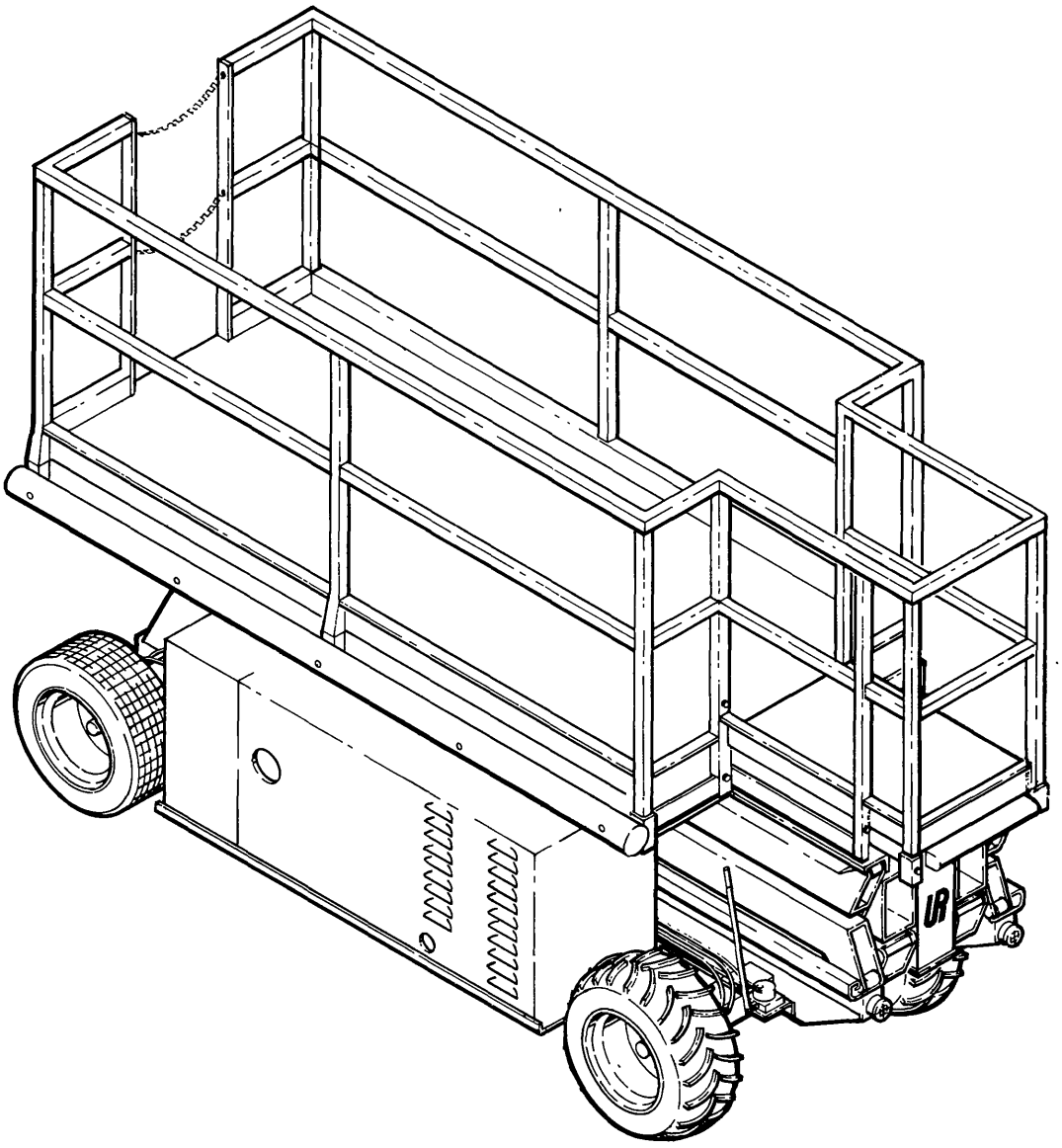
UP-RIGHT INC.

XL-25



SERVICE & PARTS MANUAL

Information here-in, 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.

PART No. 60599-00

UpRight

Call Toll Free in U.S.A.

1-800-926-LIFT

UpRight, Inc.
1775 Park Street
Selma, California 93662
TEL: 209/891-5200
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PARTSFAX: 209/896-9244

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont'd)

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS (Cont'd)

LIST OF ILLUSTRATIONS (Cont'd)

LIST OF TABLES

SECTION I

INTRODUCTION AND GENERAL INFORMATION

1-1. INTRODUCTION.

1-2. IDENTIFICATION. This manual describes and illustrates the operation and maintenance instructions for the UP-RIGHT XL-25 Maintenance Work Platform manufactured by Up-Right, Inc., Selma Operations of Selma, California. (See Figure 1-1.)

1-3. PURPOSE. The UP-RIGHT XL-25 Maintenance Work Platform is designed to be used as a means of elevating maintenance personnel and equipment and to provide a mobile work scaffold. It is designed to provide mobility with the platform in the raised or lowered positions. However, travel with the platform raised more than one foot is limited to the lowest speed range.

1-4. GENERAL DESCRIPTION.

1-5. COMPONENT ARRANGEMENT. The Maintenance Work Platform consists of the platform, the scissor mechanism, the energy module, the power module and the chassis.

1-6. LEADING PARTICULARS. Refer to Table 1-1.

Table 1-1. Leading Particulars

Physical Characteristics	
Platform Size	6' X 10' X 3'
Platform Capacity	1500 lbs. max. distributed
Platform Height Max.	25 feet
Extension Platform Capacity	250 lbs.
Speed Range (Forward or Reverse)	0.6 to 2 mph
Power Source	
Option A	Dual fuel (gas propane) 10 h.p. engine
Option B	3-1/2 hp electric motor. (6) 250 amp. hr. batteries
Dimensions	
Length	159 inches
Width	83 inches
Height	81 inches
Weight	
Dual Fuel	4760 lbs.
Electric	5100 lbs.
Hydraulic Tank	
Capacity	13 gals.

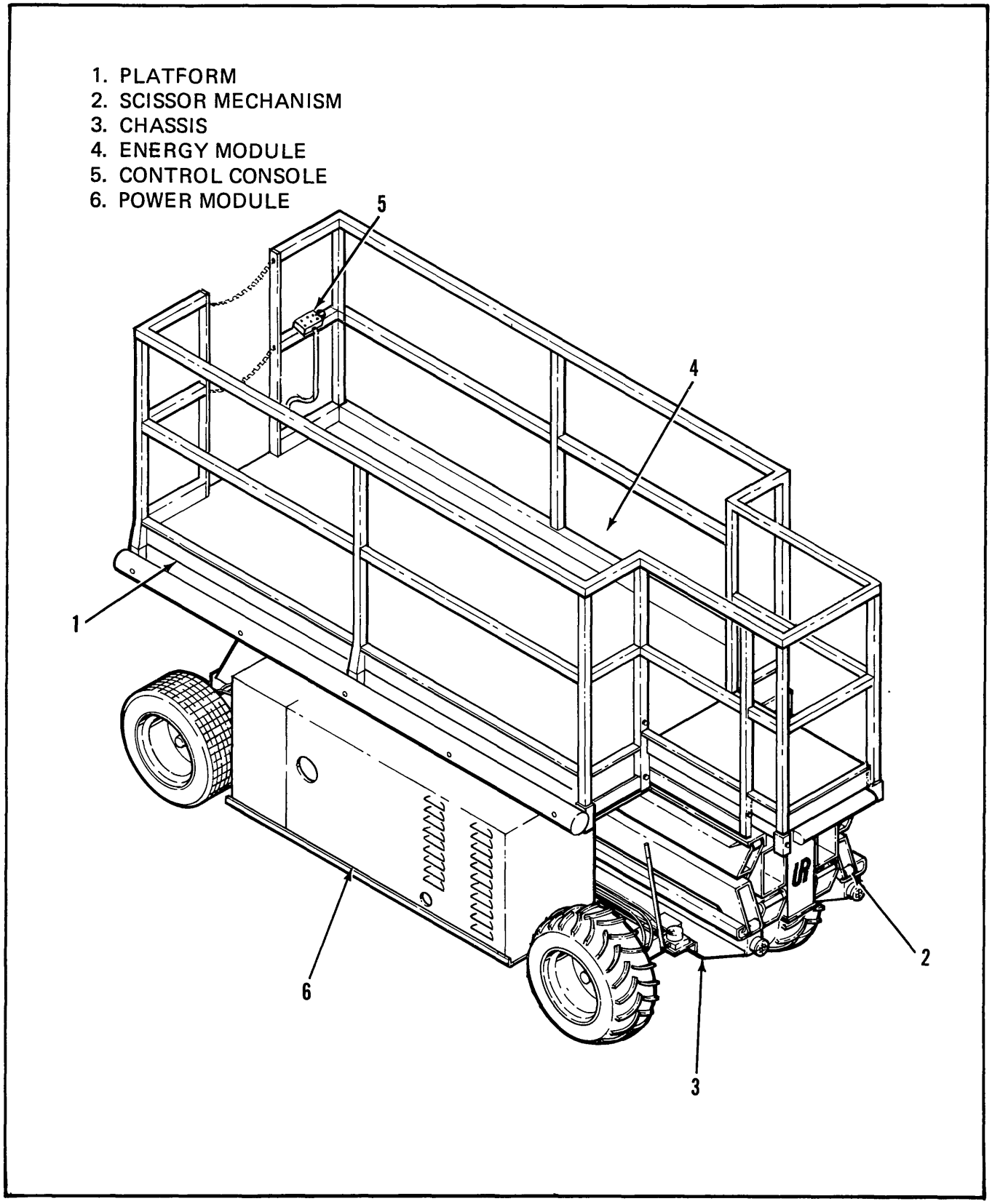


Figure 1-1. XL-25 Maintenance Work Platform

Table 1-1. Leading Particulars (Cont'd)

Fuel Capacity	
Option A only	15 gals. propane, 10 gals. gasoline
Lift System	Single two stage lifting cylinder
Surface Speed Platform Lowered	2.0 mph. max.
Surface Speed Platform Raised	0.6 mph. max.
Drive Control	Control stick for direction and speed. Toggle switch for steering.
Drive System	Dual rear wheel hydraulic drive.
Tire Size	4 Ply 26" X 12.00 –
Front	12 (ST)
Rear	8 Ply 26" X 12.00 – 12 (STG)

1-7. POWER MODULE. The dual fuel system power module, located on the left side of the chassis, contains the gas-propane engine, hydraulic pump, hydraulic control valves and the hydraulic reservoir. The electric system power module contains the electric motor, hydraulic pump, hydraulic control valves and the hydraulic reservoir.

1-8. ENERGY MODULE. The dual fuel system energy module contains the propane fuel tank, gasoline fuel tank and the 12-volt battery used to start the engine. The electric system energy module contains the 36-volt battery pack and the 30-amp battery charger.

1-9. TIRE INFLATION. The tire inflation is specific for the application and should be checked with an air gauge once a week. Do not operate the unit with the tires over or under inflated. (20 psi front, 42 psi rear.)

1-10. OPTIONS. Other options available for the maintenance work platform include a towbar steering and free wheeling hub kit.

SECTION II

SAFETY

2-1. RULES AND PRECAUTIONS.

a. BEFORE USING THE UP-RIGHT XL-25, thoroughly inspect the machine for damage such as cracked welds or structural members, loose or missing parts or fasteners, hydraulic leaks, damaged cables or hoses, loose wire connections and tire damage. Do not use damaged equipment. DO NOT change operating or safety systems.

b. Check all four tires for correct inflation. (20 P.S.I. front, 42 P.S.I. rear.)

c. Before operating the machine, always survey the work area for surface hazards such as holes, drop-offs, bumps and debris.

d. Always look up, down and around for obstructions and electrical conductors.

e. Distribute all loads evenly on platform. See "Machine Specifications" for maximum platform loads. DO NOT exceed these loads.

f. DO NOT elevate the platform unless the machine is level.

g. DO NOT drive while elevated except on firm level surfaces.

h. DO NOT operate the machine within 20 feet of electric power lines. THIS MACHINE IS NOT INSULATED.

i. DO NOT attach overhanging loads or increase platform size.

j. DO NOT use ladders, scaffolding or any other object to increase working height.

k. DO NOT sit, stand or climb on guardrail or midrail.

l. DO NOT climb down the scissors with the platform elevated.

m. DO NOT recharge batteries of electric model near sparks or open flame; batteries that are being charged emit highly explosive hydrogen gas.

n. DO NOT operate dual-fuel model if you smell gas. Close propane tank supply valve and correct leak.

o. DO NOT perform service on machine with platform elevated.

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 guard rails, module covers and scissor linkage.

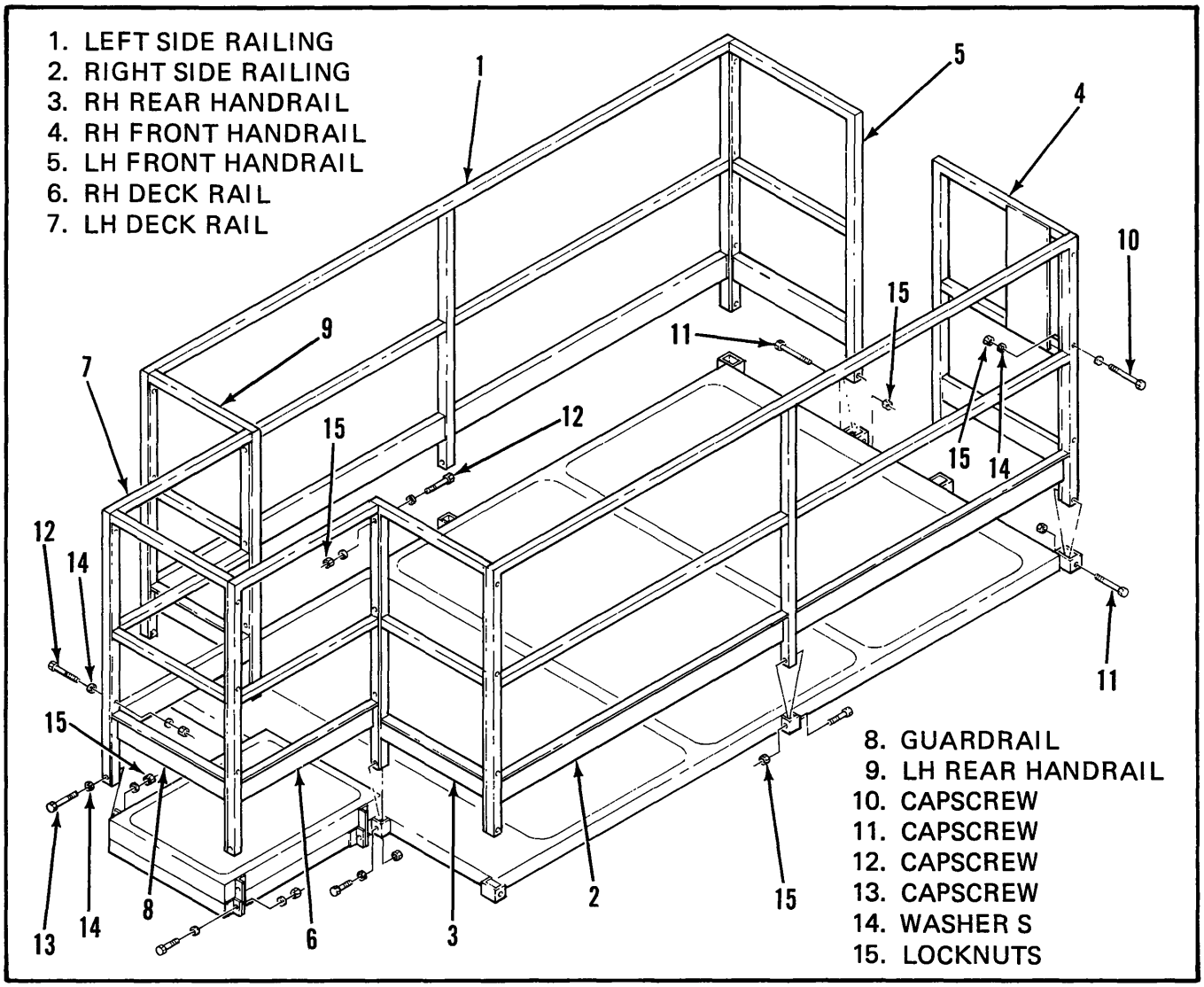


Figure 3-1. Railing Removal and Installation

b. Unpack the control console and plug the cable into the receptacle on the front of the power module.

c. Refer to Figure 3-1 and install the railing assemblies (1 thru 9) and secure with capscrews (10 thru 13), washers (14) and locknuts (15).

3-2. PREPARATION FOR SHIPMENT.

a. Grease all the grease fittings as per the lubrication chart (Figure 5-1).

b. Fully lower the platform.

c. Disconnect the battery leads from the battery(s) and secure them to the energy module floor.

d. Unplug and package the control console.

e. Band the power module cover and energy module cover, if applicable, to the power and energy modules.

f. Band the scissor linkage to the frame just behind the front wheels and just aft of the brake release pump.

g. Refer to Figure 3-1 and remove all the locknuts (15), washers (14) and capscrews (10 thru 13) then remove the railing assemblies (1 thru 9).

h. Position the railings flat on the platform and band them together.

i. For sea shipment, perform preservation per extended storage paragraph 3-4a.

j. Place the packaging container on the platform and band into place.

3-3. TRANSPORT.

NOTE

If forklifting is required, lift from either side of machine by using sockets located under the frame.

a. Maneuver the unit into transport position and chock the wheels.

b. Secure the unit to the transport vehicle with chains or straps of adequate load capacity attached to the unit's chassis tie down lugs.

c. Remove the tow bar, if applicable, and band to the chassis.

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 unit is to be placed in long term storage, use the following preservation procedure.

a. Preservation.

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

(2) Fill the hydraulic tank to operating level.

NOTE

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

(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 an approved preservative.

b. Battery(s)

(1) Disconnect the battery leads and secure to the chassis. Tape the connectors on the ends of the leads to the chassis.

(2) Remove the battery(s) and place in alternate service.

c. Place the unit in a covered location.

d. Raise the frame and lower onto blocks. Remove the tires.

SECTION IV

OPERATION INSTRUCTIONS

4-1. THEORY OF OPERATION.

4-2. GENERAL. A two section hydraulic pump, driven by either a gas-propane engine or electric motor, is used to operate all functions. The oil flow is directed through the use of electrically activated solenoid valves and pressure actuated hydraulic switches.

4-3. DRIVING. On the dual fuel units, the engine control switch (1, Figure 4-1) is normally in the "RUN" position which energizes the emergency switch (2, Figure 4-1). On the electric powered units, the engine control switch is inoperative. When the emergency switch (2, Figure 4-1) is turned "ON", it activates the fuel pump circuit (3, Figure 4-1), the fuel cut off solenoid (4, Figure 4-1) and the hour meter (5, Figure 4-1). For the electric units, when the emergency switch (1, Figure 4-2) is turned "ON", it activates the mode switch (2, Figure 4-2) and the hour meter (19, Figure 4-2). When the engine control switch (1, Figure 4-1) is pushed to "START", the starter relay (6, Figure 4-1) is activated closing the starter motor circuit, thus operating the starter (7, Figure 4-1). When released, the engine control switch (1, Figure 4-1) returns to the "RUN" position supplying power to the emergency switch (2, Figure 4-1). The mode switch (8, Figure 4-1 or 2, Figure 4-2) is set to "DRIVE" to render the joystick directional control operative. Moving the joystick toward "FORWARD" energizes the dump valve solenoid (10, Figure 4-1 or 4, Figure 4-2) which causes the dump valve (17, Figure 4-3) to close blocking the oil flow. At the same time that circuit energizes the forward solenoid (9, Figure 4-1 or 3, Figure 4-2) which moves the forward - reverse valve (2, Figure 4-3) to the forward position. This allows oil to be pumped through the forward - reverse valve (2, Figure 4-3) to the shuttle valve (3, Figure 4-3) which blocks the oil flow in one direction sending oil to the drive motors (4, Figure 4-3) in only one direction and at the same time sends oil through the open needle valve (5, Figure 4-3) to retract the brake cylinder (6, Figure 4-3). The flow of oil is divided prior to driving the drive motors (4, Figure 4-3) so that each motor receives half the flow. Not all the oil is flowing through the drive motors. Part of the flow bypasses the motor circuit by flowing through a flow restricting needle valve (13, Figure 4-3) to the bypass valve (7, Figure 4-3). This needle valve (13, Figure 4-3) is used to control the "creep speed" of the unit by limiting the amount of flow permitted to bypass the drive motors (4, Figure 4-3). The "creep speed limit switch" (18, Figure 4-1 or 12, Figure 4-2) is activated while the platform is raised more than one foot. This switch opens the bypass switch circuit preventing the bypass valve (7, Figure 4-3) from closing and blocking flow, therefore limiting the unit to creep speed while the platform is elevated.

Pressure supplied to the motors is also transmitted through a sensing line to shift a pressure switch (9, Figure 4-3) which creates a flow back through the forward-reverse valve (2, Figure 4-3) to the return filter (10, Figure 4-3) and into the hydraulic reservoir (11, Figure 4-3). As the joystick is moved further forward a second circuit is energized activating the bypass solenoid (11, Figure 4-1 or 5, Figure 4-2) which closes the bypass valve (7, Figure 4-3). This causes more flow to be directed to the drive motors (4, Figure 4-3) which increases the speed of the unit. Setting the drive range switch (26, Figure 4-1 or 13, Figure 4-2) to "HIGH" activates the series solenoid (12, Figure 4-1 or 6, Figure 4-2) causing the series valve (8, Figure 4-3) to change the flow route for the drive motor oil. Now ALL the flow passes through each drive motor doubling the previous flow rate to achieve the unit's highest speed. In REVERSE, the reverse solenoid (13, Figure 4-1 or 7, Figure 4-2) operates the forward - reverse valve (2, Figure 4-3) to

the reverse mode thus causing the oil to flow through the drive motors (4, Figure 4-3) in the opposite direction as before then to pressure switch (12, Figure 4-3), forward - reverse valve and back to the hydraulic reservoir (11, Figure 4-3). The bypass circuit works the same as in forward. The series valve (8, Figure 4-3) performs the same function as in forward but the oil flows in the opposite direction. When the joystick is returned to "neutral" the forward - reverse valve (2, Figure 4-3) returns to neutral blocking flow to the brake cylinder (6, Figure 4-3) allowing the spring loaded cylinder to automatically apply the parking brake. The dump valve solenoid (10, Figure 4-1 or 4, Figure 4-2) is de-energized allowing the dump valve (17, Figure 4-3) to open.

To steer, the steering switch (15, Figure 4-1 or 9, Figure 4-2) is held to either "LEFT" or "RIGHT" thus energizing either the left or right solenoids (16 or 17, Figure 4-1, 10 or 11, Figure 4-2). Activating the left solenoid operates the steering valve (14, Figure 4-3) to send the oil flow to the left steering cylinder (15, Figure 4-3) causing it to extend. As the oil enters the cylinder, that chamber expands causing the chamber below the cylinder piston to compress forcing the oil from that compressing to the right steering cylinder (16, Figure 4-3) causing it to retract. In turn, the oil forced from the right cylinder passes through the steering valve (14, Figure 4-3) and back to the hydraulic reservoir (11, Figure 4-3).

Steering right sends the oil to the right steering cylinder (16, Figure 4-3) extending it which forces oil to the left steering cylinder (15, Figure 4-3) retracting it and thus sending the excess oil back to the hydraulic reservoir.

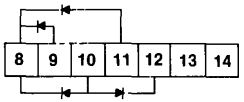
4-4. RAISING AND LOWERING PLATFORM. Positioning the mode switch (8, Figure 4-1 or 2, Figure 4-2) to "LIFT" energizes the lift switch (19, Figure 4-1 or 14, Figure 4-2). Positioning the lift switch to "UP" energizes the dump solenoid (10, Figure 4-1 or 4, Figure 4-2) closing the dump valve (17, Figure 4-3), and the bypass solenoid (11, Figure 4-1 or 5, Figure 4-2) closing the bypass valve (7, Figure 4-3). The up solenoid (20, Figure 4-1 or 15, Figure 4-2) is also energized operating the up valve (18, Figure 4-3) to open the passage for oil to enter the lift cylinder (19, Figure 4-3). When the platform reaches its maximum height a limit switch (21, Figure 4-1 or 16, Figure 4-2) opens the electrical circuit de-energizing the up solenoid (20, Figure 4-1 or 15, Figure 4-2). Returning the lift switch to neutral de-energizes the bypass and dump solenoids allowing the bypass and dump valves to open. The check valve (20, Figure 4-3) prevents the oil from flowing back out of the lift cylinder (13, Figure 4-3). Positioning the lift switch to "DOWN" energizes the down solenoid (22, Figure 4-1 or 17, Figure 4-2) which opens the down valve (21, Figure 4-3) allowing the oil to escape back to the hydraulic reservoir. With the down solenoid circuit energized, the down alarm (23, Figure 4-1 or 18, Figure 4-2) is also energized. The rate of descent of the platform is regulated by a flow restricting needle valve (22, Figure 4-3). As a safety feature, the lift cylinder has a "velocity" fuse which trips stopping the descent if the rate of descent is too high. The emergency lower valve (23, Figure 4-3) provides a means to bypass the check valve (20, Figure 4-3) and manually lower the platform.

In addition to the components mentioned above, each hydraulic circuit has a preset hydraulic pressure relief valve. The steering system is limited to a 1000 psi relief (25, Figure 4-3), the drive and lift circuits 2950 psi through relief valve (26, Figure 4-3).

CONTROLLER LOGIC

	CONTROLLER STICK POSITION						
	FORWARD				REVERSE		
SWITCH	3	2	1		1	2	3
REVERSE	○	○	○	○	●	●	●
FORWARD	●	●	●	○	○	○	○
BY-PASS	●	●	○	○	○	●	●
SERIES	●	○	○	○	○	○	●

○ OPEN ● CLOSED



FANNING STRIP

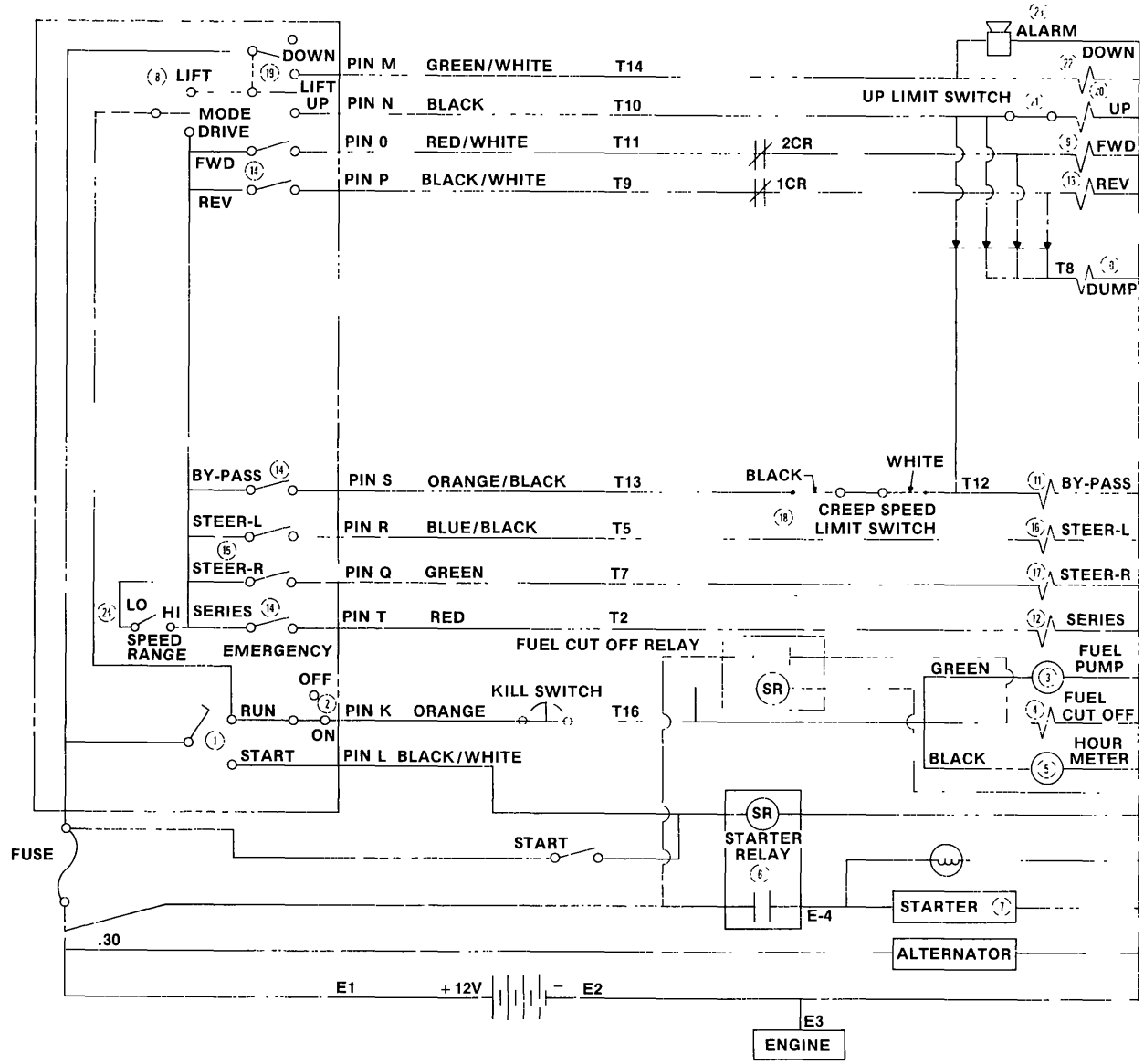


Figure 4-1. Electrical Schematic (Dual Fuel)

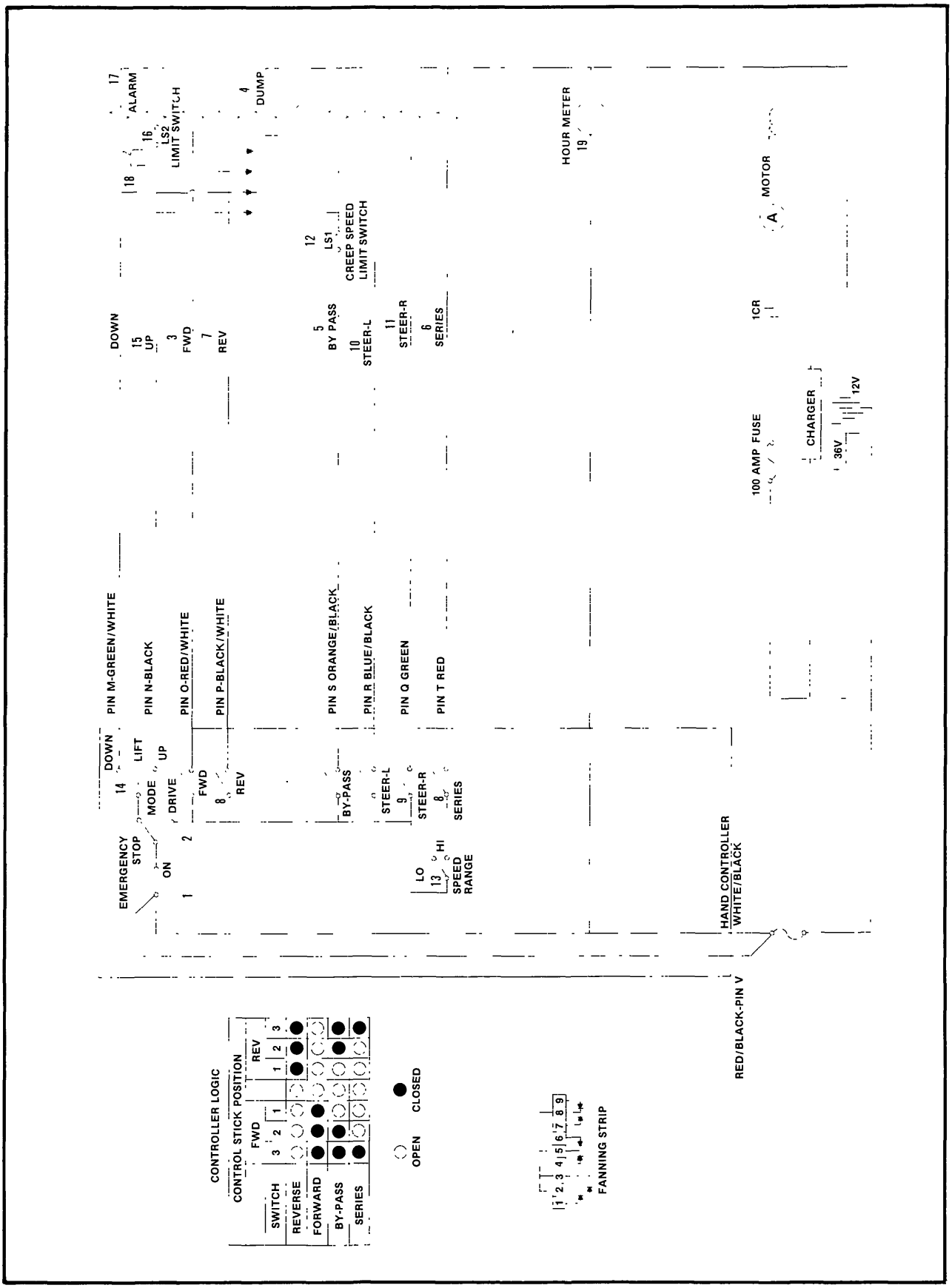


Figure 4-2. Electrical Schematic (Electric)

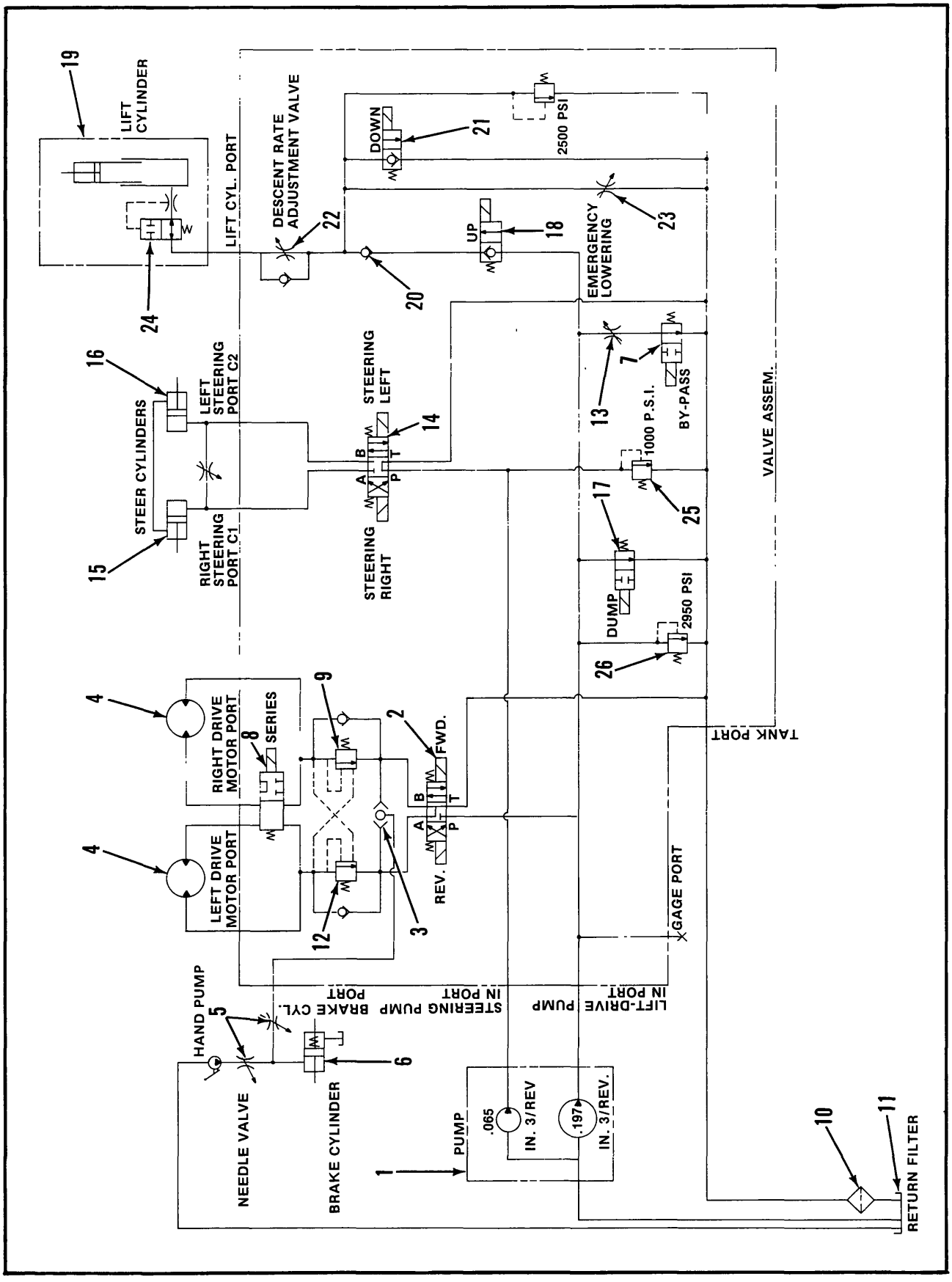


Figure 4-3. Hydraulic Schematic

1. ENGINE CONTROL SWITCH
2. EMERGENCY SHUT OFF SWITCH
3. FUEL PUMP
4. FUEL CUT-OFF SOLENOID
5. HOURMETER
6. STARTER RELAY
7. STARTER MOTOR
8. MODE SWITCH
9. FORWARD SOLENOID
10. DUMP SOLENOID
11. BY-PASS SOLENOID
12. SERIES SOLENOID
13. REVERSE SOLENOID
14. "JOYSTICK" CONTROL
15. STEERING SWITCH
16. STEER LEFT SOLENOID
17. STEER RIGHT SOLENOID
18. CREEP SPEED LIMIT SWITCH
19. LIFT SWITCH
20. UP SOLENOID
21. HEIGHT LIMIT SWITCH
22. DOWN SOLENOID
23. DOWN ALARM
24. DRIVE RANGE

Legend for Figure 4-1

1. EMERGENCY SHUT OFF SWITCH
2. MODE SWITCH
3. FORWARD SOLENOID
4. DUMP SOLENOID
5. BYPASS SOLENOID
6. SERIES SOLENOID
7. REVERSE SOLENOID
8. "JOYSTICK" CONTROL
9. STEERING SWITCH
10. STEER LEFT SOLENOID
11. STEER RIGHT SOLENOID
12. CREEP SPEED LIMIT SWITCH
13. DRIVE RANGE
14. LIFT SWITCH
15. UP SOLENOID
16. HEIGHT LIMIT SWITCH
17. DOWN SOLENOID
18. DOWN ALARM
19. HOUR METER

Legend for Figure 4-2

1. HYDRAULIC PUMP
2. FORWARD-REVERSE CONTROL VALVE
3. SHUTTLE VALVE
4. HYDRAULIC DRIVE MOTORS
5. NEEDLE VALVE
6. BRAKE CYLINDER
7. BYPASS VALVE
8. SERIES VALVE
9. PRESSURE SWITCH
10. RETURN FILTER
11. HYDRAULIC RESERVOIR
12. PRESSURE SWITCH
13. FLOW RESTRICTING NEEDLE VALVE
14. STEERING VALVE
15. LEFT STEER CYLINDER
16. RIGHT STEER CYLINDER
17. DUMP VALVE
18. UP VALVE
19. LIFT CYLINDER
20. CHECK VALVE
21. DOWN VALVE
22. FLOW RESTRICTING NEEDLE VALVE
23. EMERGENCY LOWERING VALVE
24. VELOCITY FUSE
25. RELIEF VALVE (STEERING)
26. RELIEF VALVE (DRIVE/LIFT)

Legend for Figure 4-3

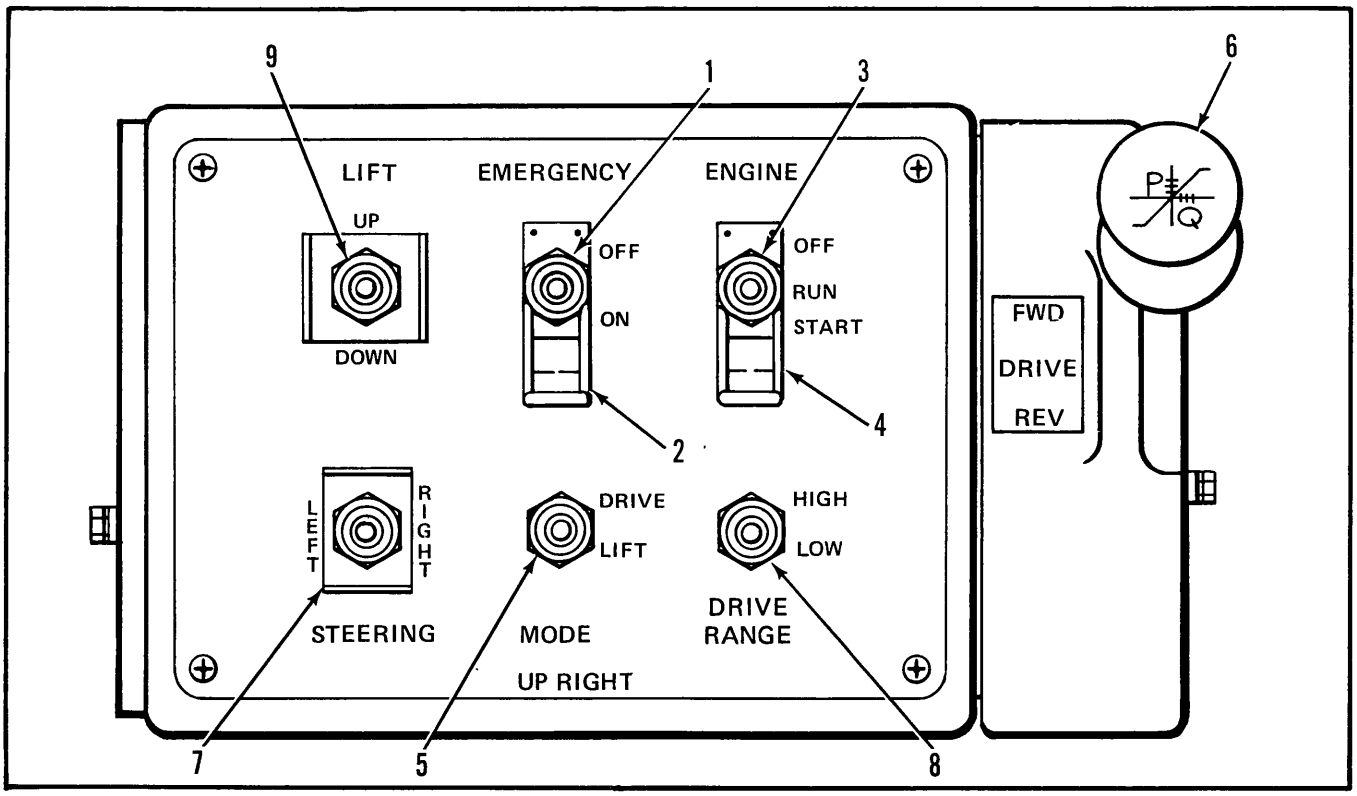


Figure 4-4. Controls & Indicators (View 1 of 4)

4-5. CONTROLS AND INDICATORS. The controls and indicators for operation of the Maintenance Work Platform are shown in Figure 4-4. 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.

Table 4-1. Controls and Indicators

INDEX NUMBER	NAME	FUNCTION
1	EMERGENCY STOP SWITCH	A two position toggle switch. Position the switch "ON" to energize the electric fuel pump, fuel cut off solenoid and hour meter. Position the switch to "OFF" to shut down the engine and render all electrical controls, except the lift switch DOWN function, inoperative.
2	SWITCH GUARD (Emergency Stop)	Normally open. When closed, the switch guard automatically positions the Emergency Stop Switch to OFF.
3	ENGINE SWITCH	A three position toggle switch controls the engine operation. Hold in START position to activate the engine

Table 4-1. Controls and Indicators (Cont'd)

INDEX NUMBER	NAME	FUNCTION
3	ENGINE SWITCH (Cont'd)	starter motor. Once started release the switch and it returns to the RUN position. Push switch to OFF to stop the engine. Operational on dual fuel systems only.
4	ENGINE SWITCH GUARD	Normally open allowing operation of the Engine Switch No. 3. Closing the guard automatically positions the engine switch in the OFF position stopping the engine.
5	MODE SWITCH	A two position toggle switch. DRIVE position sends electrical power to the JOYSTICK (6) control, the STEERING switch (7) and the DRIVE RANGE switch (8). LIFT position sends electrical power to the LIFT switch (9).
6	FORWARD - REVERSE CONTROL with LOCKING COLLAR	Normally locked by the collar in NEUTRAL. A joystick control. Pull up on the locking collar then push forward to move the unit forward. With the unit platform lowered, the further the joystick is moved away from NEUTRAL the higher the speed in either forward or reverse. Pull up the locking collar and pull back to travel backward. There are three speed ranges that are activated electrically and hydraulically as the joystick is operated through its range of travel. There are no detents felt as the joystick is operated. The difference in travel speed is the only indication that the speed range has shifted. When the platform is raised more than one foot, the two higher speed ranges are deactivated so the unit will only travel at its slowest pace or "creep speed". When released, the joystick automatically returns to NEUTRAL.
7	STEERING SWITCH	A three position toggle switch that is normally centered. Push the switch to LEFT to steer left, RIGHT to steer 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 unit to assure proper direction.
8	DRIVE RANGE SWITCH	A two position toggle switch. Provides the platform operator with two speed ranges, in forward or reverse.

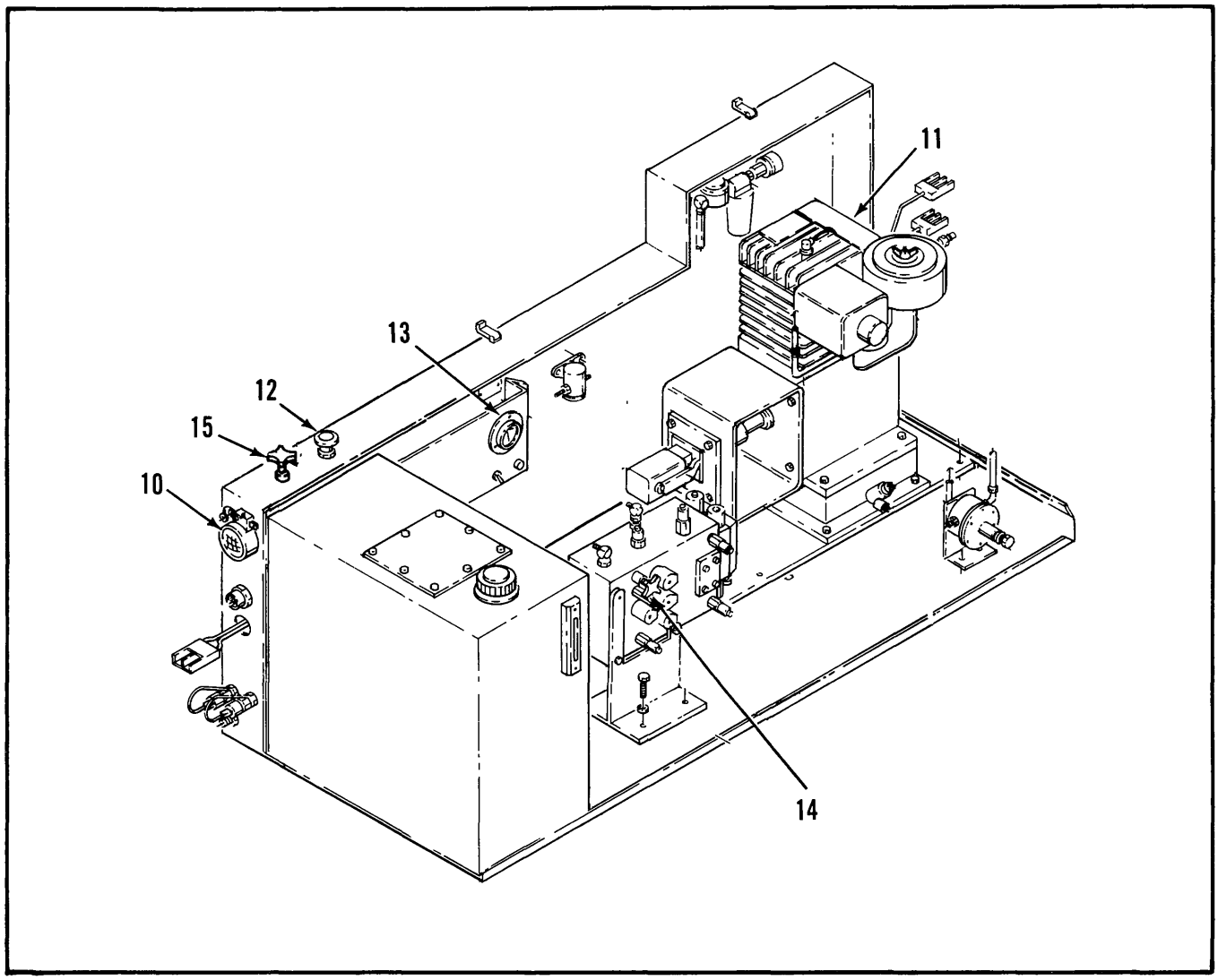


Figure 4-4. Controls & Indicators (View 2 of 4)

Table 4-1. Controls and Indicators (Cont'd)

INDEX NUMBER	NAME	FUNCTION
9	LIFT SWITCH	A three position toggle switch controls the lift function. Push the switch to UP to raise the platform to the desired height then release the switch. Push the switch to DOWN to lower the platform to the desired level then release the switch.
10	ALARM (Platform Lowering)	Emits an audible alarm signal while the platform is lowering when the Lift switch on the control console is used to lower the platform. If the Emergency Lowering

Table 4-1. Controls and Indicators (Cont'd)

INDEX NUMBER	NAME	FUNCTION
10	ALARM (Platform Lowering) (Cont'd)	Valve (14) is used to do the lowering the alarm will not function.
11	ENGINE STOP SWITCH	Dual fuel models only. Set this switch to "OFF" to stop the engine thereby stopping all hydraulic and electric functions with the exception of lowering the platform.
12	EMERGENCY STOP SWITCH	Push this switch down to stop the engine or electric motor thereby stopping all the hydraulic and electric functions with the exception of lowering the platform which may still be accomplished with the Lift Switch (9) or the Emergency Lowering Valve (14).
13	HOURMETER	Records the cummulative total number of hours the engine or electric motor has been operating.

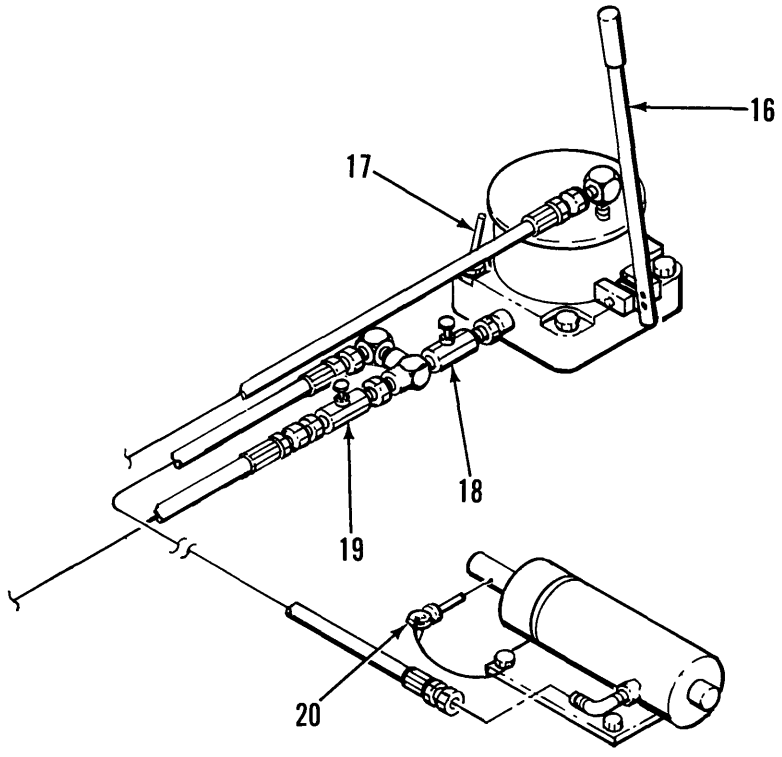


Figure 4-4. Controls & Indicators (View 3 of 4)

Table 4-1. Controls and Indicators (Cont'd)

INDEX NUMBER	NAME	FUNCTION
14	EMERGENCY LOWERING	On dual fuel units, open the valve by turning the knob counterclockwise to lower the platform. On electric units, pull the knob out to lower the platform.
15	STEERING BY-PASS VALVE (Optional)	This valve must be opened by turning counterclockwise when the unit is to be towed. This will allow the steering cylinders to compress or expand as the towbar steers the unit. Close the valve by turning clockwise to return the steering control to the unit's control box switch.

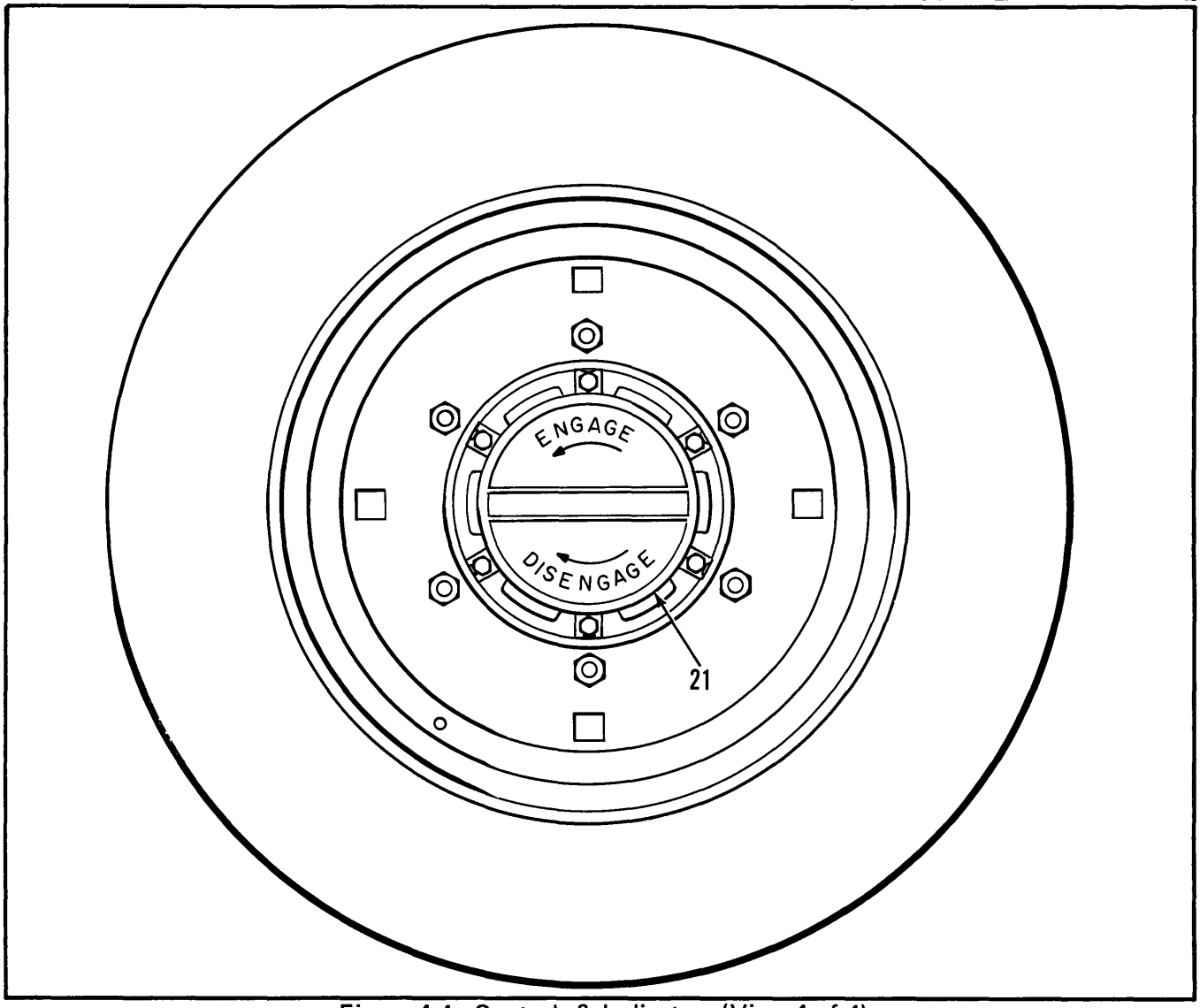


Figure 4-4. Controls & Indicators (View 4 of 4)

Table 4-1. Controls and Indicators (Cont'd)

INDEX NUMBER	NAME	FUNCTION
16	MANUAL BRAKE RELEASE PUMP (Optional)	This pump is used to retract the parking brake hydraulic cylinder rod when hydraulic drive power is unavailable such as for towing.
17	PUMP VALVE (Optional)	The handle is normally down leaving the valve open rendering the pump (15) inoperable.
18	NEEDLE VALVE (Optional)	This valve, when closed, blocks the flow of drive pressured hydraulic oil from entering the pump (15). Instead the oil pressurizes the brake cylinder and releases the brake. Rotate the knob counterclockwise to open the valve, clockwise to close.
19	NEEDLE VALVE	This valve, when closed, is used to block the flow of oil from the pump (15) from returning to the hydraulic reservoir. This blockage diverts the oil to the brake cylinder causing the brake to release.
20	LOCK PIN (Brake Release)	Insert this pin through the hole in the brake cylinder rod when the brake is released to prevent the brake cylinder from engaging the brake disc.
21	FREE WHEELING HUB CONTROL (Optional)	A rotating dial controls the functioning of the drive hubs. Rotate counterclockwise to engage, clockwise to disengage.

4-6. OPERATING PROCEDURES.

NOTE

All functions of the machine may be operated from the ground by disconnecting the control console cable from the front of the platform, disconnecting the extension cable from the power module and connecting the control console cable to the power module. Return the console to the original configuration for normal operation.

4-7. PREOPERATIONAL CHECK.

WARNING

Do not perform service on machine with the platform elevated.

a. Carefully inspect the entire machine for damage such as cracked welds or structural members, loose or missing parts, oil or fuel leaks, damaged cables or hoses, loose connections or tire damage. Do not use damaged equipment. Do not modify the operating or safety systems.

b. Check all four tires for proper inflation pressures. (20 psi front, 42 psi rear.)

c. Before operating the machine, survey the work area ahead for surface hazards such as holes, drop-offs, bumps and debris.

d. Check in ALL directions for obstructions and electrical conductors.

e. Remove the module covers and visually inspect for damage or missing parts.

f. Remove the cap from the hydraulic reservoir and check the level of the oil with the platform fully lowered.

g. Check the engine oil and fuel level, if applicable.

h. Check the battery(s) fluid level.

WARNING

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

WARNING

DO NOT operate the machine within 10 feet of any electrical power lines.
THIS MACHINE IS NOT INSULATED.

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

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

NOTE

Perform the following steps with the control console plugged directly into the power module as for ground level operation.

i. Raise the platform and visually inspect the scissor linkage, rollers, lift cylinder, cables and hoses for damage or erratic operation. Check for missing or loose parts.

j. Lower the platform partially and check operation of the audible lowering alarm.

k. Reach through the access hole in the power module cover and open the emergency lowering valve to check for proper operation. Once the platform is fully lowered, close the valve.

4-8. STARTING THE ENGINE (DUAL FUEL SYSTEM)

a. Set the dual fuel selector switch, located next to the hourmeter, to the desired position.

NOTE

If machine is to be operated on propane, open the supply valve on the propane tank.

WARNING

If you smell propane, close the supply valve. Locate and repair the leak.

b. Check that the engine stop switch (11, Figure 4-4) is in the "ON" position.

c. Check that the emergency stop switch (12, Figure 4-4) on the power module is in the "ON" position (PULLED OUT).

d. Open the switch guard (2, Figure 4-4) on the control console and set the emergency stop switch (1) to the "ON" position.

e. Start the engine by opening the engine switch guard (4, Figure 4-4) and push the engine switch (3) to "START". When the engine starts, release the switch allowing it to return to "RUN".

4-9. STARTING ELECTRIC UNITS.

a. Check that the emergency stop switch (12, Figure 4-4) on the power module is in the "ON" position (PULLED OUT).

b. Check that the emergency stop switch (1) on the control console is in the "ON" position.

4-10. TRAVEL (PLATFORM LOWERED).

a. Connect the cable from the control console to the receptacle under the front side of the platform. Insert the control console mount into the slot provided at the right front of the platform.

b. Refer to paragraph 4-8 or 4-9 for starting procedures.

c. Check that the drive hubs (21, Figure 4-4) are engaged.

d. Set the mode switch (5, Figure 4-4) to the "DRIVE" position.

e. Set the drive range switch (8, Figure 4-4) to "HIGH" or "LOW".

f. Pull up the locking collar to release the joystick control (6, Figure 4-4) from the "neutral" position. SLOWLY move the joystick forward and backward to check for speed and directional control.

g. Move the steering switch (7, Figure 4-4) to "LEFT" then "RIGHT" to check for steering control.

4-11. LIFTING PLATFORM.

WARNING

Look up and around for obstructions before performing the lifting function.

DO NOT elevate the platform unless the machine is level.

DO NOT operate this machine within 10 feet of any electrical power lines. THIS MACHINE IS NOT INSULATED.

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

a. Refer to paragraph 4-8 or 4-9 for starting procedures.

b. If necessary, drive the machine to an unobstructed area to allow for full platform elevation.

c. Position the mode switch (5, Figure 4-4) to "LIFT".

d. Push the lift switch (9, Figure 4-4) to "UP" and hold there to elevate the platform.

WARNING

NEVER enter the scissor linkage area while the platform is elevated.

e. Once raised to the desired position the engine, if applicable, may be shut off if desired by positioning the engine switch (3, Figure 4-4) to "OFF" and holding the switch there until the engine stops.

NOTE

Be certain to shut the emergency stop switch (2) off to stop the electric fuel pump from operating.

WARNING

Check under platform for obstructions before lowering the platform.

f. When the work task is completed the platform may be lowered without starting the engine or electric motor by holding the lift switch (9, Figure 4-4) in the "DOWN" position. Lowering with the engine or electric motor operating is accomplished in the same manner.

4-12. TRAVEL WITH PLATFORM ELEVATED.

NOTE

The unit will travel no faster than "creep speed" with the platform elevated.

a. If travel with the platform elevated is anticipated, check the surface to be traversed prior to being elevated.

WARNING

Distribute all loads evenly on platform.

DO NOT exceed unit's specified load limits.

DO NOT attach overhanging loads or increase platform size.

DO NOT use ladders, scaffolding or any other object to raise work height.

DO NOT sit, stand or climb on guardrails.

b. Check the clearance above, below and to the sides of both the platform and the chassis.

WARNING

Travel only on hard, level, smooth surfaces.

c. Set the mode switch (5) to "DRIVE".

d. Pull up the locking collar on the joystick (6) and slowly move the joystick in the desired direction.

WARNING

Before switching directions, double check that the route is clear of obstructions.

4-13. TOWING THE WORK PLATFORM (TOWBAR OPTION).

WARNING

Do not tow the unit with the platform elevated.

a. Remove the lock pin securing the tow bar pivot pin in place then withdraw the pivot pin (Figure 4-5).

b. Position the tow bar in place and insert the pivot pin. Secure with the lock pin.

CAUTION

Block the wheels to prevent the unit from rolling when the brake is released.

c. Refer to Figure 4-4 and close needle valve (19). Open needle valve (18) and raise the valve handle (17) on the back of the pump. Operate the pump handle (16) to retract the brake rod.

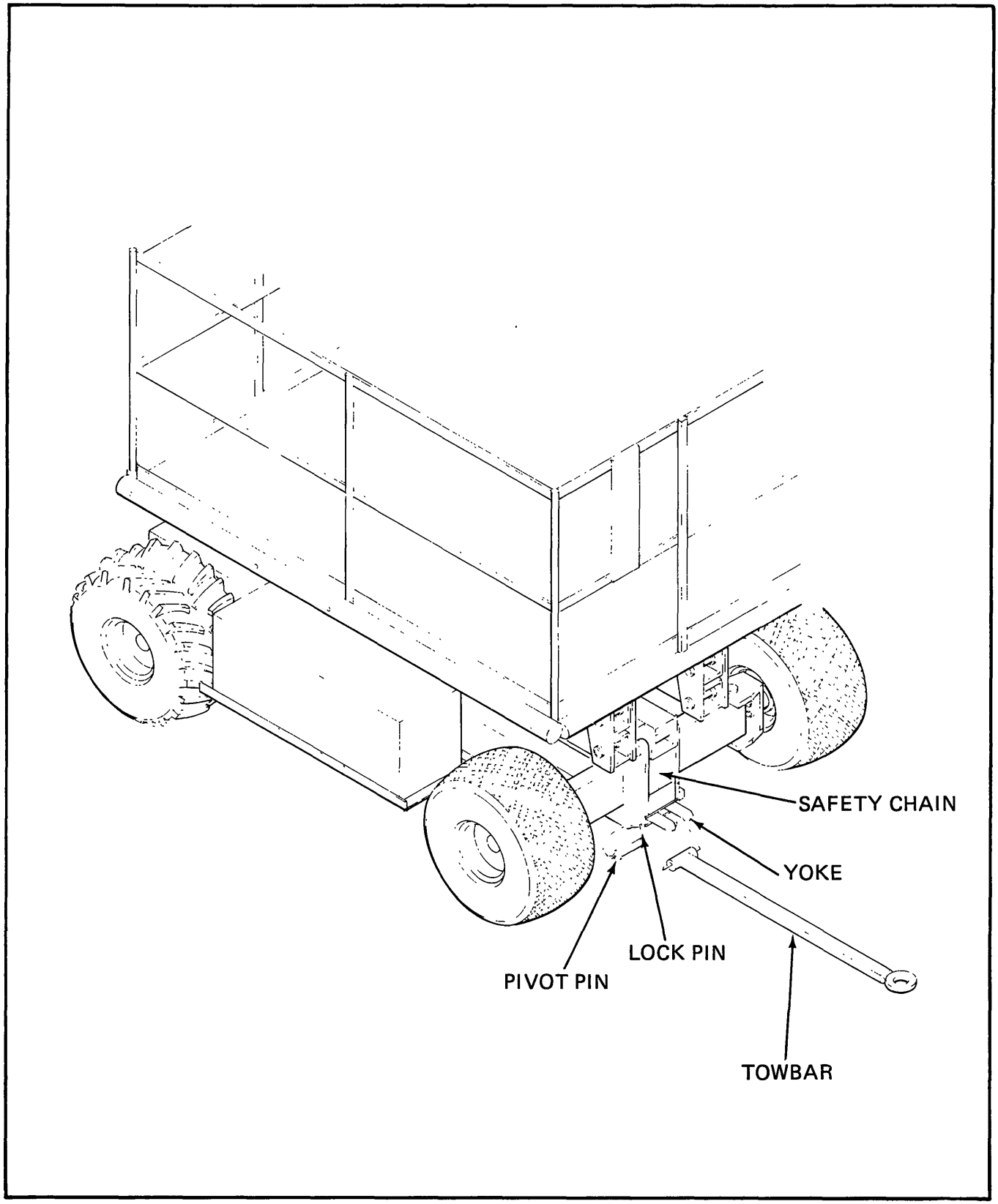


Figure 4-5. Towbar Installation

d. Secure the parking brake rod with lock pin (20).

e. Open the steering bypass valve (15) completely.

f. Turn the drive hubs (21) to "DISENGAGE".

g. Secure the towbar to the tow vehicle and attach safety chain.

CAUTION

DO NOT exceed 15 mph while towing the Maintenance Work Platform.

h. Remove wheel blocks and tow to desired location.

i. Once towing is completed perform the following:

(1) Block the wheels to prevent the machine from rolling.

(2) Remove the lock pin securing the parking brake rod.

(3) Open needle valve (19) and close needle valve (18) then lower the valve handle (16).

(4) Rotate the free wheeling hub controls to "ENGAGE".

(5) Close the steering bypass valve (15) completely.

(6) Disconnect and stow the safety chain.

(7) Remove the towbar and wheel blocks.

SECTION V

MAINTENANCE INSTRUCTIONS

5-1. INSPECTION.

5-2. GENERAL. The complete inspection consists of periodic visual and operational checks, together with all necessary minor adjustments to assure proper performance.

5-3. PERIODIC INSPECTION. The periodic inspection chart, Table 5-1, is arranged according to lapsed time, between inspections. The inspection requirements are to be fulfilled by operating and maintenance personnel.

Table 5-1. Periodic Inspection and Maintenance

COMPONENT	INSPECTION or SERVICE	INTERVAL			
		EACH SHIFT	50 hr	250 hr	1000 hr
Engine Oil (Dual Fuel)	Check level and condition	X			
	Check for leaks	X			
	Change oil		X		
	Change filter			X	
Engine Fuel System (Dual Fuel)	Check fuel level	X			
	Check for leaks	X			
	Replace fuel filter			X	
Battery System	Check electrolyte level	X			
	Check specific gravity	X			
	Clean exterior	X			
	Clean the terminals			X	
	Check battery cable condition	X			
	Charge batteries	X			
Hydraulic Oil	Check oil level	X			
	Drain and replace oil				X
Hydraulic Oil Filter	Change filter			X	
Hydraulic Control Valves	Check for leaks		X		
	Check hose connections		X		

Table 5-1. Periodic Inspection and Maintenance (Cont'd)

COMPONENT	INSPECTION or SERVICE	INTERVAL			
		EACH SHIFT	50 hr	250 hr	1000 hr
Hydraulic Hoses	Check connections Check for exterior wear		X X		
Emergency Hyd System	Open the emergency down valve		X		
Control Console	Check switches operation Check cable plug		X X		
Control Cable	Check the connector plugs Check the exterior of the cable for pinching, binding or rubbing damage	X X			
Platform Deck and Rails	Check fasteners for tightness Check welds for cracks Check condition of deck	X X X			
Tires	Check for damage Check air pressure	X X			
Hydraulic Pump	Wipe clean Check for leaks at mating surfaces Check for hose fitting leaks Check mounting bolts for tightness Check the drive coupling for tightness and proper alignment		 X X X X	X	
Drive Motors	Check for operation and leaks		X		
Steering System	Check locknuts for security Grease pivot pins Check steering cylinder for leaks or looseness		 X X	X	

Table 5-1. Periodic Inspection and Maintenance (Cont'd)

COMPONENT	INSPECTION or SERVICE	INTERVAL			
		EACH SHIFT	50 hr	250 hr	1000 hr
Front Wheel Bearings	Check wheel assembly for play		X		
	Repack wheel bearings				X
	Replace wheel bearings and seals				X
Scissor Linkage	Inspect for structural cracks	X			
	Check pivot points for wear			X	
	Check the pivot pin retainer bolts for tightness		X		
	Check the roller tracks for wear and deformation			X	
	Check scissor arms for bending			X	
Chassis	Check component mountings for tightness			X	
	Check welds for cracks			X	
	Check hoses for pinch or rubbing points				
Lift Cylinder	Check the cylinder rod for gouges or scoring		X		
	Check mounting pin pivot bolts for tightness		X		
	Inspect for leaks		X		
	Inspect the pivot points for wear		X		
Entire Unit	Check fasteners for tightness			X	
	Check for corrosion, remove and repaint			X	
	Check for and repair collision damage			X	
Towing System (Optional)	Check the tow bar/safety chain assembly			X	
	Operate steering bypass valve			X	
	Check steering alignment			X	
	Check free wheeling hubs for leaks			X	

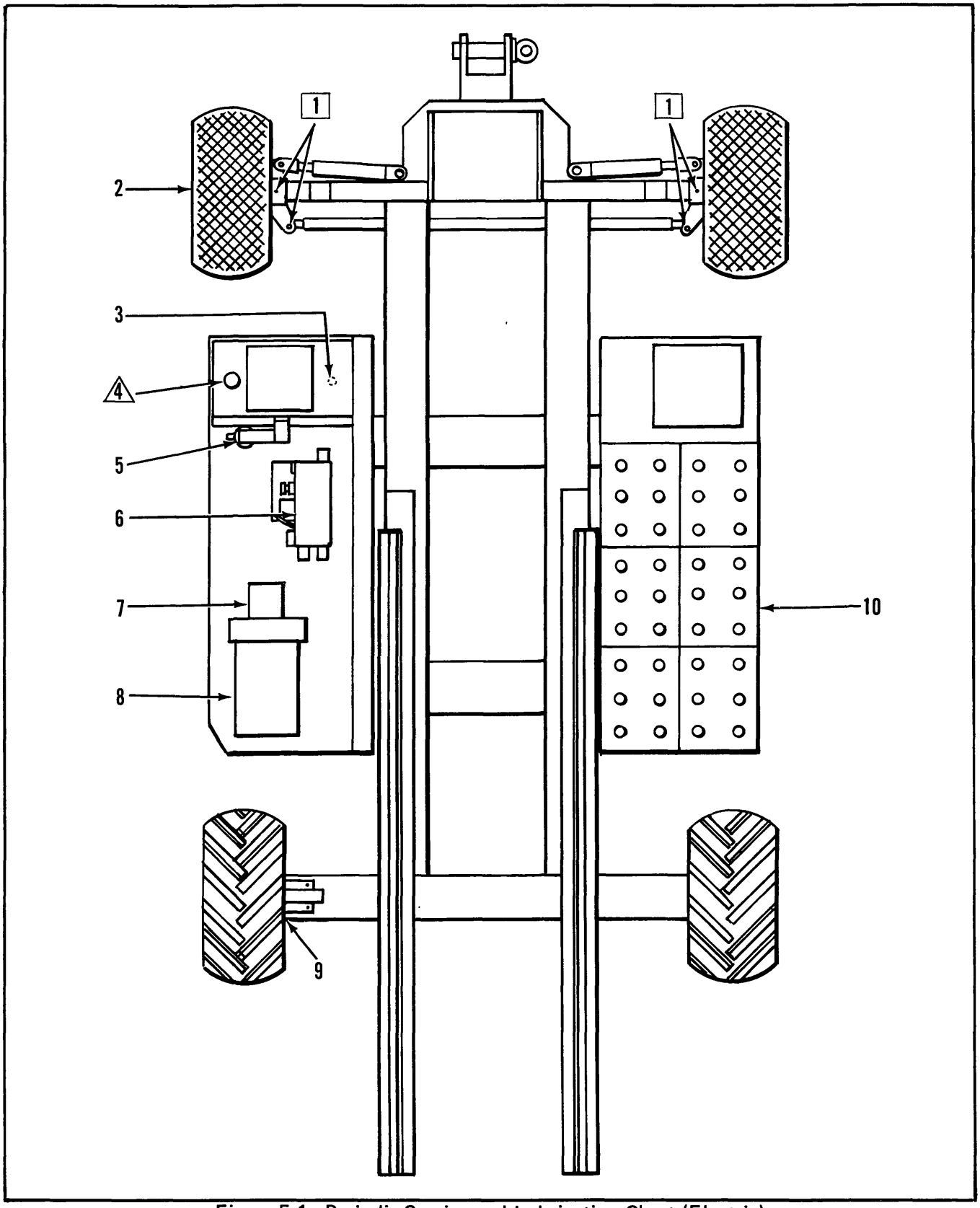


Figure 5-1. Periodic Service and Lubrication Chart (Electric)

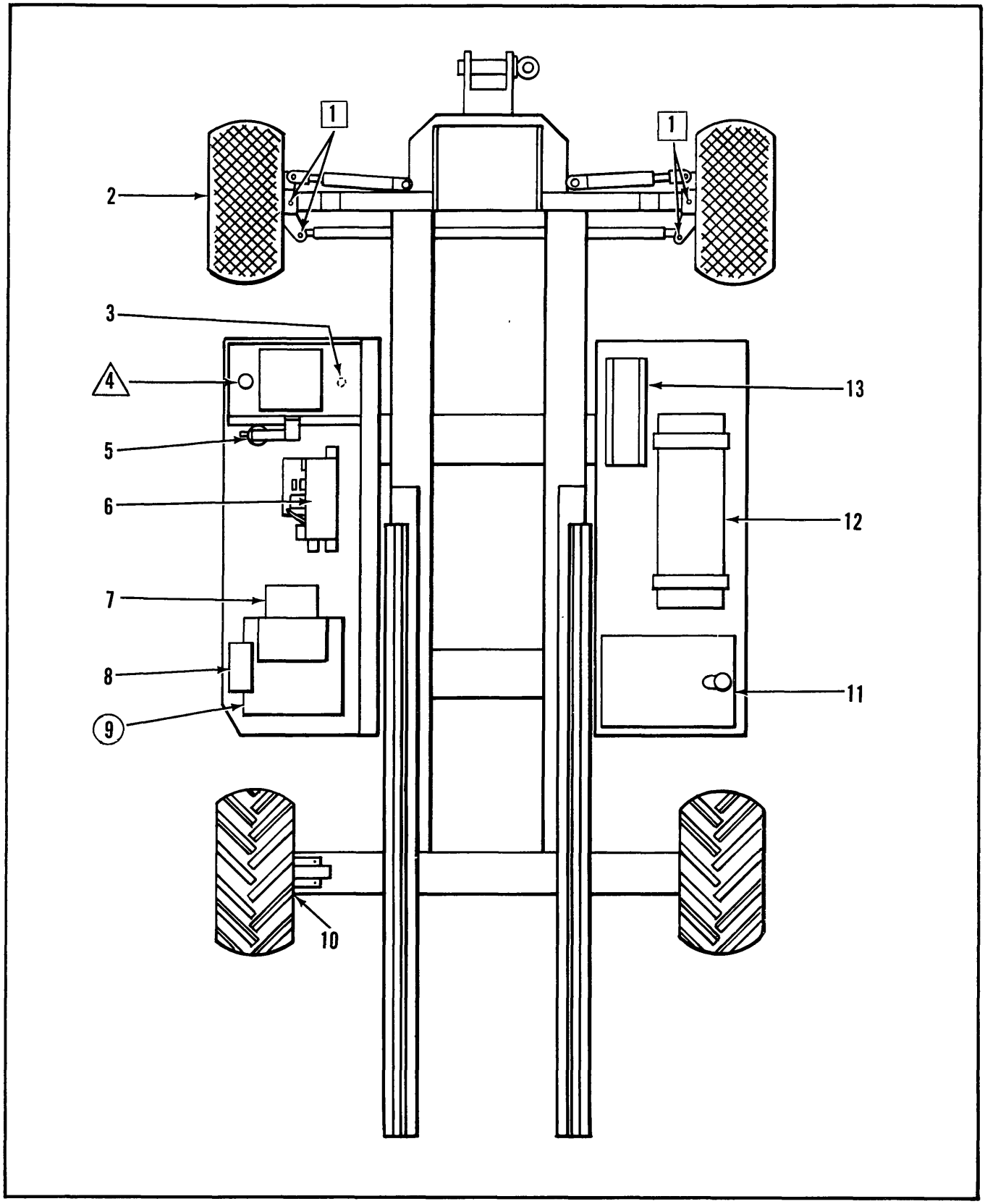


Figure 5-1A. Periodic Service and Lubrication Chart (Dual Fuel)

1. GREASE FITTING
2. FRONT WHEEL HUBS
3. HYDRAULIC RESERVOIR DRAIN
4. HYDRAULIC OIL RESERVOIR
5. HYDRAULIC OIL FILTER
6. CONTROL VALVE BLOCK
7. HYDRAULIC PUMP
8. ELECTRIC MOTOR
9. HYDRAULIC DRIVE MOTORS
10. BATTERIES

□ Grease
△ Hydraulic Oil

Legend for Figure 5-1 (Electric)

1. GREASE FITTING
2. FRONT WHEEL HUBS
3. HYDRAULIC RESERVOIR DRAIN
4. HYDRAULIC OIL RESERVOIR
5. HYDRAULIC OIL FILTER
6. CONTROL VALVE BLOCK
7. HYDRAULIC PUMP
8. ENGINE AIR CLEANER
9. ENGINE OIL
10. HYDRAULIC DRIVE MOTORS
11. GASOLINE TANK
12. PROPANE TANK
13. BATTERY

□ Grease
△ Hydraulic Oil
○ Engine Oil

Legend for Figure 5-1A (Dual Fuel)

5-4. LUBRICATION. Refer to the lubrication chart (Figures 5-1 and 5-1A) for the location of items that require lubrication service.

5-5. TROUBLESHOOTING. See Table 5-2 for a listing of troubles, probable causes and remedies for problems that may be encountered during operation of the electric or dual fuel system maintenance work platform.

Table 5-2. Troubleshooting

TROUBLE	PROBABLE CAUSE	REMEDY
Engine failure to start. Does not crank or cranks slowly.)	1. Battery terminals corroded or loose.	Clean and tighten terminals.
	2. Discharged battery.	Check condition of battery. If serviceable, recharge it. If defective replace battery.
	3. Defective starter solenoid.	Replace the starter solenoid.
	4. Defective starter motor.	Repair or replace starter.
	5. Defective starter switch.	Replace the switch.
	6. Defective main fuse.	Check fuse. Replace if required.
Engine cranks but will not start.	1. Blocked fuel line.	Remove obstruction.
	2. Fuel filter clogged.	Clean or replace filter.
	3. Air leaks in the fuel system.	Tighten all fuel line fittings or clamps.
	4. Water in fuel system.	Drain water separator and tank if necessary to evacuate all water.
	5. Defective shut-off solenoid.	Check solenoid. Replace if defective.
	6. Defective fuel feed pump.	Replace the pump.
	7. Cylinder head locknuts loose.	Torque to proper specification.
Engine starts then stops.	1. Low fuel level.	Fill fuel tank.
	2. Fuel filter clogged.	Clean or replace the filter element.
	3. Air locks in the fuel system.	Tighten all fuel line connections and clamps.

Table 5-2. Troubleshooting (Cont'd)

TROUBLE	PROBABLE CAUSE	REMEDY
Engine starts then stops. (Cont'd)	4. Water in the fuel.	Drain the filter separator and tank if necessary to remove all water.
	5. Defective fuel feeling pump.	Replace the pump.
	6. Clogged air filter.	Clean the air filter.
	7. Defective engine run switch.	Replace the switch.
Engine smokes (white).	1. Oil level too high in crankcase.	Drain oil to proper level.
	2. Piston rings worn or sticking.	Replace rings.
Loss of power.	1. Choked air filter.	Service the filter.
	2. Clogged fuel filter.	Replace the filter.
	3. Incorrect fuel.	Drain and refill tank with proper fuel.
	4. Incorrect valve clearance.	Adjust to proper clearance.
	5. Fuel pump defective.	Replace the pump.
Engine stops.	1. Fuel tank empty.	Refill tank and prime injector system;
	2. Water in fuel.	Drain fuel system to evacuate all water and refill with fresh fuel.
	3. Shut off solenoid failure.	Replace the solenoid.
Hourmeter does not register.	1. Electrical connections loose or connected improperly.	Tighten and/or correct the connections.
	2. Hourmeter failure.	Replace the meter.
	– OPERATION –	
All console controls inoperative.	1. Control cable unplugged.	Connect cable.
	2. Blown fuse.	Find short. Replace fuse.

Table 5-2. Troubleshooting (Cont'd)

TROUBLE	PROBABLE CAUSE	REMEDY
Platform will not elevate.	1. Manual lowering valve open.	Close valve.
	2. Platform overloaded.	Observe maximum load rating.
	3. Ruptured hydraulic hose.	Replace the hose and check relief valve setting.
	4. Lift valve solenoid malfunction.	Test solenoid and replace if defective.
	5. Maximum height limit switch malfunction.	Test switch and wiring. Replace if defective.
	6. Circuit relief valve stuck open.	Replace the relief valve.
	7. Lift switch on control console defective.	Test switch, replace if defective.
	8. Mode switch defective.	Test the switch, replace if defective.
	9. Lift valve defective.	Repair or replace valve.
	10. Hydraulic pump defective.	Check for pressure and delivery. Repair or replace if defective.
	11. Down valve stuck open.	Remove and inspect the valve for sticky operation or damaged o-rings. Repair or replace if unserviceable.
Unit will not steer left. (Lift function operative.)	1. Left steering valve coil defective.	Test coil, replace if defective.
	2. Open circuit in control cable.	Test cable for continuity, replace if defective.
	3. Steering valve malfunction.	Test valve, replace if not serviceable.
	4. Mechanical damage.	Replace damaged parts.
	5. Steering switch defective.	Replace switch.
	6. Mode switch defective.	Replace switch.

Table 5-2. Troubleshooting (Cont'd)

TROUBLE	PROBABLE CAUSE	REMEDY
Unit will not steer left. (Lift function operative.)	7. Circuit relief valve stuck open.	Inspect the relief valve, replace if defective.
	8. Steering bypass valve open.	Close valve.
	9. Hydraulic pump defective. (Platform will not elevate.)	Check pump flow and pressure, replace if necessary.
Unit will not steer right. (Lift function operative.)	1. Right steering valve coil defective.	Test coil, replace if defective.
	2. Control cable defective.	Test cable, replace if defective.
	3. Steering switch defective.	Replace switch.
	4. Mode switch defective.	Replace switch.
	5. Steering valve not shifting.	Test the valve, if defective replace it.
	6. Mechanical damage.	Replace damaged parts.
	7. Circuit relief valve stuck open.	Check the valve, replace if defective.
	8. Steering bypass valve open.	Close valve.
	9. Lift valve stuck or defective. (Platform lifts when steering.)	Test valve, replace if defective.
Unit will not drive.	1. Free wheeling hubs disengaged, if applicable.	Engage hubs.
	2. Drive circuit solenoid valve malfunction.	Test solenoid, replace if defective.
	3. Brake not releasing.	Manually release brake.
	4. Control cable defective.	Test cable, replace if defective.
	5. Mode switches defective.	Test switches, replace if defective.
	6. Ruptured hydraulic hose.	Replace hose.

Table 5-2. Troubleshooting (Cont'd)

TROUBLE	PROBABLE CAUSE	REMEDY
Unit will not drive (Cont'd)	7. Joystick control malfunction.	Replace if defective.
	8. Circuit relief valve malfunctioning.	Test relief, replace if defective.
	9. Hydraulic pump defective.	Test pump pressure and delivery, replace if not serviceable.
	10. Hydraulic motors defective.	Test hydraulic pressure at drive circuit quick disconnects. If normal replace the motors.
Unit will not drive full speed.	1. Series valve solenoid malfunction.	Test solenoid, replace if defective.
	2. Bypass valve malfunction.	Test solenoid, replace if defective.
	3. Joystick control malfunction.	Test the control, replace if defective.
	4. Hydraulic motors worn.	Inspect the motors, replace if not serviceable.
	5. Hydraulic pump worn.	Check pump pressure and delivery, replace if not serviceable.
	6. Circuit relief valve stuck open.	Check relief valve, replace if defective.
	7. Drive range switch defective.	Replace switch.
Brake does not release.	1. Pressure line needle valve closed.	Open needle valve.
	2. Hand pump needle valve open.	Close needle valve.
	3. Brake cylinder mount bolts loose.	Position cylinder so that retracted cylinder rod clears the brake plate, then tighten mount bolts.
	4. Shuttle valve stuck.	Replace shuttle valve.

Table 5-2. Troubleshooting (Cont'd)

TROUBLE	PROBABLE CAUSE	REMEDY
Platform will not lower.	1. Blown fuse.	Locate electrical short then replace fuse.
	2. Down valve solenoid coil defective.	Test coil, replace if defective.
	3. Control cable defective.	Check cable, replace if defective.
	4. Down console switch defective.	Check switch, replace if defective.
	5. Mode switch defective.	Check switch, replace if defective.
Platform starts to lower then stops.	1. Hydraulic cylinder internal fuse blown (oil too high viscosity).	Raise platform slightly. Allow hydraulic oil to warm up, then lower platform.

5-6. ENGINE OIL, Perform the following procedure to replace the engine oil.

a. Operate the engine to allow the oil to warm to operating temperature.

b. Provide a suitable container to catch the used oil. Remove power module cover.

CAUTION

The oil will be of sufficient temperature to cause burns. Wear leather gloves when performing an oil change.

c. Shut down the engine.

d. Position the container to catch the oil then remove the plug from the engine crankcase.

e. When all the oil has drained, replace the plug.

f. Fill the crankcase to the full mark on the dipstick.

g. Operate the engine for a few minutes then shut it down and allow it to cool.

h. Check the oil level and add oil as necessary to bring the level up to the full mark.

5-7. ENGINE AIR CLEANER. Perform the following procedure to replace the air filter.

a. Remove the air cleaner rod extension nut to remove the cover.

b. Remove the filter element.

c. Remove any dirt or debris present around the air cleaner and on the interior of the cover.

d. Install a replacement filter element and the air cleaner cover on the engine.

e. Check that the air cleaner cover is properly seated on the air cleaner mounting plate.

f. Install the rod extension nut and tighten securely.

5-8. HYDRAULIC OIL TANK FILTER AND STRAINER (Figure 5-2).

a. Operate the engine or electric motor to bring the hydraulic oil up to normal operating temperature.

b. Provide a suitable container to catch the drained oil.

CAUTION

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

c. Remove the drain plug (7) and allow all the oil to drain.

NOTE

It may be necessary to remove the filler cap (8) to break any vacuum that may develop as the oil drains.

d. Reinstall the drain plug (7).

e. Remove the capscrews (2) and cover (3) taking care not to damage the gasket (4).

f. Unscrew the suction strainer (5).

g. Clean the strainer in an approved solvent.

h. Replace the strainer within the hydraulic reservoir.

i. Replace the gasket (4) if damaged during the removal of the cover.

j. Position the cover (3) and secure with capscrews (2).

k. Unthread the return filter (1) from the filter head.

1. RETURN FILTER
2. CAPSCREW
3. COVER
4. GASKET
5. SUCTION STRAINER
6. HYDRAULIC RESERVOIR
7. PLUG
8. FILLER CAP

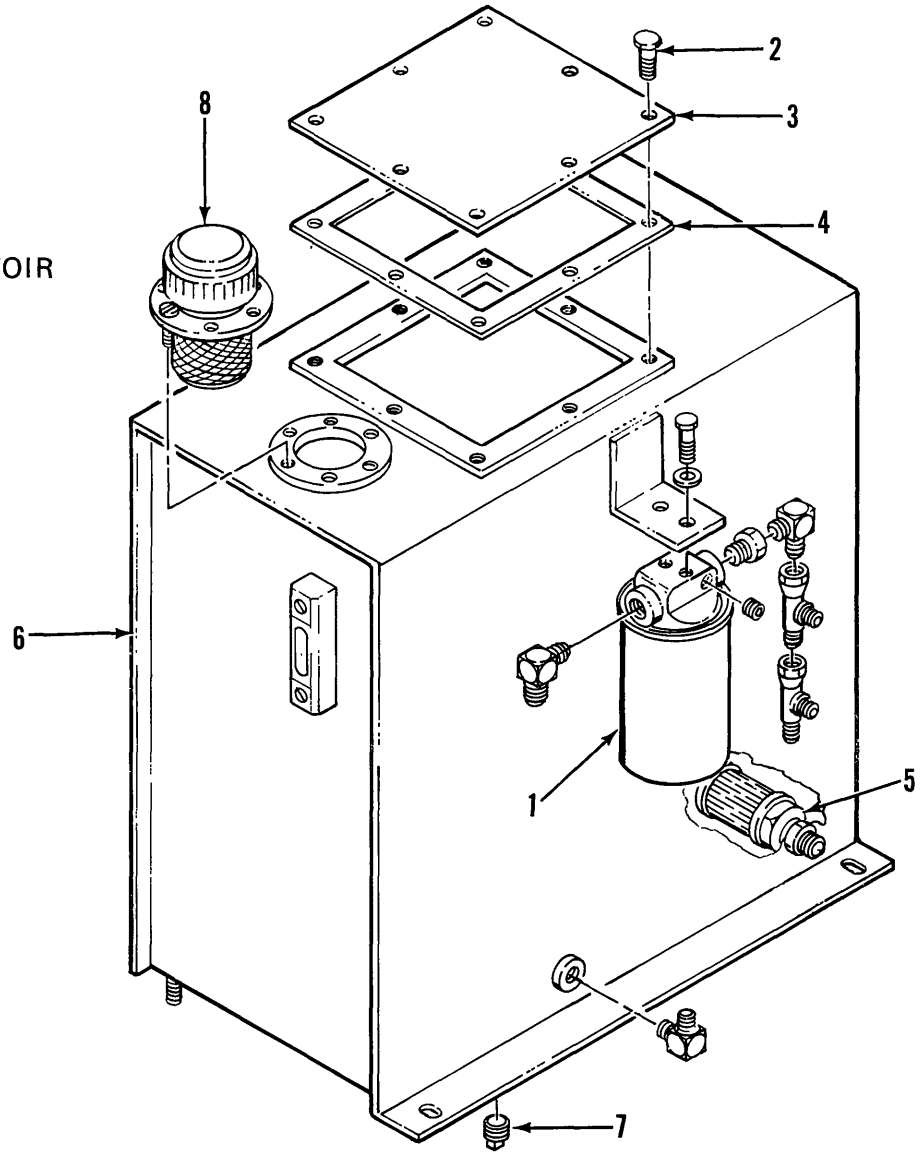


Figure 5-2. Hydraulic Oil Tank, Filter and Strainer

l. Apply a thin film of clean oil to the gasket of the replacement filter.

m. Thread the replacement filter onto the filter head until the gasket makes contact then rotate the filter 3/4 of one turn further.

n. Fill the hydraulic reservoir with the specified hydraulic oil.

5-9. POWER MODULE (ELECTRIC OR DUAL FUEL)

a. Removal (Figure 5-3). Perform the following procedure to disconnect and remove the power module.

NOTE

The hose connections at each end of the power module have metal identification tags to aid maintenance personnel in relocating and connecting the hoses during assembly.

(1) Disconnect the hydraulic and fuel hoses (1) at each end of the power module (2).

(2) Disconnect the control console cable plug (3) from the receptacle on the front of the power module.

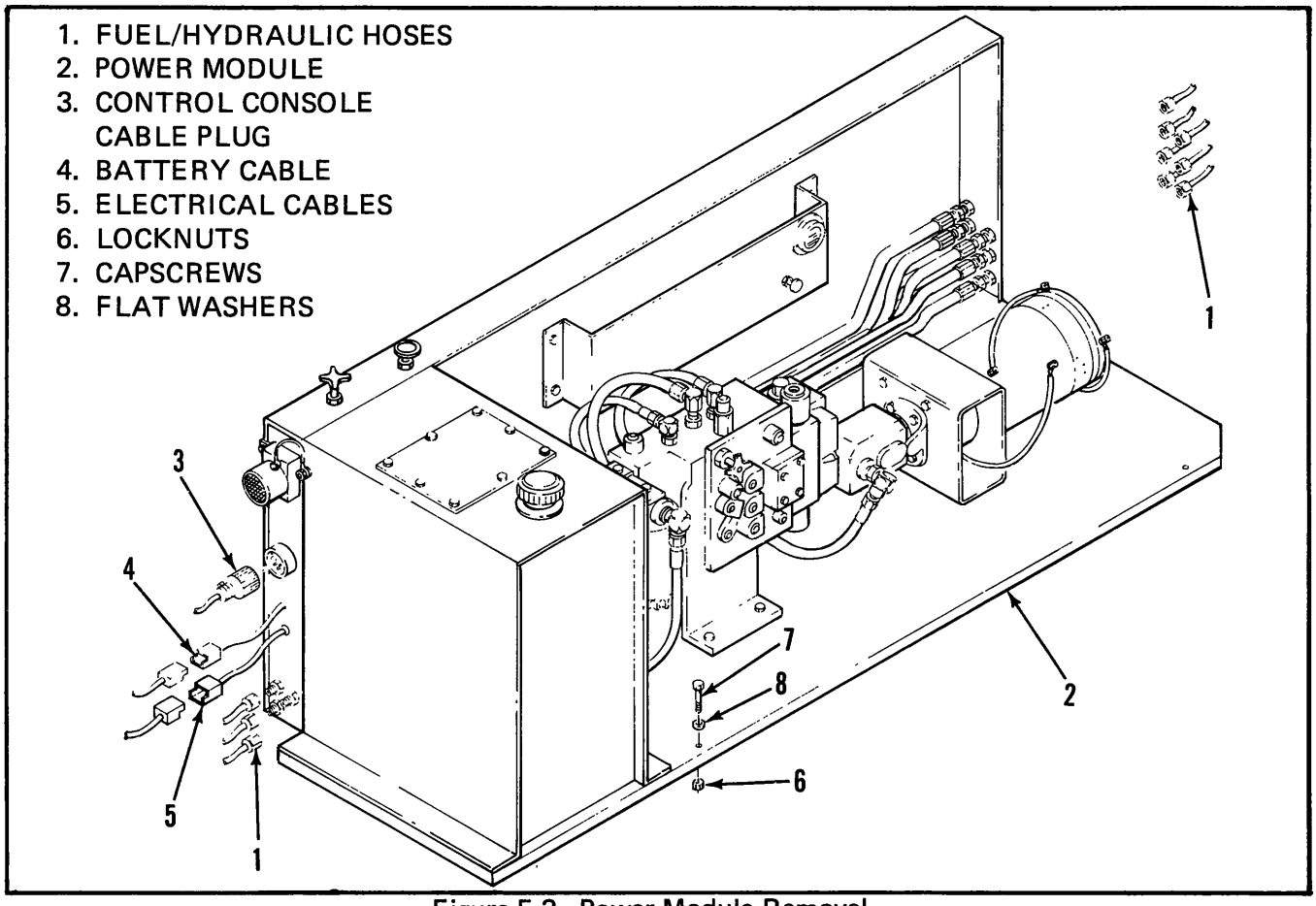


Figure 5-3. Power Module Removal

(3) Unplug the battery cable (4) and electrical (5) connections on the front of the power module.

(4) Remove the power module cover.

(5) Remove the locknuts (6), capscrews (7) and flat washers (8) securing the module to the chassis.

(6) Position a forklift under the module and raise the module up off the chassis.

CAUTION

Check around the module to be sure no cables or hoses remain connected.

(7) Remove the module from the unit.

b. Installation.

(1) Position the power module (2) on the chassis and install the capscrews (7), flatwashers (8) and locknuts (6) to secure the module to the chassis.

(2) Connect the control console cable plug (3) to the power module (2).

(3) Connect the battery cable (4) and electrical (5) connections to the chassis receptacles.

(4) Connect the hydraulic and fuel hoses, if applicable, to the module.

(5) Check that the engine, if equipped, crankcase has the proper amount of oil.

(6) Check that the hydraulic reservoir is filled to within 3 inches of the top.

(7) Start the engine or electric motor and operate all the hydraulic functions through their entire range of travel to expel any trapped air.

(8) Install the power module cover.

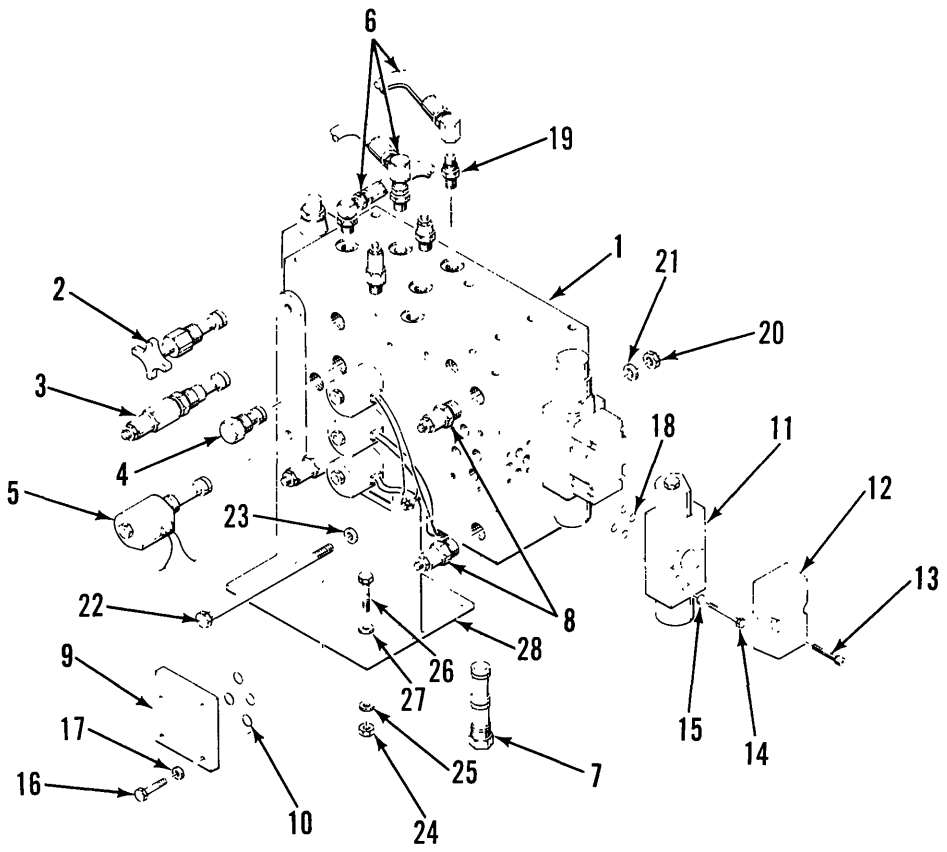
5-10. HYDRAULIC MANIFOLD (Figure 5-4).

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

b. Disassembly.

NOTE

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



1. MANIFOLD
2. NEEDLE VALVE
3. RELIEF VALVE
4. CHECK VALVE
5. SOLENOID VALVE
6. HYDRAULIC HOSES
7. SHUTTLE VALVE
8. COUNTER BALANCE VALVE
9. ADAPTER BLOCK
10. O-RING
11. DIRECTIONAL CONTROL VALVE
12. COVER
13. CAPSCREW
14. CAPSCREW
15. LOCKWASHERS
16. CAPSCREW
17. LOCKWASHER
18. O-RING
19. MALE FITTING
20. NUT
21. LOCKWASHER
22. CAPSCREW
23. FLAT WASHER
24. NUT
25. LOCKWASHER
26. CAPSCREW
27. FLAT WASHER
28. BRACKET

Figure 5-4. Hydraulic Manifold

(1) Unscrew the needle valve (2), relief valve (3), check valve (4), counterbalance valves (8) and the shuttle valve (7).

(2) Tag and disconnect the electrical leads to the solenoid valves (5) then remove the valves from the manifold.

(3) Remove the capscrews (13) to remove the covers (12) to allow access to the capscrews (14) and lockwashers (15).

(4) Tag and disconnect the electrical leads to the directional control valves (11) then remove the capscrews (14), lockwashers (15), valve (11) and o-rings (18).

(5) Tag and disconnect the hydraulic hoses (6) then unscrew the male fittings (19).

(6) Unscrew any remaining valves and hydraulic hoses, and disconnect any remaining electrical connections.

(7) Remove the capscrews (16), lockwashers (17), adapter block (9) and o-rings (10).

c. Removal.

(1) Remove the nuts (20), lockwashers (21), capscrews (22) and flat washers (23) to release the manifold (1) from the mounting bracket (28).

(2) Remove the nuts (24), lockwashers (25), capscrews (26) and flat washers (27) to release the mounting bracket (28) from the power module.

d. Cleaning and Inspection.

(1) Mark the location of each plug - then remove the plugs.

(2) Wash the manifold in an approved solvent to eliminate all contaminants then blow out all passages with filtered compressed air.

(3) Inspect the manifold for cracks, thread damage and scoring where valve mechanisms slide against internal surfaces.

(4) Inspect each valve mechanism for thread damage, worn or cracked o-rings and proper operation.

(5) Check the mounting bracket (28) for stress cracks.

(6) Replace parts found not serviceable.

(7) Replace o-rings (10 and 18).

e. Assembly and Installations.

(1) Position the mounting bracket (28) in place on the manifold (1) and secure with capscrews

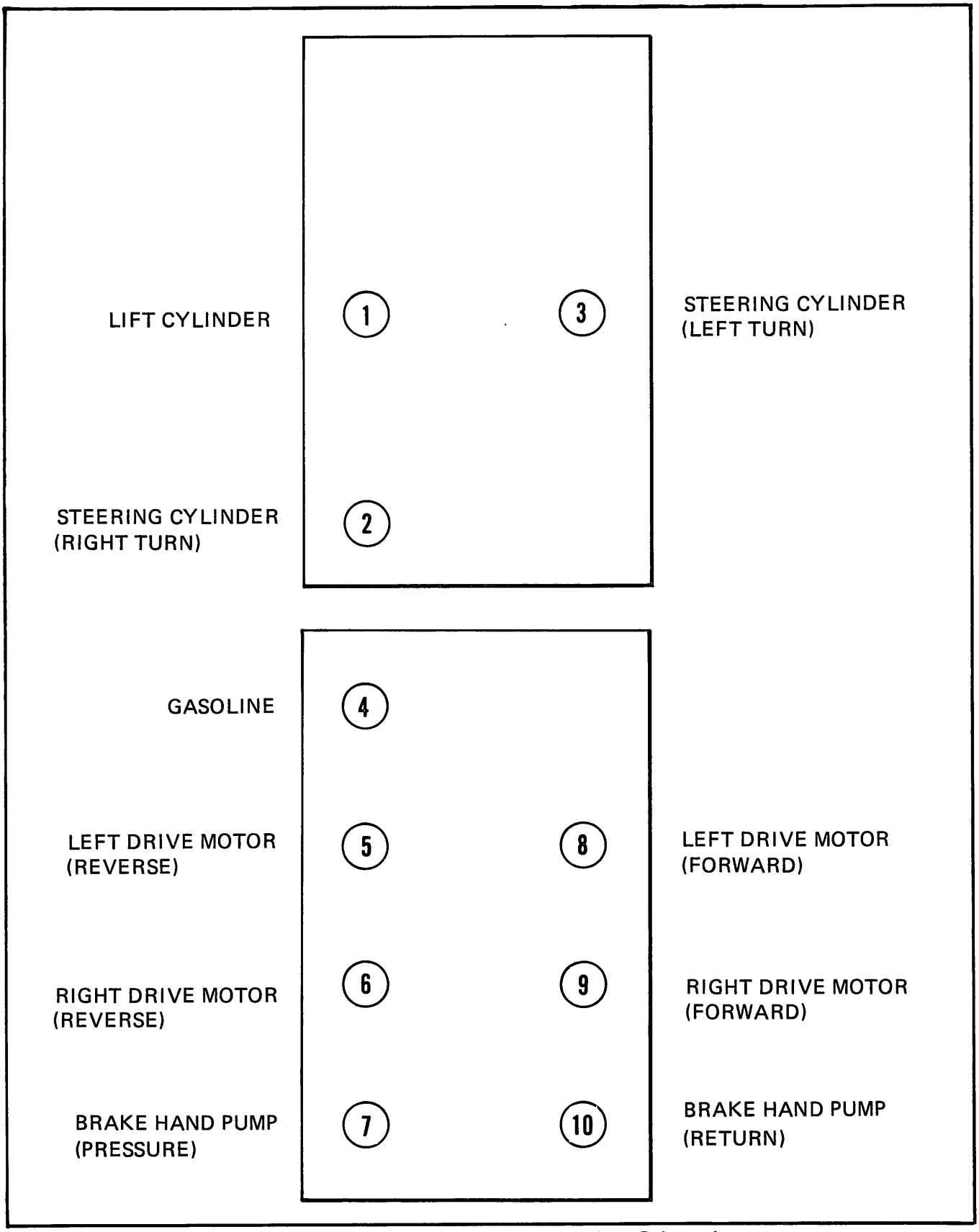


Figure 5-5. Power Module Junction Hose Orientation

(22), flat washers (23), lockwashers (21) and nuts (20) then install any plugs that were removed for cleaning.

(2) Position the manifold and mounting bracket assembly on the power module and install the capscrews (26), flat washers (27), lockwashers (25) and nuts (24).

(3) Install the solenoid valves (5) and connect their electrical leads.

(4) Position the replacement o-rings (18) in place and install the directional control valves (11). Secure with capscrews (14) and lockwashers (15), then install the covers (12) and capscrews (13). Connect their electrical leads.

(5) Position the replacement o-rings (10) in place and install the adapter block (9). Secure with capscrews (16) and lockwashers (17).

(6) Install the shuttle valve (7), check valve (4), relief valve (3) and needle valve (2).

(7) Install the male fittings (19) then connect the hydraulic hoses (6).

(8) Connect any remaining hydraulic hoses.

(9) Start the engine or electric motor and operate each hydraulic function through its entire range of travel several times to expel any air trapped in the system.

(10) Check for proper operation and leaks.

5-11. SETTING HYDRAULIC PRESSURES.

NOTE

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

a. Main Pump Relief Valve.

(1) Refer to Figure 5-5 and disconnect the lift cylinder hose (1) and install a flow meter, pressure gage and needle valve test set with a hose to return the oil to the hydraulic reservoir.

(2) Operate the engine or electric motor 10 to 15 minutes to warm the oil.

(3) Refer to Figure 5-6 and loosen the locknut on the lift circuit relief valve (4).

(4) Screw the adjusting screw IN until it bottoms, to increase that valve's pressure setting high enough to render that valve inoperative, causing the main relief valve (5) to open first.

(5) Position the mode switch to LIFT.

(6) Position the lift switch to UP and hold it there.

1. COUNTERBALANCE VALVE (FORWARD)
2. COUNTERBALANCE VALVE (REVERSE)
3. STEERING RELIEF VALVE
4. LIFT CIRCUIT RELIEF VALVE
5. MAIN PUMP RELIEF VALVE
6. DESCENT RATE ADJUSTMENT VALVE
7. NEEDLE VALVE (BY-PASS FLOW RATE ADJUSTMENT)
8. HYDRAULIC MANIFOLD
9. GAUGE PORT PLUG

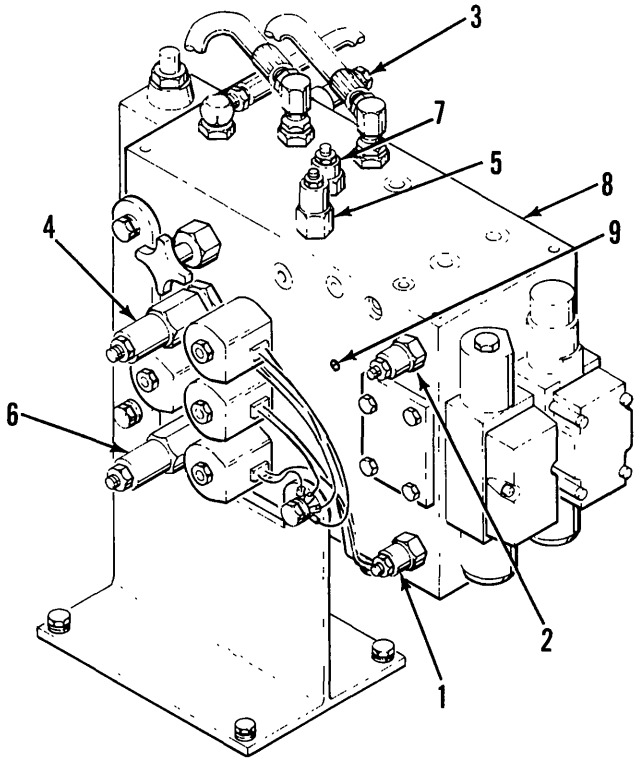


Figure 5-6. Hydraulic Pressure Adjustment

(7) Observe the pressure gage as the needle valve is closed.

(8) Loosen the locknut on the main relief valve (5) and screw the adjusting screw OUT to reduce that valve's pressure setting to 2500 psi.

(9) Slowly screw the adjusting screw of the main relief valve (5) IN to increase the pressure to 2950 psi then lock the adjusting screw with the lock nut.

(10) Refer to the following paragraph 5-11b. and reset the lift circuit relief valve.

(11) Release the lift switch, then remove the test set from the lift circuit hose.

(12) With the platform fully lowered, check the hydraulic fluid level and replace any oil lost during the test.

(13) Operate the lift function to expel any trapped air and check for leaks.

b. Lift Circuit Relief Valve.

(1) Remove the gauge port plug (9, Figure 5-6) and install a 3000 psi pressure gauge, or if the main relief valve has just been adjusted, leave the test set connected to the power module but remove the return line hose from the test set and connect the test set to the hose leading to the lift cylinder.

(2) Operate the engine or electric motor 10 to 15 minutes to warm the hydraulic oil.

(3) Position a 1500 lb. load centered on the platform.

(4) Position the mode switch to LIFT.

(5) Position the lift switch to UP and hold it there and observe the pressure gauge.

(6) Loosen the locknut on the lift circuit relief valve (4, Figure 5-6) 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 to approximately 2500 psi the platform should start to lift. Lock the adjustment screw with the locknut just as the platform starts to rise. This pressure setting limits the lifting capability of the unit to 1500 lbs.

NOTE

The pressure setting may vary as much as 200 psi either way from 2500 psi.

(8) Release the lift switch and shut down the engine or electric motor.

(9) Remove the pressure gauge from the gauge port and install the plug or remove the test set from the lift circuit and reconnect the hose to the power module.

(10) Operate the lift circuit again to expel air trapped in the system and check for leaks.

c. Steering Relief Valve.

NOTE

Check that the steering by-pass valve, if equipped, is closed to test the steering pressure.

(1) Disconnect the hydraulic hose (3, Figure 5-5) to the left steer cylinder at the power module junction and install a flow meter, pressure gauge and needle valve test set. Attach the disconnected hose to the other end of the test set to complete the circuit.

(2) Operate the engine or electric motor 10 to 15 minutes to warm the hydraulic oil.

(3) Position the mode switch to DRIVE.

(4) Position the steer switch to LEFT and hold it there. Observe the pressure gauge as the steer cylinder bottoms.

(5) The gauge should read 1000 psi with the cylinder bottomed. If not, loosen the locknut on the steering relief valve (3, Figure 5-6).

(6) Back the adjustment screw OUT until the pressure drops to 900 psi then slowly turn the screw IN to raise the pressure to 1000 psi. Lock the screw with the locknut.

(7) Release the steer switch, shut down the engine or electric motor and remove the test set from the steering circuit.

(8) Reconnect the steer cylinder hose and operate the steering system to expel trapped air and check for leaks.

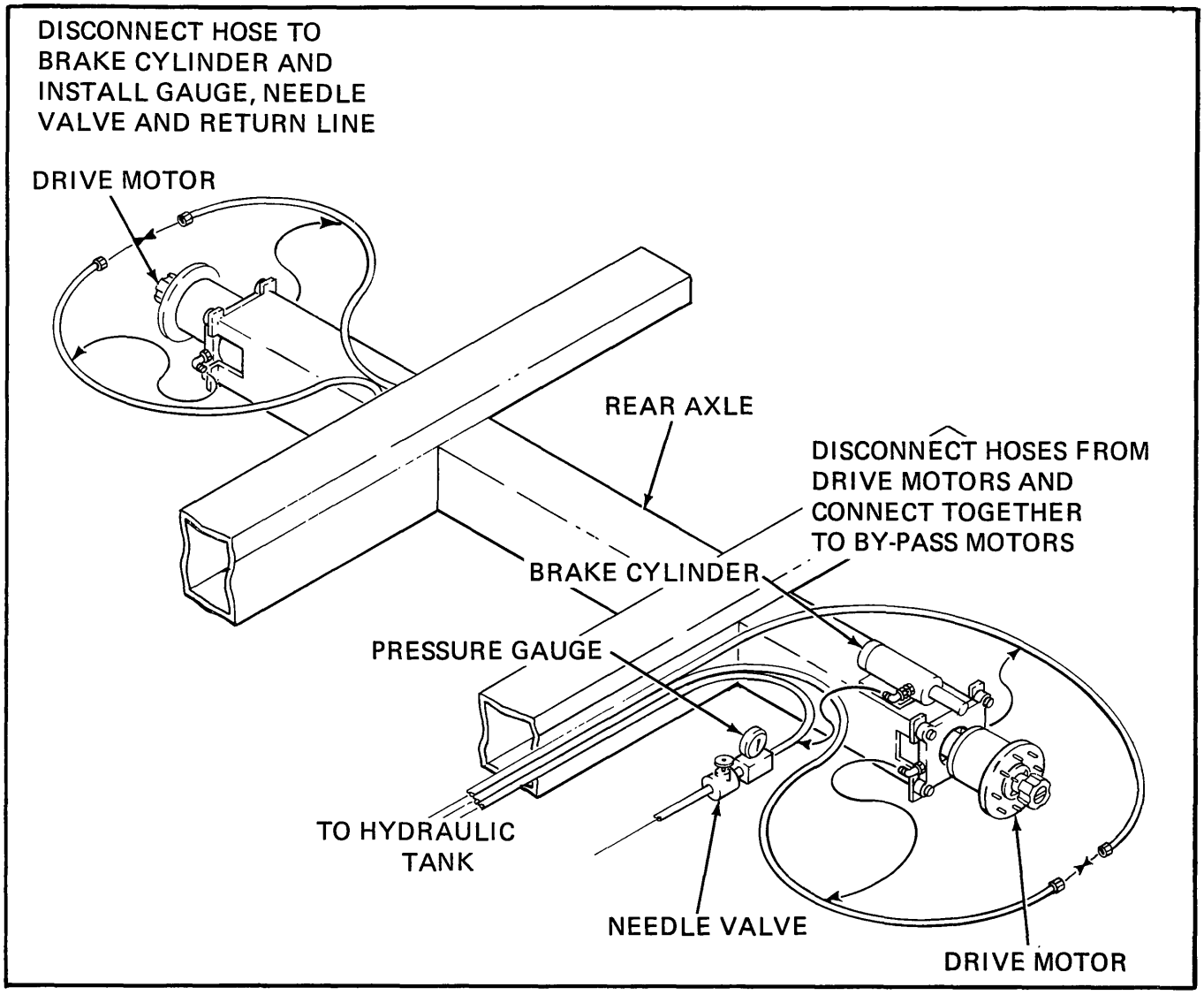


Figure 5-7. Counterbalance Valve Test Procedures

d. Counterbalance Valve.

(1) Disconnect the hydraulic hose from the brake cylinder and connect a pressure gauge and needle valve with a return line to the hydraulic reservoir.

(2) Disconnect the two hydraulic hoses to each drive motor and connect them together thus, by-passing the drive motors (Figure 5-7).

(3) Remove the adjusting caps from the counterbalance valves (1 and 2, Figure 5-6).

(4) Operate the engine or electric motor 10 to 15 minutes to warm the hydraulic oil.

(5) Position the mode switch to DRIVE.

(6) Position the joystick to FORWARD.

(7) Close the needle valve on the brake hose.

(8) Adjust the REVERSE counterbalance valve (2, Figure 5-6) by turning the adjustment screw OUT until the pressure gauge indicates 1000 psi then slowly turn the screw IN until the gauge indicates 500 psi. Lock adjustment with the locking cap.

(9) Position the joystick control to REVERSE.

(10) Adjust the FORWARD counterbalance valve by turning the adjustment screw OUT to achieve 1000 psi then slowly turn the screw IN to reach 500 psi. Lock the adjustment with the lock cap.

(11) Return the joystick to neutral.

(12) Reconnect the hoses to the drive motors.

(13) Remove the gauge and needle valve from the brake circuit and reconnect the hose to the brake cylinder. Bleed the brake cylinder of trapped air.

(14) Operate the drive system and check for leaks.

5-12. HYDRAULIC PUMP.

a. Removal (Figure 5-8).

NOTE

If the hydraulic reservoir has not been drained, provide a means of plugging hose assembly (1) to prevent fluid loss.

(1) Disconnect the hose assemblies (1, 2 and 3) and plug them.

1. HOSE ASSEMBLY
2. HOSE ASSEMBLY
3. HOSE ASSEMBLY
4. SET SCREW
5. SET SCREW
6. 3 PIECE COUPLING
7. NUT
8. LOCKWASHER
9. PUMP
10. KEY

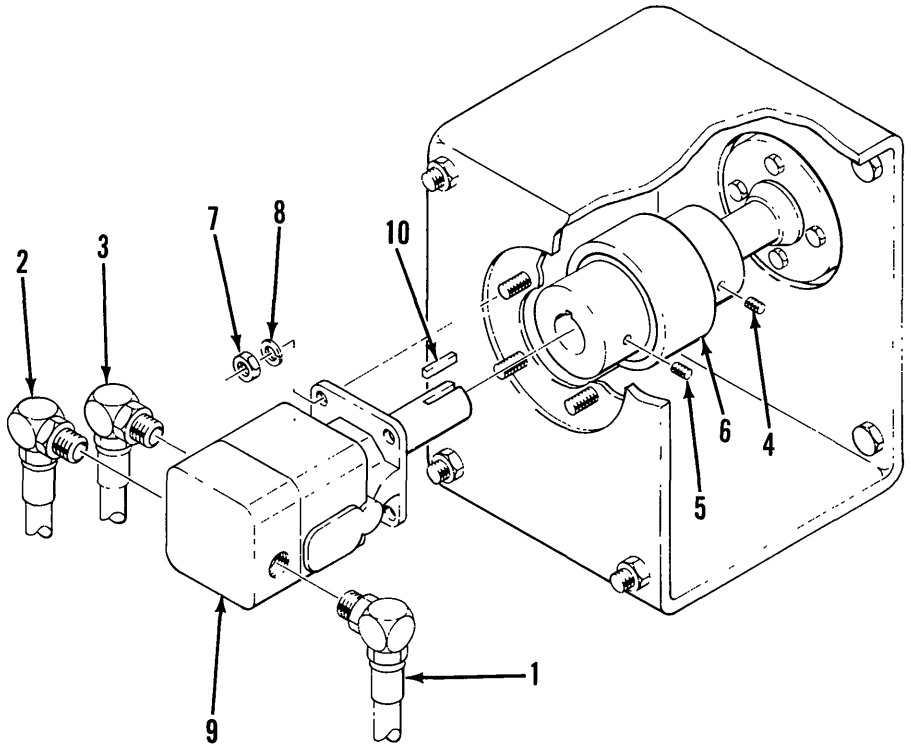


Figure 5-8. Hydraulic Pump Removal

1. SQUARE KEY
2. HEX BOLTS
3. GEAR HOUSING
4. GASKET
5. IDLER SHAFT
6. SNAP RING
7. GEAR
8. PIN
9. IDLER SHAFT
10. GEAR
11. STATOR
12. GASKET
13. KEY
14. IDLER SHAFT
15. SNAP RING
16. GEAR
17. PIN
18. IDLER SHAFT
19. SHAFT
20. SNAP RING
21. GEAR
22. PIN
23. BEARING
24. SEAL
25. PIN
26. GEAR HOUSING
27. SCREW
28. NAMEPLATE

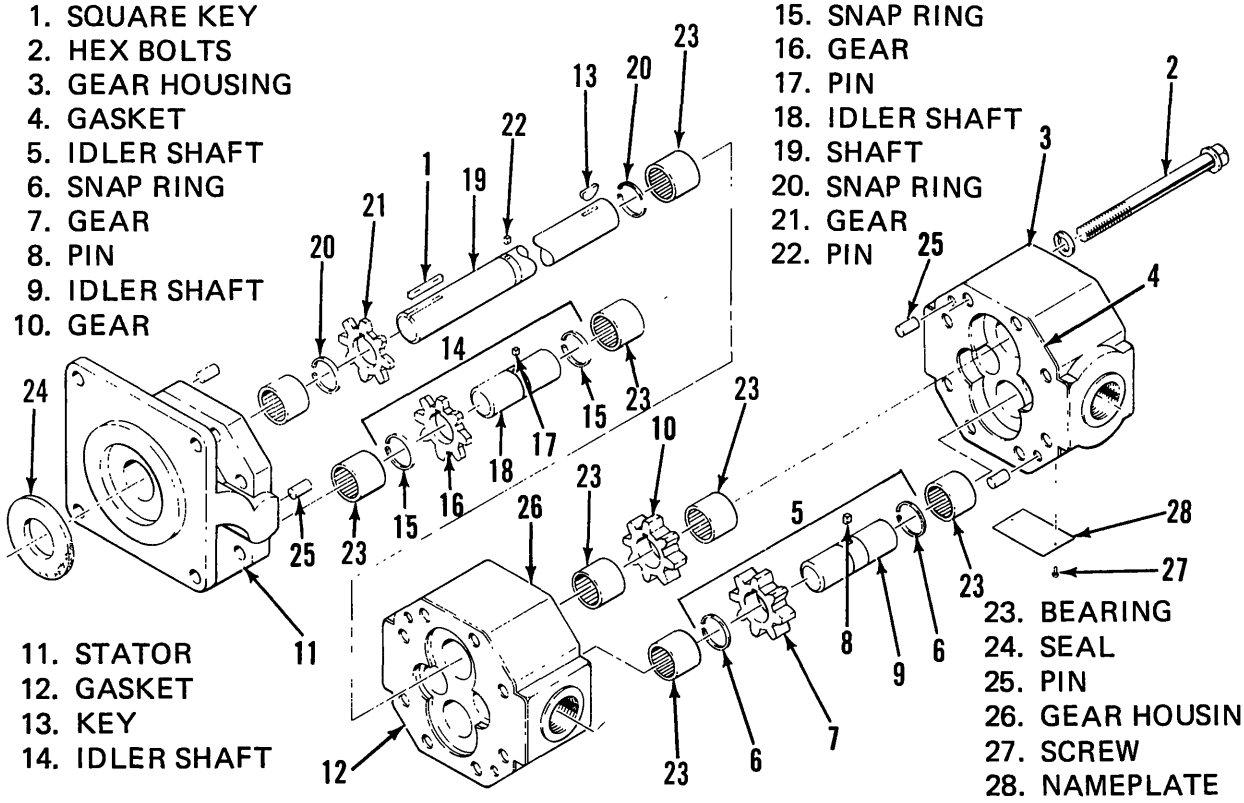


Figure 5-9. Hydraulic Pump Disassembly

(2) Loosen the setscrews (4 and 5) then slide the three piece coupling (6) toward the engine, or electric motor, as far as possible.

(3) Remove the nuts (7) and lockwashers (8) to free the pump (9) from the mount.

(4) As the pump (9) is maneuvered away from the mount, slide the coupling off the pump shaft. Take care to retain the key (10).

b. Disassembly and Inspection (Figure 5-9).

NOTE

Prepare a clean work surface on which to disassemble the hydraulic pump.

(1) Remove the eight hex bolts (2) in an alternating pattern from side to side.

(2) Separate the rear gear housing (3) from the rest of the pump assembly taking care not to damage the gasket (4).

(3) Withdraw the idler shaft (5), and examine the shaft for pitting, discoloration or other signs of excessive wear. Check the teeth of the gear (7) for surface irregularities or cracks, check the sides for scoring.

NOTE

If worn, the gears (7 and 10) must be replaced as a set.

(4) If the shaft (9) is worn, remove the bearings (23) from the gear housings (3 and 26) using a suitable puller and install replacements.

(5) Remove the snap rings (6) from the idler shaft (9) and slide the gear (7) off the shaft taking care to retain the pin (8).

(6) Slide the gear (10) off the shaft (19) and remove the key (13).

(7) Separate the gear housing (26) from the stator (11) taking care not to damage the gasket (12).

(8) Withdraw the idler shaft assembly (14) and examine the shaft for surface irregularities, discoloration or scoring. Check the gears (16 and 21) for pitting, discoloration, scoring or other signs of excessive wear.

NOTE

If worn, the gears (16 and 21) must be replaced as a set.

(9) Remove the snap rings (15) from the idler shaft (18) then slide the gear (16) from the shaft taking care to retain pin (17).

(10) If the shaft ends are worn, remove the bearings (23) from the stator (11) and gear housing (26) using a suitable puller and install replacements.

(11) Remove the snap rings (20) from the shaft (19) and slide the gear (21) off the shaft taking care to retain pin (22).

(12) If the seal (24) requires replacement, use a puller to remove it and press in replacement.

c. Assembly.

(1) Press seal (24) into the stator then lubricate the seal with grease.

(2) Install the bearings (23) within the stator, the gear housings (26 and 3) and lubricate with clean hydraulic oil.

(3) Assemble the shaft (19), pin (22), gear (21) and snap rings (20).

(4) Wrap the key slot end of the shaft (19) with cellophane to protect the seal (24) then slide the shaft assembly through the stator (11).

(5) Assemble the idler shaft (18), pin (17), gear (16) and snap rings (15).

(6) Position the idler shaft assembly (14) in the stator (11).

(7) Position the gasket (12) on the face of the stator (11) using the pins (25) to locate the gasket.

(8) Assemble the gear housing (26) onto the stator assembly.

(9) Install the key (24) in the shaft (19) then slide the gear (10) onto the shaft, over the key (24), against the face of the gear housing (26).

(10) Assemble the idler shaft (9), pin (8), gear (7) and snap rings (6), then position the assembly on the gear housing (26) with the gears (7 and 10) meshed.

(11) Position the gasket (4) on the face of the gear housing (3) using the pins (25) as locators.

(12) Install the gear housing (3) onto the rest of the pump assembly and secure with hex bolts (2), tightening them in small increments and alternating from side to side.

5-13. ENERGY MODULE.

NOTE

It is not necessary to remove the energy module (electric or dual fuel) to service the module components. Prior to servicing, a determination should be made as to whether or not the module should be removed.

a. Removal.

(1) Tag and disconnect the fuel lines for the dual fuel system energy module.

(2) Disconnect the battery cable plug from the frame connection.

(3) Remove the mounting nuts, flat washers and capscrews as described in paragraph 5-9a.

(4) Position a fork lift truck under the energy module, lift and back away.

b. Installation.

(1) Position the energy module on the unit frame and secure with capscrews, flat washers and nuts as described in paragraph 5-9b.

(2) Connect the battery cable plug to the frame connection.

(3) Connect the fuel lines for the dual fuel system energy module.

(4) Operate the engine or electric motor to check for proper operation of the energy modules components.

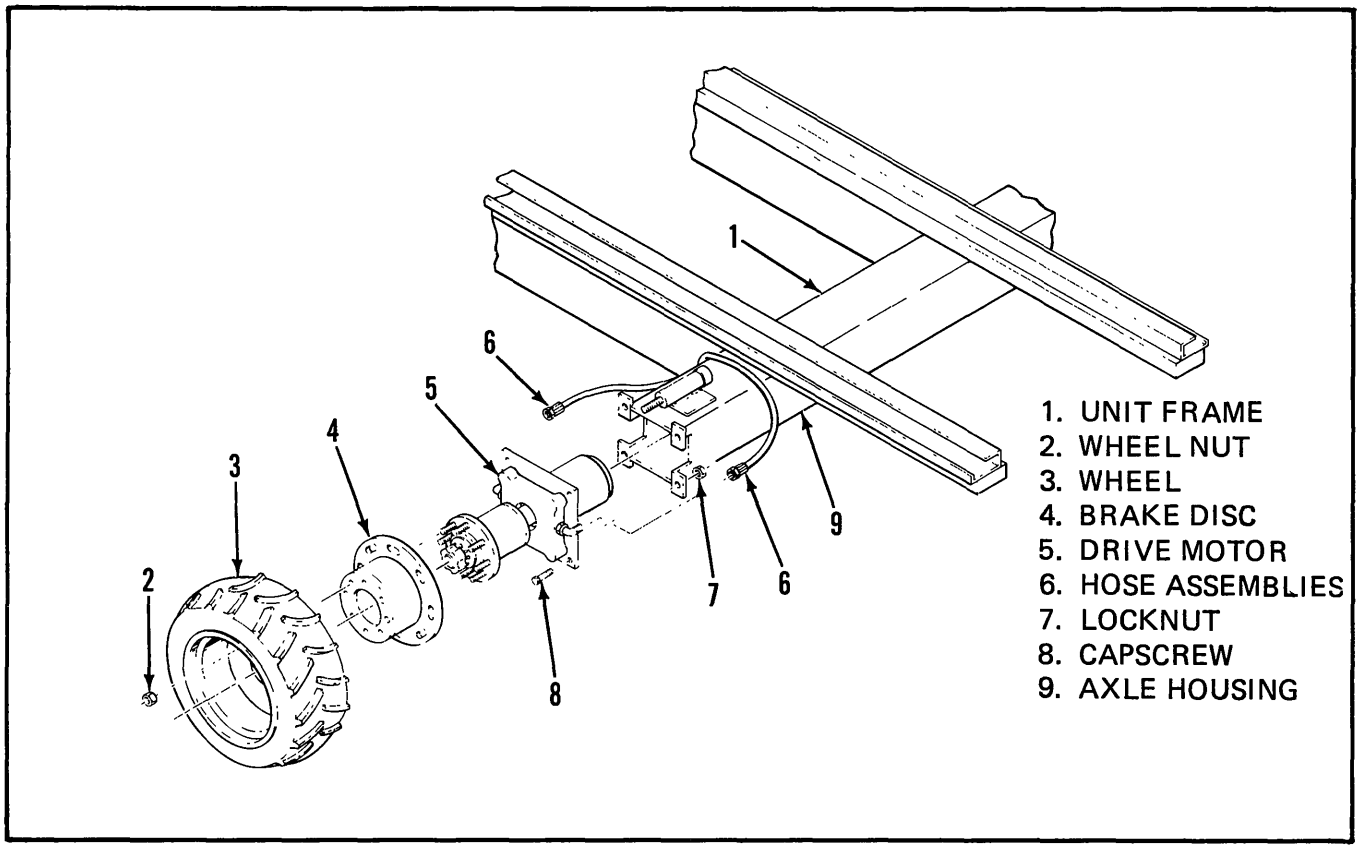


Figure 5-10. Drive Motor Removal (Optional)

5-14. OPTIONAL HYDRAULIC DRIVE MOTOR AND HUBS.

a. Removal (Figure 5-10).

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

(2) Use a 1.5 ton capacity jack to raise the desired rear corner.

NOTE

The brake will prevent the left rear wheel from turning thus, allowing the wheel nuts to be loosened with the wheel off the ground. When removing the right side rear wheel, loosen the wheel nuts prior to raising the wheel off the ground.

WARNING

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

(3) Remove the wheel nuts (2), wheel (3) and brake disc (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.

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

(5) Remove the locknuts (7) then slide the drive motor (5) out of the axle housing (9).

b. Disassembly and Inspection.

NOTE

It is not necessary to disassemble the drive hub assemblies to service the drive motors. If it is necessary to disassemble any of the component parts, make sure that a clean work bench or table is used. All parts should be cleaned separately in clean solvent and blown dry with air to avoid nicks and burrs.

(1) Refer to Figure 5-11 and bend down lock tabs of the lockwashers (2) to allow removal of the capscrews (1) and the de-clutch assembly (3).

1. CAPSCREW
2. LOCKWASHER
3. DE-CLUTCH ASSEMBLY
4. RETAINER RING
5. BEARING HOUSING
6. BEARING
7. RETAINING RING
8. BEARING
9. RETAINING RING
10. DRIVE MOTOR

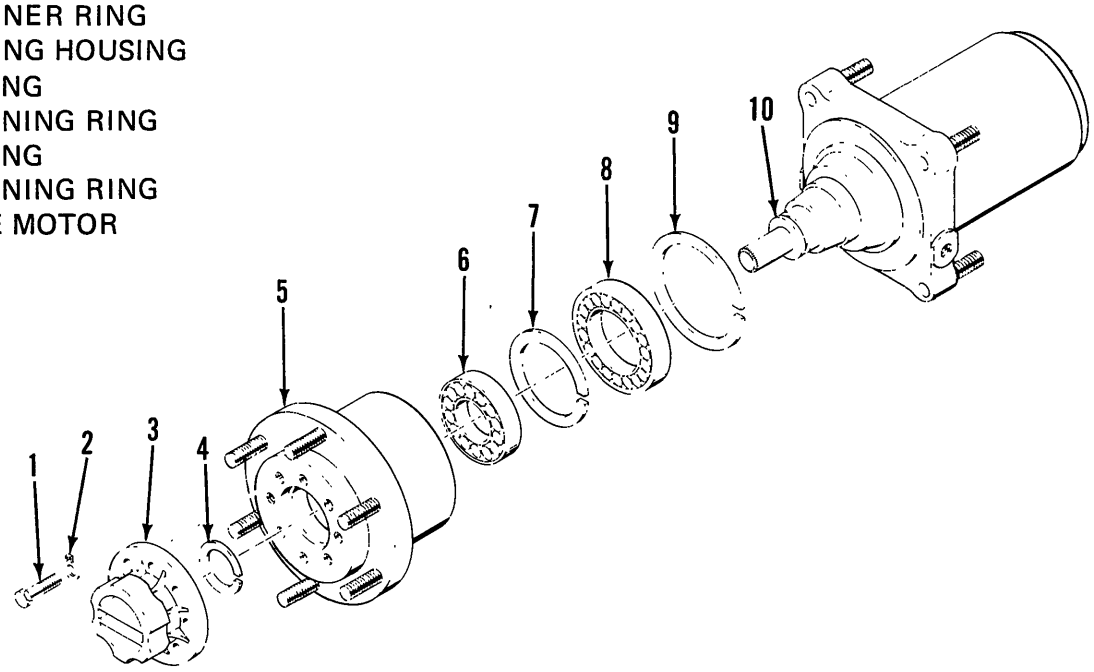


Figure 5-11. Free Wheeling Hub

(2) Remove the retaining ring (4) then slide the bearing housing (5) and attached parts from the drive motor housing (10).

(3) Remove the retaining ring (9) to free the bearing (8).

(4) Remove the retaining ring (7) to free the bearing (6).

(5) Refer to Figure 5-12. Clamp the motor assembly by the housing (25), in a vise with the shaft (16) pointing down.

(6) Remove the seven special capscrews (1) to allow removal of the end cover assembly (2) by inserting a screwdriver between the end cover and the sleeve (5) and prying up. Remove the seal ring (4) with the end cover then remove and discard the seal ring (4).

(7) Remove the commutator ring (6), seal ring (7), commutator (8) and manifold (9) by using two of the capscrews (1) as a lifting tool.

(8) Use compressed air to separate the seal ring (7) from the commutator (8) then discard the seal ring.

(9) Inspect the manifold (9) for cracks and replace if damage is evident.

(10) Remove the manifold plate (10) by using the two capscrews (1) as a lifting tool.

CAUTION

DO NOT drop these parts while handling.

(11) Remove the stator (11), rotor (12) and vanes (13) again by using two capscrews (1) as a lifting tool.

(12) Inspect the rotor outside lobes for pits and wear marks. If wear is evident, replace the rotor set (stator, rotor and vanes).

(13) Remove the sleeve (5) by prying it from the housing (25) with a screw driver. Remove any rust by lightly sanding.

(14) Remove and discard the seal ring (17).

NOTE

DO NOT REMOVE the thrust washers and bearing (19, 21, 20 and 18) unless damage is evident or the shaft seals require replacement.

(15) If the bearings require replacement, press out the thrust washers and bearing (19, 20 and 21) as well as the bearing (18). The housing (25) face should be placed on a wood block to protect it during the pressing operation. Discard the thrust washers and bearing, replace with new ones, as they may have been damaged when pressed out.

(16) Remove the seal (22), back-up washer (23) and seal (24). Discard the seals (22 and 24).

c. Assembly.

CAUTION

Before starting assembly, clean all parts with clean solvent and blow dry with air. Be sure all paint chips have been removed. Lubricate all seals before assembly with SAE 10W-40 oil or clean grease.

(1) Clamp the housing (25) in a vise with the small bore end pointing down. Apply clean grease to seal (24) and install in the housing (25).

(2) Hold the back-up washer (23) between the thumb and index finger and slightly collapse to facilitate installation into the housing.

(3) Grease the seal (22) and install in the housing (25).

(4) Assemble the replacement thrust washer (21), thrust bearing (20) and thrust washer (19) in the housing.

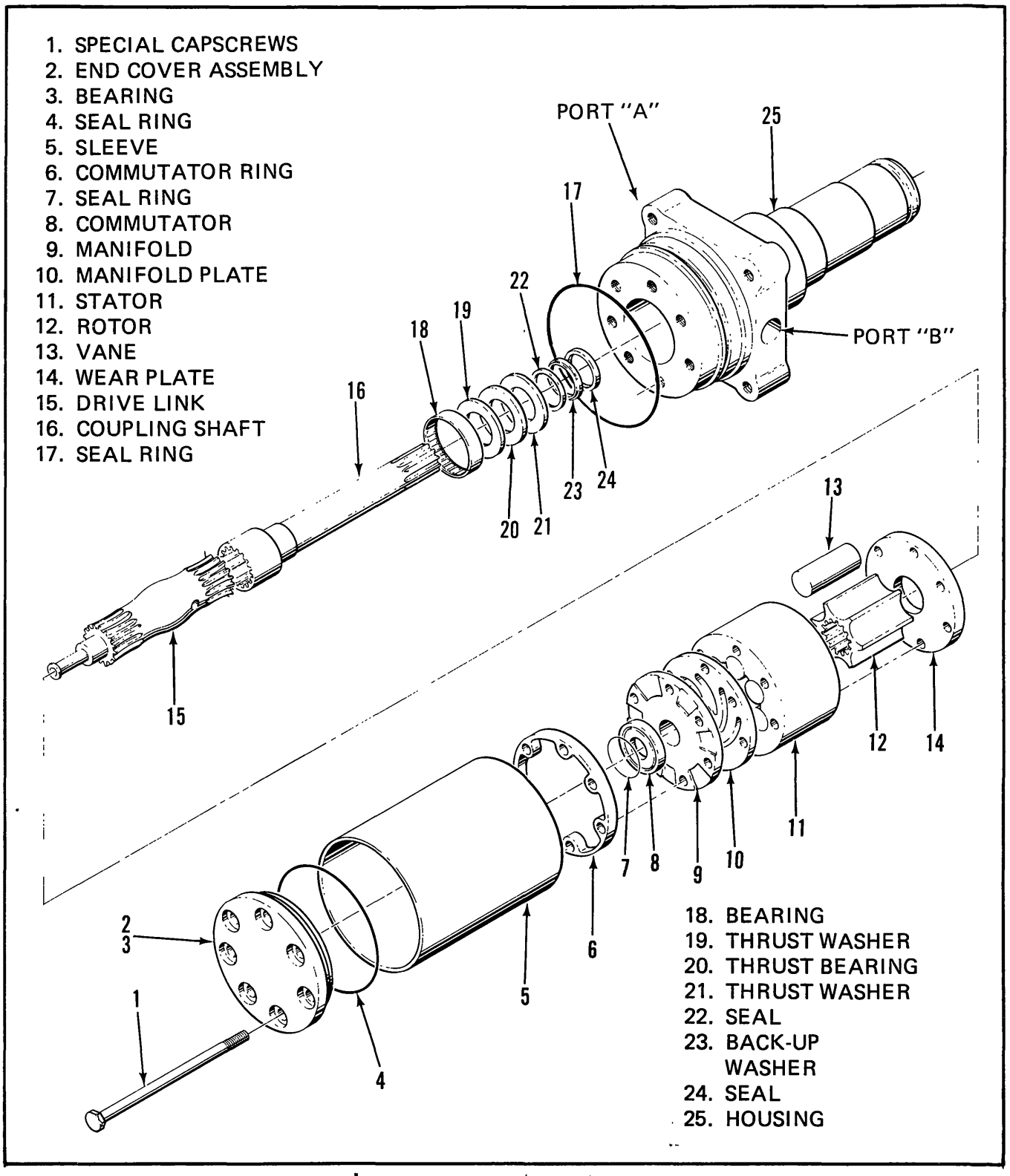


Figure 5-12. Drive Motor (Optional)

(5) Press the bearing assembly (18) into position within the housing.

(6) Wrap the splines of the coupling shaft (16) to prevent damage to the seals (22 and 24) then install the coupling shaft.

(7) Install the drive link (15) aligning the hole in the drive link with the one in the coupling shaft.

(8) Install the wear plate (14).

(9) Install the rotor set (11, 12 and 13) with the counter bore of the rotor (12) facing down.

(10) Install the manifold plate (10), manifold (9) and the commutator ring (6).

(11) Install the commutator (8) and seal ring (7).

(12) Install replacement seal rings (17 and 4) on the housing assembly (25) and end cover (2).

(13) Apply a generous amount of petroleum jelly to both ends of the sleeve (5) and assemble onto housing (25). Be certain it is on straight.

(14) Assemble the end cover (2) onto the sleeve (5) making certain it is straight.

(15) Install the seven special capscrews (1) and tighten finger tight. Tighten the capscrews alternately to pull the end cover (2) and sleeve (5) into place. Torque the capscrews to between 45 and 55 lbs./ft.

(16) Refer to Figure 5-11 and install the bearing (6) in the housing (5) and secure with retaining ring (7).

(17) Install the bearing (8) in the housing (5) and secure with retaining ring (9).

(18) Install the housing assembly on the drive motor (10) and secure with retaining ring (4).

(19) Apply a bead of locktite around the circumference of the de-clutch mating flange. Align the splines of the de-clutch assembly with the drive motor then slide the assembly onto the drive motor shaft.

(20) Secure the de-clutch assembly (3) to the bearing housing (5) with capscrews (1) and lockwashers (2). Torque the capscrews to 35 to 45 lb./ft. then bend the lock tabs to secure the capscrew heads.

d. Installation.

(1) Refer to Figure 5-10 and position the drive motor assembly (5) within the axle housing (9) and secure with locknuts. Torque the locknuts to 50 to 60 lb./ft.

(2) Remove the plugs from the hose assemblies (6) and connect them to the drive motor (5).

1. WHEEL CAPSCREW
2. WHEEL
3. NUT
4. BRAKE DISC/HUB
5. DRIVE MOTOR
6. CAPSCREW
7. NUT
8. AXLE HOUSING
9. SPACER
10. BEARING
11. CAPSCREW
12. PLATE
13. NUT

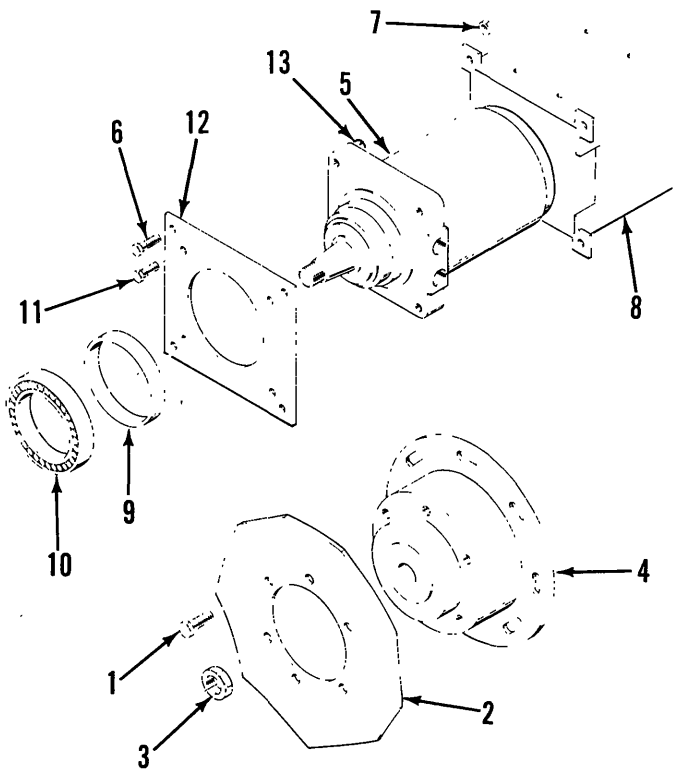


Figure 5-13. Drive Motor Removal (Standard)

(3) Install the brake disc (4) over the drive hub onto the wheel studs.

(4) Install the wheel (3) over the studs and secure with wheel nuts (2). Torque to 80 to 90 lb./ft.

(5) Lower the jack a sufficient amount to allow its removal then operate the drive system and check for leaks.

5-15. STANDARD HYDRAULIC DRIVE MOTOR AND HUBS.

a. Removal (Figure 5-13).

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

(2) Use a 1.5 ton capacity jack to raise the desired rear corner.

NOTE

The brake will prevent the left rear wheel from turning thus, allowing the wheel capscrews to be loosened with the wheel off the ground. When removing the right side rear wheel, loosen the wheel capscrews prior to raising the wheel off the ground.

WARNING

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

(3) Remove the wheel capscrews (1) and wheel (2).

(4) Remove the nut (3), the brake disc (4) and the spacer (9).

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.

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

(6) Remove the capscrews (6) and nuts (7).

(7) Slide the drive motor (5) out of the axle housing (8).

(8) Remove the bearing (10) from the brake disc or hub (4).

(9) Remove the nuts (13) and capscrews (11) to remove plate (12).

b. Disassembly and Inspection (Figure 5-14).

NOTE

Disassemble drive motors on a clean work bench or table. All parts should be cleaned separately in clean solvent and blown dry with air to avoid nicks and burrs.

(1) Clamp the housing (6) in a vise with the coupling shaft (11) pointed down.

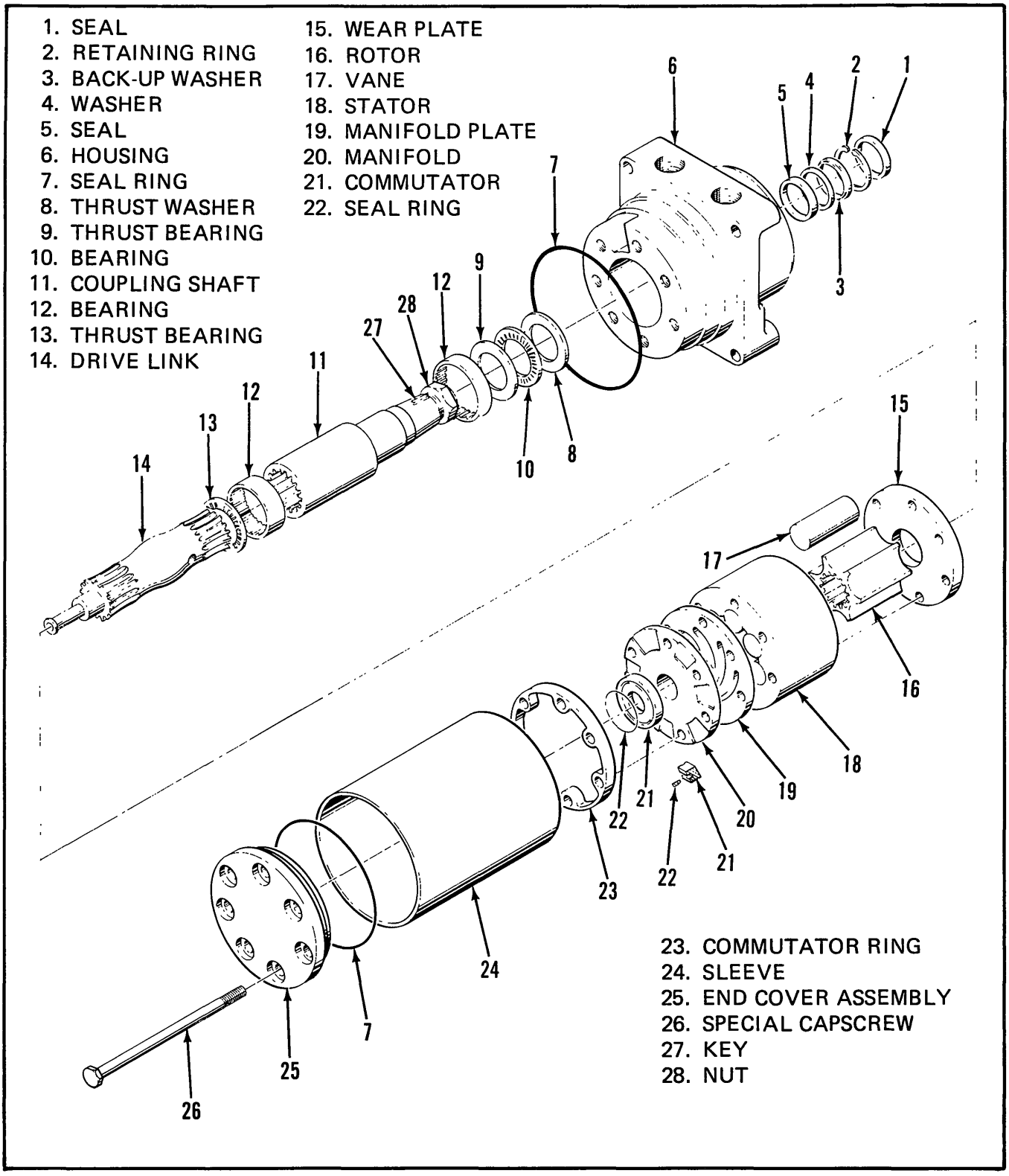
(2) Remove the seven capscrews (26).

(3) Remove the end cover (25) and seal ring (7) by inserting screwdriver between the end cover and sleeve (24).

(4) Remove the seal ring (7) and discard.

(5) Remove the commutator ring (23), commutator (21), seal ring (22) and manifold (20) by using two of the capscrews (26) as a lifting tool.

(6) Remove the seal ring (22) from the commutator (21) by using an air hose. Discard the seal ring.



5-14. Drive Motor (Standard)

(7) Inspect the manifold (20) for cracks and replace if cracks are visible.

(8) Remove the manifold plate (19) by using two capscrews (26) as a lifting tool.

(9) Remove the rotor assembly (16, 17 and 18), wear plate (15) and drive link (14) in the same manner mentioned in step 8.

(10) Remove the vanes (17) and rotor (16) from the stator (18).

(11) Inspect the rotor (16) outside lobes for pits and wear marks. If pits or wear marks are visible, replace the rotor assembly (16, 17 and 18).

(12) Remove the thrust bearing (13).

(13) Remove the drive link (14) and coupling shaft (11).

(14) Remove the sleeve (24) by inserting screwdriver between the sleeve and housing (6) and pry up. Remove any visible rust by sanding lightly.

(15) Remove the seal ring (7) from the housing (6) and discard the seal ring.

(16) Remove the housing (6) from the vise, turn over and reclamp with the dirt seal (1) facing up.

(17) Remove the dirt seal (1), retaining ring (2), back-up washer (3), washer (4) and seal (5). Discard the seals.

NOTE

DO NOT REMOVE the thrust washers (8), thrust bearing (9) and bearings (10 and 12) unless damage or wear is evident.

(18) If bearing (10) requires replacement, press out the thrust washers (8), thrust bearing (9) and bearings (10 and 12). The housing face should be placed on a block of wood during the pressing operation to protect it.

c. Assembly.

CAUTION

Before starting assembly, clean all parts with clean solvent and blow dry with air. Be sure all paint chips have been removed. Lubricate all seals before assembly with SAE10W-40 oil or clean grease.

(1) Clamp the housing (6) in a vise with the small bore end pointed up. Apply clean grease to replacement seal (5) and install in the housing.

(2) Hold washer (4) between thumb and index finger and slightly collapse to facilitate assembly into housing (6).

(3) Install the back-up washer (3) and retaining ring (2) into housing (6). Check that rounded edge of retaining ring is facing inward.

(4) Apply a small amount of clean grease to back side of seal (1) and install in the housing (6).

(5) Remove the housing (6) from the vise, turn over and reclamp with large bore end pointed up.

(6) Install the thrust washer (8), thrust bearing (9) and thrust washer (8) in the housing (6).

(7) Press in bearing (10) into housing (6).

(8) Press in bearing (12) into housing (6).

(9) Apply cellophane tape around key way on coupling shaft (11) to prevent damaging seal (5).

(10) Install the coupling shaft (11) and thrust bearing (13) into the housing (6).

(11) Install the drive link (14). Align hole in drive link with hole in coupling shaft (11).

(12) Install the wear plate (15) onto the housing (6).

(13) Install the rotor assembly (16, 17 and 18) onto the wear plate (15) with the counterbore of the rotor (16) facing down.

(14) Install the manifold plate (19), manifold (20) and commutator ring (23).

(15) Install the commutator (21) and seal ring (22).

(16) Install seal rings (7) on the housing (6) and end cover (25).

(17) Apply a generous amount of petroleum jelly to both ends of the sleeve (24) and install onto housing (6).

(18) Install the end cover (25) on the sleeve (24).

(19) Install the seven capscrews (26) and screw in finger tight. Tighten the capscrews alternately to pull the end cover (25) and sleeve (24) into place. Torque capscrews to 45 to 55 lb./ft.

d. Installation.

(1) Refer to Figure 5-13 and position the plate (12) on the drive motor (5).

(2) Install capscrews (11) and tighten securely. Torque the capscrews to 35 to 45 lb./ft.

(3) Position the drive motor (5) within the axle housing (8) and secure with capscrews (6) and nuts (7) and tighten securely.

(4) Install bearing (10) in the brake disc or hub (4).

(5) Install spacer (9) and the brake disc (4) on the drive motor (5) and secure with nut (3). Torque to 300 to 400 lb./ft.

(6) Remove the plugs from the hose assemblies and connect to the drive motor (5).

(7) Position the wheel (2) on the brake disc or hub and install the whee? capscrews (1). Torque to 80 to 90 lb./ft.

(8) Lower the jack a sufficient amount to allow its removal then operate the drive system and check for leaks.

5-16. OPTIONAL BRAKE RETRACT PUMP (Figure 5-15).

a. Removal.

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. Make sure work bench is clean.

(1) Disconnect the hose assemblies (1 and 2) and plug the openings.

(2) Remove the nuts (3), lockwashers (4), capscrews (5) and flatwashers (6) to free the pump body (50) from the chassis.

b. Disassembly.

(1) Remove the snap rings (8, 10 and 12) to remove the pins (7, 9 and 11) and release the pivot block (13) and handle (14).

(2) Remove the capscrew (20), washer (21) and lockwire (22) to free the head (23).

(3) Remove the seal (24) from the head (23) and discard it.

(4) Withdraw the piston (27) and attached parts from the pump body (50).

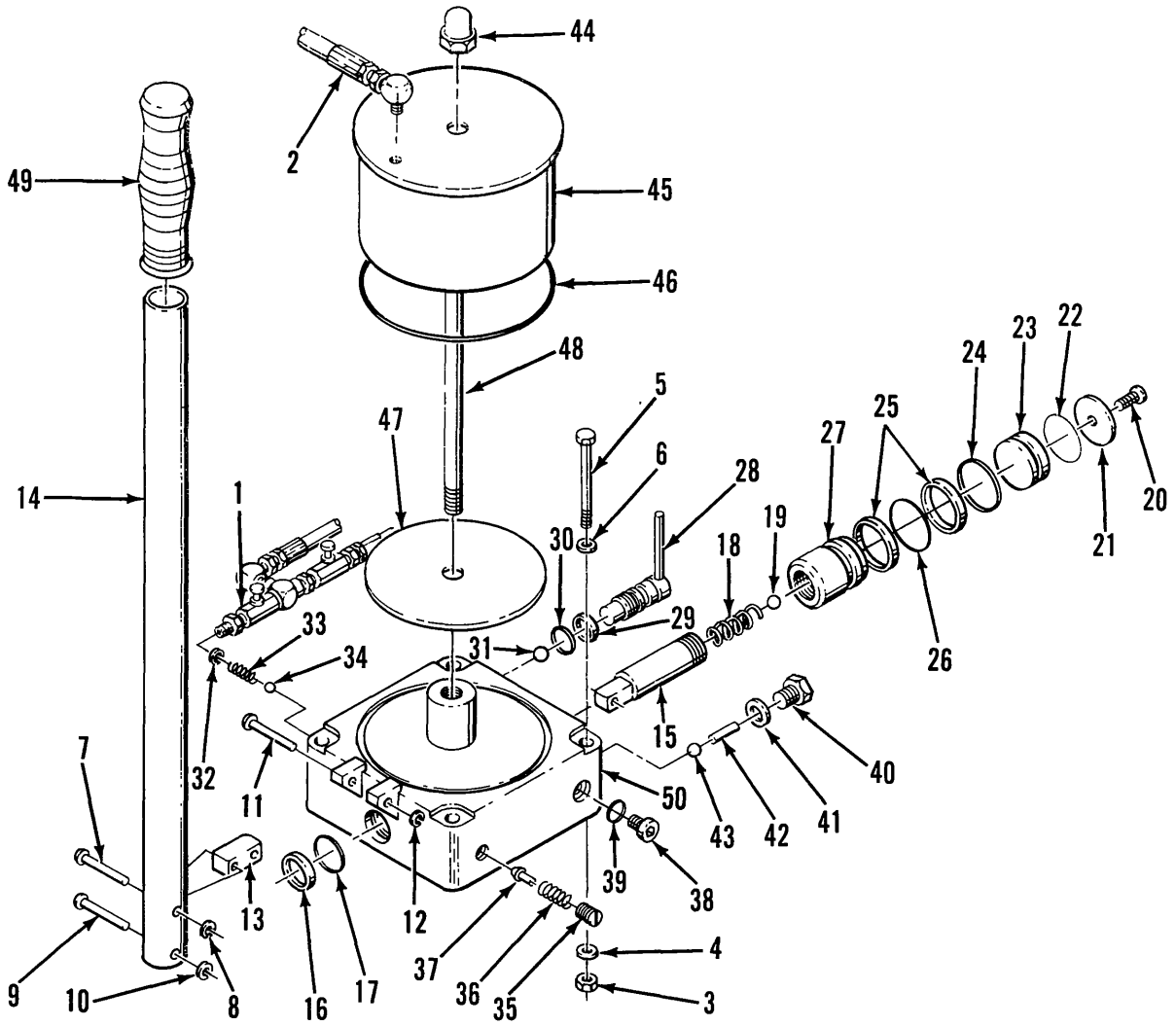
(5) Remove the o-ring (26) and back-up ring (25) from the piston (27), then clamp the piston in a soft jawed vise. Unscrew the plunger (15) from the piston to release the ball (19) and spring (18).

(6) Remove the seal (16) and back-up ring (17) from the pump body (50).

(7) Unscrew the release valve (28) to remove the ball (31).

(8) Remove the o-ring (30) and back-up ring (29) from the relief valve assembly (28).

(9) Remove the plug and roll pin assembly (40 and 42), washer (41) to release the ball (43).



1. HOSE ASSEMBLY
2. HOSE ASSEMBLY
3. NUT
4. LOCKWASHER
5. CAPSCREW
6. FLAT WASHER
7. PIN
8. SNAP RING
9. PIN
10. SNAP RING
11. PIN
12. SNAP RING
13. PIVOT BLOCK
14. HANDLE
15. PLUNGER
16. SEAL
17. BACK-UP RING
18. SPRING
19. BALL
20. CAPSCREW
21. WASHER
22. WIRE RING
23. HEAD
24. SEAL
25. BACK-UP RING
26. O-RING
27. PISTON
28. RELEASE VALVE
29. BACK-UP RING
30. O-RING
31. BALL
32. SNAP RING
33. CHECK SPRING
34. BALL
35. SCREW ADJUSTER
36. SPRING
37. POPPET
38. PLUG
39. O-RING
40. PLUG
41. W ASHER
42. ROLL PIN
43. BALL
44. NUT
45. TANK
46. GASKET
47. BAFFLE
48. TIE ROD
49. GRIP
50. PUMP BODY

Figure 5-15. Brake Release Pump (Optional)

(10) Remove the plug (38) and o-ring (39).

(11) Remove the adjusting screw (35), spring (36) and poppet (37).

(12) Remove the nut (44), tank (45) and gasket (46). Discard gasket.

(13) Do not remove the tie rod (48) unless thread damage is evident.

c. Cleaning, Inspection and Repair.

(1) Clean all parts separately in an approved solvent then blow dry to avoid nicks and burrs.

(2) Replace all gaskets, o-rings and seals.

(3) Check all threaded components for stripped or damaged threads.

(4) Check the balls and their seats for wear.

(5) Check the springs for cracks.

(6) Check all sliding surfaces for scoring or excessive wear.

(7) Replace any parts found not serviceable.

d. Assembly.

(1) Position the ball (43) within the pump body (50) then install the plug-roll pin assembly (40 and 42) with washer (41).

(2) Install the replacement o-ring (39) and plug (38).

(3) Install the poppet (37), spring (36) and adjusting screw (35).

(4) Install replacement o-ring and back-up ring (30 and 29) on the release valve assembly, lubricating the rings with hydraulic oil, then position the ball (31) in the pump body and screw in the release valve.

(5) Position the ball (19) and spring (18) within the piston (27) then screw the plunger (15) into the piston.

(6) Install a replacement o-ring and back-up ring (26 and 25) on the piston (27).

(7) Install a replacement o-ring (24) on the head (23).

(8) Install a replacement seal and back-up ring (16 and 17) within the pump housing (50).

(9) Lubricate all the seals then insert the plunger piston assembly through the pump body until the plunger protrudes approximately 2 inches out the opposite side.

(10) Position the handle (14) so as to allow the pin (9) to be inserted through the handle (14) and the plunger (15) then secure with snap ring (10).

(11) Lubricate the o-ring with hydraulic oil then install the head (23) within the pump body and secure with wire ring (22), washer (21) and screw (20).

(12) Position the pivot block (13) on the pump body and secure with pin (11) and snap ring (12).

(13) Position the handle (14) so that the pivot hole aligns with the pivot block (13) and install the pin (7) and snap ring (8).

(14) Install a replacement gasket (46) on the pump body then thread in tie rod (48).

(15) Install the baffle (47), tank 45 and nut (44).

e. Installation.

(1) Position the pump assembly on the chassis and secure with capscrews (5), flat washers (6), lockwashers (4) and nuts (3).

(2) Connect the hose assemblies (1 and 2).

(3) Operate the system to fill the tank (45) then refer to paragraph 4-13c. and operate the brake and check for leaks.

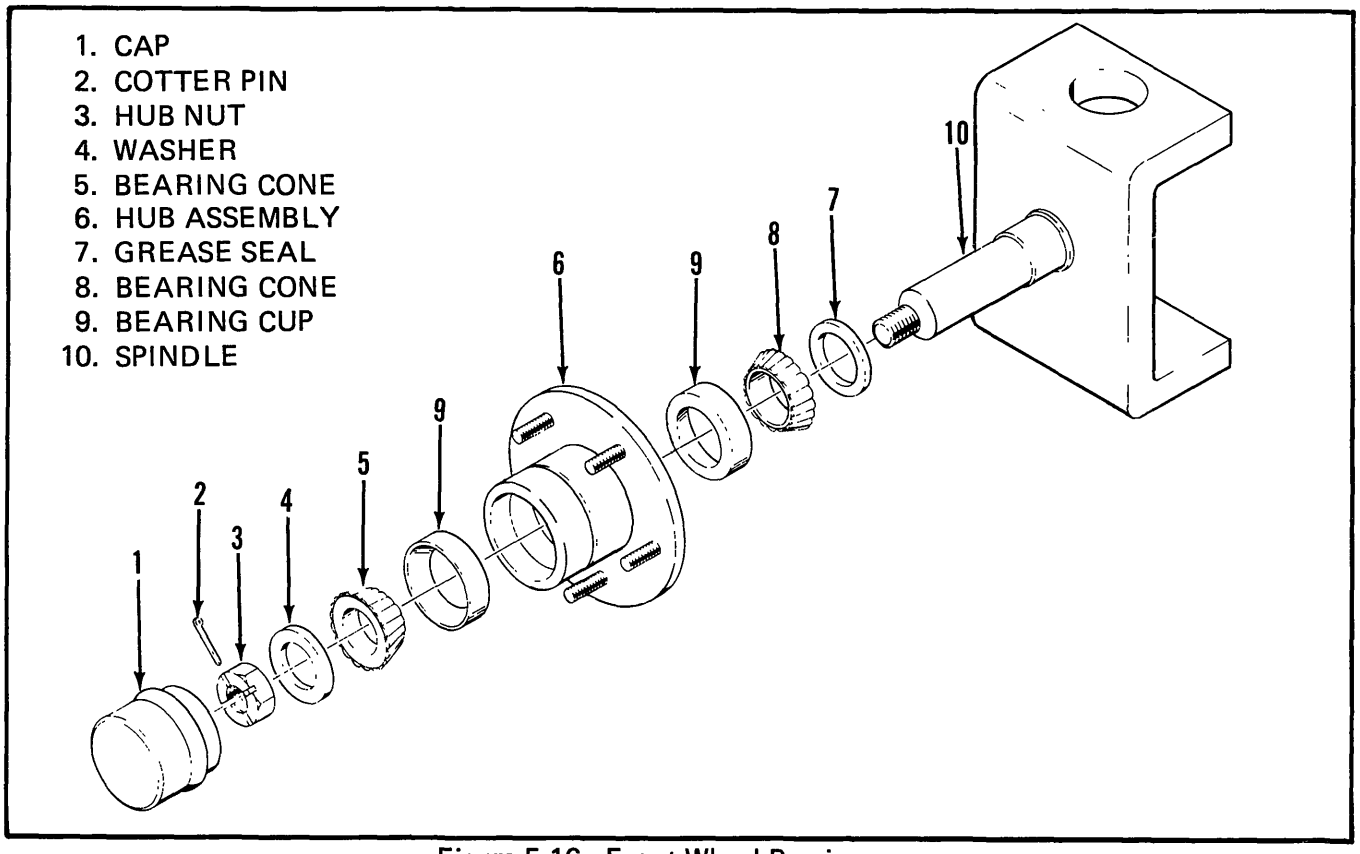


Figure 5-16. Front Wheel Bearings

5-17. FRONT WHEEL BEARINGS (Figure 5-16).

a. Removal.

NOTE

The following applies to both front wheels.

(1) Loosen the wheel lug nuts then raise the front of the unit until the front tires are off the ground.

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

(3) Remove the front 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 table top or prepared area.

(8) Remove the bearing cone (5) and place on a 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) require replacement remove them by tapping around the circumference of the outside surface of the cups from the opposite side using a long drift.

b. Installation.

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

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

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

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

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

(6) Install the washer (4) and hub nut (3). Tighten the hub nut (3), while rotating the hub assembly, 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 nut (3) and spindle (10).

(8) Install the cap (1) and wheel/tire assemblies.

5-18. BRAKE CYLINDER (Figure 5-17).

a. Removal.

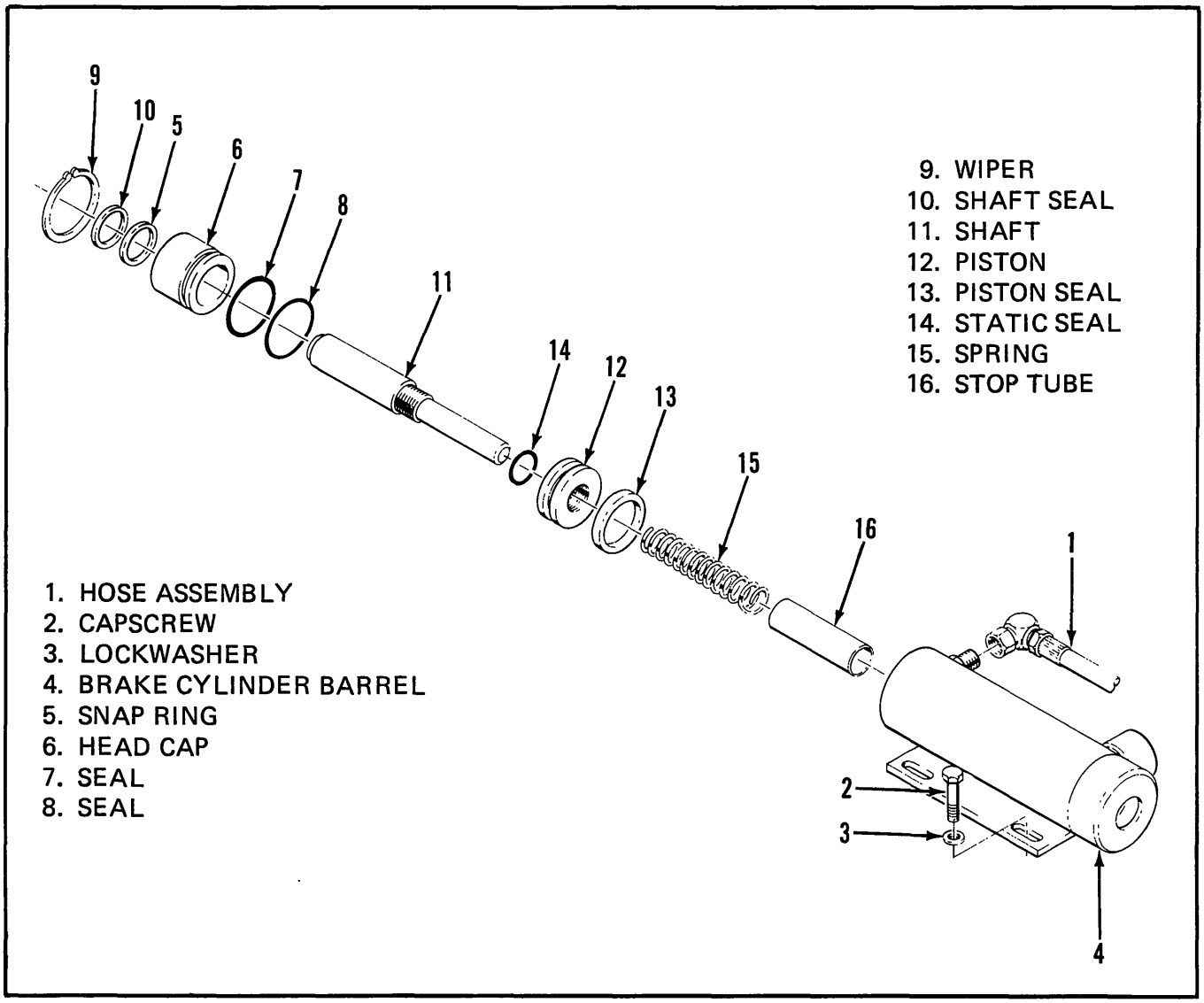


Figure 5-17. Brake Cylinder

(1) Block the wheels to prevent the unit from rolling once the brake cylinder is removed.

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

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

b. Disassembly.

NOTE

Prepare a clean work area on which to service the brake cylinder.

(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 and 8) from the head cup.

(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 barrel (4).

c. Cleaning and Inspection.

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

(2) Check all threaded 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 (15) for cracks.

(5) Replace any parts found not serviceable.

(6) Replace all seals.

d. Assembly and Installation.

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

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

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

(4) Install the seals (7 and 8) on the head cap (6).

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

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

(7) Secure with snap ring (5).

(8) Position the brake cylinder assembly on the axle housing so that the shaft (11) fully engages the brake disc yet the shaft must clear the brake disc once retracted.

(9) Connect the hose assembly (1).

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

5-19. STEERING CYLINDER (Figure 5-18.

a. Removal.

(1) Disconnect the hose assemblies from the fittings (15) and immediately cap the openings to prevent foreign material from entering.

(2) Remove the cotter pins (16) and clevis pins (1) to remove the steering cylinder assembly.

b. Disassembly.

(1) Remove the head lock ring (6), loosen the head set screw (3) then withdraw the shaft assembly (14) and all attached parts from the tube assembly (2).

(2) Remove the piston lock nut (9) to remove the piston (10) and head (5) from the shaft assembly (14).

(3) Remove the piston o-ring assembly (11) and small o-ring (12) from the piston (10).

(4) Remove the head o-ring (4), shaft packing set (7) and rod wiper (8) from the head (5).

(5) Discard all the seals.

c. Cleaning and Inspection.

(1) Clean all metal parts in an approved 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 tube assembly (2) for scoring or excessive wear.

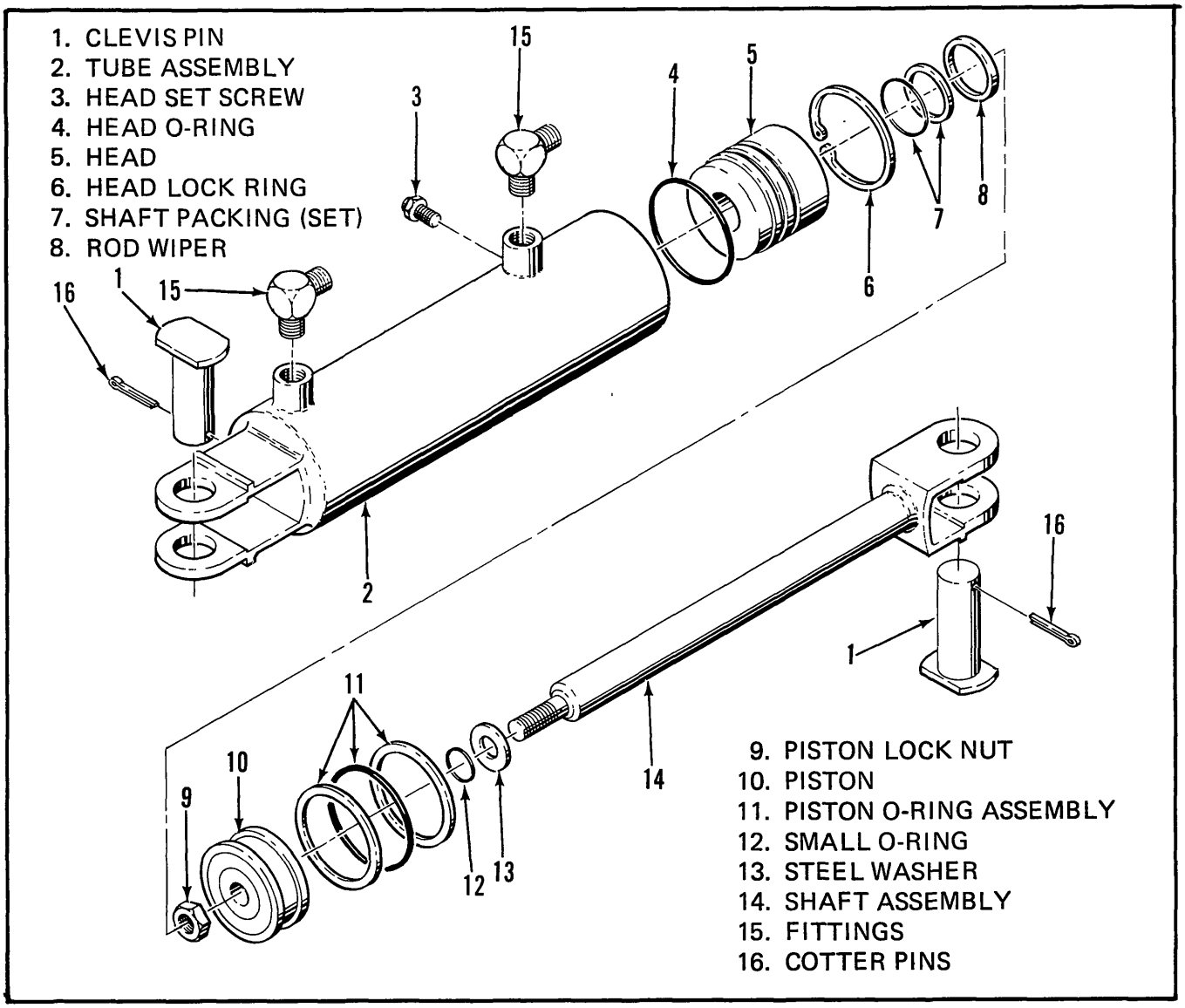


Figure 5-18. Steering Cylinder

(4) Check the circumference of the piston (10) and head (5) for scoring or excessive wear.

(5) Inspect the surface of the shaft assembly (14) for scoring or excessive wear.

(6) Replace any parts found not serviceable.

(7) Replace all the seals and packing.

d. Assembly and Installation.

(1) Install replacement shaft packing (7), shaft seal (8) and o-ring (4) in the head (5).

(2) Install a replacement piston o-ring assembly (11) on the piston (10).

(3) Lubricate the shaft seal (8), packing (7) and the inside surface of the head (5) and assemble the head and shaft assemblies.

(4) Install the steel washer (13), o-ring (12) and piston assembly (10) on the shaft assembly (14). Secure them with the piston locknut (9).

(5) Lubricate the piston and o-ring assembly (11) as well as the inner surface of the tube assembly then slide the shaft assembly into the tube assembly (2) and secure with head lock ring (6).

(6) Position the cylinder on the front axle and install the clevis pins (1) and cotter pins (16).

(7) Connect the hose assemblies to the fittings (15).

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

5-20. LIFT CYLINDER.

a. Removal.

(1) Refer to Figure 5-19 and remove the nuts (2), lockwashers (3), capscrews (4) and lockwashers (5) to remove the rear railing (6) and extension side railings (7 and 14).

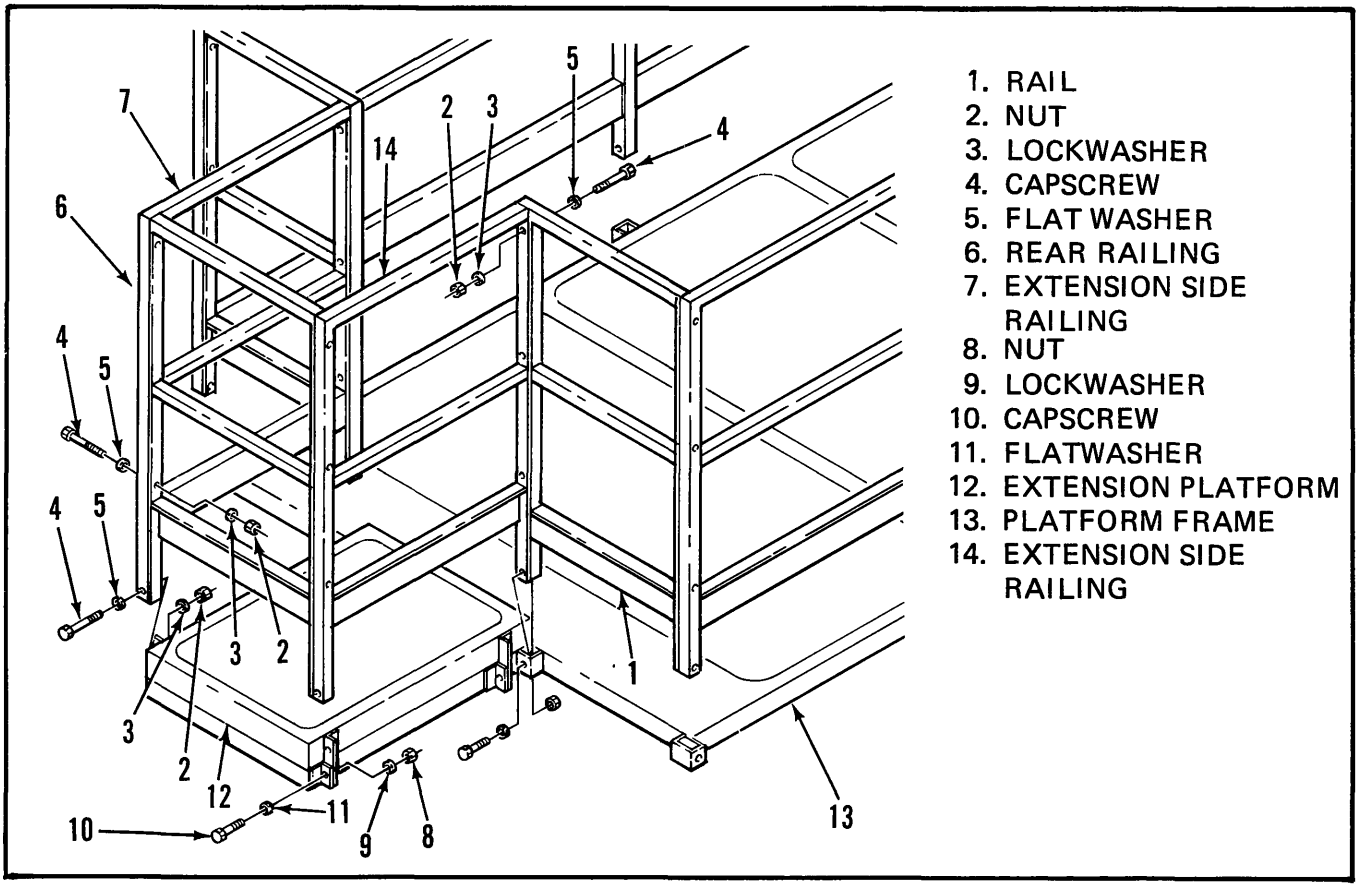


Figure 5-19. Extension Platform Removal

(2) Remove the nuts (8), lockwashers (9), capscrews (10) and flatwashers (11) to free the extension platform (12) from the extension frame (13).

(3) Once free of the frame (13), set the extension platform on the main platform.

NOTE

Be certain platform is all the way down.

(4) Provide a suitable container to catch the draining hydraulic fluid then, refer to Figure 5-20 and disconnect the hydraulic hose (5), and fitting, from the base of the lift cylinder (7).

(5) Remove the nut (9) and washer (10) then slide the cylinder pin (13) out to one side allowing one bracket (6) to swing free.

(6) Remove the capscrew (11), washer (12) and cylinder pin (13) allowing the other bracket (6) to swing free of the cylinder.

(7) Remove the brackets (6).

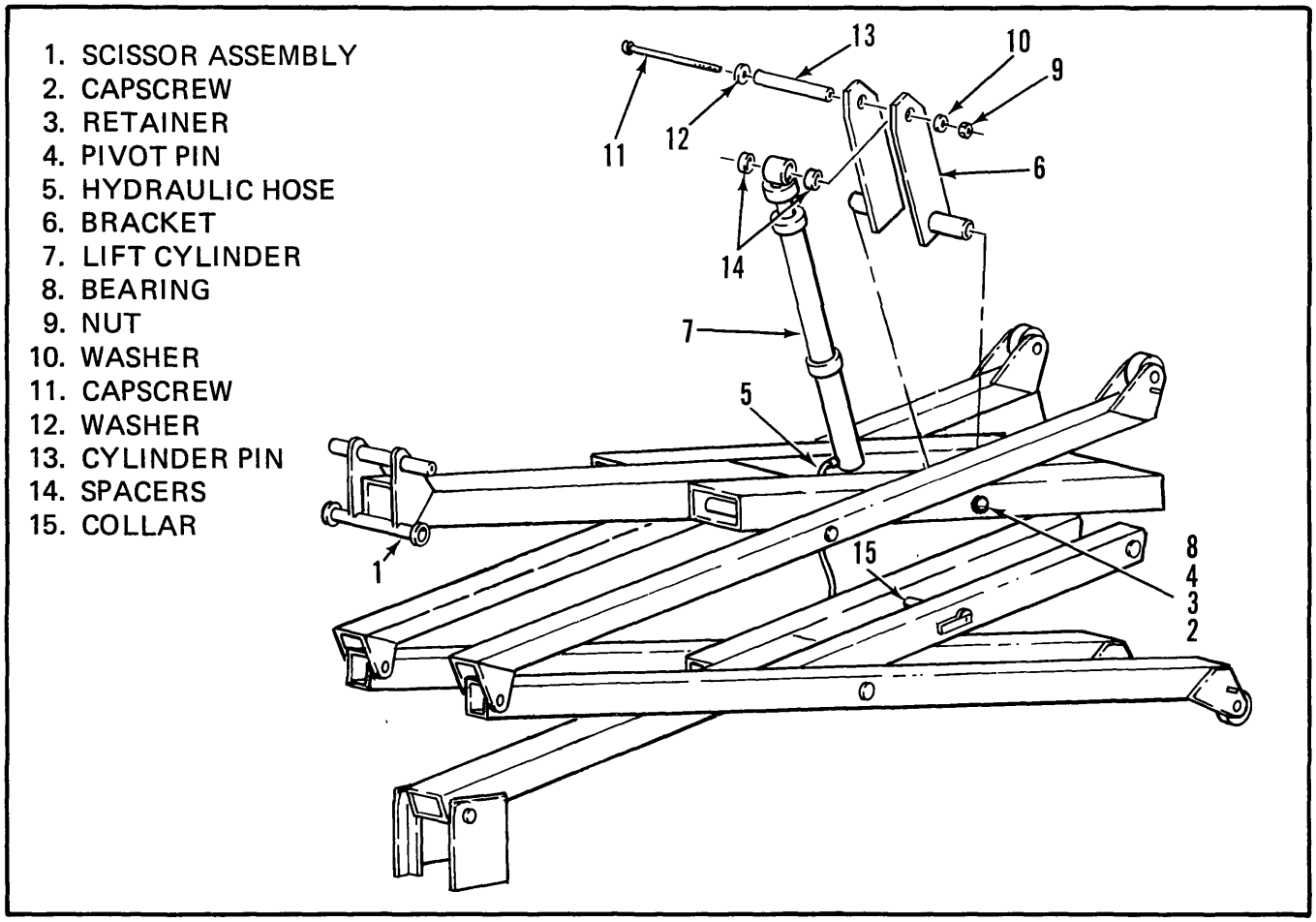


Figure 5-20. Lift Cylinder Removal

(8) Attach a suitable hoisting device and sling to the top of the lift cylinder (7) and remove it from the machine.

b. Disassembly.

(1) Refer to Figure 5-21 and unscrew the gland nut (5) and withdraw the two cylinder tubes (2 and 3) with all the attached components. Discard o-ring (17).

(2) Remove the wear ring (8) and stop ring (10) then, slide the gland nut (5) down off the cylinder tube (2).

(3) Remove and discard packing (14) and wiper ring (12) from gland nut (5).

(4) Unscrew the gland nut (4) from the cylinder tube (2) and withdraw the cylinder tube (3) and all attached parts. Discard o-ring (16).

1. CYLINDER BARREL
2. CYLINDER TUBE
3. CYLINDER TUBE
4. GLAND NUT
5. GLAND NUT
6. TOP MOUNT ASSEMBLY
7. WEAR RING
8. WEAR RING
9. STOP RING
10. STOP RING
11. WIPER RING
12. WIPER RING
13. PACKING
14. PACKING
15. O-RING
16. O-RING
17. O-RING
18. BLEEDER BALL
19. BLEEDER SCREW
20. VELOCITY FUSE

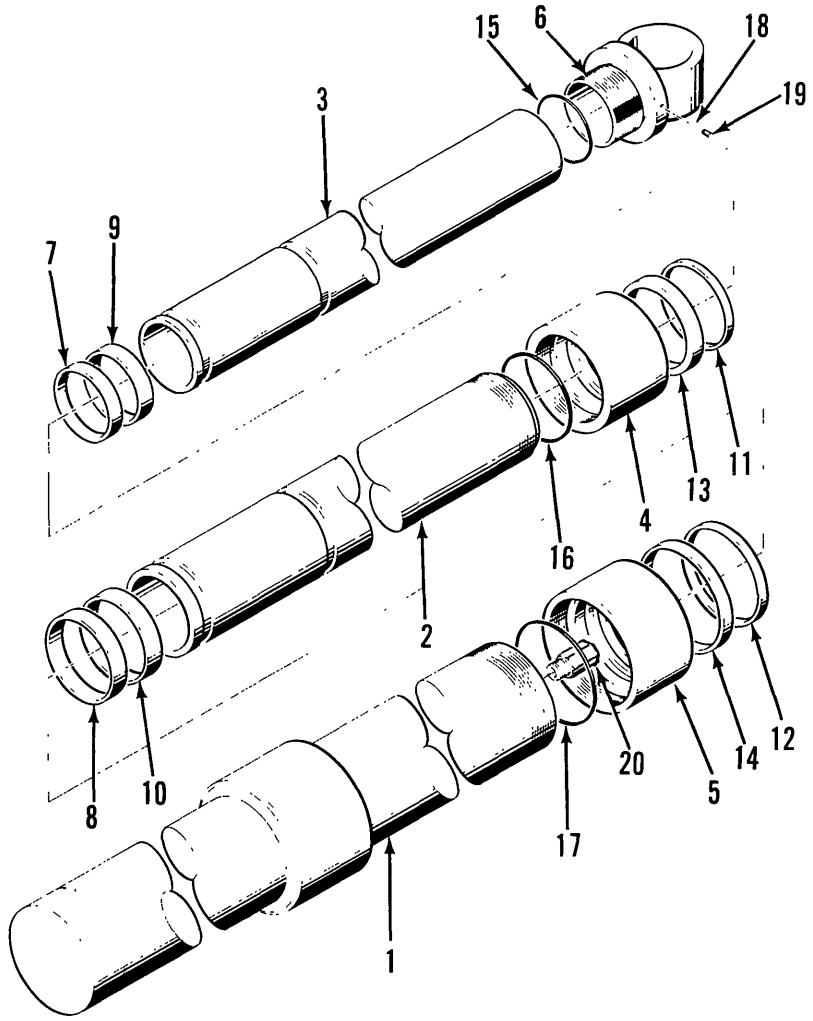


Figure 5-21. Lift Cylinder

(5) Remove the wear ring (7) and stop ring (9) then, slide the gland nut (4) down off the cylinder tube (3).

(6) Remove and discard packing (13) and wiper ring (11).

(7) Unscrew the top mount assembly (6) from the cylinder tube (3) and discard o-ring (15).

(8) Remove the bleeder screw (19) to remove the bleeder ball (18).

CAUTION

Do not remove the velocity fuse (20) unless replacement is necessary.

c. Cleaning and Inspection.

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

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

(3) Inspect the inner surface of the cylinder barrel, the inside surface of the cylinder tube (2), and the external surfaces of the two cylinder tubes (2 and 3) for scoring or excessive wear.

(4) Check the inside of each gland nut (4 and 5) for scoring. Smooth with emery cloth if only lightly scored.

(5) Replace parts found not serviceable.

(6) Replace all the seals and packing.

d. Assembly.

(1) Install the packing (13), wiper (11) and o-ring (16) in the gland nut (4) then lubricate the packing and wiper and slide the assembly onto the top of the cylinder tube (3).

(2) Position an o-ring (15) on the top mount assembly (6) then thread the top mount assembly into the cylinder tube (3).

(3) Install the stop ring (9) and wear ring (7) on the cylinder tube (3) taking care not to deform the metal rings.

(4) Install the packing (14), wiper (12) and o-ring (17) in the gland nut (5) then lubricate the packing and wiper so that the gland nut assembly will slide onto the top of the cylinder tube (2).

(5) Lubricate with hydraulic oil the inner surface of the cylinder tube (2) then slide it onto the cylinder tube (3) and tighten the gland nut (4).

(6) Install the stop ring (10) and wear ring (8), taking care not to deform the metal rings.

(7) Lubricate the inner surface of the cylinder barrel (1) then slide the cylinder tube assembly (2) into the cylinder barrel and tighten the gland nut (5).

(8) Install the bleeder ball (18) and bleeder screw (19). Do not tighten the bleeder screw.

c. Installation.

NOTE

Lubricate the cylinder pin (13) prior to installation.

(1) Attach a suitable hoisting device to the top of the cylinder and install the cylinder in the scissor linkage.

(2) Refer to figure 5-20 and install the brackets (6).

(3) Position the spacers (14) between the brackets (6) and the end of the cylinder (7) then slide the cylinder pin (13) through the assembly.

(4) Install the capscrew (11), washers (12) and nut (9).

(5) Connect the hydraulic hose and fitting (5).

(6) Refer to Figure 5-21 and loosen the bleeder screw (19).

(7) Operate the hydraulic lift circuit to allow trapped air to escape the lift cylinder. Once hydraulic fluid flows continuously from the bleed port, tighten the bleed screw and check for leaks.

(8) Refer to Figure 5-19 and position the extension platform (12) in place on the platform frame (13). Secure with capscrews (10), flat washers (11), lockwashers (9) and nuts (8).

(9) Position the extension side railings (7 and 14) and rear railing (6) in place and secure with capscrews (4), flat washers (5), lockwashers (3) and nuts (2).

5-21. ELECTRIC MOTOR (Figure 5-22).

NOTE

Brush replacement is necessary if brush is damaged or worn to a length less than 5/8 inches, measured on the short side of the brush. When replacement is required, replace all brushes.

a. Removal.

(1) Remove the brush access cover (1).

(2) Lift the brush spring (2) end upwards to slide brush (3) out of the holder (4).

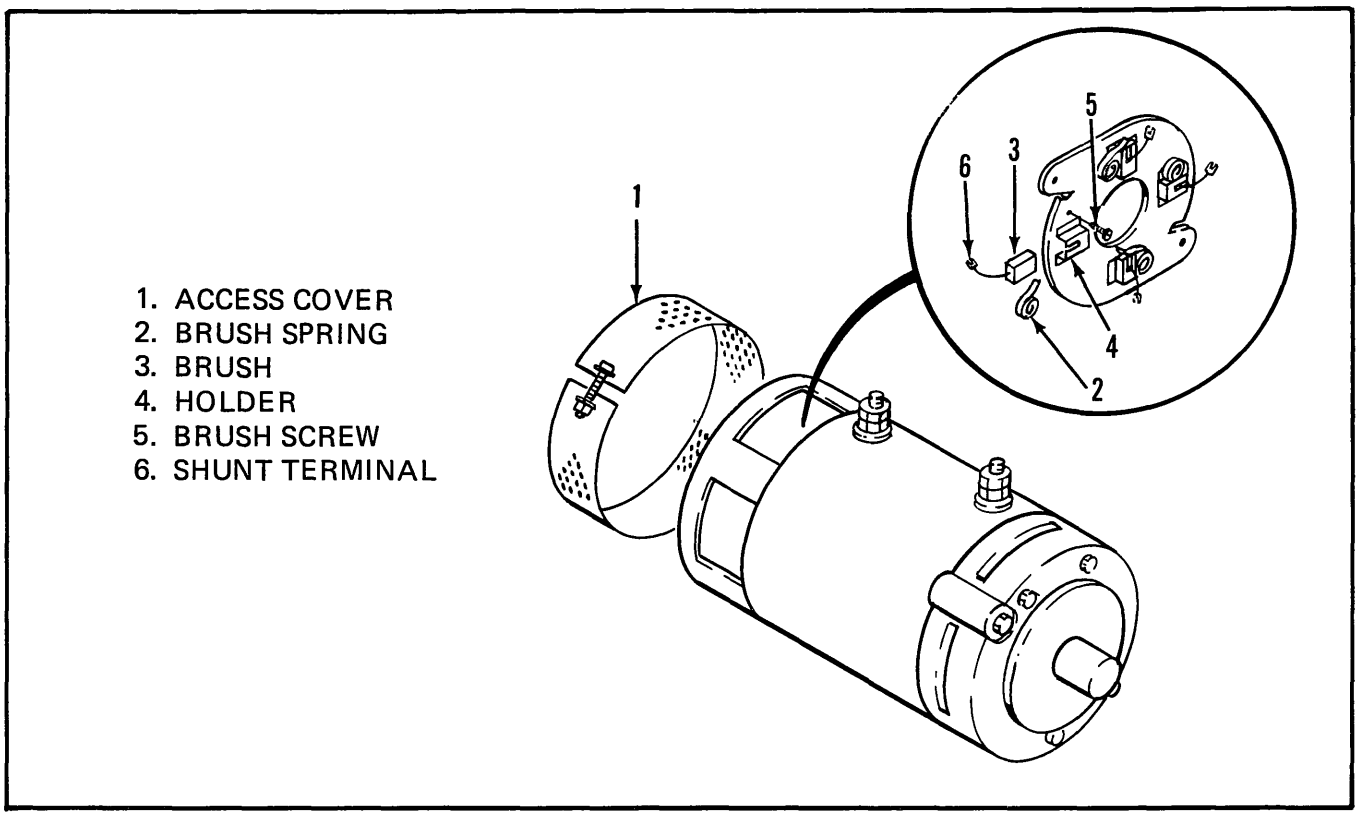


Figure 5-22. Electric Motor

(3) Loosen the brush screw (5) to remove the brush shunt terminal (6) and brush (3).

b. Installation.

(1) Lift the brush spring (2) end upwards and slide the replacement brush (3) into the holder.

(2) Reconnect the brush shunt terminal (6) and tighten the brush screw (5).

(3) Check the position of the brush (3) to ensure that the brush shunt will travel down the holder (4) slot as the brush wears.

NOTE

Motor failure will occur if the brush shunt cannot travel freely in the brush holder (4) slot. Adjust if necessary.

Ensure that only the insulated portion of the brush shunt (6) contacts the motor end shield or brush access cover (1) when installed.

(4) Install the brush access cover (1).

SECTION VI

DIAGRAMS

INDEX

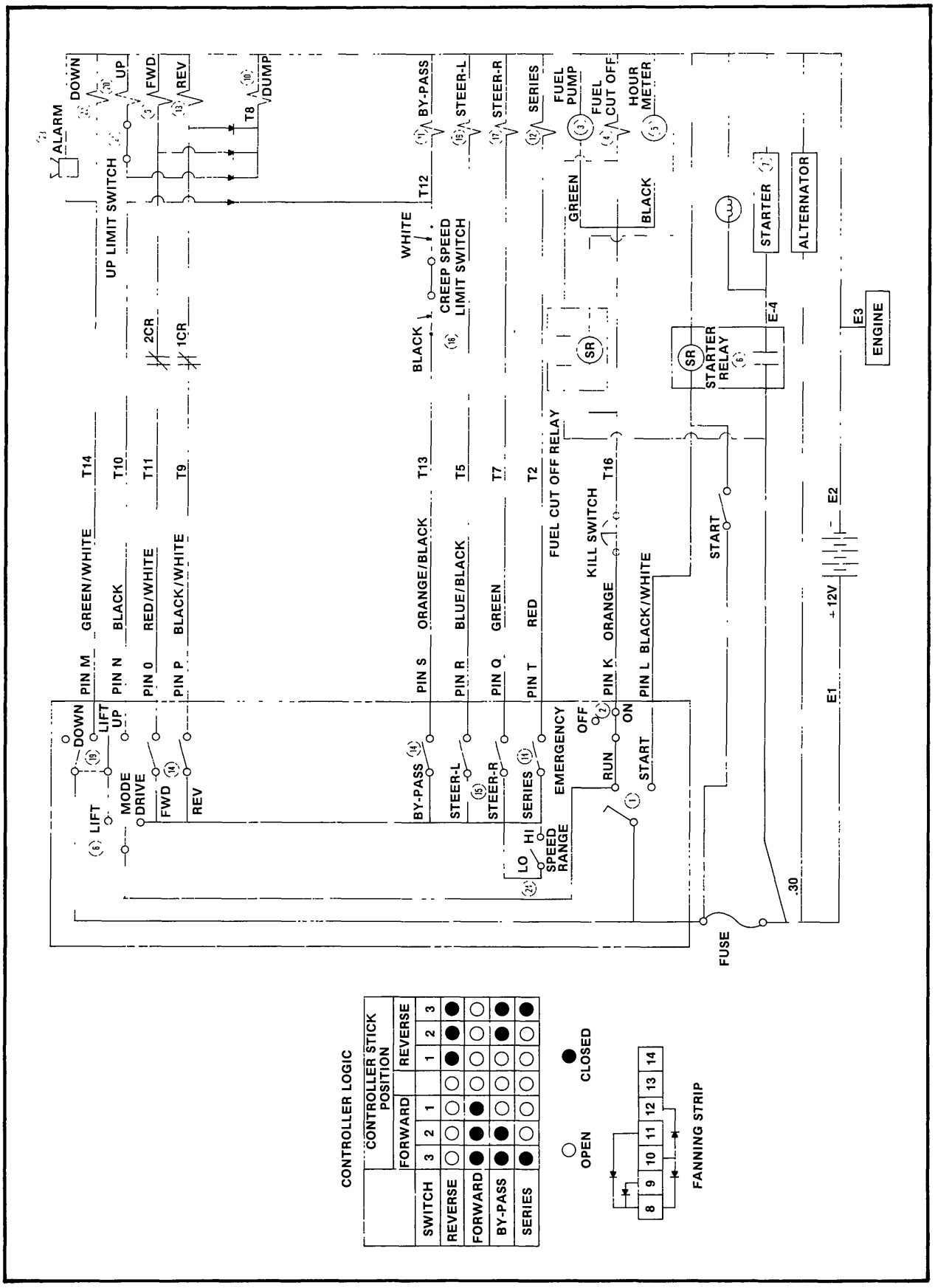


Figure 6-1. Electrical Diagram (Dual Fuel)

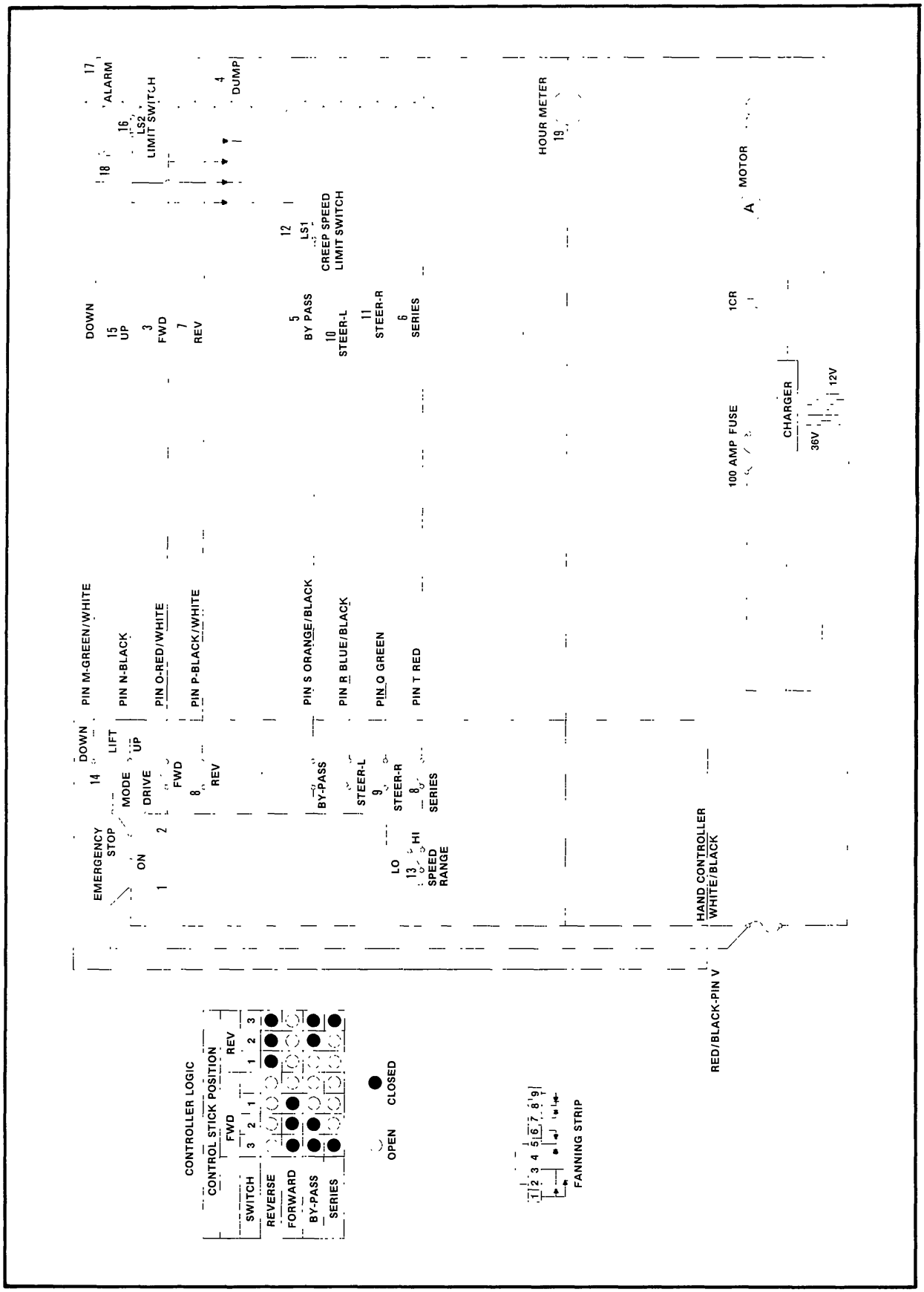


Figure 6-2 . Electrical Diagram (Electric)

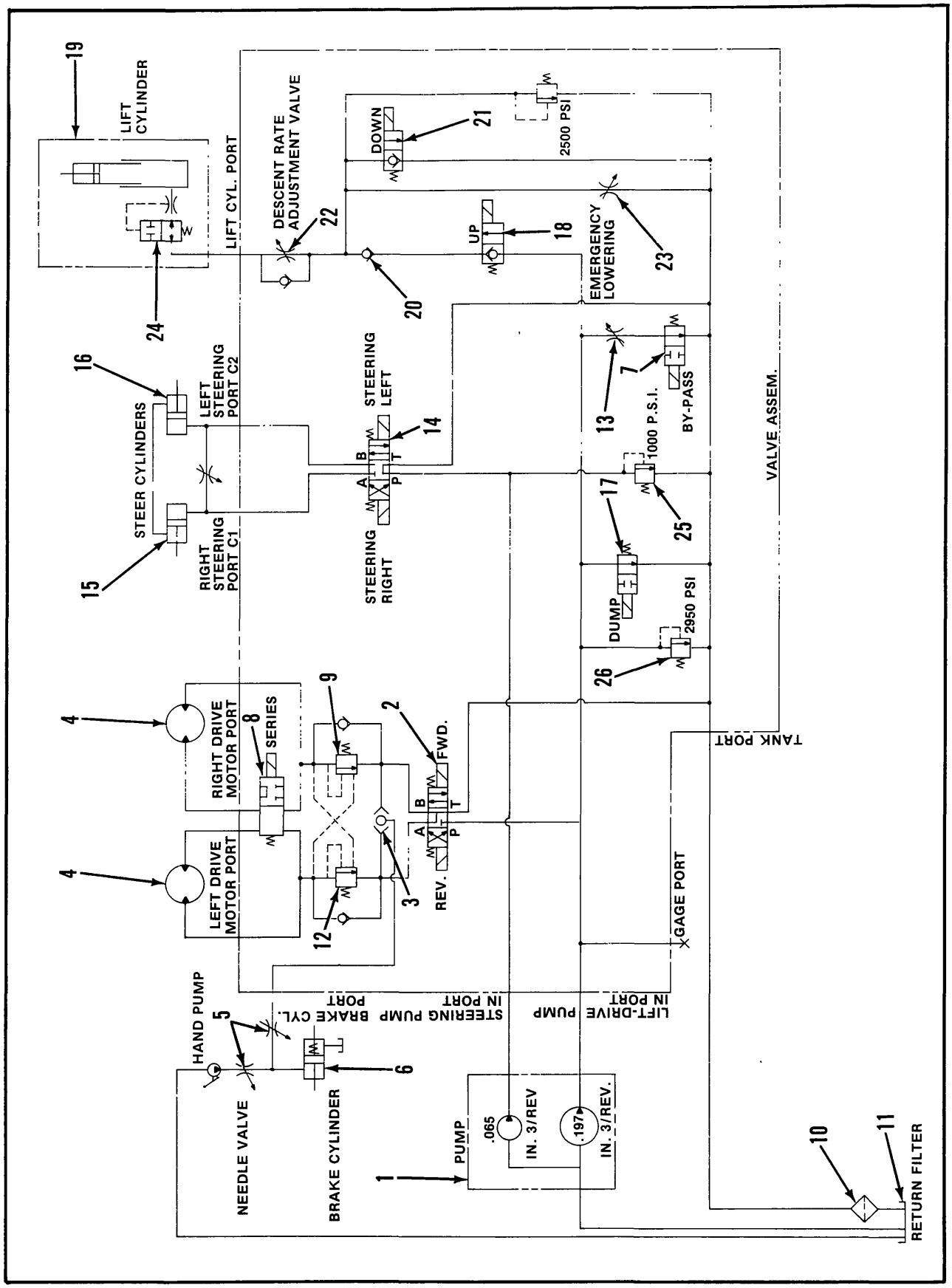


Figure 6-3. Hydraulic Diagram

SECTION VII

MAINTENANCE PARTS LIST

7-1. GENERAL. The Maintenance Parts List contains a parts listing of the complete unit divided into its assemblies, sub-assemblies and detail parts. Each assembly is followed by its component parts indented to show their relationship to the assembly.

7-2. EXPLANATION OF COLUMNS IN MAINTENANCE PARTS LIST.

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 next higher assembly and for each detail part in an assembly.

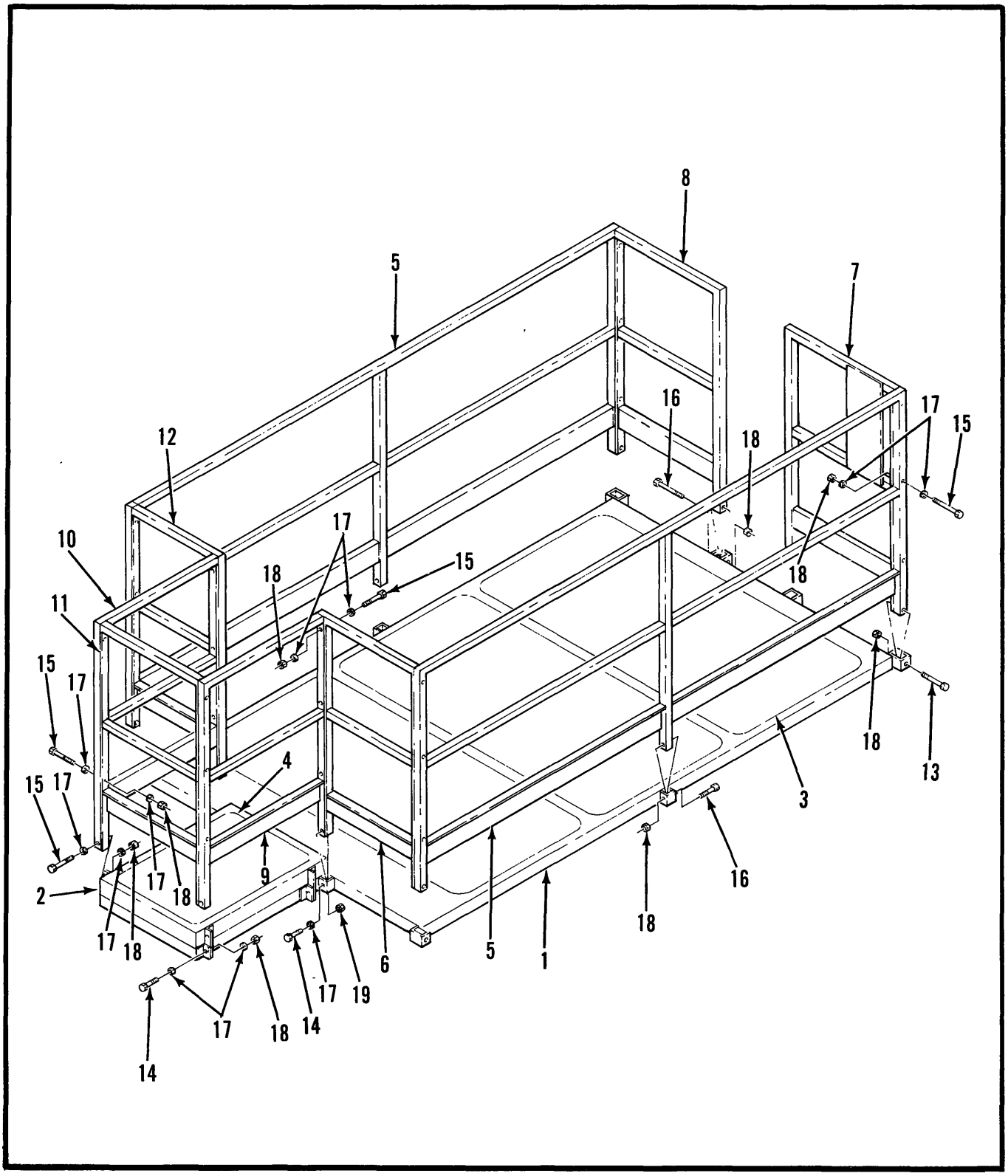


Figure 7-1. Platform Assembly

ITEM NO.	PART NO.	DESCRIPTION	QTY REQ'D
7-1	60170-000-00	PLATFORM ASSEMBLY	
-1	60144-000-00	. WELDMENT, PLATFORM	1
-2	60044-000-00	. DECK, EXTENSION	1
-3	60085-000-00	. SAFETY WALK	3
-4	60086-000-00	. SAFETY WALK	1
-5	60146-000-00	. RAIL, SIDE	2
-6	60150-000-00	. HANDRAIL, R. H. REAR	1
-7	60153-000-00	. HANDRAIL, R. H. FRONT	1
-8	60154-000-00	. HANDRAIL, L. H. FRONT	1
-9	60156-000-00	. DECK RAIL, R.H. SHORT	1
-10	60157-000-00	. DECK RAIL, L.H. SHORT	1
-11	60162-000-00	. WELDMENT, GUARDRAIL	1
-12	60163-000-00	. HANDRAIL, LH REAR	1
-13	11254-030-00	. SCREW, CAP	4
-14	11254-008-00	. SCREW, CAP	6
-15	11254-016-00	. SCREW, CAP	26
-16	11254-018-00	. SCREW, CAP	4
-17	11240-007-00	. WASHER	56
-18	11248-006-00	. NUT, LOCK	40
-19	14252-006-00	. NUTSERT	2

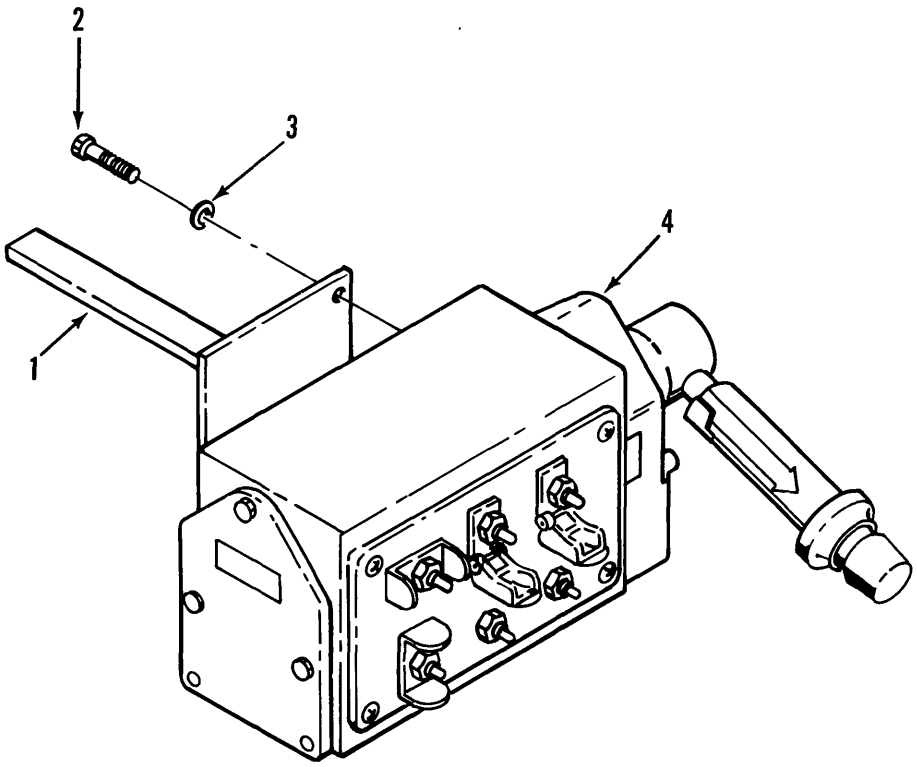


Figure 7-2. Controller Assembly

ITEM NO.	PART NO.	DESCRIPTION	QTY REQ'D
7-2	60371-000-00	CONTROLLER ASSEMBLY	
-1	60164-000-00	. MOUNT, CONTROLLER	1
-2	11252-004-00	. SCREW, CAP	4
-3	11240-004-00	. WASHER, FLAT	4
-4	60212-000-00	. CONTROLLER	1

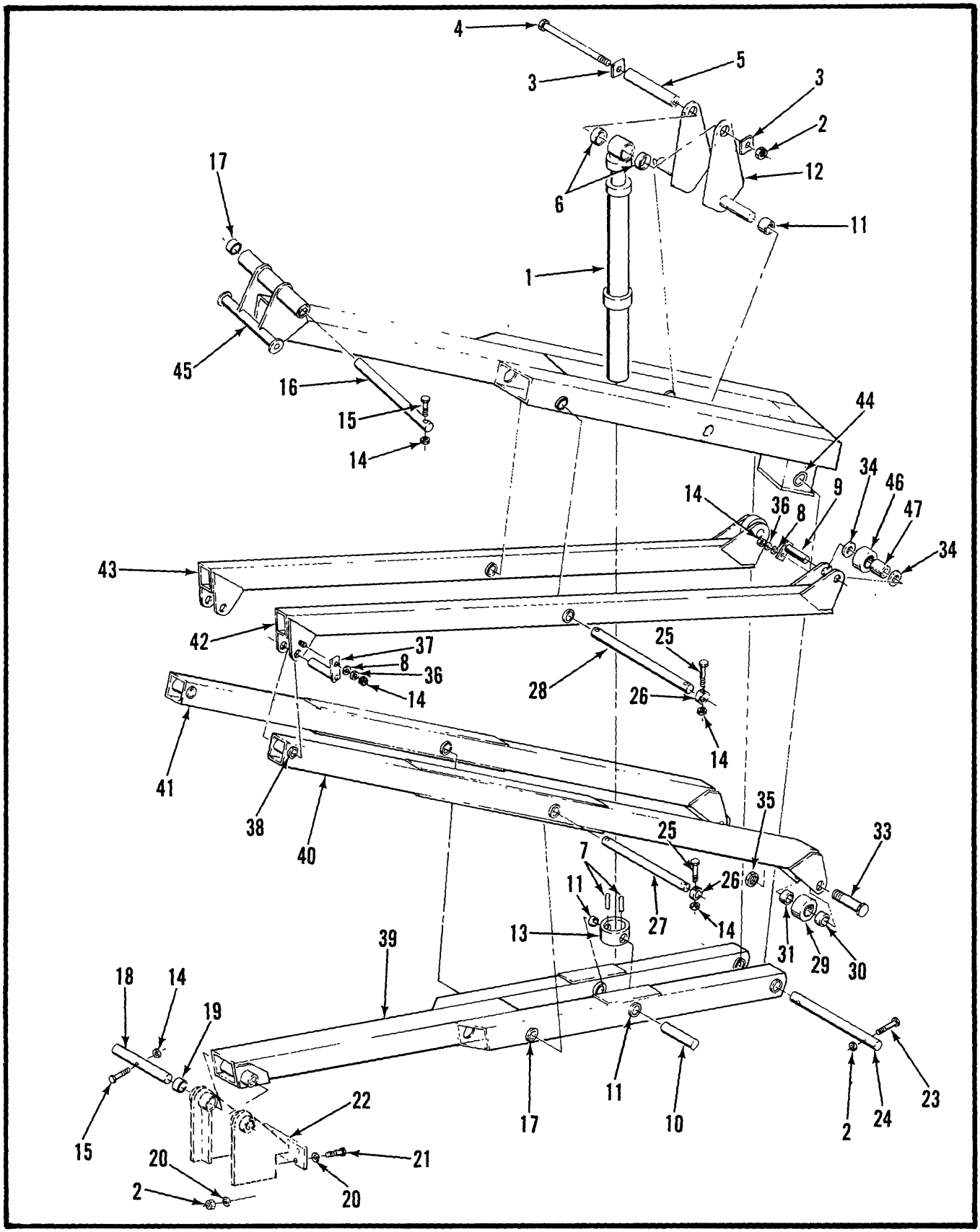


Figure 7-3. Scissor Assembly

ITEM NO.	PART NO.	DESCRIPTION	QTY REQ'D
7-3	61161-000-00	SCISSOR ASSEMBLY	
-1	60103-000-00	. CYLINDER, LIFT (See Figure 7-4)	1
-2	11248-008-00	. NUT, HEX, SELF-LOCK	7
-3	60006-000-00	. WASHER	2
-4	11256-064-00	. SCREW, CAP, 1/2 - 13 x 8	1
-5	60005-000-00	. PIN, CYLINDER	1
-6	60014-000-00	. SPACER	2
-7	60431-001-00	. PIN	2
-8	14251-005-00	. FERRULE	4
-9	60474-000-00	. PIN WELDMENT	2
-10	60441-000-00	. PIN	2
-11	60436-000-00	. BEARING	8
-12	60477-000-00	. BRACKET, CYLINDER	2
-13	60440-000-00	. COLLAR	1
-14	11248-006-00	. NUT, HEX, SELF-LOCK	9
-15	11254-028-00	. SCREW, CAP	3
-16	60028-000-00	. PIN	1
-17	27931-037-00	. BEARING	6
-18	60030-000-00	. PIN	1
-19	27931-035-00	. BEARING	2
-20	11240-008-00	. WASHER, FLAT	8
-21	11256-040-00	. SCREW, CAP	4
-22	60136-000-00	. PLATE, BACKING	1
-23	11256-032-00	. SCREW, CAP	2
-24	60029-000-00	. PIN	1
-25	11254-022-00	. SCREW, CAP	4
-26	60015-000-00	. COLLAR	2
-27	60016-000-00	. PIN	1
-28	60013-000-00	. PIN	1
-29	60435-000-00	. WHEEL	2
-30	27931-038-00	. BEARING	6
-31	60432-000-00	. SLEEVE	4
-32	60434-000-00	. SCREW, CAP, WHEEL	2
-33	60433-000-00	. SCREW, CAP, WHEEL	2
-34	60045-000-00	. SPACER	4
-35	11246-016-00	. NUT	4
-36	11240-006-00	. WASHER, FLAT	2
-37	60430-000-00	. WELDMENT, PIN	2
-38	27931-013-00	. BEARING	2
-39	60445-000-00	. WELDMENT, FRAME, BOTTOM	1
-40	60090-000-00	. WELDMENT, ARM, LOWER LEFT	1
-41	60089-000-00	. WELDMENT, ARM, LOWER RIGHT	1
-42	60092-000-00	. WELDMENT, ARM, UPPER LEFT	1
-43	60091-000-00	. WELDMENT, ARM, UPPER RIGHT	1
-44	27931-039-00	. BEARING	2
-45	60444-000-00	. WELDMENT, FRAME, TOP	1
-46	60043-000-00	. WHEEL	2
-47	27931-012-00	. BEARING	2

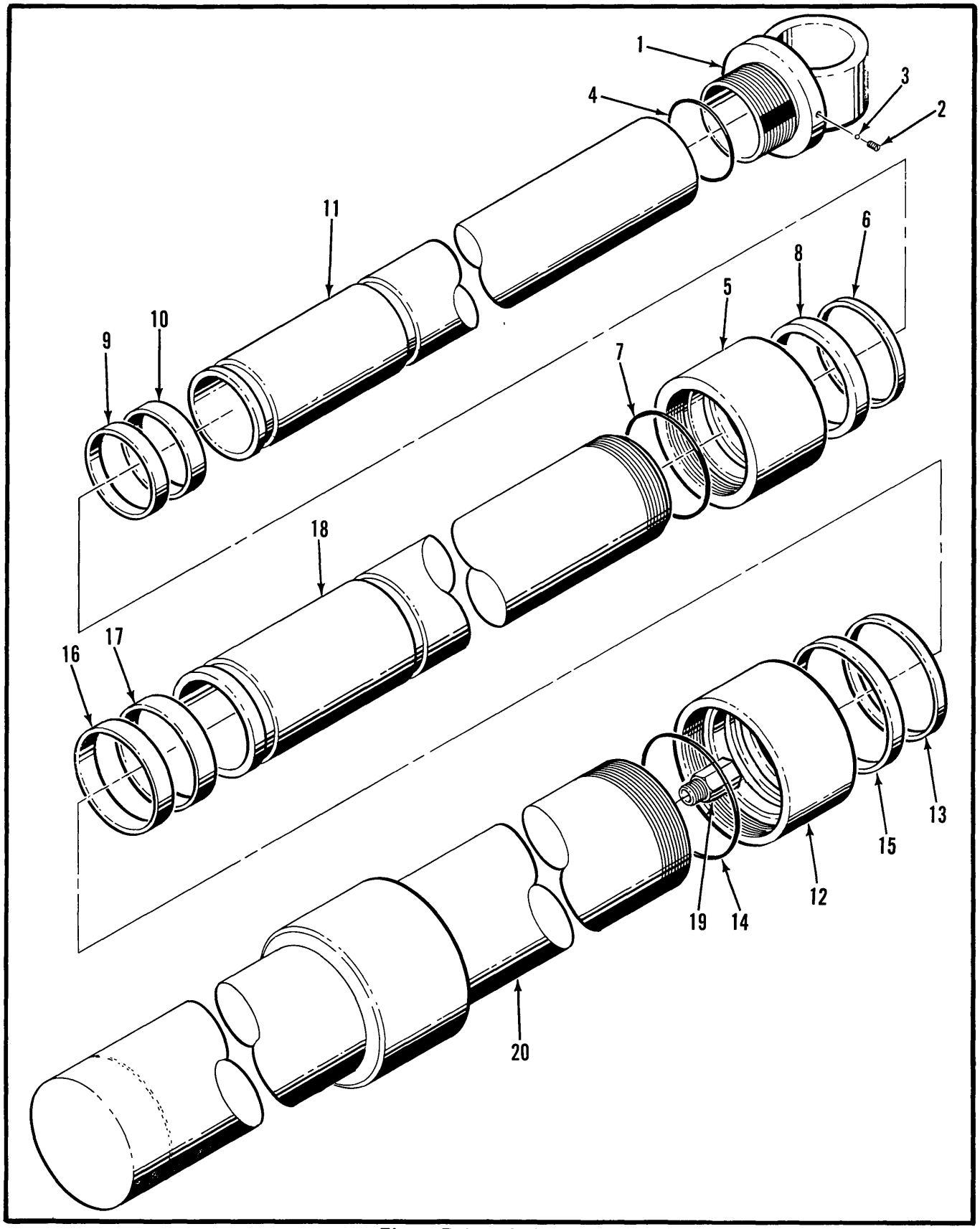


Figure 7-4. Lift Cylinder

ITEM NO.	PART NO.	DESCRIPTION	QTY REQ'D
7-4	60103-000-00	LIFT CYLINDER	
-1	60103-001-00	. MOUNT, ASSEMBLY, TOP	1
-2	60103-002-00	. SCREW, BLEEDER	1
-3	60103-003-00	. BALL, BLEEDER	1
-4	60103-004-00	. O-RING	1
-5	60103-005-00	. NUT, GLAND	1
-6	60103-006-00	. RING, WIPER	1
-7	60103-007-00	. O-RING	1
-8	60103-008-00	. SEAL	1
-9	60103-009-00	. RING, WEAR	1
-10	60103-010-00	. RING, STOP	1
-11	60103-011-00	. TUBE, CYLINDER	1
-12	60103-012-00	. NUT, GLAND	1
-13	60103-013-00	. RING, WIPER	1
-14	60103-014-00	. O-RING	1
-15	60103-015-00	. SEAL	1
-16	60103-016-00	. RING, WEAR	1
-17	60103-017-00	. RING, STOP	1
-18	60103-018-00	. TUBE, CYLINDER	1
-19	60103-019-00	. FUSE, VELOCITY	1
-20	60103-020-00	. BODY ASSEMBLY, CYLINDER	1
	60103-042-00	. KIT (Includes items 16 & 17)	
	60103-043-00	. KIT (Includes items 9 & 10)	
	60103-044-00	. KIT, SEAL (Includes items 13, 14 & 15)	
	60103-045-00	. KIT, SEAL (Includes items 6, 7 & 8)	

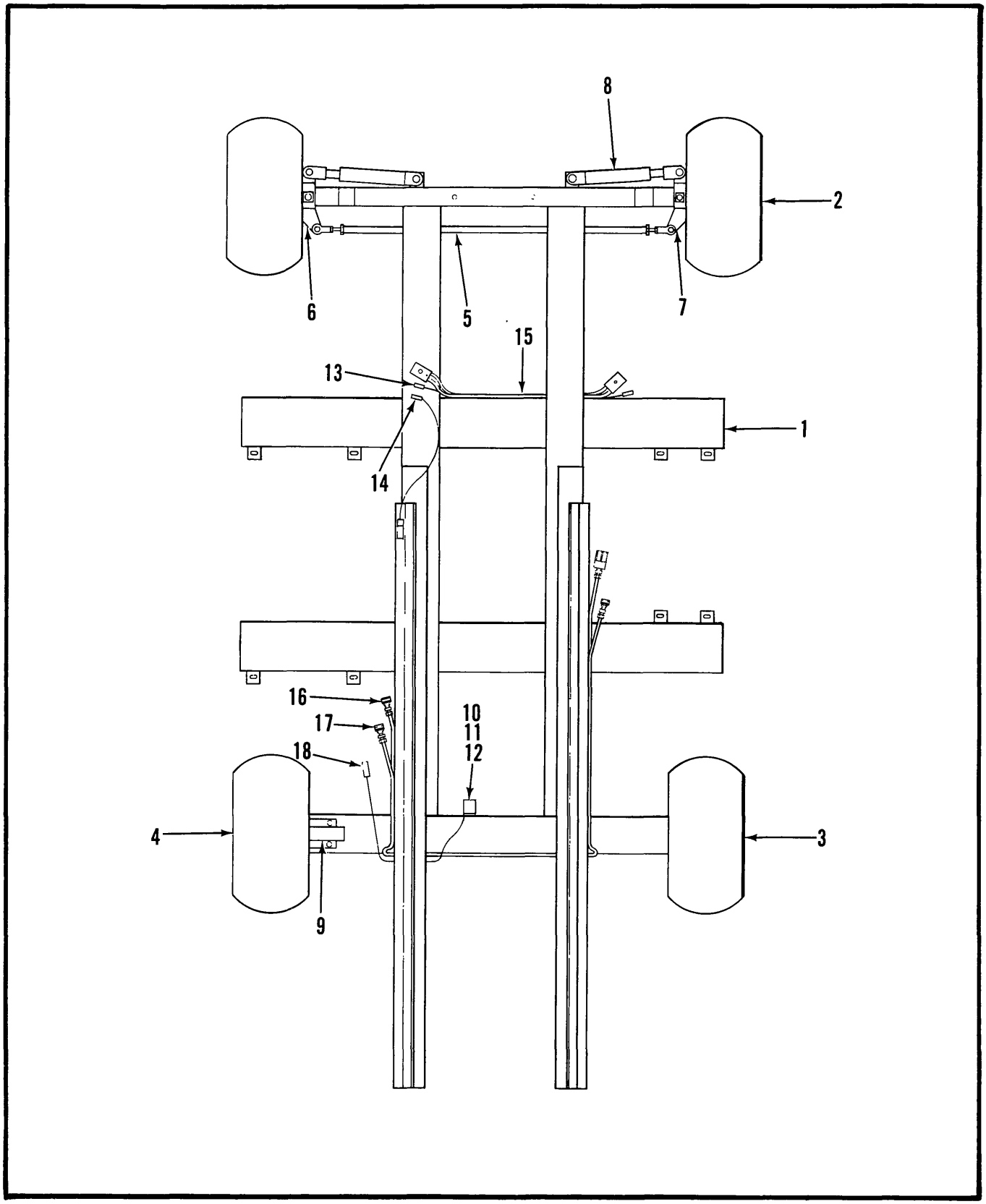


Figure 7-5. Chassis Assembly

ITEM NO.	PART NO.	DESCRIPTION	QTY REQ'D
7-5	60120-000-00	CHASSIS ASSEMBLY	
-1	60139-000-00	. WELDMENT, FRAME	1
-2	60224-000-00	. TIRE& WHEEL ASSEMBLY, FRONT	2
-3	60175-000-00	. TIRE & WHEEL ASSEMBLY, R. H. REAR	1
-4	60174-000-00	. TIRE & WHEEL ASSEMBLY, L. H. REAR	1
-5	60327-000-00	. TIE ROD ASSEMBLY	1
-6	60324-000-00	. SPINDLE ASSEMBLY, L. H. (See Figure 7-18)	1
-7	60323-000-00	. SPINDLE ASSEMBLY, R. H. (See Figure 7-18)	1
-8	60328-000-00	. CYLINDER ASSEMBLY, STEERING (See Figure 7-21)	2
-9	60329-000-00	. CYLINDER ASSEMBLY, BRAKE (See Figure 7-20)	1
-10	29859-000-00	. SWITCH, LIMIT	2
-11	29860-000-00	. . ACTUATOR	2
-12	29925-000-00	. CONNECTOR, CABLE	2
-13	60454-000-00	. CABLE ASSEMBLY, CHASSIS	2
-14	60455-000-00	. CABLE ASSEMBLY, UP LIMIT SWITCH	2
-15	60186-000-00	. CABLE ASSEMBLY, BATTERY	1
-16	60187-000-00	. HOSE ASSEMBLY, PROPANE (Dual fuel only)	1
-17	60394-000-00	. HOSE ASSEMBLY, GASOLINE (Dual fuel only)	1
-18	60456-000-00	. CABLE ASSEMBLY, DOWN LIMIT SWITCH	1

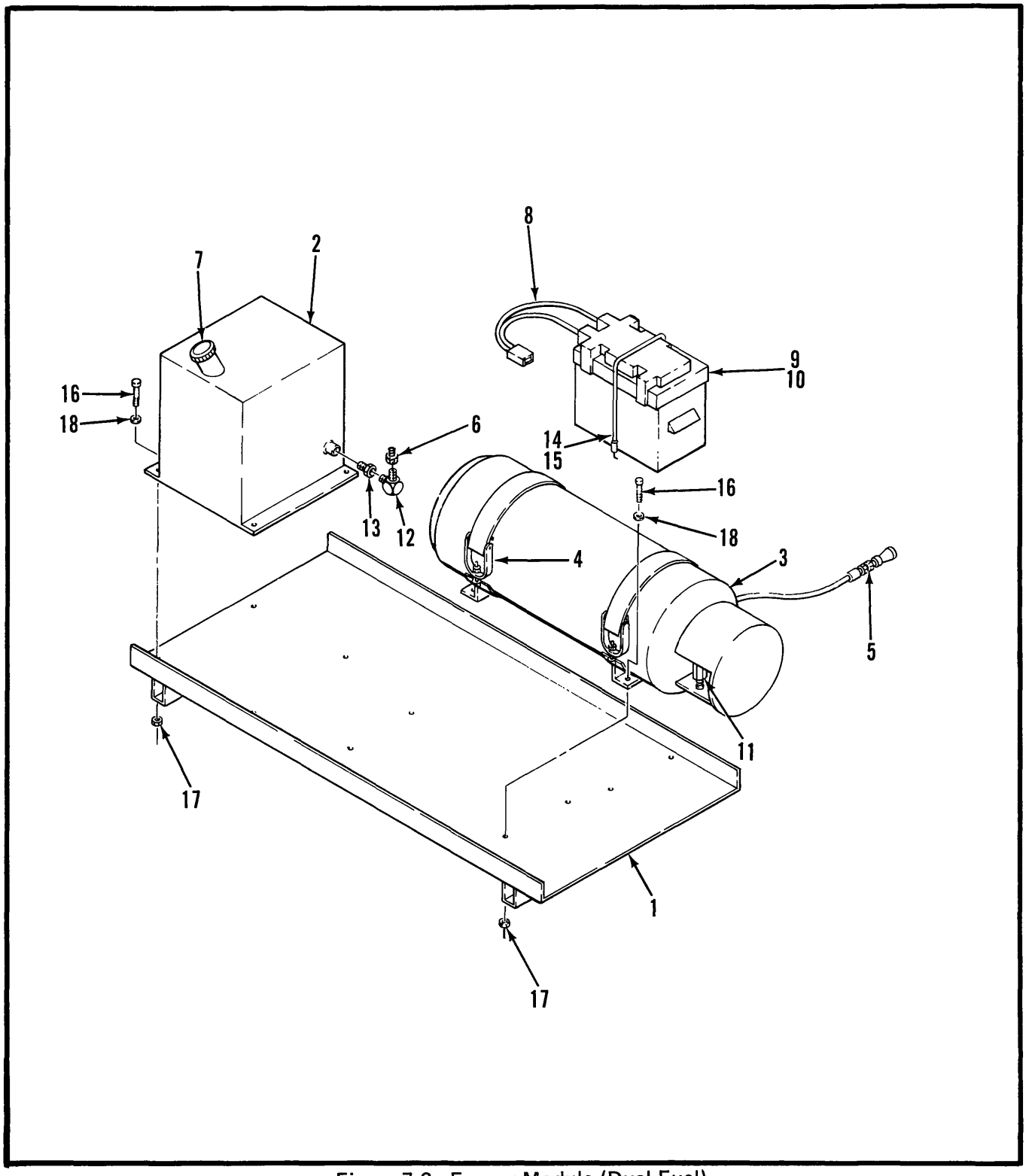


Figure 7-6. Energy Module (Dual Fuel)

ITEM NO.	PART NO.	DESCRIPTION	QTY REQ'D
7-6	60377-000-00	ENERGY MODULE ASSEMBLY (DUAL FUEL)	
-1	60378-000-00	. WELDMENT, ENERGY MODULE	1
-2	60264-000-00	. WELDMENT, FUEL TANK	1
-3	27934-002-00	. TANK, PROPANE, 10 GAL DOT	1
-4	27823-000-00	. BRACKET, MOUNTING	2
-5	60338-000-00	. HOSE ASSEMBLY, PROPANE	1
-6	60320-000-00	. FITTING	1
-7	60217-000-00	. CAP, FUEL	1
-8	60172-000-00	. CABLE ASSEMBLY, BATTERY	1
-9	27967-000-00	. BOX, BATTERY	1
-10	14417-001-00	. BATTERY, 12V DC	1
-11	27935-000-00	. CONNECTOR	1
-12	13963-002-00	. FITTING	1
-13	11923-003-00	. FITTING	1
-14	14490-099-00	. ROPE, RUBBER	1
-15	14489-000-00	. . HOOK	2
-16	11254-010-00	. SCREW, CAP	6
-17	11248-006-00	. NUT, HEX	8
-18	11240-006-00	. WASHER, FLAT	14

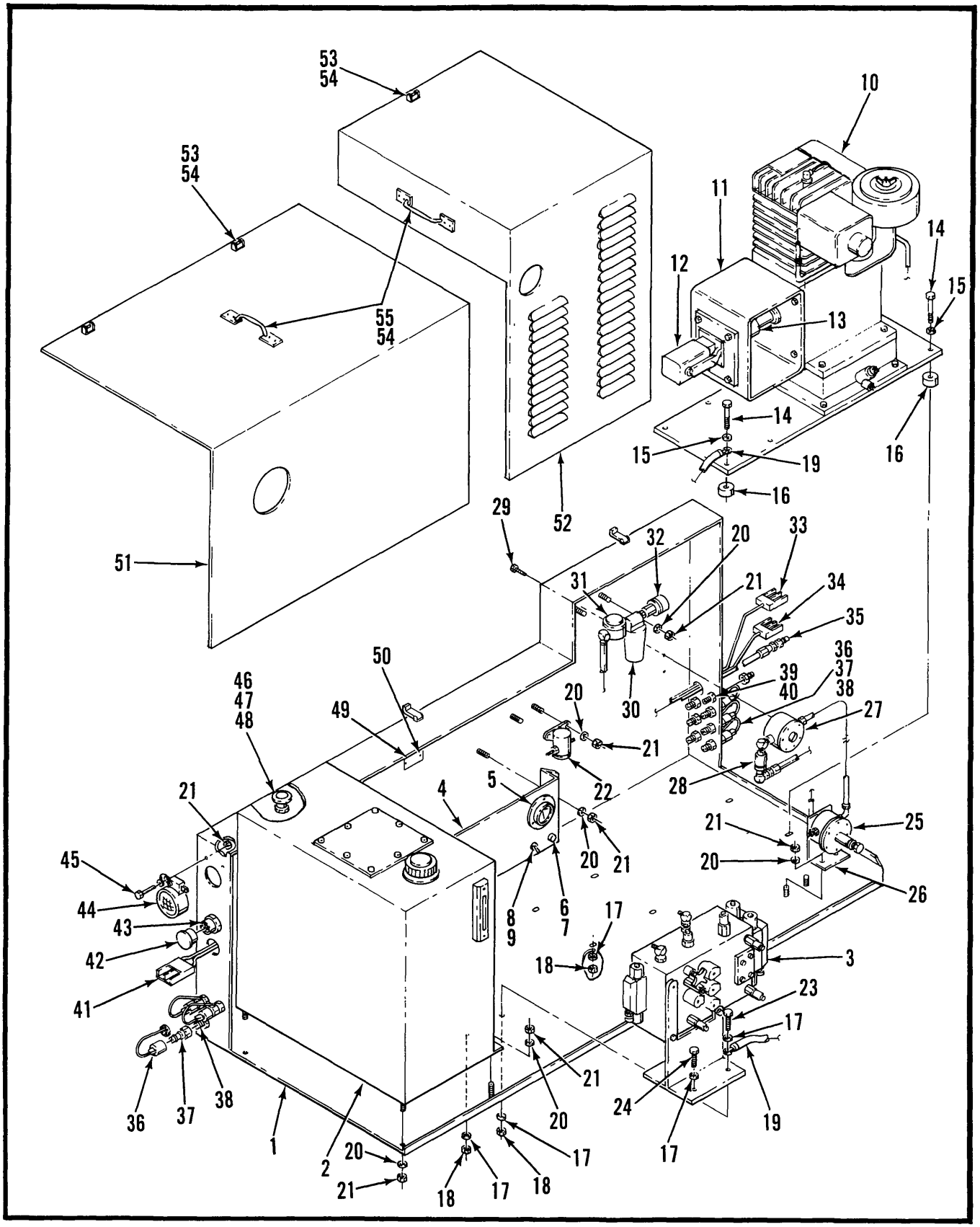


Figure 7-7. Power Module (Dual Fuel)

ITEM NO.	PART NO.	DESCRIPTION	QTY REQ'D
7-7	60374-000-00	POWER MODULE ASSEMBLY (DUAL FUEL)	1
-1	60375-000-00	. POWER MODULE WELDMENT	1
-2	60357-000-00	. TANK, HYDRAULIC	1
-3	60365-000-00	. VALVE ASSEMBLY, RUCKER	1
-4	60362-000-00	. BRACKET ASSEMBLY, ELECTRICAL	1
-5	27965-000-00	. . HOURMETER	1
-6	29701-000-00	. . HOLDER, FUSE	1
-7	29704-020-00	. . FUSE, 20 AMP AGC	1
-8	29870-001-00	. . SWITCH, TOGGLE	1
-9	29872-000-00	. . BOOT	1
-10	60463-000-00	. ENGINE	1
-11	60384-000-00	. MOUNT, PUMP	1
-12	60363-000-00	. PUMP	1
-13	60205-001-00	. COUPLING	1
-14	11254-008-00	. SCREW, CAP	6
-15	11238-006-00	. WASHER, LOCK	6
-16	60206-000-00	. BUSHING	6
-17	11240-006-00	. WASHER, FLAT 3/8"	16
-18	11248-006-00	. NUT, SELF LOCKING, 3/8" - 16NC	10
-19	27063-002-00	. CABLE ASSEMBLY	1
-20	11240-004-00	. WASHER, FLAT, 1/4"	10
-21	11248-004-00	. NUT, SELF LOCKING, 1/4" - 20NC	12
-22	27972-000-00	. SOLENOID, STARTER	1
-23	11254-014-00	. SCREW, CAP, 3/8" - 16NC X 1-3/4" Lg GD5	1
-24	11254-010-00	. SCREW, CAP 3/8" - 16NC X 1-1/4" Lg	3
-25	60396-000-00	. CONTROL, FUEL	1
-26	60408-000-00	. BRACKET	1
-27	60395-000-00	. REGULATOR, PRESSURE	1
-28	60203-002-00	. FILTER	1
-29	14073-004-00	. SCREW, SELF TAPPING, 8 - 32NC X 1/2" Lg	2
-30	60314-000-00	. PUMP, FUEL	1
-31	60196-000-00	. REGULATOR	1
-32	60204-000-00	. SOLENOID, VALVE	1
-33	60458-000-00	. CABLE ASSEMBLY	1
-34	60459-000-00	. CABLE ASSEMBLY	1
-35	60177-000-00	. HOSE ASSEMBLY, PROPANE	1
-36	60414-000-00	. PLUG, DUST	9
-37	14983-003-00	. FITTING, COUPLING HALF	9
-38	14922-003-00	. FITTING	9
-39	60320-000-00	. FITTING	1
-40	14922-001-00	. FITTING	1
-41	60339-000-00	. CABLE ASSEMBLY, BATTERY	1
-42	60415-000-00	. COVER, DUST	1
-43	28800-002-00	. RECEPTACLE	1
-44	27943-000-00	. ALARM, DOWN	1
-45	11252-010-00	. SCREW, CAP, 1/4" - 20NC - 1-1/4" Lg	2
-46	27961-000-00	. BUTTON	1
-47	27960-001-00	. BLOCK, CONTACT	1
-48	27959-000-00	. OPERATOR	1
-49	60448-000-00	. PLATE, NAME	1
-50	26551-004-00	. RIVET, POP	2
-51	61022-000-00	. COVER, FRONT	1
-52	60410-000-00	. COVER, ENGINE	1
-53	13595-020-00	. LATCH	3
-54	26553-001-00	. RIVET, POP	12
-55	25427-002-00	. HANDLE	3

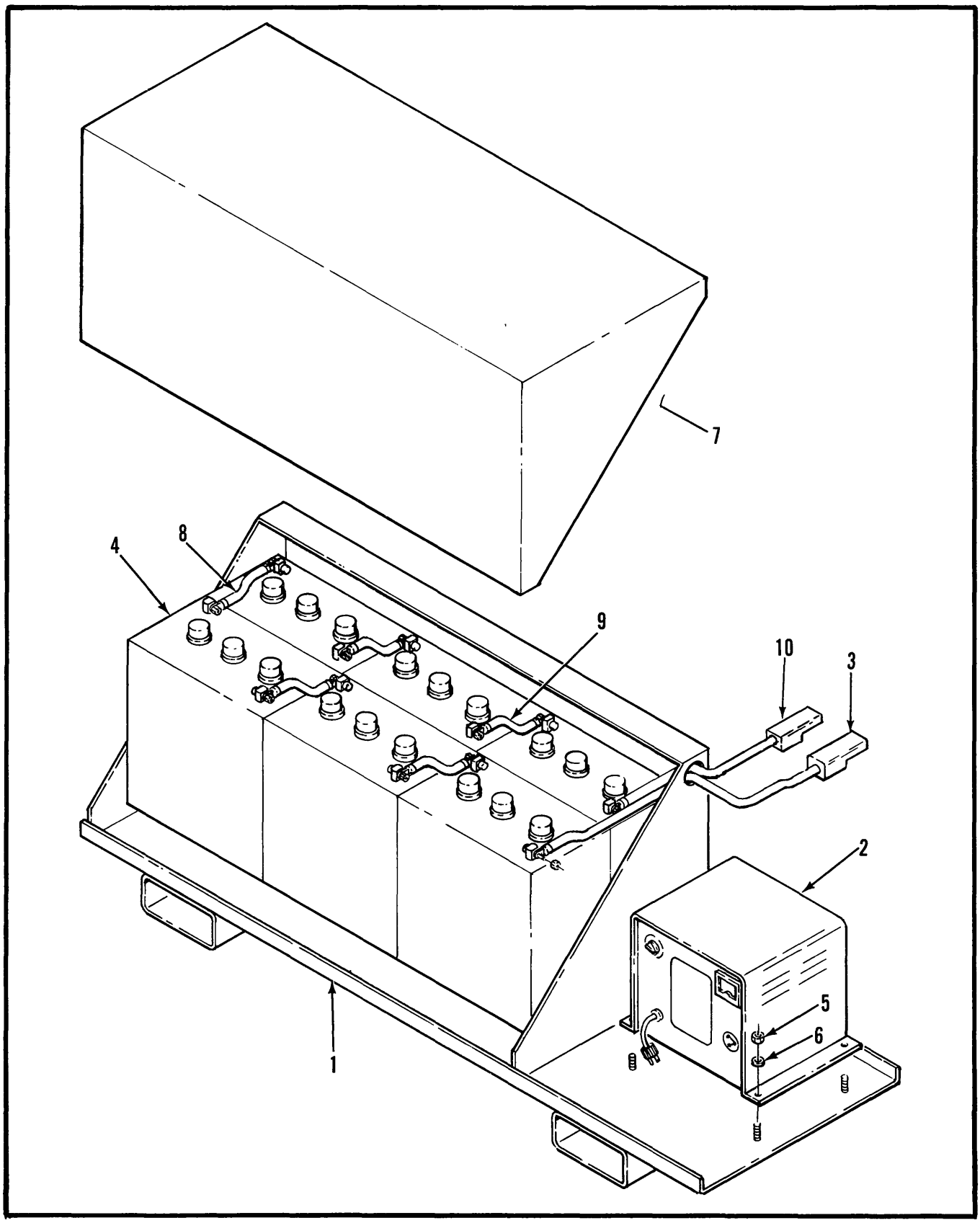


Figure 7-8. Energy Module (Electric)

ITEM NO.	PART NO.	DESCRIPTION	QTY REQ'D
7-8	60333-000-00	ENERGY MODULE ASSEMBLY (ELECTRIC)	
-1	60275-000-00	. WELDMENT, ENERGY MODULE	1
-2	60201-000-00	. CHARGER, BATTERY	1
-3	60173-000-00	. CABLE ASSEMBLY, BATTERY	1
-4	11674-002-00	. BATTERY, 6V 250A	6
-5	11248-004-00	. NUT	4
-6	11240-004-00	. WASHER, FLAT	4
-7	60233-000-00	. WELDMENT, COVER	1
-8	27477-002-00	. CABLE ASSEMBLY, BATTERY	1
-9	27477-001-00	. CABLE ASSEMBLY, BATTERY	4
-10	60466-000-00	. CABLE ASSEMBLY, ELECTRIC ENERGY MODULE	1

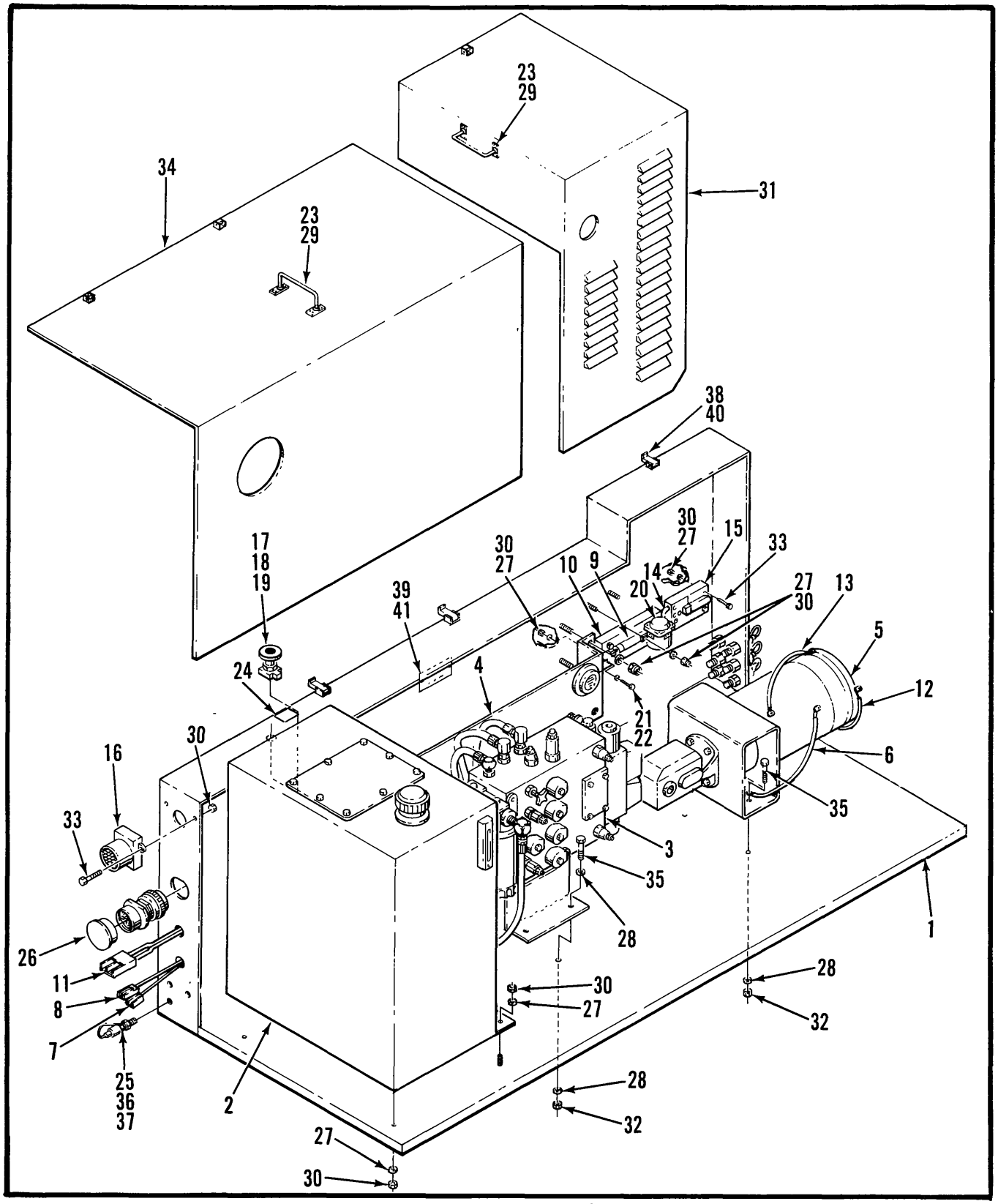


Figure 7-9. Power Module (Electric)

ITEM NO.	PART NO.	DESCRIPTION	QTY REQ'D
7-9	60381-000-00	POWER MODULE ASSEMBLY (ELECTRIC)	1
-1	60375-000-00	. POWER MODULE WELDMENT	1
-2	60357-000-00	. TANK ASSEMBLY, HYDRAULIC	1
-3	60365-000-00	. VALVE ASSEMBLY	1
-4	60368-000-00	. BRACKET ASSEMBLY, ELECTRICAL	1
-5	60382-000-00	. MOTOR ASSEMBLY, ELECTRICAL	1
-6	60192-000-00	. CABLE ASSEMBLY	1
-7	60194-000-00	. CABLE ASSEMBLY	1
-8	60195-000-00	. CABLE ASSEMBLY	1
-9	60215-001-00	. FUSE, 100 AMP	1
-10	60216-000-00	. HOLDER, FUSE	1
-11	60339-000-00	. CABLE ASSEMBLY, BATTERY	1
-12	05416-004-00	. CABLE ASSEMBLY	1
-13	05416-005-00	. CABLE ASSEMBLY	1
-14	05416-011-00	. CABLE ASSEMBLY	1
-15	27457-001-00	. CONTACTOR ASSEMBLY	1
-16	27943-000-00	. ALARM, DOWN	1
-17	27959-000-00	. OPERATOR	1
-18	27960-002-00	. BLOCK, CONTACT	1
-19	27961-000-00	. BUTTON	1
-20	29944-001-00	. SOLENOID	1
-21	11239-004-00	. WASHER, 1/4" FLAT	4
-22	12553-008-00	. SCREW, SOC HD, 1/4" - 20 UNC X 1" Lg.	4
-23	26553-007-00	. RIVET, POP, 3/16" - .500 GRIP	12
-24	60344-000-00	. DECAL, EMERGENCY STOP	1
-25	60414-000-00	. PLUG, DUST, FEMALE	9
-26	60415-000-00	. PLUG, DUST	1
-27	11240-004-00	. WASHER, 1/4" FLAT	13
-28	11240-006-00	. WASHER, 3/8" FLAT	12
-29	25427-003-00	. HANDLE, DOOR PULL	3
-30	11248-004-00	. NUT, 1/4 - 20 UNC SELF LOCKING	17
-31	60410-000-00	. COVER, WELDMENT, ENGINE	1
-32	11248-006-00	. NUT, 3/8" - 16 SELF LOCKING	6
-33	11252-010-00	. SCREW, 1/4 - 20 X 1-1/4 CAP	3
-34	61022-000-00	. COVER MOTOR FRONT	1
-35	11254-010-00	. SCREW, 3/8" - 16 NC X 1-1/4"	6
-36	14922-003-00	. FITTING	9
-37	14983-003-00	. FITTING, MALE	9
-38	13595-020-00	. LATCH	3
-39	60448-000-00	. NAME PLATE, MODULE	1
-40	26551-002-00	. RIVET, 1/8" POP., 125 GRIP	3
-41	26551-006-00	. RIVET, 1/8" POP, .250 GRIP	2
	05222-001-00	. DECAL, FORK LIFT	2
	14222-003-86	. DECAL, BRAKE PRESSURE	1
	14222-003-87	. DECAL, LH DRIVE MOTOR REVERSE	1
	14222-003-88	. DECAL, LH DRIVE MOTOR, FORWARD	1
	14222-003-89	. DECAL, RH DRIVE MOTOR, REVERSE	1
	14222-003-90	. DECAL, RH DRIVE MOTOR, FORWARD	1
	14222-003-96	. DECAL, BRAKE RETURN	1
	14222-003-93	. DECAL, LIFT CYLINDER	1
	14222-003-94	. DECAL, LH STEERING	1
	14222-003-95	. DECAL, RH STEERING	1
	60197-000-00	. DECAL, HYDRAULIC FLUID	1
	60354-000-00	. DECAL, DANGER	1
	60346-000-00	. DECAL, EMERGENCY LOWERING VALVE	1
	60353-000-00	. DECAL, CAUTION	1

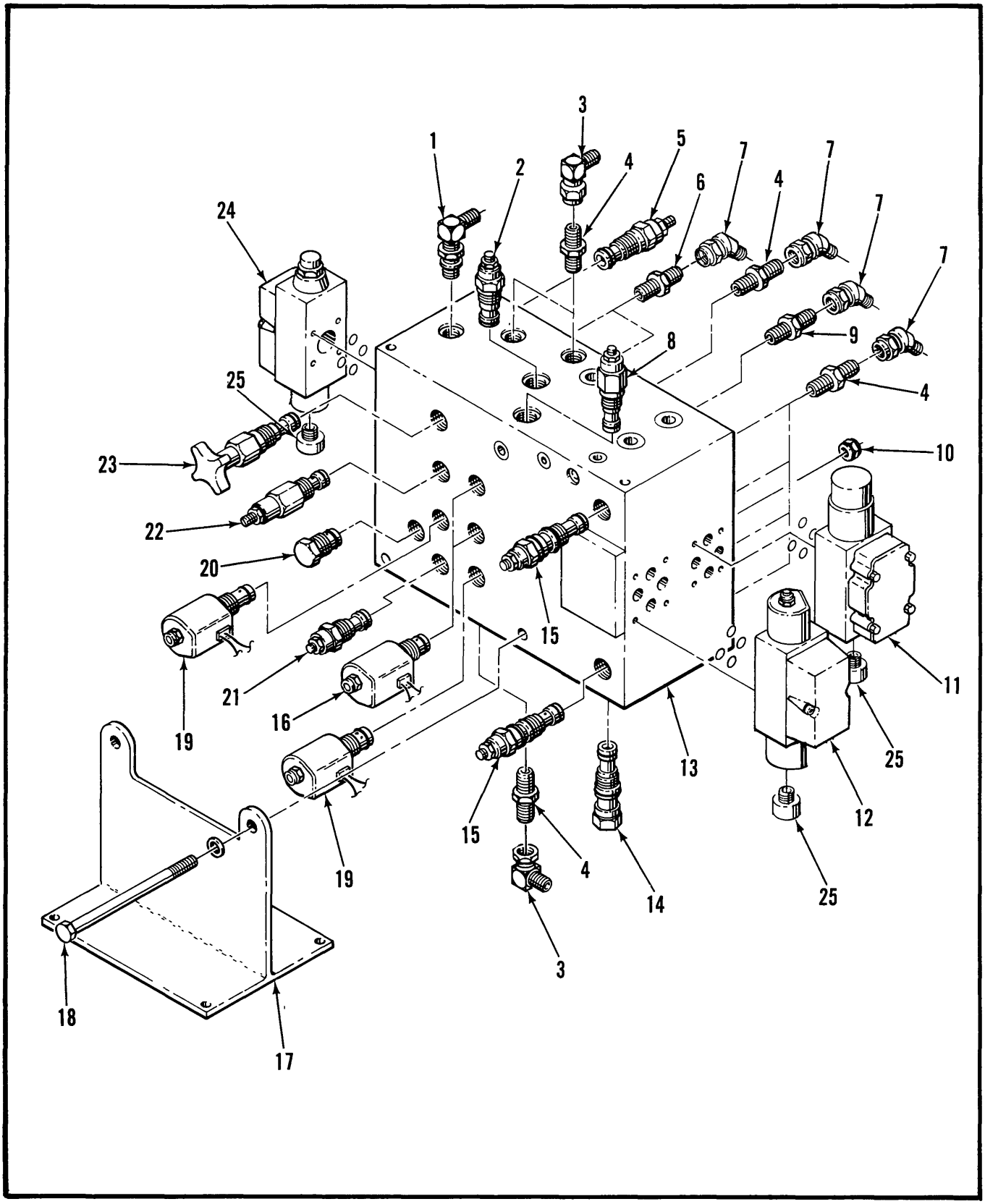


Figure 7-10. Control Valve Assembly

ITEM NO.	PART NO.	DESCRIPTION	QTY REQ'D
7-10	60365-000-00	CONTROL VALVE ASSEMBLY	
-1	11934-004-00	. FITTING, ELBOW, O-RING BOSS	1
-2	60387-000-00	. VALVE, NEEDLE CARTRIDGE	1
-3	11937-003-00	. FITTING, ELBOW	2
-4	11941-009-00	. FITTING, STRAIGHT, O-RING BOSS	7
-5	60391-000-00	. VALVE, CARTRIDGE, RELIEF	1
-6	11941-005-00	. FITTING, STRAIGHT, O-RING BOSS	2
-7	11932-003-00	. FITTING, ELBOW	8
-8	60294-000-00	. VALVE, CARTRIDGE, MAIN RELIEF	1
-9	11941-002-00	. FITTING, STRAIGHT, O-RING BOSS	1
-10	11248-006-00	. NUT, HEX, SELF-LOCK	2
-11	60286-000-00	. VALVE, CONTROL	1
-12	60284-000-00	. VALVE, DIRECTIONAL CONTROL	1
-13	60392-000-00	. BLOCK, VALVE MANIFOLD	1
-14	60198-000-00	. VALVE, CARTRIDGE, SHUTTLE	1
-15	60289-000-00	. VALVE, CARTRIDGE, COUNTERBALANCE	2
-16	60296-000-00	. VALVE, SOLENOID	2
-17	60312-000-00	. MOUNT, VALVE	1
-18	11254-040-00	. SCREW, CAP	2
-19	60291-000-00	. VALVE, SOLENOID	2
-20	60290-000-00	. VALVE, CHECK	1
-21	60199-000-00	. VALVE, CA RTRIDGE, R ESTRICTOR	1
-22	60390-000-00	. VALVE, CARTRIDGE, RELIEF	1
-23	60388-000-00	. VALVE, CARTRIDGE	1
-24	60389-000-00	. VALVE, DIRECTIONAL CONTROL	1
-25	29925-000-00	. CONNECTOR	3

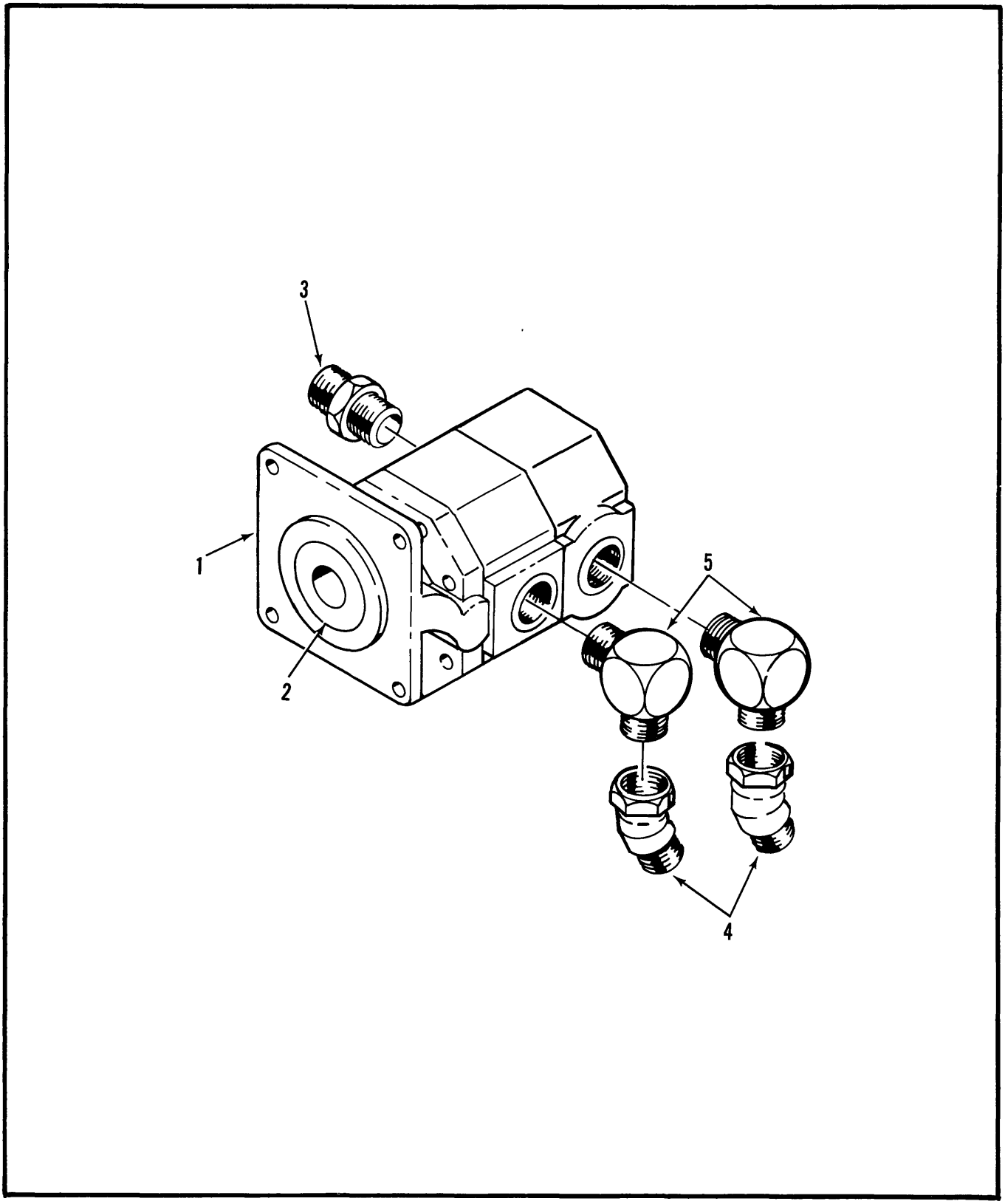


Figure 7-11. Hydraulic Pump Assembly

ITEM NO.	PART NO.	DESCRIPTION	QTY REQ'D
7-11	60363-000-00	HYDRAULIC PUMP ASSEMBLY	
-1	60104-000-00	. PUMP, HYDRAULIC	1
-2	60104-001-00	. . SEAL, OIL	1
-3	11941-012-00	. FITTING	1
-4	11932-003-00	. FITTING	2
-5	11934-004-00	. FITTING	2

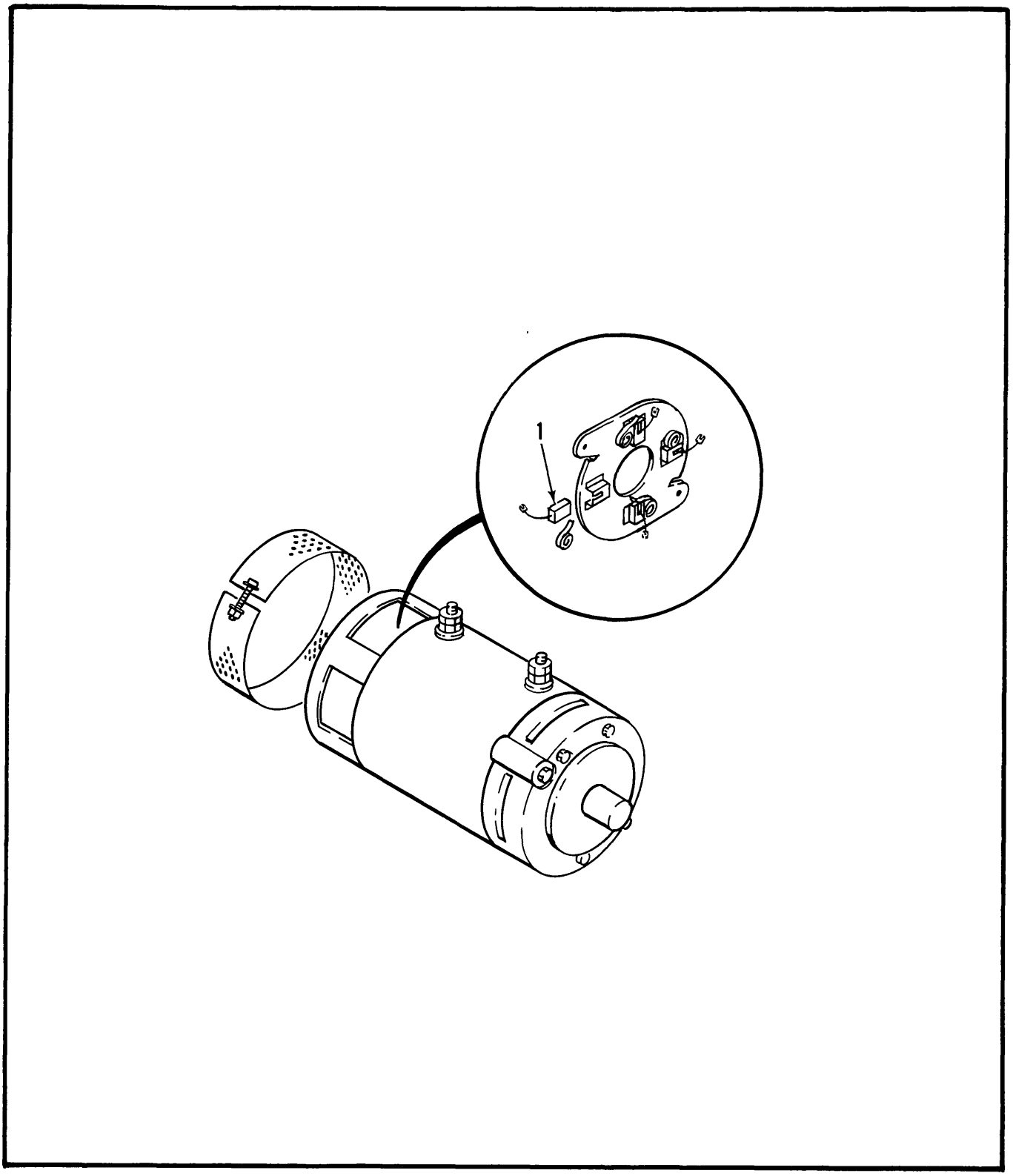


Figure 7-12. Electric Motor

ITEM NO.	PART NO.	DESCRIPTION	QTY REQ'D
7-12	05975-000-00	MOTOR, ELECTRIC, GE 58C49JB353	
-1	26539-000-00	. BRUSH	4

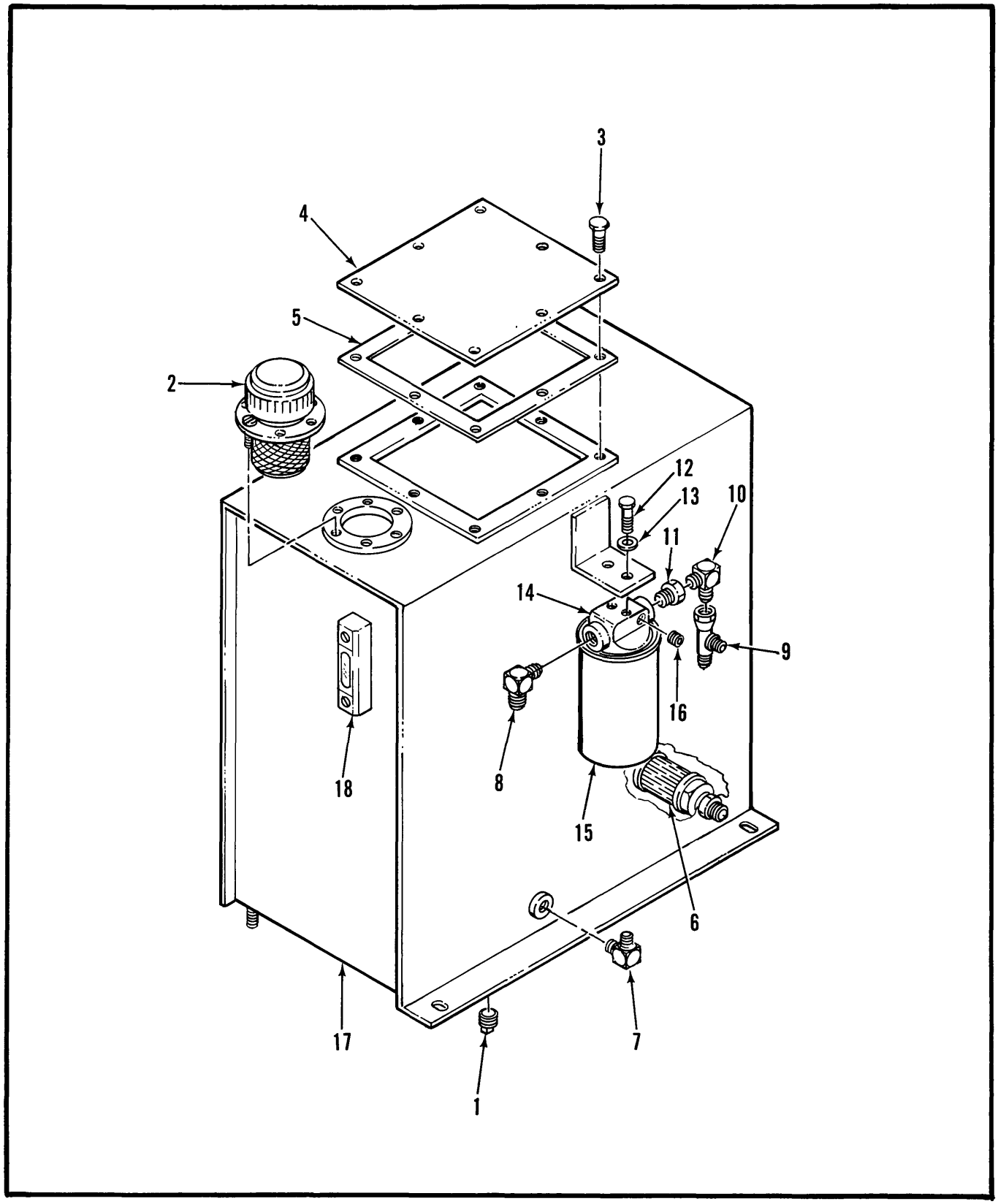


Figure 7-13. Hydraulic Tank Assembly

ITEM NO.	PART NO.	DESCRIPTION	QTY REQ'D
7-13	60357-000-00	HYDRAULIC TANK ASSEMBLY	
-1	21305-006-00	. PLUG, MAGNETIC	1
-2	05963-000-00	. FILLER - BREATHER	1
-3	11811-005-00	. SCREW, SELF-TAPPING, HEX HEAD	8
-4	60255-000-00	. PLATE, COVER	1
-5	60282-000-00	. GASKET, PLATE	1
-6	05964-000-00	. FILTER, SUMP	1
-7	11940-019-00	. FITTING, ELBOW	1
-8	11940-016-00	. FITTING, ELBOW	1
-9	20733-002-00	. FITTING, TEE	1
-10	11940-014-00	. FITTING, ELBOW	1
-11	11923-009-00	. FITTING, REDUCING	1
-12	11252-006-00	. SCREW, CAP	2
-13	11240-004-00	. WASHER, FLAT	2
-14	05154-001-00	. FILTER ASSEMBLY, HYDRAULIC	1
-15	05154-002-00	. . ELEMENT, FILTER, SPIN-ON	1
-16	11919-002-00	. PLUG	1
-17	60277-000-00	. TANK WELDMENT, HYDRAULIC	1
-18	60380-000-00	. SIGHT GAUGE	1

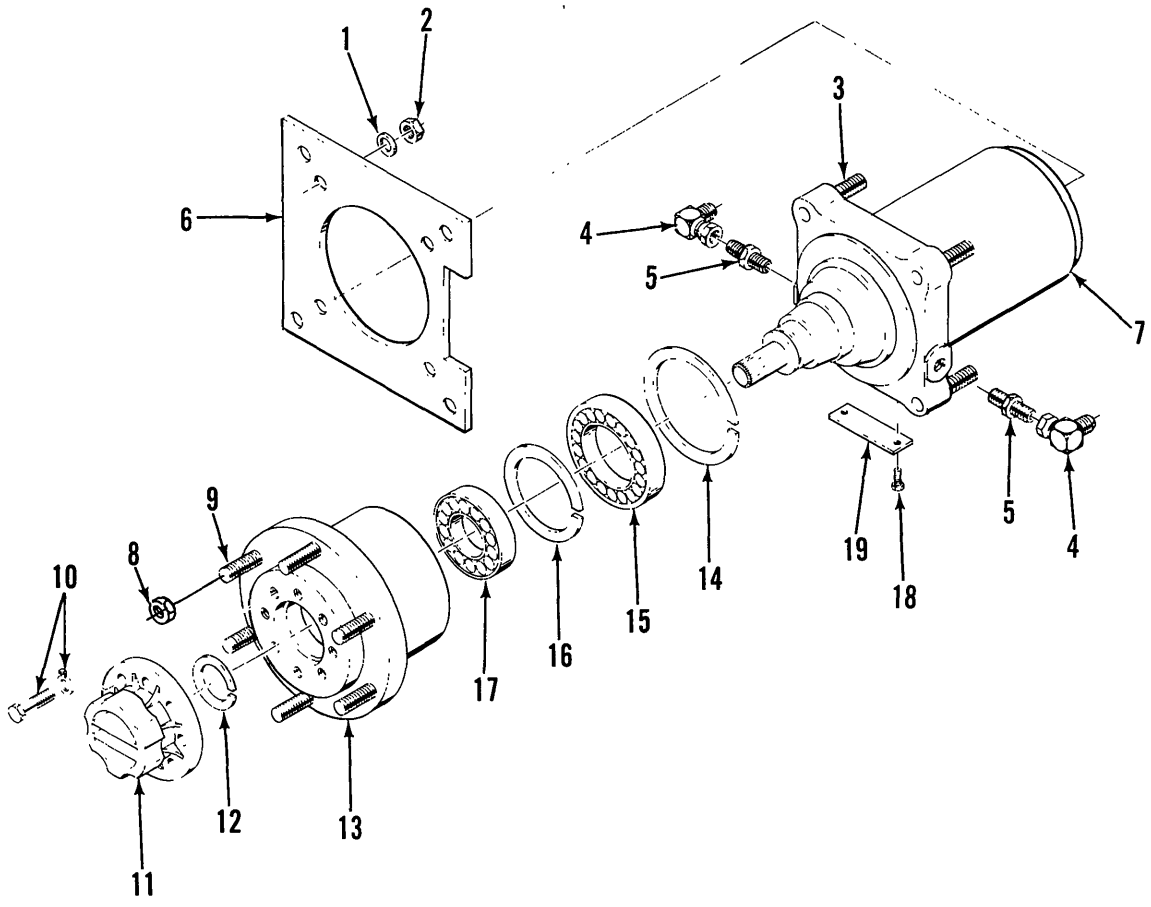


Figure 7-14. Hydraulic Motor Assembly (Optional)

ITEM NO.	PART NO.	DESCRIPTION	QTY REQ'D
7-14	61138-000-00	HYDRAULIC MOTOR ASSEMBLY (OPTIONAL)	
-1	MS27183-17	. WASHER, FLAT	4
-2	11248-008-00	. NUT, HEX, 1/2" - 13	4
-3	11256-020-00	. SCREW, CAP, 1/2" - 13 X 2-1/2"	4
-4	11937-003-00	. FITTING	2
-5	11941-013-00	. FITTING	2
-6	60265-000-00	. PLATE	1
-7	12779-000-00	. MOTOR, HYDRAULIC (See Figure 7-15)	1
-8	12779-001-00	. . NUT, LUG	6
-9	11468-000-00	. . STUD, BOLT	6
-10	12779-002-00	. . SCREW, CAP	6
-11	12779-003-00	. . DECLUTCH ASSEMBLY	1
-12	12779-004-00	. . RING, RETAINER	1
-13	12779-005-00	. . HOUSING, BEARING	1
-14	12779-006-00	. . RING, RETAINER	1
-15	12779-007-00	. . BEARING	1
-16	12779-008-00	. . RING, RETAINER	1
-17	12779-009-00	. . BEARING	1
-18	12779-010-00	. . SCREW, CAP	2
-19	12779-011-00	. . PLATE	1

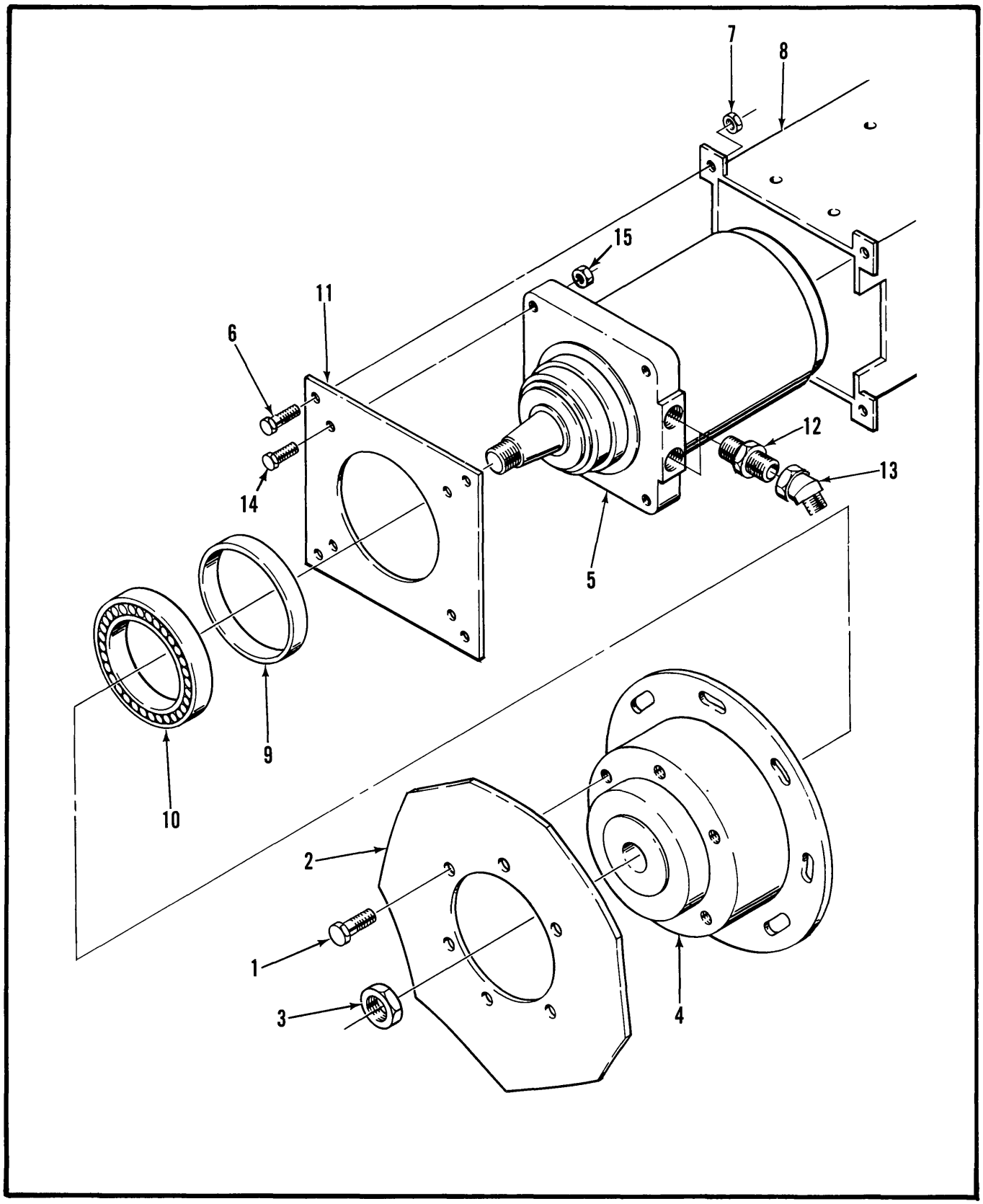


Figure 7-15. Hydraulic Motor Assembly (Standard)

ITEM NO.	PART NO.	DESCRIPTION	QTY REQ'D
7-15	60325-000-00	HYDRAULIC MOTOR ASSEMBLY (STANDARD)	
-1	11468-000-00	. SCREW, CAP, WHEEL	6
-2	60174-000-00	. WHEEL & TIRE ASSEMBLY, L. H. REAR	1
-2	60175-000-00	. WHEEL & TIRE ASSEMBLY, R. H. REAR	1
-3	60283-001-00	. NUT	1
-4	60228-000-00	. HUB, R. H. REAR	1
-4	60230-000-00	. HUB & ROTOR, R.H. REAR	1
-5	60283-000-00	. MOTOR, HYDRAULIC	1
-6	11256-012-00	. SCREW, CAP	8
-7	11248-008-00	. NUT	8
-8	60139-000-00	. WELDMENT, FRAME	1
-9	18484-001-00	. SPACER	1
-10	60208-001-00	. BEARING	1
-11	60266-000-00	. PLATE	1
-12	11941-013-00	. FITTING	2
-13	11937-003-00	. FITTING	2
-14	11256-020-00	. SCREW, CAP	8
-15	11248-008-00	. NUT, SELF LOCKING	8

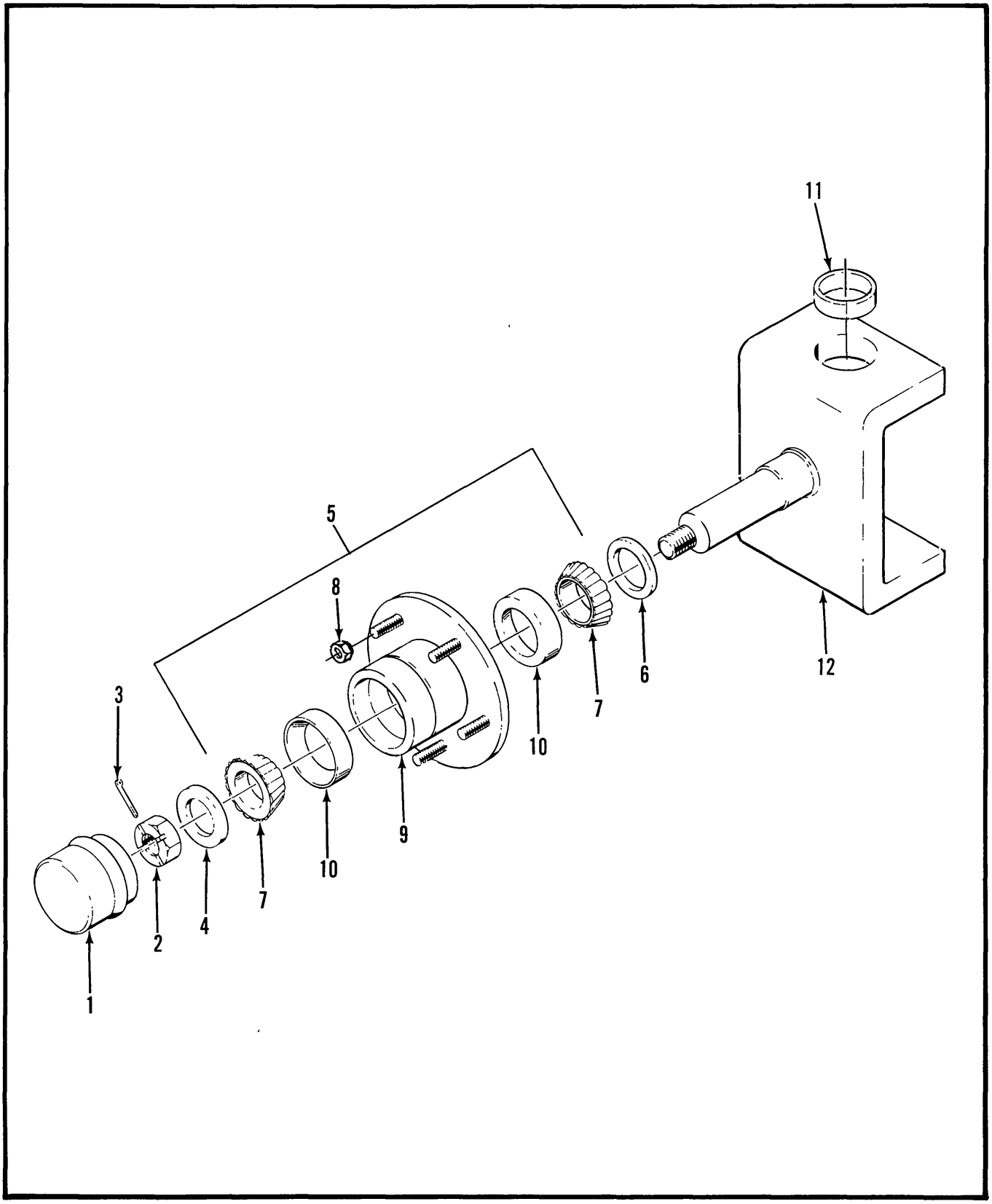


Figure 7-16. R.H. & L.H. Spindle Assemblies

ITEM NO.	PART NO.	DESCRIPTION	QTY REQ'D
7-16	60323-000-00	R. H. SPINDLE ASSEMBLY	
7-16	60324-000-00	L. H. SPINDLE ASSEMBLY	
-1	05078-000-00	. CAP, DUST	1
-2	11245-016-00	. NUT, CASTLE	1
-3	11753-012-00	. PIN, COTTER	1
-4	11239-016-00	. WASHER, FLAT	1
-5	05100-000-00	. HUB ASSEMBLY	1
-6	05104-000-00	. . SEAL, GREASE	1
-7	11775-011-00	. . CONE, BEARING	2
-8	05105-000-00	. . NUT, WHEEL	5
-9	05100-001-00	. . HUB	1
-10	11776-004-00	. . CUP, BEARING	2
-11	27931-011-00	. BEARING	2
-12	60249-000-00	. SPINDLE, FRONT (R. H. only)	1
-12	60248-000-00	. SPINDLE, FRONT (L. H. only)	1

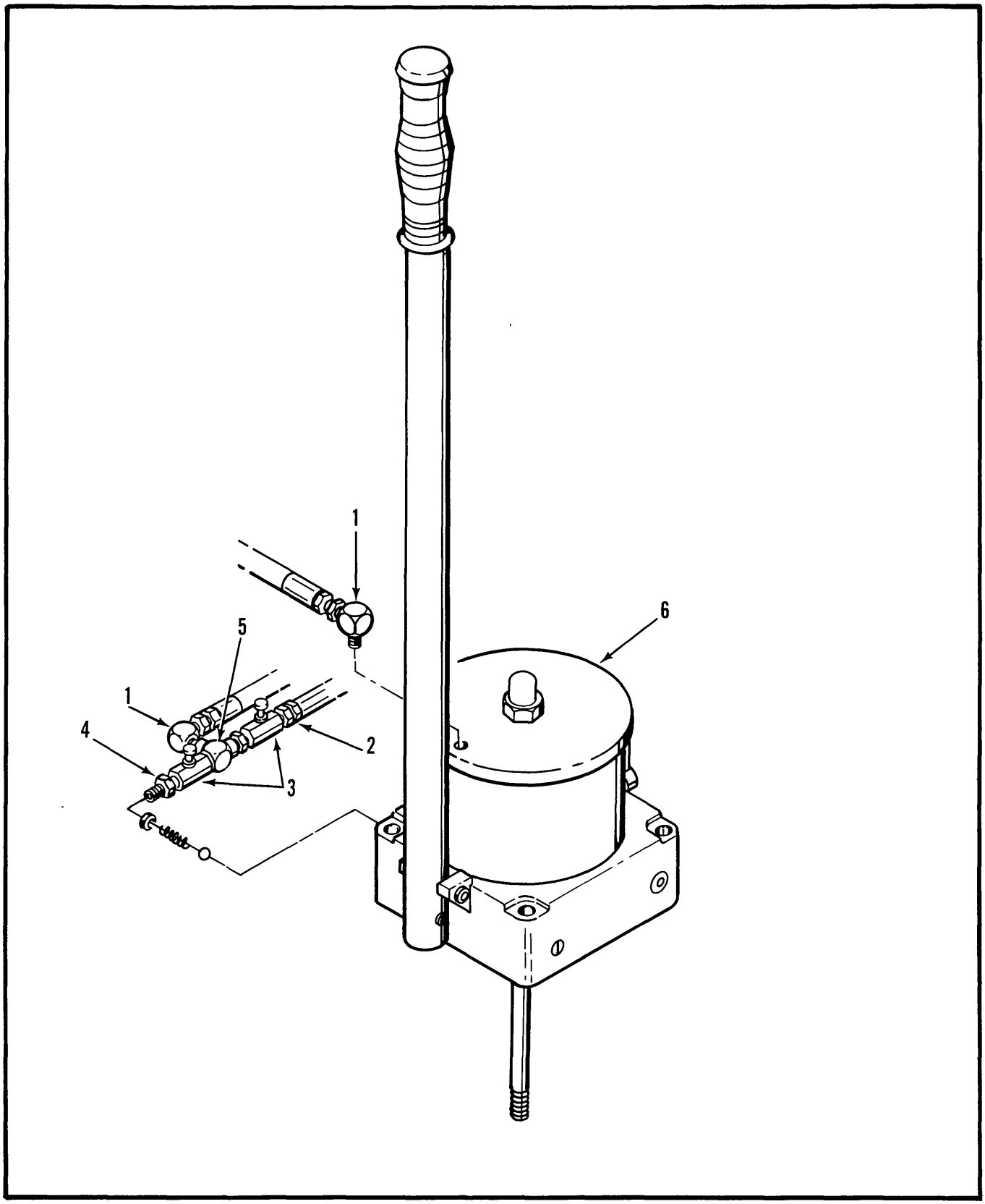


Figure 7-17. Hand Pump Assembly (Optional)

ITEM NO.	PART NO.	DESCRIPTION	QTY REQ'D
7-17	61151-000-00	HAND PUMP ASSEMBLY - OPTIONAL	
-1	11940-010-00	. FITTING, ELBOW	2
-2	11939-010-00	. FITTING, STRAIGHT	1
-3	05881-000-00	. VALVE, NEEDLE	2
-4	13487-005-00	. FITTING, STRAIGHT	2
-5	11982-003-00	. FITTING, TEE	1
-6	14949-000-00	. PUMP, HAND	1

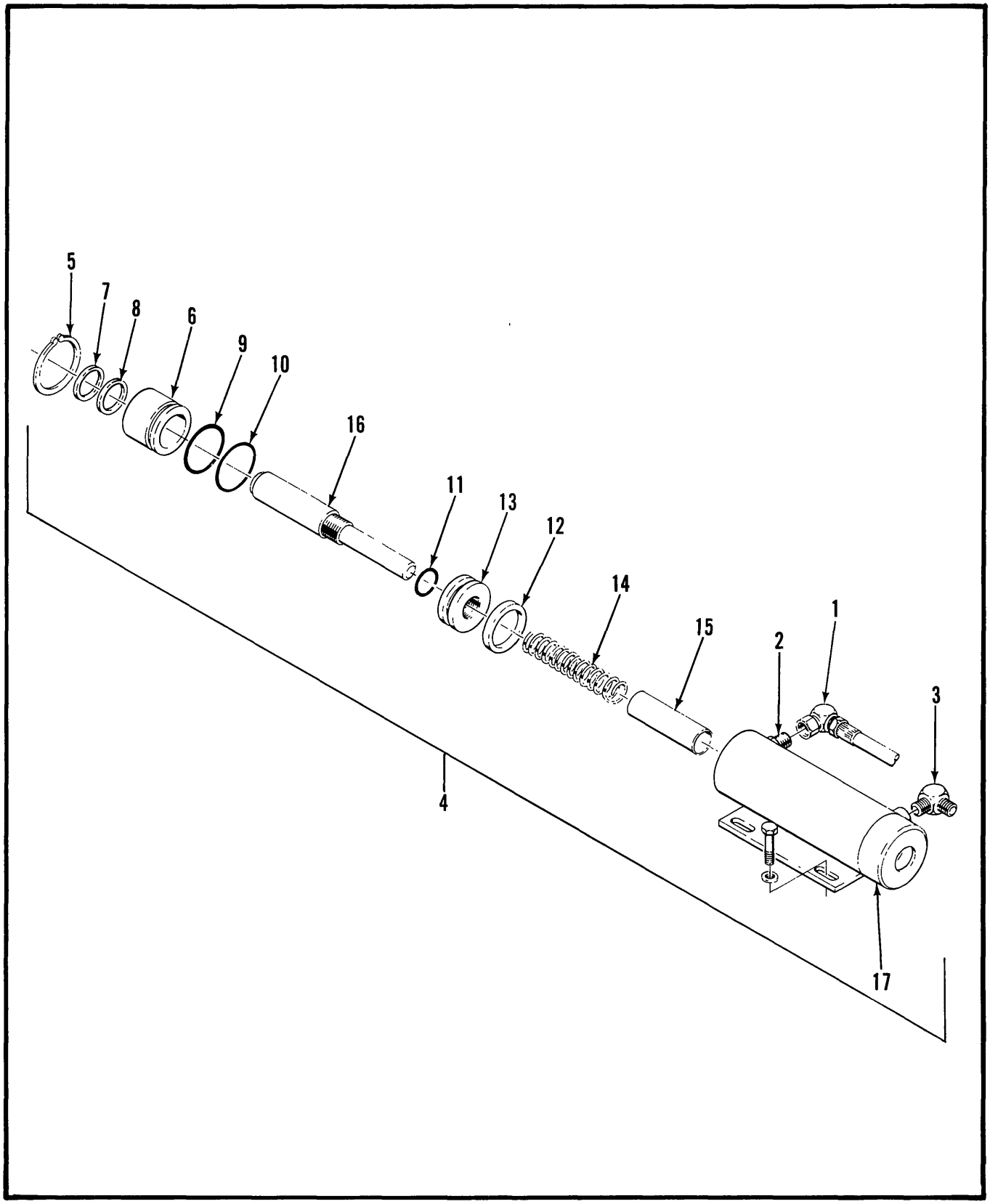


Figure 7-18. Brake Cylinder Assembly

ITEM NO.	PART NO.	DESCRIPTION	QTY REQ'D
7-18	60329-000-00	BRAKE CYLINDER ASSEMBLY	
-1	11937-003-00	. FITTING	1
-2	11939-010-00	. FITTING	1
-3	11940-010-00	. FITTING	1
-4	60211-000-00	. CYLINDER, BRAKE	1
-5	60211-011-00	. . RING, SNAP	1
-6	60211-010-00	. . HEADCAP	1
-7	60211-013-00	. . WIPER	1
-8	60211-012-00	. . SEAL, SHAFT	1
-9	60211-009-00	. . SEAL, STATIC	1
-10	60211-008-00	. . SEAL, STATIC	1
-11	60211-005-00	. . SEAL, STATIC	1
-12	60211-006-00	. . SEAL, PISTON	1
-13	60211-004-00	. . PISTON	1
-14	60211-003-00	. . SPRING, RETURN	1
-15	60211-002-00	. . TUBE, STOP	1
-16	60211-007-00	. . SHAFT	1
-17	60211-001-00	. . BARREL ASSEMBLY	1
	60211-014-00	. KIT, SEAL (Includes items 7, 8, 9, 10, 11 & 12)	

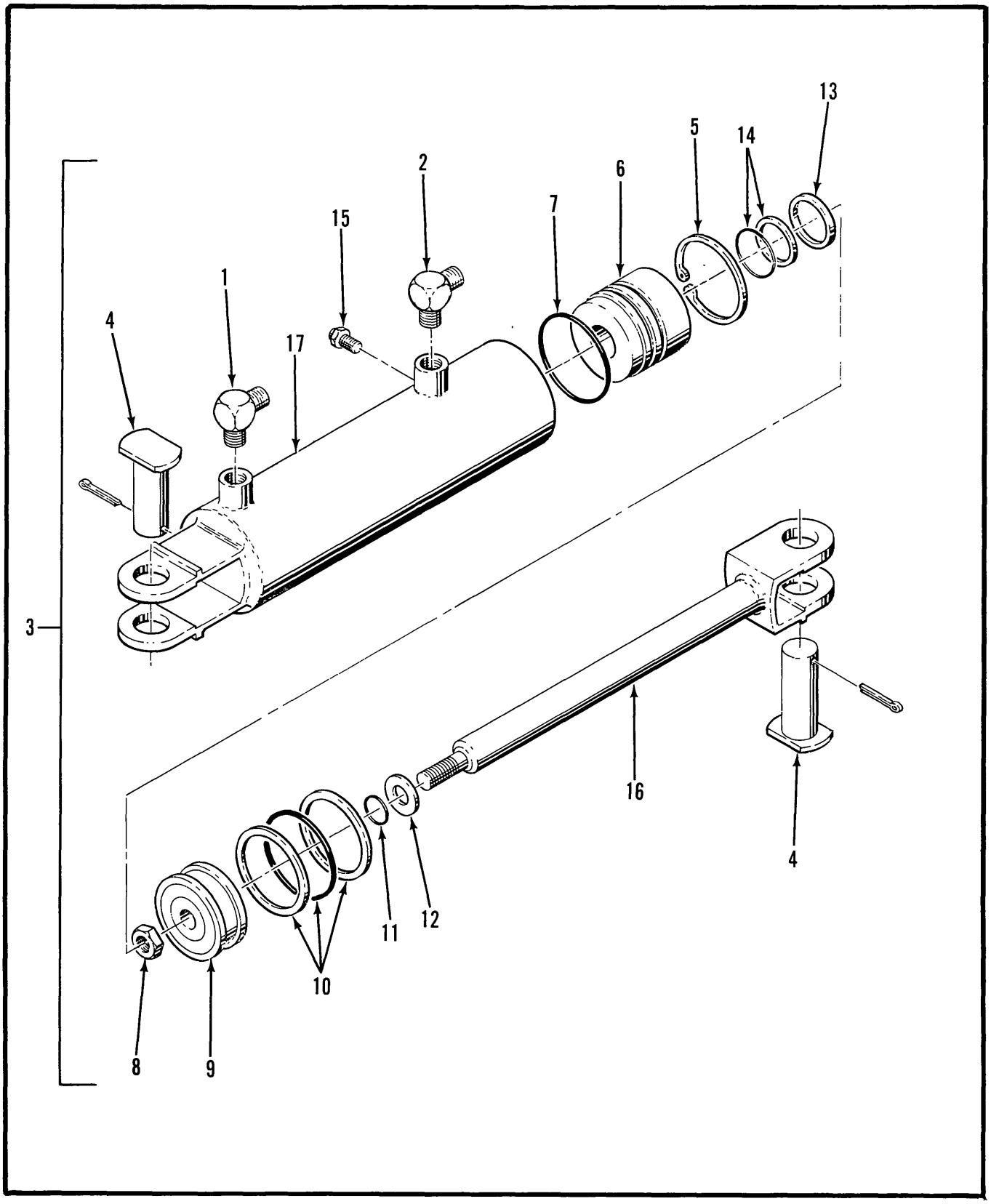


Figure 7-19. Steering Cylinder Assembly

ITEM NO.	PART NO.	DESCRIPTION	QTY REQ'D
7-19	60328-000-00	STEERING CYLINDER ASSEMBLY	
-1	11940-008-00	. FITTING	1
-2	11940-010-00	. FITTING	1
-3	60300-000-00	. CYLINDER, STEERING	1
-4	60300-002-00	. . PIN, CLEVIS	2
-5	60300-003-00	. . RING, HEAD LOCK	1
-6	60300-004-00	. . HEAD	1
-7	60300-005-00	. . O-RING	1
-8	60300-006-00	. . NUT, LOCK	1
-9	60300-007-00	. . PISTON	1
-10	60300-008-00	. . O-RING ASSEMBLY, PISTON	1
-11	60300-009-00	. . O-RING	1
-12	60300-010-00	. . WASHER, STEEL	1
-13	60300-011-00	. . WIPER, ROD	1
-14	60300-012-00	. . PACKING SET, SHAFT	1
-15	60300-013-00	. . SETSCREW, HEAD	1
-16	60300-014-00	. . SHAFT ASSEMBLY	1
-17	60300-015-00	. . TUBE ASSEMBLY	1
	60300-016-00	. KIT, REPAIR (Includes items 7, 10, 11, 13 & 14)	

ITEM NO.	PART NO.	DESCRIPTION	QTY REQ'D
7-20	60281-000-00	DECAL KIT, DUAL FUEL & ELECTRIC	
-1	08635-000-00	. DECAL	1
-2	08790-001-00	. DECAL, DANGER	2
-3	14844-002-01	. DECAL, UP-RIGHT XL-25	1
-4	14844-002-02	. DECAL, XL-25 LOWER	2
-5	60171-000-00	. DECAL, TIRE PRESSURE REAR	2
-6	60183-000-00	. DECAL, UP-RIGHT LOWER	2
-7	60184-000-00	. DECAL, UP-RIGHT UPPER	2
-8	60185-000-00	. DECAL, XL-25 UPPER	2
-9	60348-000-00	. DECAL, TIRE PRESSURE FRONT	2
-10	60349-000-00	. DECAL, XL-25 ANSI. STD	1
-11	60350-000-00	. DECAL, LOAD 1500 LBS	2
-12	60352-000-00	. DECAL, CAUTION STRIPES	1

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