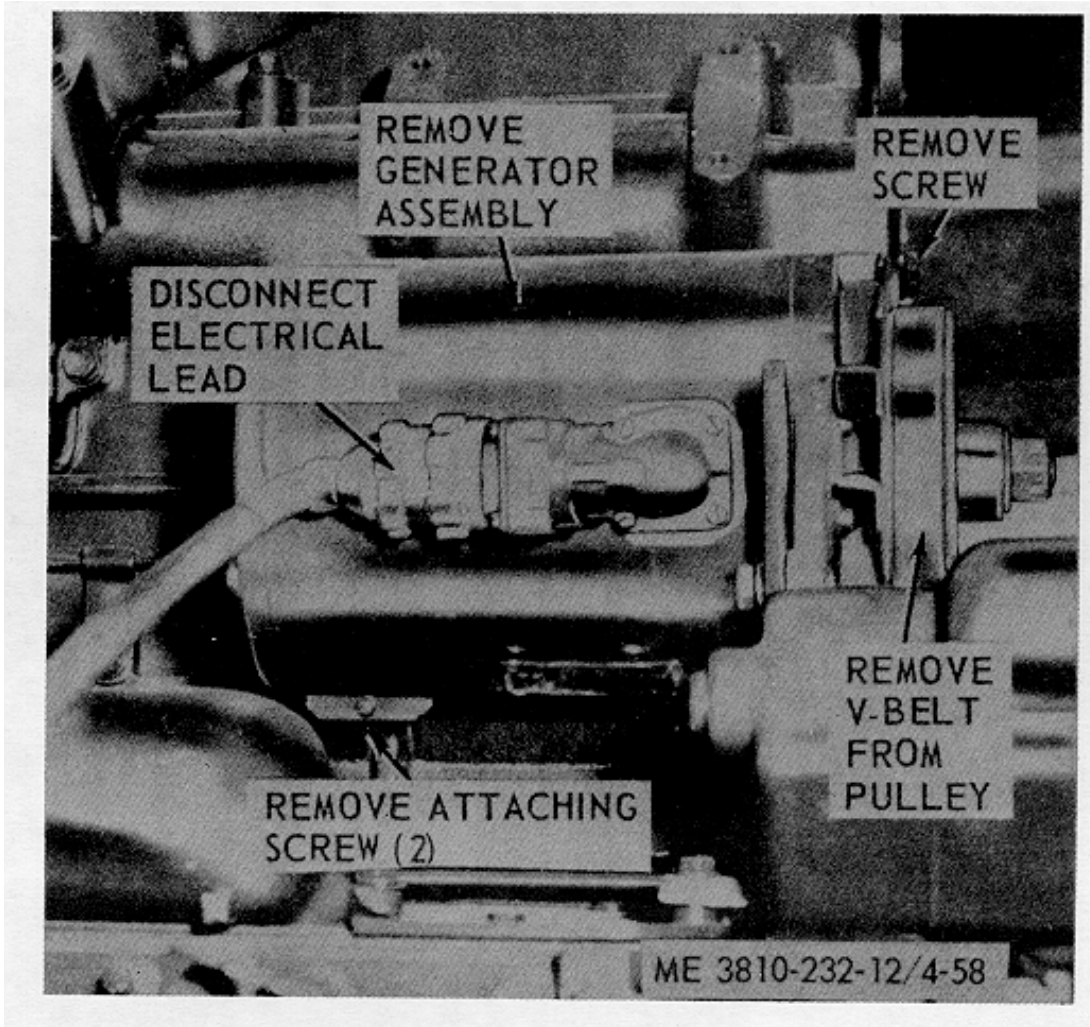
Figure 4-57. Carrier magnetic switch. removal and installation.

- b. Cleaning and Inspection.
  - (1) Clean exterior with a damp cloth.
  - (2) Inspect magnetic switch for defects. Replace defective switch.
- c.. Installation. Install magnetic switch as illus-

trated in figure 4-57.

**4-64. Generator (Model 2380)**

- a. Removal. Remove generator as illustrated in figure 4-58.



*Figure 4-58. Carrier generator. removal and installation (model 2380).*



- b.. Cleaning, Inspection and Replacement.  
(1) Wipe exterior of generator with a damp cloth.  
(2) Inspect for cracks or other defects. Inspect

brushes, and replace if required as illustrated in figure 4-59.

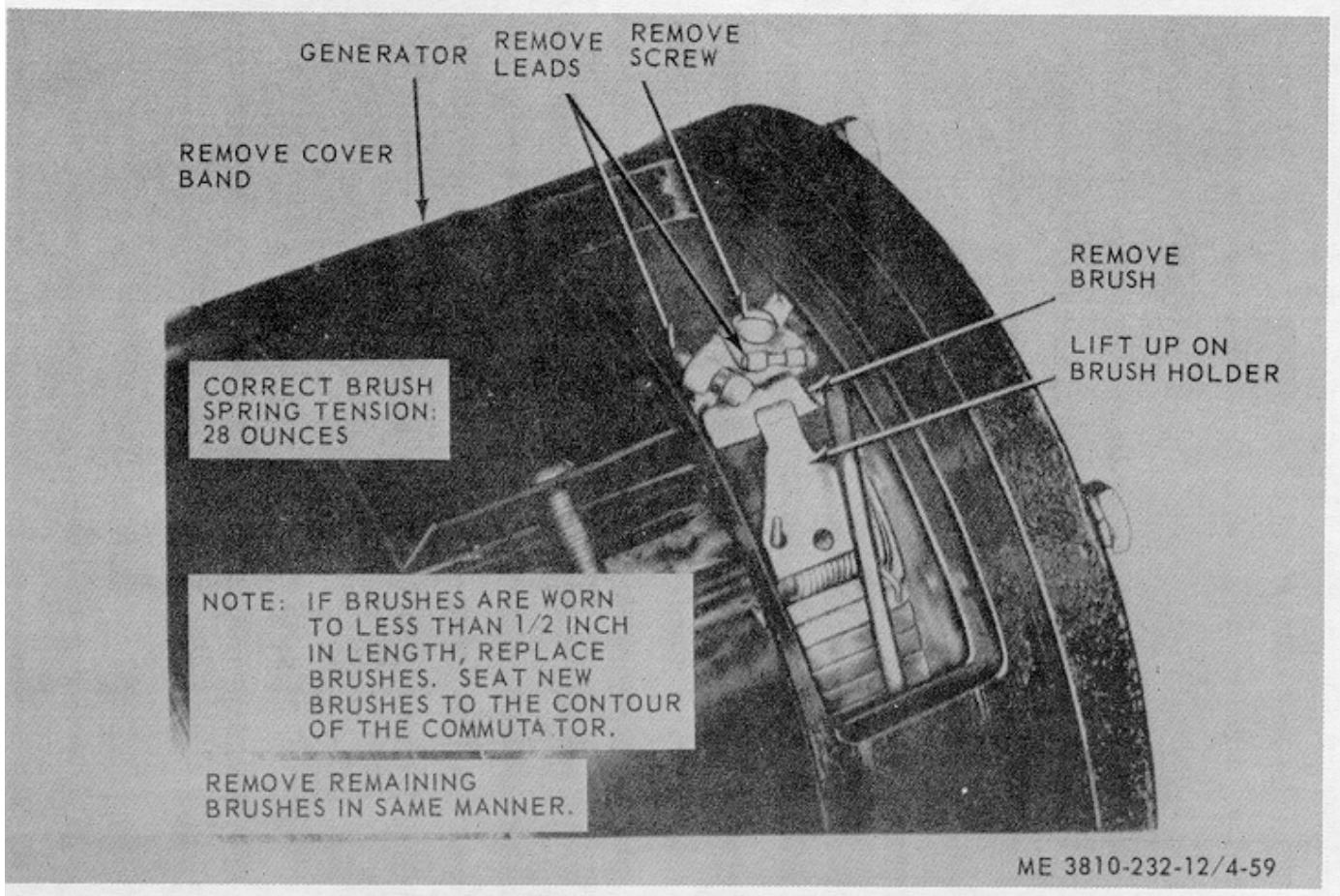


Figure 4-59. Generator brushes, removal and installation (model 2380).

(3) Replace a defective generator.

c. Installation. Install carrier generator as illustrated in figure 4-58. Adjust the generator and water pump drive belt as described in paragraph 4-48.

d. Polarize.

**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 result in burned regulator contact points, a run-down battery, and possible serious damage to the generator. The generator should be polarized after it has been installed and before the engine has been started.

(1) Disconnect cable from generator to generator regulator.

(2) Disconnect cable from generator regulator to battery.

(3) Momentarily connect a wire from battery to generator. This allows a momentary surge of current to flow through generator field coils to correctly polarize the generator.

(4) Remove jumper connection and reconnect cables from generator to generator regulator and from generator regulator to battery.

**4-65. Alternator (Model 2385)**

a. *Removal.* Remove alternator as illustrated in figure 4-60.

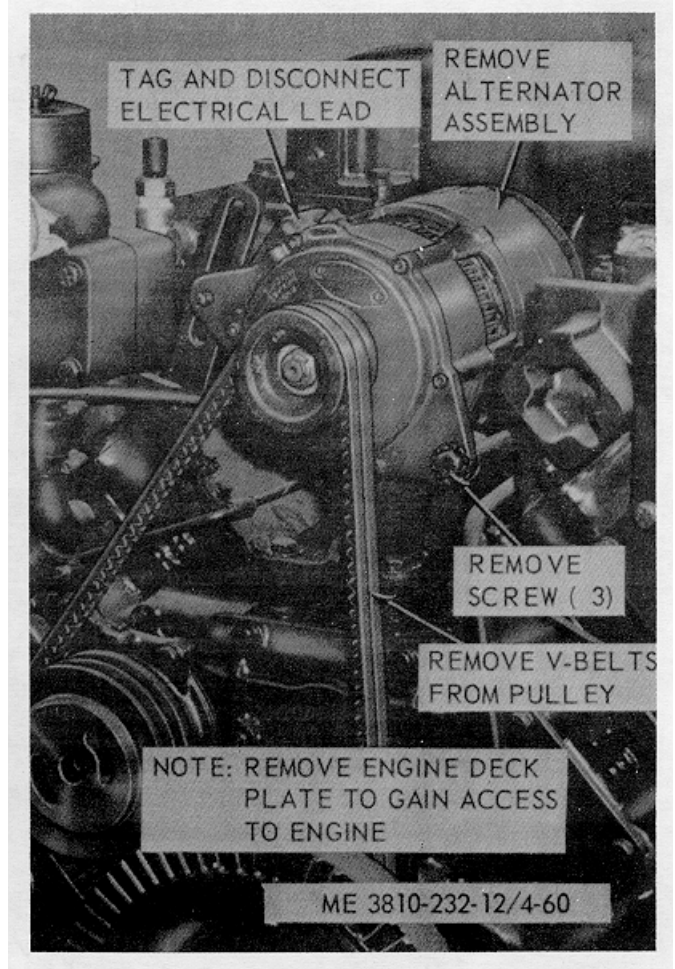


Figure 4-60. Carrier Engine alternator removal and installation. (model 2385).



- b. Cleaning, Inspection and Replacement.
- (1) Wipe exterior of alternator with a damp cloth.
  - (2) Inspect all wiring and terminals for signs of wear, looseness or corrosion. Check for worn or frayed insulation which could result in shorts or grounds. Clean and tighten all terminals and connections.
  - (3) Replace a defective alternator.
- c.. Installation. Install carrier alternator as illustrated in figure 4-60. Refer to paragraph 4-49 and adjust drive belts.

#### 4-66. Instrument Panels and Controls

- a. Removal. Remove instrument panels as illustrated in figure 4-61.
- b.. Disassembly (Model 2380). Refer to figure 4-62 and disassemble instrument panels.
- c.. Disassembly (Model 2385). Refer to figure 4-63 and disassemble instrument panels.

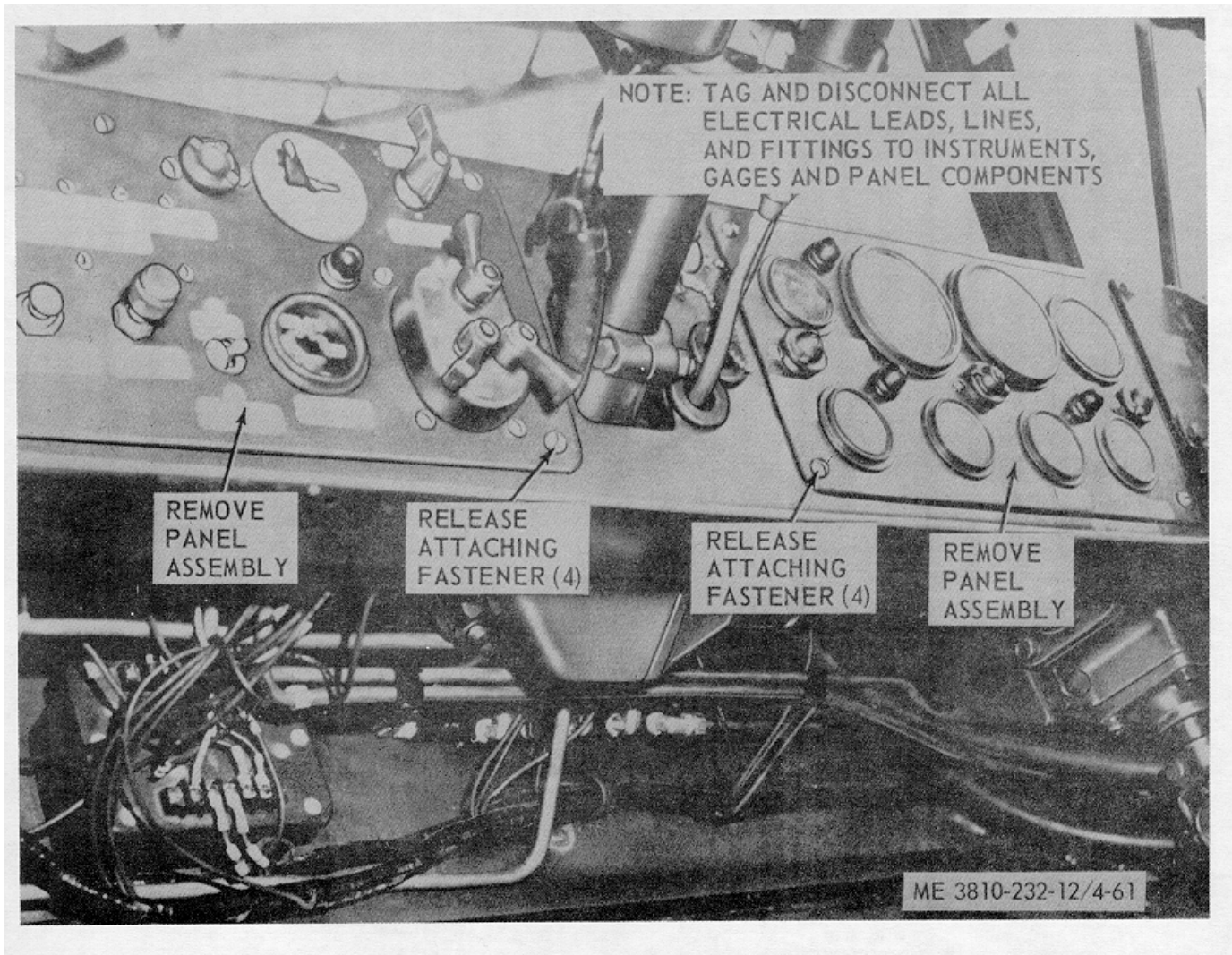
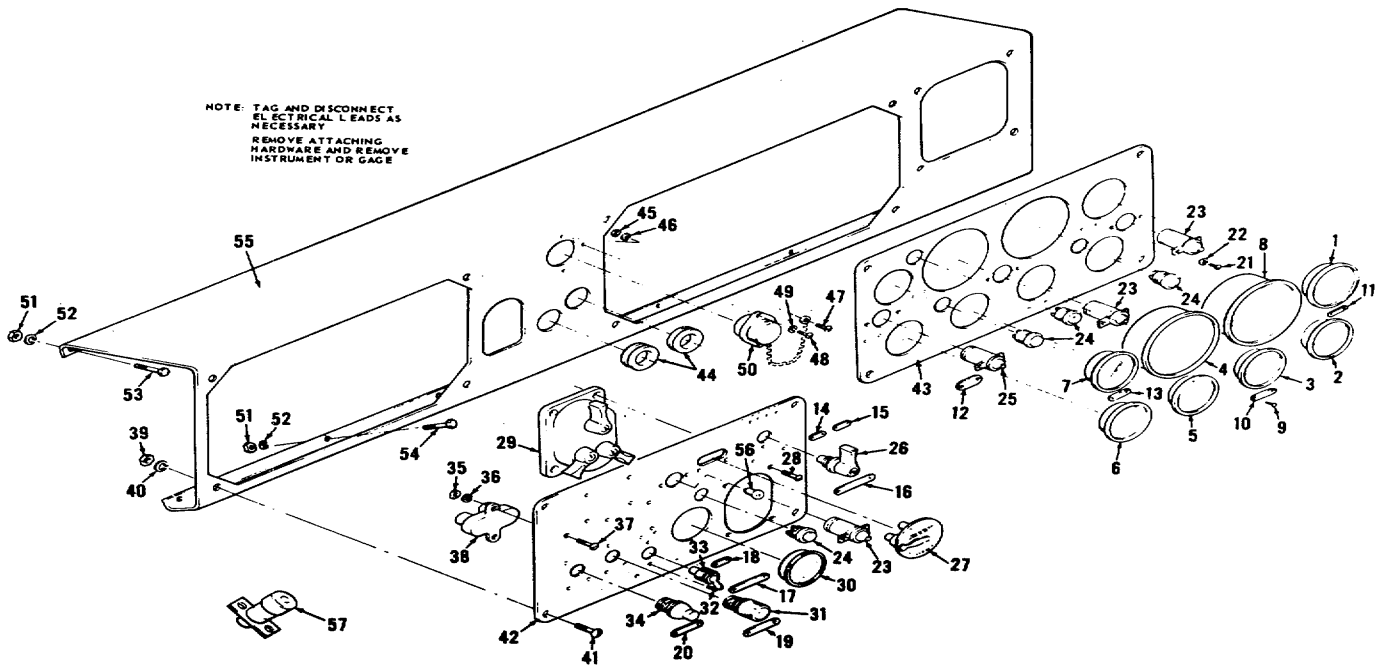


Figure 4-61. Carrier instrument panels. removal and installation



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- |                                |                           |
|--------------------------------|---------------------------|
| 1. Air gage                    | 30. Temperature indicator |
| 2. Temperature indicator       | 31. Wiper control         |
| 3. Liquid fuel indicator       | 32. Screw                 |
| 4. Speedometer                 | 33. Water-tite switch     |
| 5. Pressure indicator          | 34. Starter push switch   |
| 6. Battery generator indicator | 35. Nut                   |
| 7. Pressure indicator          | 36. Washer                |
| 8. Tachometer                  | 37. Screw                 |
| 9. Screw                       | 38. Circuit breaker       |
| 10. Fuel title strip           | 39. Nut                   |
| 11. Air title strip            | 40. Washer                |
| 12. High beam title strip      | 41. Screw                 |
| 13. Oil title strip            | 42. Instrument panel      |
| 14. Off title strip            | 43. Instrument panel      |
| 15. On title strip             | 44. Rubber grommet        |
| 16. Main switch title strip    | 45. Nut                   |
| 17. Heater-off title strip     | 46. Washer                |
| 18. On title strip             | 47. Screw                 |
| 19. Wiper title strip          | 48. Screw                 |
| 20. Starter title strip        | 49. Washer                |
| 21. Screw                      | 50. Utility outlet        |
| 22. Washer                     | 51. Nut                   |
| 23. Lamp assembly              | 52. Washer                |
| 24. Light indicator            | 53. Screw                 |
| 25. Lamp assembly              | 54. Screw                 |
| 26. Switch assembly            | 55. Instrument board      |
| 27. Control valve              | 56. Lamp bulb             |
| 28. Screw                      | 57. Dimmer switch         |
| 29. Switch-vehicular lights    |                           |

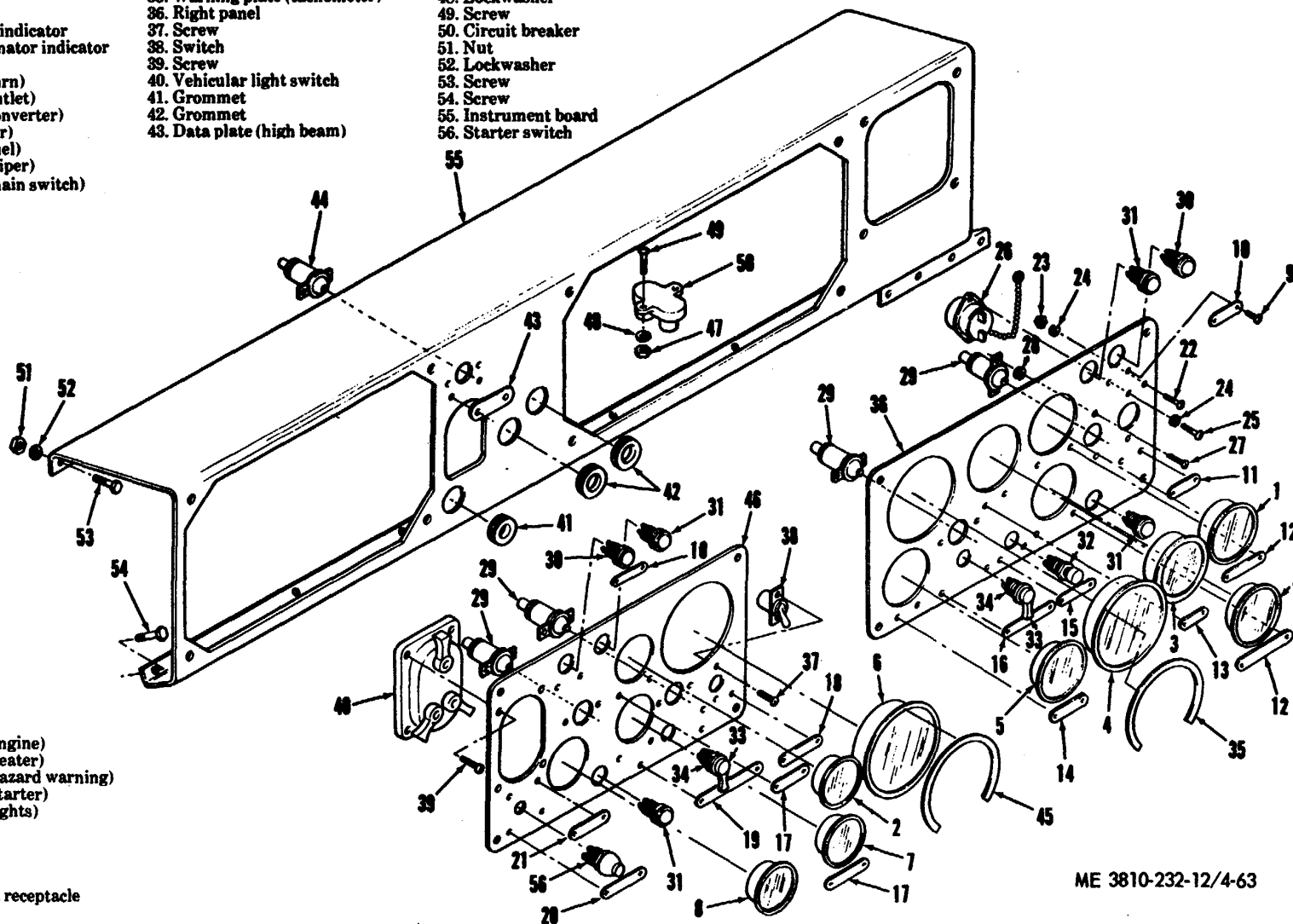
Figure 4-62. Carrier instrument panels, disassembly and reassembly (Model 2380).

1. Temperature indicator
2. Pressure indicator
3. Air gage
4. Tachometer-hourmeter
5. Fuel gage
6. Speedometer
7. Temperature indicator
8. Battery-alternator indicator
9. Drive screw
10. Data plate (turn)
11. Data plate (outlet)
12. Data plate (converter)
13. Data plate (air)
14. Data plate (fuel)
15. Data plate (wiper)
16. Data plate (main switch)

31. Indicator light
32. Windshield wiper control
33. Lever
34. Rotary switch
35. Warning plate (tachometer)
36. Right panel
37. Screw
38. Switch
39. Screw
40. Vehicular light switch
41. Grommet
42. Grommet
43. Data plate (high beam)

44. Indicator light (high beam)
45. Warning plate (speedometer)
46. Left panel
47. Nut
48. Lockwasher
49. Screw
50. Circuit breaker
51. Nut
52. Lockwasher
53. Screw
54. Screw
55. Instrument board
56. Starter switch

17. Data plate (engine)
18. Data plate (heater)
19. Data plate (hazard warning)
20. Data plate (starter)
21. Data plate (lights)
22. Screw
23. Nut
24. Lockwasher
25. Screw
26. Utility outlet receptacle
27. Screw
28. Lockwasher
29. Dash lamp
30. Turn indicator light



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Figure 4-63. Carrier instrument panels, disassembly and reassembly (model 2585)

d. *Cleaning and Inspection.*

(1) Clean all parts and dry thoroughly.

(2) Inspect all parts for defects or damage. Replace damaged or defective parts.

e. *Reassembly (Model 2380).* Refer to figure 4-62 and reassemble instrument panels.

f. *Reassembly (Model 2385).* Refer to figure 4-63 and reassemble instrument panels.

g. *Installation.* Install instrument panels as illustrated in figure 4-61.

4-67. **Carrier Engine Temperature Thermostat and Warning Light Sending Units**

a. Removal. Remove temperature thermostat and warning light sending units as illustrated in figure 4-64.

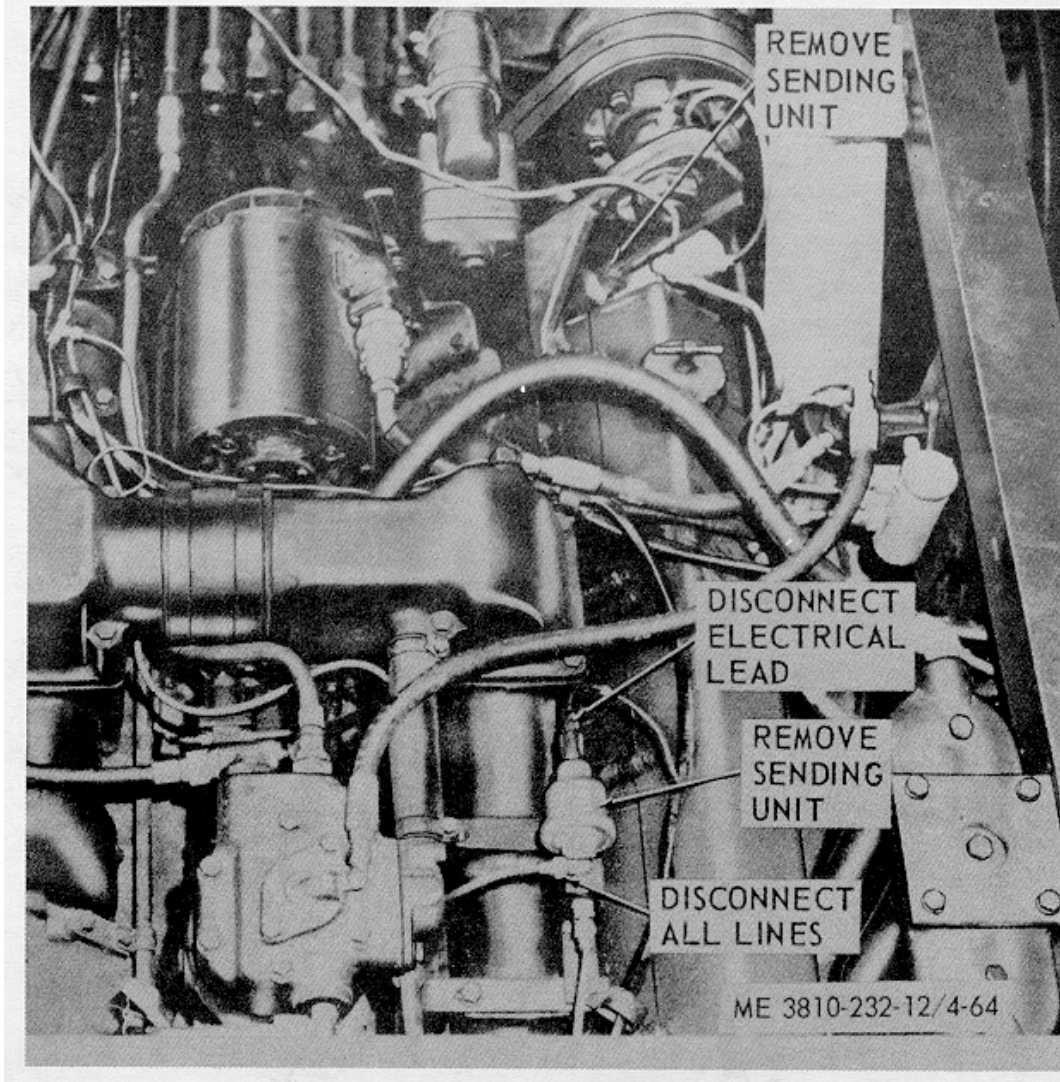


Figure 4-64. Carrier engine temperature thermostat and warning lights sending units, removal and installation.

- b. Cleaning and Inspection.
  - (1) Clean sending units and dry thoroughly.
  - (2) Inspect for defects. Replace defective sending units.
- c.. Installation. Install temperature thermostat and warning light sending units as illustrated in figure 4-64.

**4-68. Horn and Horn Button Unit**

- a. Removal.
  - (1) Remove horn as illustrated in figure 4-65.

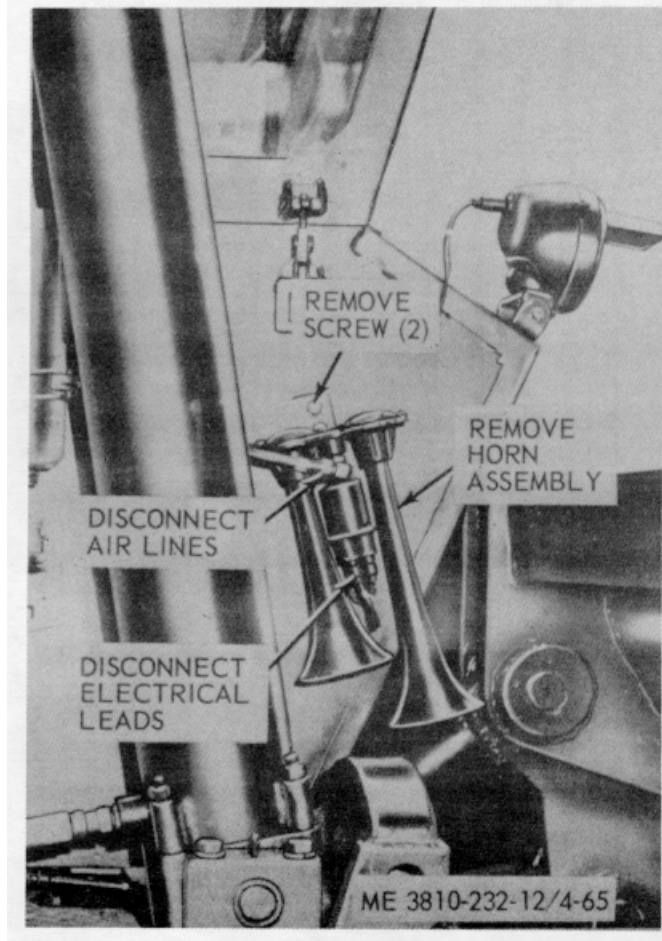
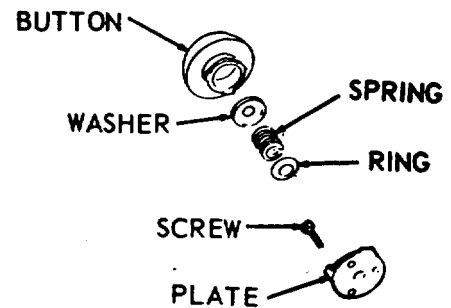


Figure 4-65. Carrier horn, removal and installation .  
 (2) Remove horn button unit as illustrated in figure 4-66.

NOTE: PRESS DOWN AND TURN COUNTERCLOCKWISE TO REMOVE BUTTON.



CAUTION: DISCONNECT BATTERY CABLES.

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Figure 4-66. Carrier horn button unit, removal and installation.

- b.. Cleaning and Inspection.
  - (1) Clean all parts with a cloth dampened in an approved cleaning solvent and dry thoroughly.
  - (2) Inspect for defects or damage. Replace defective or damaged parts.
- c.. Installation.
  - (1) Install horn button unit as illustrated in figure 4-66.
  - (2) Install the carrier horn as illustrated in figure 4-65.

**4-69. Carrier Cab and Chassis Wiring**

- a.. Inspection. Inspect wiring for frayed, cracked, and oil soaked insulation, for broken wires, and for loose or corroded connections.
- b. Repair. Remove defective wire. Splice length of wire needed to replace removed wire. Solder and tape connections.

**4-70, Service and Stop Blackout Taillights (Model 2380)**

- a. Removal Remove service and stop blackout taillights as illustrated in figure 4-67.

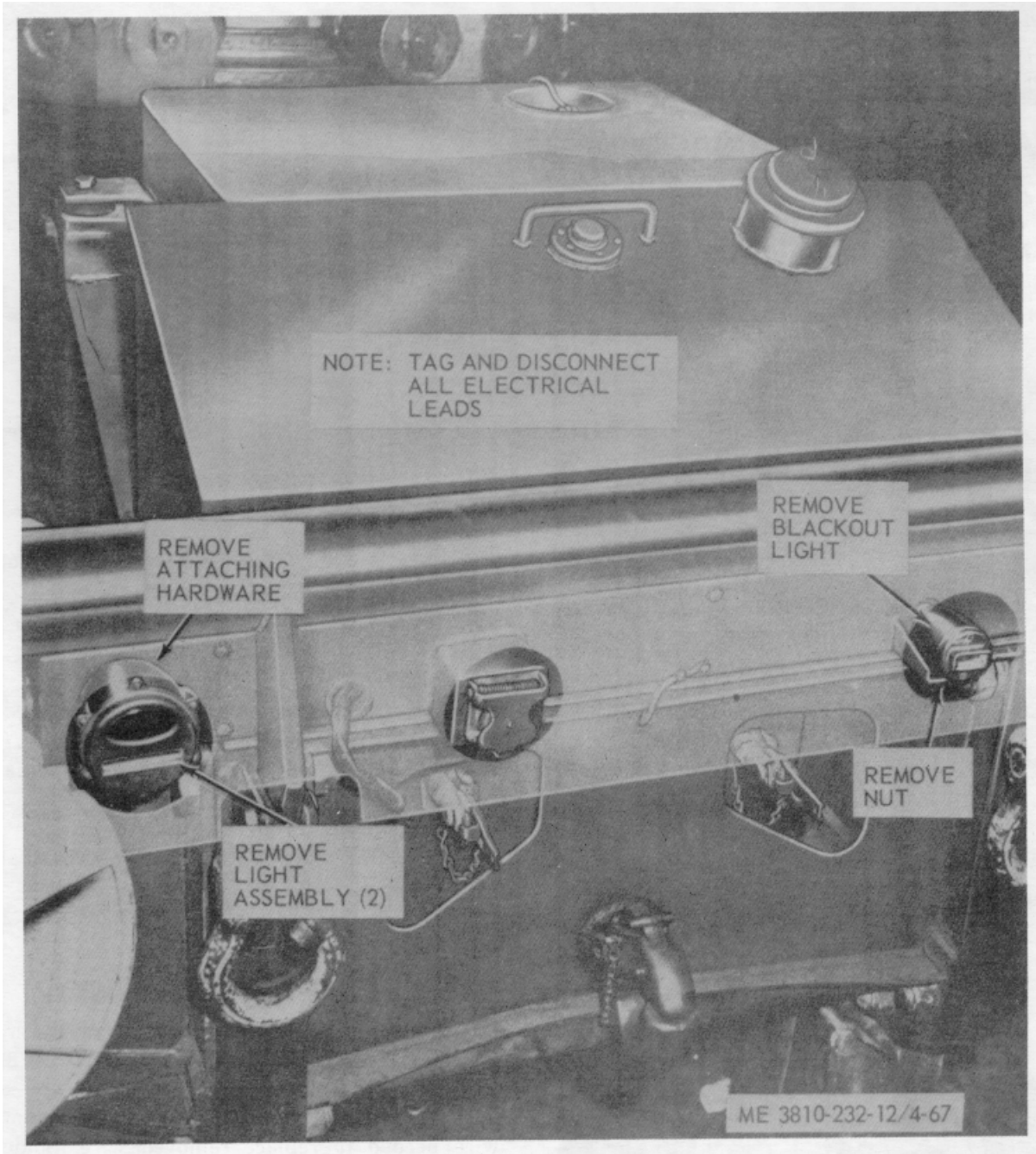
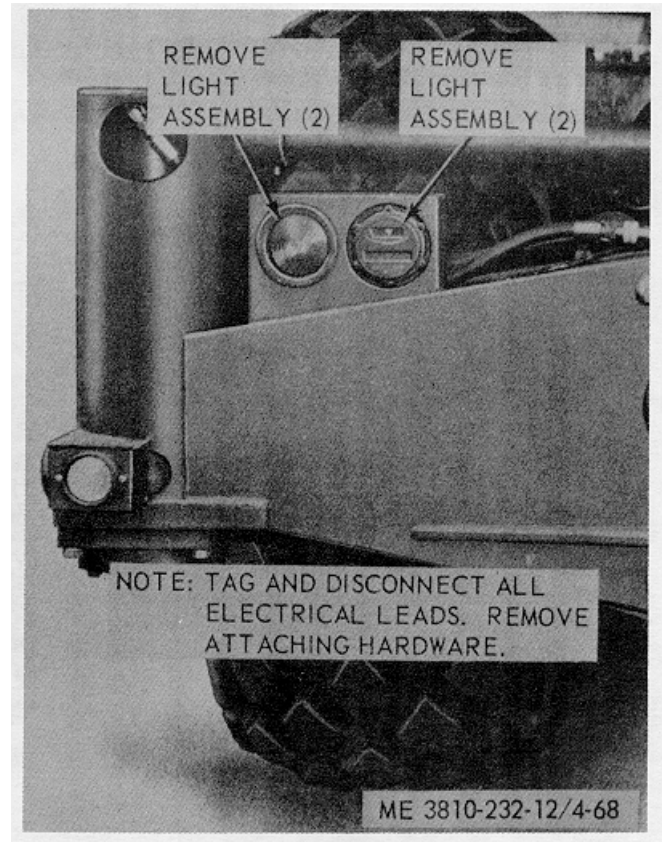


Figure 4-67. Service and stop blackout, taillights, removal and installation. (Model23(80).

- b. Replacement. Replace defective parts.
- c. Installation.. Install service and stop blackout taillights as illustrated in figure 4-67.

**4-71. Service and Stop Blackout Taillights (Model 2385)**

- a. *Removal.* Remove service and stop blackout taillights as illustrated in figure 4-68.



*Figure 4-68. Service and stop blackout, taillights removal as illustrated in figure 4-68.*



- b. Replacement. Replace defective parts.
- c. Installation. Install service and stop blackout taillights as illustrated in figure 4-68.

**4-72. Marker, Blackout, and Headlights (Model 2380)**

- a. Removal. Remove marker, blackout, or headlights as illustrated in figure 4-69.

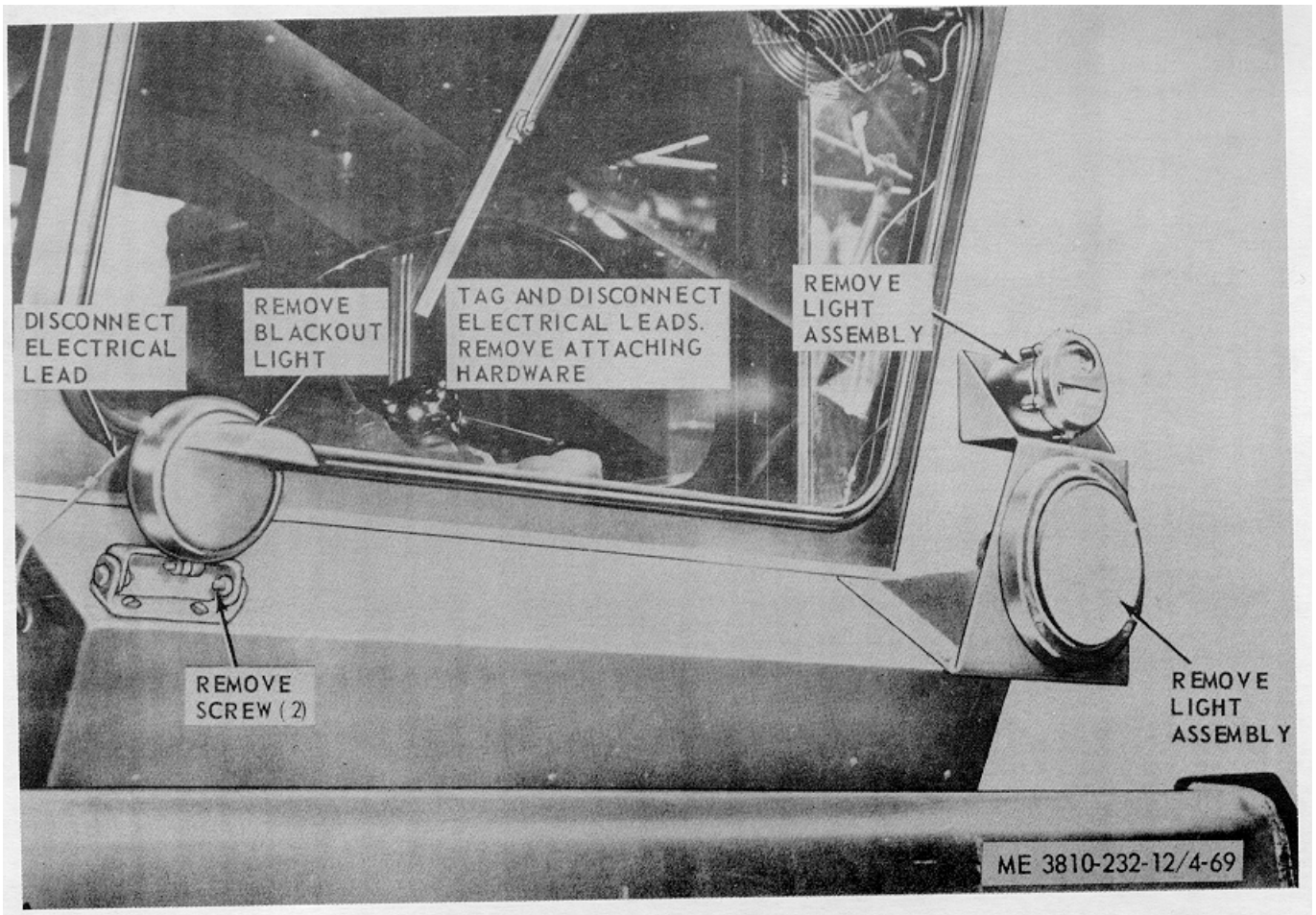


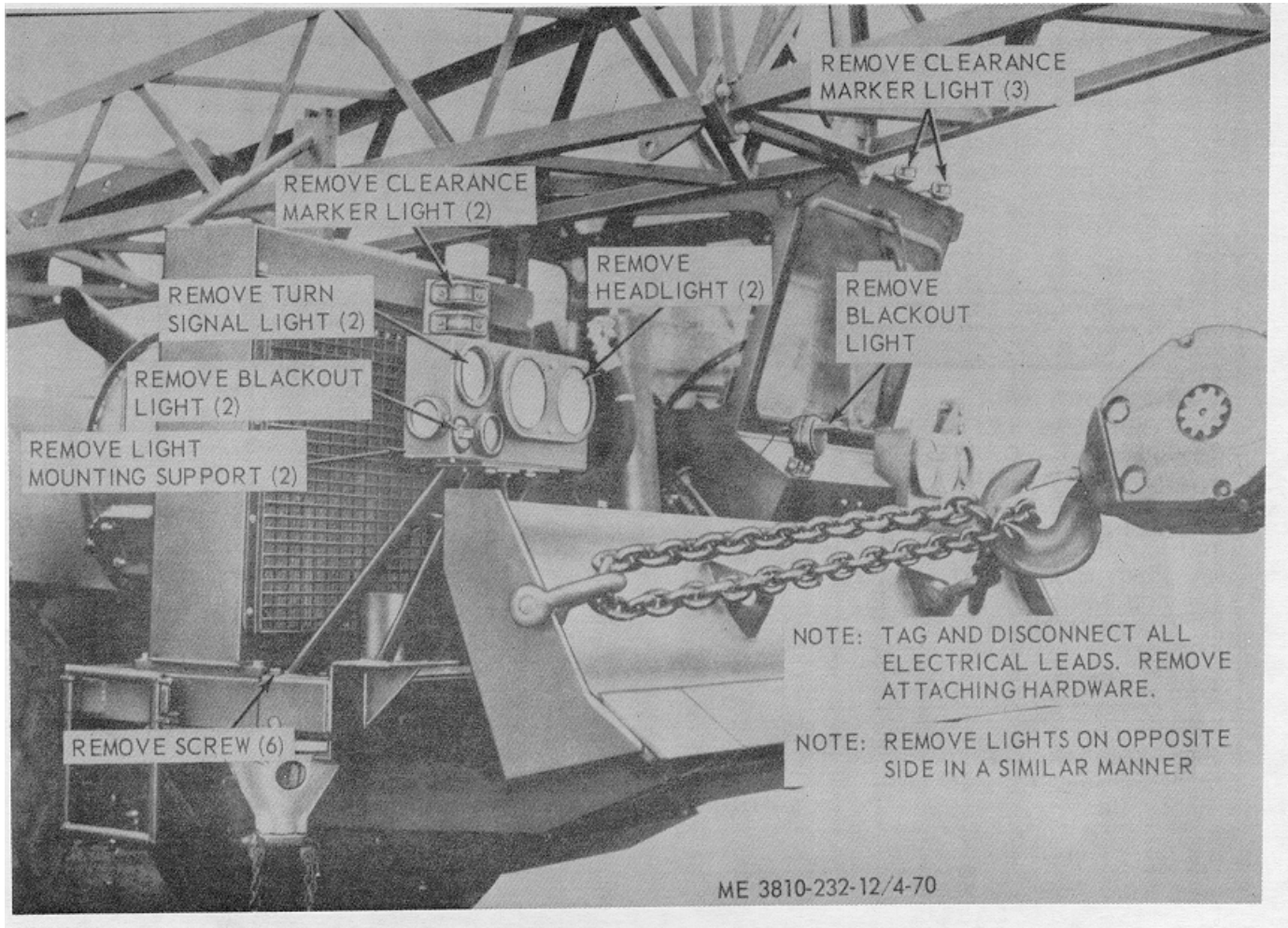
Figure 4-69. Marker, blackout and headlights, removal and installation.(Model 2380).



- b. Replacement. Replace defective parts.
- c. Installation. Install marker, blackout, or headlight as illustrated in figure 4-69.

**4-73. Marker, Blackout, and Headlights (Model 2385)**

- a. Removal. Remove marker, blackout, or headlights as illustrated in figure 4-70.

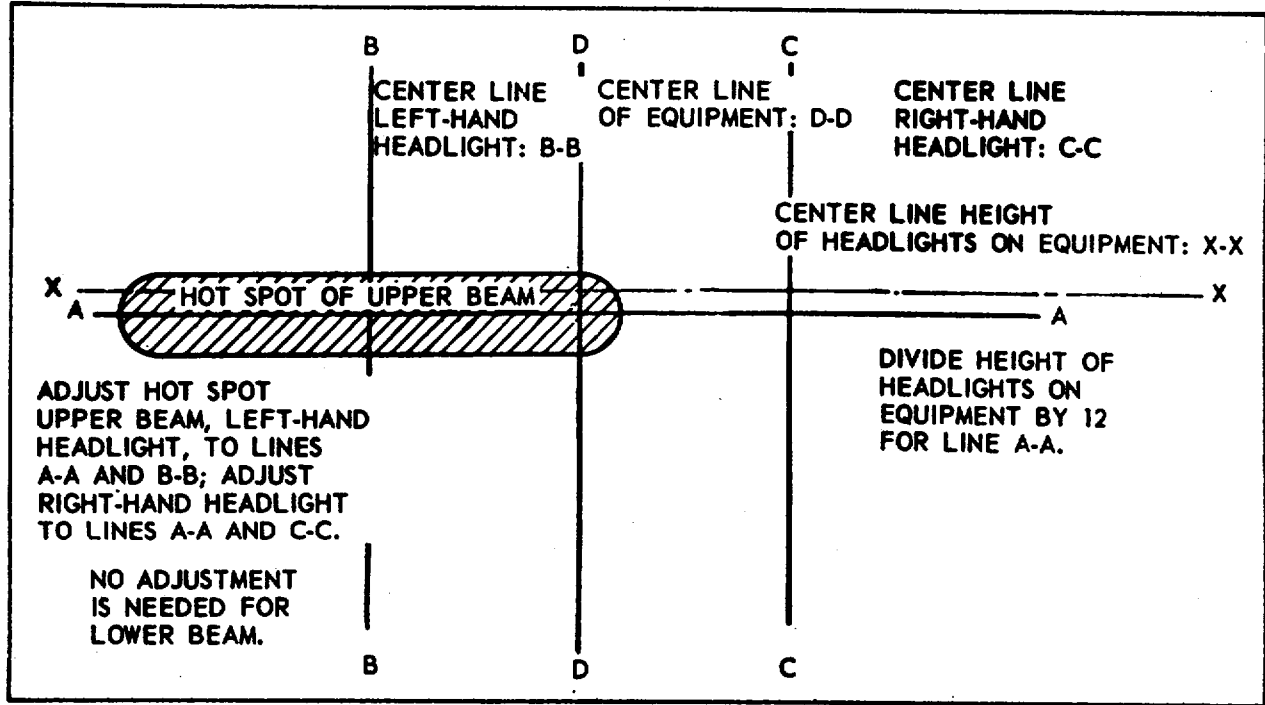


*Figure 4-70. Marker, blackout and headlights removal and installation (model 2385).*

- b. Replacement. Replace defective parts.
- c. Installation. Install marker, blackout, or headlight as illustrated in figure 4-70.

#### 4-74. Headlight Adjustment

- a. Position the carrier on a flat and level surface at right angles to, and 25 feet from a suitable vertical surface. Use the headlight adjusting diagram, figure 4-71, for aid in laying out adjustment lines.



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Figure 4-71. Headlight adjusting diagram.

- b. Measure height of headlight center from floor, and mark an horizontal line (X-X) at this height on vertical surface.
- c. Mark line (A-A) one-twelfth of distance between line (X-X) and floor, below line (X-X).
- d. Draw vertical lines (B-B) and (C-C) directly in front of each headlight.
- e. Turn on headlights and select high beam.
- f. Remove headlight rim.
- g. Turn top adjusting screw in or out for vertical adjustment and turn side screw for horizontal adjustment of sealed beam. Use a cover to cover one headlight while aiming the other.
- h. Replace the headlight rim.

#### 4-75. Dome Light

- a. Removal Remove dome light as illustrated in figure 4-72.
- b. Installation. Install dome light as illustrated in figure 4-72.

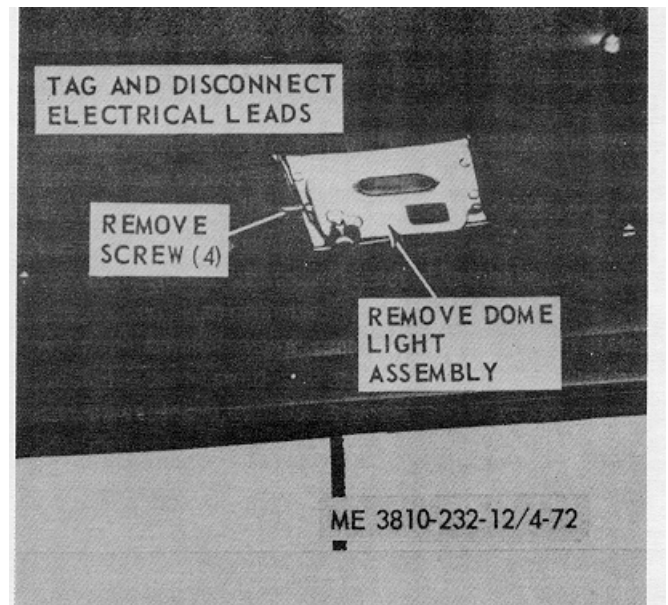
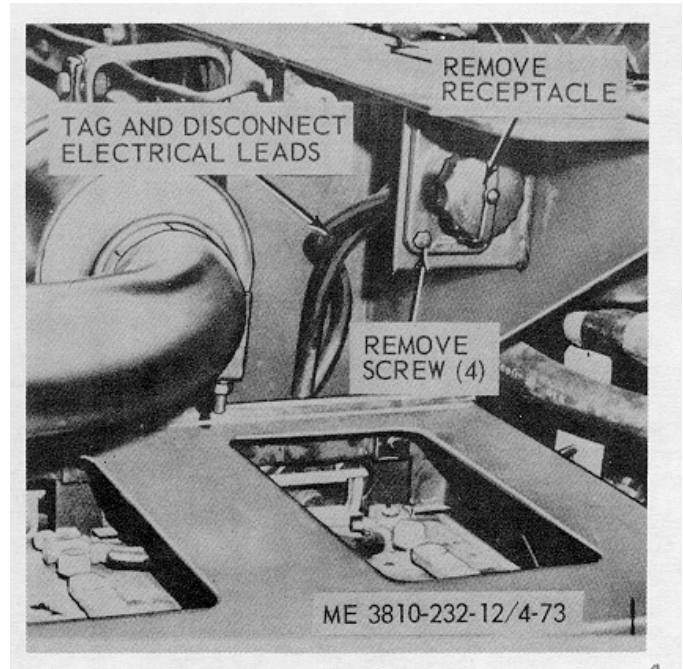


Figure 4-72. Dome light, removal and installation.

**4-76. Slave Receptacle (Model 2380)**

a. Removal. Remove slave receptacle as illustrated in figure 4-73.



*Figure 4-73. Carrier slave receptacle, removal and installation (model 2380).*

**4-77**

b. *Installation.* Install slave receptacle as illustrated in figure 4-73.

#### 4-77. Slave Receptacle (Model 2385)

a. *Removal.* Remove slave receptacle as illustrated in figure 4-74.

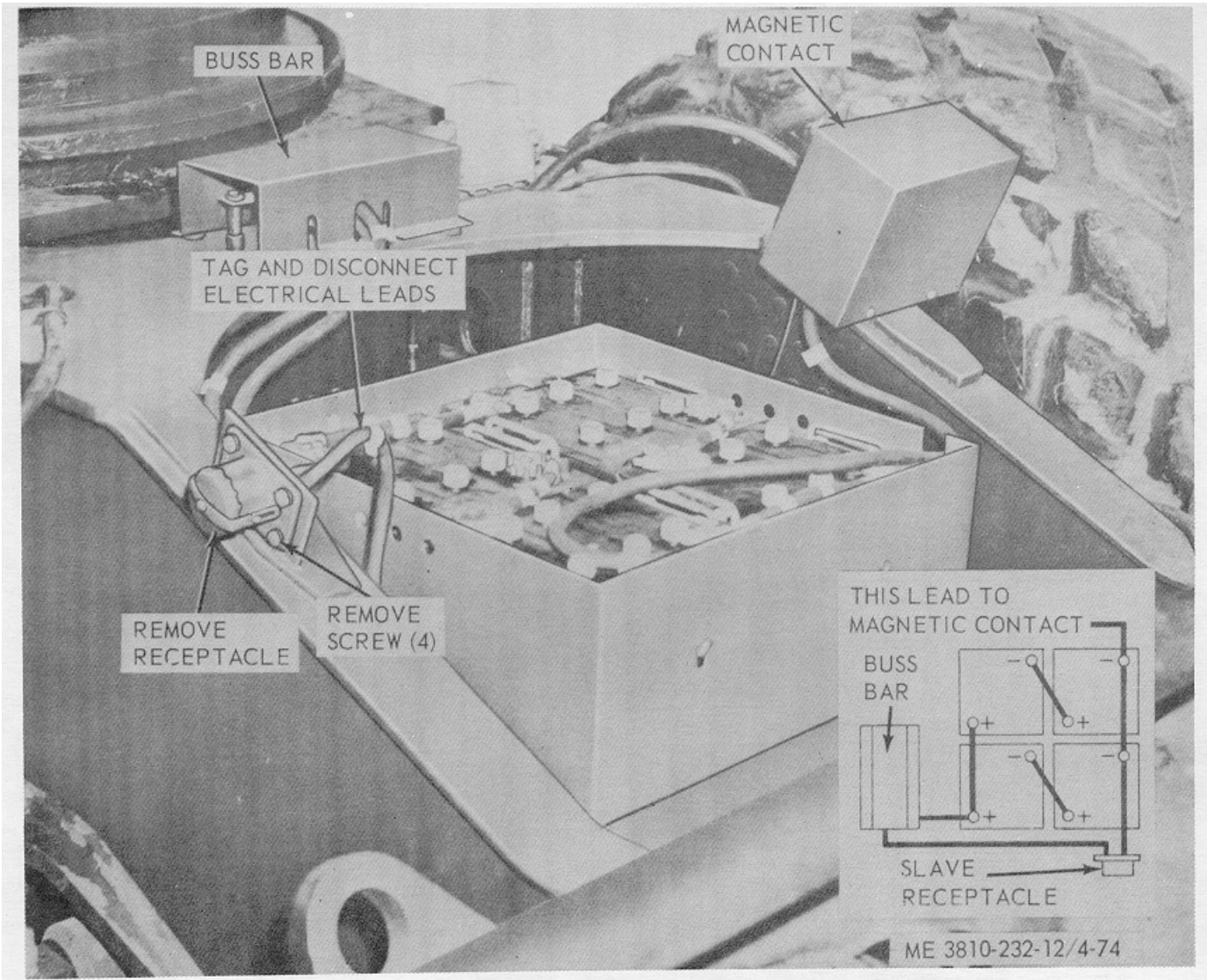


Figure 4-74. Carrier slave receptacle, removal and installation. (Model 2385).

b. Installation. Install slave receptacle as illustrated in figure 4-74.

#### 4-78. Stoplight Switch

a. Removal. Remove stoplight switch as illustrated in figure 4-75.

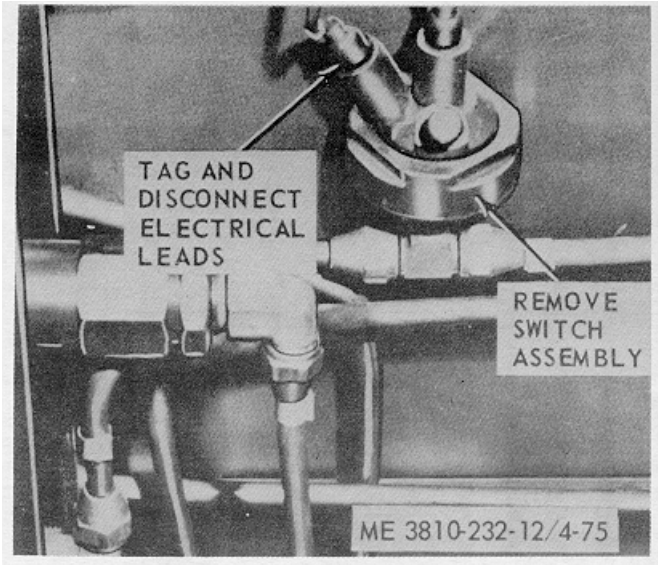


Figure 4-75. Stoplight switch, removal and installation.

b. Installation. Install stoplight switch as illustrated in figure 4-75.

#### 4-79. Turn Signal Switch

a. Removal. Remove turn signal switch as illustrated in figure 4-76.

b. Installation. Install turn signal switch as illustrated in figure 4-76.

#### 4-80. Trouble Light and Reel

a. Removal. Remove trouble light and reel as illustrated in figure 2-7 for model 2380 and 2-8 for model 2385.

b. Replacement. Replace defective parts.

c. Installation. Install the carrier trouble light and reel as illustrated in figure 2-7 or 2-8.

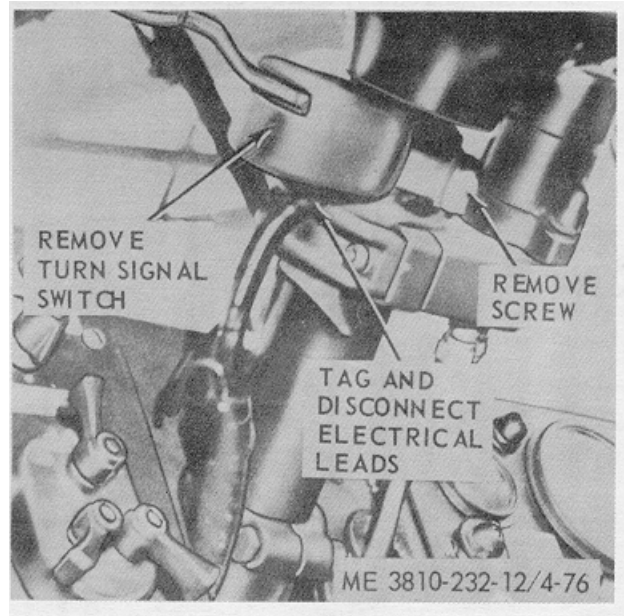


Figure 4-76. Turn signal switch, removal and installation.

## Section XVII. MAINTENANCE OF CRANE ENGINE ELECTRICAL SYSTEM CONTROLS AND INSTRUMENTS

### 4-81. General

The crane electrical system consists of four 12-volt batteries, connected in series, a starter, generator, generator regulator, lights, gages, and the wiring.

#### CAUTION

Remove ground cable from battery before servicing or removing any electrical component.

### 4-82. Batteries, Cables, and Battery Box

a. Servicing and Testing. Service and test the crane batteries as instructed in paragraph 4-60.

b. Removal.

(1) Remove battery box cover.

(2) Remove cables, batteries, and box as illustrated in figure 4-77.

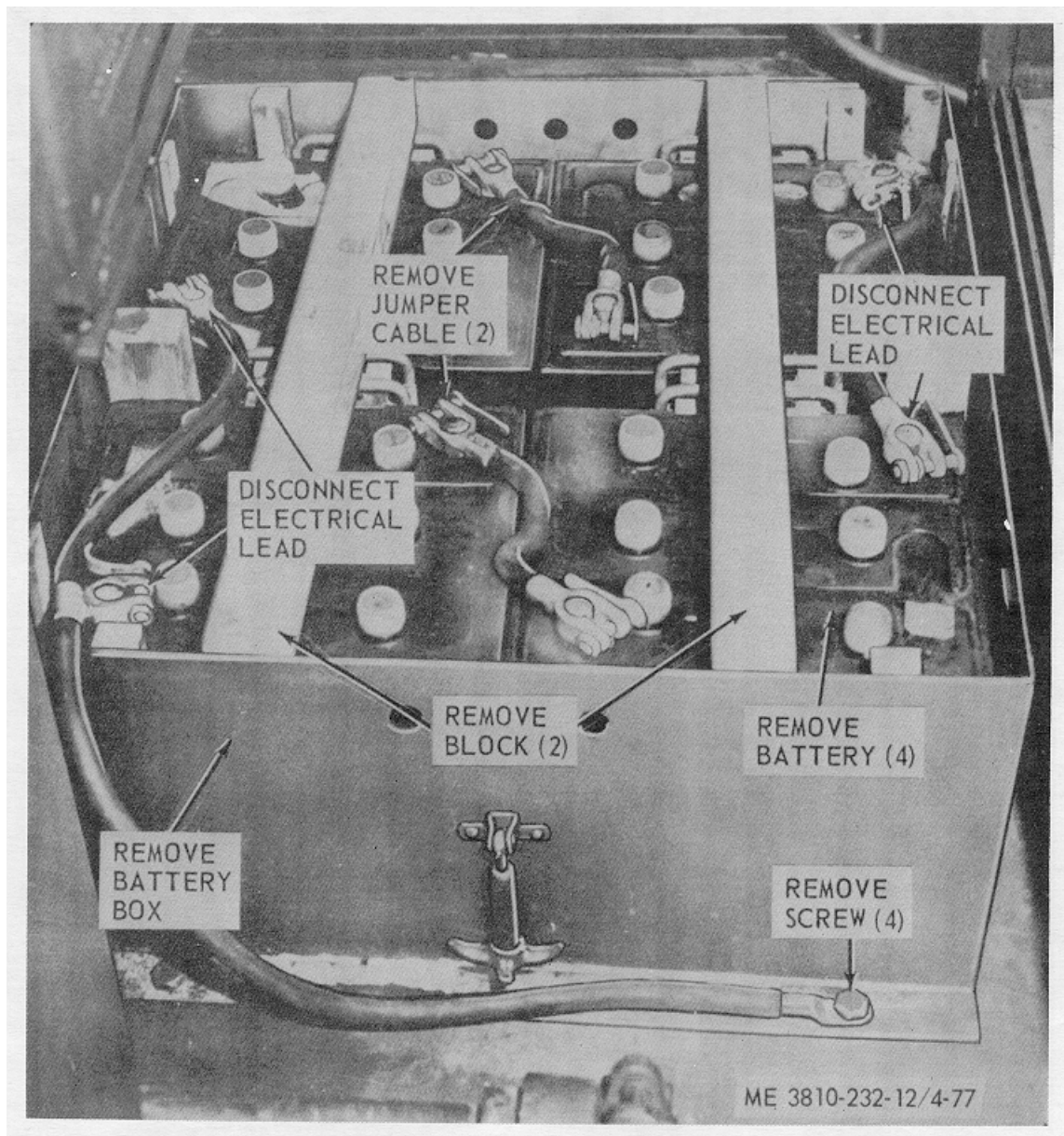


Figure 4-77. Crane batteries, cables and box, removal and installation.



c. Cleaning, Inspection and Replacement. Clean, inspect, and replace crane batteries, cables, and battery box as instructed in paragraph 4-61.

d. Installation

(1) Install crane battery box, batteries and cables as illustrated in figure 4-77.

(2) Install battery box cover.

#### 4-83. Starter and Solenoid

a. Removal.

(1) Remove starter and solenoid as illustrated in figure 4-78.

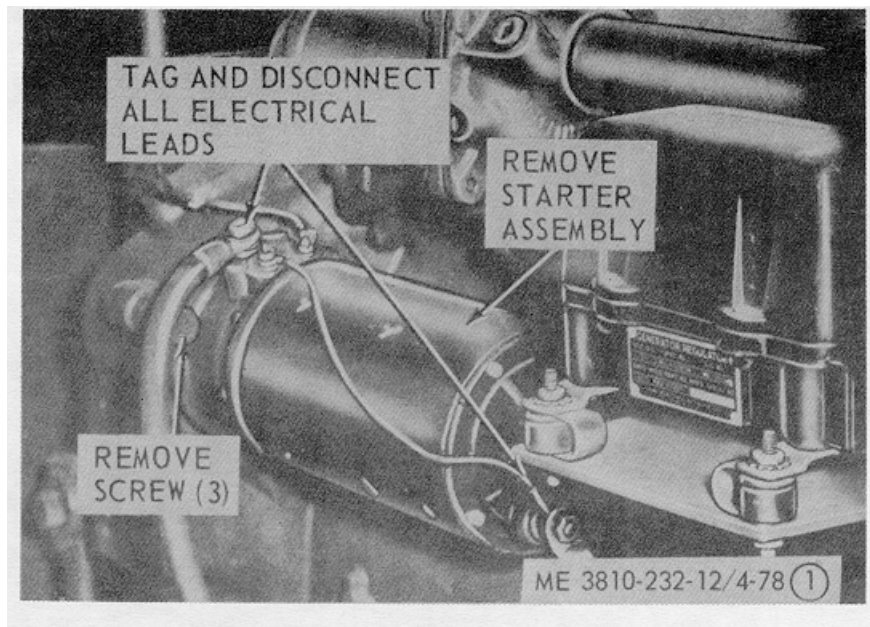


Figure 4-78. Crane engine starter and solenoid, removal and installation. Sheet 1 of 3.

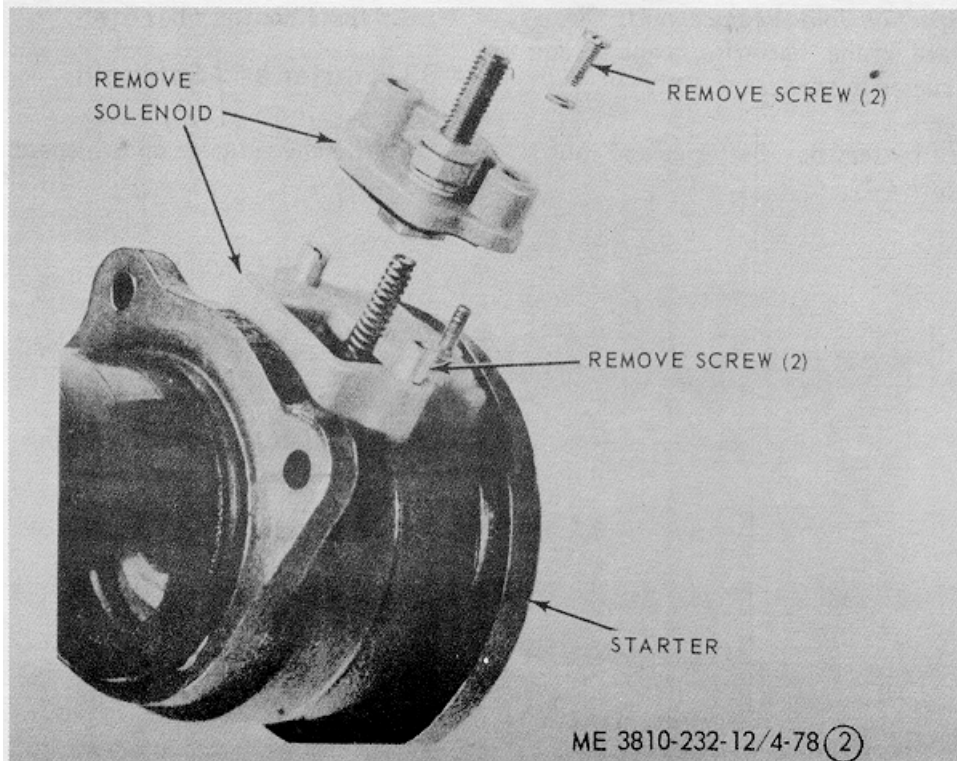
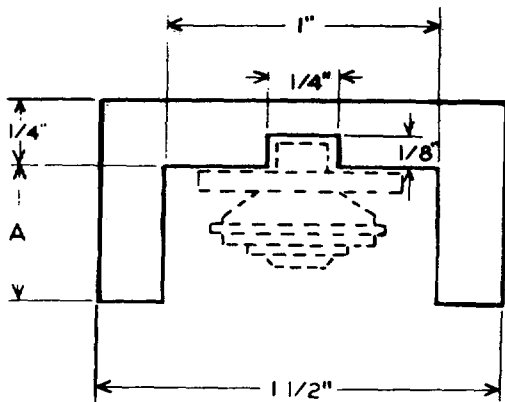
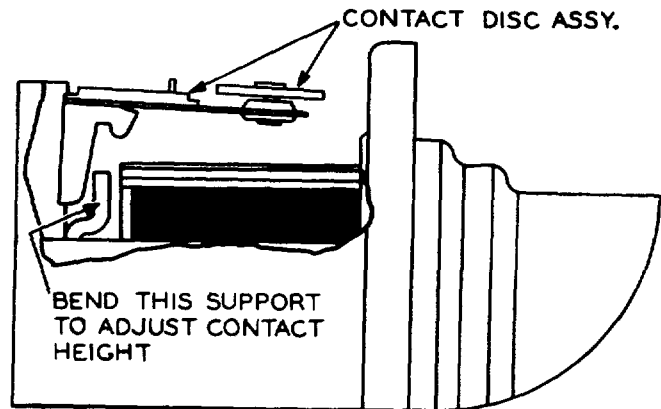


Figure 4-78. Crane engine starter and solenoid, removal and installation. Sheet 2 of 3.



.50-.55 inch gauge dimension height of switch contact to flat of pinion housing with solenoid sealed.



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Figure 4-78. Crane engine s tarter and solenoid, removal and installation, Sheet 3 of 3.



b. Cleaning and Inspection.

(1) Clean starter and solenoid with a damp cloth.

(2) Rotate drive pinion to see that the armature turns freely and does not bind. If armature binds, replace starter.

(3) brushes for excessive wear.

(4) Inspect solenoid contact assembly.

(5) Inspect wires for frays and breaks.

(6) Inspect for damage and defects.

c. Replacement.

(1) Replace defective wires.

(2) Replace a defective solenoid.

(3) Replace starter brushes as illustrated in figure 4-56.

(4) Replace a defective starter.

d. Adjustment and Installation.

(1) Place a gage, made of sheet metal and cut to dimensions shown in figure 3-78, over center of solenoid contact disc. Energize solenoid by applying battery to solenoid terminal and ground. Contact disc should bottom on gage. Adjust contact height by bending support as shown in figure 4-78.

(2) Install solenoid as illustrated in figure 4-78.

(3) Install starter as illustrated in figure 4-78.

#### 4-84. Generator Belt

a. Removal.

(1) Remove fan belts as instructed in paragraph 4-58.

(2) Remove generator belt as illustrated in figure 4-79.

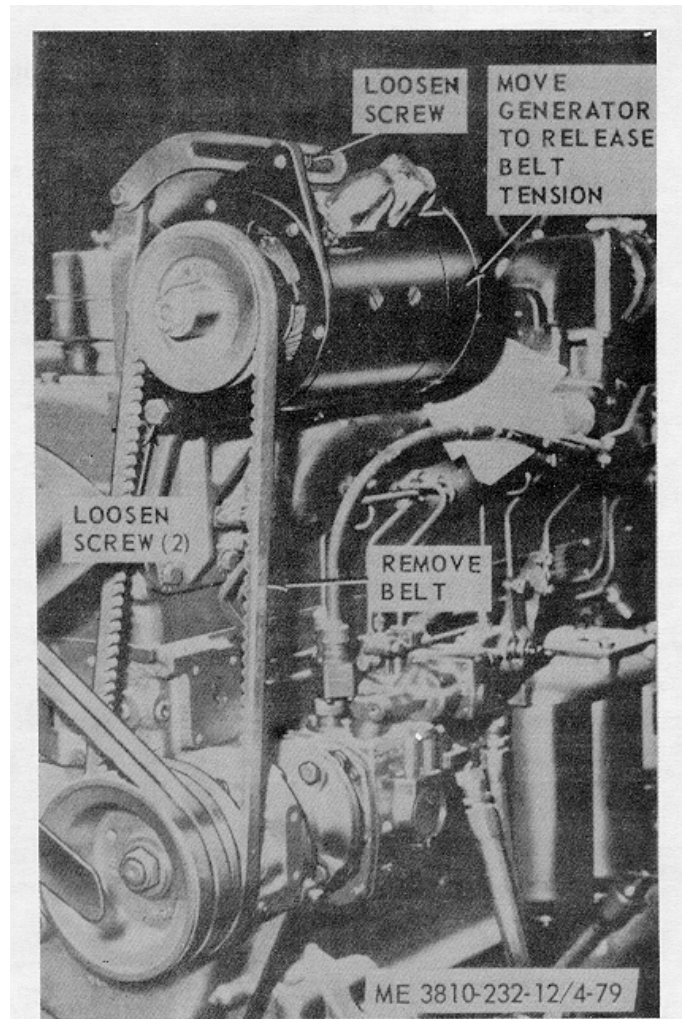


Figure 4-79. Crane engine generator belt, removal and installation

- b. Cleaning and Inspection.
  - (1) Clean belt with a damp cloth.
  - (2) Inspect belt for cracks, breaks, and frayed or stretched condition. Replace a defective belt.
- c. Installation.
  - (1) Install generator belt as illustrated in figure 4-79.
  - (2) Install fan belts as instructed in paragraph 4-58.
  - (3) Adjust the crane engine belts as instructed in paragraph 3-17.

**4-85. Generator**

- a. removal
  - (1) Remove generator belt as instructed in para- graph 4-84.

- (2) Disconnect generator electrical leads.
- (3) Remove loosened generator attach screws.

- b. Cleaning and Inspection. Clean, inspect and re- place generator and generator brushes as instructed in paragraph 4-64.

- c. Installation.
  - (1) Install generator.
  - (2) Install generator belt as instructed in para- graph 4-84.

- d. Polarize. Polarize generator as instructed in paragraph 4-64.

**4-86. Instrument Panel**

- a. Removal and Disassembly.
  - (1) Remove crane instrument panel as illustrated in figure 4-80.

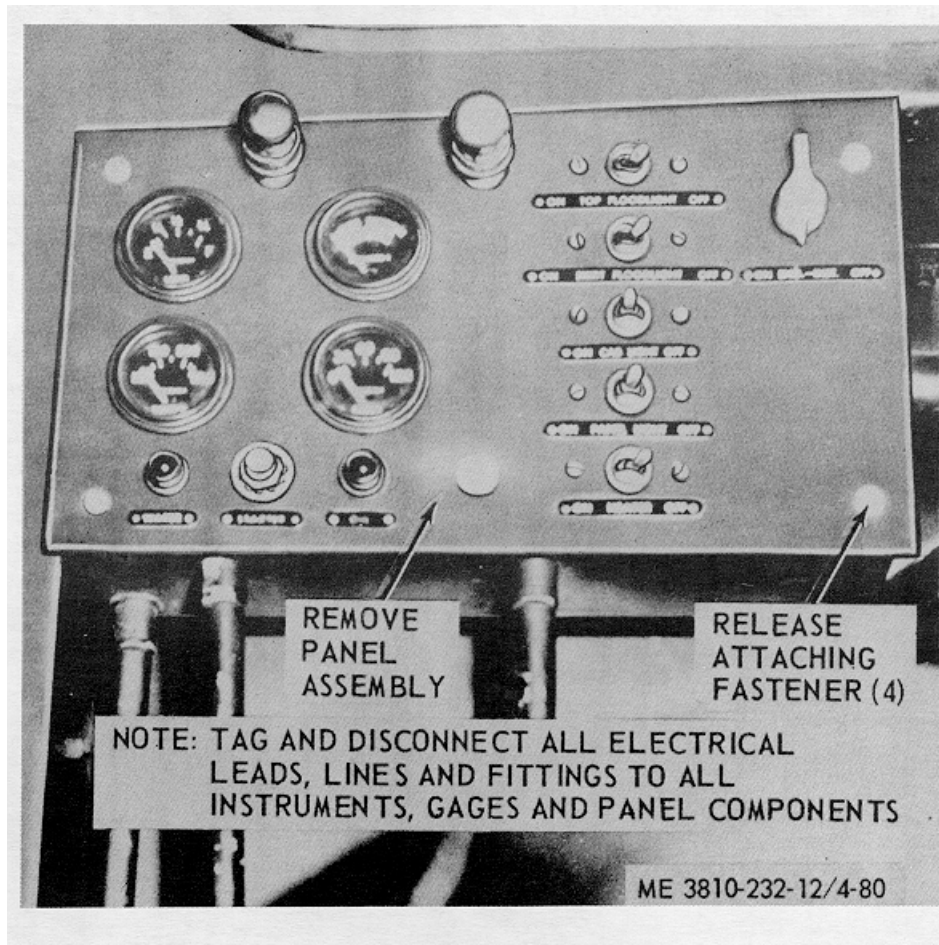
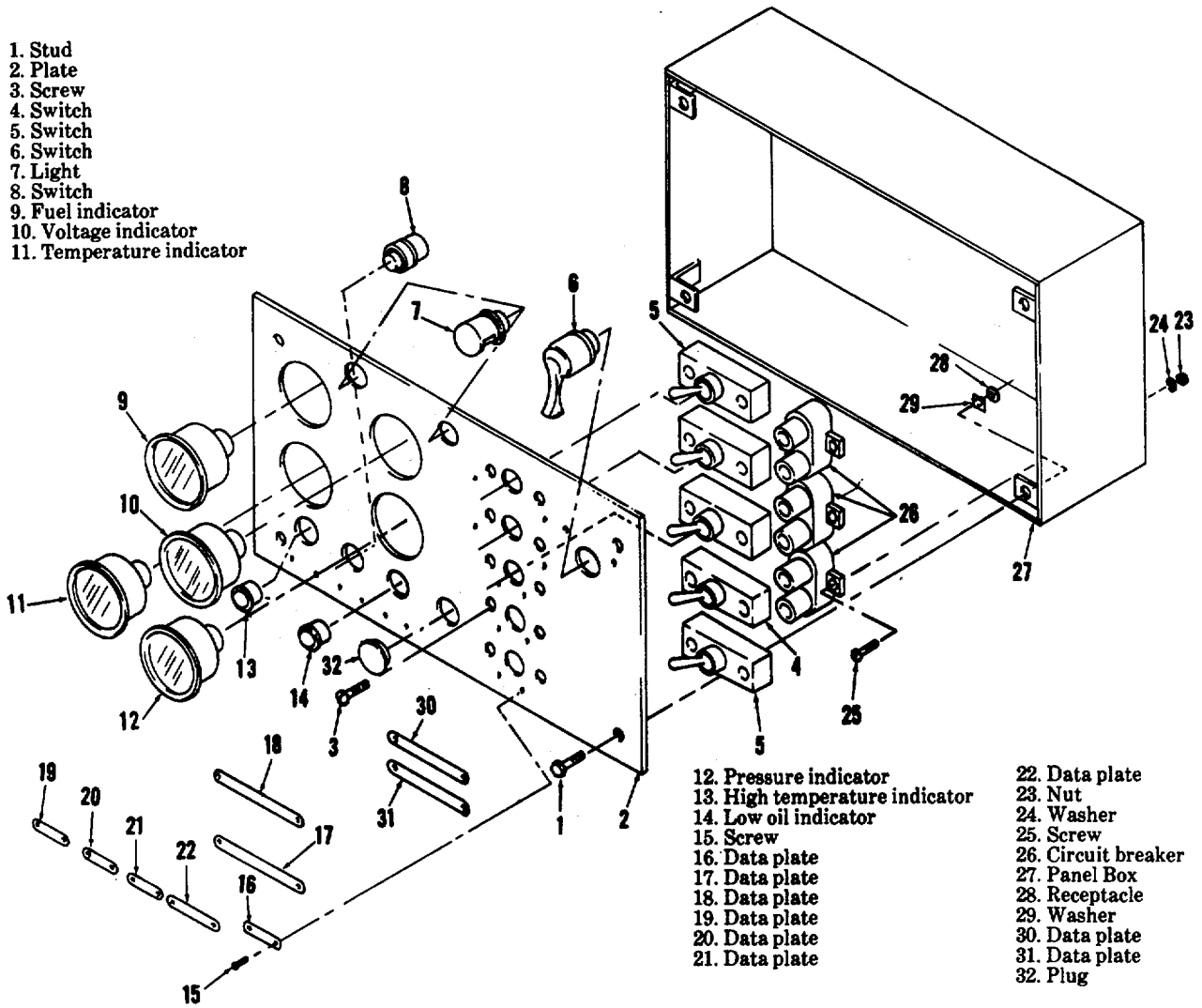


Figure 4-80. Crane instrument panel, removal and installation.

(2) Disassemble the crane instrument panel as illustrated in figure 4-81.

- 1. Stud
- 2. Plate
- 3. Screw
- 4. Switch
- 5. Switch
- 6. Switch
- 7. Light
- 8. Switch
- 9. Fuel indicator
- 10. Voltage indicator
- 11. Temperature indicator



- 12. Pressure indicator
- 13. High temperature indicator
- 14. Low oil indicator
- 15. Screw
- 16. Data plate
- 17. Data plate
- 18. Data plate
- 19. Data plate
- 20. Data plate
- 21. Data plate
- 22. Data plate
- 23. Nut
- 24. Washer
- 25. Screw
- 26. Circuit breaker
- 27. Panel Box
- 28. Receptacle
- 29. Washer
- 30. Data plate
- 31. Data plate
- 32. Plug

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Figure 4-81. Crane instrument panel, disassembly and reassembly.

*b. Cleaning and Inspection.*

- (1) Clean all parts.
- (2) Inspect for defects or damage.
- (3) Replace defective or damaged parts as required.

*c. Reassembly and Installation.*

- (1) Reassemble instrument panel as illustrated in figure 4-80.

- (2) Install instrument panel as illustrated in figure 4-81.

**4-87. Oil Pressure Sending Unit, and Pressure Switch**

- a. Removal.** Remove oil pressure sending unit and pressure switch as illustrated in figure 4-82.

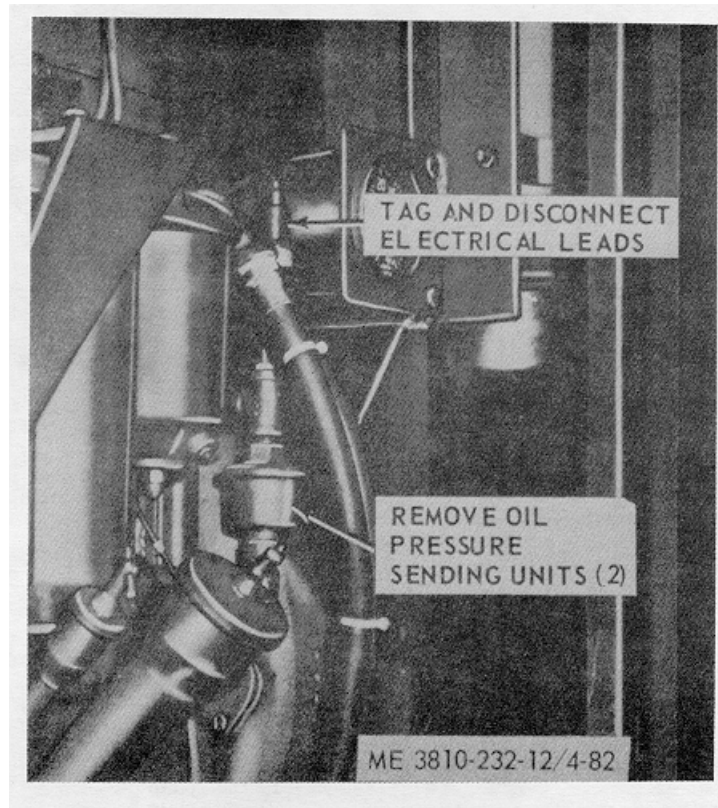


Figure 4-82. Crane engine oil pressure sending unit and pressure switch, removal and installation.

- b. Cleaning and Inspection.
  - (1) Clean parts with a damp cloth.
  - (2) Inspect for defects and damage.
  - (3) Replace defective or damaged unit.
- c. Installation. Install oil pressure sending unit and pressure switch as illustrated in figure 4-82.

**4-88. Water Temperature Sending Units a. Removal.**

- (1) Drain cooling system.
- (2) Remove water temperature sending units as illustrated in figure 4-83.
- b. Cleaning and Inspection.
  - (1) Clean parts with a damp cloth.
  - (2) Inspect for defects and damage.
  - (3) Replace defective or damaged sending unit.
- c. Installation.
  - (1) Install water temperature sending units as illustrated in figure 4-83.
  - (2) Fill cooling system as instructed in paragraph 3-21.

**4-89. Slave Receptacle**

a, *removal* Remove slave receptacle as illustrated in figure 4-84.

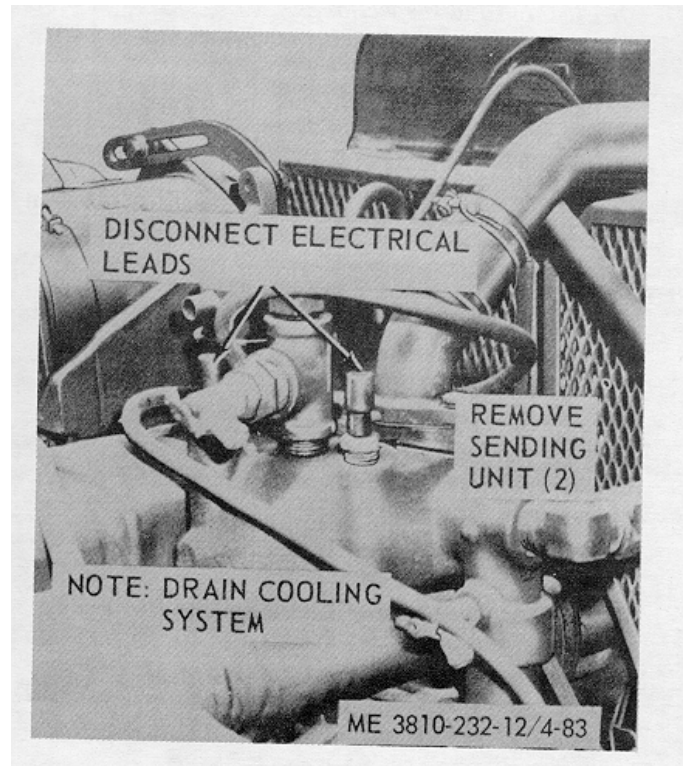


Figure 4-833. Crane engine water temperature sending units, removal and installation

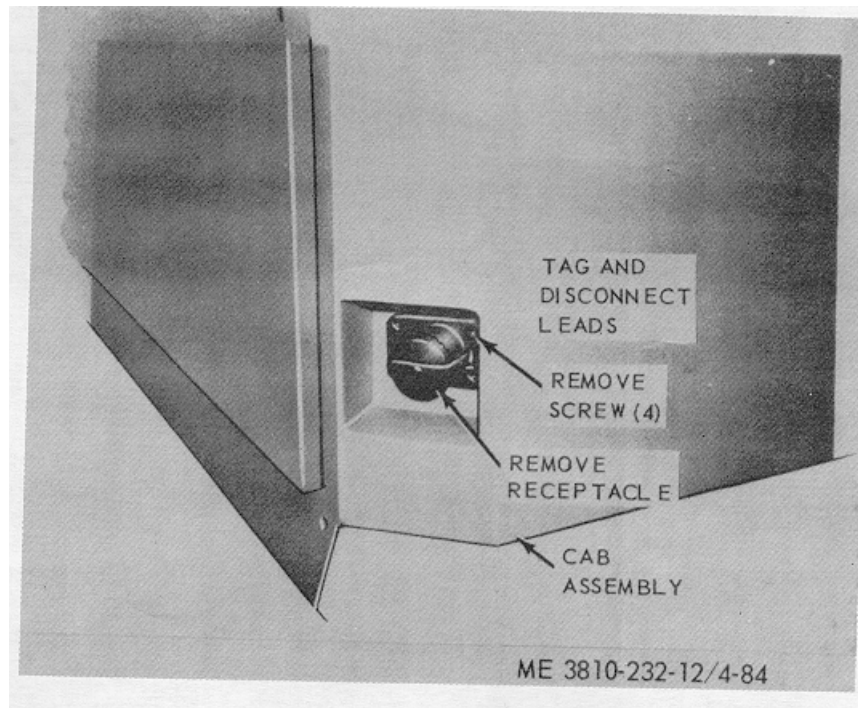


Figure 4-84. Crane slave receptacle, removal and installation.

b. *Cleaning and Inspection.*

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

(2) *Inspect* receptacle for breaks, frayed or broken leads, and other damage.

(3) Replace defective or damaged unit.

c. *Installation* Install receptacle as illustrated in figure 4-84.

**4-90. Trouble Light and Reel**

a. *removal* Remove crane trouble light and reel as illustrated in figure 2-6.

b. *Replacement.* Replace defective parts.

c. *Installation.* Install trouble light and reel as illustrated in figure 2-6.

4-91. Horn

a. *removal* Remove crane horn as illustrated in figure 4-85.

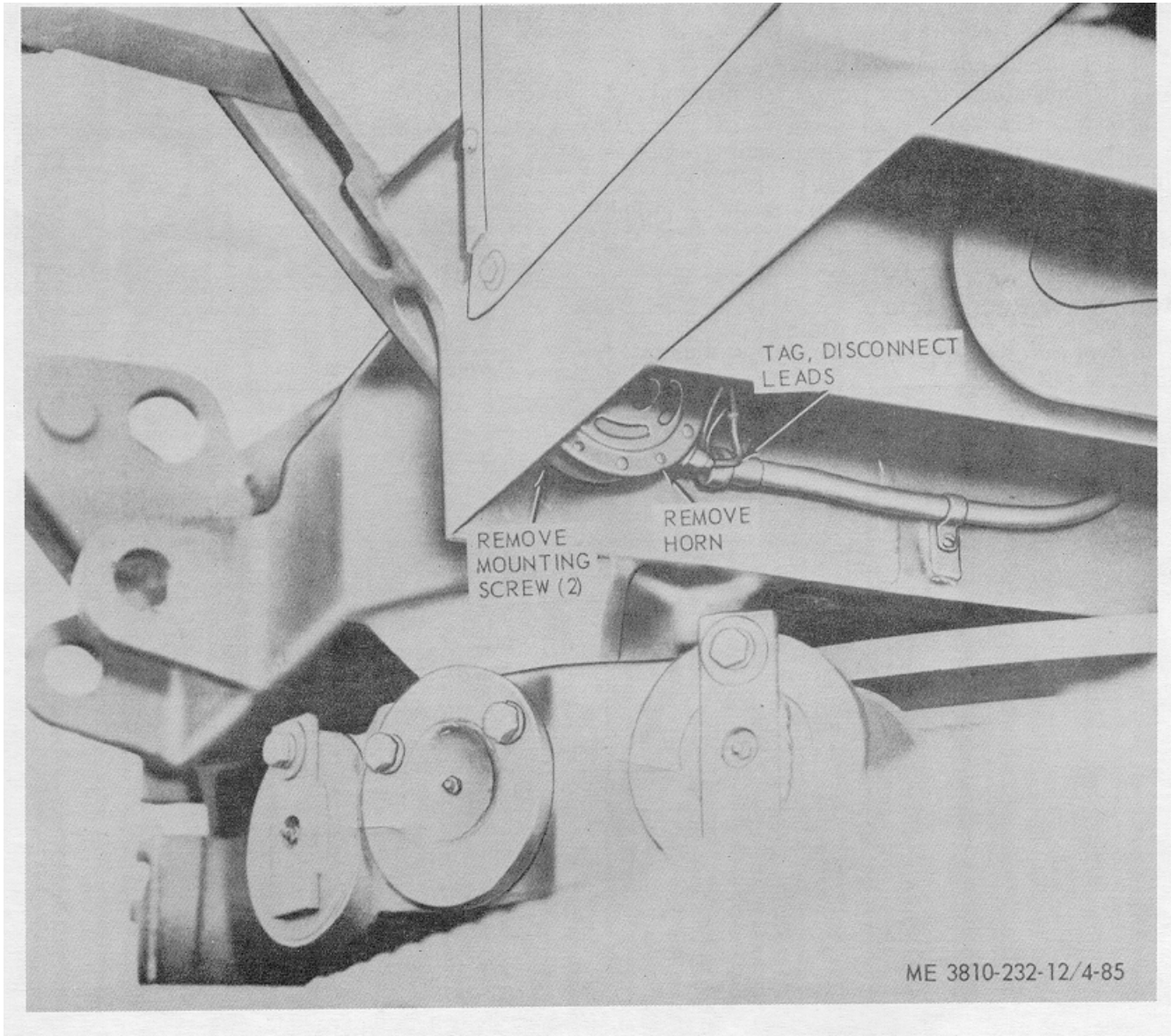


Figure 4-85. Crane horn, removal and installation.

- b. Cleaning and Inspection.
  - (1) Clean horn with a damp cloth.
  - (2) Inspect for defects or damage.
  - (3) Replace defective or damaged parts.
- c. Installation. Install horn as illustrated in figure 4-85.

**4-92. Floodlights**

- a. Removal Remove the floodlights as illustrated in figure 4-86.
- b. Replacement. Replace defective parts.
- c. Installation. Install floodlights as illustrated in figure 4-86.

**4-93. Crane Cab Wiring**

Inspect and repair the crane cab wiring as instructed in paragraph 4-69.

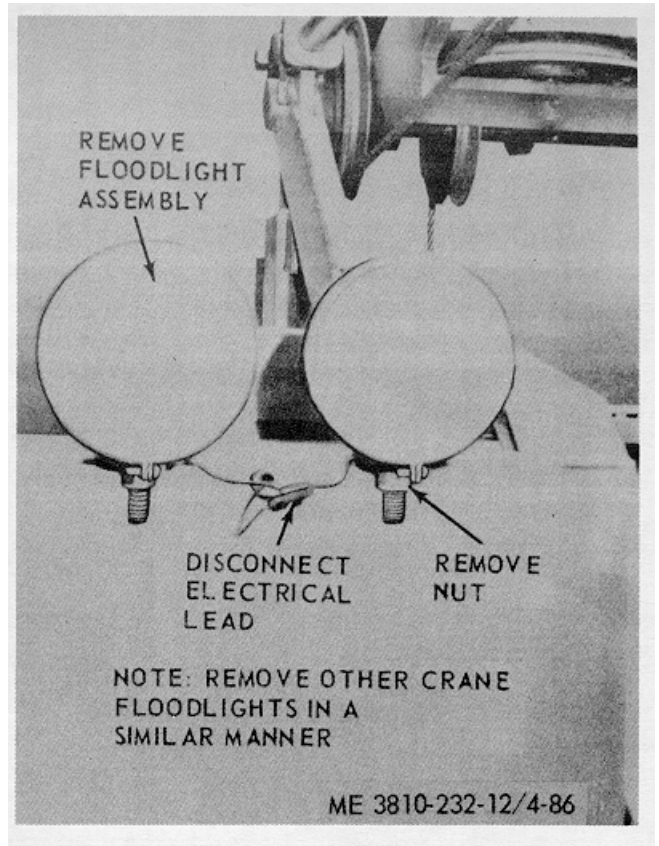


Figure 4-86. Floodlight, removal and installation

**Section XVIII. CRANE HYDRAULIC SYSTEM**

**4-94. General**

Each hydraulic control 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 cylinder is connected to a clutch by mechanical linkage. Movement of a lever actuates the position in the corresponding cylinder.

**NOTE**

Be sure the working area is clean when working on hydraulic components. Cleanliness is the greatest factor for good hydraulic operation.

**4-95. Service ,**

a. *Fill (Model 2380).* Add hydraulic fluid to master cylinder until level is 1/6 inch from top. Refer to lubrication order.

b. *Fill (Model 2385).* Add hydraulic fluid to master cylinder reservoir until level is at HIGH level mark on dipstick. Keep oil level between HIGH and LOW level marks. Refer to lubrication order.

c. Bleed.

(1) Cycle clutch until bleeder valve is at highest point of clutch.

(2) Attach hose of bleeding ball to bleeder valve. Draw off air and fluid into a container.

(3) bleed valve on clutch cylinder before detaching bleeder ball from master cylinder.

(4) Operate clutch. If clutch is still "spongy" or lacks desired holding power, check all hydraulic lines from master cylinder, including clutch cylinder, for any seepage. If seepage is found, retighten connections, or replace. Repeat bleeding operation.

**Section XIX. CRANE CLUTCH AND BRAKE ASSEMBLIES,  
CONTROLS AND LINKAGE**

**4-96. General**

a. Clutches. The operating clutches are of the internal expanding type. The band assemblies are composed of a clutch shoe with lining, and a clutch actuating arm retracting spring.

b. Brakes. The brakes are of the external-contracting type mounted on the outside of the clutch drums. They consist of a two-part hinged-attached brake assembly with lining. One end of the band assembly

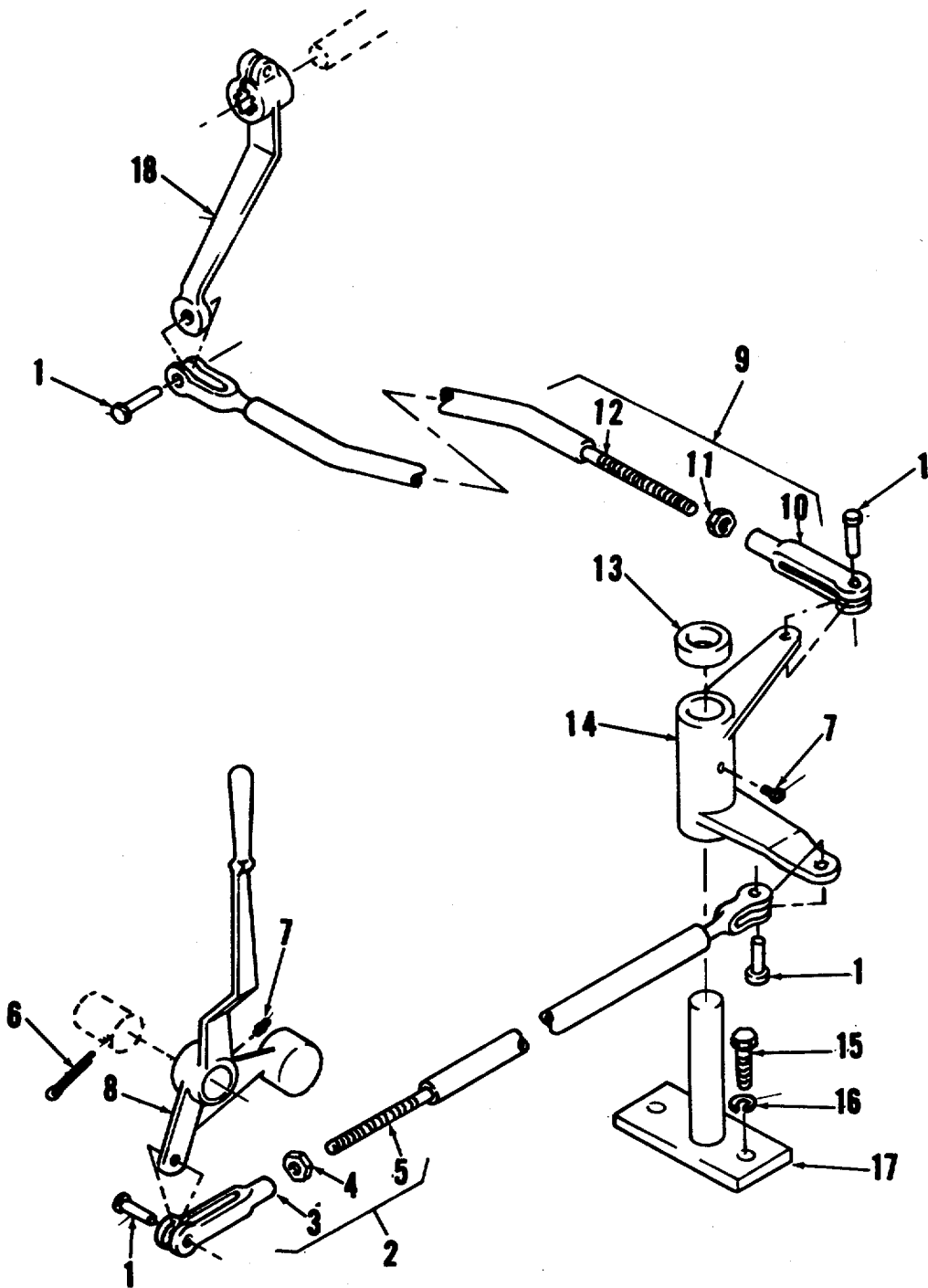
is anchored and the other is actuated.

**4-97. Master Clutch Control Assembly Adjustment**

a. When clutch is disengaged, the hand lever must fall back of vertical position.

b. Adjustment is performed by loosening clevis lock nut ((4) or (11) fig. 4-87) and rotating clevis (3) or (10) as required.





- |             |              |
|-------------|--------------|
| 1 Pin       | 10 Clevis    |
| 2 Connector | 11 Nut       |
| 3 Clevis    | 12 Clevis    |
| 4 Nut       | 13 Collar    |
| 5 Clevis    | 14 Bellcrank |
| 6 Pin       | 15 Screw     |
| 7 Fitting   | 16 Washer    |
| 8 Lever     | 17 Support   |
| 9 Connector | 18 Crank     |

Figure 4-87. Master clutch control assembly adjustment.

#### 4-98. Crane Engine Clutch

Adjust the crane engine clutch as illustrated in figure 4-88.

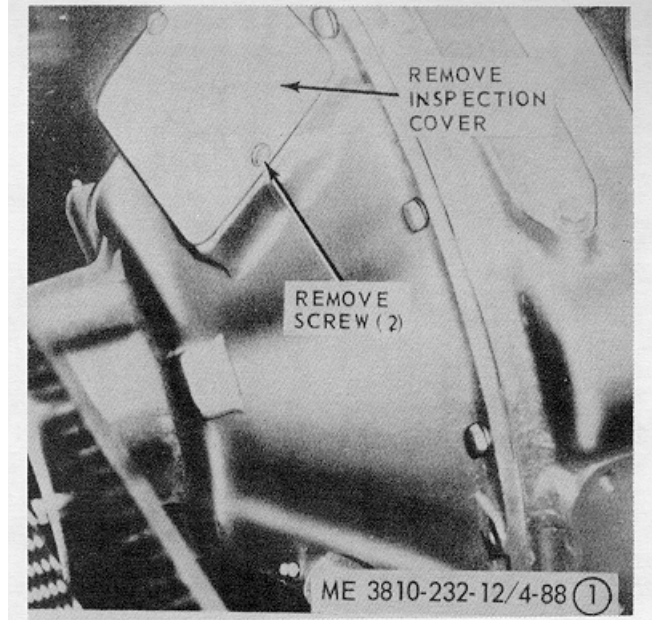


Figure 4-88. Crane engine clutch adjustment. Sheet 1 of 2.

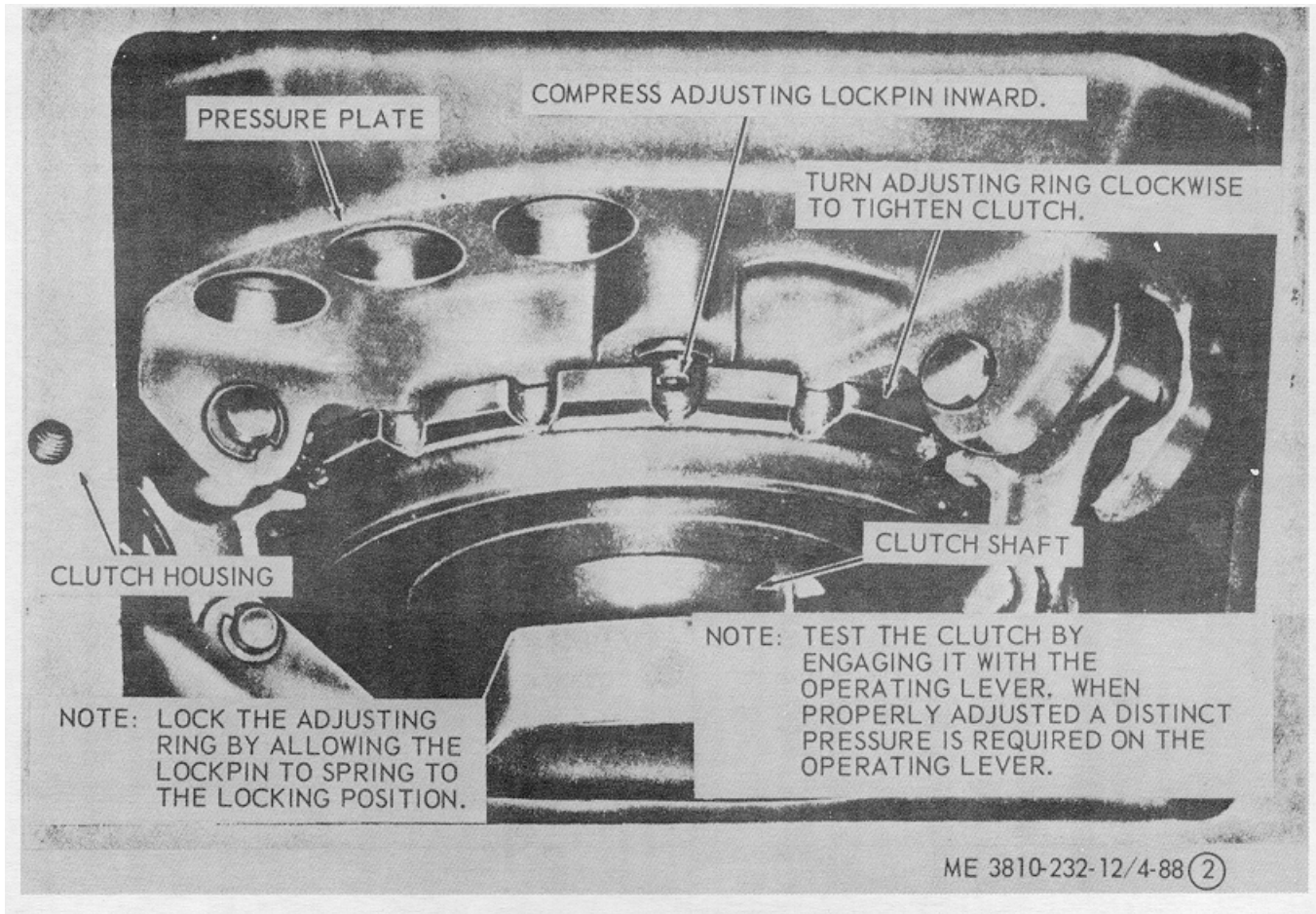


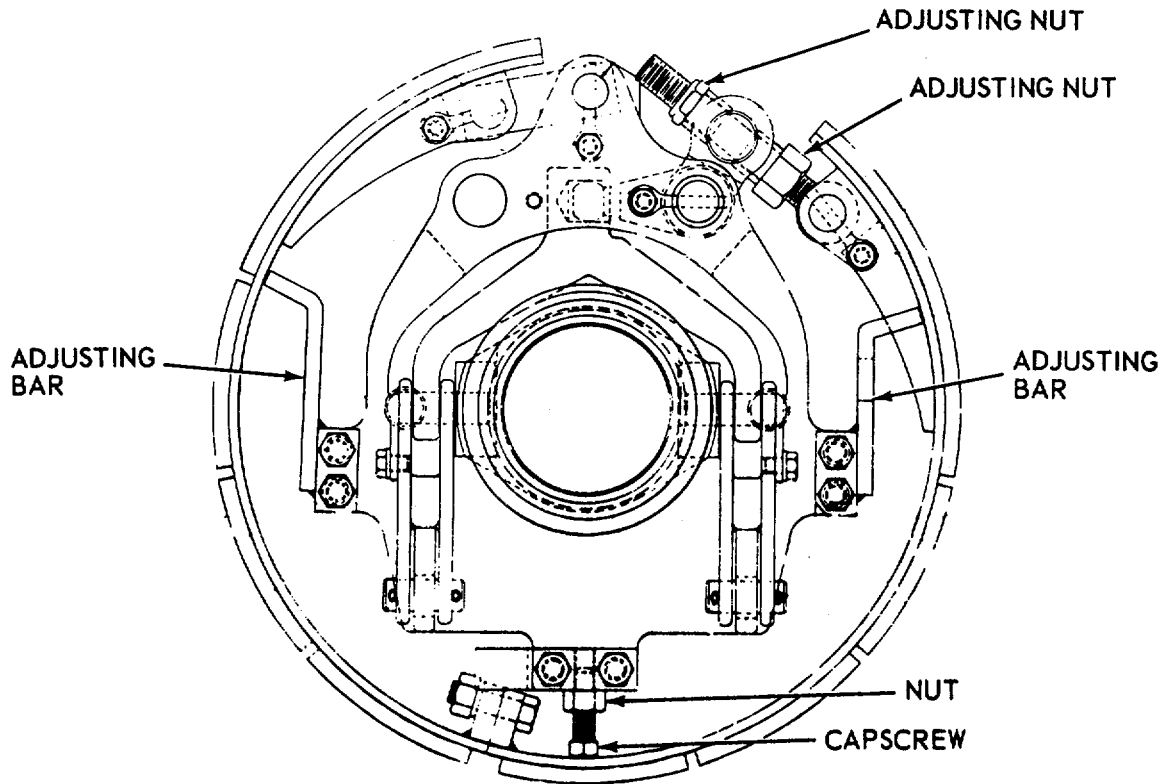
Figure 4-88. Crane engine clutch adjustment. Sheet 2 of 2

**4-99. Swing Shaft Clutch Bands (Left Hand and Right Hand) Adjustments**

**NOTE**

The left-hand swing shaft clutch requires a special wrench (table 4-1).

a. Loosen adjusting nut, figure 4-89, nearest the end of the eyebolt, and run the other adjusting nut tight against the swivel pin. Ensure these nuts are tight after adjustment is made.



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Figure 4-89. Clutch band adjustment

b. Adjust the adjusting bars and nut and capscrew to allow approximately 1/32 inch clearance between band and stops with clutch engaged. The band lining should never be allowed to drag on the drums, when clutch is fully disengaged.

**4-100. Independent Boom Hoist Clutch Bands Adjustment**

Adjust the independent boom hoist clutch bands in

the same manner as the left hand swing shaft clutch bands.

**4-101. Auxiliary Shaft Clutch Bands (Power Load Lowering)**

- a. Engage clutch by toggling in lever.
- b. Use a feeler gage to set distance between dead end setscrew (fig. 4-90) on spider and band (not lining) at 0.010 inch.
- c. Tighten locknuts

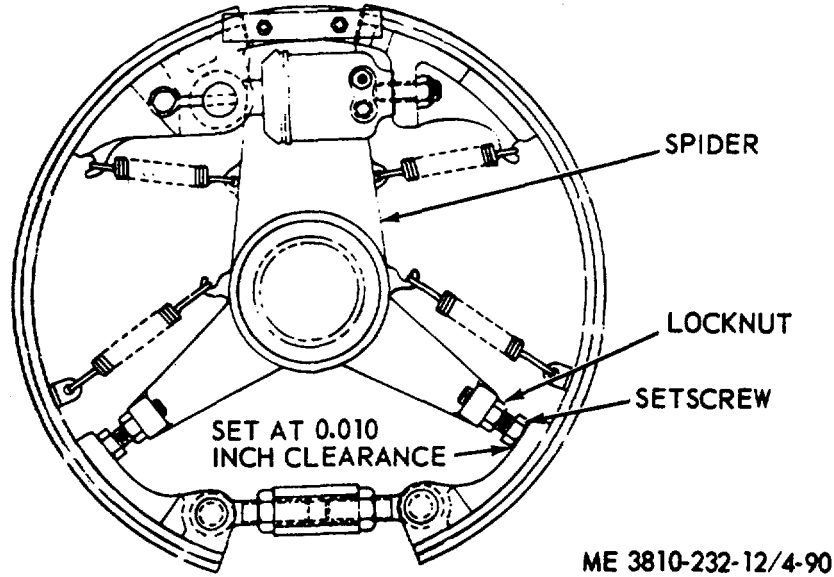


Figure 4-90. Auxiliary clutch adjustment.

**4-102. Hoist Drum Shaft Clutch Bands (Left Hand and Right Hand) Adjustment**

- a. Engage clutch by toggling in lever.
- b. Use a feeler gage to set distance between dead and setscrew (fig. 4-91) on spider and band (not lining) at 0.005 inch.
- c. In the same manner set center adjusting screw gap at 0.008 inch and the line end adjusting screw

gap at 0.010 inch.

- d. Tighten locknuts.

**4-103. Boom Hoist Brakeband Adjustment**

Adjust boom hoist brake band as shown in figure 4-92.

**4-104. Hoist Brakeband Adjustment**

Adjust hoist Brakeband as shown in figure 4-93.

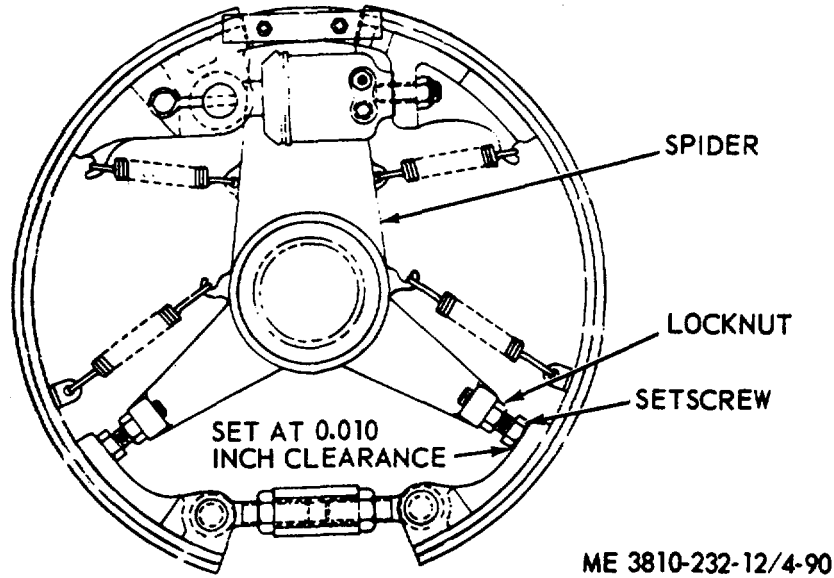
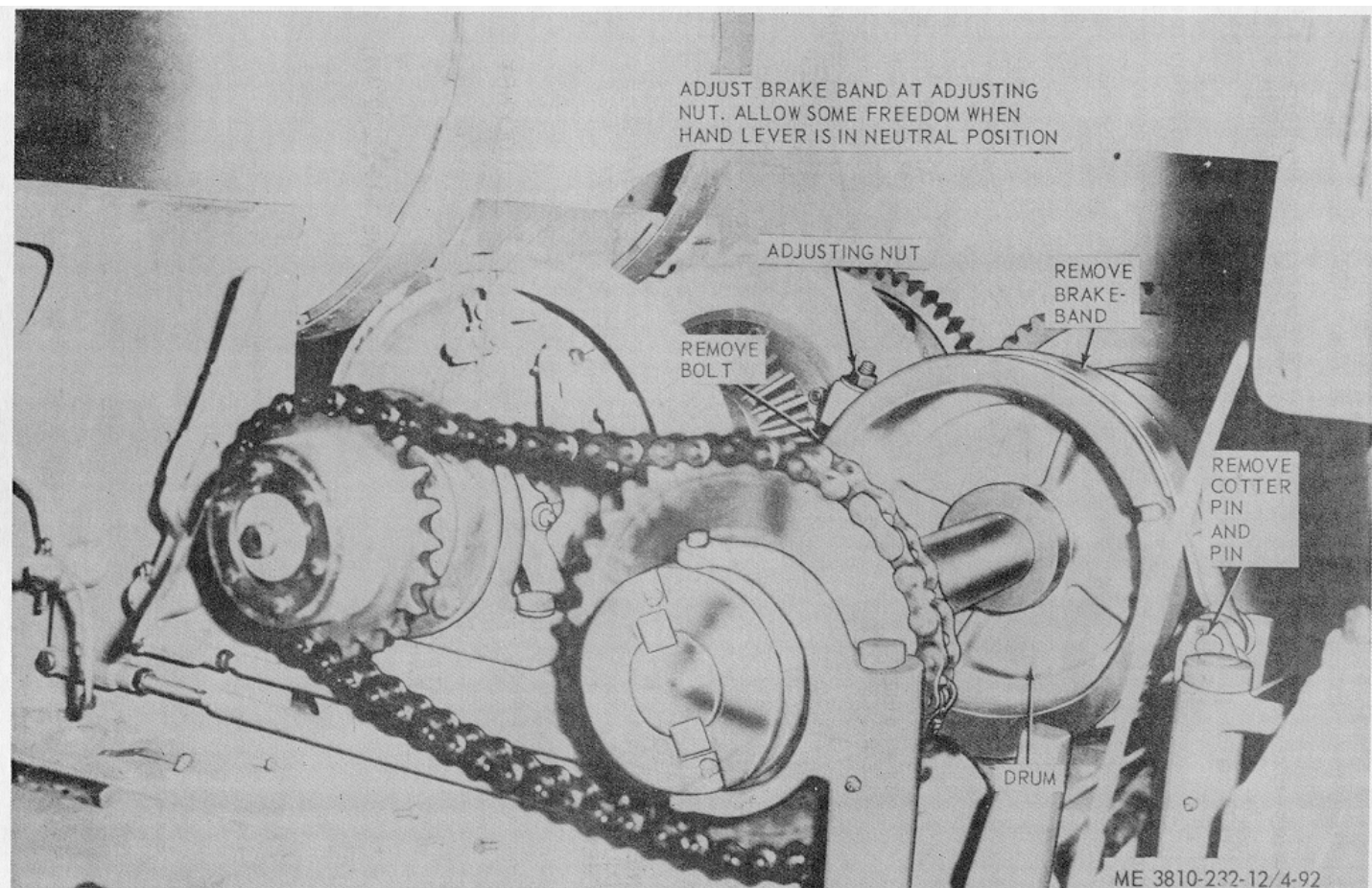


Figure 4-91. Hoist clutch adjustment



*Figure 4-92. Boom hoist Brakeband adjustment*

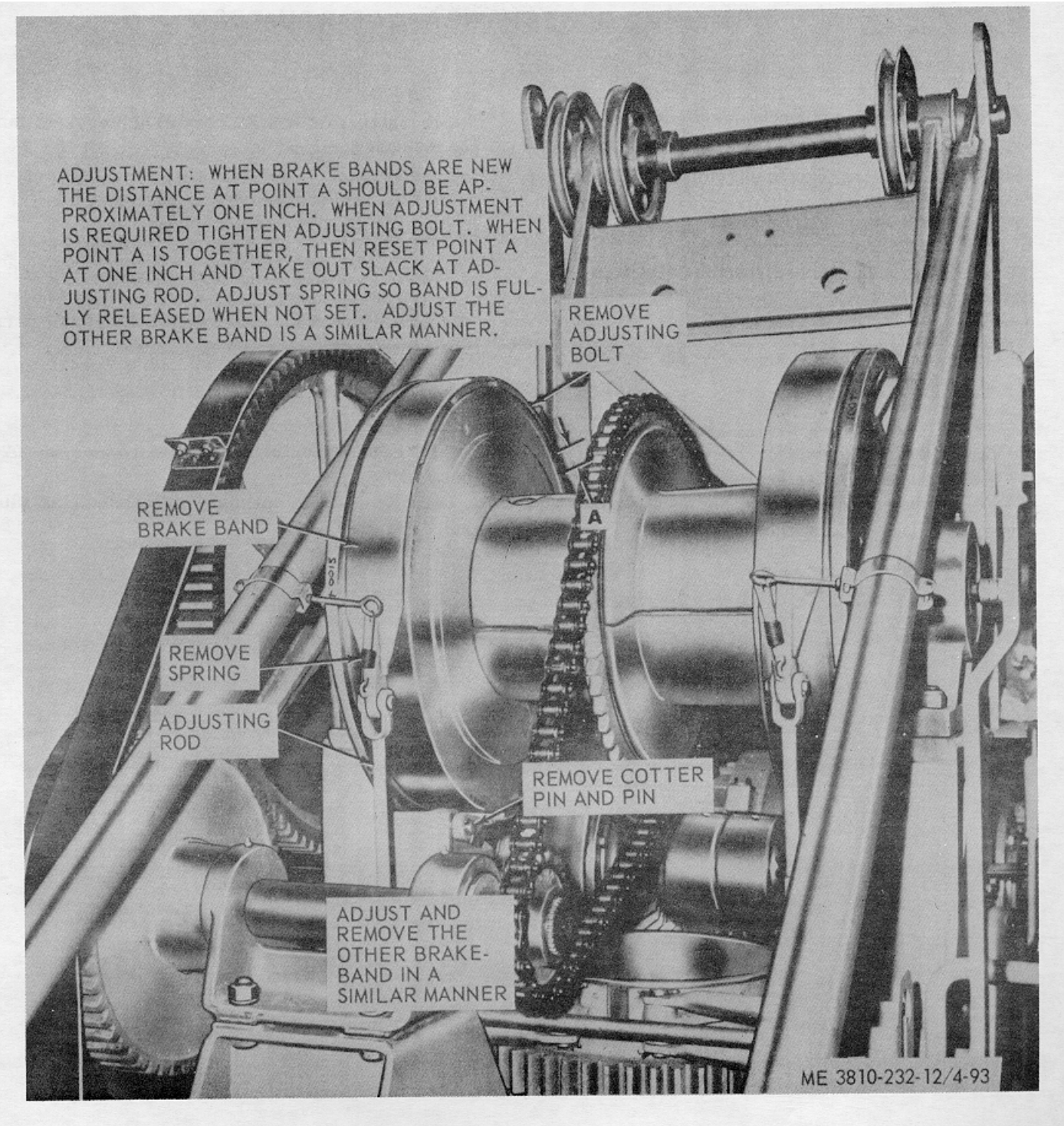


Figure 4-93. Hoist brakeband adjustment.

## Section XX. DRIVE CHAINS AND GEAR GUARDS

### 4-105. General

The primary drive chain is enclosed in the drive chain case. The input sprocket and countershaft sprocket are connected by the multistrand silent-type chain.

The secondary drive chains are the open roller type.

### 4-106. Primary Drive Chain Case Cover

#### a. Removal

(1) Drain oil from chain case.

(2) Remove chain case cover as illustrated in figure 4-94.

#### NOTE

If chain case cover is to be removed from cab, the front cab panel must be removed.

#### b. Cleaning and Inspection.

(1) Clean primary drive chain case cover and breather fill cap and dry thoroughly.

(2) Inspect for cracks, breaks, and obvious damage. Replace damaged parts.

#### c. Installation.

(1) Install primary chain case cover as illustrated in figure 4-94.

#### NOTE

Tighten in rotation around the case progressively and evenly the (46) capscrews to 2 ft-lbs torque.

(2) Fill the chain case with oil. Refer to current lubrication order.

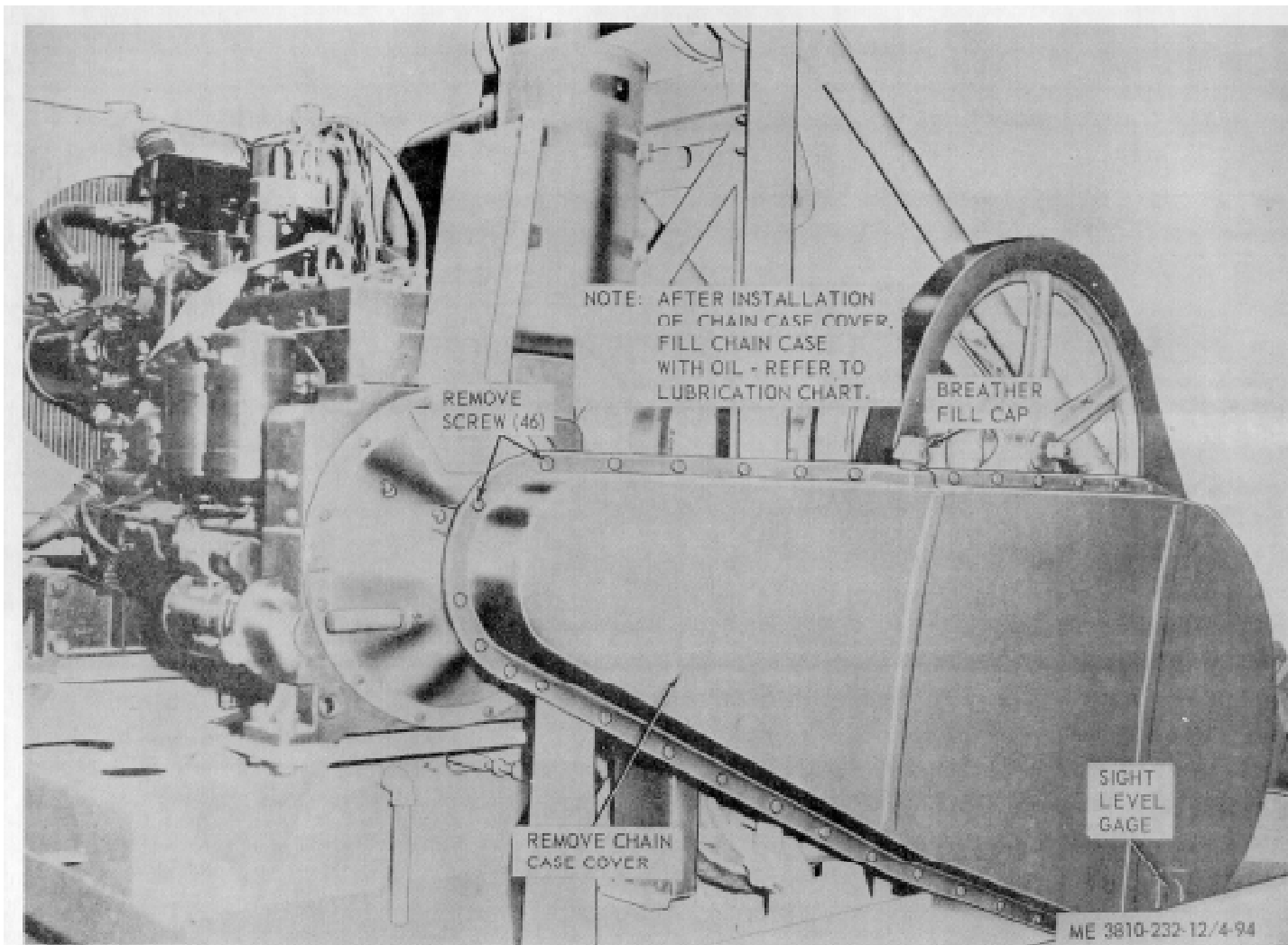
### 4-107. Primary Drive Chain

#### a. removal

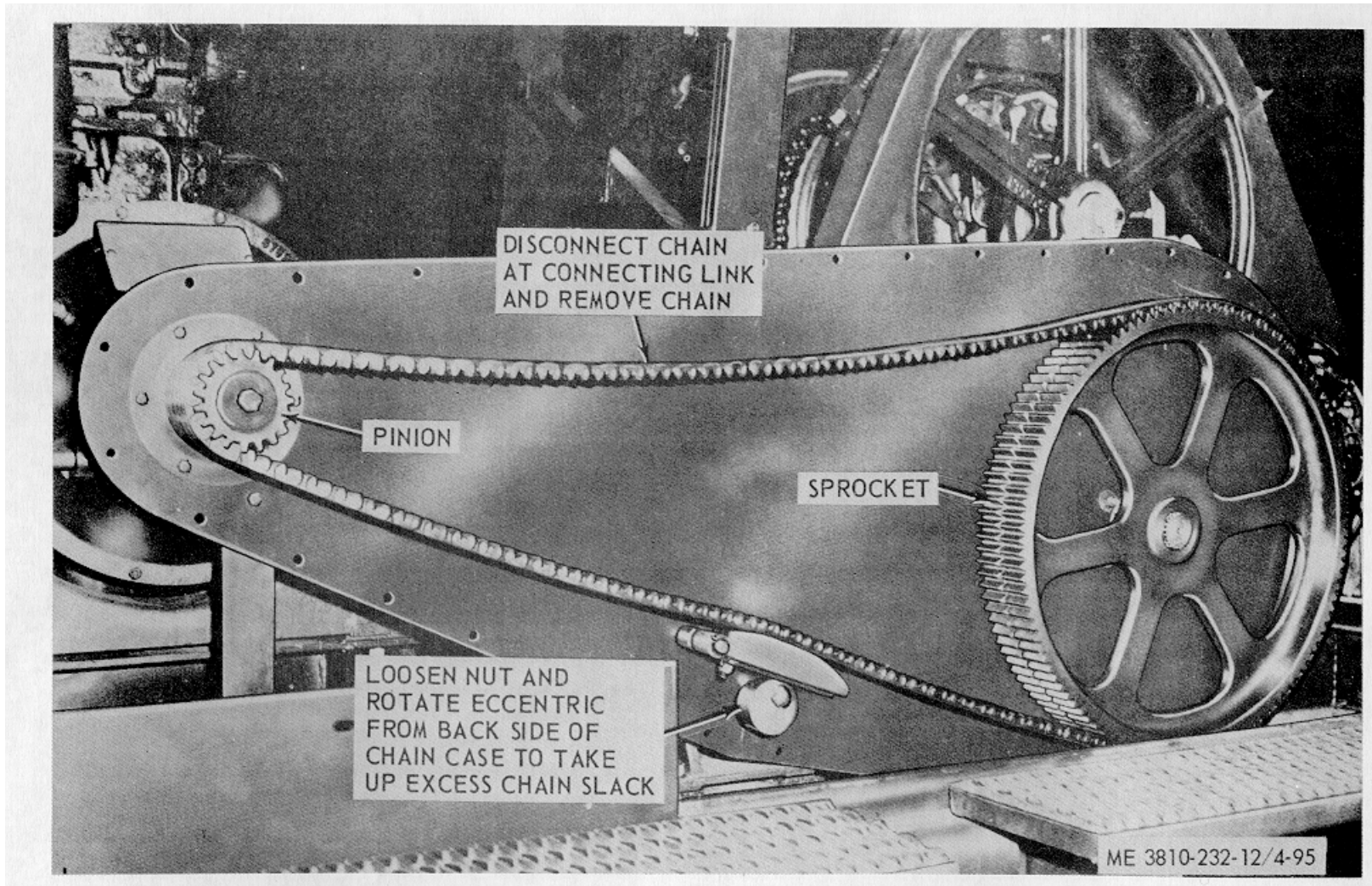
(1) Remove the primary drive chain case cover (para 4-106).

(2) Remove the primary drive chain as illustrated in figure 4-95.





*Figure 4-94. Primary drive chain case cover, removal and installation*



*Figure 4-95. Primary drive chain, removal installation and adjustment.*

b. *Cleaning and Inspection*

(1) Clean chain

(2) Inspect the chain for cracked or damaged links. Replace damaged chain.

c. *Installation and Adjustment.*

(1) Install and adjust primary drive chain as illustrated in figure 4-95.

(2) Install the primary drive chain case cover (para 4-106).

**4-108. Power Load Lowering Drive Chain**

a. *Removal.* Remove power load lowering drive chain as illustrated in figure 4-96.

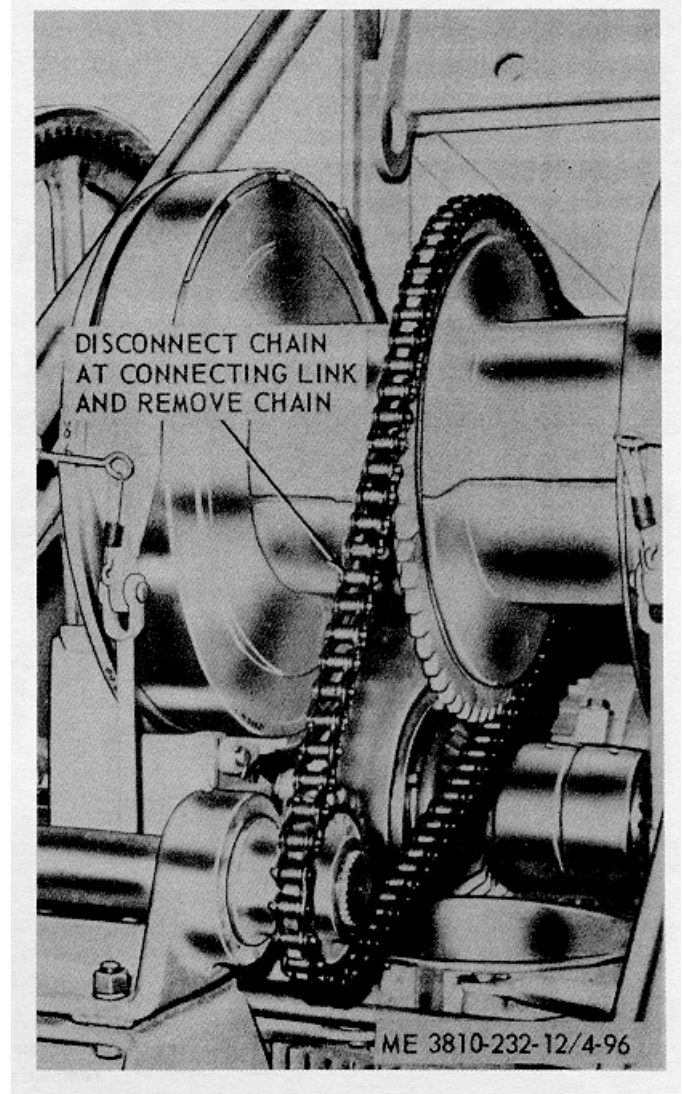


Figure 4-96. Power load lowering drive chain removal and installation.

b. *Cleaning and Inspection*

(1) Clean all parts

(2) Inspect chain for defects. Replace a defective chain.

c. *Installation.* Install power lowering drive chain

as illustrated in figure 4-96

**4-109. Boom Hoist Drive Chain Guard and Chain**

a. *Removal.* Remove boom hoist drive chain guard and chain as illustrated in figure 4-97

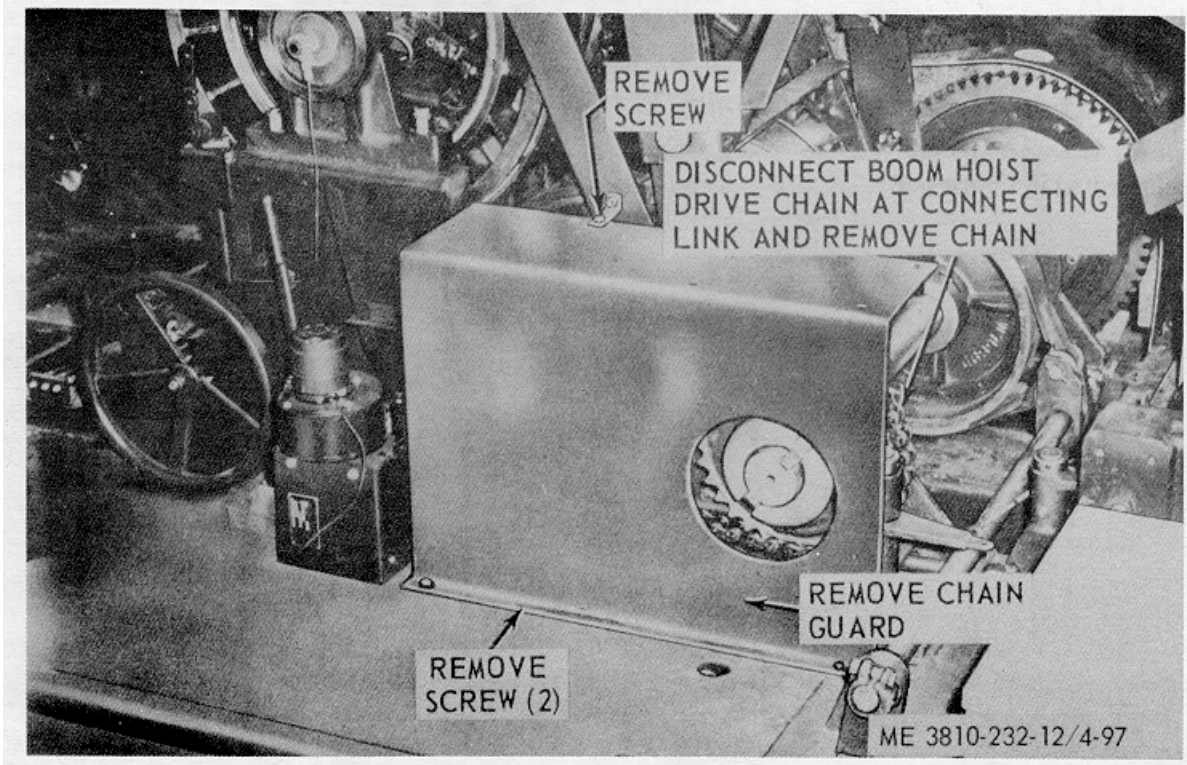


Figure 4-97. Boom hoist drive chain guard and chain, removal and installation.

- b. Cleaning and Inspection.
  - (1) Clean chain guard and chain.
  - (2) Inspect for cracks and obvious defects.
  - (3) Replace a defective chain and guard.
- c.. Installation and Adjustment.
  - (1) Install drive chain as illustrated in figure

4-97.

- (2) Adjust this chain by removing a link or half-link as required.

- (3) Install chain guard as illustrated in figure 4-97

#### 4-110. Gear Guards

- a. Removal. Remove gear guards as illustrated in figure 4-98.

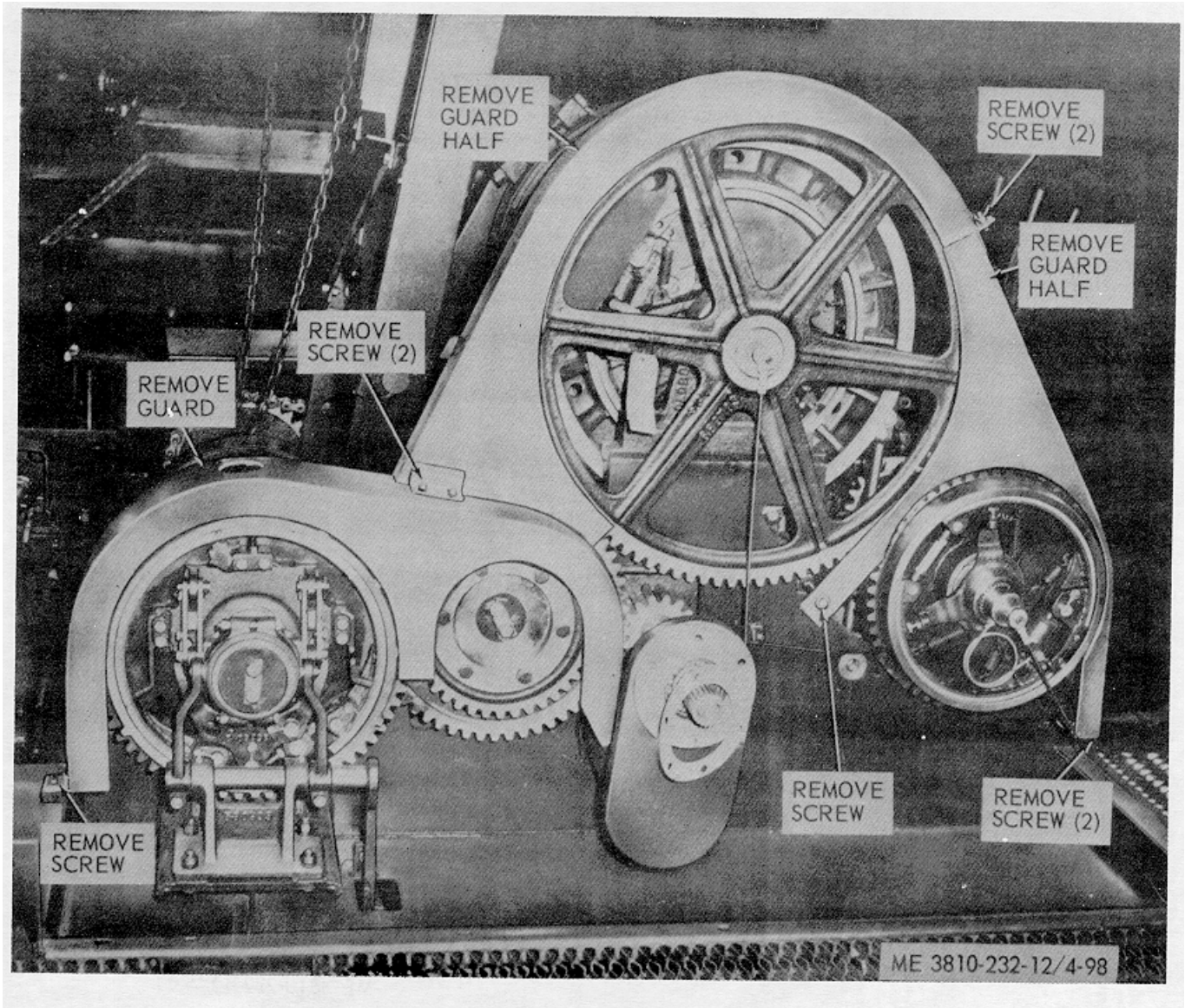


Figure 4-98. Gear guards, removal and installation.

- b. Cleaning and Inspection.
  - (1) Clean guards.
  - (2) Inspect for defects, and replace defective

- parts.
  - c. Installation. Install gear guards as illustrated in figure 4-98.

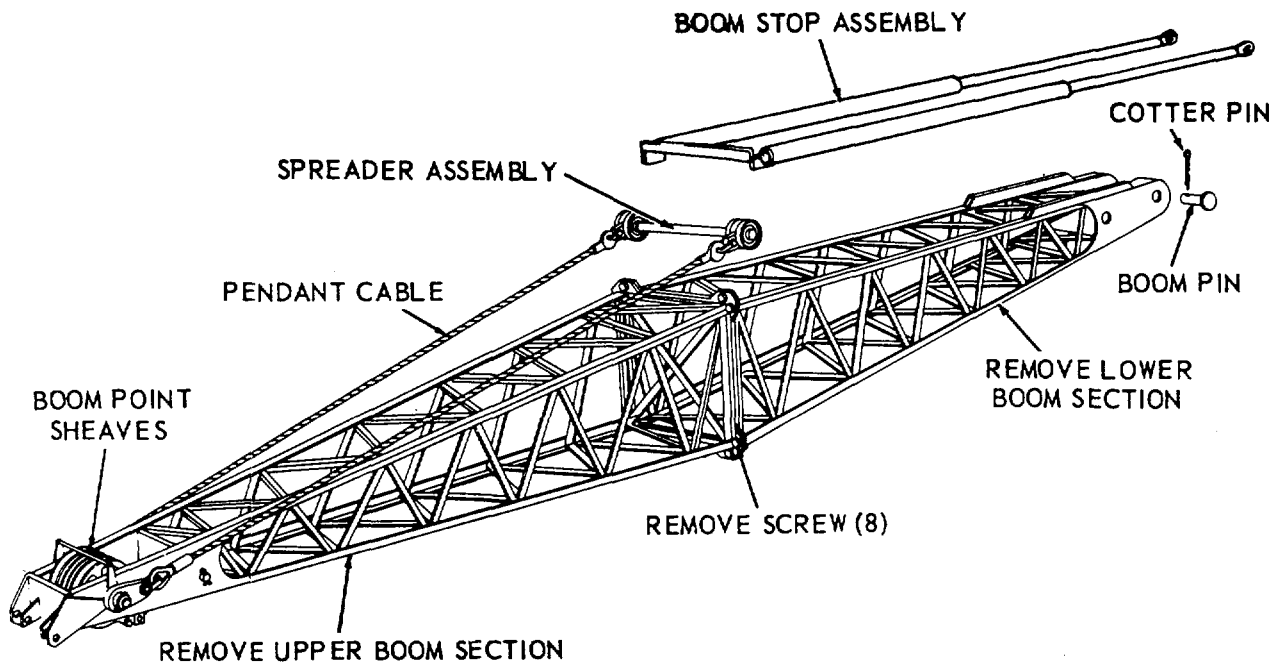
**Section XXI. CRANE BOOM AND ATTACHMENTS**

**4-111. General**

The boom for the crane consists of two sections, the lower boom section is connected by two boom foot pins to the revolving frame. The upper boom section is connected to the lower section and consists of the boom point sheaves.

**4-112. Crane Boom**

- a. Removal.
  - (1) Remove all reeving from crane boom using a reverse procedure described in paragraph 2-2.
  - (2) Remove crane boom from revolving frame (para 2-3).
- b. Disassembly. Disassemble crane boom as instructed in figure 4-99.



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Figure 4-99. Crane boom, disassembly and reassembly.

- c. Cleaning and Inspection.
  - (1) Clean all parts and dry thoroughly.
  - (2) Inspect boom for broken welds, bends, and other damage. Replace all defective parts.
- d. Reassembly. Reassemble boom as illustrated in figure 4-99.
- e.. Installation.

- (1) Install boom on revolving frame (para 24).
- (2) Install reeving (para 2-2).

**4-113. Bridle Assembly**

- a.. Removal Remove bridle assembly from crane boom by reversing installation procedure (para 2-2).
- b. Disassembly. Disassemble bridle assembly as illustrated in figure 4-100.

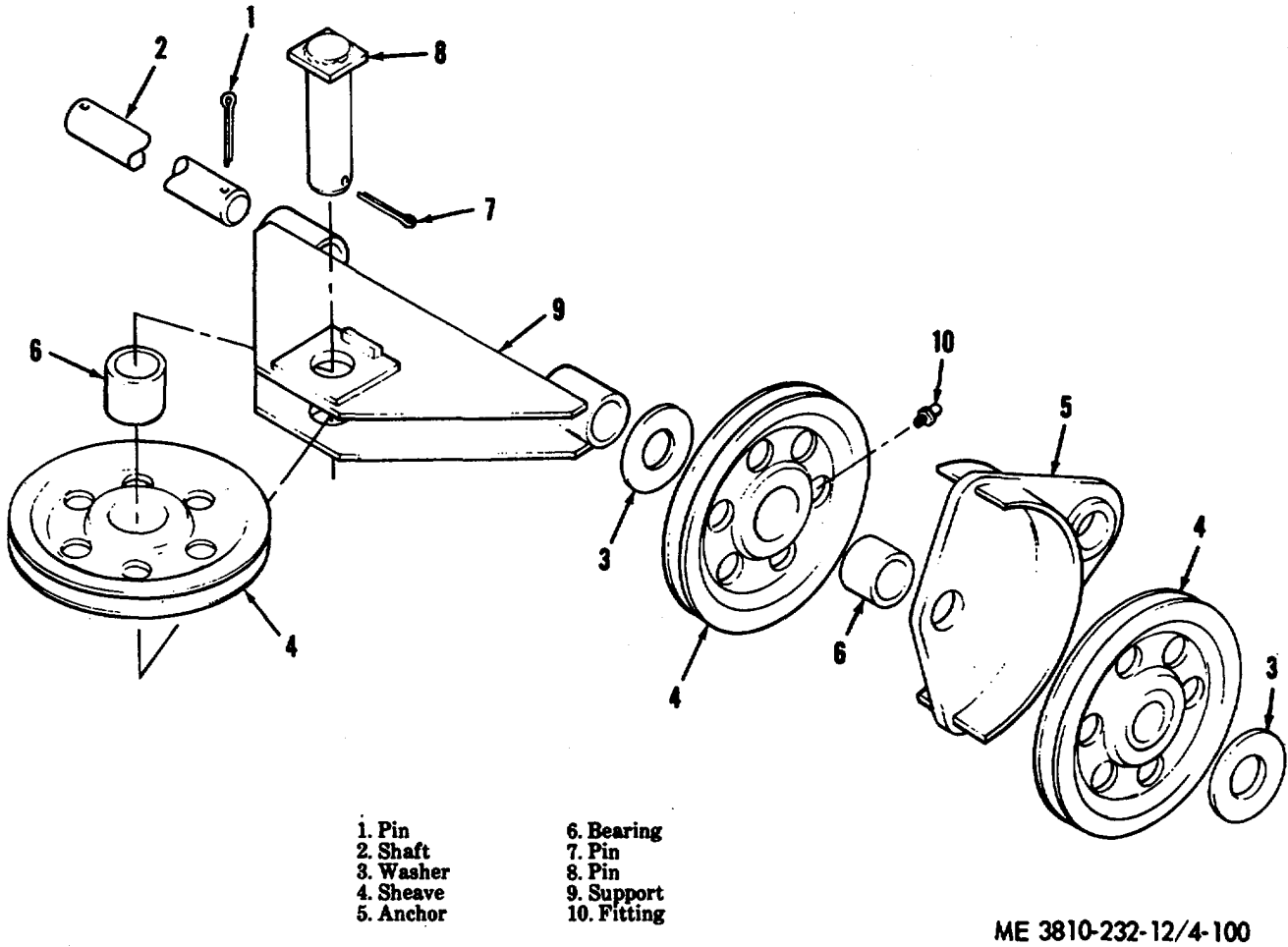


Figure 4-100. Bridle assembly, disassembly and reassembly.

c. Cleaning, Inspection, and Repair.

(1) Clean all parts.

(2) Inspect all parts for cracks, excessive wear, or other damage. Repair by replacing defective parts.

d. Reassembly. Reassemble bridle assembly as illustrated in figure 4-100.

e. Installation. Install bridle assembly (para 2-2).

#### 4-114. Boom Angle Indicator

a. Removal and Disassembly. Remove and disassemble boom angle indicator as illustrated in figure 4-101.

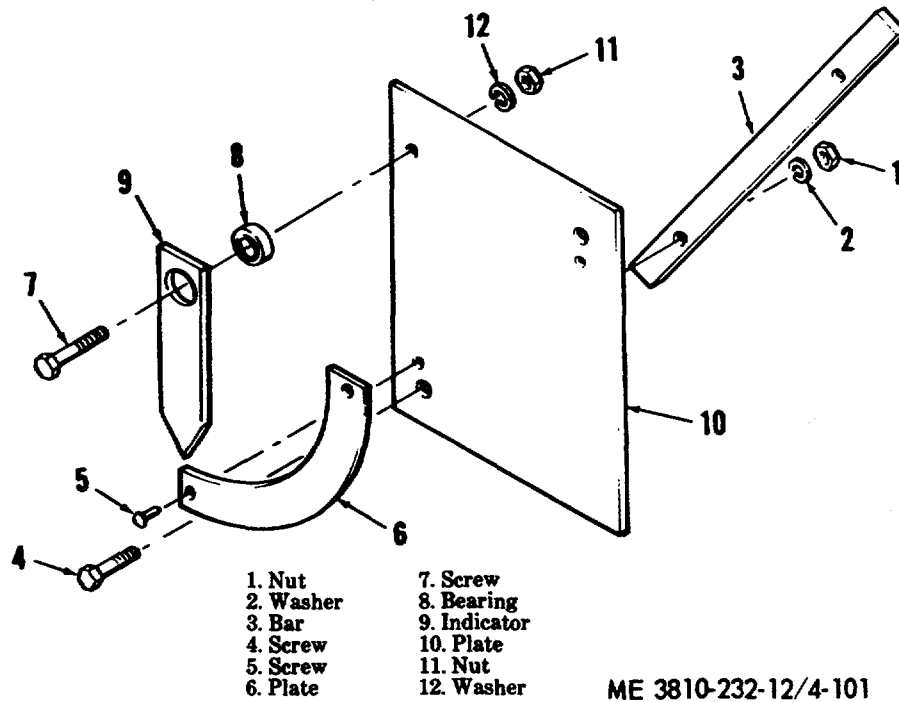


Figure 4-101. Boom angle indicator, Removal and installation



- b. Cleaning and Inspection.
  - (1) Clean all parts
  - (2) Inspect all parts for breaks, cracks, excessive wear, or other damage. Replace defective parts.
- c. Reassembly and Installation. Reassemble and install boom angle indicator as illustrated in figure 4-101.

**4-115. Hook Block**

- a. Removal Remove cables from hook block by reversing the reeving procedure (para 2-2).
- b. Cleaning and Inspection.
  - (1) Clean hook block.
  - (2) Inspect for cracks or other damage. Replace a defective hook block.
- c. Installation. Install hook block by Reeving cables through hook block sheaves as instructed in paragraph 2-2.

**Section XXII. CRANE CAB AND WALKWAY**

**4-116. Walkway Assembly**

- a. Removal and Disassembly. Remove and disassemble walkway assembly as illustrated in figure 4-102.

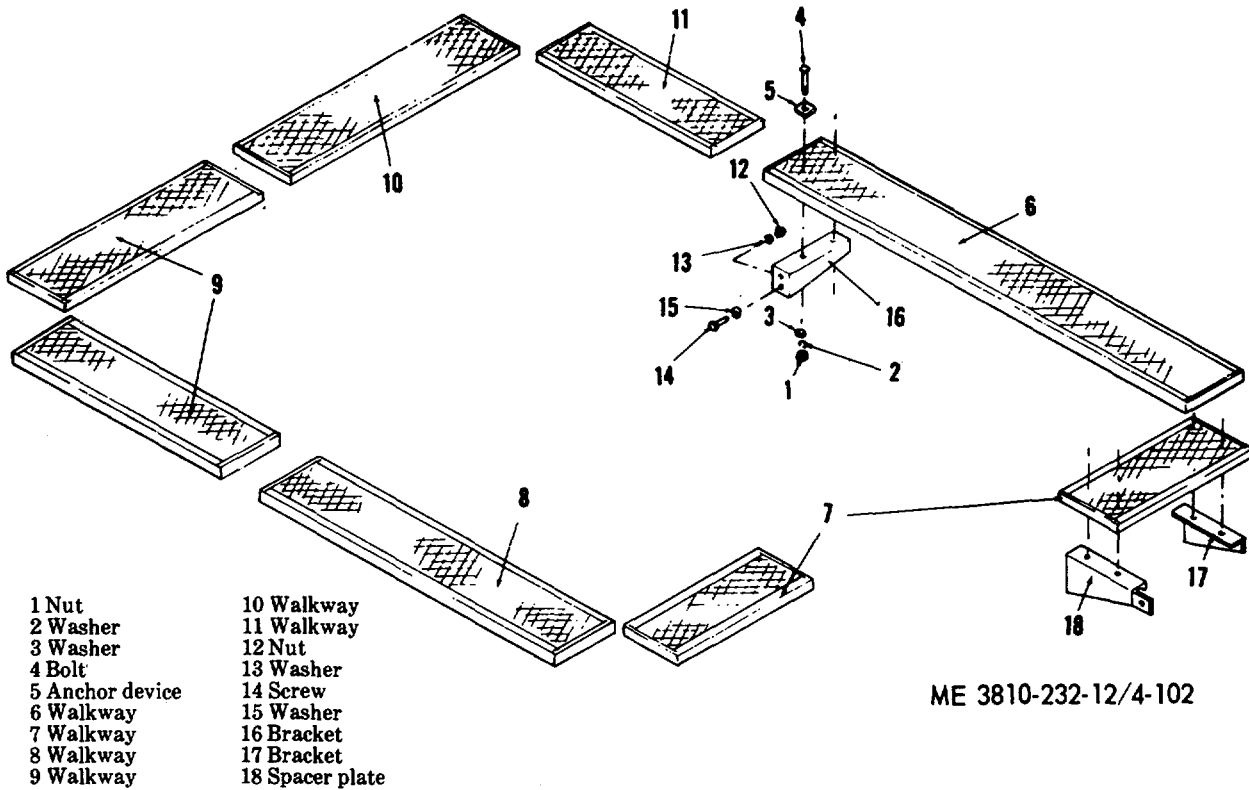


Figure 4-102. Crane walkway assembly, removal and installation.

b. Cleaning, Inspection, and Repair

(1) Clean walkway assembly.

(2) Inspect for cracks, bends or other damage.

(3) Straighten bends and weld cracks as necessary.

(4) Replace parts as required.

c.. Reassembly and Installation. Reassemble and install walkway assembly as illustrated in figure 4-102.

**4-117. Crane Cab Glass**

a.. Removal

(1) Insert a suitable tool under rubber channel seal strip at seam as illustrated in figure 4-103.

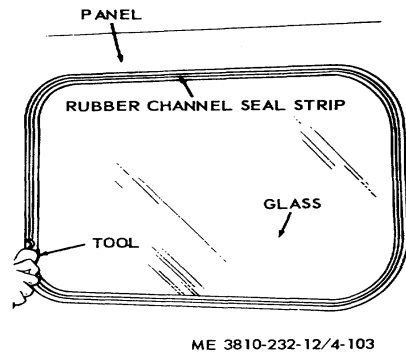


Figure 4-103. Tool inserted under rubber channel seal strip.

(2) Slide tool around weather strip to remove seal strip.

(3) Insert a tool at seam of weather strip between the weather strip and glass edge.

(4) Slide tool around glass edge and press gently to remove the glass.

b. *Cleaning and Inspection.*

(1) Clean edges of window panel with an approved cleaning solvent.

(2) Inspect rubber weather strip for cracks and other damage.

(3) Inspect glass for cracks. Replace all cracked or broken glass.

c. *Installation.*

(1) Apply a coating of rubber cement to panel edge around window opening, rubber weather strip, and glass window edge.

(2) Place rubber weather strip around window opening in panel and back to starting point with a 1A inch overlap.

(3) Place ends of the weather strip channel together and press into place to obtain a tight, smooth joint.

(4) Position glass in one of lower corners of weather strip channel.

(5) Use a suitable tool to open channel, allowing glass to slip in.

(6) Insert a suitable tool in weather strip channel and force seal strip in place.

**NOTE**

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

**4-118. Crane Cab Door**

a. Removal Remove the crane cab door as illustrated in figure 4-104.

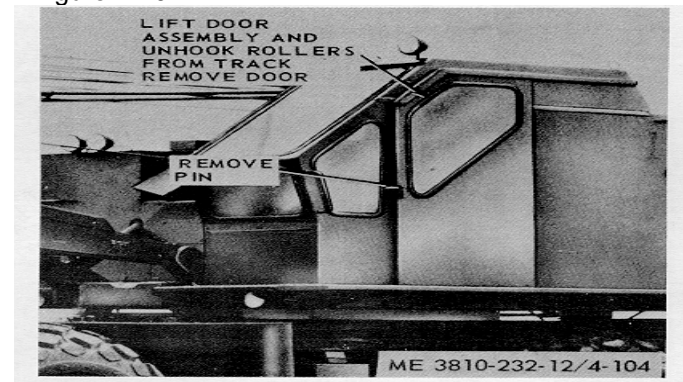


Figure 4-104. Crane cab door, removal and installation.

b. Cleaning and Inspection.

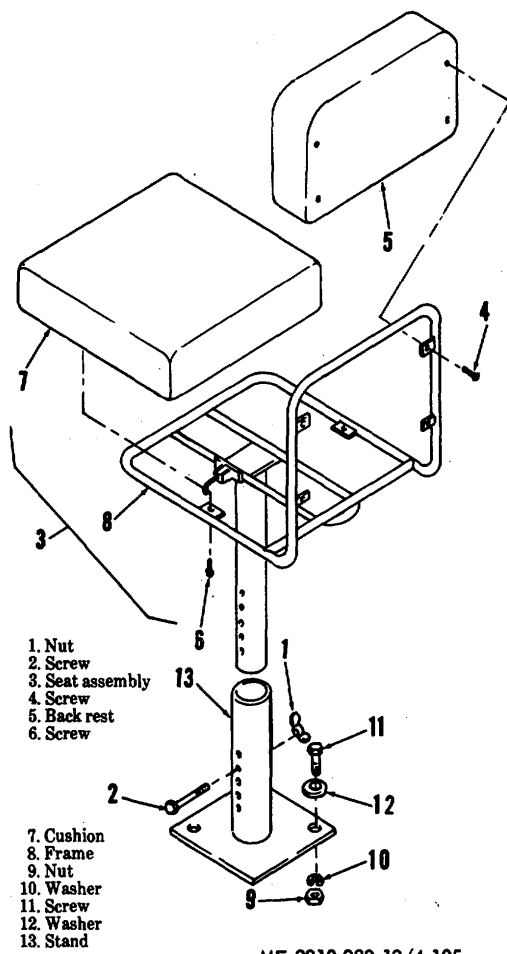
(1) Clean door.

(2) Inspect door for cracks, bent condition, or other damage. Replace a defective door.

c. Installation. Install crane cab door as illustrated in figure 4-104.

**4-119. Operator's Seat**

a. Removal and Disassembly. Remove and disassemble crane operator's seat as illustrated in figure 4-105.



b. *Cleaning, Inspection and Repair.*

(1) Clean all parts with an approved cleaning solvent, except cushions. Use soap and water for cleaning cushions.

(2) Inspect cushions for torn or ripped covers. Replace a damaged cushion.

(3) Inspect seat frame for cracks and bends. Straighten bends and weld all cracks.

(4) Replace damaged or defective seat.

c. *Reassembly and Installation.* Reassemble and install crane operator's seat as illustrated in figure 4-105.

Figure 4-105. Crane operators seat, removal and installation.

**Section XXIII. CARRIER TRANSMISSION AND TORQUE CONVERTER OIL FILTER**

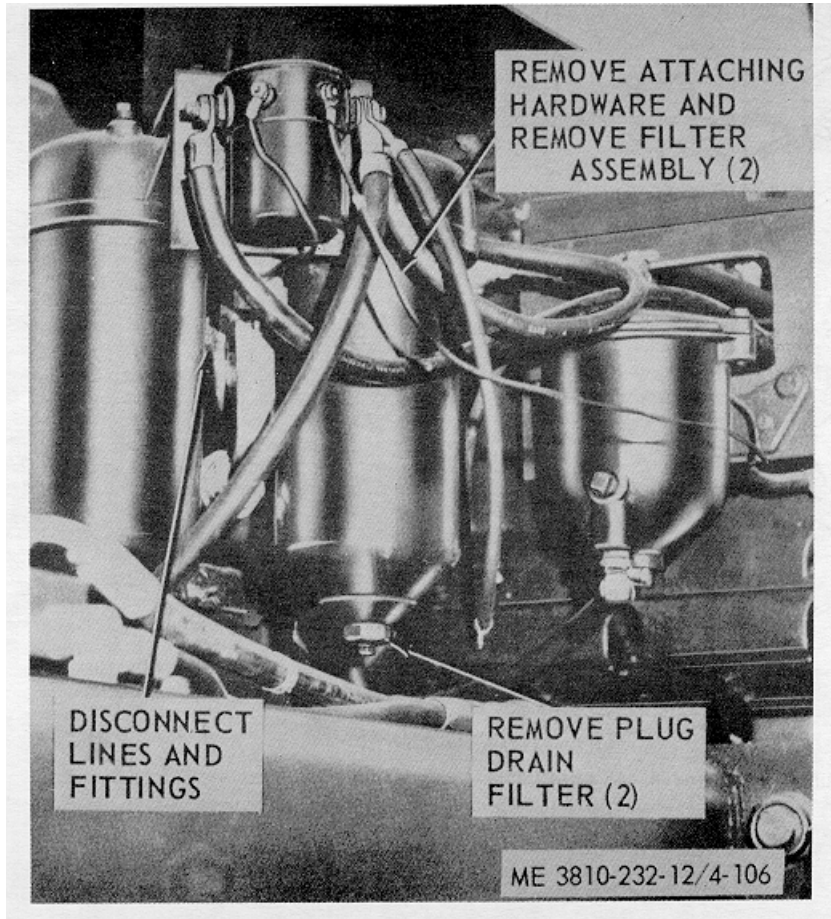
**4-120. General**

The transmission and torque converter oil filter is a double oil filter that filters the lubricating oil used in the transmission and torque converter.

**4-121. Transmission and Torque Converter Oil Filter**

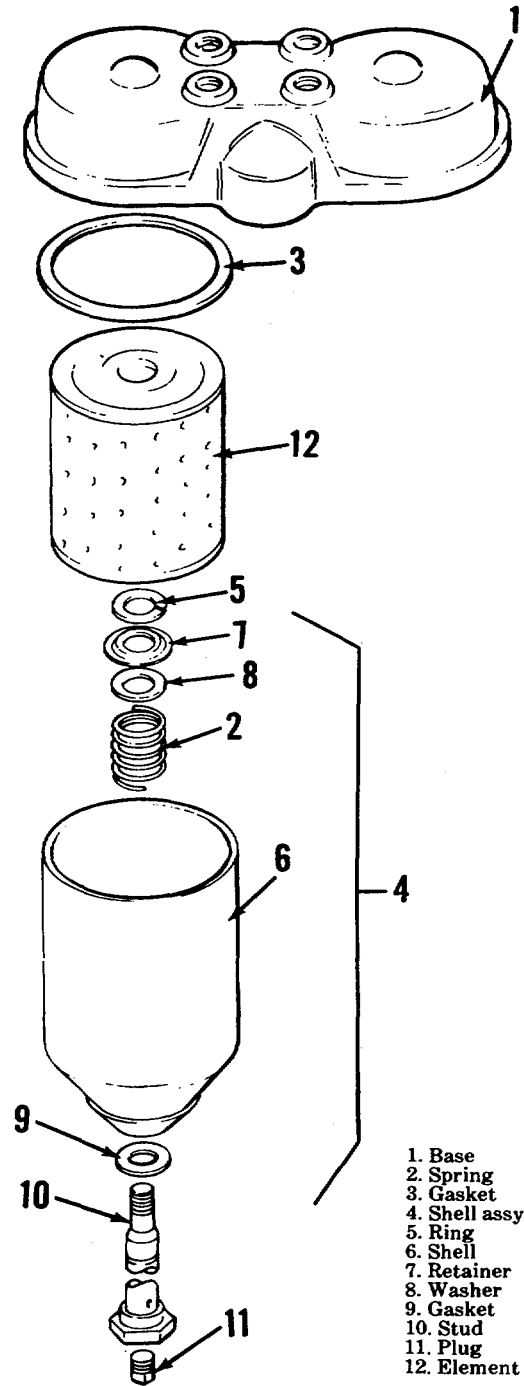
a. *Removal and Disassembly.*

(1) Remove transmission and torque converter oil filter as illustrated in figure 4-106.



*Figure 4-106. Transmission and torque converter oil filter, removal and installation.*

(2) Disassemble oil filter as illustrated in figure 4-107.



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Figure 4-107. Transmission and torque converter oil filter, disassembly and reassembly.

- b. Cleaning and Inspections  
(1) Clean all parts. Discard gaskets and elements.  
(2) Inspect all parts for cracks or other damage.  
Replace defective parts and gaskets and elements.

- c. Reassembly. Reassemble oil filter as illustrated in figure 4-107.  
d. Installation. Install transmission and torque converter oil filter as illustrated in figure 4-106. Check hydraulic level as described in lubrication order.

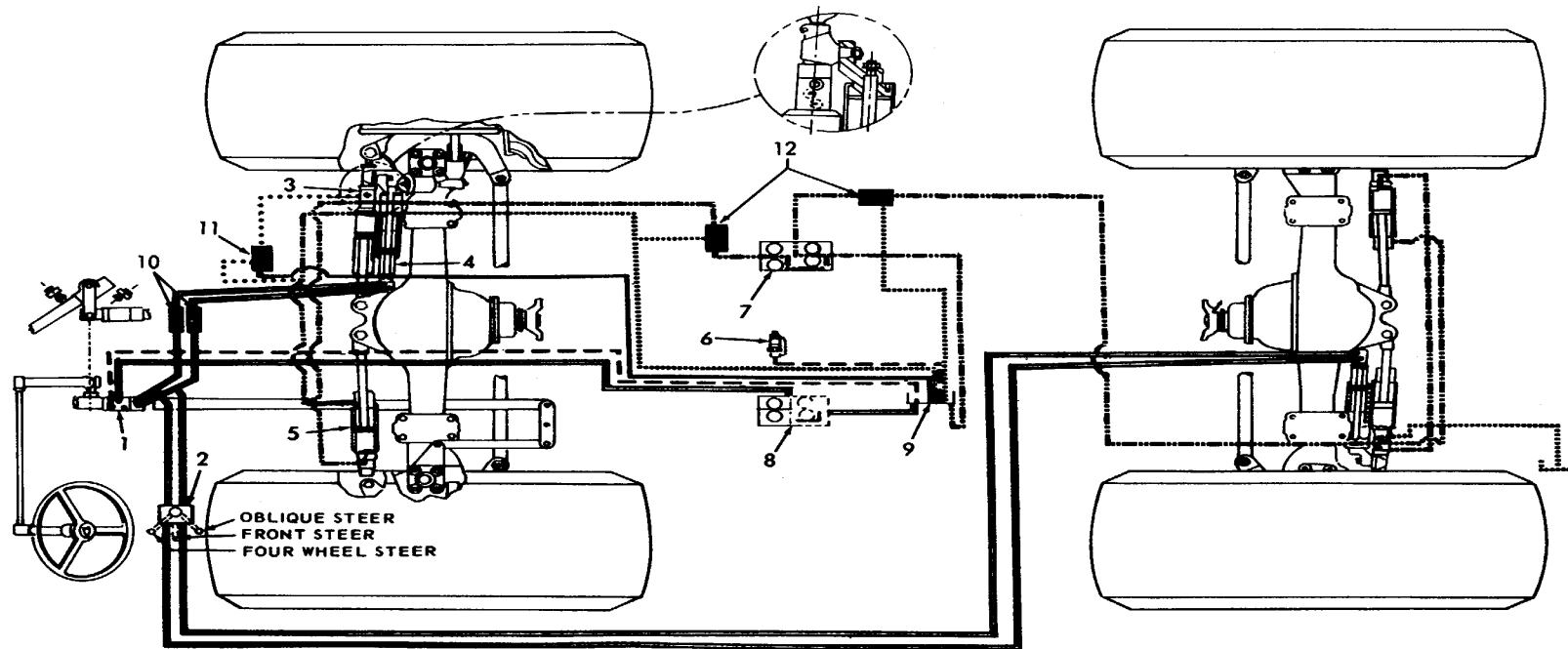
## **Section XXIV. CARRIER STEERING CONTROLS**

### **4-122. General**

The carrier is equipped with a mechanical steering system with hydraulic power assist. Front and rear wheel steering is controlled by the steering wheel.

The rear wheel steering is engaged hydraulically by lever in cab (para 2-6). Figure 4-108 depicts the steering hydraulic system for model 2380 and figure 4-109 depicts the steering hydraulic system for model 2385.

**4-112**



### STEERING SYSTEM

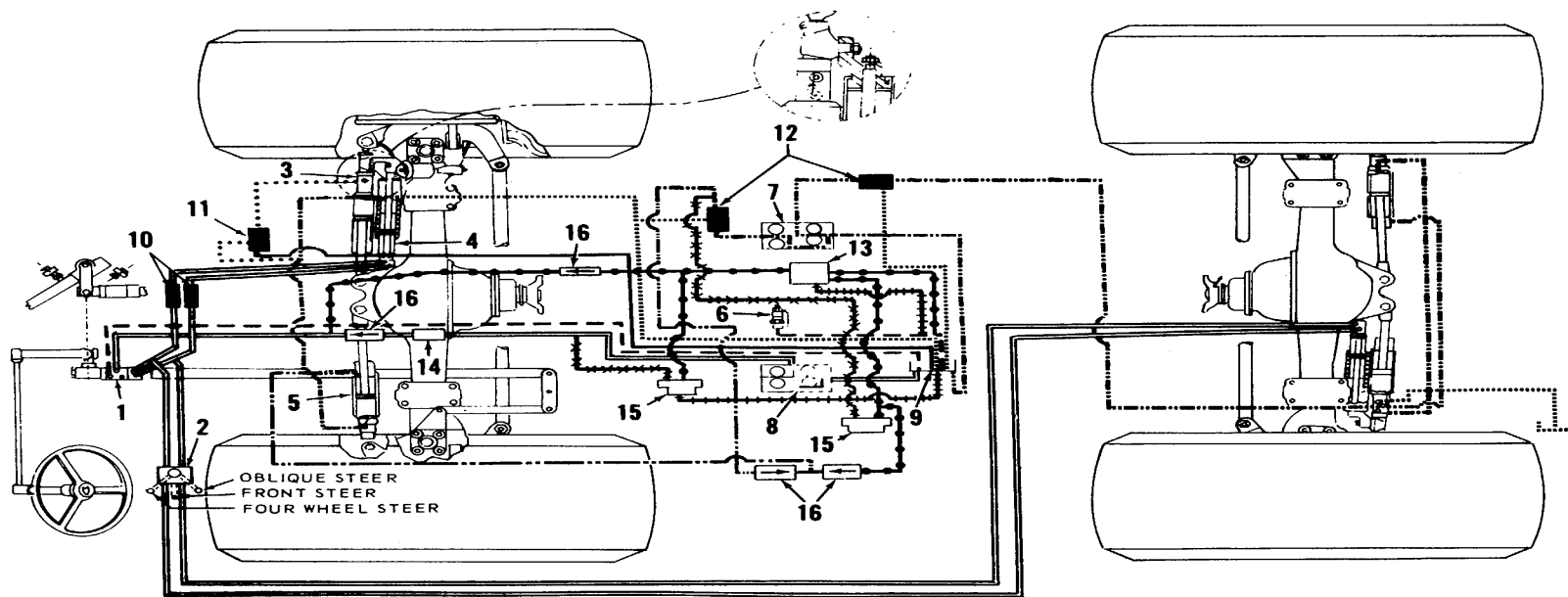
|           |                                 |          |
|-----------|---------------------------------|----------|
| —————     | STEERING CONTROL SYSTEM         | 650 PSI  |
| - - - - - | RETURN STEERING CONTROL SYSTEM  |          |
| —————     | STEERING SYSTEM                 | 1850 PSI |
| —————     | RETURN STEERING SYSTEM          |          |
| .....     | MANUAL STEERING OIL FLOW        |          |
| —————     | RETURN MANUAL STEERING OIL FLOW |          |

### ITEM

|    |                                       |
|----|---------------------------------------|
| 1  | STEERING CONTROL VALVE                |
| 2  | STEERING SELECTION VALVE              |
| 3  | TANDEM UNIT STEERING CYLINDER & VALVE |
| 4  | SPRING LOADED SELF CENTERING CYLINDER |
| 5  | STEERING CYLINDER                     |
| 6  | RELIEF VALVE                          |
| 7  | DUAL PUMP                             |
| 8  | DUAL PUMP                             |
| 9  | RESERVOIR                             |
| 10 | CHECK VALVE-ORIFICE                   |
| 11 | CONTROL VALVE                         |
| 12 | FLOW CONTROL & RELIEF VALVE           |

ME 3810-232-12/4-108

Figure 4-108. Carrier steering hydraulic system schematic (model 2S80).



**STEERING SYSTEM**

- STEERING CONTROL SYSTEM 650 PSI
- - - RETURN STEERING CONTROL SYSTEM
- ..... STEERING SYSTEM 1850 PSI
- ..... RETURN STEERING SYSTEM
- ..... MANUAL STEERING OIL FLOW
- ..... RETURN MANUAL STEERING OIL FLOW
- > EMERGENCY STEERING SYSTEM
- X X PILOT PRESSURE EMERGENCY STEERING SYSTEM
- + + + + RETURN EMERGENCY STEERING SYSTEM

**ITEM**

**NOMENCLATURE**

- 1 - STEERING CONTROL VALVE
- 2 - STEERING SELECTION VALVE
- 3 - TANDEM UNIT STEERING CYLINDER & VALVE
- 4 - SPRING LOADED SELF CENTERING CYLINDER
- 5 - STEER CYLINDER
- 6 - RELIEF VALVE
- 7 - DUAL PUMP
- 8 - DUAL PUMP
- 9 - RESERVOIR
- 10 - CHECK VALVE-ORIFICE
- 11 - CONTROL VALVE
- 12 - FLOW CONTROL & RELIEF VALVE
- 13 - PUMP, EMERGENCY STEERING
- 14 - FLOW DIVIDER VALVE
- 15 - CHECK VALVE PILOT-ORIFICE
- 16 - CHECK VALVE

ME 3810-232-12/4-109

Figure 4-109. Carrier steering hydraulic system schematic (model 2385).



#### 4-123. Steering Wheel

##### a. Removal.

- (1) Remove horn button (para 4-68).
- (2) Remove steering wheel as instructed in

figure  
4-110.

##### b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent and dry thoroughly.
- (2) Inspect for cracks, or other damage.

Replace a defective steering wheel.

##### c. Installation .

- (1) Install steering wheel as illustrated in figure  
4-110.
- (2) Install the horn button (para 4-68).

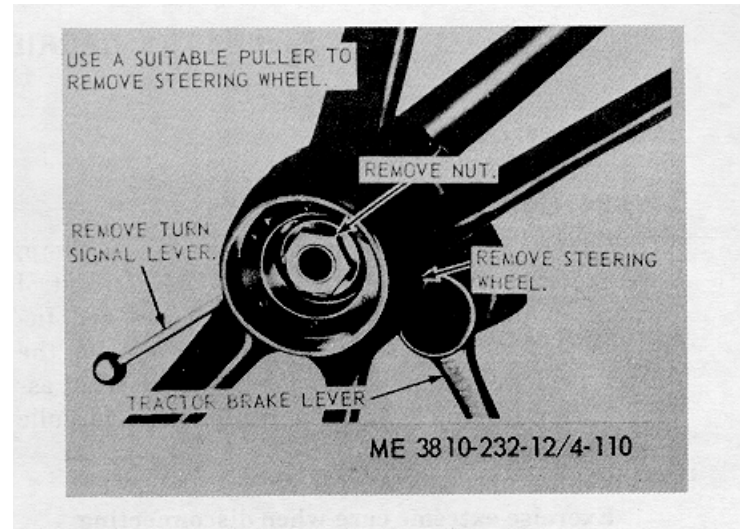


Figure 4-110. Steering wheel removal and installation.

## Section XXV. CARRIER HYDRAULIC SYSTEM

### 4-124. General

The carrier hydraulic system consists of a pump, accumulator, fluid reservoir, relief valves, control valves, cylinders, filters and tubes, hoses and fittings. Hydraulic pressure is used to operate the dozer blade, outriggers, and for power steering assist. Refer to figures 1-7 and 1-8 for the hydraulic system schematics.

#### CAUTION

Exercise extreme care when disconnecting

hoses, lines, and parts to prevent dirt or foreign matter from entering the hydraulic system.

### 4-125. Hydraulic Oil Filter (Model 2380)

#### a. Removal and Disassembly.

(1) Remove hydraulic oil filter as illustrated in figure 4-111.

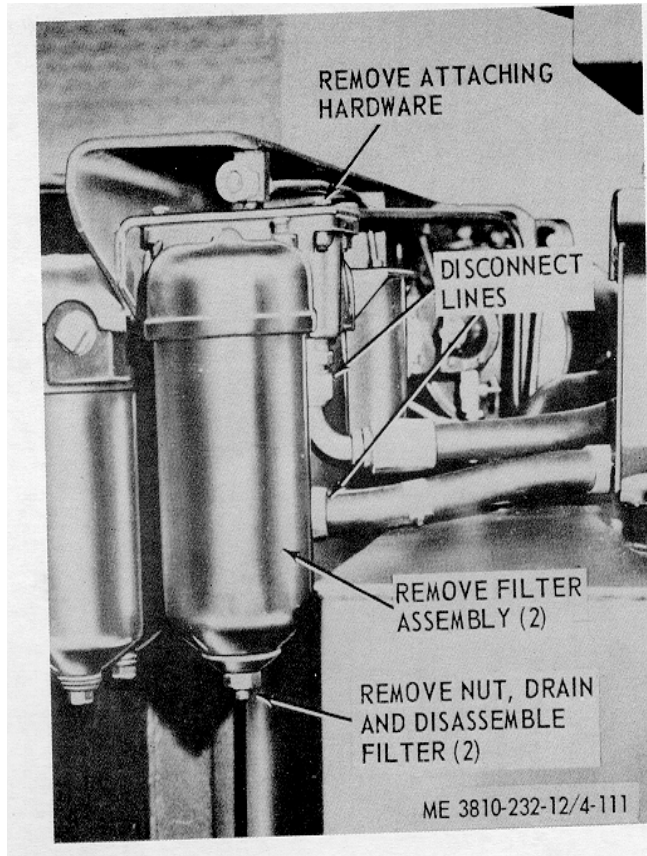


Figure 4-111. Hydraulic oil filter, removal and installation (model 2380).

(2) Disassemble in accordance with paragraph 4-21.  
 b. *Cleaning, Inspection and Reassembly.* Refer to paragraph 4-121 for cleaning, inspection and reassembly of the filter.

c. *Installation.* Install hydraulic filter as illustrated in figure 4-111. Check hydraulic level as described in lubrication order.

**4-126. Hydraulic Oil Filter (Model 2385)**

**a. Removal and Disassembly.**

(1) Remove hydraulic oil filter as illustrated in figure 4-112.

(2) Disassemble hydraulic oil filter as illustrated in figure 4-113.

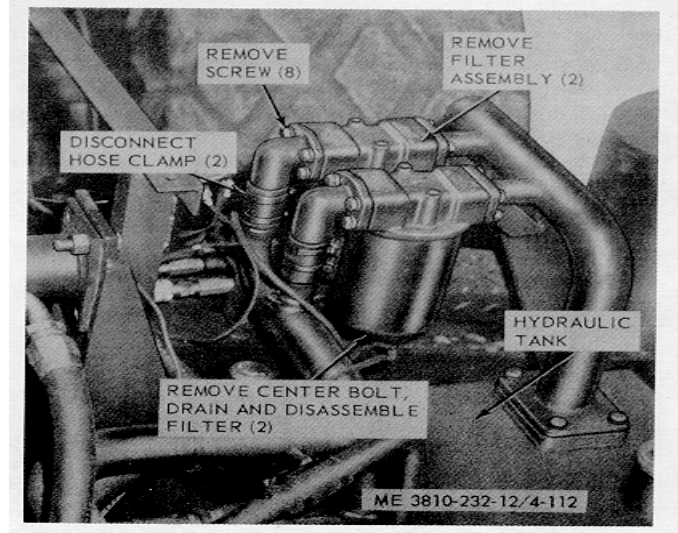


Figure 4-112. Hydraulic oil filter, removal and installation (model 2385)  
 4-117

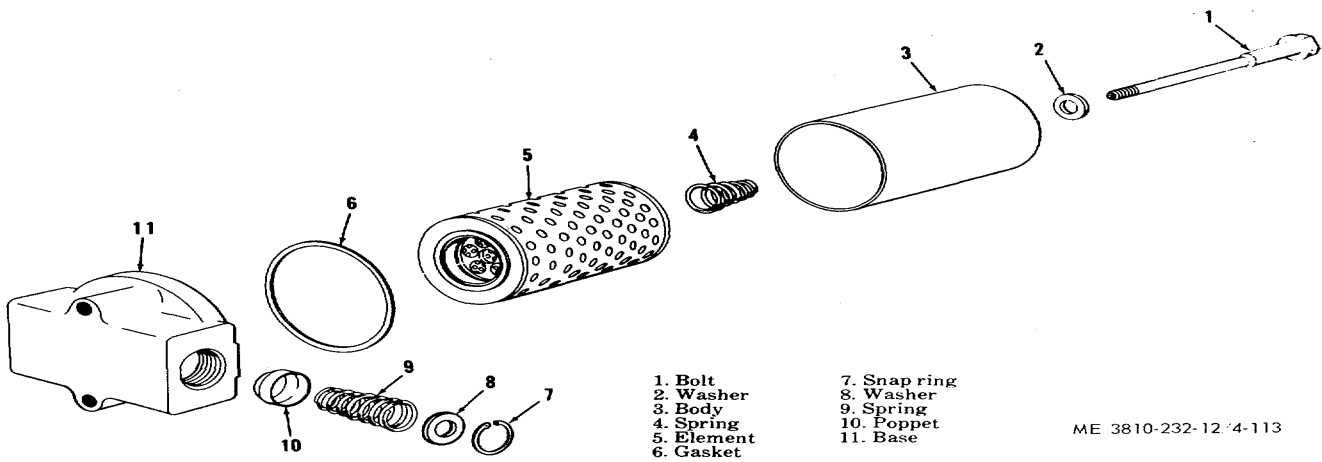


Figure 4-113. Hydraulic oil filter, disassembly and reassembly (model 2385).

b. *Cleaning and Inspection.*

(1) Clean all metal parts. Discard gaskets and element.

(2) Inspect all parts for cracks or other damage. Replace defective parts and install new gaskets and element.

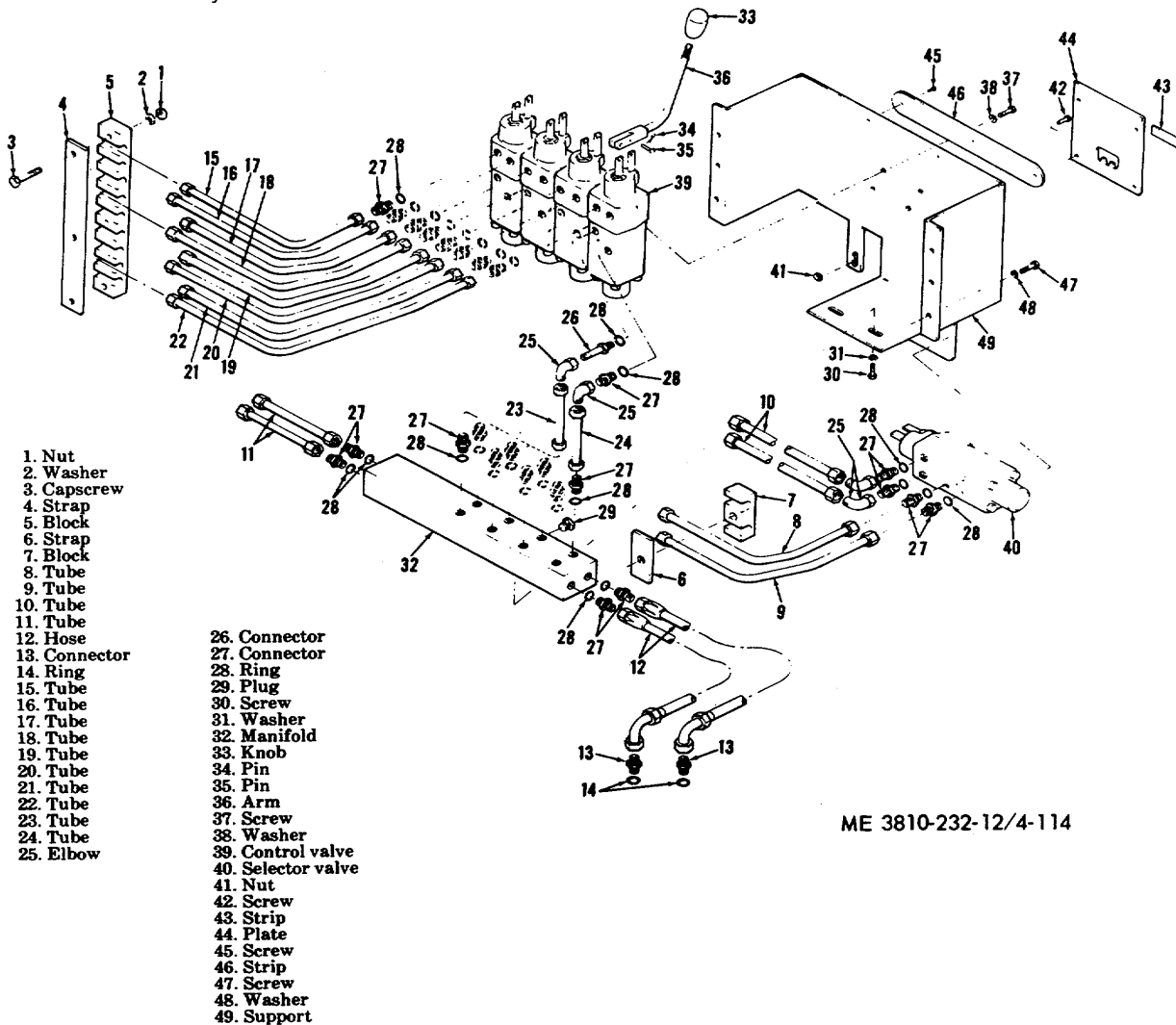
c. *Reassembly.* Reassemble hydraulic oil filter in reverse order of disassembly.

e. *Installation.* Install hydraulic oil filter in reverse

order of removal. Check hydraulic oil level as described in Lubrication Order.

**4-127. Manifold, Control Valves, and Related Parts**

a. *Removal (Model 2380).* Remove manifold, control valves, and related parts as illustrated in figure 4-114.



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Figure 4-114. Manifold, control valves, and related parts, removal and installation (model S80).

b. *Removal (Model 2385).* Remove manifold control valve and related parts as illustrated in figure 4-115.

c. *Control Valves Disassembly.*  
 (1) Disassemble the control valves as illustrated in figure 4-116.

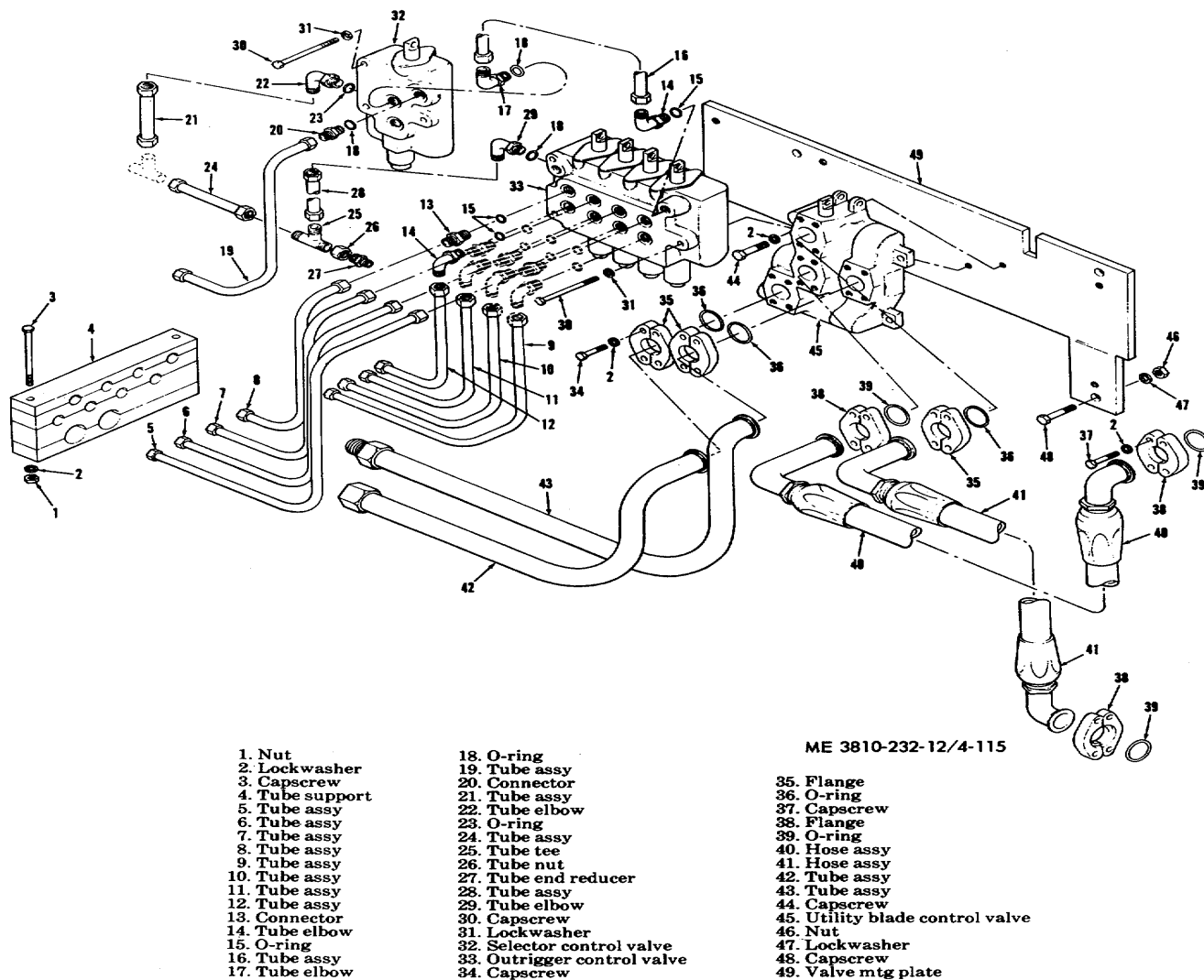
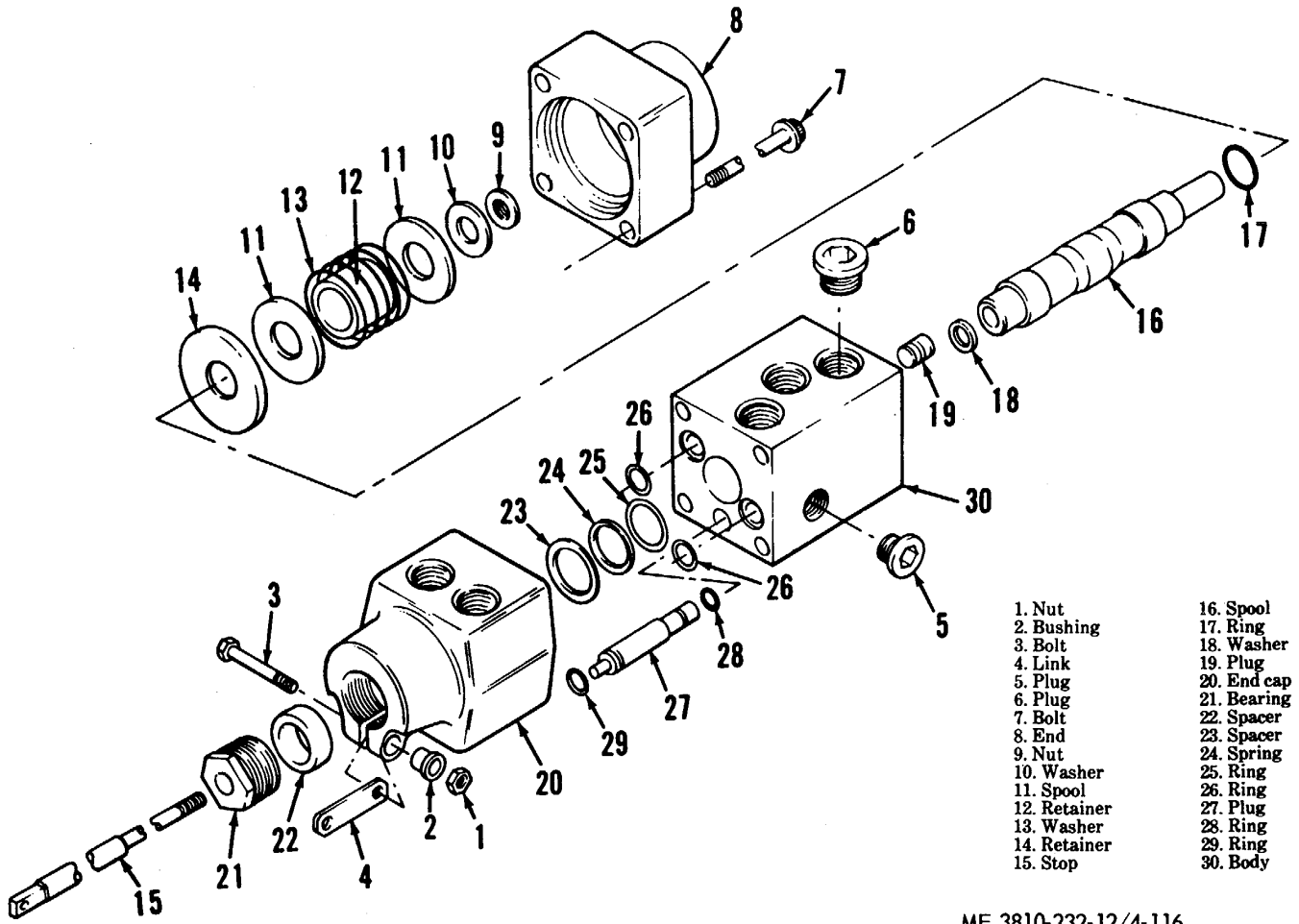


Figure 4-115. Manifold control valves, and related parts, removal and installation (model 2385).



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Figure 4-116. Control valve, disassembly and reassembly.

d. *Cleaning and Inspection.*

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

(2) Inspect for cracks, stripped threads, corrosion or other defects.

(3) Replace all gaskets, and damaged or defective parts.

e. *Control Valves Reassembly.* Reassemble the control valves as illustrated in figure 4-116.

f. *Installation.* Install the manifold, control valves, and related parts as illustrated in figure 4-114 or 4-115.

g. *Dozer Control Valve Stop Adjustment.* Adjust screw socket head stop and angle stop (fig. 4-117) to stop dozer control lever just before spool reaches the end of strokes (lower and raise).

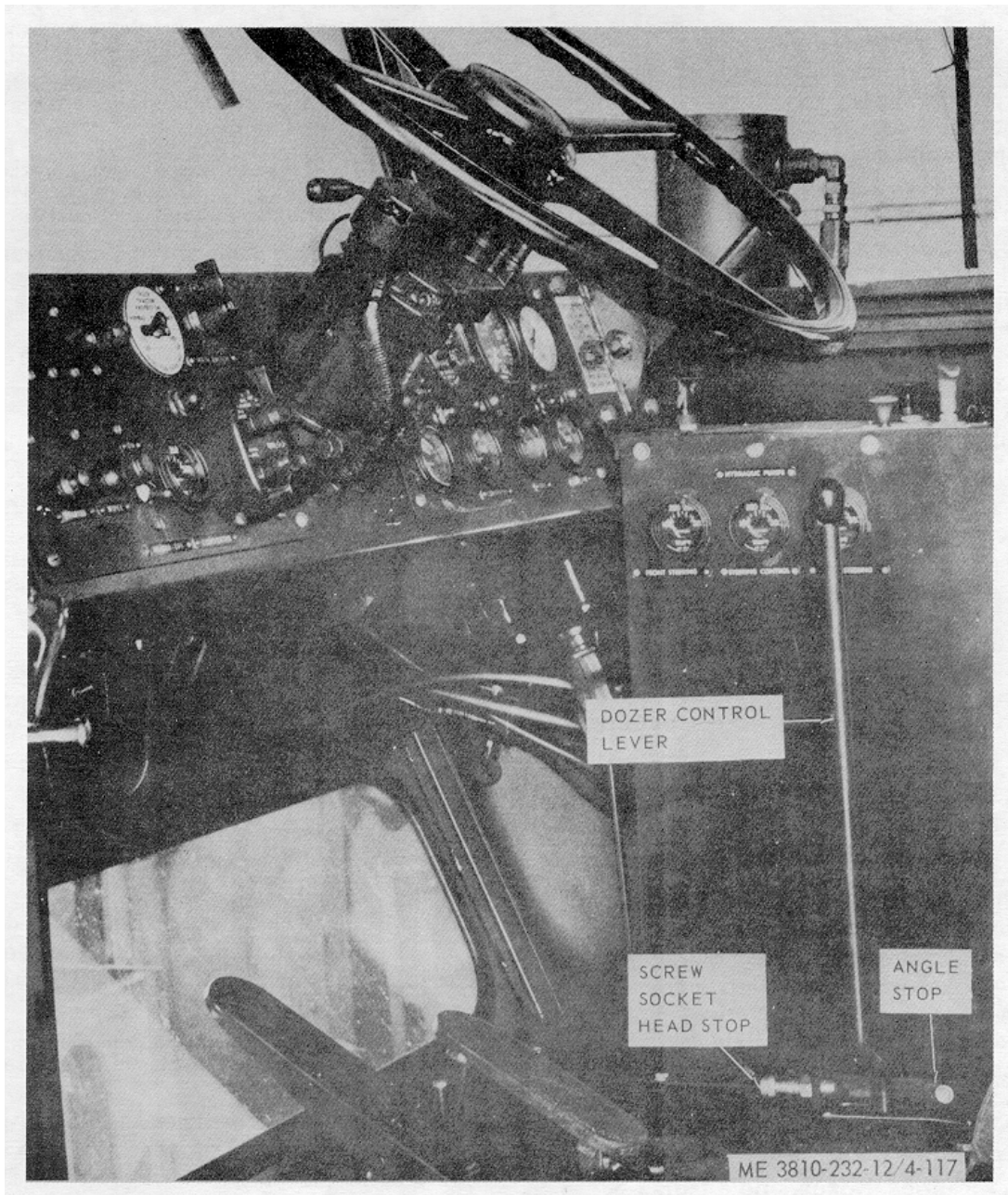


Figure 4-117. Control valve stop adjustment.

#### 4-128. Hydraulic Reservoir Cap and Screen

a. *Removal.* Remove hydraulic reservoir cap and screen.

b. *Cleaning and Inspection.*

(1) Clean cap and screen with an approved solvent.

(2) Inspect cap and screen for defects. Replace a defective cap or screen.

c. *Installation.* Install hydraulic reservoir cap and screen.

#### 4-129. Accumulator

a. *General.* The accumulator weights approximately 130 pounds. The low side is pressurized to 800 psi with nitrogen. This pressure will not be relieved when the upper hydraulic line is disconnected. The pressurized nitrogen acts as a cushion when the hydraulic system's fluid pressure is against the accumulator piston. To recharge the accumulator, refer to direct support maintenance.

b. *Removal*

(1) Relieve hydraulic system pressure by operating the dozer and outrigger controls (6, 7, 8, 9 and 14, fig. 2-14) until pressure has been relieved.

(2) Remove oil filter located directly forward of accumulator.

(3) Remove accumulator as illustrated in figure 4-118. Attach a rope through bracket attached to the

accumulator to assist in lifting accumulator from above. Remove accumulator by lifting up and outward from lower support bracket.

#### CAUTION

**Use care not to damage valve stem guard or valve stem.**

#### WARNING

**Do not drop.**

c. *Cleaning and Inspection.*

(1) Wipe exterior of accumulator with a damp cloth.

(2) Inspect for cracks, or other defects. Replace defective accumulator.

d. *Installation.*

(1) Attach a rope to accumulator's bracket and install accumulator as illustrated in figure 4-118.

#### CAUTION

**Use care not to damage valve stem guard or valve stem.**

#### WARNING

**Do not drop.**

(2) Remove rope from bracket.

(3) Install oil filter.

### Section XXVI. AIR SYSTEM

#### 4-130. General

The carrier engine is equipped with an air compressor that supplies air pressure to operate air brakes, emergency braking system, windshield wiper, air horn, and fan drive clutch. Governors and safety valves protect the system from excess pressure. Filters and strainers trap and contain any moisture or dirt in the air system.

#### NOTE

**Relieve pressure from system before removing any part of it.**

#### 4-131. Air Lines, Hoses, and Fittings

a. *Removal.*

(1) Drain pressure from - System..

(2) Remove screws and clamps securing hoses and lines.

(3) Disconnect and remove the hoses and lines from valves, brake chambers, and air compressor. Refer to the carrier air brake system piping diagram.

b. *Cleaning and Inspection.*

(1) Clean all parts and dry thoroughly.

(2) Inspect for cracks, damaged threads, deterioration, or other defects.

(3) Replace all defective lines, hoses, and fittings.

c. *Installation.* Install and connect all lines, hoses and fittings to compressor, valves and brake chambers (Refer to fig. 4-119 for model 2380 or fig. 4-120 for model 2385).



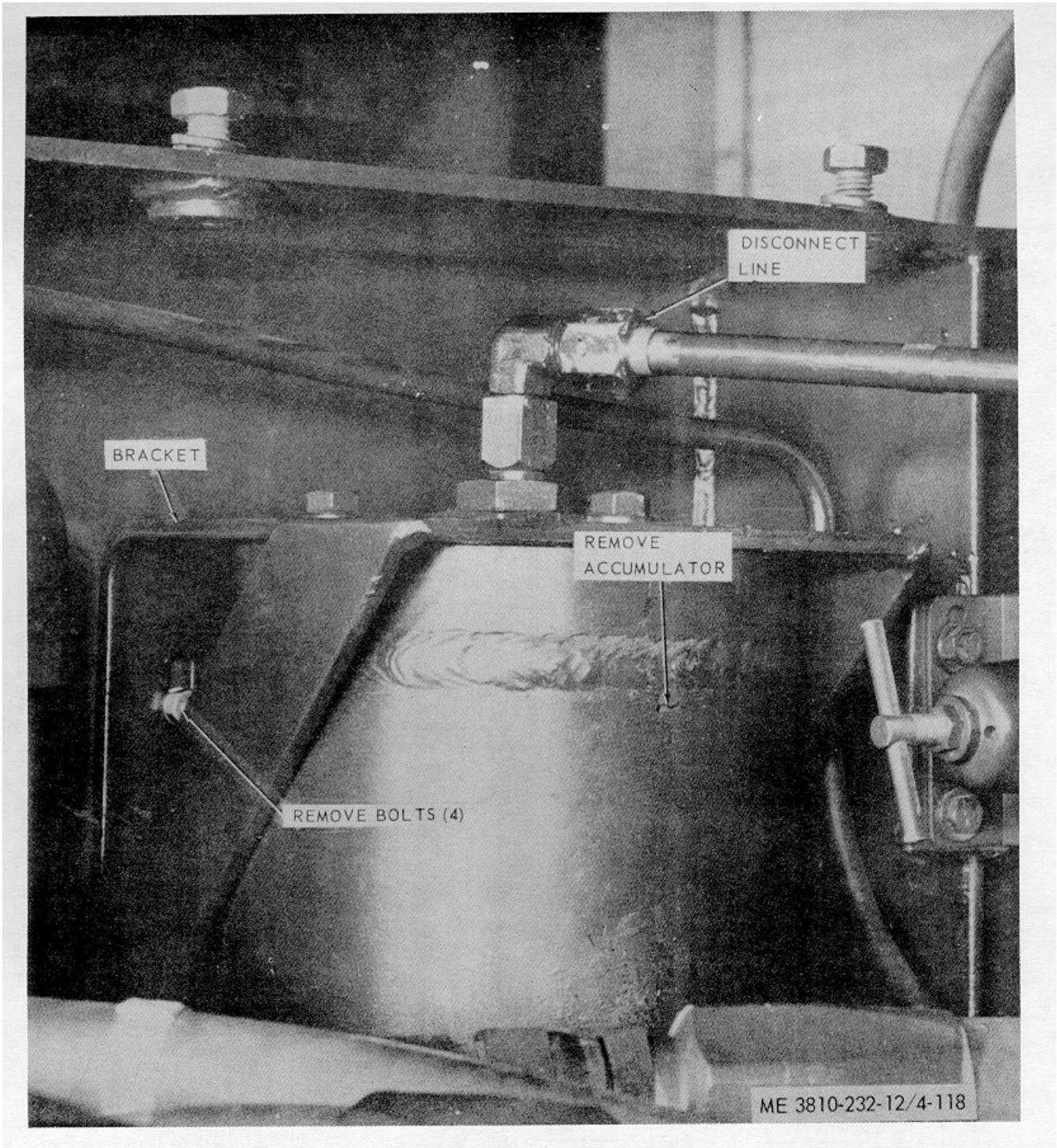
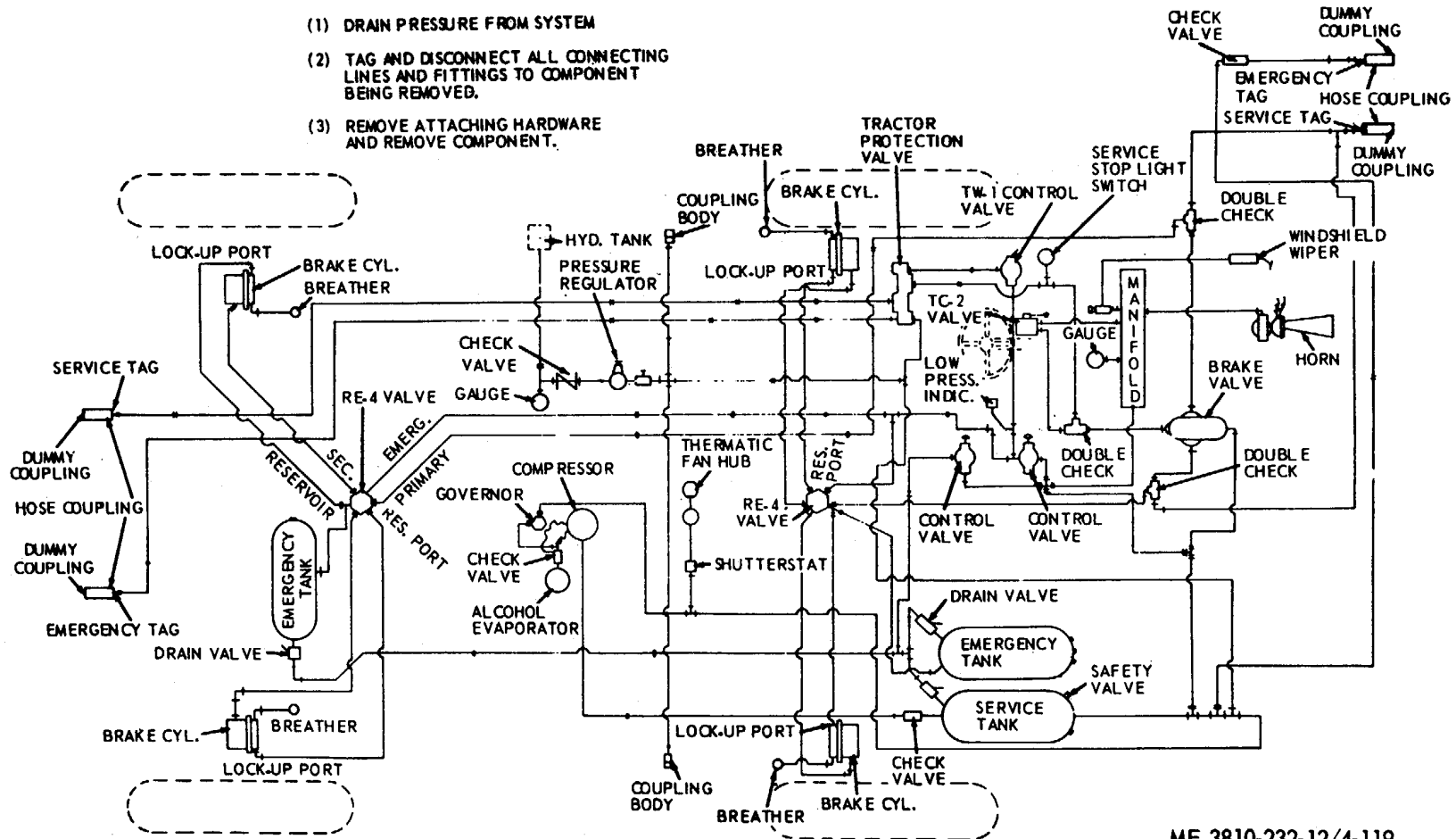


Figure 4-118. Accumulator, removal and installation.

NOTE: TO REMOVE ANY CONTROL VALVE, CHECK VALVE, FITTING, OR SIMILAR ITEM FROM THE AIR SYSTEM PROCEDURE IS AS FOLLOWS:

- (1) DRAIN PRESSURE FROM SYSTEM
- (2) TAG AND DISCONNECT ALL CONNECTING LINES AND FITTINGS TO COMPONENT BEING REMOVED.
- (3) REMOVE ATTACHING HARDWARE AND REMOVE COMPONENT.



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Figure 4-119. Carrier air brake system, piping diagram (model 2380).

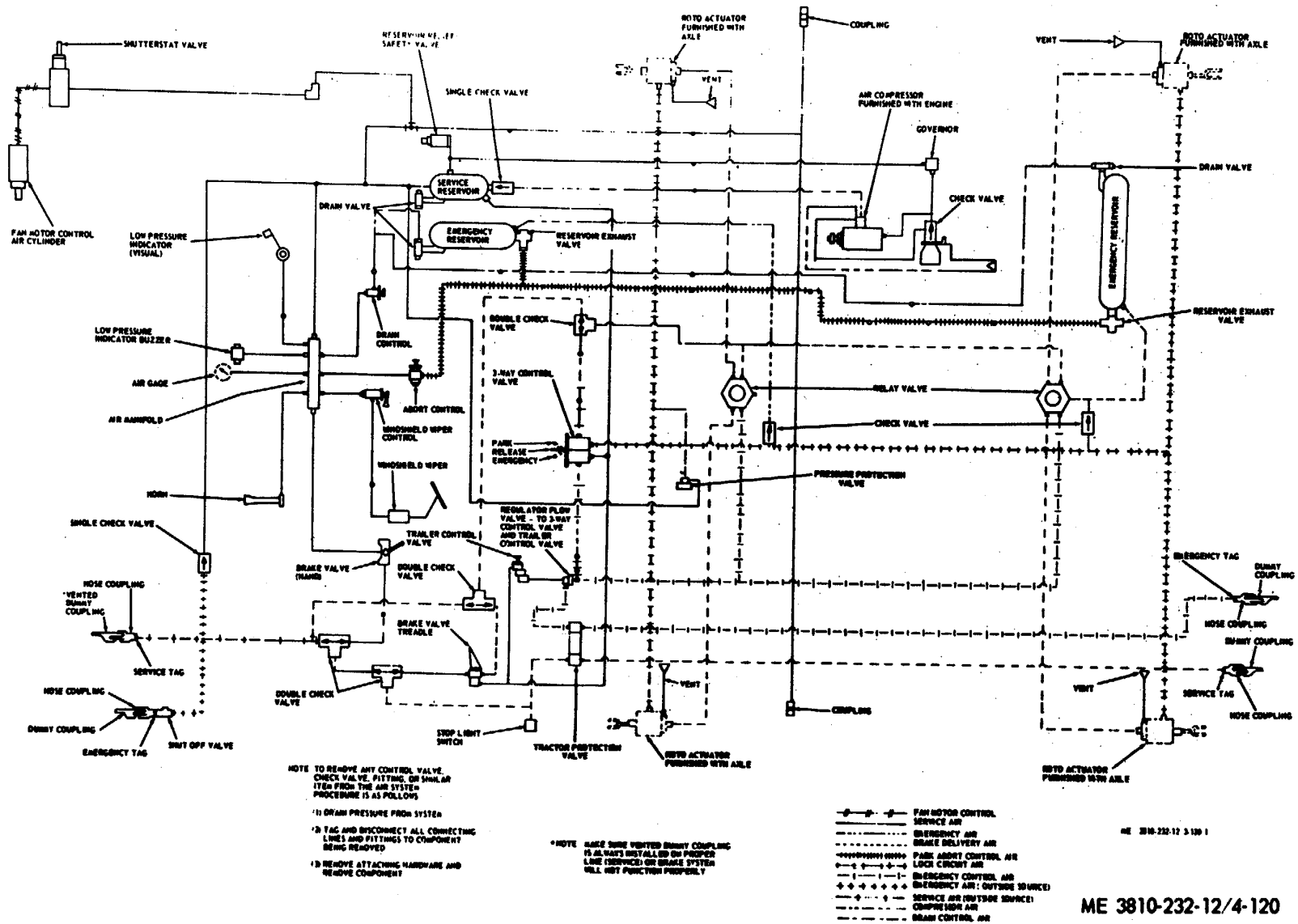


Figure 4-120. Carrier air brake system, piping diagram (model 2385).

#### 4-132. Brake Valve

##### a. Removal

(1) Relieve pressure from system.

(2) Remove the brake valve as illustrated in figure 4-121.



Figure 4-121. Brake valve, removal and installation

##### b. Cleaning and Inspection.

(1) Clean and dry thoroughly.

(2) Inspect for cracks or other defects. Replace a defective brake valve.

c. *Installation.* Install brake valve as illustrated in figure 4-121.

#### 4-133. Moisture Ejector Drain Valves

##### a. Removal

(1) Relieve pressure from system.

(2) Remove the drain valves as illustrated in figures 4-119 or 4-120.

##### b. Cleaning and Inspection.

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

(2) Inspect for cracks, damaged threads, or other defects. Replace defective drain valves.

c. *Installation.* Install drain valves as illustrated in figures 4-119 or 4-120.

#### 4-134. Relay Valves

##### a. Removal

(1) Relieve system pressure.

(2) Remove relay valves as illustrated in figure 4-122.

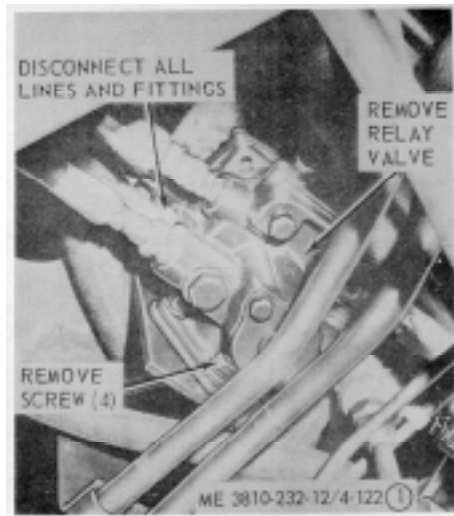


Figure 4-122. Relay valves, removal and installation. Sheet 1 of 2.

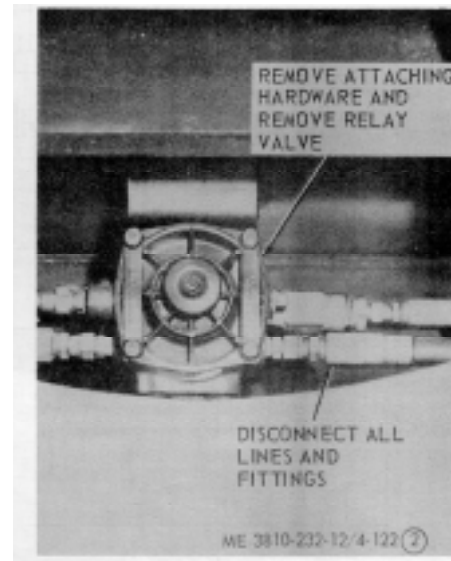


Figure 4-122. Relay valves, removal and installation. Sheet 2 of 2.

b. *Cleaning and Inspection.*

(1) Clean all parts and dry thoroughly.

(2) Inspect for cracks or other defects. Replace defective relay valves.

c. *Installation.* Install relay valves as illustrated in figure 4-122.

#### 4-135. Emergency-Park Brake Control Valve

a. *Removal*

(1) Relieve system pressure.

(2) Remove emergency-park brake control valve as illustrated in figure 4-119 or 4-120.

b. *Cleaning and Inspection.*

(1) Clean valve and dry thoroughly.

(2) Inspect for cracks or other defects. Replace defective control valve.

c. *Installation.* Install control valve as illustrated in figures 4-119 or 4-120.

#### 4-136. Pressure Regulating Valve

a. *Removal.*

(1) Relieve pressure from both sides of regulating valve.

(2) Remove pressure regulating valve as illustrated in figure 4-123.

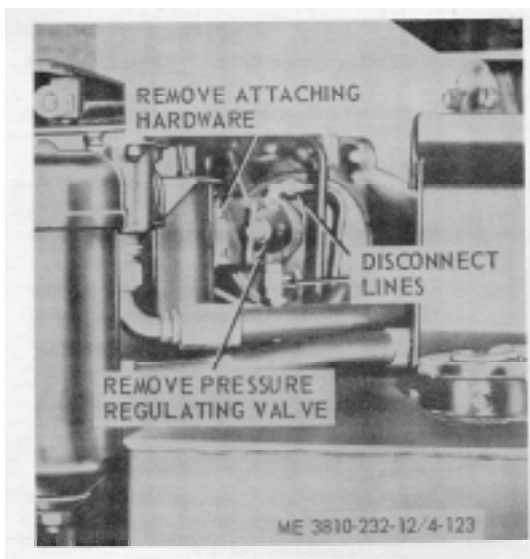


Figure 4-123. Pressure regulating valve, removal and installation.

b. *Cleaning and Inspection.*

(1) Clean all parts and dry thoroughly.

(2) Inspect for cracks, damaged threads, or other defects. Replace defective parts.

c. *Installation.* Install pressure regulating valve as illustrated in figure 4-123. Adjust the pressure regulating valve to apply 6 psig in hydraulic tank as indicated on pressure gage in figures 4-119 or 4-120.

#### 4-137. Trailer Brake Control Valve

a. *Removal.*

(1) Relieve system pressure.

(2) Remove trailer brake control valve as illustrated in figure 4-124.

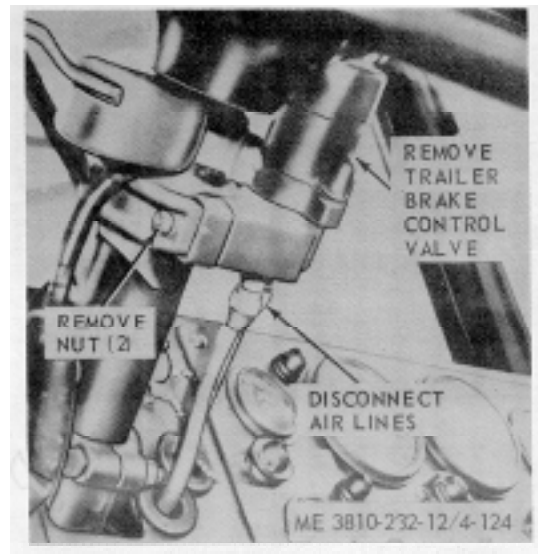


Figure 4-124. Trailer brake control valve, removal and installation

b. *Cleaning and Inspection.*

(1) Clean valve exterior.

(2) Inspect valve for cracks or other damage.

Replace a defective valve.

c. *Installation.* Install valve as illustrated in figure 4-124.

#### 4-138. Tractor Protection Valve

a. *Removal.*

(1) Drain system pressure.

(2) Remove safety valve as instructed in figures 4-119 or 4-120.

b. *Cleaning and Inspection.*

(1) Clean valve and dry thoroughly.

(2) Inspect valve for cracks or other damage.

Replace a defective valve.

c. *Installations.* Install valve as illustrated in figures 4-119 or 4-120.

#### 4-139. Air Compressor Governor

##### a. Removal.

(1) Relieve pressure from the system.

(2) Remove air compressor governor as illustrated in figure 4-125.

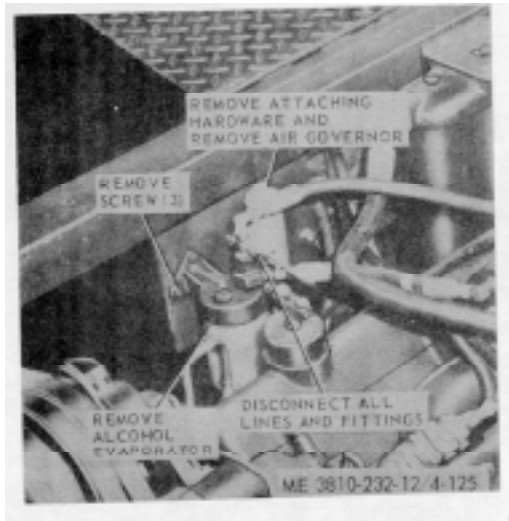


Figure 4-125. Air compressor governor and alcohol evaporator for, removal and installation.

##### b. Cleaning and Inspection.

(1) Clean and dry thoroughly.

(2) Inspect for cracks or other defects. Replace defective governor.

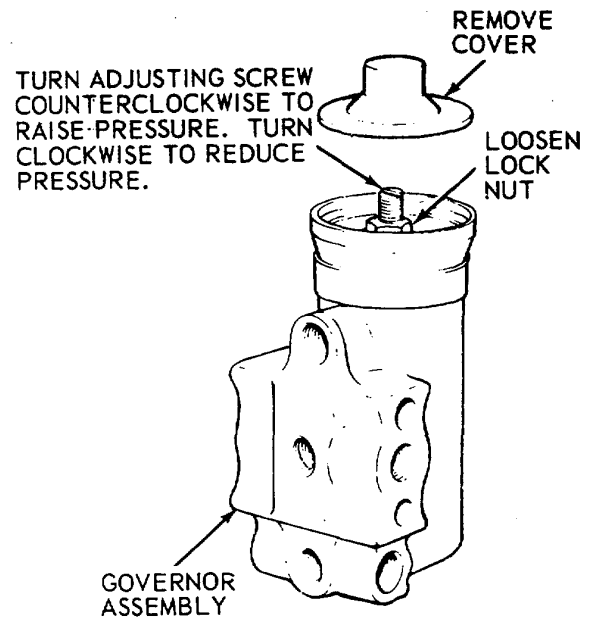
c. Installation. Install governor as illustrated in figure 4-125.

d. Adjustment. Adjust air compressor governor as illustrated in figure 4-126.

#### 4-140. Alcohol Evaporator

a. General The alcohol evaporator permits vaporized alcohol to be drawn into the air brake system and thus guards against any possible interruption of braking service when a vehicle is operated in below freezing temperatures. The evaporator consists of a support casting and a reservoir for methyl alcohol.

b. Removal. Remove alcohol evaporator as illustrated in figure 4-125.



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Figure 4-126. Air compressor governor adjustment.

##### c. Cleaning and Inspection.

(1) Clean the alcohol evaporator with an approved cleaning solvent.

(2) Inspect strainer in the bottom of the body near the mounting flange to be sure it is clean and free of obstructions.

(3) Inspect all connections and openings in body to be sure they are free of obstructions.

(4) Inspect for cracks or other damage.

(5) Replace a damaged or defective alcohol evaporator.

d. Installation. Install the alcohol evaporator as illustrated in figure 4-125.

e. Service. Fill reservoir two-thirds full of pure methyl 188 proof alcohol. Alcohol should be free of any inhibitor.

#### 4-141. (Not Applicable)

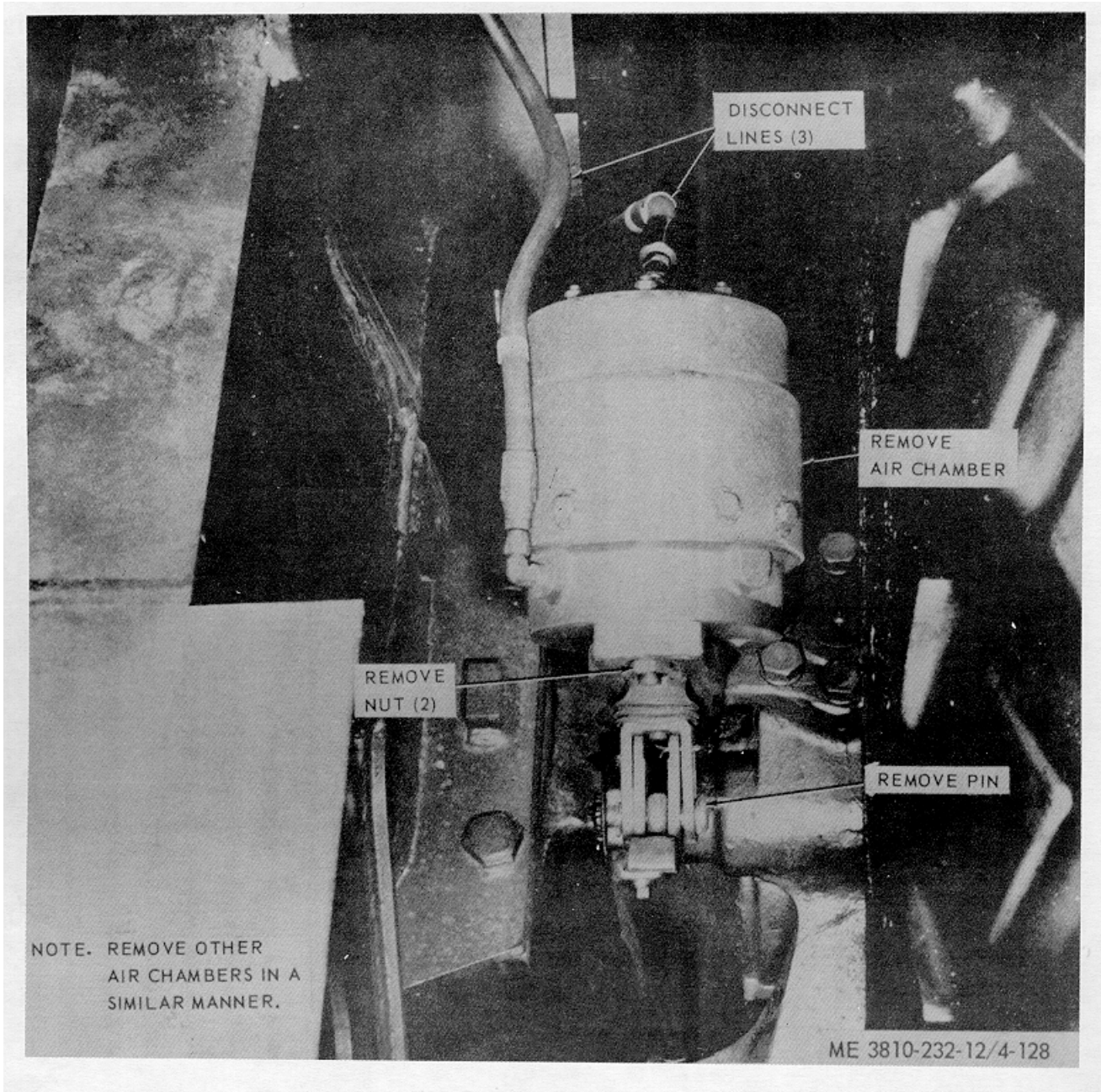
#### 4-142. Air Chamber

##### a. Removal

(1) Relieve air pressure from system.

(2) Remove air chamber as illustrated in figure 4-128.

Figure 4-127. Not used.



*Figure 4-128. Air chamber, removal and installation.*



b. *Cleaning and Inspection.*

(1) Wipe exterior of air chamber with a damp cloth.

(2) Inspect for cracks or other defects. Replace defective air chamber.

c. Install air chamber as illustrated in figure 4-128.

**4-143. Brake Adjustment**

Adjust brakes as illustrated in figure 4-129.

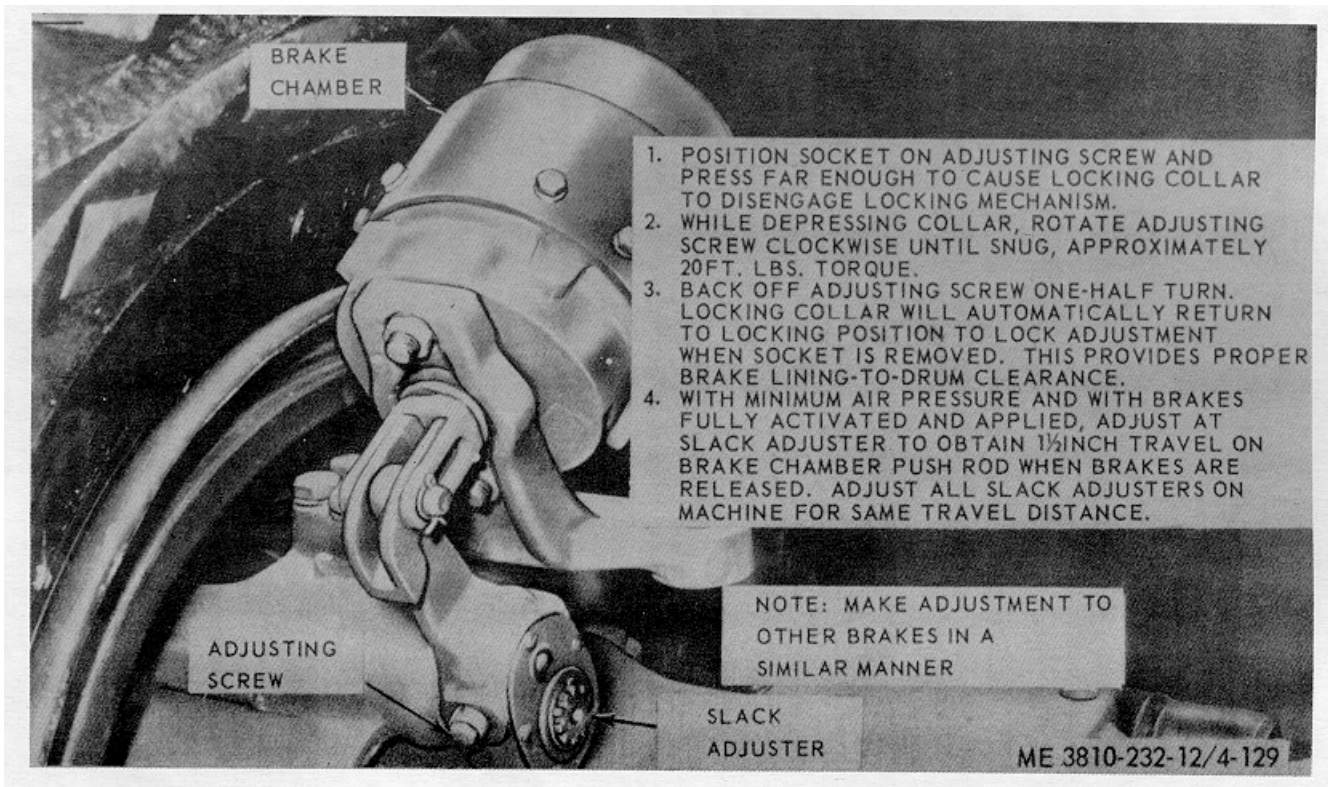


Figure 4-19. Brake adjustment.



## Section XXVII. CARRIER FRAME

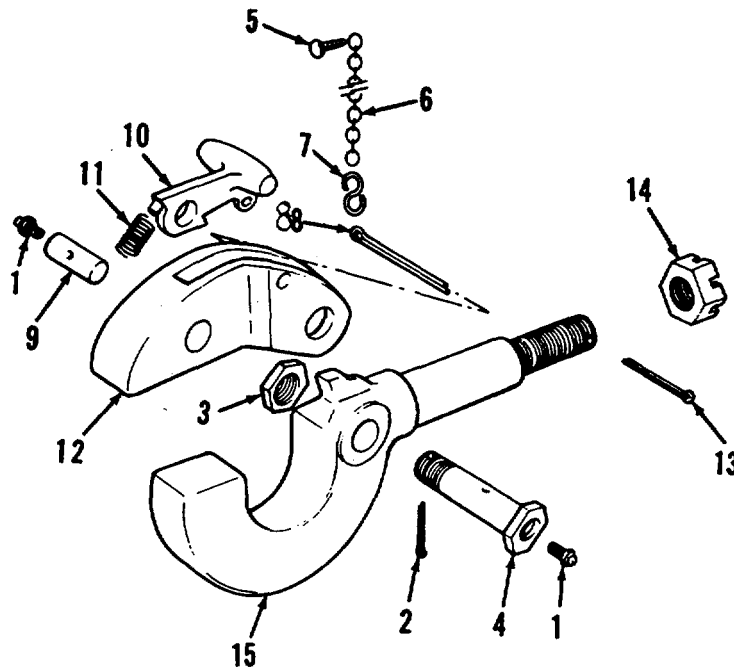
### 4-144. General

The carrier frame is an all welded high yield strength, low carbon, steel structure with cross-members, supporting brackets welded integrally with the frame. The carrier frame supports and carries the crane and all components. A pintle hook is mounted on the rear

for towing purposes. Refer to TM 9-237 for special welding techniques for the frame.

### 4-145. Pintle Hook

a. *Removal and Disassembly.* Remove and disassemble pintle hook as shown in figure 4-130.



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Figure 4-130. Pintle hook, removal and installation.

- b. *Cleaning, Inspection and Repair.*
  - (1) Clean all parts.
  - (2) Inspect all parts for defective condition.
  - (3) Repair or replace damaged parts.
- c. *Reassembly and Installation.* Reassemble and

install pintle hook as illustrated in figure 4-130.

**4-146. Fender**

- a. *Removal*

(1) Refer to figure 4-131 and remove the fender.

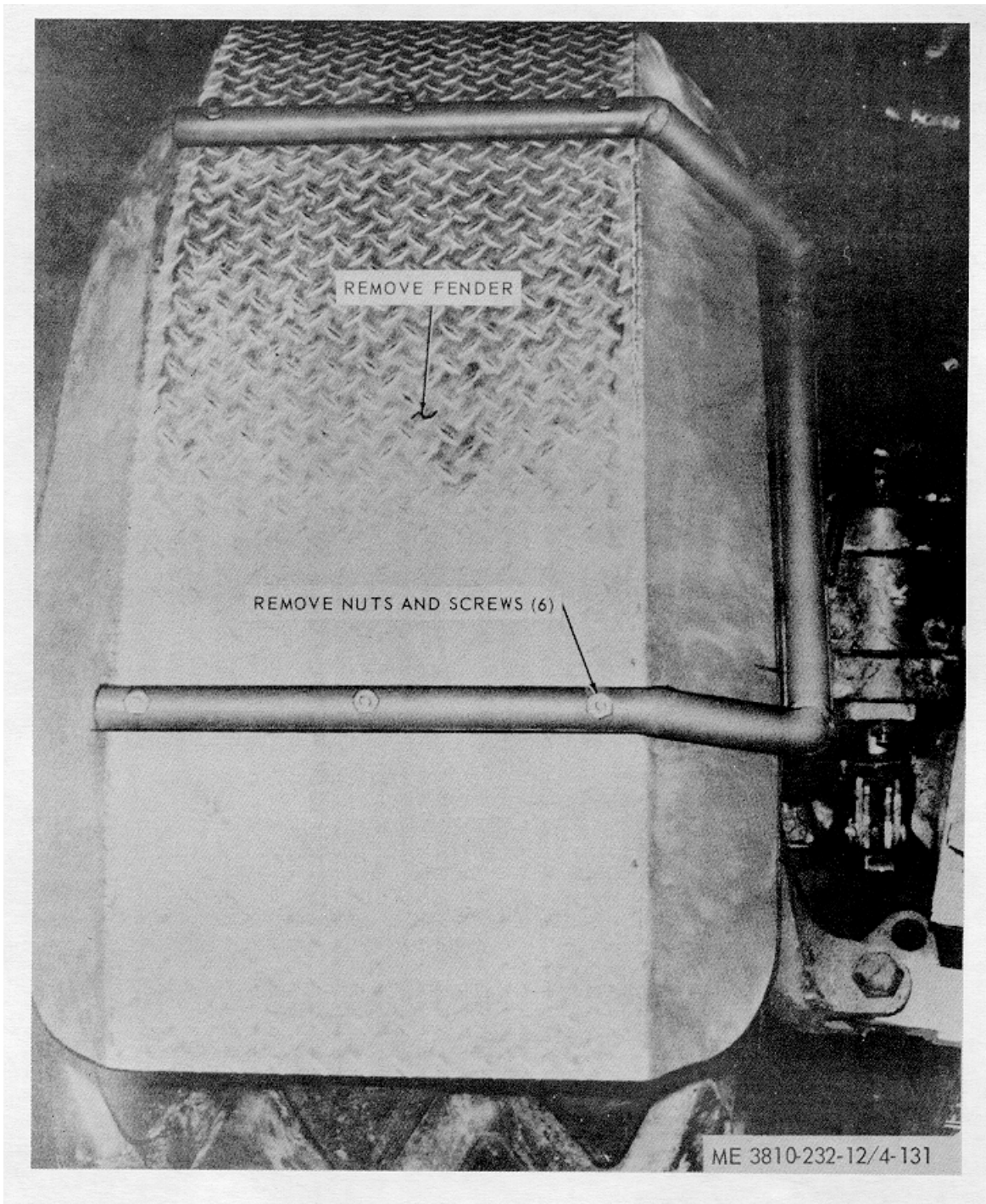
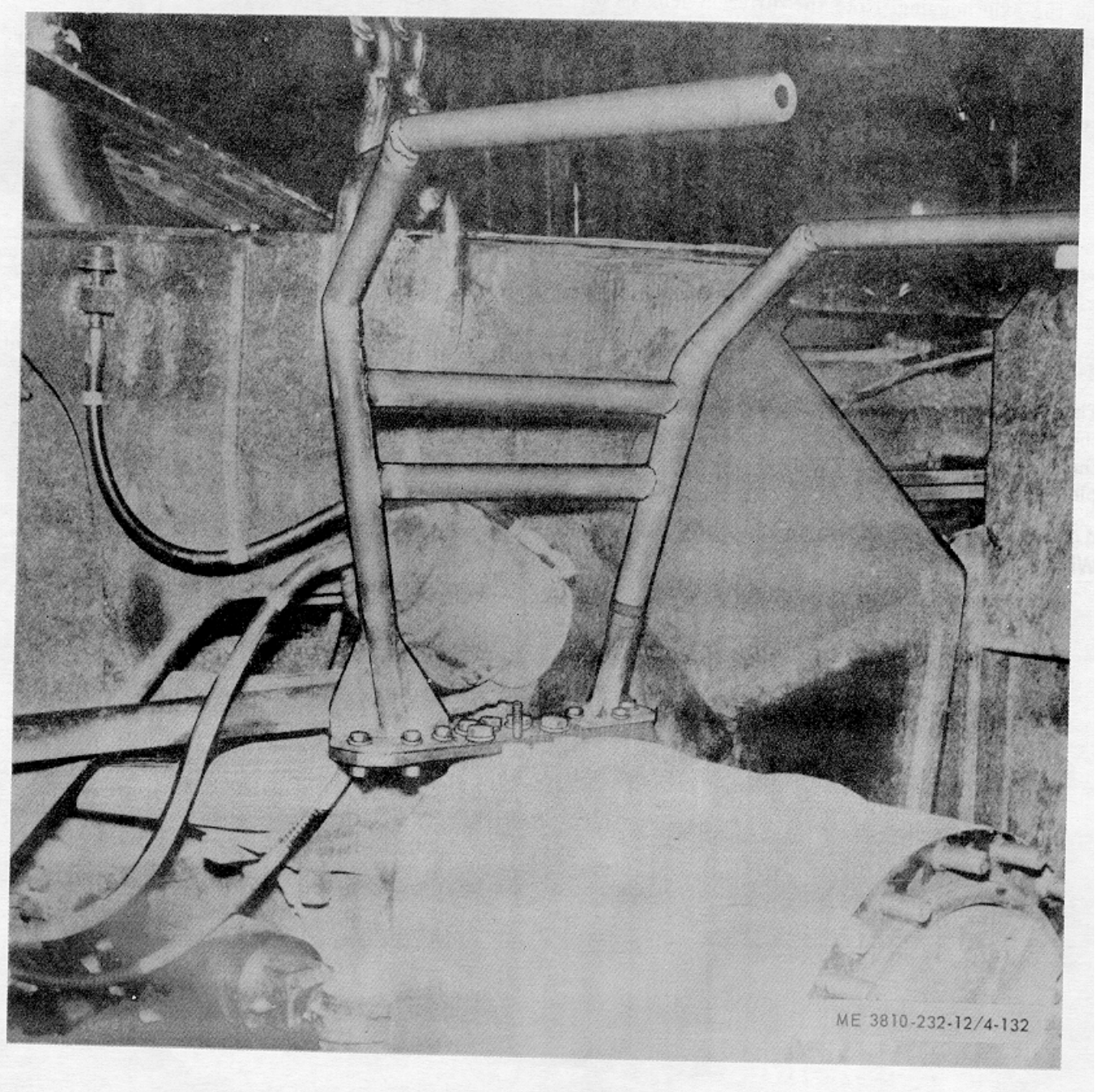


Figure 4-131. Carrier fender, removal and installation.

(2) Refer to figure 4-132 and remove the fender mounting bracket.



*Figure 4-132. Fender mounting bracket ins tailed.*

(3) If necessary to remove the baseplate, be careful not to lose the steel spacers between the plate and the axle housing. Note the different lengths of the capscrews for proper reinstallation.

*b. Inspection and Repair.* Inspect fender and bracket for dents, breaks, or other damage. Repair by welding, straightening or replacement of components.

*c. Installation.*

(1) Install the base plate and torque the 3/8 inch capscrews to 370 ft.-lb., torque the 5/8 inch capscrews to 225 ft.-lbs.

(2) Install the fender bracket by sliding fender up over tire and secure to bracket with screws, lockwashers and nuts.

## **Section XXVIII. CARRIER CAB AND COMPONENTS**

### **4-147. General**

The carrier cab is mounted on the left-front side of the carrier frame. It is designed to accommodate only the driver. The top portion can be removed as a complete unit.

### **4-148. Windshield, Small Side and Rear Window Glass**

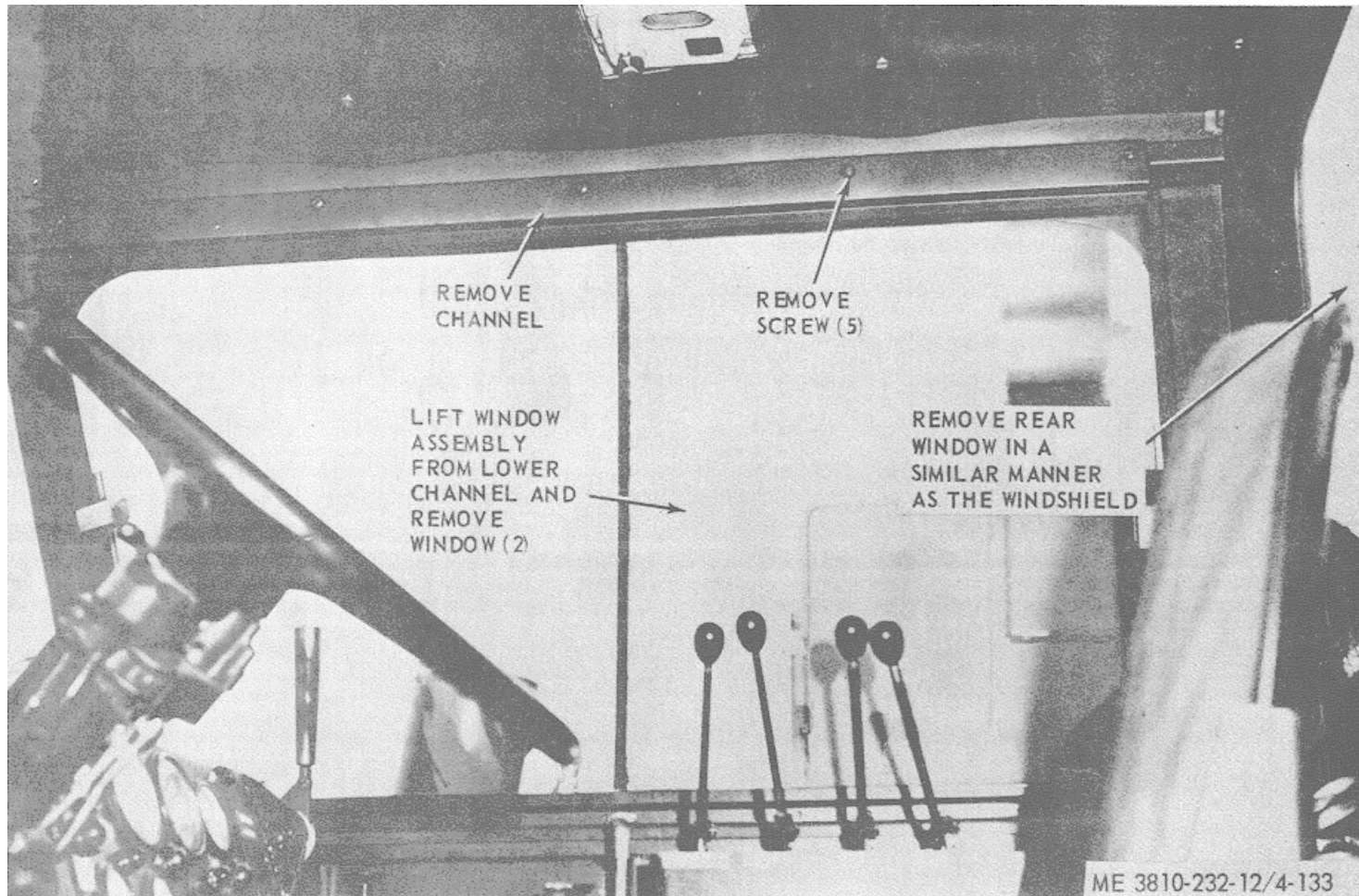
*a. Removal.* This glass is removed in the same

manner as the door window and windshield glass in the crane (para 4-117).

*b. Installation.* This glass is installed in the same manner as the door window and windshield glass in the crane (para 4-117).

### **4-149. Side Window Glass**

*a. Removal.* Remove side window glass as instructed in figure 4-133.



*Figure 4-133. Carrier cab side window glass, removal and installations.*

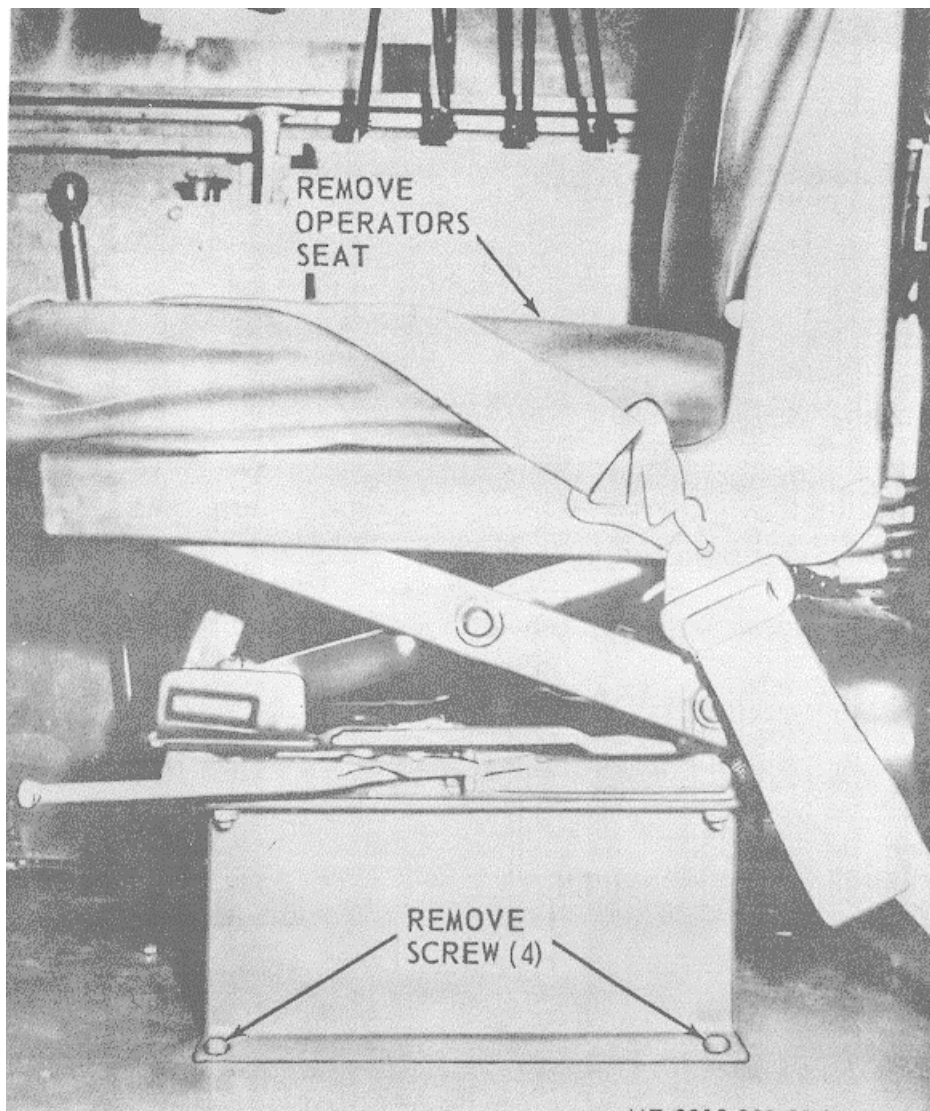
*b. Cleaning and Inspection.*

- (1) Clean all parts.
- (2) Inspect the window mounting gasket for damage and inspect glass for cracks and chipped edges.
- (3) Replace damaged parts.

*c. Installation.* Install side window glass as illustrated in figure 4-133.

**4-150. Operator's Seat**

*a. Removal* Remove operator's seat from carrier cab as illustrated in figure 4-134.



*Figure 4-134. Carrier cab seat, removal and installation*



b. *Cleaning, Inspection, and Repair.*

(1) Clean all parts. Use soap and water for cleaning cushions.

(2) Inspect cushions for torn or ripped covers and broken springs. Replace damaged cushions.

(3) Inspect seat frame and suspension for cracks and bends. Straighten bends and weld cracks.

(4) Replace damaged seat.

c. *Installation.* Install carrier cab seat as illustrated in figure 4-134.

#### 4-151. Cab Operator's Door

a. *Removal.* Remove carrier cab door as instructed in figure 4-135.



Figure 4-135. Carrier cab door, removal and installation.

b. *Cleaning, Inspection, and Repair.*

(1) Clean all parts.

(2) Inspect door for dents, and broken parts.

(3) Repair dents.

(4) Replace broken or cracked hinges, handles and glass as required. Glass is removed and replaced as follows:

(a) Remove the inside door and window handles.

(b) Remove the inner panel.

(c) Remove and replace glass in channel.

(d) Install inner panel and handles.

c. *Installation.* Install carrier cab door as illustrated in figure 4-135.

#### 4-152. Windshield Wiper Motor

a. *Removal and Disassembly.*

(1) Remove windshield wiper motor as illustrated in figure 4-136.

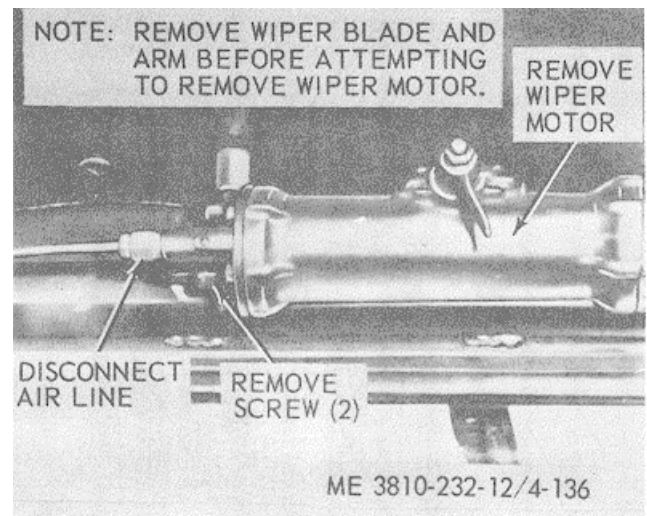


Figure 4-136. Windshield wiper motor, and installation.

(2) Disassemble motor as illustrated in figure 4-137.

b. *Cleaning, Inspection, and Repair.*

(1) Clean all parts and dry thoroughly.

(2) Inspect for cracks or other defects.

(3) Repair by replacing damaged or defective parts.

c. *Reassembly and Installation.*

(1) Reassemble motor as illustrated in figure 4-137.

(2) Install motor as illustrated in figure 4-136.

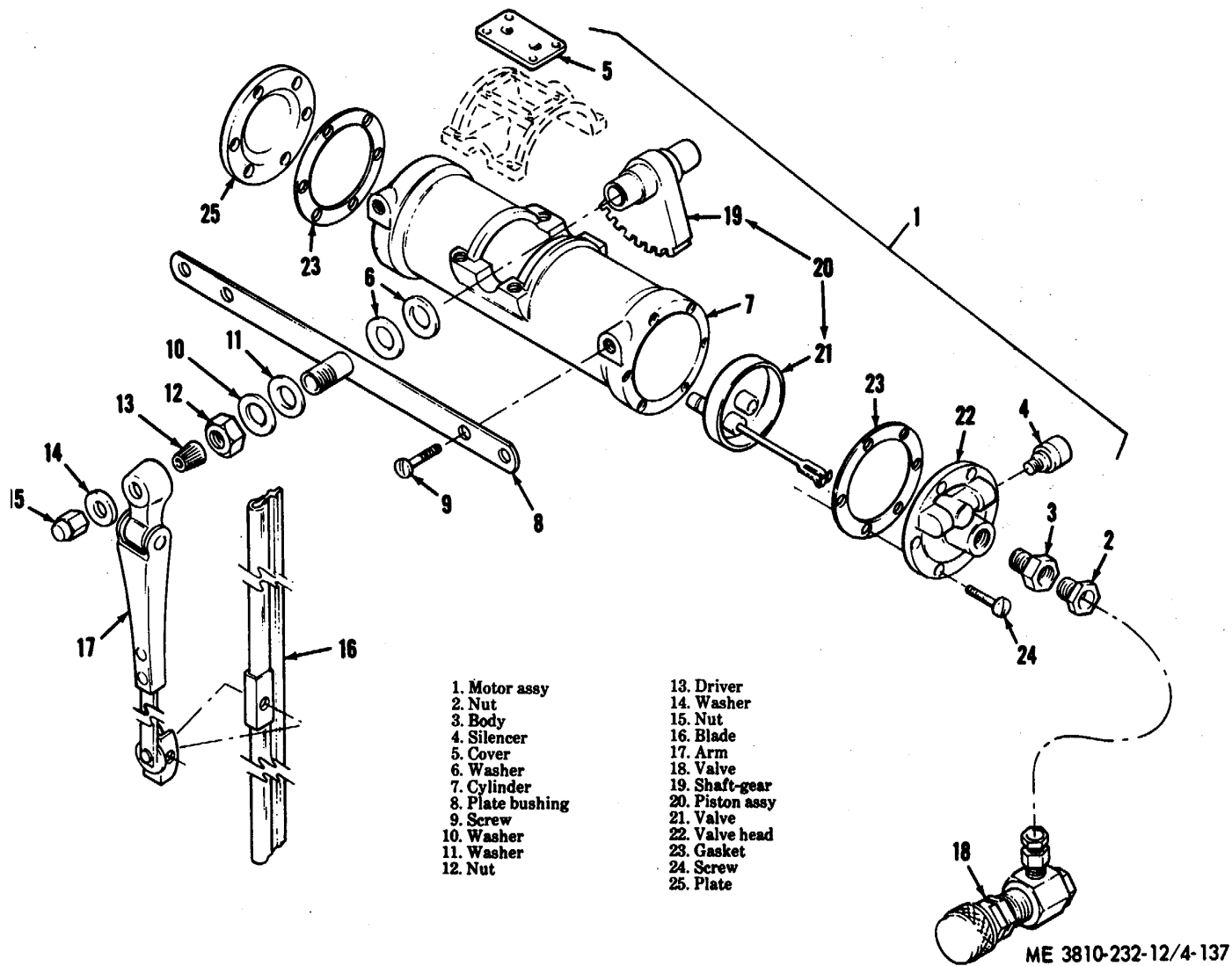


Figure 4-157. Windshield wiper motor, disassembly and reassembly.



## **Section XXIX. UTILITY BLADE ASSEMBLY**

### **4-153. General**

The utility blade has a replaceable cutting edge and end bits. It is provided with a bowl hook to lock it in raised position when the machine is traveling. The utility blade is constructed of high yield strength, low carbon steel, and Requires special welding tech-

niques. Refer to TM 9-237, 6 November 1967.

### **4-154. Utility Blade Assembly**

Inspect cutting edge and blade bits. Replace damaged cutting edge or blade bits as illustrated in figure 4-138.

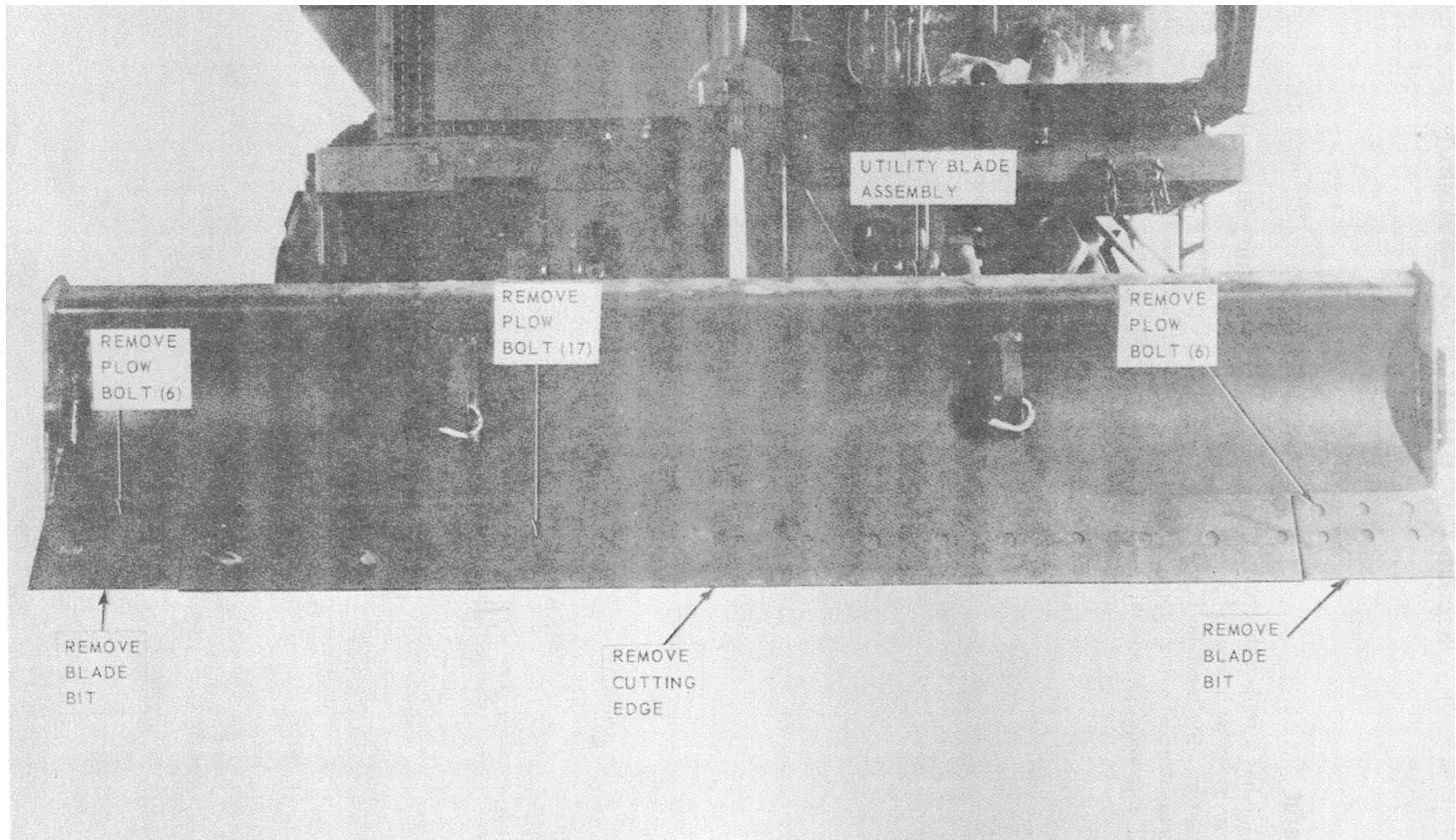


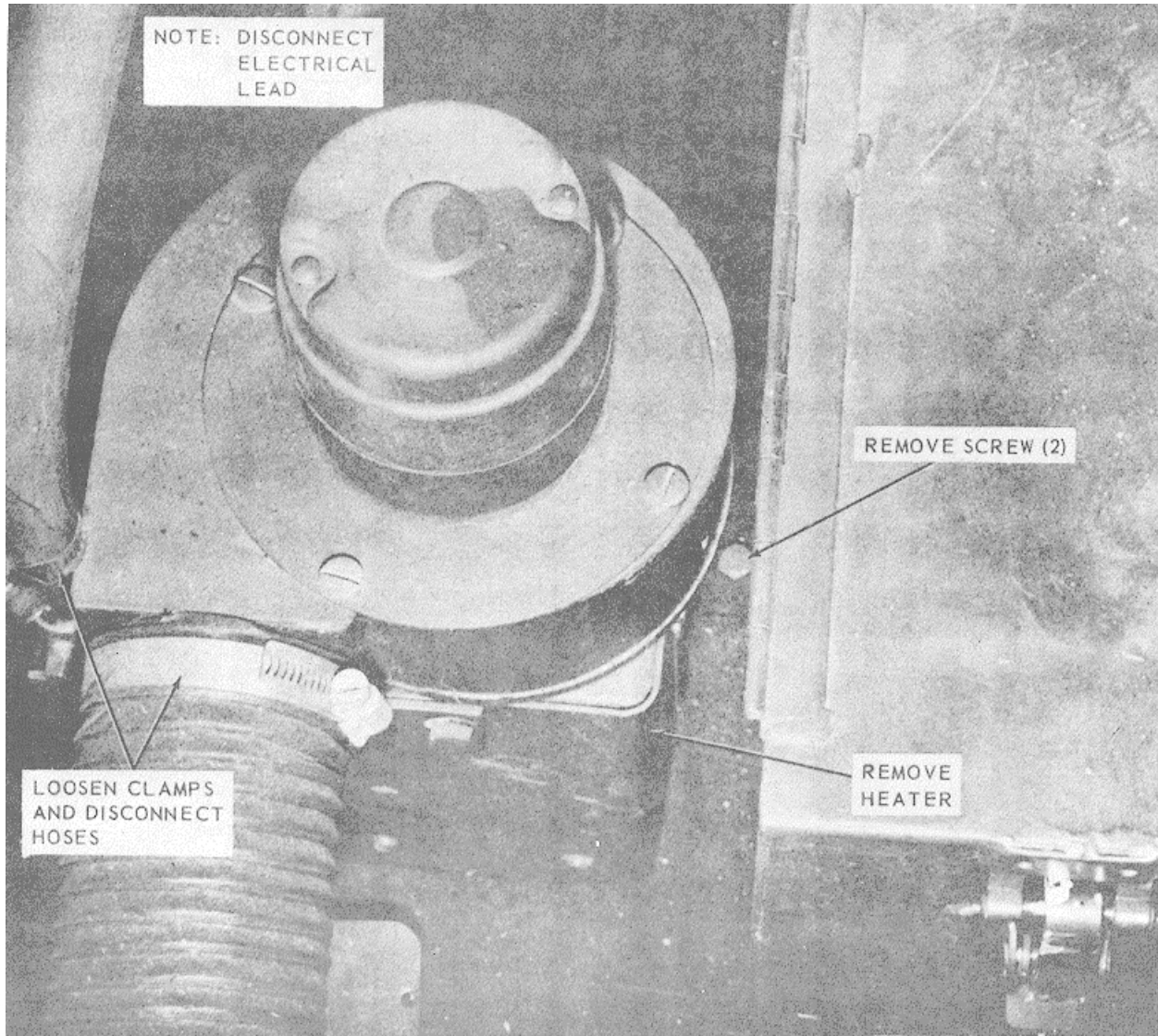
Figure 4-138. Cutting edge and end bits, removal and installation.

**Section XXX. CRANE AND CARRIER ACCESSORIES**

**4-155. Crane Cab Heater**

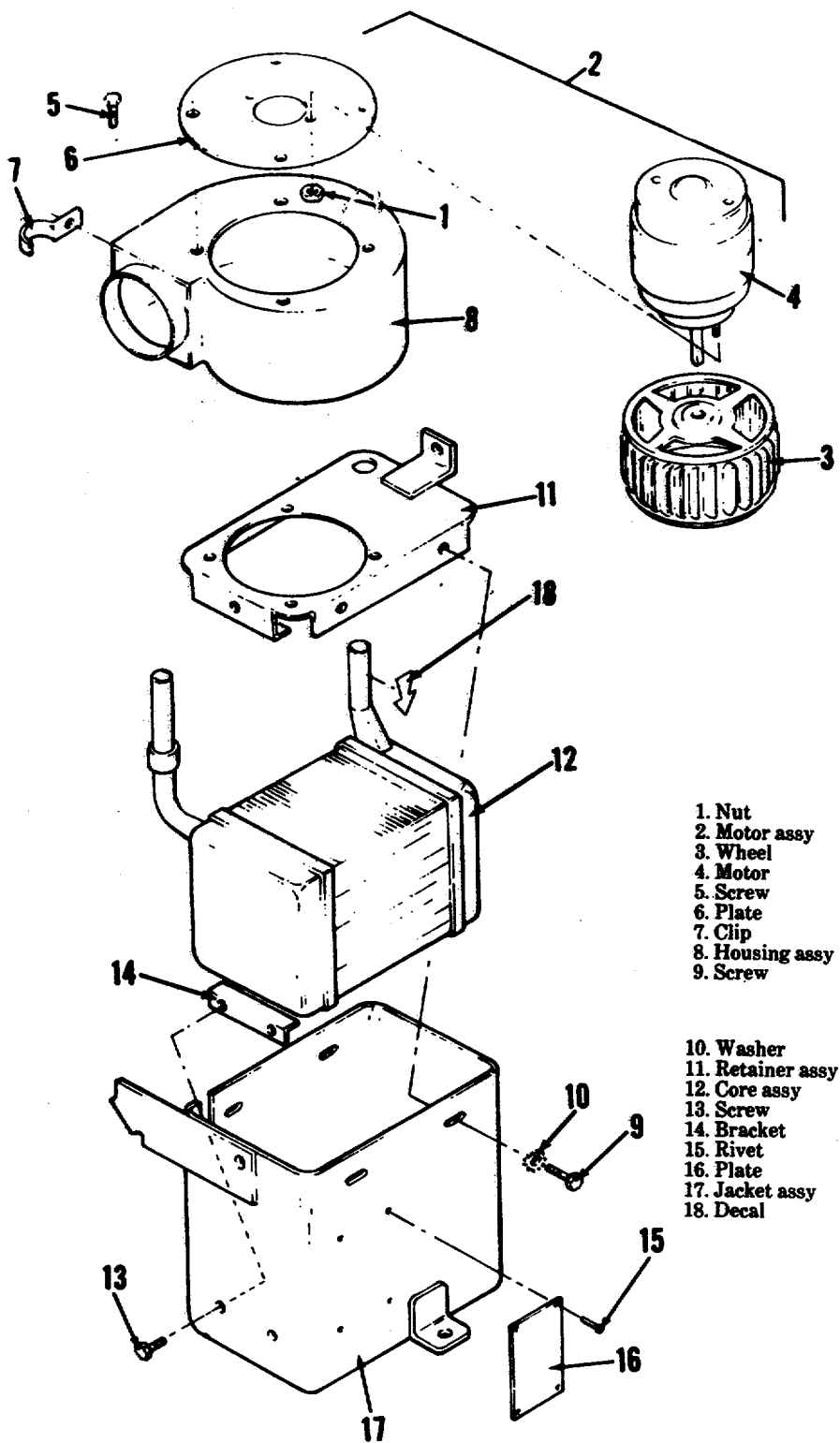
*a. Removal and Disassembly.*

(1) Remove crane heater as illustrated in figure 4-139.



*Figure 4-139. Crane heater, removal and installation.*

(2) Disassemble crane heater as illustrated in figure 4-140.



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Figure 4-140. Crane heater, disassembly and reassembly.

b. *Cleaning and Inspection.*

- (1) Clean all parts and dry thoroughly
- (2) Inspect for cracks or other defects.

Replace defective parts as required.

c. *Reassembly and Installation.*

- (1) Reassemble heater as illustrated in figure 4-140.
- (2) Install heater as illustrated in figure 4-139.

**4-156. Carrier Cab Heater**

a. *Removal and Disassembly.*

- (1) Drain cooling system (para 3-20).
- (2) Remove heater as illustrated in figure 4-

141.

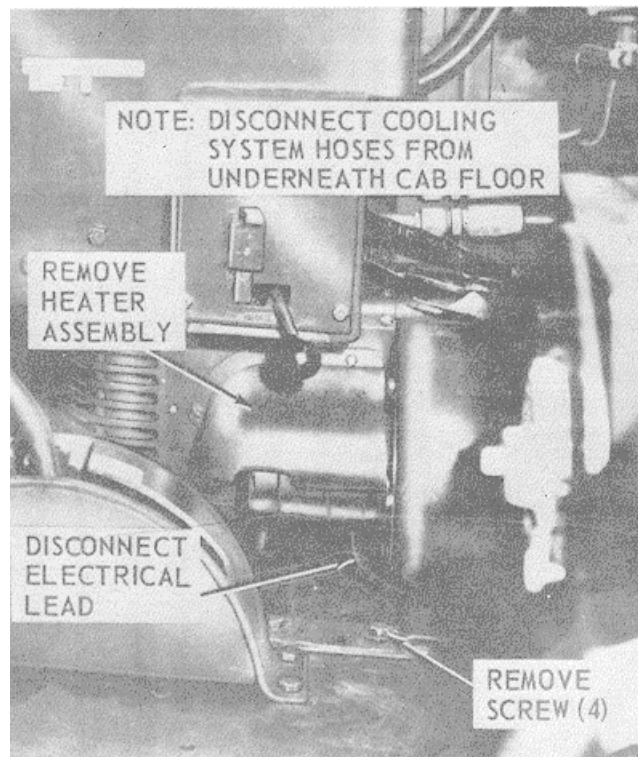
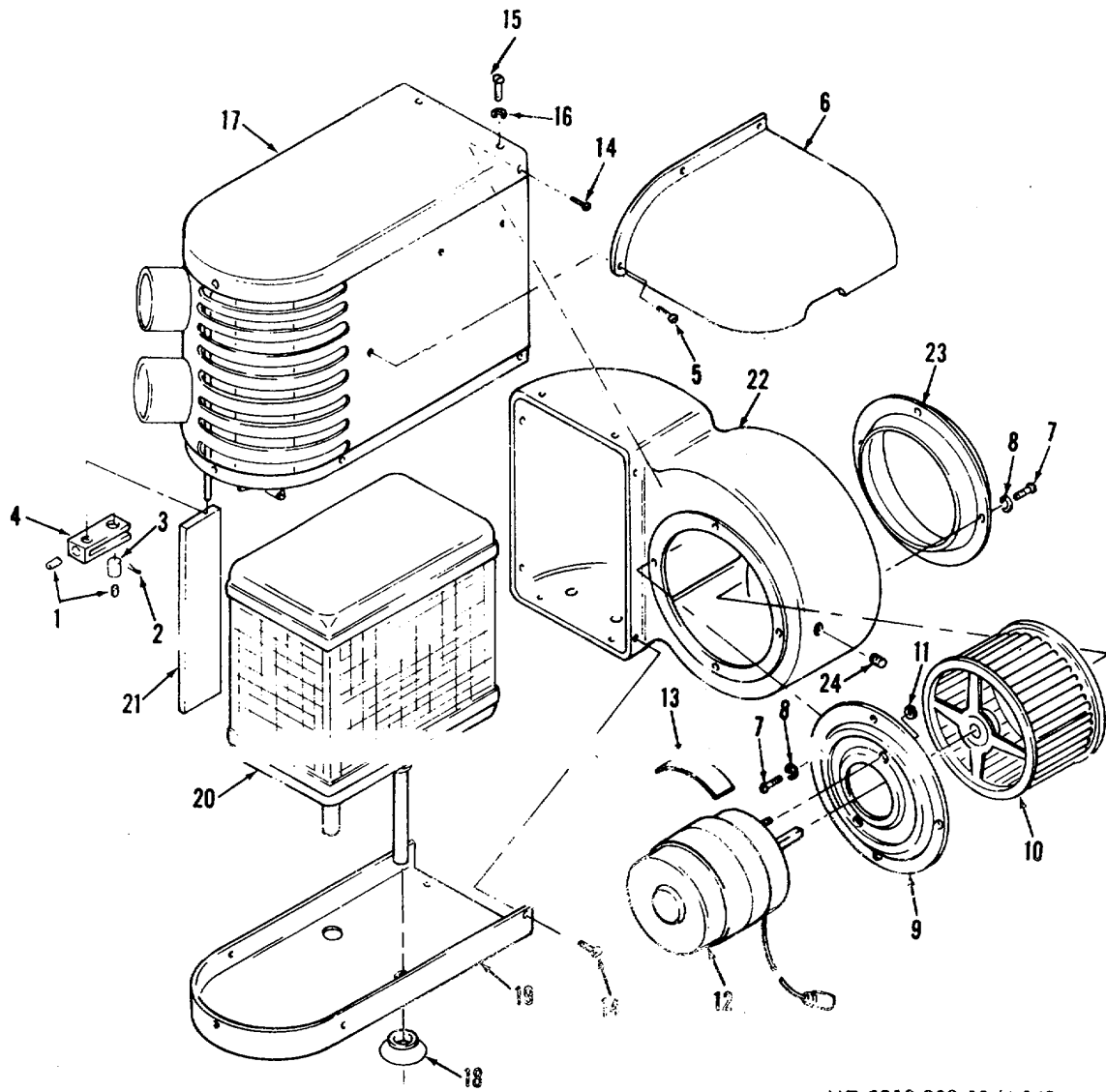


Figure 4-141. Carrier cab heater, removal and installation

(3) Disassemble heater as illustrated in figure 4-142.



ME 3810-232-12/4-142

- |              |                  |
|--------------|------------------|
| 1. Screw     | 13. Plate        |
| 2. Pin       | 14. Screw        |
| 3. Pin       | 15. Screw        |
| 4. Lever     | 16. Washer       |
| 5. Screw     | 17. Cover        |
| 6. Casting   | 18. Grommet      |
| 7. Screw     | 19. Plate        |
| 8. Washer    | 20. Core-tank    |
| 9. Flange    | 21. Spacer       |
| 10. Impeller | 22. Housing duct |
| 11. Nut      | 23. Flange       |
| 12. Motor    | 24. Plug         |

Figure 4-142. Carrier cab heater, disassembly and reassembly.

*b. Cleaning, Inspection, and Repair.*

(1) Clean all parts and dry thoroughly.

(2) Inspect heater for leaks, cracks, or other damage. Replace defective heater.

(3) Inspect hoses for breaks or cracks. Replace if defective.

(4) Inspect hose clamps and mounting hardware for damage.

(5) Inspect fan for distortion or other damage.

Replace all damaged or defective parts.

*c. Reassembly and Installation.*

(1) Reassemble heater as illustrated in figure 4-142.

(2) Install heater as illustrated in figure 4-141.

(3) Fill cooling system (para 3-20).

**4-157. Defroster Fan**

*a. Removal.* Remove defroster fan as illustrated in figure 4-143.

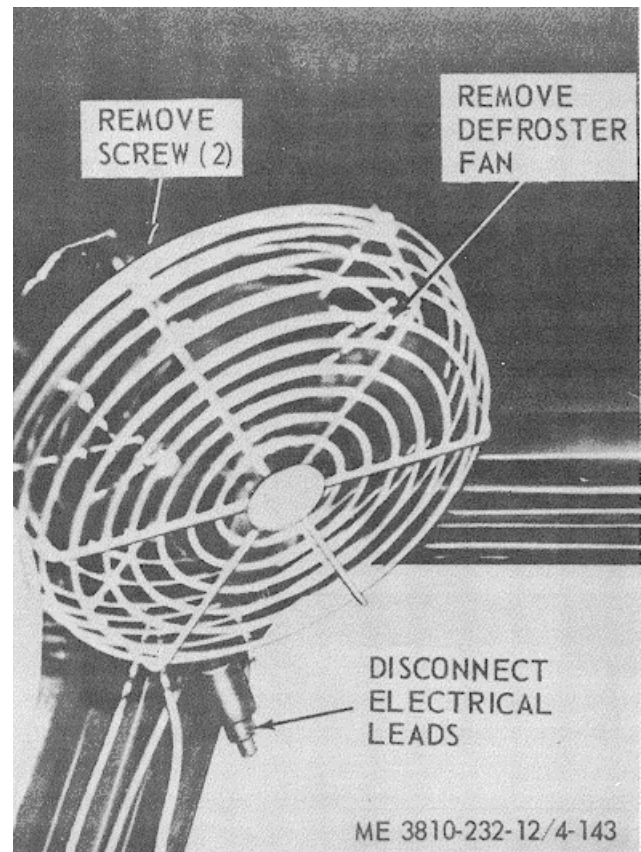
*b. Cleaning and Inspection.*

(1) Clean with a damp cloth and dry thoroughly.

(2) Inspect for cracks, breaks, defective wiring and other damage.

(3) Replace a damaged or defective defroster fan.

*c. Installation.* Install defroster fan as illustrated in figure 4-143.



*Figure 4-143. Defroster fan, removal and installation*

## APPENDIX A REFERENCES

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### A-1. Fire Protection

TB 5-4200-200-10

Hand Portable Fire Extinguishers for Army Users

### A-2. Lubrication

C91001L

Fuels, Lubricants, Oils and Waxes

LO 5-3810-232-12-1,  
-2, -3,-4, -5, & -6

Lubrication Order

### A-3. Painting

TM 9-213

Painting Instructions for Field Use

### A-4. Radio Suppression

TM 11-483

Radio Interference Suppression

### A-5. Maintenance

MT 9-237

Welding Techniques

TM 9-1870-1

Care and Maintenance of Pneumatic Tires

TB 750-651

Use of Antifreeze Solutions and Cleaning Compounds in  
Engine Cooling System

TM 38-750

Army Maintenance Management System (TAMMS)

TM 5-3810-232-20P

Organizational Maintenance Repair Parts and Special  
Tools Lists

TM 9-6140-200-15

Operation and Organizational Field and Depot  
Maintenance Storage Batteries, Lead Acid Type  
Safety Use of Cranes, Crane-Shovel Dragline, and  
Similar Equipment Near Electric Power Lines

TB 385-101

### A-6. Shipment and Storage

TM 740-90-1

Administrative Storage of Equipment

### A-7. Destruction of Army Materiel

TM 750-244-3

Procedures for Destruction of Equipment to Prevent  
Enemy Use



**APPENDIX B  
BASIC ISSUE ITEMS LIST**

**Section I. INTRODUCTION**

**B-1. Scope**

This appendix lists items which accompany the crane or are required for installation, operation, or operator's maintenance.

**B-2. General**

This Basic Issue Items List is divided into the following sections:

*a. Basic Issue Items - Section II.* A list of items which accompany the crane and are required by the operator/crew for installation, operation, or maintenance.

*b. Maintenance and Operating Supplies - Section III.* A listing of maintenance and operating supplies required for initial operation.

**B-3. Explanation of Columns**

The following provides an explanation of columns in the tabular list of Basic Issue Items, section II.

*a. Source, Maintenance, and Recoverability Codes (SMR):*

(1) Source code indicates the source for the listed item. Source codes are:

| <i>Code</i> | <i>Explanation</i>   |
|-------------|--|
| P           | Repair parts which are stocked in or supplied from the GSA/DSA, or Army supply system and authorized for use at indicated maintenance categories.  |
| P2          | Repair parts which are procured and stocked for insurance purposes because the combat or military essentiality of the end item dictates that a minimum quantity be available in the supply system.   |
| M           | Repair parts which are not procured or stocked, but are to be manufactured in indicated maintenance levels.  |
| A           | Assemblies which are not procured or stocked as such, but are made up of two or more units. Such component units carry individual stock numbers and descriptions, are procured and stocked separately and can be assembled to form the required assembly at indicated maintenance categories.                                    |
| X           | Parts and assemblies which are not procured or stocked and the mortality of which normally is below that of the applicable end item or component. The failure of such part or assembly should result in retirement of the end item from the supply system.   |
| X1          | Repair parts which are not procured or stocked. The requirement of such items will be filled by the use of the next higher assembly or component.  |
| X2          | Repair parts which are not stocked. The indicated maintenance category requiring such repair parts will attempt to obtain them through cannibalization. Where such repair parts are not obtainable through cannibalization, requirements will be requisitioned, with accompanying justification, through normal supply channels. |
| G           | Major assemblies that are procured with PEMA funds for initial issue only as exchange assemblies at  |

DSU and GSU level. These assemblies will not be stocked above GS and DS level or returned to depot supply level.

(2) Maintenance code indicates the lowest category of maintenance authorized to install the listed item. The maintenance level code is:

| <i>Code</i> | <i>Explanation</i> |
|-------------|--------------------|
| C           | Operator/crew      |

(3) Recoverability code, indicates whether unserviceable items should be returned for recovery or salvage. Items not coded are expendable. Recoverability codes are:

| <i>Code</i> | <i>Explanation</i>   |
|-------------|--|
| R           | Repair parts (assemblies and components) which are considered economically repairable at direct and general support maintenance levels. When the maintenance capability to repair these items does not exist, they are normally disposed of at the GS level. When supply considerations dictate, some of these repair parts may be listed for automatic return to supply for depot level repair as set forth in AR 710-50. When so listed, they will be replaced by supply on an exchange basis. |
| S           | Repair parts and assemblies which are economically repairable at DSU and GSU activities and which normally are furnished by supply on an exchange basis. When items are determined by a GSU to be uneconomically repairable they will be evacuated to a depot for evaluation and analysis before final disposition.  |
| T           | High dollar value recoverable repair parts which are subject to special handling and are issued on an exchange basis. Such repair parts are normally repaired or overhauled at depot maintenance activities.   |
| U           | Repair parts specifically selected for salvage by reclamation units because of precious metal content, critical materials, or high dollar value reusable casings or castings.  |

*b. Federal Stock Number.* This column indicates the Federal stock number assigned to the item and will be used for requisitioning purposes.

*c. Description.* This column indicates the Federal item name and any additional description of the item required. The abbreviation "w/e", when used as a part of the nomenclature, indicates the Federal stock number, includes all armament, equipment, accessories, and repair parts issued with the item. A part number or other reference number is followed by the

applicable five-digit Federal supply code for manufacturers in parenthesis. Repair parts quantities included in kits, sets, and assemblies are shown in front of the repair part name.

d. *Unit of Measure (U/M).* A two-character alphabetic abbreviation indicating the amount or quantity of the item upon which the allowances are based, e.g., ft, ea, pr, etc.

e. *Quantity Incorporated in Unit.* This column indicates the quantity of the item used in the assembly group. A "V" appearing in this column in lieu of a quantity indicates that a definite quantity cannot be indicated (e.g., shims, spacers, etc.).

f. *Quantity Furnished With Equipment.* This column indicates the quantity of an item furnished with the equipment.

g. *Illustration.* This column is divided as follows: (1) *Figure number.* Indicates the figure number of the illustration in which the item is shown.

(2) *Item number.* Indicates the callout number used to reference the item in the illustration.

**B-4. Explanation of Columns in the Tabular List of Maintenance and Operating Supplies-Section III**

a. *Component Application.* This column identifies the component application of each maintenance or operating supply item.

b. *Federal Stock Number.* This column indicates the Federal stock number assigned to the item and will be used for requisitioning purposes.

c. *Description.* This column indicates the item name and brief description.

d. *Quantity Required for Initial Operation.* This column indicates the quantity of each maintenance or operating supply item required for initial operation of the equipment.

e. *Quantity Required for 8 Hours Operation.* This column indicates the estimated quantities required for an average 8 hours of operation.

f. *Notes.* This column indicates informative notes keyed to data appearing in a preceding column.

**Section II. BASIC ISSUE ITEMS**

| (1)      | (2)                  | (3)   | (4)          | (5)             | (6)                 | (7)          |          |
|----------|----------------------|---|--------------|-----------------|---------------------|--------------|----------|
| SMR Code | Federal Stock Number | Description   | Unit of Meas | Qty inc in Unit | Qty furn with equip | Illustration |          |
|          |                      |   |              |                 |                     | Fig no.      | Item No. |
| PC       | 7510-889-3494        | BINDER: loose-leaf, U. S. Army Equipment Logbook                              | EA           |                 | 1                   |              |          |
| PC       | 2590-505-6737        | BRACKET, RIFLE  | EA           |                 | 2                   |              |          |
| PC       | 7520-559-9618        | CASE, MAINTENANCE AND OPERATIONAL MANUAL                                      | EA           |                 | 1                   |              |          |
|          |                      | DEPARTMENT OF THE ARMY OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL         |              |                 |                     |              |          |
|          |                      | TM 5-3810-232-12  | EA           |                 | 1                   |              |          |
|          |                      | DEPARTMENT OF THE ARMY LUBRICATION ORDER                                      |              |                 |                     |              |          |
|          |                      | LO 5-3810232-12-1   | EA           |                 | 1                   |              |          |
|          |                      | LO 5-3810232-12-2   | EA           |                 | 1                   |              |          |
|          |                      | LO 5-3810-232-12-3  | EA           |                 | 1                   |              |          |
|          |                      | LO 5-810-232-124  | EA           |                 | 1                   |              |          |
|          |                      | LO 5-3810-212-5   | EA           |                 | 1                   |              |          |
|          |                      | LO 5-3810-232-12-6  | EA           |                 | 1                   |              |          |
| PC       | 4210-889-2221        | EXTINGUISHER, FIRE, DRY CHEMICAL: hand type, 21/2 lb capacity, w/wall bracket | EA           |                 | 2                   |              |          |

**Section III. MAINTENANCE AND OPERATING SUPPLIES**

| (1)<br>Component<br>application | (2)<br>Federal<br>stock number                      | (3)<br>Description<br><br>operation   | (4)<br>Quantity<br>required<br>f/Initial<br>operation | (5)<br>Quantity<br>required<br>f/8 hours | (6)<br>Notes  |
|---------------------------------|---|---|---|--|---|
| AIR CLEANER                     | (2)<br>9150-01099<br>9150-680-1102                  | OIL LUBRICATING:<br>HDO-30<br>HDO-10  | (1)<br>(1)  | (3)<br>(3)                               | (1) Includes quantity of oil to fill engine oil system as<br>Carrier engine follows:<br>26 qt-crankcase<br>w/filters<br>5 qt-air cleaner  |
| CHAIN                           | 9150-242-7603<br><br>9150-265-9435<br>9150-265-9428 | OES<br><br>OIL LUBRICATING<br>OE-30<br>OE-10  | (1)<br><br>3 qt<br>3 qt                               | (3)<br><br>(3)<br>(3)                    | Crane engine:<br>21 qt-crankcase<br>w/filters<br>5 qt-air cleaner   |
| CLUTCH                          | 9150-242-7603                                       | OES<br>HYDRAULIC FLUID:<br>1 gal can as follows:  | 3 qt  | (3)                                      | (2) See C9100-IL for additional data and requisitioning procedures on FSC9100   |
| CLUTCH                          | 9150-252-6375<br>9150-223-4129                      | HBA<br>OAI  | 2 qt ea<br>1/16 qt                                    | (3)<br>(3)                               | (3) See current LO for grade application and replenishment intervals<br>(4) Use oil as prescribed for air cleaner   |
| CRANKCASE                       |   | OIL LUBRICATING (4)   | (1)   | (3)                                      |   |
| ENGINE STARTING AIDS            | 2910-565-9424<br>2910646-9727                       | CYLINDER, FUEL (CARRIER)<br>CYLINDER, FUEL (CRANE)  | (1)<br>(1)  |  | (5) Tank capacity is as follows:<br>110 gal - carrier<br>50 gal- crane  |
| EXPOSED GEARS                   | 9150-234-5199                                       | LUBRICATION OIL, CHAIN WIRE ROPE - EXPOSED GEAR:<br>5-lb can as follows:<br>CW-11B                    | 2 lb  | (3)                                      | (6) Average fuel consumption per hour of continuous operation is as follows:<br><br>16.G gal - carrier<br>6.5 gal - crane   |
| FUEL TANK follows:              | 9140-286-5294<br>9140-286-5286<br>9140-286-5283     | FUEL OIL, DIESEL:<br>Bulk as follows:<br>DF-2 regular grade<br>DF-1 winter grade<br>DF-A Arctic grade | (5)<br>(5)<br>(5)                                     | (6)<br>(6)<br>(6)                        | (7) Radiator capacity is as<br><br>72 qt - carrier<br>30 qt - crane<br><br>(8) Maximum protection is obtained at 60 percent by volume (4.8 pts of ethylene glycol per gallon of solution) |
| GREASE POINTS ARTILLERY,        | 9150-190-0907                                       | GREASE, AUTOMOTIVE AND<br><br>35-lb pail as follows:<br>GAA   |   |  | (9) Antifreeze capacity is as follows:<br>48 qt - carrier<br>26 qt - crane  |
| PLANETARY FRONT ANDREAR         | 9150-577-5844<br>9150-257-5440                      | LUBRICATING OIL, GEAR:<br>5-gal pail as follows:<br>GO-90<br>GOS                                      | 8 qt ea<br>8 qt                                       | (3)<br>(3)                               | (10) Use oil as prescribed for planetary gear.<br>(11) Use oil as prescribed for transmission   |
| RADIATOR                        | 6850-244-8730<br>6850-174-1806                      | ANTIFREEZE;<br><br>ANTIFREEZE; ethylene glycol<br>ANTIFREEZE; compound,                               | (8)<br><br>(9)  |  | (7)<br>5 gal can as follows:  |

| (1)<br>Component<br>application   | (2)<br>Federal<br>stock number | (3)<br>Description<br><br>operation   | (4)<br>Quantity<br>required<br>f/Initial<br>operation | (5)<br>Quantity<br>required<br>f/8 hours | (6)<br>Notes |
|---|--------------------------------|---|---|--|--------------|
| RESERVOIR<br><br>STEERING GEAR<br>BOX<br>TRANSMISSION<br>AND TORQUE CONVERTER | 9150-265-9428<br>9150-246-7603 | OIL, LUBRICATING<br>OE-10<br>OES<br>LUBRICATING OIL, GEAR (10)<br><br>OIL, LUBRICATING (11)<br>LUBRICATING OIL, GEAR (10) | 228 qt<br>228 qt<br><br>26 qt<br>22 qt ea             | (3)<br>(3)<br>(3)<br><br>(3)<br>(3)      |              |

**APPENDIX C  
MAINTENANCE ALLOCATION CHART**

**Section I. INTRODUCTION**

**C-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.

**C-2. Explanation of Columns in Section II**

a. Group Number, Column (1). The assembly group is a numerical group assigned to each assembly in a top down breakdown sequence. The applicable assembly groups are listed on the MAC in disassembly sequence beginning with the first assembly removed in a top down disassembly sequence.

b. Assembly Group, Column (2). This column contains a brief description of the components of each assembly group.

c. Maintenance Functions, Column (S). 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, and to add fuel, lubricants, cooling agents, and air. If it is desired that elements, such as painting and

lubricating, be defined separately, they may be so listed.

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 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 category 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 normally 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 category. Rebuild reduces to zero the hours or miles the equipment, or component thereof, has been in use.

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 IV) pertinent to the maintenance functions.

**C-3. Explanation of Columns in Section III**

a. *Reference Code.* This column consists of a number and a letter separated by a dash. The number references the T&TE requirements column on the MAC. The letter represents the specific maintenance function the item is to be used with. The letter is representative of columns A through K on the MAC.

b. *Maintenance Category.* This column shows the lowest level of Maintenance authorized to use the special tool or test equipment.

c. *Nomenclature.* This column lists the name or identification of the tool or test equipment.

d. *Tool Number.* This column lists the manufacturer's code and part number, or Federal Stock Number of tools and test equipment.

**C-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)<br>Group No. | (2)<br>Assembly   | (3)<br>Maintenance functions |      |         |        |       |           |         |         |        |          |         | (4)<br>Tools and equipment | (5)<br>Remarks |  |  |   |
|------------------|---|------------------------------|------|---------|--------|-------|-----------|---------|---------|--------|----------|---------|----------------------------|----------------|--|--|---|
|                  |   | A                            | B    | C       | D      | E     | F         | G       | H       | I      | J        | K       |                            |                |  |  |   |
|                  |   | Inspect                      | Test | Service | Adjust | Align | Calibrate | Install | Replace | Repair | Overhaul | Rebuild |                            |                |  |  |   |
| 01               | ENGINE ASSEMBLY (CARRIER)<br>...Engine, diesel .....<br>Crankcase, Block, Cylinder Head<br>...Block assembly .....<br>...Head, cylinder.....<br>...Crankshaft .....   | O                            | -    | C       |        |       |           |         |         | H      | H        | D       |                            |                |  |  |   |
| 02               | FLYWHEEL ASSEMBLY<br>...Flywheel .....<br>...Pistons, Connecting Rods<br>...Rod, connecting .....<br>Valves, Camshaft and Timing<br>...Systems:<br>...Valve, insert, rocker arm<br>...assembly .....  |                              |      |         |        |       |           |         |         | H      | D        |         |                            |                |  |  | A |
| 03               | ENGINE LUBRICATION SYSTEM<br>...Pump, Oil, Adapter Assy .....<br>...Filter, oil.....<br>...Cooler, oil .....<br>...Lines, External.....<br>...Pan, Oil.....   |                              |      |         | O      |       |           |         | H       | H      |          |         |                            |                |  |  | C |
| 04               | CLUTCH<br>...Torque Converter .....<br>...Heat Exchanger.....   |                              |      |         |        |       |           |         |         | H      |          |         |                            |                |  |  | D |
| 05               | FUEL SYSTEM<br>...Injector, fuel .....<br>...Fuel pumps<br>...Pump, fuel and governor .....<br>...Cleaner Air.....<br>Tanks, Lines, Fittings<br>...Tank, fuel.....<br>...Filter, fuel.....<br>...Engine Starting Aids.....<br>Controls, throttle..... | F                            |      |         | O      | O     |           |         |         | F      | H        |         |                            |                |  |  | D |
| 06               | EXHAUST<br>...Muffler and Pipes<br>...Muffler.....  |                              | C    | O       |        |       |           |         |         | F      |          |         |                            |                |  |  | E |
|                  |   |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |   |

**SECTION II. MAINTENANCE ALLOCATION CHART**

| (1)<br>Group No. | (2)<br>Functional Group                                   | (3)<br>Maintenance functions |      |         |        |       |           |         |         |        |          |         | (4)<br>Tools and equipment | (5)<br>Remarks |  |  |   |
|------------------|---|------------------------------|------|---------|--------|-------|-----------|---------|---------|--------|----------|---------|----------------------------|----------------|--|--|---|
|                  |   | A                            | B    | C       | D      | E     | F         | G       | H       | I      | J        | K       |                            |                |  |  |   |
|                  |   | Inspect                      | Test | Service | Adjust | Align | Calibrate | Install | Replace | Repair | Overhaul | Rebuild |                            |                |  |  |   |
| 7                | COOLING SYSTEM  |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |   |
|                  | Radiator.....   | C                            |      | C       |        |       |           |         |         | F      | F        |         |                            |                |  |  |   |
|                  | ... Water Manifolds, Thermostat<br>... and Housing Gasket |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |   |
|                  | ... Hoses, Pipes, Manifold.....                           | O                            |      |         |        |       |           |         |         | O      |          |         |                            |                |  |  |   |
|                  | ... Thermostat.....                                       |                              | O    |         |        |       |           |         |         | O      |          |         |                            |                |  |  |   |
|                  | ... Valve, thematic, fan.....                             |                              |      |         |        |       |           |         |         | F      |          |         |                            |                |  |  |   |
|                  | ... Pump, water.....                                      |                              |      |         |        |       |           |         |         | F      | F        |         |                            |                |  |  |   |
|                  | Fan Assembly  |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |   |
|                  | ... Drive Shaft.....                                      |                              |      |         |        |       |           |         |         | H      | H        |         |                            |                |  |  |   |
|                  | ... Belts.....  | C                            |      |         | O      |       |           |         |         |        |          |         |                            |                |  |  |   |
|                  | ... Clutch assembly.....                                  |                              |      |         | F      |       | H         |         |         |        |          |         |                            |                |  |  |   |
|                  | Water Filter.....   |                              | O    |         |        |       |           |         |         | O      | O        |         |                            |                |  |  |   |
| 08               | ELECTRICAL SYSTEM   |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |   |
|                  | ... Generator.....  |                              |      |         |        |       |           |         |         | O      | F        |         |                            |                |  |  | F |
|                  | ... Brushes.....  | O                            |      |         |        |       |           |         |         | O      |          |         |                            |                |  |  |   |
|                  | Belts.....  |                              |      |         |        | O     |           |         |         |        |          |         |                            |                |  |  |   |
|                  | Generator Regulator                                       |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |   |
|                  | Regulator.....  |                              |      |         |        | F     |           | H       | O       | H      |          |         |                            |                |  |  |   |
|                  | Motor, starting.....                                      |                              |      |         |        |       |           | F       | F       | F      |          |         |                            |                |  |  | G |
|                  | Brushes.....  |                              |      |         |        |       |           |         |         | F      |          |         |                            |                |  |  |   |
|                  | Miscellaneous Items                                       |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |   |
|                  | ... Circuit Breakers, Switches.....                       |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |   |
|                  | ... Batteries.....  | C                            | O    | C       |        |       |           |         |         | O      |          |         |                            |                |  |  |   |
|                  | ... Cables.....   | C                            |      |         |        |       |           |         |         | O      |          |         |                            |                |  |  |   |
|                  | ... Box.....  |                              |      |         |        |       |           |         |         | O      | F        |         |                            |                |  |  |   |
|                  | ... Hull or Chassis Wiring Harness                        |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |   |
|                  | Cables.....   |                              |      |         |        |       |           |         |         | F      | O        |         |                            |                |  |  |   |
| 09               | TRANSMISSION  |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |   |
|                  | ... Transmission.....                                     |                              |      | C       |        |       |           |         |         | H      | H        | D       |                            |                |  |  |   |
|                  | ... Gearshift and controls                                |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |   |
|                  | ... Gearshift assembly.....                               |                              |      |         |        |       |           |         |         | F      | F        |         |                            |                |  |  |   |
|                  | ... Intermediate Clutch                                   |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |   |
|                  | ... Clutches.....   |                              |      |         |        |       |           |         |         | H      | H        | D       |                            |                |  |  |   |
|                  | Pumps   |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |   |
|                  | Pump.....   |                              |      |         |        |       |           |         |         | F      | F        |         |                            |                |  |  |   |
|                  | Filter.....   |                              |      | C       |        |       |           |         |         | O      | O        |         |                            |                |  |  |   |
| 10               | Propeller Shaft   |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |   |
|                  | Shaft, universal joints.....                              |                              |      | C       |        |       |           |         |         | F      |          |         |                            |                |  |  |   |
| 11               | FRONT AXLE  |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |   |
|                  | Axle, front.....  |                              |      |         |        |       |           |         |         | H      | H        | D       |                            |                |  |  |   |
|                  | Differential  |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |   |
|                  | Gears, Bearings.....                                      |                              |      |         |        |       |           |         |         | H      |          | D       |                            |                |  |  |   |
| 12               | REAR AXLE   |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |   |
|                  | Axle, rear.....   |                              |      |         |        |       |           |         |         | H      | H        | D       |                            |                |  |  |   |
| 13               | BRAKES  |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |   |
|                  | ... Service Brakes  |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |   |
|                  | ... Brakes.....   | C                            |      |         | O      |       |           |         |         |        |          |         |                            |                |  |  |   |
|                  | ... Shoes.....  |                              |      |         |        |       |           |         |         | H      | H        |         |                            |                |  |  |   |
|                  | Air Brake System  |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |   |
|                  | ... Valves.....   |                              |      |         |        |       |           |         |         | F      |          |         |                            |                |  |  |   |
|                  | ... Chamber, brake.....                                   |                              |      |         |        |       |           |         |         | O      | F        |         |                            |                |  |  |   |
|                  | ... Tank.....   |                              |      |         |        |       |           |         |         | F      |          |         |                            |                |  |  |   |
|                  | ... Air compressor.....                                   |                              |      | O       |        |       |           |         |         | F      | F        | H       |                            |                |  |  |   |
|                  | ... Trailer Brake Connections<br>... and controls         |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |   |
|                  | ... Valves, hand.....                                     |                              |      |         |        |       |           |         |         |        | O        |         |                            |                |  |  |   |

**SECTION II. MAINTENANCE ALLOCATION CHART**

| (1)<br>Group No. | (2)<br>Functional Group  | (3)<br>Maintenance functions |      |         |        |       |           |         |         |        |          |         | (4)<br>Tools and equipment | (5)<br>Remarks |  |
|------------------|--|------------------------------|------|---------|--------|-------|-----------|---------|---------|--------|----------|---------|----------------------------|----------------|--|
|                  |  | A                            | B    | C       | D      | E     | F         | G       | H       | I      | J        | K       |                            |                |  |
|                  |  | Inspect                      | Test | Service | Adjust | Align | Calibrate | Install | Replace | Repair | Overhaul | Rebuild |                            |                |  |
| 14               | WHEELS<br>Wheel Assembly<br>... Wheels .....<br>... Bearings .....<br>Tires and Tubes<br>... Tires .....   |                              |      | O       |        |       |           |         | H       | H      |          |         |                            |                |  |
| 15               | STEERING<br>... Steering Assembly .....<br>... Gear box .....<br>... Universal joints .....<br>Hydraulic Pump Assembly<br>... Pump .....<br>Hose, Lines, Fittings<br>... Hose, fittings .....<br>Steering Cylinders .....<br>Steering System Valves<br>... Valves .....<br>... Valve, relief .....   | C                            |      |         | O      |       |           |         | F       | F      | D        |         |                            |                |  |
| 16               | FRAME, TOWING ATTACHMENTS<br>AND DRAWBARS<br>Frame Assembly<br>... Frame, main .....<br>Landing Gear, Leveling Jacks<br>... Outriggers .....   |                              | C    |         | O      |       |           |         |         | F      | F        |         |                            |                |  |
| 17               | BODY, CAB, HOOD, AND HULL<br>... Body, Cab Assembly<br>... Cab .....<br>... Door .....<br>... Glass .....<br>... Floors .....<br>... Seat .....  |                              |      |         |        |       |           |         |         |        | H        |         |                            |                |  |
| 18               | ACCESSORY ITEMS<br>... Defroster fan .....<br>... Heater .....<br>... Wiper motor .....  |                              |      |         |        |       |           |         | O       | O      |          |         |                            |                |  |
| 19               | HYDRAULIC, AIR AND<br>... VACUUM SYSTEMS<br>Strainers, Filter, Hose<br>... Fittings<br>... Hose, fittings .....<br>... Strainers, filters .....<br>Pump and Pump Drives<br>... Pump .....<br>Control Valves<br>... Valves .....<br>Hydraulic Cylinders<br>... Cylinder, dozer .....<br>... Cylinder, outrigger .....<br>Liquid Tanks or Reservoir<br>... Accumulator .....<br>... Tank .....<br>Hydraulic Controls and/or<br>... Manual Controls<br>... Levers, rods .....<br>Assembled Hose, Fittings,<br>... Lines, Breathers, Filters,<br>... and Traps<br>... Filter .....<br>... Joint assemblies, unions ..... |                              | O    |         | O      |       |           |         |         | F      | F        |         |                            |                |  |
|                  |  |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |



**SECTION II. MAINTENANCE ALLOCATION CHART**

| (1)<br>Group No.                | (2)<br>Functional Group            | (3)<br>Maintenance functions |      |         |        |       |           |         |         |        |          |         | (4)<br>Tools and equipment | (5)<br>Remarks |   |  |   |
|---------------------------------|------------------------------------|------------------------------|------|---------|--------|-------|-----------|---------|---------|--------|----------|---------|----------------------------|----------------|---|--|---|
|                                 |                                    | A                            | B    | C       | D      | E     | F         | G       | H       | I      | J        | K       |                            |                |   |  |   |
|                                 |                                    | Inspect                      | Test | Service | Adjust | Align | Calibrate | Install | Replace | Repair | Overhaul | Rebuild |                            |                |   |  |   |
| 20                              | Manifold or Control Valves         |                              |      |         |        |       |           |         |         |        |          |         |                            |                |   |  |   |
|                                 | ... Valves                         |                              |      |         |        |       |           |         |         | O      | O        |         |                            |                |   |  |   |
|                                 | Valves, Throttle and Quick         |                              |      |         |        |       |           |         |         |        |          |         |                            |                |   |  |   |
|                                 | ... Release                        |                              |      |         |        |       |           |         |         |        |          |         |                            |                |   |  |   |
|                                 | ... Valve, safety                  |                              |      |         |        |       |           |         |         | O      |          |         |                            |                |   |  |   |
|                                 | Tank or Reservoirs                 |                              |      |         |        |       |           |         |         |        |          |         |                            |                |   |  |   |
|                                 | ... Tank, air                      |                              | C    | -       |        | C     |           |         |         | F      |          |         |                            |                |   |  |   |
|                                 | PNEUMATIC EQUIPMENT                |                              |      |         |        |       |           |         |         |        |          |         |                            |                |   |  |   |
|                                 | Air Intake                         |                              |      |         |        |       |           |         |         |        |          |         |                            |                |   |  |   |
|                                 | ... Cleaner                        |                              |      |         |        | C     |           |         |         |        | O        |         |                            |                |   |  |   |
| 21                              | Unloader System Components         |                              |      |         |        |       |           |         |         |        |          |         |                            |                |   |  |   |
|                                 | ... Governor                       |                              |      |         |        | O     |           |         |         | F      |          |         |                            |                |   |  |   |
|                                 | EARTH MOVING EQUIPMENT COMPONENTS  |                              |      |         |        |       |           |         |         |        |          |         |                            |                |   |  |   |
| 22                              | Utility Blade (Dozer Assy)         | C                            | -    |         | O      |       |           |         |         | F      | O        |         |                            |                |   |  |   |
|                                 | Lift Arms and Pivot Assy           |                              |      |         |        |       |           |         |         |        |          |         |                            |                |   |  |   |
|                                 | ... Push beam                      |                              |      |         | O      |       |           |         |         | F      |          |         |                            |                |   |  |   |
| 23                              | FIRE FIGHTING EQUIPMENT COMPONENTS |                              |      |         |        |       |           |         |         |        |          |         |                            |                |   |  |   |
|                                 | ... Extinguishers, fire            | C                            | -    |         | O      |       |           |         |         |        | O        |         |                            |                |   |  |   |
|                                 | ENGINE ASSEMBLY (CRANE)            |                              |      |         |        |       |           |         |         |        |          |         |                            |                |   |  |   |
|                                 | ... Engine, diesel                 | O                            |      | C       | -      |       |           |         | F       |        | F        | D       | D                          |                |   |  |   |
|                                 | Crankcase, Block Cyl Head          |                              |      |         |        |       |           |         |         |        |          |         |                            |                |   |  |   |
|                                 | ... Block assembly                 |                              |      |         |        |       |           |         |         |        | D        | D       |                            |                | D |  |   |
|                                 | ... Head, cylinder                 |                              |      |         |        |       |           |         |         |        | F        | H       |                            |                |   |  |   |
|                                 | ... Crankshaft                     |                              |      |         |        |       |           |         |         |        | H        | D       |                            |                |   |  | A |
|                                 | ... Flywheel                       |                              |      |         |        |       |           |         |         |        | H        | D       |                            |                |   |  | B |
|                                 | Pistons, connecting rods           |                              |      |         |        |       |           |         |         |        |          |         |                            |                |   |  |   |
| ... Piston assembly, connecting |                                    |                              |      |         |        |       |           |         |         |        |          |         |                            |                |   |  |   |
| ... rod assembly                |                                    |                              |      |         |        |       |           | H       |         | H      |          |         |                            |                |   |  |   |
| 24                              | Valves, Camshafts and              |                              |      |         |        |       |           |         |         |        |          |         |                            |                |   |  |   |
|                                 | ... Timing System                  |                              |      |         |        |       |           |         |         |        |          |         |                            |                |   |  |   |
|                                 | ... Valves, rocker arm assy        |                              |      |         |        |       |           |         |         |        | H        | H       |                            |                |   |  | C |
|                                 | Engine Lubrication System          |                              |      |         |        |       |           |         |         |        |          |         |                            |                |   |  |   |
|                                 | ... Pump, oil, adapter assy        |                              |      |         |        |       |           |         |         |        | H        | H       |                            |                |   |  |   |
|                                 | ... Pan, oil                       |                              |      |         |        |       |           |         |         |        | F        | F       |                            |                |   |  |   |
|                                 | ... Cooler, oil                    |                              |      |         |        |       |           |         |         |        | F        | F       |                            |                |   |  |   |
|                                 | ... Lines (external)               |                              |      |         |        |       |           |         |         |        | O        |         |                            |                |   |  |   |
|                                 | ... Filter, oil                    |                              |      |         |        |       |           |         |         |        | O        | O       |                            |                |   |  |   |
|                                 | CLUTCH                             |                              |      |         |        |       |           |         |         |        |          |         |                            |                |   |  |   |
| 25                              | ... Clutch assembly                | O                            |      |         | O      | O     |           |         |         | F      | F        |         |                            |                |   |  |   |
|                                 | Clutch Release Mechanism           |                              |      |         |        |       |           |         |         |        |          |         |                            |                |   |  |   |
|                                 | ... Rods, levers                   |                              |      |         |        |       | O         |         |         | F      |          |         |                            |                |   |  |   |
|                                 | FUEL SYSTEM                        |                              |      |         |        |       |           |         |         |        |          |         |                            |                |   |  |   |
|                                 | Injector, fuel                     |                              |      |         |        |       | O         |         |         | F      |          |         |                            |                |   |  |   |
|                                 | Pump, fuel                         |                              |      |         |        |       |           |         |         | F      | D        |         |                            |                |   |  |   |
|                                 | Cleaner, air                       |                              |      |         |        | C     |           |         |         | O      |          |         |                            |                |   |  |   |
|                                 | Tanks, Lines, Fittings             |                              |      |         |        |       |           |         |         |        |          |         |                            |                |   |  |   |
|                                 | ... Tank, fuel                     |                              |      |         |        | C     |           |         |         | O      | F        |         |                            |                |   |  |   |
|                                 | ... Lines and Fittings             |                              |      |         |        | C     |           |         |         | O      |          |         |                            |                |   |  |   |
| 26                              | Engine Speed Governor and          |                              |      |         |        |       |           |         |         |        |          |         |                            |                |   |  |   |
|                                 | ... Controls                       |                              |      |         |        |       |           |         |         |        |          |         |                            |                |   |  |   |
|                                 | ... Governor, engine               |                              |      |         |        | O     |           |         |         | F      | F        | H       |                            |                |   |  |   |
|                                 | ... Filters, fuel                  |                              |      |         |        | C     |           |         |         | O      |          |         |                            |                |   |  |   |
|                                 | Accelerator, throttle              |                              |      |         |        |       |           |         |         |        |          |         |                            |                |   |  |   |
|                                 | ... Controls                       |                              |      |         |        |       |           |         |         |        |          |         |                            |                |   |  |   |
|                                 | ... Controls                       |                              |      |         |        | O     |           |         |         | O      |          |         |                            |                |   |  |   |
|                                 | EXHAUST SYSTEM                     |                              |      |         |        |       |           |         |         |        |          |         |                            |                |   |  |   |
|                                 | ... Muffler and pipe               | O                            |      |         |        |       |           |         |         | O      |          |         |                            |                |   |  |   |

**SECTION II. MAINTENANCE ALLOCATION CHART**

| (1)<br>Group No. | (2)<br>Functional Group                        | (3)<br>Maintenance functions |      |         |        |       |           |         |         |        |          |         | (4)<br>Tools and equipment | (5)<br>Remarks |  |  |  |
|------------------|--|------------------------------|------|---------|--------|-------|-----------|---------|---------|--------|----------|---------|----------------------------|----------------|--|--|--|
|                  |  | A                            | B    | C       | D      | E     | F         | G       | H       | I      | J        | K       |                            |                |  |  |  |
|                  |  | Inspect                      | Test | Service | Adjust | Align | Calibrate | Install | Replace | Repair | Overhaul | Rebuild |                            |                |  |  |  |
| 27               | COOLING SYSTEM                                 |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |  |
|                  | Radiator.....                                  | C                            | O    | C       |        |       |           |         |         |        | O        | F       |                            |                |  |  |  |
|                  | Water Manifolds, Thermostat and Housing Gasket |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |  |
|                  | Thermostat.....                                |                              | O    |         |        |       |           |         |         |        | O        |         |                            |                |  |  |  |
|                  | Water Pump.....                                | C                            |      |         |        |       |           |         |         |        | F        |         |                            |                |  |  |  |
|                  | Fan Assembly.....                              |                              |      | C       |        |       |           |         |         |        | O        | F       |                            |                |  |  |  |
|                  | Belt.....                                      |                              |      |         |        |       |           |         |         |        | C        | O       |                            |                |  |  |  |
| 28               | ELECTRICAL SYSTEM                              |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |  |
| 28               | Generator.....                                 |                              |      |         |        |       |           |         |         |        | O        | F       |                            |                |  |  |  |
|                  | ELECTRICAL SYSTEM                              |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |  |
|                  | Brushes.....                                   |                              |      |         |        |       |           |         |         |        | O        | F       |                            |                |  |  |  |
|                  | Belts.....                                     | C                            |      |         | C      |       |           |         |         |        | O        | O       |                            |                |  |  |  |
|                  | Generator Regulator                            |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |  |
|                  | Regulator.....                                 |                              |      |         | F      |       |           |         |         |        | O        | H       |                            |                |  |  |  |
|                  | Motor, starting.....                           |                              |      |         |        |       |           |         |         |        | O        | F       |                            |                |  |  |  |
|                  | Brushes.....                                   |                              |      |         |        |       |           |         |         |        | F        |         |                            |                |  |  |  |
|                  | Solenoid.....                                  |                              |      |         |        |       |           |         |         |        | F        |         |                            |                |  |  |  |
|                  | Batteries.....                                 |                              | O    | C       |        |       |           |         |         |        | O        |         |                            |                |  |  |  |
|                  | Cables.....                                    |                              | O    | C       |        |       |           |         |         |        | O        |         |                            |                |  |  |  |
|                  | Box.....                                       |                              |      |         |        |       |           |         |         |        | O        | F       |                            |                |  |  |  |
|                  | Hull or Chassis Wiring                         |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |  |
|                  | Harness  |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |  |
|                  | Harness, wiring.....                           |                              |      |         |        |       |           |         |         |        | F        | O       |                            |                |  |  |  |
| 29               | FRAME  |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |  |
|                  | Frame Assembly                                 |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |  |
|                  | Catwalks.....                                  |                              |      |         |        |       |           |         |         |        | O        | O       |                            |                |  |  |  |
| 30               | CAB  |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |  |
|                  | Cab Assembly                                   |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |  |
|                  | Cab.....                                       |                              |      |         |        |       |           |         |         |        |          | H       |                            |                |  |  |  |
|                  | Doors.....                                     |                              |      |         |        |       |           |         |         |        | O        |         |                            |                |  |  |  |
|                  | Glass.....                                     |                              |      |         |        |       |           |         |         |        | O        |         |                            |                |  |  |  |
|                  | Seat.....                                      |                              |      |         |        |       |           |         |         |        | O        | O       |                            |                |  |  |  |
| 31               | ACCESSORY ITEMS                                |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |  |
|                  | Heater.....                                    |                              |      |         |        |       |           |         |         |        | O        | O       |                            |                |  |  |  |
| 32               | HYDRAULIC, AIR AND VACUUM SYSTEMS              |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |  |
|                  | Assembled Hose, Fittings, Lines                |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |  |
|                  | Hose, tubing.....                              |                              |      | C       |        |       |           |         |         |        | F        |         |                            |                |  |  |  |
|                  | Rotating joint.....                            |                              |      | C       |        |       |           |         |         |        | O        | F       |                            |                |  |  |  |
|                  | Control Valves                                 |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |  |
|                  | Valves.....                                    | O                            | F    |         |        |       |           |         |         |        |          |         |                            |                |  |  |  |
| 33               | CRANES, SHOVELS OR EARTH WORKING EQUIPMENT     |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |  |
|                  | Crane, Dragline or Clamshell Attachments       |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |  |
|                  | Boom.....                                      | C                            |      |         |        |       |           |         |         |        | C        | O       | O                          |                |  |  |  |
|                  | Sheaves.....                                   | C                            |      | C       |        |       |           |         |         |        |          | F       |                            |                |  |  |  |
|                  | Guards, rollers.....                           |                              |      |         |        |       |           |         |         |        |          | F       |                            |                |  |  |  |
|                  | Hookblock, tagline.....                        | C                            |      | C       |        |       |           |         |         |        | C        | O       |                            |                |  |  |  |
|                  | Bridle assembly.....                           | C                            |      | C       | C      |       |           |         |         |        | C        | O       | O                          |                |  |  |  |
|                  | Wire rope.....                                 | C                            |      | C       |        |       |           |         |         |        | C        | O       |                            |                |  |  |  |
|                  | Base, Deck                                     |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |  |
|                  | Upper structure assembly.....                  | C                            |      | C       |        |       |           |         |         |        | H        | F       | D                          |                |  |  |  |
|                  | Revolving base.....                            | C                            |      | C       |        |       |           |         |         |        |          | D       | F                          |                |  |  |  |
|                  | Conical rollers.....                           | C                            |      | O       | O      |       |           |         |         |        | F        | F       |                            |                |  |  |  |
|                  | Bushing, pivot.....                            |                              |      | O       |        |       |           |         |         |        | H        |         |                            |                |  |  |  |

**SECTION II. MAINTENANCE ALLOCATION CHART**

| (1)<br>Group No.                      | (2)<br>Functional Group                | (3)<br>Maintenance functions |      |         |        |       |           |         |         |        |          |         | (4)<br>Tools and equipment | (5)<br>Remarks |  |  |   |
|---------------------------------------|--|------------------------------|------|---------|--------|-------|-----------|---------|---------|--------|----------|---------|----------------------------|----------------|--|--|---|
|                                       |  | A                            | B    | C       | D      | E     | F         | G       | H       | I      | J        | K       |                            |                |  |  |   |
|                                       |  | Inspect                      | Test | Service | Adjust | Align | Calibrate | Install | Replace | Repair | Overhaul | Rebuild |                            |                |  |  |   |
| 34                                    | Shafts                                 |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |   |
|                                       | Counter shaft assy.....                | O                            | O    |         |        |       |           |         |         | H      | H        |         |                            |                |  |  |   |
|                                       | Drive chain .....                      | O                            |      | O       |        |       |           |         |         | O      |          |         |                            |                |  |  |   |
|                                       | Case cover, chain.....                 |                              | O    |         |        |       |           |         |         | O      | F        |         |                            |                |  |  |   |
|                                       | Swing shaft assy .....                 | O                            | O    |         |        |       |           |         |         | H      | H        |         |                            |                |  |  |   |
|                                       | Clutch .....                           | C                            | O    | O       |        |       |           |         |         | F      | F        |         |                            |                |  |  | I |
|                                       | Drum shaft assy .....                  | O                            | O    |         |        |       |           |         |         | F      | H        |         |                            |                |  |  |   |
|                                       | Brakes.....                            | O                            |      |         |        |       |           |         |         | F      |          |         |                            |                |  |  |   |
|                                       | Auxiliary shaft .....                  | O                            | O    |         |        |       |           |         |         | H      | H        |         |                            |                |  |  |   |
|                                       | Clutch .....                           | O                            | O    |         |        |       |           |         |         | F      | F        |         |                            |                |  |  |   |
|                                       | Chain.....                             |                              |      |         |        |       |           |         |         | F      |          |         |                            |                |  |  |   |
|                                       | Vertical swing shaft.....              | O                            | O    |         |        |       |           |         |         | F      | F        |         |                            |                |  |  |   |
|                                       | Reverse shaft .....                    | O                            | O    |         |        |       |           |         |         | H      | H        |         |                            |                |  |  |   |
|                                       | Swing brake.....                       | O                            | O    | F       | F      |       |           |         |         |        |          |         |                            |                |  |  |   |
|                                       | Cab Lock .....                         |                              |      | C       |        |       |           |         |         | F      | F        |         |                            |                |  |  |   |
|                                       | Machinery Gear Case or Frame           |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |   |
|                                       | Pillow blocks, bearings .....          |                              |      | O       |        |       |           |         |         |        | F        |         |                            |                |  |  |   |
|                                       | Independent or Precision<br>Boom Hoist |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |   |
|                                       | Boom hoist assembly .....              | O                            | O    |         |        |       |           |         |         | F      | H        |         |                            |                |  |  |   |
|                                       | Clutch brake .....                     | O                            | O    |         |        |       |           |         |         | F      | F        |         |                            |                |  |  |   |
|                                       | Overrunning clutch .....               |                              |      | O       |        |       |           |         |         | F      | F        |         |                            |                |  |  |   |
| Machinery Mechanism Controls          |  |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |   |
| Lever, rods, shafts .....             | C                                      | C                            |      |         |        |       |           |         | F       |        |          |         |                            |                |  |  |   |
| Gantry                                |  |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |   |
| Frame, gantry .....                   |  |                              | O    |         |        |       |           |         | O       | O      |          |         |                            |                |  |  |   |
| FIRE FIGHTING EQUIPMENT<br>COMPONENTS |  |                              |      |         |        |       |           |         |         |        |          |         |                            |                |  |  |   |
| Extinguishers, fire .....             | C                                      |                              | O    |         |        |       |           |         |         | O      |          |         |                            |                |  |  |   |

**Section III. SPECIAL TOOL AND SPECIAL TEST EQUIPMENT REQUIREMENTS**

| Reference | Maintenance category | Nomenclature | Tool number    |
|-----------|----------------------|--------------|----------------|
| A-D       | O                    | WRENCH       | 912903 (93389) |

**Section IV. REMARKS**

| Reference Code | Remarks   |
|----------------|---|
| A - I          | Metabolizing resizing.                              |
| B - H          | Replace ring gear.                                  |
| C - H          | Includes refacing.                                  |
| D - C          | Service of pump includes cleaning filter.           |
| E - H          | Includes replacing cylinder.                        |
| F - I          | Repair of generator includes installing repair kit. |
| G - I          | Repair of starter includes installing repair kit.   |
| H - I          | Includes installing repair kit.                     |
| I - D          | Adjust swing clutch.                                |

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

Official:

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Major General United States Army,  
The Adjutant General

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To be distributed in accordance with DA Form 12-25, (qty rqr block no. 366) Section II, Organizational maintenance requirements for Crane-Shovels, Wheel Mounted, 20 Ton.

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| ITEM | APPROXIMATE LOCATION ON CARRIER   |
|------|---|
| 1    | MOUNTED ON OUTSIDE OF LEFT FRAME RAIL BETWEEN LEFT FRONT OUTRIGGER ARM AND LEFT REAR WHEELS.                    |
| 2    | MOUNTED ON INSIDE AND NEAR BOTTOM OF LEFT FRAME RAIL, BELOW AND TO THE REAR OF DUAL PUMP (ITEM 11).             |
| 3    | MOUNTED ON LEFT REAR OF REAR AXLE.  |
| 4    | MOUNTED ABOVE AND BETWEEN RESERVOIR (ITEM 1) AND LEFT FRONT OUTRIGGER ARM.                                      |
| 5    | CONNECTED TO LEFT FRAME RAIL, BELOW AND TO THE REAR OF DUAL PUMP (ITEM 2).                                      |
| 6    | MOUNTED ON RIGHT FRONT OF FRONT AXLE, CYLINDER (ITEM 8).  |
| 7    | MOUNTED ON LEFT FRONT OF FRONT AXLE, CYLINDER (ITEM 8).   |
| 8    | MOUNTED ON LEFT REAR OF TORQUE CONVERTER.   |
| 9    | CONNECTED TO TOP PORT OF HYDRAULIC MANIFOLD, INSIDE OF FRAME RAIL, BELOW AND TO THE REAR OF DUAL PUMP (ITEM 2). |
| 10   | MOUNTED IN STEERING LINKAGE BELOW CAB, AND INSIDE LEFT FRAME RAIL, CLOSE TO RESTRICTOR CHECK VALVE (ITEM 13).   |
| 11   | MOUNTED ON RIGHT FRONT OF FRONT AXLE AND BELOW STEERING CYLINDER (ITEM 8).                                      |
| 12   | MOUNTED INSIDE OF CAB ON RIGHT WALL, BELOW STEERING CYLINDER (ITEM 4).  |
| 13   | MOUNTED ON INSIDE AND NEAR BOTTOM OF LEFT FRAME RAIL, BELOW DUAL PUMP (ITEM 11).                                |
| 14   | MOUNTED INSIDE OF CAB ON RIGHT WALL, BELOW STEERING CYLINDER (ITEM 4).  |
| 15   | MOUNTED ON TOP OF LEFT FRONT OUTRIGGER ARM.   |
| 16   | MOUNTED INSIDE LEFT FRONT OUTRIGGER ARM.  |
| 17   | MOUNTED ON TOP OF RIGHT FRONT OUTRIGGER ARM.  |
| 18   | MOUNTED INSIDE RIGHT FRONT OUTRIGGER ARM.   |
| 19   | MOUNTED INSIDE OF CAB ON RIGHT WALL, BELOW STEERING CYLINDER (ITEM 4).  |
| 20   | MOUNTED INSIDE OF CAB ON RIGHT WALL, BELOW STEERING CYLINDER (ITEM 4).  |
| 21   | MOUNTED ON TOP OF LEFT FRAME RAIL, BELOW CAB FLOOR, OUTRIGGER ARM.  |
| 22   | MOUNTED INSIDE OF CAB ON RIGHT WALL, BELOW STEERING CYLINDER (ITEM 4).  |
| 23   | MOUNTED ON TOP OF LEFT FRONT OUTRIGGER ARM.   |
| 24   | MOUNTED INSIDE LEFT FRONT OUTRIGGER ARM.  |
| 25   | MOUNTED ON TOP OF RIGHT FRONT OUTRIGGER ARM.  |
| 26   | MOUNTED INSIDE RIGHT FRONT OUTRIGGER ARM.   |
| 27   | MOUNTED INSIDE OF CAB ON RIGHT WALL, BELOW STEERING CYLINDER (ITEM 4).  |
| 28   | MOUNTED INSIDE OF CAB ON RIGHT WALL, BELOW STEERING CYLINDER (ITEM 4).  |
| 29   | MOUNTED INSIDE LEFT REAR OUTRIGGER ARM.   |
| 30   | MOUNTED INSIDE LEFT REAR OUTRIGGER ARM.   |
| 31   | MOUNTED INSIDE OF CAB ON RIGHT WALL, BELOW STEERING CYLINDER (ITEM 4).  |
| 32   | MOUNTED INSIDE OF CAB ON RIGHT WALL, BELOW STEERING CYLINDER (ITEM 4).  |
| 33   | MOUNTED INSIDE LEFT REAR OUTRIGGER ARM.   |
| 34   | MOUNTED INSIDE LEFT REAR OUTRIGGER ARM.   |

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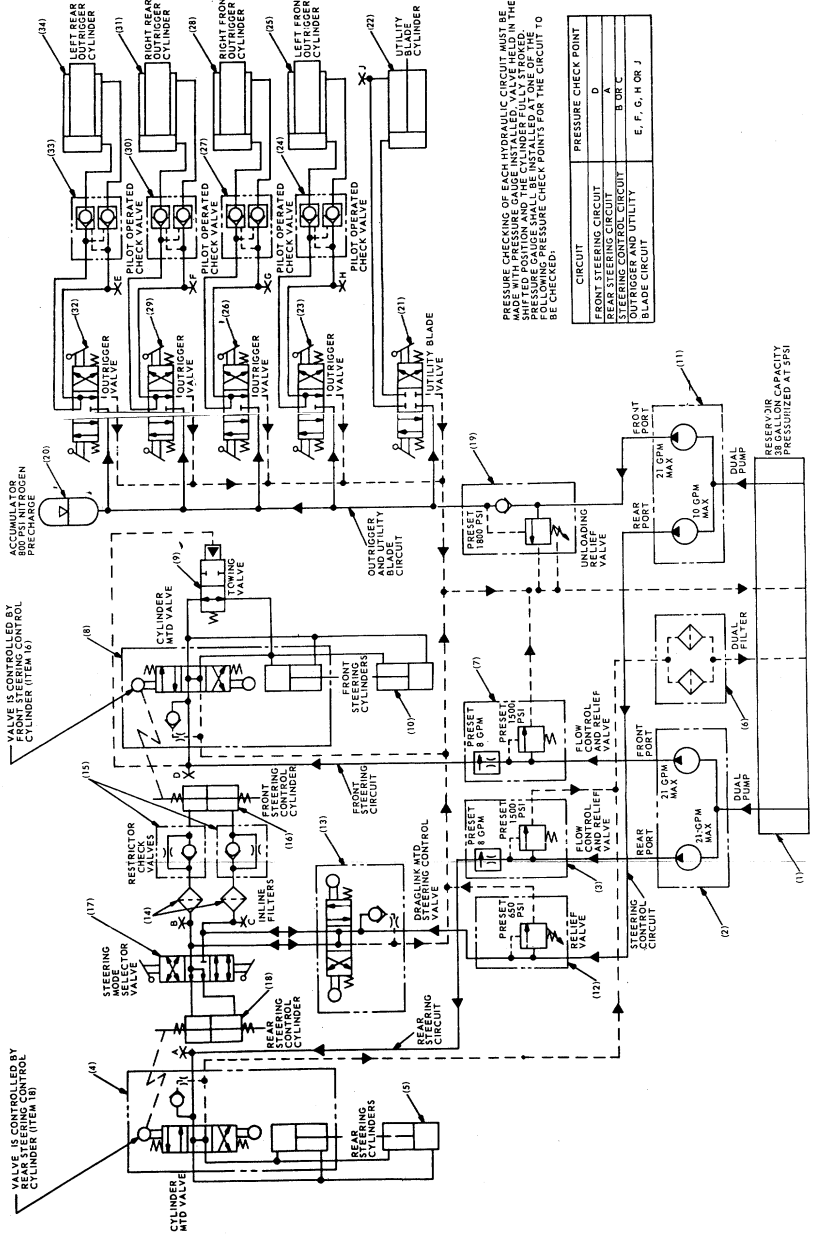


Figure FO1. Hydraulic circuit pressure check points

**WARNING**  
**DANGEROUS CHEMICALS**

Exercise care  
when filling the batteries with electrolyte  
to prevent splashing or spilling the acid on clothing or body.  
Do not smoke or use open flame in the vicinity,  
as batteries generate explosive gas during charging.

**WARNING**  
**DANGEROUS GASES**

Do not operate the equipment in an enclosed area,  
unless the exhaust gases are piped to the outside.  
Inhalation of exhaust fumes will result  
in illness or death

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