

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

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TECHNICAL MANUAL  
OPERATOR AND ORGANIZATIONAL  
MAINTENANCE MANUAL  
FOR  
TRUCK, LIFT, FORK, EMD, SOLID RUBBER  
TIRED WHEELS, 4000LBS. CAPACITY  
144 AND 180 IN LIFT  
ARMY MODEL MHE 227  
ALLIS CHALMERS MODELS  
ACE40AEE144 AND ACE40AEE180  
NSN 3930-00-327-1603 (144 IN.)  
NSN 3930-00-327-1600 (180 IN.)

This copy is a reprint which includes current  
pages from Changes 1 and 2.

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HEADQUARTERS, DEPARTMENT OF THE ARMY

FEBRUARY 1975

## WARNING

When servicing battery, do not smoke or use flame in the vicinity. Batteries generate hydrogen, a highly explosive gas.

Do not use the same hydrometer to check specific gravity of nickel/ iron, nickel/ cadmium or lead acid batteries. Mixing of the slightest amounts of different electrolytes can damage the battery.

Make sure fire extinguisher (Class BC) is on the truck.

**USE EXTREME CARE WHEN HIGH TIERING:** Position elevated load, with slight back tilt of mast, directly over loading spot then tilt mast forward to stack.

Use caution when approaching doorways, aisles, intersections or other workers.

Always travel with mast tilted back and forks raised just high enough to clear any uneven floor conditions.

Avoid sudden starting and stopping. Reduce speed on turns. Know the rated capacity of the truck and do not overload it. Never pick up a load until certain it can be carried safely. Make sure the load is steady before lifting and keep the load against the carriage back rest.

When transporting bulky loads, travel in reverse. Always descend ramps in reverse when carrying load.

Do not butt loads with the forks or with the rear of the truck.

Make sure forks are lowered to the ground and parking brake is properly engaged.

If the truck is parked on an incline, set brakes and block at least two wheels in the event of parking brake failure.

Cleaning compound, solvent (Fed. Spec. P-D-680) is a potentially DANGEROUS CHEMICAL. Do not use near open flame.

By Order of the Secretary of the Army:

Official:

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

WILLIAM J. MEEHAN II  
*Brigadier General, United States Army*  
*The Adjutant General*

Distribution:

To be distributed in accordance with DA Form 12-25F (Block No. 2194), Operator maintenance requirements for Fork Lift, 4000 LB Capacity, Solid Tire, EMD (Model MHE 227).

CHANGE  
NO. 2

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
Washington, D.C., 22 December 1989

**Technical Manual  
Operator's and Organizational Maintenance Manual**

**TRUCK, LIFT, FORK, EMD, SOLID RUBBER  
TIRED WHEELS, 4000 LBS. CAPACITY  
144 AND 180 IN. LIFT  
ARMY MODEL MHE 227  
ALLIS-CHALMERS MODELS  
ACE40AEE144 AND ACE40AEE180  
NSN 3930-00-327-1603 (144 IN.)  
NSN 3930-00-327-1600 (180 IN.)**

TM 10-3930-631-12, 10 February 1975 is changed as follows:

1. The manual title is changed to read as shown above.
2. Remove old pages and insert new pages.
3. New or changed material is indicated by a vertical bar in the margin of the page and by a vertical bar adjacent to the TA number.

**Remove Pages**

*i and ii  
1-1 and 1-2  
4-15 and 4-16  
4-37 and 4-38  
4-51 and 4-52  
A-1/(A-2 Blank)  
B-1 through B-7  
I-1 and I-2*

**Insert Pages**

*i and ii  
1-1 and 1-2  
4-15 through 4-16  
4-37 and 4-38  
4-51 through 4-52  
A-1/(A-2 Blank)  
B-1 through B-11/(B-12 Blank)  
I-1 and I-2*

4. File this change sheet in front of the publication for reference purposes.

CHANGE }  
No. 1 }

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

**Operator and Organizational  
Maintenance Manual  
TRUCK, LIFT, FORK, END, SOLID RUBBER TIRES,  
4000 LB CAPACITY, 144 and 180  
IN. LIFT, ARMY MODEL MHE 227,  
ALLIS CHALMERS MODELS ACE40AEE144 and  
ACE40AEE180  
NSN 3930-00-327-1603 (144IN),  
3930-00-327-1600 (180 IN).**

TM 10-3930-631-12, 10 February 1975, is changes as follows.  
Page 4-4, paragraph 4-13. Add the following before paragraph 4-13.

**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:

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

Official:

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

Distribution:

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

TECHNICAL MANUAL }  
 No. 10-3930-631-12

HEADQUARTERS  
 DEPARTMENT OF THE ARMY  
 WASHINGTON, D. C, 10 February 1975

**OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL**

**TRUCK, LIFT, FORK, EMD, SOLID RUBBER  
 TIRED WHEELS, 4000 LBS. CAPACITY  
 144 AND 180 IN. LIFT  
 ARMY MODEL MHE 227  
 ALLIS-CHALMERS MODELS  
 ACE40AEE144 AND ACE40AEE180  
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## CHAPTER 1

## INTRODUCTION

## Section I. GENERAL

**1-1. Scope**

This manual is for your use in operating and maintaining the Allis-Chalmers Fork Lift Truck Models ACE40EE144 and ACE40AEE180. The manual provides information on operation and organizational maintenance of the equipment. Included in the manual are descriptions of the main units and their functions in relation to other components.

**1-2. Maintenance Forms and Records**

a. DA Form 2258, Depreservation Guide for Engineer Equipment.

b. DAForm1397, Processing and Deprocessing for Shipment, Storage and Issue of Vehicles and Spare Engines.

c. Maintenance forms and records that you are required to use are explained in DA Pam 738-750.

**1-3. Reporting Errors and Recommending Improvements**

You can help improve this manual. If you find any mistakes, or know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028

(Recommended Changes to Publications and Blank Forms), or DA Form 2028-2, located in the back of this manual, direct to: Commander, U.S. Army Tank-Automotive Command, ATTN: AMSTA-MB, Warren, MI 48397-5000. A reply will be furnished to you.

**1-4. Destruction of Material to Prevent Enemy Use**

Procedures to be used for destruction of equipment to prevent enemy use are defined in TM 750-244-6.

**1-5. Equipment Serviceability Criteria**

This equipment is not covered by an Equipment Serviceability Criteria.

**1-6. Administrative Storage**

Refer to TM 740-90-1 for instructions pertaining to administrative storage of the fork lift truck.

**1-7. Orientation**

Throughout this manual the terms right, left, front and rear with respect to the truck and components, are determined from the viewpoint of the operator sitting on the seat of the truck.

## Section II. DESCRIPTION AND DATA

**1-8. Description**

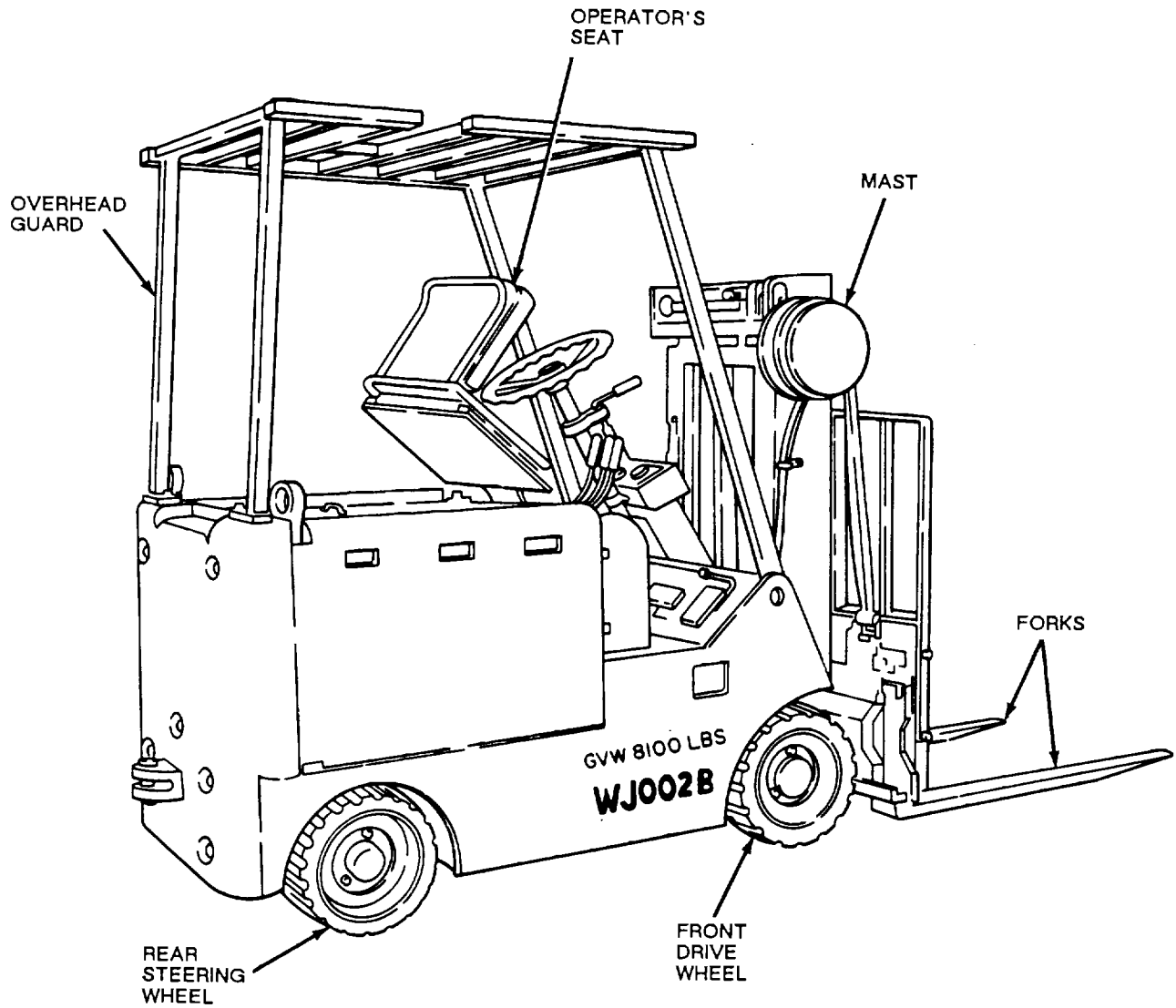
a. The Allis-Chalmers Models ACE40AEE144 and ACE40AEE180 Fork Lift Trucks are nontactical trucks (figs. 1-1 and 1-2) designed for warehouse operation.

The trucks can be used to load, transport, unload and stack loads weighing as much as 4, 000 pounds at a 24 inch load center. (The load center is measured from the heel of the fork).

Change 2 1-1

SHIPPING DIMENSIONS

OVERALL LENGTH	84.25 IN.
OVERALL HEIGHT	82.70 IN.
OVERALL WIDTH	40.00 IN.
SHIPPING CUBAGE	161.06 CU. FT.
SHIPPING WEIGHT:	
ACE40AEE144	7980 LBS.
ACE40AEE180	8110 LBS.



TA501859

Figure 1-1. Fork lift truck with shipping dimensions, right side view.

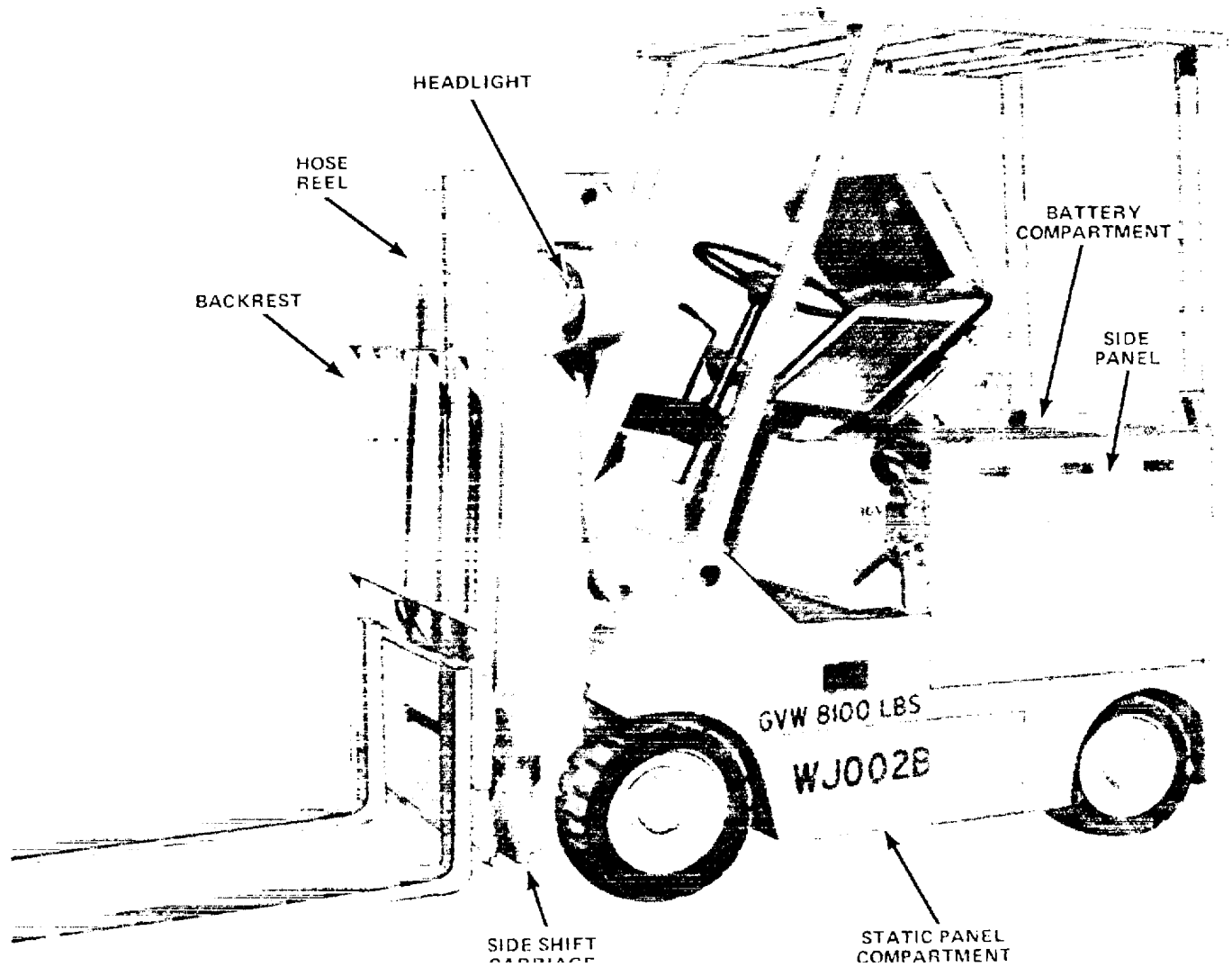


Figure 1-2. Fork lift truck, left side view

b. Loads weighing up to 4, 000 pounds as described above can be lifted to a height of 144 inches (ACE40AEE144 truck) or 180 inches (ACE40AEE180 truck)

c. The trucks are powered by 36 volt batteries. The battery furnishes current to electric motors to drive the truck and operate the hydraulic pumps

d. Hydraulic oil pressure for the lift cylinders and the tilt cylinders is supplied by a dual hydraulic pump. A separate hydraulic pump supplies pressure to operate the power steering.

**1-9. Tabulated Data**

a. *Lift Truck.*

Make ..... Allis-Chalmers

Models:

144 inch lift ..... ACE40AEE144-

180 inch lift ..... ACF40AEE 180

Army models:

144 inch lift ..... MHE 227

180 inch lift ..... MHE 227

b. *Capacities.*

Hydraulic system:

Full ..... 5.9 gal.

Useable ..... 5.0 gal

c. Dimensions and Weight.

Ground clearance (at mast center)..... 3 in.

Height:

With uprights extended:

ACE40AEE144 ..... 228.45 in.

ACE40AEE180 ..... 264.45 in.

With uprights retracted ..... 82.7 in.

Length:

Overall ..... 122.45 in.

Forks 40.00 in.

Forks spread (maximum) ..... 32.0 in.

Width ..... 40.0 in.

Weight (gross):

ACE40AEE144 ..... 7980 lbs.

ACE40AFEI80 ..... 8100 lbs.

**d. Performance.**

Aisle width (minimum):

Intersecting ..... 46.0 in.

Right angle stacking ..... 146.0 in.

Lift height (maximum):

ACE40AEE144 ..... **144** in.

ACE40AEE180 ..... 180 in.

Load capacity (maximum) ..... -4.000 lbs.

Maximum speed (empty):

Forward..... 4 mph (min.)

Reverse ..... 4 mph (min.)

Number of speeds:

Forward..... 1

Reverse ..... 1

Tilt limitations:

ACE40AEE144:

Backward..... 10 deg.

Forward ..... 3 deg.

ACE40AEE180:

Backward..... 6.5 deg.

Forward ..... 2 deg.

e. Tires.

Type ..... Solid

Number ..... 4

Size:

Drive ..... 17 X 7 X 12.13

Steer ..... 15 X 5 X 11.25

f. Battery.

Voltage ..... 36

Polarity ..... Positive to main  
..... fuse

Federal stock number:

Lead acid type ..... 6140-00-116-2946

Nickel iron type..... 6140-00-901-1055

g. Hydraulic System.

Pressure setting (at 2015 rpm):

Primary ..... 1500 psii

gpm ..... 9.5

Secondary ..... 1500 psi

gpm ..... 2.3

Steering Pump:

Pressure setting (at 2700 1000 psi rpm) .....

h. Wiring Diagram. Refer to figure 1-3 for the wiring diagram of the fork lift truck.

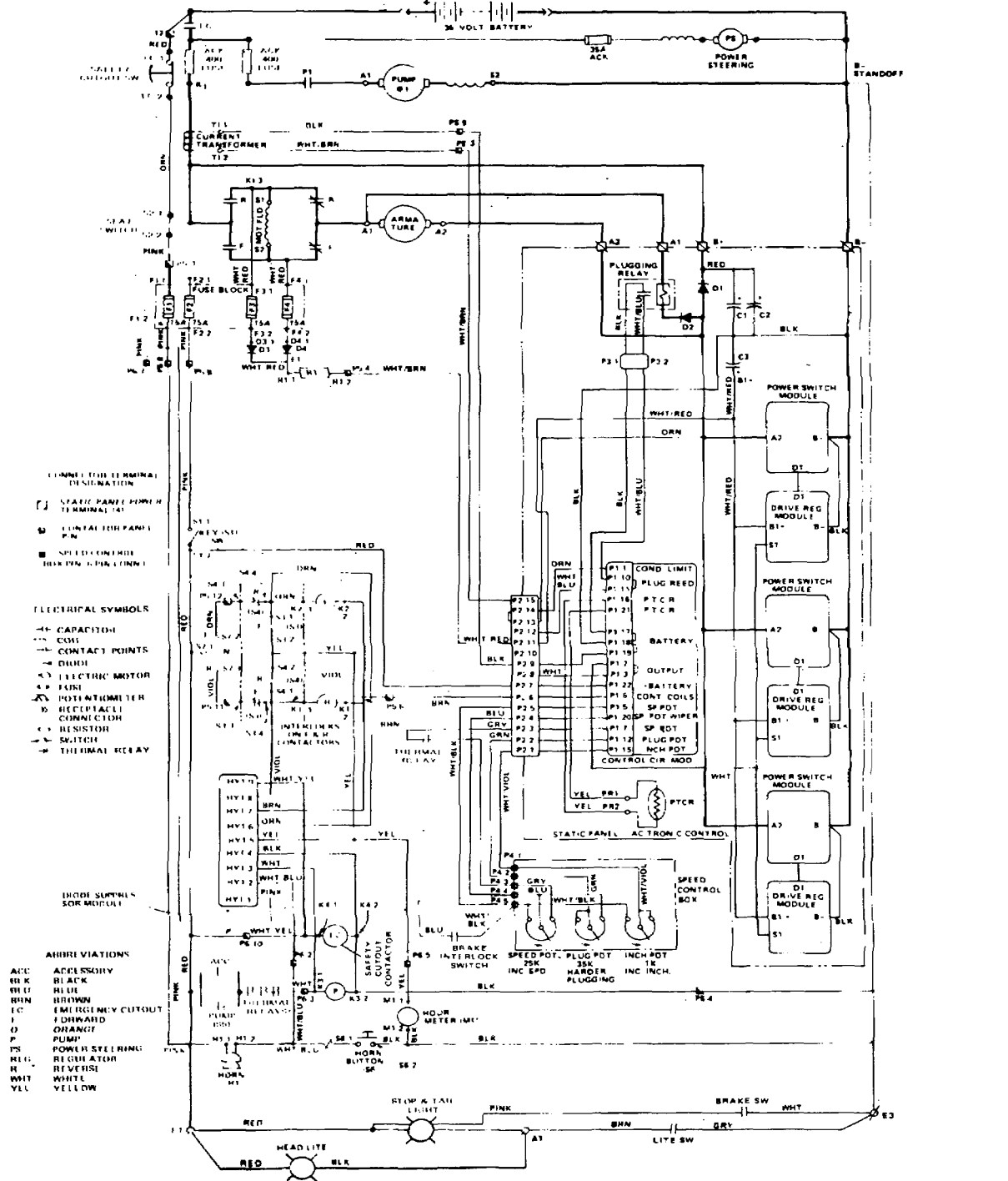


Figure 1-3. Wiring diagram.

i. *Data Plates.* The truck identification plate and shipping plate are mounted on the right front of the truck.

(1) The identification plate includes type of truck, type of tires and model number. Also included are the contract, serial and registration numbers, federal stock number and capacity.

(2) The shipping plate includes capacity of lift, shipping weight and wheel loading weights. It also shows the center of gravity and applicable heights and distances for the important parts of the truck.

#### **1-10. Differences in Models**

Two models of the fork lift truck are covered in this manual, AllisChalmers models ACE40AEE144 and ACE40AEE180. The only difference between the two is in the masts and lift cylinders. The ACE40AEE144 can lift 4, 000 (1812.0 kg) pounds to a height of 144 inches (3657.6 mm). The ACE40AEE180 can lift 4, 000 pounds, (1812.0 kg) to a height of 180 inches (4572.0 mm). All differences affecting maintenance of the trucks or components will be covered in the applicable paragraphs.

## CHAPTER 2 OPERATING INSTRUCTIONS

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### Section I. OPERATING PROCEDURES

#### **WARNING**

If equipment fails to operate refer to troubleshooting procedures in Chapter 3.

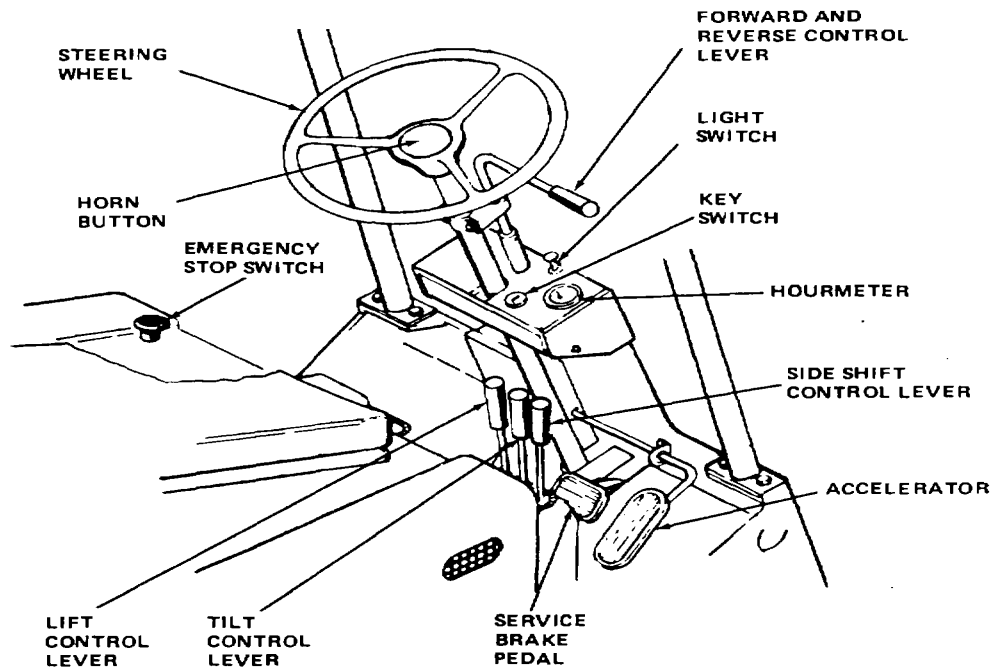
the operator, crew, or organizational maintenance personnel sufficient information to insure proper operation of the fork lift truck.

#### **2-2. Controls and Instruments**

Refer to figures 2-1 and 2-2 for the purpose, normal readings and location of all controls and instruments.

#### **2-1. General**

This section describes, locates, illustrates, and furnishes



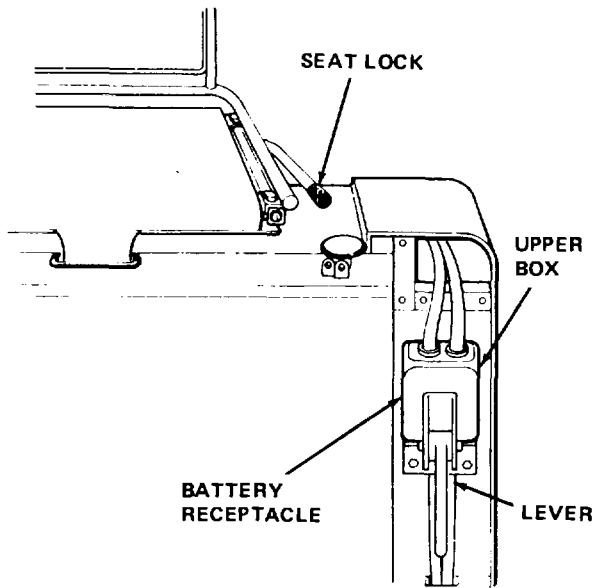
**CONTROLS**

1. HORN BUTTON - DEPRESS BUTTON TO SOUND HORN.
2. STEERING WHEEL - ROTATE WHEEL IN DIRECTION DESIRED TO TURN TRUCK.
3. FORWARD AND REVERSE CONTROL LEVER - MOVE LEVER UP TO "F" POSITION TO MOVE TRUCK FORWARD; MOVE LEVER DOWN TO "R" POSITION TO MOVE TRUCK TO REAR; POSITION LEVER IN "N" (NEUTRAL) POSITION TO PARK OR HALT OPERATION. LEVER SHOULD SNAP INTO EACH POSITION.
4. LIGHT SWITCH - PULL SWITCH OUT TO TURN ON LIGHTS.
5. KEY SWITCH - TURN KEY TO RIGHT TO ACTUATE CIRCUITS.
6. ACCELERATOR - DEPRESS PEDAL TO START TRUCK IN MOTION AND TO INCREASE SPEED; RELEASE TO DECREASE SPEED
7. SERVICE BRAKE PEDAL - DEPRESS PEDAL TO APPLY BRAKES AND STOP TRUCK.
8. SIDE SHIFT CONTROL LEVER - MOVE LEVER FORWARD TO SHIFT CARRIAGE TO LEFT; MOVE LEVER TO REAR TO SHIFT CARRIAGE TO RIGHT.
9. TILT CONTROL LEVER - MOVE LEVER FORWARD TO TILT MAST FORWARD; MOVE LEVER TO REAR TO TILT MAST BACKWARD.
10. LIFT CONTROL LEVER - MOVE LEVER FORWARD TO LIFT CARRIAGE; MOVE LEVER TO REAR TO LOWER CARRIAGE
11. EMERGENCY STOP SWITCH - DEPRESS SWITCH BUTTON TO HALT ALL ELECTRICAL OPERATION.

**INSTRUMENTS**

1. HOURMETER - OPERATES ONLY WHEN DRIVE OR HYDRAULIC PUMP MOTORS ARE ENERGIZED. RECORDS HOURS OF OPERATION.

*Figure 2-1. Controls and instruments.*



1. BATTERY RECEPTACLE--LIFT LEVER UP TO UNLOCK RECEPTACLE AND DISCONNECT BY SEPARATING BOXES.
2. SEAT LOCK--MOVE LOCK TO RIGHT TO RELEASE: MOVE SEAT FORWARD OR TO REAR AS REQUIRED. RELEASE LOCK TO LOCK SEAT IN POSITION.

Figure 2-2. Seat adjustment and battery receptacle.

### 2-3. Operation

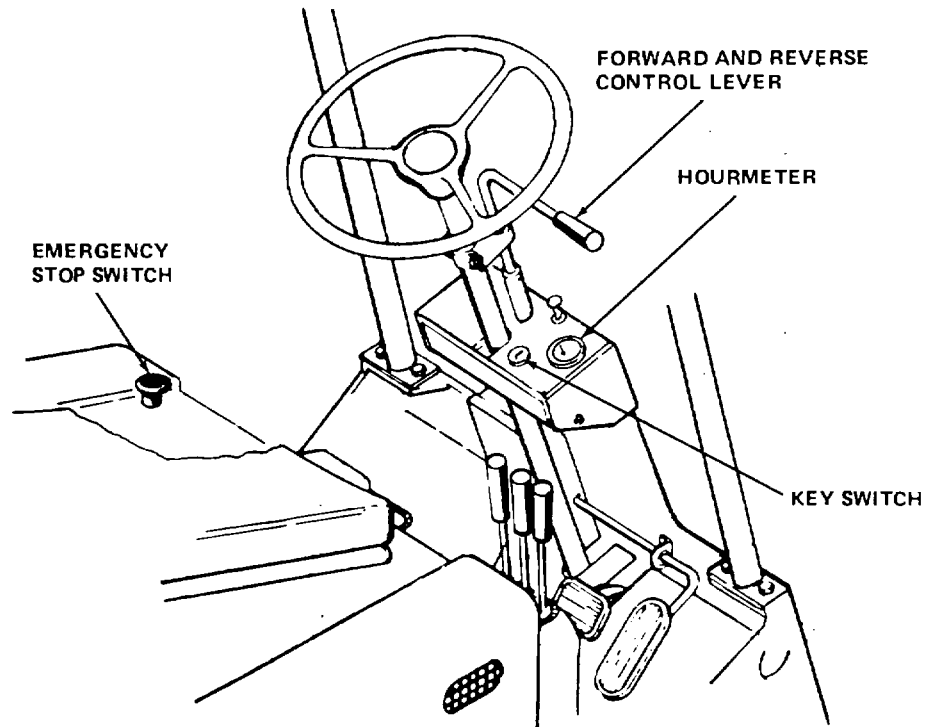
a. The instructions in this section are published for the information and guidance of personnel responsible for operation of the fork lift truck.

b. The operator must know how to perform every operation of which the fork lift truck is capable. The section gives instructions on starting and stopping the truck, operation of the truck and on coordinating the basic motions to perform the specific tasks for which the equipment is designed. Since nearly every job presents a different problem the operator may have to vary given procedures to fit the individual job.

### 2-4. Starting

a. *Preparation for Starting.* Perform the before operation services (para 3-4).

b. *Starting.* Refer to figure 2-3 and start the truck.

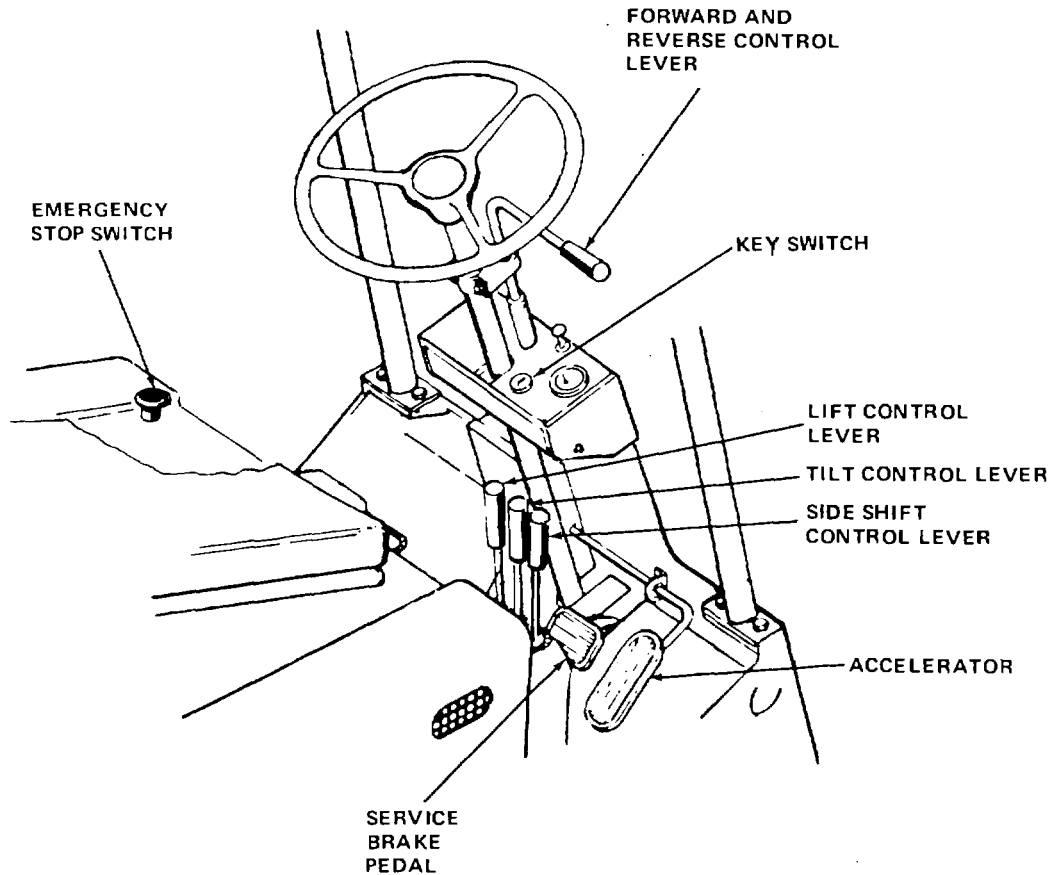


1. PLACE FORWARD AND REVERSE LEVER IN "N" (NEUTRAL POSITION).
2. TURN KEY SWITCH TO RIGHT TO CLOSE SWITCH AND ACTUATE CONTROL CIRCUITS.
3. TRUCK IS READY TO OPERATE.

*Figure 2-3. Starting the truck.*

## **2-5. Stopping**

- a. Refer to figure 2-4 and stop the truck.



- 1 RELEASE FOOT FROM ACCELERATOR
- 2 DEPRESS SERVICE BRAKE PEDAL GRADUALLY TO BRING TRUCK TO A SAFE SMOOTH STOP.
- 3 MOVE TILT CONTROL LEVER FORWARD TO PLACE MAST IN A VERTICAL POSITION.
- 4 MOVE SIDE SHIFT CONTROL LEVER TO CENTER CARRIAGE
- 5 MOVE LIFT CONTROL LEVER FORWARD AND LOWER CARRIAGE AND FORKS TO THE GROUND.
- 6 TURN KEY SWITCH TO THE LEFT TO "OFF" POSITION TO CUT OFF CONTROL CIRCUITS NOTE: TO STOP ALL ELECTRICAL OPERATIONS IN AN EMERGENCY, DEPRESS EMERGENCY STOP SWITCH.
- 7 PARKING BRAKE IS APPLIED WHEN SEAT IS EVACUATED.

Figure 2-4. Truck stopping instructions.

b. The brake is automatically set when the operator leaves the seat. A linkage connected to the seat sets the brake when weight is removed.

## 2-6. Operation of Equipment

The following paragraphs and illustrations describe truck operation under usual conditions.

## 2-7. Moving the Truck

- a. Refer to paragraph 2-4 and start the truck.
- b. Raise forks slightly to clear ground by pulling lift control lever (fig. 2-1) to rear.
- c. Place forward and reverse lever (fig. 2-1) in F for forward movement or R for reverse movement.
- d. Depress accelerator (fig. 2-1) to increase motor speed and move truck. Control speed of travel with pressure on accelerator.

**WARNING**

Use caution when approaching doorways, aisles, intersections or other workers.

e. Control direction of movement by turning steering wheel (fig. 2-1) to guide truck.

**CAUTION**

Avoid sudden stopping and starting.  
Reduce speed on turns.

f. To change direction of travel, release accelerator and depress brake pedal (fig. 2-1) to halt movement. After truck comes to a complete stop, move forward and reverse lever to direction desired (F for forward; R for reverse). Depress accelerator to increase

motor speed and move truck.

g. After completing movement and with truck parked, refer to paragraph 2-5 to stop truck. Park truck on level surface if possible. If necessary to park truck on an incline, block at least two wheels in event of parking brake failure.

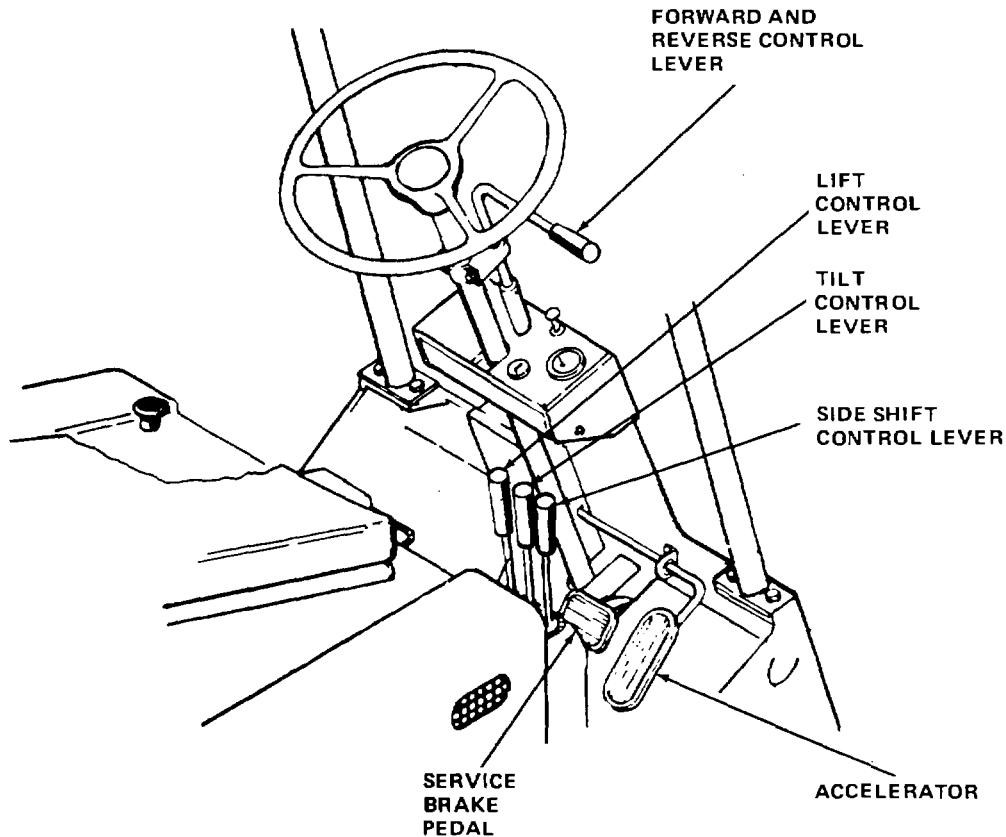
**CAUTION**

Make sure forks are lowered to the ground.

**2-8. Lifting and Transporting a Load.**

a. Refer to paragraph 2-7 and move the truck to the vicinity of the load.

b. As truck nears load, bring truck to a halt and raise or lower forks to position them under a load. Refer to figure 2-5 for lifting operations.



1. BRING TRUCK TO A HALT.
2. RAISE OR LOWER FORKS, USING LIFT CONTROL LEVER TO BRING FORKS IN LINE WITH THE LOAD.
3. USE SIDE SHIFT IF NECESSARY TO CENTER FORKS UNDER LOAD.
4. PULL LIFT CONTROL LEVER TO REAR TO RAISE FORKS AND LOAD TO CLEAR GROUND OR STACK.
5. TILT MAST TO REAR BY PULLING TILT CONTROL LEVER TO REAR TO SAFELY TRANSPORT LOAD.
6. RAISE OR LOWER LOAD AS NECESSARY, USING LIFT CONTROL LEVER.

Figure 2-5. Lifting operation.

c. If load is on a pallet, center forks between upper and lower members of pallet. With the mast in vertical position, move truck forward (para 2-7), using accelerator, until load rests against rear of forks. Shift carriage, if necessary.

**CAUTION**

Know the rated capacity of the truck. Do not overload it. Never pick up a load until certain it can be carried safely. Make sure the load is steady before lifting and keep the load against the carriage backrest.

d. Raise forks (fig. 2-5) enough to clear stack or floor below the load. Tilt back by pulling tilt control lever (fig. 2-5) to rear. Mast must be tilted far enough to rear to travel safely with load.

e. Place forward and reverse control lever in reverse and move truck and load to rear to clear stack or other obstacle. Turn truck to face in direction of travel required. If load is raised, lower load to assure clear vision forward. If load is bulky and obstructs vision it may be required to travel in reverse to enable operator to see.

**CAUTION**

When transporting bulky loads, travel in reverse. Always descend ramps in reverse when carrying load.

- f. Obey speed limits and drive carefully.

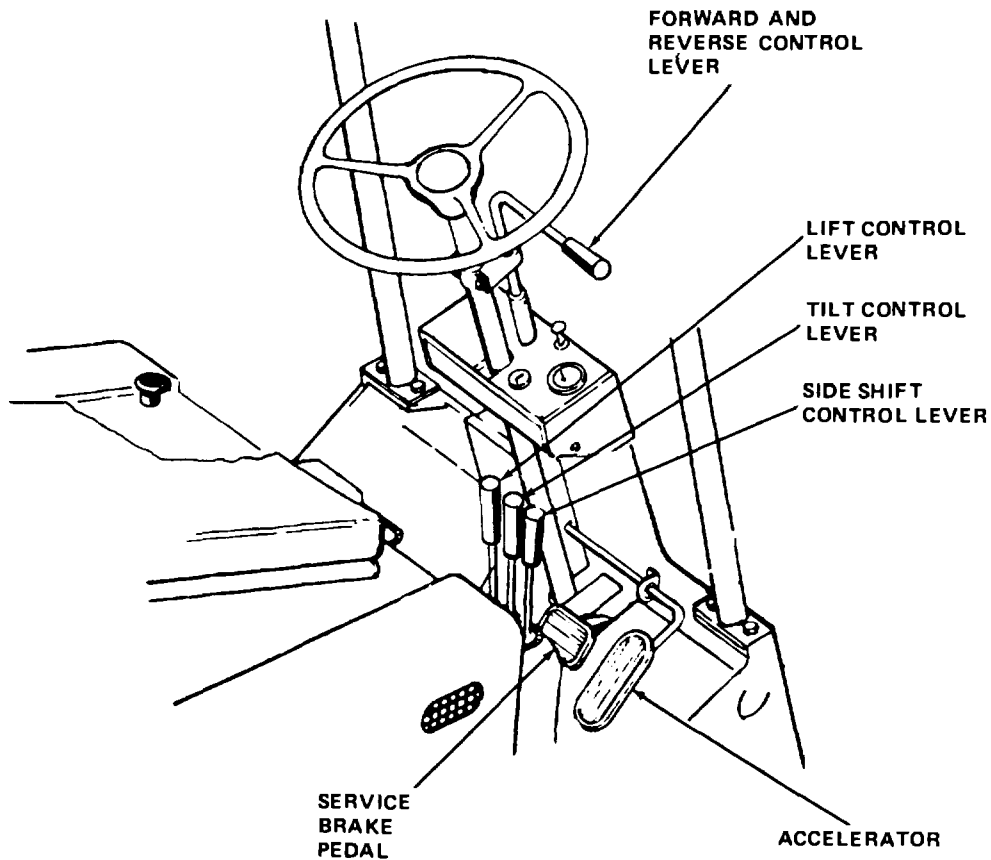
**WARNING**

Always travel with the load tilted back

and forks raised just high enough to clear any uneven floor conditions.

**2-9. Depositing the Load**

- a. Move truck with load to place where load is to be deposited. Refer to figure 2-5 to raise or figure 2-6 to lower load and move truck as necessary to bring it in line with top of stack or ground.



1. MOVE TRUCK INTO POSITION WITH ACCELERATOR TO BRING FORKS AND LOAD OVER PLACE TO DEPOSIT LOAD.
2. HALT TRUCK WITH SERVICE BRAKE PEDAL. MOVE FORWARD AND- REVERSE CONTROL LEVER TO "N" (NEUTRAL POSITION).
3. MOVE LIFT CONTROL LEVER FORWARD TO GRADUALLY LOWER LOAD. MOVE TILT CONTROL LEVER FORWARD TO BRING MAST TO A VERTICAL POSITION. MOVE SIDE SHIFT CONTROL LEVER AS NECESSARY TO CENTER LOAD.
4. LOWER LOAD INTO POSITION.
5. PLACE FORWARD AND REVERSE LEVER IN "R" (REVERSE) POSITION. DEPRESS ACCELERATOR AND MOVE TRUCK AWAY FROM LOAD.

*Figure 2-6. Lowering operation.*

- b. Move tilt control lever forward to align forks horizontally with stack or ground.
- c. Refer to figure 2-6 and lower load into desired position.

- d. Refer to paragraph 2-7 and move truck away from load and return for further loading operations or parking place. Parking brake is set when weight is removed from operator's seat.

## Section II. OPERATION UNDER UNUSUAL CONDITIONS

### 2-10. General

Although the truck is designed primarily for warehouse operations, the truck could be operated under unusual conditions as described in the following paragraphs. When operating under these conditions, extra care must be provided to maintain the truck in good operating condition. To operate under these conditions certain additional services must be performed and certain regular maintenance procedures may be required more often.

### 2-11. Operation in Extreme Heat

- a. Check battery electrolyte level more often. Maintain level 5/8-inch above the plates.
- b. Check specific gravity of battery more often.
- c. Clean battery cables frequently.
- d. If thermal relays cut out electric motors due to overheating, allow truck to cool. Relays will automatically reset and allow operation to resume.

### 2-12. Operation in Extreme Cold

- a. *Protection.* The truck should be stored in a heated building or shelter if possible. If a shelter is not available, park the truck with the front end facing into the wind and cover with a tarpaulin. Fasten tarpaulin securely to prevent it from blowing away.

### b. *Electrical System.*

- (1) Check specific gravity of battery more often.
- (2) Do not add water to the battery unless the truck is going to be operated immediately or charging is to be performed.
- (3) Keep battery charged as much as possible to insure proper operation and prevent freezing at low temperatures.

### 2-13. Operation in Sandy or Dusty Areas

- a. Remove all sand from axles, wheels, steering spindles and brake assemblies periodically. Check all parts often to prevent undue wear caused by sand.
- b. Protect lift and tilt mechanism from entrance of sand. Cover exposed parts of lift, side shift and tilt cylinder rods, lift chains and reservoir during sand storms.

### 2-14. Operation in Damp Tropical Areas

- a. Check all paint for chipping and scratching. Corrosive action from dampness will take place almost immediately if bare metal is exposed.
- b. Touch up all spots where paint is chipped or scratched.

## CHAPTER 3

OPERATOR/ CREW MAINTENANCE INSTRUCTIONS

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## Section I. LUBRICATION

**3-1. General Lubrication Information**

a. These paragraphs contain general lubrication instructions and lubrication instructions which are supplemental to and not specifically covered in, the lubrication order.

b. Refer to DA PAM 310-4 for the current lubrication order.

**3-2. Detailed Lubrication Information**

a. *General.* Keep all lubricants in sealed containers and stored in a clean dry place away from external heat. Allow no dust, dirt or other foreign material to mix with the lubricants. Keep all lubrication equipment clean and ready to use.

b. *Cleaning.* Keep all external parts not requiring lubrication clean of lubricants. Before lubricating the equipment, wipe all lubrication points free of dirt and grease. Clean all lubrication points after lubricating to prevent accumulation of foreign matter.

c. *Points of Lubrication.* Service the points of lubrication at the proper intervals as illustrated on current lubrication order.

d. *Operation Immediately After Lubrication.* Operate the truck through all movements for 5 minutes immediately after lubrication. Inspect filters and lines for evidence of leakage.

## Section II. PREVENTIVE MAINTENANCE

**3-3. General**

To insure that the fork lift truck is ready to operate at all times, it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance checks and services to be performed by the operator are listed and described in paragraph 3-4. The item numbers indicate the sequence of minimum inspection requirements. Defects discovered during operation of the unit will be noted for future correction, to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noted during operation which would damage the equipment if operation were continued. All deficiencies and shortcomings will be recorded together with the corrective action taken on DA Form 2404 at the earliest

possible opportunity.

**3-4. Preventive Maintenance Checks and Services**

a. This paragraph contains a tabular listing of preventive maintenance services which must be performed by the operator at the indicated intervals.

b. Table 3-1 lists preventive maintenance services in item numbers listed consecutively and indicate the sequence of minimum requirements. The intervals are listed under services to be performed by the operator. Columns indicate the item to be inspected, the procedure, and the paragraph reference in this manual where the procedure is described. When operational checks are to be made, operator must be seated on seat and seat depressed to operate electrical circuits.

Table 3-1. Operator Crew Preventive Maintenance Checks and Services.

B-Before Operation Time required --.5			D-During Operation Tim required--.9	A—After Operation Time required--.4
Interval and Sequence No.			ITEM TO BE INSPECTED PROCEDURE	Work Time (M H)
B	D	A		
			<b>NOTE</b>	
			Visually inspect for evidence of lubricant leaks concurrently with daily service checks.	
			<b>TIRES</b>	
			<b>Remove</b> imbedded material, check for gouges and other damage (para 3-11)0.2	
2			<b>HORN</b>	
			Check horn for operation (para 2-2)	0.1
3			<b>LIGHTS</b>	
			Check lights for proper operation (para 2-2)	0.1
4			<b>FIRE EXTINGUISHER</b>	
			Inspect for broken seal and correct pressure	0.1
			<b>INSTRUMENTS</b>	
			Check that all instruments indicate within required ranges (para 2-2)	0.2
2			<b>CONTROLS</b>	
			Check that all controls perform as required (para 2-2)	0.3
3			<b>BRAKES</b>	
			Check parking brake and service brakes to assure safe operation (para 2-2)	0.2
4			<b>UNUSUAL NOISES AND VIBRATION</b>	
			Listen for unusual noises and check for excessive vibration. If present, shut off truck and report to organizational maintenance.	0.2
		1	<b>BATTERY</b>	
			Check electrolyte level. Fill to 5/8 inch above plates. Charge e at regular rate (para 3-8)	0.4
<b>Section III. TROUBLESHOOTING</b>				

**3-5. General**

a. This section contains troubleshooting information for locating and correcting most of the operating troubles which may develop in the fork lift truck. Each malfunction for an individual component, unit or system is followed by a list of tests or inspections which will help you to determine probable causes and corrective actions to take. You should perform the tests/inspections and corrective actions in the order

listed.

b. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not correctly listed by corrective actions, notify your supervisor.

**3-6. Troubleshooting Chart**

Malfunctions which may occur are listed in Table 3-2. Each malfunction stated is followed by a list of tests and inspections with the recommended corrective action.

Table 3-2. Troubleshooting

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
1: TRUCK DOES NOT MOVE WHEN ACCELERATOR IS DEPRESSED.		
	Step 1. Check control sequencing procedure.	Perform correct sequence.
	Step 2. Check to see if emergency stop switch is depressed.	If stop switch is depressed, reset switch.
	Step 3. Check for properly connected battery receptacle.	Connect battery receptacle.
	Step 4. Check battery charge.	Charge battery if necessary.

**MALFUNCTION****TEST OR INSPECTION****CORRECTIVE ACTION**

- 
- 2 TILT, LIFT OR SIDE SHIFT MECHANISM DOES NOT OPERATE WHEN LEVERS ARE ACTUATED.
- Step 1. Check to see if emergency stop switch is depressed
    - Reset stop switch if necessary
  - Step 2. Check for properly connected battery receptacle.
    - Connect battery receptacle.
  - Step 3. Check battery charge.
    - Charge battery if necessary.
  - Step 4. Check hydraulic oil level.
    - Fill hydraulic reservoir if necessary.
- 3 HEAD AND TAILLIGHTS DO NOT OPERATE WHEN SWITCH IS ACTUATED.
- Step 1. Check to see if emergency stop switch is depressed
    - Reset stop switch if necessary
  - Step 2. Check for properly connected battery receptacle
    - Connect battery receptacle.
  - Step 3. Check battery charge.
    - Charge battery if necessary.
  - Step 4. Check light switch and connections.
    - Clean connections and tighten as necessary. If switch is defective, notify organizational maintenance.
- 4 HORN DOES NOT SOUND.
- Step 1. Check to see if emergency stop switch is depressed.
    - Reset stop switch if necessary.
  - Step 2. Check for properly connected battery receptacle.
    - Connect battery receptacle.
  - Step 3. Check battery charge.
    - Charge battery if necessary.
  - Step 4. Check horn and horn button.
    - If horn or horn button are defective, notify organizational maintenance.

**3-7. General Section IV. MAINTENANCE OF TRUCK**

Operator's maintenance of the truck is limited to the following items.

**3-8. Battery****WARNING**

When servicing battery do not smoke or use flame in vicinity. Batteries generate hydrogen, a highly explosive gas. Do not use the same hydrometer to check specific gravities of nickel/iron, nickel/cadmium or lead acid batteries. Mixing of the slightest amounts of different electrolyte will damage the battery.

- a. Check specific gravity of battery.
- b. Inspect battery and receptacle for damage.
- c. Check battery receptacle for good condition and secure connection.

**3-9. Lubrication**

- a. Lubricate truck in accordance with the current lubrication order.
- b. Refer to paragraph 3-2 for detailed lubrication information.

**3-10. Controls and Instruments**

- a. Check hourmeter for proper operation.
- b. Check all controls to see that they function properly.

**3-11. Tires**

- a. Inspect tires for imbedded material and remove if possible.
- b. Check tires for gouges and other damages.

**3-12. Brake and Hydraulic Systems**

- a. Check systems for leaks.
- b. Inspect hose and tubes for damage.
- c. Tighten loose connections.

**3-13. Drive Axle**

- a. Check drive axle for leaks and damage.
- b. Check screws mounting ring or bull gear to drive wheel. Tighten if necessary.

**3-14. Control Levers and Linkage**

- a. Move control levers through all operational positions and check operation.
- b. Inspect yoke pins and cotter pins for secure mounting and good condition.

**3-15. Brake Assembly**

- a. Drive truck and operate service brakes. Brakes should stop truck smoothly and operate properly.
- b. Inspect master cylinder and brake lines for evidence of leaks and damage.

**3-16. Steering Wheel**

- a. Check steering wheel for secure mounting and proper operation.
- b. Inspect wheel for cracks, nicks and damage.

**3-17. Hoist Cylinder**

- a. Operate truck and check operation of cluster cylinder and single cylinder. Mast should raise and lower smoothly without jerking or binding.
- b. Inspect cylinders and connecting hoses and tubes for leaks and damage.

**3-18. Accelerator**

- a. Inspect accelerator for wear and damage to rubber pad.
- b. Check operation of accelerator and control rod. Rod should pivot smoothly in bearings.

**3-19. Lights**

- a. Operate light switch and check operation of head and tail light.
- b. Inspect lights for damaged lens and loose wiring.

**3-20. Parking Brake Linkage**

- a. Sit on seat and stand up to relieve weight from seat. Check operation of linkage and check parking brake for proper holding of truck in position.
- b. Inspect linkage for wear and damage.

## CHAPTER 4

## ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

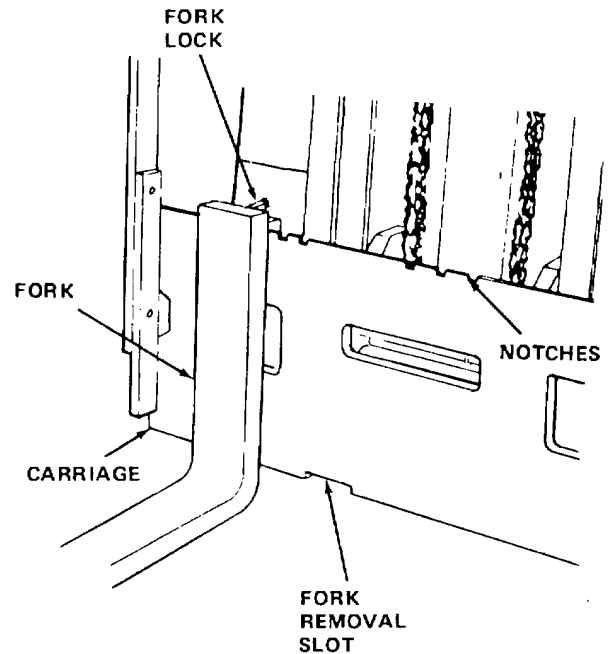
## Section I. SERVICE UPON RECEIPT OF TRUCK

**4-1. Inspecting and Servicing the Equipment**

a. When a truck is received by the using organization it must be serviced to prepare it for operation. The services required are described in Section IV.

b. Carefully inspect the truck for any signs of dents or damage that may have occurred during shipment.

c. Remove tape, paper and other packing materials. Remove forks from truck by removing strapping and tie downs and install forks on carriage as shown on figure 4-1.

**INSTALLATION**

1. RELEASE FORK LOCK BY TURNING POINT UP.
2. SLIDE FORK IN LINE WITH SLOT ON CARRIAGE. LIFT FRONT OF FORK UP AND SLIDE INTO POSITION.
3. TURN POINT OF FORK LOCK DOWN TO LOCK FORK IN NOTCH ON CARRIAGE.

**REMOVAL**

1. TURN POINT UP TO RELEASE FORK LOCK.
2. SLIDE FORK IN LINE WITH SLOT ON CARRIAGE. LIFT FRONT OF FORK UP AND REMOVE FROM CARRIAGE.

**ADJUSTMENT**

1. RELEASE LOCK.
2. SLIDE FORK IN LINE WITH NOTCH AND LOCK IN POSITION.

*Figure 4-1. Removing, installing, or adjusting carriage forks.*

d. Remove any preservative compound that has been sprayed on metal surfaces with cleaning compound, solvent (Fed. Spec. P-D-680) and dry thoroughly.

**NOTE**

Preservative compound is not a lubricant. Take special care to completely remove the compound from all wearing surfaces.

**WARNING**

If battery is received with a metal cover, remove and discard metal cover and install battery.

**WARNING**

When servicing battery, do not smoke or use flame in the vicinity. Batteries generate hydrogen, a highly explosive gas. Do not use the same hydrometer to check specific gravity of nickel/iron, nickel/cadmium or lead acid batteries.

Mixing of the slightest amounts of different electrolytes can damage the battery.

e. Check battery to determine type battery installed. For lead acid type batteries, fill battery with electrolyte to 5/8 inch above the plates. For lead acid or nickel/iron batteries, check specific gravity of electrolyte as prescribed in TM 10-t 1690A/TO 19-75C BAE-13. Use battery charger, National stock number 6130-00-500-0069, 36 volts to 60 volts, 160 amp. 230 volts ac, metallic rectifier type, alternating operating power, when charging lead acid or nickel/iron batteries.

f. Lubricate the truck in accordance with the current lubrication order.

g. Fill hydraulic reservoir with proper grade of oil. Refer to current lubrication order.

h. Refer to Table 4-1 for a list of maintenance and operating supplies required for initial operation of the fork lift truck.

Table 4-1. Maintenance and Operating Supplies

(1) Component Application	(2) National Stock No.	(3) Description	(4) Quantity Required for Initial	(5) Quantity Required for 8 Hrs	(6) Notes
Hydraulic Brake System automotive. to Differential	9150-00-231-9071	OIL, , HYDRAULIC: 1 gal can as follows: HB--nonpetroleum base,	2 pt.	(1)	(1) See current LO for grade application and replenishment intervals. (2) Includes quantity .fill hydraulic system as follows: 1 qt.--filter 2 1/2 qt.-lines 3 3/4 gal.--reservoir (3) See C9100-IL for additional data and requisitioning procedure.
	9150-00-262-9375	HBA--nonpetroleum base, automotive, arctic-type	1/2 pt.	(1)	
	9150-00-577-5845(3) 9150-00-240-2244(3) 9150-00-257-5422(3)	OIL, LUBRICATING, GEAR: 55 gal drum as follows: GO 90 GO 75 GOS	6 pt. 6 pt. 6 pt.	(1) (1) (1)	
Hydraulic System	9150-00-265-9429(3)	OIL, LUBRICATING: 55 gal drum as follows: OE 10	21 qt. (2)	(1)	
	9150-00-242-7604(3)	OES	21 qt. (2)		
Lubricating Fittings	9150-00-190-0907(3)	GREASE, AUTOMOTIVE AND ARTILLERY: 35 lb. can as follows: )GAA	As required	(1)	

**4-2. Installation of Separately Packed Components**

a. *Components.* The only components not already installed are the forks, battery and the fire extinguisher.

b. *Fire Extinguisher.* Remove separately packed fire extinguisher and install in bracket on instrument panel. Be certain bracket clamp locks properly to secure fire extinguisher in position.

c. Battery.

- (1) Open battery compartment and remove side panels.
- (2) Using a hoist of sufficient capacity, lift battery into compartment.
- (3) Connect battery receptacle as shown in

figure 2-2.

**CAUTION**

Do not reverse polarity of battery cables.  
 (4) Service and charge battery as described in paragraph 4-26.

**Section II. MOVEMENT TO A NEW WORKSITE**

**4-3. Dismantling for Movement**

The only component that may require dismantling for movement is the forks. If necessary to conserve space when transporting the lift truck by means of

another carrier, refer to figure 4-1 and remove the forks.

**4-4. Reinstallation after Movement**

If forks were removed to transport the lift truck, refer to figure 4-1 and install the forks on the carriage.

**Section III. REPAIR PARTS, SPECIAL TOOLS, AND EQUIPMENT**

**4-5. Tools and Equipment**

Tools, equipment and repair parts issued with or authorized for the fork lift truck are listed in the basic issue items list, appendix C.

perform organizational maintenance of the fork lift truck.

**4-7. Maintenance Repair Parts**

Repair parts and equipment are listed and illustrated in the repair parts and special tools list (TM 10-3930-631-20P) for the fork lift truck.

**4-6. Special Tools and Equipment**

No special tools and equipment are required to

**Section IV. LUBRICATION INSTRUCTIONS**

**4-8. General**

These paragraphs contain lubrication instructions which are supplemental to and not specifically covered in the lubrication order.

**4-9. Hydraulic Filter**

a. Replacement of the filter element is required at regular intervals.

b. A hydraulic filter element indicator (fig. 4-2) is located to the right of the control valve handles. The indicating line (fig. 4-2) should be in line with the green band. This indicates filter element is operating properly. If indicating line is in line with yellow band element is becoming contaminated and should be changed at earliest convenience. When white indicating line reaches any portion of red band, change filter element at once.

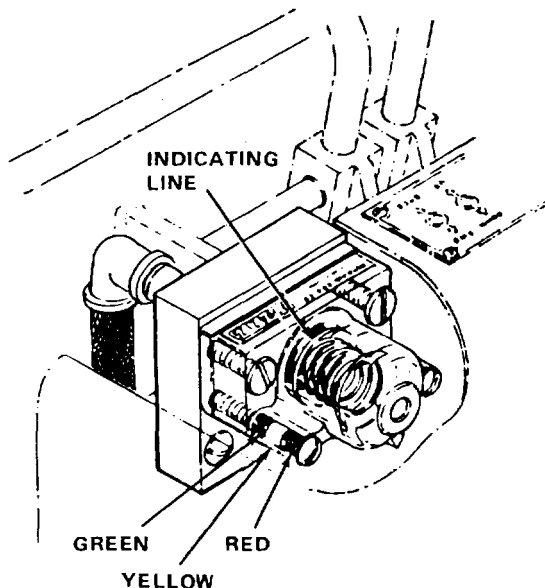


Figure 4-2. Hydraulic filter element indicator, installed view.

c. Refer to paragraph 4-61 to service the hydraulic filter.

**4-10. Hydraulic Reservoir**

- a. The hydraulic system reservoir and breather must be serviced at regular intervals.
- b. Refer to paragraph 4-59 to service the reservoir and breather.
- c. To drain reservoir, remove drip pan and place a suitable container under reservoir. Remove drain plug and drain reservoir.
- d. Install drain plug and fill reservoir through level gauge hole. Install drip pan.

**4-11. Brake Master Cylinder**

- a. The brake system must be checked and serviced at regular intervals.
- b. Refer to paragraph 4-33 to fill the master cylinder.

**4-12. Drive Axle**

- a. The drive axle requires addition of lubricant and draining and refilling at regular intervals.
- b. To drain axle differential, remove drain plug at bottom of housing. Fill axle differential through level plug located on cover side of housing.

**Section V. PREVENTIVE MAINTENANCE CHECKS AND SERVICES**

**4-13. General**

To insure that the fork lift truck is ready for operation at all times, it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance checks and services to be performed by the operator are listed and described in paragraph 3-4. Organizational Maintenance checks and services are listed and described in paragraph 4-14. The item numbers indicate the sequence of minimum inspection requirements. All deficiencies and shortcomings will be recorded, together with the corrective action taken, on DA Form 2404 at the earliest possible opportunity.

**4-14. Preventive Maintenance Services**

a. This paragraph contains a tabular listing of preventive maintenance services which must be performed by organizational maintenance personnel at the indicated intervals.

b. Table 4-2 lists preventive maintenance services in item numbers listed consecutively and indicate the sequence of minimum requirements. The intervals are listed under services to be performed by organizational maintenance personnel. Columns indicate the interval and sequence number, the item to be inspected, the procedure, and the paragraph reference in this manual where the procedure is described. When operational checks are to be made, an operator must be seated on seat and seat depressed to operate electrical circuits.

*Table 4-2. Organizational Preventive Maintenance Checks and Services.*

D—Daily Time required: 2.8 Interval and Sequence No.		Item to be inspected procedure	Q-Quarterly Time Required: 2.8
M	Q		Work Time (M/H)
1		BATTERY Check for frayed cables and remove corrosion. fill to 5/8 inch above plates. Clean vent holes in caps. Charge at regular charge and with finish charge (para 4-26).	0.2
2		LIFT, TILT AND SIDE SHIFT CYLINDERS Check operation and check for leaks (para 2-2).	0.4
3		LIFT CHAINS Clean and inspect chains (para 4-56).	0.4
4		BRAKE PEDAL Check operation. Adjust if brake pedal does not have ¼1 inch free travel (para 4-32).	0.4
5		SERVICE BRAKE LINING Check brake lining. If lining is worn to less than i/8 inch thickness, replace brake shoes (para 4-34).	0.4
6		HYDRAULIC SYSTEM Check hoses and tubes for leaks and deterioration.0.2	

D—Daily Time required: 2.8		Item to be inspected procedure	Q-Quarterly Time Required: 2.8
Interval and Sequence No.			Work Time (M/H)
M	Q		
7		CONTACT POINTS Inspect for wear and burning. Replace if necessary (para 4-28).	0.4
8		HYDRAULIC RESERVOIR Check oil level. Add oil as required (para 4-10).	0.2
9		BRAKE MASTER CYLINDER Inspect for leaks. Clean fill plug vent. Add fluid as required (para 4-33).	0.2
	1	CONTROL VALVE Check operation of controls and valve. Check for leaks (para 4-52).	0.4
	2	ELECTRICAL SYSTEM Check and adjust components including motors, contactors and controls (para 4-29).	0.4
	3	STEERING GEAR Check for leaks. Check operation and adjust tie rods and stops if necessary (para 4-40).	0.4
	4	AXLE DIFFERENTIAL Check oil level. Fill if necessary. Refer to current lubrication order.	0.2
	5	SERVICE BRAKES Correct deficiencies if brake application is spongy or ineffective (para 4-32).	0.4
	6	PARKING BRAKE Check operation of seat linkage. Check holding ability of parking brake. Adjust linkage if necessary (para 4-31).	0.4
	7	DRIVE GEARS Inspect mounting screws. Tighten if necessary (para 4-48).	0.4

**4-15. General Section VI. TROUBLESHOOTING**

a. This section contains troubleshooting information for locating and correcting most of the operating troubles which may develop in the fork lift truck. Each malfunction for an individual component, unit, or system is followed by a list of tests or inspections which will help you to determine probable causes and corrective actions to take. You should perform the tests/inspections and corrective actions in the order

listed.

b. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

**4-16. Troubleshooting Table.**

The following table, Table 4-1, lists the malfunctions, tests and inspections, and corrective actions as applicable to organizational maintenance.

*Table 4-3. Troubleshooting*

**MALFUNCTION**

**TEST OR INSPECTION**

**CORRECTIVE ACTION**

**1. TRUCK DOES NOT MOVE WHEN ACCELERATOR IS DEPRESSED.**

Step 1. Check for defective fuse.

Replace fuse if defective (para 4-27).

Step 2. Check for open or defective thermal switch.

Allow truck to cool. Notify direct and general maintenance personnel to replace defective switch.

Step 3. Check for defective or improperly adjusted seat or brake interlock switch.

Adjust or replace seat switch (para 4-31). or brake switch (para 4-23).

Step 4. Check for burned or pitted contact points or defective contractor.

Clean or replace contact points (para 4-28). If contractor is defective refer to direct and general support maintenance personnel.

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**MALFUNCTION  
TEST OR INSPECTION  
CORRECTIVE ACTION**

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2. TRUCK ACCELERATES UNEVENLY AND DOES NOT INCH PROPERLY.
  - Step 1. Check for improperly adjusted controls.  
If controls are not adjusted, notify direct and general maintenance personnel.
  - Step 2. Check for defective controls or panels-r  
If controls are defective notify, direct and general support maintenance personnel.
3. TRUCK HAS INADEQUATE POWER FOR CLIMBING GRADES OR TRANSPORTING LOADS.
  - Step 1. Check for improperly adjusted or defective controls.  
If controls are not adjusted or are defective, notify direct and general support personnel
  - Step 2. Check for defective drive motor or drive axle.  
If motor or axle are defective, notify direct and general support maintenance personnel.
4. TILT LIFT AND SIDE, SHIFT SHIFT MECHANISM IS DO NOT OPERATE WHEN LEVERS ARE ACTUATED.
  - Step 1. Check for defective fuse.  
Replace defective fuse (para 4-27).
  - Step 2. Check for improperly adjusted or defective pump switch.  
Adjust or replace pump switch (para 4-33).
  - Step 3. Check for improperly adjusted or defective seat switch.  
Adjust or replace seat switch (para 4-31).
  - Step 4. Check for burned or defective contact points or contactors.  
Replace burned or defective points para 4-28) or notify direct and general support maintenance personnel to replace defective contactor.
5. OIL LEAKING FROM RESERVOIR BREATHER.
  - Step 1. Check oil level in reservoir.  
Drain oil from reservoir if necessary.
  - Step 2. Check control linkage for proper adjustment.  
Adjust control linkage (para 4-53).
6. HEAD AND TAILLIGHTS DO NOT OPERATE WHEN SWITCH IS ACTUATED.
  - Step 1. Check for defective lamps or lights.  
Replace defective lamps or lights (para 4-24).
  - Step 2. Check for defective light switch., i  
Replace defective light switch (para 4-21).
  - Step 3. Check for loose or defective wiring.  
Tighten loose connections or replace defective wiring.
  - Step 4. Check for defective fuse.  
Replace defective fuse (para 4-27).
7. STOPLIGHT DOES NOT OPERATE WHEN BRAKES ARE APPLIED.
  - Step 1. Check for loose or defective wiring.  
Tighten loose connections and replace defective wiring.
  - Step 2. Check for defective pressure switch.  
Replace defective switch (para 4-23).
  - Step 3. Check for improperly adjusted or defective seat switch.  
Adjust or replace seat switch (para 4-31).
  - Step 4. Check for defective master cylinder.  
If master cylinder is defective, notify direct and general support maintenance personnel.
8. SERVICE BRAKES DRAG OR DO NOT OPERATE PROPERLY
  - Step 1. Check for proper pedal and linkage travel.  
Adjust pedal and linkage (para 4-32).
  - Step 2. Check for weak or broken return spring.  
Replace return spring (para 4-33).
  - Step 3. Check for worn or improperly fitted brake linings.  
Replace brake shoes (para 4-34).
  - Step 4. Check for loose or worn wheel bearings.  
Adjust or replace wheel bearings (para 4-37).
9. BRAKE PEDAL SOFT OR SPONGY.
  - Step 1. Check for air in brake hydraulic system.  
Bleed system (para 4-33).
  - Step 2. Check oil level in master cylinder.  
If oil is low, fill master cylinder (para 4-33).'
  - Step 3. Check for proper master cylinder operation.  
Replace defective master cylinder (para 4-33).
  - Step 4. Check for defective wheel cylinders.  
Replace defective wheel cylinder (para 4-35).
10. BRAKE PEDAL HARD TO DEPRESS.
  - Step 1. Check for improperly adjusted pedal or linkage.  
Adjust pedal free travel (para 4-32).

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**MALFUNCTION  
TEST OR INSPECTION  
CORRECTIVE ACTION**

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- Step 2 Check for glazed brake linings.  
Replace glazed brake shoes (para 4-.34).
- 11 EXCESSIVE BRAKE PEDAL TRAVEL REQUIRED TO APPLY BRAKES.  
Step 1. Check for air in brake hvdraulic system  
Pump pedal several times If pressure builds up to hold pedal to normal travel. bleed brake system (para 4-33)  
Step 2 Check oil supply in master cylinder  
Fill master cylinder if necessary Para 4-33).
- 12 TRUCK PULLS TO ONE SIDE WHEN BRAKES ARE APPLIED.  
Step 1 Check for oil or grease on brake lining  
Replace brake shoes Para 4.34).  
Step 2. Check for wear or broken brake shoe return spring  
Replace weak or broken spring (para 4-34)  
Step 3. Check for defective wheel cylinder  
Replace defective cylinder Para 4-35)
13. PARKING BRAKE DRAGS.  
Step 1. Check for improperly adjusted linkage.  
Adjust linkage (para 4-31).  
Step 2. Check for defective parking brake.  
If brake is defective, notify direct and general support maintenance personnel.
14. STEERING MECHANISM NOT OPERATING PROPERLY.  
Step 1. Check hydraulic system for leaks.  
Tighten loose connections or replace hydraulic lines Para 4-41)  
Step 2. Check steering tie rod adjustment.  
Adjust steering tie rod (para 4-40).  
Step 3. Check steering cylinder for leaks and proper operation.  
Replace steering cylinder (para 4-41).  
Step 4. Check hydraulic pump and valve for leaks.  
If components are leaking, notify direct and general support maintenance personnel.
15. HORN DOES NOT SOUND.  
Step 1. Check for defective horn button.  
Replace defective horn button (para 4-25).  
Step 2. Check for defective fuse.  
Replace defective fuse (para 4-27).  
Step 3. Check for loose wire.  
Tighten loose connections.  
Step 4. Check for improperly adjusted or defective seat switch.  
Adjust or replace seat switch (para 4-31).  
Step 5. Check for defective horn.  
Replace horn (para 4-25).
- 

**Section VII. RADIO INTERFERENCE SUPPRESSION**

**4-17. General Methods to Obtain Proper Suppression**

Essentially, suppression is obtained by providing a low resistance path to ground for stray currents. The methods used include grounding the frame with bonding straps and using capacitors and resistors.

**4-18. Interference Suppression Components**

Radio interference suppression in the fork lift truck is obtained through the use of two bonding straps (fig. 4-

41) attached to the drive motor flange below the drive axle.

**4-19. Replacement of Suppression Components**

- a. Remove drip pan from beneath truck.
- b. Remove two screws and lock washers attaching drive motor to drive axle and remove two bonding straps (fig. 4-41).
- c. Install bonding straps on flange and secure with two screws and lock washers.
- d. Install drip pan.

**Section VIII. ELECTRICAL SYSTEM****4-20. General**

a. Refer to figure 1-3 for a schematic diagram of the electrical system.

b. The main components of the electrical system are the battery, which supplies the electrical power; the controls, which control and distribute the power; the instruments and the electric motors, which convert the electrical energy into mechanical energy. The motors power the drive axle and hydraulic pumps.

c. Operational controls consist of a directional control and a speed control. The forward and reverse lever allows the operator to select the direction of travel. Speed control of the truck is maintained through a foot pedal or accelerator.

d. A key switch on the instrument panel opens and closes the circuits to operate the truck. An hourmeter installed on the instrument panel records elapsed running time of the truck drive and hydraulic pump motors.

e. All circuits on the truck are protected by fuses.

The main power fuse is 400 amps. Fuses rated at 15 amps protect the key switch, horn, lights and contactor circuits. The power steering motor circuit has a 35 amp fuse. A 400 amp fuse protects the hydraulic pump circuit.

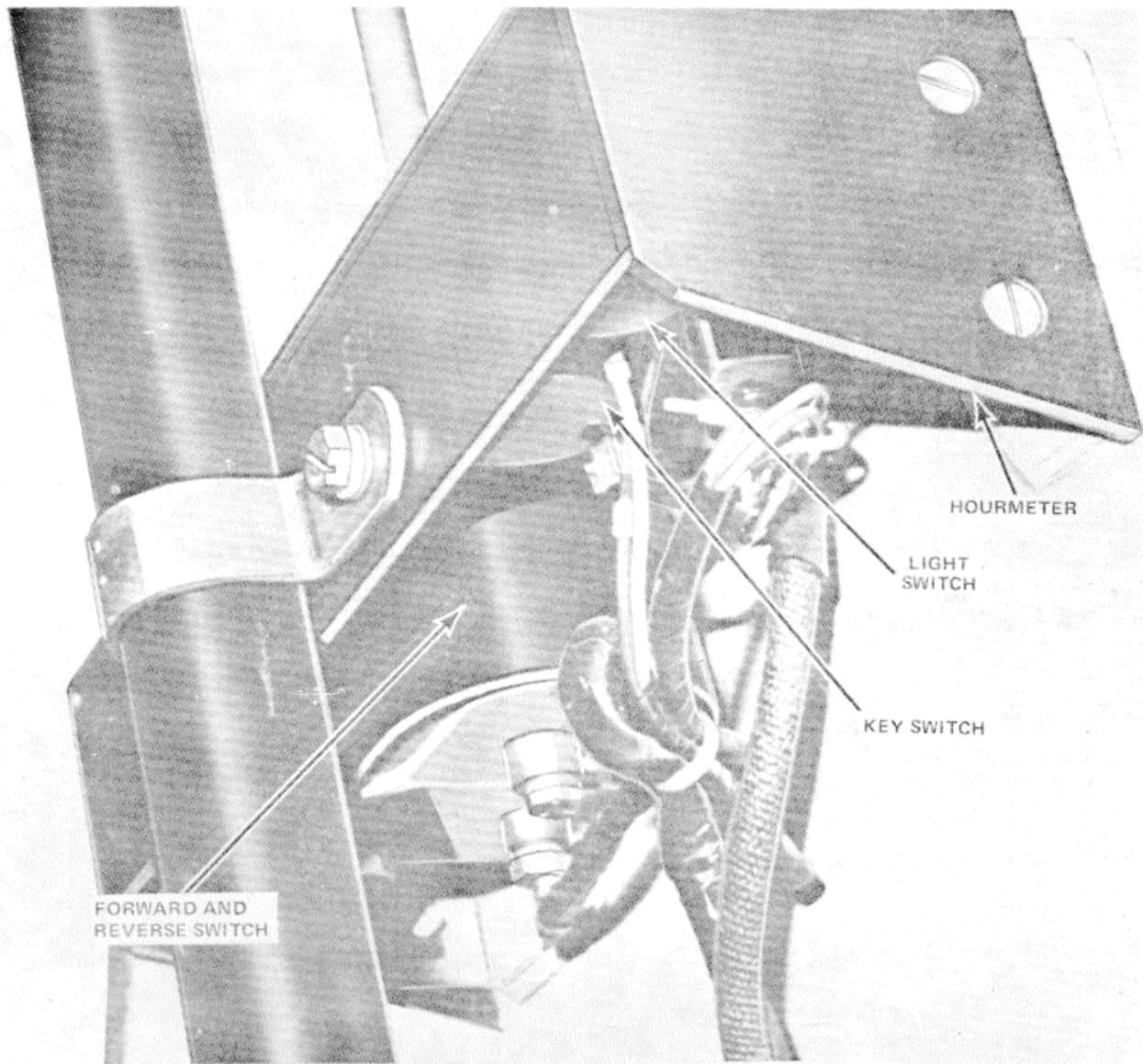
**CAUTION**

Before performing any electrical repairs on the truck, disconnect battery receptacle (fig. 2-2). Discharge capacitors by turning key switch on and depressing horn button.

**4-21. Hourmeter and Switches**

a. Removal. Remove sheet metal cover to gain access to hourmeter and switches. Refer to figure 4-3 and remove the hourmeter and switches.

b. Installation. Refer to figure 4-3 and install hourmeter and switches.



1. TO REMOVE LIGHT SWITCH, DISCONNECT WIRES AND REMOVE SWITCH.
2. TO REMOVE KEY SWITCH, REMOVE KEY, DISCONNECT WIRES AND REMOVE SWITCH FROM PANEL.
3. TO REMOVE HOURMETER, DISCONNECT WIRES, REMOVE THREE SCREWS AND REMOVE HOURMETER.

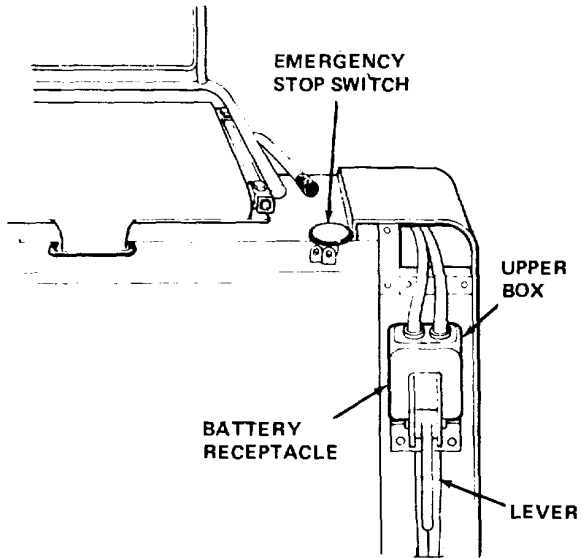
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*Figure 4-3. Hourmeter and switches, removal and installation.*

**4-22. Emergency Stop Switch.**

a. Removal. Refer to figure 4-4 and remove the emergency stop switch.

b. Installation. Refer to figure 4-4 and install the emergency stop switch.



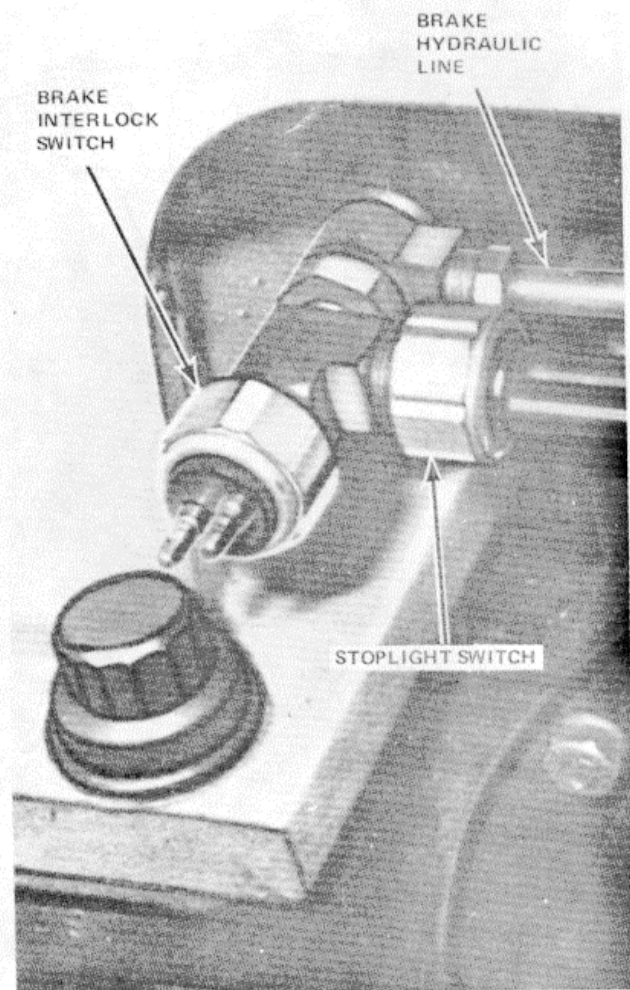
NOTE. DISCONNECT BATTERY RECEPTACLE.  
EMERGENCY STOP SWITCH

1. REMOVE SETSCREW AND REMOVE KNOB. REMOVE LEVERS.
2. DISCONNECT WIRES.
3. REMOVE ROUND NUT AND REMOVE SWITCH. BATTERY RECEPTACLE
1. LIFT LEVER UP AND SEPARATE RECEPTACLES.
2. REMOVE UPPER BOX AND UNSOLDER CABLES.
3. REMOVE MOUNTING SCREWS AND REMOVE LOWER RECEPTACLE.
4. UNSOLDER CABLES FROM LOWER RECEPTACLE.

Figure 4-4. Emergency stop switch and battery receptacle, removal and installation.

**4-23. Stoplight and Interlock Switches**

- a. Inspection. Depress brake pedal and check stoplight. If stop light does not operate, replace switch.
- b. Removal. Refer to figure 4-5 and remove the stoplight and interlock switches.
- c. Installation. Refer to figure 4-5 and install the stoplight and interlock switches.



1. DISCONNECT WIRES FROM BRAKE INTERLOCK AND STOPLIGHT SWITCHES.
2. REMOVE SWITCHES FROM FITTING IN MASTER CYLINDER.

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Figure 4-5. Stoplight and interlock switches, installed view.

**4-24. Lights**

- a. Headlight.

(1) Lamp replacement. Remove two screws and separate guard and lens from body. Disconnect wires from lamp (fig. 4-6), remove locking ring, and remove lamp from headlight. Install lamp in reverse order of removal.

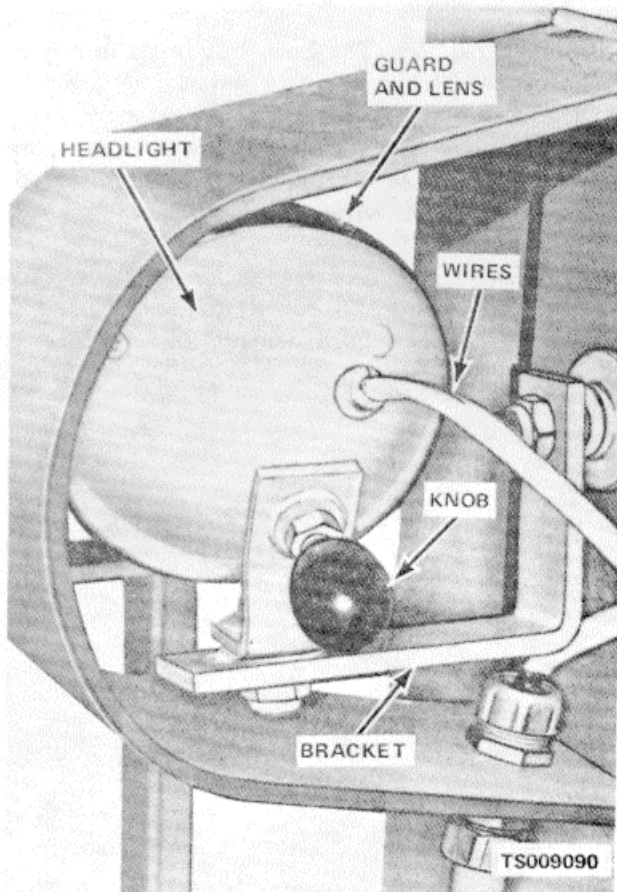


Figure 4-6. Headlight, removal and installation.

(2) Headlight replacement. Remove knob (fig. 4-6) from headlight and remove locking nut. Remove headlight from bracket and disconnect wires from headlight. Connect wires to new headlight, install in bracket and secure with locking nut and adjusting knob.

b. Combination Rear Light .

(1) Lamp replacement. Remove screws attaching lens (fig. 4-7) to light. Push in on lamp and turn one-quarter turn to release lamp. Remove lamp from light. Both lamps are removed in this manner. Install new lamps and install lens. Secure lens with screws.

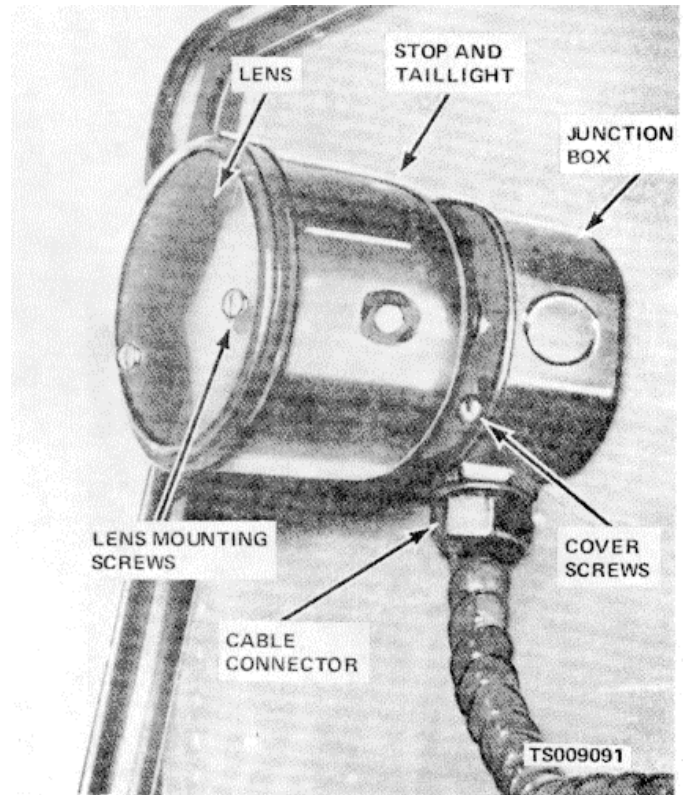


Figure 4-7. Combination rear light, installed view.

(2) Light replacement. Remove screws securing cover to junction box (fig. 4-7). Remove cover and light from junction box. Disconnect wires from light and remove light from cover. Install new light in cover, connect wires and install cover on junction box. Secure cover to junction box with screws.

**4-25. Horn**

a. General. The horn is mounted below the floor plate on the left side of the truck. Remove floor plate to gain access to horn.

b. Removal. Refer to figure 4-8 and disconnect wires from horn. Remove one screw securing horn to frame and remove horn.

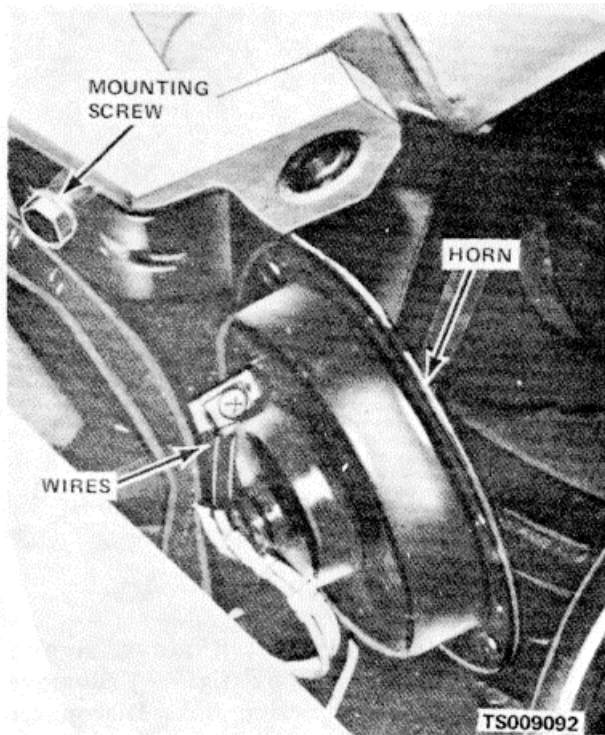


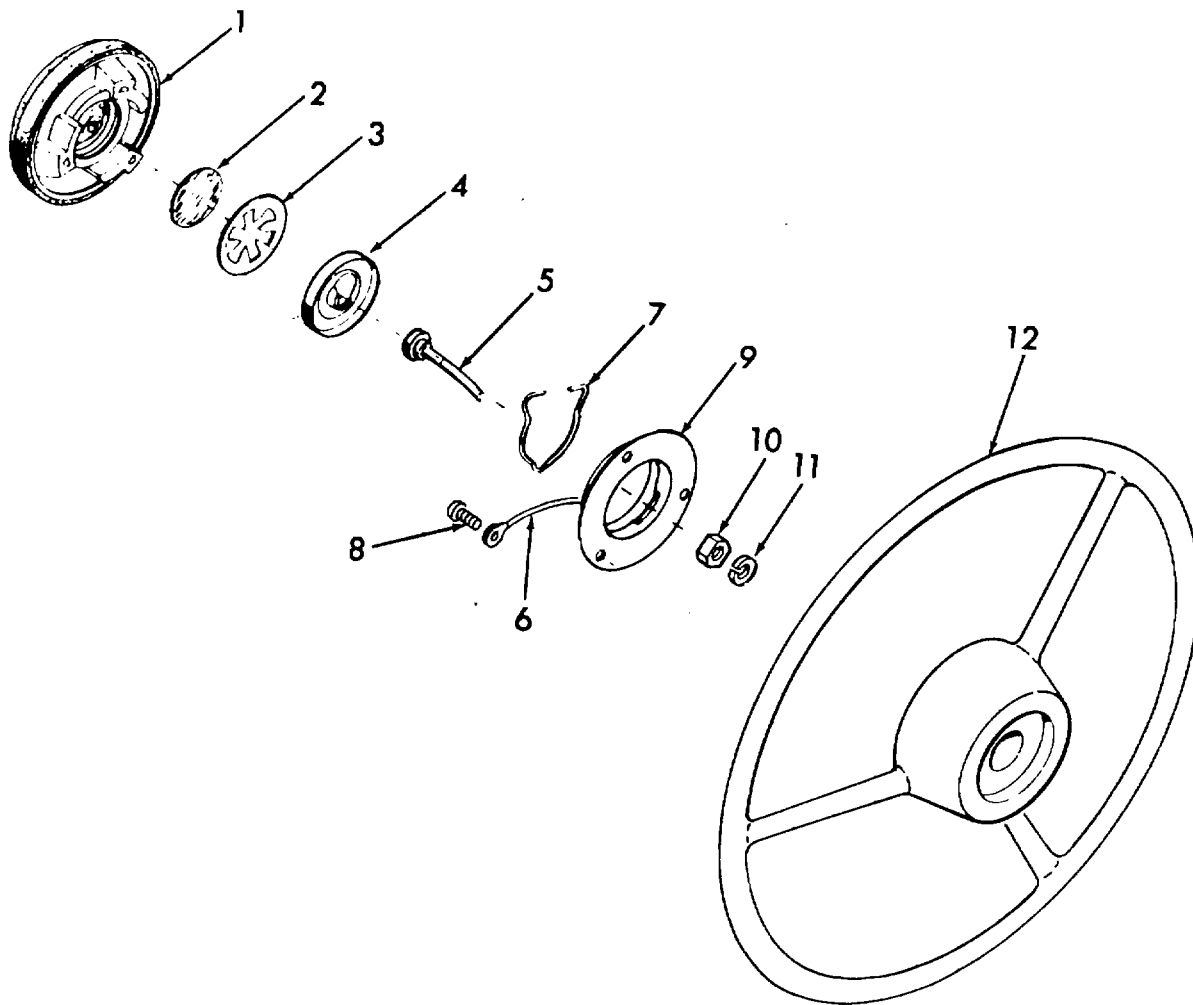
Figure 4-8. Horn, installed view.

c. Installation. Install horn (fig. 4-8) and secure to frame with one screw. Connect wires to horn.

d. Horn Button. The horn button is mounted in the center of the steering wheel.

(1) Removal. Press down and twist cover (1, fig. 4-9) counterclockwise to remove from steering wheel. Remove disk, spring and contact cup from wheel. Disconnect wires from contact cup and base plate.

(2) Inspection and Repair. Inspect contact cup (4) and spring (3) for damage. Replace if necessary. Inspect horn wiring and replace if necessary.



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- |                   |                    |
|-------------------|--------------------|
| 1. Cover          | 7. Lock wire       |
| 2. Disk           | 8. Screw           |
| 3. Contact spring | 9. Base plate      |
| 4. Contact cup    | 10. Nut            |
| 5. Wire           | 11. Lock washer    |
| 6. Ground wire    | 12. Steering wheel |

Figure 4-9. Horn button, exploded view.

(3) Installation. Connect wires to base plate (9, fig. 4-9) and contact cup. Install cup (4), spring (3) and disk (2) in wheel. Install cover (1) and twist clockwise to engage lugs.

**4-26. Battery and Receptacle**

a. General. The battery (fig. 4-10) is mounted in a compartment below and to the rear of the operator's seat. The battery receptacle (fig. 4-4) is mounted on the left side of the battery compartment.

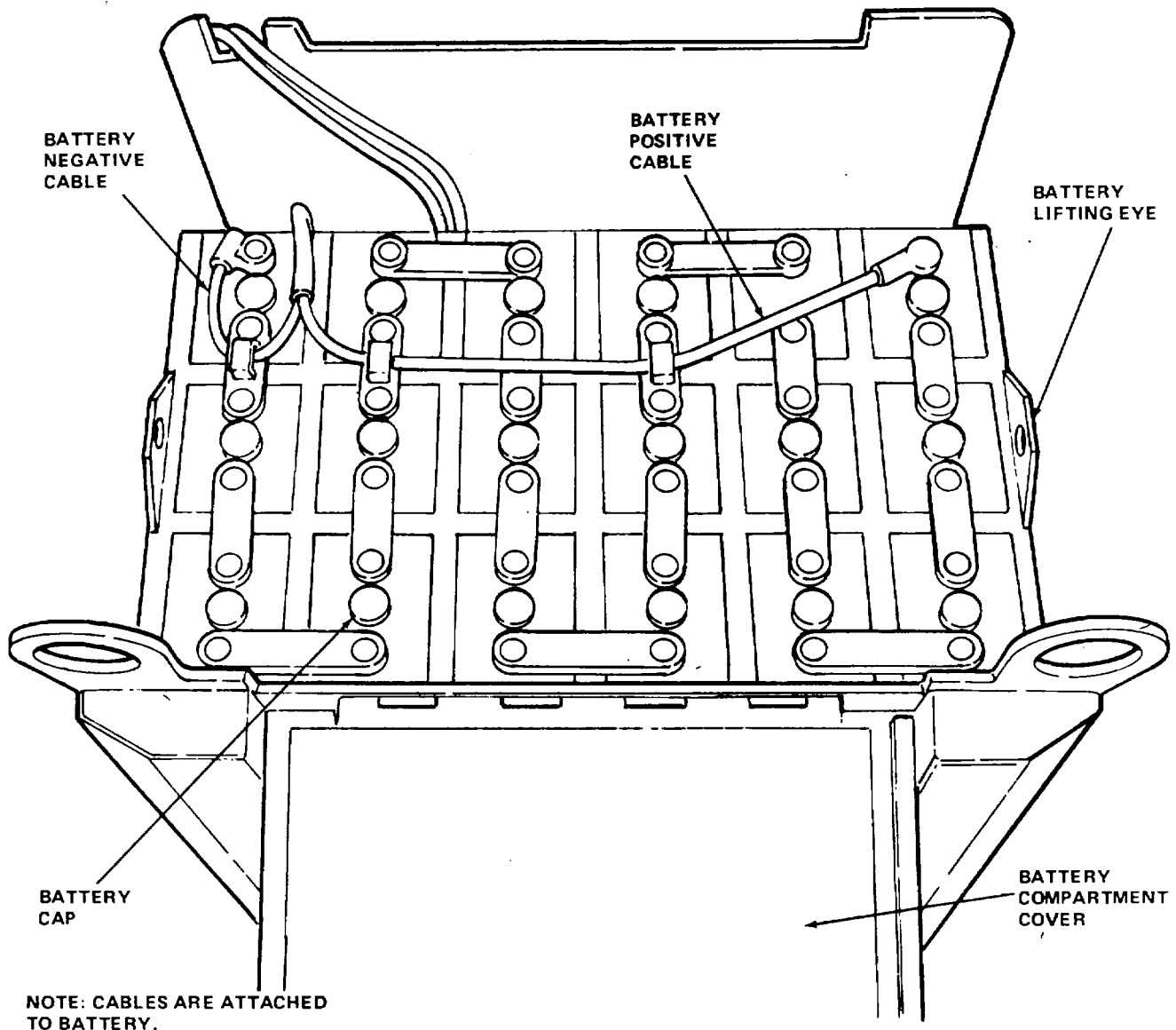


Figure 4-10. Battery service

b. Battery.

(1) Removal. Open battery cover and remove side panels. Raise seat to locked position to provide clearance when removing battery from truck. Disconnect battery receptacle (fig. 4-4). Attach a hoist of sufficient capacity to lifting eyes on battery and lift battery and receptacle connector from the truck.

**CAUTION**

Do not clean or flush top of battery while installed in truck.

(2) Cleaning. Tighten all filler caps securely. Clean battery posts, cable terminals, and top of battery with a solution of baking soda and water. Use care to prevent solution from entering filler caps and getting into battery. After foaming from solution stops, flush battery with clean, fresh water.

(3) Inspection and testing.

(a) Check cables for frayed insulation, broken strands, and damaged terminals.

(b) Inspect battery for cracks, breaks and other defects.

(c) Use a hydrometer and take a specific gravity reading of the battery. A fully charged battery should show a reading of approximately 1.275. If reading is 1.125 or lower, recharge battery. Refer to TM 10-6140-200-14 for checking specific gravity of battery.

(d) Check electrolyte level and fill to 5/8 inch above plates.

(4) Installation. Connect hoist to battery (fig. 4-10) and lift battery into compartment. Connect removable receptacle to lower receptacle and secure with lever. Install side panels and close battery cover.

c. Battery Receptacle and Cables.

(1) General. The battery receptacle provides the connection between the battery and the truck electrical system. A removable connector is attached to the battery negative and positive leads. A receptacle is mounted to the frame at the left of the operator's seat. The connector is inserted in the mounted receptacle and a lever is lowered to draw the connector into the receptacle and bring the contacts together.

(2) Inspection. Inspect receptacles for loose wires, burned contacts and damage. Replace if necessary.

(3) Removal. Disconnect receptacle (fig. 4-4). Unsolder cables from receptacle connector.

(a) Tag leads before disconnecting to be certain battery polarity will be correct.

(4) Disassembly.

(a) Remove screws (7, fig. 4-10.1) and remove case (8) from block.

(b) Remove screws (9) and separate blocks (10 and 14). Remove springs (11). Remove retaining rings (13) and remove contacts (12).

(c) Remove screws (19, fig. 4-10.1) and remove case (26). Remove screws (20) and separate blocks (21 and 25).

(d) Remove springs (22). Remove retaining rings (24) and contacts (23) from block.

(e) Refer to paragraph 4-25 and remove horn (5, fig. 4-10.1) from truck.

(5) Cleaning, Inspection and Repair.

**WARNING**

Cleaning compound, solvent (Fed. Spec. P-D-680), used for cleaning, is

potentially dangerous to personnel and property. Do not use near open flame. Flash point of solvent is 1000F to 138°F (380C to 590C).

(a) Clean all parts in cleaning compound, solvent (Fed. Spec. P-D-680) and dry thoroughly.

(b) Inspect contacts for burned, pitted and cracked surfaces. Replace unserviceable contacts.

(c) Inspect springs for bends and damage and lack of tension. Replace unserviceable springs.

(d) Inspect blocks for cracks and damage. Replace unserviceable blocks.

(6) Assembly.

(a) Install contacts (23, fig. 4-10.1) in block (25) and secure with retaining rings (24). Install springs (22) in block.

(b) Install block (21) over springs and contacts and secure with screws (20).

(c) Install case (26) over blocks and secure with screws (19).

(d) Install contacts (12, fig 4-10.1) in block and secure with retaining rings (13). Install springs (11) in block (10).

(e) Enclose springs and contacts between blocks (10) and (14) and secure blocks together with screws (9).

(f) Install case (8) over battery cables, checking to be sure polarity is correct. Solder cables to contacts in blocks. Slide case over cables and on blocks. Secure case to blocks with screws (7).

(7) Installation.

(a) Install battery receptacle (18, fig. 4-10.1) on truck and secure with screws (15), lock washers (16) and nuts (17).

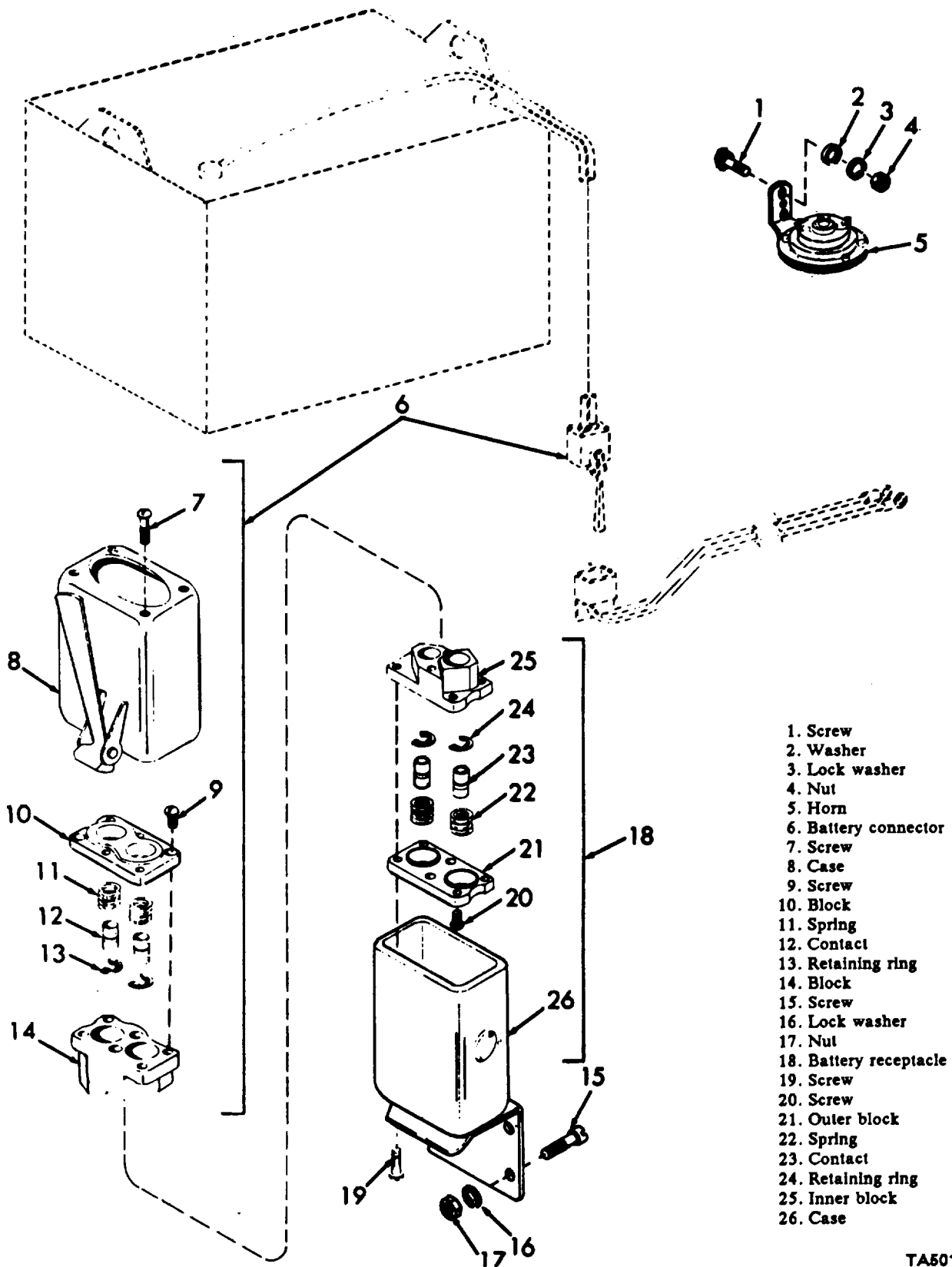
(b) Solder cables to receptacle. Connect removable receptacle to lower receptacle and secure with lever.

**4-27. Fuses**

a. General. The fuses are of the cartridge type and are mounted in fuse holders. Four are mounted in the contactor box along with the 400 amp and 35 amp fuses.

b. Test. Test fuses with a test light. If light does not glow, replace fuses.

c. Removal and Installation. Remove fuses from holders and install identical fuses in their place. Loosen screws to remove main fuses from contactor box.



- 1. Screw
- 2. Washer
- 3. Lock washer
- 4. Nut
- 5. Horn
- 6. Battery connector
- 7. Screw
- 8. Case
- 9. Screw
- 10. Block
- 11. Spring
- 12. Contact
- 13. Retaining ring
- 14. Block
- 15. Screw
- 16. Lock washer
- 17. Nut
- 18. Battery receptacle
- 19. Screw
- 20. Screw
- 21. Outer block
- 22. Spring
- 23. Contact
- 24. Retaining ring
- 25. Inner block
- 26. Case

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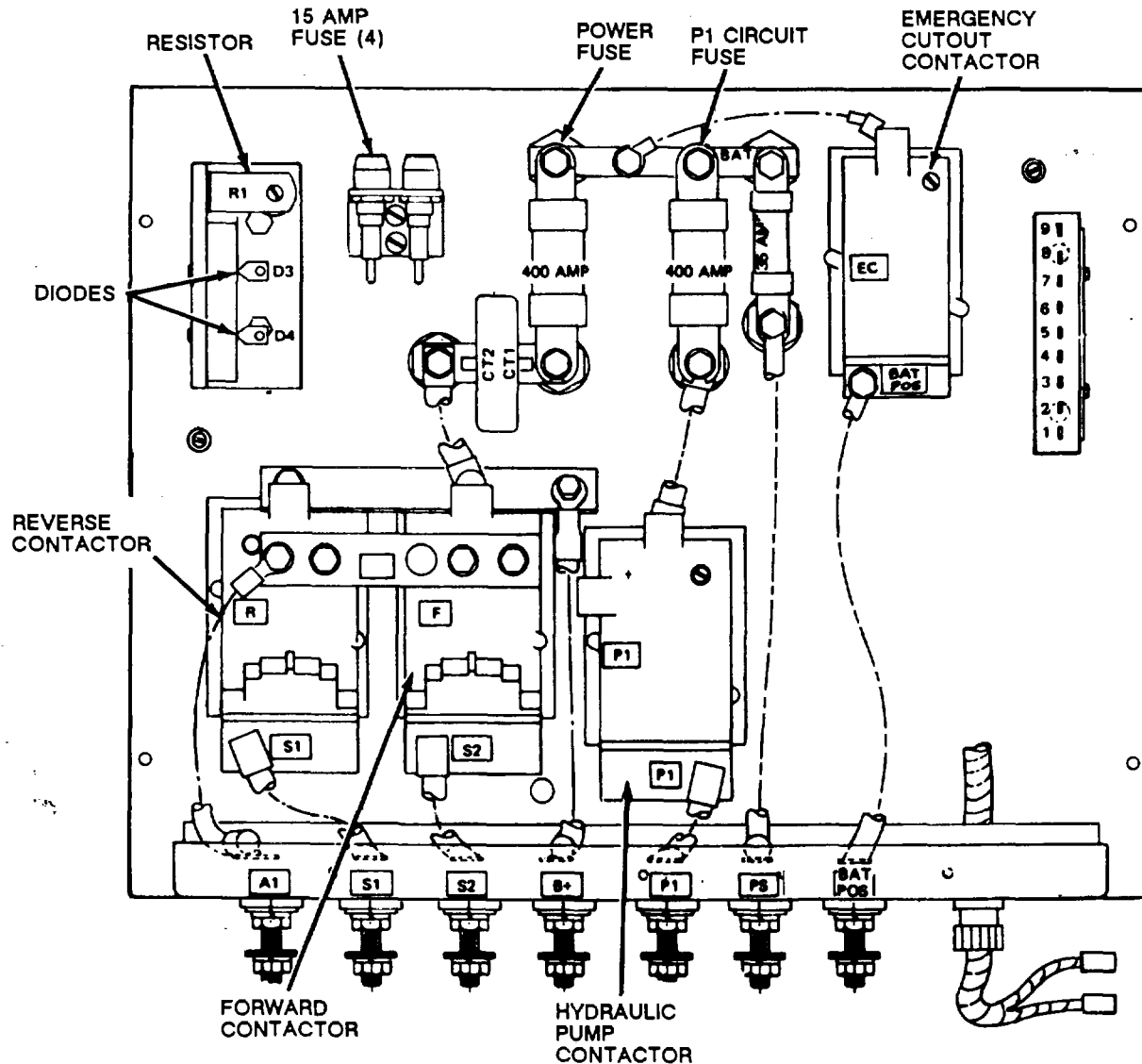
Figure 4-10.1. Battery connector, exploded view.

**4-28. Relay Contacts**

a. General. Four contactor assemblies serve to connect components into the circuit. The contactors are mounted in the contactor box at the front of the battery compartment below the seat. The contactors operate the hydraulic pump motor, forward and reverse motion (drive motor) and the emergency cutout. Contacts are

made of a silver alloy. The contacts may have to be dressed or replaced to insure proper operation. Remove cover from contactor box to gain access to the contactors.

b. Removal. Refer to figure 4-11 and remove contacts from contactor armatures.



1. TO REMOVE CONTACT POINTS FROM FORWARD, REVERSE AND HYDRAULIC PUMP CONTACTORS, REMOVE SCREW AND LOCK WASHER.
2. TO REMOVE POINTS FROM EMERGENCY CUTOUT CONTACTOR, REMOVE NUT AND LOCK WASHER.

Figure 4-11. Contactor box, installed view.

c. Cleaning and Inspection. Clean contacts with a fine file to remove rough spots and erosion. Replace contacts when inspection reveals silver facings are almost-worn through.

**CAUTION**

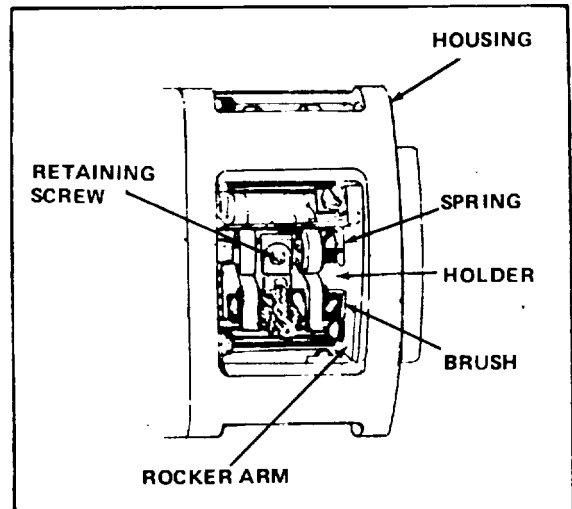
Do not file or clean contacts while they are installed in the contactor. Filings could cause damage to the electrical system.

d. Installation. Refer to figure 4-11 and install the contacts.

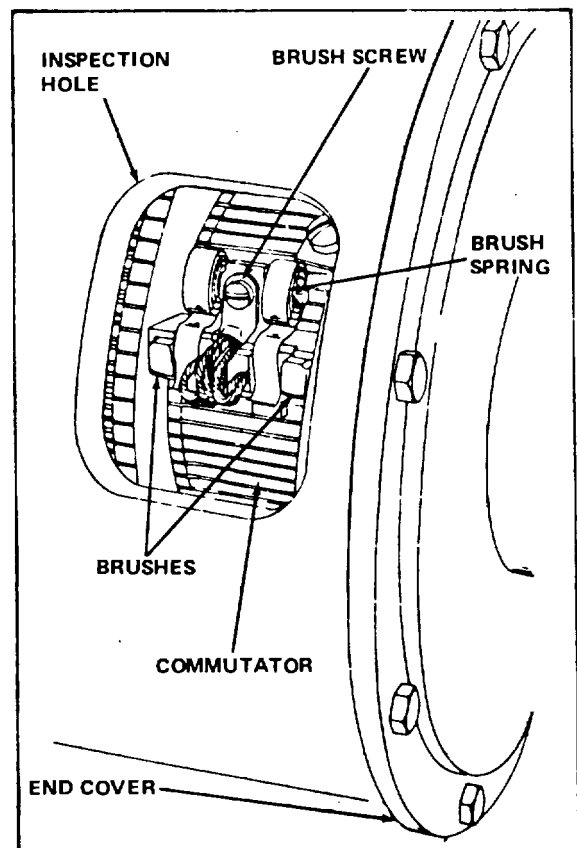
**4-29. Electrical Component Inspection**

a. General. The following components should be inspected periodically to maintain the truck in a serviceable condition. Any damage, wear, or conditions found that warrant replacement of the component should be brought to the attention of direct and general support personnel.

b. Drive Motor Brushes. Remove the drip pan, and the floor plates. Remove the screws securing the rear band and remove band from motor. Brushes will appear through inspection hole in the field yoke (B, fig. 4-12). Inspect brush condition and commutator for wear and damage. Check spring for cracks, damage, and unserviceable conditions. Install rear band to motor. Install drip pan and floor plates.



**A. PUMP MOTOR**



**B. DRIVE MOTOR**

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Figure 4-12. Brush location.

c. Pump Motor Brushes. Remove the drip pan and acid tray. Remove rear band from the motor. Brushes will appear through inspection hole in the field yoke (A, fig. 4-12). Inspect brush condition and commutator for wear and damage. Check spring for cracks, damage, and unserviceable conditions. Install rear band to motor. Install drip pan and acid tray.

d. Accelerator Control. This control is located on the front part of the frame to the left of the steering column. Remove the cover from the box to gain access to the components. Inspect components as follows:

(1) Check potentiometer (fig. 4-13) for secure mounting and operation.

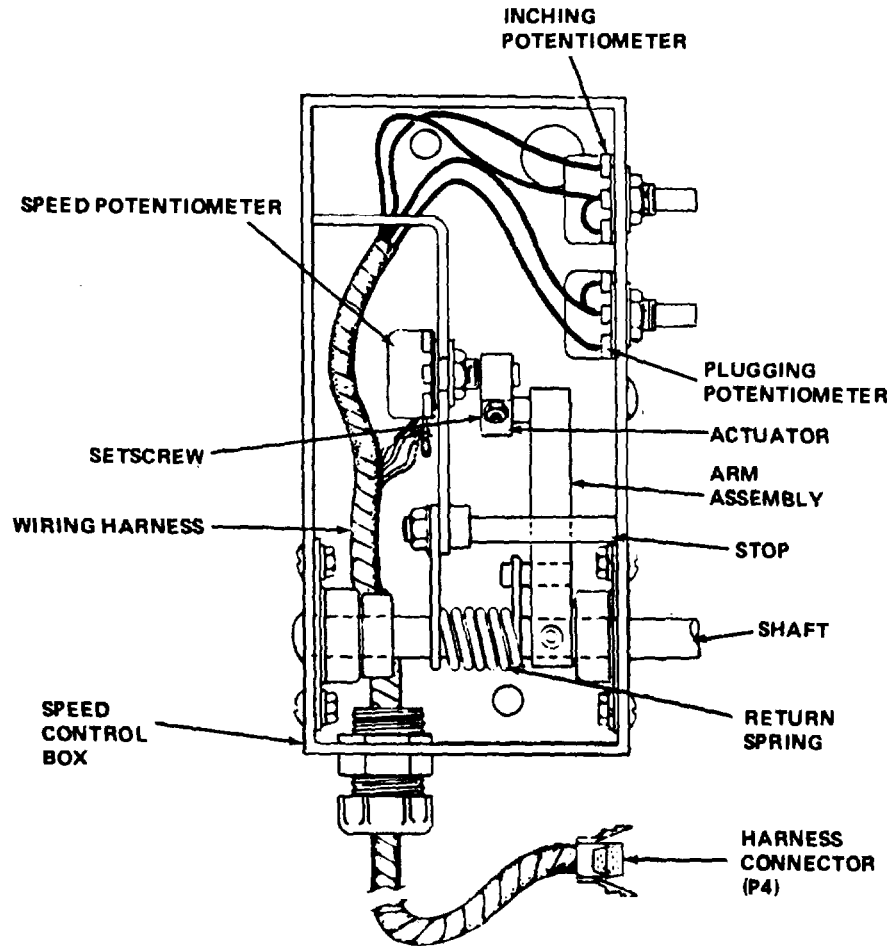


Figure 4-13. Accelerator control box, installed view.

(2) Check actuator and arm for proper operation. Depress accelerator and observe operation of speed potentiometer.

(3) Inspect return spring for cracks and damage. Operate accelerator and observe action of return spring.

e. Forward and Reverse Switch. The forward and reverse switch is mounted in a box below the instrument

panel. To inspect the switch, remove cover from box (fig. 4-3). Inspect switch for secure wiring and damage. Install cover on box.

f. Harness Wiring. Inspect the wiring harnesses for damage, broken wires, damaged insulation, loose terminals, and insecure mounting. Repair and tighten terminals. Tape or cover damaged insulation. Connect broken wires, if possible. Tighten mounting clamps and

ties, if necessary.

g. Thermal Relays. Inspect thermal relays for

loose wires and damage.

## Section IX. BRAKES

### 4-30. General

a. Brakes on the fork lift truck consist of two systems: a seat operated parking brake, on the drive motor shaft and service brakes on the two front wheels.

b. The parking brake is a dual-shoe mechanical operated type. Actuation of the brake is accomplished through a linkage connected to the hinged Operator's seat. When the operator leaves the seat or stands up, removing his weight from the seat, the brake is applied. A spring at the lower end of the linkage expands and moves the brake actuating lever which forces the brake caliper against brake disk. This pressure keeps the shaft from rotating, locking the front wheel and holding the truck in position. A seat switch is actuated by the linkage when the seat is raised or lowered. The switch is closed when the seat is down. Raising the seat opens the switch and removes power from all electrical circuits.

c. The service brakes are hydraulically actuated through a pedal and master cylinder. Depressing the pedal operates the master cylinder sending hydraulic pressure to the wheel cylinders. The wheel cylinders are the double end type and hydraulic pressure extends the ends of the cylinder, pivoting the brake shoes against the brake drum inside the wheel. The pressure in the master cylinder also closes the stoplight switch and interlock switch and operates the stoplight. When the pedal is released, springs return the pedal and brake shoes to the released position.

d. A brake interlock switch is employed in the electrical system to reduce the amount of load on the

drive motor and conserve battery current. The switch is a normally open switch and is closed when the brake pedal is depressed. Closing the switch bypasses power from the speed control potentiometers. This halts powered movement of the truck.

### 4-31. Parking Brake Linkage and Caliper Assembly

a. General. The parking brake linkage extends down from the lower right side of the operator's seat. Remove sheet metal cover from right side below seat to gain access to linkage. Elevate truck with jacks and block in position. Remove drip pan from bottom of truck to gain access to lower part of linkage.

b. Removal. Refer to figures 4-14 and 4-15 and remove the brake linkage.

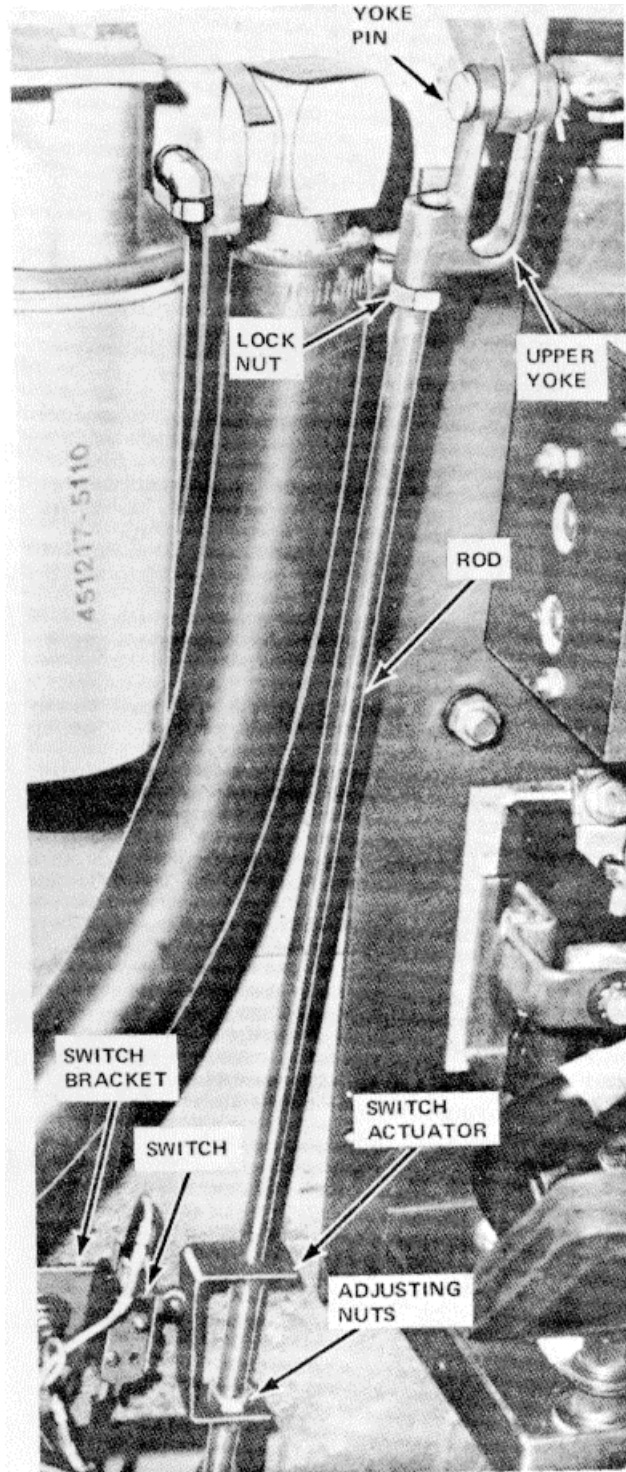
### CAUTION

Carefully remove retainer from lower end of rod. Spring is under tension.

c. Installation. Refer to figures 4-14 and 4-15 and install parking brake linkage. Refer to d below to adjust linkage.

d. Linkage Adjustment. Drive truck to a 15 degree incline and remove weight from seat. Truck should remain stationary. If truck does not hold in position or if brake drags when truck is operated, adjust as follows:

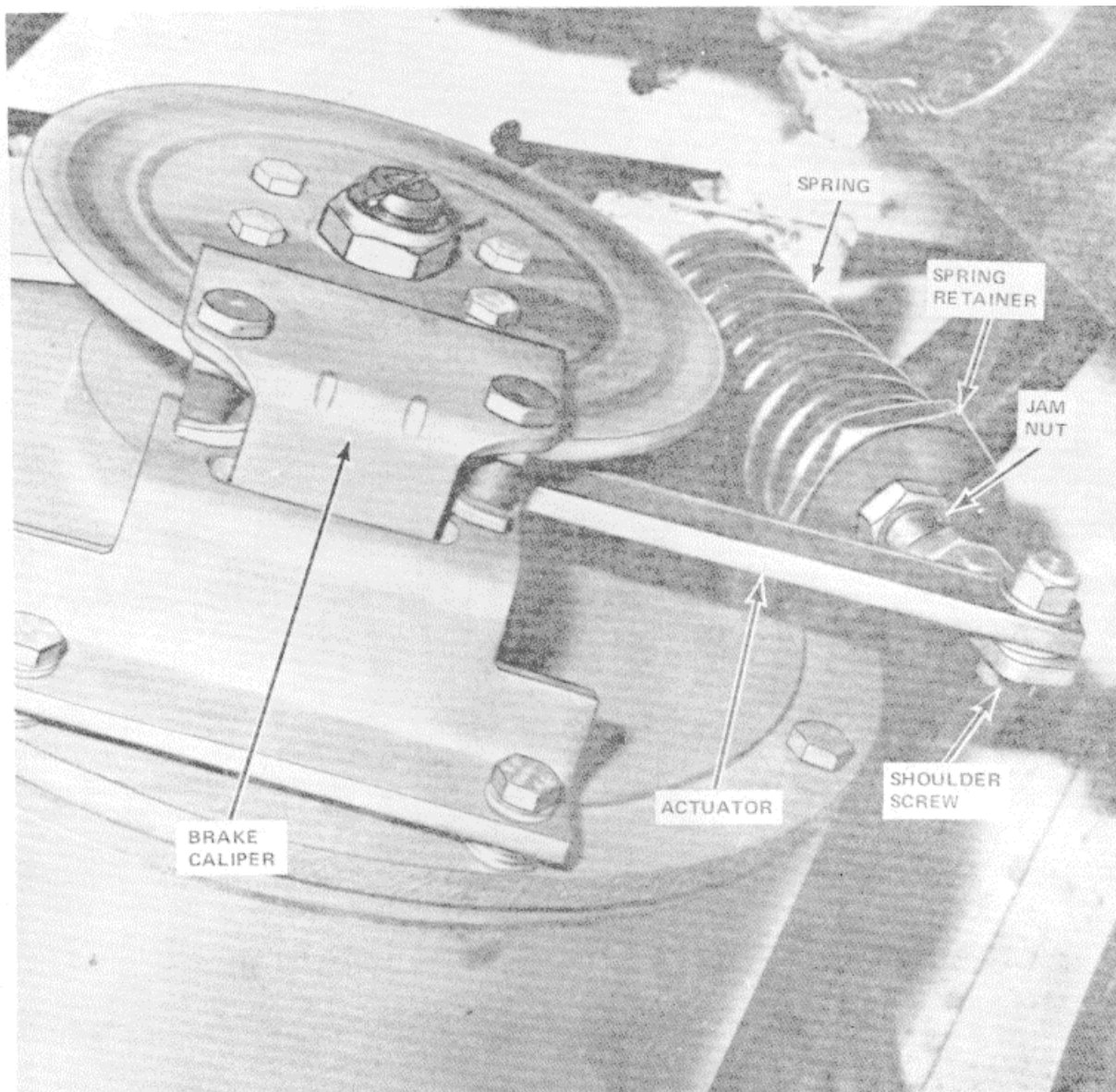
(1) Disconnect battery receptacle and block a wheel to prevent truck from rolling. Remove floor and toe plates and drip pan.



1. REMOVE YOKE PIN AND DISCONNECT UPPER YOKE FROM SEAT HINGE.
2. REMOVE LOCK NUT AND YOKE FROM ROD.
3. DISCONNECT LOWER YOKE AND REMOVE ROD AND SWITCH ACTUATOR.
4. REMOVE TWO SCREWS AND REMOVE SEAT SWITCH.

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Figure 4-14. Parking brake upper linkage and caliper assembly, installed view.



1. REMOVE SHOULDER SCREW AND DISCONNECT LINKAGE FROM ACTUATOR.
2. REMOVE JAM NUTS AND REMOVE SPRING FROM ROD.
3. REMOVE ROD, BEARING, CLEVISES AND SWITCH ACTUATOR FROM TRUCK.

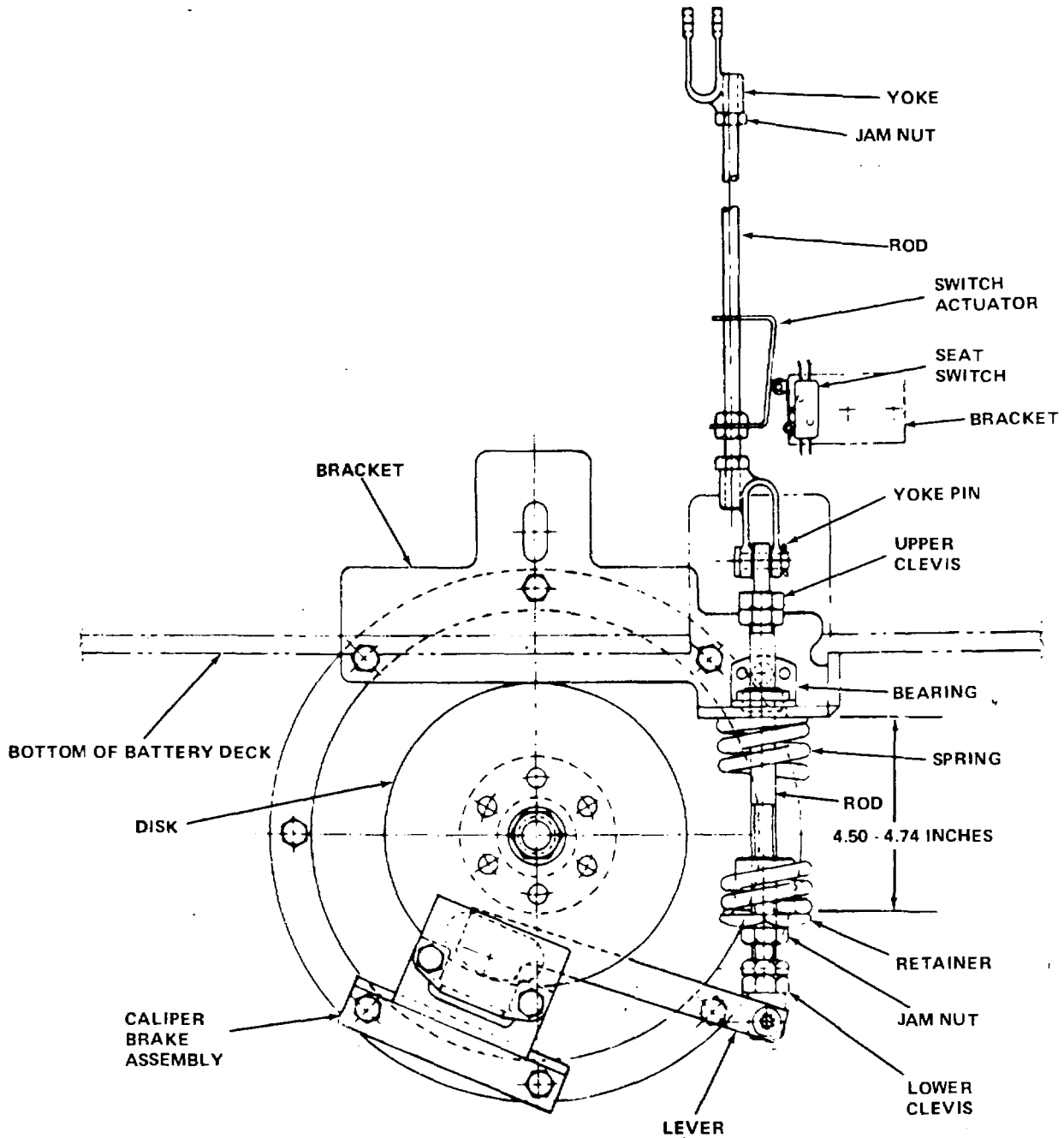
*Figure 4-15. Parking brake lower linkage and capliper assembly, installed view.*

(2) Raise operator's seat all the way. Remove cotter pin and yoke pin (fig. 4-14) from upper end of linkage.

(3) Loosen lock nut (fig. 4-14) and adjust yoke on rod. Turn yoke clockwise to shorten linkage and provide more brake action or counterclockwise to provide

less brake action.

(4) Connect yoke (fig. 4-14) to seat hinge brake link and measure distance from top of spring retainer (fig. 4-15) to bottom of brake bracket (fig. 4-16) with seat not occupied.



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Figure 4-16. Parking brake linkage adjustment.

(5) Distance should be 4.50 to 4.74 inches.

(6) Remove self-locking nut, washer and shoulder screw (fig. 4-15) to disconnect lower linkage. Loosen jam nut and adjust spring retainer (fig. 4-15) to compress spring to distance shown in (5) above. Tighten jam nut to hold retainer.

(7) Thread clevis fully on bottom of rod and secure with jam nut.

(8) Connect lower clevis to brake caliper with shoulder screw, flat washer and lock nut.

e. Caliper Assembly Brake Pad Inspection and Adjustment. If caliper brake pads wear or are out of adjustment, adjust as follows:

(1) Seat must be occupied and brake in off position.

(2) Check distance between disk and pads on brake stator (fig. 4-17).

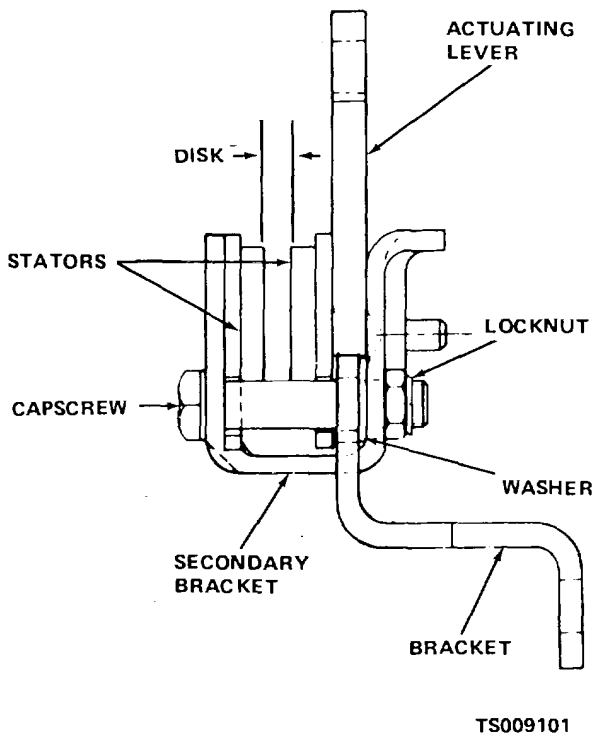


Figure 4-17. Checking brake caliper adjustment.

(3) Tighten lock nuts (fig. 4-17) to move stator pads closer to disk. Tighten nuts until disk almost makes contact with stator pads. Disk should move freely between pads.

(4) Release seat to place brake in park

position. Make certain stator pads contact disk.

f. Brake Switch Adjustment. When the seat is occupied the seat switch must be closed to allow truck to operate. A switch actuator (fig. 4-14) connected to the switch linkage moves up and down to operate the switch. Adjust actuator as follows:

(1) With operator's seat unoccupied, actuator must move down and depress switch arm and open switch contacts.

(2) Check across switch with continuity tester to make certain switch contacts are open.

(3) If contacts are not open, adjust switch bracket (fig. 4-16) by loosening mounting screws and raising or lowering switch until switch arm contacts actuator properly. Further adjustment is possible by moving jam nuts on brake rod to raise or lower switch actuator to achieve correct switch operation. Tighten bracket mounting screws and jam nuts to hold adjustment.

(4) With seat occupied, switch arm should move away from switch as actuator rises. Check switch with continuity tester, to be certain switch contacts are closed.

g. Adjustment Check. Check adjustment as follows:

(1) Connect battery receptacle and prepare truck to travel (para 2-4).

(2) With operator in seat and key switch on, place truck in motion (para 2-7).

(3) Remove weight from seat to apply parking brake. Truck should stop and remain stationary on a 15 degree incline.

(4) Install drip pan, floor and toe plates and sheet metal cover.

h. Switch Replacement. Refer to figure 4-14 to replace seat switch.

#### 4-32. Service Brake Linkage

a. General. The service brake pedal (fig. 2-1) is connected to the master cylinder by a clevis attached to the cylinder piston push rod. A spring, mounted between two retainers on the rod, returns the pedal to released position.

b. Adjustment. Pedal free play should be adjusted to one-half inch of travel to allow master cylinder to return to off position and reduce useable length of stroke. Remove floor and toe plates to gain access to master cylinder and linkage. Refer to figure 4-18 and adjust service brake pedal travel as follows:

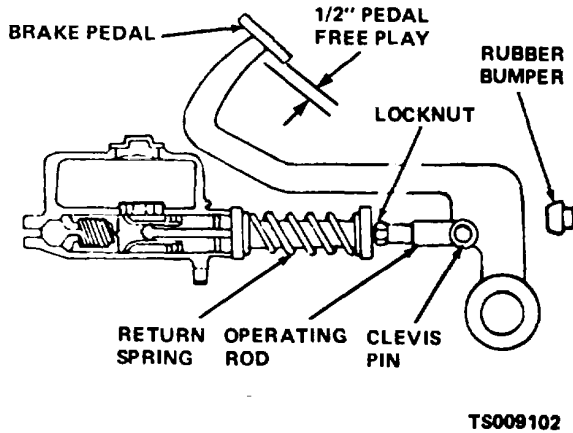


Figure 4-18. Service brake pedal adjustment.

- (1) Slowly depress brake pedal and check free travel. Observe push rod action at master cylinder.
- (2) If free travel is more or less than one-half inch, remove cotter pin and clevis pin and disconnect clevis from pedal.
- (3) Loosen lock nut on clevis and adjust

clevis to bring pedal travel to correct limits.

(4) Connect clevis to brake pedal and secure with clevis pin and cotter pin. Check pedal travel. Adjust as above if necessary to bring travel within limits specified.

(6) A rubber bumper mounted in front of the brake pedal arm stops forward progress of pedal. If necessary to obtain correct pedal travel as above, screw bumper in or out of the bracket to allow pedal movement.

#### 4-33. Service Brake Master Cylinder

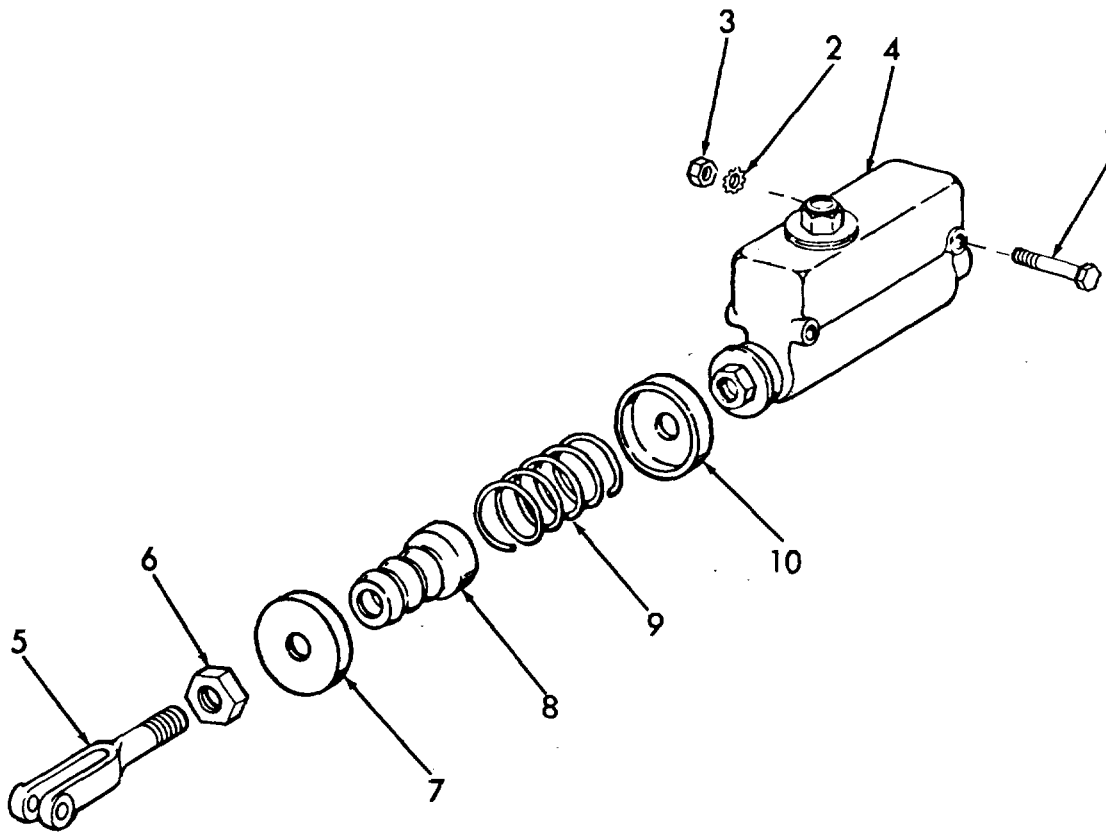
a. Inspection. Remove floor and toe plates. Inspect master cylinder for leaks, damage and proper fluid level. Replace master cylinder if leaking or damaged.

b. Removal.

(1) Refer to figure 4-6 and remove stoplight and interlock switches and disconnect brake line from master cylinder.

(2) Disconnect clevis (fig. 4-18) from brake 11 pedal.

(3) Remove mounting screws (1, fig. 4-19), lock washers (2), and nuts (3). Remove master cylinder (4) from truck.



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|--------------------|---------------------|
| 1. Screw           | 6. Nut              |
| 2. Lock washer     | 7. Spring retainer  |
| 3. Nut             | 8. Boot             |
| 4. Master cylinder | 9. Return spring    |
| 5. Clevis          | 10. Spring retainer |

Figure 4-19. Service brake master cylinder, exploded view.

(4) Remove nut (6) and clevis (5) and remove spring retainers (7) and (10), boot (8) and return spring (9) from master cylinder.

c. Installation.

(1) Install spring retainers (7 and 10, fig. 4-19), return spring (9), nut (6) and clevis (5) on master cylinder (4).

(2) Install master cylinder on truck and secure with screws (1), lock washers (2) and nuts (3).

(3) Connect brake line (fig. 4-5) and install brake interlock and stoplight switches on master cylinder.

(4) Connect clevis (fig. 4-18) to brake

pedal. Adjust pedal travel (para 4-32) as necessary.

(5) Refer to d. below to fill master cylinder and bleed brake hydraulic system.

d. Bleeding Brake Hydraulic System. Each time the system has been drained or refilled or a part has been disconnected or replaced, the system must be bled as follows:

(1) Remove filler cap from master cylinder and fill to proper level (3/8 to 1/2 inch from top).

(2) Connect a bleeder hose to bleeder screw (fig. 4-20) on front wheel. Submerge other end of hose in a glass jar filled with brake fluid.

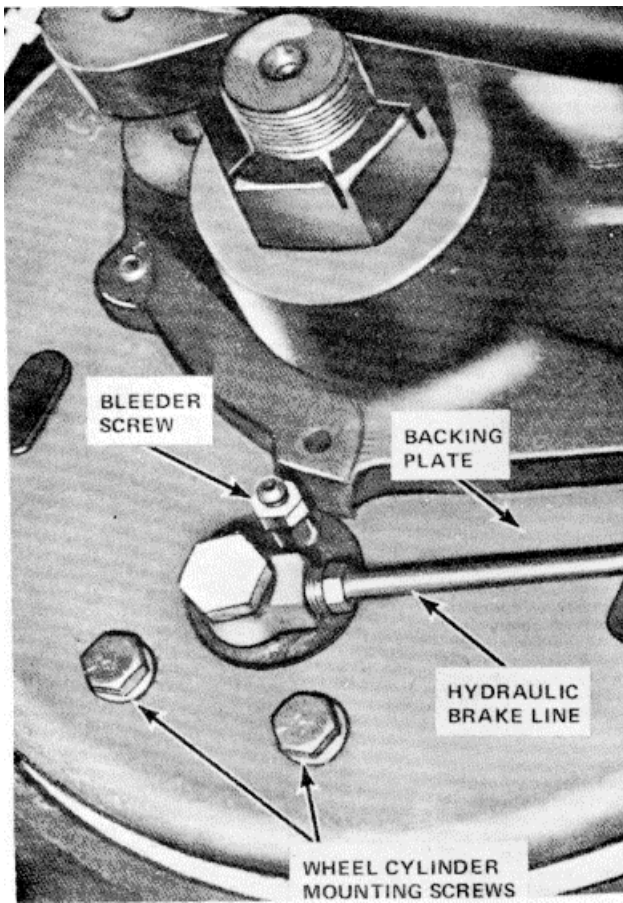


Figure 4-20. Service brake system bleeder screw.

- (3) Open the bleeder screw one turn.
- (4) Slowly depress brake pedal to end of travel and release pedal. Repeat several times. Observe hose in jar and repeat pumping of brake pedal until no air bubbles escape from hose. Hold pedal at bottom of travel and close bleeder screw to keep additional air from entering system.

**NOTE**

While pumping pedal check fluid level in master cylinder. Add fluid to keep cylinder as close to full as possible at all times.

- (5) Close bleeder screw and disconnect hose. Repeat operation on bleeder screw on other front wheel.

- (6) Fill master cylinder to proper level after bleeding operation. Replace filler cap.

**CAUTION**

Discard fluid salvaged from brake system during bleeding operation. Do not use in system.

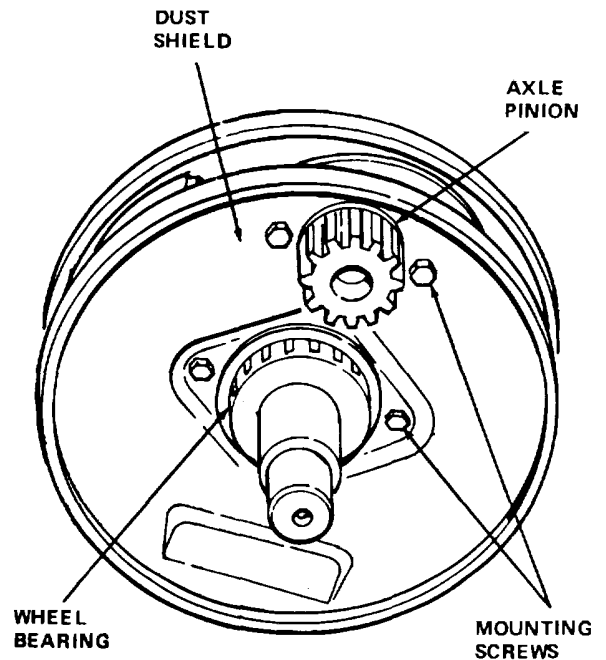
**4-34. Service Brake Brake Shoes**

a. General. The service brake brake shoes are mounted behind the dust shield. The shoes are attached to the wheel cylinders and return springs. The brakes are self-adjusting.

b. Removal.

(1) Refer to paragraph 4-37 and remove the front drive wheel and tire assembly.

(2) Refer to figure 4-21 and remove brake dust shield as follows:



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Figure 4-21. Service brake dust shield, installed view.

(a) Remove four screws and lock washers securing dust shield to axle. Remove wheel bearing from axle.

(b) Carefully remove dust shield from around axle pinion.

(3) Refer to figure 4-22 and remove brake shoes as follows:

(a) Disconnect three springs from brake shoes.

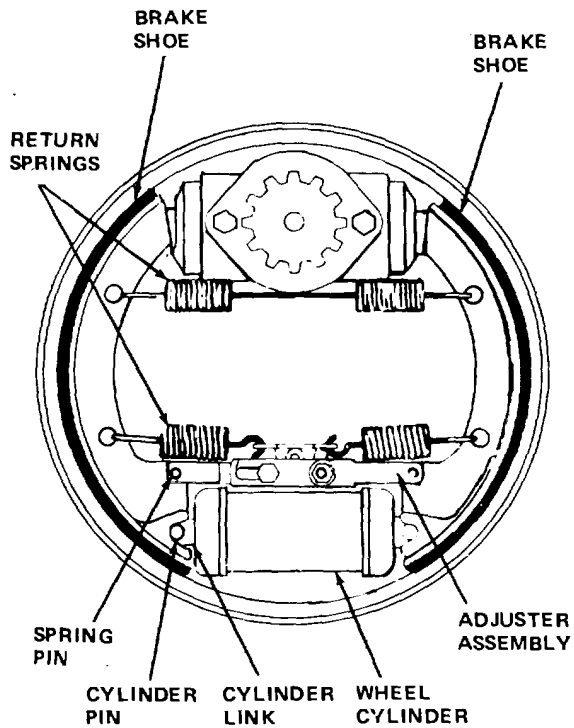


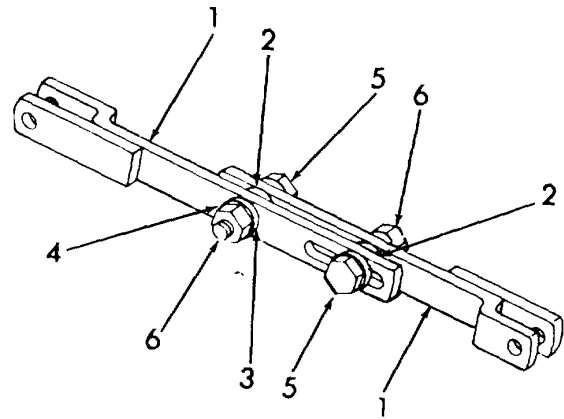
Figure 4-22. Service brake shoes, installed view.

(b) Disconnect brake shoes from wheel cylinder and lift brake shoes and attached adjuster assembly and cylinder links from backing plate.

(c) Using a brass drift, drive the spring pins from adjuster assembly and remove adjuster assembly from brake shoes.

(d) Remove pins securing cylinder links to brake shoes and remove links.

(e) Disassemble brake adjuster by removing two screws (5, fig. 4-23) nuts (6) and washers (3 and 4). Separate slide assemblies (1) and remove nylon washers (2).



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1. Slide assembly
2. Nylon washer
3. Washer
4. Lock washer
5. Screw
6. Nut

Figure 4-23. Brake adjuster, disassemble and assembly.

c. Cleaning and Inspection.

(1) Inspect linings on shoes for wear, dirt, grease, and brake fluid.

(2) Clean linings to remove foreign matter.

(3) Inspect brake drums in wheels for cracks, deep scratches, and other defects.

(4) If linings are worn to less than 1/8 inch or if linings are saturated with fluid or grease, replace shoes.

(5) Inspect brake shoes for wear, cracks or other damage.

(6) Inspect return springs for broken, nicked or fatigued coils.

d. Installation.

**CAUTION**

Brake shoes are free floating and self-adjusting. Check for obstructions during installation that could interfere with floating action.

(1) Refer to figure 4-23 and assemble adjuster assembly as follows:

(a) Install slide assemblies (1) with nylon washers (2) between slides.

(b) Secure slides with screws (5), nuts (6) and washers (3-and 4). Tighten only finger tight.

(c) Move slides along slot until center-to-center distance of holes in ends of slides is 5 1/4 inches.

(d) Tighten screws (5) to a torque of 14 to 16 pound-inches.

(e) Hold screws in position and tighten nuts

(6) to a torque of 29 pound-inches.

(f) Check slip resistance of slide assemblies. Resistance must be 250 to 300 pounds.

(2) Refer to figure 4-22 and install brake shoes as follows:

(a) Install wheel cylinder links on bottom of brake shoes and secure links with pins.

(b) Install adjuster assembly on brake shoes and secure to brake shoes with spring pins.

(c) Install brake shoes on backing plate, with links installed in ends of wheel cylinder. Hold shoes in position with three return springs.

(3) Refer to figure 4-21 and install dust shield and secure with four screws and lock washers.

(4) Refer to paragraph 4-37 and install front drive wheels.

#### **4-35. Service Brake Wheel Cylinder.**

a. Inspection. Refer to paragraph 4-37 and remove front drive wheel. Inspect wheel cylinder (fig. 4-22) for leaks, damage and proper link movement. Replace wheel cylinder if necessary.

b. Removal.

(1) Refer to paragraph 4-34 and remove brake shoes.

(2) Refer to figure 4-20 and remove wheel cylinder as follows:

(a) Disconnect hydraulic brake line from fitting in wheel cylinder.

(b) Remove two screws and lock washers securing cylinder to backing plate and remove wheel cylinder.

c. Installation.

(1) Refer to figure 4-20 and install wheel cylinder on brake backing plate as follows:

(a) Install wheel cylinder on backing plate and secure with two screws and lock washers.

(b) Connect brake line to fitting in wheel cylinder.

(2) Refer to paragraph 4-34 and install service brake shoes.

(3) Refer to paragraph 4-33 and bleed brake system hydraulic lines.

## **Section X. WHEELS**

### **4-36. General**

a. The front drive wheels are mounted on spindles attached to the axles. Jackshafts, with pinion gears, extend through the brake assemblies and mesh with the ring or bull gears in the wheels. Rotation of the pinions cause the ring gears to rotate around the spindles, driving the truck.

b. The rear steering wheels (fig. 4-26) mount on spindles attached to the steering axle. Action of the steering cylinder and drag link moves the pivot arm assembly. Tie rods, extending to the spindles, are connected to the pivot arm. As the pivot arm moves, the tie rods move the spindles, turning the wheels in the direction of travel desired.

c. Both pairs of wheels are mounted on tapered roller bearings. The bearings must be greased and

adjusted as described in paragraph 4-37.

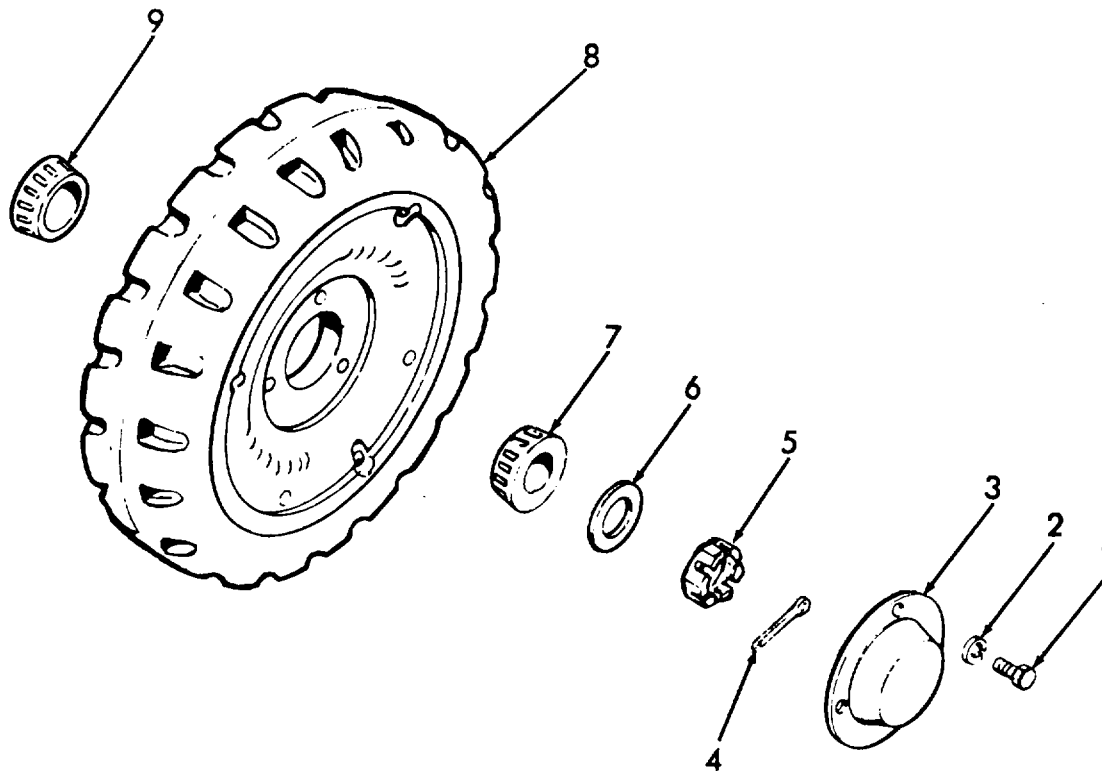
### **4-37. Wheels and Tires**

a. General. The front or drive wheel assemblies consist of the wheel and brake drum, tire, wheel bearings, and a ring or bull gear. The rear or steering wheel assemblies consist of the wheel, tire and wheel bearings.

b. Front Wheel Removal.

(1) Raise the front of the truck until the wheel clears the floor. Tilt mast to full backward position. Place a wooden block under the mast assembly and tilt mast forward to vertical position. Movement of mast will elevate drive wheel clear of the floor.

(2) Refer to figure 4-24 and remove front drive wheel as follows:



1. Screw
2. Lock washer
3. Hub cap
4. Cotter pin
5. Wheel nut
6. Washer
7. Outer wheel bearing
8. Wheel and tire assembly
9. Inner wheel bearing

Figure 4-24. Drive wheel, exploded view.

(a) Remove three screws (1) and lock washers (2) and remove hub cap (3).

(b) Remove cotter pin (4) from wheel nut (5) and remove wheel nut and washer (6) from axle.

(c) Remove outer wheel bearing (7) from wheel and axle.

(d) Remove wheel assembly (8). Remove wheel carefully to prevent damage to brake shoes or drums.

(e) Remove inner wheel gearing (9).

c. Inspection.

(1) Inspect wheel and tire (8, fig. 4-24) for damage. Check teeth on ring or bull gear inside wheel for damage.

(2) Inspect brake drum for cracks, flat spots, excessive wear, and damage.

(3) Inspect bearings (7 and 9) and bearing cups in wheel for wear or damage.

(4) Clean bearings and bearing surfaces with cleaning compound, solvent (Fed. Spec. P-D-680).

d. Front Wheel Installation. Refer to figure 4-24 and install the wheel assembly as follows:

(1) Repack the outer and inner bearings (7 and 9) with grease (GAA).

(2) Install inner bearing (9) on axle spindle, with tapered side out.

(3) Install wheel assembly (8) on bearing and spindle. Hold wheel assembly in place and install

outer wheel bearing (7) on spindle and inside wheel tapered side in.

(4) Install wheel nut (5) and washer (6) on spindle. Tighten nut and as nut is tightened rotate wheel under power. Elevate truck. Block other wheel to prevent turning. Continue tightening nut until heavy drag is felt while rotating wheel. Tighten nut to 50 foot-pounds.

(5) Slowly loosen nut to align cotter pin hole. Be sure wheel rotates freely and no bearing end play is

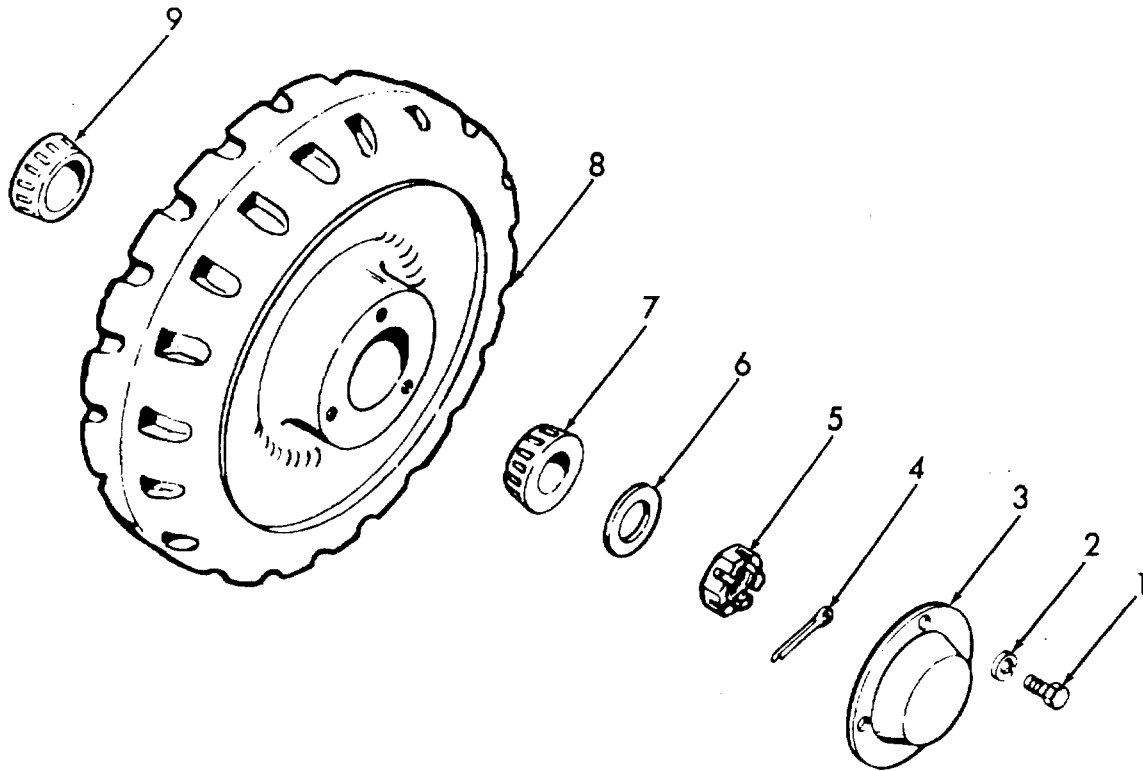
evident.

(6) Install cotter pin (4) to secure nut.

(7) Install hub cap (3) and secure with three screws (1) and lock washers (2).

(8) Tilt mast backward to lower wheel to floor. Remove block from under mast.

e. Rear Wheel Removal. Use a suitable jack and raise rear of truck until wheels clear the floor. Block front wheel to prevent truck from rolling. Refer to figure 4-25 and remove rear wheel as follows:



1. Screw
2. Lock washer
3. Hub cap
4. Cotter pin
5. Wheel nut
6. Washer
7. Outer wheel bearing
8. Wheel and tire assembly
9. Inner wheel bearing

Figure 4-25. Rear wheel, exploded view.

(1) Remove three screws (1) and lock washers (2) and remove hub cap (3).

(2) Remove cotter pin (4) from wheel nut (5) and remove wheel nut and washer (6).

(3) Remove outer wheel bearing (7) and wheel assembly (8) from axle spindle.

(4) Remove inner wheel bearing (9).

f. Inspection. Refer to b. above to inspect and clean wheel assembly. Repack wheel bearings with grease (GAA).

g. Rear Wheel Installation. Refer to figure 4-25 and install rear wheel as follows:

(1) Install rear wheel bearing (9) on spindle, tapered side out. and install wheel assembly (8) over bearing.

(2) Hold wheel in place and install outer

wheel bearing (7), tapered side in, in wheel.

(3) Refer to c. above to adjust wheel bearings, Rotate wheels by hand. Torque wheel nuts (5) to 50 foot-pounds, rotating wheel six times in each direction. Back off nut and retorque nut to 25 foot-pounds. Install cotter pin (4).

(4) Install hub cap (3) and secure with three screws (1) and lock washers (2).

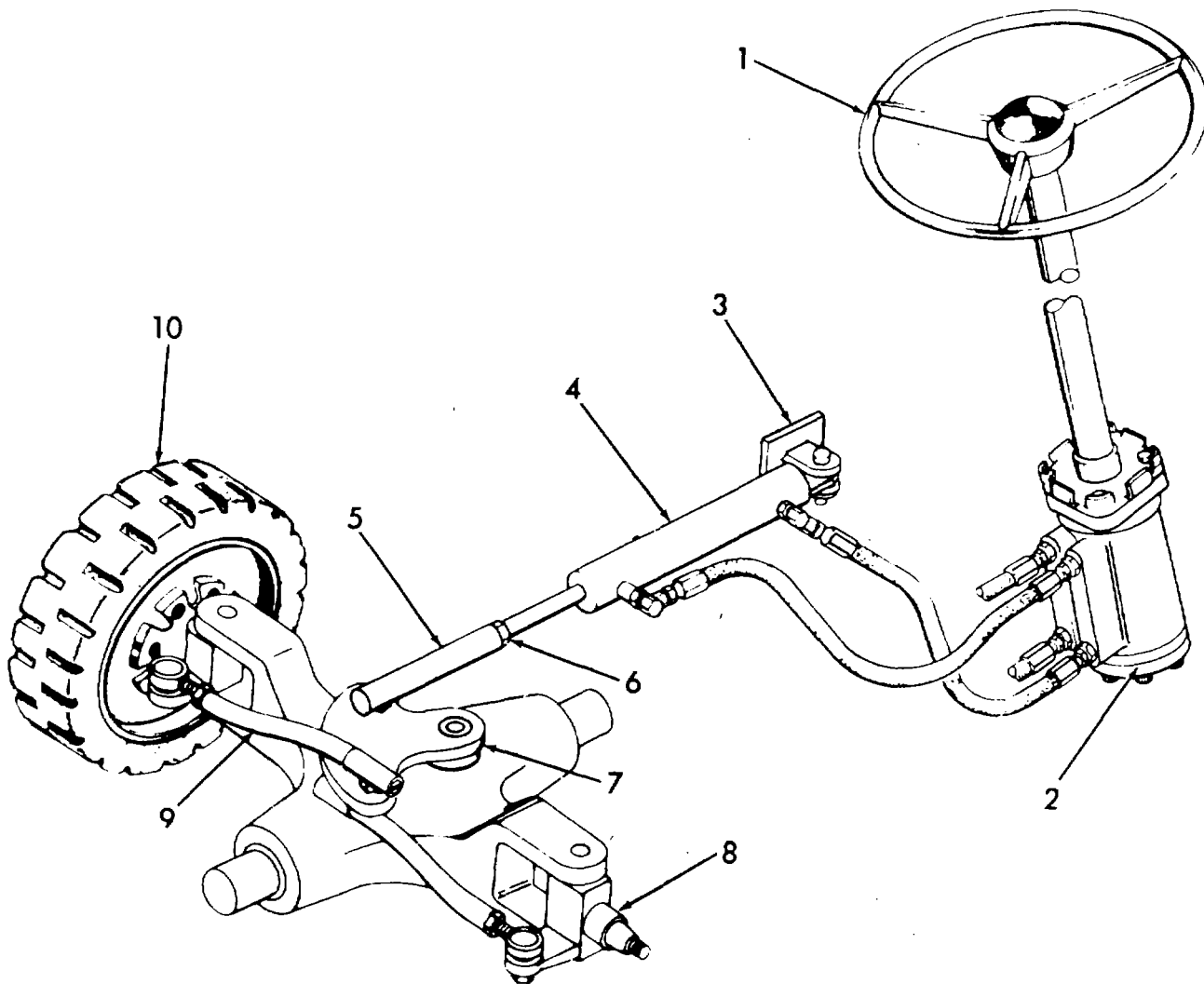
(5) Lower jack and remove jack from truck.

## Section XI. STEERING SYSTEM

### 4-38. General

a. The steering system (fig. 4-26) is hydraulically operated. Main components are the steering wheel,

steering column, power steering unit, steering cylinder, drag link and tie rods.



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- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>1. Steering wheel</li> <li>2. lower steering unit</li> <li>3. Cylinder anchor</li> <li>4. Steering cylinder</li> <li>5. Drag link</li> </ul> | <ul style="list-style-type: none"> <li>6. Lock nut</li> <li>7. Pivot arm</li> <li>8. Spindle</li> <li>9. Tie rod</li> <li>10 Rear wheel</li> </ul> |
|---|--|

Figure 4-26. Steering system.

b. A separate electric motor driven pump supplies hydraulic oil under pressure to the steering unit (2, fig. 4-26). Rotation of the steering wheel (1) allows oil pressure to flow to the steering cylinder (4). The cylinder piston moves under the pressure. Attached to the piston is a rod which is in turn connected to the drag link (5). Movement of the rod and drag link rotates the pivot arm (7). The two tie rods (9) are connected to the pivot arm and wheel spindles (8). The tie rods move the spindles which mount the wheels (10). Movement of the spindles

turns the wheels in the direction desired.

**4-39. Steering Wheel**

a. *Removal.*

(1) Refer to paragraph 4-25 and remove the horn button.

(2) Remove lock wire (7, fig. 4-9) and screws (8) and remove base plate (9).

- (3) Remove nut (10) and lock washer (11);
- (4) Using a suitable puller, pull steering wheel (12) from steering gear shaft.

b. *Installation.*

- (1) Install steering wheel (12, fig. 4-9) on steering wheel shaft. Secure wheel with nut (10) and lock washer (11).
- (2) Install base plate (9) and secure with screws (8) and lock wire (7).
- (3) Refer to paragraph 4-25 and install horn button.

**4-40. Steering System Adjustments**

- a. *General.* Adjustments required consist of wheel toe-in, drag link and spindle stops.

b. *Toe-In.*

- (1) Place a jack under rear of truck and raise truck far enough to provide working clearance. Place blocks under truck to hold in raised position. Block front wheels to prevent movement.

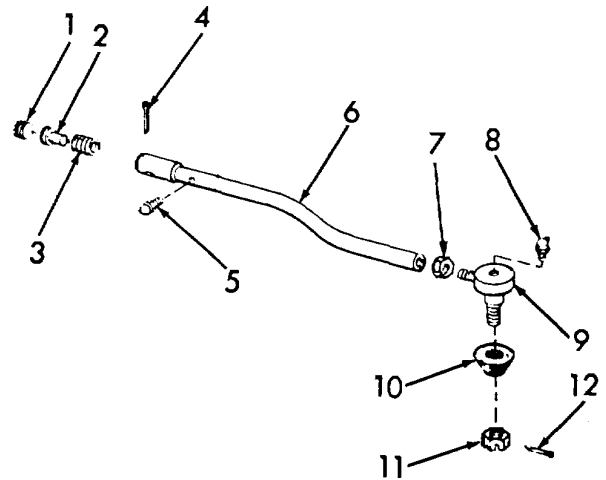
- (2) Remove toe and floor plates to gain access to steering cylinder.

- (3) Turn master switch on and, sitting in operator's seat, turn wheels to bring them into position parallel with frame.

- (4) Measure the distance between the centers of the wheel treads at the rear of the tires and then at the front of the tires.

- (5) If measurements are the same, no adjustment is required. If measurements are unequal, adjust the tie rods.

- (6) Remove cotter pin (12, fig. 4-27) and nut (11). Remove boot (10) and tap ball socket (9) from wheel spindle.



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- 1. Adjusting plug
- 2. Ball seat
- 3. Spring
- 4. Cotter pin
- 5. Lubrication fitting
- 6. Tie rod tube
- 7. Nut
- 8. Lubrication fitting
- 9. Ball socket
- 10. Boot
- 11. Nut
- 12. Cotter pin

Figure 4-27. Tie rod, exploded view.

(7) Loosen nut (7) and adjust length of rods by turning ball socket in or out on tube to bring both measurements equal. Torque nut (7) to 50 to 70 foot-pounds to secure adjustment.

(8) Install ball socket (9) on spindle and secure with boot (10), nut (11) and cotter pin (12).

c. *Spindle Stops.* Two stop screws (fig. 4-28), secured by lock nuts extend through the axle and prevent extreme inward pivoting of spindles and to prevent piston from bottoming in steering cylinder.

(1) Turn master switch on the turn wheels full right and full left. Measure clearance between tire and steering axle housing at both wheels. Clearance should be a minimum of one-half inch.

(2) Loosen lock nut (fig. 4-28) and adjust stop screw to stop spindle with proper clearance. Hold stop screw and tighten lock nut to secure adjustment.

d. *Drag Link Adjustment.*

(1) Position the rear wheel straight ahead and parallel with the frame.

(2) Remove cotter pin (2, fig. 4-29) from the end of drag link (3) and loosen adjusting plug (1).

(3) Lift drag link from ball stud on pivot arm (10).

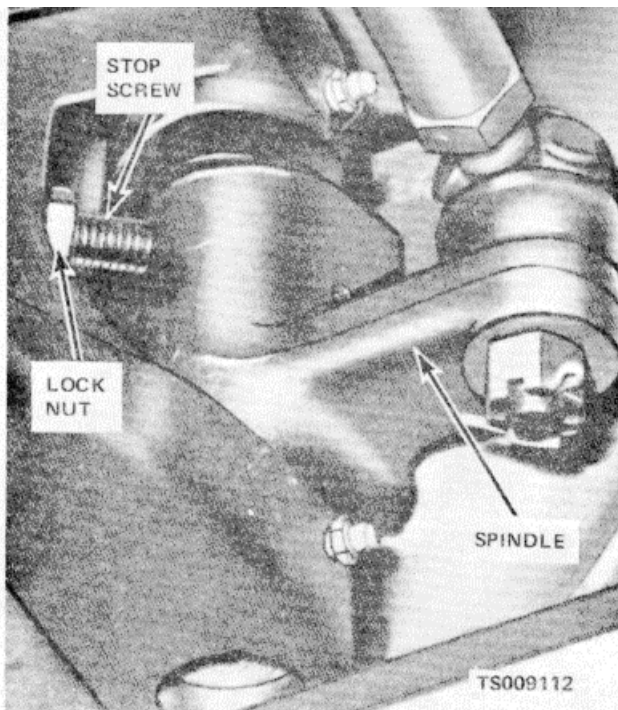
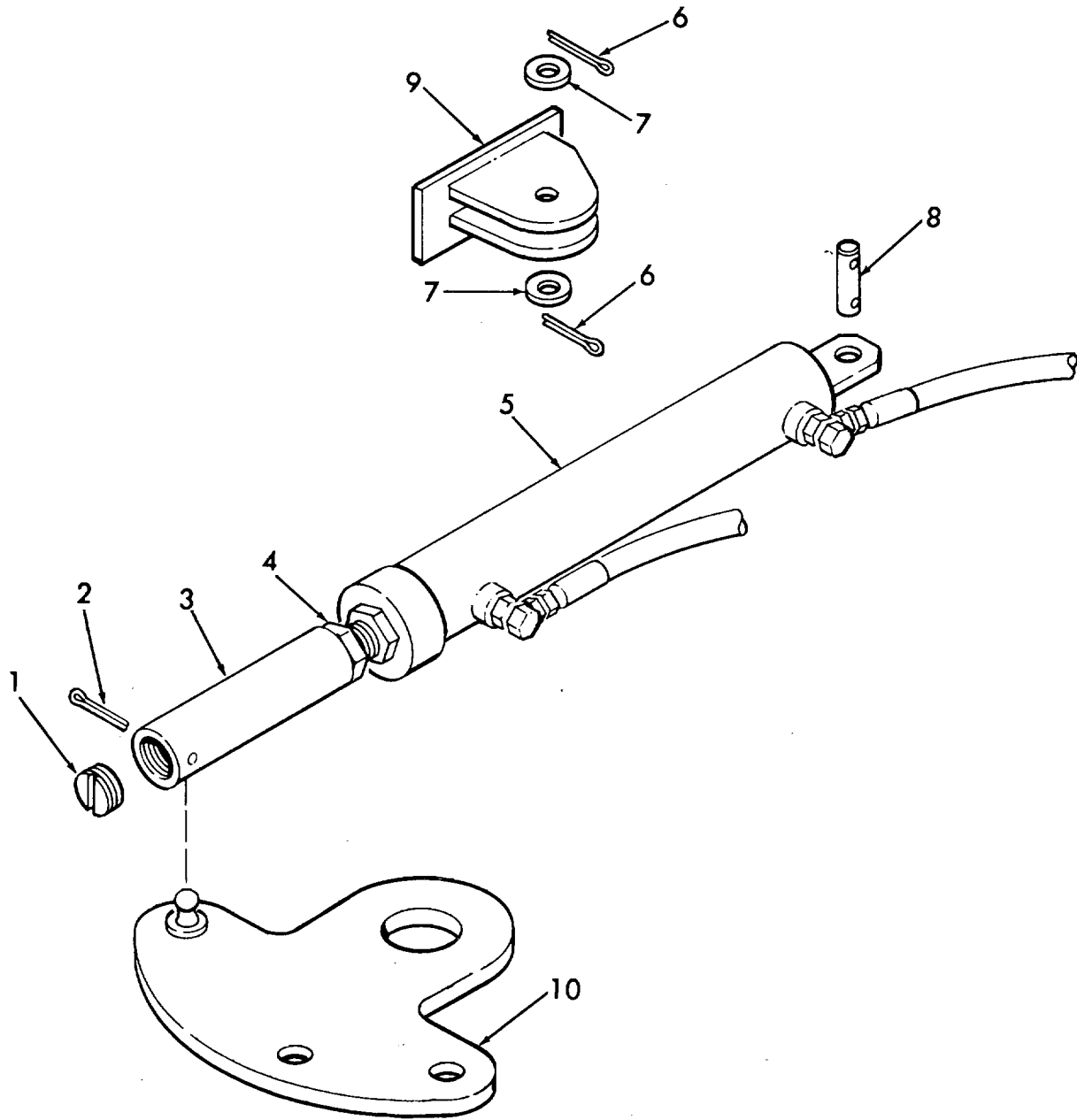


Figure 4-28. Spindle stop screw adjustment.



- |                      |               |
|----------------------|---------------|
| 1. Adjusting plug    | 6. Cotter pin |
| 2. Cotter pin        | 7. Washer     |
| 3. Drag link         | 8. Pin        |
| 4. Lock nut          | 9. Bracket    |
| 5. Steering cylinder | 10. Pivot arm |

Figure 4-29. Steering cylinder and drag link, exploded view.

(4) Position the cylinder plunger rod half way out of the steering cylinder (5). Loosen lock nut (4) securing drag link to cylinder.

(5) Turn drag link in or out on cylinder rod. Place wrench on flats on cylinder plunger rod to hold rod while adjusting ball socket. Adjust drag link until it is centered over pivot arm ball stud with the rear wheels in a straight ahead position and parallel with the frame.

(6) Connect drag link (3) to ball stud. Tighten adjusting plug to secure drag link on stud. Install cotter pin (2) in drag link to secure adjusting plug.

e. *Adjusting Check.*

(1) Remove the blocks and lower rear of truck to rest on wheels.

(2) Sit in operator's seat and turn master switch on. Turn steering wheel to full left and full right positions. Wheel spindles should contact stop screws in each direction and cylinder plunger rod should extend and retract an equal distance.

**4-41. Steering Cylinder**

a. *Inspection.* Lift and block truck as described above. Remove floor and toe plates to gain access to steering cylinder. Remove drip pan. Inspect steering cylinder and hoses for leaks and damage. Replace cylinder if necessary.

b. *Removal, -*

(1) Disconnect hoses from steering cylinder

(5, fig. 4-29). Cap hoses and fittings to prevent entrance of foreign material into hydraulic system.

(2) Remove cotter pin (2) and loosen adjusting plug (1) and lift drag link from pivot arm ball stud.

(3) Support cylinder and remove cotter pins (6) and washers (7). Tap or drive pin (8) from bracket (9) and cylinder.

(4) Remove cylinder from truck. Loosen lock nut (4) and remove drag link from cylinder.

c. *Installation.*

(1) Install drag link (3, fig. 4-29) and lock nut (4) on the threaded end of cylinder rod. Do not tighten lock nut.

(2) Install cylinder and drag link in truck with cylinder in line with hole in bracket (9). Secure cylinder to bracket with pin (8), washers (7) and cotter pins (6).

(3) Refer to paragraph 4-40 above and adjust drag link and cylinder rod extension to position wheel correctly.

(4) Remove caps from cylinder and hoses and connect hoses to cylinder fittings.

(5) Check steering operation as described in paragraph 4-40.

(6) Check hydraulic connections for leaks.

(7) Install toe and floor plates and drip pan.

**Section XII. FRAME AND SEAT**

**4-42. General**

a. The welded frame mounts the components of the truck. Truck components are enclosed with sheet metal covers. The battery compartment has a hinged cover.

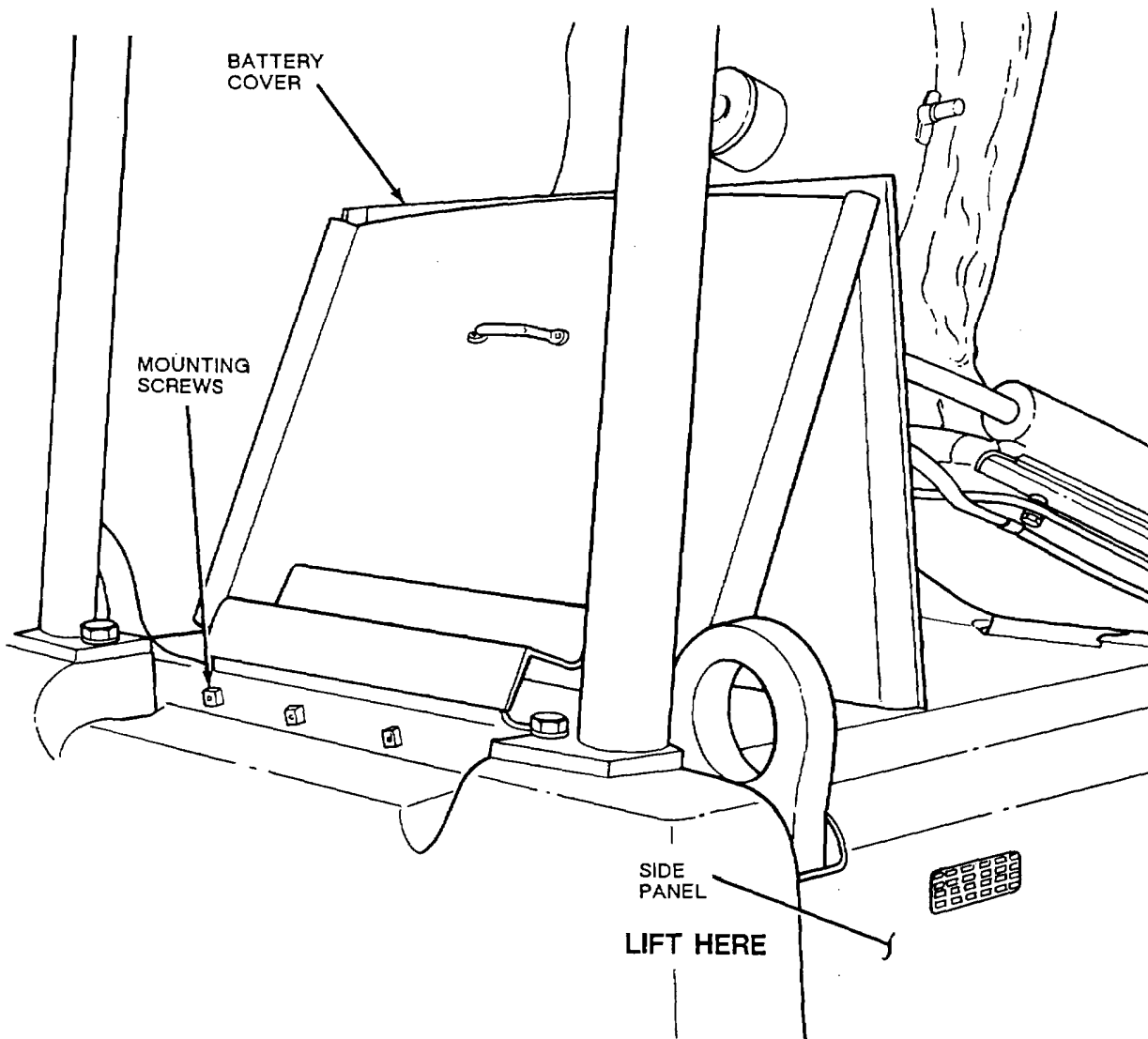
b. A seat assembly is mounted just forward of the battery compartment. The seat is hinged to operate the parking brake linkage and when it is unoccupied it tilts up and forward.

c. An overhead guard to protect the operator is mounted on the four corners of the frame.

**4-43. Battery Compartment Covers**

a. *Removal.* Inspect battery covers for dents, breaks and drainage. Replace if necessary.

(1) Tilt seat forward and remove four screws and nuts securing battery cover (fig. 4-30) to truck and remove cover.



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Figure 4-30. Battery compartment covers, removal and installation.

(2) Remove battery compartment side panels (fig. 4-30) by using hand holes and lifting panels from truck.

b. *Installation.*

(1) Install side panels (fig. 4-30) in position on truck.

(2) Install hinged battery cover on truck and secure front hinge with four screws and nuts.

#### 4-44. Floor plates

a. *General.* To gain access to components the floor and toe plates may have to be removed.

b. *Removal.* Inspect floor and toe plates for dents and damage. Replace if necessary.

(1) Remove two screws and remove floor plate (fig. 4-31) from truck.

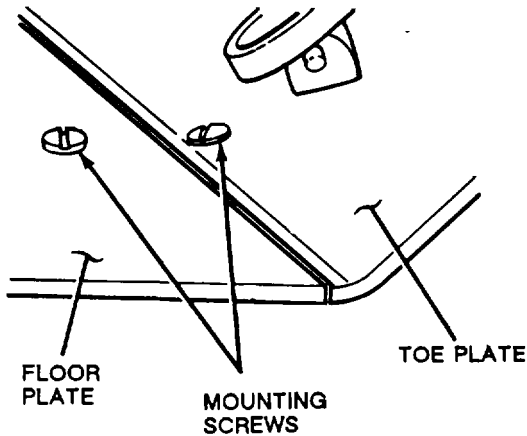


Figure 4-31. Floor and toe plates, removal and installation.

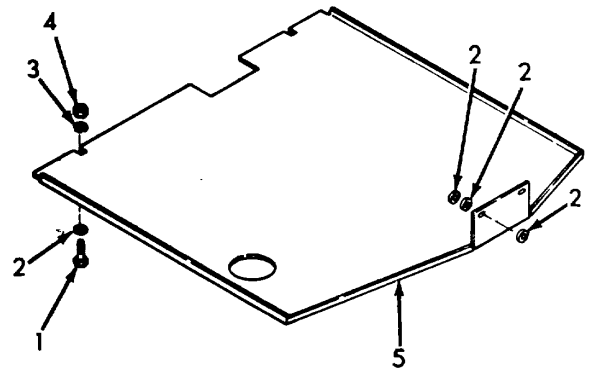


Figure 4-31.1. Drip pan, exploded view.

(2) Remove four screws and remove toe plate (fig. 4-31) from truck.

c. *Installation.*

(1) Install toe plate (fig. 4-31) in position on truck and secure with four screws.

(2) Install floor plate (fig. 4-31) on truck and secure with two screws.

**4-44.1 Drip pan**

a. *Removal.*

(1) Refer to figure 4-31.1 and remove four screws (1), eight washers (2), two lock washers (3) and four nuts (4). (2) Remove drip pan (5).

(2) Remove drip pan (5).

b. *Installation.*

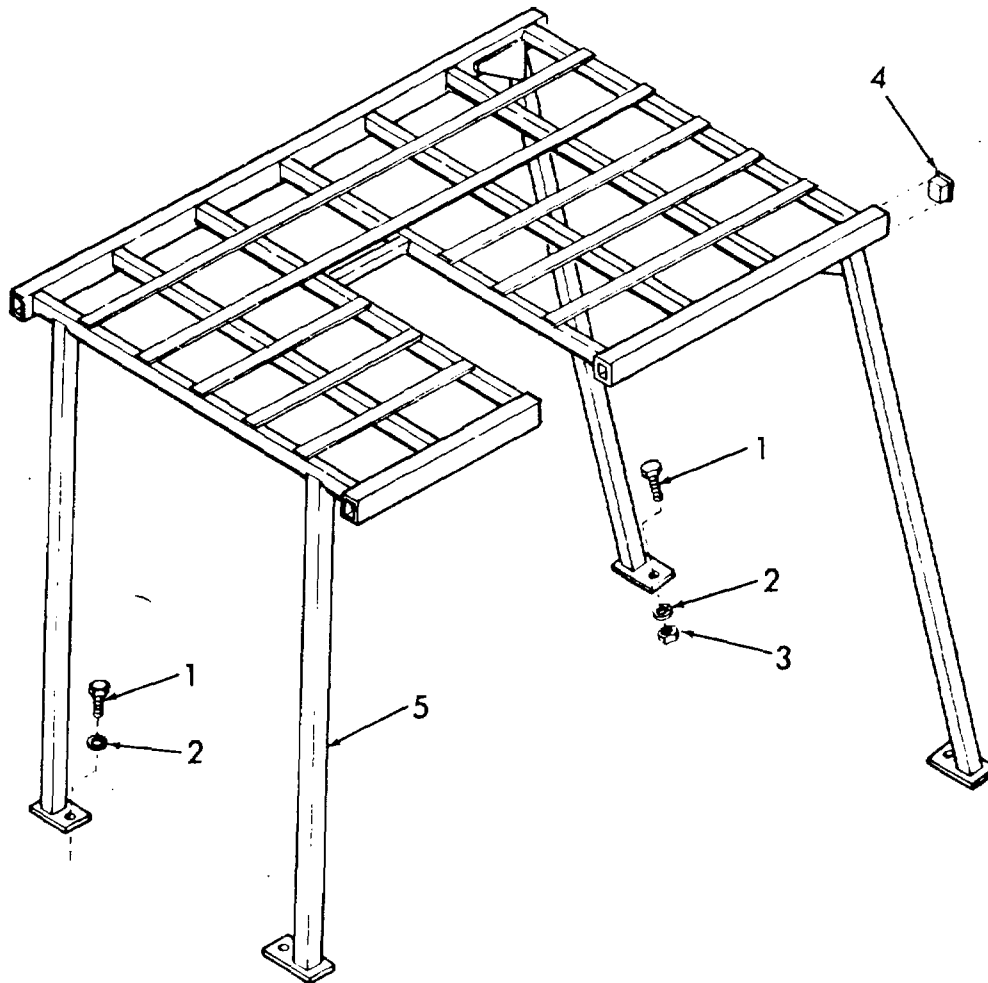
(1) Install drip pan (5) with four screws (1), eight washers (2), two lockwashers (3) and four nuts (4).

**4-45. Overhead Guard**

a. *Removal.*

(1) Attach a suitable hoist to overhead guard and lift guard enough to take strain from mounting screws.

(2) Remove screws (1, fig. 4-32), lock washers (2) and nuts (3) from lower legs of overhead guard.



- 1. Screw
- 2. Lock washer
- 3. Nut
- 4. Plastic plug
- 5. Overhead guard

Figure 4-32. Overhead guard, removal and installation

(3) Carefully lift overhead guard from truck, using hoist.

(4) Check plastic plugs (4) and replace if worn or damaged.

b. *Installation.*

(1) Use a suitable hoist and lift overhead guard (5, fig. 4-32) into position on truck frame.

(2) Secure overhead guard to frame with screws (1), lock washers (2) and nuts (3).

**4-46. Operator's Seat**

a. *Removal.* Inspect seat for tears, rips and damage to cushions and frame. Replace if necessary.

(1) Refer to paragraph 4-24 and disconnect and remove taillight from rear of seat.

(2) Remove lock nuts (1, fig. 4-33) and washers (2) and remove seat assembly (12) from plate (4).

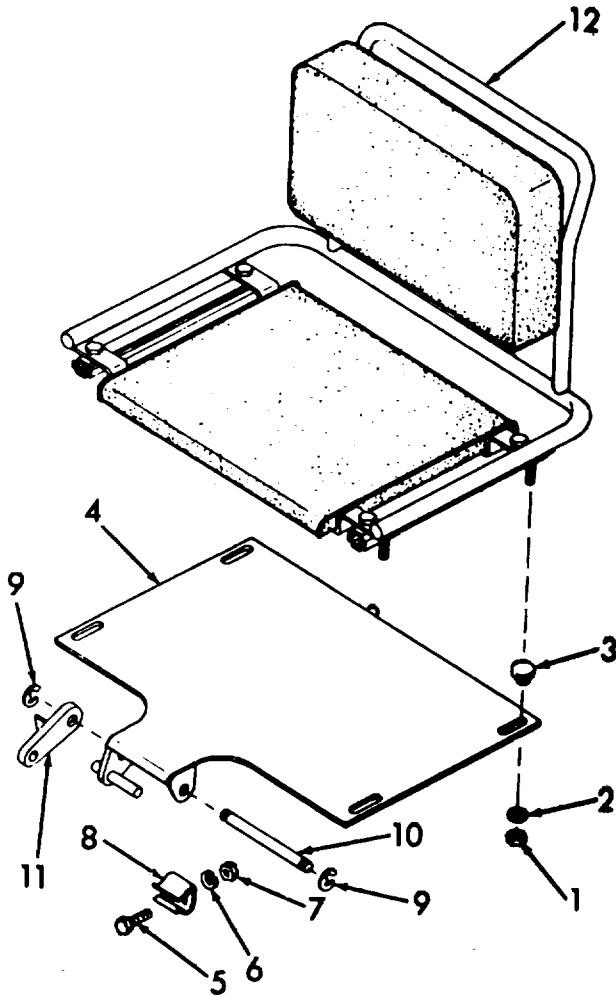
(3) Disconnect seat brake linkage from seat (para 4-31).

(4) Remove retaining rings (9) and shaft (10) and remove plate (4).

b. *Disassembly.* If seat cushions or slides must

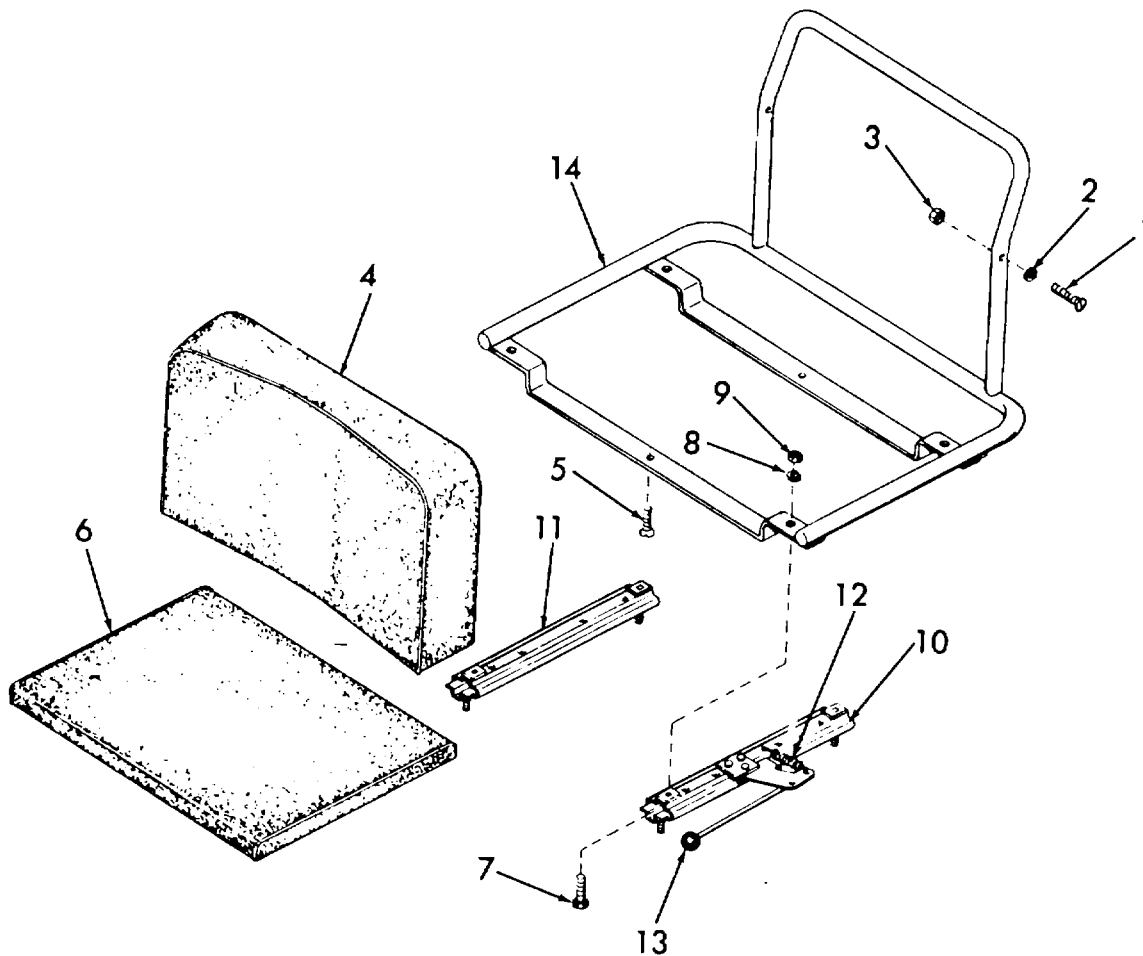
be replaced, disassemble seat as follows:

(1) Remove screws (1, fig. 4-34), washers (2) and nuts (3) and remove back cushion (4) from mat. Remove screws (5) and remove seat cushion (6).



1. Lock nut
2. Washer
3. Rubber bumper
4. Plate
5. Screw
6. Lock washer
7. Nut
8. Clip
9. Retaining ring
10. Shaft
11. Brake link
12. Seat assembly

Figure 4-33. Seat and mounting, exploded view.



- 1. Screw
- 2. Washer
- 3. Nut
- 4. Back cushion
- 5. Screw
- 6. Seat cushion
- 7. Screw
- 8. Washer
- 9. Nut
- 10. Adjustable slide
- 11. Slide
- 12. Spring
- 13. Knob
- 14. Seat frame

Figure 4-34. Seat assembly, exploded view.

(2) Remove screws (7), lock washers (8) and nuts (9) and remove slides (10 and 11) from frame (14).

(3) Check spring (12) for good condition.

c. Assembly.

(1) Install slides (10 and 11, fig. 4-34) on frame (14) and secure with screws (7), lock washers (8) and nuts (9).

(2) Install seat cushion (6) and secure with screws (5).

(3) Install back cushion (4) on frame and secure with screws (1), washer (2) and nuts (3).

d. *Installation.*

(1) Install plate (4, fig. 4-33) on frame and install shaft (10) through plate and brake link (11). Secure shaft with retaining rings (9).

(2) Refer to paragraph 4-31 and connect seat brake linkage to brake link.

(3) Install seat assembly (12) on plate and secure with lock nuts (1) and washers (2).

(4) Refer to paragraph 4-31 and adjust seat brake linkage if necessary.

(5) Refer to paragraph 4-24 and install and connect taillight on rear of seat.

### Section XIII. AXLE ASSEMBLIES

#### 4-47. General

a. The front or driving axle is connected to the drive motor shaft. The shaft drives the differential in the center of the axle. Torque is transmitted to the axles or jackshafts. The pinion on the axle is meshed with a ring or bull gear in the wheel assembly. Rotation of the axles rotates the wheels providing motive power from the truck.

b. The rear or steering axle is mounted on brackets at the front and rear. The spindles pivot on king pins and are actuated by the tie rods extending from a pivot arm mounted at the center of the axle. A power steering unit, controlled by the steering wheel, rotates the pivot arm, through the steering cylinder drag link, in the direction required to turn the wheels.

#### 4-48. Front Axle

a. Service points on the front axle include the breather and drain and level plugs.

b. The breather is located on the right top of the differential housing. Remove breather and clean with cleaning compound, solvent (Fed. Spec. P-D-680) and dry thoroughly. Install breather and tighten securely.

c. The level plug is located at the right front of the axle housing. Remove plug and check level of lubricant.

Oil should be to level of plug hole. Add lubricant as required. Install plug.

d. The drain plug is located at the bottom of the differential housing. Remove level plug. Place a suitable container beneath axle, remove plug, and drain lubricant. Install plug and tighten securely. Fill differential through level plug opening to level of hole. Install level plug.

e. Lubrication of axle pinion and ring or bull gear is accomplished by removing the front wheel. Refer to paragraph 4-37 and remove the front wheels. Clean the pinion and ring or bull gears with solvent and dry thoroughly with compressed air. Lubricate gears with grease (GAA). Fill gear spaces to three-fourths height of teeth with grease. Install front wheels. Check ring or bull gear mounting screws for tightness. Tighten if necessary.

#### 4-49. Rear Axle

a. The rear, or steering axle, requires very little service. Lubricate according to the lubrication order.

b. Check tie rods, axle, steering cylinder and drag link for damage.

c. Check steering action and adjust if necessary (para 4-40).

### Section XIV. HYDRAULIC LIFT COMPONENTS

#### 4-50. General

a. Power to raise, lower and tilt the mast and carriage is supplied by the hydraulic system (fig. 4-35). The carriage can be shifted from side to side hydraulically. Included in the system is a power steering pump and motor, valve and cylinder to steer the lift truck. Hydraulic oil is stored in the reservoir and pumped by the hydraulic pumps to the control valve and steering unit. Manipulation of the control valve levers opens and closes ports to various cylinders providing the motion to lift and

tilt the mast and side shift the carriage.

b. The main components of the hydraulic lift system as illustrated on figure 4-35 are the hydraulic oil reservoir, motor-driven dual hydraulic pump, control valve, filter, lift, tilt and side shift cylinders and hoses and tubes.

c. Power steering components consist of the motor-driven single pump, steering unit valve and steering cylinder. Oil for the steering system is also supplied by the hydraulic reservoir.



**4-51. Hydraulic Pump**

- a. Remove the floor and toe plates and drip pan to gain access to hydraulic pump.
- b. Check pump and motor for secure mounting.
- c. Inspect pump and hose connections for evidence of leaks. Tighten connections if necessary. Replace leaking or deteriorated hoses.
- d. Install drip pan and floor and toe plates.

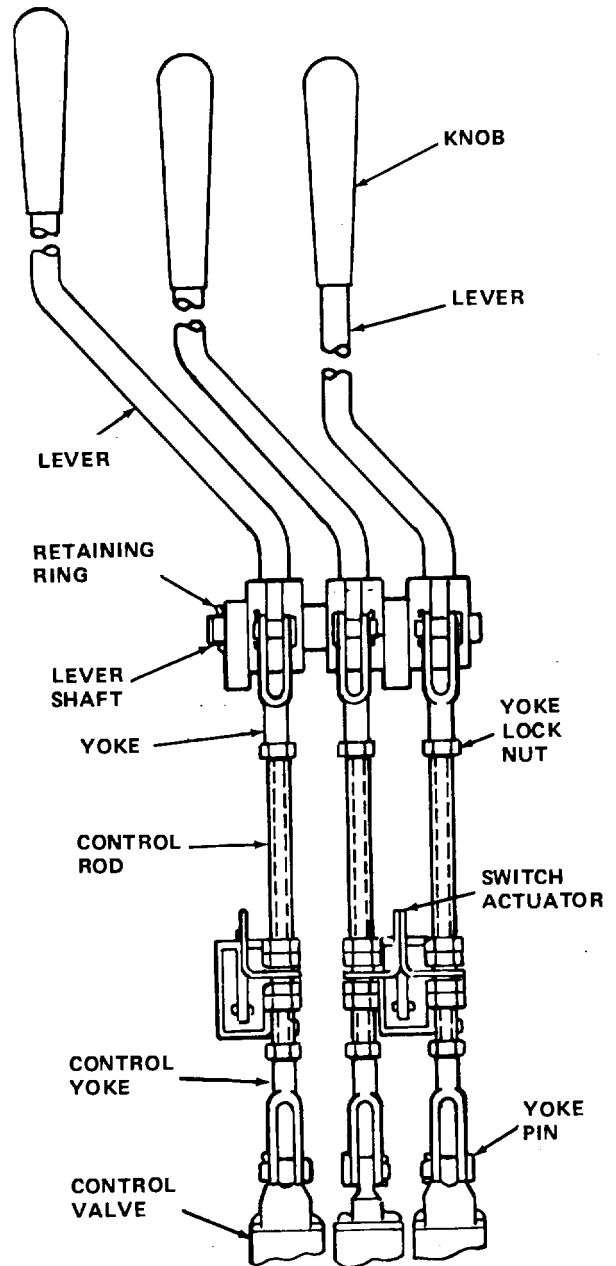
**4-52. Hydraulic Control Valve**

- a. Remove cover from right side below seat to gain access to control valve.
- b. Move levers and check for freedom of operation in valve.
- c. Check hose and tube connections to valve for leaks. Inspect hoses for leakage and deterioration. Replace hoses if necessary.

**4-53. Control Levers and Linkage**

- a. *General.* Three control levers, connected to the control valve by linkages, actuate the lift, tilt and side shift cylinders. Movement of the levers opens ports in the valve to allow hydraulic pressure to flow to the cylinders. Two switches normally open, are mounted on brackets behind the control rods. When a control lever is moved, the actuator contacts and closes the switch and starts the hydraulic pump motor. Remove sheet metal cover to gain access to linkage.

- b. *Lever Adjustment.* Refer to figure 4-36 and adjust linkage as follows:



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Figure 4-36. Hydraulic valve linkage.

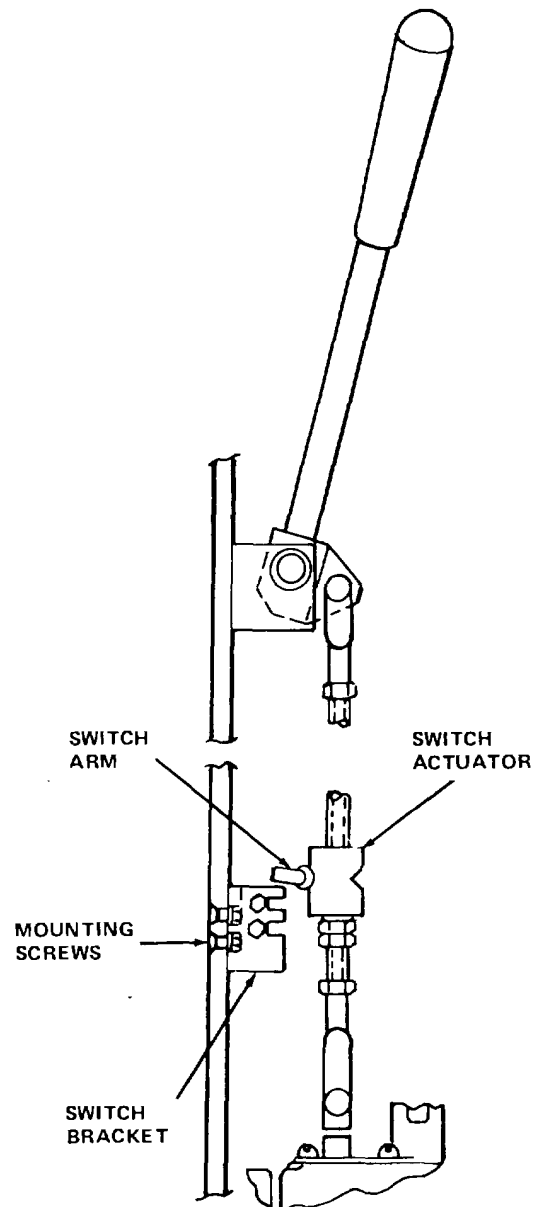
(1) Remove cotter pins and yoke pins attaching yokes to control levers or to control valve.

(2) Loosen yoke lock nuts and adjust yokes on rods to shorten or lengthen linkage.

(3) Linkage should be adjusted to allow the least amount of free play. When adjustment is complete, control valve plungers must be in the neutral position when levers are released.

c. *Switch Adjustment.* Switch actuators must be adjusted to have switch open when plungers are in neutral position. Adjustment must be such that the actuators close the switch with little movement of the control lever. Disconnect battery receptacle. Refer to figure 4-37 and adjust switch and actuators as follows:

(1) Move control levers (fig. 4-36) as if operating lift, tilt and side shift mechanisms. Switches (fig. 4-37) should close with an audible click after little movement.



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Figure 4-37. Hydraulic pump switches installed view.

(2) Loosen switch mounting screws and move switch in or out as required. Switch rollers should just touch grooves in actuators. Tighten switch mounting screws.

(3) Move control levers and check adjustment.

(4) Connect battery receptacle and check operation. Pump should operate before cylinders extend.

d. *Switch Replacement.* If switch requires replacement, disconnect battery receptacle and refer to figure 4-37 and replace switch as follows:

(1) Disconnect wires from switch.

(2) Remove two mounting screws and remove switch.

(3) Install new switch and secure with mounting screws.

(4) Connect wires to switch.

(5) Check and adjust switch (c above) to assure proper operation.

(6) Connect battery receptacle.

e. *Control Lever Replacement.* Refer to figure 4-36 and replace control levers as follows:

(1) To replace lever knobs, remove knob from lever.

(2) To replace lever, remove cotter pin and yoke pin to disconnect lever from yoke.

(3) Remove retaining rings and remove lever shaft from brackets and levers.

(4) Remove levers and spacing washers.

(5) Install new levers, with shaft through brackets, levers and spacing washers. Secure shaft with retaining rings.

(6) Connect yokes to levers with screws and self-locking nuts.

#### 4-54. Tilt Cylinder

a. *General.* Two tilt cylinders, one on each side of the frame, provide power to tilt the mast.

b. *Removal.* Remove the tilt cylinder as follows:

(1) Operate the tilt control lever (fig. 2-1) to tilt the mast forward. Connect a chain hoist to the mast to hold it in a forward position.

(2) Remove floor and toe plates. Remove drip pan from underside of truck. Inspect tilt cylinders for leaks and damage. Replace cylinders if necessary.

(3) Disconnect hose assemblies (fig. 4-38) from elbows in cylinder. Plug hose and cylinder ports.

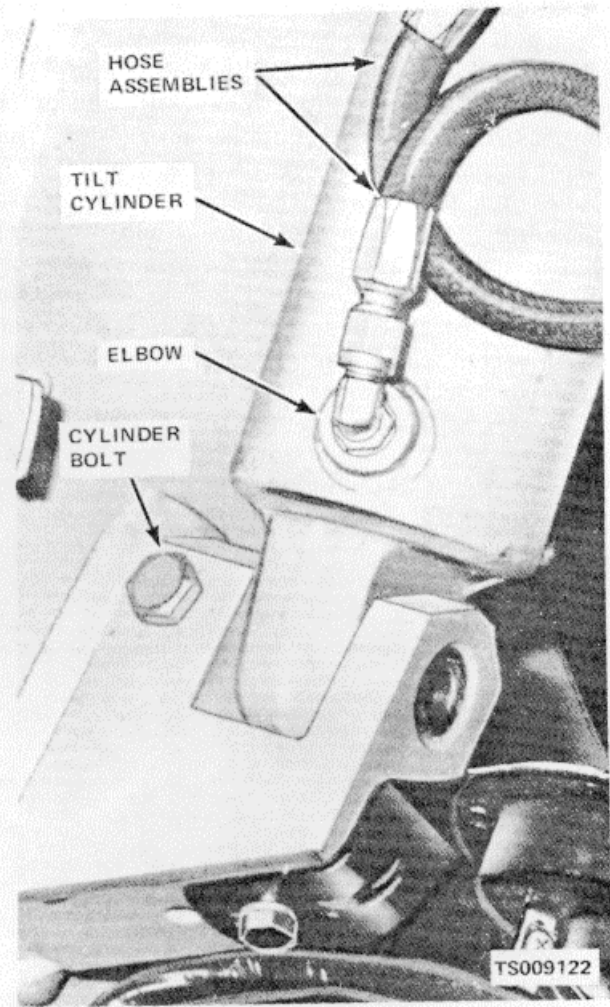


Figure 4-38. Tilt cylinder, installed view.

(4) Support cylinder with a block of wood. Remove cotter pins and remove yoke pin (fig. 4-39) from yoke and mast.

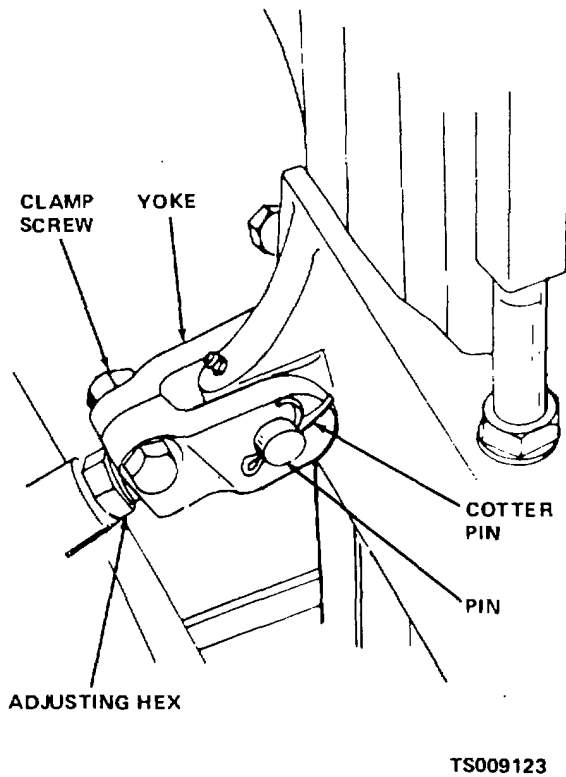
(5) Remove cylinder bolt and self-locking nut (fig. 4-38) securing rear of cylinder to frame.

(6) Remove cylinder from truck.

c. *Installation.* Install tilt cylinder in truck as follows:

(1) Install tilt cylinder (fig. 4-38) in position on truck. Install cylinder bolt (fig. 4-38) through frame and cylinder and secure with self-locking nut.

(2) Install pin (fig. 4-39) through mast and yoke at front of cylinder. Secure pin with two cotter pins (fig. 4-39).



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Figure 4-39. Tilt cylinder yoke, installed view.

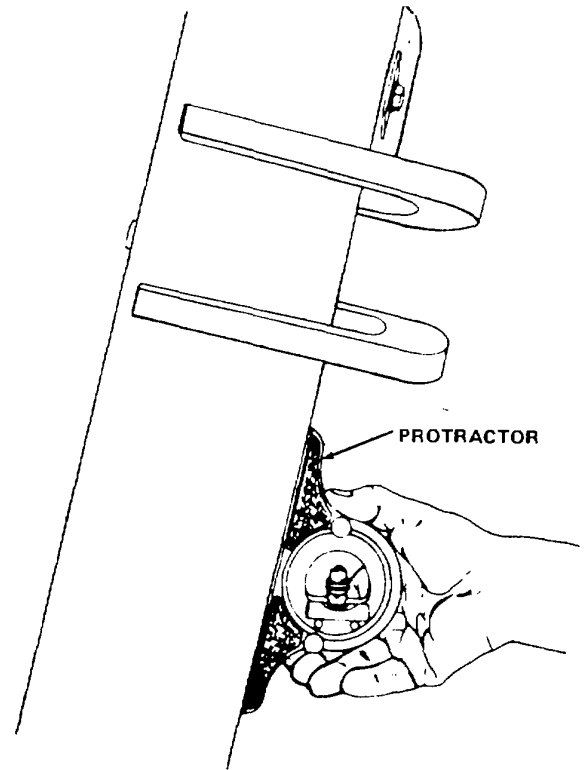


Figure 4-40. Checking degrees of mast tilt.

(3) Remove plugs from hoses and cylinder and connect hose assemblies (fig. 4-38) to tilt cylinder.

d. Tilt Adjustment.

(1) Normal tilt of the mast on model ACE40AEE144 truck is 30 forward and 100 backward. Operate tilt cylinders and check tilt angle with a protractor as shown in figure 4-40. Make sure both cylinders have reached the end of their stroke.

**NOTE**

Truck must be on a flat level surface to check and adjust mast tilt.

(a) Set protractor to measure to tilt. Place protractor against mast as shown. Tilt mast to end of backward stroke. Bubble in protractor must be centered if tilt is correct.

(b) If tilt is not correct, tilt mast to the forward position and loosen clamp screw (fig. 4-39) on yoke at front end of cylinder. Turn adjusting hex on cylinder rod (fig. 4-39) to extend or retract rod as necessary to adjust tilt.

(c) After adjusting, check degree of tilt. Continue adjusting piston rod until 100 of backward tilt is obtained. Tighten clamp screw (fig. 4-39) on yoke.

(d) Forward tilt is automatically adjusted to proper angle when backward tilt is correct.

(e) Install floor and toe plates and drip pan.

(2) Normal tilt of the mast on model ACE40AEE180 trucks is forward and 30 minutes backward. Check and set tilt as described in (1) above to these limits.

**4-55. Flow Regulator**

a. *General.* The flow regulator is connected to the inlet on the cluster cylinder. Flow of fluid back to the valve is regulated to allow a controlled lowering of the mast and carriage.

b. *Removal* Refer to figure 4-41 and remove the flow regulator as follows:

(1) Jack or lift front end of truck. Block in position.

(2) Remove drip pan from beneath truck to gain access to components.

(3) Disconnect hose assembly from regulator. Plug hose and regulator to prevent entrance of foreign material.

(4) Remove flow regulator body and flow regulator from cylinder. Remove elbow from regulator body. Plug port in cylinder.

c. *Installation.* Refer to figure 4-41 and install flow regulator as follows:

(1) Remove plug from cylinder and install flow regulator body in cylinder.

(2) Install flow regulator and elbow in flow regulator body.

(3) Remove plug from hose assembly and connect hose assembly to regulator body.

(4) Install drip pan beneath truck.

(5) Remove blocks and lower truck to ground.

**46-6. Lift Chains**

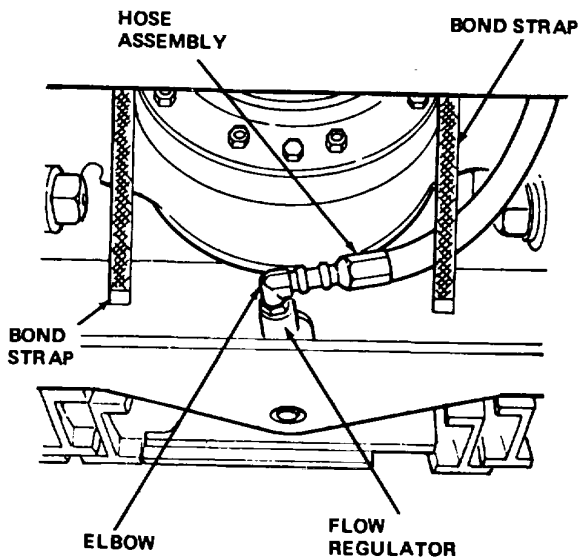
a. *General.* Extension of the two outer cylinders of the cylinder cluster raise the chain bearing and cross head. As the bearing raises the chains, which are anchored on the rear to the cylinder cluster, chains raise the carriage. Chains raise the carriage to the furthest extent of the cylinders.

b. *Removal.*

(1) Lower the mast and carriage to the lowest limit.

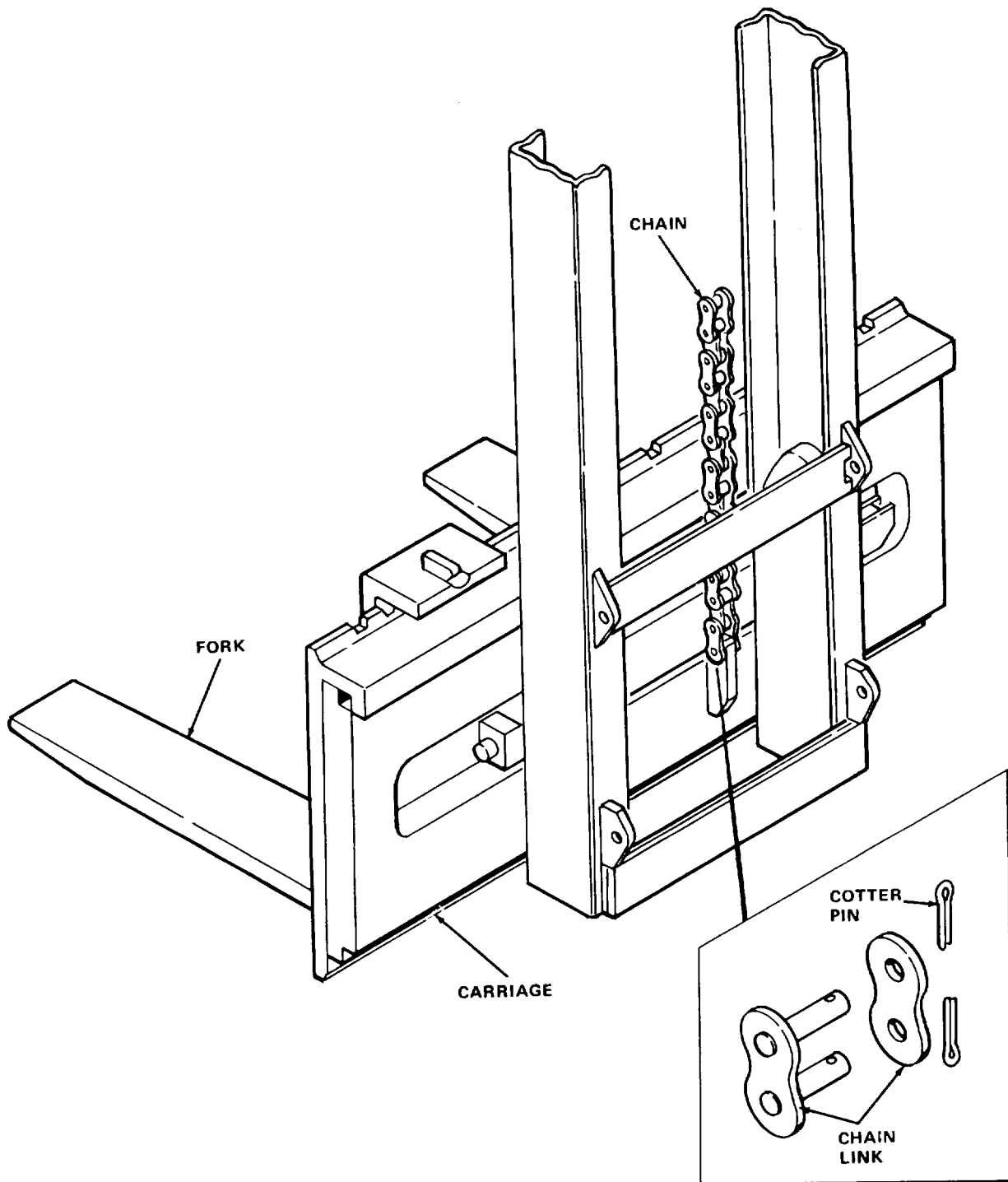
(2) Attach a chain hoist to the carriage and raise slightly to relieve tension on the chains.

(3) Refer to figure 4-42 and remove cotter pins and chain links securing chains to carriage.



TS008125

Figure 4-41. Flow regulator, installed view.



TS0091: 6

Figure 4-42. Lift chains and carriage, installed view.

(4) Refer to figure 4-43 and remove cotter pins and chain links from chain anchors attached to the cluster cylinder. Lift chains over chain bearings and off of cross head and remove chains from mast.

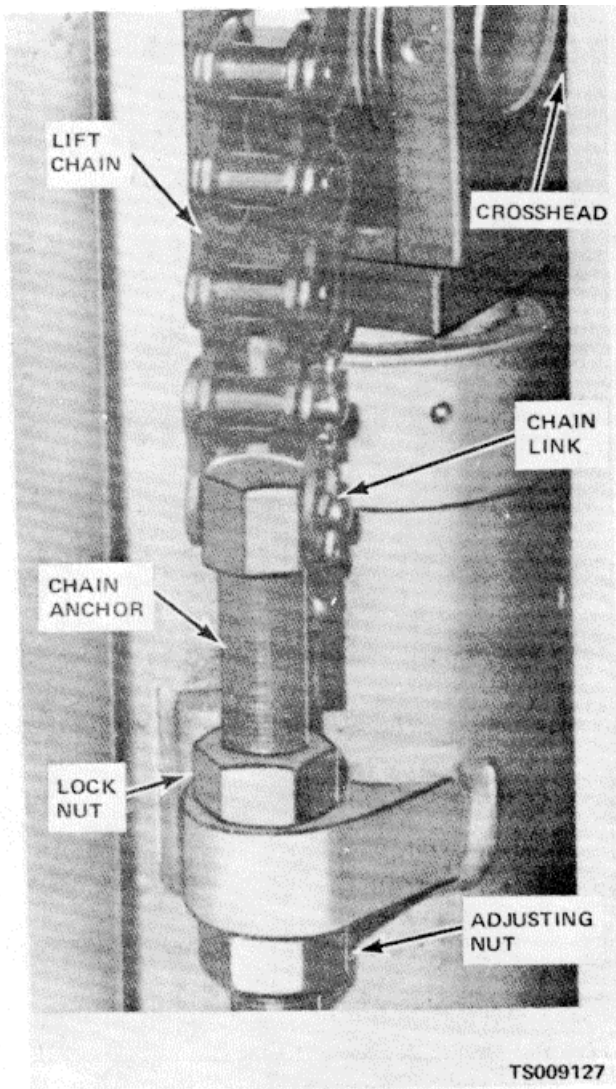


Figure 4-43. Lift chains and chain anchors, installed view.

c. *Cleaning and Inspection.*

- (1) Clean chains with cleaning compound, solvent (Fed. Spec. P-D-680) and dry thoroughly.
- (2) Inspect chains for bent, cracked, or damaged links. Replace defective links.
- (3) Lubricate chains with oil IOE).

d. *Installation.*

- (1) Refer to figure 4-43 and place chains through cross heads and around chain bearings.
- (2) Connect chains to chain anchors with chain links and cotter pins.
- (3) Lower other ends of chains to anchors on carriage (fig. 4-42) and attach chains to anchors with chain links and cotter pins.
- (4) Operate lift mechanism and check chains for bending or uneven operation. If cylinder cluster is fully retracted, carriage should be level and forks should not touch floor. Refer to e below to adjust chains.

e. *Chain Adjustment.*

- (1) Check to see that mast is in a vertical position and that cylinder cluster is fully retracted.
- (2) Loosen locknuts and adjusting nuts (fig. 4-43) on the chain anchors.
- (3) Turn the adjusting nuts to vary chain length. Tighten or loosen the chains until the chains are a snug fit and forks barely clear the floor.
- (4) Tension must be equal on both chains and carriage must be level.
- (5) Tighten locknuts. Check adjustment to see it has not been disturbed.
- (6) Operate lift mechanism and check chain operation.
- (7) Lower carriage and fully retract cylinder cluster. Check for carriage level and forks clearing floor.

**4-57. Side Shift Cylinder**

a. *Removal.*

- (1) Lower carriage and forks to ground. Shift carriage to center position. Shut off truck.
- (2) Disconnect hoses (fig. 4-44) from fittings in cylinder. Cap or plug hoses and fittings to prevent entrance of foreign matter.

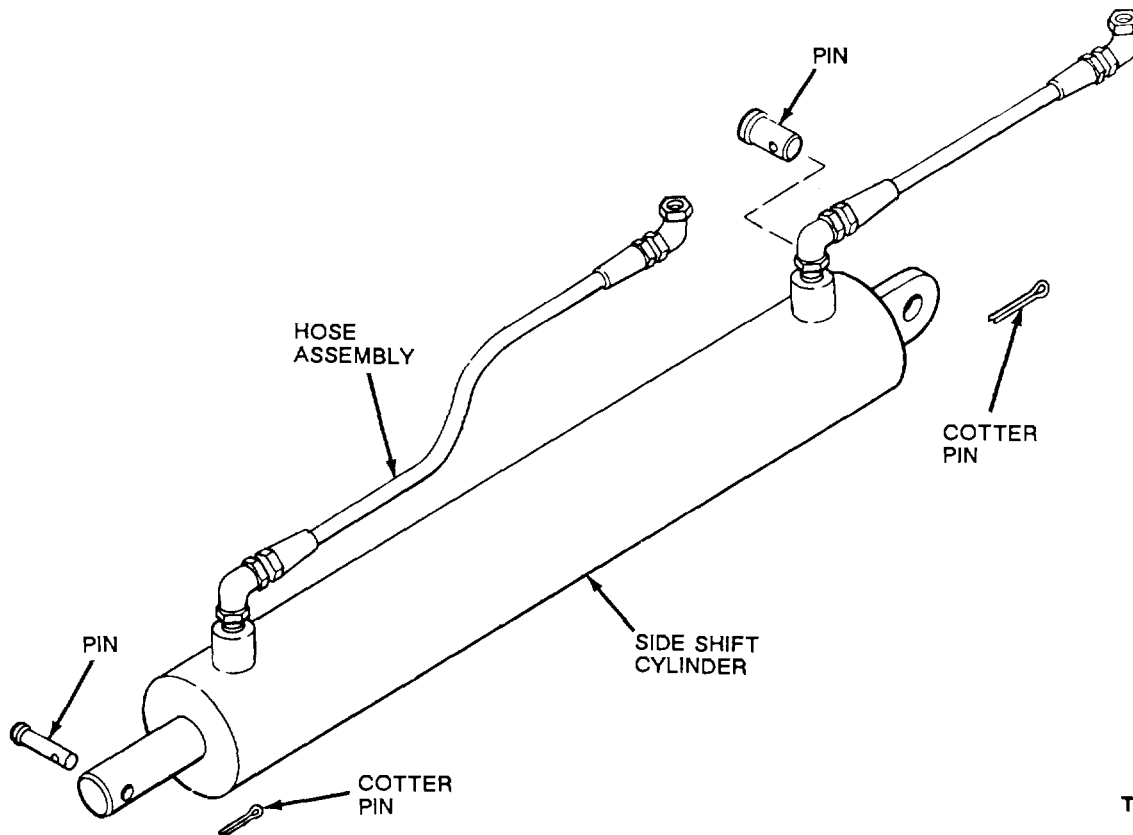


Figure 4-44. Side shift cylinder, exploded view.

(3) Remove cotter pins and cylinder pins from both ends of cylinder and remove cylinder from carriage.

b. *Installation.*

(1) Install cylinder (fig. 4-44) on carriage with ends of cylinder in line with mounting brackets.

(2) Secure cylinder to carriage with cylinder pins and cotter pins.

(3) Remove plugs or caps from cylinder and hoses and connect hoses to cylinder.

(4) Operate side shift mechanism and check hoses and cylinder for leaks.

**4-58. Side Shift Hose Reel**

a. *Removal.*

(1) Unreel hoses (1, fig. 4-45) from reel (2). Disconnect hoses from fittings at end of reel and from junction block (3) inside reel. Cap or plug hoses to prevent entrance of foreign matter.

(2) Remove two long screws (4) and lock washers (5) securing hose reel to mounting block (6) on inner mast.

b. *Disassembly.*

(1) Remove two screws (7) and lock washers (8) and remove swivel block (9) from reel. Remove packings (10).

(2) Work through cutout in drum and remove setscrew (11) and pin (12) and disengage shaft from shaft extension. Remove retaining ring (13) and washer (14). Remove shaft from swivel.

(3) Remove pin (15) from shaft. Remove backup rings (16) and packings (17) from shaft (27). Discard backup rings and packing.

(4) Remove nuts (18) and separate swivel (19) and drum (20). Remove cover (21) from spring and cup (26).

(5) Remove pin (22) and disengage shaft extension (23) from hub (24). Remove hub and spring (25) from cup (26).

c. *Cleaning, Inspection and Repair.*

**WARNING**

Cleaning compound, solvent (Fed. Spec. P-D-680), used for cleaning, is potentially dangerous to personnel and property. Do not use near open flame. Flash point of solvent is 1000F to 1380F (380C to 590C).

(1) Clean all metal parts in cleaning compound, solvent (Fed. Spec. P-D-680) and dry thoroughly.

(2) Inspect shaft for nicks, burrs, wear and damage. Remove burrs and nicks with crocus cloth. Replace shaft if damaged.

(3) Inspect shaft bore in swivel for nicks, burrs, wear and damage. Remove burrs and nicks with crocus cloth. Replace damaged swivels.

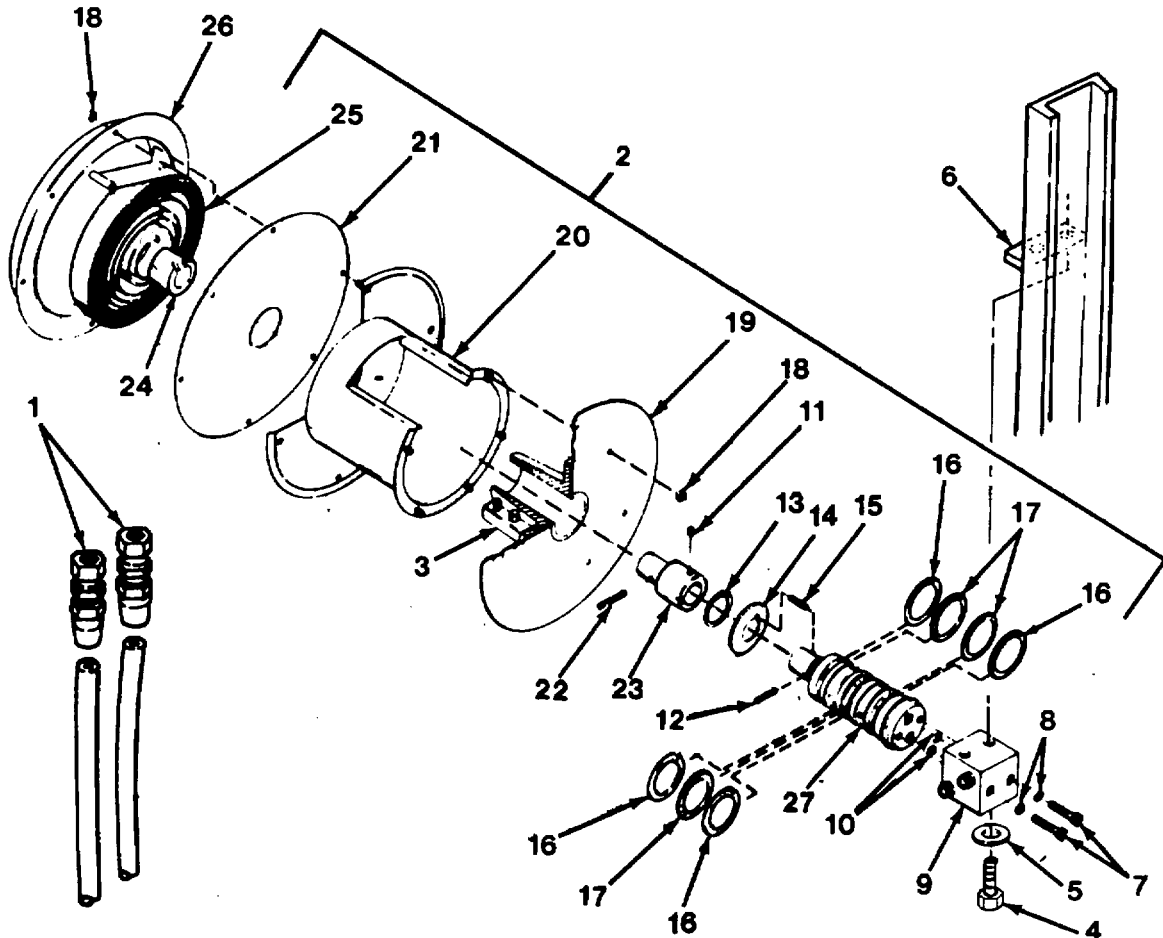
(4) Inspect shaft extension and hub for wear and damage. Replace unserviceable parts.

(5) Inspect spring for cracks and damage. Replace spring if cracked or damaged.

(6) Inspect drum for dents and bends that could interfere with hose. Straighten if possible. Replace damaged drums.

d. *Assembly.*

(1) Install spring (25) in cup (26) and attach upper end to pin in cup. Install hub (24) inside of spring and connect spring to hub. Install shaft extension (23) in hub and secure with pin (22).



- |                   |                    |                 |                     |
|-------------------|--------------------|-----------------|---------------------|
| 1. Hose           | 8. Lock washer     | 15. Drive pin   | 22. Pin             |
| 2. Reel, hose     | 9. Swivel block    | 16. Backup ring | 23. Shaft extension |
| 3. Junction block | 10. Packing        | 17. Packing     | 24. Hub             |
| 4. Screw          | 11. Setscrew       | 18. Nut         | 25. Spring          |
| 5. Lock washer    | 12. Pin            | 19. Swivel      | 26. Spring cup      |
| 6. Mounting block | 13. Retaining ring | 20. Drum        | 27. Shaft           |
| 7. Screw          | 14. Washer         | 21. Cover       |                     |

Figure 4-45. Side shift hose reel, exploded view.

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(2) Install new packings (17) and backup rings (16) in grooves in shaft (27). Install pin (15) in shaft.

(3) Slide shaft into swivel, using care so as not to damage packings. Install retaining washer (14) and retaining ring (13).

(4) Assemble cup, cover (21), drum (20) and swivel (19). End of shaft must enter shaft extension. Install setscrew (11) to secure shaft to extension.

(5) Secure reel parts together with nuts (18). Install new packings (10) in block (9) and secure lock to end of shaft with screws (7) and lock washers (8).

*e. Installation.*

(1) Install hose reel (2) on mounting block (6) on mast and secure hose reel to mounting block with two long screws (4) and lock washers (5).

(2) Remove plugs from hoses (1) and reel and connect hoses to hose reel.

(3) Reel hoses onto reel to position

required.

**4-58.1. Swivel Block**

*a. Removal.*

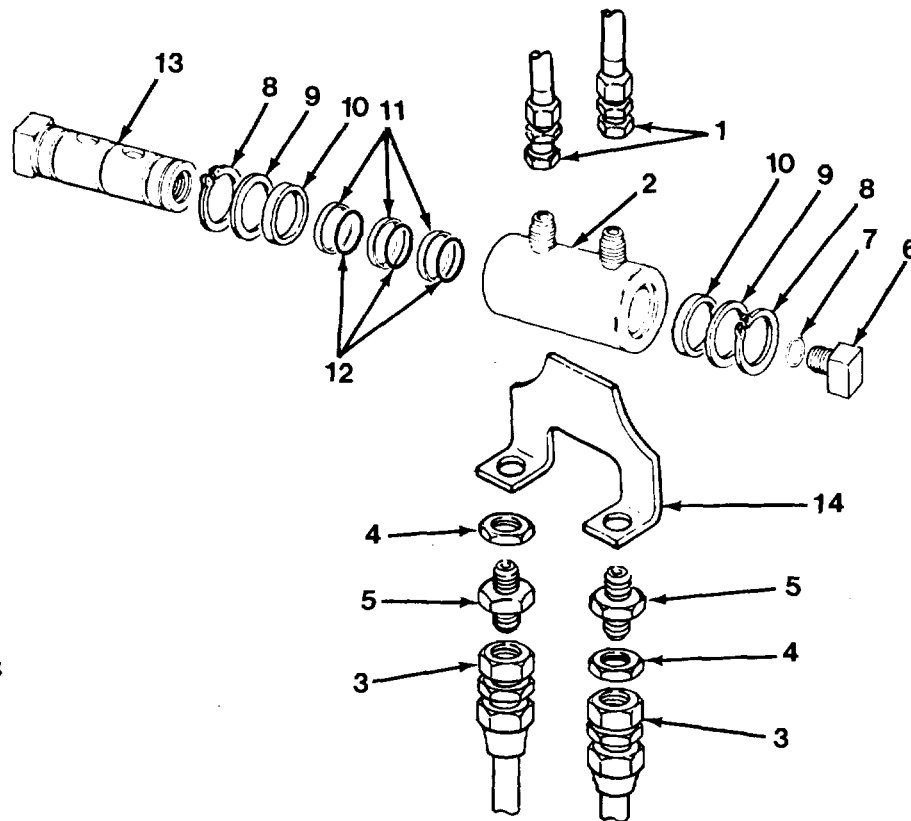
(1) Disconnect side shift hoses (1) from top of swivel block (2) (see figure 4-45.1).

(2) Disconnect side shift cylinder hoses (3) from beneath block.

(3) Remove nuts (4) and remove fittings (5) from swivel block. Remove block from bracket.

*b. Disassembly.*

(1) Remove elbow (6) and packing (7). Discard packing.



- 1. Hose
- 2. Swivel block
- 3. Hose
- 4. Nuts
- 5. Hose fitting
- 6. Elbow
- 7. Packing
- 8. Retaining ring
- 9. Washer
- 10. Seal
- 11. Teflon ring
- 12. Packing
- 13. Shaft
- 14. Housing

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Figure 4-45.1. Swivel block, exploded view.

(2) Remove outer retaining ring (8), washer (9) and felt seal (10). Slide shaft from housing.

(3) Remove teflon rings (11) and packing (12) from shaft. Discard rings and packing. Remove retaining ring (8), washer (9) and felt seal (10) from shaft (13).

*c. Cleaning, Inspection and Repair.*

**WARNING**

Cleaning compound, solvent (Fed. Spec. P-D-680), used for cleaning, is potentially dangerous to personnel and property. Do not use near open flame. Flash point of solvent is 100°F to 138°F (38°C to 59°C).

(1) Clean all metal parts in cleaning compound, solvent (Fed. Spec. P-D-680) and dry thoroughly.

(2) Inspect shaft for burrs, wear and damage. Remove burrs with crocus cloth. Replace damaged or worn shaft.

(3) Inspect bore of housing for burrs, wear and damage. Remove burrs with crocus cloth. Replace worn or damaged housing.

(4) Replace washer, felt seals, backup rings and packing contained in parts kit.

d. *Assembly.*

(1) Install retaining ring (8) in groove in shaft. Install new washer (9) and felt seal (10) against retaining ring.

(2) Install new teflon rings (11) and packings (12) in grooves in shaft. Carefully install shaft in swivel block (2). Do not damage packings and teflon rings.

(4) Install new felt washer (10) and washer (9) on shaft and secure with retaining ring (8).

(5) Use a new packing (7) and install elbow (6) in shaft.

(6) Rotate shaft. Shaft should rotate freely with a slight drag.

e. *Installation.*

(1) Install swivel block (2) on bracket (14) attached to carriage, with elbow and end of shaft extending down through bracket.

(2) Install nuts (4) and fittings (5) in swivel block to secure block to bracket.

(3) Connect side shift hoses (1) to top of swivel block. Connect side shift cylinder hoses (3) to fittings (5).

**4-59. Hydraulic Reservoir Breather**

a. *Removal.*

(1) Remove floor and toe plates to gain access to hydraulic reservoir.

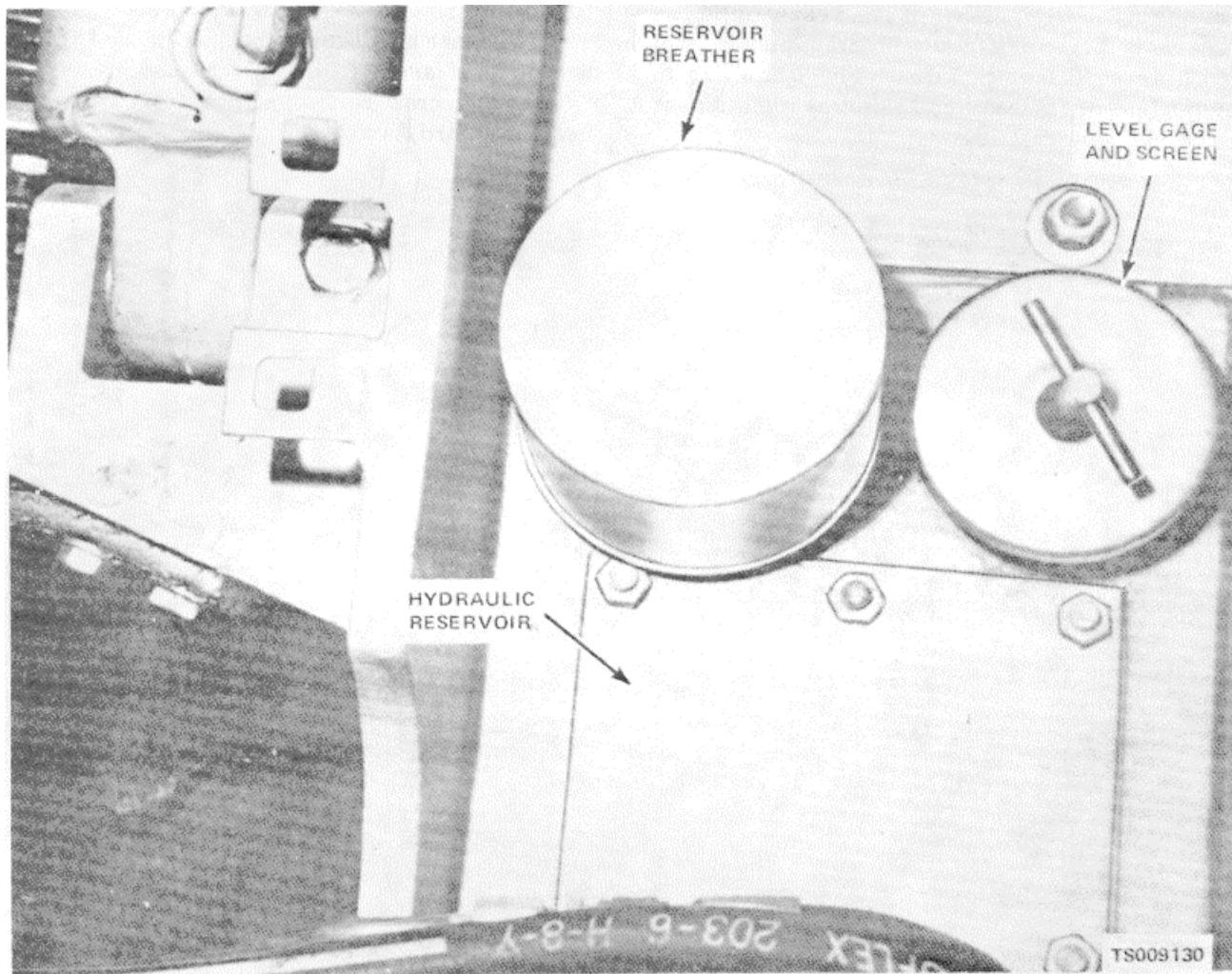


Figure 4-46. Hydraulic reservoir.

(2) Remove breather (fig. 4-46) from hydraulic reservoir.

(3) Check breather for damage. If breather is damaged, replace breather.

b. *Installation.*

(1) Install breather in place on reservoir.

(2) Install floor and toe plates.

#### 4-60. Hydraulic Reservoir Inlet Screen

a. *Removal.*

(1) Remove floor and toe plates to gain access to reservoir.

(2) Remove hydraulic reservoir gage (fig. 4-46) from reservoir.

(3) Remove screen from below gage.

(4) Clean screen in cleaning compound, solvent (Fed. Spec. P-D-680) and dry thoroughly.

b. *Installation.*

(1) Install screen in hydraulic reservoir gage filler pipe.

(2) Install hydraulic reservoir gage (fig. 4-46) in reservoir.

(3) Install floor and toe plates.

#### 4-61. Hydraulic Oil Filter

a. *General.* The hydraulic oil filter is mounted on a bracket on the frame below the seat. All return oil from the hydraulic system and steering system flows through the filter before returning to the reservoir. A filter element indicator (fig. 4-48) is mounted on a bracket above the filter. Pressure of the oil passing through the filter registers on the indicator. A white indicating line in the indicator is moved by the pressure. If the

indicating line is in line with any portion of the green band on the indicator, the filter element is filtering properly. When the white indicating line is in line with any portion of the yellow band the element is becoming contaminated but is still providing sufficient filtration. The white line in any portion of the red band requires replacement of the element cartridge.

b. *Service.* Service of the filter consists of

replacing the filter element cartridge.

(1) Remove sheet metal cover to gain access to the filter.

(2) Place a suitable container below the filter to catch oil as cartridge is removed.

(3) Unscrew cartridge (fig. 4-47) from filter head. Discard cartridge.

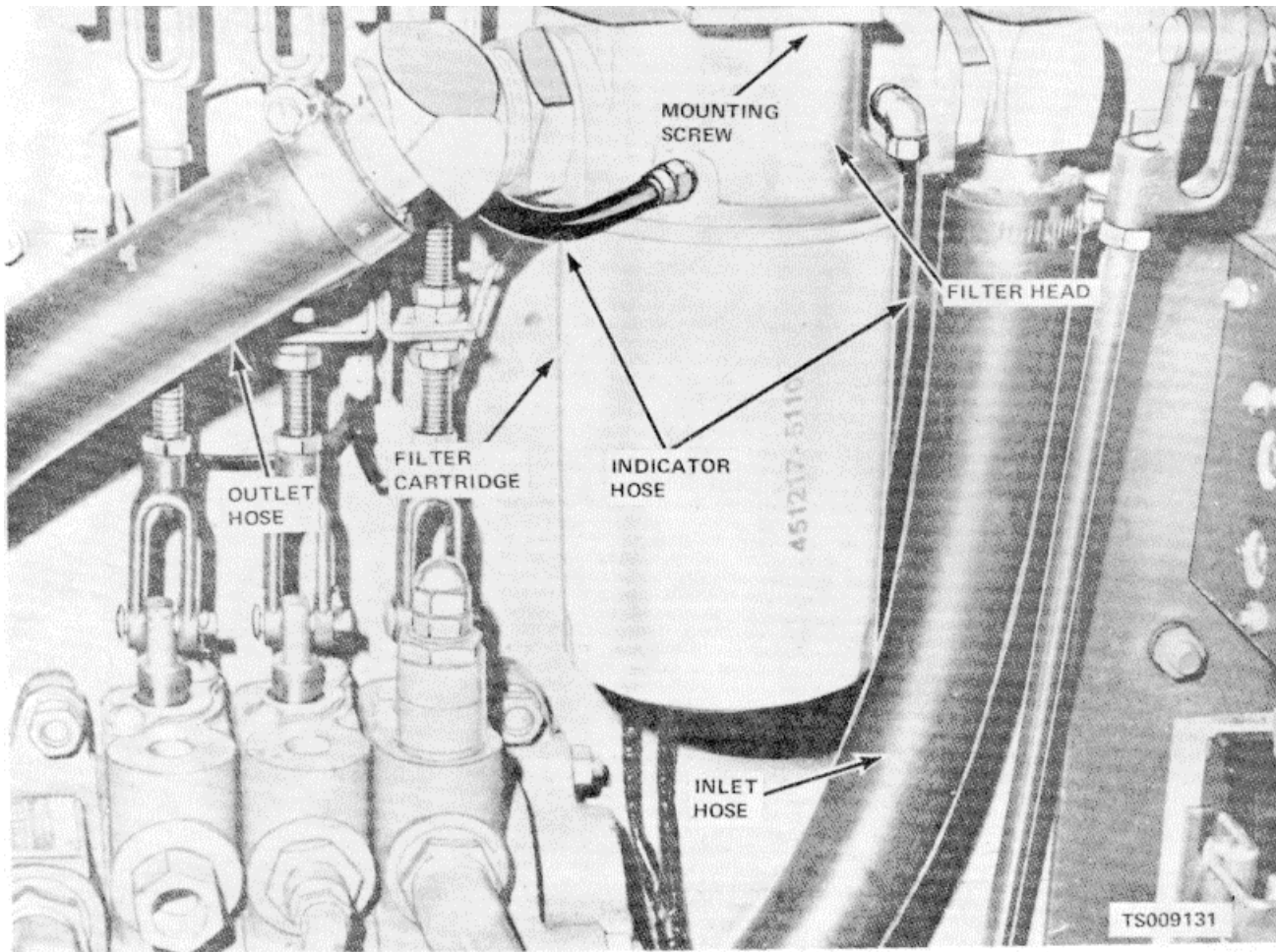


Figure 4-47. Hydraulic filter, installed view.

(4) Clean interior of head and dry thoroughly. Be sure no lint or foreign material is in head.

(5) Install cartridge in filter head and tighten snugly.

(6) Operate truck hydraulic system and check filter for leaks. Check oil level in reservoir and add oil if necessary to bring to full mark on gage.

c. *Removal.* Refer to figure 4-47 and remove the hydraulic filter as follows:

(1) Place a suitable container below filter to catch oil.

(2) Loosen hose clamps and disconnect

inlet and outlet hoses from elbows in filter. Plug hoses to prevent entrance of foreign material.

(3) Slide indicator hose from fitting on filter. Disconnect other hose from elbow. Plug hose to prevent entrance of foreign material.

(4) Remove two screws (fig. 4-47) and lock washers securing filter to bracket. Remove filter.

(5) Remove elbows and hose fittings from filter head.

d. *Installation.* Refer to b above to service filter and replace element if necessary.

(1) Install elbows and hose fittings in filter head.

(2) Install filter assembly on bracket and secure to bracket with screws (fig. 4-47) and lock washers.

(3) Remove plugs from hoses. Connect two small hoses to elbow and fitting in filter head.

(4) Connect hoses to elbows and secure hoses with clamps.

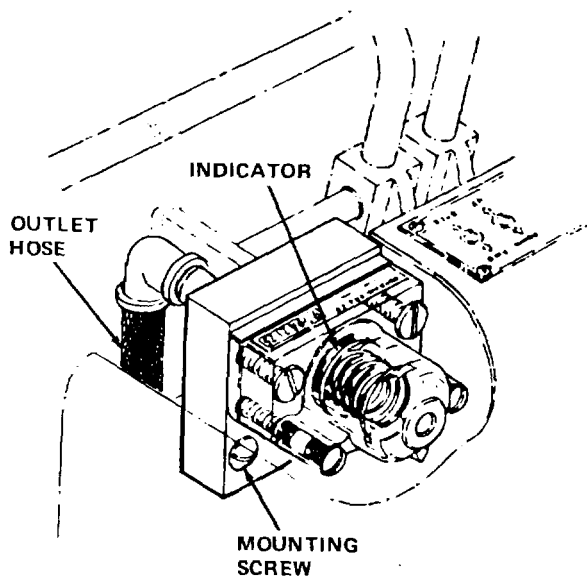
(5) Operate truck hydraulic system and check filter and hoses for leaks.

(6) Check hydraulic oil in reservoir and add oil if necessary to bring to full mark on gage.

#### 4-62. Hydraulic Filter Element Indicator

##### a. Removal.

(1) Remove two mounting screws, lock washers and nuts and lift filter element indicator (fig. 4-48) from bracket.



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Figure 4-48. Hydraulic filter element indicator.

(2) Lift indicator far enough to gain access to hoses. Disconnect hoses from indicator. Plug hoses to prevent entrance of foreign material.

(3) Remove hose fitting, two elbows, and pipe nipple from indicator.

##### b. Installation.

(1) Install pipe nipple, two elbows and hose fitting in rear of indicator.

(2) Remove plugs from hoses and connect hoses to fittings.

(3) Install filter element indicator (fig. 4-48) on bracket and secure with two screws, lock washers and nuts.

#### 4-63. Hydraulic Reservoir

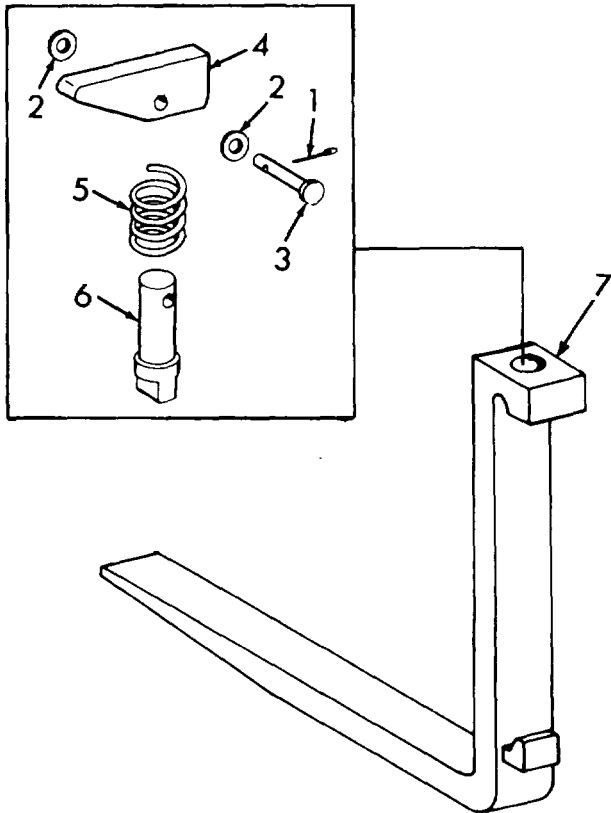
a. Inspect hydraulic reservoir (fig. 4-46) for leaks and damage.

b. Check pipe and hose fittings in reservoir for evidence of leakage and damage.

#### 4-64. Lift Forks

a. *Inspection.* Inspect forks and fork locks (fig. 4-49) for wear, damage and proper operation. Replace if necessary.

b. *Removal.* Refer to figure 4-1 to remove forks. Remove cotter pin (1, fig. 4-49) and remove washers (2) and pin (3). Remove latch (4) and spring (5). Remove locking pin (6) from fork (7).



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Figure 4-49. Lifting fork, exploded view.

c. *Installation.* Install locking pin (6) in fork (7). Install spring (5) and latch (4). Secure latch with washers (2), latch pin (3) and cotter pin (1). Refer to figure 4-1 and install fork on carriage.

**4-65. Mast and Bearings**

- a. Inspect mast bearings for evidence of wear, damage and loose mounting.
- b. Notify direct and general maintenance personnel if mast or bearings require replacement or repair.
- c. Refer to current lubrication order and coat mating surfaces of masts with grease GAA.

APPENDIX A

REFERENCES

<p><b>A-1. Fire Protection</b> TM 5-4200-200-100</p>	<p>Hand Portable Fire Extinguishers Approved for Army Users</p>	<p>■</p>
<p><b>A-2. Lubrication</b> C9100IL LO 10-3930-631-12</p>	<p>Fuels, Lubricants, Oils and Waxes Lubrication Order for Truck, Lift, Fork, Electric, Solid Rubber Tires, 4000 Lb. Capacity, 144 and 180 Inch Lift, Allis-Chalmers Models ACE40AEE144 and ACE40AEE180</p>	<p>■</p>
<p><b>A-3. Painting</b> TM 43-0139</p>	<p>Painting Instructions for Field Use</p>	<p>■</p>
<p><b>A-4. Radio Interference Suppression</b> FM 11-65</p>	<p>High Frequency Radio Communications</p>	<p>■</p>
<p><b>A-5. Maintenance</b> TM 750-244-6  DA Pam 738-750 TM 9-6140-200-14  TM 10-6140-200-14  TM 10-3930-631-20P</p>	<p>Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use The Army Maintenance Management System (TAMMS) Operator's, Organizational, Direct Support and General Support Maintenance Manual for Lead-Acid Storage Batteries Installation, Use, Maintenance, and Repair of Industrial Motive Power Storage Batteries for Materials Handling Equipment Organizational Maintenance Repair Parts and Special Tools Lists for Truck, Lift, Fork, Electric, Solid Rubber Tires, 4000 Lb. Capacity, 144 and 180 Inch Lift, Allis-Chalmers Models ACE40AEE144 and ACE40AEE180</p>	<p>■</p>
<p><b>A-6. Shipment and Storage</b> TB 740-97-2  TM 740-90-1</p>	<p>Preservation of USAMECOM Mechanical Equipment for Shipment and Storage Administrative Storage of Equipment</p>	<p>■</p>

Change 2 A-1

## APPENDIX B MAINTENANCE ALLOCATION CHART

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### Section I. INTRODUCTION

#### B-1. General

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

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

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

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

#### B-2. Maintenance Functions

Maintenance functions will be limited to and defined as follows:

a. *Inspect*. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e. g. , by sight, sound, or feel).

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

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

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

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

f. *Calibrate*. To determine and cause corrections to be made or to be adjusted on instruments or test,

measuring, and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

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

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

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

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

k. *Rebuild*. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc. ) considered in classifying Army equipment/components.

**B-3. Explanation of Columns in the MAC, Section II**

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

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

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

.....d. *Column 4, Maintenance Level.* Column 4 specifies, by the listing of a *work time* figure in the appropriate subcolumn(s), the level of maintenance authorized to perform the function listed in Column 3. This figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance levels, appropriate work time figures will be shown for each level. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the Maintenance Allocation Chart. The symbol designations for the various maintenance levels are as follows:

- C.....Operator or Crew
- O .....Organizational Maintenance
- F .....Direct Support Maintenance
- H.....General Support Maintenance
- D.....Depot Maintenance

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

f. *Column 6, Remarks.* This column shall, when applicable, contain a letter code, in alphabetic order, which shall be keyed to the remarks contained in Section IV.

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

a. *Column 1, Tool or Test Equipment Reference Code.* The tool and test equipment reference code correlates with a code used in the MAC, Section II, Column 5.

b. *Column 2, Maintenance Level.* The lowest level of maintenance authorized to use the tool or test equipment.

c. *Column 3, Nomenclature.* Name or identification of the tool or test equipment.

d. *Column 4, National/NATO Stock Number.* The National or NATO Stock Number of the tool or test equipment.

e. *Column 5, Tool Number.* The manufacturer's part number.

**B-5. Explanation of Columns in Remarks, Section IV**

a. *Column 1, Reference Code.* The code recorded in Column 6, Section II.

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

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
06 0607	<b>ELECTRICAL SYSTEM</b> <i>Instrument or Engine</i> Control Panel Light Switch	Inspect	0.1						
		Replace		0.3					
0608	<i>Miscellaneous Items</i> Control Pedal	Hourmeter Inspect	0.1						
		Replace		0.3					
0609	<i>Lights</i> Headlight	Inspect	0.3						
		Replace		0.6					
0611	<i>Lights</i> Taillight	Inspect	0.2						
		Replace		0.5					
		Repair		0.4					
		Inspect	0.2						
0612	Lamps	Replace		0.5					
		Repair		0.4					
0613	<i>Horn, Siren</i> Horn, Electrical	Inspect	0.1						
		Replace		0.3					
0612	Horn Button Assembly <i>Batteries, Storage</i>	Test	0.2						
		Replace		0.6					
0613	Battery Connector	Replace	0.1					3	
		Inspect		0.2					
		Test		0.2					
		Service		0.2					
0613	<i>Chassis Wiring Harness</i> Headlight Wiring Harness	Replace		0.2					
		Replace		1.0					
		Repair		0.6					
0613	Taillight Wiring Assembly	Inspect		0.3					
		Replace		2.5					
		Replace		1.0					

Change 2 B-3

Section II. MAINTENANCE ALLOCATION CHART - Continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
10 1000	<b>FRONT AXLE</b> <i>Front Axle Assembly</i>	Replace			6.0				
		Repair			3.0				
		Overhaul				20.0			
1002	<i>Differential</i> Differential Carrier	Replace			5.0				
		Repair			6.0				
11 1104	<b>REAR AXLE</b> <i>Steering, Sideshift and Wheel Leaning Mecha- nism</i> Steering Axle	Overhaul			8.0				
		Inspect			4.0				
		Service		0.5					
		Replace			5.0				
		Repair			6.0				
		Overhaul				8.0			
12 1201	<b>BRAKES</b> <i>Hand Brakes</i> Parking Brake Linkage Assembly	Inspect			0.4				
		Adjust			1.0				
		Replace			3.5				
		Repair			5.0				
1202	<i>Service Brakes</i> Brake Shoes	Inspect	0.2						
		Adjust		0.5					
		Replace		1.0					
		Inspect		1.0					
1204	<i>Hydraulic Brake System</i> Tube, Assembly, Metal	Adjust		0.5					
		Replace			1.8				
1204	<i>Hydraulic Brake System</i> Tube, Assembly, Metal	Repair			1.8				
		Inspect		0.4					
1204	<i>Hydraulic Brake System</i> Tube, Assembly, Metal	Replace		0.9					
		Inspect		0.3					
1204	<i>Hydraulic Brake System</i> Tube, Assembly, Metal	Replace		0.7					
		Inspect		0.3					

Change 2 B-4

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
1204	Hydraulic Brake System (Cont 'd) Master Cylinder	Inspect Service Replace Repair		0.3 0.3 1.0					
	Wheel Cylinder Assembly	Inspect Replace		0.4 1.8	1.6				
1206	Mechanical Brake Sys- tem Brake Pedal Assembly	Replace Repair			1.5 2.0				
13	<b>WHEELS AND TRACKS</b>								
1311	Wheel Assembly Bearing Rear Wheels	Replace Inspect Service Adjust Replace	1.5 0.9 0.3 0.2 1.5						
1313	Tires, Tubes and Tire Chains Tires	Inspect Replace	0.2			1.7		8	
14	<b>STEERING</b>								
1401	Mechanical Steering Gear Assembly Tie Rods	Adjust Replace Repair		0.7	1.5 2.0				
	Steering Wheel	Inspect Replace	0.1	0.4					
	Steering Column Assembly	Replace		0.5					

Change 2 B-5

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
1410	Hydraulic Pump or Fluid Motor Assembly Power Steering Motor Assembly  Steering, Pump	Inspect			0.5			2	
		Test			1.0			6	
		Replace			3.0			4	
		Repair			4.0				
		Overhaul				8.0			
		Inspect			0.6			1	
1411	Hoses, Lines and Fittings	Replace			1.5				
		Repair			2.5				
		Inspect		0.1					
1412	Hydraulic or Air Cylinders Power Steering Cylinder Assembly	Replace			0.6				
		Repair			0.5				
		Inspect		0.3					
1414	Steering System Valves Steering Gear Assembly	Replace			1.2				
		Repair			1.8				
		Adjust			0.6				
15	FRAME, TOWING AT- TACHMENTS AND DRAWBARS	Replace			2.0				
		Repair			4.2				
		Inspect			0.2				
1502	Counterweights	Replace		1.0					
1503	Pintles and Towing At- tachments	Replace		0.2					
18	<b>BODY, CAB AND HOOD</b>								
1801	Body, Cab and Hood Assemblies Drip Pan Overhead Guard Instrument Panel	Replace			0.5				
		Replace			0.5				
		Inspect	0.1						
		Replace			0.8				

Change 2 B-6

Section II. MAINTENANCE ALLOCATION CHART - Continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
1801	Body, Cab and Hood Assemblies (Con't) Battery Compartment Assembly Operator's Seat Mounting Plate	Inspect Replace Replace	0.1	0.1 0.4					
1805	Floors and Subfloors Floor and Toe Plate	Inspect Replace		0.1 0.2					
1806	Upholstery Seats and Carpets Operator's Seat Assembly	Inspect Replace Repair		0.1 0.4 1.0					
1808	Stowage Racks, Boxes, Straps, Carrying Cases, Cable Reels and Hose Reels Hose Reel Assembly	Replace Repair		0.7 1.4					
22	BODY AND CHASSIS ACCESSORY ITEMS								
2210	Data Plates and Instruction Holders	Replace		0.1					
24	HYDRAULIC AND FLUID SYSTEMS								
2401	Pump and Motor Hydraulic Pump Motor Assembly  Hydraulic Pump Assembly	Inspect Test Replace Repair Inspect Replace Repair			0.5 1.0 3.0 4.0		2 5 4		
				0.6	1.5 2.5		1		

Change 2 B-7

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
2402	Manifold and/or Control Valve Hydraulic Control Valve	Inspect		0.3				1	
		Replace		1.6					
		Repair		2.0					
2403	Hydraulic Controls and/or Manual Controls Hydraulic Control Valve Linkage	Adjust		1.4					
		Replace		0.6					
2404	Tilt Cylinders and Tilt Crank Elbow Swivel	Replace		0.6					
		Repair		0.5					
		Replace		0.7					
2405	Side Shift Cylinder Assembly Tilt Cylinder Assembly	Repair			1.0				
		Inspect		0.3					
		Replace		1.8					
2405	Mast Column Repair Lifting Forks	Replace			1.0				
		Replace		2.5					
		Replace		5.0					
2405	Fork Backrest Lift Cylinder Assembly	Inspect		0.1					
		Replace		0.2					
		Replace	0.1	0.3					
2405	Lift Cluster Assembly	Inspect			4.0				
		Replace			4.5				
		Repair			2.5				
2405	Crosshead Side Shift Carriage Assembly Chain Assembly	Replace			2.0				
		Replace			0.6				
		Replace			1.5				
2406	Strainers, Filters, Lines and Filings	Inspect		0.1					
		Service		0.2					
		Adjust		0.2					
2406	Strainers, Filters, Lines and Filings	Replace		0.5					
		Inspect	0.1						
		Replace		0.6					
2406	Strainers, Filters, Lines and Filings	Repair		0.4					
		Repair		0.4					

Change 2 B-8

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
2408	Liquid Tanks or Reservoirs	Inspect Service Replace		0.5 0.9	7.0				
	Gauge, Hydraulic Reservoir	Repair			2.5				
	Filter Element	Replace	0.4						
<b>40</b>	<b>ELECTRIC MOTORS AND GENERATORS</b>	Inspect Replace	0.4 0.4						
4001	Rotor Assemblies Drive Motor Assembly	Inspect Test Replace Repair			0.5 1.0 8.0 4.0			2 5 4	A
	Brush Holder Assembly	Overhaul Inspect Replace Repair				13.0			
	Bearing, Ball	Inspect Replace			2.0 1.5				
4009	Control Panels, Housing and Cubicles Cable Assemblies	Inspect Replace Replace		0.1	0.8 1.0				
4010	Wiring Harness Master or Auxiliary Control Assembly Speed Control Assembly	Test Replace Repair			0.5 0.3 1.0			7	
	Resistor, Variable Contact Assembly, Electrical Static Control Panel Assembly	Replace Replace Replace			1.0 1.0 0.2				
		Replace Repair			0.5 2.0				

Change 2 B-9

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
4010	Master or Auxiliary Control Assembly (Cont'd) Contactor Panel Assembly Electromagnetic Relay, Emergency Cutout Electromagnetic Relay, Hydraulic Pump Cutout Insulation Plate Bus Bars Panel Shelf Emergency Cutout Push Switch Forward and Reverse Contactor Assembly	Replace			0.5				
		Repair			3.0				
		Replace			1.0				
		Repair			1.0				
		Replace			0.2				
		Repair			1.0				
		Replace			0.2				
		Replace			0.2				
		Replace			0.3				
		Replace			0.2				
		Inspect		0.2				2	
		Replace			0.8				
		Repair			0.4				
4012	Switches Bracket Assembly	Replace		1.0					
		Repair		1.0					
4014	Resistors Electronic Components  Fixed Resistor	Test			0.7			2	
		Replace			0.6				
		Repair			0.5				
		Test			0.5			2	
		Replace			0.3				

Change 2 B-10

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

(1) TOOL OR TEST EQUIPMENT REF CODE	(2) MAINTENANCE LEVEL	(3) NOMENCLATURE	(4) NATIONAL/NATO STOCK NUMBER	(5) TOOL NUMBER
1	O	Hydraulic pressure gauge	6685-00-957-7090	
2	O	Multimeter	6625-00-553-0142	TS352BU
3	O	Tester battery electric	6630-00-171-5126	171E
4	F	Ohmmeter	6625-00-548-0127	7675
5	F	Test set, armature-s	6625-00-238-1460	TYPE I
6	F	Test set, Armu A/VIND	6625-00-238-1459	MILT 594 TYPE B
7	H	Oscilloscope		323
8	H	Press arbor HD OP 60T	3444-00-449-7295	26A49

**Section IV. REMARKS**

REFERENCE CODE	REMARKS
A	Reference TM 5-764 "Electric Motor and Generator Repair" for Testing and Repair procedures.

Change 2 B-11

**APPENDIX C  
BASIC ISSUE ITEMS LIST AND ITEMS  
TROOP INSTALLED OR AUTHORIZED**

**Section I. INTRODUCTION**

**C-1. Scope**

This appendix lists basic issue items, items troop installed or authorized which accompany the fork lift truck and are required by the crew/operator for operation, installation, or operator's maintenance.

**C-2. General**

This basic issue items, items troop installed or authorized list is divided into the following sections:

a. *Basic Issue Items List-Section II.* Not applicable.

b. *Items Troop Installed or Authorized List-Section III.* A list in alphabetical sequence of items which at the discretion of the unit commander may accompany the end item, but are NOT subject to be turned in with the end item.

**C-3. Explanation of Columns**

The following provides an explanation of columns in the tabular list of Basic Issue Items List, Section II, and Items Troop Installed or Authorized, Section III.

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

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

c. *Unit of Measure (U/M).* A 2 character alphabetic abbreviation indicating the amount or quantity of the item upon which the allowances are based, e. g. , ft, ea, pr, etc.

**Section III. ITEMS TROOP INSTALLED OR AUTHORIZED LIST**

National stock number	Description	U M	Qty auth
6130-00-500-0069	BATTERY CHARGER: metallic rectifier, 36v to 60v charging, 160 amp. max,charging, 230/208/460 volt ac, 3 phase, 60 cps operating power. JETDS Type No. 2926/U: Fed. Spec. W-C-260, Type 1 Size C.	EA	1

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