

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

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**ORGANIZATIONAL MAINTENANCE MANUAL**

**ORGANIZATIONAL MAINTENANCE MANUAL  
TRUCK, LIFT, FORK, ELECTRIC  
SOLID RUBBER TIRES, 2000 LB. CAPACITY  
ARMY MODEL MHE-197, BAKER MODEL FTD-020-EE  
FSN 3930-724-4058 (100-IN LIFT)  
FSN 3930-965-0075 (130-IN LIFT)**

**This copy is a reprint which includes current  
pages from Change 1.**

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**HEADQUARTERS, DEPARTMENT OF THE ARMY  
APRIL 1965**

## **SAFETY PRECAUTIONS**

### **Operation**

Refer to TM 10-3939-255-10 for safety precautions to be observed during operation of the forklift truck.

### **Hydraulic System**

Before working on any part of the hydraulic system, be sure-

1. Lift carriage is fully lowered.
2. Mast is tilted fully DOWN.
3. All hydraulic pressure is relieved from unit or hose to be serviced.
4. All personnel and materiel are clear, should some system be operated accidentally.
5. Disconnect battery at charging receptacle, except when battery power is required to support the maintenance being done.

### **Electrical System**

1. Avoid contact with spilled electrolyte. It is corrosive to most metals and fabrics and can burn skin if not washed off immediately with running water.
2. Be very careful of flame, smoking, or creating sparks by short circuiting near charging or recently charged batteries. Hydrogen gas given off during charging is explosive and easily ignited.
3. Disconnect battery at charging receptacle, except when battery is needed to support maintenance being done.
4. Remove rings, metal watch bands, or any object which might short across the electrical circuit. Serious burns can result, and equipment can be damaged, if this is not done.

CHANGE }  
No. 1 }

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON, DC, 7 February 1980

**Organizational Maintenance Manual  
TRUCK, LIFT, FORK, ELECTRIC, SOLID RUBBER TIRES, 2000 POUND CAPACITY, ARMY  
MODEL MHE-197, BAKER MODEL FTD-020-EE (NSN 3930-00-724-4058) (100-INCH LIFT),  
(NSN 3930-00-965-0075) (130-INCH LIFT).**

TM 10-3930-255-20, 22 April 1965, is changed as follows:  
*Page 11.* Add the following before paragraph 13:

**WARNING**

**Insure that static electricity discharge straps are installed on the forklift truck and are in good condition. Failure to use the straps could result in the generation of a spark which could ignite explosives or flammables.**

By Order of the Secretary of the Army:

Official:

E. C. MEYER  
*General, United States Army  
Chief of Staff*

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

Distribution:

To be distributed in accordance with DA Form 12-25A, Organizational maintenance requirements for Warehouse Equipment.

TECHNICAL MANUAL }  
 No. 10-3930-255-20 }

HEADQUARTERS  
 DEPARTMENT OF THE ARMY  
 WASHINGTON, D.C., 22 April 1965

**Organizational Maintenance Manual**

**TRUCK, LIFT, FORK, ELECTRIC, SOLID RUBBER TIRES, 2,000-POUND CAPACITY,  
 ARMY MODEL MHE-197, BAKER MODEL FTD-020-EE,  
 FSN 3930-724-4058 (100-INCH LIFT)  
 FSN 3930-965-0075 (130-INCH LIFT)**

	Paragraph	Page
CHAPTER 1. INTRODUCTION		
Section I. General .....	1-5	2
II. Description and data .....	6, 7	2, 4
CHAPTER 2. SERVICE UPON RECEIPT OF TRUCK.....	8-10	6
CHAPTER 3. MAINTENANCE INSTRUCTIONS		
Section I. Lubrication .....	11, 12	7
II. Preventive maintenance services .....	13, 14	11, 13
III. Troubleshooting .....	15, 16	13
IV. Electrical system .....	17-29	18-23
V. Power axle .....	30	23
VI. Rear axle.....	31-33	23-24
VII. Brakes.....	34-39	24-27
VIII. Wheels.....	40-42	29-30
IX. Steering.....	43-45	30-31
X. Body and hood.....	46-51	31-33
XI. Hydraulic lift components.....	52-64	33-40
XII. Electric motors .....	65-74	40-46
CHAPTER 4. SHIPMENT AND LIMITED STORAGE		
Section I. Shipment within the Zone of Interior .....	75, 76	47, 48
II. Limited storage .....	77, 78	50
APPENDIX I. REFERENCES .....		53
II. MAINTENANCE ALLOCATION.....		54
INDEX .....		59-60

**CHAPTER 1**  
**INTRODUCTION**

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**Section I. GENERAL**

**1. Scope**

These instructions are published for the use of personnel responsible for the organizational maintenance of Truck, Lift, Fork, Electric, Solid Rubber Tires, 2,000-Pound Capacity, Baker Model FTD-020-EE, Army Model MHE-197, Federal Stock No. 3930-724-4058 (100-inch lift), Federal Stock No. 3930-965-0075 (130inch lift).

**2. Appendixes**

Appendix I is a list of current references. Appendix II is the maintenance allocation chart. The repair parts and special tools list authorized for use at organizational level is published in TM 10-3930-255-20P.

**3. Maintenance Forms, Records, and Reports**

The maintenance forms, records, and reports to be used in organizational maintenance of this truck are listed and described in TM 38-750.

**4. Reporting of Equipment Manual Improvements**

The direct reporting of errors, omissions, and recommendations for improving this manual by the individual user is authorized and encouraged. DA Form 2028 (Recommended Changes to DA Publications) will be used for reporting these improvements. This form will be completed in triplicate using pencil, pen, or typewriter. The original and one copy will be forwarded direct to Commanding General, U.S. Army Mobility Equipment Center, Attn: SMOME-MMP, 4300 Goodfellow Boulevard, St. Louis, Mo. 63120

**5. Orientation**

Throughout this manual, the terms *right*, *left*, *front*, and *rear* indicate directions from the viewpoint of the operator sitting in the seat of the truck.

**Section II. DESCRIPTION AND DATA**

**6. Description**

*a. General.* Refer to TM 10-3930-255-10 for a more general description of the truck.

*b. Truck.* Power for travel and lifting is by a 36-volt battery. The travel system includes motor, motor controls, and power axle assembly to provide four speeds forward and reverse. The truck may be equipped with either of two lift heights. Trucks rated for 100-inch lift height are not fitted with overhead guard mentioned and shown in this manual. Lifting mechanisms are similar except for certain dimensions for each lift height. The lifting system includes an electric motor, pump, controls, reservoir, lift and tilt cylinders, mast assembly, and forks. Hydraulic service brakes, and both hand and automatic parking brakes are used.

If the motor is reversed while the accelerator is depressed, the circuit to the travel motor is broken. If the motor is reversed while traveling in first or in second speed, the vehicle will slow down, stop, and then reverse.

*c. Power Axle and Motor Assembly.* The power train consists of the travel motor, coupling, power axle with differential, axle shafts, final drive gears, and wheels. Power is transmitted direct from the travel motor through an adapter incorporating reduction gearing, to a bevel ring gear and pinion in the axle, through the axle drive shafts, final drive gear and wheels.

*d. Control System.* The travel motor power and vehicle speed and direction are regulated by a system which includes relays, an accelerating

TAGO 8345A

master switch, directional switch, and a tapped resistor providing four speeds forward or reverse. A foot accelerator operates the accelerating master switch to select, in sequence, any one of four speeds. Resistors are used in the travel motor circuit to control speed of truck.

*e. Steering System.* The steering system includes a recirculating ball type steering gear mounted at front of truck, connected by a drag link to the steering bellcrank, tie rods, and steering knuckles, mounted on the trailing axle.

*f. Brake System.* The brake system consists of a mechanical parking brake and a hydraulic foot brake. The mechanical brake operates on a drum on the travel motor armature shaft. This brake is applied either by a handle on the steering column, or automatically through spring action as the driver rises from the seat. The hydraulic brake is a conventional automotive type system, effective only on the front (drive) wheels.

*g. Mast Assembly.* The mast assembly consists of four main assemblies as follows:

- (1) *Outer upright assembly.* The outer upright assembly is a welded one-piece assembly that is mounted on the frame assembly and incloses the hoist cylinder and inner upright assembly.
- (2) *Inner upright assembly.* The inner upright assembly is a welded one-piece assembly that is mounted within the outer upright assembly. The hoist cylinder, mounted in the base of the outer upright assembly, is secured through the top of the inner upright assembly. The inner upright assembly is raised or lowered by action of the hoist cylinder.
- (3) *Crosshead assembly.* The crosshead assembly is mounted over the hoist cylinder. Chains are attached to the lift carriage assembly, roll over the crosshead assembly, and are secured to the hoist cylinder. As the cylinder rises, the crosshead assembly rises, tightening the chains and raising the lift carriage assembly.

- (4) *Lift carriage assembly.* The lift carriage assembly rides on four rollers within the inner upright assembly, which in turn slides up and down inside of the outer upright channels. Two forks are mounted on the front of the lift carriage assembly for handling of loads.

*h. Lift Hydraulic System.* The hydraulic system consists of a reservoir, pump, control valve, hoist and tilt cylinder, and hydraulic hoses. The hoist cylinder raises the lift carriage and forks by hydraulic pressure supplied by the pump. Gravity lowers the lift carriage.

*i. Lift Cylinders.* A compound lift is used on this vehicle. The lift carriage rises to the top of the outer upright before the inner upright together with the lift carriage move upward in the second stage. This is achieved by a dual hydraulic hoist cylinder. assembly with two pistons working in sequence.

*j. Tilt Cylinders.* The tilt cylinders are double-acting. The uprights are tilted in and out by hydraulic pressure to the tilt cylinders.

*k. Electrical System.* The electrical system is a two-wire, ungrounded type. The battery is connected into the circuit by means of a removable connector. The charging connection is also made through this connector. The weight of the operator in the driver's seat closes the circuit to the accelerating switch by an interlock switch. Travel control is through the accelerating switch, with circuit made and broken by relay. The direction of travel is selected by the directional switch lever on the steering gear post. Resistors in the motor armature circuit control the speed of the truck. The stop and taillight is inclosed in a guard on the rear of the truck. The headlight, mounted on the right side of the hoist upright, is controlled by a toggle switch on the instrument housing.

*l. Battery.* The 36-volt battery (Government furnished equipment) used will weigh approximately 1600 pounds. The inside of the truck battery compartment is 28 1/2 inches long, 32 1/8 inches wide, and 24 3/8 inches high.

*m. Accelerator Master Assembly.* The accelerator master assembly contains four sensitive switches, operated in sequence by cams. The cams are acuated by the accelerator pedal. The switches energize relays, in the electrical equipment box, which select resistances from taps to govern speed of the travel motor. It provides four individual speeds, and plugging control. The accelerating switch is located under the floor plate.

*n. Directional Switch.* The directional switch selects "forward" or "reverse" operation of the travel motor. This switch is a three-position, manually operated, two-circuit pilot device. The direction switch is located on the steering gear post.

*o. Relays.* The relays make and break the circuits in response to related manual and automatic controls. These relays are mounted in the electrical equipment box inside the cowl.

*p. Travel Motor.* The travel motor, under the operator's floor plate, is a series wound, direct current electric motor. Connected to the

power axle, it drives the truck forward or backward.

*q. Hydraulic Pump Motor.* The pump motor for the upright hydraulic system is controlled by a switch which closes the pump motor relay. The switch is operated by either the lift control, or the tilt control, starting the motor when either lever is moved about one-quarter of its travel toward lift or tilt position. The switch is opened when the lever is returned to neutral position. The pump motor is a series wound, direct current motor.

*r. Resistors.* The fixed, tapped resistor which controls truck speed, is located in an inclosed box on the left side of the truck. The travel motor controls select as much-resistance as required, by connecting sections of the resistor in series with the travel motor circuit.

*s. Hourmeter.* The hourmeter is the only instrument used on this truck. This meter automatically records the number of hours truck has been in operation.

**7. Tabulated Data**

*a. Electrical System.*

Type.....	Type EE, spark inclosed, two-wire, ungrounded.
Voltage .....	36 volts de
Battery .....	Government-furnished equipment.
Traveling motor:	
Current draw (empty).....	50 amps
Current draw (loaded).....	60 amps
Hydraulic pump motor:	
No load draw.....	90 amps
Full load draw.....	150 amps
 <i>b. Manufacturer's Identification.</i>	
Nomenclature .....	Truck, lift, fork, electric.
Manufacturer .....	Baker Industrial Trunks, Division of Otis Elevator Company.
Capacity.....	2,000 lbs
Model.....	FTD-020
Contract number.....	DSA-4-020840-MP302
Service weight .....	3,600 lbs (add 1,600 lbs for battery).
Wheel load (no load on forks):	
Drive wheels (total) .....	1,900 lbs
Steering wheels (total) .....	3,300 lbs
Center of gravity (no load on forks):	
Horizontal.....	27.3 in. from axle of drive wheels.
Vertical.....	13.7 in. above axle of drive wheels.

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*c. General.*

Vehicle capacity.....	2,000 lbs at 24 in. load center.
Maximum speed (empty).....	5.0 mph
Maximum speed (loaded).....	4.8 mph
Gradeability .....	15 percent with max load.

*d. Shipping Dimensions.* Refer to TM 10-4930-255-10.

*e. Hydraulic System.*

Main pump output.....	3.4 gpm (gallons per minute) at 1,000 psi and 1,200 rpm.
Relief valve setting .....	1,650 psi
Hoist speed (empty) .....	50 ft per minute
Hoist speed (loaded) .....	35 ft per minute

*f. Battery (Government-furnished equipment).*

Voltage .....	36 volts
Type.....	Lead-Acid or Nickel-Iron

*g. Hydraulic Pump Motor.*

Manufacturer .....	GE
Type.....	BT

*h. Control Valve.*

Manufacturer .....	Hydraulic Unit Specialties Co.
Model.....	3500-33

*i. Directional Switch.*

Manufacturer .....	Square D Company
Type.....	CD-2A
Class.....	8963

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## CHAPTER 2

### SERVICE UPON RECEIPT OF TRUCK

---

#### 8. General

When a new truck is received by an organization, it must be serviced as described in paragraphs 9 and 10 by organizational maintenance personnel.

#### 9. Removal of Preservatives

*a.* Remove tape, paper, or other packing. Use extreme care when unpacking and installing separately packaged components.

*b.* Remove with SD (solvent, drycleaning) preservative compound from exposed metal surfaces. Because this compound is not a lubricant, take special care to see that it is completely removed from all wearing surfaces.

*c.* Fill drive axle and hydraulic tank with

proper lubricant as indicated in lubrication order (para 11).

*d.* Refer to direct support maintenance for battery installation, and welding of battery retaining angles (shipped loose with new truck) to floor of battery compartment.

#### 10. Maintenance Inspection and Tests

*a.* The organization mechanic will perform the services and tests that are listed and described in figure 3. The services performed at this time will begin the cycle of regularly scheduled preventive maintenance services.

*b.* The deficiencies and shortcomings noted, and the corrective action taken will be reported on the appropriate forms prescribed and explained in TM 38-750.

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## CHAPTER 3

### MAINTENANCE INSTRUCTIONS

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#### Section I. LUBRICATION

##### 11. General

LO 10-3930-255-20 prescribes lubrication maintenance of the truck; compliance with the instructions is mandatory at all levels of maintenance. The order includes lubrication instructions for normal and abnormal conditions and temperatures. If a truck is received without a lubrication order, the using

organization must requisition a lubrication order through normal channels in accordance with AR 310-1

##### 12. Illustrations

The lubrication order is illustrated in figure 1. The numbers that have been inserted on the border of the illustration refer to specific lubrication points that are pictured in figure 2 and called out by numbers 1 through 22.

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**LUBRICATION  
ORDER**

# LO 10-3930-255-20

5 APRIL 1965

**TRUCK, LIFT, FORK, ELECTRIC, SOLID RUBBER TIRES, 2,000  
LBS CAPACITY, 100 IN. LIFT, AND 130 IN. LIFT, (BAKER MODEL  
FTD-020-EE, ARMY MODEL MHE 197)**

Reference C9100-1L

Intervals are based on normal hours of operations. Reduce to compensate for abnormal operations and severe conditions. During inactive periods, sufficient lubrication must be performed for adequate preservation.

Clean parts with SOLVENT, dry-cleaning, or with OIL, fuel, Diesel. Dry before lubricating.

Lubricate points indicated by dotted arrow shafts on both sides of equipment.

Clean fittings before lubricating.

Drain gearcases when hot. Fill and check level.

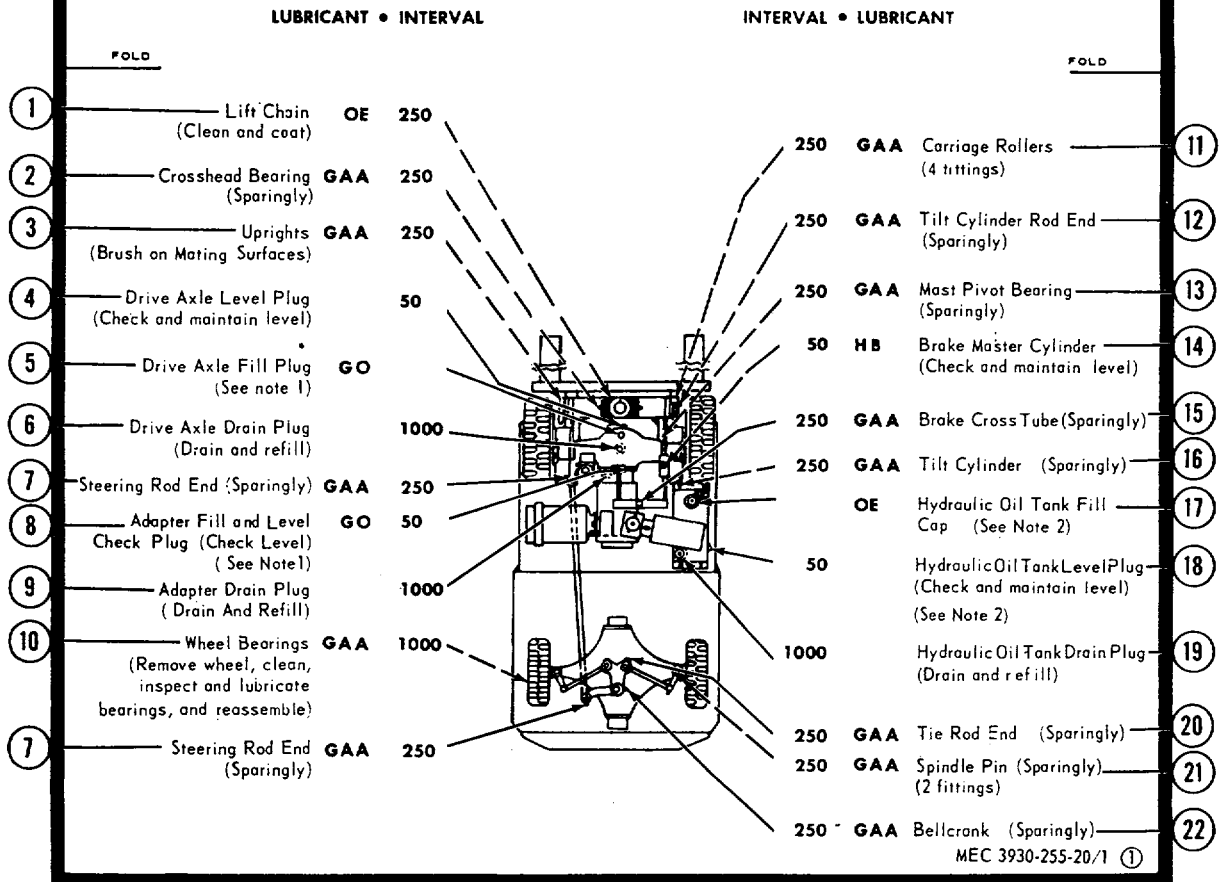


Figure 1. LO 10-3930-255-20.

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- KEY -

LUBRICANTS	CAPACITY	EXPECTED TEMPERATURES			INTERVALS
		Above +32°F	+40°F to -10°F	0°F to -40°F	
<b>OE</b> - Oil, Engine, Heavy Duty		<b>OE 10</b> or <b>9110</b>	<b>OE 10</b> or <b>9110</b>	<b>OES</b>	Intervals given are in hours of normal operation
Hydraulic Oil Reservoir	11 qt.				
Oil Can Points					
<b>OES</b> - Oil, Engine, Sub-zero		<b>GO 90</b>	<b>GO 90</b>	<b>GOS</b>	
<b>GO</b> - LUBRICATION OIL, Gear Drive Axle	2 pt.				
<b>GOS</b> - LUBRICATION OIL, Gear, Sub-zero					
Adapter	1 1/2 pt.				
<b>HB</b> - HYDRAULIC FLUID, Automotive Master Brake Cylinder		All temperatures			
<b>GAA</b> - GREASE, Automotive and Artillery		All temperatures			

FOLD

FOLD

NOTES:

1. FOR OPERATION OF EQUIPMENT IN PROTRACTED COLD TEMPERATURES BELOW - 10 F. Remove lubricants prescribed in the key for temperatures above 10 F. Clean parts with SOLVENT, dry-cleaning. Relubricate with lubricants specified in the key for temperatures below -10 F. A copy of this Lubrication Order will remain with the equipment at all times; instructions contained herein are mandatory.

2. HYDRAULIC SYSTEM. After refilling system, operate lift 5 minutes, check level and bring to full mark. BY ORDER OF THE SECRETARY OF THE ARMY:

HAROLD K. JOHNSON  
General, United States Army,  
Chief of Staff.

3. OIL CAN POINTS. Every 100 hours lubricate seat brake and hand brake, linkage, accelerate pivots, battery rollers and all adjusting threads with OE. OFFICIAL: J. C. LAMBERT, Major General, United States Army, The Adjutant General.

MEC 3930-255-20/1 (2)

Figure 1.-Continued

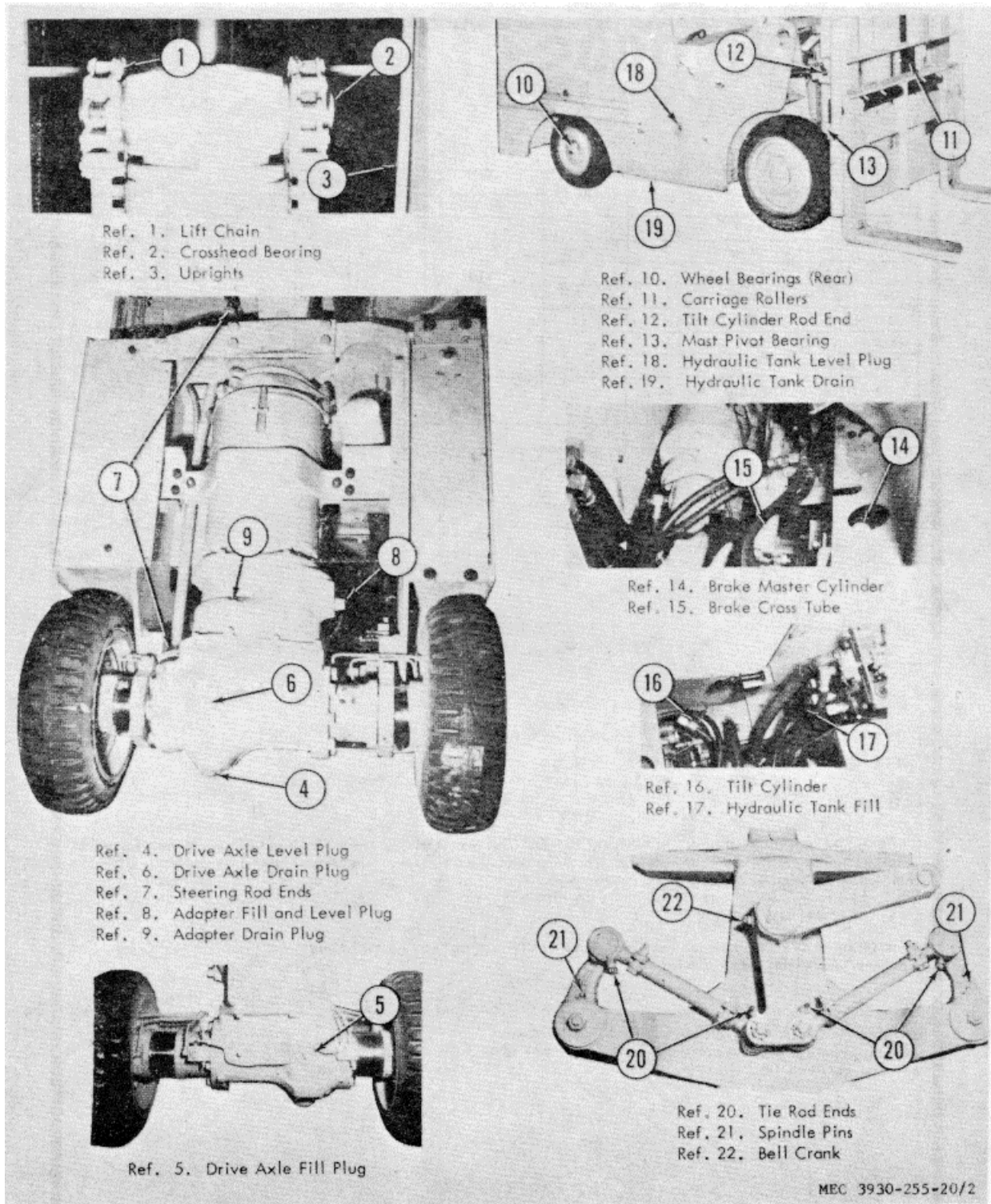


Figure 2. Lubrication points.

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## Section II. PREVENTIVE MAINTENANCE SERVICES

### 13. General

To insure that equipment is ready for operation at all times, it must be inspected systematically, so that defects will be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance services to be performed are listed in figure 3, and are described in paragraph 14. The item numbers indicate a convenient

sequence in which to perform the inspection. Note minor defects discovered during operation of the forklift truck for future correction, to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noted which would damage equipment if operation were continued. All deficiencies and shortcomings will be recorded, with corrective action taken, on DA Form 2404, at the earliest possible opportunity.

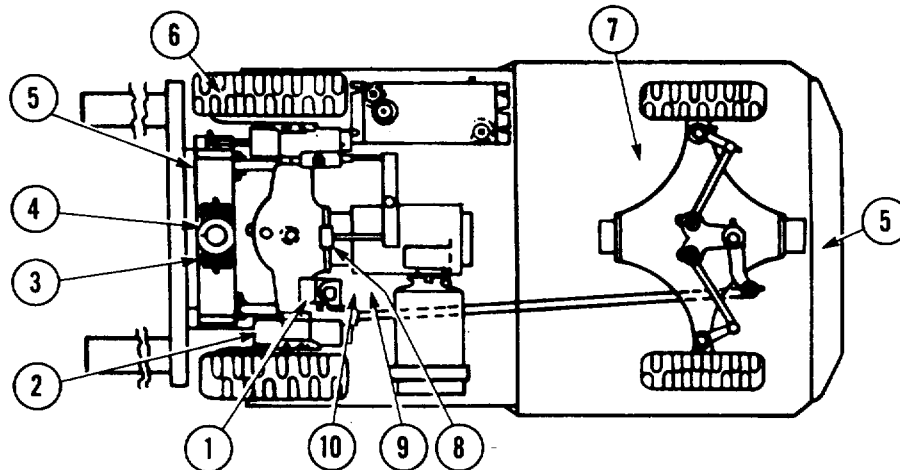
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# PREVENTIVE MAINTENANCE SERVICES QUARTERLY

TM10-3930-255-20

BAKER MODEL FTD-020-EE  
ARMY MODEL MHE 197

FORK LIFT TRUCK



ITEM	LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION ORDER	PAR REF
1	<b>FIRE EXTINGUISHER.</b> Inspect for broken seal. The dry chemical type must be weighed every 6 months. If the weight has decreased to less than 4-1/2 pounds or the pressure is below 125 psi, the extinguisher must be replaced.	
2	<b>TILT CYLINDERS.</b> Check for leaks or damage and for proper adjustment. Uprights will extend evenly when properly adjusted. Tighten loose connections. Tighten packing gland.	
3	<b>LIFT CHAIN.</b> Check for cracked, broken, or excessively worn links. Replace defective links.	<b>59</b>
4	<b>LIFT CYLINDER.</b> Check for leaks. Tighten loose connections. Tighten packing nuts.	
5	<b>LIGHTS.</b> Check operation. Replace a defective lamp or lamp unit.	<b>24</b>
6	<b>TIRES.</b> Check tires for cuts. Remove foreign material.	
7	<b>BATTERY.</b> Remove corrosion. Add water as needed.	
8	<b>BRAKE PEDAL.</b> Check pedal for 1/4 to 1/2 inch free travel. Adjust if necessary.	<b>36-39</b>
9	<b>HORN.</b> Check operation. Replace defective horn.	<b>26</b>
10	<b>CONTROLS.</b> Check controls for proper operation. Controls should operate freely without binding.  <b>NOTE. OPERATIONAL TEST.</b> During operation observe for any unusual noise or vibration.	

MEC 3930-255-20/3

*Figure 3. Quarterly preventive maintenance services.*

**14. Quarterly Preventive Maintenance Services**

a. This paragraph contains an illustrated tabulated listing of preventive maintenance services which must be performed by organizational maintenance personnel at quarterly intervals. A quarterly interval is equal to 3

calendar months, or 250 hours of operation, whichever occurs first.

b. The item numbers are listed consecutively and indicate the sequence of minimum requirements. Refer to figure 3 for the quarterly preventive maintenance services.

**Section III. TROUBLESHOOTING**

**15. General**

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the forklift truck and its components. Each trouble symptom stated is followed by a list of probable causes of the

trouble. The possible remedy recommended is described opposite the probable cause. Any remedial action required beyond the scope of organizational maintenance will be reported to direct support maintenance.

**16. Troubleshooting Chart**

(1) *Truck will not start or develop full power.*

a. *Electrical.*

<i>Probable cause</i>	<i>Remedy</i>
Dead battery.....	Charge or replace (para. 28).
Fusetron blown.....	Replace (para. 69).
Defective battery plug or receptacle.....	Replace plug or receptacle (para. 20).
Braided shunt in relay broken .....	Refer to direct support.
Contacts dirty, worn, or broken in relay. or directional switch.	Replace switch (para. 71), or refer to direct support.
Dirt in relay causing mechanical restric- tion.	Clean relay thoroughly.
Mechanical binding in relay or accelera- tor master assembly.	Refer to direct support.
Pole faces of plugging magnet not seal- ing properly.	Refer to direct support.
Snap switches malfunctioning in accel- erator master assembly.	Replace switches as necessary (para. 68).
Seat switch not working.....	Adjust or replace switch (para. 36f).
Open circuit due to loose connections in accelerator master assembly.	Clean and secure connections firmly (para. 68).

(2) *All speeds not obtainable.*

<i>Probable cause</i>	<i>Remedy</i>
Open in relay main circuit.....	Refer to direct support.
Object lodged in relay.....	Remove object.
Dirty contacts on relay.....	Replace contacts (para. 67).
Switches in accelerator master assembly malfunctioning.	Replace switches as necessary (para. 68).
Sticking or binding of accelerator in any part of stroke.	Refer to direct support.



- (3) *Overheating.*  
*Probable cause*  
 Dirty relay contacts .....  
 Broken, worn or 'improperly adjusted..  
 brushes or brush holders in travel  
 motor.  
 Vehicle operating in low speed for pro-  
 longed periods.
- Remedy*  
 Replace contacts (para. 67).  
 Refer to direct support.
- No technical remedy. Advise operator to  
 avoid practice if possible.

- (4) *Improper plugging control and timing through all speeds.*  
*Probable cause*  
 Improper timing through all speeds.....  
 Truck fails to leave first speed.....  
 Shorted wires .....  
 Open relay in main circuit.....  
 Dirt in relay or directional switch.....  
 Dirty contact in relay or directional .....  
 switch.
- Remedy*  
 Refer to direct support.  
 Refer to direct support.  
 Refer to direct support.  
 Refer to direct support.  
 Clean unit thoroughly.  
 Clean contacts.

*b. Brakes.*

- (1) *Brakes dragging.*  
*Probable cause*  
 Plugged master cylinder compensating  
 port.  
 Seat brake improperly adjusted.....  
 Mineral oil in brake system.....
- Remedy*  
 Open wheel cylinder bleeder fitting. If  
 brakes release when fluid escapes, re-  
 place master cylinder.  
 Adjust so that brake does not drag when  
 seat is down and is firmly applied when  
 seat is up (para. 36).  
 Refer to direct support.

- (2) *Brake pedal goes to floor.*  
*Probable cause*  
 Worn lining .....  
 Air in system.....  
 Fluid low in master cylinder .....  
 Pedal improperly adjusted.....
- Remedy*  
 Install new lined brakeshoes (para. 38).  
 Bleed system (para. 37b).  
 Replenish fluid and check for leaks.  
 Refer to direct support.

- (3) *Brake pedal under pressure gradually goes to floor plate.*  
*Probable cause*  
 Leaks in hydraulic brake system .....  
 Scored master cylinder barrel or defec-  
 tive cup.
- Remedy*  
 Locate and eliminate leaks.  
 Replace master cylinder (para. 39).

- (4) *Brake pedal has springy or rubbery action.*  
*Probable cause*  
 Air in system.....
- Remedy*  
 Bleed system (para. 37b).

- (5) *Weak braking action.*  
*Probable cause*  
 Oil on linings.....  
 Incorrect lining.....
- Remedy*  
 Replace brakeshoes (para. 38).  
 Replace brakeshoes (para. 38).

- (6) *Harsh braking action.*  
*Probable cause*  
 Brake lining grease or oil soaked .....  
 Brake backing plate loose .....
- Remedy*  
 Replace brakeshoes (para. 38).  
 Refer to direct support.

(7) *Brake releases slowly.*  
*Probable cause*  
 Hydraulic fluid congealed .....  
 Retraction of brakeshoes restricted by weak return springs or dirt  
 Dirt in master cylinder.....

*Remedy*  
 Drain, flush, and replace with proper brake fluid (para. 37b).  
 Clean, adjust or replace as necessary (para. 38).  
 Replace master cylinder (para. 39).

(8) *Truck pulls to one side.*  
*Probable cause*  
 Brake lining grease or oil soaked .....

*Remedy*  
 Replace brakeshoes (para. 38).

c. *Steering.* Difficult steering or wandering.

*Probable cause*  
 Steering gear adjustment too slack.....  
 Damage drag link .....  
 Defective steering gear .....

*Remedy*  
 Readjust steering gear (para. 44).  
 Refer to direct support.  
 Refer to direct support.

d. *Hydraulic.*

(1) *Lift carriage will not lift load.*  
*Probable cause*  
 Oil leaks in hoses .....  
 Defective pump .....  
 Fusetron blown.....  
 Defective control valve .....

*Remedy*  
 Inspect fittings and couplings. Tighten or replace as required.  
 Replace pump (para. 53).  
 Replace (para. 69).  
 Replace valve.

(2) *Load creeps down from raised position.*  
*Probable cause*  
 Oil leak in lines .....  
 Leaky control valve.....

*Remedy*  
 Tighten fittings.  
 Tighten connections, replace valve if necessary (para. 54).

(3) *Hoisting speed erratic.*  
*Probable cause*  
 Air in system.....  
 Low level in reservoir.....

*Remedy*  
 Bleed air from system by operation.  
 Fill reservoir to prescribed level (LO 10-3930-255-20).

(4) *Control valve plungers will not return to neutral.*  
*Probable cause*  
 Sticking plungers .....  
 Broken springs or dirt lodged in seats...

*Remedy*  
 Replace control valve (para. 54).  
 Replace valve (para. 54).

(5) *Forks uneven when load is lifted.*  
*Probable cause*  
 Lift chains out of adjustment .....

*Remedy*  
 Adjust so chain raises forks evenly (para. 58).

(6) *No motion of hydraulic unit when first started up.*  
*Probable cause*  
 Oil supply in tank too low.....  
 Oil viscosity too heavy.....

*Remedy*  
 Fill per LO 10-3930-255-20.  
 Change to oil specified in LO 10-3930-255-20.

<i>Probable cause</i>	<i>Remedy</i>
Air leak in pump inlet line .....	Tighten hose connection.
Restricted pump inlet hose .....	Repair or replace (para. 53).
Broken pump drive shaft, motor shaft ... or coupling .....	Replace pump (para. 53) or motor (para. 66).
Pump completely worn out .....	Replace pump (para. 53).
Weak or broken relief valve spring .....	Replace control valve (para. 54).
Relief valve plunger stuck by dirt or ..... foreign matter.	Replace control valve (para. 54).
Pump rotating in wrong direction .....	Refer to direct support.
Insufficient pressure to start load .....	Refer to direct support.
Truck overloaded.....	Reduce load.
Failure at switch .....	Replace switch.
 (7) <i>Loss of motion during operation.</i>	
<i>Probable cause</i>	<i>Remedy</i>
Loss of oil supply due to broken pump.. inlet, outlet or cylinder connecting hoses or tank return hose.	Replace hose (para. 61).
 (8) <i>Slow motion.</i>	
<i>Probable cause</i>	<i>Remedy</i>
Pump wearing out .....	Replace pump (para. 53).
Pump rpm too slow.....	Replace pump motor (para. 66).
Failure in hydraulic hoses.....	Replace hoses (para. 61).
Relief valve plunger held partially off its seat by dirt or foreign matter.	Replace control valve (para. 53).
Badly scored relief valve plunger or ..... seat.	Replace control valve (para. 53).
Weak relief valve spring .....	Replace control valve (para. 53).
Aerated oil supply (foam in tank).....	Change oil (LO 10-3930-255-20).
Oil too thin .....	See LO 10-3930-255-20 for proper grade.
Oil supply too low .....	Fill reservoir (LO 10-3930-255-20).
Worn or scored piston packing .....	Refer to direct support.
Bore of cylinder tube badly scored or.... nicked.	Refer to direct support.
Cylinder misalignment.....	Correct chain adjustment (para. 58).
Mechanical obstruction of moving parts	Remove obstruction.
 (9) <i>Jerky motion.</i>	
<i>Probable cause</i>	<i>Remedy</i>
Air in system.....	Bleed hydraulic system by operation.
Cylinder misaligned due to structural .... warpage.	Refer to direct support.
 (10) <i>Speed or operation slow down after usage.</i>	
<i>Probable cause</i>	<i>Remedy</i>
Pump worn .....	Replace pump (para. 53).
Improper oil used in system .....	See LO 10-3930-255-20 for proper grade.
Dirt or foreign matter in system .....	Drain, flush out system, replace with new oil.
 (11) <i>Noisy operation.</i>	
<i>Probable cause</i>	<i>Remedy</i>
Air in hydraulic system.....	Bleed system by operation.
Insufficient oil supply .....	Fill reservoir (LO 10-3930-255-20).
Pump worn out .....	Replace pump (para. 53).

<i>Probable cause</i>	<i>Remedy</i>
Air leak 'in pump intake line.....	Tighten hose.
Misalignment between motor shaft and pump drive shaft.	Tighten attaching parts.
Vibration of pump lines.....	Secure lines.
Chattering relief valve. Weak relief ... valve spring.	Replace control valve (para. 54).
Incorrectly set relief valve pressure.....	Replace control valve (para. 54).
Broken or cracked gears in pump .....	Replace pump (para. 53).
 (12) <i>Oil heats up rapidly.</i>	
<i>Probable cause</i>	<i>Remedy</i>
Pump slippage, oil too thin .....	See LO 10-3930-255-20.
Continued operation at relief valve pressure setting.	Check operation (TM 10-3930-255-10).
Operating pressure is close to relief..... valve pressure setting.	Check operation (TM 10-3930-255-10).
Operating at excessively high pressure	Refer to direct support.
Dirt oil .....	Change oil (LO 10-3930-255-20).
Misalignment between pump drive shaft and motor shaft.	Tighten attaching parts.
 (13) <i>Hoist cylinder packing leaks.</i>	
<i>Probable cause</i>	<i>Remedy</i>
Defective hoist cylinder.....	Refer to direct support.
 (14) <i>Hoist or tilt cylinder lowers or tilts while truck stands idle.</i>	
<i>Probable cause</i>	<i>Remedy</i>
Wrong packing .....	Refer to direct support.
Worn or scored seals, packing or cylinders.	Refer to direct support.
Failure in hydraulic hose.....	Check, tighten or replace hose.
 (15) <i>Reservoir flows over.</i>	
<i>Probable cause</i>	<i>Remedy</i>
Excess oil in reservoir .....	Check oil level with forks in lowered position and tilted back.

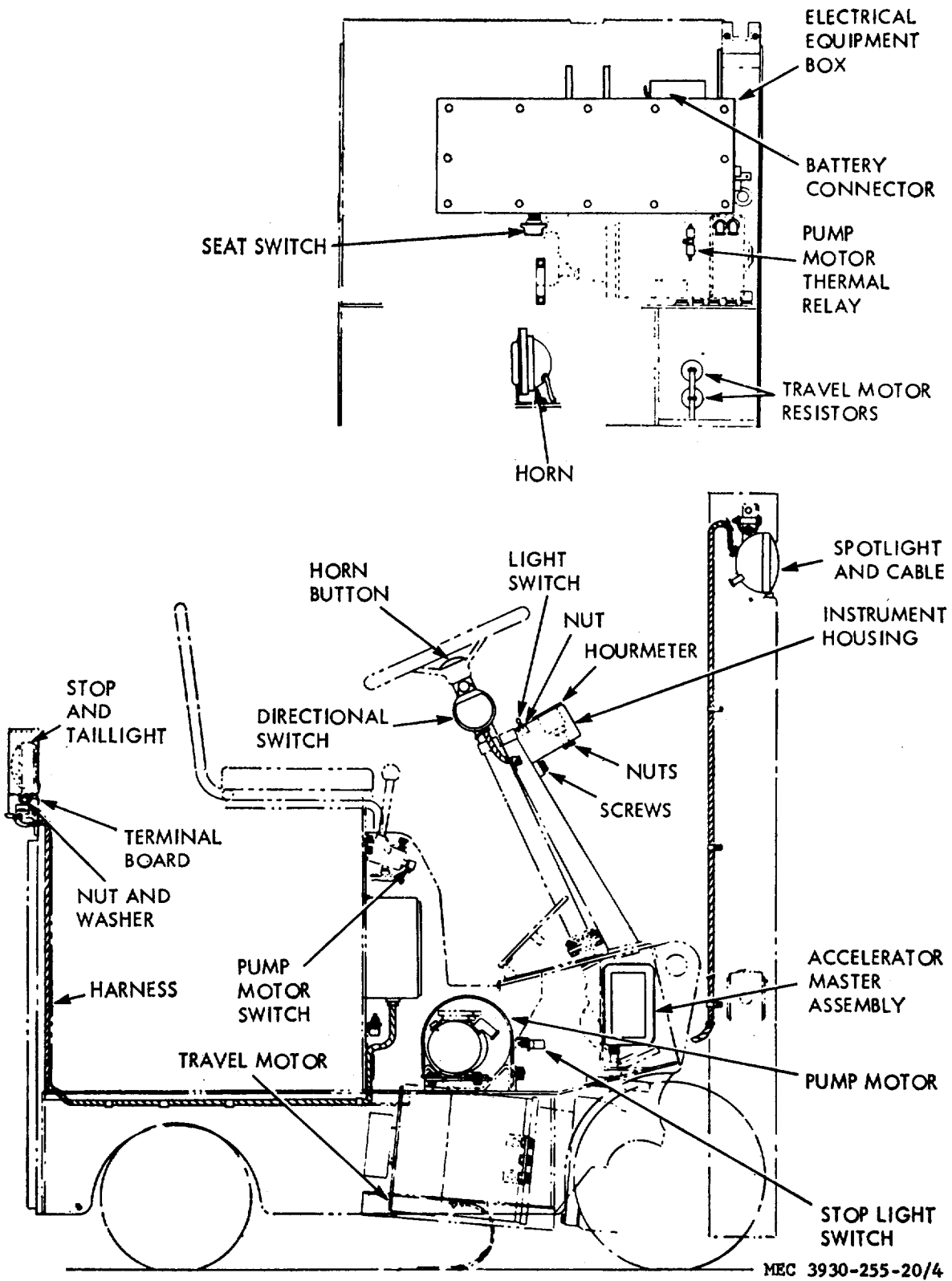
## Section IV. ELECTRICAL SYSTEM

### 17. General

This section presents instructions for organizational

maintenance of the electrical system Figure 4 shows the location of components.

TAGO 8845A



MEC 3930-255-20/4

Figure 4. Electrical system arrangement.

## 18. Hourmeter

### a. Removal.

- (1) Remove two screws attaching instrument housing (fig. 4) to truck, and remove housing.
- (2) Disconnect two leads at hourmeter, tape ends, and tag leads for identification.
- (3) Remove two nuts holding hourmeter to instrument housing, and lift hourmeter out of housing.

b. *Installation.* Reverse procedures in a above.

## 19. Light Switch

### a. Removal.

- (1) Remove two screws attaching instrument housing (fig. 4) to truck, and remove housing.
- (2) Remove nut at top of light switch and lower switch out bottom of instrument housing.
- (3) Disconnect, tape, and tag leads from switch.

b. *Installation.* Reverse procedures in a above.

## 20. Battery Connector Receptacle

### a. Removal.

- (1) Remove four screws shown in figure 5.
- (2) Disconnect leads shown, inside electrical equipment box, and draw them out. Remove receptacle with leads.

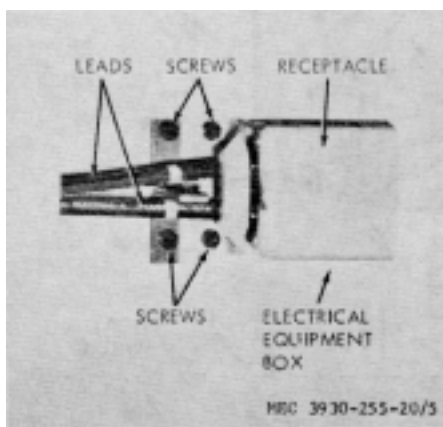


Figure 5. Battery connector receptacle.

b. *Installation.* Reverse procedures in a above.

## 21. Stoplight Switch

Before replacing switch, check that it is truly defective, and not merely in need of adjustment, and that leads are correctly installed as in a above.

### a. Inspection and Test.

- (1) Remove floor plate (para 50).
- (2) Inspect that wires labeled (+) and (33) to switch (fig. 6) are connected to terminals marked "A" and wires (9) and (10) are connected to "B" terminals. If not, connect them correctly before proceeding.
- (3) Connect a voltmeter lead to each "A" terminal, and operate switch button by hand. If meter reads system voltage with button free, and zero voltage with button pressed, switch is operative. Test at "B" terminals for opposite results. Continue to (4) below.
- (4) With voltmeter still connected as in (3) above, operate pedal manually. If operation of pedal does not give same results, switch position must be adjusted so brake application closes switch at "A" terminals and opens switch at "B" terminals, reversing this on releasing brake pedal.

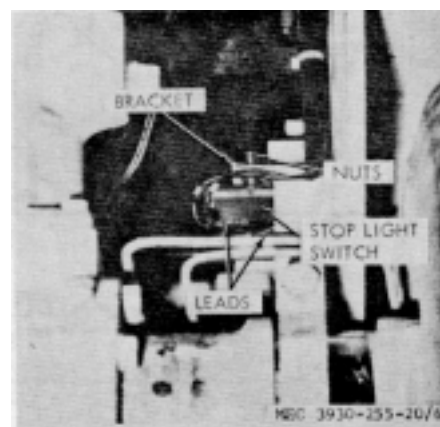


Figure 6. Stoplight switch.

*b. Adjustment.* Disconnect leads, and loosen two nuts shown in figure 6. Adjust switch position by turning it in or out of threaded hole in bracket so switch lights spotlight before braking action begins, and light goes out before pedal reaches top of travel. Tighten nuts.

*c. Removal.*

- (1) Remove floor plates (para 50).
- (2) Remove outermost nut (fig. 6) and leads, and unscrew switch from bracket.

*d. Installation.* Reverse procedures in c above and adjust switch (b above).

## 22. Headlight

*a. Removal.*

- (1) Remove clamps (fig. 7) holding conduit to outer upright.
- (2) Disconnect two wires at terminals at bottom end of conduit.
- (3) Remove two screws, nuts and washers attaching light to upright and remove light and conduit as an assembly.

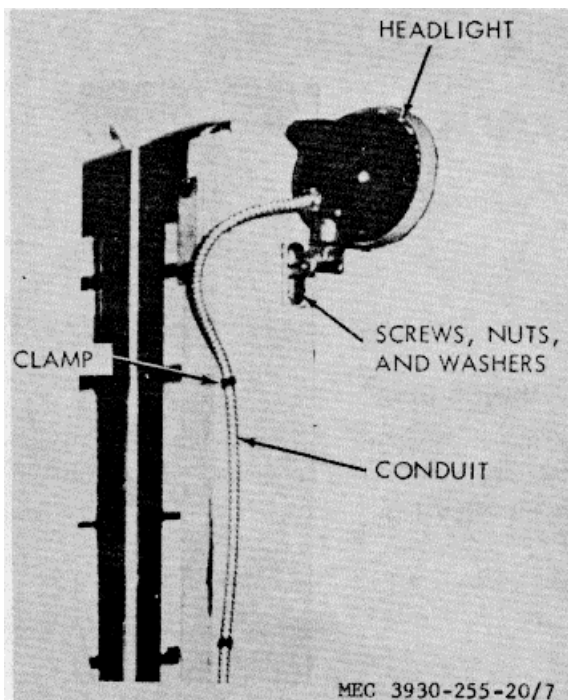


Figure 7. Headlight, installed.

*b. Repair.* Repair of headlight is confined to replacing the sealed beam lamp (para 24).

*c. Installation.* Reverse procedures in a above.

## 23. Stop and Taillight

*a. Removal.*

- (1) Remove two screws, nuts, and washers (fig. 8) attaching guard to truck. Lift guard and disconnect light wires from terminal board under guard.
- (2) Remove screws holding screen to guard and remove screen.
- (3) Remove nut and washer holding light assembly to guard, and remove guard.

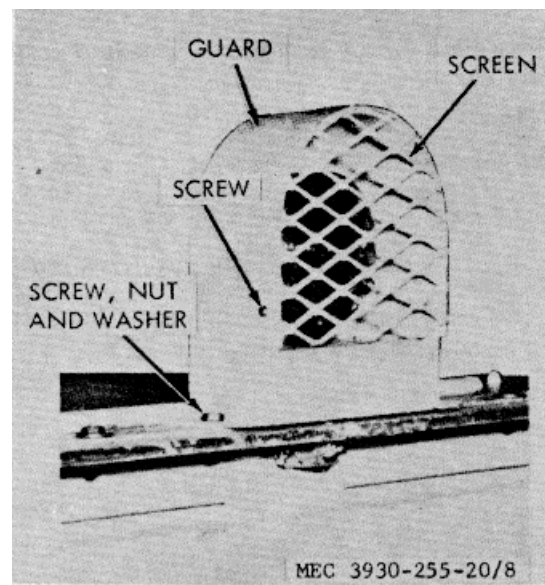


Figure 8. Stop and taillight, installed.

*b. Repair.* Remove bezel and lens, and install new bulb. Replace bezel and lens.

*c. Installation.* Reverse procedures shown in a above.

## 24. Lamps

*a. Headlight Lamp Replacement.*

- (1) Remove bezel from headlight.
- (2) Withdraw sealed beam unit from headlight shell and disconnect two wires to lamp.



- (3) Install by reversing procedures in (1) and (2) above.

*b. Stop and Taillight Lamp Replacement.* See paragraph 23b.

## 25. Taillight Resistor

### *a. Removal.*

- (1) Remove electrical equipment box cover (fig. 4).
- (2) Disconnect wires numbered 32 and 33 from resistor, located at center of box, on board. Remove two mounting screws and remove resistor.

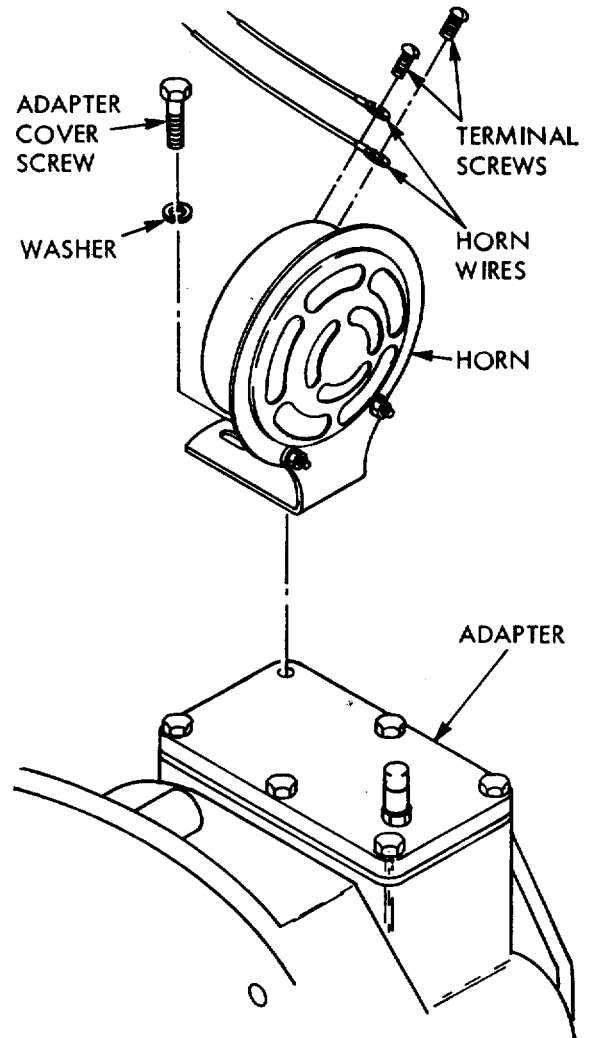
*b. Test.* Test resistor with ohmmeter across terminals for 40 ohms resistance, plus or minus 20%.

*c. Installation.* Reverse procedures in a above.

## 26. Horn

### *a. Removal.*

- (1) Remove truck floor plate (para 50).
- (2) Disconnect wires (fig. 9) from horn.
- (3) Remove screws holding horn to adapter and remove horn.



MEC 3930-255-20/9

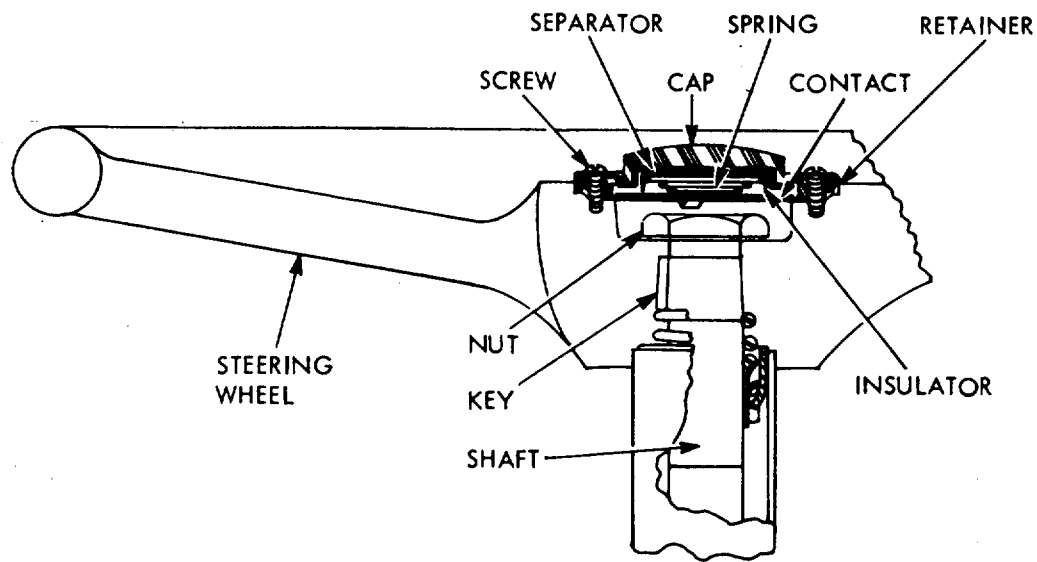
Figure 9. Horn, installed.

*b. Installation.* Reverse procedures in a above.

## 27. Horn Button

*a. Removal.* Remove four screws (fig. 10) and lift off retainer, cap, separator, insulator, contact, and spring.

TAGO 8345A



MEC 3930-255-20/10

Figure 10. Horn button, cutaway view.

b. *Installation.* Reverse procedures in a above.

## 28. Battery

a. *Service.* Refer to TM 10-3930-255-10, and TM 10-1690A.

b. *Removal.*

- (1) Open battery compartment, and disconnect battery leads from truck at receptacle (TM 10-3930-255-10).
- (2) With a hoist rated at more than 2,000-pounds capacity, lift battery from truck by hooks through the lifting eyes at each side of battery.

**Caution:** Use spreader bar as wide as battery between lifting hooks to avoid inward pull on battery case. Keep personnel at a distance during removing operation to minimize risk from electrolyte spillage.

c. *Installation.* Reverse procedures in b above.

## 29. Headlight, Stop and Taillight Wiring Harness Repair

Wiring to these lights is contained in flexible metal conduit. It is not practical to repair this wiring. If damaged, refer to direct support maintenance for replacement.

## Section V. POWER AXLE

### 30. Power Axle Service

All organizational level service of the power axle is given in LO 10-3930-255-20.

## Section VI. REAR AXLE

### 31. General

Since the rear axle provides steering for the truck, it is functionally associated with the

steering gear. Maintenance at organizational level is limited to adjustment of the tie rods for toe-in. Related steering gear adjustments will be found in paragraph 44.

TAGO 8345A

### 32. Adjustment of Wheel Alignment

*a. Measurement.* Determine if wheel alignment adjustment is needed, as follows:

- (1) With rear axle (fig. 11) level, front to rear, and wheels in straight ahead position, measure inside span between tires at hub height at front of axle.
- (2) Repeat (1) above at rear of axle.
- (3) If measurements obtained in (1) and (2) above differ by over 1/16 inch, adjust as given in b below until wheels are parallel to within 1/16 inch as measured in (1) and (2) above.

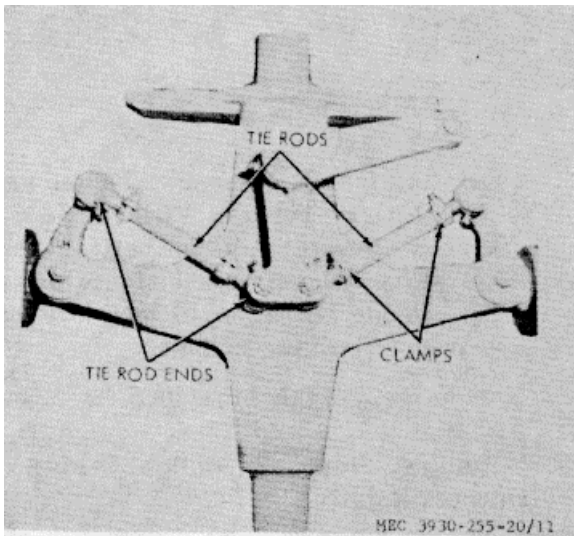


Figure 11. Steer axle, adjustment points.

*b. Adjustment.*

- (1) Loosen (but do not remove) screws and nuts through all tie rod end clamps (fig. 11).
- (2) Turn each tie rod an equal number of turns in the direction necessary to change toe-in as required. Each tie rod has right-hand threads at one end, left-hand threads at the other, so adjustment can be made to change effective length without dismounting tie rod.
- (3) When adjustment has been completed tighten tie rod clamp screws and washers.

### 33. Steering Knuckle Service

All steering knuckle service allocated to operational maintenance is given in LO 10-3930-255-20.

## Section VII. BRAKES

### 34. General

This section contains organizational maintenance instructions for the mechanical (parking) and hydraulic (service) brake systems used on the truck.

### 35. Handbrake Lever

*a. Removal.*

- (1) Release handbrake, and remove screws, nuts, and washers which attach handbrake lever (fig. 12) to bracket on steering column.
- (2) Remove cotter pin and clevis pin attaching handbrake cable assembly to handbrake lever, and remove lever.

TAGO 8345A

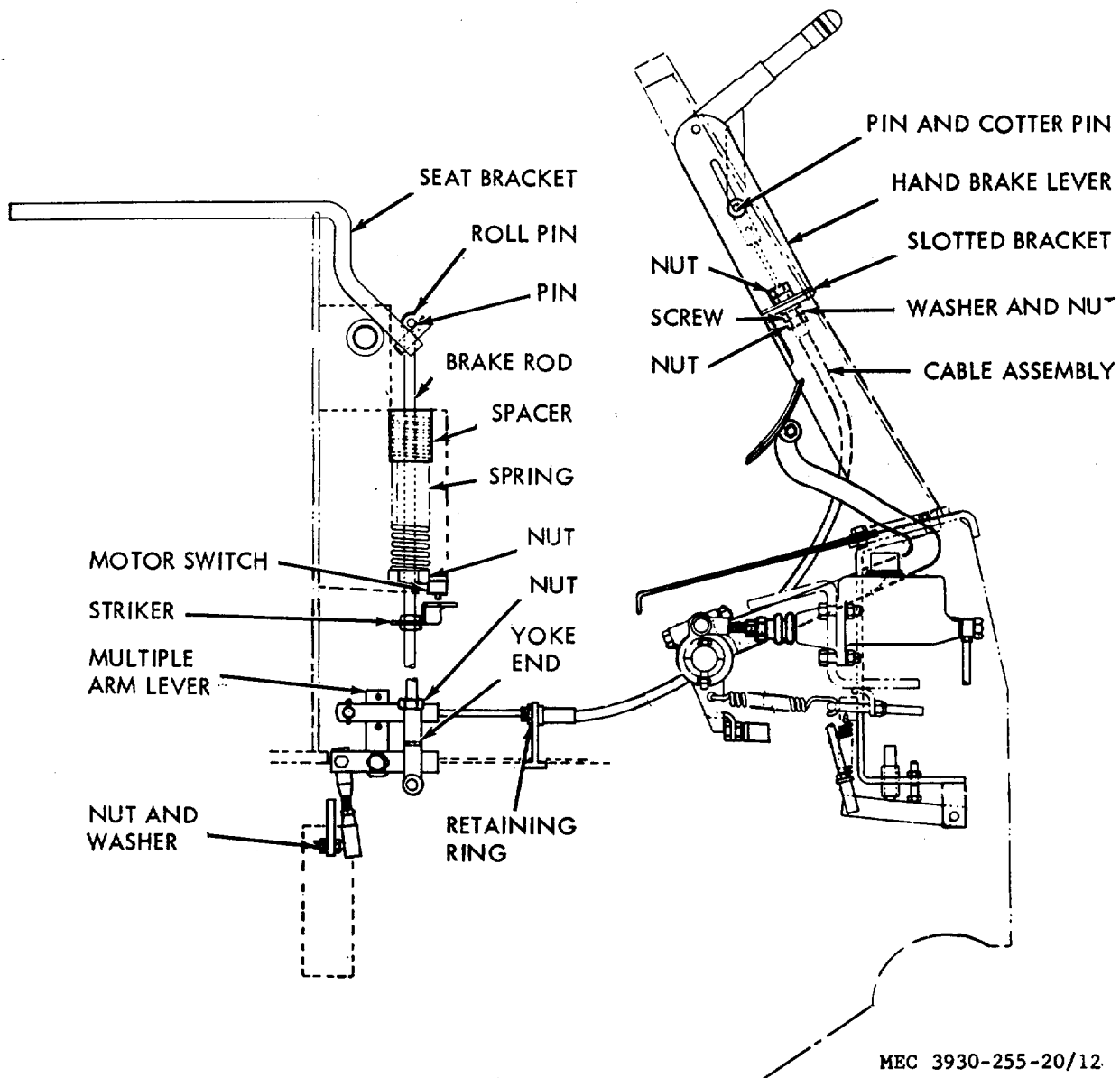


Figure 12. Service and parking brake controls.

b. *Installation.* Reverse procedures in a above.

### 36. Brake Cable and Brake Rod

a. *Cable Removal.*

- (1) Remove handbrake lever (para 35a).
- (2) Loosen two nuts holding cable to slotted bracket on steering column and slide cable from slot.
- (3) Remove screws, nuts, washers, and

two clamps holding cable assembly to truck frame.

- (4) Remove pin and cotter pin attaching cable to offset yoke, loosen two nuts at slotted bracket on truck frame (lower end of cable), and remove cable assembly from truck.

b. *Cable Installation.* Reverse procedures in a above.

c. *Cable Adjustment.* Position cable housing by adjusting nuts at both slotted brackets until brake releases fully, and locks in applied position with a definite snap action.

d. *Brake Rod Removal.*

- (1) Run down large nut (fig. 12) under spring, until spring tension is relieved.
- (2) Drive out roll pin and remove pin from eye at top of brake rod.

**Warning: Be sure spring tension is relieved before removing pin.**

- (3) Loosen jamnut on lower end of brake rod at yoke, unscrew rod from yoke and remove rod with striker, spring, and spacer attached.

e. *Brake Rod Installation.* Install spacer, spring, striker, and nuts as shown in figure 12, on rod, and reverse procedures in d above.

f. *Brake Rod Adjustment.* After installation, perform the following:

- (1) Adjust spring tension raising seat to suit operator, by turning large nut beneath spring.
- (2) Adjust position of motor switch striker, with seat bottomed as by operator's weight, so motor switch is definitely actuated. Run two striker jamnuts up or down rod to position striker.

### 37. Service Brake

a. *Brake Adjustment.* The service brakes are self-adjusting to take up play due to lining wear. Refer to paragraph 39b for pedal adjustment.

b. *Bleeding Service Brake System.* The hydraulic brake system must at times be bled to expel air in the system. The need is generally indicated by springy or spongy brake pedal action. Unless special brake bleeding equipment is available, two men are required to bleed the system, one to maintain a constant supply of fluid in the master cylinder and to pump the brake pedal, the other to perform the bleeding operation.

- (1) Remove filler plug from master cylinder and fill with hydraulic brake fluid.
- (2) Clean bleeder screws at each wheel cylinder (fig. 13). Remove small screws from bore of bleeder screws. Attach one end of bleeder hose to bleeder screw and place other end of hose in clean container partially filled with hydraulic brake fluid. Be sure end of hose is submerged in the hydraulic fluid.
- (3) Turn bleeder screw counterclockwise three-quarters of a turn. Apply steady pressure to brake pedal. Hydraulic fluid containing air bubbles should be forced through bleeder hose into container.
- (4) Maintain fluid level in master cylinder and continue to operate brake pedal until fluid flows in a steady solid stream without air bubbles. Close bleeder screw by turning it clockwise. Remove bleeder hose, and replace small screw in bleeder screw.
- (5) Repeat bleeding procedure at other wheel, replenishing brake fluid in master cylinder before each wheel cylinder before each wheel cylinder is bled. Replace filler plug in master cylinder.

**Caution: Hydraulic brake fluid from the brake system must not be reused.**

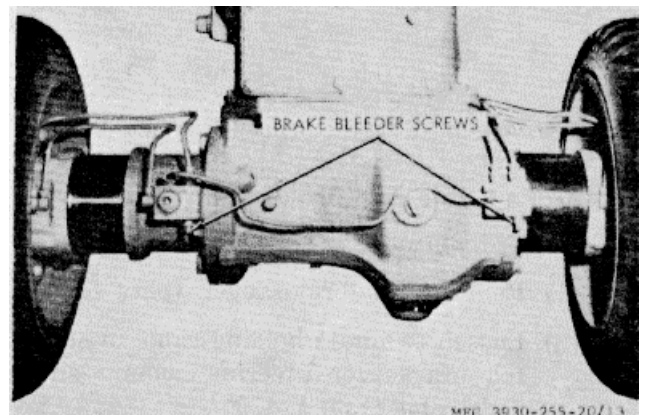


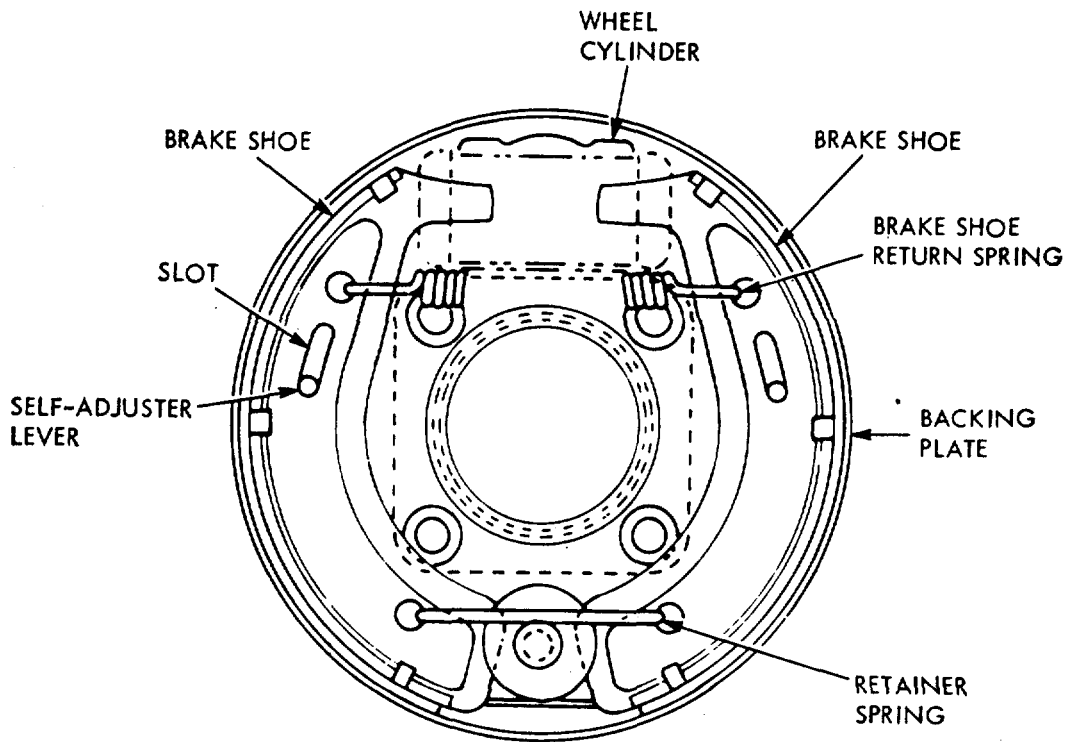
Figure 13. Brake bleeding points.

### 38. Brakeshoes

#### a. Removal.

- (1) Remove front wheels (para 41).
- (2) With brake spring pliers, remove

brakeshoe return spring (fig. 14) and retainer spring. Carefully remove brakeshoes, and install brake clamps on wheel cylinder to prevent pistons being pushed out of cylinder by residual pressure in brake lines.



MEC 3930-255-20/14

Figure 14. Brakeshoe removal.

#### b. Installation.

- (1) Reverse procedure in a(2) above.
- (2) Temporarily adjust shoes inward as far as they will go. This procedure consists essentially of tapping self-adjuster levers toward center of axle.
- (3) Install front wheels (para 41) and operate brake pedal several times to adjust brakes.

### 39. Master Cylinder

#### a. Removal.

- (1) Remove floor plate (para 50).
- (2) Remove hollow bolt (fig. 15) and brake line fitting from front of master cylinder. Take precautions to keep dirt from entering brake line.
- (3) Remove nuts, washers, and screws attaching master cylinder to truck, and remove master cylinder. Push rod will remain connected to brake shaft and need not be removed.

TAGO 8345A

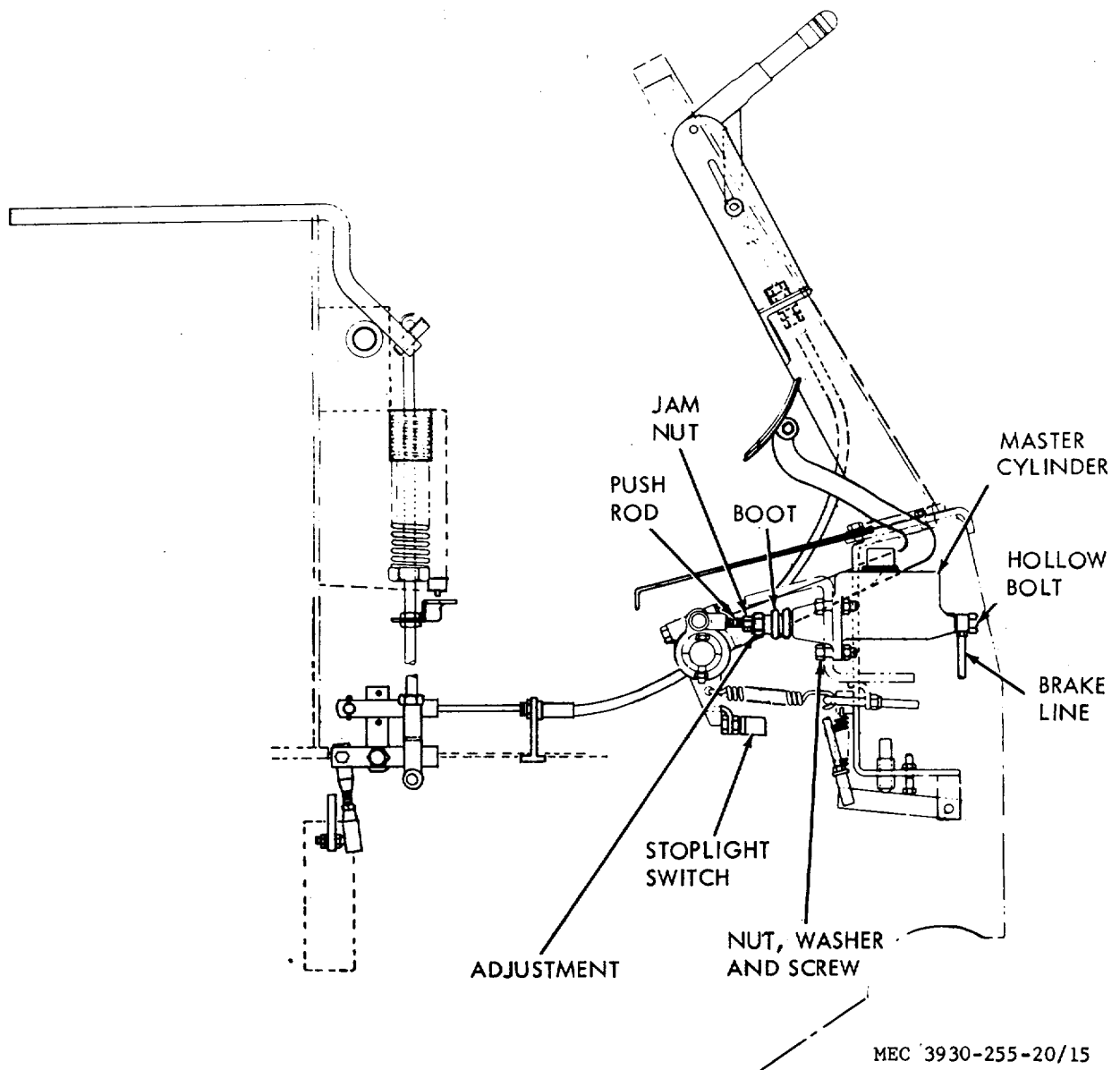


Figure 15. Master cylinder.

b. Installation.

- (1) Reverse procedures in a above.
- (2) Fill cylinder with brake fluid (LO 10-3930-255-20).
- (3) Bleed brake hydraulic system (para 37b).
- (4) Loosen jamnut on push rod, and adjust length of push rod to give 1/4-inch to 5/8-inch free travel of pedal before brake application begins. Tighten jamnut to secure adjustment.

TAGO 8345A

## Section VIII. WHEELS

### 40. General

This section contains instructions for replacement of the truck wheels, and service and replacement of rear wheel bearings. Refer service other than this to higher maintenance level.

### 41. Wheels

#### a. Front Wheel Removal.

- (1) Jack up front wheels as follows:
  - (a) Tilt mast to extreme back position.
  - (b) Place block directly under mast at lift cylinder.
  - (c) Tilt mast forward until wheels are clear.
- (2) Remove six screws (fig. 16) holding wheel to truck.
- (2) Remove wheel.

**Note.** If brake lining drags on wheel, interfering with removal, slack off adjustment of brake self-adjusters by vigorously wiggling wheel to force brakeshoes inward.

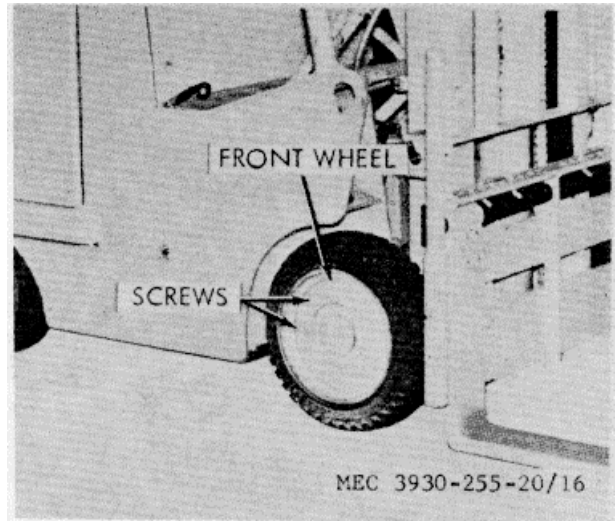


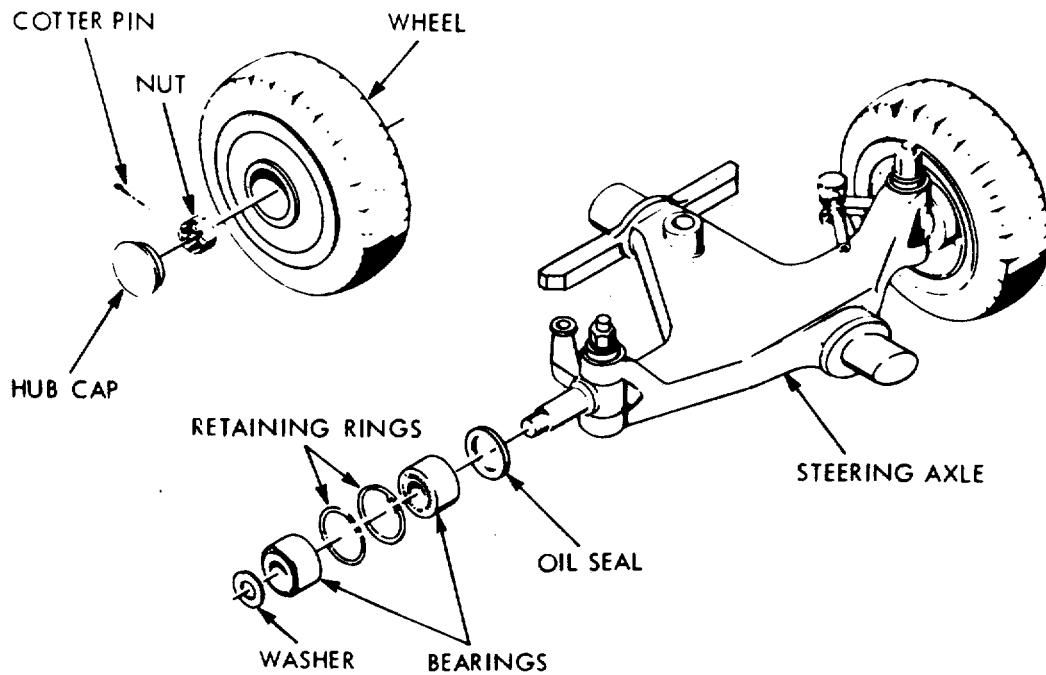
Figure 16. Front wheel removal.

b. Front Wheel Installation. Reverse procedures in a above.

#### c. Rear Wheel Removal.

- (1) Lower forks fully and tilt mast back. Raise rear of truck until wheels clear floor.
- (2) Remove hub cap (fig. 17), and remove cotter pin, nut, and washer from bore of wheel.
- (3) Draw wheel from steering axle spindle. Because of manufacturing tolerances the cone and rollers of the inboard bearing may remain with spindle. If so, it can easily be removed. Avoid damaging oil seal, if possible, when removing wheel.





MEC 3930-255-20/17

Figure 17. Rear wheel removal.

d. *Rear Wheel Installation.* Reverse procedures in c above, tightening wheel nut snug, then backing it off not more than 1/6 turn, and install cotter pin.

## 42. Rear Wheel Bearings

### a. Removal.

- (1) Remove rear wheels (para 41c).
- (2) Pull bearings from bore of wheel. A slip hammer bearing puller may be used to pull bearings from wheel if they stick in bore.
- (3) Remove retaining rings which position

bearings.

### b. Service.

- (1) Clean bearings with SD and dry thoroughly.
- (2) Inspect cups and rollers for wear or failure. Inspect cone and roller assemblies for roughness when rotated.
- (3) If bearings are serviceable, repack with grease in accordance with LO 10-3930-255-20, using a bearing packing device, if available.

c. *Installation.* Reverse procedures in a above.

## Section IX. STEERING

### 43. General

This section contains organizational maintenance instructions for the steering gear and linkage to the steering axle. Service according to the instructions in LO 10-3930-255-20.

TAGO 8345A

### 44. Steering Gear Assembly

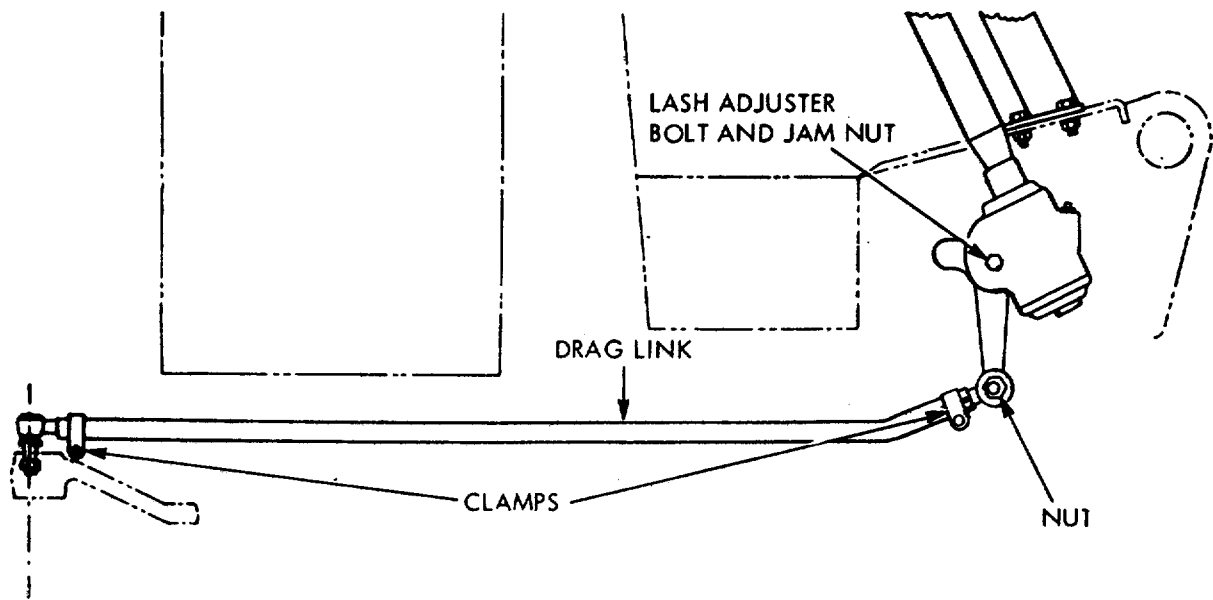
#### a. Lash Adjustment.

- (1) Remove nut (fig. 18) holding drag link to pitman arm, and disconnect drag link.

**Note.** If necessary, use puller, but do not damage threads, or place strain on pitman arm.

with screwdriver until steering wheel passes through center of travel with 14 to 18 ounces pull on the rim. Tighten jamnut, and install drag link.

- (2) Loosen jamnut and turn lash adjuster



MEC 3930-255-20/18

Figure 18. Steering adjustment.

*b. Steering Linkage Adjustment.*

- (1) With steering wheel halfway between extreme right and extreme left turn, assembly pitman arm to steering gear as shown in figure 18.
- (2) With trailing axle wheels in straight ahead position, adjust drag link to proper length by loosening clamps and turning drag link tubing until tie rod end at front of drag link will enter hole in pitman arm freely, with pitman arm vertical.
- (3) Tighten clamps.

**45. Steering Wheel**

*a. Removal.*

- (1) Remove horn button assembly (para 27a).
- (2) Remove nut (fig. 10).
- (3) With a steering wheel puller, draw wheel from shaft.

**Caution:** Do not try to remove wheel without proper puller, as the steering gear could be damaged.

*b. Installation.* Reverse procedures in a above.

**Section X. BODY AND HOOD**

**46. General**

This section contains maintenance instructions for exterior structural components, and the seat of the truck, within the scope of organizational maintenance.

TAGO 8345A

**47. Battery Box Top Cover**

*a. Removal.*

- (1) Remove taillight and taillight guard as an assembly (para 23a(1)).

- (2) Remove screws and nuts (fig. 19) which attach cover hinge to truck, and lift off cover.

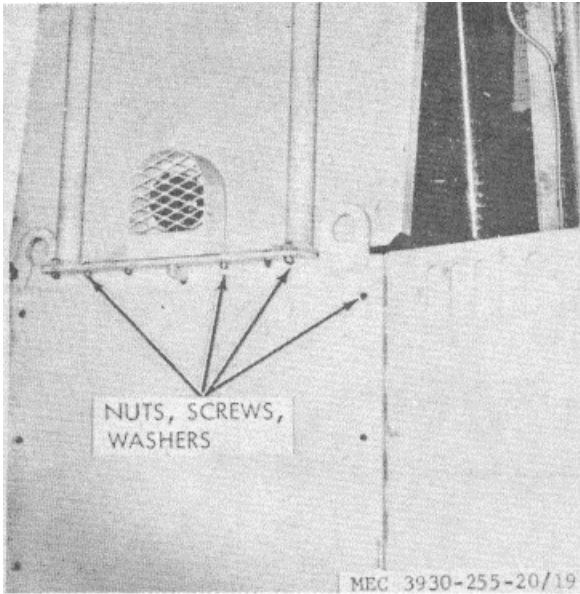


Figure 19. Battery box top cover and overhead guard.

- b. *Installation.* Reverse procedures in a above.

#### 48. Battery Box Side Covers

a. *Removal.* Pull open side cover to be removed, remove nuts and screws (fig. 19) attaching side cover to truck, and remove cover.

- b. *Installation.* Reverse procedures in a above.

#### 49. Overhead Guard (Used on Trucks With 130-Inch Lift Only)

a. *Removal.* Remove screws (fig. 19) at each upright bore of guard, and lift guard from truck.

- b. *Installation.* Reverse procedures in a above.

#### 50. Floor Plate

- a. *Removal.*

- (1) Unhook cowl latches (fig. 20) and lift cowl free of truck.
- (2) Remove two screws at front of floor plate, and lift off floor plate.

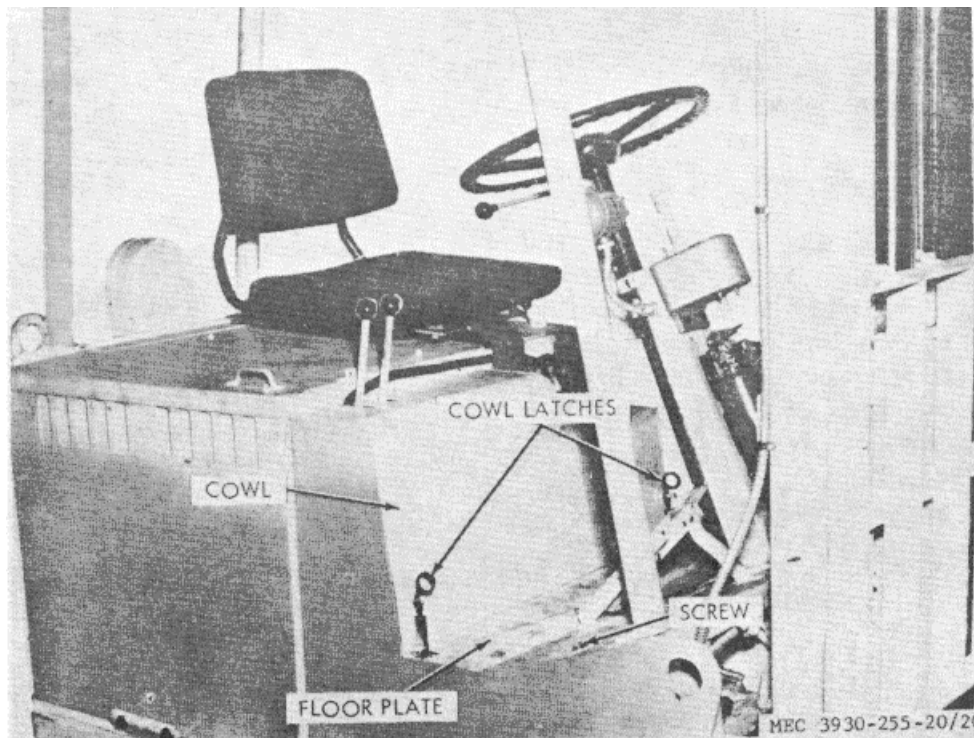


Figure 20. Floor plate removal.

b. *Installation.* Reverse procedures in a above.

## 51. Seat Assembly

a. *Removal.* Remove four screws, nuts, and washers (fig. 21) which attach assembly to brake actuating bar. Remove seat from truck.

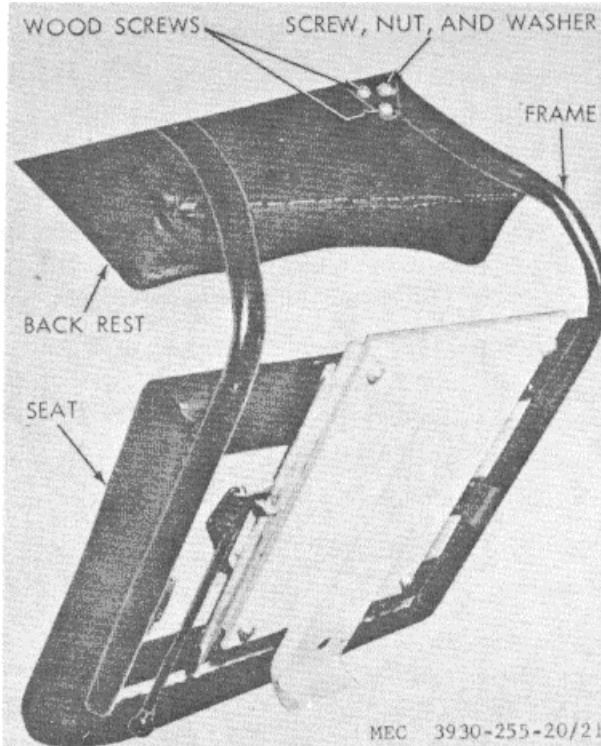


Figure 21. Seat.

b. *Disassembly.* Remove wood screws holding backrest to frame and remove backrest. Remove nuts and washers holding seat cushion to frame. Do not disassemble guide rails.

c. *Repair.* Repair slightly damaged (torn) upholstery material according to good commercial practice, by sewing, or adhesive patch. If wear or damage is extensive, replace entire cushion:

d. *Assembly.* Reverse procedure in b above.

e. *Installation.* Reverse procedure in a above.

## Section XI. HYDRAULIC LIFT COMPONENTS

### 52. General

This section contains instructions for organizational maintenance of the hydraulic and mechanical items related to the lift mechanism, including controls.

### 53. Hydraulic Pump Assembly

a. *Removal.*

TAGO 8345A

- (1) Remove floor plate (para 50).
- (2) Position a bucket under pump (fig. 22) to catch draining oil, and disconnect hose elbow fittings at pump. Remove hoses from pump and cap ends.
- (3) Remove two screws attaching pump to motor. Remove pump.

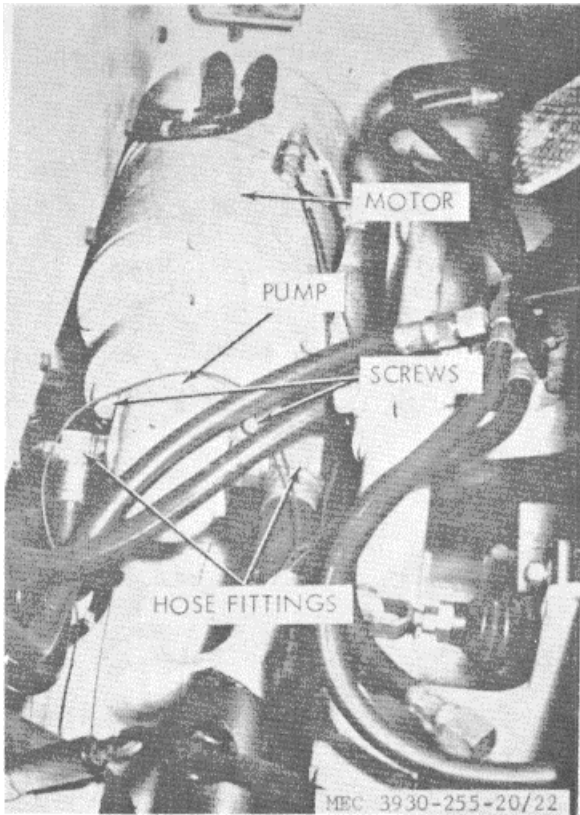


Figure 22. Hydraulic pump and motor.

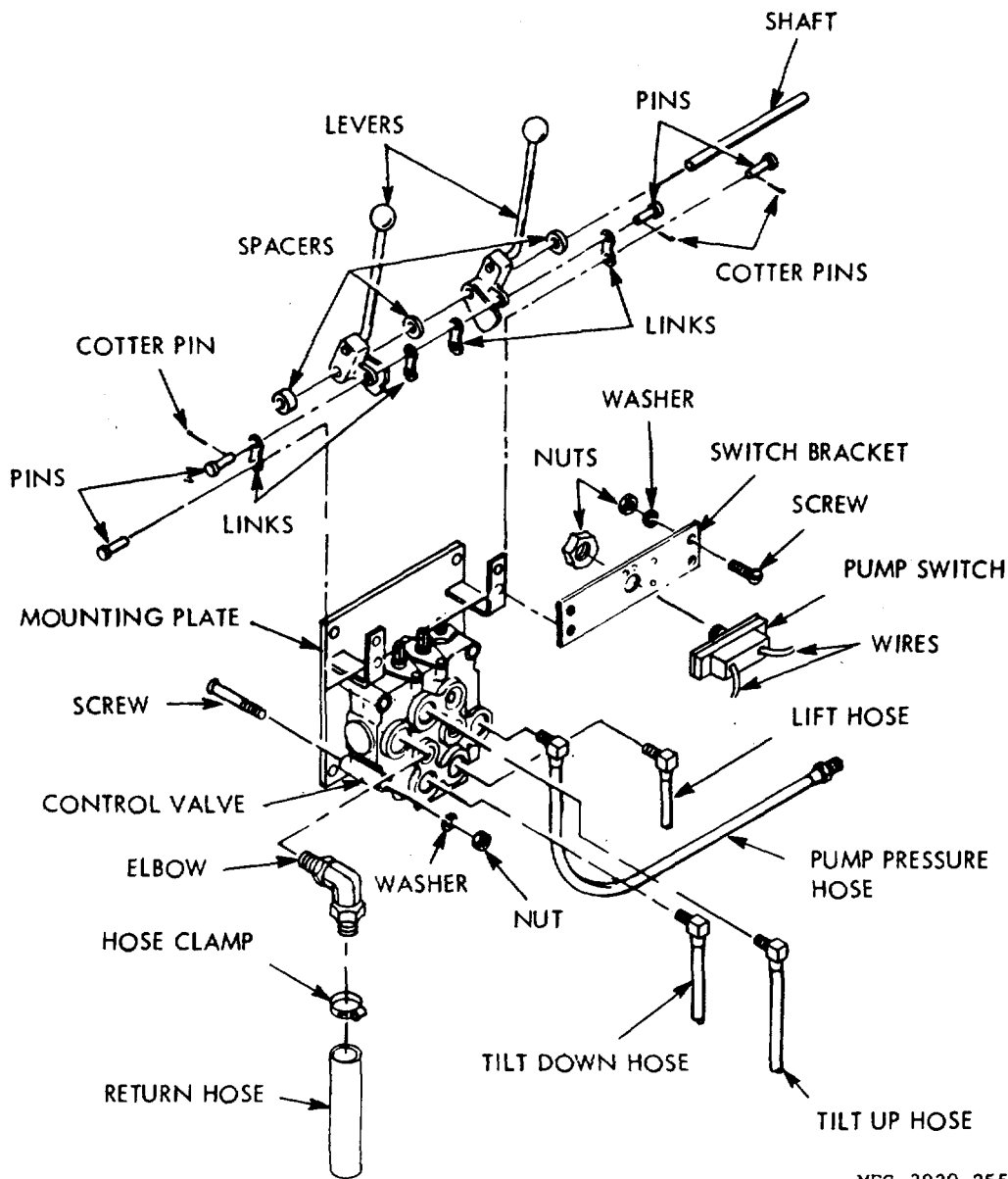
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b. *Installation.* Reverse procedures in a above.

#### 54. Control Valve

a. *Removal.*

- (1) Remove cowl (para 50a).
- (2) Remove one cotter pin and clevis pin (fig. 23) from links at each lever, disconnecting levers from valve plungers.
- (3) Disconnect four hoses equipped with elbow fittings, remove hose clamp, and remove last hose.
- (4) Remove three nuts, screws, and washers attaching valve and mounting plate to truck, and remove valve. Cap or plug hoses and parts of valve.
- (5) Remove screws, nuts, and washers holding switch bracket to mounting plate, and remove switch bracket, with switch attached.
- (6) Remove screws, nuts, and washers, and remove mounting plate from valve.



MEC 3930-255-20/23

Figure 23. Control valve.

b. *Installation.* Reverse procedures in a above.

pin is drawn out of levers and bracket.

### 55. Control Valve Levers

a. *Removal.*

- (1) Perform procedures in paragraph 54a(1) and (2).
- (2) Remove cotter pins from pin on which handles pivot (fig. 23) and withdraw pin, removing three spacer washers as

(3) Lift off levers.

b. *Installation.* Reverse procedures in a above.

### 56. Control Valve Mounting Plate

a. *Removal.* Refer to paragraph 54.

b. *Installation.* Reverse procedures in paragraph 54a, turning switch in or out of switch bracket and position so that levers will actuate it when operated.

## 57. Tilt Cylinders

### a. Removal.

- (1) Disconnect hoses (fig. 24) from tilt cylinder. Cap hoses and plug ports in cylinder to exclude dirt.

- (2) Remove screws, nuts, and washers attaching plates to brackets on truck frame and on uprights. Remove plates from notches in pins.
- (3) Pull or drive pins from brackets and tilt cylinder ends. Be careful not to let cylinder fall as pins come out.

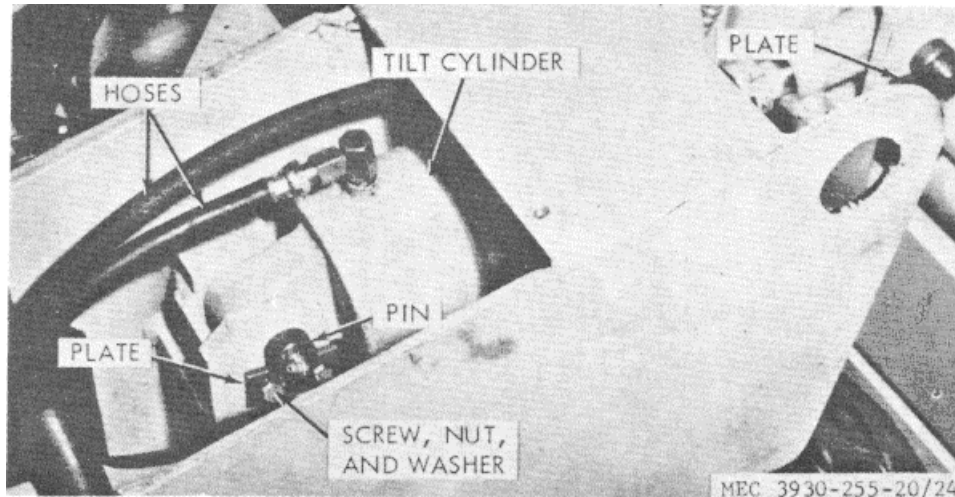


Figure 24. Tilt cylinder.

*b. Installation.* Reverse procedures in a above. After installation, operate tilt control several times to purge air from cylinder. Check cylinder and hose fittings for leakage while operating.

- (1) Lower carriage fully, remove nuts (fig. 25) from chain adjusting screws, and lay chains back out of way.
- (2) Remove retaining rings, washers, rollers, and bushings from crosshead.

## 58. Crosshead Rollers

### a. Removal.

TAGO 8345A

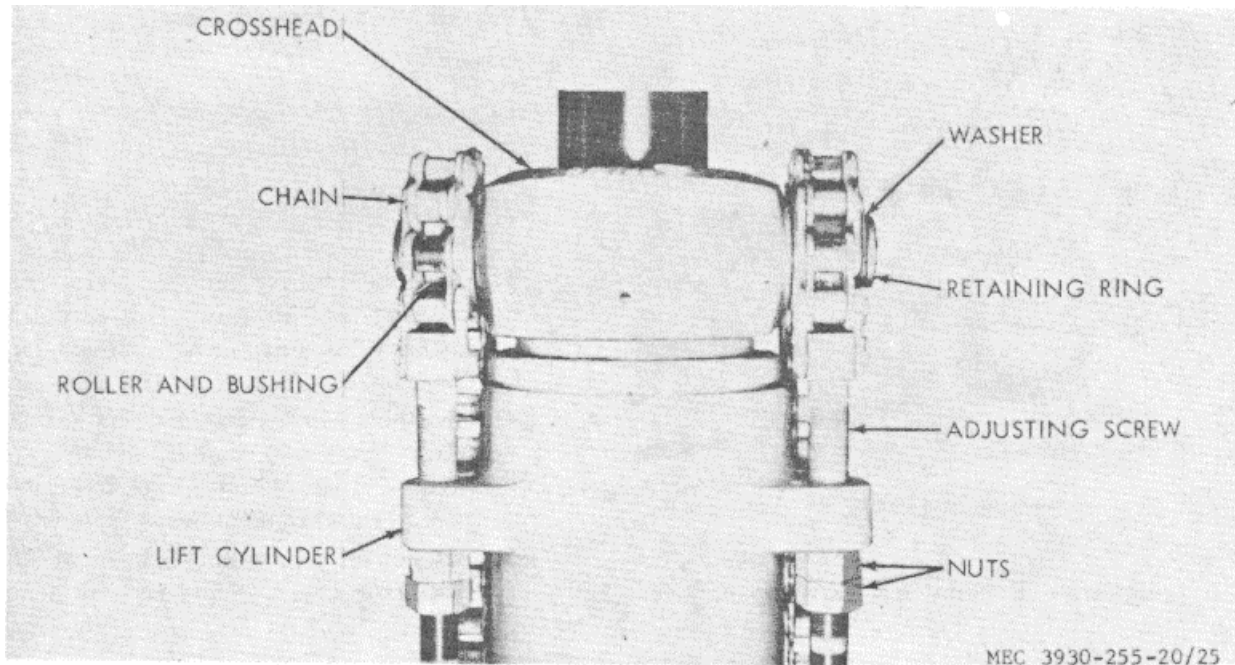


Figure 25. Crosshead, rollers, and chains.

*b. Installation.*

- (1) Reverse procedures in a above.
- (2) Adjust nuts on chain adjusting screws (fig. 25) so each chain begins lifting at same time.

**Caution:** If load is not shared equally by chains, first chain to begin lifting will cock crosshead and cause rapid wear and damage to lift cylinder.

- (1) Remove chain from truck (b above).
- (2) With a chain breaking tool, remove damaged link or links from chain. Failure of one link may damage adjacent links. Remove all damaged links.
- (3) Install replacement link and rivet pin end to secure side plates of chain.

**Note.** Plates of end links are secured by cotter pins. Do not rivet or peen these pins.

**59. Chain Assemblies**

*a. Adjustment.* Refer to paragraph 58b(2).

*b. Removal.*

- (1) Refer to paragraph 58a(1).
- (2) Unhook chains from carriage assembly.

*c. Installation.* Reverse procedures in b above.

*d. Repair.* Repair is limited to replacing damaged links.

**60. Forks**

*a. Removal.*

- (1) Lower carriage fully, and lift load backrest from carriage (fig. 26).
- (2) Lift spacers from carriage. Remove screws, washers, and one plate from carriage. Hold forks so they don't fall and draw shaft from carriage. Forks are now free. Remove them.

TAGO 8345A



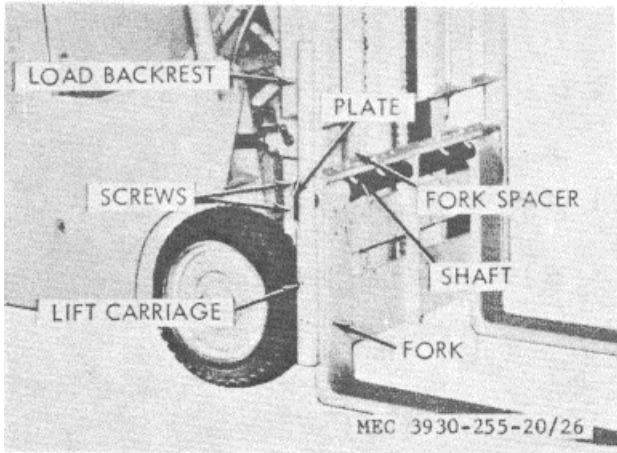


Figure 26. Fork removal.

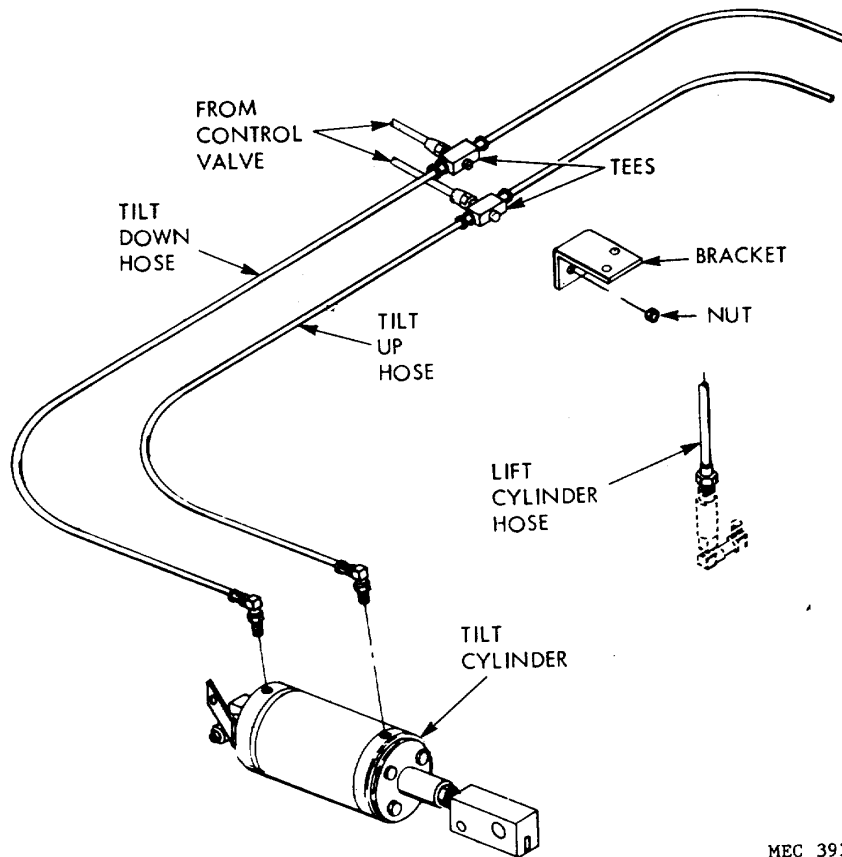
b. Installation. Reverse procedures in a above.

## 61. Tilt and Lift Cylinder Hoses

a. Removal.

**Note.** Cap or plug open hoses and ports to exclude dirt.

- (1) Remove floor plate (para 50).
- (2) Disconnect hose or hoses to be removed at control valve (fig. 23).
- (3) Disconnect tilt cylinder hoses from valve at tees in lines to tilt cylinders. If these hoses are to be removed, take them off of truck at this point.
- (4) Disconnect hoses at tilt cylinders. Remove nuts and washers holding tee fittings in tilt cylinder lines to bracket (fig. 27) and remove hoses from truck.
- (5) Disconnect lift cylinder hose at flow restrictor (fig. 27) and remove hose.



MEC 3930-255-20/27

Figure 27. Hose removal.

*b. Installation.* Reverse procedures in a above. Actuate lift and tilt systems for several cycles without load to bleed units of air.

## 62. Filter Cartridges

Two filters are used in the hydraulic system; one in suction line to pump, within the tank, the other in return line from control valve, at left rear of tank.

### *a. Suction Filter Cartridge Replacement.*

- (1) Remove four screws and washers (fig. 28) and lift off cover and gasket.
- (2) Lift out used cartridge and install new cartridge.
- (3) Reverse procedure in (1) above.

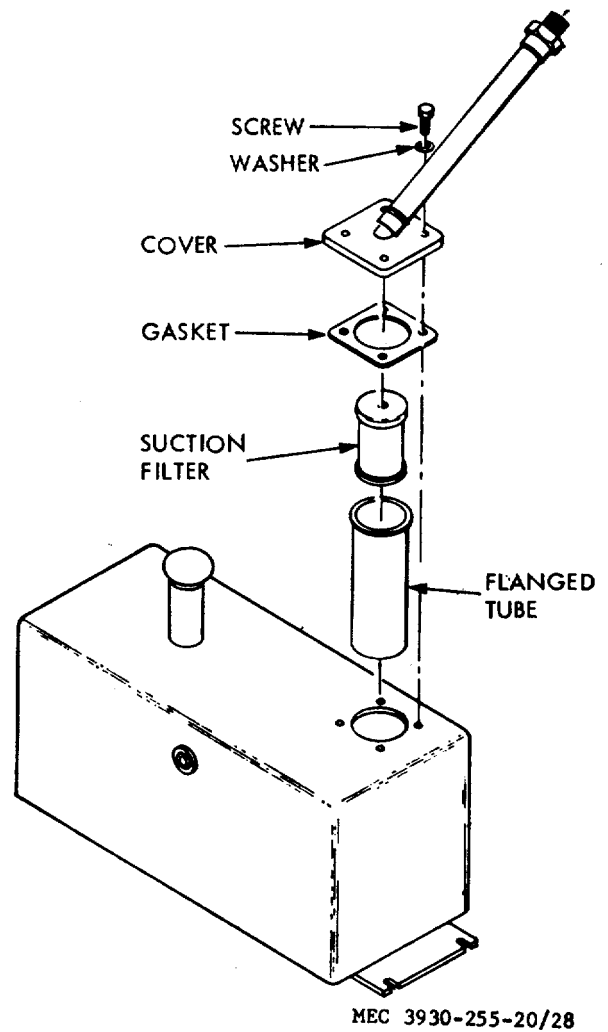
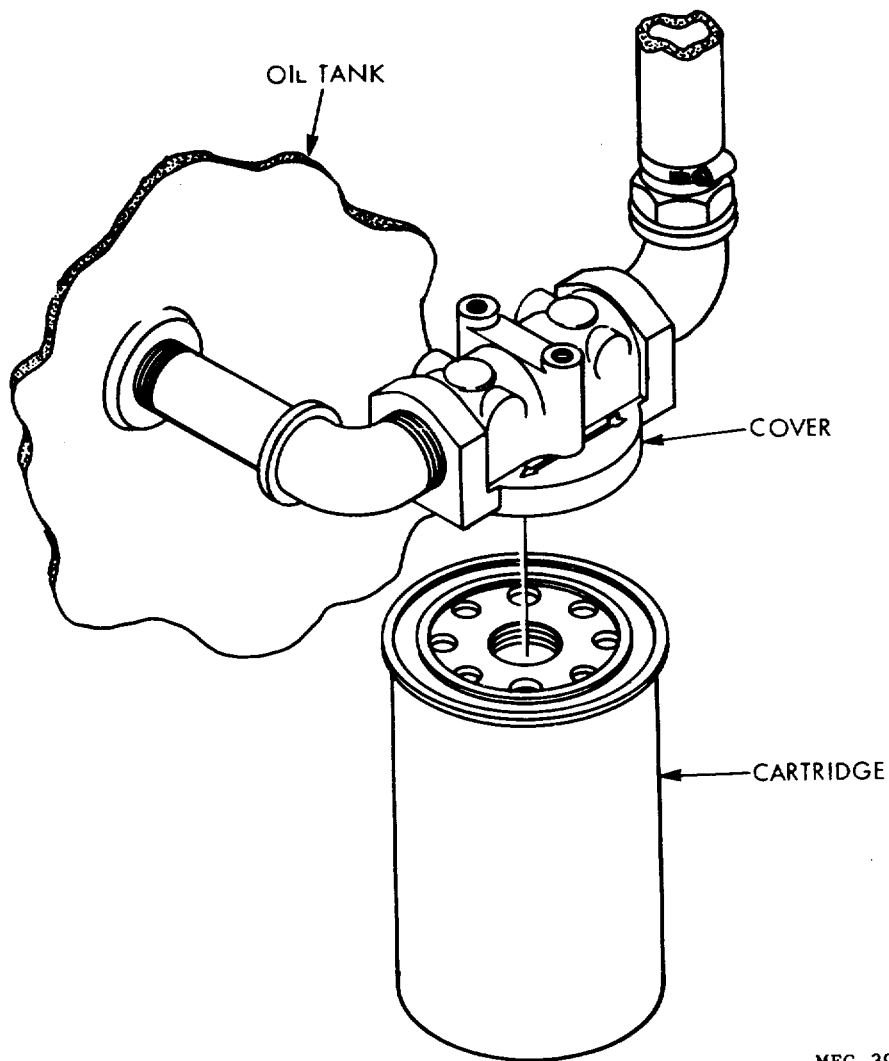


Figure 28. Suction filter.

### *b. Return Filter Cartridge Replacement.*

- (1) Turn cartridge (fig. 29) from filter cover by hand.
- (2) Install new cartridge by reversing procedure in (1) above.



MEC 3930-255-20/29

Figure 29. Return filter.

### 63. Oil Tank

Service according to LO 10-3930-255-20.

### 64. Oil Breather Cap

To clean, remove cap (fig. 28) by lifting it off, clean thoroughly with SD, and replace.

## Section XII. ELECTRIC MOTORS

### 65. General

This section contains instructions for the pump motor, power steering motor, and such other electrical items as are within the scope of organizational maintenance.

### 66. Pump Motor

#### a. Removal.

- (1) Remove floor plate (para 50).
- (2) Remove pump (para 53).

**Note.** Leave hoses connected to pump.

- (3) Disconnect wires at terminals (fig. 30), remove nuts and screws through strap holding motor. Remove screw and clamp (fig. 4) holding thermal relay to motor and remove thermal relay. Remove motor.

- (2) Note free running current draw of motor. Draw should not exceed 90 amperes at 36 volts. Motor should run freely and quietly.

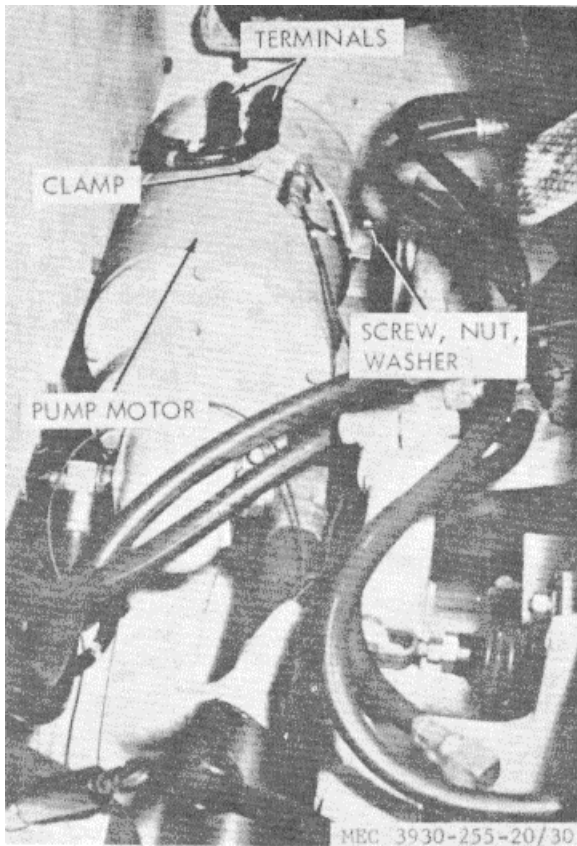
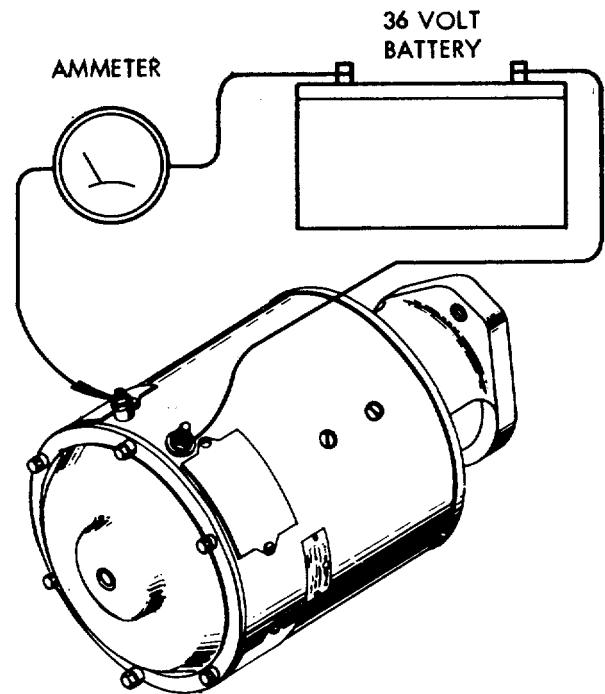


Figure 30. Pump motor.

*b. Test.*

- (1) With motor removed from truck (or while pump is removed from motor), make connections to motor, as shown in figure 31.

**Caution:** Hold motor securely against starting torque action.



MEC 3930-255-20/31

Figure 31. Motor test, organizational maintenance.

- c. Installation.* Reverse procedures in a above.

## 67. Master or Auxiliary Control Relay Repair

Organizational maintenance of these relays consists only of replacement of the contacts, when the silver has worn almost down to the steel support.

- a.* Remove cowl (para. 50a(1)), and remove twelve screws securing cover of electrical equipment box (fig. 4).

- b.* Remove contact to be replaced by removing nut (fig. 32) on that contact and lifting contact free of relay.

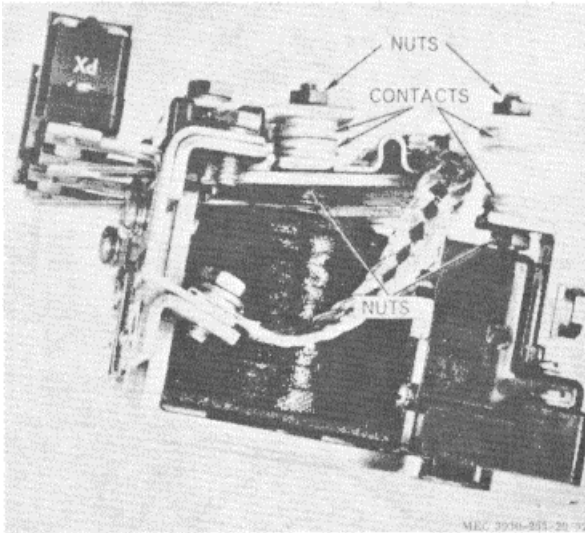


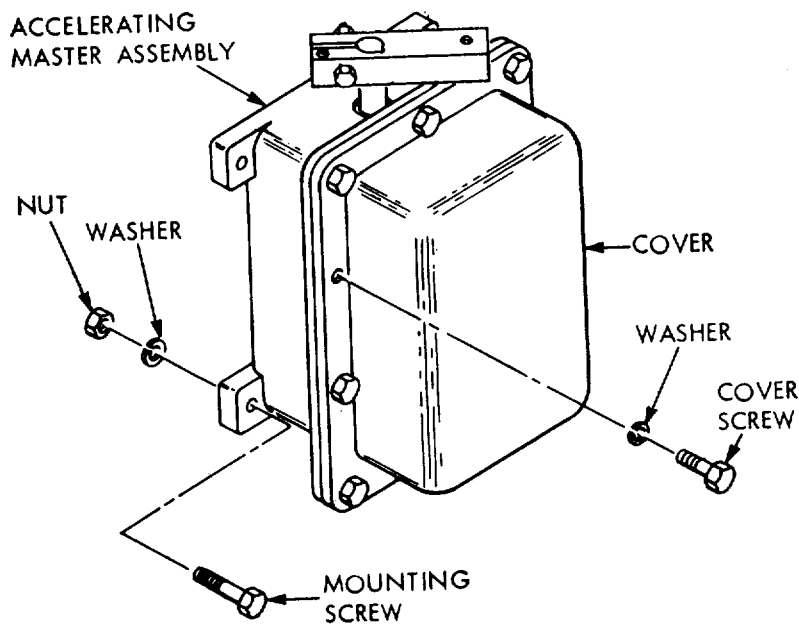
Figure 32. Contact replacement.

c. Install new contact by reversing procedures in a and b above.

### 68. Accelerator Master Assembly

#### a. Removal.

- (1) Disconnect linkage from operating lever (fig. 33), remove cover screws, and remove cover.
- (2) Disconnect leads inside housing at switch terminal screws (fig. 34). Carefully draw leads out through conduit fitting. Do not remove identification labels from leads.
- (3) Remove screws holding base of housing to truck and remove assembly.



MEC 3930-255-20/33

Figure 33. Accelerator master assembly, installed.

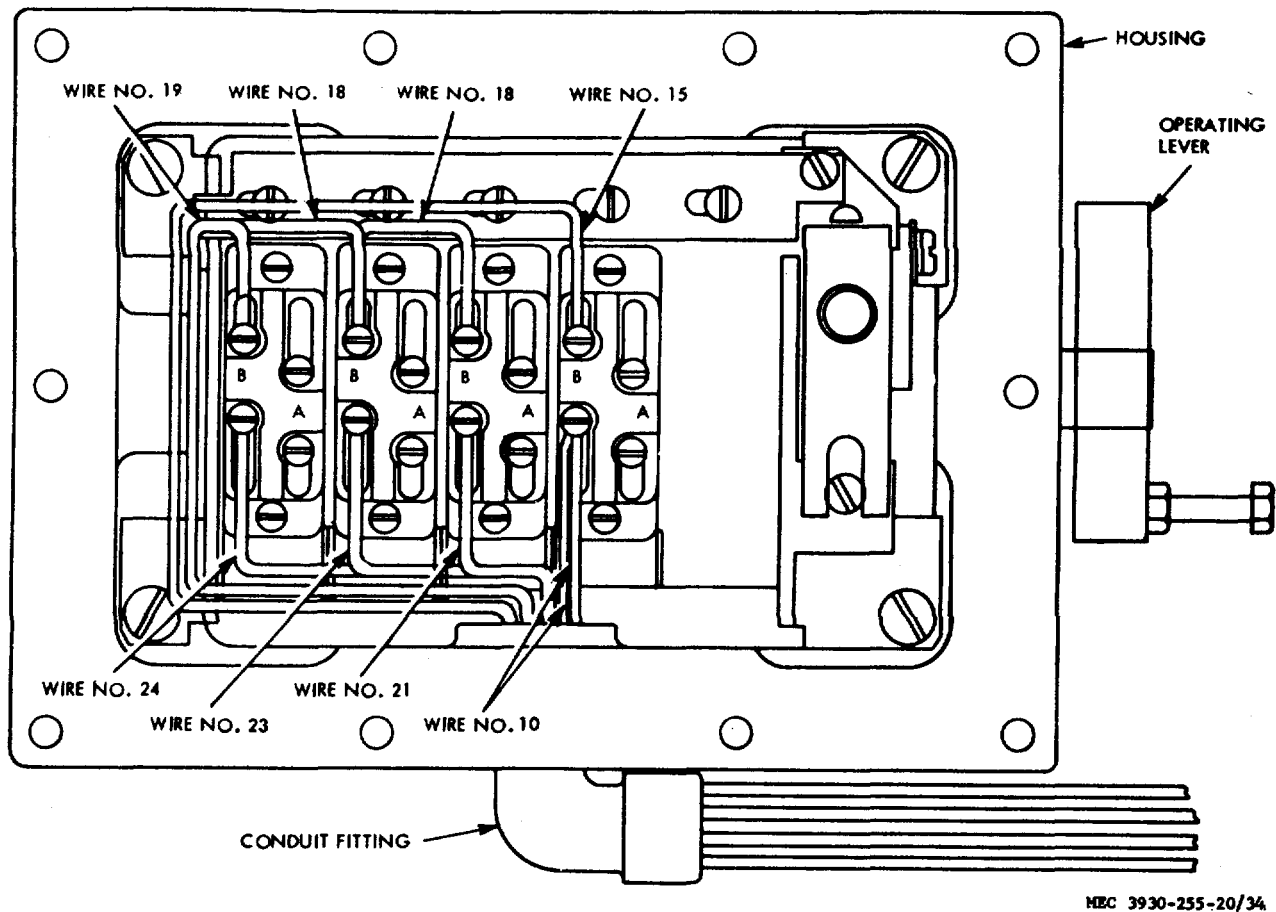


Figure 34. Accelerator master assembly, interior view.

*b. Repair.* The following procedure does not require removal of the assembly.

- (1) Remove truck floor plate (para 50).
- (2) Remove cover screws and cover (fig. 33).
- (3) Disconnect leads at switch to be replaced, remove switch hold-down screws, and remove switch.
- (4) Install new switch by reversing procedures in (1) to (3) above.

*c. Installation.* Reverse procedures in a above, dressing leads neatly, as shown in figure 34.

Connect leads according to the numbers, in the arrangement illustrated in figure 34.

## 69. Fusetrons

*a. Removal.*

- (1) Remove hood (para 50a(1)).
- (2) Remove screws and cover plate at top right end of electrical equipment box (fig. 4), to expose fusetrons and fuses (fig. 35).
- (3) Remove nuts at each end of fusetron to be replaced, and remove fusetron.

TAGO 8345A

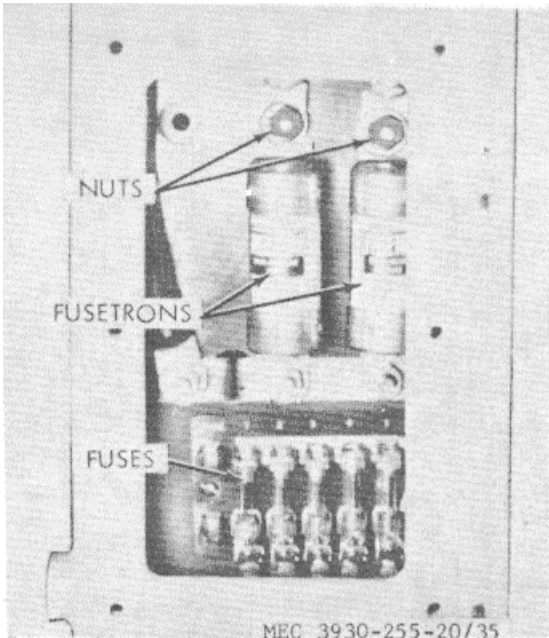


Figure 35. Fusetrons and fuses.

b. *Installation.* Reverse procedures in a above.

## 70. Fuses

a. *Removal.*

- (1) Refer to paragraph 69a (1) and (2).
- (2) Pull fuse to be replaced straight up from fuse holder.

b. *Installation.* Reverse procedures in a above.

## 71. Directional Control Switch

a. *Removal.*

- (1) Remove two cover screws and cover (fig. 36). Disconnect and tag leads inside control switch.
- (2) Disconnect conduit at fitting. Draw leads from control switch.
- (3) Remove four clamp screws, clamp, and control switch.

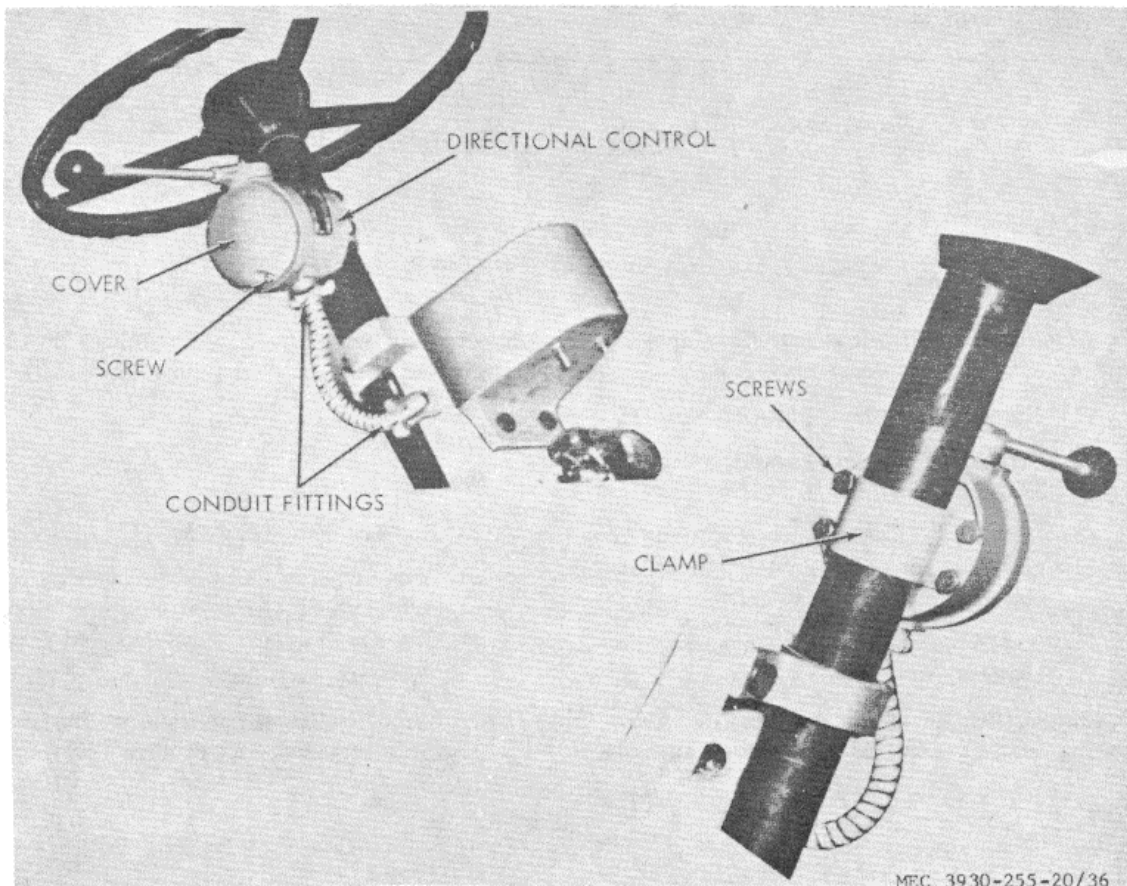


Figure 36 Directional control, right and left views.

b. *Installation.* Reverse procedures in a above, installing leads to terminals from which they were removed.

## 72. Pump Motor Switch

### a. Removal.

- (1) Remove cowl (para 50a(1)).
- (2) Disconnect leads at switch (fig. 23), loosen jamnut, and screw switch out of switch bracket.

b. *Installation.* Reverse procedures in a above, turning switch in to point where levers actuate it.

## 73. Speed Resistor

This is a two part unit with several taps.

### a. Test.

- (1) Disconnect and tag leads at resistor taps (fig. 37).
- (2) With ohmmeter, measure resistances between taps for values displayed in figure 38.

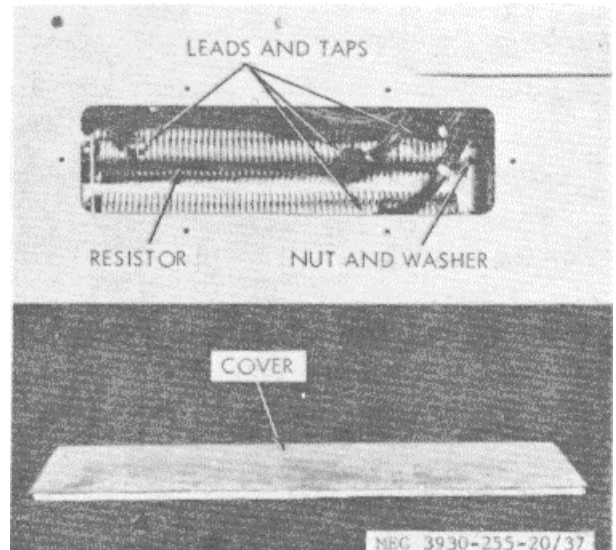
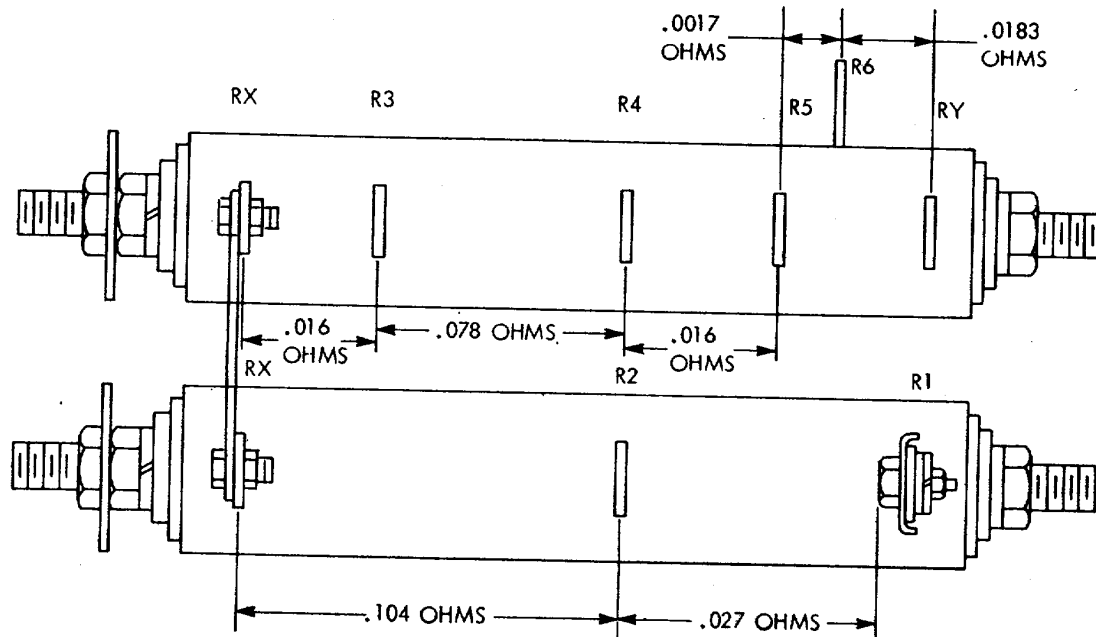


Figure 37. Speed resistors, installed.



MEC 3930-255-20/38

Figure 38. Speed resistor test values.



*b. Removal.*

- (1) Perform procedure in a(1) above.
- (2) Remove nuts and washers at end of resistor and lift resistor from truck.

*c. Installation.* Reverse procedures in b above.

- (2) Scrape sealing compound from relay terminals. Unsolder leads at terminals.

*b. Installation.* Reverse procedures in a above, soldering leads to terminals with rosin flux and solder. Avoid unnecessary heating of the relay while soldering. Coat terminals after soldering with silicone rubber sealing compound.

#### **74. Thermal Relay**

Each motor is protected by a thermal relay which will open the motor circuit if overheating occurs. When temperature sensed by the relay drops to a safe operating value, the relay will automatically close.

*a. Removal.*

- (1) Remove screw and clamp (fig. 4) which fastens relay to motor and lift relay from motor.

*c. Test.*

- (1) Test electrical continuity of relay between terminals with an ohmmeter or test light. Test at room temperature.
- (2) If controlled temperature is available, test opening temperature of relay. It should open on rising temperature at 224°F., plus or minus 4°.

TAGO 8845A

## CHAPTER 4

### SHIPMENT AND LIMITED STORAGE

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#### Section I. SHIPMENT WITHIN THE ZONE OF INTERIOR

##### 75. Preparation of Equipment for Shipment

*a. General.* Detailed instructions for the preparation for domestic shipment are outlined within this paragraph. Preservation will be accomplished in sequence that will not require the operation of previously preserved components.

*b. Inspection.* Equipment will be inspected for any unusual conditions such as damage, rusting, accumulation of water, and pilferage. Utilize the inspection criterion provided on the quarterly preventive maintenance services (para 14), to execute DA Form 2404 on the lift truck, as applicable.

*c. Cleaning and Drying.* Clean and dry the lift truck by an approved method. Approved methods of cleaning, drying, types of preservatives, and methods of application are described in TM 38-230.

*d. Painting.* Paint all surfaces where the paint has been removed or damaged. Refer to TM 9-213 for detailed cleaning and painting instructions.

*e. Sealing of Openings.* Openings that will permit direct entry of water into the interior of the electric motors will be sealed with pressure sensitive tape conforming to Specification PPP-T-60, type III, class 1.

*f. Hydraulic Control Systems, Except Hydraulic Brakes.*

- (1) Fully retract the lift and tilt pistons as far as the linkage will permit, and secure.
- (2) Coat exposed portions of the hydraulic piston rods and operating valve controls with type P-6 preservative conforming to Specification MIL-C-11796, class 3.
- (3) Wrap with type I, class 2, grade A, barrier material conforming to MIL-B-121B.

- (4) Secure the hydraulic operating valve controls in a neutral position.

*g. Exterior Surfaces.* Coat exposed machine ferrous metal surfaces with preservative (P-6) conforming to Specification MIL-C-11796, class 3. If preservative is not available, use automotive and artillery grease as specified on the lubrication order.

*h. Marking.* Marking will conform to MIL STD-129.

*i. Seat Backs and Cushions.* Wrap seat backs and cushions in a waterproof barrier material and seal the seams with type III, class 1, pressure-sensitive tape conforming to Specification PPP-T-60.

*j. Batteries and Cables.* The battery (if installed) will be dry and fully charged and secured in the battery compartment. Cables will be disconnected, ventholes sealed, and all terminals wrapped and secured with type III, class 1, pressure-sensitive tape conforming to Specification PPP-T-60.

*k. Disassembly, Disassembled Parts, and Basic Issue Items.*

- (1) Disassembly will be limited to the removal of parts and projecting components that tend to increase the overall profile of the equipment and that which is subject to pilferage.-
- (2) Disassembled items will be packed with the publications, in a suitable container and secured to the equipment to prevent loss or pilferage. Refer to TM 38-230 for selection and fabrication of containers.
- (3) Forks will be detached and securely strapped to the mast or other suitable part of the truck in such a manner as not to cause damage or increase the

TAGO 8345A

cube unnecessarily. Flat steel strapping not less than 11/ inch by 0.035 inch will be used.

#### **76. Loading Equipment for Shipment, Rail or Truck**

This paragraph outlines the requirements for loading and blocking truck. A flatcar is illustrated; however, if shipment is by truck or box-car, adapt these instructions to suit the carry-

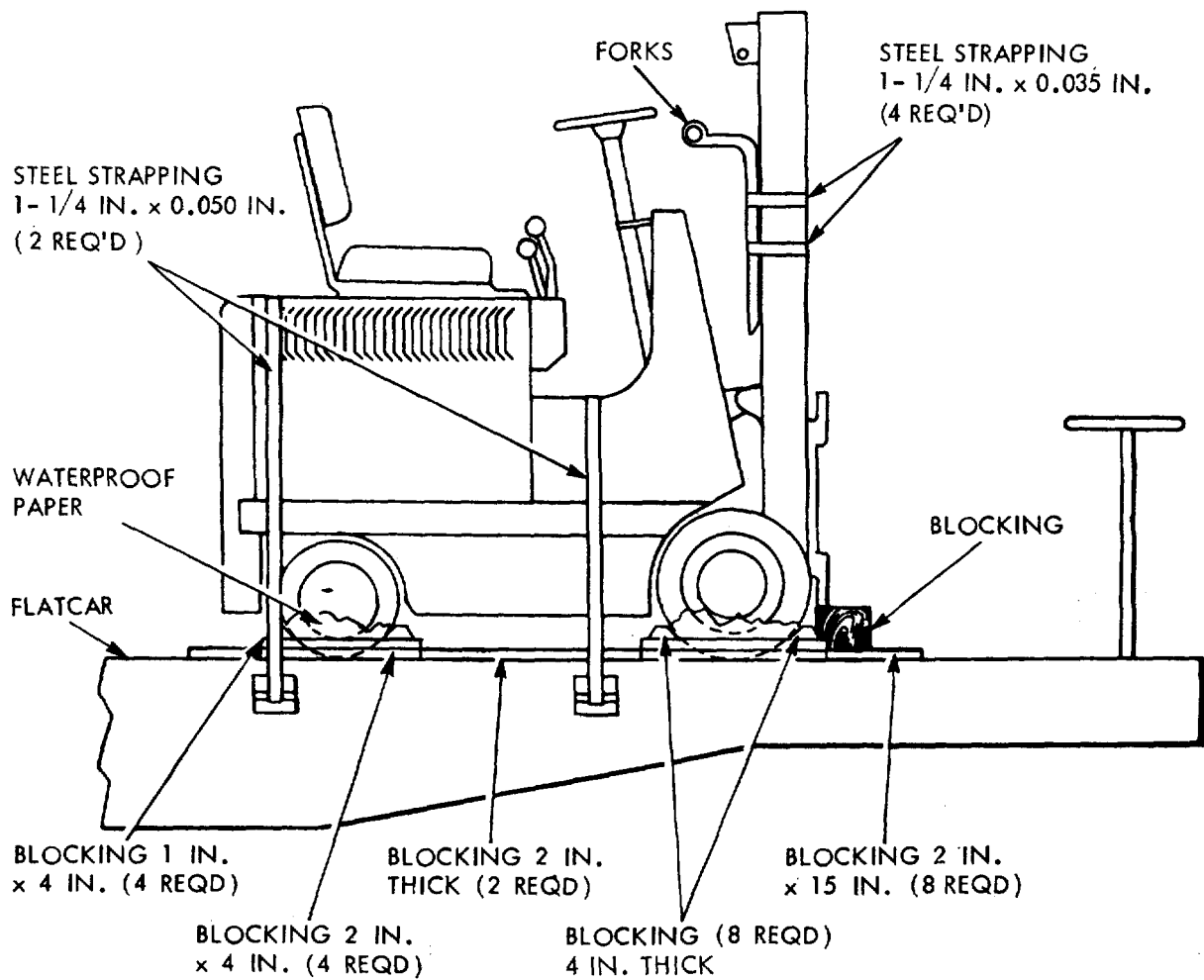
ing vehicle with no more than essential deviations.

##### *a. Loading.*

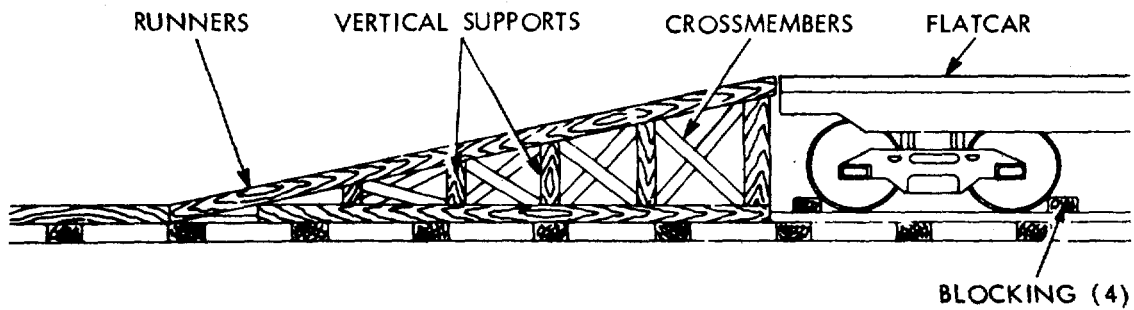
- (1) Lift truck onto flatcar with a hoist rated at 4 tons or greater, or
- (2) Construct a ramp as shown in figure 39 and drive or pull truck up ramp.

**Caution: Be very careful about tipping on ramp.**

TAGO 8345A



**A. BLOCKING, STRAPPING, AND TIEDOWN**



**B. LOADING RAMP**

MEC 3930-255-20/39

TAGO 8345A

Figure 39. Loading truck for shipment.

b. *Blocking.* Block, strap, and tie down truck as shown in figure 39.

## Section II. LIMITED STORAGE

### 77. Preparation of Equipment for Limited Storage

a. *General.* Detailed instructions for preserving and maintaining equipment in limited storage are outlined in this paragraph. Limited storage is defined as storage not to exceed 6 months. Refer to AR 743-505.

b. *Inspection.* Equipment will be inspected for any unusual conditions such as damage, rusting, accumulation of water, and pilferage. Utilize the inspection criterion provided on the quarterly preventive maintenance services (para 14) to execute DA Form 2404 on the lift truck, as applicable.

c. *Cleaning and Drying.* Clean and dry the lift truck by an approved method. Approved methods of cleaning, drying, types of preservatives, and methods of application are described in TM 38-230.

d. *Painting.* Paint all surfaces where paint has been removed or damaged. Refer to TM 9-213 for detailed cleaning and painting instructions.

e. *Sealing of Openings.* Openings that will permit direct entry of water into the interior of the electric motors will be sealed with pressure sensitive tape, conforming to Specification PPP-T-60, type III, class 1.

f. *Hydraulic Control Systems, Except Hydraulic Brakes.*

- (1) Fully retract the piston as far as the linkage will permit and secure.
- (2) Coat exposed portions of the hydraulic piston rods and operating valve controls with type P-6 preservative conforming to Specification MIL-C-11796, class 3.
- (3) Wrap with type I, class 2, grade A, barrier material conforming to Specification MIL-B-121B.

g. *Exterior Surfaces.* Coat exposed machine

ferrous metal surfaces with preservative (P-6) conforming to Specification MIL-C-11796, class 3..If preservative is not available, use automotive and artillery grease as specified 'on the lubrication order.

h. *Seat Backs and Cushions.* Wrap seat backs and cushions in a waterproof barrier material and seal the seams with type III, class 1, pressure-sensitive tape conforming to Specification PPP-T-60.

i. *Batteries and Cables.* The battery will be secured in the battery compartment. The battery will be filled and fully charged. Cables will be disconnected, ventholes sealed, and all terminals wrapped and secured with type III, class 1, pressure-sensitive tape conforming to Specification PPP-T-60.

j. *Disassembly, Disassembled Parts, and Basic Issue Items.*

- (1) Disassembly will be limited to the removal of parts and projecting components that tend to increase the overall profile of the equipment and that which is subject to pilferage.
- (2) Disassembled items will be packed with the publications in a suitable container and secured to the equipment to prevent loss or pilferage. Refer to TM 38-230 for selection and fabrication of containers.

k. *Weatherproofing.* Warehouse storage is preferred for the truck. If this is not available, select a firm, level, well-drained location. Place truck on heavy planking or other solid surface. Cover truck with tarpaulin or other waterproof material and tie down securely.

### 78. Inspection and Maintenance of Equipment in Storage

a. *Inspection.* When equipment has been placed in limited storage all scheduled preventive maintenance services, including inspection,

will be suspended and preventive maintenance inspection will be performed as specified herein. Refer to AR 743-505.

*b. Worksheet and Preventive Maintenance.* Applicable forms listed in TM 38-750 will be prepared for each major item of equipment every 90 days while in limited storage. Perform

required maintenance promptly to make sure equipment is mechanically sound and ready for immediate use.

*c. Operation.* Operate equipment in limited storage long enough to insure complete lubrication of all bearings, gears, and the like, every 90 days. Equipment must be serviced and in satisfactory condition before it is operated.

TAGO 8345A

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TAGO 8345A

## APPENDIX I

### REFERENCES

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AR 320-5	Dictionary of United States Army Terms
AR 320-50	Authorized Abbreviations and Brevity Codes
AR 700-58	Report of Damaged or Improper Shipment
AR 700-3900-5	Registration of Materials Handling Equipment and Special Purpose Vehicles
AR 746-5	Color and Marking of Army Materiel
AR 750-3900-1	Materials Handling Equipment
AR 750-5	Organization, Policies, and Responsibilities for Maintenance Operations
DA Pam 108-1	Index of Army Motion Pictures, Film Strips, Slides, Tapes, and Phono-Recordings
DA Pam 310-1	Military Publications: Index of Administrative Publications
DA Pam 310-2	Military Publications: Index of Blank Forms
DA Pam 310-3	Military Publications: Index of Doctrinal, Training, and Organizational Publications
DA Pam 310-4	Military Publications: Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 4, 6, 7, 8, and 9), Supply Bulletins, Supply Catalogs (type CL), Lubrication Orders, and Modification Work Orders
FM 21-5	Military Training Management
FM 21-6	Techniques of Military Instruction
FM 21-30	Military Symbols.
LO 10-3930-255-20	Lubrication Order; Truck, Lift, Fork, Electric, Solid Rubber Tires, 2000-Pound Capacity, Army Model MHE-197, Baker Model FTD-020-EE, Federal Stock Number 3930-724-4058 (100-in. lift), Federal Stock Number 3930-965-0075,(130 in. lift)
MIL-STD-162A	Preparation for Delivery of Warehouse Materials Handling Equipment for Domestic and Overseas Shipment and Storage
SB 5-111	Supply of DA Approved Fire Extinguishers to Army Troop Users
TM 10-3930-255-10	Operator's Manual; Truck, Lift. Fork, Electric, Solid Rubber Tires, 2000-Pound Capacity, Army Model MHE-197, Baker Model FTD-020-EE, Federal Stock Number 3930-724-4058 (100-in. lift), Federal Stock Number 3930-965-0075 (130-in. lift)
TM 10-3930-255-20P	Organizational Maintenance Repair Parts and Special Tools List; Truck, Lift, Fork, Electric, Solid Rubber Tires, 2000-Pound Capacity, Army Model MHE-197, Baker Model FTD-020-EE, Federal Stock Number 3930-724-4058 (100-in. lift), Federal Stock Number 3930-965-0075 (130-in. lift)
TM 10-1690A	Industrial Motive Power Storage Batteries for Materials Handling Equipment
TM 21-300	Driver Selection and Training (Wheeled Vehicles)
TM 38-230	Preservation, Packaging, and Packing of Military Supplies and Equipment
TM 38-750	Army Equipment Record Procedures
TM 5-764	Electric Motor and Generator Repair
TM 9-213	Painting Instructions for Field Use
TAGO 8345A	



## APPENDIX II

### MAINTENANCE ALLOCATION

---

#### Section I. INTRODUCTION

##### 1. General

This appendix contains the explanations of all the maintenance and repair functions authorized the various maintenance levels.

*a. Section II (Maintenance Allocation Chart)* designates overall responsibility for the performance of maintenance operations. The implementation of maintenance tasks upon the end item or component will be consistent with the assigned maintenance operations.

*b. Section III (Tool and Test Equipment Requirements)* contains a list of the special tools and special test equipment required for each maintenance operation as referenced from section II, Column K. This section cross-references a particular maintenance operation on the MAC when special tools and equipment are required to perform a specific maintenance task.

*c. Section IV (Remarks)* contains supplemental instructions, explanatory notes and/or illustrations required for a particular maintenance operation. This section is cross-referenced to the MAC (sec. II, col. L).

##### 2. Maintenance Operations

Maintenance is any action taken to keep material in a serviceable condition or to restore it to serviceability when it is unserviceable. Maintenance of material includes the following:

*a. Service.* Operations required periodically to keep the item in proper operating condition, i.e., to clean, preserve, drain, paint, and replenish fuel, lubricants, hydraulic, and deicing fluids, or compressed air supplies.

*b. Adjust.* Regulate periodically to prevent malfunction. Adjustments will be made commensurate with adjustment procedures and associated equipment specifications.

*c. Align.* Adjust two or more components of an electrical or mechanical system so that their

functions are properly synchronized or adjusted.

*d. Calibrate.* Determine, check, or rectify the graduation of an instrument, weapon, or weapons system, or components of a weapons system.

*e. Inspect.* Verify serviceability and detect incipient electrical or mechanical failure by close visual examination.

*f. Test.* Verify serviceability and detect incipient electrical or mechanical failure by measuring the mechanical or electrical characteristics of the item and comparing those characteristics with authorized standards. Tests will be made commensurate with test procedures and with calibrated tools and/or test equipment referenced on the MAC.

*g. Replace.* Substitute serviceable components, assemblies, and subassemblies for unserviceable counterparts or remove and install the same item when required for the performance of other maintenance operations.

*h. Repair.* Restore to a serviceable condition by replacing unserviceable parts or by any other action required using available tools, equipment, and skills to include welding, grinding, riveting, straightening, adjusting, and facing.

*i. Overhaul.* Restore an end item to completely serviceable condition as prescribed by serviceability standards developed and published by national maintenance points having maintenance responsibility for the item. This is accomplished through employment of the technique of "Inspection and repair only as necessary" (IROAN). Maximum use of diagnostic and test equipment is combined with minimum disassembly during overhaul, "overhaul" may be assigned to any level of maintenance except organizational, provided the time, tools, equipment, repair parts authorization,.

TAGO 8345A.

and technical skills are available at that level. Normally, overhaul as applied to end items, is limited to depot maintenance level.

j. **Rebuild.** Restore to a condition comparable to new, by disassembling to determine the condition of each component part and reassembly using serviceable, rebuilt, or new assemblies, subassemblies, and parts.

### 3. Explanations of Columns (Sec. II)

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

b. *Component Assembly Nomenclature.* This column contains the functional grouping index heading, subgroup heading, and a brief description of the part starting with the noun name.

c. *Essentiality.* The essentiality column reflects whether or not an assembly, or repair part, is combat essential to the tactical use of the end item. The letter "E" in this column, indicates the items are combat essential.

d. *Maintenance Operations and Maintenance Levels.* This column contains the various maintenance operations "A" through "J," service, adjust, etc. A symbol indicating the maintenance level placed in the appropriate column in line with an indicated maintenance operation authorizes that level to perform the function. The symbol indicates the lowest level of maintenance responsible for performing the function, but does not necessarily indicate repair parts stockage at that level. Higher levels of maintenance are authorized to perform the indicated functions of lower levels. The symbol designations for the various maintenance levels

are as follows:

O/C..... Operator or crew  
O ..... Organizational  
DS ..... Direct Support  
GS ..... General Support  
D..... Depot

e. *Reference Note.* This column is subdivided in two columns. Column "K" references the tool and test equipment requirements (T & TE) (Sec. III). Column "L" references the remarks (Sec. IV).

### 4. Explanation of Columns (Sec. 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 operation the item is to be used with. The letter is representative of columns "A" through "J" on the MAC.

b. *Maintenance Level.* 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.

### 5. Explanation of Columns (Sec. IV)

a. *Reference Code.* This column consists of two letters separated by a dash. The first letter references column "L." The second letter references a maintenance operation, column "A" through "J" on the MAC (sec. II).

b. *Remarks.* This column lists the remarks and other information pertinent to the operation being performed as indicated on the MAC (sec. II).

**Section II. MAINTENANCE ALLOCATION CHART**

Functional group No.	Component assembly nomenclature	Essentiality	Maintenance operations						and Maintenance levels					Note ref		
			A	B	C	D	E	F	G	H	I	J	K	L		
			Service	Adjust	Align	Calibrate	Inspect	Test	Replace	Repair	Overhaul	Rebuild	T&TE rgrmt	Remarks		
06	ELECTRICAL SYSTEM															
0607	Instrument panel															
	Hour meter .....	.....	.....	.....	.....	O/C	.....	O								
	Panel, instrument .....	.....	.....	.....	.....	.....	.....	O								
	Switch, light.....	.....	.....	.....	.....	.....	.....	O								
0608	Miscellaneous items															
	Receptacle battery .....	.....	.....	.....	.....	.....	.....	O								
	Switch, stoplight .....	.....	.....	.....	.....	O/C	.....	O								
0609	Lights															
	Lamps .....	.....	.....	.....	.....	.....	.....	O								
	Lights .....	.....	.....	.....	.....	.....	.....	O	O							
	Resistors, lights .....	.....	.....	.....	.....	.....	.....	O	O							
0611	Horn															
	Button, horn .....	.....	.....	.....	.....	.....	.....	O	O							A
	Horn assembly .....	.....	.....	.....	.....	.....	.....	O	O							
0612	Batteries															
	Battery, storage.....	.....	O/C	.....	.....	.....	.....	O	O							
	Cables, battery.....	.....	.....	.....	.....	.....	.....	.....	O							
0613	Hull or chassis wiring harness															
	Harness, wiring .....	.....	.....	.....	.....	.....	.....	.....	DS							
10	FRONT AXLE															
1000	Front axle assembly															
	Axle assembly, driving .....	.....	O	.....	.....	.....	.....	.....	DS	DS	GS					
1002	Differential															
	Differential assembly.....	.....	.....	.....	.....	.....	.....	.....	GS	GS						
11	REAR AXLE															
1100	Rear axle assembly															
	Axle assembly, steering .....	.....	.....	O	.....	.....	.....	.....	DS	DS						
1104	Steering															
	Arm, steering.....	.....	O/C	.....	.....	.....	.....	.....	DS							
	Axle, steering .....	.....	.....	.....	.....	.....	.....	.....	DS							
12	BRAKES															
1201	Handbrakes															
	Brakeshoe assembly, motor .....	.....	.....	.....	.....	.....	.....	.....	DS	DS						
	Cable, handbrake.....	.....	.....	.....	.....	.....	.....	.....	O							
	Control linkage .....	.....	.....	O	.....	.....	.....	.....	O							
	Drum, brake .....	.....	.....	.....	.....	.....	.....	.....	DS							
	Lever, handbrake .....	.....	.....	.....	.....	.....	.....	.....	O							
1202	Service brakes															
	Brake assembly .....	.....	.....	O	.....	.....	.....	.....	DS	DS						
	Shoe assembly .....	.....	.....	.....	.....	.....	.....	.....	DS							
1204	Hydraulic brake system															
	Master cylinder.....	.....	O	.....	.....	.....	.....	.....	O	DS	.....	.....	.....			B
	Tube assembly, metal.....	.....	.....	.....	.....	.....	.....	.....	O							
	Wheel, cylinder .....	.....	.....	.....	.....	.....	.....	.....	O	DS	.....	.....	.....			C
13	WHEELS															
1311	Wheel assembly															
	Bearing and seals, rear whee's....	.....	O	.....	.....	.....	.....	.....	O							
	Wheel assembly .....	.....	.....	.....	.....	.....	.....	.....	O							
1313	Tires															
	Tires, solid.....	.....	.....	.....	.....	.....	.....	.....	DS							
TAGO 8345A																

Functional group No.	Component assembly nomenclature	Essentiality	Maintenance operations						Maintenance levels				Note ref			
			A	B	C	D	E	F	G	H	I	J	K	L		
			Service	Adjust	Align	Calibrate	Inspect	Test	Replace	Repair	Overhaul	Rebuild	T&TE, rgmt	Remarks		
14	STEERING															
1401	Steering assembly															
	Bearing, bellcrank .....	.....	.....	.....	.....	.....	.....	.....	DS							
	Bellcrank .....	.....	.....	.....	.....	.....	.....	.....	DS							
	Drag, link.....	.....	.....	.....	.....	.....	.....	.....	DS							
	Rod assembly, tie .....	.....	.....	.....	.....	.....	.....	.....	DS							
	Steering gear assembly .....	.....	O	O	.....	.....	.....	.....	DS	DS						
	Wheel, steering .....	.....	.....	.....	.....	.....	.....	.....	O							
18	BODY, CAB, HOOD AND HULL															
1801	Body, cab, hood, hull assemblies															
	Covers.....	.....	.....	.....	.....	.....	.....	.....	O							
	Guards .....	.....	.....	.....	.....	.....	.....	.....	O							
1805	Floor															
	Plate, floor.....	.....	.....	.....	.....	.....	.....	.....	O							
1806	Seats															
	Seat assembly .....	.....	.....	.....	.....	.....	.....	.....	O	O						
24	HYDRAULIC LIFT COMPONENTS															
2401	Hydraulic pump															
	Pump, rotary, power driven, hydraulic .....	.....	.....	.....	.....	.....	.....	.....	O	DS						
2402	Hydraulic control valve															
	Valve, directional control .....	.....	.....	.....	.....	.....	.....	.....	DS	DS						
2403	Hydraulic control levers and linkage															
	Bracket, control valve.....	.....	.....	.....	.....	.....	.....	.....	O							
	Levers, control .....	.....	.....	.....	.....	.....	.....	.....	O							
2404	Hydraulic tilt cylinders															
	Cylinder assembly, tilt .....	.....	.....	.....	.....	.....	.....	.....	O	DS						
2405	Hydraulic mast column															
	Chain assembly .....	.....	.....	O	.....	.....	.....	.....	O	O						
	Crosshead.....	.....	.....	.....	.....	.....	.....	.....	DS	DS						
	Cylinder assembly, actuating, hoist.....	.....	.....	.....	.....	.....	.....	.....	DS	DS						
	Forks .....	.....	.....	.....	.....	.....	.....	.....	O							
	Roller assembly .....	.....	.....	.....	.....	.....	.....	.....	DS							
	Upright assembly, inner .....	.....	.....	.....	.....	.....	.....	.....	DS							
2406	Hydraulic lines and fittings .....															
	Cap, oil breather .....	.....	O/C	.....	.....	.....	.....	.....	O							
	Filter element .....	.....	.....	.....	.....	.....	.....	.....	O							
	Hoses assembly, rubber .....	.....	.....	.....	.....	.....	.....	.....	O							
	Tank, oil .....	.....	.....	.....	.....	.....	.....	.....	O							
	Valve, regulating .....	.....	.....	.....	.....	.....	.....	.....	O	O						
40	ELECTRIC MOTORS															
4000	Motor assembly															
	Motor assembly, travel.....	.....	.....	.....	.....	.....	.....	.....	DS	DS	DS	GS				
	Motor assembly, pump.....	.....	.....	.....	.....	.....	.....	.....	O	O	DS					
4001	Rotor assemblies															
	Armature, travel motor .....	.....	.....	.....	.....	.....	.....	.....	DS							
	Armature, pump motor .....	.....	.....	.....	.....	.....	.....	.....	DS							
	Stator assemblies															
	Winding, motor field .....	.....	.....	.....	.....	.....	.....	.....	DS							
4003	Brush holders															
	Brush, electrical contact.....	.....	.....	.....	.....	.....	.....	.....	DS							
TAGO 8345A																
				57												

Functional group No.	Component assembly nomenclature	Essentiality	Maintenance operations						Maintenance levels				Note ref			
			Service	Adjust	Align	Calibrate	Inspect	Test	Replace	Repair	Overhaul	Rebuild	T&TE rgmt	Remarks		
4005	Holder, electrical contact, brush .. Endbell .....	.....	.....	.....	.....	.....	.....	.....	DS							
4007	Frame supports and housings Bearing, ball annular, drive motors .....	.....	.....	.....	.....	.....	.....	.....	DS							
4010	Drive components Adapter assembly, gear reduction Master control assembly	.....	O/C	.....	.....	.....	.....	.....	DS	DS						
4011	Contact, relay .....	.....	.....	.....	.....	.....	.....	.....	DS							
	Control, interlock .....	.....	.....	.....	.....	.....	.....	.....	DS							
	Switch, sensitive .....	.....	.....	.....	.....	.....	.....	.....	DS							
4012	Fuse and fuse holder Fuse, cartridge .....	.....	.....	.....	.....	.....	.....	.....	O							
	Fuse holder .....	.....	.....	.....	.....	.....	.....	.....	DS							
	Link, fuse .....	.....	.....	.....	.....	.....	.....	.....	DS							
4014	Switches Lever, switch .....	.....	.....	.....	.....	.....	.....	.....	DS	DS						
	Switch, accelerator .....	.....	.....	.....	.....	.....	.....	.....	DS							
	Switch, directional control .....	.....	.....	.....	.....	.....	.....	.....	DS							
4015	Resistor Resistor, adjustable .....	.....	.....	DS	.....	.....	.....	.....	DS							
	Resistor, fixed .....	.....	.....	.....	.....	.....	.....	.....	DS							
4017	Relay Relay, armature .....	.....	.....	.....	.....	.....	.....	.....	DS							
4019	Rectifier Diode, rectifier .....	.....	.....	.....	.....	.....	.....	.....	DS							
	Radio interference suppression Strap, static drag .....	.....	.....	.....	.....	.....	.....	.....	DS							

### Section III. SPECIAL TOOL AND SPECIAL TEST EQUIPMENT REQUIREMENTS

Reference	Maintenance level	Nomenclature	Tool No.
		No special tools or equipment are required by organizational, direct, general support, and depot personnel for performing maintenance on the truck, lift, fork.	

### Section IV. REMARKS

Reference code	Remarks
A - H	Repair includes installing repair kit.
B - H	Repair includes installing repair kit.
C - H	Repair includes installing repair kit.

## INDEX

	Paragraph	Page
Accelerator master assembly .....	68	42
Battery .....	28	23
Battery box top and side covers .....	47, 48	31-32
Brake cable .....	36	25
Brake master cylinder .....	39	27
Brake rod .....	36	25
Brakeshoes:		
Adjustment .....	37	26
Replacement .....	38	27
Chain .....	59	37
Contact .....	67	41
Control relay .....	67	41
Control valve .....	54	34
Crosshead rollers .....	58	36
Data, tabulated .....	7	4
Description, truck and components .....	6	2
Directional control switch .....	71	44
Filter cartridge service .....	62	39
Fork .....	60	37
Fuse replacement .....	70	44
Fusetron replacement .....	69	43
Handbrake lever .....	35	24
Harness, wiring .....	29	23
Headlight .....	22	21
Horn .....	26	22
Horn button .....	27	22
Hoses, hydraulic .....	61	38
Hourmeter .....	18	20
Hydraulic hose .....	61	38
Hydraulic pump .....	53	33
Hydraulic pump motor .....	66	40
Lamp replacement .....	24	21
Lift and tilt control .....	54	34
Lubrication, general .....	11	7
Master cylinder (brake) .....	39	27
Preventive maintenance .....	13, 14	11-13
Pump motor .....	66	40
Pump switch .....	56	35
Relay .....	68	42
Return filter cartridge replacement .....	62	39
Seat assembly .....	51	33
Specifications .....	7	4
Speed resistor .....	73	45
Steer wheels .....	32	24
Steering gear lash .....	44a	30
Steering linkage .....	44b	31
Steering wheel .....	45	31
Stop and taillight .....	23	21
Stoplight switch .....	21	20
Suction filter cartridge replacement .....	62	39

TAGO 8345A

	<b>Paragraph</b>	<b>Page</b>
Tabulated data.....	7	4
Taillight resistor .....	25	22
Thermal relay.....	74	46
Tilt cylinder .....	57	36
Troubleshooting chart.....	16	13
Wheel replacement .....	41	29
Wheel bearings (rear only) .....	42	30
Wheel brake .....	37	26

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POE (2)	57-100

NG: State AG (3).

USAR: None.

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

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