

SERVICE & PARTS MANUAL

FOR XL-19B MODELS WITH SERIAL NUMBERS 2000 to CURRENT

Information herein, subject to change without notice. When contacting Up-Right for service or parts information, be sure to include the MODEL and SERIAL NUMBERS from the equipment name plate.



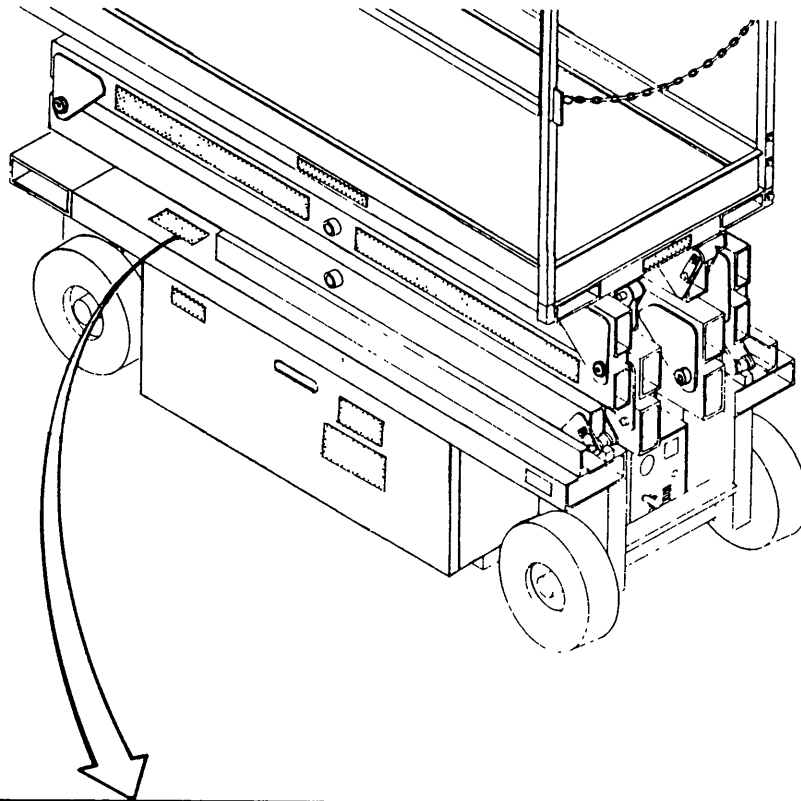
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JUNE 1, 1986

PART No. 60591-000-00



UP-RIGHT INC.			
1775 PARK ST. SELMA, CA 93662			
MODEL NO.	<input type="text"/>	MAX. PLATFORM HEIGHT	<input type="text"/>
SERIAL NO.	<input type="text"/>	BATTERY VOLTAGE	<input type="text"/>
MAX. DISTRIBUTED LOAD	<input type="text"/>	<input type="text"/>	<input type="text"/>
CAUTION: CONSULT OPERATOR'S MANUAL BEFORE USE.			
THIS PLATFORM IS NOT ELECTRICALLY INSULATED			
P/N 61205-000-00			

PART NUMBER

Identification Plate and Model Number

LIST OF EFFECTIVE PAGES

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DESTROY SUPERCEDED PAGES.

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Date of issue for original and changed pages are:
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SECTION I

INTRODUCTION AND GENERAL INFORMATION

1-1. INTRODUCTION.

1-2. **PURPOSE.** This manual provides illustrations and instructions for the operation and maintenance of the UP-RIGHT XL-19B Work Platform manufactured by Up-Right, Inc. Selma Operations, of Selma, California. (See Figure 1-1).

1-3. **SCOPE.** The operating instructions include both operation and maintenance responsibilities concerning the XL-19B Work Platform's readiness. The functions cover scheduled maintenance, troubleshooting, repair, adjustment and replacement.

1-4. GENERAL INFORMATION.

1-5. **ITEM DESCRIPTION.** The UP-RIGHT XL-19B Work Platform is a self-propelled scissor lift designed to be used as a means of elevating maintenance personnel and equipment and to provide a mobile work platform. It is designed to provide mobility with the platform in a raised or lowered position. Travel with the platform raised more than one foot is limited to the low speed range.

1-6. **PURPOSE AND LIMITATIONS.** The objective of the XL-19B Work Platform is to provide a quickly deployable, self-propelled, variable height work platform. The elevating function shall only be used when the work platform is on a level paved or reinforced work area. The work platform is intended to be self-propelled when in relatively close proximity to the work area.

1-7. **SPECIFICATIONS.** Refer to Table 1-1.

Table 1-1. Specifications

ITEM	DESCRIPTION
Platform Size	29 In. x 77 In.
Maximum Platform Capacity Max. Cantilever Cage or Extension Capacity	550 lbs. (750 lbs*) 250 lbs. (Combined Platform and Cage Capacity Not To Exceed 550 lbs.)*
Working Height	25 Ft.
Maximum Platform Height	19 Ft.
Minimum Platform Height	44 In.

*750 lb. load option, limited drive height 15 Ft.

Table 1-1. Specifications - Continued

ITEM	DESCRIPTION
Energy Source	24 Volt Battery Pack 4 H.P. D.C. Electric Motor Four 220 Ampere-hour Batteries
Battery Charger	25 AMP Battery Charger
Battery Duty Cycle	25% for 8 Hours
Lift System	Two Single Stage Lifting Cylinders
Driveable Height	19' Standard 15' W/Cage, Extension and 750 lb. Option
Surface Speed Platform Lowered Platform Raised	0 to 2 MPH 0 to .6 MPH
Hydraulic Tank Capacity	4 Gallons
Hydraulic Fluid	Mobil 423
Dimensions Weight Overall Width Overall Height Overall Length	2,650 lb. 32-1/2 In. 86 In. 80 In.
Control System From Serial #2000 to #2221 From Serial #2222 to Current	3 Speed - Forward 1 Speed - Reverse 3 Speed - Forward 3 Speed - Reverse
Drive Control	Toggle Switches for all Functions
Horizontal Drive	Dual Front Wheel Hydraulic Motors
Wheels	16 In. Diameter, Solid Rubber
Braking	Spring Applied, Hydraulic Release Parking Brake

Table 1-1. Specifications - Continued

ITEM	DESCRIPTION
Toeboard	4 In. High
Guardrails	Fold-down Guardrails, 42 In. High*
Turning Radius	85 In. Outside
Gradability	17%
Wheel Base	62 In.

*Guardrails fold down to 79 In. overall work platform height for passage through 80 In. height door.

1. Platform
2. Scissor Mechanism
3. Chassis
4. Energy and Power Module
5. Control Console

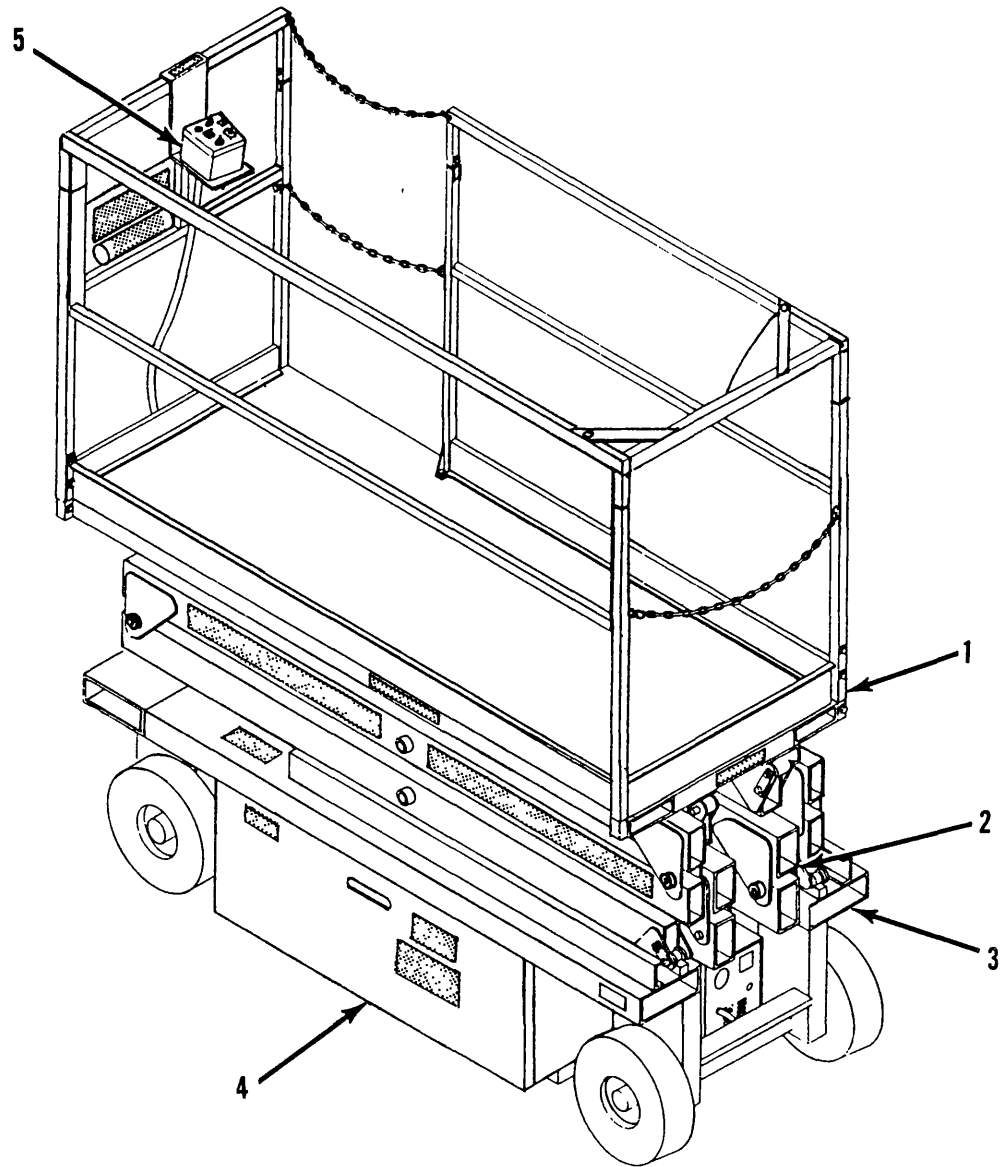


Figure 1-1. XL-19B Work Platform

SECTION II

SAFETY

2-1. RULES AND PRECAUTIONS. BEFORE USING THE UP-RIGHT XL-19B.

Read and then follow completely all Safety Rules and Precautions before operating the Up-Right XL-19B.

- a. Thoroughly **INSPECT** the work platform for cracked welds, loose hardware, hydraulic leaks damaged control cable, loose wire connections and tire damage.
- b. **DISTRIBUTE** all loads evenly on the platform. Do not exceed maximum platform load specifications.
- c. **SURVEY** the work area for surface hazards such as holes, drop-offs, bumps and debris before operating work platform.
- d. **LOOK** up, down & around for overhead obstructions and electrical conductors.
- e. **HOOK** chains across entrance after mounting platform.
- f. **CHECK** that all guardrails are in place and secured with all fasteners in place.
- g. **DO NOT** use damaged equipment. (Contact nearest UP-RIGHT Service Center for instructions.)
- h. **DO NOT** change operating or safety systems.
- i. **DO NOT** operate the work platform within ten feet of power lines. **THIS WORK PLATFORM IS NOT INSULATED.**
- j. **DO NOT** elevate the platform or drive the work platform while elevated unless on firm level surface (less than 1 degree slope).
- k. **DO NOT** attach overhanging loads or increase platform size.
- l. **DO NOT** use ladders or scaffolding on the platform.
- m. **DO NOT** sit, stand or climb on guardrail or midrail.
- n. **DO NOT** climb down scissors with the platform elevated.
- o. **DO NOT** recharge batteries near sparks or open flame; batteries that are being charged emit highly explosive hydrogen gas.
- p. **DO NOT** perform service on work platform while platform is elevated without blocking the scissors.

SECTION III

PREPARATION FOR USE, SHIPMENT AND STORAGE

3-1. PREPARATION FOR USE

WARNING

STAND CLEAR when cutting the metal banding to avoid being cut when the banding snaps back.

- a. Remove the metal banding from the module covers and scissor linkage.
- b. Remove the banding from the control console.
- c. Lift the front of XL-19B and remove banding and blocks from front wheels.
- d. Lower work platform.
- e. Close the emergency lowering valve.
- f. Connect the negative battery lead (1, Figure 3-1).

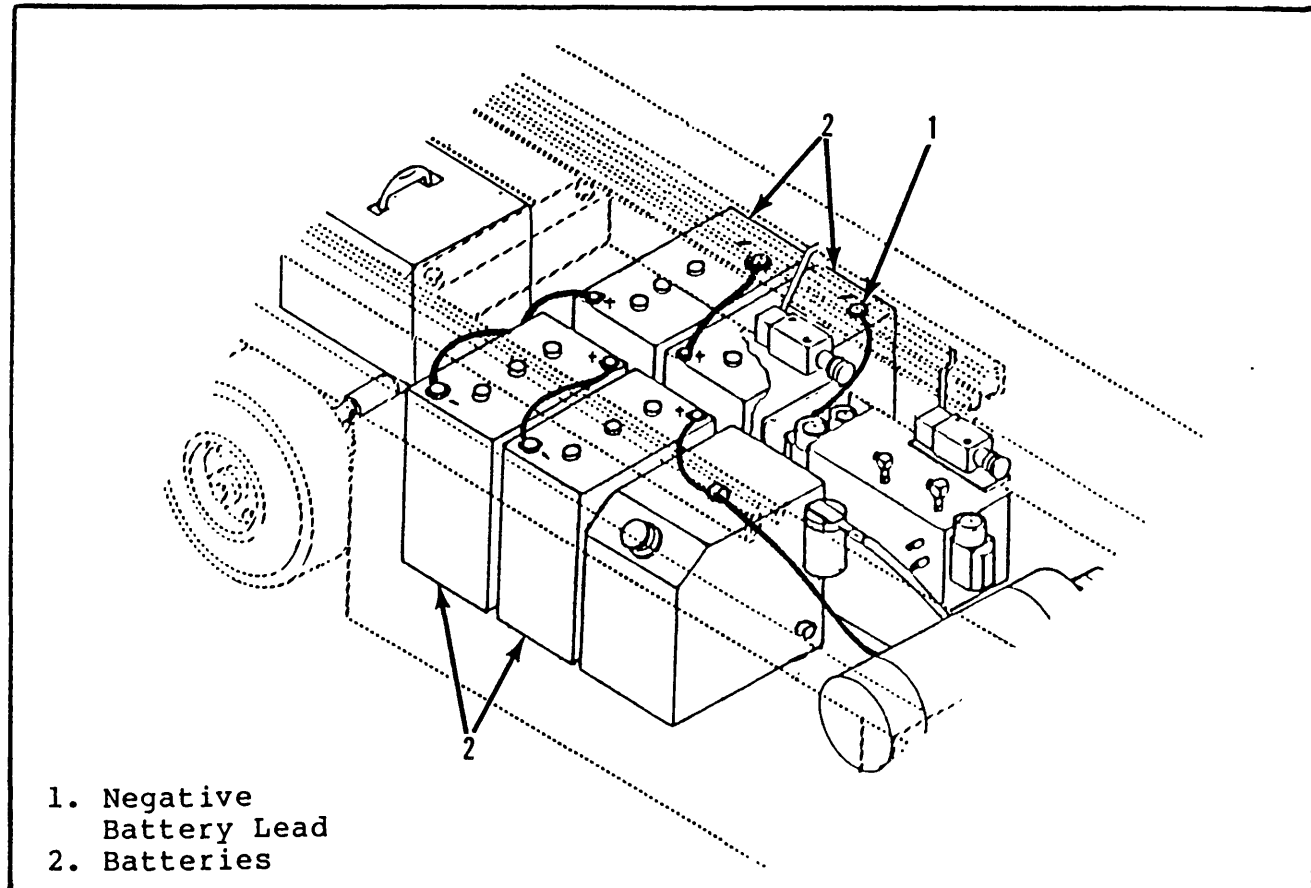


Figure 3-1. Batteries

3-2. Preparation for shipment.

- a. Grease all the grease fittings as per Paragraph 5-9.
- b. Fully lower the platform.
- c. Disconnect the battery negative (-) lead from the battery pack (1, Figure 3-1).
- d. Band the control console to the front guardrail.
- e. Band the scissor linkage to the frame just behind the front wheels and at the rear wheels.
- f. For sea shipment, perform preservation per extended storage paragraph 3-4 a.

3-3. TRANSPORT.

- a. Maneuver the XL-19B into transport position and chock wheels.

NOTE

If forklifting is required, lift from rear of the work platform.

- b. Place blocks under the front wheel yokes.
- c. Secure the work platform to the transport vehicle with chains or straps of adequate load capacity attached to the chassis tie down lugs.
- d. Open emergency lowering valve.

3-4. **STORAGE.** No preparation for storage is required for normal usage. Regular maintenance per Table 5-1 and Figure 5-1 should be performed. If the work platform is to be placed in long term storage (dead storage) use the following preservation procedure.

a. Preservation.

- (1) Clean painted surfaces. If the paint surface is damaged, repaint.

NOTE

This hydraulic system is filled to the operating level with approved fluid required for operation. Do not drain.

- (2) Fill the hydraulic tank to operating level.
- (3) Coat exposed portions of extended cylinder rods with an approved preservative and wrap with barrier material.

- (4) Coat all exposed unpainted metal surfaces with preservative.

b. Batteries.

- (1) Disconnect all the battery leads and secure to the chassis. Tape the connectors on the ends of the leads to the chassis.
- (2) Remove the batteries and place in alternate service.

c. Front Wheel Yokes.

CAUTION

XL-19B must be blocked under front wheel yokes to prevent damage to motor seals.

- (1) Jack up front of work platform.
- (2) Place blocks under front wheel yokes. The blocks must be high enough to prevent front tires from touching the ground.
- (3) Lower work platform onto the blocks.

SECTION IV

OPERATION INSTRUCTIONS

4-1. THEORY OF OPERATION.

4-2. GENERAL FUNCTIONING. The battery powered electric motor directly drives a two section hydraulic pump. This pump supplies oil under pressure to operate all the work platform functions. The oil flow is directed to the different functions by electrically activated solenoid valves.

4-3. DRIVING (Figure 6-1 & 6-2). When the Emergency Stop Switch (S1) is turned on (and the Key Ignition Switch (S7) on units equipped with Toggle Mode Switches (S2)) it energizes the Toggle Mode Switch (S2). Positioning the Toggle Mode Switch to **DRIVE** energizes the Drive (S5) and Steer (S4) Toggle Switches. To drive forward push the Drive Switch (S5) to the **FORWARD** position. This energizes the Forward Valve Coil (L6), the Motor Start Relay (CR1) and the Speed Range Switch (S6). Oil now will flow from the pump (ASSY1) into the hydraulic valve manifold. Inside the valve manifold the oil flows first to the Flow Regulator (FR1). Part of the flow travels from the Flow Regulator to the Bypass Valve (V4) and then returns to the oil reservoir. The remaining oil flows to the Drive Valve (V1) then to the Reverse Counterbalance Valve (V3). Just ahead of the Counterbalance Valve, a small amount of oil is diverted to the Shuttle Valve (SV1) then to the Brake Cylinder (CYL1), which releases the brake. Just after the Reverse Counterbalance Valve the oil divides. Part of the oil flows to the Right Drive Motor (MOT2), through it then to the Series-Parallel Valve (V5). The remaining oil flows to the Series-Parallel Valve (V5) then to the Left Drive Motor (MOT1). The oil from the Left Drive Motor rejoins the oil from the Right Drive Motor and then flows to the Forward Counterbalance Valve (V2). This valve has been opened by a pilot pressure line from the upstream side of the Reverse Counterbalance Valve, which allows the oil to pass through and flow back to the Drive Valve. From the Drive Valve the oil returns through the Filter (FLTR) to the tank.

If the Speed Range Switch (S6) is pushed to the **LOW** position while driving forward, the Bypass Valve (V4) will be energized and will block the oil flow from returning to the tank. This will cause it to flow through the Creep Check Valve (CV1) then join the flow coming from the Flow Regulator. This causes a larger amount of oil to flow through the Drive Motors giving a faster speed.

Pushing the Speed Range Switch to the **HIGH** position will energize the Series-Parallel Valve (V5) along with the Bypass Valve. This will cause all of the oil to flow to the Right Drive Motor instead of dividing as it did in the **CREEP** and **LOW** speed range positions. The oil then flows through the Series-Parallel Valve, to the Left Drive Motor, then back through the circuit as before. This gives the highest machine speed.

When the Drive Switch is pushed to the **REVERSE** position the Reverse Drive Valve Coil (L5), Motor Start Relay and Series-Parallel Valve Coil are energized. The oil flow is the reverse of forward high speed except only part of the oil flows through the drive circuit. Most of the oil is flowing through the Bypass Valve and returning to the tank.

When the Deck is elevated 6 inches or more the Speed Control Limit Switch (S8) opens. This prevents the Bypass Valve from being energized. Therefore, the work platform can only travel in CREEP speed when the platform is elevated.

To protect the hydraulic system from high pressure a Relief Valve (RV1) is provided in the circuit. If pressure exceeds the pressure setting of the Relief Valve, the valve will open and allow oil to return to the hydraulic oil reservoir.

Another device in the hydraulic circuit that allows the work platform to function smoother is the Cushion Cylinder (CYL2). The Cushion Cylinder is located near the Pump (ASSY1). When a valve is actuated, oil will flow into the Cushion Cylinder compressing its spring. This allows pressure to build up gradually instead of instantaneously, which allows smoother operation.

To steer, the Steering Switch (S4) is held to either **LEFT** or **RIGHT** thus energizing either the Left or Right Steering Valve Solenoids (L3 or L4). Activating the Left Steering Solenoid operates the Steering Valve (V6) to send the oil flow to the right side of the Steering Cylinder (CYL3). As the oil enters the cylinder, that chamber expands causing the cylinder piston to force the oil from the opposing chamber and move the shaft assembly to the left. The oil forced from the Steering Cylinder passes through the Steering Valve (V6) and back to the hydraulic reservoir.

Steering **RIGHT** sends the oil to left side of the Steering Cylinder (CYL3) forcing the oil from the right side and back to the hydraulic reservoir. A Relief Valve (RV2) set at 1950 psi is installed in the system to protect it from damage due to excessive pressure.

4-4. RAISING AND LOWERING PLATFORM. Turning the Mode Switch (S2) (or positioning the Toggle Switch on work platforms so equipped) to the **LIFT** position energizes the Lift Switch (S3). Pushing the Lift Switch to **UP** position energizes the Lift Valve Solenoid (L1), Motor Start Relay (CRL) and Bypass Valve Solenoid. This causes all the oil to flow through the Lift Valve (V9) to the Lift Check Valve (CV2) then out at the valve manifold to the Lift Cylinders (CYL4). This causes the platform to elevate. Releasing the Lift Switch will de-energize the Lift Valve Solenoid, Motor Start Relay and Bypass Valve Solenoid, causing the platform to stop. When the platform reaches its maximum height a Limit Switch (SL0) is actuated, which opens the Lift Valve Solenoid circuit.

Positioning the Lift Switch (S3) to **DOWN** will energize the Lowering Valve Solenoid (L7). This opens the Lowering Valve (V7) allowing oil to flow from the Lift Cylinders (CYL4), through the Descent Rate Control Orifice (ORF2), through the Lowering Valve and back to the hydraulic reservoir via the Filter (FLTR). As a safety measure, each Lift Cylinder is equipped with a Velocity Fuse (V10). These devices will automatically close and prevent the platform from lowering if the descent rate exceeds a predetermined speed, such as would happen if a hose were to fail.

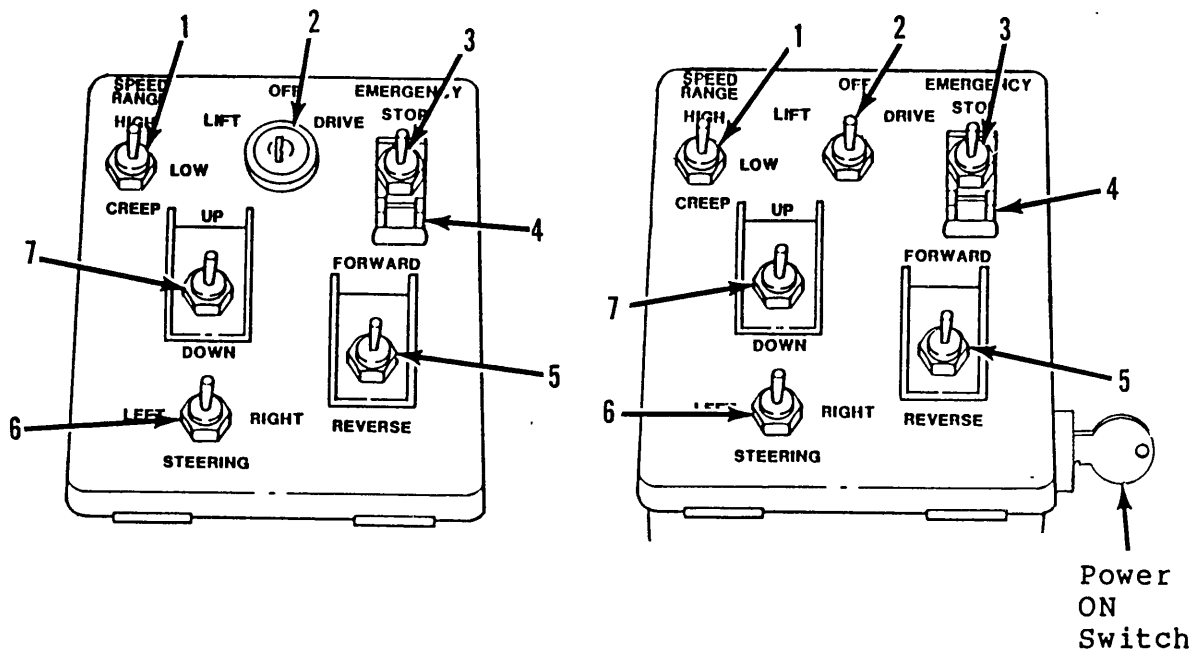
The lift hydraulic circuit is equipped with a manual Needle Valve (V8) which allows the platform to be lowered manually if the electrical circuit malfunctions. Also a Relief Valve (RV3), set at a pressure to just lift and hold the platform loaded with rated load, is provided as a means of protecting the work platform from damage due to overloading.

The work platform can also be raised or lowered using the chassis mounted Lift Toggle Switch (S9). Turning on the Emergency Stop Switch (S1) and positioning the Mode Switch (S2) to **LIFT** on the upper control activates the Chassis Lift Toggle Switch. Pushing **UP** on the Chassis Lift Toggle Switch will cause the platform to elevate. Pushing **DOWN** will cause the platform to lower.

4-5. SAFETY DESIGN. The XL-19B has the following features to ensure safe operation.

- a. The drive speed is limited to CREEP speed when operating the work platform while platform is elevated.
- b. The platform descent rate is controlled by an orifice. The lift cylinders are equipped with velocity fuses to prevent descent should a hose fail.
- c. A holding brake is automatically engaged when the drive toggle switch is released.
- d. The control box is equipped with an emergency-off switch.
- e. Controls are guarded to prevent inadvertant operating.
- f. An alarm is provided to signal when the platform is lowering.
- g. A lift switch is located in the module on the chassis for lifting and lowering work platform from ground level.

4-6. CONTROLS AND INDICATORS. The controls and indicators for operation of the XL-19B Work Platform are shown in Figure 4-1. The name and function of each control and indicator are listed in Table 4-1. The index numbers in the figure correspond to the index numbers in the table. The operator should know the location of each control and indicator and have a thorough knowledge of the function and operation of each before attempting to operate the unit.



1. Speed Range Switch
2. Mode Switch
(Key or Toggle)
3. Emergency Stop Switch
4. Switch Guard
5. Forward/Reverse Switch
6. Steering Switch
7. Lift Switch
8. Emergency Lowering Valve
9. Alarm (Platform Lowering)
10. Chassis Lift Switch

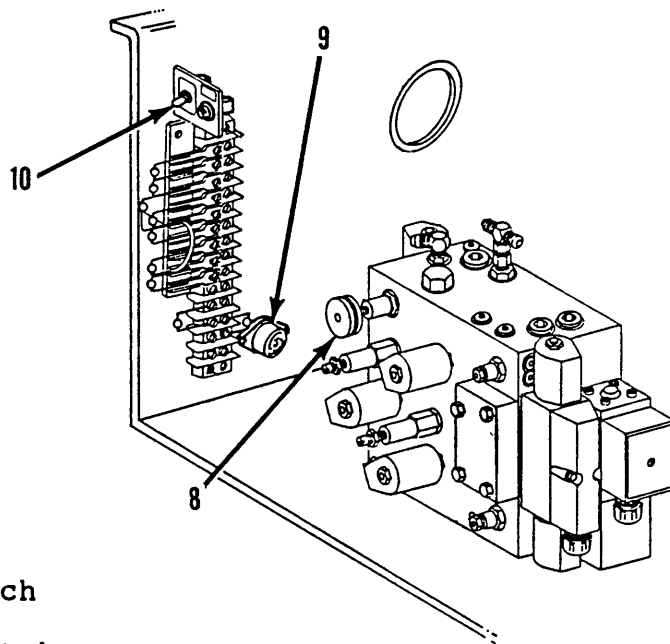


Figure 4-1. Controls and Indicators

Table 4-1. Controls and Indicators

INDEX NUMBER	NAME	FUNCTION
1	Speed Range Switch	A three position Toggle Switch. Provides the platform operator with 3 speeds; FORWARD, CREEP and REVERSE. From Serial #2222 to Current, provides 3 speeds FORWARD and 3 speeds REVERSE.
2	Mode Switch	A three position Keyed Switch (Toggle Switch on some XL-19B's). DRIVE position sends power to the Drive and Steer Toggle Switches. LIFT position sends power to the Lift (Up/Down) Switch. OFF cuts off power to all systems and allows the key to be removed.
3	Emergency Stop	A two position Toggle Switch. When switch is in ON (down) position the electrical circuits are energized. When switch is in OFF (up) position all electrical circuits are shut down.
4	Switch Guard (Emergency Stop)	Normally open. When closed, the Switch Guard automatically positions the Emergency Stop Switch to OFF (up).
5	Forward-Reverse Switch	<p>A three position Toggle Switch. Controls the drive direction. When the switch is pushed to FORWARD position, the work platform moves forward. Release toggle to STOP. When toggle is pulled back to REVERSE position platform moves in reverse.</p> <p>When platform is raised more than one foot, the work platform will only travel at its lowest or CREEP speed. When released, the drive toggle switch automatically returns to neutral.</p>
6	Steering Switch	A three position Toggle Switch. Controls the steer function. When switch is pushed to LEFT, work

Table 4-1. Controls and Indicators - Continued

INDEX NUMBER	NAME	FUNCTION
6	Steering Switch - continued	platform steers left. When switch is pushed to RIGHT work platform steers right. Although the switch is self-centering, the steering system is not. The wheels must be steered back to straight. Observe the tires while maneuvering the work platform to ensure proper direction.
7	Lift Switch	A three position Toggle Switch. Controls the lift function. When the switch is pushed to UP position the platform raises to desired height. When switch is released, platform stops raising. When switch is pushed to DOWN position the platform lowers. When switch is released platform stops lowering.
8	Emergency Lowering Valve	When Knob is turned counterclockwise to OPEN position platform lowers. When platform is down, valve is CLOSED by turning knob clockwise. The platform cannot be raised until the valve is closed.
9	Alarm (Platform Lowering)	Sounds an audible signal while platform is lowering when lift switch on the control console is used to lower the platform. If the Emergency Lowering Valve (8) is used to actuate the lowering, the alarm does not sound.
10	Chassis Lift Switch	A three position Toggle Switch provides for lifting and lowering platform at the ground level. Switch is located in the module above terminal strip.

4-7. OPERATING PROCEDURES.

4-8. PRE-OPERATION CHECKOUT.

WARNING

DO NOT perform service on work platform with the platform elevated unless it is properly blocked.

- a. Open module covers and inspect for damage and missing parts.
- b. Remove the cap from the hydraulic reservoir and check the level of the oil with the platform fully lowered. Oil should be visible in strainer. Use Mobil 423 or equivalent.
- c. Check the fluid level in the batteries (See Figure 7-10).
- d. Check state of battery charge (See Section V, Battery Maintenance).
- e. Check that A.C. extension cord has been disconnected from charger.
- f. Check that all guardrails are in place and secured with fasteners.
- g. Carefully inspect the entire work platform for damage such as cracked welds or structural members, loose or missing parts, oil leaks, damaged cables or hoses, loose connections and tire damage.

WARNING

Perform the following checks from the ground.

WARNING

STAND CLEAR of work platform while performing checks.

NOTE

Unhook control console from front guardrail and hold while performing the following tests.

- h. Before operating the work platform survey the work area for surface hazards such as holes, drop-offs, bumps and debris.
- i. Check in **ALL** directions for obstructions and electrical conductors.
- j. Lift the Emergency Stop Switch cover and position toggle to the **ON** position. (When switch guard is closed, Emergency Stop Switch will automatically go to **OFF** position).

CAUTION

Protect control console cable from possible damage while performing checks.

- k. Turn Mode Switch to **DRIVE** position (Toggle Switch on some XL-19B's).

NOTE

Step 1. should be performed with Speed Range Switch first in **CREEP**, **LOW** and then **HIGH**.

- l. Push Drive Switch to **FORWARD** position then **REVERSE** position to check for speed and directional control.
- m. Move Steering Switch **RIGHT**. Then **LEFT** to check for steering control.
- n. Rehook control console to front guardrail and turn Mode Switch to **LIFT**.

WARNING

LOOK up and around for obstructions prior to operating the lift function.

DO NOT operate the work platform within 10 feet of any electrical power lines. **THIS WORK PLATFORM IS NOT INSULATED.**

DO NOT elevate the platform unless the work platform is on firm level ground.

DO NOT enter the scissor linkage while the platform is elevated.

- o. Push Chassis Lift Switch to **UP** position and fully elevate platform.
- p. Visually inspect the scissor linkage, rollers, lift cylinder, cables and hoses for damage or erratic operation. Check for missing or loose parts.
- q. Lower the platform partially by pushing Chassis Lift Switch to **DOWN**, and check operation of the audible lowering alarm.
- r. Open the Emergency Lowering Valve to check for proper operation. Once the platform is fully lowered, close the valve.
- s. Close module covers.

- t. Turn Mode Switch to **OFF** and close Emergency Stop Switch Cover.

4-9. OPERATION.

4-10. TRAVEL WITH PLATFORM LOWERED (Figure 4-1).

- a. After mounting platform hook chains across entrance. Also check that chain at middle of rear guardrail is hooked in position.
- b. Check that route is clear of obstructions, holes and drop-offs and is capable of supporting wheel loads.
- c. Check clearances above, below and to the sides of platform.
- d. Turn the Emergency Stop Switch (3) on the control console to the **ON** position.
- e. Turn Mode Switch (2) to **DRIVE**.
- f. Set the Speed Range Switch (1) to **CREEP, LOW** or **HIGH** depending on area in which you are traveling.
- g. Push Drive Toggle Switch (5) to **FORWARD** position or **REVERSE** position to travel in desired direction.
- h. Move the Steering Toggle Switch (6) to **RIGHT** or **LEFT** to turn work platform.

NOTE

Steering is not self-centering. Wheels must be returned to straight ahead position by operating Steering Toggle Switch.

4-11. LIFTING PLATFORM.

WARNING

LOOK up and around for obstructions before performing the **LIFT** function.

DO NOT elevate the platform unless work platform is level.

DO NOT operate work platform within 10 feet of any electrical power lines. **THIS WORK PLATFORM IS NOT INSULATED.**

DO NOT perform service on work platform with the platform elevated, unless properly blocked.

- a. Turn Mode Switch (2) to **LIFT** position.

- b. Push the Lift Toggle Switch (7) to **UP** position and hold to elevate the platform.

WARNING

NEVER enter the scissor linkage while the platform is elevated.

- d. When the work task is completed, lower the platform by holding the Lift Toggle Switch (7) in the **DOWN** position until the platform is fully lowered.

4-12. TRAVEL WITH PLATFORM ELEVATED (Figure 4-1).

NOTE

Work platform will travel at reduced speed when platform is elevated.

- a. Check that route is clear of persons, obstructions, holes and drop-offs and is capable of supporting the wheel loads.
- b. Check clearances above, below and to the sides of platform.
- c. Travel with platform elevated on hard level surface only.
- d. Turn Mode Switch to **DRIVE** position.

WARNING

BEFORE traveling in **REVERSE**, check that route is clear.

- e. Push Drive Toggle Switch (5) to **FORWARD** or **REVERSE** for desired direction of travel.

4-13. XL-19B FOLD DOWN GUARDRAILS (Figure 4-2).

- a. Fold Down Procedure.

1. Remove control console from front guardrail and lay it on the platform deck.

2. Lift up on front top guardrail (1) until slots disengage from pins (2). Fold guardrail back.

3. Remove retaining pin (3) at right side of rear top guardrail (4) rotate it to position along left top guardrail (5) and pin in place.

4. Lift up on left top guardrail (5) until slots disengage with pins and fold guardrail in.

5. Lift up on right top guardrail (6) until slots disengage with pins (7) and fold guardrail in.

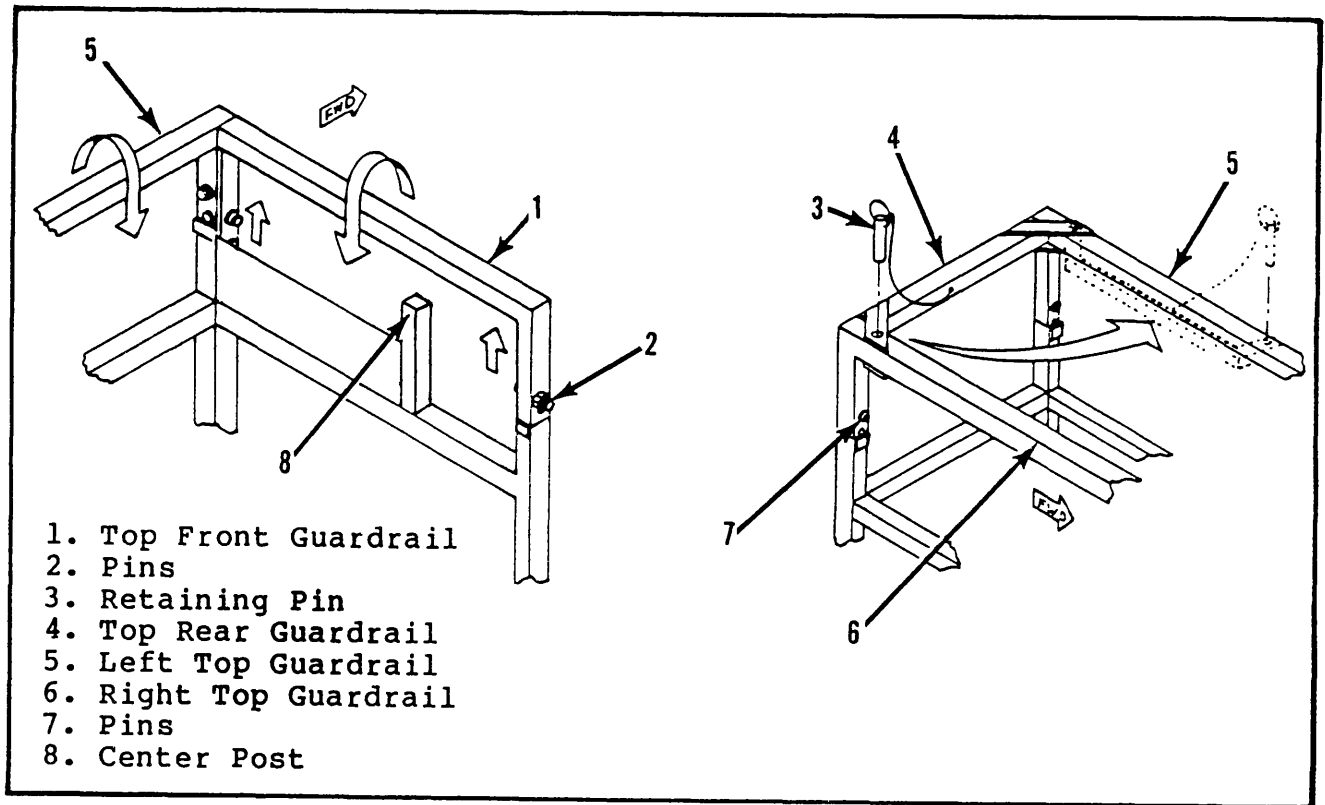


Figure 4-2. Fold Down Guardrails

b. Erection Procedure.

1. Raise the right top guardrail (6) and push down to engage pins (7) with slots.

2. Raise the left top guardrail (5) and push down to engage pins with slots.

3. Remove retaining pin (3) from rear top guardrail (4) (attached to left top guardrail (5)), swing it into place across rear of work platform and pin to right top guardrail (6).

4. Raise front top guardrail (1) and push down to engage the pins (2) with the slots.

5. Hook control console over front guardrail (1) and fit U-bracket on back of control console around center post (8) of front guardrail.

SECTION V

MAINTENANCE INSTRUCTIONS

5-1. **SCOPE.** This section contains instructions for the maintenance of the XL-19B. Procedures for the operational checkout, adjustment, scheduled maintenance, troubleshooting, and repair/removal are included.

5-2. **LOCATION OF COMPONENTS.** Figure 5-1 shows components on complete work platform. Figure 5-2 shows components mounted directly to chassis and located in the control valve.

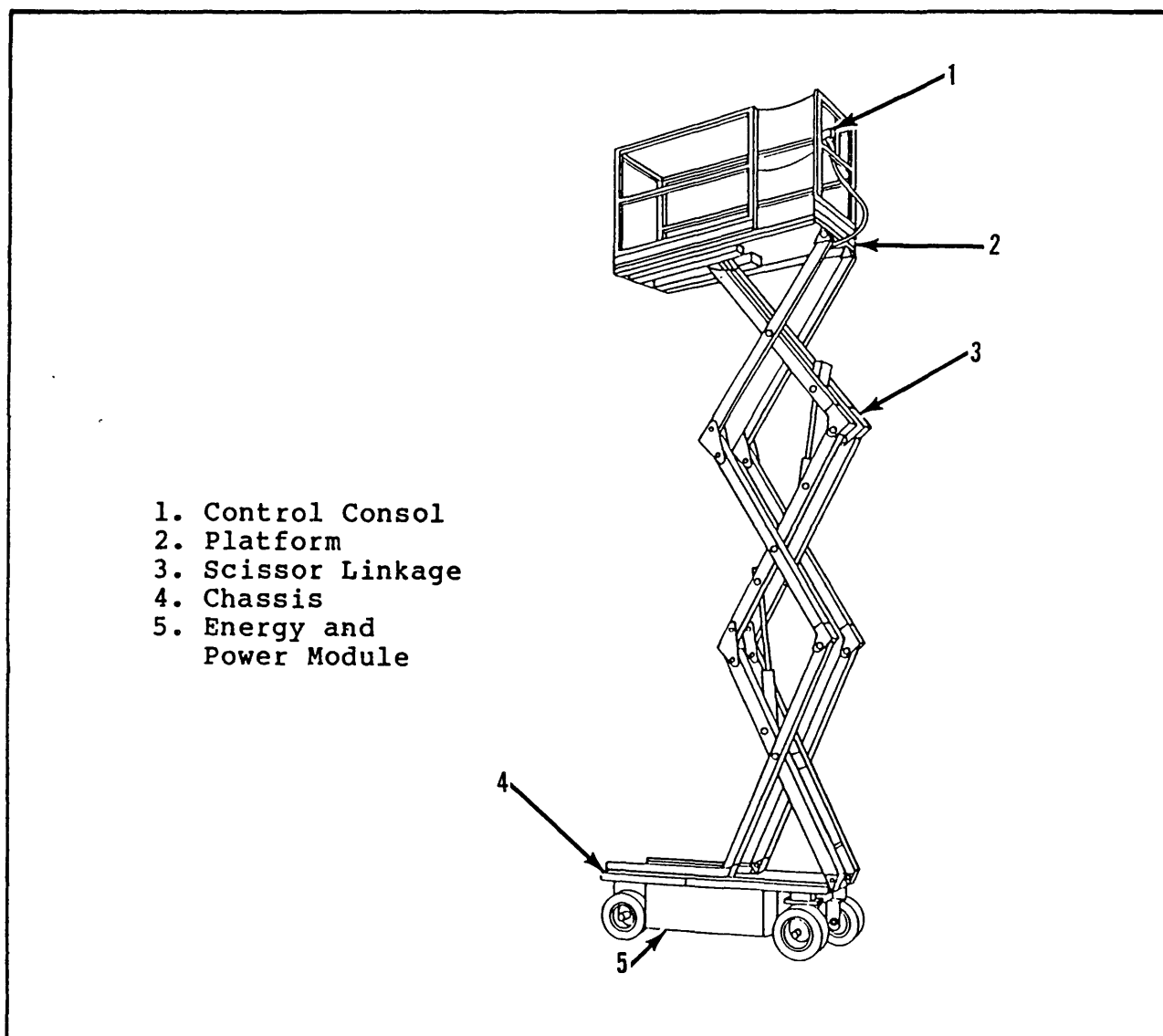


Figure 5-1. Location of Components

1. Battery
2. Return Filter
3. High Speed Cutout Switch
4. Battery Charger
5. Brake Cylinder
6. Motor Relay Kit
7. Electric Motor
8. Hydraulic Pump
9. Platform Height Limit Switch
10. Drive Motors
11. Steering Cylinders
12. Emergency Lowering Valve
13. Steering Relief Valve
14. Series-Parallel Valve
15. Forward/Reverse Valve

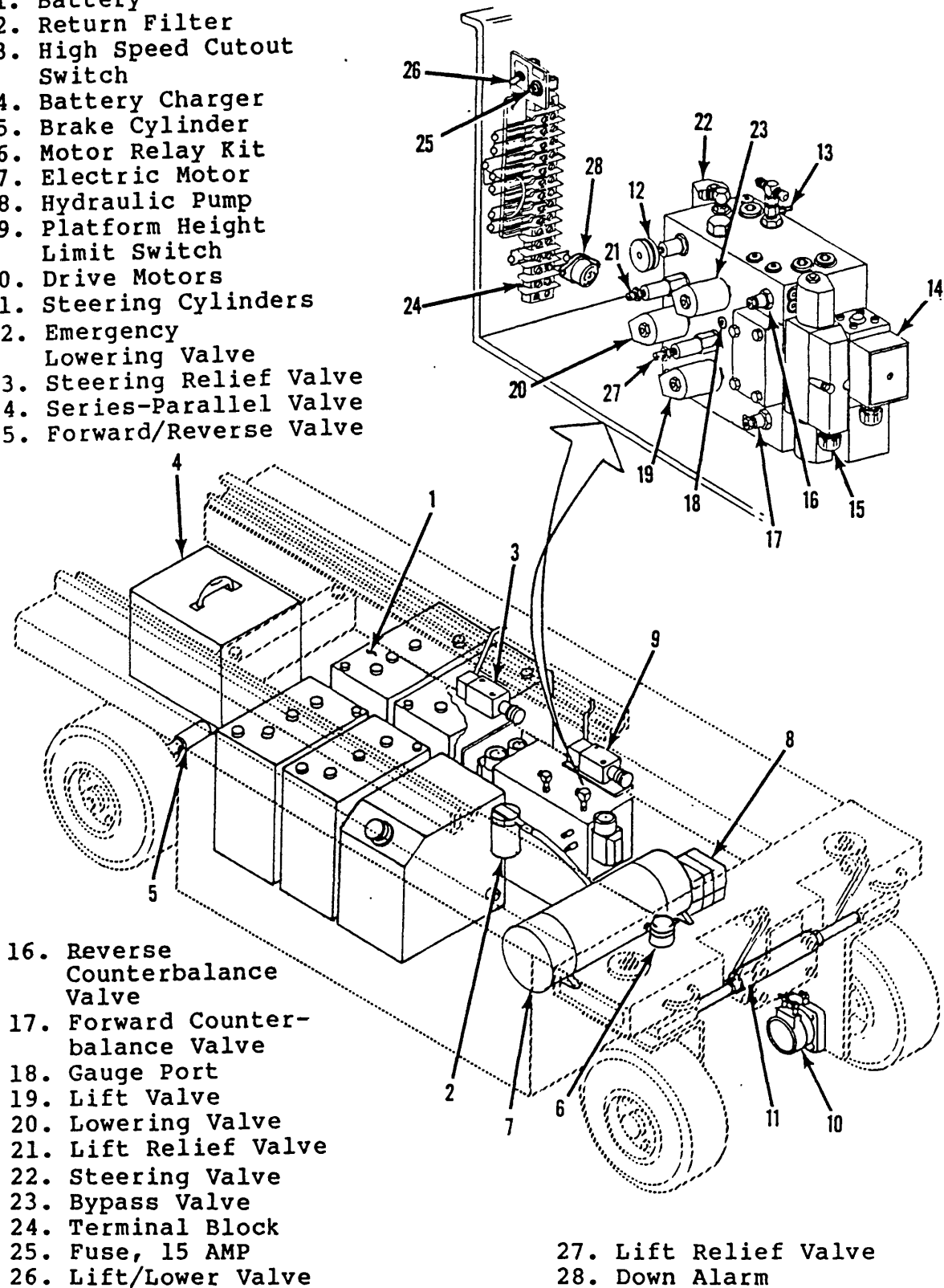


Figure 5-2. Location of Components, Chassis

5-3. SCHEDULED INSPECTION AND MAINTENANCE.

5-4. GENERAL. The complete inspection consists of periodic visual and operational checks, together with all necessary minor adjustments to assure proper performance. Refer to Table 5-1.

Table 5-1. Inspection, Checks and Services

INTERVAL	COMPONENT/LOCATION	INSPECTION/CHECK/SERVICES
Each Shift	Battery System/Chassis	Check electrolyte level. Check specific gravity. Clean exterior. Check cable condition. Charge batteries per paragraph 5-7.
	Hydraulic Oil Tank/Chassis	Check oil level and fill if necessary.
	Tires/Chassis	Check for damage.
	Control Linkage Cable/Scissors	Check the exterior of the cable for pinching, binding or wear.
	Deck and Guardrails/Platform	Check fasteners for tightness. Check welds for cracks. Check condition of deck.
	Arms/Scissors	Inspect for structural bend and weld cracking.
125 Hours	Control Valves/Hydraulic System	Check for leaks at valve bases. Check valve hose connections.
	Hoses/Hydraulic System	Check hose connections for serviceability. Check hoses for wear.
	Emergency Hydraulic System/Chassis Module	Open emergency down module and check for serviceability.
	Hydraulic Pump/Chassis	Check for leaks at mating surfaces. Check for hose fitting leaks. Check mounting bolts for tightness.

Table 5-1. Inspection, Checks and Services - Continued

INTERVAL	COMPONENT/LOCATION	INSPECTION/CHECK/SERVICE
125 Hours - Cont'd.	Drive Motors/Chassis	Check for operation and leaks.
	Steering System/Chassis	Check hardware for tightness.
	Steering Cylinders/Chassis	Check rods for gouges. Check Seals for leakage. Check hoses for serviceability. Check fittings for tightness.
	Rear Wheel Bearings/Chassis	Check wheel assembly for play.
	Pivot Pin Retainer/Scissors	Check bolts for tightness.
	Lift Cylinders/Hydraulic System	Check rods for gouges. Check mounting pivot pins for wear. Check seals for leaks. Check hoses for serviceability. Check fittings for tightness. Check snaprings.
	Control Console/Platform	Check switches operation. Check cable for wear.
	Work Platform, Complete	Perform operational checkout per paragraph 4-8.
	Work Platform, Complete	Lubricate per paragraph 5-8.
250 Hours	Batteries/Chassis	Clean terminals per paragraph 5-7.
	Hydraulic Oil Filter/Chassis	Change filter per paragraph 5-9.
	Hydraulic Pump/Chassis	Wipe clean.
	Steering System/Chassis	Check hardware.

Table 5-1. Inspections, Checks and Services - Continued.

INTERVAL	COMPONENT/LOCATION	INSPECTION/CHECK/SERVICE
250 Hours - Cont'd.	Pivot Points/Scissors Rollers and Tracks/ Scissors Arms/Scissors	Check for wear. Check for wear and deformation. Check for bending and weld cracks.
	Entire Work Platform	Check component mountings for tightness. Check all fasteners for tightness. Check welds for cracks. Check hoses for serviceability. Check for and repair collision damage.
500 Hours	Entire Work Platform	Check for corrosion, remove and repaint.
1000 Hours	Hydraulic Oil/Chassis	Drain hydraulic tank and replace oil per paragraph 5-8.
	Rear Wheel Bearings/ Chassis	Repack wheel bearings per paragraph 5-20.
2000 Hours	Rear Wheel Bearings/ Chassis	Replace wheel bearings and seals per paragraph 5-20.

5-5. BLOCKING SCISSORS (FIGURE 5-3).

WARNING

BEFORE performing maintenance service on work platform while platform is elevated ensure that scissors are properly blocked.

NOTE

A 4x4 of firm wood with a length of 14 to 18 inches shall be used to block the scissors.

a. Installation.

- (1) Park the work platform on firm, level ground.
- (2) Open Emergency Stop Switch Cover on control console and position toggle in the ON position.

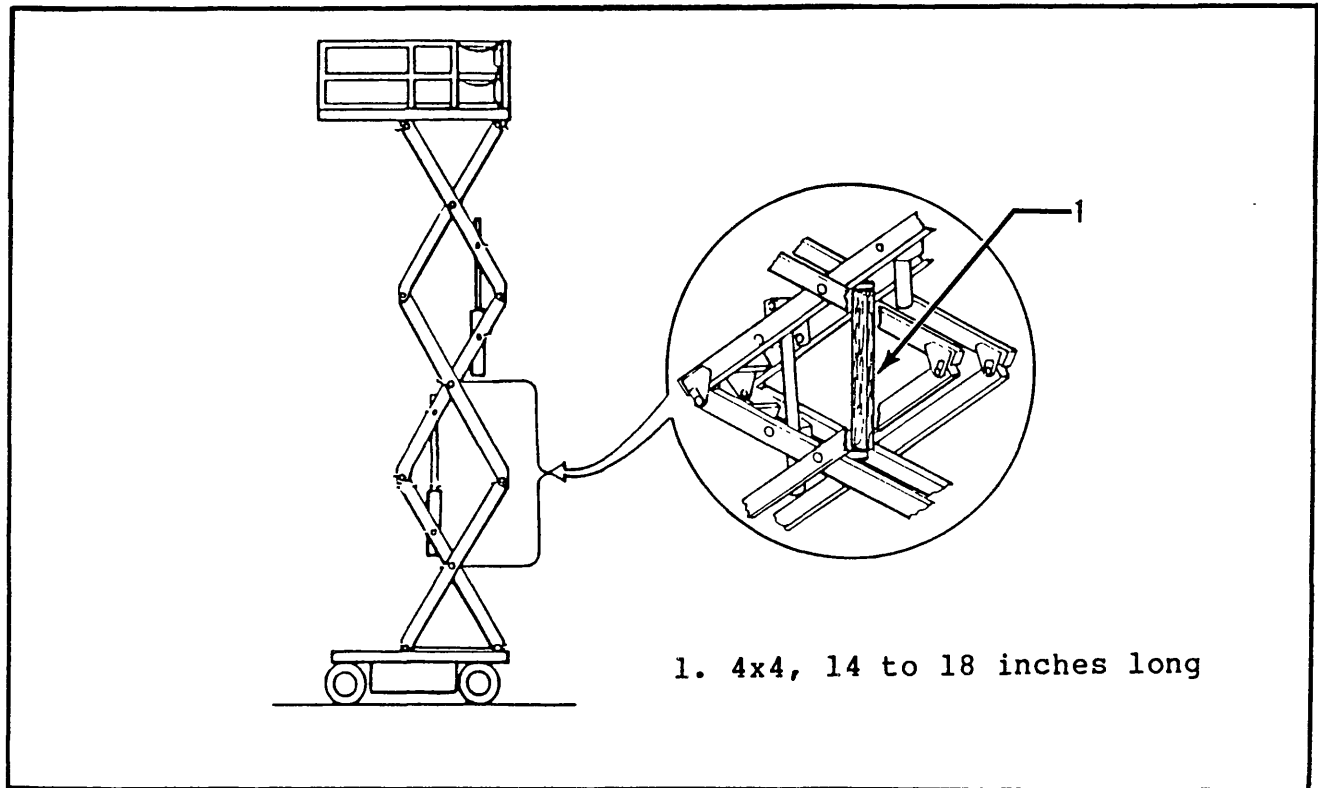


Figure 5-3. Blocking the Scissors

(3) Turn Mode Switch on control console to **LIFT** position.

(4) Push Chassis Lift Switch (located in hydraulic module) to **UP** position and elevate platform approximately four feet.

WARNING

DO NOT stand in scissors area while performing steps 5 and 6.

(5) Place 4x4 between center pivot assembly of the lower scissors arms and center pivot assembly of middle scissors arms.

(6) Push Chassis Lift Switch to **DOWN** position and gradually lower scissors until 4x4 is secured tightly between pivot points.

b. Removal.

WARNING

DO NOT stand in scissors area while removing block.

(1) Push Chassis Lift Switch to **UP** position and gradually raise platform.

(2) Remove 4x4 block.

(3) Push Chassis Lift Switch to **DOWN** position and completely lower platform.

(4) Turn Mode Switch to the **OFF** position and close Emergency Stop Switch Cover.

5-6. MAINTENANCE-DETAIL INSTRUCTIONS.

5-7. BATTERY MAINTENANCE. Electrical energy for the motor is supplied by four six volt batteries wired in series for 24 volts DC. Proper care and maintenance of the batteries and motor will ensure maximum performance from the work platform.

a. Battery Inspection and Cleaning.

(1) Check battery fluid level daily, especially if work platform is being used in a warm, dry climate.

CAUTION

If battery water level is not maintained, batteries are not capable of full charge therefore creating a low discharge rate which will damage motor/pump unit and void warranty.

(2) Batteries and cables should be inspected periodically for signs of cracks in the cases, electrolyte leakage and corrosion of the terminals. Inspect cables for worn spots or breaks in the insulation and for broken cable terminals.

(3) Clean batteries which show signs of corrosion at the terminals, or onto which electrolyte has overflowed during charging. Use a baking soda or ammonia solution to clean the batteries, taking care not to get the solution inside the cells. Rinse thoroughly with clear water. Clean battery and cable contact surfaces to a bright metal finish whenever a cable is removed.

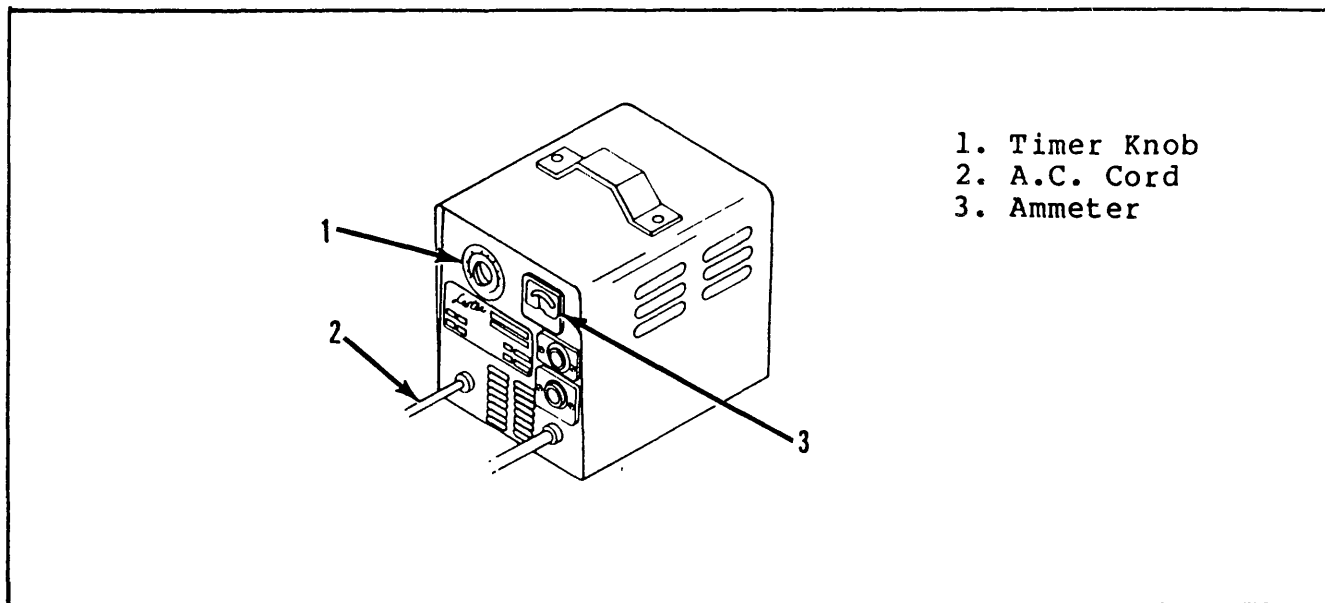


Figure 5-4. Battery Charger

b. Battery Charging (See Figure 5-4).

(1) Charge batteries at end of each work shift or sooner if batteries have been discharged.

CAUTION

Do not charge batteries when the work platform is in a hazardous area.

CAUTION

Permanent damage to batteries will result if batteries are not immediately recharged after discharging.

(2) Do not charge unused vehicles regularly except during winter storage on a monthly basis.

(3) When night air temperatures fall below 65 degrees F batteries charged in unheated areas should be placed on charge as soon after use as possible. Under such conditions a 4 hour equalize charge once a week in the early afternoon will improve state of charge and battery life.

(4) With Timer Knob (1) turned to **OFF**, connect A.C. Cord (2) to a properly grounded 115 volt, 60Hz power supply.

(5) Set Timer Knob (1) to 7 for lightly discharged batteries and to **ON** (16 hours) for well discharged batteries. Charger shuts off automatically at end of set period.

(6) Initial charge rate varies with state of discharge but finish rate should be in green area on Ammeter (3) when all cells are good.

(7) To determine approximate full charge at start of day's use, turn Timer Knob (1) to 1. Drop of Ammeter needle to green area in 15 minutes or less indicates full charge.

c. Battery Cell Equalization.

(1) The specific gravity of the electrolyte in the battery cells should be equalized monthly. To do this, charge batteries as outlined in Battery Charging. After this initial charge, check the electrolyte level in all cells and add water as necessary. Then, turn the charger on for additional eight hours. During this time, the charging current will be low (four amps) as cells are equalizing.

(2) After equalization, the specific gravity of all cells should be checked with a hydrometer. The temperature corrected specific gravity in this state should be 1.260. If any corrected readings are below 1.230, the batteries containing such cells should be replaced. At any rate, the specific gravity in all cells after equalization should not vary more than .010. If a wide variation exists, this is an indication for need of battery replacement.

(3) Do not check the specific gravity in a cell to which water has just been added. If there is not enough electrolyte in a fully charged cell to obtain a sample for the hydrometer, add water and continue charging for one to two hours to adequately mix the water and electrolyte.

5-8. **LUBRICATION.** Refer to Figure 5-5 for location of items that require lubrication service.

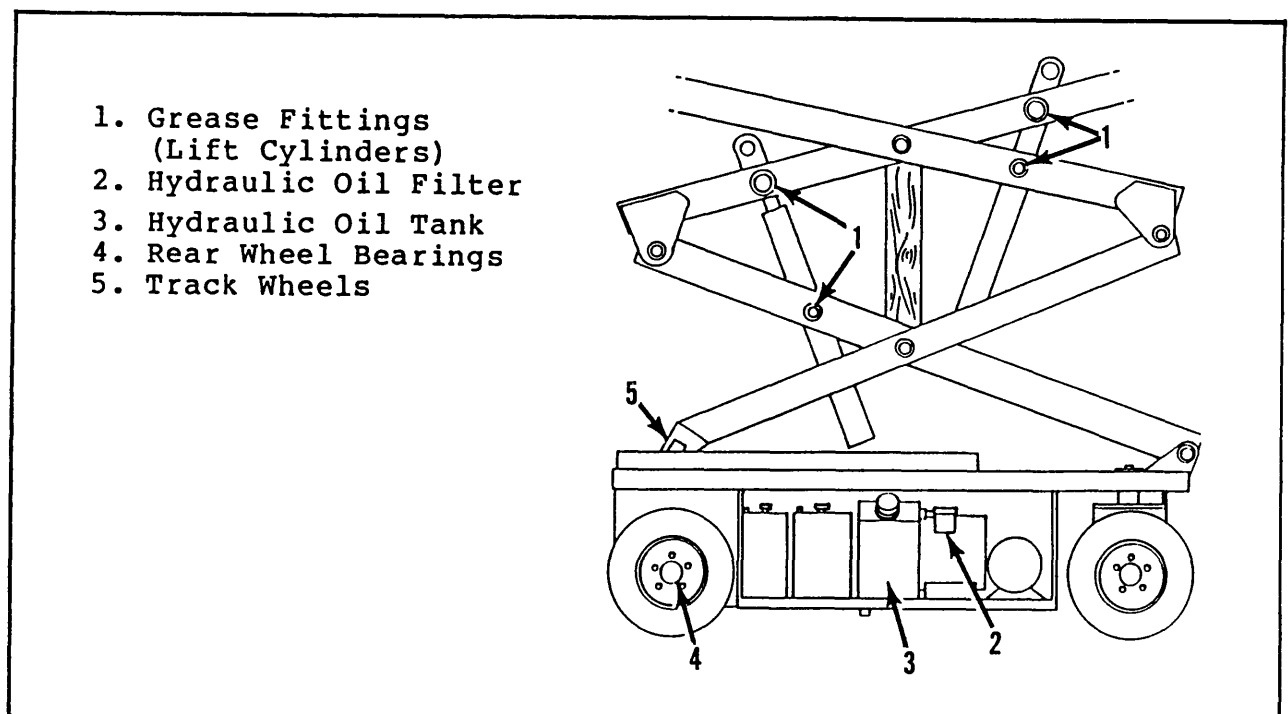


Figure 5-5. Lubrication Points

5-9. HYDRAULIC OIL TANK AND FILTER (Figure 5-6).

a. Operate the work platform to bring the hydraulic oil up to normal operating temperature.

b. Provide a suitable container to catch the drained oil.
Hydraulic tank has a 4 gallon capacity.

WARNING

The hydraulic oil may be of sufficient temperature to cause burns. Wear safety gloves and safety glasses when handling hot oil.

c. Remove the drain plug (3) and allow all oil to drain.

d. Reinstall the drain plug (3).

e. Unthread the filter (2) from the filter head.

f. Apply a thin film of clean hydraulic oil (Mobil 423 or equivalent) to the gasket of the replacement filter.

g. Thread the replacement filter onto the filter head until the gasket makes contact then rotate the filter $\frac{3}{4}$ of one turn further.

h. Fill the hydraulic reservoir with Mobile 423 hydraulic oil or equivalent. Hydraulic tank has a 4 gallon capacity.

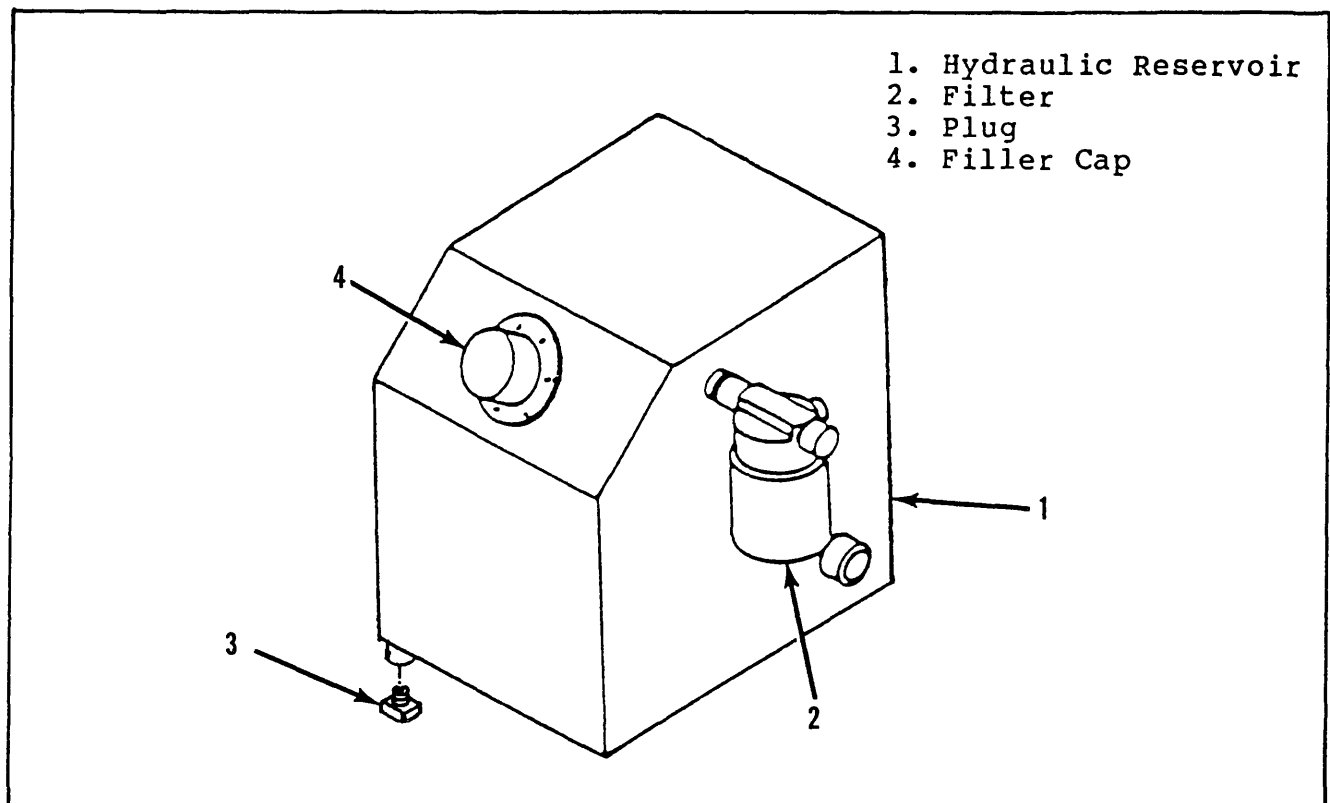


Figure 5-6. Hydraulic Oil Tank and Filter

5-10. TROUBLESHOOTING.

5-11. **SCOPE.** Table 5-2 provides a logical sequence of tests that are designed to isolate problems with the XL-19B. This table includes a list of probable causes and remedies.

5-12. SAFETY.

WARNING

When troubleshooting, ensure that the work platform is resting on a firm, level surface. When performing any service which requires the platform to be raised, the scissors must be blocked per paragraph 5-5. Disconnect the batteries when replacing or testing the continuity of any electrical component.

5-13. **GENERAL PROCEDURE.** In general, troubleshooting should be carried out by first thoroughly looking at the electrical circuits and components that could cause the problem. Loose terminal connections and short circuits are always a potential probable cause when troubleshooting. Only when electrical circuits and components have been found fault-free, should the hydraulic system be examined. Refer to Tables 6-1 and 6-2 for Reference Designations used in Table 5-2.

TABLE 5-2. Troubleshooting

TROUBLE	PROBABLE CAUSE	REMEDY
All functions inoperable, electric motor does not start.	1. Blown control circuit fuse.	Check 15 amp Control Circuit Fuse (F1). Replace if blown.
	2. Faulty battery charger.	Check the voltage output of the battery charger. If less than 24 VDC, repair or replace.
	3. Faulty battery (ies).	After completely charging the batteries, test each battery (BT). Replace as required.
	4. Defective motor relay.	While operating the steering, check voltage across the coil terminals of Motor Relay (CRL). If no voltage is present, proceed with step 5. If

TABLE 5-2. Troubleshooting - Continued

TROUBLE	PROBABLE CAUSE	REMEDY
All functions inoperable. Electric motor does not start - Cont'd.	4. Defective Motor relay - Cont'd.	20 VDC or more, check continuity across the contact terminals of Motor Relay (CR1) while still operating the steering function. If there is no continuity, replace the defective Motor Relay (CR1).
	5. Emergency stop switch failed open.	With the Emergency Stop Switch (S1) in the ON position, check continuity across the contacts. If none, replace.
	6. Faulty electric motor.	While operating the steering function, check voltage across the Electric Motor (B) terminals. If 24 VDC is present, replace the Motor (B).
All functions inoperable. Electric motor starts when control is actuated.	1. Hydraulic reservoir low.	Check hydraulic fluid level, top off as required.
	2. Damaged coupling.	Remove Pump (ASSY1) from Motor (B) and check coupling.
	3. Defective hydraulic pump.	Check pressure and delivery of the Hydraulic Pump (ASSY1). Replace if required.
Electric motor continues to run after controls are returned to the OFF position.	Motor relay contacts fused together.	With 0 voltage at the coil terminals of the Motor Relay (CR1) check continuity across the contact terminals. If there is continuity, replace the Motor Relay (CR1).
Lift and drive inoperable. Steering functions properly.	1. Relief valve out of adjustment or defective.	Adjust the Relief Valve (RV1). If not adjustable, replace.

TABLE 5-2. Troubleshooting - Continued

TROUBLE	PROBABLE CAUSE	REMEDY
Lift and drive inoperable. Steering functions properly - Cont'd.	2. Hydraulic pump defective.	Check pressure and delivery of the Hydraulic Pump (ASSY1). Replace if required.
Work platform will not drive or steer. Platform Up/Down functions properly.	Defective mode switch	With the Mode Switch (S2) in the DRIVE position, check continuity. Replace if faulty.
Work platform will not drive forward or reverse. Lift function operable.	1. Defective drive toggle switch.	Check continuity of Drive Toggle Switch (S4).
	2. Defective mode switch	Check continuity of Mode Switch (S2).
	3. Forward/reverse valve defective.	Check the Forward/Reverse Valve (V1). If the spool is not shifting, replace the valve.
	4. Mechanical failure.	Inspect drive motor shafts, hubs, and keys.
	5. Worn drive motors.	Check hydraulic pressure being delivered to the Drive Motors (MOT1, MOT2). If sufficient, replace Drive Motors.
Work platform drives too fast when elevated.	1. Defective high speed cutout switch.	With the platform completely lowered, check continuity in High Speed Cutout Switch (S10). If the switch is open adjust or replace as required.
Work platform will not drive in CREEP speed.	Flow regulator orifice plugged.	Remove and clean Flow Regulator (FR1).
Work platform will not drive full speed.	1. Defective bypass valve coil.	Test Bypass Valve Coil (L2). If proper voltage is present and coil is not magnetized, replace.

TABLE 5-2. Troubleshooting - Continued

TROUBLE	PROBABLE CAUSE	REMEDY
Work platform will not drive full speed - Cont'd.	2. Defective series valve coil.	Test Series Valve Coil (L8). If proper voltage is present and coil is not magnetized, replace.
	3. Defective high speed cutout switch.	With the platform completely lowered, check continuity in High Speed Cutout Switch (S10). If the switch is open adjust or replace as required.
	4. Defective drive range switch.	Test Drive Range Switch (S9) for continuity. Replace if defective.
	5. Defective Diode.	Test Diode (D1). Replace if defective.
	6. Relief valve out of adjustment or defective.	Adjust the Relief Valve (RV1). If not adjustable, replace.
	7. Drive counterbalance valve out of adjustment or defective.	Adjust Counterbalance Valves (V2, V3).
	8. Bypass valve stuck in the OPEN position.	Replace the Bypass Valve (V4) Cartridge.
	9. Series valve sticking.	Inspect the Series Valve (V5) to see if the spool shifts freely. If sticking, replace.
	10. Defective hydraulic motors.	Check hydraulic pressure being delivered to Hydraulic Drive Motors (MOT1, MOT2). If sufficient, replace Drive Motors.
	11. Defective hydraulic pump.	Check pressure and delivery of Hydraulic Pump (ASSY1). Replace if required.

TABLE 5-2. Troubleshooting - Continued

TROUBLE	PROBABLE CAUSE	REMEDY
Work platform will not drive forward.	1. Faulty solenoid on drive valve.	Test the forward Solenoid (L6) on the Drive Valve. If the proper voltage is present and the valve is not magnetized, replace.
	2. Drive toggle switch malfunction.	Check Drive Toggle Switch (S3) for continuity when held in the REVERSE position. Replace if required.
	3. Reverse counterbalance valve cartridge out of adjustment or defective.	Adjust the Reverse Counterbalance Valve Cartridge (V2). If not adjustable, replace.
	4. Plugged flow regulator orifice.	Remove and clean Flow Regulator (FR1).
Steering inoperable or functions sluggishly.	1. Defective steering switch.	Test Steering Switch (S4) for continuity. Replace if defective.
	2. Defective key switch.	Test Key Switch (S7) for continuity. Replace if defective.
	3. Steering relief valve out of adjustment or defective.	Adjust Steering Relief Valve (RV2). If not adjustable, replace.
	4. Mechanical damage.	Inspect all steering components. Replace damaged parts.
	5. Steering valve stuck.	Inspect Steering Valve (V6). If spool is sticking, replace.
	6. Steering Cylinder piston seal leaking.	Check Steering Cylinder (CYL3) for leakage from one port to another. Repair as required.
Work platform will not steer right.	1. Defective steering switch.	Test Steering Switch (S4) for continuity. Replace if defective.

TABLE 5-2. Troubleshooting - Continued

TROUBLE	PROBABLE CAUSE	REMEDY
Work platform will not steer right-Cont'd.	2. Defective diode.	Test Diodes (D4, D5). Replace if defective.
	3. Defective steer right solenoid.	Test Steer Right Solenoid (L4). If the proper voltage is present and the Coil is not magnetic, replace.
Work platform will not steer left.	1. Defective steering switch.	Test Steering Switch (S4) for continuity. Replace if defective.
	2. Defective diode.	Test Diodes (D4, D5) Replace if defective.
	3. Defective steer left solenoid.	Test Steer Left Solenoid (L4). If the proper voltage is present and the Coil is not magnetic, replace.
Platform will not elevate or elevates slowly.	1. Emergency down valve open.	Close Emergency Down Valve (V7).
	2. Platform overload.	Observe maximum load rating (See Table 1-1).
	3. Defective diode.	Test Diodes (D2, D3), replace if defective.
	4. Defective up valve coil.	Test Up Valve Coil (L1). If proper voltage is present and the coil is not magnetized, replace.
	5. Faulty bypass valve coil.	Test Bypass Valve Coil (L2). If proper voltage is present and coil is not magnetized, replace.
	6. Height limit switch malfunction.	Test Height Limit Switch (S10) for continuity. Replace if required.
	7. Defective lift switch.	While holding the Lift Switch (S3) in the LIFT position, check continuity. Replace if defective.

TABLE 5-2. Troubleshooting - Continued

TROUBLE	PROBABLE CAUSE	REMEDY
Platform will not elevate, or elevates slowly - Cont'd.	8. Defective key switch.	Test Key Switch (S7) for continuity. Replace if defective.
	9. Relief valve out of adjustment or defective.	Adjust the Lift Relief Valve (RV3). If not adjustable, replace.
	10. Lift valve sticking.	Replace the Lift Valve (V9).
	11. Lowering valve stuck in the OPEN position.	Replace the Lowering Valve (V7).
	12. Bypass valve sticking.	Replace the Bypass Valve (V4).
	13. Defective hydraulic pump.	Check pressure and delivery of the Hydraulic Pump (ASSY1). Replace if required.
Platform drifts down after being elevated.	1. Emergency down valve partly open or defective.	Ensure that the Emergency Down Valve (V8) is completely closed. If the platform still drifts down, replace the Emergency Down Valve (V8).
	2. Check valve leaking.	Check for contamination under Ball (CV2). Clean and reseal Ball in block.
	3. Leaky down valve cartridge.	Replace the Down Valve (V7).
	4. Defective relief valve.	Replace the Lift Relief Valve (RV3).
	5. Defective Valve O-rings.	Check and replace O-Rings on Emergency Lowering Valve (V8), Lowering Valve (V7) and Lift Relief Valve (RV3).
	6. Defective lift valve.	Replace the Lift Valve (V9).

TABLE 5-2. Troubleshooting - Continued

TROUBLE	PROBABLE CAUSE	REMEDY
Work platform drives while lifting.	Defective diode.	Test Diode (D1). Replace if defective.
Work platform lifts while driving.	Defective diode.	Test Diodes (D2, D3). Replace if defective.
Platform will not lower.	1. Defective lowering valve coil.	Test Lowering Valve Coil (L2). If proper voltage is present and Coil is not magnetized, replace.
	2. Defective mode selector switch.	With the Mode Selector Switch (S2) in the LIFT position, check continuity. Replace if defective.
	3. Defective lift switch.	While holding the Lift Switch (S3) in the DOWN position, check continuity. Replace if defective.
	4. Lowering valve stuck.	Replace the Lowering Valve (V7).
	5. Plugged lowering speed orifice.	Remove and clean Orifice (ORF2).
	6. Velocity fuse valve sticking.	Replace the Velocity Fuse Valve (V10).
Down alarm horn does not sound.	Defective down alarm horn.	Check voltage to Down Alarm Horn. If proper voltage is present, replace the Down Alarm Horn (HN).
Brake will not release.	1. Orifice plugged.	Remove and clean Brake Orifice (ORF1).
	2. Defective brake cylinder.	Check and replace Seals in Brake Cylinder (CYL1).
Brake will not lock wheel.	1. Orifice plugged.	Remove and clean Brake Orifice (ORF).
	2. Defective brake cylinder.	Check and replace Seals in Brake Cylinder (CYL).

5-14. ADJUSTMENTS.

5-15. SETTING HYDRAULIC PRESSURES (Figure 5-7).

NOTE

Check the hydraulic pressures whenever the manifold, pump or relief valves have been serviced or replaced.

a. Main Pump Relief Valve (5, Figure 5-7).

(1) Operate the hydraulic system 10-15 minutes to warm the oil.

(2) Remove the plug (7, Figure 5-7) in the Gauge Port and install a 0-3000 psi pressure gauge.

(3) Disconnect one of the quick-disconnect connectors in the Lift Limit Switch wires (located by terminal block).

(4) Loosen the locknut on the Main Pump Relief Valve (5, Figure 5-7).

(5) Position the Chassis Lift Switch to UP position and hold it there.

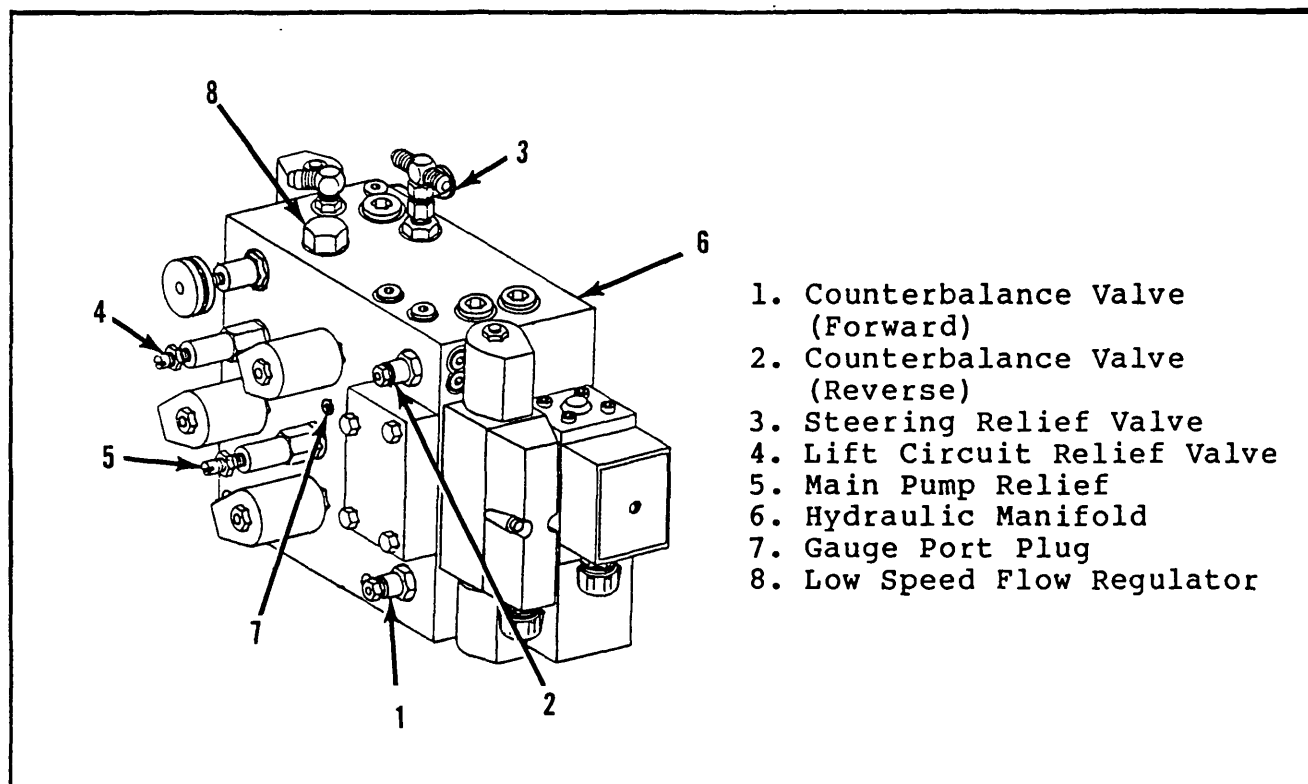


Figure 5-7. Hydraulic Pressure Adjustment

(6) Slowly screw the adjusting screw in to increase the pressure to 2950 psi, then tighten the locknut.

(7) Reconnect the Lift Limit Switch wire.

(8) Remove pressure gauge and install plug (7, Figure 5-7).

b. Lift Circuit Relief Valve (4, Figure 5-7).

(1) Remove the Gauge Port Plug (7, Figure 5-7) and install an 0-3000 psi pressure gauge or if the Main Relief Valve has just been adjusted leave the gauge connected.

(2) Operate the hydraulic system 10 to 15 minutes to warm the hydraulic oil

(3) Position a 550 lb. load centered on the platform.
(Load may vary depending on option. Check nameplate for load.)

(4) Position the Mode Switch to LIFT.

(5) Position the Chassis Lift Switch to UP, hold it there and observe the pressure gauge.

(6) Loosen the locknut on the Lift Circuit Relief Valve (4) and screw the adjusting screw OUT to lower the pressure setting to 2000 psi.

WARNING

If the platform starts to raise, backing the pressure to 2000 psi will cause the platform to lower.

(7) Observe the pressure gauge as the adjustment screw of the Relief Valve (4) is screwed IN. As the pressure increases the platform should start to lift. Lock the adjustment screw with the locknut just as the platform starts to raise. This pressure setting limits the lifting capability of the work platform to 550 lbs.

NOTE

The pressure setting may vary as much as 200 psi either way from 2950 psi.

(8) Operate lift system stop and starting to ensure proper function.

(9) Remove the pressure gauge from the gauge port and install plug.

(10) Remove load and check for leaks.

c. Steering Relief Valve (3, Figure 5-7).

(1) Disconnect the hydraulic hose on the left side of the steering cylinder and install an 0-3000 psi pressure gauge.

(2) Operate the hydraulic system 10 to 15 minutes to warm the hydraulic oil.

(3) Turn the Mode Switch to **DRIVE** position.

(4) Position the Steer Switch to **LEFT** and hold it there. Observe the pressure gauge.

(5) The gauge should read 1950 psi. If not, loosen the locknut on the Steering Relief Valve (3, Figure 5-7).

(6) Back the adjustment screw **OUT** several turns and then slowly turn the screw **IN** until the appropriate pressure is reached. Tighten locknut.

(7) Release the Steering Switch and remove the gauge from the steering hose.

(8) Reconnect the Steering Cylinder Hose and operate the steering system to expel trapped air and check for leaks.

d. Counterbalance Valve (1,2, Figure 5-7).

(1) Remove Gauge Port Plug (7, Figure 5-7) and install an 0-3000 psi pressure gauge.

(2) Lift work platform and block front wheels off ground.

(3) Operate the hydraulic system 10 to 15 minutes to warm the hydraulic oil.

(4) Position the Mode Switch to **DRIVE**.

(5) Position Speed Range Switch to **CREEP**.

(6) Position the Drive Toggle Switch to **FORWARD**.

(7) Adjust the **REVERSE** Counterbalance Valve (2, Figure 5-7) by turning the adjustment screw **OUT** until the pressure gauge indicates 300 psi, then slowly turn the screw **IN** until the gauge indicates 250 psi. Lock adjustment with locknut.

(8) Position the Drive Toggle Switch to **REVERSE**.

(9) Adjust the **FORWARD** Counterbalance Valve by turning the adjustment screw **OUT** to achieve 300 psi, then slowly turning the screw **IN** to reach 250 psi. Lock the adjustment with the locknut.

(10) Actuate **FORWARD**, actuate **REVERSE** checking gauge to ensure pressures are 250 psi. Readjust as needed.

(11) Remove blocks and lower work platform to ground.

(12) Remove the gauge from the gauge port and reinstall plug.

(13) Operate the drive system and check proper speeds and braking.

5-16. REPAIR. The following procedures are to handle replacement of components that are damaged or worn beyond acceptable performance specifications.

5-17. HYDRAULIC MANIFOLD (Figure 5-8).

a. General. It is not necessary to remove the manifold to perform all maintenance procedures. A determination should be made prior to beginning as to whether or not the manifold should be removed.

b. Removal.

(1) Tag and disconnect the solenoid valve leads from the terminal strip.

NOTE

It will be necessary to disconnect the hydraulic hoses from the components they connect to in order to unscrew them from the manifold. The exceptions are the left cylinder hose and the brake release hose.

(2) Tag and disconnect the hydraulic hoses.

(3) Remove the locknuts (19), jam nuts (20) and capscrews (31) that hold the manifold (1) to the mounting bracket (27).

(4) Remove manifold (1).

c. Disassembly.

NOTE

Mark all components as they are removed so as not to confuse their location during assembly.

(1) Remove the capscrews (25) and spool valve covers (24) to allow access to the spool valve mount capscrews (26).

(2) Remove capscrews (26), spool valves (6, 22) and O-rings (8, 21).

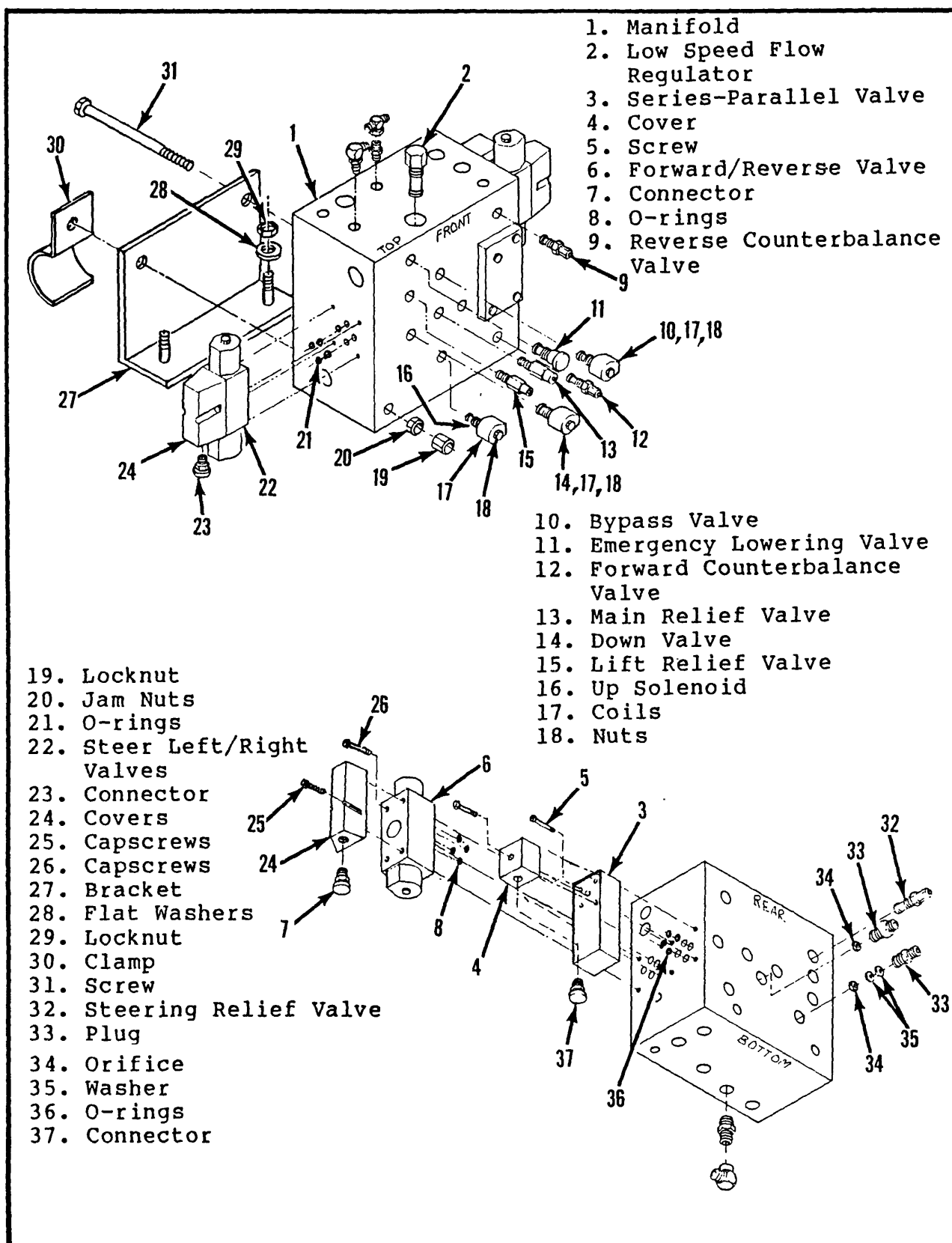


Figure 5-8. Hydraulic Manifold (Sheet 1 of 2)

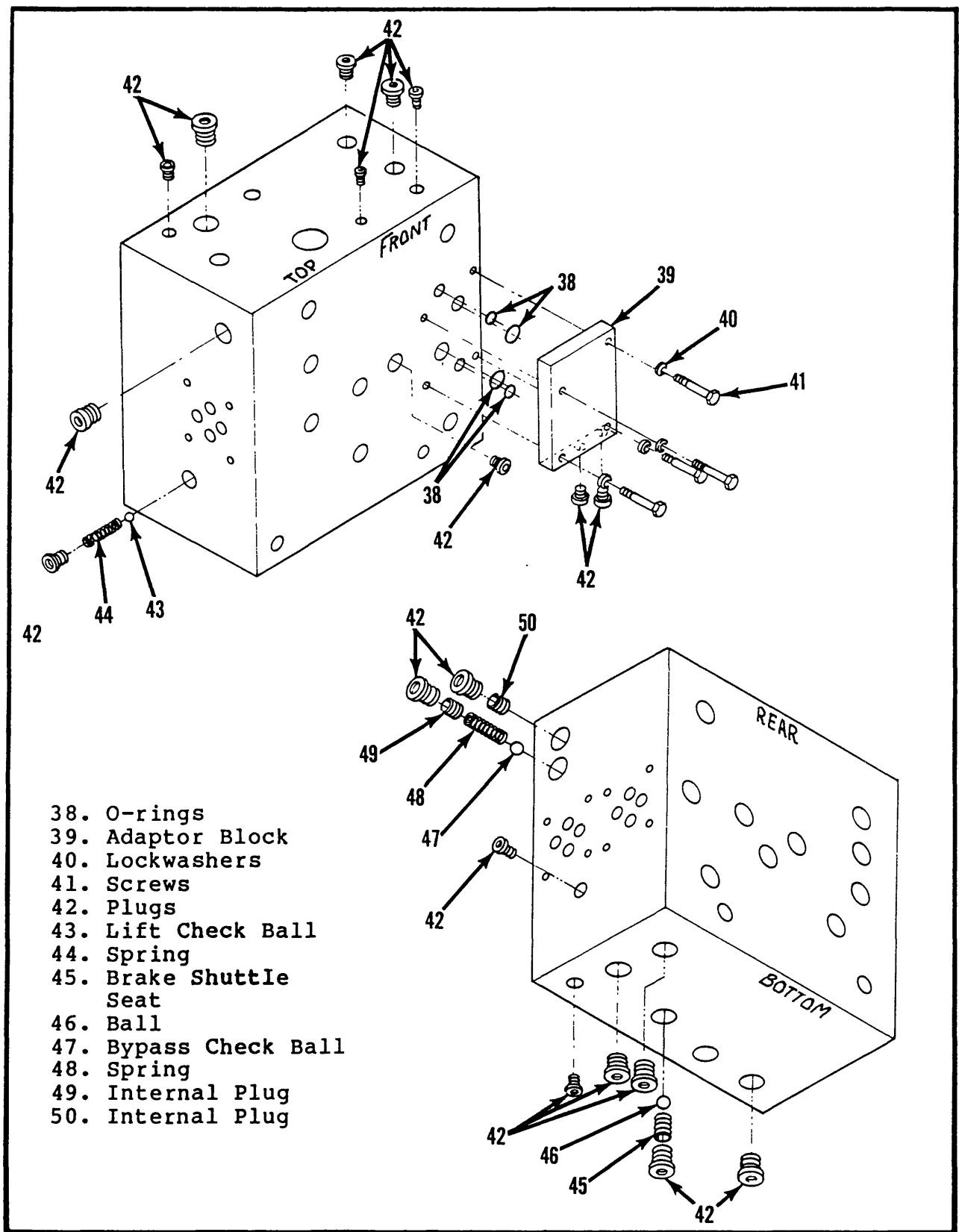


Figure 5-8. Hydraulic Manifold (Sheet 2 of 2)

(3) Remove the coil mount nuts (18) and coils (17) from the cartridge solenoid valves (10, 14, 16).

(4) Unscrew cartridge solenoid valves (10, 14, 16), relief valves (13, 15, 32), counterbalance valves (9, 12) and flow control valve (2).

(5) Remove adapter fittings (33) orifices (34) and washers (35) from lift and brake ports.

(6) Remove capscrews (41), lockwashers (40), adapter block (39) and O-rings (38).

d. Cleaning and Inspection.

(1) Remove all exterior plugs (42) from manifold.

(2) Remove lift check spring (44) and ball (43).

(3) Remove internal plug (49), spring (48) and bypass check ball (47).

(4) Remove brake shuttle seat (45) and ball (46).

(5) Remove internal plug (50) from creep passage.

(6) Wash the manifold in cleaning solvent to remove built up contaminants and then blow out all passages with clean compressed air.

(7) Inspect the manifold for cracks, thread damage and scorings where O-rings seal against internal surfaces.

(8) Wash and dry each component and check for thread damage, torn or cracked O-rings and proper operation.

(9) Replace parts and O-rings found not serviceable.

e. Assembly.

(1) Install internal plug (50) in creep passage. (Use one drop #242 loctite.)

(2) Install brake shuttle ball (46) and seat (45). (Use one drop #242 loctite.)

(3) Install bypass check ball (47), spring (48) and internal plug (49). (Use one drop #242 loctite.) Note: Deformed end of spring should be towards ball.

(4) Install lift check ball (43), spring (44) and plug (42).

(5) Reinstall all exterior plugs (42).

(6) Install brake and lift orifices (34), washers (35) and adapter fittings (33). Note: Groove in orifice plate must face out.

(7) Install adapter block (39) and O-rings (38) with capscrews (41) and lockwashers (40).

(8) Install cartridge solenoid valves (10, 14, 16), relief valves (13, 15, 32), counterbalance valves (9, 12) and flow control valve (2).

(9) Install the coils (17) on the cartridge solenoid valves (10, 14, 16) with mount nuts (18).

(10) Install O-rings (8, 21), spool valves (6, 22) and capscrews (26).

(11) Attach spool valve covers (4, 24) to spool valves (6, 22) with capscrews (25).

f. Installation.

(1) Attach manifold assembly to mounting bracket (27) with capscrews (31), jam nuts (20) and locknuts (19). Note: Longer capscrow and jam nut go in hole nearest the front of the work platform. Install jam nut (1) and tighten. Then attach all valve solenoid ground wires with second jam nut.

(2) Connect valve coil leads to terminal strip (as tagged previously).

(3) Connect hydraulic hoses. Be certain to tighten hoses into manifold, before tightening the other ends.

(4) Operate each hydraulic function and check for proper function and leaks.

5-18. HYDRAULIC PUMP (Figure 5-9 and 5-10).

a. Removal (Figure 5-9).

NOTE

If the hydraulic tank has not been drained, suitable means for plugging the hoses should be provided to prevent excessive fluid loss.

(1) Mark, disconnect and plug the hose assemblies (1, 2, 3).

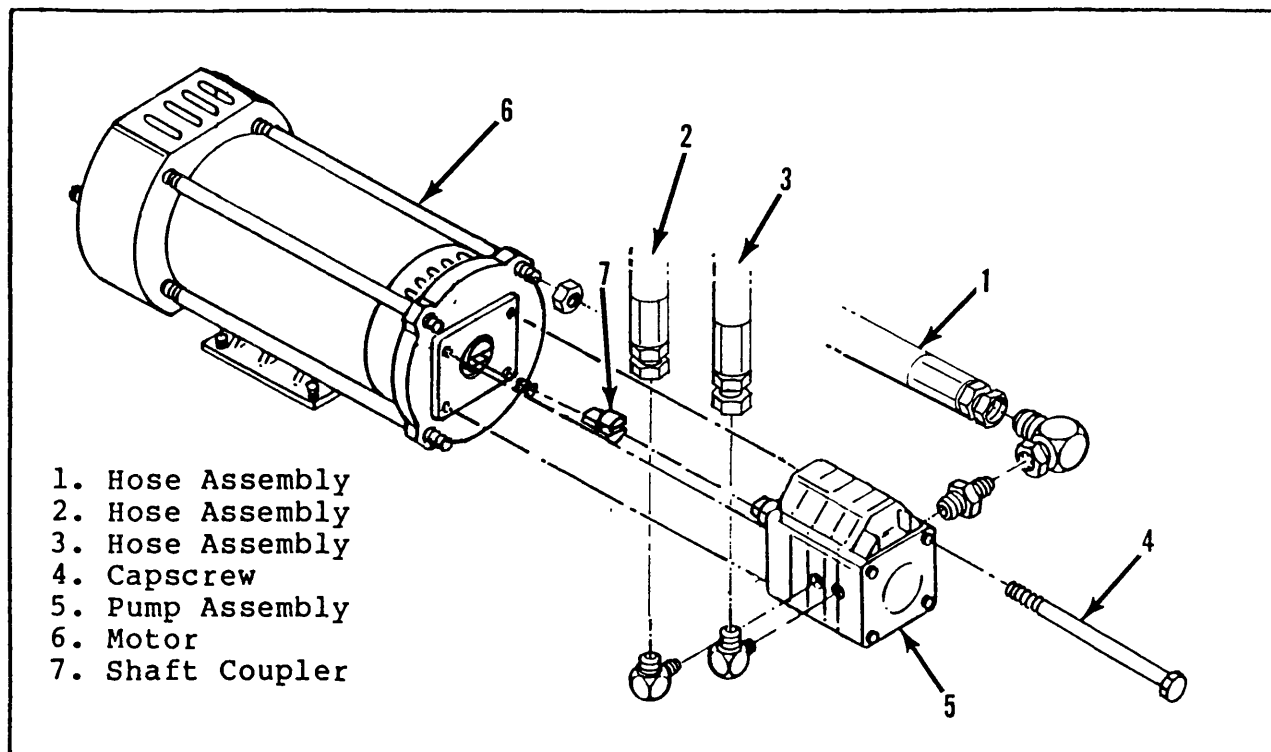


Figure 5-9. Hydraulic Pump Removal

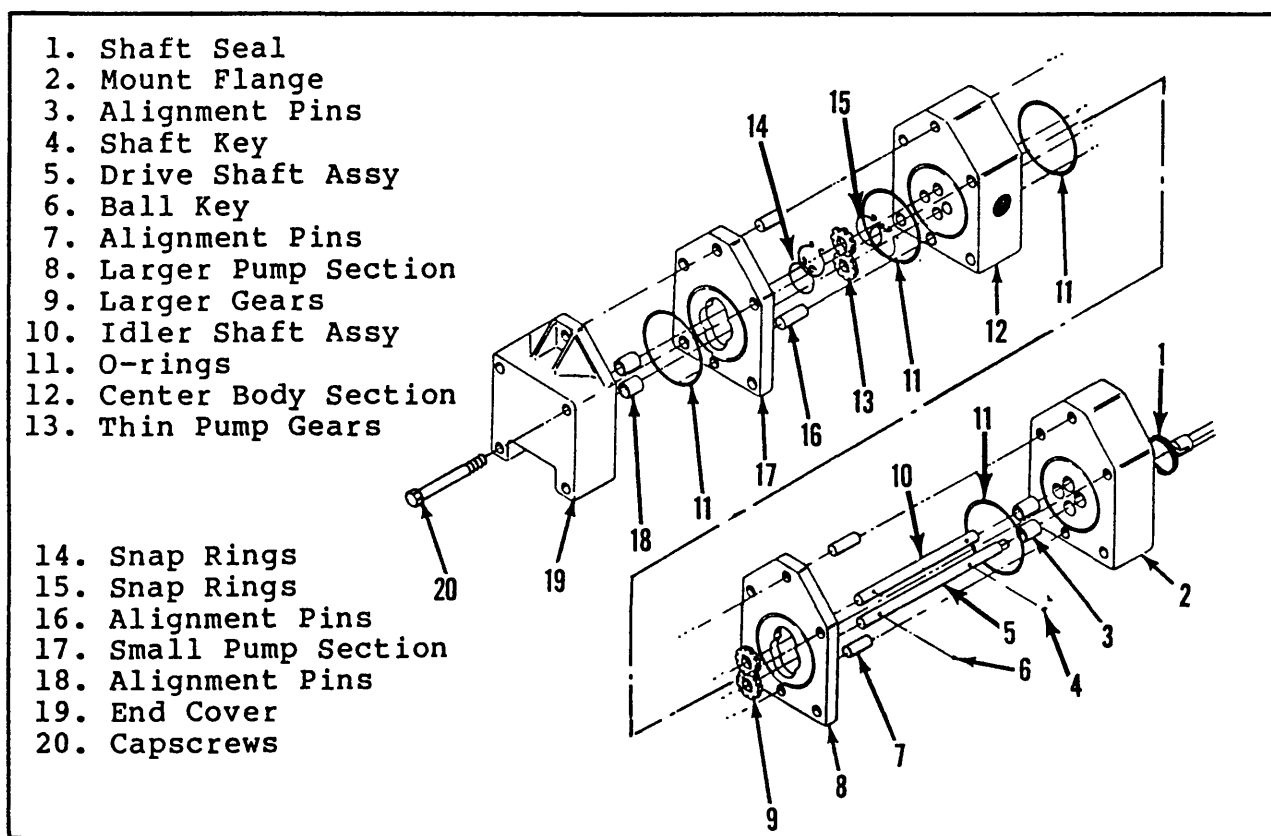


Figure 5-10. Hydraulic Pump Disassembly

(2) Loosen the upper right and lower left capscrews (4) and remove the pump assembly (5) from the motor (6). Ensure not to loose the shaft coupler (7).

b. Disassembly and Inspection (Figure 5-10).

NOTE

Repair and rebuilding of the pump assembly in the field is not recommended unless the proper special tools are available. Pumps should be returned to a factory authorized service center for repair.

A clean work area must be prepared before disassembling the pump. A large clean sheet of paper makes an excellent disposable table cover. As the pump is being disassembled lay the parts in the order and direction of disassembly so that they can be reassembled in proper order.

(1) Clamp the pump in a vise by the mount flange (2) with the shaft pointing down.

(2) Loosen the two remaining capscrews (20) and remove the end cover (19) from the pump.

(3) Remove the thin pump section (17). Then remove the thin pump gears (13) ensuring not to misplace the small ball (6) that keys the drive gear to the drive shaft.

(4) Separate the center body section (12) from the rest of the pump assembly.

(5) Remove the drive shaft assembly (5), idler shaft assembly (10) and the larger pump section (8) from the mount flange (2).

(6) Remove the alignment pins (3, 7, 16, 18) from the pump body sections.

(7) Remove the shaft seal (1) from the mount flange (2).

(8) Using cleaning solvent, thoroughly clean all parts and then dry with clean air.

NOTE

The larger section gears should not be removed from their shafts unless inspection shows that they should be replaced. Worn gears and pump sections should be replaced as sets.

(9) Inspect the bearings, housing, gears and shafts for pitting, discoloration or other signs of excessive wear.

c. Gear Shaft Disassembly.

(1) Insert the short end of the shaft (5, 10) into a shaft protector tube. The shaft may be wrapped with .003-.005 shim stock if a shaft protector tube is not available.

(2) Expand the snap ring (16) and slip it over the shaft protector and off the shaft.

(3) Remove the gear (9) and ensure not to misplace the shaft key (4).

CAUTION

Use extreme care when removing or installing the gear retaining snap rings. Any scratches on the shafts could cause the seal to leak or cause excessive bearing wear.

(4) Remove the other snap ring (15) using the shaft protector tube and expander as before.

NOTE

It is recommended that new O-rings and new shaft seal be used when reassembling a pump that has been in service for any length of time. A thin coat of petroleum jelly on the O-rings may be helpful in holding them in place while assembling the pump. Lubricate internal parts and internal surfaces with light coating of general purpose grease.

d. Gear Shaft Assembly.

NOTE

Snap rings should seat snugly in their grooves.

(1) Slide the shaft (5, 10) into a shaft protector tube and install the back snap ring (15). The shaft may be wrapped with .003-.005 shim stock if a shaft protector tube is not available.

(2) Remove protector tube, insert shaft key (4) and slide gear (9) into place.

(3) Slide shaft into protector tube and install front snap ring (14).

e. Pump Assembly.

(1) Clamp mount flange (2) in a vise with mount surface pointing down.

(2) Install alignment pins (3) in mount flange (2).

(3) Place new O-ring (11) in its groove in mount flange and then install larger pump section (8) and shaft assemblies (5, 10).

(4) Place new O-ring (11) in front groove of center body section (12) and slip it over shafts (5, 10) and aligning pins (3, 7). Ensure O-ring remains in its groove.

(5) Install thin pump section alignment pins (18) in center body section (12).

(6) Place O-ring (11) in back groove of center body section (12) and install thin pump section (17).

(7) Install gear ball key (6) in drive shaft (5) and then slide gears on shafts and into place.

(8) Place O-ring in groove on end cover (19) and then slide end cover on to shaft and align pins.

(9) Install the two short capscrews (20) in pump body and tighten until snug (approximately 5 ft. lb. torque).

(10) Slide a shaft protector tube over the exposed end of the pump shaft. Slip the front shaft seal over the shaft protector tube and press into place.

f. Installation (Figure 5-9).

(1) Lubricate the pump (5) and shaft coupler (7) with general purpose grease and attach the pump and shaft coupler to the motor (6) with the two long capscrews (4).

(2) Use a criss cross pattern and torque each capscrew a little at a time until all 4 capscrews are torqued to 20 ft. lbs.

(3) Unplug and reconnect the hydraulic hoses.

(4) Check the oil level in the hydraulic tank before operating the work platform.

5-19. HYDRAULIC DRIVE MOTORS AND HUBS.

a. Removal (Figure 5-11).

(1) Park the work platform on firm level ground then block the wheels to prevent the work platform from rolling.

1. Spindle
2. Locknut
3. Drive Motor
4. Shaft Key
5. Capscrew
6. Hub
7. Hub Nut
8. Wheel
9. Lug Bolts
10. Cotter Pin

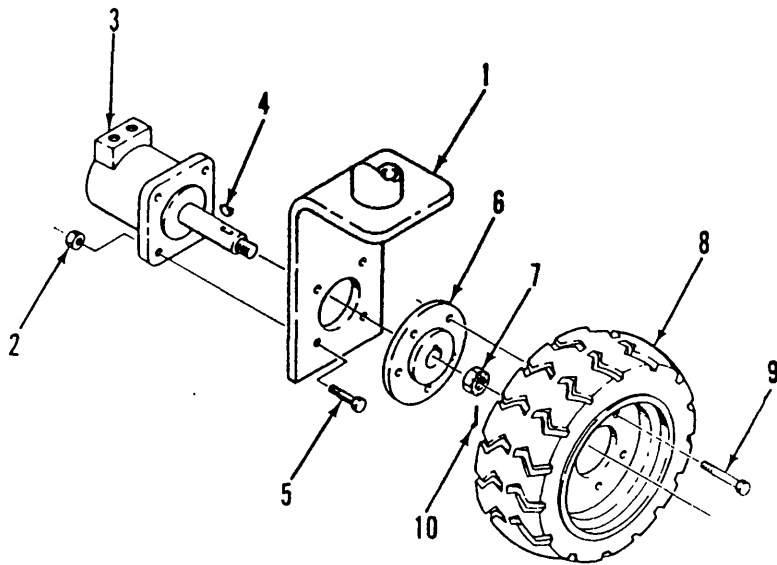


Figure 5-11. Drive Motor Removal

(2) Loosen the wheel lug bolts (9) on the front corner to be raised.

(3) Use a 1.5 ton capacity jack to raise the desired front corner.

WARNING

Position blocks under the raised corner to prevent the work platform from falling if the jack fails.

(4) Remove the wheel lug bolts (9) and wheel (8).

(5) Remove the cotter pin (10), locknut (7), hub (6) and the shaft key (4).

NOTE

Before disconnecting hoses, thoroughly clean off all outside dirt around fittings. (After disconnecting hoses and before removing from vehicle, **IMMEDIATELY** plug port holes.) Finish cleaning and drying assembly before placing on work bench.

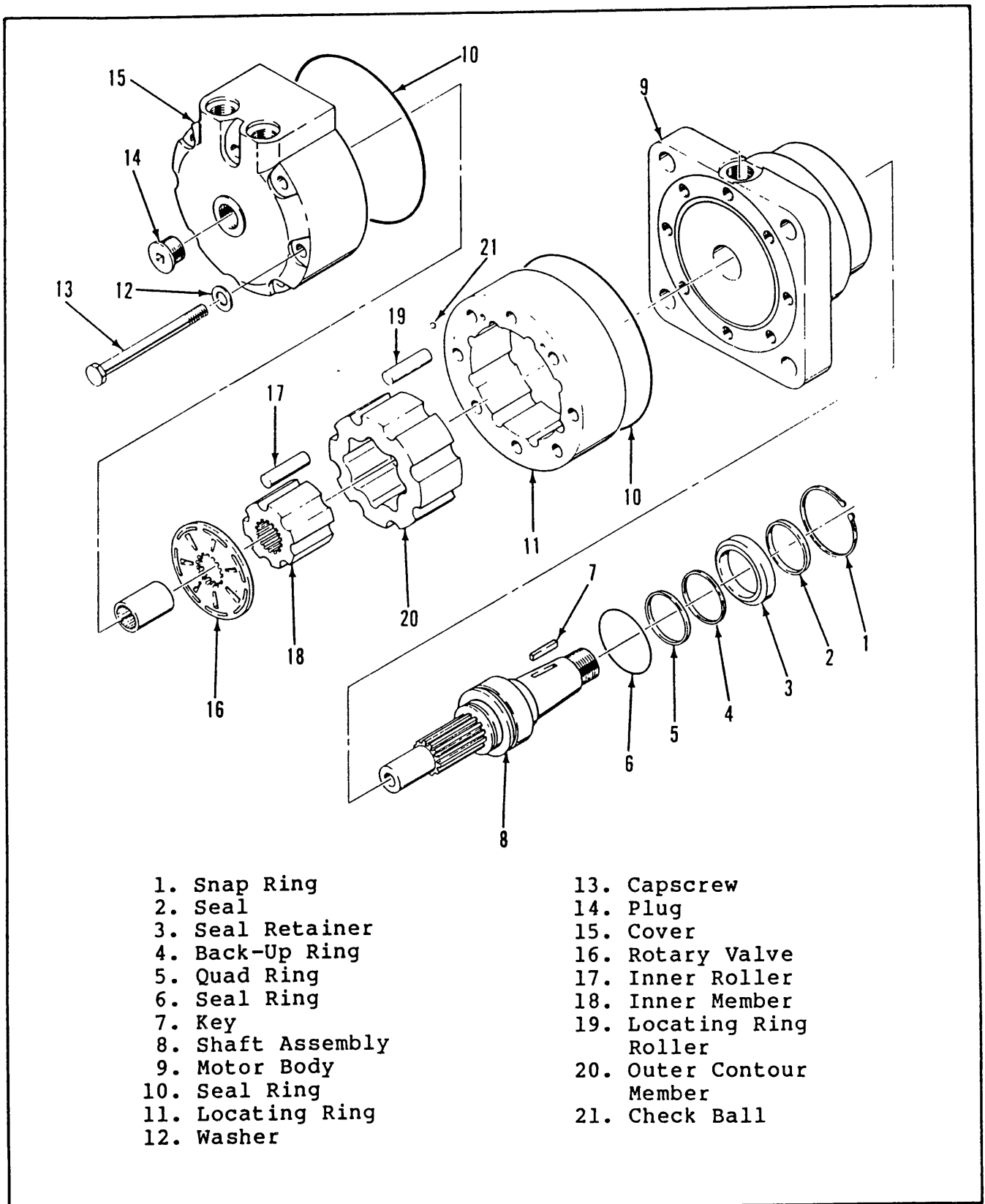


Figure 5-12. Drive Motor

(6) Tag, disconnect and plug the hose assemblies to prevent foreign material from entering.

(7) Remove the locknuts (2), capscrews (5) and drive motor (3) from the mounting plate (1).

b. Disassembly, Inspection and Assembly.

NOTE

Ensure that a clean work bench or table is used. All parts should be cleaned separately in cleaning solvent and blown dry with air to avoid nicks and burrs.

(1) Refer to Figure 5-12. Place the drive motor on a clean, flat surface with the cover (15) face down.

(2) Remove the seal retainer snap ring (1).

(3) Using two screwdrivers, remove the seal retainer (3) using the slots provided.

(4) Remove the dust seal (2), quad ring (5) and back-up ring (4) and discard.

(5) Remove the seal ring (6) from the groove in the body bore and discard.

CAUTION

When pulling the shaft vertically, **DO NOT** rotate the shaft or move the motor. The internal timing can be altered if the parts are disturbed.

NOTE

If the shaft assembly cannot be removed easily, vise grips can be clamped to the shaft end and, by tapping on the grips, the shaft assembly will come out.

(6) Remove the shaft assembly (8).

WARNING

DO NOT attempt to remove the heavy duty snap rings which hold the tapered bearings on the shaft. The bearing assembly cannot be serviced in the field.

(7) Check the shaft assembly (8) for wear at the cover bearing and seal areas. If excessive wear is apparent, replace the shaft assembly.

NOTE

When performing step 8 if the shaft stops without going all the way in, pull the shaft out 1/4 inch and rotate one or two degrees to engage the external shaft spline with the internal spline. This will allow the shaft to enter easily.

(8) **SLOWLY** lower the small end of the shaft assembly (8) into the motor body (9).

(9) Lubricate and install a replacement seal ring (6) into the motor body (9) bore groove.

(10) Install a replacement back-up ring (4) and quad ring (5) in the seal retainer (3).

(11) Install dust seal (2) into seal retainer (3) with rubber lip facing outward.

(12) Install seal retainer (3) in the motor body (9) and the seal retainer snap ring (1).

(13) Clamp the motor body (9) in a vise with the shaft assembly (8) facing down.

(14) Remove the eight capscrews (13) and seal washers (12).

CAUTION

When performing the following steps, **DO NOT** drop parts while handling.

(15) Remove the cover (15), the cover seal ring (10), rotary valve (16), check balls (21), IGR assembly (17 thru 21) and square ring seal (10). Discard the seal ring and square ring seal.

(16) Remove the eight locating ring rollers (19), the outer contour member (20), the seven inner rollers (17) and the inner member (18) from the locating ring (11). Inspect for pits and wear marks. If wear is evident, replace the IGR assembly (17 thru 21).

(17) Lubricate the square ring seal (10) with hydraulic oil and install in the motor body (9).

(18) Install the inner member (18) on the shaft assembly (8).

(19) Install the outer contour member (20) over the inner member (18).

(20) Install the seven inner rollers (17) between the inner member (18) and the outer contour member (20).

CAUTION

DO NOT dislodge the body square ring seal (10) while aligning the locating ring (11) to the motor body (9).

(21) Install the locating ring (11) on the motor body (9) with the check ball holes facing upward. Align the eight capscrew holes in the locating ring (11) with the capscrew holes in the motor body (9). The holes will align in one position only.

(22) Install the eight locating ring rollers (19) between the locating ring (11) and the outer contour member (20).

(23) Check that the clearance between the inner rollers (17) and the outer contour member (20) does not exceed .015 inches.

(24) Install the rotary valve (16) on the shaft assembly (8) so that the seven inner rollers (17) cannot be seen through the slots on the rotary valve (16).

(25) Install the two check balls (21) in the locating ring (11).

(26) Lubricate the cover seal ring (10) with hydraulic oil and install in the cover (15).

(27) Install the cover (15) on the shaft end and align the capscrew holes.

(28) Install the eight capscrews (13) with seal washers (12) in the capscrew holes. Torque the capscrews to 30 ft. lb.

c. Installation.

(1) Refer to Figure 5-11 and position the drive motor (3) on the spindle (1) and secure with capscrews (5) and locknuts (2).

(2) Remove the plugs from the hose assemblies and connect to the drive motor (3).

(3) Install the shaft key (4), hub (6) and locknut (7). Torque the locknut to 350 to 400 ft. lb. Install the cotter pin (10).

(4) Install the wheel (8) with capscrews (9) onto the hub (6). Torque to 40 ft. lb.

(5) Lower the jack and remove. Operate the drive system and check for leaks.

5-20. REAR WHEEL BEARINGS (Figure 5-13).

a. Removal.

NOTE

The following applies to both rear wheels except the brake cylinder must be removed on the right side. (See Paragraph 5-22a).

(1) Loosen the wheel lug nuts then raise the rear of the work platform until the rear tires are off the ground.

(2) Install support blocks to prevent the work platform from falling if the jack fails.

(3) Remove the wheel lug nuts and the rear wheels.

(4) Remove the cap (1).

(5) Straighten the cotter pin (2) then withdraw it from the spindle (10) and hub nut (3).

(6) Remove the hub nut (3) and washer (4).

(7) Slide the entire hub assembly (6) from the spindle (10) and place on clean surface.

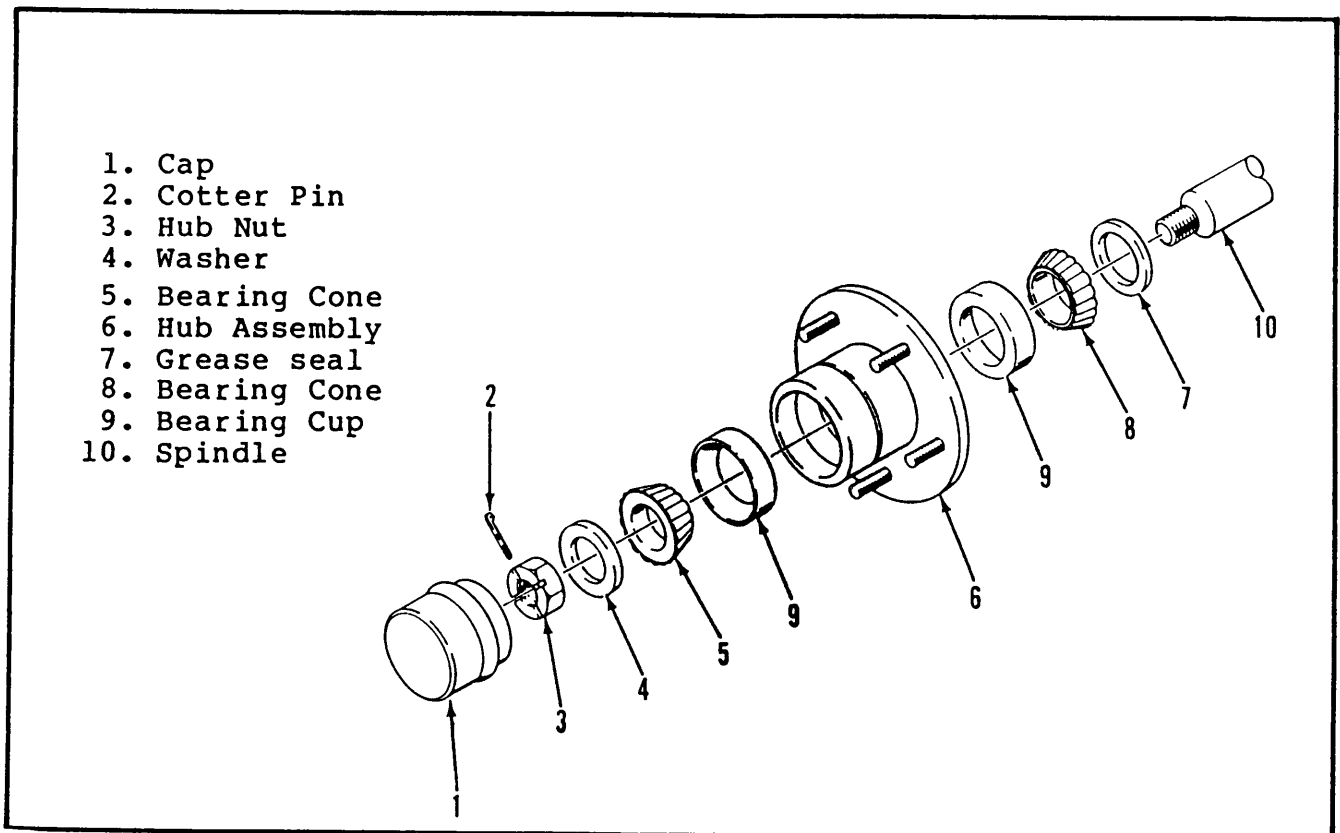


Figure 5-13. Rear Wheel Bearings

(8) Remove the bearing cone (5) and place on clean surface.

(9) Remove the grease seal (7) thus allowing the bearing cone (8) to be removed.

NOTE

At this point, examine the bearing cups (9). If they are smooth, shiny and free of pits or any surface irregularities, **DO NOT** remove them.

(10) If the cups (9) need replacement, remove them by tapping around the circumference of the inside surface of the cups from the opposite side using a long drift.

b. Installation.

(1) Position the replacement bearing cup (9) over the opening in the hub assembly (6) then position the worn cup over the replacement so that the bearing surfaces face each other. Use the old as a drift to work the replacement into position by tapping evenly around the circumference.

(2) Apply a liberal coating of multi purpose grease to the bearing surface of each cup.

(3) Pack the bearing cone (8) with multi purpose grease and position it within the rear bearing cup (9) in the hub assembly (6) install the new grease seal (7) again using the worn bearing cup as a drift.

(4) Apply a thin coating of multi purpose grease to the spindle (10) to protect the grease seal (7) then slide the hub assembly (6) onto the spindle (10).

(5) Pack the bearing cone (5) with multi purpose grease and slide it onto the spindle (10) until it seats in the outer bearing cup (9).

(6) Install the washer (4) and hub nut (3). Tighten the hub nut (3), while rotating the assembly (6), until the hub drags then back the nut to the first slot that aligns with the cotter pin hole in the spindle (10).

(7) Install the cotter pin (2) and bend the end up over the hub nut (3) and the spindle (10).

(8) Install the cap (1) and wheel/tire assemblies. Torque the lug nuts to 40 ft. lbs.

(9) Remove blocks and lower work platform to the ground.

5-21. BRAKE CYLINDER (Figure 5-14).

a. Removal.

(1) Block the wheels to prevent the work platform from rolling when the brake is removed.

(2) Disconnect the hose assemblies (1, 17) and cap the opening to prevent foreign material from entering.

(3) Remove the capscrews (2) and lockwashers (3) to remove the cylinder from the chassis.

b. Disassembly.

NOTE

Prepare a clean work area on which to service the internal parts.

(1) Remove the snap ring (5) and withdraw the shaft (11) and all attached components from the cylinder barrel (4).

(2) Remove the head cap (6) from the shaft (11) then remove the wiper (9), shaft seal (10) and seals (7, 8) from the head cap (6).

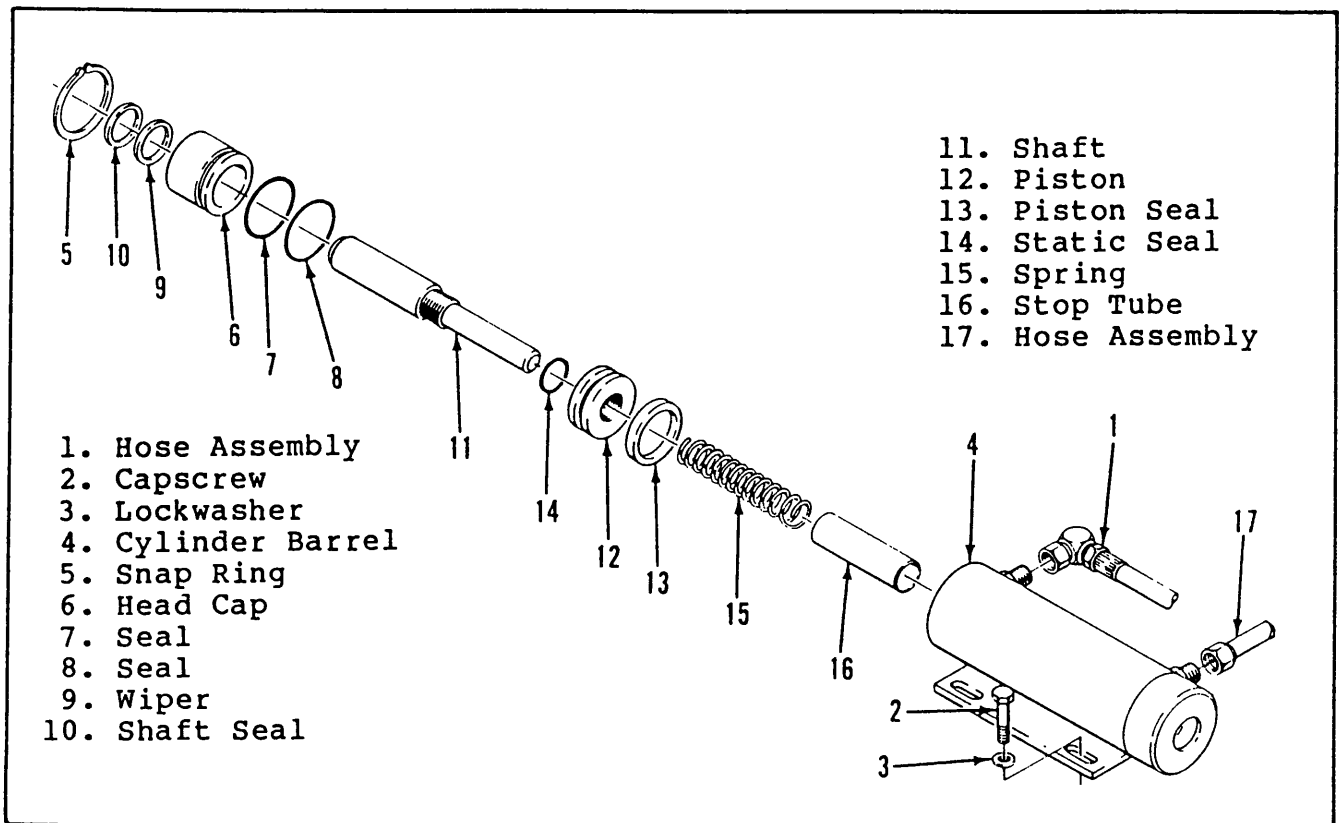


Figure 5-14. Brake Cylinder

(3) Unscrew the piston (12) from the shaft (11) and remove the static seal (14). Remove the piston seal (13) from the piston (12).

(4) Remove the spring (15) and stop tube (16) from the cylinder barrel (4).

c. Cleaning and Inspection.

(1) Clean all metal parts in solvent and blow dry with filtered compressed air.

(2) Check all thread parts for stripped or damaged threads.

(3) Check the bearing surfaces inside of the head cap (6), outer edge surface of the piston (12), inside of the cylinder barrel (4) and the shaft (11) for signs of scoring or excessive wear.

(4) Check the spring for cracks.

(5) Replace any parts found not serviceable.

(6) Replace all seals.

b. Assembly and Installation.

(1) Install the piston seal (13) on the piston (12) then assemble the static seal (14), shaft (11) and piston (12).

(2) Position the spring (15) and stop tube (16) on the shaft assembly.

(3) Lubricate the piston seal (13) with clean hydraulic fluid, then install the shaft assembly in the cylinder barrel (4).

(4) Lubricate the seals (7, 8) with clean hydraulic fluid and install on the head cap (6).

(5) Install the shaft seal (10) and wiper (9) within the head cap (6).

(6) Lubricate entire assembly's seals (7,8) and the shaft seal and wiper (10, 9) with clean hydraulic fluid then install the head cap (6) onto the shaft (11) and into the cylinder barrel (4).

(7) Secure with snap ring (5).

(8) Position the brake cylinder assembly on the chassis so that the shaft (11) fully engages the brake disc, however the shaft must clear the brake disc once retracted. Secure with capscrews (2) and lockwashers (3).

(9) Connect the hose assemblies (1, 17).

(10) Operate the brake retract circuit and check that the shaft clears the brake disc. Check for leaks.

5-22. CUSHION CYLINDER (Figure 5-15).

a. Removal.

(1) Mark and disconnect the three hose assemblies (1) from the fittings and immediately cap or plug the openings to prevent foreign material from entering.

(2) Remove the cylinder clamp (2) by removing the front valve manifold bolt (3).

b. Disassembly.

(1) Clamp the cylinder securely in a vise.

(2) Mark and remove fittings (4) from end plugs.

(3) Unscrew the end plugs (5) from the barrel tube (6).

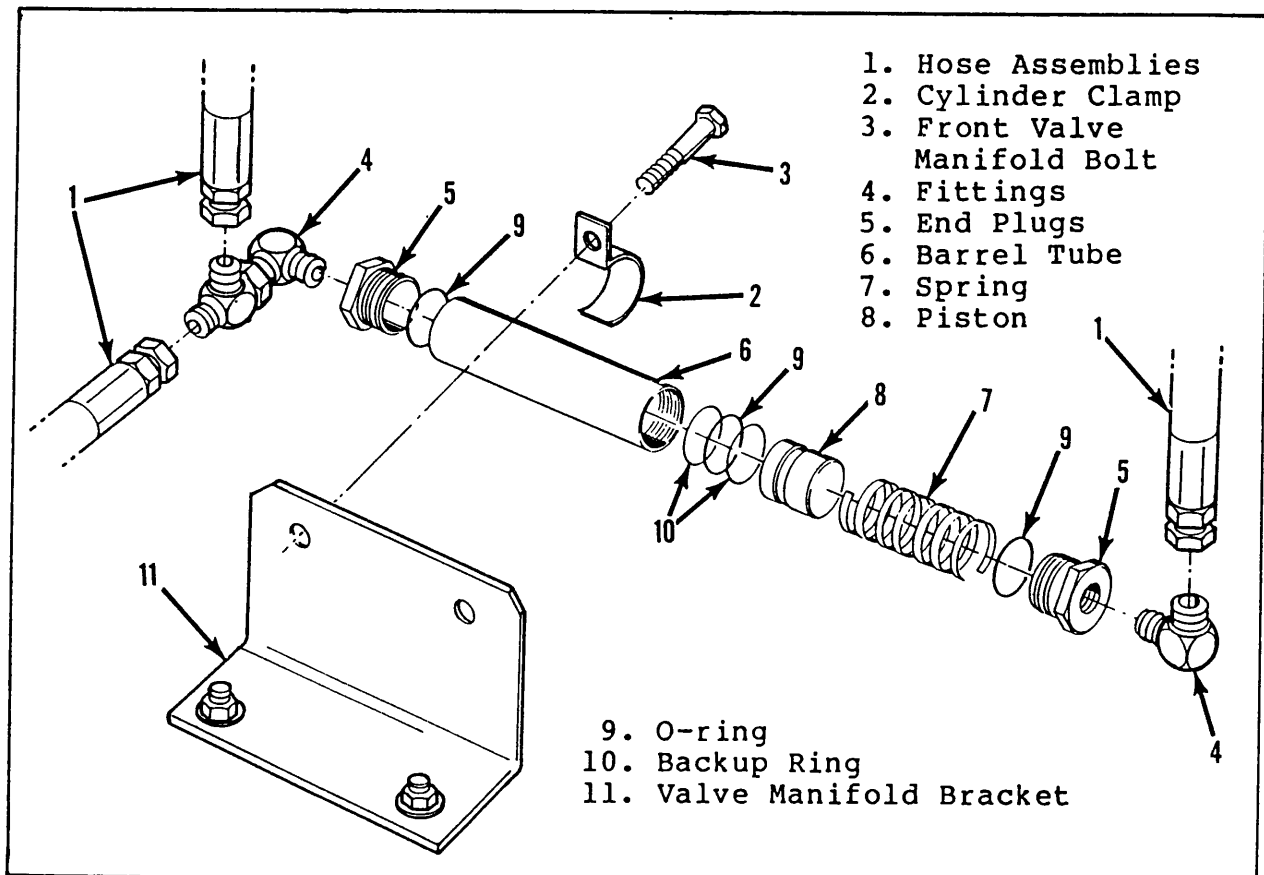


Figure 5-15. Cushion Cylinder Removal and Disassembly

- (4) Remove the spring (7) from the barrel tube.
- (5) Push the piston (8) out of the barrel tube.
- (6) Remove all O-rings (9) and backup rings (10) from piston and end plugs.

c. Cleaning and Inspection.

- (1) Wash all the cylinder metal parts and fittings in cleaning solvent and blow dry with clean compressed air.
- (2) Inspect the barrel tube (6) inner surface for scoring or excessive wear.
- (3) Inspect the piston for scoring or excessive wear.
- (4) Replace any parts found not serviceable.
- (5) Replace all O-rings and backup rings.

d. Assembly.

- (1) Install new O-rings (9) on each end plug.
- (2) Screw one end plug (5) into barrel tube 1 to 2 turns.
- (3) Install the spring (7) into barrel tube.
- (4) Install the backup rings (10) and O-ring (9) on the piston (8).
- (5) Dip the piston in clean hydraulic oil (Mobil 423) and install it in the barrel tube.
- (6) Screw the other end plug (5) into the cylinder and then tighten both end plugs.

e. Installation.

NOTE

When installing cushion cylinder the piston end of cylinder must be pointing towards the hydraulic pump.

- (1) Install the fittings (4) into the cushion cylinder.
- (2) Attach the cushion cylinder to the valve manifold bracket (11) with the clamp (2) and valve manifold mount bolt (3).
- (3) Attach hydraulic hoses (1) to cushion cylinder.

5-23. STEERING CYLINDER (Figure 5-16).

a. Removal.

(1) Mark and disconnect the hose assemblies from the fittings and immediately cap the openings to prevent foreign material from entering.

(2) Remove the cotter pins and clevis pins.

(3) Remove the locknuts (14) and capscrews (15) to remove the cylinder assembly.

b. Disassembly.

(1) Remove the tie rod nuts (6), tie rods (7) and the end plates (8).

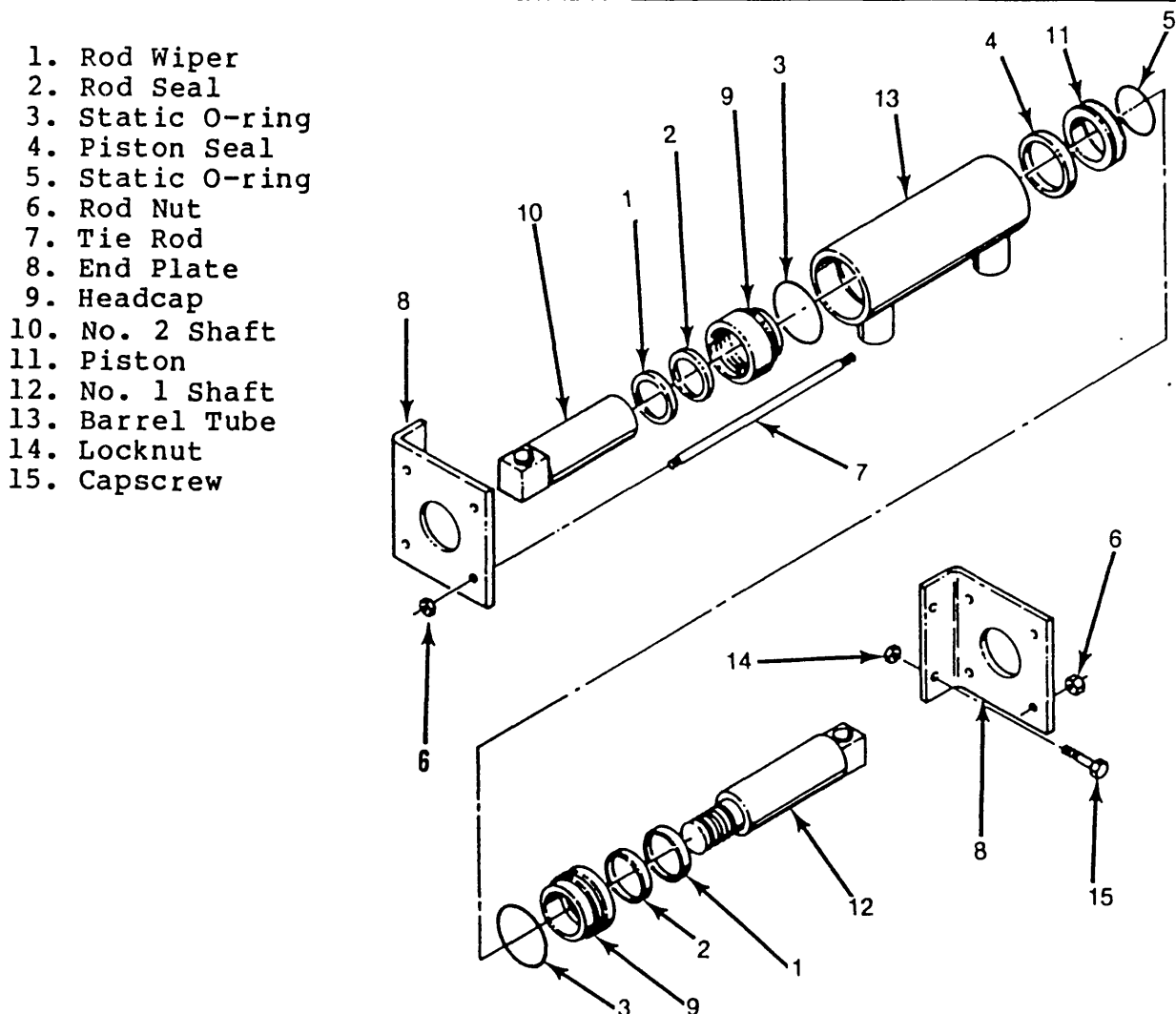


Figure 5-16. Steering Cylinder

(2) Remove the headcaps (9) from the barrel tube (13).

(3) Withdraw the entire shaft assembly from either end of the barrel tube (13).

(4) Remove the rod wipers (1), rod seals (2) and static O-rings (3) from the headcaps (9).

(5) Discard all the seals.

(6) Unscrew the No. 1 shaft (12) from the No. 2 shaft (10) and remove the piston (11).

(7) Remove the piston seal (4) and static O-ring (5) from the piston (11).

(8) Discard the static O-ring (5) and piston seal (4).

c. Cleaning and Inspection.

(1) Wash all the metal parts in cleaning solvent and blow dry with filtered compressed air.

(2) Inspect all the threaded components for stripped or damaged threads.

(3) Check the inside surface of the barrel tube (13) for scoring or excessive wear.

(4) Check the piston (11) and head caps (9) for scoring or excessive wear.

(5) Inspect the surface of both shafts (10, 12) for scoring or excessive wear.

(6) Replace all seals and O-rings.

d. Assembly and Installation.

(1) Install a replacement piston seal (4) and static O-rings (5) on the piston (11).

(2) Install the piston (11) on the No. 1 shaft (12).

(3) Thread the No. 2 shaft (10) onto the No. 1 shaft (12) and tighten securely.

(4) Lubricate the piston seal (4) and install the shaft assembly in the barrel tube (13).

(5) Lubricate and install replacement rod seals (2) and static O-rings (3) on the headcaps (9).

(6) Lubricate and install replacement rod wipers (1) in the headcaps (9).

(7) Install the headcaps (9) in the barrel tube (13).

(8) Install the end plates (8), tie rods (7) and tie rod nuts (6) and tighten securely.

(9) Position the cylinder assembly on the chassis and secure with capscrews (15) and locknuts (14).

(10) Install the clevis pins and cotter pins.

(11) Connect the hose assemblies to the fittings.

(12) Operate the steering circuit several times throughout its entire range of travel to expel trapped air and check for leaks.

5-24. LIFT CYLINDER REMOVAL (Figure 5-17).

a. Removal.

(1) Block scissor linkage per paragraph 5-5.

(2) Remove platform floorboard.

(3) Remove snap rings (1) from cylinder pin (2).

(4) Remove cylinder pin (2) and spacers (3) from cylinder (4) and plates (5).

(5) Provide a suitable container to catch the draining hydraulic fluid, then disconnect the hydraulic hose (8) and fitting (7) from the base of the cylinder (4). Immediately plug hose to prevent foreign material from entering.

(6) Attach a suitable hoisting device and sling to the top of the cylinder (4).

(7) Lift cylinder from collar (6).

(8) Move cylinder to a prepared work area.

b. Disassembly (Figure 5-18).

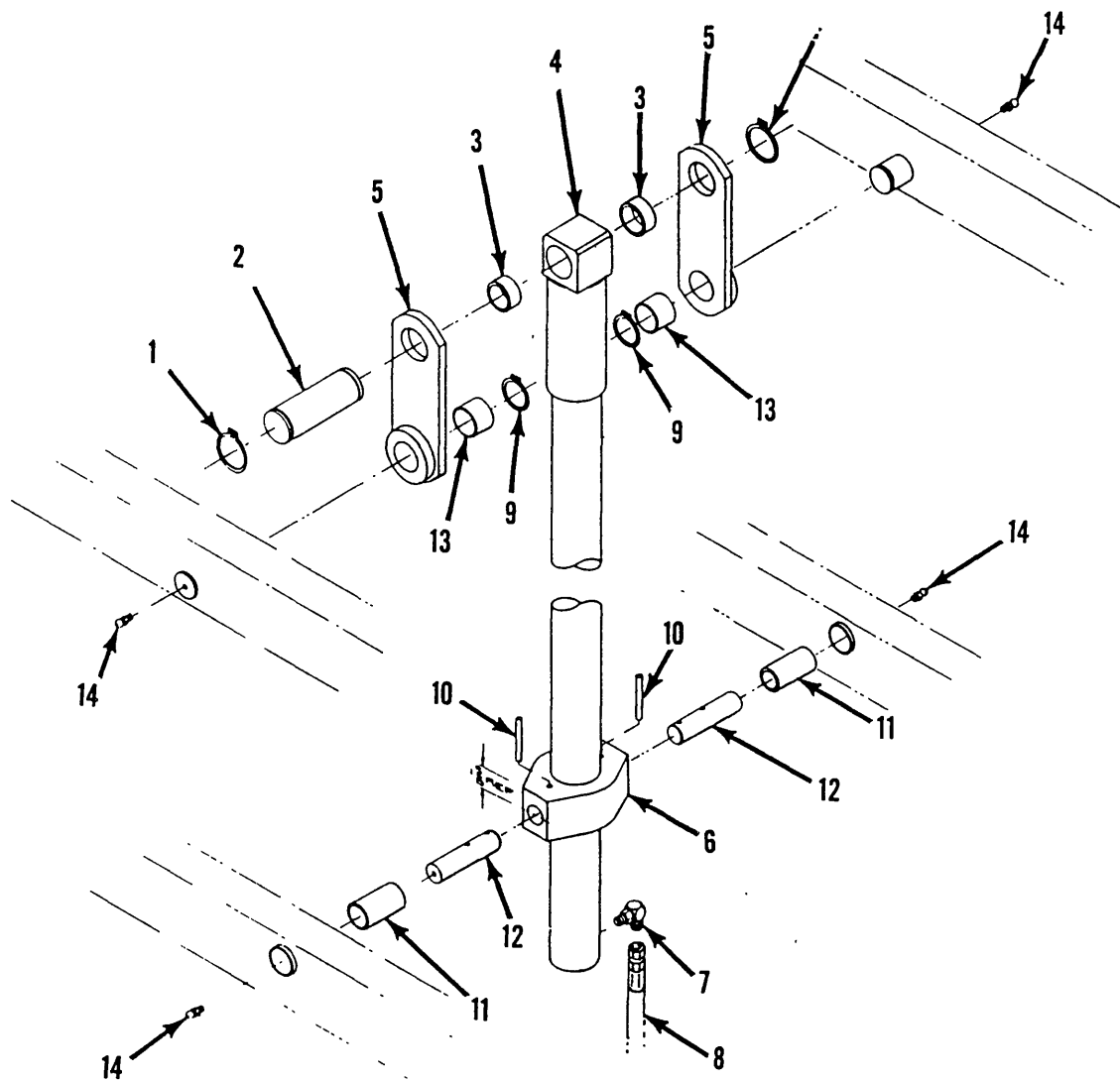
(1) Unscrew and withdraw the barrel tube (2) from the mount tube (6).

(2) Unscrew the clevis rod (13) from the rod tube (4).

(3) Withdraw the rod tube (4) from the mount tube (6).

(4) Remove the bleeder screw (12) from the clevis rod (13).

(5) Remove the static O-ring (8) from the clevis rod (13) and discard.



- | | |
|----------------------|-------------------------|
| 1. Snap Ring | 8. Hydraulic Hose |
| 2. Cylinder Pin | 9. Retaining Ring |
| 3. Spacer | 10. Drive Pin |
| 4. Cylinder | 11. Bearing |
| 5. Plate | 12. Cylinder Collar Pin |
| 6. Cylinder Collar | 13. Bearing |
| 7. Hydraulic Fitting | 14. Grease Fitting |

Figure 5-17. Lift Cylinder Removal

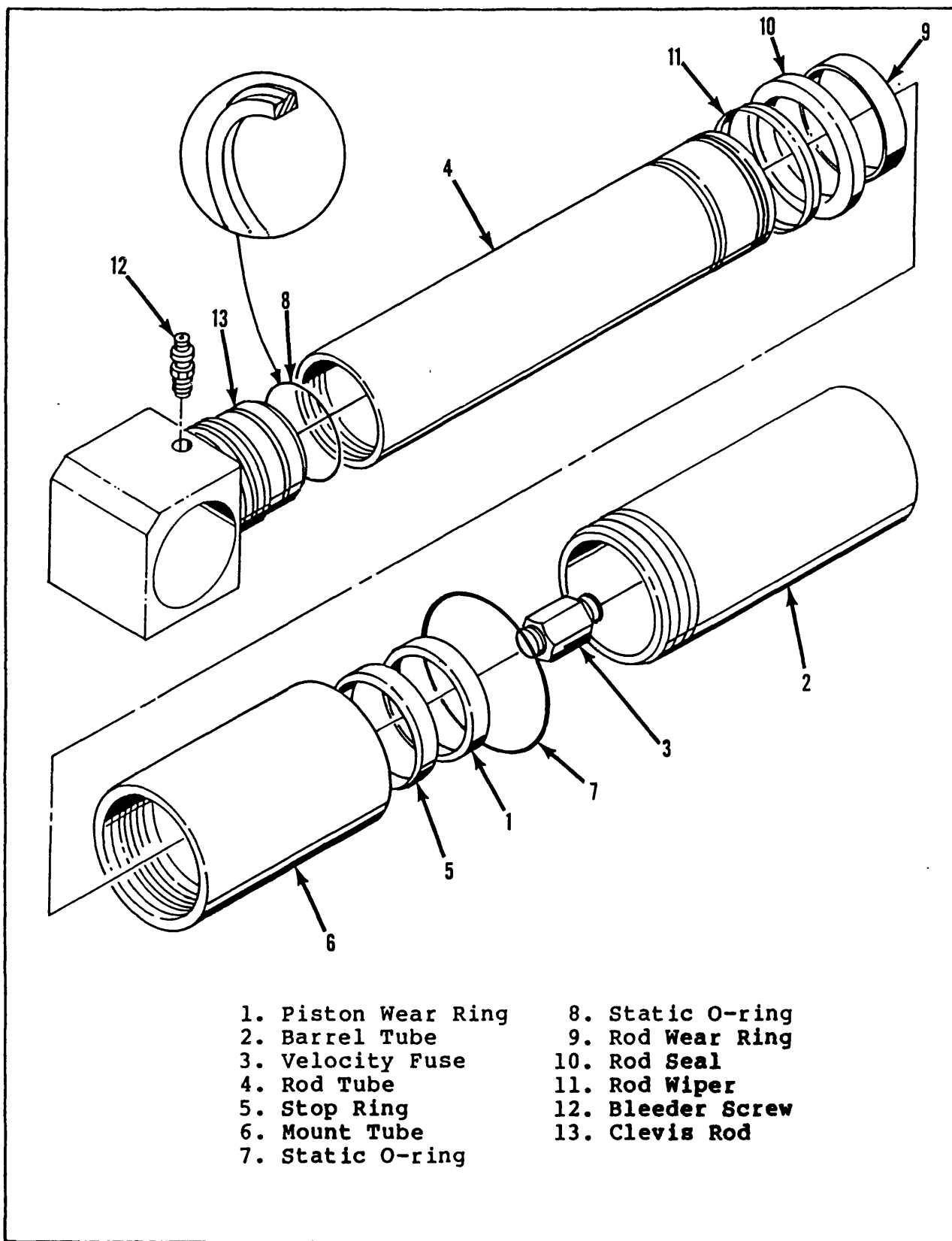


Figure 5-18. Lift Cylinder Disassembly

(6) Remove the piston wear ring (1) and stop ring (5) from the rod tube (4) and discard.

(7) Remove the static O-ring (7), rod wear ring (9), rod seal (10) and rod wiper (11) from the mount tube (6) and discard.

(8) Do not remove the velocity fuse (3) unless replacement is necessary.

c. Cleaning and Inspection (Figure 5-18).

(1) Clean all the metal parts in cleaning solvent and blow dry with filtered compressed air.

(2) Check the mating surfaces of the mount tube (6), barrel tube (2) and rod tube (4) for excessive wear or scoring.

(4) Replace all parts found not serviceable.

(5) Replace all seals and O-rings.

d. Reassembly (Figure 5-18).

(1) Lubricate and install the static O-ring (7), rod wear ring (9), rod seal (10) and rod wiper (11) in the mount tube (6).

(2) Install the piston wear ring(1) and stop ring (5) on the rod tube (4).

(3) Lubricate and insert the rod tube (4) through the bottom of the mount tube (6).

(4) Lubricate and install the static O-ring (8) on the clevis rod (13).

(5) Thread the clevis rod (13) into the rod tube (4) and tighten securely.

(6) Lubricate the inside surface of the barrel tube (2) and slide over the rod tube (4). Thread the barrel tube (2) into the mount tube (6) and tighten securely.

(7) Install the bleeder screw (12). DO NOT tighten the bleeder screw.

e. Installation (Figure 5-17).

NOTE

Lubricate the cylinder pin (2) with hydraulic fluid prior to installation.

(1) Attach a suitable hoisting device to the top of the lift cylinder (4) and position cylinder (4) over the collar (6). Then lower the lift cylinder into the collar.

(2) Connect the hydraulic fitting (7) and the hydraulic hose (8).

(3) Raise the plates (5) to align with the cylinder (4) and install the cylinder pin (2).

(4) Install the snap rings (1) to each end of the cylinder pin (2).

(5) Operate the hydraulic lift circuit with the bleeder screw (12, Figure 5-18) loose to allow trapped air to escape the lift cylinder. Once hydraulic fluid flows continuously from bleed port, tighten the bleeder screw. Check for leaks.

(6) Install the platform floorboard.

(7) Test with weight at rated platform load to check system operation.

5-25. ELECTRIC MOTOR (Figure 5-19).

NOTE

Brush replacement is necessary if the brushes are damaged or excessively worn. Replace when tolerance is 5/16 inch. When replacement is needed, replace all brushes (8).

a. Removal and Disassembly.

(1) Remove the acorn nuts (1) and lockwashers (2) from the motor tie-bolts (3).

(2) Tap gently on the brush housing (4) to separate the brush housing and brush plate (5) assembly from the motor housing and armature (14).

(3) Remove the brush plate (5) from the brush housing (4).

(4) Remove the brush screws (6) and locknuts (12). Remove the brushes (7).

NOTE

Ensure that the brush springs (8) and armature bearing spring (9) are not lost when disassembling the brush housing and brush plate assembly.

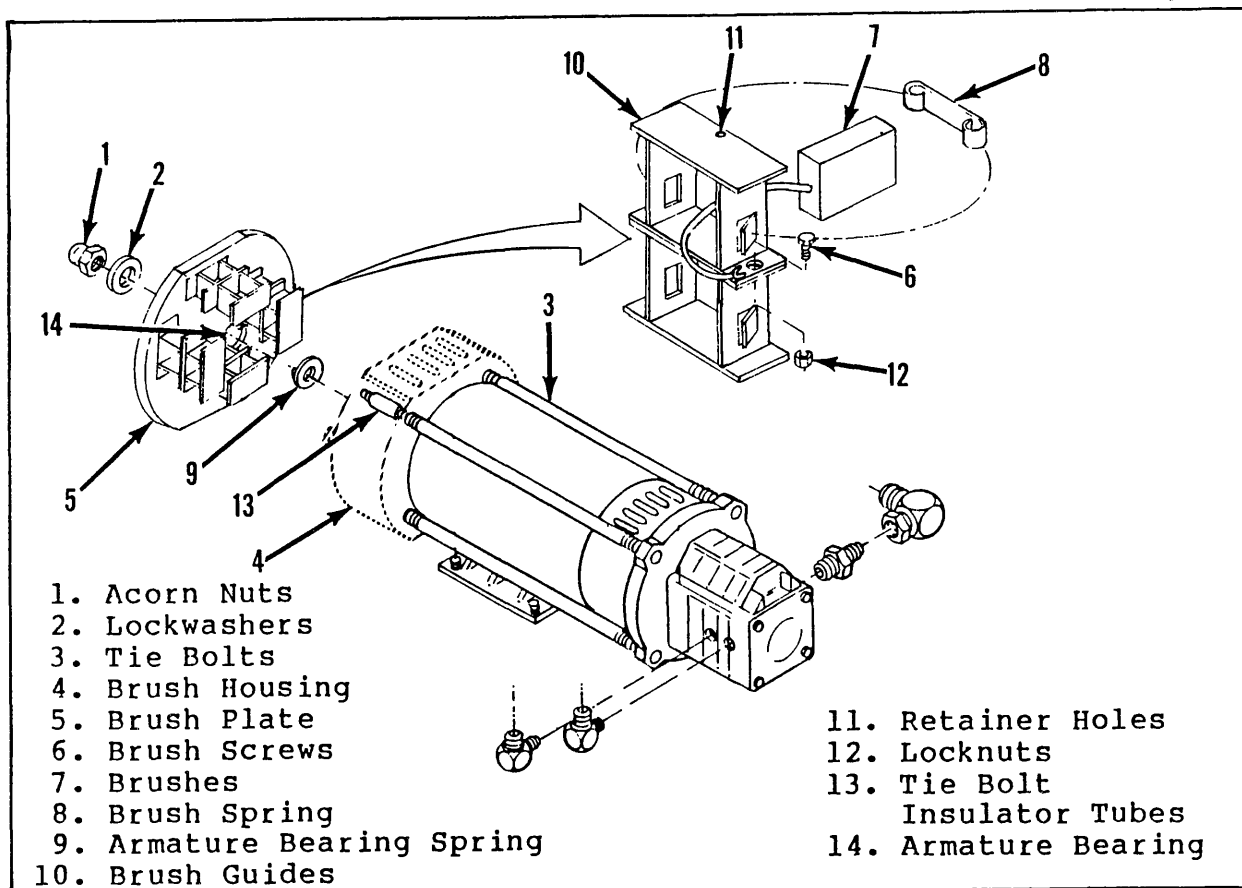


Figure 5-19. Electric Motor

b. Reassembly.

(1) Attach the brushes (7) and tighten the brush screws (6) and nuts (12).

(2) Ensure that the brush springs (9) are in proper position.

(3) Slide the brushes completely into the brush guides (10). Retain brushes by sliding a round wooden toothpick or small dowel through the retainer holes (11) provided in the brush guides (10) and brush plate (5).

c. Installation.

(1) Slide the brush housing (4) over the motor tie bolts (3) against the motor housing. Ensure that the key on the brush housing engages the slot in the motor housing.

(2) Position the tie bolt insulator tube (13) so the brush wires will not contact the motor tie rods.

NOTE

When performing step 6 ensure that armature bearing spring (9) is positioned properly in armature bearing (14).

(3) Slide the brush plate assembly (5) into the brush housing (4) and onto the armature bearing (14). Ensure that the brush plate aligning pin properly engages the aligning hole in the brush housing.

(4) Install the lockwashers (2) and acorn nuts (1).

(5) Pull out the brush retainers (toothpicks).

SECTION VI

DIAGRAMS

6-1. CONTENT. This section contains electrical diagrams, hydraulic power diagrams, and associated information for maintenance purposes.

6-2. USE. The diagrams are to be used in conjunction with Table 5-2 TROUBLESHOOTING. They allow understanding of the make-up and functions of the systems for checking, tracing, and fault-finding during trouble analysis.

6-3. INDEX OF DIAGRAMS. The diagrams appear in the following order:

Figure 6-1. Electrical Diagram.

Figure 6-2. Hydraulic Diagram.

6-4. DIAGRAM LEGENDS. The components that comprise the electrical and hydraulic systems are given a reference designation and are explained as to location and function in the following tables:

Table 6-1. Electrical Diagram Legend.

Table 6-2. Hydraulic Diagram Legend.

TABLE 6-1. Electrical Diagram Legend.

REFERENCE DESIGNATION	NAME	FUNCTION	LOCATION
B	Motor, Electric	Provides power to Drive Hydraulic Pump.	Front Center of Module.
BT	Battery; 6 volt	To store energy to power work platform.	2 per side - rear of Module.
CR1	Motor Relay	Connects Batteries to Motor.	Right front of Module.
D1	Diode	Provides power to Bypass Valve Coil when Speed Range Switch is in HIGH or LOW.	Between T1 and T2 on Fanning Strip.

TABLE 6-1. Electrical Diagram Legend - Continued

REFERENCE DESIGNATION	NAME	FUNCTION	LOCATION
D2	Diode	Provides power to Bypass Valve Coil when Lift Switch is activated.	Between T3 and T2 on Fanning Strip.
D3	Diode	Provides power to Motor Start Relay when Lift Switch is activated.	Between T3 and T5 on Fanning Strip.
D4	Diode	Provides power to Motor Start Relay when Steer Switch is activated RIGHT .	Between T4 and T5 on Fanning Strip.
D5	Diode	Provides power to Motor Start Relay when Steer Switch is activated LEFT .	Between T6 and T5 on Fanning Strip.
D6	Diode	Provides power to Motor Start Relay when Drive Switch is activated to REVERSE .	Between T7 and T8 on Fanning Strip.
D7	Diode	Provides power to Motor Start Relay when Drive Switch is activated to FORWARD .	Between T9 and T8 on Fanning Strip.
D8	Diode	Provides power to Series-Parallel Valve Coil when Speed Range Switch is activated to HIGH .	Between T11 and T12 on Fanning Strip.
D9	Diode	Provides power to Series-Parallel Valve Coil when Drive Switch is actuated to REVERSE .	Between T13 and T12 on Terminal Block.

TABLE 6-1. Electrical Diagram Legend - Continued

REFERENCE DESIGNATION	NAME	FUNCTION	LOCATION
F1	Fuse, 15 AMP	Provides over-load protection for the Control Circuit.	On Chassis Lift Switch Bracket.
H4	Alarm	Provides warning sound when deck is lowering.	Near lower end of Terminal Block.
L1	Solenoid (coil)	Opens Lift Valve.	Lower center of front surface of Valve Manifold.
L2	Solenoid (coil)	Closes Bypass Valve.	Center top of outer surface of Valve Manifold.
L3	Solenoid (coil)	Shifts Steer Valve to RIGHT TURN position.	Lower end of Spool Valve mounted on front surface of Valve Manifold.
L4	Solenoid (coil)	Shifts Steer Valve to LEFT TURN position.	Upper end of Spool Valve mounted on front surface of Valve Manifold.
L5	Solenoid (coil)	Shifts Drive Valve to REVERSE position.	Lower end of outer Spool Valve mounted on rear surface of Valve Manifold.
L6	Solenoid (coil)	Shifts Drive Valve to FORWARD position.	Upper end of outer Spool Valve mounted on rear surface of Valve Manifold.
L7	Solenoid (coil)	Opens Lowering Valve.	Lower left of outer surface of Valve Manifold.
L8	Solenoid (coil)	Shifts Series-Parallel Valve to SERIES position.	Lower end of inner Spool Valve mounted on rear surface of Valve Manifold.
S1	Switch, Emergency Stop	Control Circuit shut off.	On Control Box right front.

TABLE 6-1. Electrical Diagram Legend - Continued

REFERENCE DESIGNATION	NAME	FUNCTION	LOCATION
S2	Switch Mode (Toggle or Key)	Supplies power to Lift, Drive and Steer switch.	On Control Box center front.
S3	Switch, Lift	Supplies power to Lift or Lower Valve Solenoids and Motor Start Relay.	On Control Box left center.
S4	Switch, Steer	Supplies power to Steer Valve Solenoids and Motor Start Relay.	On Control Box left rear.
S5	Switch, Drive	Supplies power to Drive Valve Solenoids, Motor Start Relay and Speed Range Switch.	On Control Box right rear.
S6	Switch, Speed Range	Supplies power to Bypass Valve Solenoid and Series Valve Solenoid.	On Control Box left front.
S7	Switch, Key	Supplies power to Emergency Stop Switch.	On Control Box right side.
S8	Switch, Speed Control Limit	Opens Bypass Valve Solenoid Circuit when Deck is raised.	On Battery Cover in Chassis.
S9	Switch, Chassis Lift	Provides power to Lift or Lower Valve Solenoids and Motor Start Relay.	On Bracket mounted on right front of Module.
S10	Switch, Platform Height Limit	Opens Lift Valve Solenoid Circuit when Deck is fully elevated.	Near left side Roller Track at center of Work Platform.

TABLE 6-2. Hydraulic Diagram Legend

REFERENCE DESIGNATION	NAME	FUNCTION	LOCATION
ASSY1	Duplex Pump	One section supplies hydraulic oil flow for Lift and Drive, the other provides oil to Steer.	On Electric Motor at left front of Module.
CV1	Check Valve - Creep	Prevents Creep Speed Oil from going through Bypass Valve.	In Manifold Block second Port down on rear surface.
CV2	Check Valve - Lift	Prevents oil from flowing back through Lift Valve.	In Manifold Block lower Port on front surface.
CYL1	Cylinder - Brake	Disengage Brake Disc when a Drive function is actuated.	Inside right Rear Wheel.
CYL2	Cylinder - Cushion	Absorbs part of the shock of work platform start up.	Behind the Valve Manifold.
CYL3	Cylinder - Steering	Provides force to turn Front Wheels.	Center front of Chassis.
CYL4	Cylinder - Lift	Provides force to lift Platform.	Inside the inner Scissor Frame Weldments.
FR1	Regulator - Flow	Provides controlled oil flow for DRIVE speeds.	In Valve Manifold, center top surface.
MOT1	Drive Motor LEFT	Provides tractive effort for work platform.	on LEFT front Steering Knuckle.
MOT2	Drive Motor RIGHT	Provides tractive effort for work platform.	On RIGHT Steering Knuckle.

TABLE 6-2. Hydraulic Diagram Legend - Continued

REFERENCE DESIGNATION	NAME	FUNCTION	LOCATION
ORF1	Orifice - Brake	Delays the engagement of the Brake Cylinder Shaft with the Wheel Caliper.	In Fitting Port for Brake Supply Hose rear block surface.
ORF2	Orifice - Descent	Controls the descent rate.	In Fitting Port for Lift Cylinder Supply Hose rear Block surface.
SV1	Valve - Shuttle	Provides oil to Brake Cylinder when either Drive FORWARD or REVERSE are actuated.	In Port in bottom of Manifold Block.
V1	Valve - Drive	Provides directional control of oil for Drive functions.	Outer Valve on rear surface of Valve Manifold.
V2	Valve - Counterbalance FORWARD	Prevents work platform from running away on slopes and cushions stops.	Upper rear corner of outer Manifold surface.
V3	Valve - Counterbalance REVERSE	Prevents work platform from running away on slopes and cushions stops.	Lower rear corner of outer Manifold surface.
V4	Valve - Bypass	Directs Bypass oil to Drive Valve to give HIGH speed.	Top center of outer Manifold surface.
V5	Valve - Series-Parallel	Connects the Drive Motors in either Series or Parallel.	Inner Valve on rear Manifold surface.
V6	Valve - Steer	Provides directional control for Steering Cylinder.	Front surface of Manifold.

TABLE 6-2. HYDRAULIC DIAGRAM LEGEND

REFERENCE DESIGNATION	NAME	FUNCTION	LOCATION
V7	Valve - Down	Allows oil to flow out of Lift Cylinders to Tank.	Left center of front Manifold surface.
V8	Valve - Emergency Lowering (Needle)	Provides manual means of allowing oil to flow from Lift Cylinder to Tank.	Upper left of front Manifold surface.
V9	Valve - Lift	Provides oil flow to Lift Cylinders.	Lower center of front Manifold surface.
V10	Valve - Velocity Fuse	Locks Cylinders if line breaks.	Inside each Lift Cylinder.
RV1	Valve - Relief Main	Provides over pressure protection to LARGE Pump Section.	Lower center of front Manifold surface.
RV2	Valve - Relief Steering	Provides over pressure protection to SMALL Pump Section.	Upper front of rear Manifold surface.
RV3	Valve - Relief Lift	Prevent platform from being raised with excessive load.	Left center of front Manifold surface.

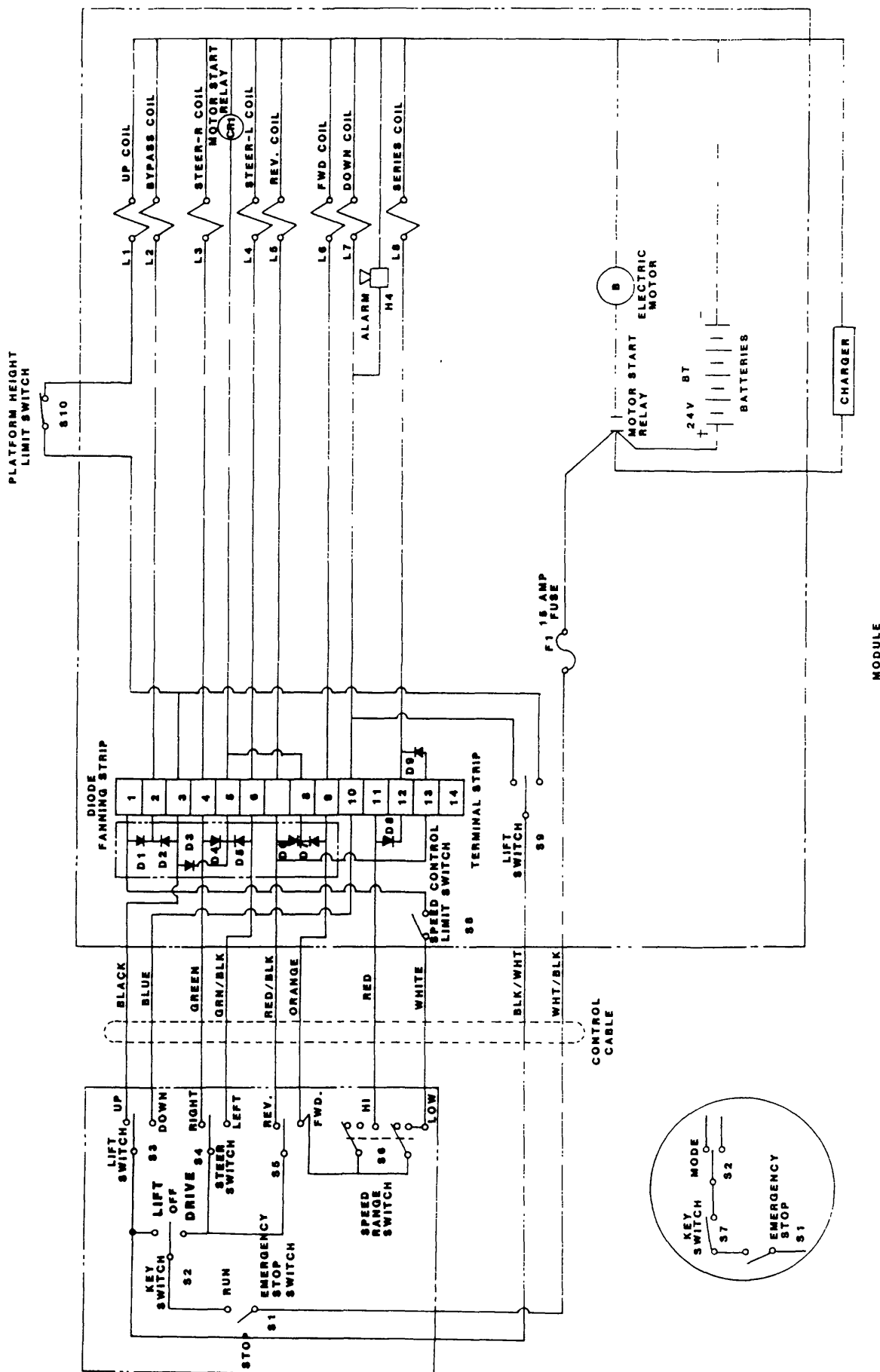


Figure 6-1. Electrical Diagram (Sheet 1 of 2)

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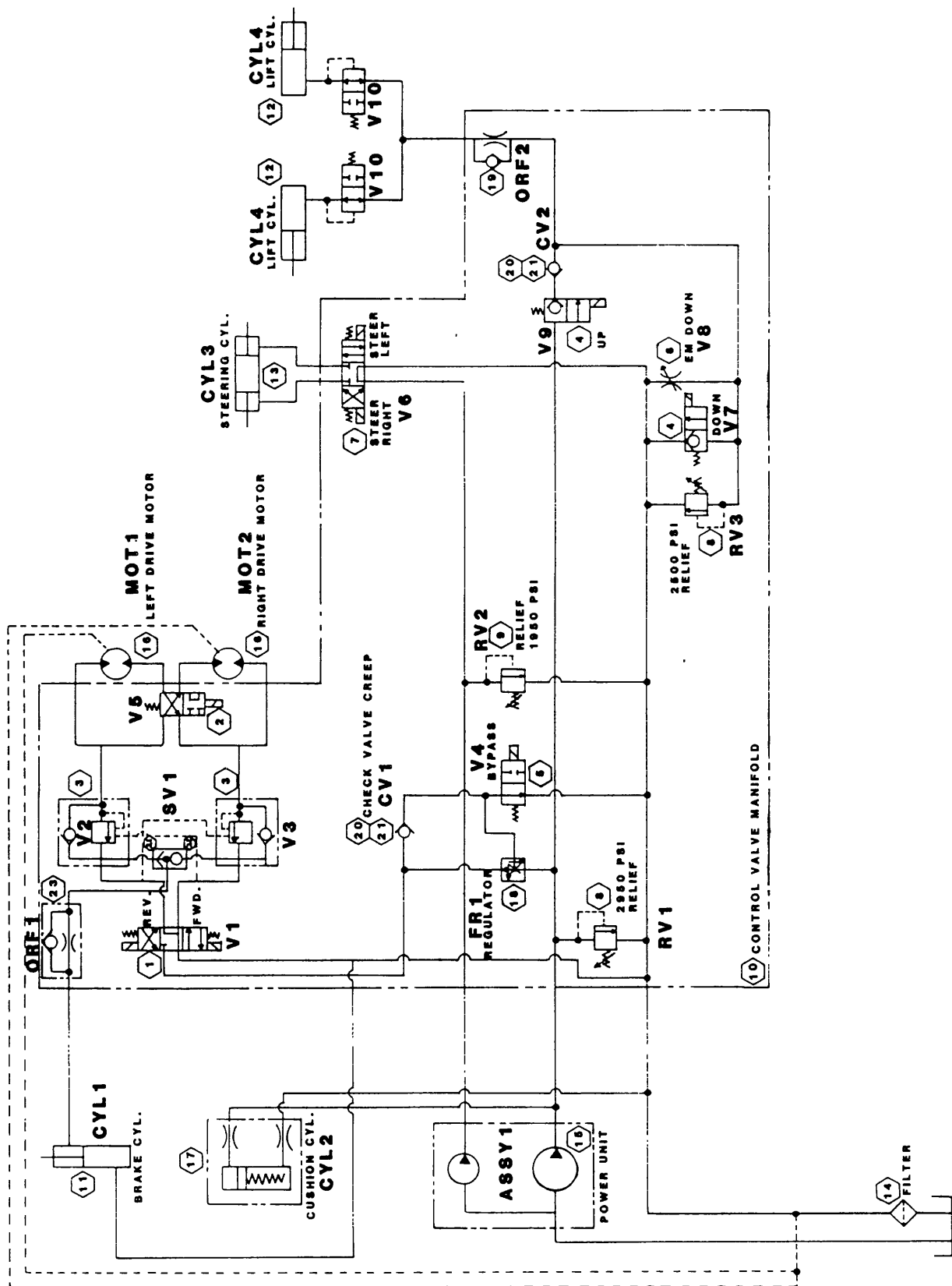


Figure 6-2. Hydraulic Diagram

SECTION VII

ILLUSTRATED PARTS BREAKDOWN

7-1. INTRODUCTION. This section lists and illustrates the replaceable assemblies and parts of the XL-19B Work Platform, as manufactured by UP-RIGHT INC., Selma, California, 93662. Each assembly is followed by its components parts indented to show their relationship to the assembly.

7-2. EXPLANATION OF COLUMNS IN ILLUSTRATED PARTS BREAKDOWN.

7-3. FIGURE AND INDEX NUMBER COLUMN. The figure and index numbers correlate each parts list to its appropriate illustration. The first number in this column on each page of listings indicates the figure number of the associated illustration. The following numbers, preceded by a dash, correspond to the index numbers of each part on the illustration.

7-4. PART NUMBER COLUMN. This column contains the manufacturer's part number for each item listed.

7-5. DESCRIPTION COLUMN. This column contains the manufacturer's nomenclature for each assembly or part. Each part description is indented to show relationship. Reference to next higher assembly or detail parts breakdown follow the description where applicable.

7-6. QUANTITY REQUIRED COLUMN. This column contains the quantity required for each assembly in the higher assembly and for each detail part in an assembly.

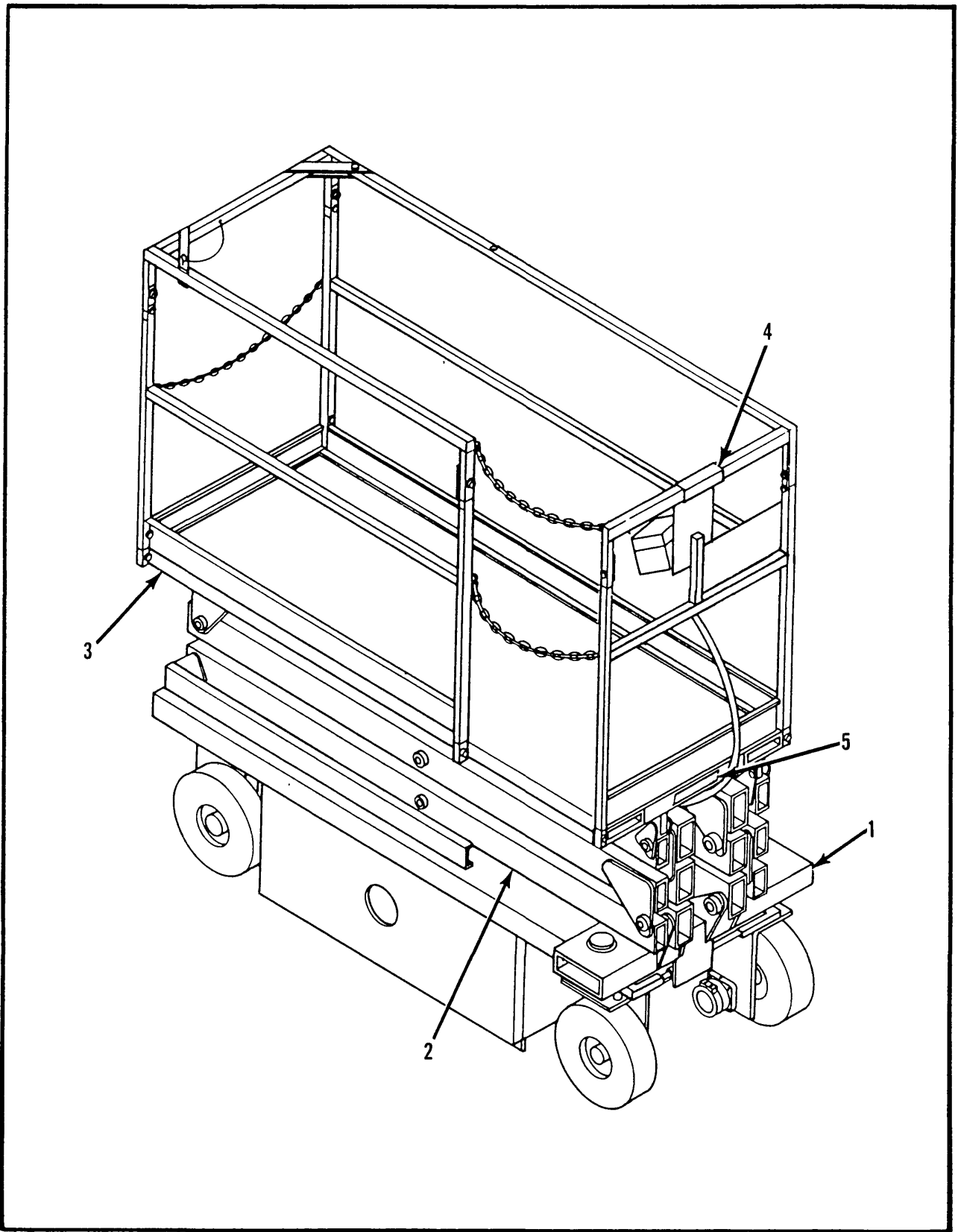


Figure 7-1. XL-19B Work Platform

ITEM	PART	DESCRIPTION	QTY
7-1	61700-000-00	XL-19B WORK PLATFORM.	1
-1	NO NUMBER	. CHASSIS ASSEMBLY. (See Figure 7-2)	1
-2	No Number	. SCISSORS ASSEMBLY (See Figures 7-12 , 7-13)	1
-3	No Number	. PLATFORM/GUARDRAIL ASSEMBLY (See Figure 7-16)	1
-4	61704-000-00	. CONTROLLER ASSEMBLY (See Figure 7-17)	1
-5	11705-000-00	. DECAL KIT INSTALLATION. (See Figure 7-19)	1

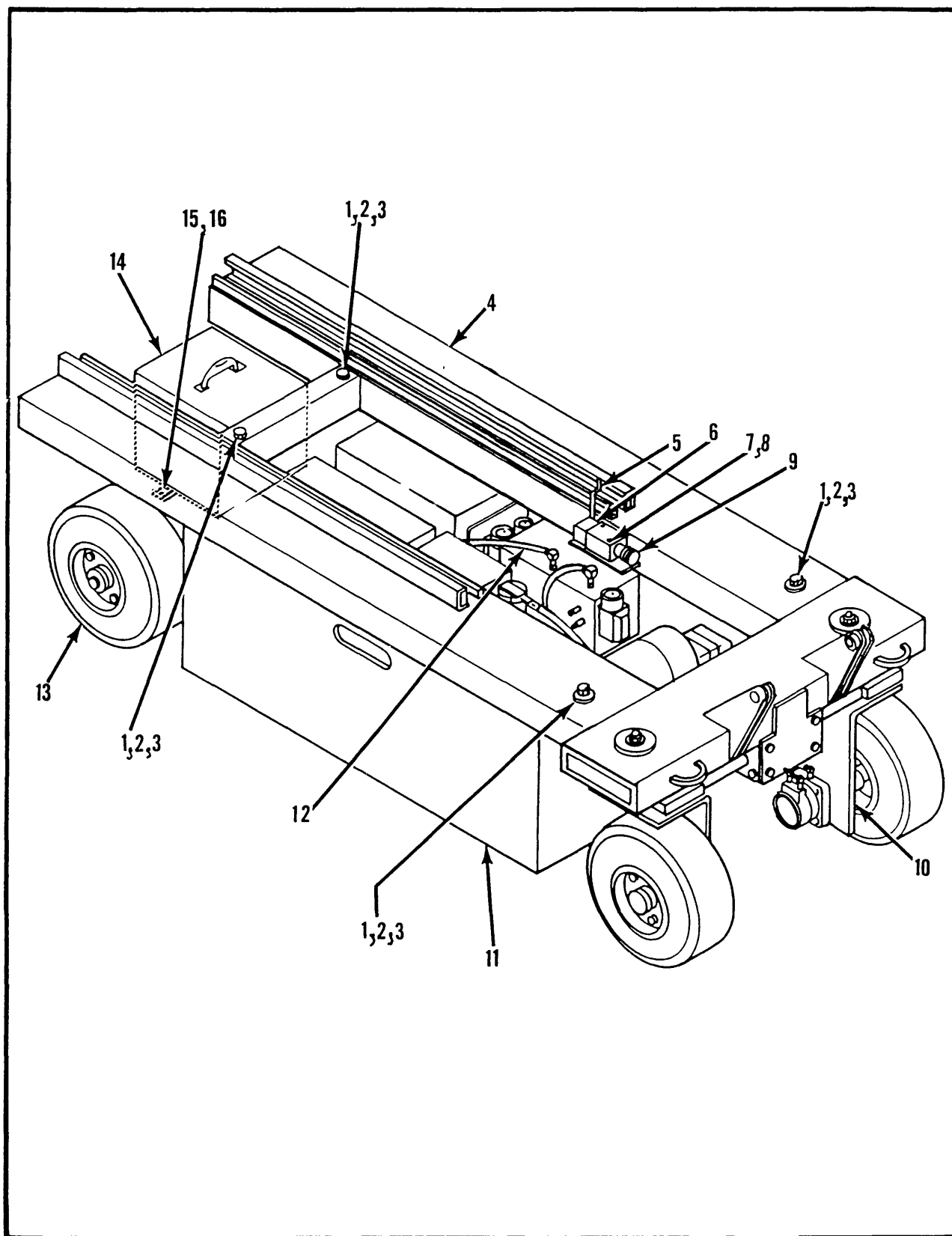


Figure 7-2. Chassis Assembly

ITEM	PART	DESCRIPTION	QTY
7-2	No Number	CHASSIS ASSEMBLY.	REF
-1	11254-032-00	. SCREW, HHC 3/8-16 UNC GR5 x 4	4
-2	11240-006-00	. WASHER, Flat 3/8 DIA.	8
-3	11248-006-00	. LOCKNUT, HEX 3/8-16 UNC	8
-4	61715-000-00	. FRAME WELDMENT.	1
-5	61753-000-00	. WAND, Platform Height	1
-6	No Number	. SWITCH ASSEMBLY, Limit. (Telemecanique)	1
	15793-001-00	. . HEAD, Switch.	1
	15793-002-00	. . BODY, Switch.	1
	15793-004-00	. . . SWITCH.	1
	15793-003-00	. . LEVER	1
	No Number	. SWITCH ASSEMBLY, Limit (Denison).	1
	29859-001-00	. . SWITCH, Limit	1
	29859-003-00	. . . SWITCH.	1
	29860-000-00	. . ACTUATOR.	1
-7	11709-016-00	. SCREW, RD HD MACH #10-24 UNC x 2.	2
-8	11248-003-00	. LOCKNUT, HEX #10-24 UNC x 2	2
-9	29925-000-00	. CONNECTOR	1
-10	No Number	. FRONT STEERING AND DRIVE MOTOR/WHEEL. . INSTL. (See Figure 7-3)	1
-11	No Number	. MODULE ASSEMBLY (See Figure 7-4).	1
-12	61706-000-00	. HOSE KIT/INSTALLATION (See Figure 7-11)	1
-13	No Number	. REAR WHEEL AND HUB ASSEMBLY (See Figure 7-10)	1
-14	10112-000-00	. CHARGER, Battery.	1
	27877-005-00	. . DIODE ASSEMBLY.	2

ITEM	PART	DESCRIPTION	QTY
7-2	No Number	CHASSIS ASSEMBLY (Cont')	REF
	27877-006-00	. . FUSE.	2
	27877-007-00	. . AMMETER	1
	27877-023-00	. . . LENS.	1
	10112-001-00	. . TIMER, 16 Hour.	1
-15	11829-006-00	. BOLT, Carriage 1/4-20 UNC x 3/4	2
-16	11248-004-00	. SCREW, HEX 1/4-20 UNC	2

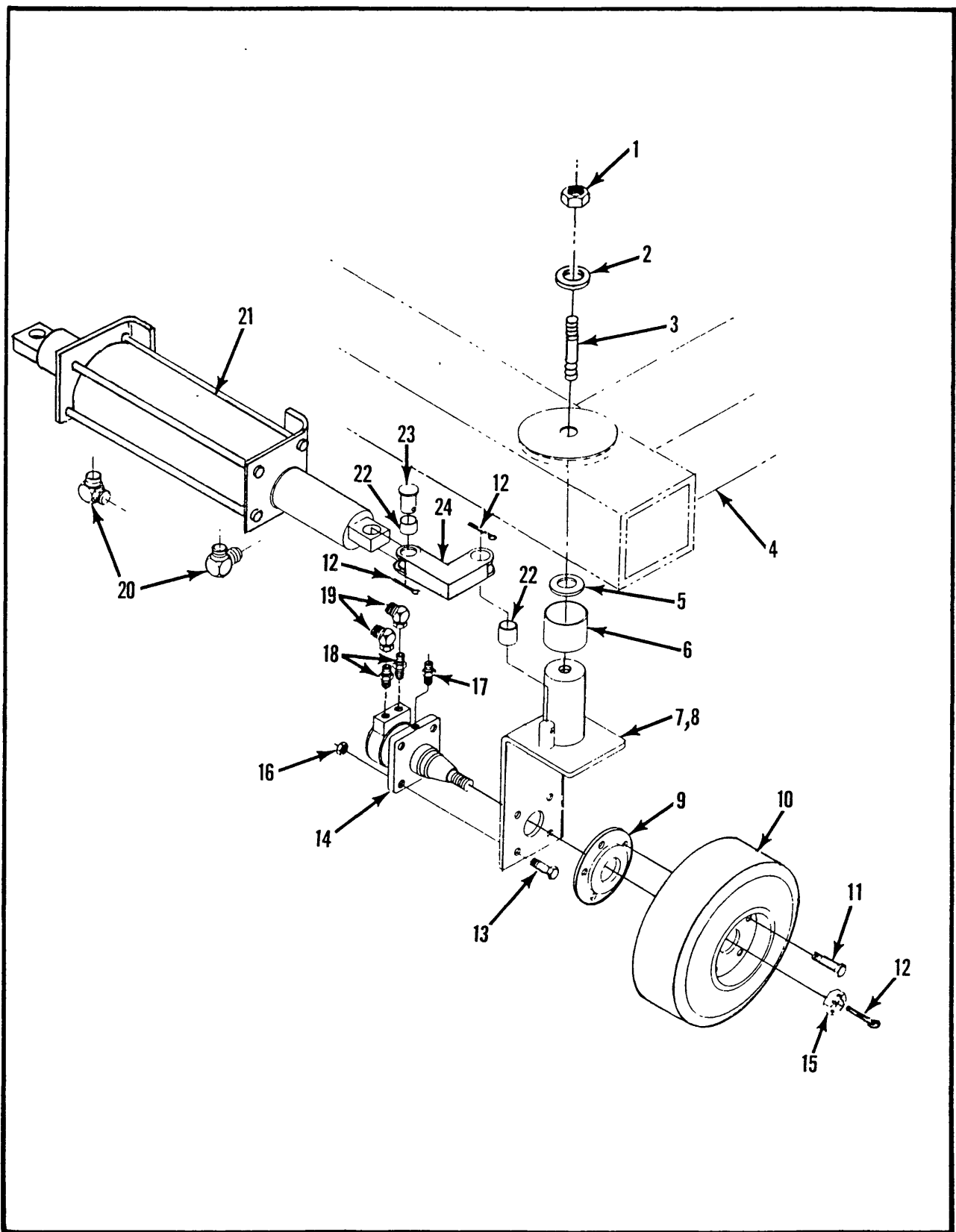


Figure 7-3. Front Steering and Drive Motor Assembly

ITEM	PART	DESCRIPTION	QTY
7-3	No Number	FRONT STEERING AND DRIVE MOTOR ASSY . . .	REF
-1	11248-006-00	. LOCKNUT, HEX 3/8-16 UNC	2
-2	11240-006-00	. WASHER, Flat 3/8 DIA.	2
-3	15795-001-00	. STUD.	2
-4	No Number	. FRAME WELDMENT. (See Figure 7-2)	REF
-5	11782-008-00	. BEARING, Thrust	2
-6	27931-032-00	. BEARING	2
-7	61712-000-00	. SPINDLE-RH. (Not Shown)	1
-8	61713-000-00	. SPINDLE-LH.	1
-9	60737-000-00	. HUB	2
-10	05107-000-00	. WHEEL ASSEMBLY.	2
-11	14122-001-00	. BOLT, Wheel	10
-12	11753-012-00	. PIN, Cottor	6
-13	11256-008-00	. SCREW, HHC 1/2-13 UNC GR5 x 1	8
-14	12795-000-00	. MOTOR, Drive.	2
-15	11274-016-00	. . NUT, Castle 1-14 UNF.	2
-16	11248-008-00	. LOCKNUT, HEX 1/2-13 UNC	8
-17	11941-001-00	. FITTING, Straight	2
-18	11941-013-00	. FITTING, Straight	4
-19	11932-003-00	. FITTING, Elbow.	4
-20	11940-006-00	. FITTING, Elbow.	2
-21	12802-000-00	. CYLINDER, Steering.	1
	12802-014-00	. . SEAL KIT.	1
-22	27931-029-00	. BEARING	4

ITEM	PART	DESCRIPTION	QTY
7-3	No Number	FRONT STEERING AND DRIVE. MOTOR ASSEMBLY (Cont'd)	REF
-23	60741-000-00	. PIN	2
-24	61731-000-00	. STEERING LINK WELDMENT.	2

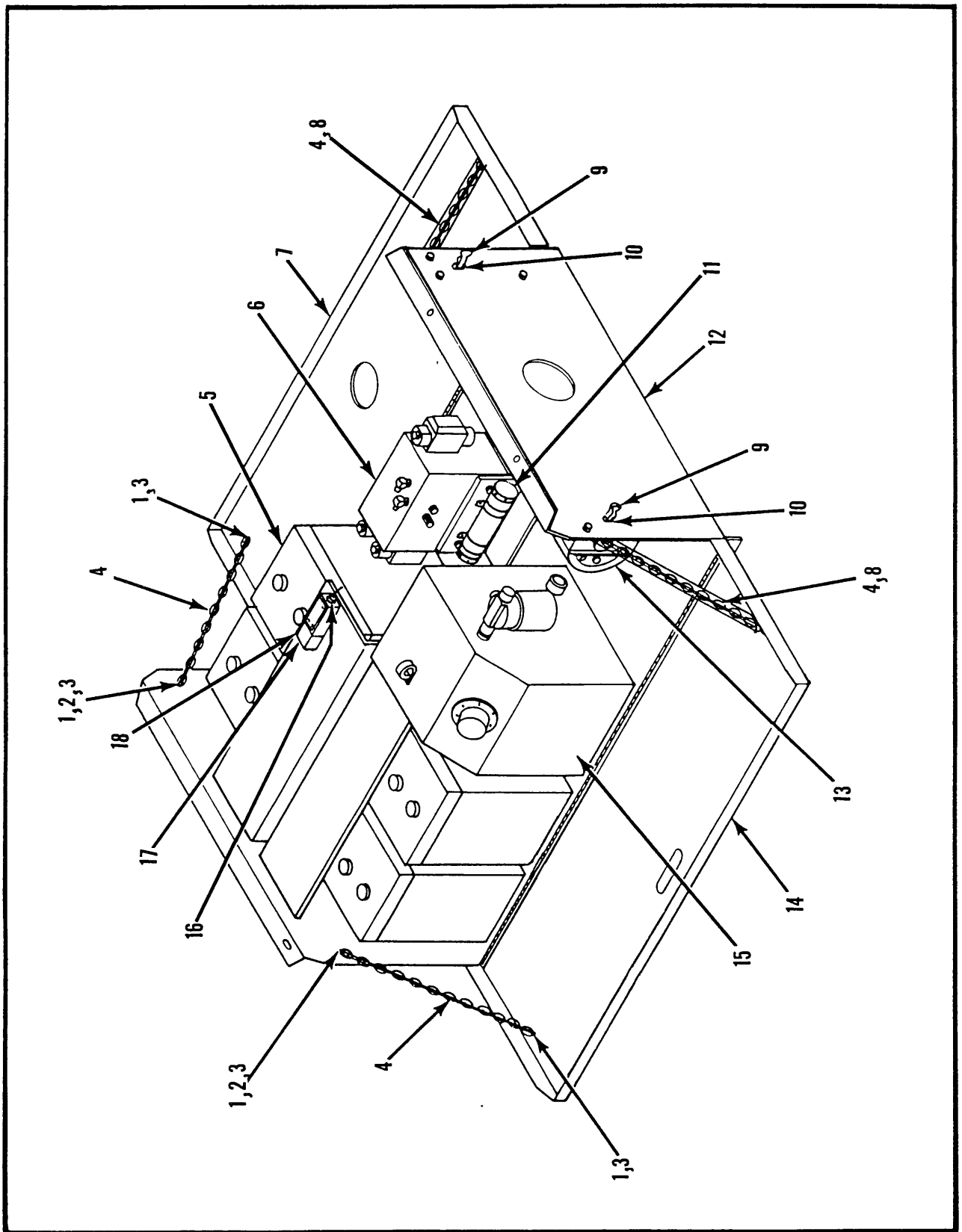


Figure 7-4. Module Assembly

ITEM	PART	DESCRIPTION	QTY
7-4	No Number	MODULE ASSEMBLY	REF
-1	11252-006-00	. SCREW, HHC 1/4-20 UNC GR5 x 3/4	8
-2	11240-004-00	. WASHER, Flat 1/4 DIA.	4
-3	11248-004-00	. LOCKNUT, HEX 1/4-20 UNC	8
-4	15901-001-00	. CHAIN	4
-5	12807-000-00	. BATTERY, 6V 220 AMP	4
-6	61707-000-00	. HYDRAULIC MANIFOLD. (See Figure 7-5)	1
-7	61745-000-00	. COVER WELDMENT-LH	1
-8		. TUBE.	2
-9	08783-000-00	. LATCH	4
-10	26553-002-00	. RIVET, Pop 3/16 DIA .126-.250 Grip.	8
-11	No Number	. CUSHION CYLINDER INSTALLATION (See Figure 7-7)	1
-12	61724-000-00	. MODULE WELDMENT	1
-13	No Number	. PUMP/MOTOR AND ELECTRICAL COMPONENTS. INSTALLATION (See Figure 7-8)	1
-14	60802-000-00	. COVER WELDMENT-RH	1
-15	No Number	. HYDRAULIC TANK INSTALLATION (See Figure 7-9)	1
-16	29925-000-00	. CONNECTOR	1
-17	No Number	. SWITCH ASSEMBLY, Limit. (Telemecanique)	1
	15793-001-00	. . HEAD, Switch.	1
	15793-002-00	. . BODY, Switch.	1
	15793-004-00	. . . SWITCH.	1
	15793-003-00	. . LEVER	1
	No Number	. SWITCH ASSEMBLY, Limit (Denison).	1

ITEM	PART	DESCRIPTION	QTY
7-4	No Number	MODULE ASSEMBLY (Cont'd)	REF
	29859-001-00	. . SWITCH, Limit	1
	29859-003-00	. . . SWITCH.	1
	29860-000-00	. . ACTUATOR.	1
-18	61752-000-00	. WAND, Speed Control	1

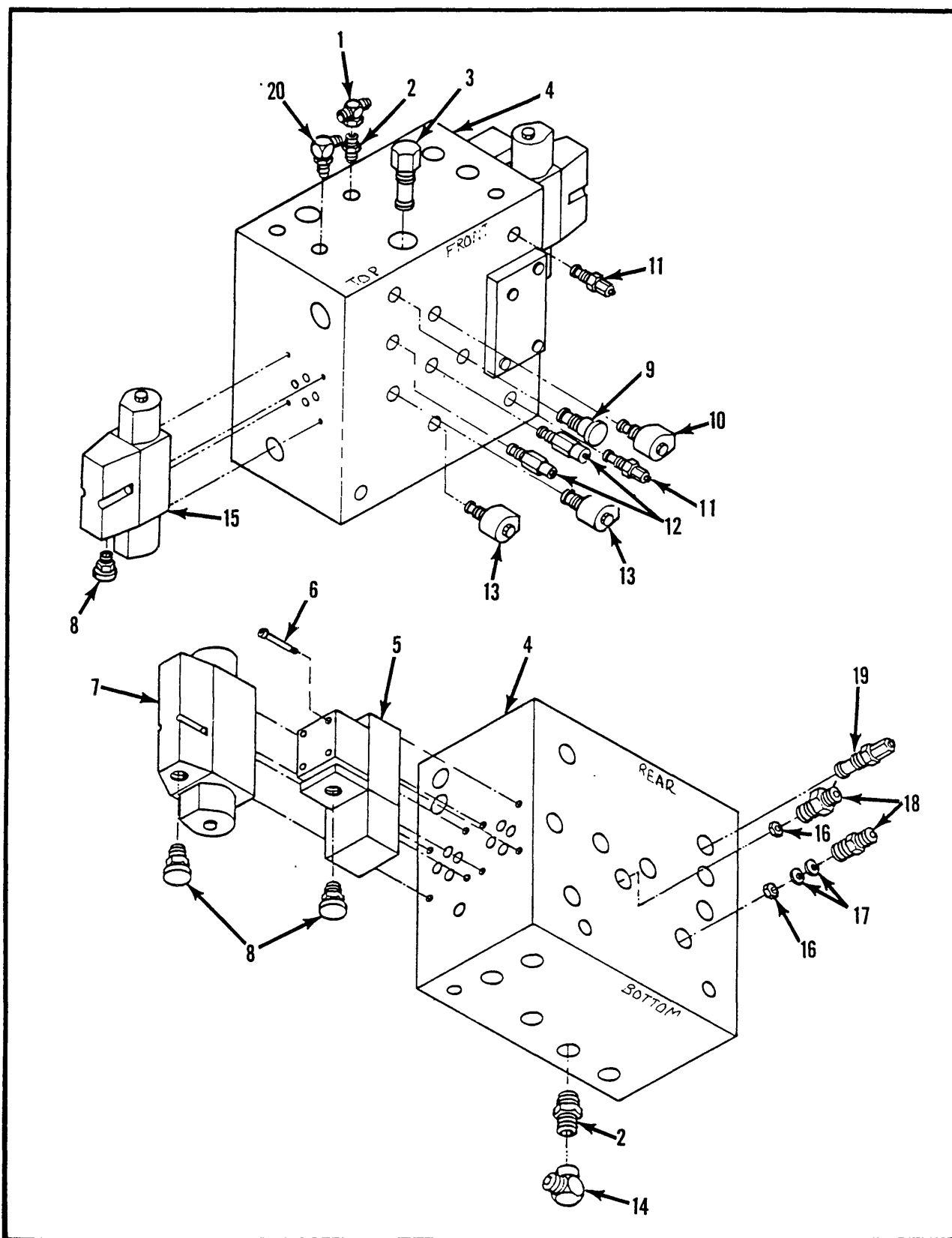


Figure 7-5. Hydraulic Manifold Assembly

ITEM	PART	DESCRIPTION	QTY
7-5	61707-000-00	HYDRAULIC MANIFOLD ASSEMBLY (See Figure 7-4 for NHA)	REF
-1	20809-001-00	. FITTING, Tee.	1
-2	11941-009-00	. FITTING, Straight	2
-3	15918-000-00	. REGULATOR, Flow	1
	13888-057-00	. . O-RING, Small	1
	13888-058-00	. . O-RING, Medium.	1
	13888-056-00	. . O-RING, Large	1
-4	61708-000-00	. HYDRAULIC MANIFOLD SUBASSEMBLY. (See Figure 7-6)	1
-5	15761-000-00	. VALVE, Solenoid, Series-Parallel.	1
	13888-062-00	. . O-RING.	4
	15761-001-00	. . COIL (Rucker)	1
	15761-002-00	. . COIL (Dynex/Rivet).	1
-6	14412-016-00	. SCREW, SOC HD #10-24 UNC x 2.	4
-7	15763-000-00	. VALVE, Solenoid, Drive.	1
	15760-001-00	. . COIL.	1
	13888-007-00	. . O-RING.	4
-8	29925-000-00	. CONNECTOR	3
-9	60388-000-00	. VALVE, Cartridge, Emergency Down.	1
	13888-057-00	. . O-RING, Small	1
	13888-056-00	. . O-RING, Large	1
-10	15762-000-00	. VALVE, Solenoid, N.O.	1
	15762-001-00	. . COIL.	1
	15762-002-00	. . POPPET, N.O..	1
	13888-057-00	. . . O-RING, Small	
	13888-058-00	. . . O-RING, Large	

ITEM	PART	DESCRIPTION	QTY
7-5	61707-000-00	HYDRAULIC MANIFOLD ASSEMBLY (Cont'd) . . .	REF
-11	15900-000-00	. VALVE, Counterbalance	2
	13888-059-00	. . O-RING, Small	1
	13888-058-00	. . O-RING, Large	1
-12	60390-000-00	. VALVE, Cartridge, Relief.	2
	13888-057-00	. . O-RING, Small	1
	13888-056-00	. . O-RING, Large	1
-13	15764-000-00	. VALVE, Solenoid, N.C.	2
	15762-001-00	. . COIL.	1
	15764-002-00	. . POPPET, N.C..	1
	13888-057-00	. . O-RING, Small	1
	13888-056-00	. . O-RING, Large	1
-14	11937-003-00	. FITTING, Elbow.	1
-15	15760-000-00	. VALVE, Solenoid, Steering	2
	15760-001-00	. . COIL.	1
	13888-007-00	. . O-RING.	4
-16	15919-000-00	. ORIFICE	2
-17	11240-002-00	. WASHER, Flat #8 DIA	2
-18	11941-005-00	. FITTING, Straight	2
-19	60294-000-00	. VALVE, Cartridge, Steering Relief . . .	1
	13888-061-00	. . O-RING, Small	1
	13888-060-00	. . O-RING, Large	1
-20	11934-004-00	. FITTING, Elbow.	1

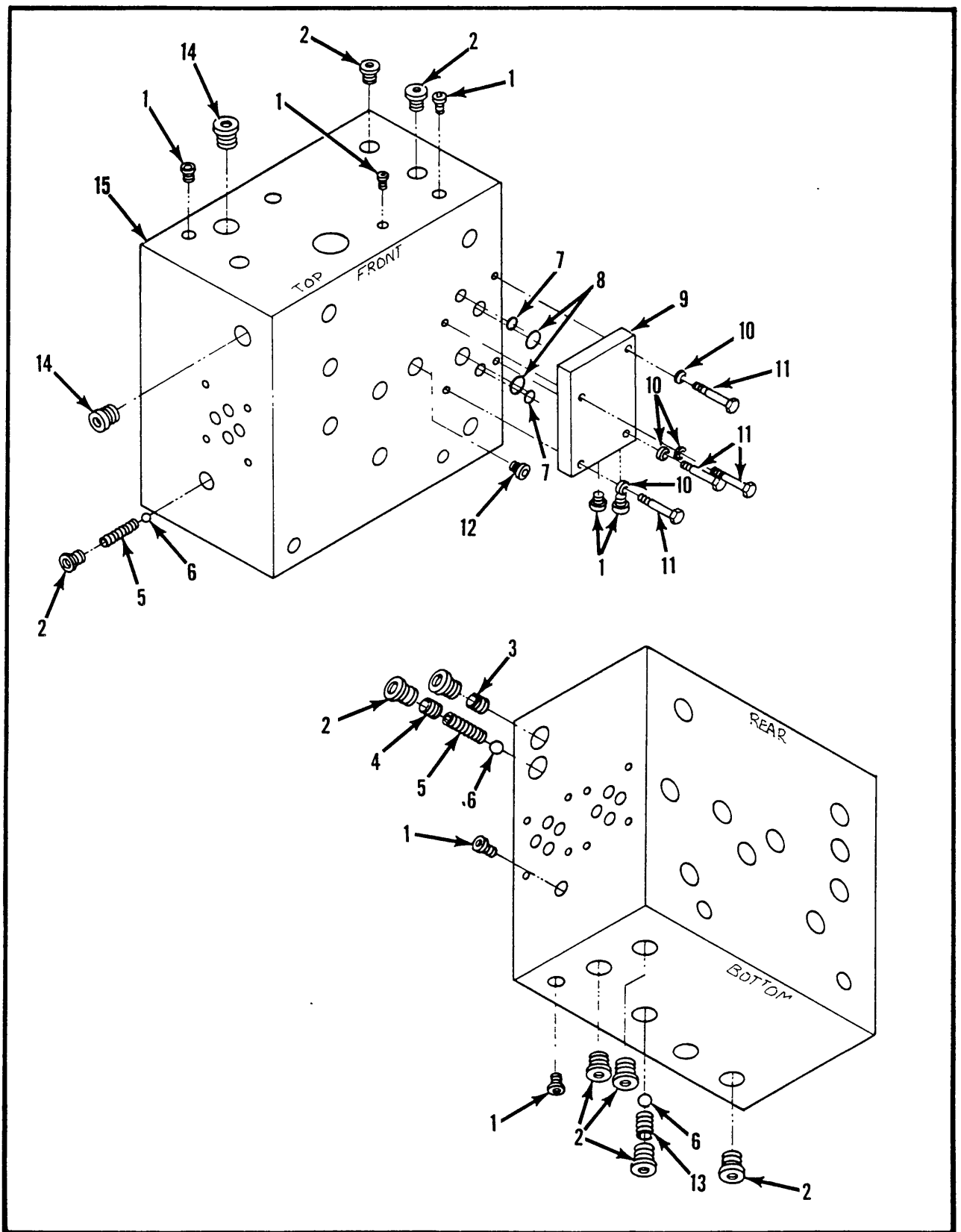


Figure 7-6. Hydraulic Manifold Subassembly

ITEM	PART	DESCRIPTION	QTY
7-6	61708-000-00	HYDRAULIC MANIFOLD SUBASSEMBLY	REF
-1	12004-002-00	. PLUG.	8
-2	12004-006-00	. PLUG.	8
-3	11711-005-00	. SCREW, Set.	1
-4	11713-006-00	. SCREW, Set.	1
-5	15799-000-00	. SPRING.	2
-6	05135-000-00	. BALL.	3
-7	13888-007-00	. O-RING.	2
-8	13888-032-00	. O-RING.	2
-9	61538-000-00	. BLOCK, Valve.	1
-10	11238-004-00	. LOCKWASHER, Split 1/4 DIA	4
-11	11252-010-00	. SCREW, HHC 1/4-20 UNC GR5 x 1-1/4 . . .	4
-12	12004-004-00	. PLUG.	1
-13	61728-000-00	. ORIFICE	1
-14	12004-008-00	. PLUG.	2
-15	61717-000-00	. MANIFOLD.	1

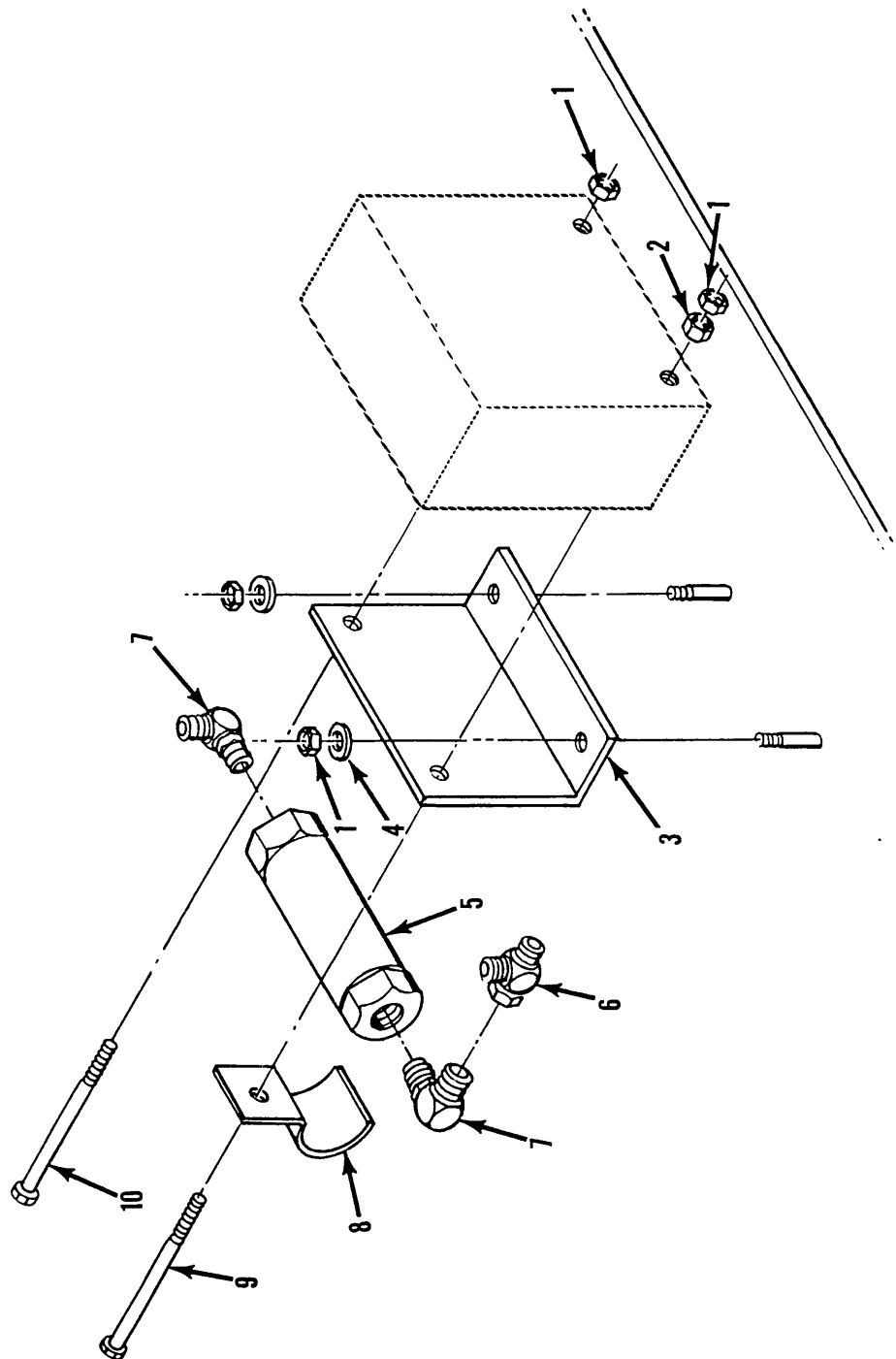


Figure 7-7. Cushion Cylinder Installation

ITEM	PART	DESCRIPTION	QTY
7-7	No Number	CUSHION CYLINDER INSTALLATION	REF
-1	11248-006-00	. LOCKNUT, HEX 3/8-16 UNC	4
-2	11273-006-00	. NUT, Jam 3/8-16 UNC	1
-3	61730-000-00	. BRACKET, Valve Mount.	1
-4	11240-006-00	. WASHER, Flat 3/8 DIA.	2
-5	61779-000-00	. CYLINDER, Cushion	1
	61779-001-00	. . SEAL KIT.	1
-6	20733-002-00	. FITTING, Tee.	1
-7	11934-004-00	. FITTING, Elbow.	2
-8	15928-005-00	. CLAMP	1
-9	11254-044-00	. SCREW, HHC 3/8-16 UNC GR5 x 5-1/2 . . .	1
-10	11254-040-00	. SCREW, HHC 3/8-16 UNC GR5 x 5	1

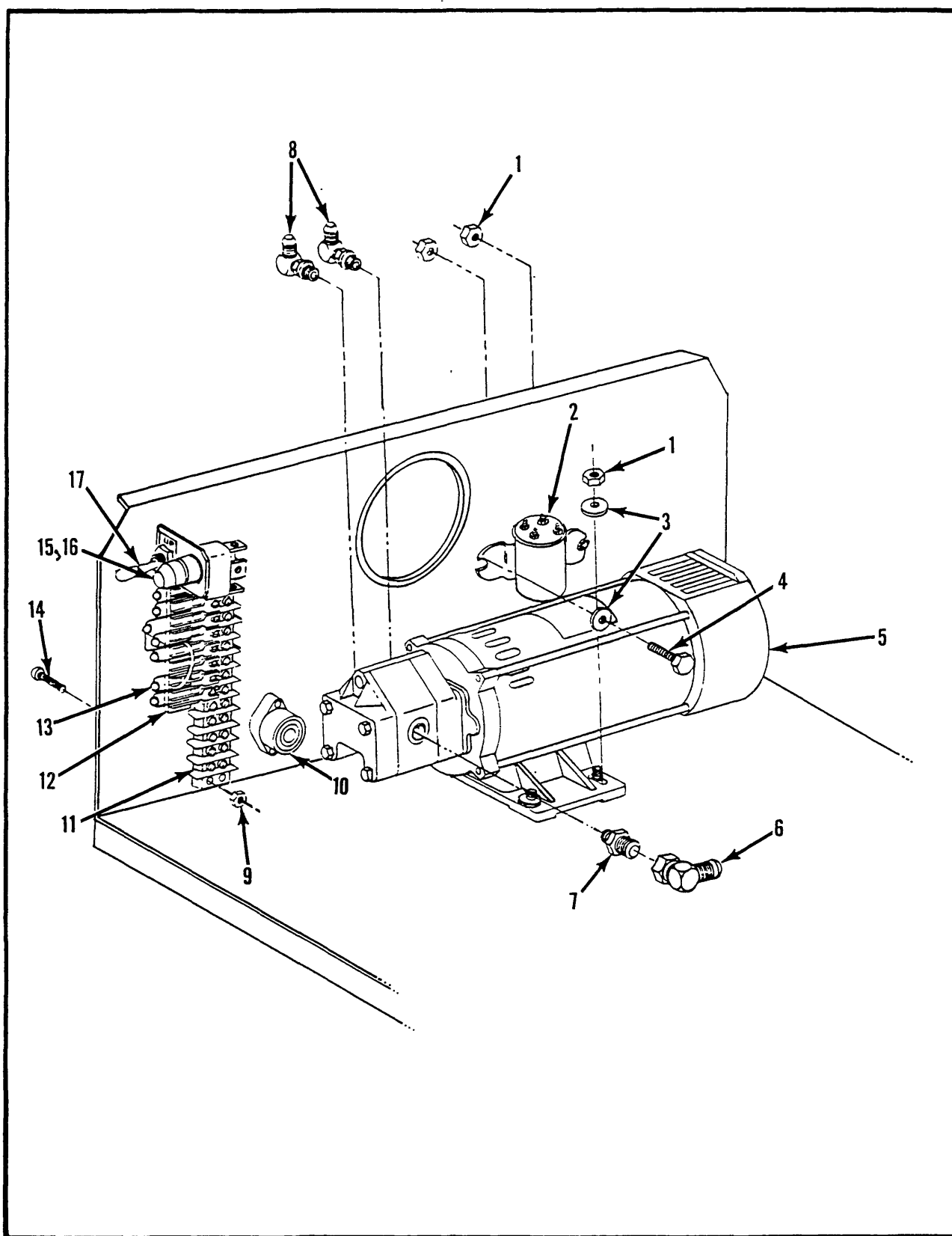


Figure 7-8. Pump/Motor and Electrical Components Installation

ITEM	PART	DESCRIPTION	QTY
7-8	No Number	PUMP/MOTOR AND ELECTRICAL COMPONENTS. . . INSTALLATION	REF
-1	11248-004-00	. LOCKNUT, HEX 1/4-20 UNC	6
-2	10122-000-00	. SOLENOID.	1
-3	11240-004-00	. WASHER, Flat.	6
-4	11252-006-00	. SCREW, HHC 1/4-20 UNC GR5 x 3/4	2
-5	15797-000-00	. PUMP/MOTOR ASSEMBLY	1
	15797-001-00	. . PUMP.	1
	15797-003-00	. . . SEAL KIT.	1
	15797-002-00	. . COUPLING.	1
	15797-004-00	. . MOTOR, Electric	1
	15797-005-00	. . . BRUSHES SET	1
-6	11937-007-00	. FITTING, Elbow.	1
-7	11941-012-00	. FITTING, Straight	1
-8	11939-004-00	. FITTING, Elbow.	2
-9	11248-026-00	. LOCKNUT, HEX #6-32 UNC.	2
-10	15765-000-00	. BUZZER.	1
-11	29928-004-00	. BLOCK, Terminal	1
-12	61714-000-00	. STRIP, Fanning.	1
-13	29825-002-00	. . DIODE	7
-14	11715-006-00	. SCREW, RD HD MACH #6-32 UNC x 3/4 . . .	2
-15	29701-000-00	. HOLDER, Fuse.	1
-16	29704-015-00	. FUSE, 15 AMP.	1
-17	05514-000-00	. SWITCH, Toggle.	1

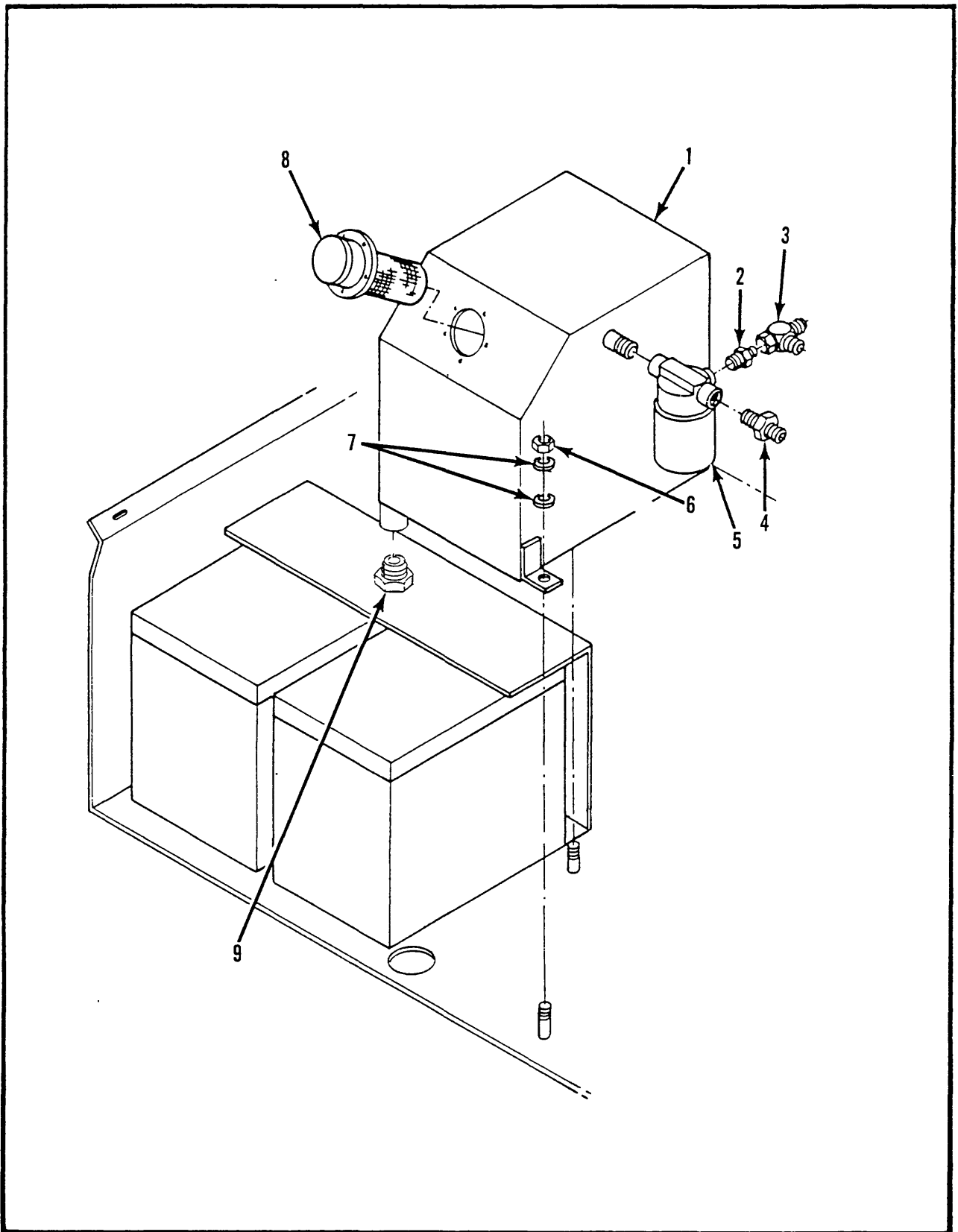


Figure 7-9. Hydraulic Tank Installation

ITEM	PART	DESCRIPTION	QTY
7-9	No Number	HYDRAULIC TANK INSTALLATION	REF
-1	61726-000-00	. HYDRAULIC TANK WELDMENT	1
-2	11939-004-00	. FITTING, Straight	1
-3	20733-001-00	. FITTING, Tee.	1
-4	11939-018-00	. FITTING, Straight	1
-5	05154-001-00	. FILTER.	1
	05154-002-00	. . ELEMENT, Filter	1
-6	11248-004-00	. LOCKNUT, HEX 1/4-20 UNC	2
-7	11240-004-00	. WASHER, Flat 1/4 DIA.	4
-8	05963-000-00	. FILLER.	1
-9	21305-006-00	. Plug.	1

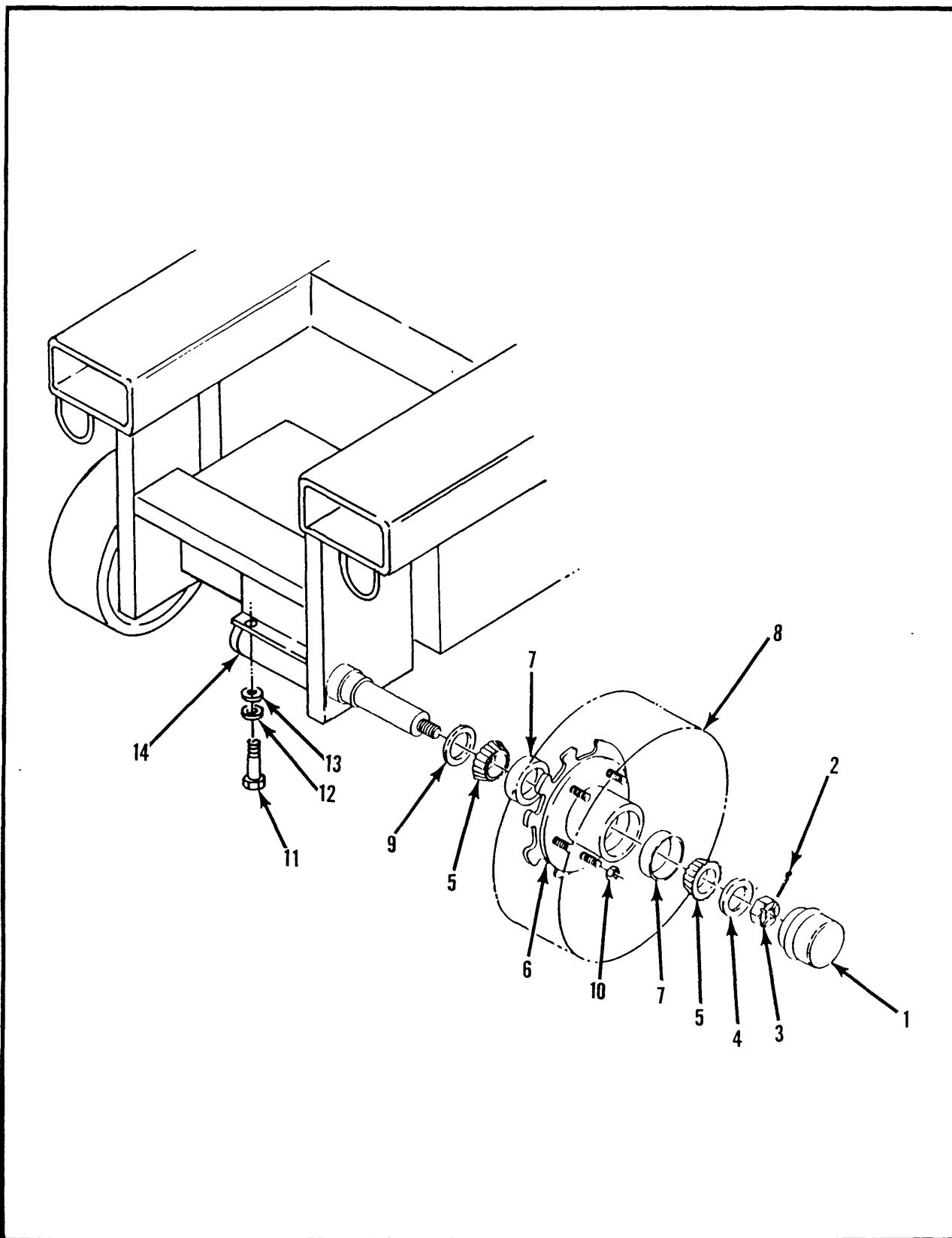


Figure 7-10. Rear Wheel and Hub Assembly

ITEM	PART	DESCRIPTION	QTY
7-10	No Number	REAR WHEEL AND HUB ASSEMBLY (See Figure 7-2 for NHA)	REF
-1	05078-000-00	. CAP, Dust	2
-2	11753-012-00	. PIN, Cotter	2
-3	11274-016-00	. NUT, Slotted HEX 1-1/4 UNF.	2
-4	11239-016-00	. WASHER, Flat 1 DIA ASTM	2
-5	11775-011-00	. CONE, Bearing	4
-6	60742-000-00	. HUB AND ROTOR WELDMENT-RH	1
-7	11776-004-00	. . CUP, Bearing.	2
-6	05100-001-00	. HUB-LH (Not Shown).	1
-7	11776-004-00	. . CUP, Bearing.	2
-8	05107-000-00	. WHEEL ASSEMBLY.	2
-9	05104-000-00	. SEAL, Grease.	2
-10	05105-000-00	. NUT, Lug.	10
-11	11254-010-00	. SCREW, HHC 3/8-16 UNC GR5 x 1-1/4 . . .	4
-12	11238-006-00	. LOCKWASHER, Split 3/8 DIA	4
-13	11240-006-00	. WASHER, Flat 3/8 DIA.	4
-14	60479-000-00	. CYLINDER, Brake	1
	60211-014-00	. . SEAL KIT.	1

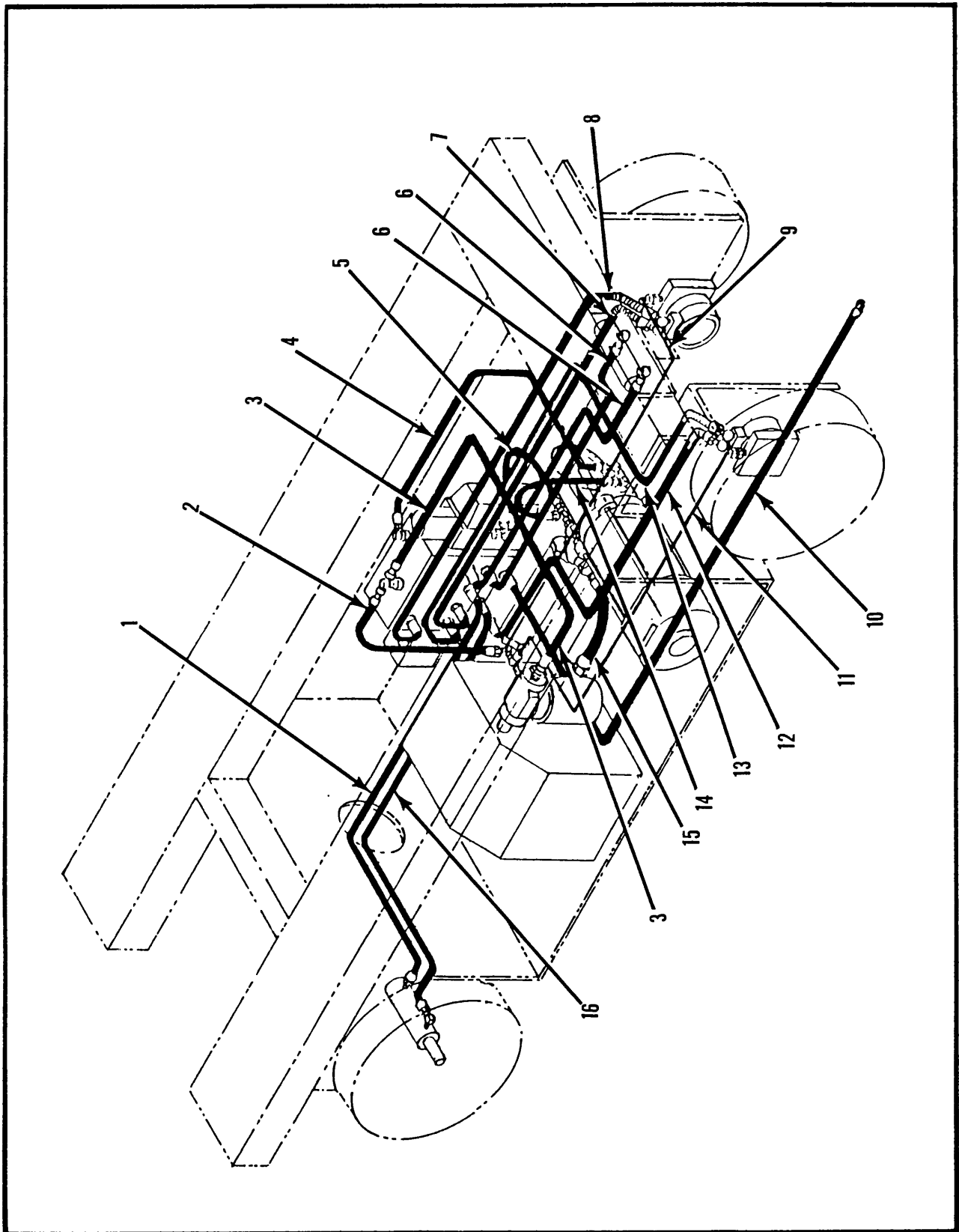


Figure 7-11. Hose Kit Installation-Chassis

ITEM	PART	DESCRIPTION	QTY
7-11	61706-000-00	HOSE KIT INSTALLATION, Chassis.	REF
-1	61791-002-00	. HOSE ASSEMBLY 3/8 x 42.	1
-2	60861-022-00	. HOSE ASSEMBLY 3/8 x 14.	1
-3	60861-016-00	. HOSE ASSEMBLY 3/8 x 36-1/2.	1
-4	60861-013-00	. HOSE ASSEMBLY 3/8 x 15-1/2.	1
-5	60861-021-00	. HOSE ASSEMBLY 3/8 x 12.	1
-6	61791-001-00	. HOSE ASSEMBLY 3/8 x 31-1/2.	2
-7	61790-001-00	. HOSE ASSEMBLY 3/8 x 48-1/2.	1
-8	61790-003-00	. HOSE ASSEMBLY 3/8 x 51-1/2.	1
-9	61351-004-00	. HOSE ASSEMBLY 3/8 x 47.	1
-10	60861-017-00	. HOSE ASSEMBLY 3/8 x 100	1
-11	61351-003-00	. HOSE ASSEMBLY 1/8 x 45.	1
-12	61790-002-00	. HOSE ASSEMBLY 3/8 x 49-1/2.	1
-13	61790-004-00	. HOSE ASSEMBLY 3/8 x 52-1/2.	1
-14	60861-018-00	. HOSE ASSEMBLY 3/8 x 18.	1
-15	61789-001-00	. HOSE ASSEMBLY 3/4 x 15-1/2.	1
-16	60861-020-00	. HOSE ASSEMBLY 3/8 x 44-1/2.	1

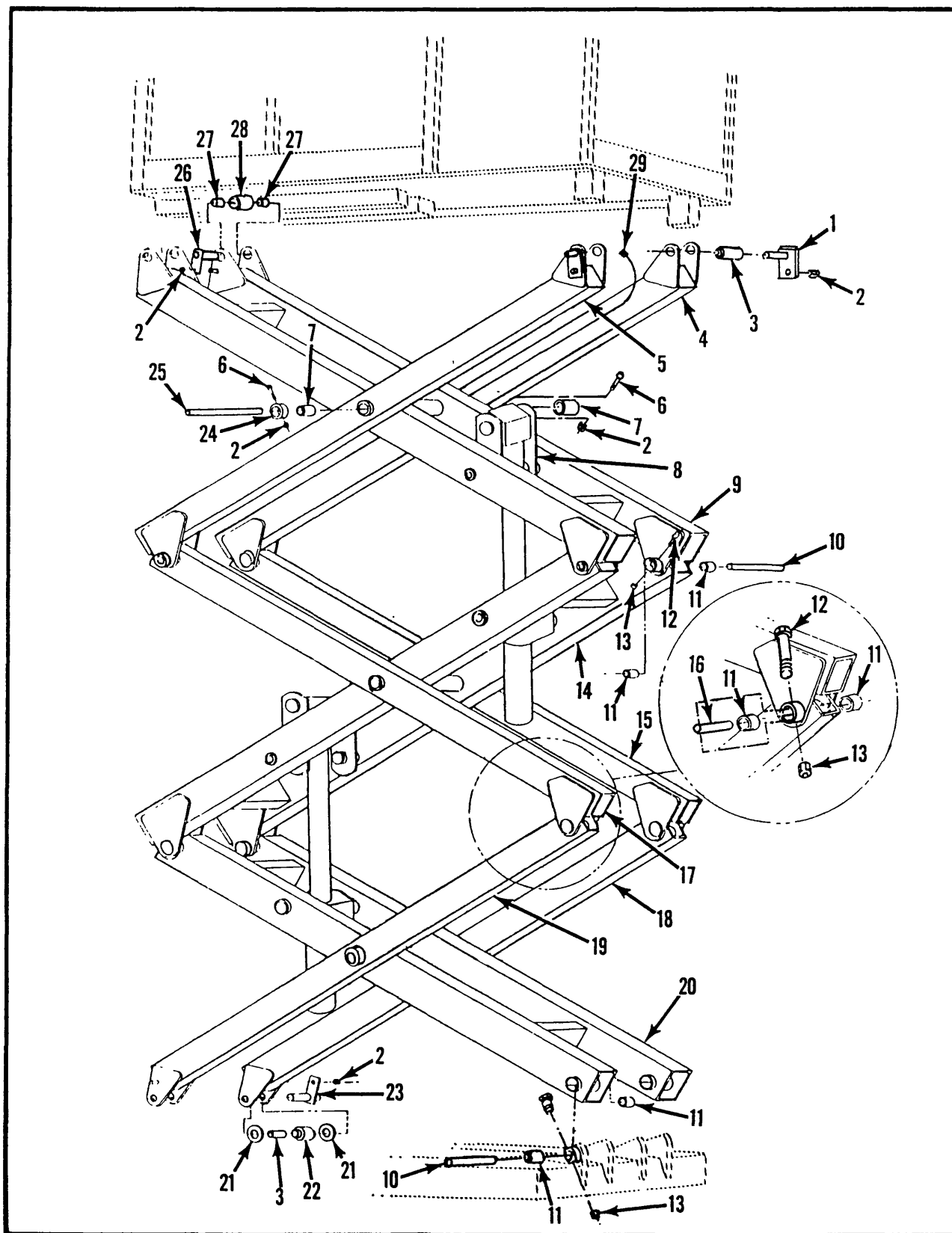


Figure 7-12. Scissors Assembly Serial No. 2126 to Current

ITEM	PART	DESCRIPTION	QTY
7-12	No Number	SCISSORS ASSEMBLY Serial No. 2126 to Current	REF
-1	61506-000-00	. PIN WELDMENT.	2
-2	11248-006-00	. LOCKNUT, HEX 3/8-16 UNC	10
-3	27931-012-00	. BEARING	4
-4	61756-000-00	. ARM WELDMENT, Upper-LH.	1
-5	61757-000-00	. ARM WELDMENT, Upper-RH.	1
-6	11254-022-00	. SCREW, HHC 3/8-16 UNC GR5 x 2-3/4	10
-7	27931-006-00	. BEARING	6
-8	No Number	. LIFT CYLINDER INSTALLATION. (See Figure 7-14)	2
-9	61723-000-00	. FRAME WELDMENT, Upper	1
-10	61565-000-00	. PIN	4
-11	27931-042-00	. BEARING	20
-12	11253-016-00	. SCREW, HHC 5/16-18 UNC GR 5 x 2	8
-13	11248-005-00	. LOCKNUT, HEX 5/16-18 UNC.	10
-14	61722-000-00	. FRAME WELDMENT, Center.	1
-15	61755-000-00	. ARM WELDMENT, Center-LH	1
-16	61788-000-00	. PIN	4
-17	61754-000-00	. ARM WELDMENT, Center-RH	1
-18	61459-000-00	. ARM WELDMENT, Outer-LH.	1
-19	61469-000-00	. ARM WELDMENT, Outer-RH.	1
-20	61758-000-00	. FRAME WELDMENT, Lower	1
-21	61536-000-00	. WASHER.	4
-22	60880-000-00	. WHEEL, Lower.	2
-23	60788-000-00	. PIN WELDMENT.	2

ITEM	PART	DESCRIPTION	QTY
7-12	No Number	SCISSORS ASSEMBLY Serial No. 2126 to Current (Cont"d)	REF
-24	61471-000-00	. COLLAR.	3
-25	61470-000-00	. PIN, Center Pivot	3
-26	61472-000-00	. PIN WELDMENT.	2
-27	27931-011-00	. BEARING	4
-28	61473-000-00	. ROLLER.	2
-29	No Number	. HOSE AND CABLE INSTALLATION,. Scissors (See Figure 7-15)	1

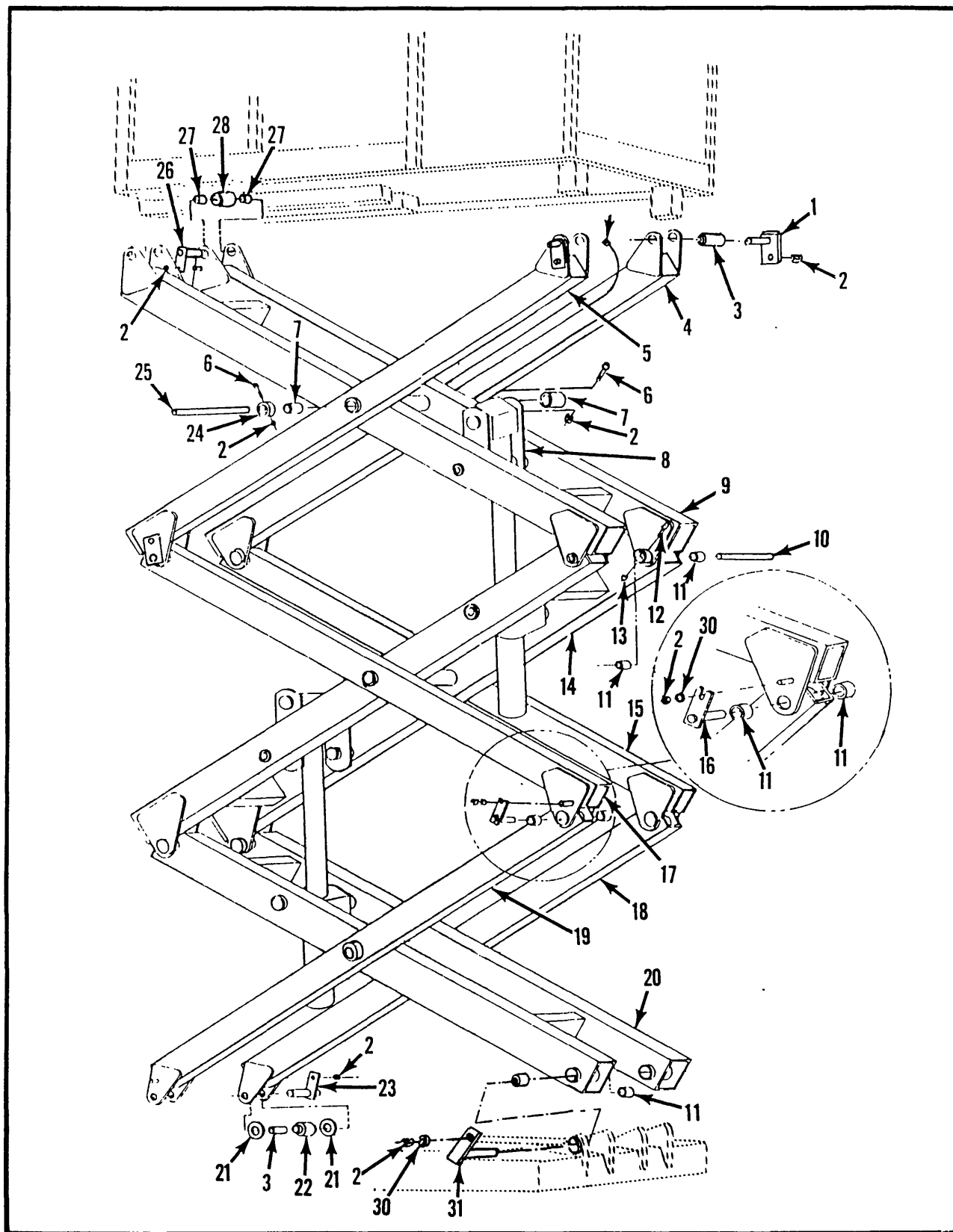


Figure 7-13. Scissors Assembly Serial No. 2000 to 2125

ITEM	PART	DESCRIPTION	QTY
7-13	No Number	SCISSORS ASSEMBLY SERIAL NO. 2000 TO 2125	REF
-1	61506-000-00	. PIN WELDMENT.	2
-2	11248-006-00	. LOCKNUT, HEX 3/8-16 UNC	16
-3	27931-012-00	. BEARING	4
-4	61458-000-00	. ARM WELDMENT, Upper-LH.	1
-5	61455-000-00	. ARM WELDMENT, Upper-RH.	1
-6	11254-022-00	. SCREW, HHC 3/8-16 UNC GR5 x 2-3/4	10
-7	27931-006-00	. BEARING	6
-8	No Number	. LIFT CYLINDER INSTALLATION. (See Figure 7-14)	2
-9	61723-000-00	. FRAME WELDMENT, Upper	1
-10	61565-000-00	. PIN	2
-11	27931-042-00	. BEARING	20
-12	11253-016-00	. SCREW, HHC 5/16-18 UNC GR5 x 2.	4
-13	11248-005-00	. LOCKNUT, HEX 5/16-18 UNC.	6
-14	61722-000-00	. FRAME WELDMENT, Center.	1
-15	61454-000-00	. ARM WELDMENT, Center-LH	1
-16	61462-000-00	. PIN WELDMENT.	4
-17	61450-000-00	. ARM WELDMENT, Center-RH	1
-18	61459-000-00	. ARM WELDMENT, Outer-LH.	1
-19	61469-000-00	. ARM WELDMENT, Outer-RH.	1
-20	61446-000-00	. FRAME WELDMENT, Lower	1
-21	61536-000-00	. WASHER.	4
-22	60880-000-00	. WHEEL, Lower.	2
-23	60788-000-00	. PIN WELDMENT.	2

ITEM	PART	DESCRIPTION	QTY
7-13	No Number	SCISSORS ASSEMBLY Serial No. 2000 to 2125 (Cont'd)	REF
-24	61471-000-00	. COLLAR.	3
-25	61470-000-00	. PIN, Center Pivot	3
-26	61472-000-00	. PIN WELDMENT.	2
-27	27931-011-00	. BEARING	4
-28	61473-000-00	. ROLLER.	2
-29	No Number	. HOSE AND CABLE INSTALLATION,. Scissors (See Figure 7-15)	1
-30	11240-006-00	. WASHER, Flat 3/8 DIA.	6
-31	61464-000-00	. PIN WELDMENT.	2

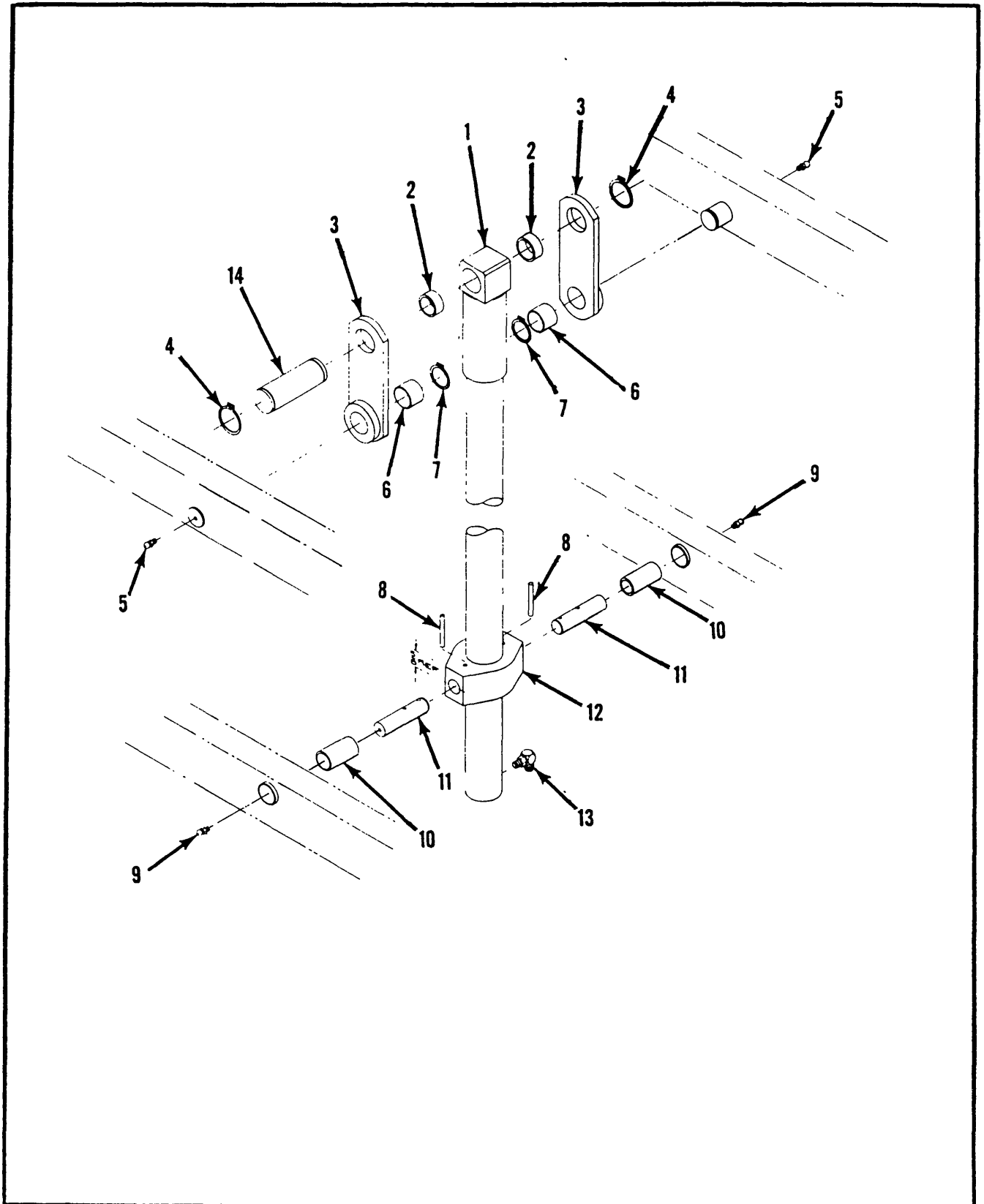


Figure 7-14. Lift Cylinder Installation

ITEM	PART	DESCRIPTION	QTY
7-14	No Number	LIFT CYLINDER INSTALLATION. (SEE for NHA)	REF
-1	12794-000-00	. CYLINDER, Lift.	1
	12794-014-00	. . SCREW, Bleeder.	1
	14413-001-00	. . FUSE, Velocity.	1
	12794-099-00	. . SEAL KIT.	1
-2	18407-001-00	. SPACER.	2
-3	60844-000-00	. PLATE WELDMENT.	2
-4	11764-034-00	. RING, Retaining	2
-5	13336-001-00	. FITTING, Grease 1/8-27 NPT.	2
-6	60845-000-00	. BEARING	2
-7	11764-027-00	. RING, Retaining	2
-8	60431-001-00	. PIN, Drive.	2
-9	13336-011-00	. FITTING, Grease 1/4-28 UNF.	2
-10	60890-000-00	. BEARING	2
-11	61468-000-00	. PIN, Pivot Cylinder Collar.	2
-12	61474-000-00	. COLLAR, Cylinder.	1
-13	11934-007-00	. FITTING, Elbow.	1
-14	61467-000-00	. PIN, Cylinder	

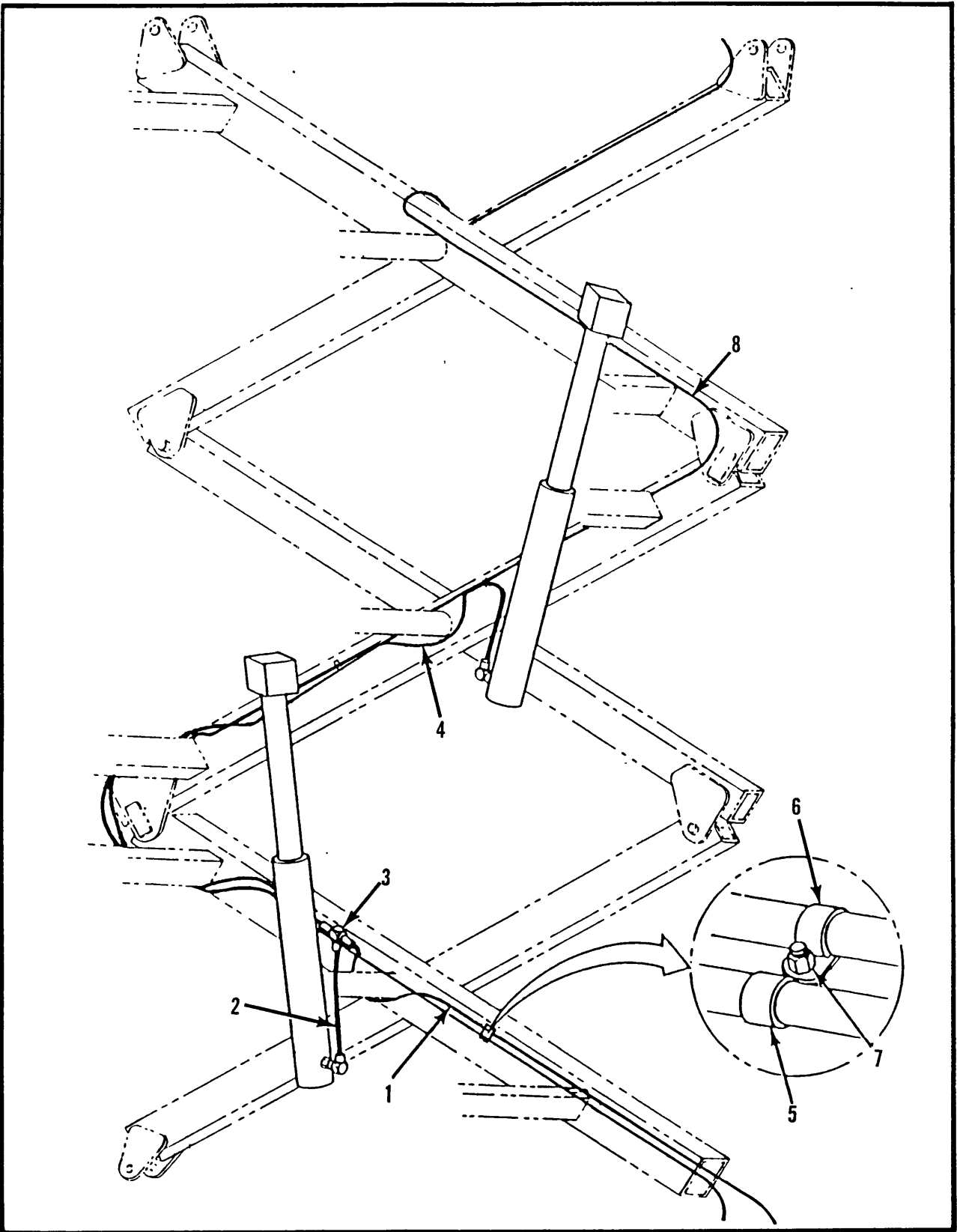


Figure 7-15. Hose and Cable Installation, Scissors

ITEM	PART	DESCRIPTION	QTY
7-15	No Number	HOSE AND CABLE INSTALLATION, Scissors . .	REF
-1	60861-017-00	. HOSE ASSEMBLY 3/8 x 100 (See Figure 7-11)	REF
-2	60861-019-00	. HOSE ASSEMBLY 3/8 x 22.	1
-3	20032-033-00	. FITTING, Tee.	1
-4	60861-023-00	. HOSE ASSEMBLY 3/8 x 97-1/2.	1
-5	13919-004-00	. CLAMP, Cable.	13
-6	13919-006-00	. CLAMP, Hose	7
-7	11248-004-00	. LOCKNUT, HEX 1/4-20 UNC	13
-8	61709-000-00	. CABLE, Control. NOTE: If replacing 9 conductor Control Cable with 12 conductor Control Cable, order CABLE CONNECTOR P/N 29925-003-00.	1

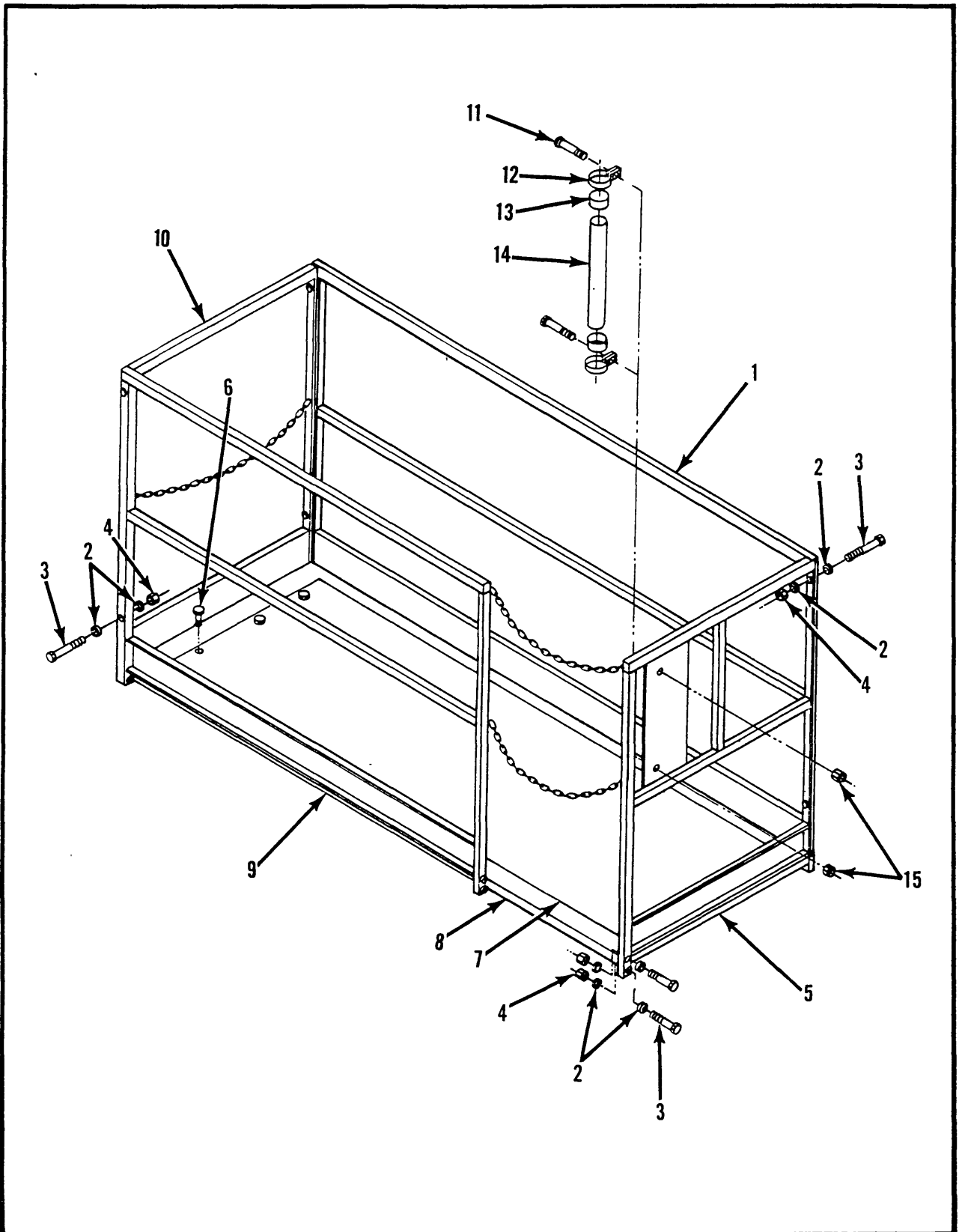


Figure 7-16. Platform/Guardrail Assembly

ITEM	PART	DESCRIPTION	QTY
7-16	No Number	PLATFORM/GUARDRAIL ASSEMBLY (See Figure 7-1 for NHA)	1
-1	61649-000-00	. GUARDRAIL, LH	1
-2	11240-006-00	. WASHER, Flat 3/8 DIA.	32
-3	11254-020-00	. SCREW, HHC 3/8-16 UNC GR5 x 2-1/4 . . .	16
-4	11248-006-00	. LOCKNUT, HEX 3/8-16	16
-5	61651-000-00	. GUARDRAIL, Front.	1
-6	15794-008-00	. SCREW, Waferhead Tex #10-24 UNC x 1 . .	6
-7	20824-003-00	. PLYWOOD	1
-8	61718-000-00	. PLATFORM WELDMENT	1
-9	61650-000-00	. GUARDRAIL, RH	1
-10	61648-000-00	. GUARDRAIL, Rear	1
-11	11252-006-00	. SCREW, HHC 1/4-20 UNC GR5 x 3/4	2
-12	20398-012-00	. CLAMP	2
-13	03612-000-00	. CAP	2
-14	03613-000-00	. TUBE.	1
-15	11248-004-00	. LOCKNUT, HEX 1/4-20 UNC	2

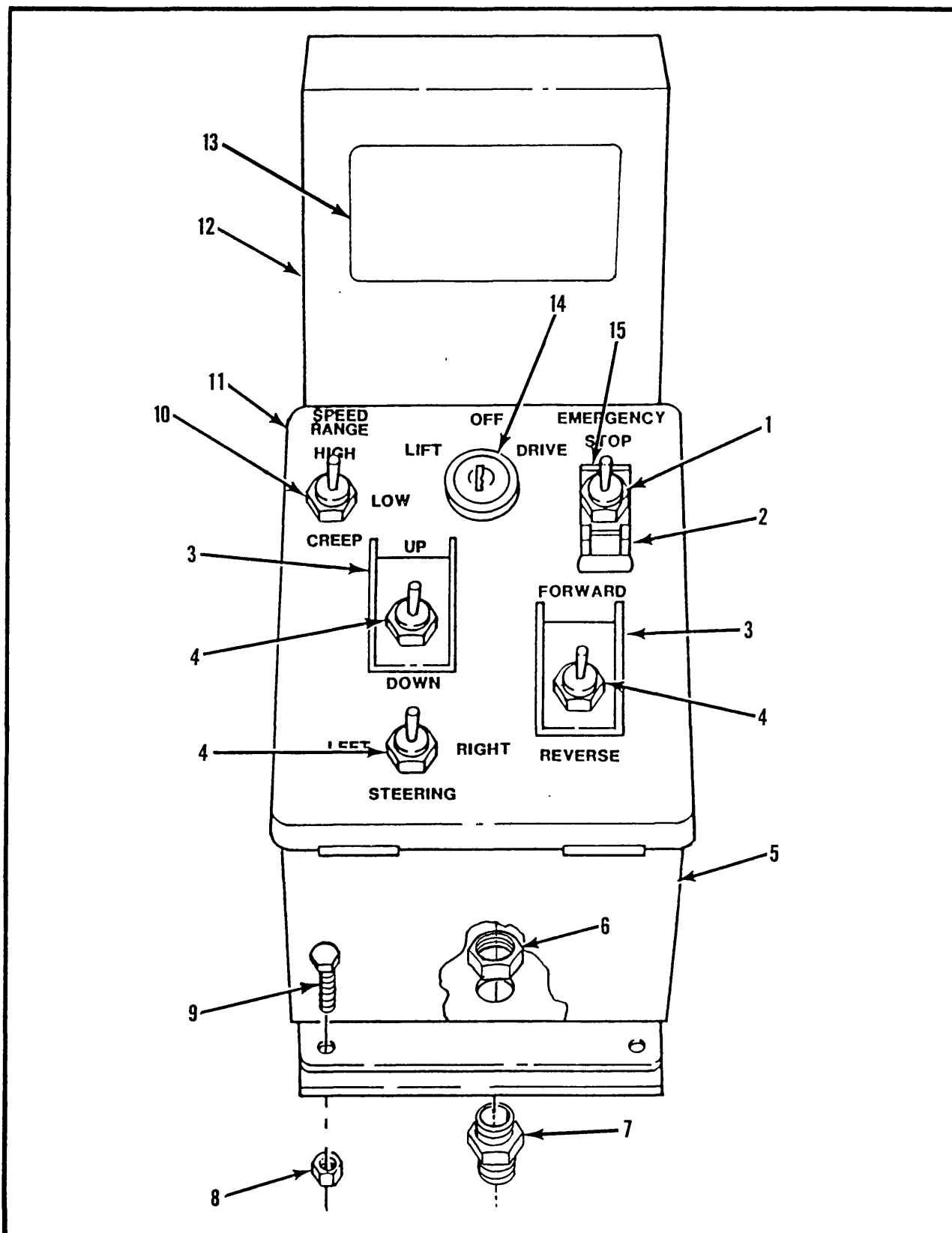


Figure 7-17. Controller Assembly with Key Lift/Drive Switch

ITEM	PART	DESCRIPTION	QTY
7-17	61704-000-00	CONTROLLER ASSEMBLY with Key Lift/Drive Switch	REF
-1	15792-000-00	. SWITCH, Toggle, Emergency Stop.	1
-2	29936-006-00	. GUARD, Switch	1
-3	08271-000-00	. GUARD, Switch	2
-4	05514-000-00	. SWITCH, Toggle.	3
-5	61716-000-00	. BOX, Control.	1
-6	29939-003-00	. LOCKNUT, HEX.	1
-7	29925-003-00	. CONNECTOR	1
-8	11248-004-00	. LOCKNUT, HEX 1/4-20 UNC	4
-9	11252-008-00	. SCREW, HHC 1/4-20 UNC GR5 x 3/4	4
-10	15902-000-00	. SWITCH, Toggle, Speed Range	1
-11	61588-000-00	. DECAL, Controller	1
-12	60809-000-00	. HANGER WELDMENT	1
-13	60865-000-00	. DECAL, Caution.	1
-14	15935-000-00	. SWITCH, Key, Mode	1
-15	29872-000-00	. BOOT.	5

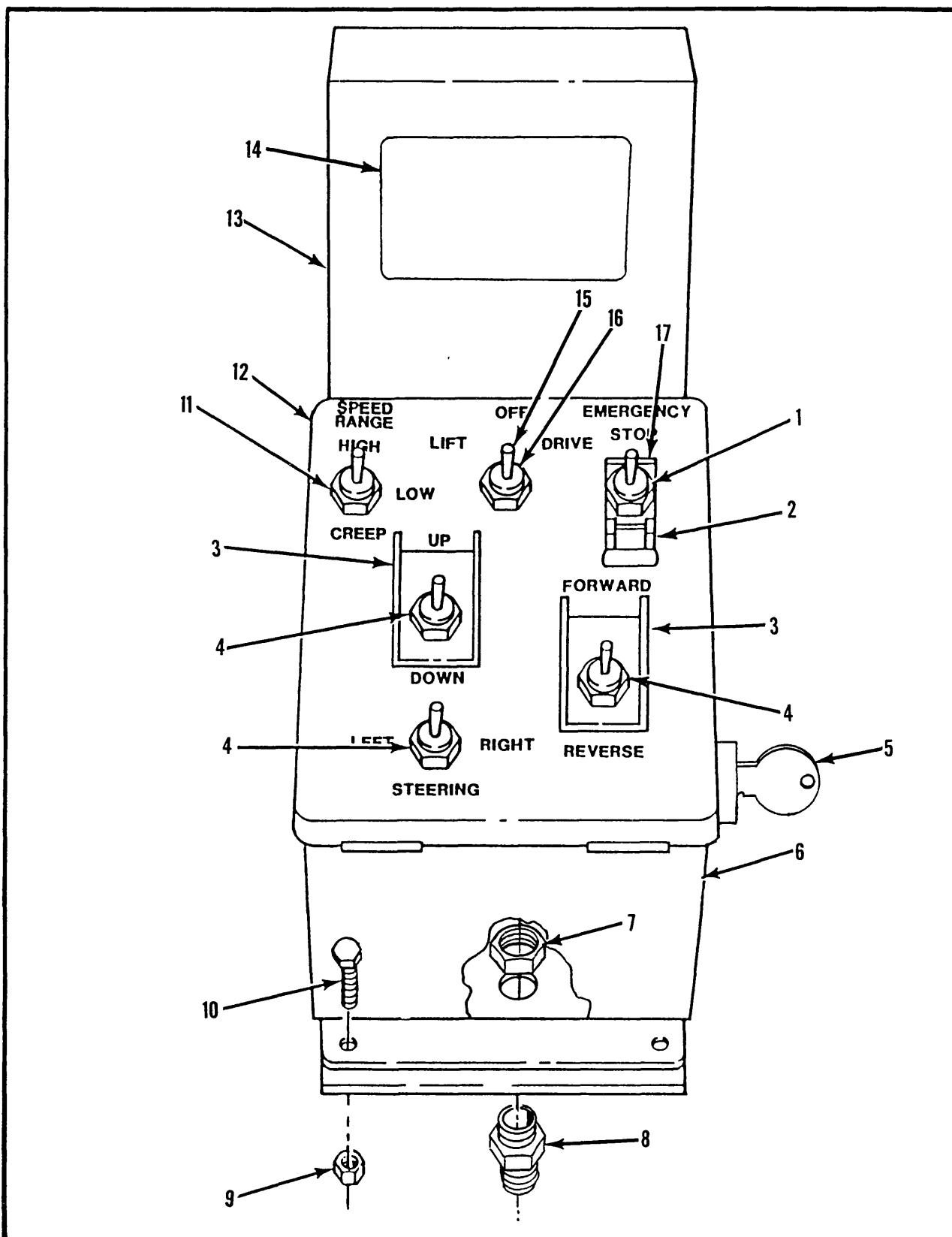


Figure 7-18. Controller Assembly with Toggle Lift/Drive Switch

ITEM	PART	DESCRIPTION	QTY
7-18	No Number	CONTROLLER ASSEMBLY with Toggle Lift/Drive Switch	REF
-1	15792-000-00	. SWITCH, Toggle, Emergency Stop.	1
-2	29936-006-00	. GUARD, Switch	1
-3	08271-000-00	. GUARD, Switch	2
-4	05514-000-00	. SWITCH, Toggle.	3
-5	15912-000-00	. SWITCH, Key, ON/OFF	1
-6	61716-000-00	. BOX, Control.	1
-7	29939-003-00	. LOCKNUT, HEX.	1
-8	29925-003-00	. CONNECTOR	1
-9	11248-004-00	. LOCKNUT, HEX 1/4-20 UNC	4
-10	11252-008-00	. SCREW, HHC 1/4-20 UNC GR5 x 3/4	4
-11	15902-000-00	. SWITCH, Toggle, Speed Range	1
-12	61588-000-00	. DECAL, Controller	1
-13	60809-000-00	. HANGER WELDMENT	1
-14	60865-000-00	. DECAL, Caution.	1
-15	15933-000-00	. SWITCH, Toggle, Mode.	1
-16	15934-000-00	. WASHER.	1
-17	29872-000-00	. BOOT.	6

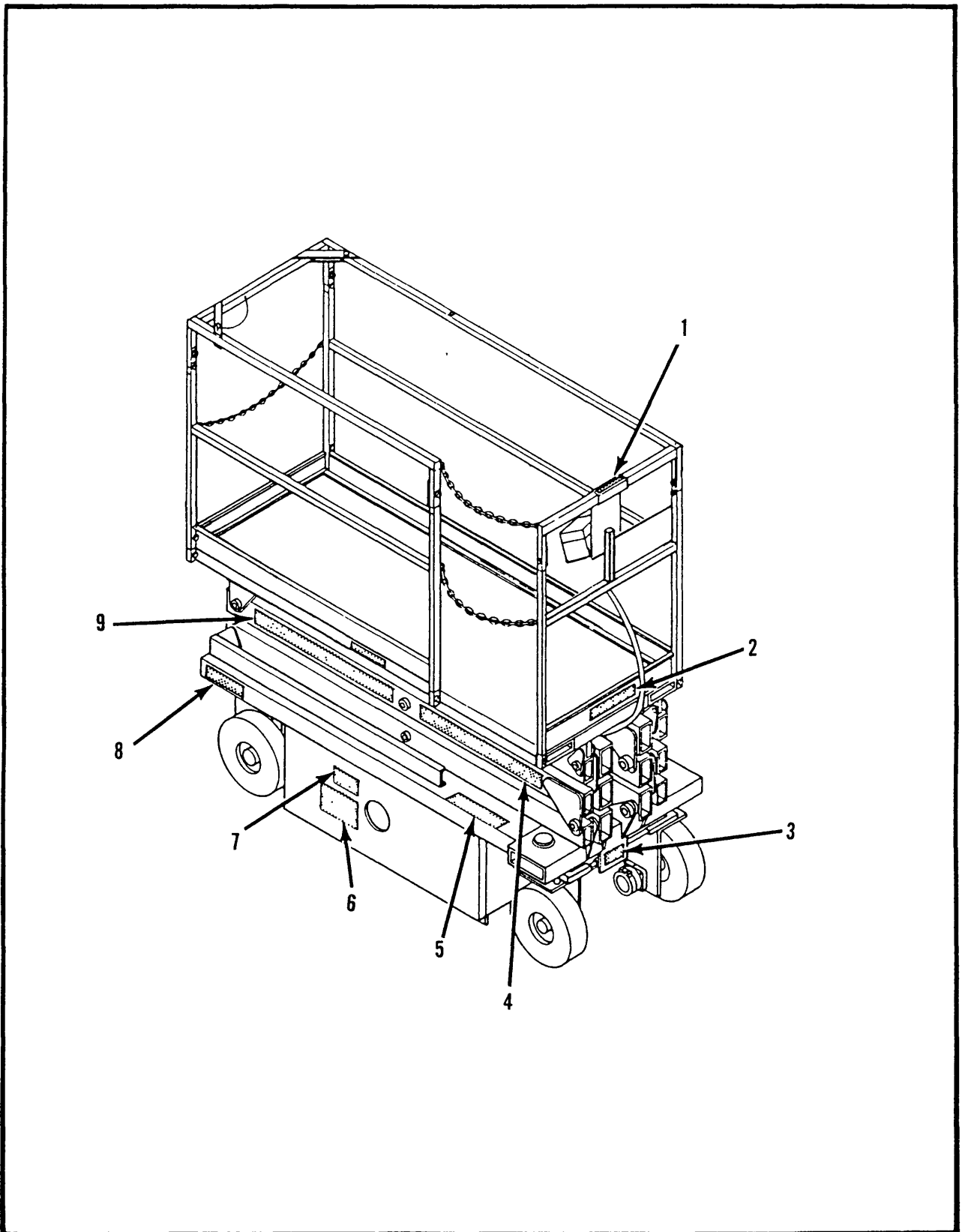


Figure 7-19. Decal Kit Installation (Sheet 1 of 2)

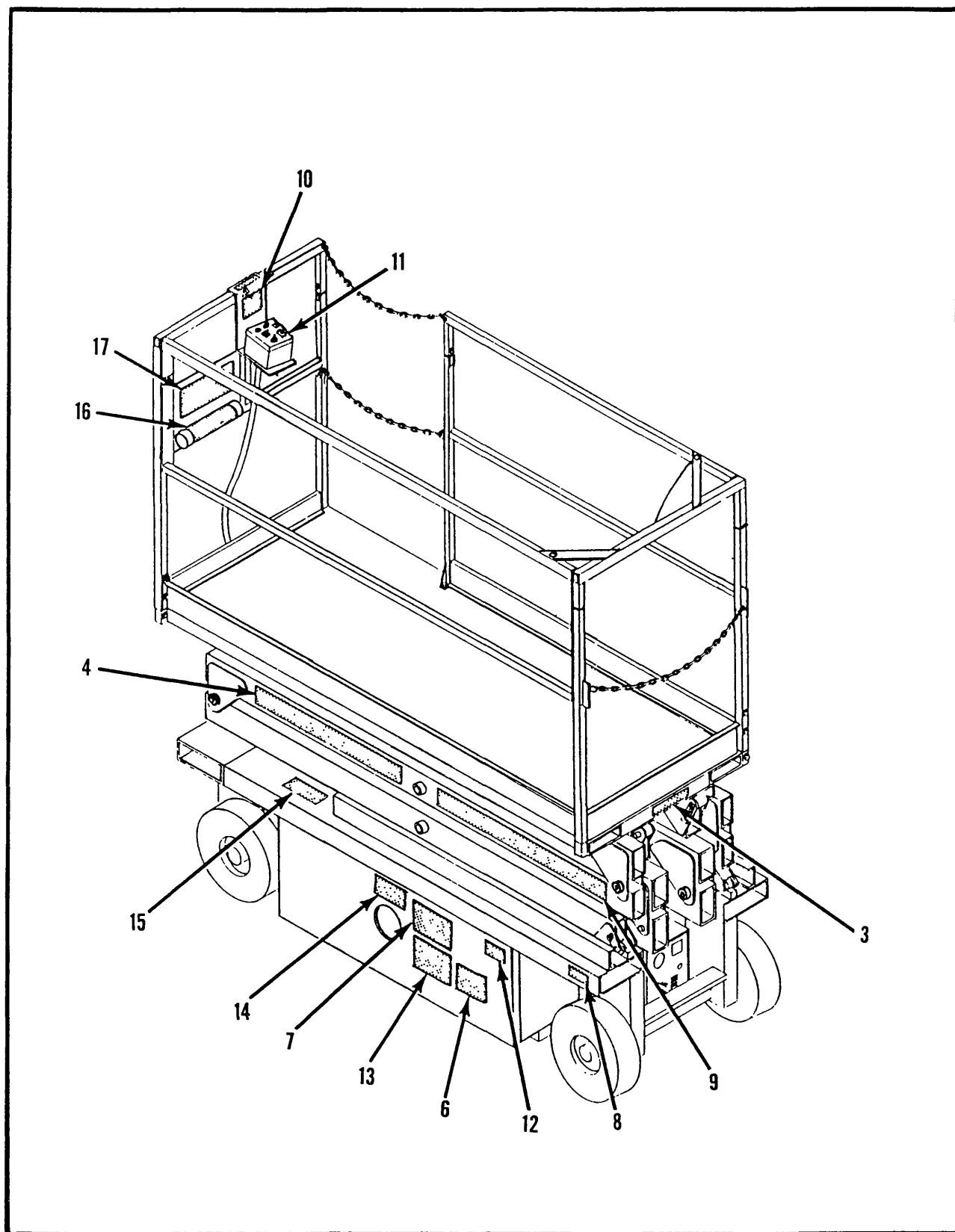


Figure 7-19. Decal Kit Installation (Sheet 2 of 2)

ITEM	PART	DESCRIPTION	QTY
7-19	61705-000-00	DECAL KIT INSTALLATION.	REF
-1	61515-000-00	. DECAL, Lift here.	1
-2	61520-000-00	. DECAL, Max Load 550 Lbs	2
-3	61531-000-00	. DECAL, Caution.	1
-4	61517-000-00	. DECAL, Up Right	2
-5	60830-000-00	. SAFETY WALK	1
-6	05225-000-00	. DECAL, Danger Hydrogen Gas.	2
-7	27993-000-00	. DECAL, Lower Platform	2
-8	14222-003-99	. DECAL, Fork Lift Here	2
-9	61508-000-00	. DECAL, XL-19B	2
-10	60865-000-00	. DECAL, Caution. (See Figure 7-17, 7-18) Not Included in 61705-000-00 Decal Kit.	REF
-11	61588-000-00	. DECAL, Controller (See Figure 7-17, 7-18) Not Included in 61705-000-00 Decal Kit.	REF
-12	05221-000-00	. DECAL, Battery Fluid.	2
-13	27992-000-00	. DECAL, Caution Do Not Adjust.	1
-14	05223-000-00	. DECAL, Emergency Down Valve	1
-15	61205-000-00	. NAME PLATE.	1
-16	26551-000-00	. RIVET, Pop 1/8 .188-.250 Grip	4
-17	03610-000-00	. DECAL, Operating Installation and . . . Storage	1
-18	61750-000-00	. DECAL, Danger Safety Rules.	1

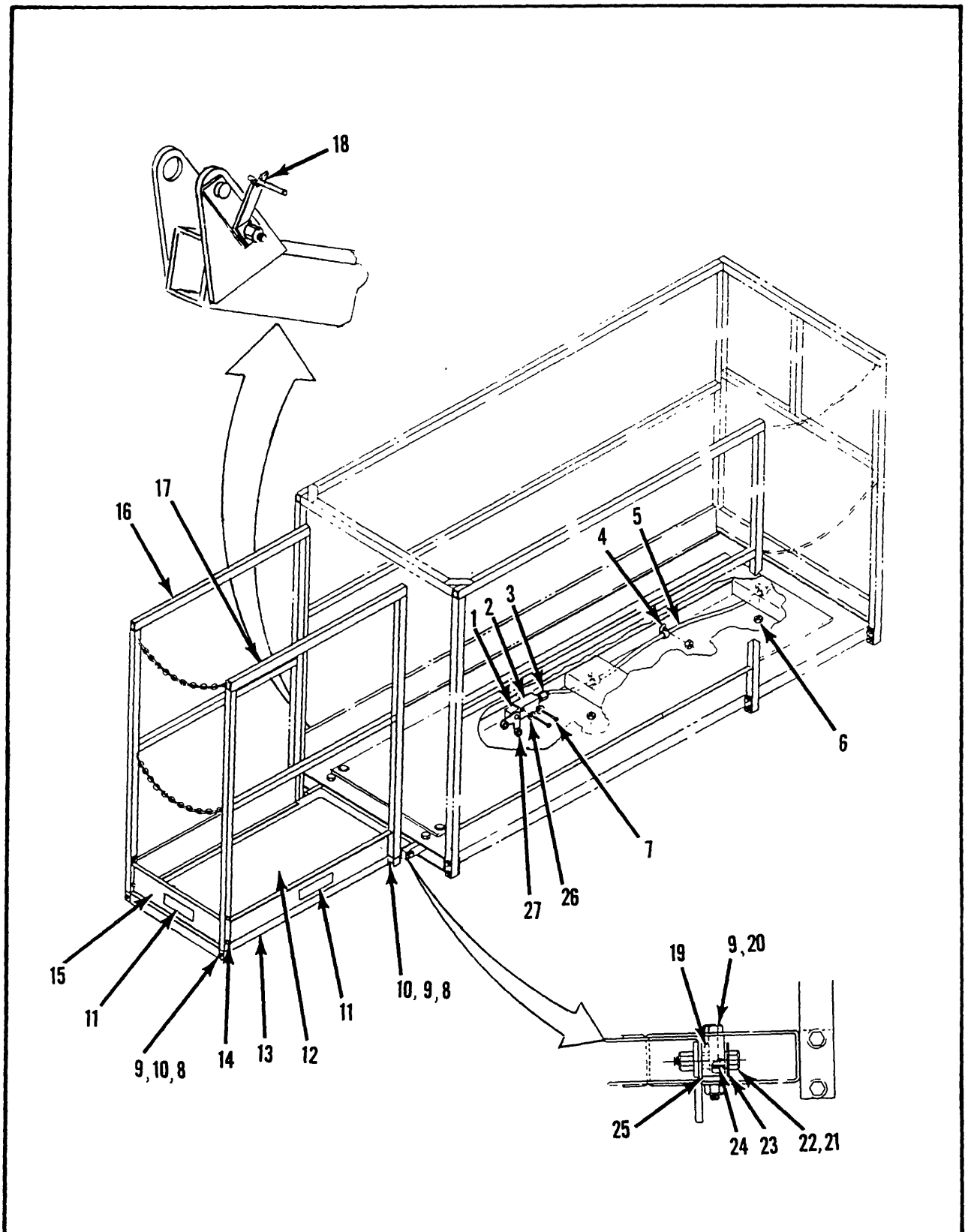


Figure 7-20. Deck Extension Option

ITEM	PART	DESCRIPTION	QTY
7-20	61581-000-00	DECK EXTENSION OPTION	REF
-1	15793-005-00	. HEAD, Switch.	1
-2	15793-001-00	. BODY, Switch.	1
	15793-004-00	. . SWITCH.	1
-3	29925-000-00	. CONNECTOR, Cable.	1
-4	13919-004-00	. CLAMP	3
-5	29496-099-00	. CABLE, 2 COND, 16 AWG	32 FT
-6	11248-004-00	. LOCKNUT, HEX 1/4-20 UNC	3
-7	11709-012-00	. SCREW, RD HD MACH #10-24 UNC x 1.	2
-8	11240-006-00	. WASHER, Flat 3/8 DIA.	10
-9	11248-006-00	. LOCKNUT, HEX 3/8-16 UNC	12
-10	11254-014-00	. SCREW, HHC 3/8-16 UNC x 1-3/4	4
-11	05652-000-00	. DECAL, Max Load 250 LBS	3
-12	60086-000-00	. SAFETY WALK	1
-13	61621-000-00	. DECK EXTENSION.	1
-14	11254-016-00	. SCREW, HHC 3/8-16 UNC x 2	4
-15	61633-000-00	. KICKRAIL.	1
-16	61629-000-00	. RAIL, LH.	1
-17	61628-000-00	. RAIL, RH.	1
-18	61644-000-00	. ACTUATOR.	1
-19	61636-000-00	. BAR, Pivot.	2
-20	11254-022-00	. SCREW, HHC 3/8-16 UNC x 2-3/4	4
-21	11256-020-00	. SCREW, HHC 1/2-13 UNC x 2-1/2	2
-22	11248-008-00	. LOCKNUT, HEX 1/2-13 UNC	2
-23	11240-008-00	. WASHER, Flat 1/2 DIA.	2

ITEM	PART	DESCRIPTION	QTY
7-20	61581-000-00	DECK EXTENSION OPTION (Cont'd)	REF
-24	61635-000-00	. BUSHING, Pivot.	2
-25	61643-000-00	. SHIM, Pivot Bar	2
-26	11250-003-00	. LOCKWASHER, Split #10	2
-27	15793-005-00	. LEVER	1

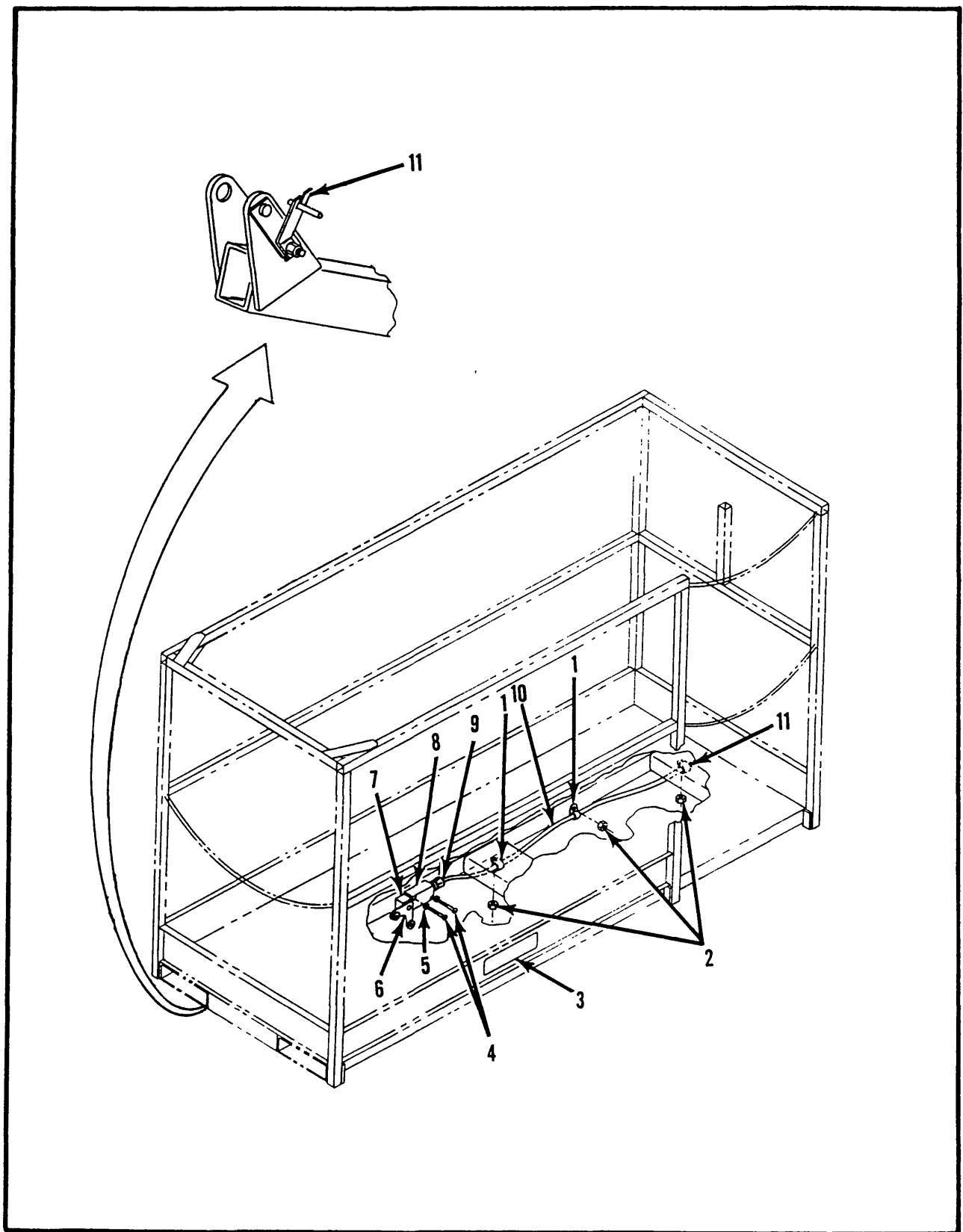


Figure 7-21. 750 LB. Capacity Option

ITEM	PART	DESCRIPTION	QTY
7-21	61580-000-00	750 LB CAPACITY OPTION.	REF
-1	13919-004-00	. CLAMP, Hose	3
-2	11248-004-00	. LOCKNUT, HEX 1/4-20 UNC	3
-3	08442-006-00	. DECAL, 750 LBS.	2
-4	11709-012-00	. SCREW, RD HD MACH #10-24 UNC x 1-1/2. .	2
-5	11238-002-00	. LOCKWASHER, Split #10 DIA	2
-6	15793-006-00	. LEVER	1
-7	15793-005-00	. HEAD, Switch.	1
-8	15793-001-00	. BODY, Switch.	1
	15793-004-00	. . SWITCH.	1
-9	29925-000-00	. CONNECTOR, Cable.	1
-10	29496-099-00	. CABLE, 2 COND 16 GA	35 FT
-11	61644-000-00	. ACTUATOR WELDMENT	1

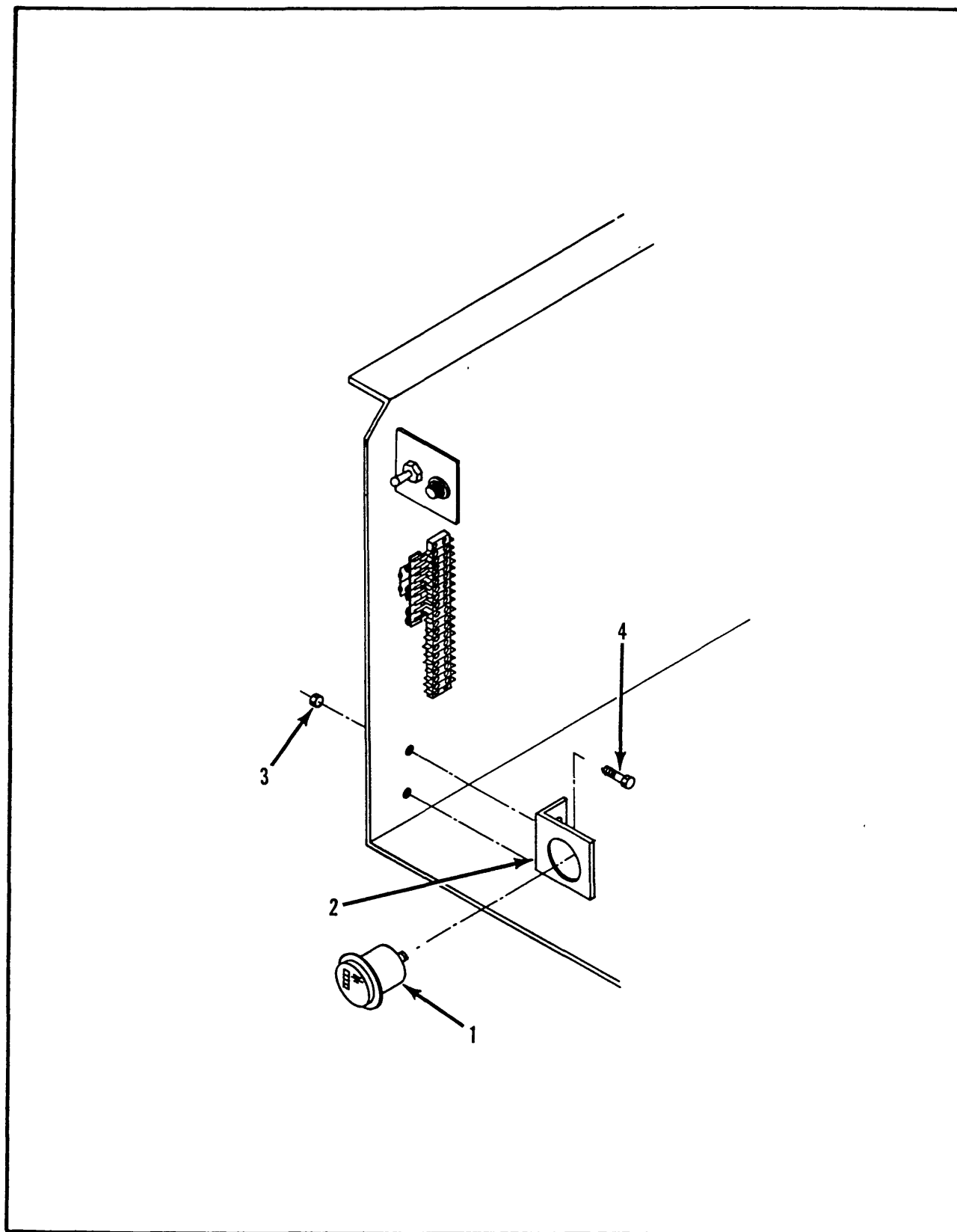


Figure 7-22. Battery Charge Indicator Option

ITEM	PART	DESCRIPTION	QTY
7-22	61583-000-00	BATTERY CHARGER INDICATOR OPTION.	REF
-1	15746-000-00	. INDICATOR, Low Voltage.	1
-2	61647-000-00	. BRACKET	1
-3	11248-004-00	. LOCKNUT, HEX 1/4-20 UNC	2
-4	11252-008-00	. SCREW, HHC 1/4-20 UNC x 1	2

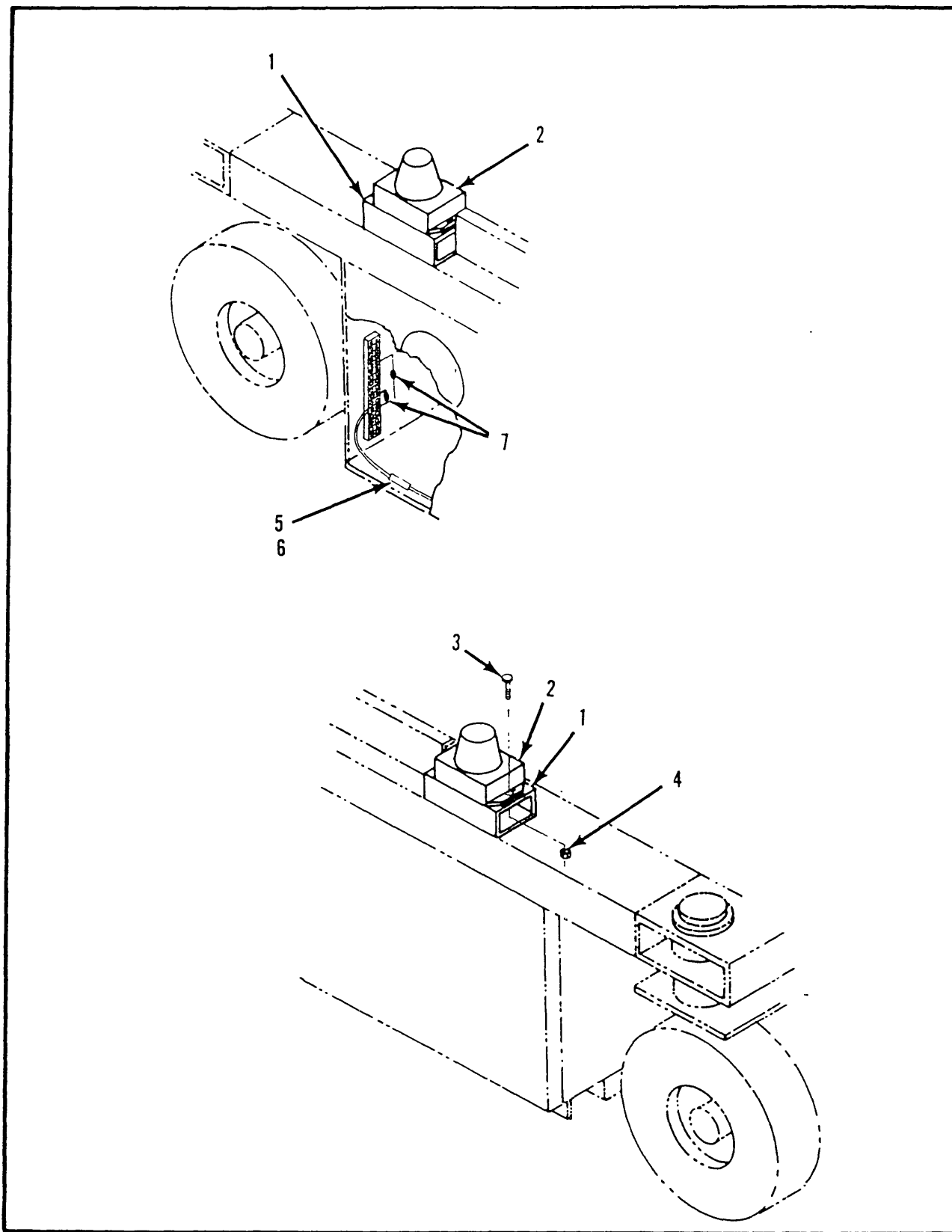


Figure 7-23. Flashing Amber Light Option

ITEM	PART	DESCRIPTION	QTY
7-23	61586-000-00	FLASHING AMBER LIGHT OPTION	REF
-1	61541-000-00	. MOUNT, Light.	2
-2	12848-004-00	. LIGHT	2
-3	11826-004-00	. SCREW, RD HD MACH #10-32 UNF x 1/2. . .	4
-4	11249-003-00	. LOCKNUT, HEX #10-32 UNF	4
-5	12616-001-00	. FUSE, 2 AMP	1
-6	29702-000-00	. HOLDER, FUSE.	1
-7	29825-003-00	. DIODE, 3 AMP.	2

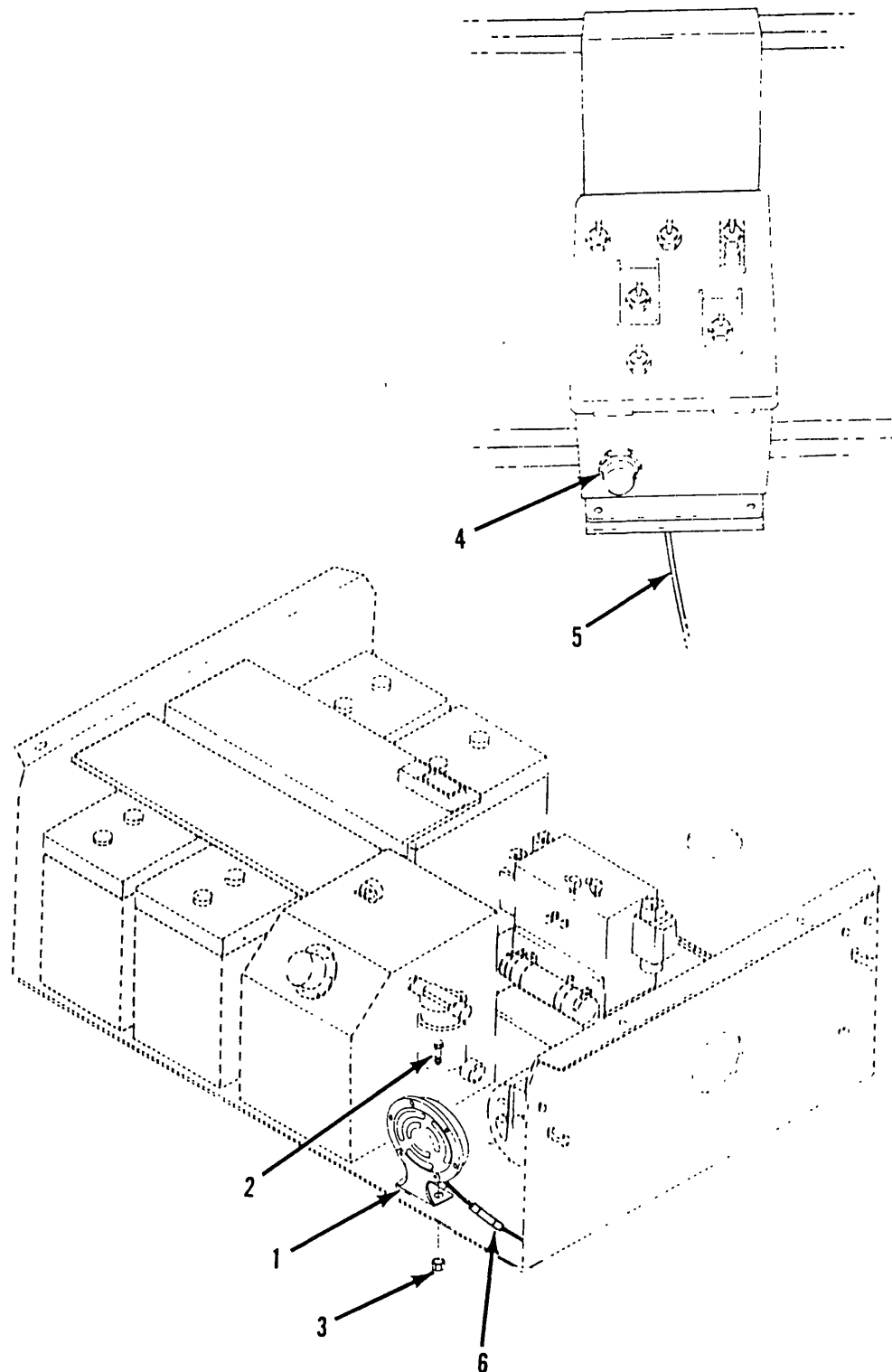


Figure 7-24. Horn Option

ITEM	PART	DESCRIPTION	QTY
7-24	61586-000-00	HORN OPTION	REF
-1	29958-000-00	. HORN.	1
-2	11252-008-00	. SCREW, HHC 1/4-20 UNC x 1	2
-3	11248-004-00	. LOCKNUT, HEX 1/4-20 UNC	2
-4	13129-000-00	. PUSHBUTTON.	1
-5	29496-099-00	. CABLE, 2 COND. 16 AWG	32 FT
7-24	61587-000-00	REVERSE ALARM OPTION.	REF
-1	29958-000-00	. HORN.	1
-2	11252-008-00	. SCREW, HHC 1/4-20 UNC x 1	2
-3	11248-004-00	. LOCKNUT, HEX 1/4-20 UNC	2
-4	08903-000-00	. FLASHER	1

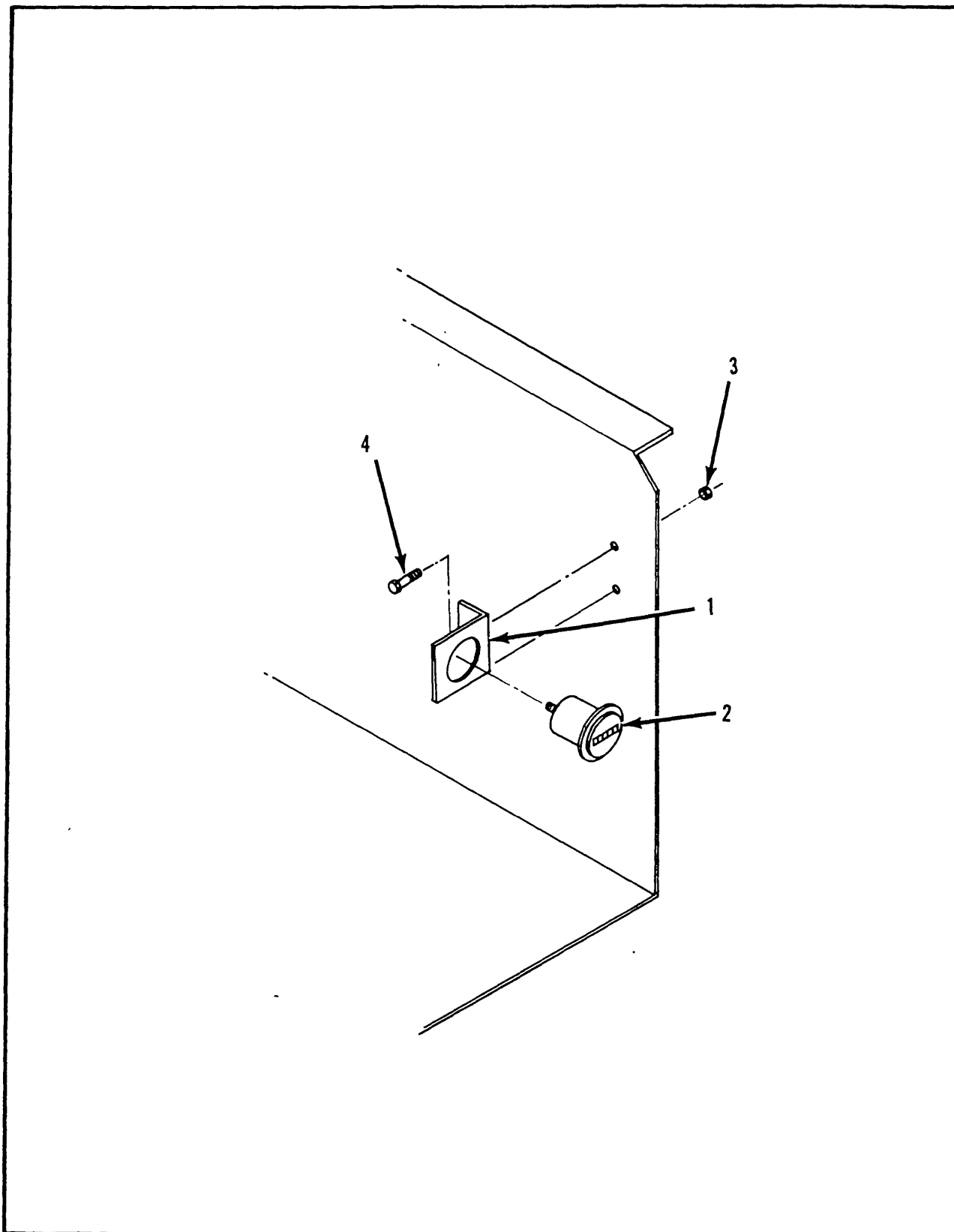


Figure 7-25. Hourmeter Option

ITEM	PART	DESCRIPTION	QTY
7-25	61584-000-00	HOURLMETER OPTION.	REF
-1	61647-000-00	. BRACKET	1
-2	15752-000-00	. HOURLMETER	1
-3	11248-004-00	. LOCKNUT, HEX 1/4-20 UNC	2
-4	11252-008-00	. SCREW, HHC 1/4-20 UNC x 1	2

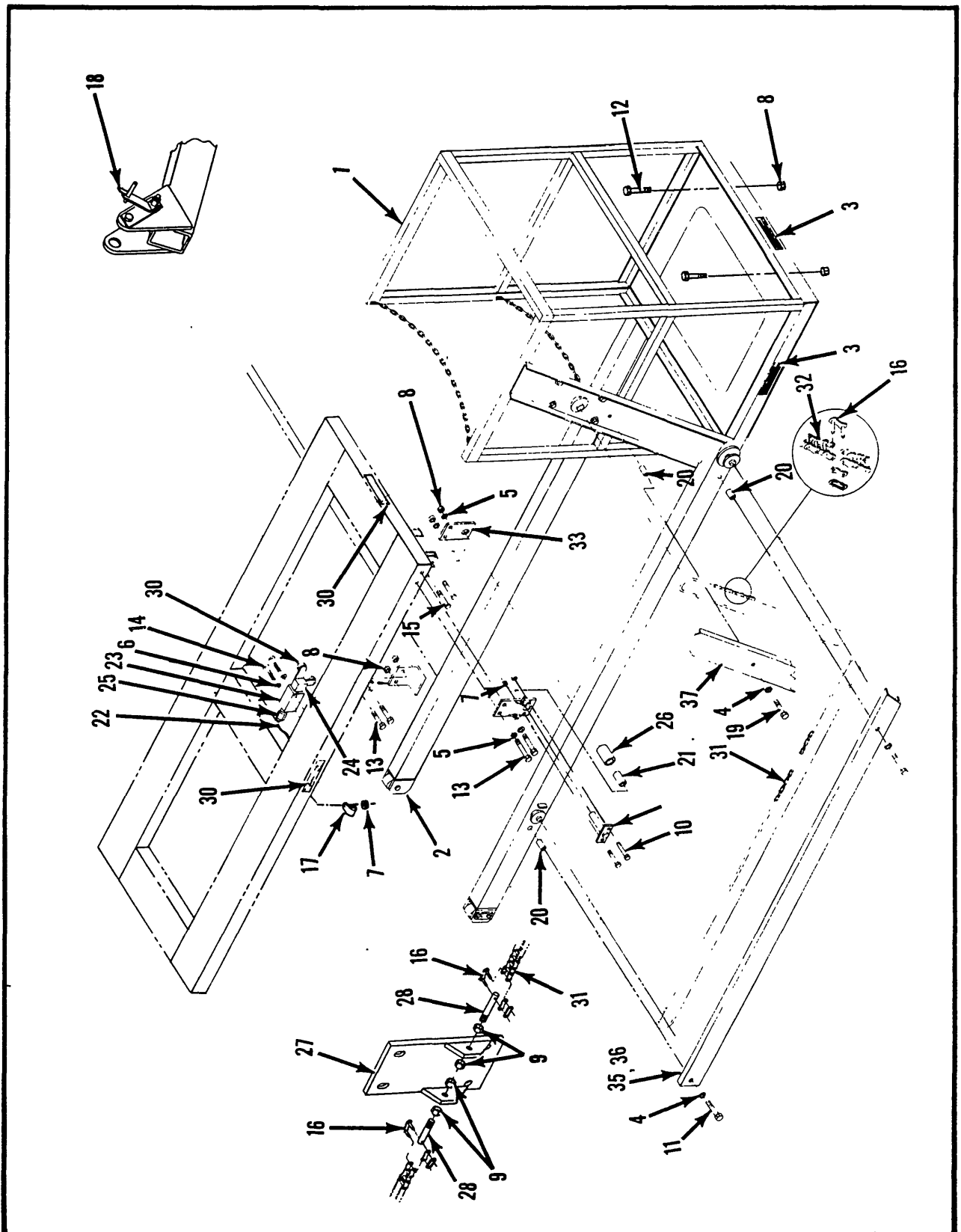


Figure 7-26. Cantilever Cage Installation

ITEM	PART	DESCRIPTION	QTY
7-26	61582-000-00	CANTILEVER CAGE OPTION INSTALLATION. . .	REF
-1	61601-000-00	. CAGE ASSEMBLY (See Figure 7-27)	1
-2	61602-000-00	. ROLLING FRAME ASSEMBLY. (See Figure 7-28)	1
-3	05652-000-00	. DECAL, Max Load 250 LBS	3
-4	11240-004-00	. WASHER, Flat 1/4 DIA.	8
-5	11240-006-00	. WASHER, Flat 3/8 DIA.	8
-6	11238-002-00	. LOCKWASHER, Split #10 DIA	2
-7	11248-004-00	. LOCKNUT, HEX 1/4-20 UNC	13
-8	11248-006-00	. LOCKNUT, HEX 3/8-16 UNC	12
-9	11250-004-00	. NUT, HEX 1/4-20 UNC	8
-10	11252-008-00	. SCREW, HHC 1/4-20 UNC	4
-11	11252-014-00	. SCREW, HHC 1/4-20 UNC x 1-3/4	4
-12	11254-008-00	. SCREW, HHC 3/8-16 UNC x 1	4
-13	11254-010-00	. SCREW, HHC 3/8-16 UNC x 1-1/4	8
-14	11709-012-00	. SCREW, RD HD MACH #10-24 UNC x 1-1/2. .	2
-15	11741-010-00	. SCREW, Flat HD SOC 3/8-16 UNC x 1-1/4	4
-16	11884-003-00	. LINK, Connecting.	5
-17	13919-004-00	. CLAMP, Hose	3
-18	61644-000-00	. ACTUATOR.	1
-19	11252-016-00	. SCREW, HHC 1/4-20 UNC x 2	2
-20	17404-002-00	. SPACER.	5
-21	27931-010-00	. BEARING	4
-22	29496-099-00	. CABLE, 2 COND 16 AWG.	32 FT

ITEM	PART	DESCRIPTION	QTY
7-26	61582-000-00	CANTILEVER CAGE OPTION. INSTALLATION (Cont'd)	REF
-23	15793-001-00	. BODY, Switch.	1
	15793-004-00	. . SWITCH.	1
-24	15793-005-00	. HEAD, Switch.	1
-25	29925-000-00	. CONNECTOR, Cable.	1
-26	61617-000-00	. ROLLER.	2
-27	61318-000-00	. BRACKET	2
-28	61322-000-00	. SCREW, Chain Adjustment	4
-29	61355-000-00	. SAFETY WALK	1
-30	15793-006-00	. LEVER	1
-31	05641-011-00	. CHAIN x 291 Pitches	2
-32	05641-012-00	. CHAIN x 193 Pitches	1
-33	61609-000-00	. BRACKET	2
-34	61610-000-00	. RETAINER.	2
-35	61611-000-00	. GUARD, LH	1
-36	61612-000-00	. GUARD, RH	1
-37	61613-000-00	. GUARD	1
-38	61615-000-00	. PIN	2

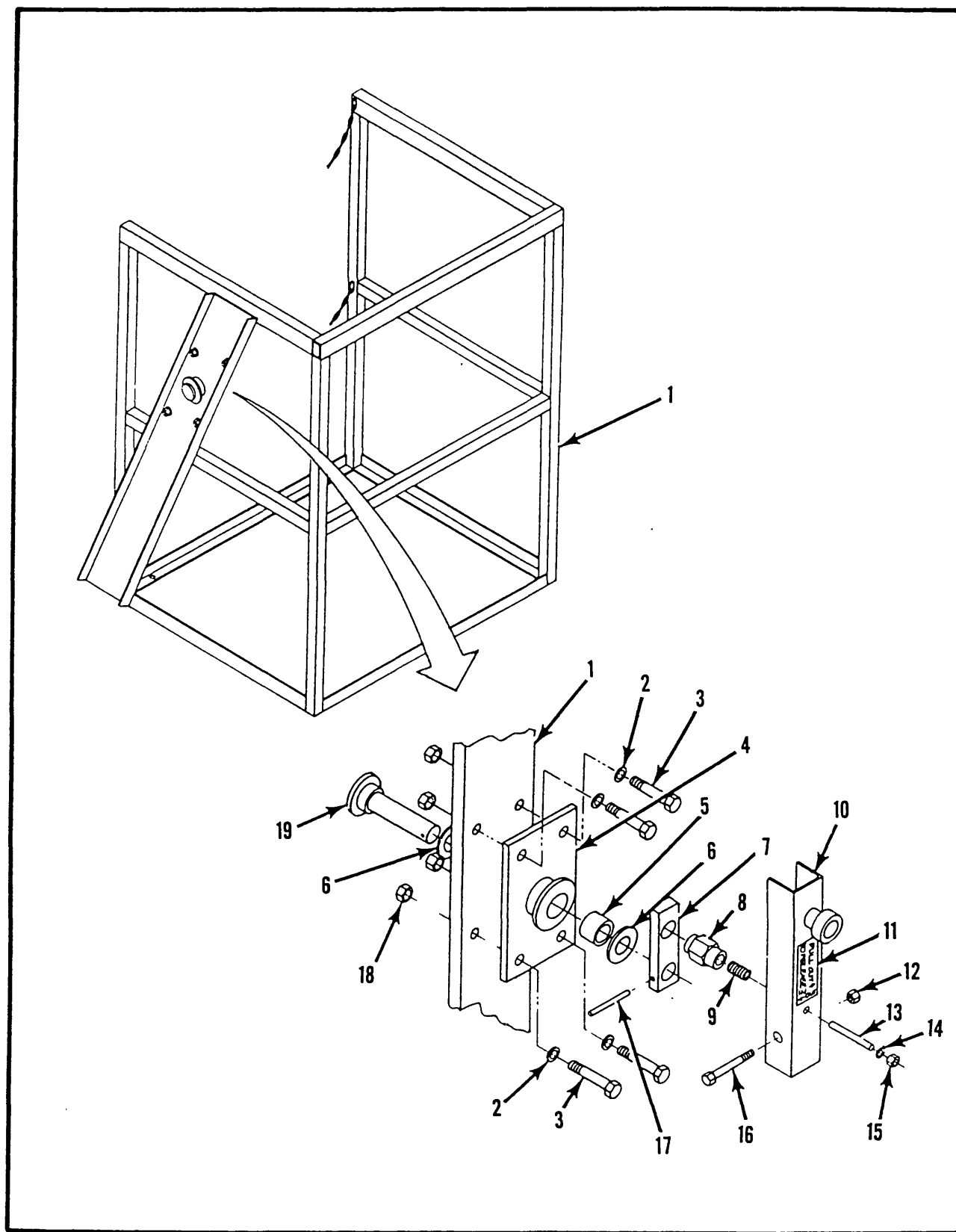


Figure 7-27. Cage Assembly, Cantilever Cage Option

ITEM	PART	DESCRIPTION	QTY
7-27	61601-000-00	CAGE ASSEMBLY, Cantilever Cage Option . . (See Figure 7-26 for NHA)	REF
-1	61603-000-00	. CAGE WELDMENT	1
-2	11240-006-00	. WASHER, Flat 3/8 DIA.	4
-3	11254-008-00	. SCREW, HHC 3/8-16 UNC GR5 x 1	4
-4	61316-000-00	. PLATE	1
-5	27931-018-00	. BEARING	1
-6	06452-000-00	. BEARING, Thrust	2
-7	05346-000-00	. ARM	1
-8	03443-001-00	. HOUSING	1
-9	05376-000-00	. SPRING.	1
-10	61353-000-00	. HANDLE.	1
-11	61352-000-00	. DECAL, Pull Out	1
-12	11248-005-00	. LOCKNUT, HEX 5/16-18 UNC.	1
-13	05373-000-00	. PIN, Retaining.	1
-14	11240-004-00	. WASHER, Flat 1/4 DIA.	1
-15	11248-004-00	. LOCKNUT, HEX 1/4-20 UNC	1
-16	11253-012-00	. SCREW, HHC 5/16-18 UNC GR5 x 1-1/2. . .	1
-17	11735-020-00	. PIN, Roll	1
-18	11248-006-00	. LOCKNUT, HEX 3/8-16 UNC	4
-19	61307-000-00	. SHAFT	1

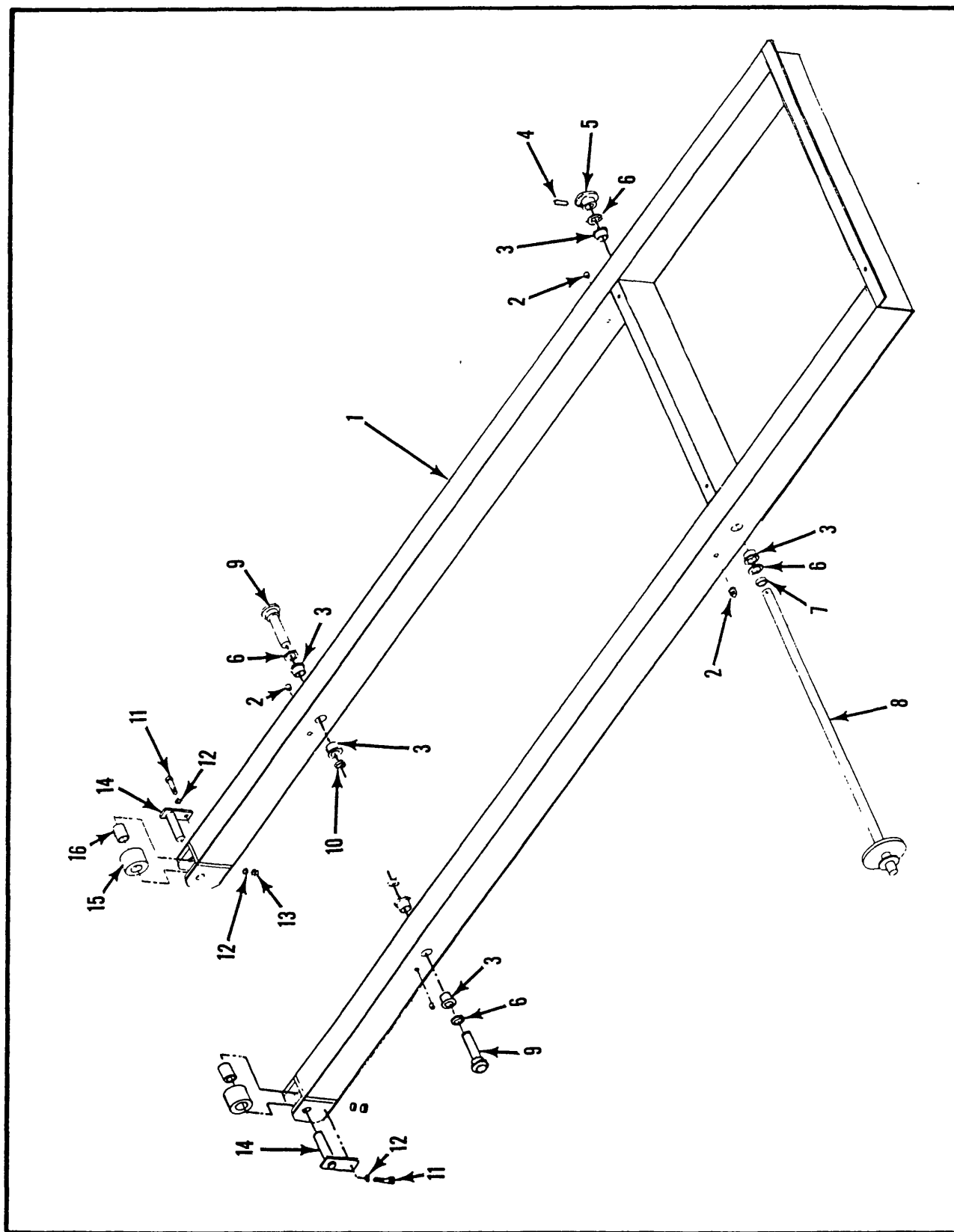


Figure 7-28. Rolling Frame Assembly, Cantilever Cage Option

ITEM	PART	DESCRIPTION	QTY
7-28	61602-000-00	ROLLING FRAME ASSEMBLY, Cantilever. . . . Cage Option (See Figure 7-26 for NHA)	REF
-1	61604-000-00	. ROLLING FRAME	1
-2	14252-004-00	. NUT SERT.	4
-3	00173-000-00	. BUSHING	6
-4	11735-020-00	. PIN, Roll	1
-5	61359-000-00	. SPROCKET.	1
-6	06452-000-00	. WASHER, Thrust.	4
-7	61340-000-00	. SPACER.	1
-8	61313-000-00	. SHAFT WELDMENT.	1
-9	61310-000-00	. SHAFT WELDMENT.	2
-10	11764-012-00	. RING, Retaining	2
-11	11252-008-00	. SCREW, HHC 1/4-20 UNC GR5 x 1	2
-12	11240-004-00	. WASHER, Flat 1/4 DIA.	4
-13	11248-004-00	. LOCKNUT, HEX 1/4-20 UNC	2
-14	61304-000-00	. PIN WELDMENT.	2
-15	61336-000-00	. ROLLER.	2
-16	27931-010-00	. BEARING	2

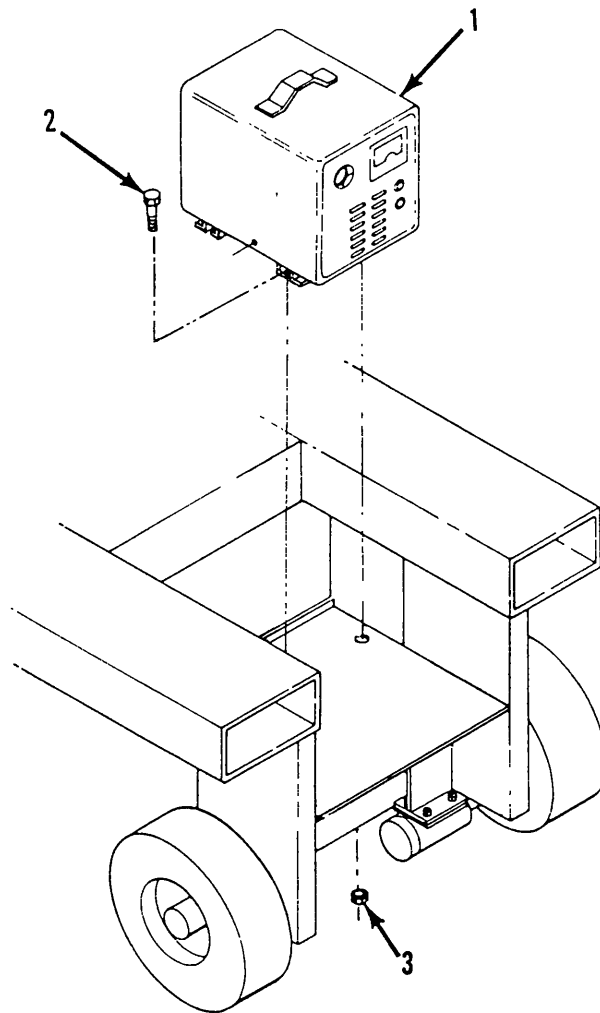


Figure 7-29. 50 Hz Battery Charger Option

ITEM	PART	DESCRIPTION	QTY
7-29	61577-000-00	50 HZ BATTERY CHARGER OPTION.	REF
-1	15786-000-00	. CHARGER	1
-2	11829-006-00	. BOLT, Carriage 1/4-20 UNC x 3/4	2
-3	11240-004-00	. LOCKNUT, HEX 1/4-20 UNC	2

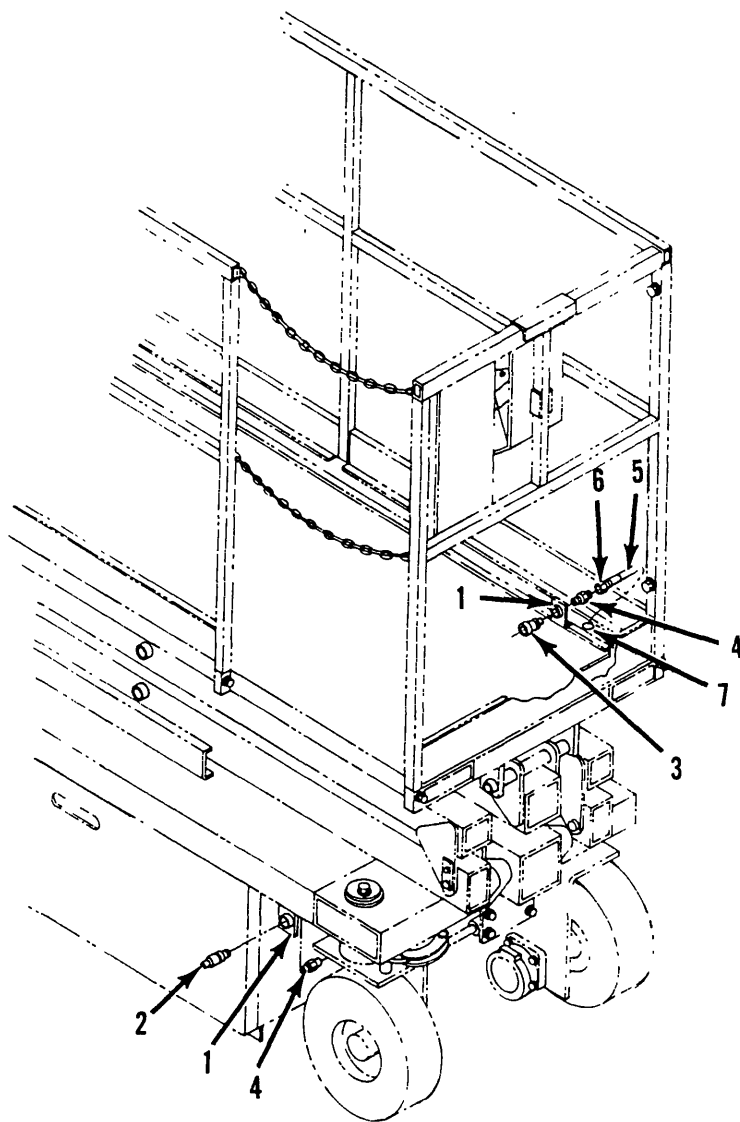


Figure 7-30. Air to Platform Option

ITEM	PART	DESCRIPTION	QTY
7-30	61393-000-00	AIR TO PLATFORM OPTION.	REF
-1	61594-000-00	. BRACKET	1
-2	12728-000-00	. COUPLING, Male.	1
-3	12729-000-00	. COUPLING, Female.	1
-4	15749-000-00	. FITTING	2
-5	15770-099-00	. HOSE.	23 FT
-6	15773-005-00	. END, Hose	2
-7	12956-010-00	. GROMMET	2

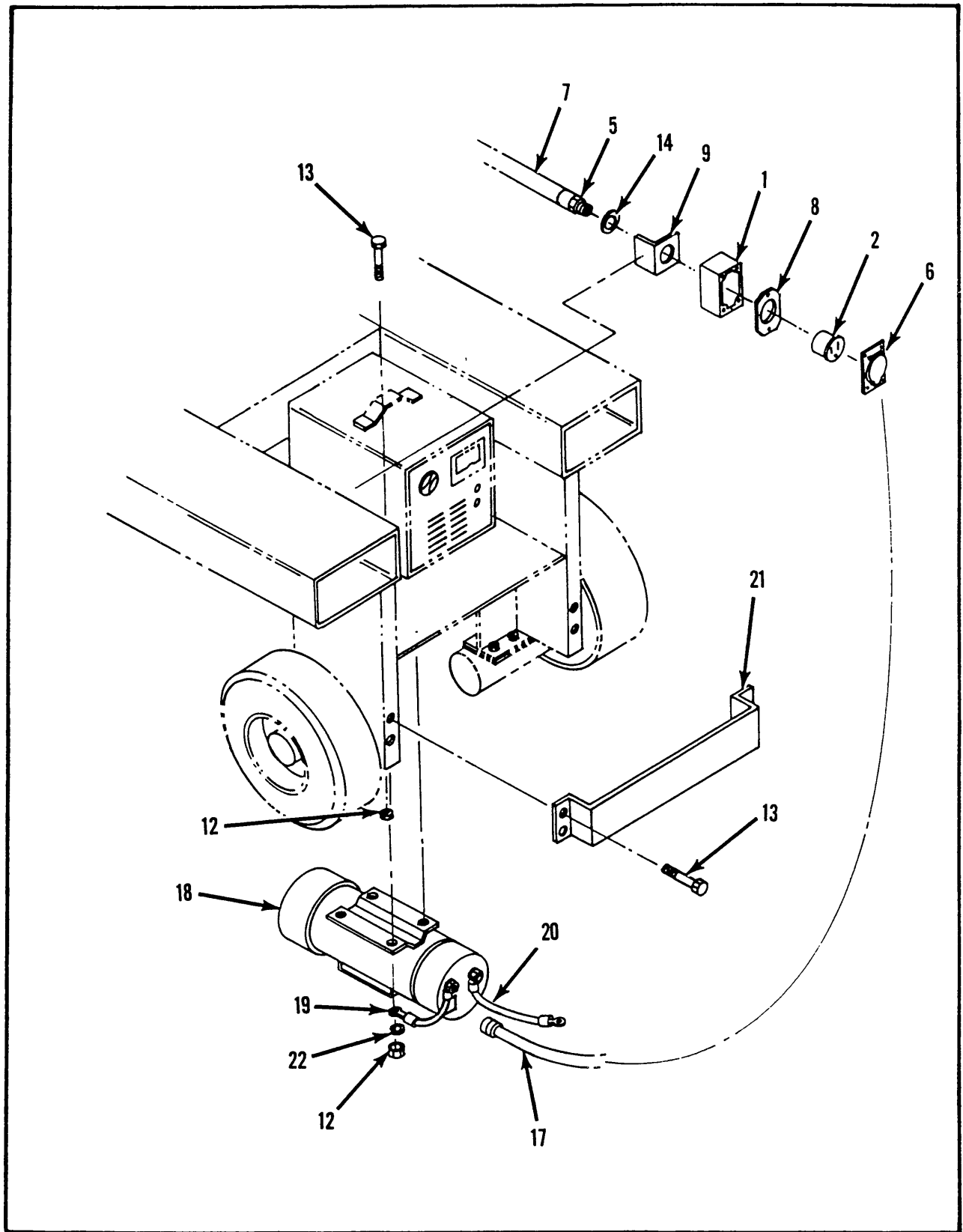


Figure 7-31. Power to Platform Option

ITEM	PART	DESCRIPTION	QTY
7-31	61391-000-00	POWER TO PLATFORM OPTION.	REF
-1	15769-000-00	. BOX	2
-2	08942-000-00	. RECEPTACLE.	1
-3	29962-000-00	. COVER, Box.	1
-4	29961-000-00	. FLANGE, Inlet	1
-5	29925-003-00	. CONNECTOR, Cable.	2
-6	26611-002-00	. COVER, Box.	1
-7	29495-099-00	. CABLE, 3 COND 14 AWG.	41 FT
-8	15788-000-00	. SUBPLATE.	1
-9	61597-000-00	. BRACKET	1
-10	05415-001-00	. CLAMP	22
-11	11248-047-00	. LOCKNUT, HEX #6-32 UNC.	2
-12	11248-004-00	. LOCKNUT, HEX 1/4-20 UNC	24
-13	11252-008-00	. SCREW, HHC 1/4-20 UNC x 1	2
-14	11240-014-00	. WASHER, Flat 7/8 DIA.	1
-15	12956-010-00	. GROMMET	2
-16	11715-004-00	. SCREW, RD HD MACH #6-32 UNC x 1/2 . . .	2

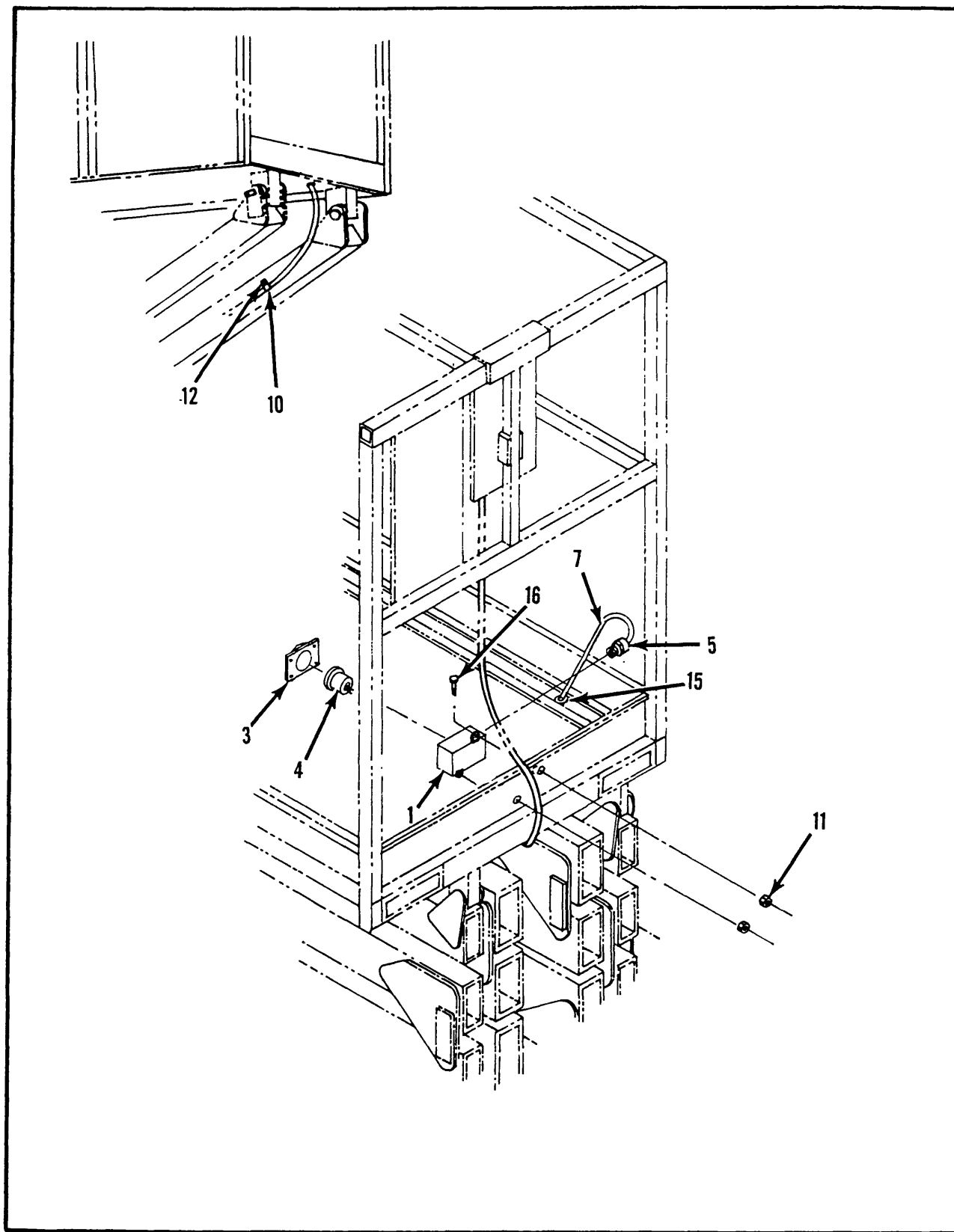


Figure 7-32. Power to Platform with Generator Option

ITEM	PART	DESCRIPTION	QTY
7-32	61392-000-00	POWER TO PLATFORM WITH GENERATOR. OPTION	REF
-1	15769-000-00	. BOX	2
-2	08942-000-00	. RECEPTACLE.	1
-3	29962-000-00	. COVER, Box.	1
-4	29961-000-00	. FLANGE, Inlet	1
-5	29925-003-00	. CONNECTOR, Cable.	2
-6	26611-002-00	. COVER, Box. . . . ,	1
-7	29495-099-00	. CABLE, 3 COND 14 AWG.	41 FT
-8	15788-000-00	. SUBPLATE.	1
-9	61597-000-00	. BRACKET	1
-10	05415-001-00	. CLAMP	22
-11	11248-047-00	. LOCKNUT, HEX #6-32 UNC.	2
-12	11248-004-00	. LOCKNUT, HEX 1/4-20 UNC	10
-13	11252-008-00	. SCREW, HHC 1/4-20 UNC x 1	10
-14	11240-014-00	. WASHER, Flat 7/8 DIA.	1
-15	12956-010-00	. GROMMET	2
-16	11715-004-00	. SCREW, RD HD MACH #6-32 UNC x 1/2	2
-17	61364-000-00	. CORD, Extension	1
-18	26461-000-00	. GENERATOR	1
-19	05416-005-00	. WIRE ASSEMBLY	1
-20	05416-013-00	. WIRE ASSEMBLY	1
-21	61544-000-00	. GUARD	1
-22	11240-004-00	. WASHER, Flat 1/4 DIA.	4

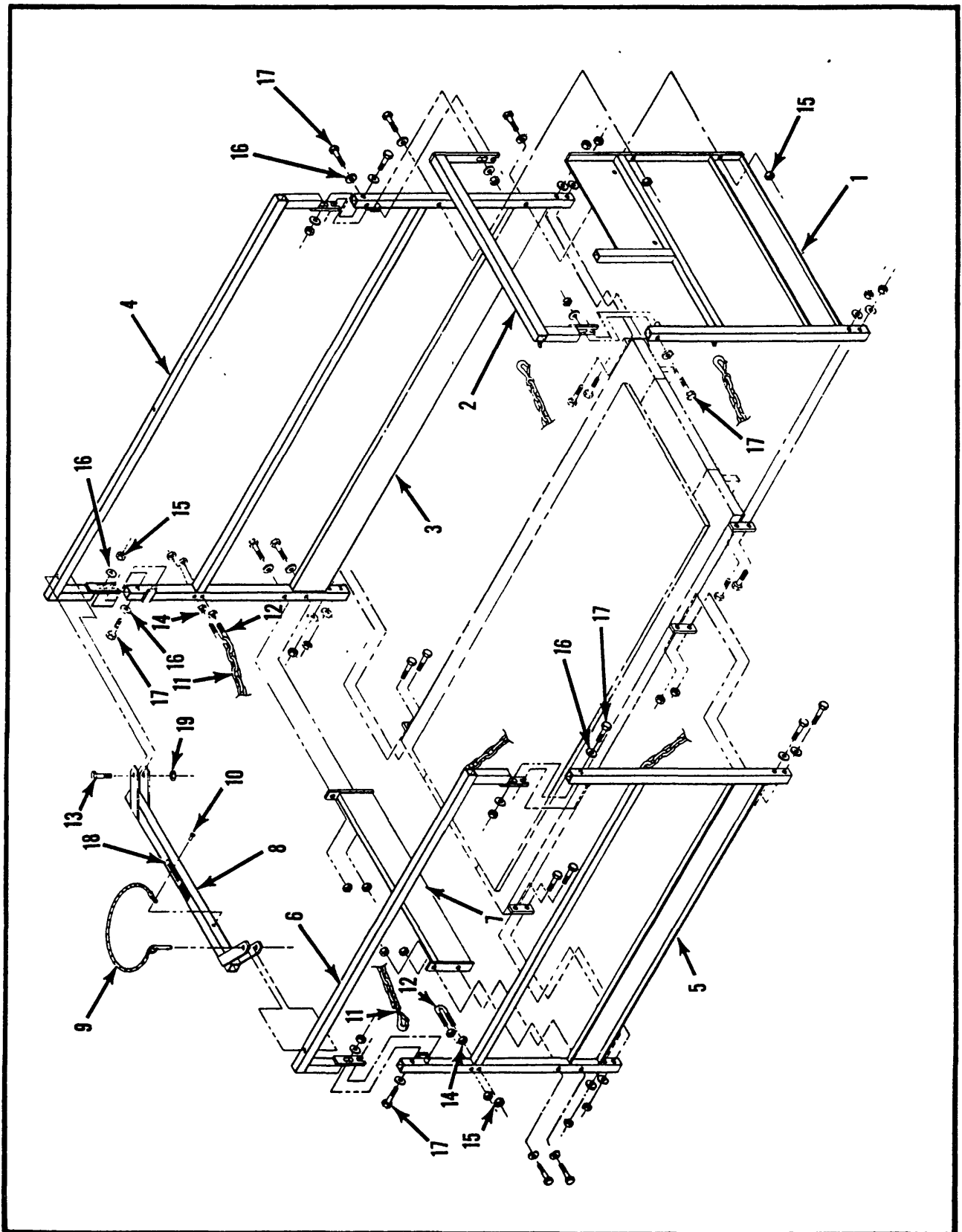


Figure 7-33. Fold Down Guardrail Option Installation

ITEM	PART	DESCRIPTION	QTY
7-33	61760-000-00	FOLD DOWN GUARDRAIL OPTION. INSTALLATION	REF
-1	61762-000-00	. GUARDRAIL, Front Lower.	1
-2	61761-000-00	. GUARDRAIL, Front Upper.	1
-3	61766-000-00	. GUARDRAIL, Left Lower	1
-4	61765-000-00	. GUARDRAIL, Left Upper	1
-5	61764-000-00	. GUARDRAIL, Right Lower.	1
-6	61763-000-00	. GUARDRAIL, Right Upper.	1
-7	61767-000-00	. KICKRAIL.	1
-8	61768-000-00	. GUARDRAIL, Rear	1
-9	61786-000-00	. LOCKING PIN ASSEMBLY.	1
-10	26554-001-00	. RIVET, Pop 1/4.	1
-11	61619-000-00	. GUARD CHAIN ASSEMBLY.	1
-12	14924-003-00	. U-BOLT.	
-13	11253-022-00	. SCREW, HHC 5/16-18 UNC x 2-3/4.	1
-14	11250-004-00	. NUT, HEX 1/4-20 UNC	4
-15	11248-006-00	. LOCKNUT, HEX 3/8-16 UNC	26
-16	11240-006-00	. WASHER 3/8 DIA.	28
-17	11254-016-00	. SCREW, HHC 3/8-16 UNC x 2	22
-18	61787-000-00	. DECAL, Danger Guardrails.	1
-19	11248-005-00	. LOCKNUT, HEX 5/16-18 UNC.	1