Manual: **901352**
Model: **PDH**
Serial Number: **333328 and higher**

This manual is effected by the following supplements. They can be found in the Service Manual Index CD on the left side of the screen under "Supplements To Manuals."

SUPPLEMENT	TITLE
187	TRANSISTOR SPEED CONTROLLER 017515-01 & -02
207	TRANSISTOR CONTROL HEAD
216 A	TRIMAST STAGING LATCH
220 A	TRANSISTOR CONTROL HEAD
230	TRANS CONTROLLER/ CONTACTOR PAN (TYPE E & EE)
245	BATTERY SAFETY AND MAINTENANCE
318	CONTROL ARM ASSEMBLY
319	DRIVE MOTOR 016040 REPLACEMENT
329 A	SPEED RESISTOR SUPPLEMENT
331	TANK FILTER SUPPLEMENT
332	PDH TRUCK MODELS WITH PLATFORM ATTACHMENT
334	DRIVE MOTOR 016040
347	PDH TRANS/CONTROLLER/CONTACTOR TYPE E AND EE
356	CYLINDER 503568 PACKING CHANGE
357	CYLINDER 504386 PACKING CHANGE
364	ALLTRAX 12V CONTROLLER
370	24V DRIVE MOTOR 016053

Manual Price $35.00

PDH SERIES
POWER DRIVEN
HEAVY DUTY
LIFT TRUCK
Serial Number 333328 and Higher

Operation

Maintenance

Repair Parts List

Big Joe Manufacturing Company-Lincolnwood, IL 60646

MANUAL NO. 901352

WARNING

Do not operate this truck unless you have been trained and authorized to do so, and have read all warnings and instructions in operator's manual and on this truck.

Do not operate this truck until you have checked its condition. Give special attention to tires, horn, lights, battery, controller, lift system (including forks or attachments, chains, cables and limit switches), brakes, steering mechanism, guard and safety device.

Operate truck only from designated operating position. Never place any part of your body into the mast structure or between the mast and the truck. Do not carry passengers. Keep feet clear of truck.

Observe applicable traffic regulations. Yield right of way to pedestrians. Slow down and sound horn at cross aisles and wherever vision is obstructed.

Start, stop, travel, steer and brake smoothly. Slow down for turns and on uneven or slippery surfaces that could cause truck to slide or overturn. Use special care when traveling without load as the risk of overturn may be greater.

Travel with lifting mechanism as low as possible. Always look in direction of travel. Keep a clear view, and when load interferes with visibility travel with load or lifting mechanism trailing.

Use special care when operating on ramps - travel slowly, and do not angle or turn. Travel with lifting mechanism downhill.

Do not overload truck. Check capacity plate for load weight and load center information.

When using forks, space forks as far apart as load will permit. Before lifting, be sure load is centered, forks are completely under load, and load is as far back as possible against load backrest.

Do not handle unstable or loosely stacked loads. Use special care when handling long, high or wide loads to avoid losing the load, striking bystanders, or tipping the truck.

Do not handle loads which are higher than the load backrest or load backrest extension unless load is secured so that no part of it could fall backward.

Elevate forks of other lifting mechanism only to pick up or stack a load. Watch out for obstructions, especially overhead.

Do not lift personnel except on a securely attached specially designed work platform. **Use extreme care when lifting personnel.** Make sure mast is vertical, place truck controls in neutral and apply brakes. Lift and lower smoothly. Remain in operating position or immediate vicinity as long as personnel are on the work platform. Never transport personnel on forks or work platform.

Do not allow anyone to stand or pass under load or lifting mechanism.

When leaving truck, neutralize travel control, fully lower lifting mechanism and set brake. When leaving truck unattended, also shut off power.

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OPERATOR INSTRUCTIONS

WARNING

Do not operate this truck unless you have been trained and authorized to do so and have read all warnings and instructions in operator's manual and on this truck.

Do not operate this truck until you have checked its condition. Give special attention to Tires, Horn, Lights, Battery, Controller, Lift System, (including forks or attachments, chains, cables and limit switches), Brakes, Steering Mechanism, Guards and Safety Devices.

Operate truck only from designated operating position. Never place any part of your body into the mast structure or between the mast and the truck. Do not carry passengers.

Observe applicable traffic regulations. Yield right of way to pedestrians. Slow down and sound horn at cross aisles and wherever vision is obstructed.

Start, stop, travel, steer and brake smoothly. Slow down for turns and on uneven or slippery surfaces that could cause truck to slide or overturn. Use special care when traveling without load as the risk of overturn may be greater.

Travel with lifting mechanism as low as possible. Always look in direction of travel. Keep a clear view, and when load interferes with visibility, travel with load or lifting mechanism trailing, except when traveling downhill.

Use special care when operating on ramps—travel slowly, and do not angle or turn. Travel with lifting mechanism or load downhill.

Do not overload truck. Check capacity plate for load weight and load center information.

When using forks, space forks as far apart as load will permit. Before lifting, be sure load is centered, forks are completely under load, and load is as far back as possible against load backrest.

Do not handle unstable or loosely stacked loads. Use special care when handling long, high or wide loads to avoid losing the load, striking bystanders, or tipping the truck.

Do not handle loads which are higher than the load backrest or load backrest extension unless load is secured so that no part of it could fall backward.

Elevate forks or other lifting mechanism only to pick up or stack a load. Watch out for obstructions, especially overhead.

Do not lift personnel except on a securely attached specially designed Work Platform. Use extreme care when lifting personnel. Make sure mast is vertical, place truck controls in neutral and apply brakes. Lift and lower smoothly. Remain in operating position or immediate vicinity as long as personnel are on the Work Platform. Never transport personnel on forks or Work Platform.

Do not allow anyone to stand or pass under load or lifting mechanism.

When leaving truck, neutralize travel control. Fully lower lifting mechanism and set brake. When leaving truck unattended, also shut off power.

PREPARATION FOR USE

Upon receipt, visually inspect the truck. If any damage is found, report it to the carrier and to your Big Joe dealer immediately.

Remove cardboard banded to truck. Check lift truck for scratches and dents. Check to make sure that the lift chains are free of slack. Inspect for oil leaks and loose wiring connections. Make certain that all accessories and attachments that were ordered are supplied.

Before the lift truck is moved, the battery must be checked, recharged if necessary, and connected. Refer to "Battery Care" in Section III for battery checking instructions.

Refer to Section 2 for operating instructions of the brakes and lift control.

If you do not obtain the proper results, or if improper operation occurs, refer to troubleshooting in Section 4.

NOTES

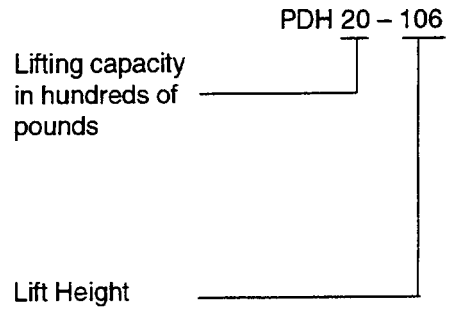
SECTION 1
DESCRIPTION

1-1. INTRODUCTION.

This publication describes the Power Driven Heavy Duty (PDH) lift truck manufactured by Big Joe Manufacturing Company, Lincolnwood, Illinois, 60646. Included are operating instructions, planned maintenance instructions, lubrication procedures, corrective maintenance procedures and a complete parts list with parts location illustrations.

By following the recommendations contained in this manual, you will receive many years of dependable service from your Big Joe lift truck.

The lift truck is identified by a model number. The model number shows truck capacity, fork and mast type, and lift height. A typical model number is explained below.



The model number will be found on the name plate (Figure 1-1) along with the serial number, lifting capacity, and load center. Figure 1-2 shows the location and identification of the decals. Also listed is the touch up paint used on the PDH trucks as well as the location of the trucks serial number and name plate. Figure 1-3 shows the locations of the trucks main components and controls.

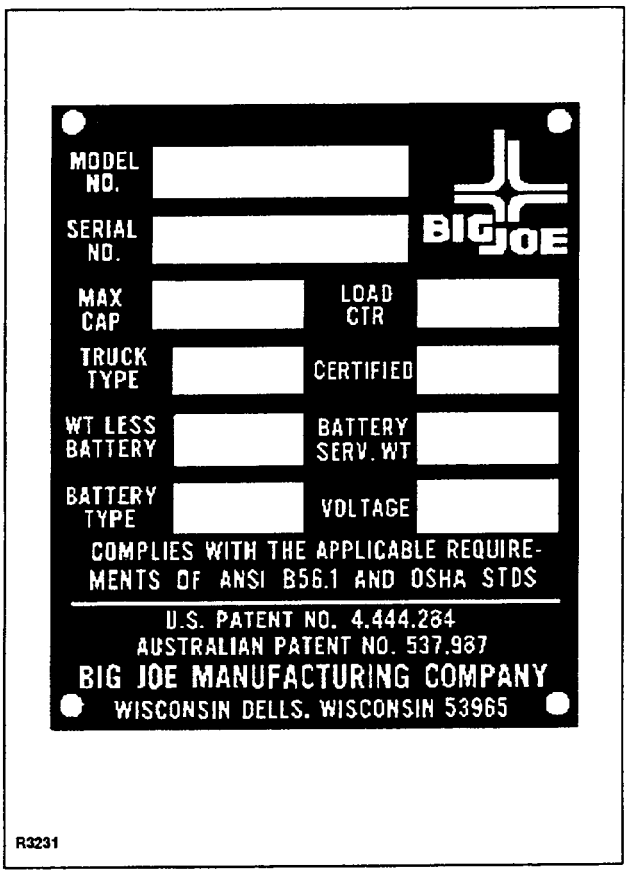


Figure 1-1. Name Plate

1-2. GENERAL DESCRIPTION.

The self-propelled PDH truck, Figure 1-3, lifts and transports payloads on adjustable forks. The PDH 20 can lift up to 2000 pounds. The PDH 25 can lift up to 2500 pounds. The PDH 30 can lift up to 3000 pounds. The PDH 40 can lift up to 4000 pounds.

The forward and reverse motion is controlled by a speed controller switch in the control head. Stopping and turning is controlled by the steering arm. Lift and Lower is controlled by either a lever mounted on the chassis, optional pushbutton controls located on the steering arm, or a control box attached by a coiled cord.

The battery-powered lift truck is quiet and without exhaust fumes.

The reversible DC motor propels the lift truck in forward and reverse direction throughout the available speed range. The PDH lift truck can be driven with forks raised or lowered; however, the speed is restricted when the forks are raised above a preset limit.

1-3. SAFETY FEATURES.

The PDH is designed and engineered to provide safety for operator and payload. Some of the safety features incorporated into the design are:

Dead-man brake to apply mechanical brake and cut off drive power when the steering arm is released.

Belly-button switch to reverse truck should the operator accidentally pin himself against a wall or obstruction.

High speed limit switch to restrict speed when lift carriage is raised above the preset limit.

All control functions automatically return to "OFF" when released.

Externally accessible quick-disconnect battery plug.

Separately fused control circuits and power circuits.

Readily accessible HORN button.

Lift carriage backrest to help stabilize the load.

Pressure compensated flow control valve regulates maximum lowering speed.

High visibility color scheme of truck provides visual alert of trucks presence.

1-4. OPTIONS AND ACCESSORIES.

Big Joe offers many options and accessories for the PDH lift truck such as:

Key switch
Remote Lift Control
Cold Conditioning
Battery Capacity Meter
Hour Meter
Lift Limit Switch
Lift Limit Override Switch
Larger capacity batteries with corresponding battery chargers
Transistor Control (Refer to Supplement 230 for trucks serial number 338442 and higher) (Refer to Supplement 187 for trucks serial number 333328 to 338442).

1-5. SAFETY SYMBOLS.

WARNING: This WARNING sign denotes a hazard. It calls attention to a procedure, practice or the like, which if not correctly performed or adhered to could result in personal injury.

CAUTION: This CAUTION sign denotes a hazard. It calls attention to a procedure, practice or the like, which if not correctly performed or adhered to could result in personal injury or damage to the equipment.

IMPORTANT: This heading calls attention to a procedure, which if not followed, may impede the operation or normal flow of a servicing or repair procedure.

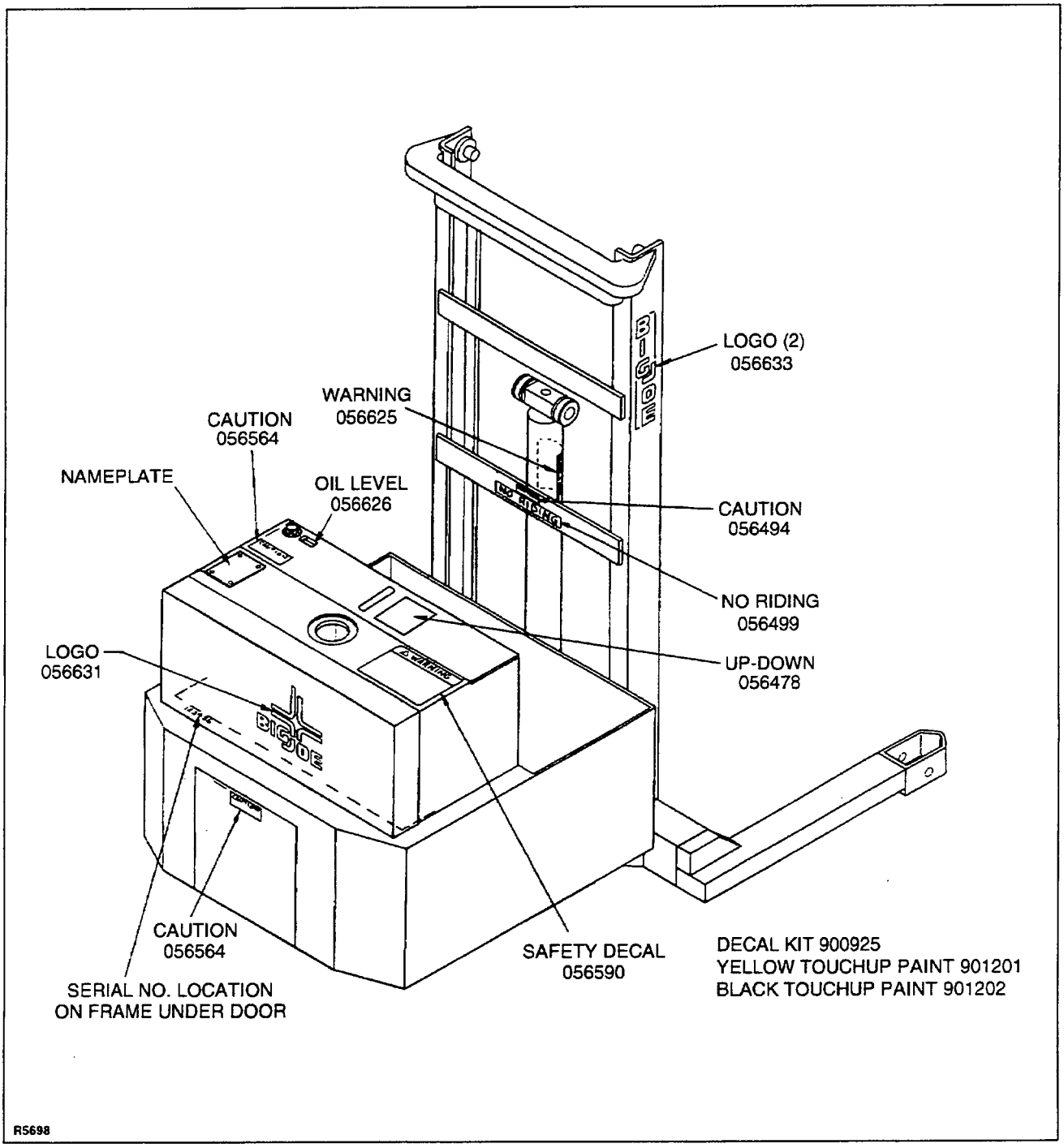


Figure 1-2. Serial Number and Decal Location

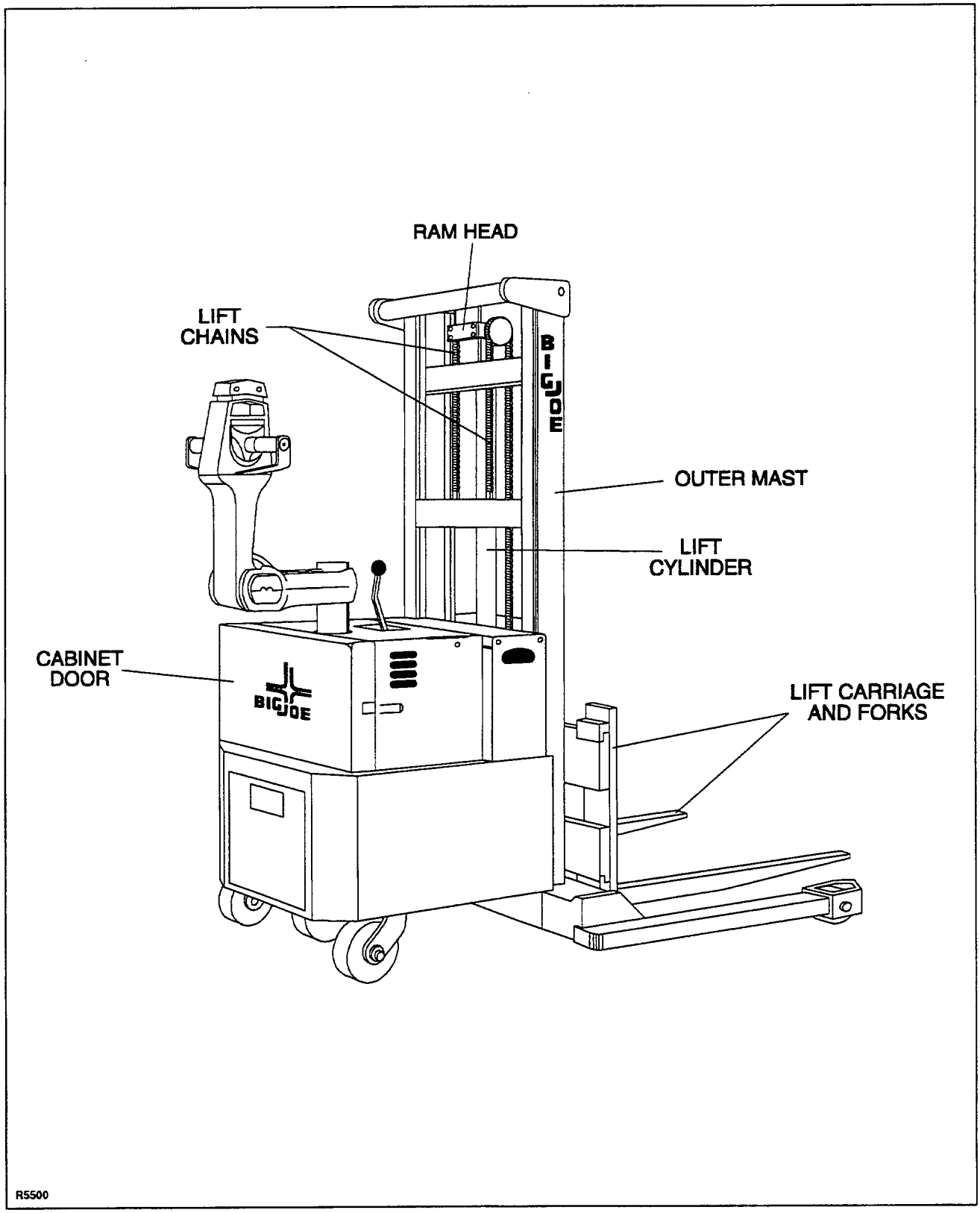


Figure 1-3. PDH Lift Truck

SECTION 2
OPERATION

1. **SEE SUPPLEMENT 220 FOR TRANSISTOR TRUCKS SERIAL NUMBER 334631 AND HIGHER.**
2. **SEE SUPPLEMENT 207 FOR TRANSISTOR TRUCKS SERIAL NUMBER 333328 TO 334630.**

2-1. GENERAL.

This section gives detailed operating instructions for the PDH lift truck. The instructions are divided into the various phases of operations, such as operating the lift, driving, and stopping. Routine precautions are included for safe operation.

2-2. OPERATING PRECAUTIONS.

WARNING: Improper operation of the lift truck may result in operator injury, or load and/or lift truck damage. Observe the following precautions when operating the PDH lift truck.

1. Do not operate this truck unless you have been trained and authorized to do so, and have read and understand all warnings and instructions in this manual and on the lift truck.
2. Do not operate this truck until the periodic inspection or service has been completed. See table 3-1.
3. Do not exceed the rated capacity (see name plate). Overloading may result in damage to the hydraulic system and structural components.
4. Do not handle unstable or loosely stacked loads. Use special care when handling long, high, or wide loads to avoid tipping, loss of load, or striking bystanders.
5. Center and carry the load as far back as possible toward the lift carriage back rest. Do not pick up loads on the tips of forks. The center-of-gravity of the load must not exceed the load center listed on the name plate. See Figure 2-1 for load center limitations.
6. Pick up loads on both forks. Do not pick up loads on only one fork.
7. When traveling, always lower the load as far as possible.
8. When stacking pallets in racks and it is necessary to move the load in the raised position, use caution. Operate truck smoothly.
9. Check for obstructions when raising or lowering the lift carriage.
10. Apply the brake gently except in cases of emergency.
11. Observe applicable traffic regulations. Yield right of way to pedestrians. Slow down and sound horn at cross aisles and wherever vision is obstructed.

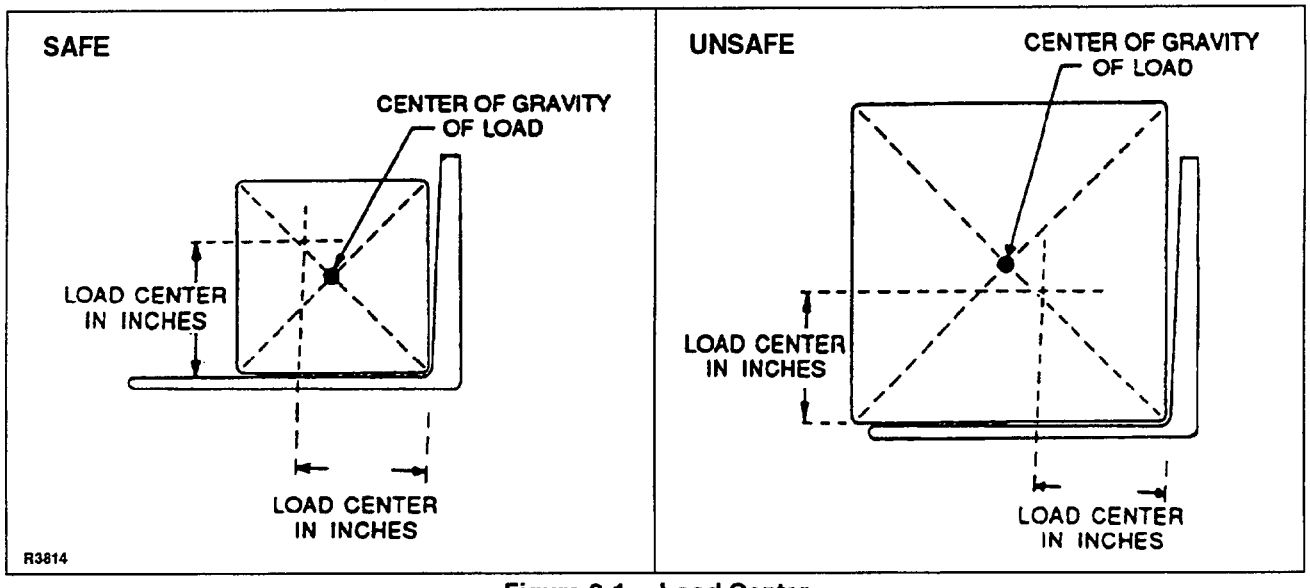


Figure 2-1. Load Center

12. Operate truck only from a walking position. Never place any part of your body between the mast uprights. Do not carry passengers.
13. Do not allow anyone to stand or pass under load or lifting mechanism.

2-3. BEFORE OPERATION

Table 2-1 covers important inspection points on PDH lift truck which should be checked prior to operation. Depending on use, some trucks may require additional checks.

Figure 2-2 shows a sample format for a Operator Checklist, which can be modified as necessary to fit your operation.

WARNING: Periodic maintenance of this truck by a QUALIFIED TECHNICIAN is required.

CAUTION: A QUALIFIED SERVICE TECHNICIAN should check the truck monthly for proper lubrication, proper fluid levels, brake maintenance, motor maintenance and other areas specified in the Section 3.

WARNING: If the truck is found to be unsafe and in need of repair, or contributes to an unsafe condition, report it immediately to the designated authority. Do not operate it until it has been restored to a safe operating condition. Do not make any unauthorized repairs or adjustments. All service must be performed by a qualified maintenance technician.

Table 2-1. Operator Checks

ITEM	PROCEDURE
Transmission and hydraulic systems.	Check for signs of fluid leakage.
Forks	Check for cracks and damage; and, that they are properly secured.
Chains, cables and hoses	Check that they are in place, properly secured and not damaged.
Guards and load backrest	Check that safety guards are in place, properly secured and not damaged.
Safety signs	Check that warning labels, nameplate, etc., are in good condition and legible.
Horn	Check that horn sounds when operated.
Steering	Check for binding or looseness in steering arm when steering.
Travel controls	Check that speed controls on control handle operate in all speed ranges in forward and reverse and that belly button switch functions.
Wheels	Check drive wheel for cracks or damage. Move truck to check load wheels for freedom of rotation.

ITEM	PROCEDURE
Hydraulic controls	Check operation of lift and lower to their maximum positions.
Brakes	Check that brakes actuate when steering arm is raised to upright position, and when lowered to horizontal position. Check that dynamic brake (if so equipped) actuates when dynamic brake pushbutton on control handle is pressed.
Deadman/Parking brake	Check that steering arm raises to upright position when released and brake applies.
Battery disconnect	Check that battery can be disconnected and reconnected. Check for connector damage.
Battery charge	Check that battery capacity meter (if equipped) is on "F".
High speed limit switch	Allow for enough space to operate truck in high speed. Elevate forks approximately two feet, then test drive truck to check if high speed is cut out.

BIG JOE
Big Joe Manufacturing Company

Electric Truck
Daily Operator Check-Off List

Date _____ Operator _____

Truck No. _____ Model No. _____

Dept. _____ Shift _____

Hour Meter
Reading—Drive _____ Hoist _____

Check	O.K. (✓)	Need Maintenance
Tires		
Lights		
Horn		
Lift—Lower Control		
Attachment Operation		
Drive Control		
Steering		
Service Brakes		
Parking Brake		
Hydraulic Leaks, Cylinders, Valves, Hoses, Etc.		

R5699

Figure 2-2. Sample of Operator Check List

2-4. INSTRUMENTS AND CONTROLS

2-4.1. Steering Arm and Control Head.

The steering arm and control handle (See Figure 2-3) provide controls for steering, forward and reverse speed control, braking, and horn. Control handles on some models have pushbuttons for raising and lowering the forks. Table 2-2 lists optional control handles. Control handles on all models have a "belly-button" reversing switch which reverses the direction of the truck upon contact with the operator.

Table 2-2. Control Handles

1. **SEE SUPPLEMENT 220 FOR TRANSISTOR TRUCKS SERIAL NUMBER 334631 AND HIGHER.**
2. **SEE SUPPLEMENT 207 FOR TRANSISTOR TRUCKS SERIAL NUMBER 333328 TO 334630.**

Type	Part Numbers
Standard	505050-01
Remote Lift in Handle	505050-02
Remote Lift and Lower in Handle	505050-03

1. **SEE SUPPLEMENT 220 FOR SPEED CONTROL TRUCKS SERIAL NUMBER 334631 AND HIGHER.**
2. **SEE SUPPLEMENT 207 FOR TRANSISTOR SPEED CONTROL TRUCKS SERIAL NUMBER 333328 TO 334630.**

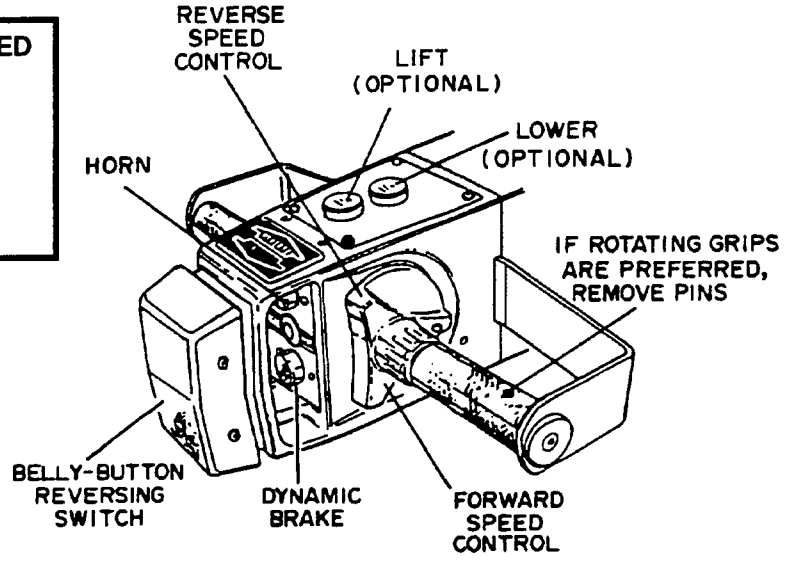


Figure 2-3. Control Handle

2-4.2. Lift/Lower.

All models come standard with a lift/lower control lever mounted near the steering arm. See Figure 2-4

2-4.3. Battery Disconnect.

A battery disconnect is mounted near the steering arm. Pulling the disconnect removes all power from truck circuits in the event of an emergency.

2-4.4. Optional Features.

The optional remote lift/lower control (if equipped) allows the operator to raise and lower the forks while standing away from the control handle. See Figure 2-5.

Other options are the battery capacity indicator, hour meter and keyswitch, which mount on the panel near the control handle. The battery capacity indicator monitors the battery discharge rate to indicate the remaining battery capacity. The hour meter records the accumulated hours that electrical energy is being drawn from the battery to run the pump and drive motors. The keyswitch provides added security to the truck, preventing unauthorized personnel from operating the machine.

Some models have additional control levers for the operation of additional accessories.

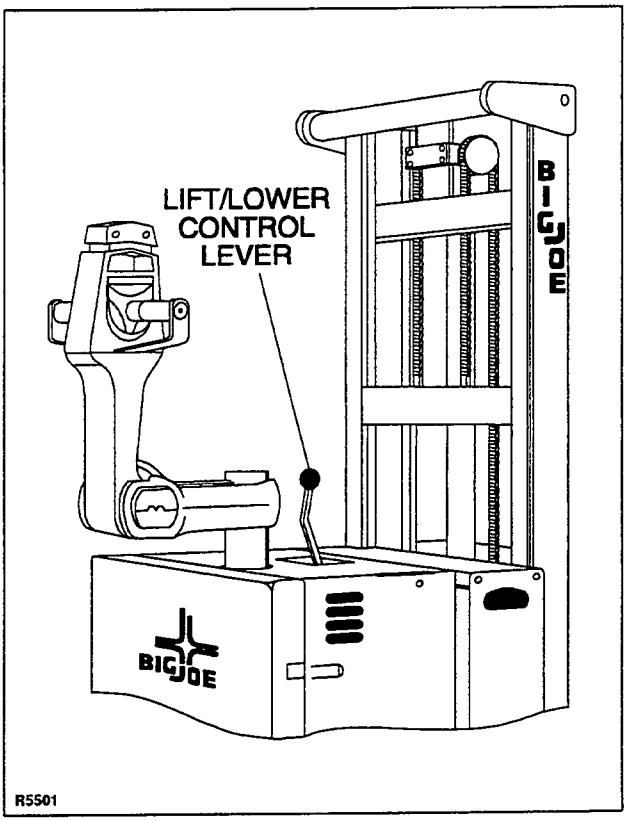


Figure 2-4. Lift/Lower Lever

2-5. OPERATION

2-5.1. Forward and Reverse Travel and Speed Control.

All directional and speed controls are located on the control handle. See Figure 2-3.

Forward and reverse are controlled by rotating the speed control lever as shown. The lever is spring loaded to return to neutral when released. Further rotation in either direction will progress the truck from slow to maximum travel speed.

To change directions or to stop the truck, rotate the speed control lever in the opposite direction. The truck will come to a stop and then, unless the controls are returned to the center neutral position, accelerate in the opposite direction.

2-5.2. Steering.

Moving the control handle (which connects to the steering arm) right or left will turn the truck right or left. When maneuvering around corners, make square turns and be sure there is adequate clearance.

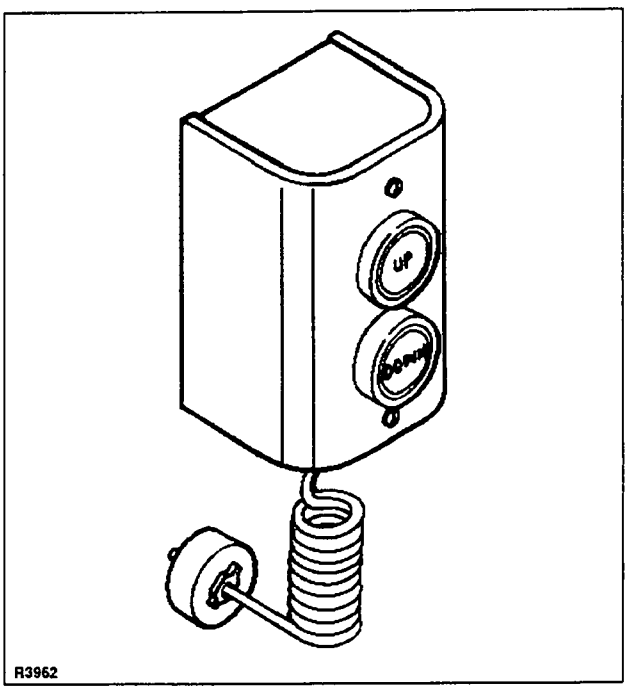


Figure 2-5. Optional Remote Lift/Lower Control

2-5.3. Stopping.

Stop the truck as gradually as possible. Unnecessary rapid stopping could be hazardous. Load could become unstable.

There are four possible ways to stop the truck:

1. **Plugging:** This electrical braking function consists of rotating the speed control lever in the opposite direction of travel and then releasing it when the truck stops. Plugging is a convenient way to stop the truck during normal operation. If the control is not released, the truck will accelerate in the opposite direction.
2. **Steering arm in horizontal position (See Figure 2-6):** Lowering the steering arm to the horizontal position applies brake pad pressure to the brake disc. Lowering the steering arm below the horizontal position increases the braking force and de-energizes the controls.
3. **Steering arm in vertical position (See Figure 2-6):** Raising the steering arm to near vertical position applies brake pad pressure to the brake disc. Further vertical positioning increases the braking force and de-energizes the controls. This position serves as a parking brake. As a safety precaution, the steering arm is spring loaded to return to the vertical position in the event the driver releases the control handle during operation. This is known as deadman braking.
4. **Dynamic Brake:** The dynamic brake serves as a secondary braking system completely independent from the mechanical brake. Pressing the dynamic brake pushbutton applies a constant DC voltage across the drive motor field coils to stop the motor.

CAUTION: The dynamic brake pushbutton should not be held in place longer than one or two seconds. Excessive use may blow the 40 Amp fuse, which will render dynamic brake inoperative.

2-5.4. Parking.

When parking the truck, do not obstruct traffic lanes or aisles.

1. Park the truck in its designated parking area.
2. Raise the steering arm until vertical to apply the parking brake.
3. Fully lower forks.
4. Turn key switch (if so equipped) to off position. Remove key for added security.
5. Pull out battery disconnect.

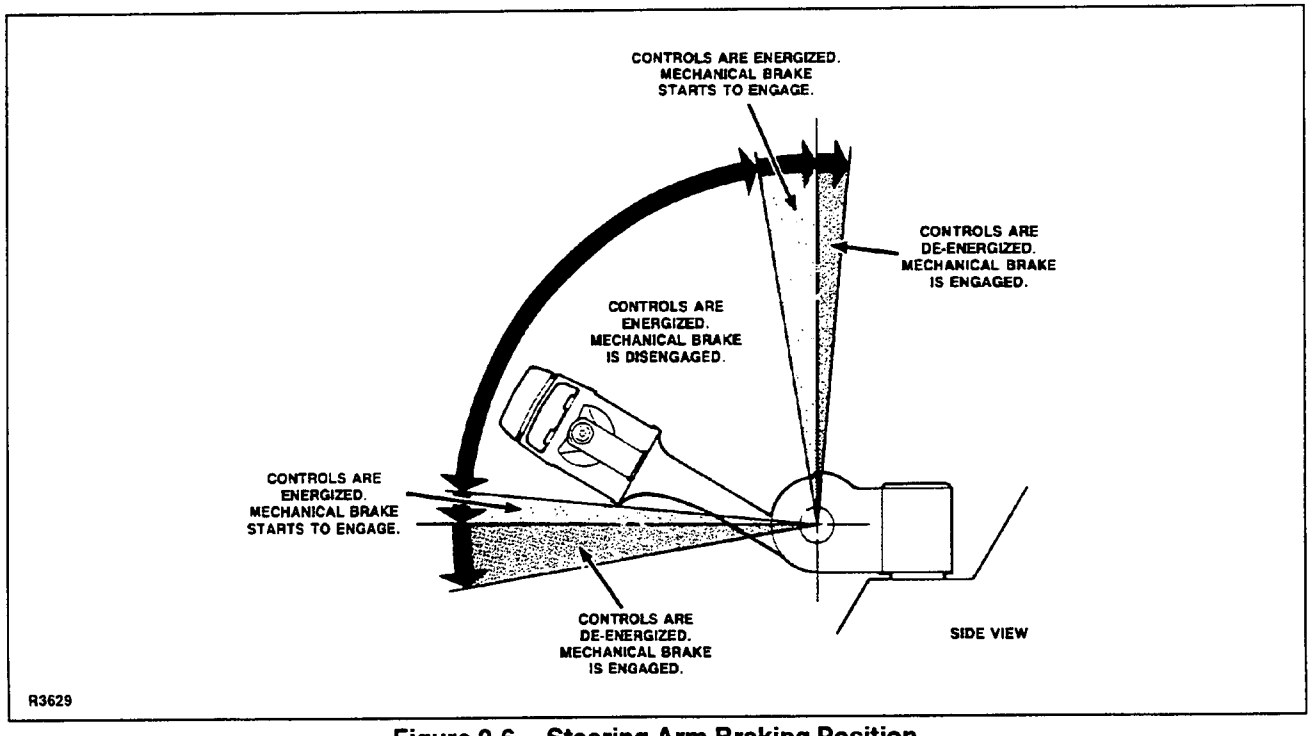
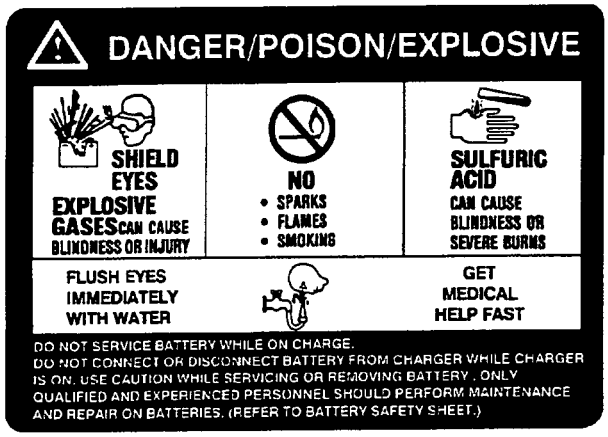


Figure 2-6. Steering Arm Braking Position

2-5.5. Battery Charging

Refer to Document 245 for battery safety and maintenance.



NOTE Battery charging instructions are contained in Section 3.

2-5.6. Load Handling.

WARNING: Handle only loads arranged for stability, and always use caution. Raise and lower the load smoothly to prevent the load from falling.

WARNING: Always be sure the load and load center are within the capacity of the truck. If in doubt, check the nameplate.

1. Approach the load slowly.
2. Stop the truck when the forks are just in front of the load.
3. Adjust the forks to the maximum practical width to support the load to be lifted.
4. Raise or lower the forks until they are properly aligned with the pallet openings.
5. Move the truck slowly into position so that the forks are centered about the load.
6. Make sure the load is against the backrest and then raise the forks until the pallet clears the rack.
7. Move the truck away from the rack until the load clears the rack and then lower the forks.
8. Lead the truck by the control handle with the load trailing except when in confined areas. Ramps should be traveled with operator uphill of truck when empty, or operator downhill of truck when load on forks.
9. Always look in the direction of travel. Move slowly and check clearances when approaching obstructions.
10. Do not make sudden starts and stops. Operate truck smoothly and gradually.
11. Travel slowly and squarely around corners. Remember that the trailing load wheels do not follow the turn path of the drive wheel. Instead they tend to cut the corner.
12. Line up the truck with the unloading area.
13. Stop the truck and raise or lower the forks until the pallet is in position with the unloading area.
14. Check the load alignment with surrounding objects.
15. Be careful not to damage or move adjacent loads and objects.
16. Slowly move into position.
17. Lower the forks until the load is resting on its own. Be sure there is no downward force of the forks on the rack or floor.
18. Move the truck back until the forks are clear of the pallet.
19. If forks are elevated, lower to travel position.

2-5.7. Moving a Disabled Truck

Do not attempt to move a disabled truck. Notify your supervisor or proper authority.

NOTES

SECTION 3
PREVENTIVE MAINTENANCE

3-1. GENERAL.

Preventive maintenance consists of periodic visual and operational checks, parts inspection, lubrication, and scheduled maintenance designed to prevent or discover malfunctions and defective parts. The operator performs the checks in Section 2, and refers any required servicing to a qualified maintenance technician who performs the scheduled maintenance and any required servicing.

3-2. MONTHLY AND QUARTERLY CHECKS.

Table 3-1 is an inspection and service chart based on normal usage of equipment eight hours per day, five days per week. If the lift truck is used in excess of forty hours per week, the frequency of inspection and service should be increased accordingly. These procedures must be performed by a qualified service technician or your Big Joe service representative.

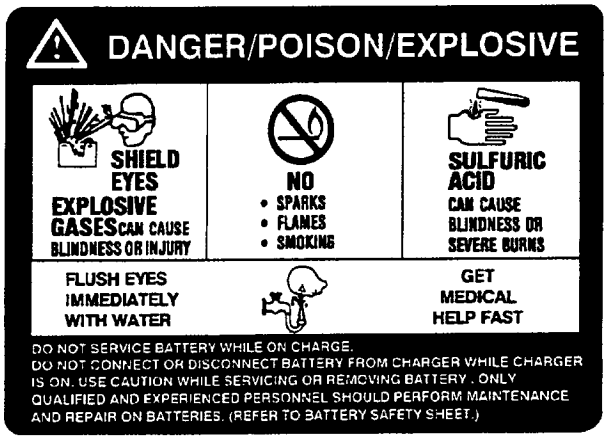
3-3. BATTERY CARE.

3-3.1. General.

The life of the battery can be extended by giving it proper care. Perform a daily check of the battery whether or not the equipment is in daily use. DO NOT overcharge the battery or battery life will be shortened. DO NOT allow battery to become completely discharged (specific gravity 1.150 or less). This will also greatly shorten battery life.

3-3.2. Battery Servicing.

Refer to Document 245 for battery safety and maintenance.



The battery cells are accessed by opening the top cover of the battery. Use the following procedure:

1. Obtain a battery hydrometer.

NOTE: These can be obtained from a local hardware store or automotive shop.

2. Use the hydrometer to check specific gravity of each cell.

Table 3-1. Inspection and Service Chart

VISUAL CHECKS	
INTERVAL	**INSPECTION OR SERVICE**
Monthly	Check condition of drive motor commutator, brushes and springs
Monthly	Check condition of pump motor commutator, brushes and springs
Monthly	Check mechanical brake for proper operation
Monthly	Check load wheels for wear
Monthly	Check caster wheels for wear
Monthly	Check drive wheel for wear
Monthly	Inspect wiring for loose connections and damaged insulation
Monthly	Inspect contactor tips for excessive pitting and wear
Monthly	Check deadman brake switch for proper operation
Monthly	Check lift chain tension
Monthly	Lubricate Unit (See Table 3-4)
Quarterly	Check lift cylinder for leakage
Quarterly	Check for excessive jerking of steering arm when stopping or starting
Semi-annually	Replace hydraulic filter assembly

NOTE: Battery specific gravity readings should agree within ± 0.025 from cell to cell. If variation is greater, the battery may have to be repaired or replaced.

CAUTION: Be sure that no cell plates are exposed (not covered by fluid) before charging. Add distilled water sufficient to just cover top of cell plates.

CAUTION: Use distilled water. Impurities in tap water will damage battery plates.

3. Charge battery as necessary.

NOTE: A fully charged battery has a specific gravity of 1.260 to 1.275.

4. After charging, check water level in each cell again. Water level must cover plates but not be higher than the base of the battery cell filler neck.

3-4. LUBRICATION.

Refer to table 3-2 for the recommended types of grease and oil, and table 3-3 for hydraulic oil capacities. Table 3-4 in conjunction with Figure 3-1 identifies the items requiring lubrication.

Table 3-2. Recommended Lubricants and Oils

No. 1	Transmission oil—EP SAE 80W-90 Transmission oil—EP SAE 10W30 (Note) **Transmission oil capacity is 3 pints.**
No. 2	Grease—Lithium base, general purpose.
No. 3	Hydraulic oil-Heavy duty with a viscosity of 150 SUS (in temperatures below 32°F use 100 SUS) foam suppressing agent and rust and oxidation inhibitors. See Table 3-3 for oil capacity. Big Joe Part No. 900855 (1 gallon) 900893 (1 quart) 055784 (Note)

NOTE: USED ON COLD CONDITIONED TRUCKS

Table 3-3. Hydraulic Oil Capacity Chart

LIFT HEIGHT	OIL CAPACITY
60 in	7.7 qts
84 in	8 qts
106 in	9 qts
130 in	10 qts
154 in	11 qts
158 in*	16 qts
194 in*	19 qts

* FFL or TRIMAST trucks

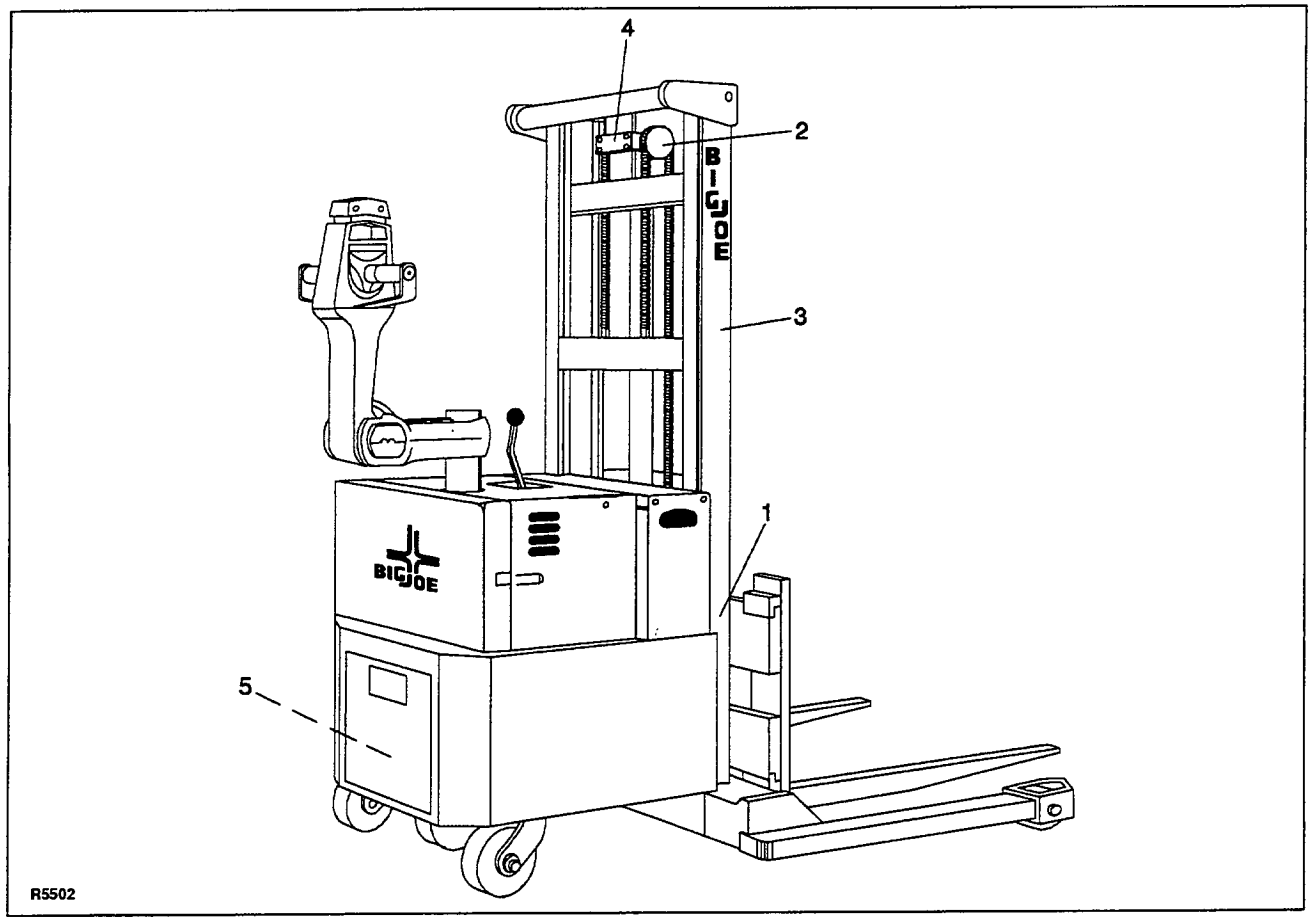


Figure 3-1. Lubrication Diagram

Table 3-4. Lubrication Chart

FIG. 3-1 REF	ITEM	METHOD OF APPLICATION	TYPE (TABLE 3-2)	NOTES
1	Lift carriage rollers	Gun	No. 2	Pressure lubricate.
2	Chain sheaves	Gun	No. 2	Pressure lubricate.
3	Outer and inner masts	Brush	No. 2	Full length of mast where rollers touch.
4	Free Lift Slide bar (Telescopic Trucks)	Brush	No. 2	Full length of slide bar where ram head touches.
5	Transmission	Can	No. 1	Fill to plug level.

NOTES

SECTION 4
TROUBLESHOOTING

1. SEE SUPPLEMENT 220 FOR CONTROL HEAD ON TRANSISTOR TRUCKS SERIAL NUMBER 334631 AND HIGHER.
2. SEE SUPPLEMENT 207 FOR CONTROL HEAD ON TRANSISTOR TRUCKS SERIAL NUMBER 333328 TO 334630.
3. SEE SUPPLEMENT 187 FOR CONTROLLER ON TRANSISTOR TRUCKS SERIAL NUMBER 333328 TO 338421.
4. SEE SUPPLEMENT 230 FOR CONTROLLER ON TRANSISTOR TRUCKS SERIAL NUMBER 338422 AND HIGHER.

4-1. GENERAL

Table 4-1 serves as a guide to determine possible causes of trouble. The table is divided into five main categories: Truck dead: trouble with travel: trouble with braking: trouble with lifting or lowering, and Miscellaneous malfunctions. Refer to electrical wiring diagram (Figures 4-1) as a supplement to the troubleshooting chart or when tracing an electrical circuit.

Table 4-1. Troubleshooting Chart

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
TRUCK DEAD		
Truck will not run forward or in reverse, nor will lift system operate.	a. 300-Amp fuse blown.	Check fuse and replace if defective.
	b. Battery dead or disconnected.	Check battery quick-disconnect plug. Check battery (See Section 3).
	c. Defective key switch.	Check and replace if required.
	d. Defective wiring.	Check for open circuit. Repair as required.
TROUBLE WITH TRAVEL	Check all wiring. A loose connection may be the cause of malfunction.	Tighten all loose connections before further troubleshooting.
Truck does not run forward or reverse. Everything else is normal.	a. 15-Amp control circuit fuse blown.	Check fuse and replace if defective.
	b. Shorted dynamic brake switch or dynamic brake relay.	Check brake switch and relay and replace if defective.
	c. Defective dead-man brake switch.	Check and replace if required.
	d. Main wire harness cut.	Replace.
	e. Belly button switch defective.	Replace.
	f. Shorted optional travel cutout.	Check and replace if required.
Truck runs forward, but not in reverse.	a. Defective speed control switch or defective contactor.	Check for positive DC voltage at number 1-wire on reverse contactor. If not present when steering arm is in operating position and speed control is in reverse, speed control switch is defective. If voltage is present, contactor is defective.

Table 4-1. Troubleshooting Chart (Continued)

Truck runs forward, but not in reverse. (continued)	b. Belly button switch out of adjustment or defective.	Adjust or replace.
Truck runs in reverse, but not in forward.	Defective speed control switch or defective contactor.	Check for positive DC voltage at number 2 wire on forward contactor. If not present when steering arm is in operating position and speed control is pressed for forward travel, speed control switch is defective. If voltage is present, contactor is defective.
Truck runs forward and in reverse at slow speed; will not run at higher speeds.	a. Third speed cutout switch out of adjustment or defective.	Adjust or replace.
	b. Defective second and/or third speed contactors.	Check coils for continuity. Check contacts for excessive wear. (A black appearance where tips make contact is normal). Repair or replace as required.
	c. Defective optional time delay relay(s).	Check for continuity and replace as required.
Truck runs forward and in reverse at second or third speed only. Truck does not move when control is in first speed position. Everything else is normal.	Defective or open speed control resistor.	Check for clean, tight connections. Check resistor for continuity and replace or repair as required.
Truck runs at second or third speed when control is in the first speed position. Everything else is normal.	a. Defective 2nd or 3rd speed contactor.	Check for shorted contacts on 2nd or 3rd speed contactor.
	b. Defective speed control switch.	Check switches.
	c. Shorted speed control resistor.	Check wiring of resistor..
TROUBLE WITH BRAKING		
Mechanical brake does not stop truck properly.	a. Brake linkage in need of adjustment.	Adjust mechanical brake (see paragraph 6-2).
	b. Disc brake pads worn.	Replace pads and readjust mechanical brake.
Mechanical brake grabs when steering arm is in operating position.	Brake linkage over adjusted.	Adjust mechanical brake (see paragraph 6-2).
Dynamic brake does not stop truck.	a. 40-Amp fuse blown.	Check and replace fuse.
	b. Defective brake switch, brake relay, or brake resistor.	If click is heard when dynamic brake pushbutton is pressed, check brake resistor and relay contacts. If no click, check brake switch and coil of relay. Repair or replace defective part.

Table 4-1. Troubleshooting Chart (Continued)

TROUBLE WITH LIFTING OR LOWERING	Oil level too low.	Check hydraulic oil level. Fill hydraulic reservoir so that oil is shown full on dipstick (approximately 2 inches from top of reservoir) with the lift carriage fully lowered, before further troubleshooting. Tighten all electrical connections.
Lift carriage does not rise; everything else is normal.	a. Defect in electrical system.	a. If pump motor does not run when LIFT control is in UP position, defect is in pump solenoids, or pump motor. Check for positive DC voltage at pump motor to locate defect. Repair or replace defective part.
		b. Check switch on control valve. Adjust or replace as necessary.
	b. Defect in hydraulic system.	a. Check for pinched hoses. Check pump for proper operation. Replace if necessary.
		b. Check flow control valve near base of lift cylinder. Check for defect in lift cylinder.
Lift carriage does not lower; everything else is normal.	Control valve defective or defect in hydraulic system.	Check control valve for proper action. Check for obstruction in the hydraulic line. Repair as required.
Forks creep downward under load; everything else is normal.	Leak in hydraulic system, packing, control valve, or pump.	Look for loose fittings in the hydraulic line, pump for leakage back into the reservoir and oil on top of packing. Repair fittings or replace pump as required. Replace pressure relief valve.
Oil sprays or flows from the top of the lift cylinder.	Defective packing in lift cylinder.	Overhaul the lift cylinder and install new packing, seal, and wiper ring.
Oil foaming in vent for hydraulic reservoir.	Leak in the suction line between the pump and the reservoir.	Check oil filter. Replace if necessary. Tighten fitting. Inspect line and replace if necessary.
Oil splashes out of vent when lowering forks.	Oil level too high.	Drain, then refill reservoir when lift carriage is in the lowest position.
Squealing sounds when forks are raised.	a. Oil level too low.	Add oil to reservoir.
	b. Dry channels in mast.	Apply grease.
	c. Defective bearing.	Replace bearing.
Forks do not lift to top. Pump motor runs.	a. Oil level too low.	Add oil to reservoir.
	b. Load heavier than capacity.	Refer to nameplate for maximum load capacity.
	c. Defective pump or motor.	Replace.

Table 4-1. Troubleshooting Chart (Continued)

Oil leaks at throttle valve release cam.	Defective O-rings in throttle valve body.	Replace O-rings around release cam.
Control valve spring-centered handle does not return to neutral.	a. Broken springs.	Replace springs.
	b. Foreign particles.	Clean system and valve.
	c. Misalignment of operating linkage.	Check linkage for binding condition.
Load drops when LIFT control is moved from neutral to UP position.	a. Dirt or foreign particles lodged between check valve poppet and seat.	Disassemble, clean and reassemble.
	b. Scored check ball.	Replace check ball.
	c. Defective check ball seat in valve body.	Lap new check ball body seat.
No motion, slow or jerky action of hydraulic system.	a. Load heavier than capacity.	Refer to nameplate for maximum lift capacity.
	b. Defective lift cylinder.	Rebuild or replace.
MISCELLANEOUS		
Steering arm does not return to the upright position.	a. Return spring improperly adjusted.	Readjust spring tension (see paragraph 5-6).
	b. Binding brake linkage or electrical cable.	Check and free the binding item.
	c. Broken spring	Replace.
Truck moves forward in low speed when arm is pulled down.	a. Belly-button reversing switch defective.	Check for short, and repair or replace as necessary.
	b. First speed forward switch defective.	Replace.
	c. Forward contactor stuck closed.	Repair or replace.
Steering arm jerks excessively when starting or stopping the truck.	a. Worn pivot tube bushings.	Replace upper and lower pivot tube bushings.
	b. Drive tire worn or mounted incorrectly.	Repair or replace.

NOTES

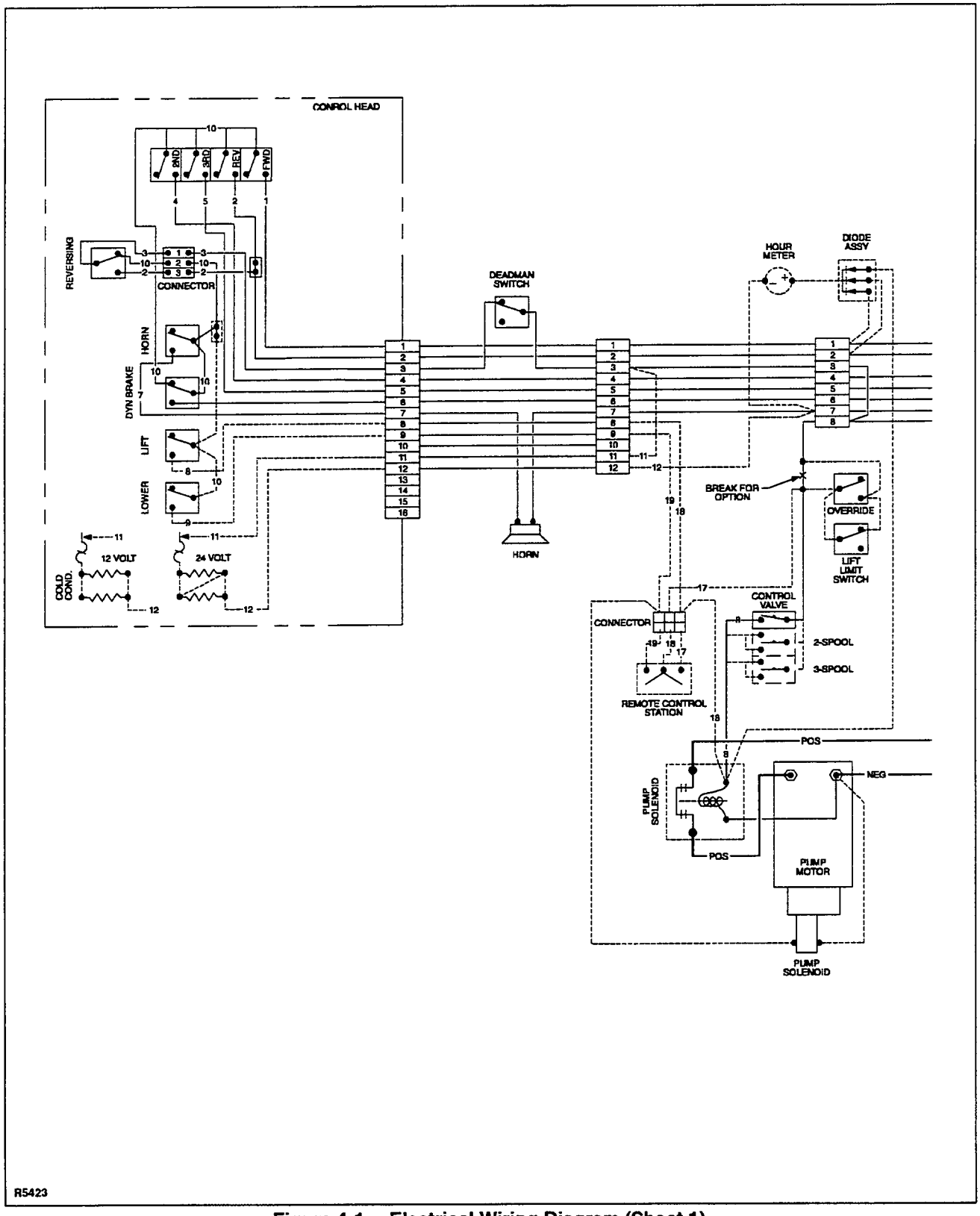
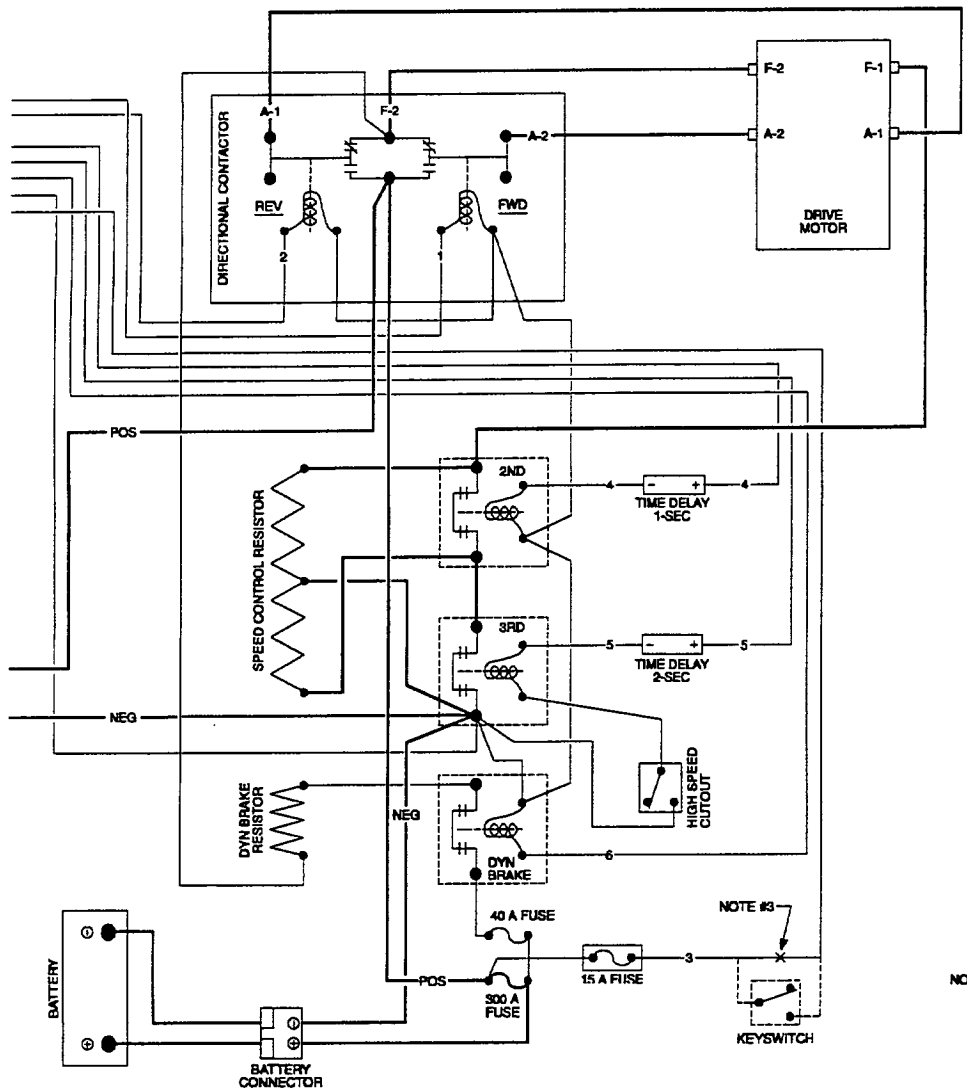


Figure 4-1. Electrical Wiring Diagram (Sheet 1)



NOTES:
1. ALL CIRCUITS TO BE NUMBER TAGGED.
2. OPTIONAL CIRCUITS SHOWN DASHED.
3. BREAK WIRE INDICATED FOR KEYSWITCH INSTALLATION.
4. DYNAMIC BRAKE RESISTOR TO BE OMITTED ON 24V TRUCKS.

Figure 4-2. Electrical Wiring Diagram (Sheet 2)

NOTES

SECTION 5
STEERING ARM AND CONTROL HEADS SERVICING.

1. SEE SUPPLEMENT 220 FOR TRANSISTOR TRUCKS SERIAL NUMBER 334631 AND HIGHER.
2. SEE SUPPLEMENT 207 FOR TRANSISTOR TRUCKS SERIAL NUMBER 333328 TO 334630.

5-1. GENERAL.

The following procedures cover adjustments, replacement, and repair of the steering arm, control head, and related assemblies and components. The procedures are independent of each other unless specifically referenced.

5-2. COLD CONDITIONING.

The cold conditioning version of the truck differs from the standard model where necessary to improve performance in cold temperatures. Heating resistors are provided for the control head switches, and cold resistant versions of other switches are used. Special cold temperature lubricants are also necessary for this application.

Figure 5-1 is an electrical schematic diagram of the cold conditioning circuit. Location of electrical parts in the control head and resistor wiring of cold conditioning equipment is illustrated in Figure 5-2.

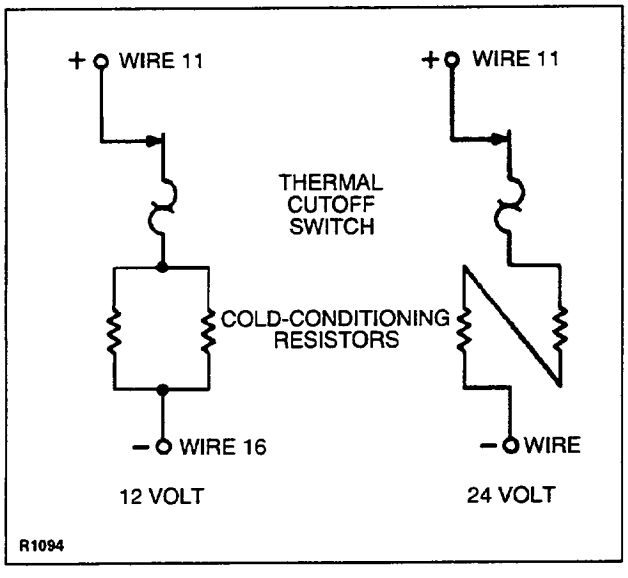
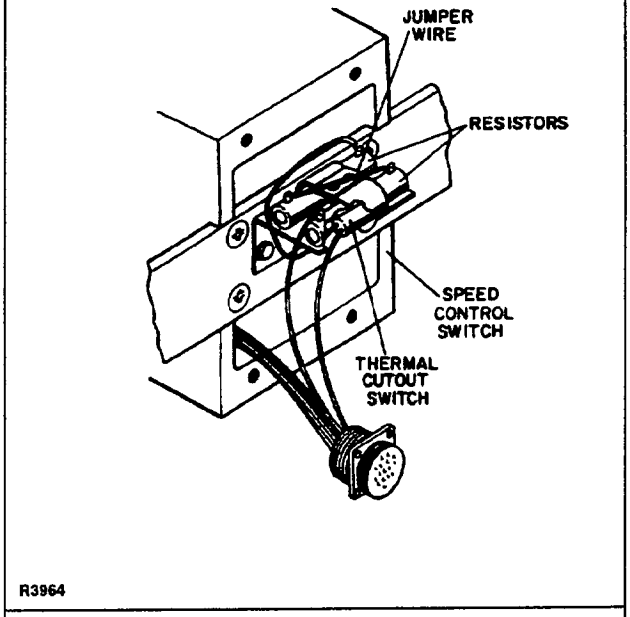


Figure 5-1. Schematic of Cold Conditioning Circuit

1. SEE SUPPLEMENT 220 FOR TRANSISTOR SPEED CONTROL TRUCKS SERIAL NUMBER 334631 AND HIGHER.
2. SEE SUPPLEMENT 207 FOR TRANSISTOR SPEED CONTROL TRUCKS SERIAL NUMBER 333328 TO 334630.



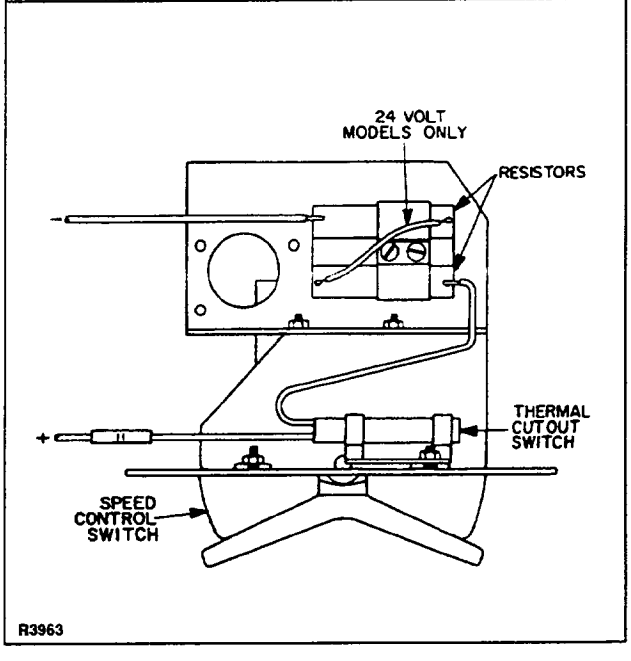


Figure 5-2. Location of Resistors and Thermal Cutout Switch

CAUTION: Cold conditioning heating resistors consume power when energized, whether truck is used or not. To avoid power waste during lengthy storage periods, remove truck from cold temperatures.

5-3. BELLY-BUTTON SWITCH ADJUSTMENT.

NOTE: All electrical connections should be tagged with identifying labels before disconnecting.

1. Disconnect battery.

CAUTION: While removing the belly-button casting, two springs (needed for reassembly) will fall free.

2. Being careful to catch and retain the belly-button springs (25, Figure 5-4) that may fall from the control head (41) as the belly-button casting (42) is removed, drive out the roll pins (11) that secure the belly-button casting. Drive the roll pin from left to right. The roll pin is only tight on the left side.

CAUTION: A misaligned switch may actuate (click) early or late in travel, or fail to operate.

WARNING: Test switch in an open area to avoid being accidentally pinned.

3. Bend actuator lever of belly-button switch (Figure 5-3) to adjust gap so that switch clicks half way through travel of casting.
4. Reinstall casting, making certain all parts are back in place.
5. Check operation of the belly-button switch by pressing the belly-button casting while listening for the "click" that indicates that the switch has actuated.

NOTE: The click should be heard when the belly-button casting has moved about 50 per cent of its normal travel distance. If the click is heard at the beginning of travel, the switch may actuate at inappropriate times. If the click is heard near the end of travel, the switch could be unreliable and may not actuate in some instances.

6. Repeat steps 2 through 5 until pressing the belly-button casting actuates the switch properly.
7. Reconnect battery and electrical connections.

WARNING: Testing of belly-button switch in operation should be limited to areas clear of obstacles against which an operator could be pinned. Use first speed, reverse.

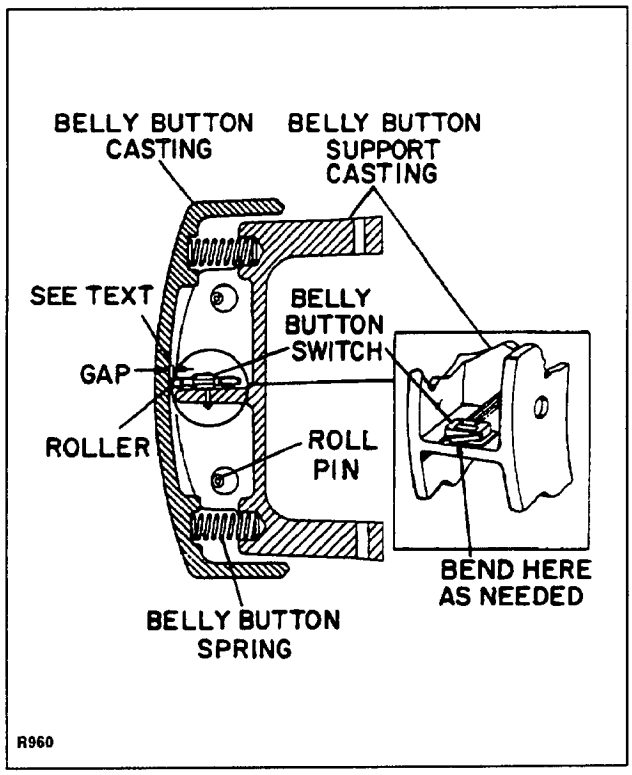


Figure 5-3. Belly-Button Switch Adjustment

5-4. CONTROL HEAD SWITCH REPLACEMENT.

NOTE: Refer to paragraph 5-5 for speed control switch replacement.

NOTE: For access to belly-button switch, see paragraph 5-3. For access to other switches on control head, the top cover (15, 16, or 17, Figure 5-5) and/or switch plate (18) must be removed.

NOTE: All electrical connections should be tagged with identifying labels before disconnecting.

1. Disconnect battery.
2. If necessary to gain access to defective belly-button switch, remove belly-button casting (42, Figure 5-4) by performing step 2 in paragraph 5-3.
3. Remove top cover (15, 16, or 17, Figure 5-5) by removing four screws (14).
4. Remove switch plate (18) by removing four screws (15 and 16, Figure 5-4) on top and bottom of control handle (41).
5. Replace belly-button switch (3), speed control switches (4), horn switch (4, Figure 5-5), or lift, lower and dynamic brake switches (3).

1. SEE SUPPLEMENT 220 FOR TRANSISTOR SPEED CONTROL TRUCKS SERIAL NUMBER 334631 AND HIGHER
2. SEE SUPPLEMENT 207 FOR TRANSISTOR SPEED CONTROL TRUCKS SERIAL NUMBER 333328 TO 334630

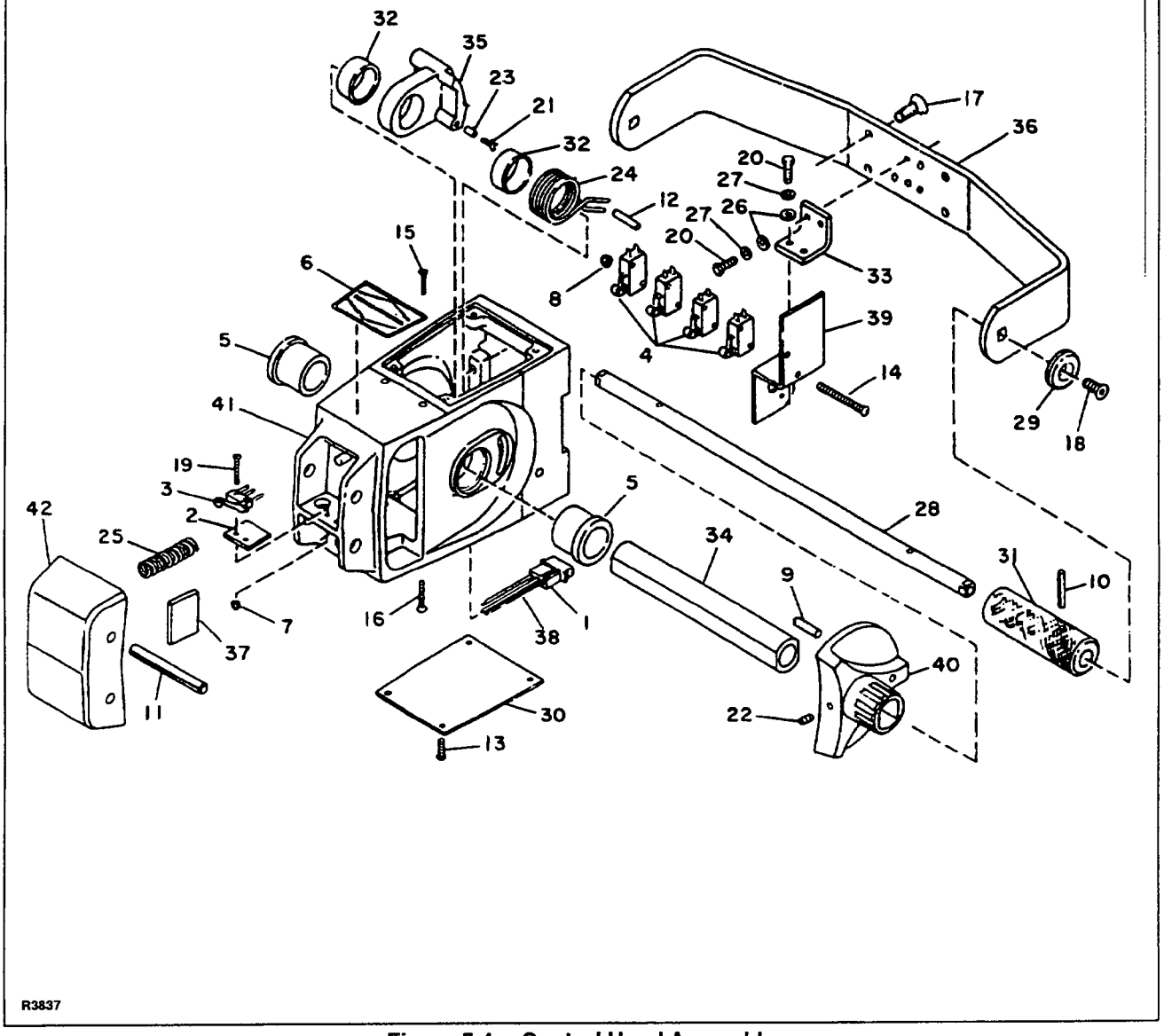
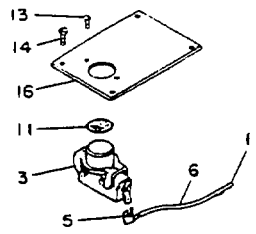


Figure 5-4. Control Head Assembly

1. SEE SUPPLEMENT 220 FOR TRANSISTOR SPEED CONTROL TRUCKS SERIAL

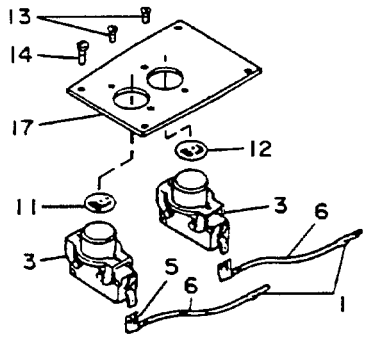
2. SEE SUPPLEMENT 207 FOR TRANSISTOR SPEED CONTROL TRUCKS SERIAL

PDH WITH LIFT ONLY 505050-02 (OPTION)



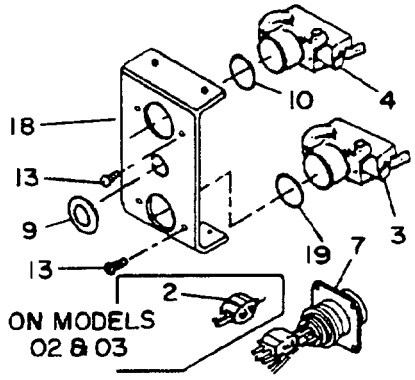
R5215

PDH WITH LIFT AND LOWER 505050-03 (OPTION)



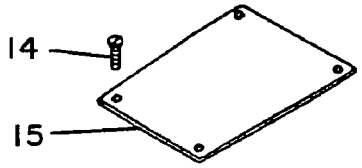
R5216

PDH WITH HORN AND BRAKE 505050-01, 02 & 03 (STANDARD)



R5217

PDH 505050-1 (STANDARD)



R5218

Figure 5-5. Control Head Pushbutton Switches

NOTE: If the belly-button switch is replaced, adjust it in accordance with paragraph 5-3 before using truck.

6. Replace switch plate (18) and secure with four screws (15 and 16, Figure 5-4) on top and bottom of control handle (41).

7. Replace top cover (15, 16, or 17, Figure 5-5) and secure with four screws (14).

8. Reconnect battery.

5-5. SPEED CONTROL SWITCH RETURN SPRING REPLACEMENT.

1. Disconnect battery.

2. Remove four screws (17, Figure 5-6) securing control head to steering arm.

3. Disconnect connector (25).

4. Remove four screws (14, Figure 5-5) and top cover (15, 16 or 17).

5. Disconnect speed control switches (4, Figure 5-4).

6. Remove four screws (17) securing handle guard (36) to control head.
7. Remove two socket head screws (18) and caps (29) from handle guard (36).
8. Remove handle guard with two brackets (33 and 39) and speed control switches (4) attached.
9. Remove roll pin (10) from right hand handle grip (31).
10. Remove right hand handle grip from shaft (28).
11. Remove set screw (22) from right hand control lever (40).
12. Remove right hand control lever from tube (34).
13. Observing through top cover opening, slide shaft (28) with tube (34) out left hand side of control head just enough to clear return spring (24).
14. Disengage return spring from spiral pin (12) and remove return spring.
15. Place new return spring in position, engage with spiral pin, and slide shaft (28) with tube (34) back through return spring and out right hand side of control head.
16. Install right hand control lever (40) onto tube (34), and secure with set screw (22).
17. Install right hand handle grip (31) onto shaft (28), align roll pin hole in handle grip with roll pin hole in shaft, and install roll pin (10).
18. Install handle guard (36), with two brackets (33 and 39) and switches (4) attached, and secure with two caps (29) and screws (18).
19. Install four screws (17) through handle guard and into control head.
20. Reconnect speed control switches (4).
21. Install top cover (15, 16 or 17, Figure 5-5) with four screws (14).
22. Reconnect connector (25, Figure 5-6).
23. Install control head onto steering arm with four socket head screws (17).
24. Reconnect battery.

5-6. STEERING ARM RETURN SPRING ADJUSTMENT.

The tension on the steering arm return spring should allow the steering arm to return gently to the upright position. Excessive tension on the steering arm return spring will cause the steering arm to snap up and may cause damage to the electrical cable, brake linkage, or the spring itself. If the steering arm does not return fully, check for binding in the brake linkage or wiring harness before making any adjustments. If they do not bind, refer to Figure 5-6 and proceed as follows to adjust the steering arm return spring tension.

1. Disconnect the battery.
2. Hold the steering arm (12, Figure 5-6) in the upright position and make sure the arm cannot fall.
3. Insert a 5/16 allen wrench through hole in bottom of steering arm and loosen screw (15). The spring tube (1) will rotate counterclockwise when screw is loosened.
4. With a pair of vise grip pliers, grip the flat surfaces of the spring tube assembly (1) and rotate clockwise 180 degrees.
5. Hold spring tube assembly in rotated position and tighten screw (15) to secure.
6. Check the spring action by lowering the steering arm and returning it to the upright position two or three times.
7. If necessary, repeat steps 2 through 6, increasing or decreasing amount of rotation of the spring tube assembly until steering arm returns gently to full upright position.
8. Reconnect battery.

5-7. STEERING ARM RETURN SPRING REPLACEMENT.

NOTE: The steering arm return spring is replaced while the steering arm is in the upright position.

1. Disconnect battery.

NOTE: The steering arm has a tendency to fall downward when the tension on the return spring is released.

2. Hold steering arm (12, Figure 5-6) in upright position and make sure the arm cannot fall.
3. Insert a 5/16 allen wrench through hole in bottom of steering arm and loosen screw (15).

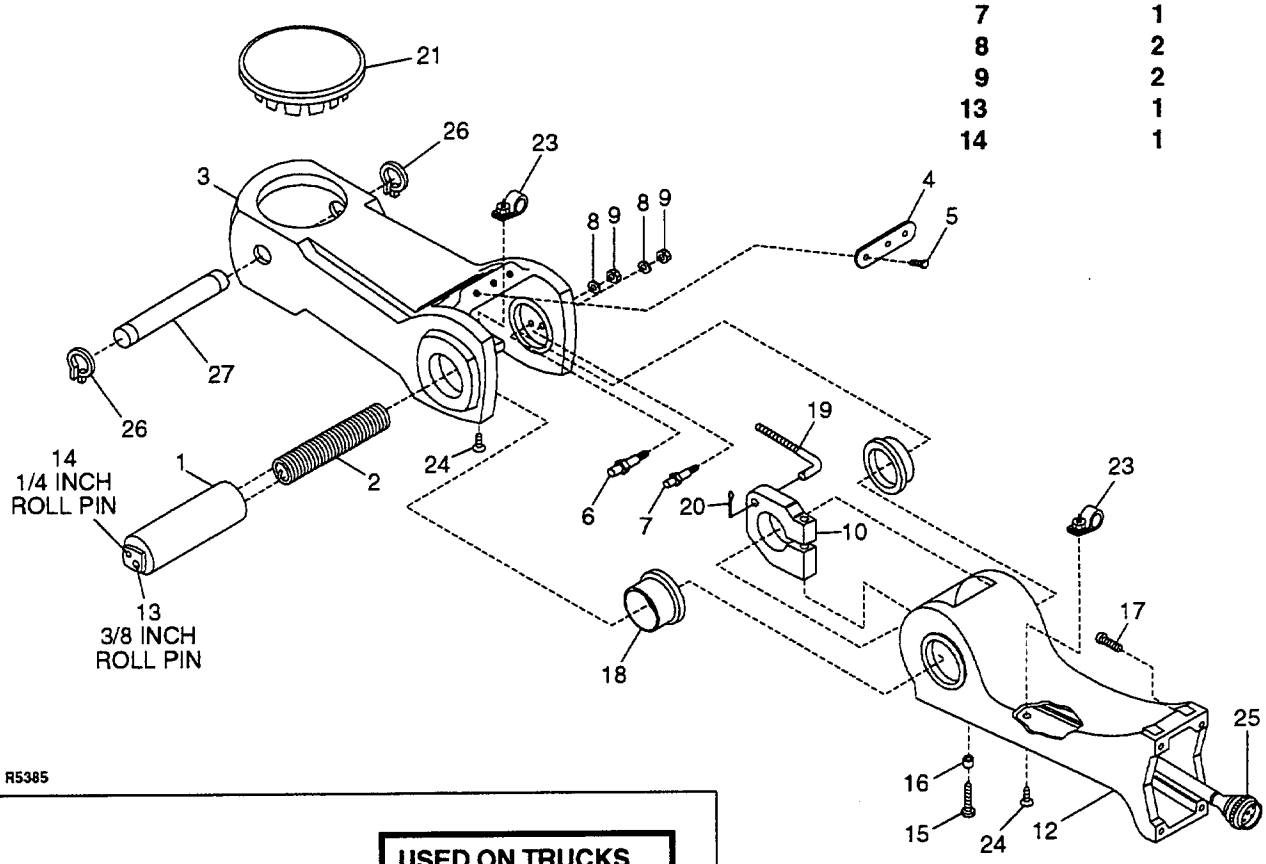
CAUTION: Unless properly supported, steering arm will drop out of pivot cap when spring tube is removed.

4. Put a block under steering arm at pivot cap.
5. With a piece of chalk or crayon, draw a straight line from center of spring tube assembly (1) into pivot cap (3), marking radial position of tube, to facilitate reinstallation.

SEE SUPPLEMENT 230 FOR TRANSISTOR SPEED CONTROL TRUCKS

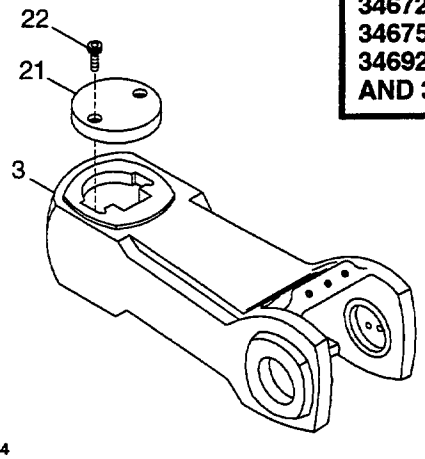
HANDLE RETURN SPRING KIT 901325 CONTAINS

ITEM	QTY
1	1
2	1
6	1
7	1
8	2
9	2
13	1
14	1



R5385

USED ON TRUCKS SERIAL NUMBER 333328 TO 346721, 346723 TO 346750, 346752 TO 346926, 346928 TO 346934 AND 346936



R5384

Figure 5-6 Steering Arm and Pivot Cap

6. With a pair of vise-grip pliers, grip the flat surfaces of spring tube assembly (1), and slowly pull it free from the steering arm, pivot cap and tube clamp (10).

NOTE: Steering arm return spring (2) will remain inside the spring tube assembly (1).

7. Remove steering arm return spring (2) from spring tube assembly (1). If spring is severely jammed and will not come loose, punch and drive the 1/4-inch diameter roll pin (14) into the tube. Save pin for reuse. Remove the spring. Tap roll pin back into place.
8. Lubricate the ends and outer surface of the new steering arm return spring (2) with a lithium base general purpose grease.
9. Insert spring into spring tube assembly and press in, making sure that one spring loop eye fits over the 3/8-inch roll pin (13) at the closed end of the spring tube assembly.
10. Slide spring tube assembly into pivot cap (3) and steering arm (12) through tube clamp (10) and through loop of electrical cable.
11. Align radial position of spring tube assembly in accordance with line drawn in step 5. Slowly rotate spring tube assembly a few degrees each way until the steering arm return spring snaps into place over spring pins (6 and 7) then tighten screw (15).
12. Apply engine lubricating oil (No. 2) to the steering arm elbow.
13. Remove block from under steering arm.
14. Adjust tension on steering arm return spring as explained in paragraph 5-6.
15. Reconnect battery.

5-8. PIVOT TUBE REPLACEMENT.

NOTE: All electrical connections and cabling should be tagged with identifying labels before disconnecting.

NOTE: A chain hoist is required for this procedure. It should be in position above the pivot tube before disassembly.

1. Remove the transmission as described in Section 7.
2. Position a support under pivot tube (7, Figure 5-8).
3. On trucks serial number 333328 to 346721, 346723 to 346750, 346752 to 346926, 346928 to 346934 and 346936, remove two socket head screws (22, Figure 5-6) securing pivot cap cover.
4. Remove pivot cap cover (21).
5. Remove electrical control cable, steering arm and control head from pivot tube assembly.
6. Remove pivot cap (3) and spacer (1, Figure 5-8).
7. Position a chain hoist above the pivot tube.
8. Connect chain to pivot tube as follows:
   a. For trucks serial numbers 333328 to 346721, 346723 to 346750, 346752 to 346926, 346928 to 346934 and 346936, use the two pivot cap cover screws (22) as a means of attachment for the chain hoist. Secure the chain hoist to the pivot tube.
   b. For trucks serial numbers 346722, 346751, 346927, 346935, 346937 and higher, use **tool kit part number 907151**. Position spacer, Figure 5-7, inside the pivot tube. Insert the pin through the support tube and secure with the cotter pin. Attach chain hoist to the spacer.
9. Remove cotter pin (10, Figure 5-8) and pull out spring support pin (12).

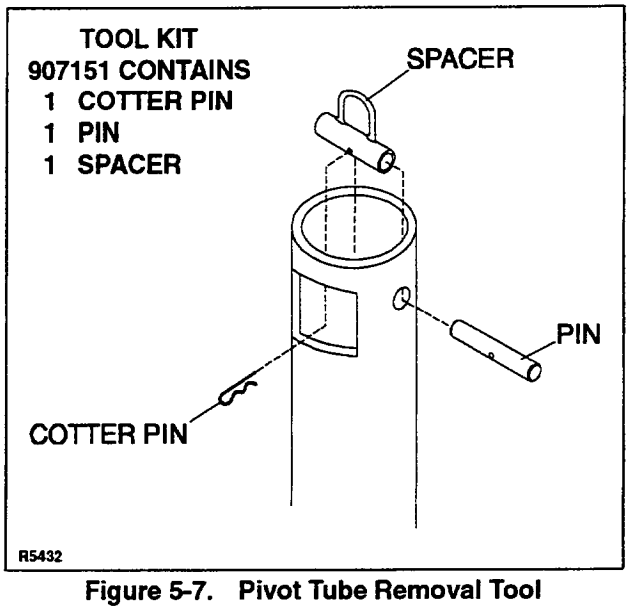


Figure 5-7. Pivot Tube Removal Tool

10. Remove the support from under the pivot tube and remove the pivot tube from the bottom of the truck.
11. Disconnect the chain from the pivot tube and remove spring support (11), spring (13), and thrust bearing (6).
12. Remove three screws (2) securing bushing (3).
13. Remove lower pivot bushing (3).
14. Remove upper pivot bushing (5).
15. Inspect the bearing (6) for wear. If worn, replace with new bearing.
16. Discard the two old bushings (3 and 5).

NOTE: When installing the new parts, refer to Figure 5-8 to be sure they are positioned on the pivot tube in the proper order.

17. Install bushing (3) with screws (2).
18. Install bushing (5).
19. Route support chain through pivot weldment and through thrust bearing (6), spring (13) and spring support (11).
20. Attach hoist chain to pivot tube as described in step 8.
21. Install the pivot tube (7) through the bottom of the truck and position a support under pivot tube.
22. Attach spring support (11) to pivot tube with spring support pin (12).
23. Secure spring support pin (12) with cotter pin (10).
24. Remove hoist chain and the two pivot cap cover screws or pivot tube tool as applicable.
25. Install spacer (1) on pivot tube (7).

CAUTION: Be sure to observe cable routing and positioning when reinstalling electrical control cable to prevent cable damage.

26. Reinstall steering arm onto pivot tube, being careful not to damage electrical control cable while routing it through the pivot tube. (See Figure 5-9).
27. Install pivot cap cover.
28. Install the transmission as described in Section 7.

5-9. ELECTRICAL CONTROL CABLE REPLACEMENT.

1. Disconnect battery.

NOTE: When removing control head in the following step, be sure to hold it in place until cable is disconnected.

2. Remove four screws (7, Figure 5-9) that secure control head to steering arm.
3. Disconnect connector (8), and set aside control head.
4. Use Amp Extraction Tool **part number 900750** to push out and disconnect wire pins from connector (8).
5. Remove cable clamps (1, 2) and loosen loop of cable that surrounds the spring tube assembly (3).
6. Remove pivot cap cover (6).
7. Pull disconnected end of old cable through steering arm and pivot cap, then up through pivot cap cover opening.
8. Tape the disconnected end of the old cable to the terminal end of the new cable.

NOTE: The dead-man switch is on the brake linkage. The wire connected to pin number 3 on the terminal board (9) is a wire that comes from the dead-man switch. Cable wire number 3 is connected to the other lead on the dead-man switch.

9. Remove base access cover, and disconnect terminal end of old cable from transmission terminal board (9) and cable wire number 3 from deadman switch lead.
10. Draw new cable into pivot tube by pulling old cable through the base access opening.

NOTE: The cable leads are numbered consecutively.

11. Untape the old cable from the new cable and connect the new cable terminals sequentially, starting with pin 1 on the transmission terminal board (9).
12. Cut the terminal off of cable wire number 3 and connect this wire to the wire from the deadman switch.
13. Check that the other wire from the deadman switch is connected to terminal 3.
14. Route connector (8) end of cable under spring tube assembly (3) and out the opening at the elbow.
15. Eliminate cable slack in pivot tube (10), then secure cable with cable clamp (1).

CAUTION: Improper cable loop adjustment while performing the following step will damage the cable. If too tight, the cable will tear when the steering arm is in the up position. If too loose, the cable will buckle or be pinched when the steering arm is in the down position.

16. Loop cable around spring tube assembly (3) as illustrated and push connector (8) end of cable through steering arm.
17. Pull the cable until the cable is wrapped firmly around the spring tube assembly (3). Slack off approximately 1/2 inch and secure the cable in this position with cable clamp (2).
18. Work steering arm up and down a few times to assure that the electrical control cable is not binding.
19. Plug connector (8) into the control head receptacle.
20. Reinstall the control head assembly, pivot cap cover, and base access cover.
21. Reconnect battery.

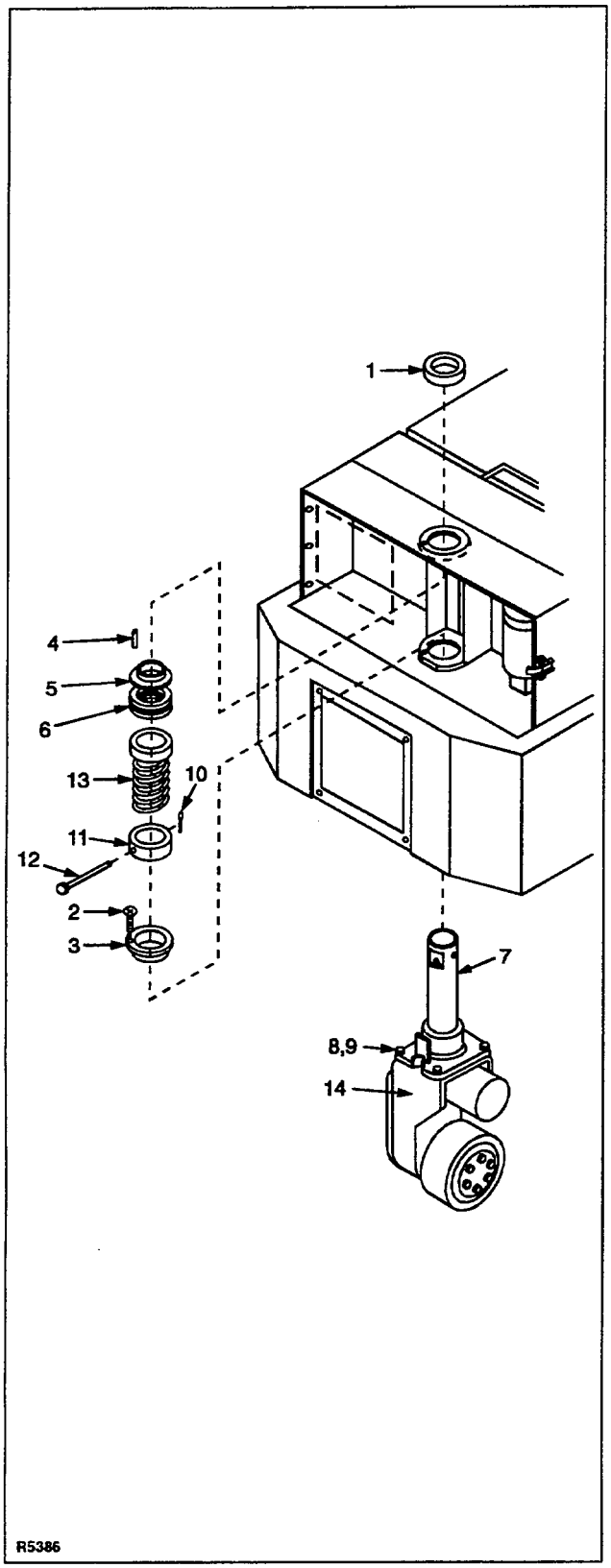
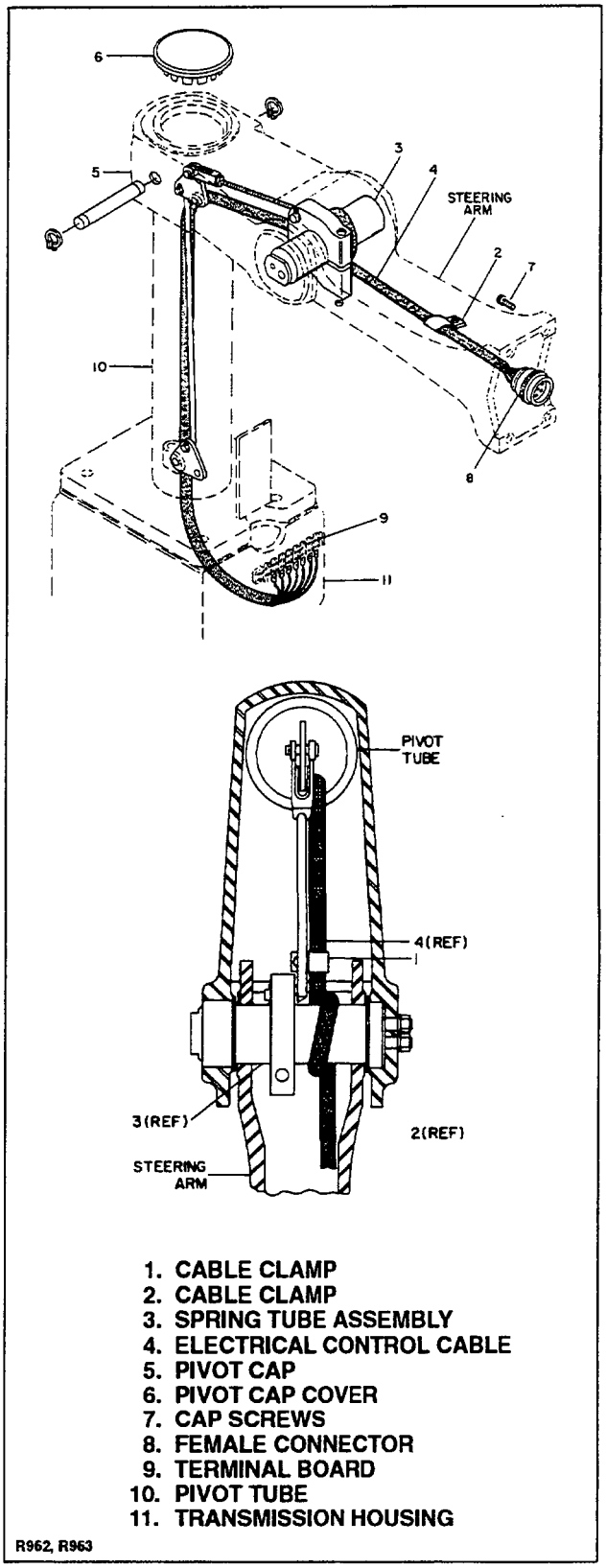


Figure 5-8. Pivot Tube Bushing Replacement



1. CABLE CLAMP
2. CABLE CLAMP
3. SPRING TUBE ASSEMBLY
4. ELECTRICAL CONTROL CABLE
5. PIVOT CAP
6. PIVOT CAP COVER
7. CAP SCREWS
8. FEMALE CONNECTOR
9. TERMINAL BOARD
10. PIVOT TUBE
11. TRANSMISSION HOUSING

Figure 5-9. Electrical Control Cable Replacement

NOTES

SECTION 6
BRAKE SERVICING

6-1. GENERAL

There are two different brake systems: one is used on truck **serial numbers 333564 and higher,** and the other is used on truck **serial numbers 333328 to 333563.** The adjustment and parts replacement procedures for these two systems are different and are described separately.

6-2. ADJUSTMENT

If the mechanical brake does not begin to hold when the steering arm is raised or lowered into the lightly shaded area in Figure 6-1, proceed as follows:

6-2.1. Adjustment For Truck Serial Numbers 333564 And Higher.

1. Disconnect battery connections.
2. Securely block the truck to prevent slipping, then jack up the truck so the drive wheel is off the ground.
3. Remove base access cover.
4. Secure steering arm assembly in a position that is in either lightly shaded area shown in Figure 6-1.

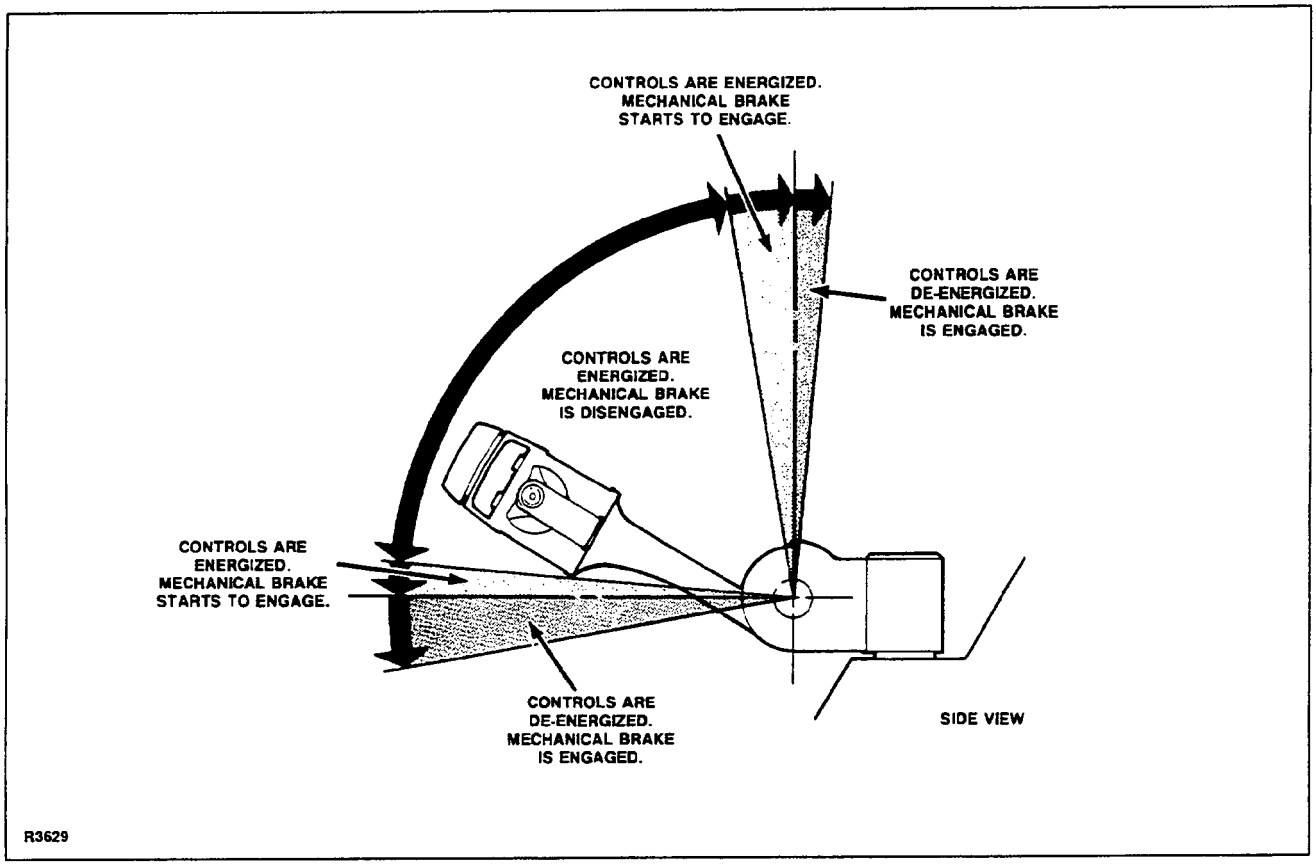


Figure 6-1. Brake Engage/Disengage

5. Remove the cotter pin (1, Figure 6-2), and pin (2) to disconnect the clevis (3) from the lever assembly.
6. Loosen the lock nut (4).

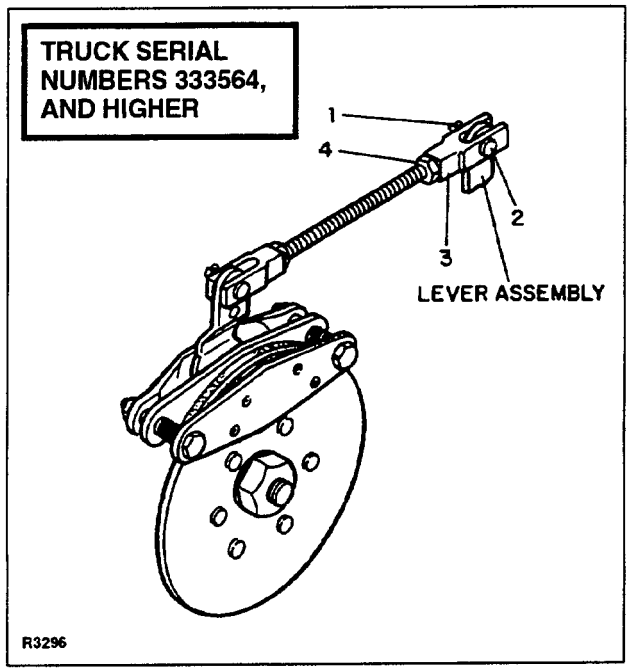


Figure 6-2. Adjustment For Truck Serial Numbers 333564 and Higher.

7. Turn the clevis (3) to adjust the brake.
8. Connect the clevis (3) to the lever assembly with pin (2), but do not insert the cotter pin (1) at this time.
9. Turn the brake disc by hand to check brake adjustment. If there is noticeable drag, go to step 12. If there is no drag, go to step 10.
10. Disconnect the clevis (3).
11. Repeat steps 7 through 9 until adjustment is correct.
12. Secure the steering arm in drive position and spin the drive wheel to make sure there is no drag. If there is any drag, carefully readjust only enough to eliminate drag in the drive position.
13. Tighten the lock nut (4) and secure the pin (2) with the cotter pin (1).
14. Remove the restrictions from the steering arm and let the arm return to the upright position.
15. Check that the brake lever has activated the dead-man brake switch (42 Figure 6-4) and open the control circuits. If the switch is not activated, go to step 16. If it is activated, go to step 18.
16. Adjust the position of the dead-man switch by loosening the screws (41) attaching the switch to the mounting bracket, then sliding the switch in or out in the adjustment slots, and tightening the screws.
17. Make sure that applying the brake activates the switch but does not fully depress the switch plunger. If necessary, repeat steps 15 and 16 until the switch is properly positioned.
18. Lower the truck and install the base access cover.
19. Reconnect battery connections.
20. In an area free of obstructions, accelerate the truck and apply the brake. Check for proper operation in both forward and reverse.

6-2.2. Adjustment For Truck Serial Numbers 333328 to 333563.

1. Disconnect battery connections.
2. Securely block the truck to prevent slipping; then jack up the truck so the drive wheel is off the ground.
3. Remove base access cover.
4. Secure steering arm assembly in a position that is in either lightly shaded area shown in Figure 6-1.
5. Spin drive wheel by hand and position weldment tube (1, Figure 6-3) by adjusting nuts (2) until you feel a noticeable drag.

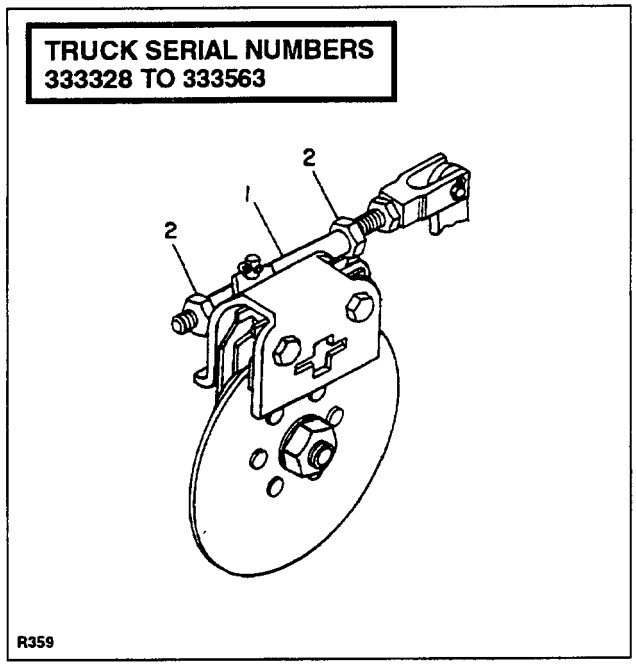


Figure 6-3. Adjustment For Truck Serial Numbers 333328 to 333563

6. Tighten nuts (2) without changing position of weldment tube.

7. Secure the steering arm in drive position and spin the drive wheel by hand to be sure there is no drag; readjust if necessary.
8. Remove the restrictions from the steering arm and let the arm return to the upright position.
9. Check that the brake lever has activated the dead-man brake switch (34, Figure 6-5) and opened the control circuits. If the switch is not activated, go to step 10. If it is activated, go to step 12.
10. Adjust the position of the dead-man switch by loosening the screws (35) attaching the switch to the mounting bracket, then sliding the switch in or out in the adjustment slots, and tightening the screws.
11. Make sure that applying the brake activates the switch but does not fully depress the switch plunger. If necessary, repeat steps 9 and 10 until the switch is properly positioned.
12. Lower the truck and reinstall base access cover.
13. Reconnect battery connections.

6-3. REPLACEMENT OF DISC BRAKE PARTS

6-3.1. Parts Replacement For Truck Serial Numbers 333564 And Higher.

1. Disconnect battery connections.
2. Block the wheels to prevent the truck from rolling.

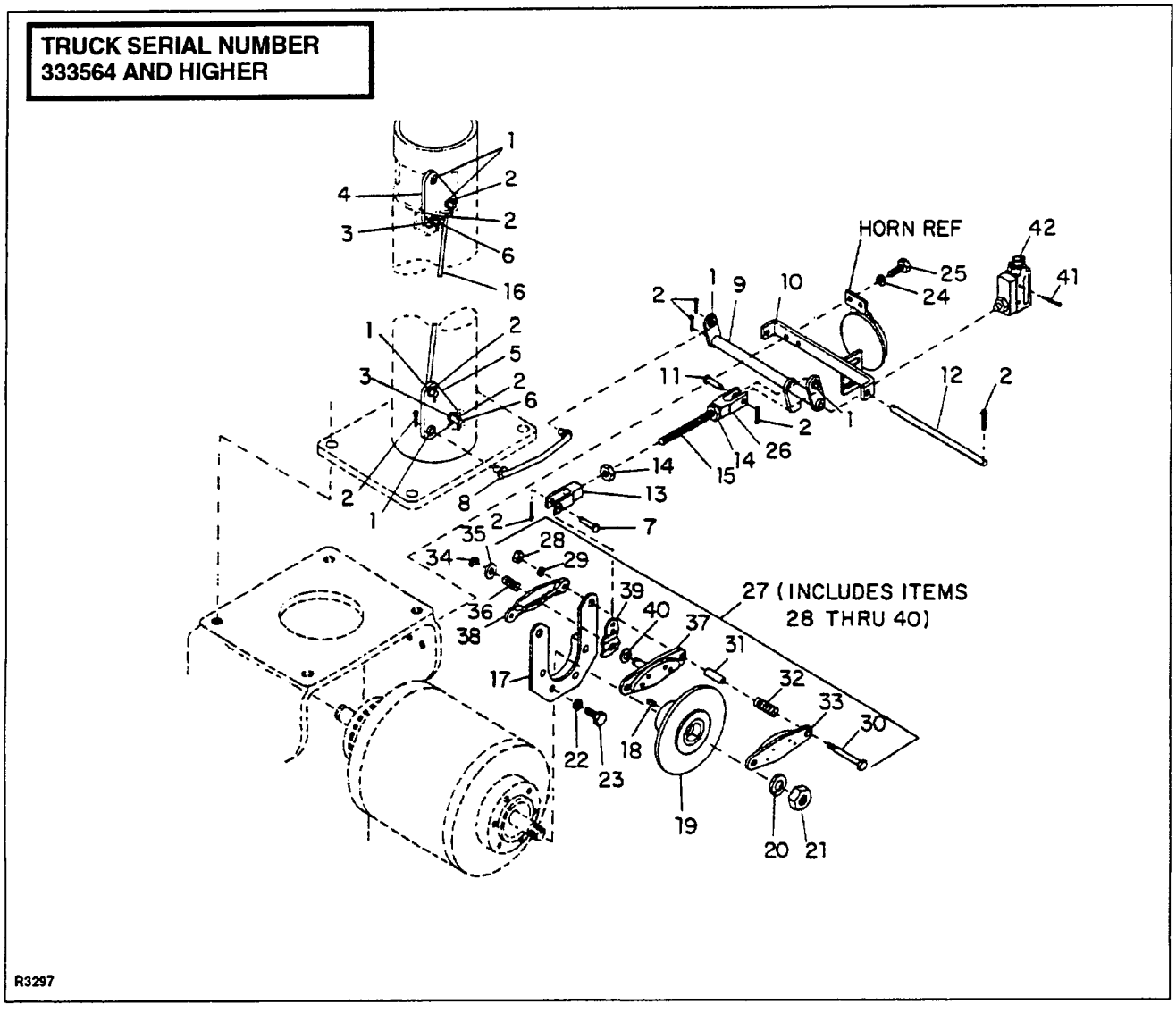


Figure 6-4. Parts Replacement for Truck Serial Numbers 333564 and Higher

3. Position the steering arm to the left as far as possible, and secure the steering arm down from its park position so that the mechanical brake is disengaged.
4. Remove base access cover.
5. Remove the cotter pin (2, Figure 6-4) and link pin (7), then swing the clevis (13) up out of the way.
6. Remove two nuts (28) and lockwasher (29).
7. Carefully pull the bolts (30) just enough to clear the mounting plate weldment (17) while you hold together the remaining parts of the disc brake assembly (27), then remove the assembly.
8. Remove the bolts (30), spacers (31), springs (32), and brake pad (33).
9. Remove the retaining C-ring (34), washer (35), spring (36), bracket (38), lever (39), and washer (40) from the brake pad (37).
10. Discard the springs (32 and 36) and brake pads (33 and 37). Replace them with new parts.
11. Assemble the washer (40), lever (39), bracket (38), spring (36), washer (35), and C-ring (34) to the brake pad (37).
12. Assemble the brake pad (33), spacers (31), and springs (32) to the two bolts (30).
13. Slip the parts assembled in step 11 onto the mounting plate weldment (17) and hold them so the bolt holes are aligned.
14. Insert the bolts (30) through pad (37) and bracket (17), so the threaded portion of the bolts passes completely through.
15. Assemble the two lock washers (29) and nuts (28) to the bolts (30).
16. Engage the clevis (13) with the lever (39), then insert the pin (7) and secure it with the cotter pin (2).
17. Remove the restrictions from the steering arm.
18. Adjust the brake as described in paragraph 6-2.
19. Install the base access cover.
20. Reconnect battery connections.

6-3.2. Parts Replacement For Truck Serial Numbers 333328 to 333563.

6-3.2.1. Disc Brake Pad Replacement.

1. Disconnect battery connections.
2. Block the wheels to prevent the truck from rolling.
3. Position steering arm to the left as far as possible and secure the steering arm down from its park position so that the brake is disengaged.
4. Remove base access cover.

NOTE: The brake pads may fall free during the next step.

5. Remove two bolts (25, Figure 6-5) and nuts (26) to release brake pads (24).
6. If brake pads don't fall free, slide brake pads out from end of clamp (22).
7. Insert replacement brake pads in clamp assembly, one pad on each side of disc (31) with linings towards the disc, and secure pads and clamp with two bolts (25) and nuts (26). Be sure spring (37) is installed between pads.
8. Release steering arm.
9. Refer to paragraph 6-2 and adjust brake.
10. Reconnect battery connections.

6-3.2.2. Brake Lever.

1. Disconnect battery.
2. Block the wheels to prevent the truck from rolling.
3. Remove base access cover.
4. Position steering arm to the left as far as possible and secure the steering arm down from its park position so that the mechanical brake is disengaged.

NOTE: The brake lever (23, Figure 6-5) has a pin that fits into one of two slots on the inside of the clamp assembly.

5. Check position of lever inside the clamp assembly so that you will be sure to place brake lever pin in correct slot during reassembly.
6. Release brake lever (23) from weldment tube (20) by removing cotter pin (19) from weldment tube stub.

NOTE: The brake pads (24) and springs (37) may fall free during the next step.

7. Remove two bolts (25) and nuts (26) to release brake clamp (22) from mounting plate (27).
8. If brake pads did not fall free, slide the brake pads (24) out from end of clamp and slide the brake lever (23) out through the brake lever access hole located on the opposite side of the clamp.
9. Check that replacement brake lever (23) has pin tightly secured.

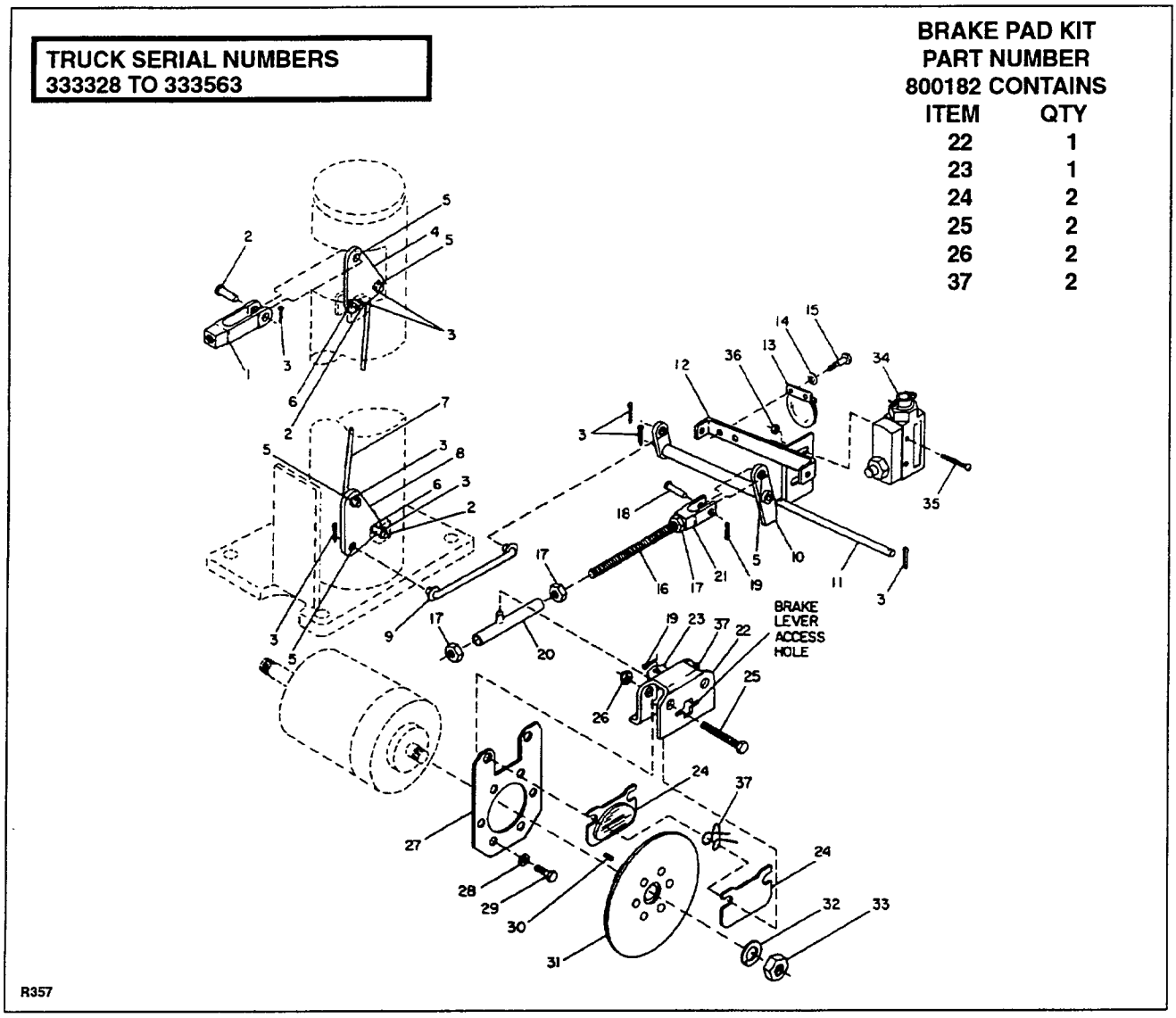


Figure 6-5. Parts Replacement for Truck Serial Numbers 333328 to 333563

10. Slide the brake lever (23) in through the brake lever access hole located on the opposite side of the clamp and align the brake lever so that the pin is in the proper pin slot.
11. Slide clamp (22) on mounting plate (27) so that mounting plate is at lever side of clamp, reinstall brake pads (24), one pad on each side of disc (31) with linings toward the disc, and check that pin in lever is in proper slot of the clamp.
12. Secure clamp to mounting plate with two bolts (25) and nuts (26). Be sure springs (37) are installed.
13. Insert stub of weldment tube (20) up through hole in brake lever (23) and secure with cotter pin (19).
14. Adjust brake as described in paragraph 6-2.
15. Reconnect battery connections.

6-3.3. Replacement of Brake Disc.

6-3.3.1. Disc Replacement For Truck Serial Numbers 333564 and Higher.

1. Disconnect the battery.
2. Block the wheels to prevent the truck from rolling.
3. Remove the base access cover.
4. Position the steering arm to the left as far as possible, and secure the steering arm down from its park position so that the mechanical brake is disengaged.

5. Remove the cotter pin (2, Figure 6-4) and pin (7), then swing the clevis (13) up out of the way.
6. Remove the two nuts (28) and lock washers (29).
7. Carefully pull the bolts (30) just enough to clear the mounting plate weldment (17) while you hold together the remaining parts of the disc brake assembly (27), then remove the assembly.
8. Remove the nut (21) and lock washer (20).
9. Remove the disc assembly (19).
10. Remove the key (18).
11. Install new disc assembly with key (18), lock washer (20) and nut (21).
12. Assemble the brake pad (33), springs (32), and spacers (31) to the two bolts (30).
13. Slip brake pad (37) with attached parts onto the mounting plate weldment (17) and hold it so the bolt holes are aligned.
14. Insert the bolts (30) through the pad (37) and bracket (17), so the threaded portion of the bolts passes completely through.
15. Assemble the two lock washers (29) and nuts (28) to the bolts (30).
16. Engage the clevis (13) with the lever (39), then insert the pin (7) and secure it with the cotter pin (2).
17. Remove the restrictions from the steering arm.
18. Adjust brake as described in paragraph 6-2.
19. Reconnect the battery.

6-3.3.2. Disc Replacement For Truck Serial Numbers 333328 to 333563.

1. Disconnect the battery.
2. Block the wheels to prevent the truck from rolling.
3. Position the steering arm to the left as far possible and secure the steering arm down from its park position so that the mechanical brake is disengaged.
4. Remove base access cover.
5. Remove two bolts (25, Figure 6-5) and nuts (26) to release brake pads (24).
6. If brake pads don't fall free, slide brake pads out from end of clamp (22).
7. Remove nut (33) and lock washer (32).
8. Remove the disc assembly (31).
9. Remove key (30).
10. Install new disc assembly with key (30), lock washer (32) and nut (33).
11. Insert brake pads in clamp assembly; one pad on each side of disc (31) with linings toward the disc, and secure pads and clamp with two bolts (25) and nuts (26). Be sure springs (37) are installed between pads.
12. Remove the restrictions from the steering arm.
13. Adjust brake as described in paragraph 6-2.
14. Reconnect the battery.

SECTION 7
TRANSMISSION, DRIVE WHEEL, CASTER WHEEL, AND LOAD WHEEL SERVICING

7-1. TRANSMISSION REMOVAL AND DISASSEMBLY

1. Disconnect battery.
2. Securely block load wheels. Remove base access cover.
3. Disconnect the wires to the dead man switch.
4. Disconnect the wire to the horn.
5. If the cable leads connected to the terminal block (42, Figure 7-1) are not clearly labeled, label them from right to left beginning with 1 and then disconnect the cable leads from the terminal board.
6. Make sure the four cables to the drive motor (38) are properly labeled A1, A2, F1, and F2 and then disconnect the cable from the drive motor.
7. Disconnect the mechanical brake by removing cotter pin (1, Figure 7-2) clevis pin (2) that secures the rod clevis to the lower lever assembly (3).

NOTE: Transmission oil capacity is 3 pints.

8. Remove the transmission drain plug (5, Figure 7-1) and drain the transmission oil.
9. Position the drive assembly to access the two screws (24) and washers (18) which secure the motor to the transmission housing and remove the screws and washers.
10. Reposition the drive assembly to allow the motor to be pulled out through the access opening.
11. Disconnect brake rod (4, Figure 7-2) from lower lever assembly (3).

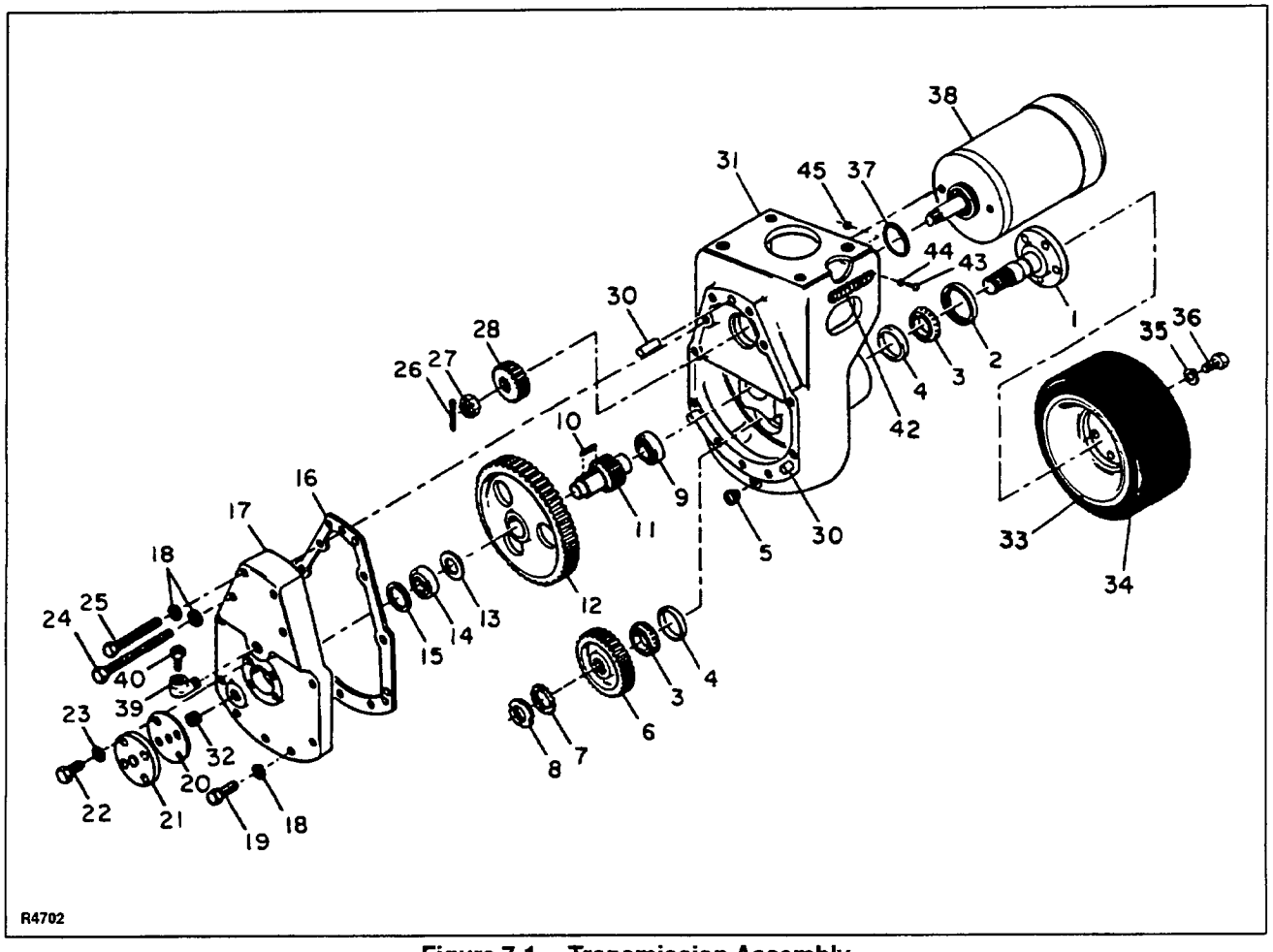
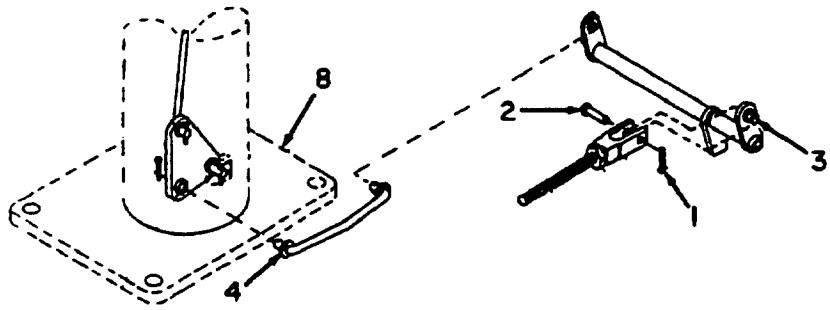
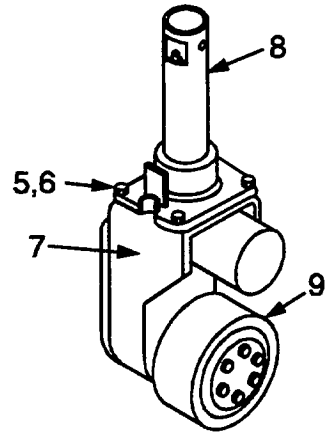


Figure 7-1. Transmission Assembly

TRUCK SERIAL NUMBERS 333564 AND HIGHER



ALL TRUCKS



TRUCK SERIAL NUMBERS 333328 TO 333563

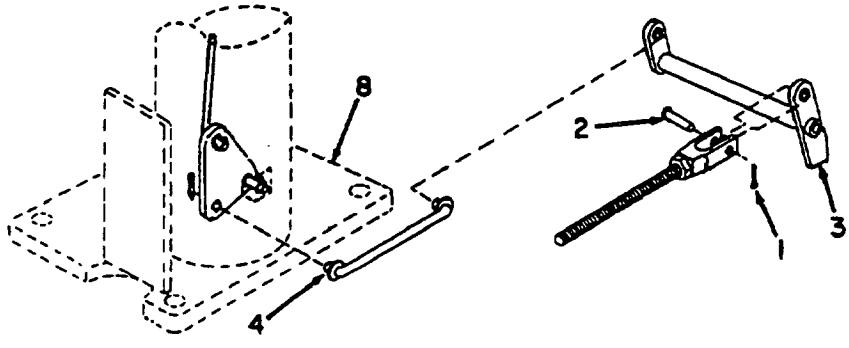


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Figure 7-2. Transmission Removal

12. Remove the four screws (5) and washers (6) that secure the transmission (7) to the pivot tube weldment (8).
13. Remove the transmission and drive wheel (9) from the truck by raising the rear of the lift truck with jacks or other suitable means and sliding the assembly out from under the truck.
14. Remove the four hex head cap screws (22, Figure 7-1) and lock washers (23), bearing cover (21) and gasket (20).
15. Remove bearing spacer (15).
16. Remove seven screws (19), two screws (25), and lock washers (18); pry off transmission cover (17) and pull off cover gasket (16).
17. Remove ball bearing (14) and pinion spacer (13).
18. Remove intermediate gear (12) and square key (10).
19. Remove spur pinion (11).
20. Remove locknut (8) and lock washer (7).
21. Remove drive wheel and axle shaft (1) to free gear (6), roller bearing cones (3) and cups (4), and oil seal (2).
22. Remove ball bearing (9).
23. Refer to the disassembly instruction as a guide, and reverse the individual procedures of steps 22 through 1 to reassemble and reinstall the transmission.

NOTE: When reassembling, be sure to replace the gasket and reinstall the magnetic drain plug before refilling the transmission with transmission oil. **Transmission oil capacity is 3 pints.**

24. Fill the transmission to fill plug level with EP SAE 80W-90 automotive transmission oil.

7-2. Drive Wheel Replacement

1. Disconnect battery.
2. Securely block the load wheels to prevent the truck from moving.
3. Remove base access cover.
4. Use a jack to raise the rear of the lift truck so that the drive wheel clears the ground.
5. Lower the truck on blocks, making certain the drive wheel is still clear of the ground.
6. Remove the five retaining screws (36, Figure 7-1) and lock washers (35) that secure the drive wheel to the axle shaft and then pry off the wheel.
7. Reverse the above procedures to install new drive wheel.

7-3. CASTER WHEELS.

1. Unload the truck and block the drive wheel and load wheels.
2. Disconnect the battery.
3. Raise the rear of the lift truck with a jack or another lift truck and place supporting boards or steel bars under the body approximately six inches in front of the caster wheel that is to be changed.
4. Lower the lift truck onto the support.
5. Remove the nut (3, Figure 7-3) and caster wheel axle (2) to remove the caster wheel, bushing, and spacers (4 through 6).
6. Remove the axle busing (5) from wheel and bearing assembly.
7. Clean bushing and check for defects.
8. Apply lithium base general purpose grease to the bushing.
9. Reassemble the caster wheel assembly, bushing, and spacers (4 through 6) with caster axle (2) and nut (3).
10. Check wheel for free movement.

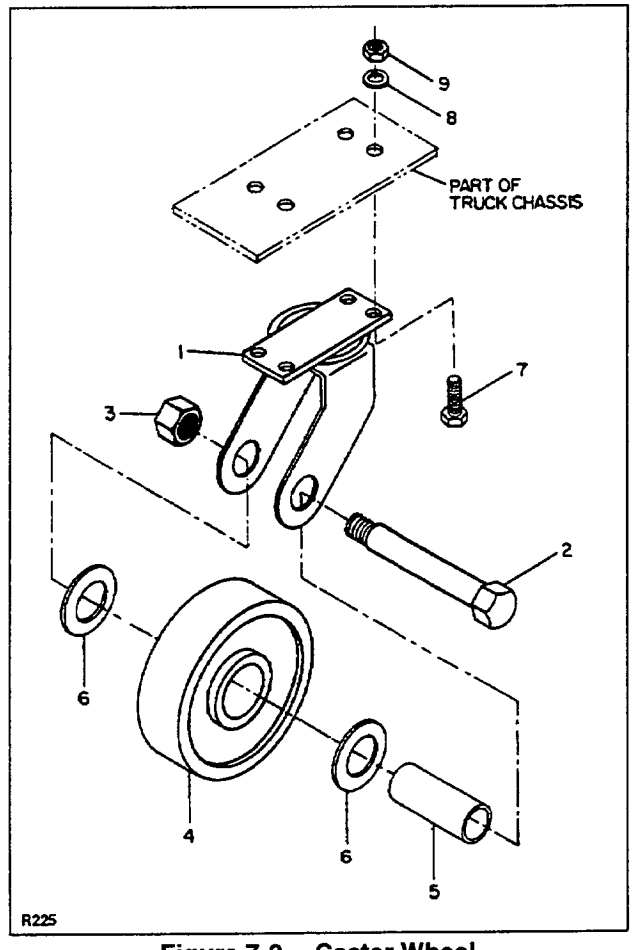


Figure 7-3. Caster Wheel

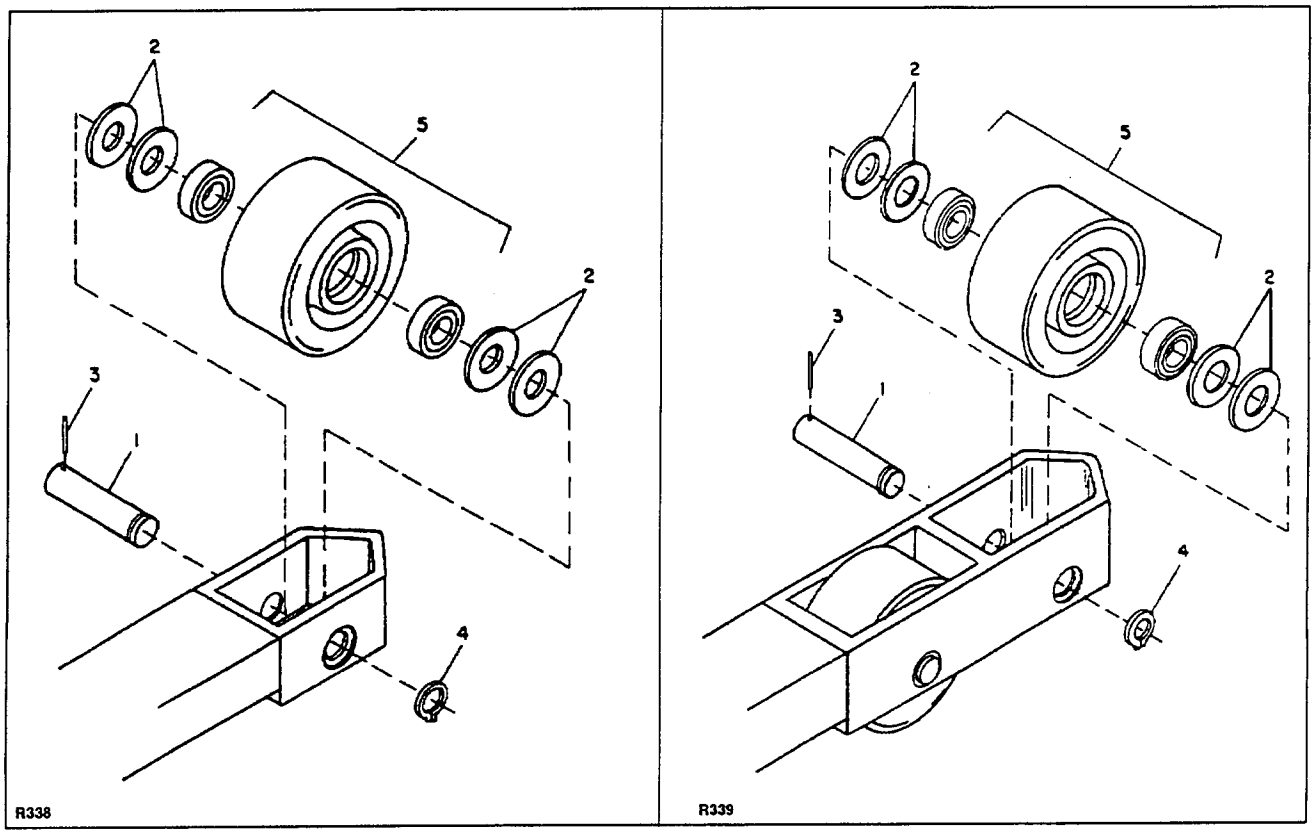


Figure 7-4. Load Wheels

7-4. LOAD WHEELS.

NOTE: PDH-40 lift trucks have tandem load wheels. Replace tandem wheels as a pair.

1. Unload the truck and block the drive wheel.
2. Disconnect battery.
3. Raise the front of the lift truck with a jack or another lift truck and place supporting boards or steel bars under the straddle leg immediately in back of the wheel housing to hold wheel at least 1 inch off of floor.
4. Lower the lift truck onto the support.
5. Remove the snap ring (4, Figure 7-4) and remove the load wheel axle (1). The load wheel and bearing washers and spacers (2) will fall out.

NOTE: The load wheel comes equipped with two sealed, permanently lubricated, ball bearings.

6. Check that ball bearing on replacement wheel turns freely and smoothly.
7. Reassemble the load wheel (5) and spacers (2) on the axle (1) and secure with roll pin (3) and snap ring (4).
8. Check wheel for free rotation.

NOTES

SECTION 8
ELEVATION SYSTEM SERVICING

8-1. GENERAL

The elevation system includes the mast, lift chains, lift cylinder, ram head and tilt cylinders.

8-2. RAM HEAD REPLACEMENT

8-2.1. Non-telescopic Trucks

The ram head may be replaced as an assembly complete with sheaves; or any part in the assembly may be replaced.

WARNING: Before attempting any service make certain power is disconnected.

1. Lower the lift carriage fully.
2. **Disconnect the battery.**
3. Slacken the lift chains by loosening the nut below the chain adjusting bolt on the lift carriage.
4. Lift the lift chains off the ram head sheaves and lay on the mast support.
5. Remove screw (21, Figure 8-1) and lock washer (22) and lift the ram head off the lift cylinder.
6. The ram head can now be repaired or replace as required.
7. Reinstall ram head in reverse order of removal.
9. Adjust lift chains as described in paragraph 8-4.

8-2.2. Telescopic Trucks

The ram head may be replaced as an assembly complete with sheaves; or any part in the assembly may be replaced.

WARNING: Before attempting any service make certain power is disconnected.

1. Lower the lift carriage fully.
2. **Disconnect the battery.**
3. Slacken the lift chains by loosening the nut below the chain adjusting bolt on the lift carriage.
4. Lift the lift chains off the ram head sheaves and lay on the mast support.
5. Remove screw (21, Figure 8-1) and lock washer (22).
6. Remove screw (10), wear spacers (20) and clamp bar (13) and lift the ram head off the lift cylinder.
7. The ram head can now be repaired or replace as required.
8. Reinstall ram head in reverse order of removal.
9. Adjust lift chains as described in paragraph 8-4.

8-3. SHEAVE COLLAR REMOVAL (TRIMAST and Full Free-Lift)

The sheave collar for the Trimast and Full Free Lift cylinders are loosely mounted to the lift cylinders and can be removed by taking the lift chains off the sheaves and loosening the top of the cylinder then sliding the sheave collar up and off the lift cylinder. The lift cylinder is removed as described in paragraph 8-6.

NOTE: When replacing sheaves be sure to lubricate using a lithium base grease.

8-4. LIFT CHAIN ADJUSTMENT

NOTE: The lift chains should be adjusted with the lift carriage fully lowered. All slack must be removed from chains. If there is slack in any chain, adjust the chain. Chains should be equally taut.

WARNING: Before attempting any adjustment make certain power is disconnected.

8-4.1. Telescopic and Non-Telescopic Trucks

1. Fully lower lift carriage.
2. **Disconnect the battery.**
3. Loosen jam nut (29, Figure 8-1) on chain adjusting bolt on the lift carriage.
4. Take up slack by tightening nut (31, Figure 8-1) on the bottom of the chain adjusting bolt.

CAUTION: At least 3 full threads must be present below hex nut after completion of adjustment.

5. Secure adjustment by tightening nut (29, Figure 8-1).
6. Reconnect battery.
7. Test chain by operating carriage. If slack is still apparent repeat above procedure.

8-4.2. Full Free Lift Trucks and PDH-40 TRIMAST Trucks

1. Fully lower lift carriage.
2. **Disconnect the battery.**

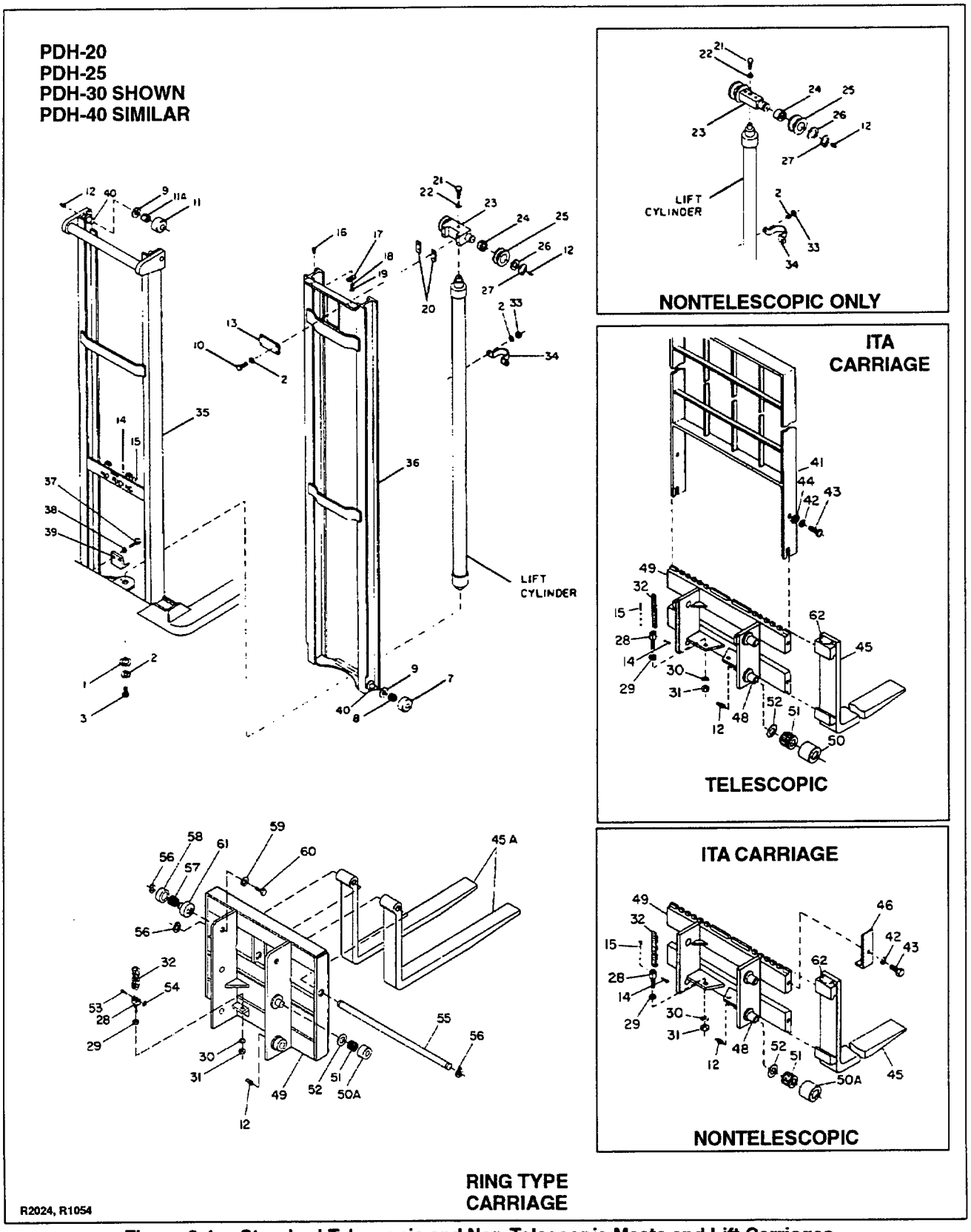


Figure 8-1. Standard Telescopic and Non-Telescopic Masts and Lift Carriages

PDH-20
PDH-25 AND PDH-30 FULL FREE LIFT SHOWN
PDH-40 FULL FREE LIFT AND TRIMAST SIMILAR

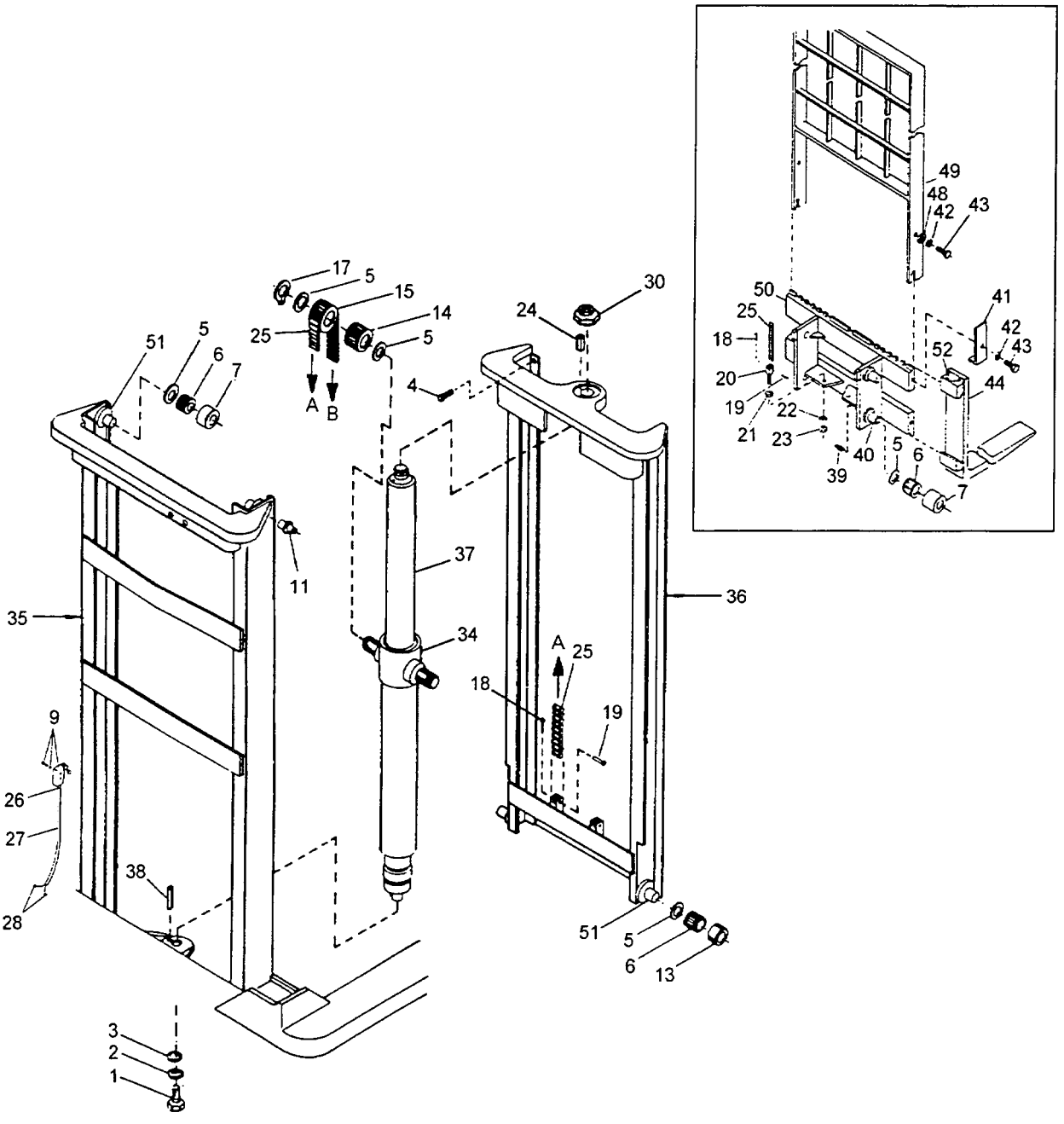


Figure 8-2. Inner and Outer Mast and Lift Carriage (Full Free Lift)

NOTE: On TRIMAST truck, the chain adjusting bolt is located on the outer mast.

3. Loosen jam nut (21, Figure 8-2) on chain adjusting bolt on the back of the lift carriage.
4. Take up slack by tightening nut (23) on the bottom of the chain adjusting bolt.

CAUTION: At least 3 full threads must be present below hex nut after completion of adjustment.

5. Secure adjustment by tightening nut (21).
6. Reconnect battery.
7. Test chain by operating carriage. If slack is still apparent repeat above procedure.

8-4.3. PDH-20, PDH-25, and PDH-30 TRIMAST Trucks

There are two sets of chains on these TRIMAST trucks. Adjustments are made for both sets of chains at the bottom of the inner-inner mast.

1. Fully lower lift carriage.
2. **Disconnect the battery.**
3. Loosen jam nut (29, Figure 8-3) on chain adjusting bolt on the inner-inner mast for the chain to be adjusted.
4. Take up slack by tightening nut (31) on the bottom of the chain adjusting bolt.

CAUTION: At least 3 full threads must be present below hex nut after completion of adjustment.

5. Secure adjustment by tightening nut (29).
6. Reconnect battery.
7. Test chain by operating carriage. If slack is still apparent repeat above procedure.

8-5. LIFT CHAIN REPLACEMENT

8-5.1. Telescopic and Non-Telescopic Trucks

1. Place a solid block on floor under the vertical members nearest the center of the lift carriage.
2. Lower lift carriage until it is supported by the block and the load chains are slack, then disconnect battery.

WARNING: Before attempting any actual replacement, make certain power is disconnected.

3. On PDH-20, -25, and -30 trucks, remove the cotter pin (14, Figure 8-1) and clevis pin (15) from end of chain connected to mast cross brace. On PDH-40 trucks, remove the clevis pin w/retaining ring from end of chain connected to mast cross brace.
4. On PDH-20, -25, and -30 trucks, remove the cotter pin (14, Figure 8-1) and clevis pin (15) from chain adjusting bolt (28) on carriage. On PDH-40 trucks, remove the clevis pin w/retaining ring from chain adjusting bolt (2) on carriage.
5. Remove chain from sheave (25, Figure 8-1) and lay aside for repair.
6. Position new chain in place on sheave.
7. On PDH-20, -25, -30 connect end of chain to adjusting bolt (28, Figure 8-1) with the clevis pin (15) and cotter pin (14). On PDH-40 connect end of chain to adjusting bolt with the clevis pin w/retaining ring.
8. On PDH-20, -25, -30 connect end of chain to mast cross brace with the clevis pin (15) and cotter pin (14). On PDH-40 connect end of chain to mast cross brace with the clevis pin w/retaining ring.
9. Adjust chain according to paragraph 8-4.

8-5.2. Full Free Lift Trucks and PDH-40 TRIMAST Trucks

1. Place a solid block on floor under the vertical members nearest the center of the lift carriage.
2. Lower lift carriage until it is supported by the block and the load chains are slack, then disconnect battery.

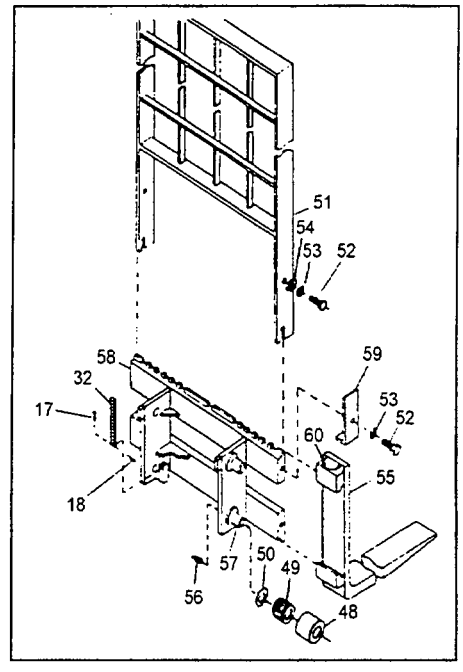
WARNING: Before attempting any actual replacement, make certain power is disconnected.

3. On PDH-20, -25, and -30 trucks, remove the cotter pin (18, Figure 8-2) and clevis pin (19) from end of chain connected to inner mast lower cross brace. On PDH-40 trucks, remove the clevis pin w/retaining ring from end of chain connected to mast cross brace.
4. On PDH-20, -25, and -30 trucks, remove the cotter pin (18) and clevis pin (19) from chain adjusting bolt (20) on carriage. On PDH-40 trucks, remove the clevis pin w/retaining ring from chain adjusting bolt (20) on carriage.
5. Remove chain from sheave (15) and lay aside for repair.
6. Position new chain in place on sheave.

PDH-20
PDH-25
PDH-30

A. ROUTED AROUND SHEAVE 36 TO LIFT CARRIAGE

B. ROUTED AROUND SHEAVE 23 TO CHAIN LUG 16 AT TOP OF OUTER MAST



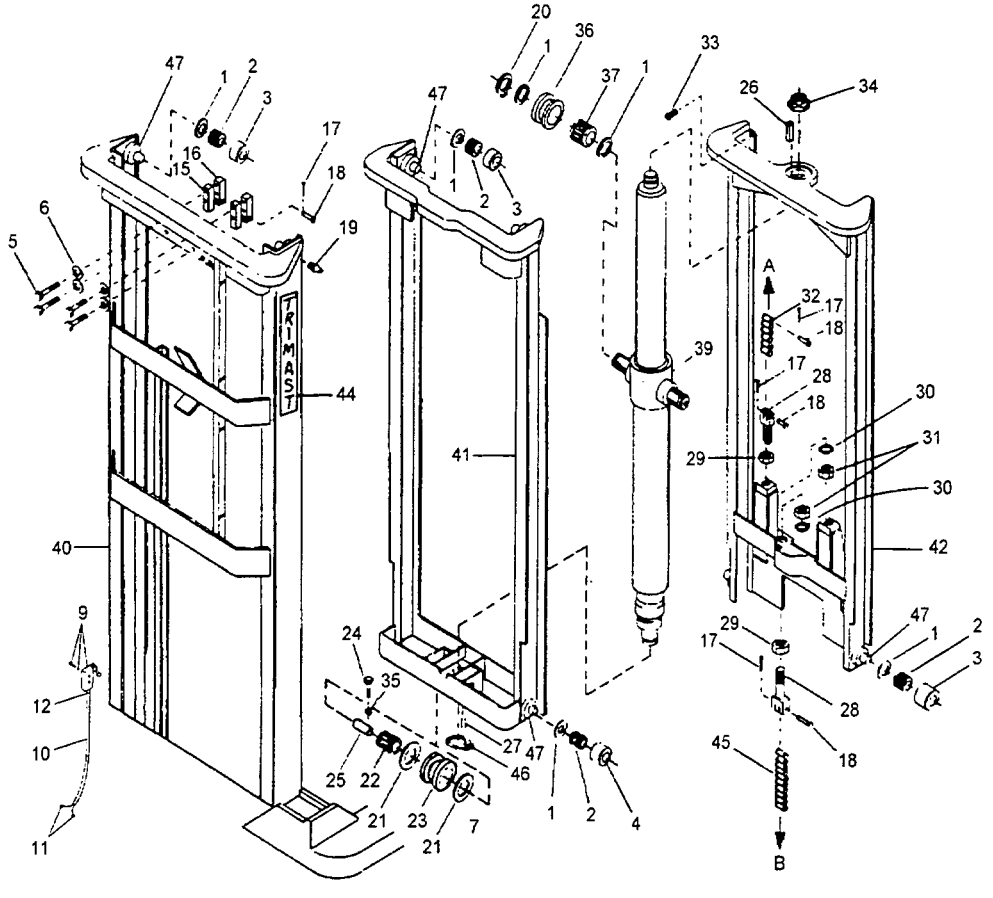


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Figure 8-3. Inner and Outer Mast and Lift Carriage (TRIMAST)

7. On PDH-20, -25, -30 connect end of chain to adjusting bolt (20) with the clevis pin (19) and cotter pin (18). On PDH-40 connect end of chain to adjusting bolt with the clevis pin w/retaining ring.
8. On PDH-20, -25, -30 connect end of chain to mast cross brace with the clevis pin (19) and cotter pin (18). On PDH-40 connect end of chain to mast cross brace with the clevis pin w/retaining ring.
9. Adjust chain according to paragraph 8-4.

8-5.3. PDH-20, PDH-25, AND PDH-30 TRIMAST Trucks

NOTE: On these TRIMAST truck, the chain adjusting bolts for both sets of chains is located on the inner-inner mast.

1. Place a solid block on floor under the vertical members nearest the center of the lift carriage and inner-inner mast.
2. Lower lift carriage until it is supported by the block and the load chains are slack, then disconnect battery.

WARNING: Before attempting any actual replacement, make certain power is disconnected.

NOTE: To remove chain between inner-inner mast and lift carriage proceed with step 3. To remove chain between outer mast and inner-inner mast proceed with step 10.

3. Remove the cotter pin (17, Figure 8-3) and clevis pin (18) from end of chain connected to chain adjusting bolt (28) on inner-inner mast lower cross brace.
4. Remove the cotter pin (17) and clevis pin (18) from chain lug on carriage.
5. Remove chain from sheave (36) and lay aside for repair.
6. Position new chain in place on sheave.
7. Connect end of chain to adjusting bolt (28) with the clevis pin (18) and cotter pin (17).
8. Connect end of chain to lift carriage with the clevis pin (18) and cotter pin (17).
9. Adjust chain according to paragraph 8-4.
10. Remove the cotter pin (17) and clevis pin (18) from end of chain going around sheave (23) connected to chain adjusting bolt (28) on inner-inner mast lower cross brace.
11. Remove the cotter pin (17) and clevis pin (18) from chain lug on outer mast.
12. Remove chain from sheave (23) and lay aside for repair.
13 Position new chain in place on sheave.
14. Connect end of chain to adjusting bolt (28) with the clevis pin (18) and cotter pin (17).
15. Connect end of chain to outer mast with the clevis pin (18) and cotter pin (17).
16. Adjust chain according to paragraph 8-4.

8-6. LIFT CYLINDER REMOVAL.

8-6.1. Non-Telescopic and Telescopic.

WARNING: Before disconnecting any hydraulic lines, make certain the system is not under pressure. Refer to paragraph 9-1.

1. Raise the lift carriage to approximately three-feet or high enough to gain access to the flow control valve located at the bottom of the lift cylinder.
2. Place a strong support under the forks or lift carriage and lower until forks or carriage are resting securely on the support.
3. **Disconnect the battery**.
4. Disconnect the overflow hose from top of lift cylinder.
5. Remove the hose retainers from the lift cylinder.
6. Remove hose assembly and the swivel elbow and the flow control valve at the bottom of the lift cylinder.
7. Remove the nipple, reducer and street elbow from the bottom of the lift cylinder.
8. Remove the ram head as described in paragraph 8-2.

CAUTION: Hold lift cylinder securely during the final stages of this procedure.

9. Non-Telescopic: Remove lift cylinder clamp (34, Figure 8-1).
10. Remove screw (3) and washers (1 and 2) from bottom of lift cylinder.
11. Raise the lift cylinder up and out of the truck.

NOTE: Disassembly of lift cylinder is covered in Section 9.

12. Reinstall lift cylinder in reverse order of removal.
13. Adjust chain according to paragraph 8-4.

8-6.2. Full Free Lift

WARNING: Before disconnecting any hydraulic lines, make certain the system is not under pressure. Refer to paragraph 9-1.

1. Fully lower the lift carriage.
2. **Disconnect the battery.**
3. Disconnect hose at the bottom of lift cylinder.
4. Remove the cylinder tube and elbows from the bottom of the lift cylinder.
5. Using another lift truck or suitable jack, raise lift carriage far enough to remove chains from around sheaves. Lay chains aside and lower lift carriage.
6. Remove lock nut (30, Figure 8-2) and roll pin (24) that secures top of lift cylinder to the inner mast (34).
7. Remove the hex head cap screw, (1) lock washer (2) and flat washer (3) securing the bottom of lift cylinder to the outer mast (35).

WARNING: Lift cylinder must be supported during the next step.

8. Support lift cylinder and using another lift truck or suitable jack, raise inner mast (36) far enough to clear top of lift cylinder.
9. Lift cylinder up and out of truck.
10. Remove snap rings (17), thrust bushings (5), sheaves (15), and bearings (14) from cylinder (37).

NOTE: Disassembly procedures are covered in section 9.

11. Reinstall lift cylinder in reverse order of removal.
12. Adjust lift chains as described in paragraph 8-4.

8-6.3. TRIMAST

WARNING: Before disconnecting any hydraulic lines, make certain the system is not under pressure. Refer to paragraph 9-1.

1. Fully lower the lift carriage.
2. **Disconnect the battery.**
3. Disconnect hose at the bottom of lift cylinder.
4. Remove the cylinder tube and elbows from the bottom of the lift cylinder.
5. Using another lift truck or suitable jack, raise lift carriage far enough to remove chains from around sheaves. Lay chains aside and lower lift carriage.
6. Remove lock nut (34, Figure 8-3) and roll pin (26) that secures top of lift cylinder to the inner-inner mast (42).
7. Remove snap ring (46) that secures the bottom of lift cylinder to the inner mast.

WARNING: Lift cylinder must be supported during the next step.

NOTE A staging latch has been added to the TRI-MAST elevation system. When the elevation system is lowered, the staging latch will engage the stop as shown in Figures 8-4 and 8-5. When the elevation system is raised, the staging latch will hold the mast down until the carriage completely raises and trips the latch as shown in Figures 8-6 and 8-7. Before the inner-inner mast can be raised in the following step, the staging latch must be tripped.

8. Support lift cylinder and using another lift truck or suitable jack, raise inner-inner mast (42, Figure 8-3) far enough to clear top of lift cylinder.
9. Lift cylinder up and out of truck.
10. Remove snap rings (20), thrust bushings (1), sheaves (36), and bearings (37) from lift cylinder.

NOTE: Disassembly procedures are covered in section 9.

11. Reinstall lift cylinder in reverse order of removal.
12. Adjust lift chains as described in paragraph 8-4.

8-7. MAST REMOVAL.

1. Remove the lift carriage as described in paragraph 8-8.

WARNING: Block the drive wheel securely so it cannot move.

2. Disconnect battery.

CAUTION: Before disconnecting any hydraulic lines, make certain the system is not under pressure. Refer to paragraph 9-1.

3. Disconnect the hydraulic hoses form the lift cylinder.
4. Remove lift cylinder as described in paragraph 8-6.
5. Use a chain hoist to remove the inner mast(s) from chassis frame.

CAUTION: Do not lean mast against wall or where it may accidentally fall or be hit.

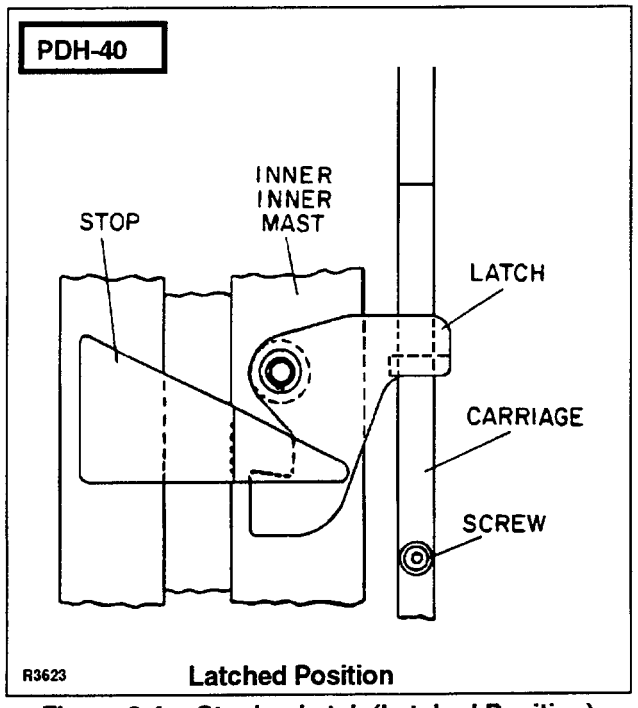


Figure 8-4. Staging Latch (Latched Position)

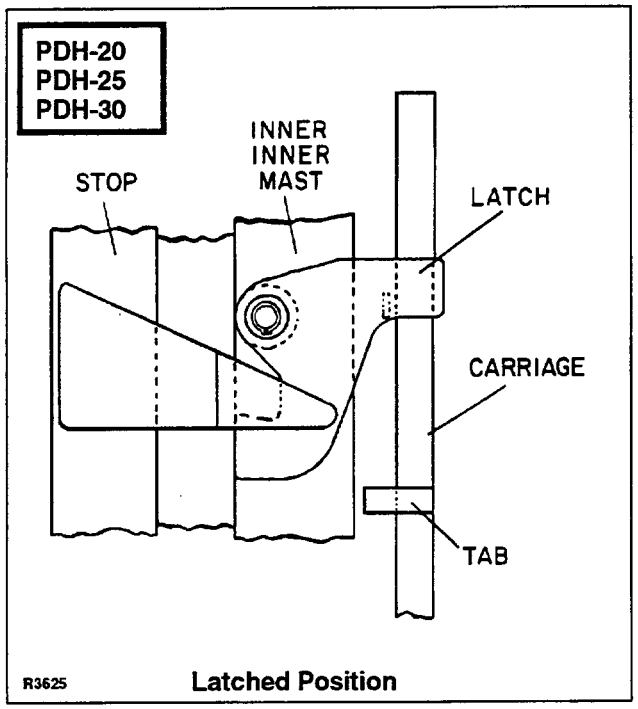


Figure 8-5. Staging Latch (Latched Position)

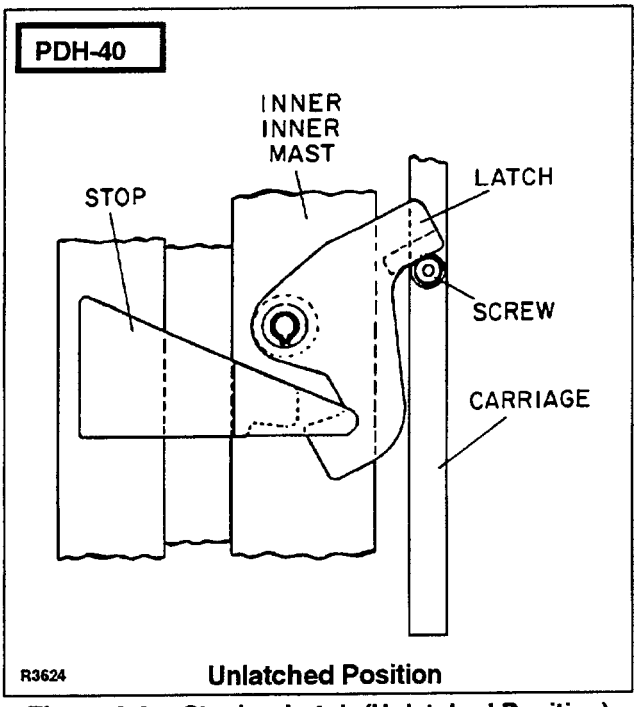


Figure 8-6. Staging Latch (Unlatched Position)

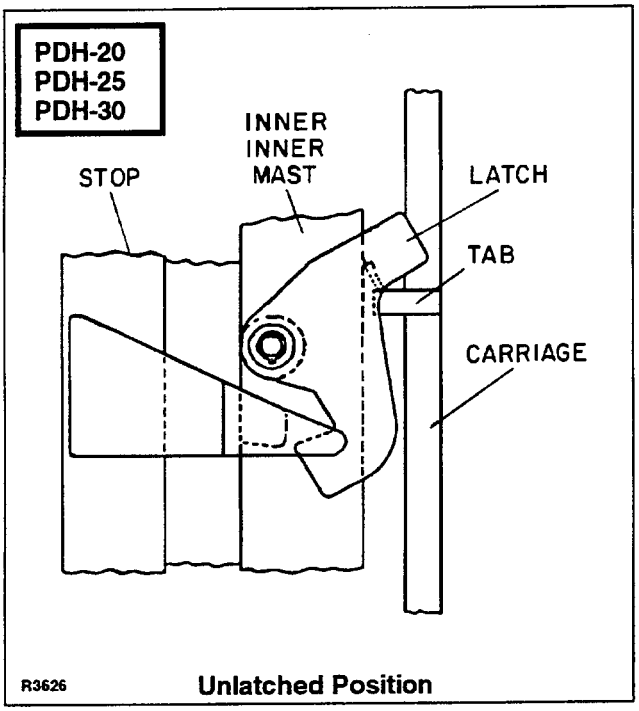


Figure 8-7. Staging Latch (Unlatched Position)

5. Installation of new or modified mast is performed in the reverse order of removal.
6. Lubricate the newly installed mast as described in paragraph 8-9 below.

8-8. LIFT CARRIAGE REPLACEMENT.

1. Place a solid block on floor under the vertical members nearest the center of the lift carriage.
2. Lower lift carriage until it is supported by the block and the load chains are slack, then disconnect battery.

WARNING: Before attempting any actual replacement, make certain power is disconnected.

3. On PDH-20, PDH-25, and PDH-30 trucks, remove cotter pin and clevis pin securing chain to lift carriage. On PDH-40 trucks remove pin w/retaining rings securing chain to lift carriage.
4. On telescopic, full free lift and TRIMAST, remove stop blocks on top of mast.
5. Secure a hoist or similar device to the lift carriage .
6. Remove lift carriage from mast.
7. Installation of new or modified lift carriage is performed in the reverse order of removal.
8. Adjust chain according to paragraph 8-4.

8-9. MAST LUBRICATION PROCEDURE

Fully lower the lift carriage

1. Apply a Lithium base general purpose grease using a lubrication gun, to the grease fittings of the following components:
   a. Outer-mast rollers
   b. Chain sheaves
   c. Inner mast rollers
   d. Lift carriage rollers
2. Apply a Lithium base general purpose grease with a brush to the full length of masts where rollers touch.

8-10. ADJUSTABLE STRADDLES

To change the straddle dimensions using the following procedure.

1. Disconnect the battery and set brake (handle up position).
2. Block the truck frame on one side so that the straddle leg wheel just clears the floor.

CAUTION: Secure truck to prevent tipping.

3. Remove the two straddle bolts (3, Figure 8-8) and lock washer (4) on each side and slide the straddles (1 and 2) to the dimension required (minimum 38 inches, maximum 50 inches).
4. Lubricate the straddles with grease as shown in Figure 8-9.

CAUTION: Both straddles must be adjusted with equal number of holes exposed on each side.

5. Retighten the straddle bolts to 200 ft lbs.

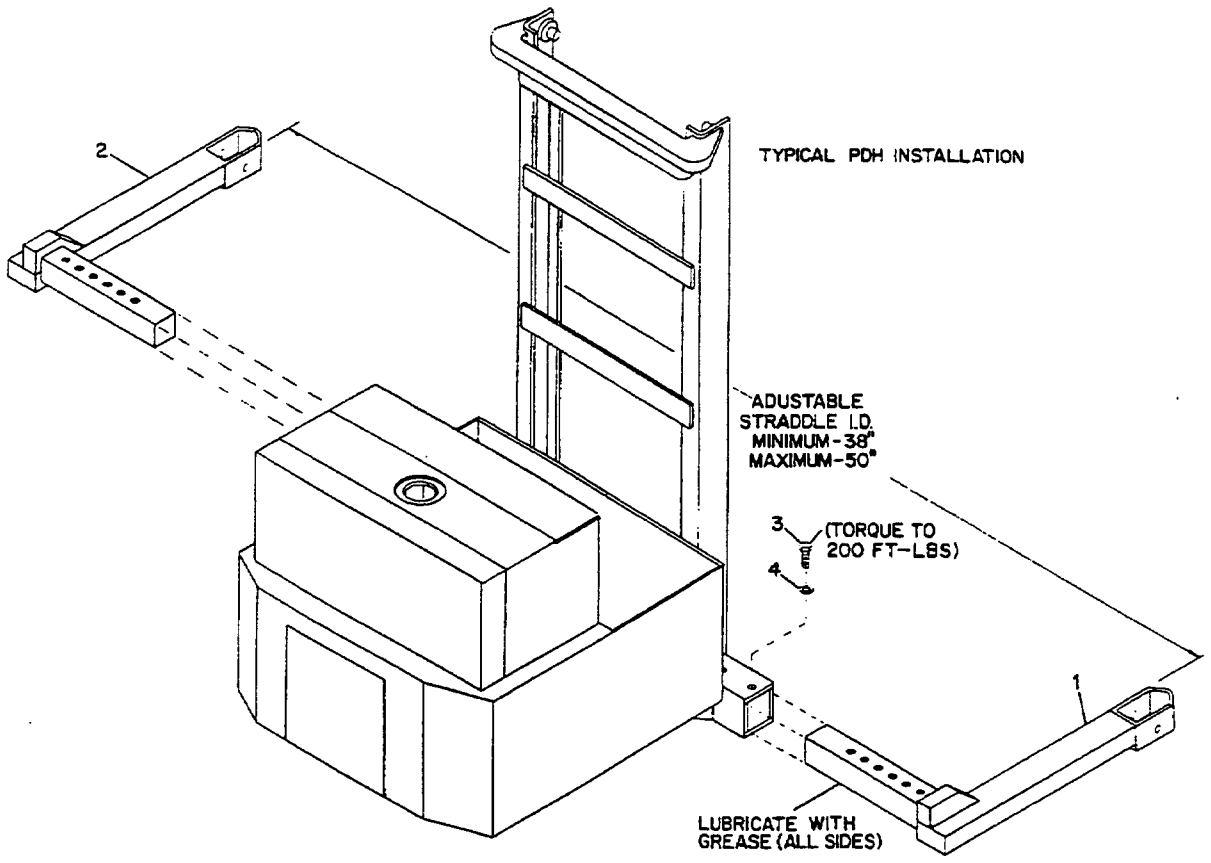


Figure 8-8. Adjustable Straddle Frame

SECTION 9
HYDRAULIC SYSTEM SERVICING

9-1. RELIEVING SYSTEM PRESSURE.

WARNING: Hydraulic system pressure must be relieved before removing hydraulic system components. Use the following procedure to relieve system pressure:

1. Fully lower the lift carriage unless the procedure for a component directs differently.
2. Disconnect battery.

CAUTION: Use rags and a suitable container to catch any dripping oil when the hydraulic lines are disconnected. Wipe off any spilled oil immediately.

3. Obtain a suitable container to catch any oil that may escape when opening a line.
4. Open the low pressure line at any convenient connection near the component that is to be repaired or replaced.

9-2. HYDRAULIC DIAGRAMS.

Figures 9-1 through 9-4 are hydraulic schematic diagrams for various configurations for all trucks. These include configurations with auxiliary hydraulics and remote control.

Figure 9-4 Hydraulic Schematic Optional 2-Spool and 3-Spool Valve Auxiliary Hydraulic System PDH-20, -25, -30

9-3. LINE, FITTING and HOSE REPLACEMENT.

9-3.1. Standard Trucks.

NOTE: Leaking hydraulic fittings can sometimes be remedied by simply tightening the fitting. If this does not remedy the leak, the fitting or line must be replaced. A leak in the suction line between the pump and the reservoir will sometimes cause hydraulic oil to foam through the vent.

WARNING: Before disconnecting any hydraulic lines, make certain the system is not under pressure. Refer to paragraph 9-1.

1. Remove reservoir drain plug (5, Figures 9-5, 9-6, and 9-8 or 8, Figure 9-7) and drain hydraulic oil into a suitable container.
2. Remove the leaking line or fitting and replace it with a new one. Refer to Figures 9-5 through 9-8.
3. Clean the drain plug thoroughly.
4. Reinstall the drain plug.

NOTE: Refill only with Big Joe hydraulic oil, and only while the lift carriage is completely lowered. Refill until oil is to the "FULL" mark on the dip stick. Refer to Section 3 for oil capacities.

5. Remove the reservoir vent cap, fill the reservoir to the "FULL" mark on the dip stick, and replace the vent cap.
6. Reconnect battery.
7. Operate the hydraulic controls and check for leaks.

9-4. FILTER REPLACEMENT.

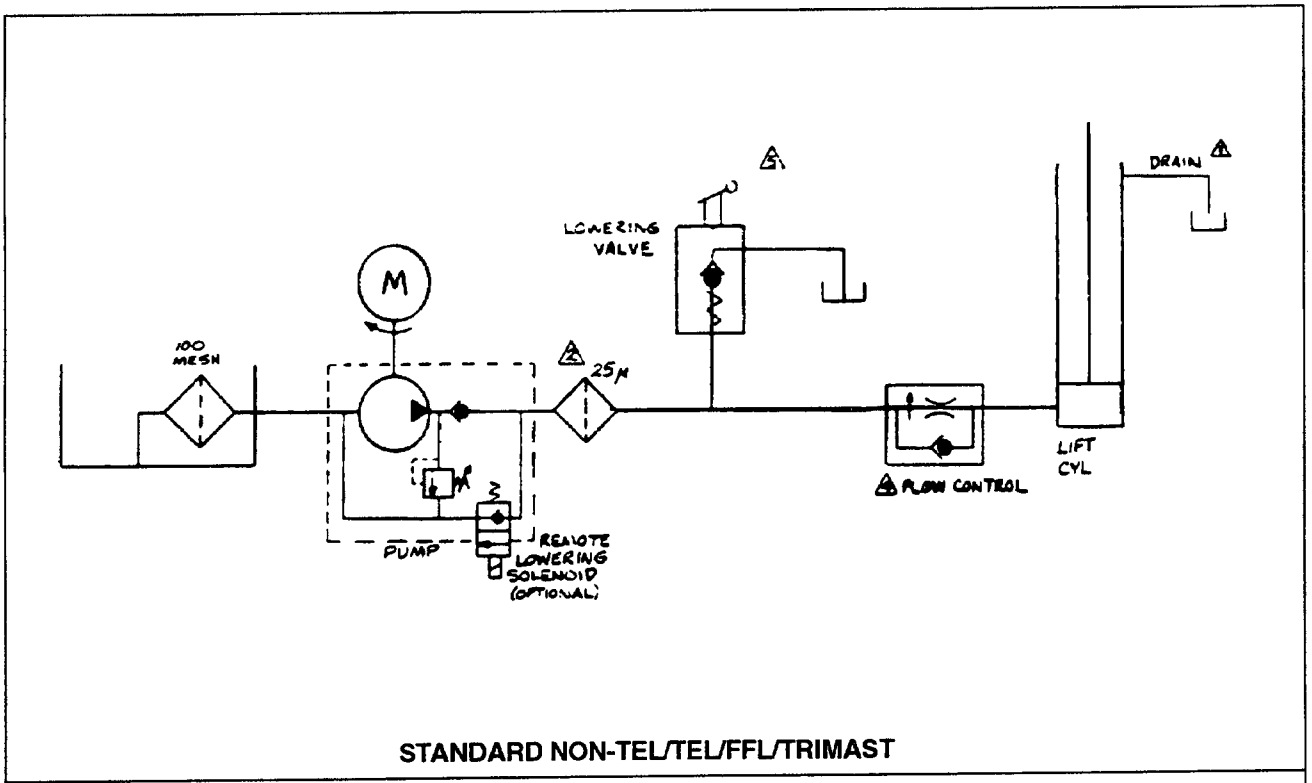
9-4.1. Sump Filter.

WARNING: Before disconnecting any hydraulic lines, make certain the system is not under pressure. Refer to paragraph 9-1.

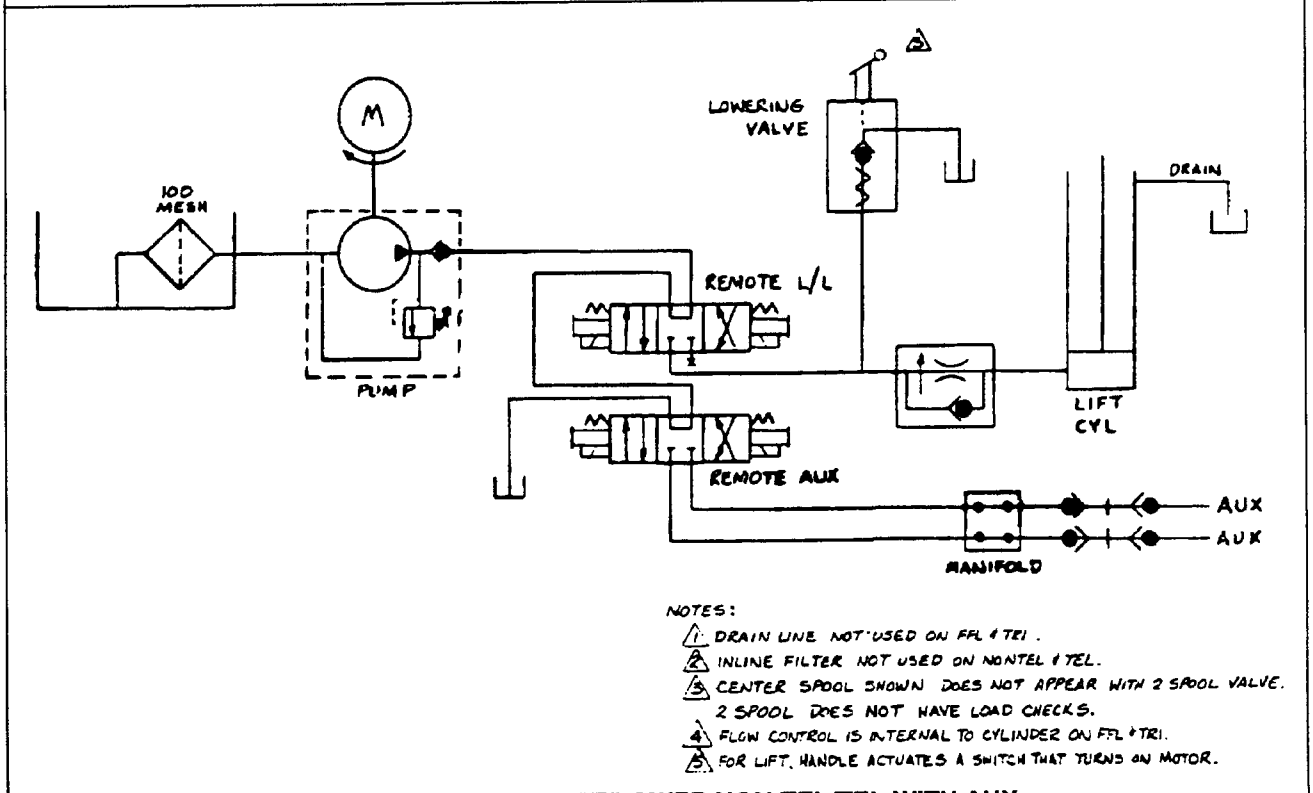
1. Lower the lift carriage fully.
2. **Disconnect the battery.**
3. Remove reservoir drain plug (5, Figure 9-5 or 9-6) and drain hydraulic oil into a suitable container.
4. Remove two nuts (9) attaching hold down plate (8) and remove hold down plate.
5. Remove filter (6) and o-ring (7).
6. Replace o-ring and install new filter.
7. Fasten hold down (8) with two nuts (9).
8. Clean the drain plug thoroughly.
9. Reinstall the drain plug.

NOTE: Refill only with Big Joe hydraulic oil, and only while the lift carriage is completely lowered. Refill until oil is to the "FULL" mark on the dip stick. Refer to Section 3 for oil capacities.

10. Remove the reservoir vent cap, fill the reservoir to the "FULL" mark on the dip stick, and replace the vent cap.
11. Reconnect battery.
12. Operate the hydraulic controls and check for leaks.



STANDARD NON-TEL/TEL/FFL/TRIMAST

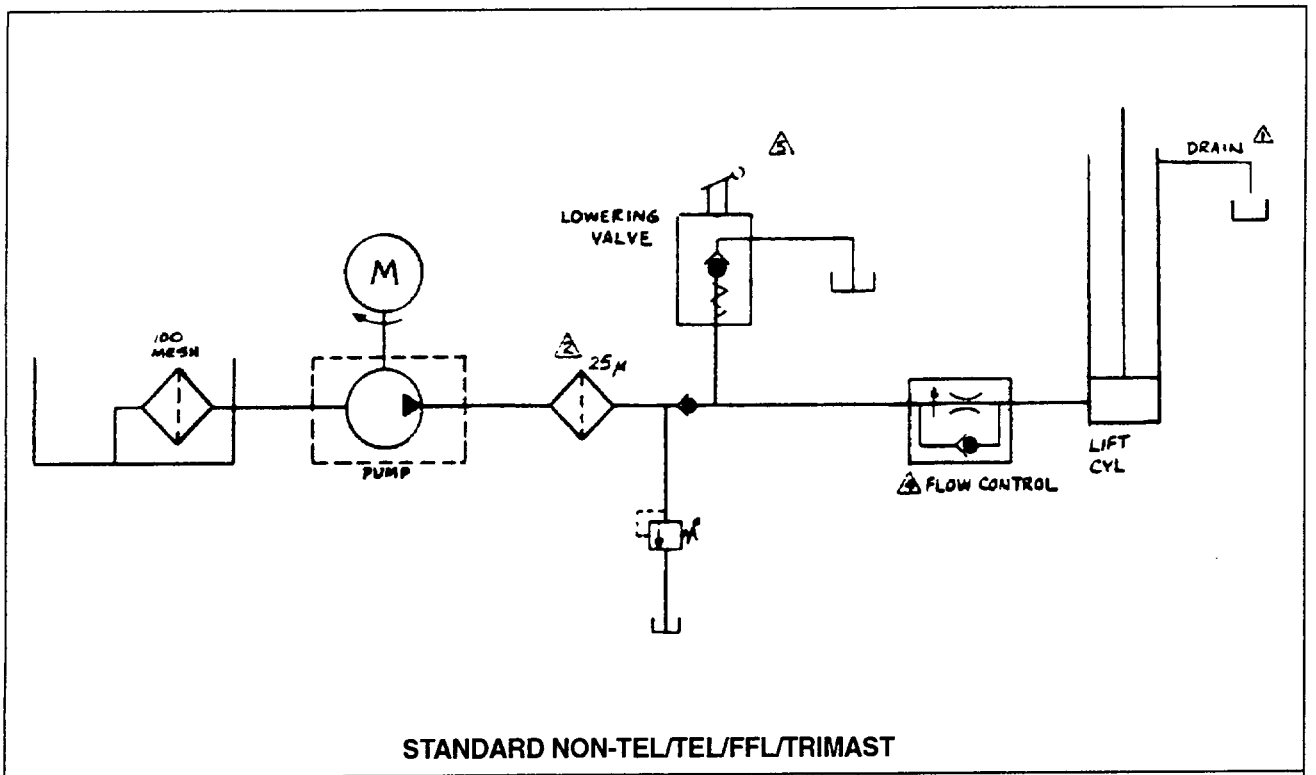


NOTES:
1. DRAIN LINE NOT USED ON FFL & TEL.
2. INLINE FILTER NOT USED ON NONTEL & TEL.
3. CENTER SPOOL SHOWN DOES NOT APPEAR WITH 2 SPOOL VALVE. 2 SPOOL DOES NOT HAVE LOAD CHECKS.
4. FLOW CONTROL IS INTERNAL TO CYLINDER ON FFL & TRI.
5. FOR LIFT, HANDLE ACTUATES A SWITCH THAT TURNS ON MOTOR.

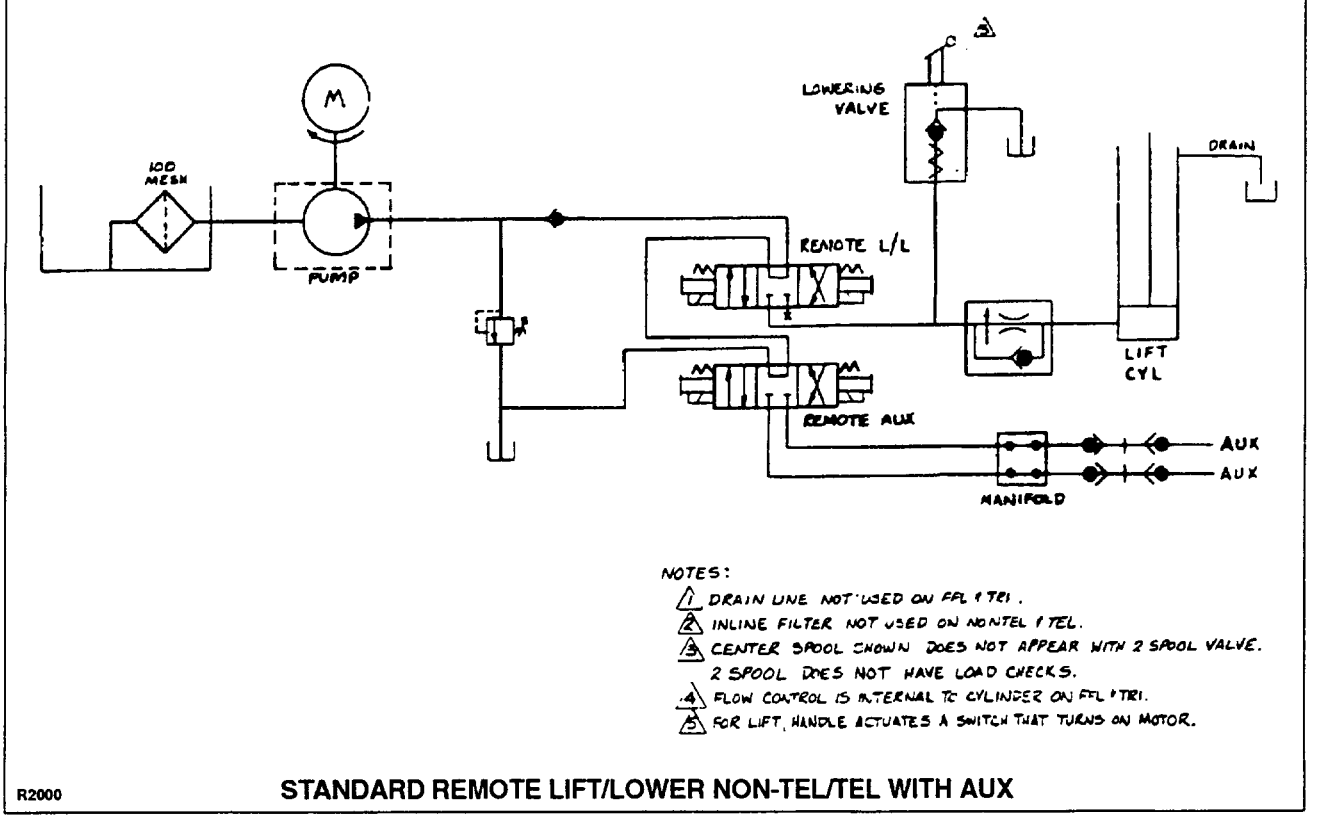
R1999

STANDARD REMOTE LIFT/LOWER NON-TEL/TEL WITH AUX

Figure 9-1. Hydraulic Schematic Standard Model PDH-20, -25, -30



STANDARD NON-TEL/TEL/FFL/TRIMAST



R2000

STANDARD REMOTE LIFT/LOWER NON-TEL/TEL WITH AUX

Figure 9-2. Hydraulic Schematic Standard Model PDH-40

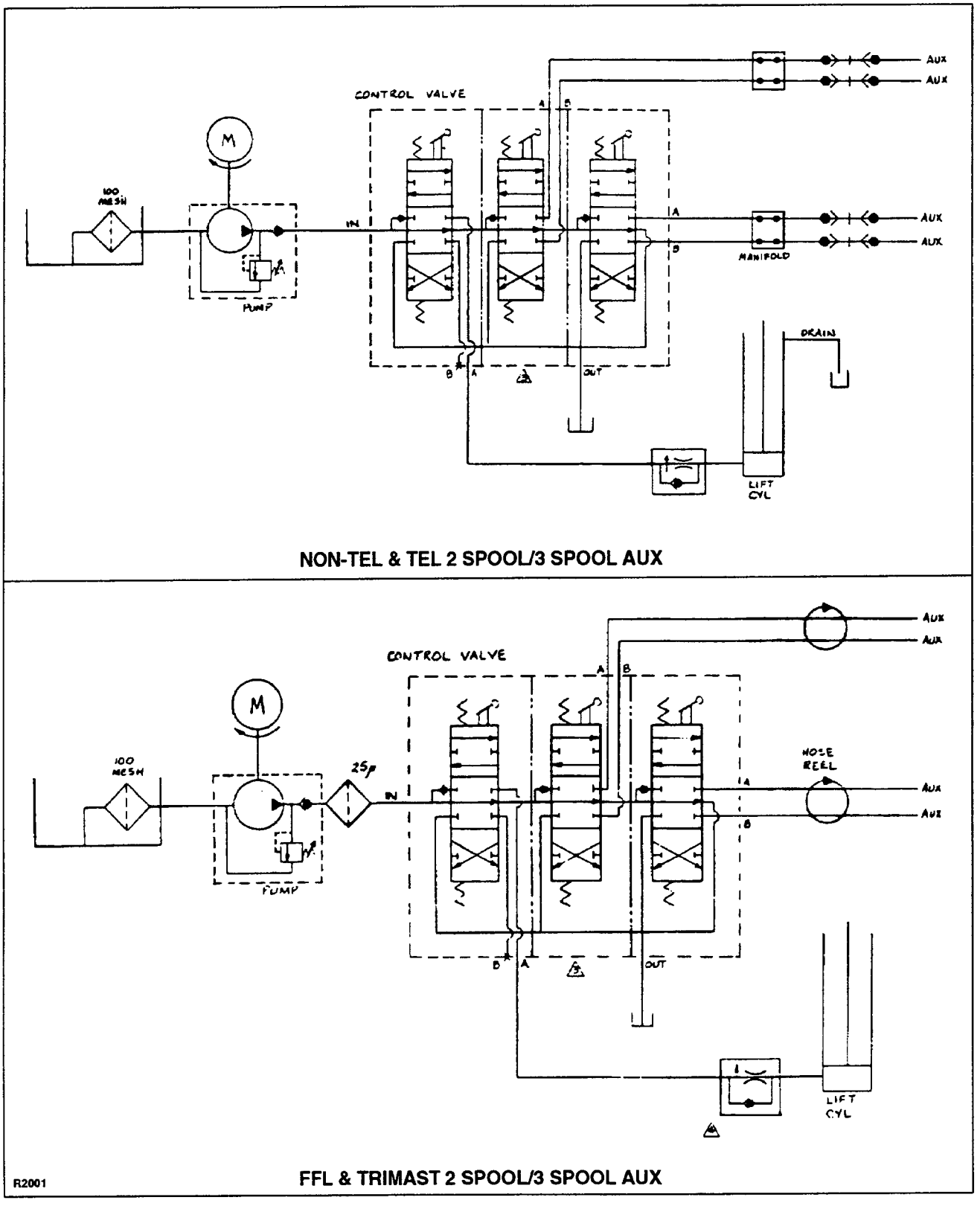
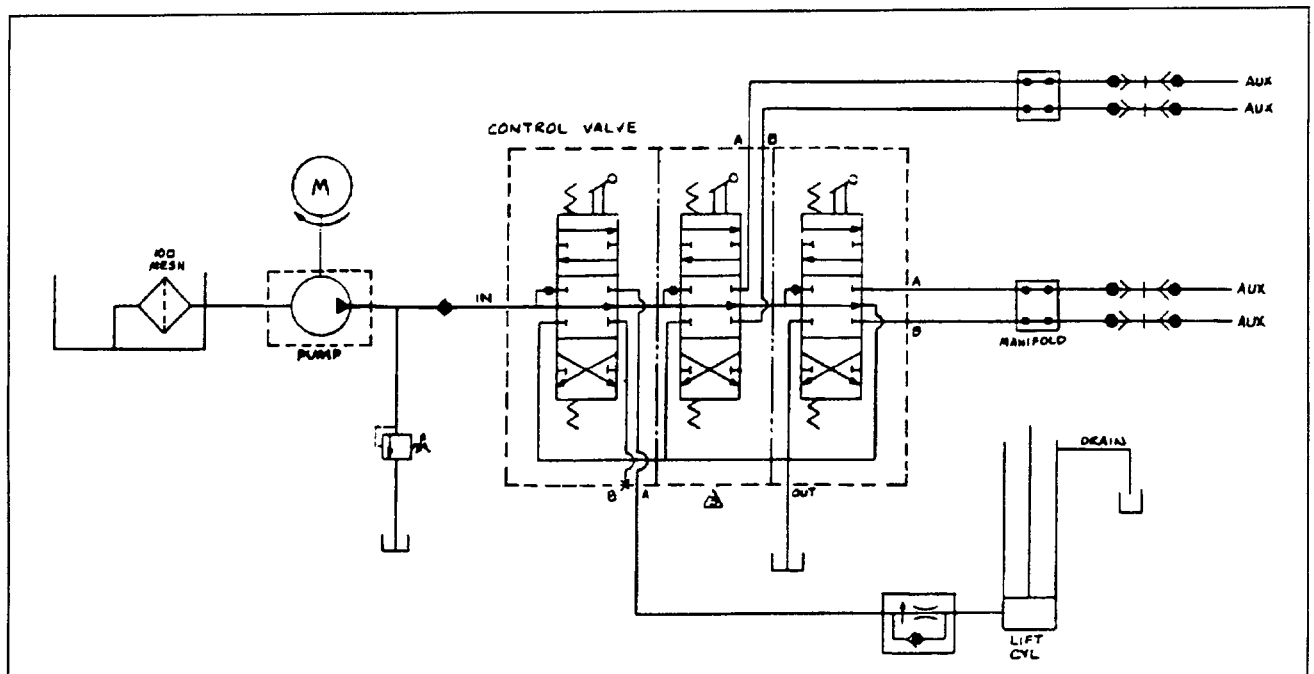
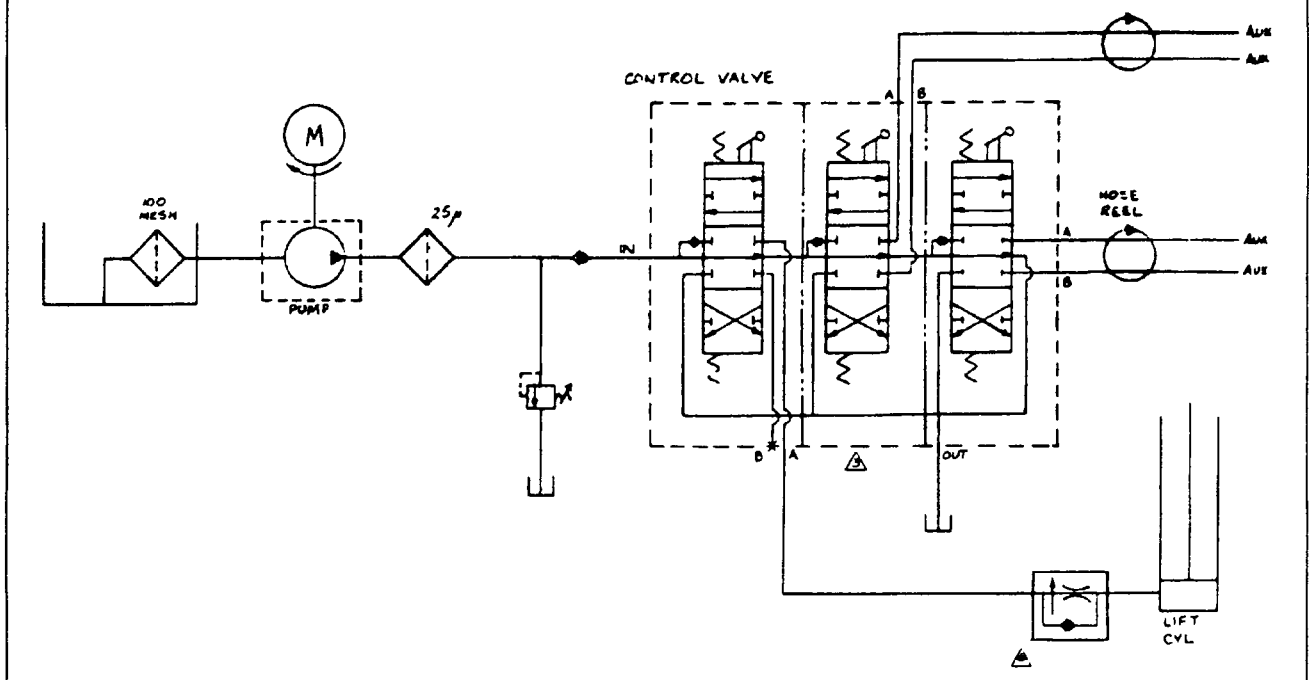


Figure 9-3. Hydraulic Schematic Optional 2-Spool and 3-Spool Valve Auxiliary Hydraulic System PDH-20, -25, -30



NON-TEL & TEL 2 SPOOL/3 SPOOL AUX



R2002

FFL & TRIMAST 2 SPOOL/3 SPOOL AUX

Figure 9-4. Hydraulic Schematic Optional 2-Spool and 3-Spool Valve Auxiliary Hydraulic System PDH-40

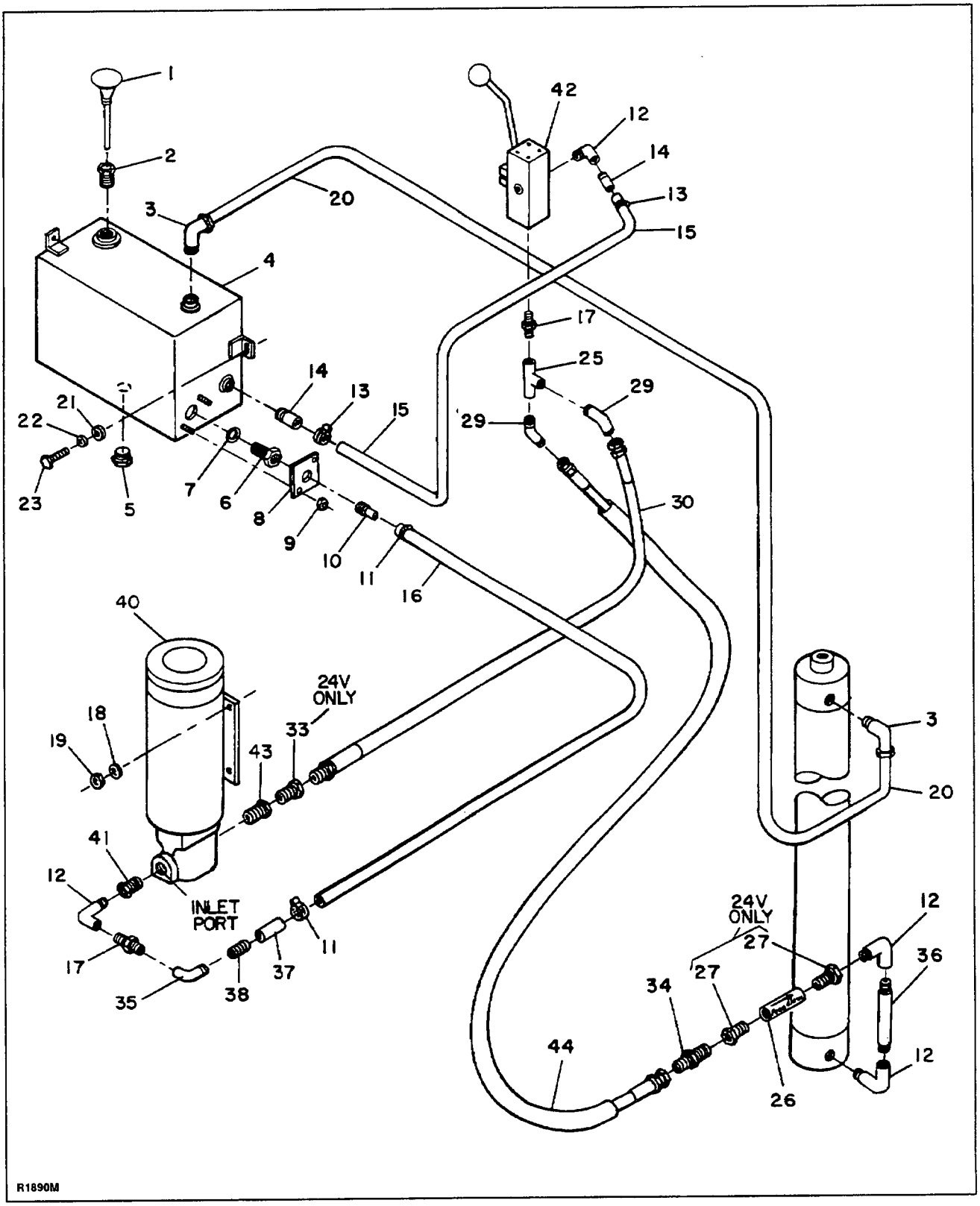


Figure 9-5. Hydraulic System
(Tel and Non-Tel) (PDH-20, -25, -30)

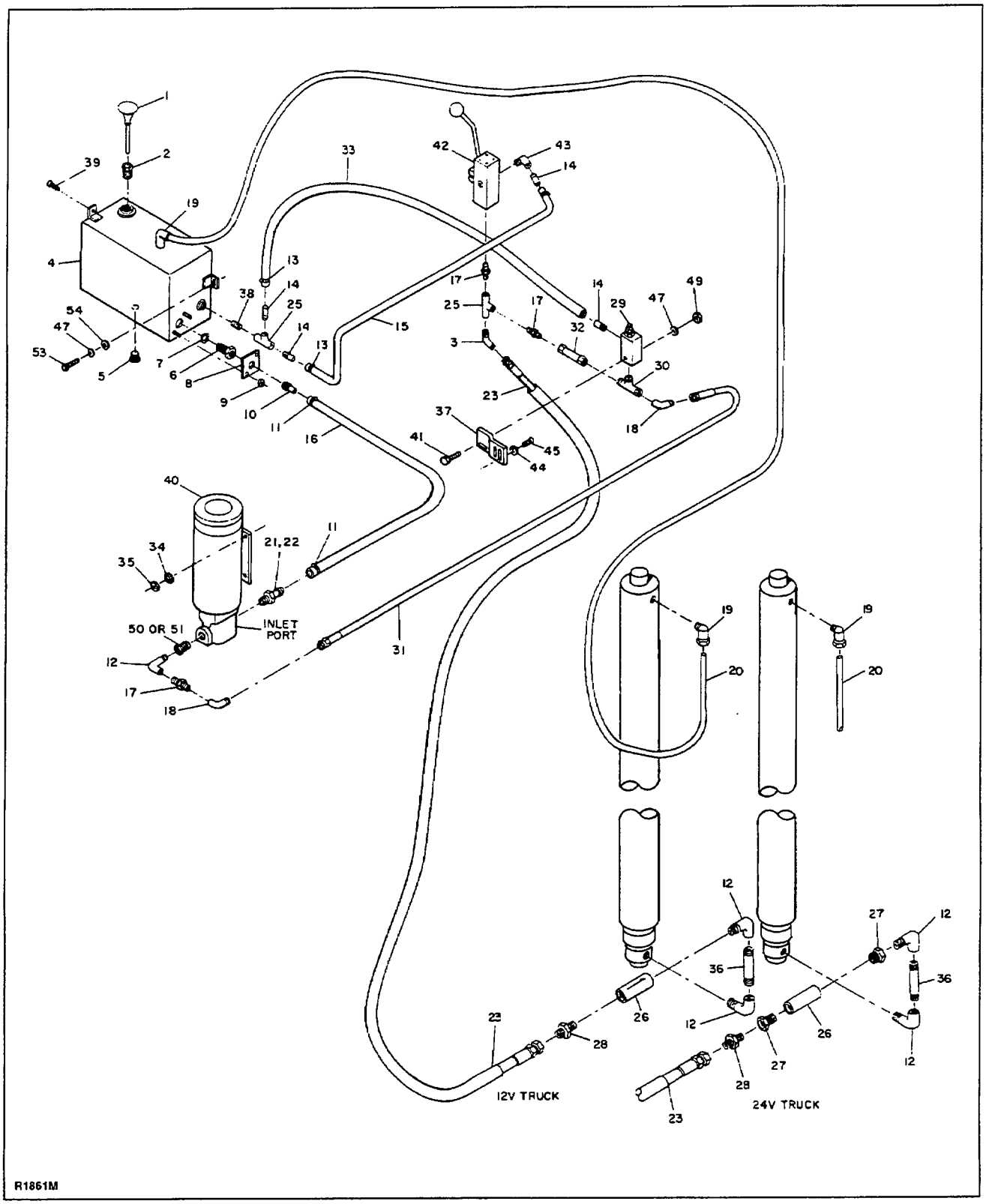


Figure 9-6. Hydraulic System (Tel and Non-Tel) (PDH-40)

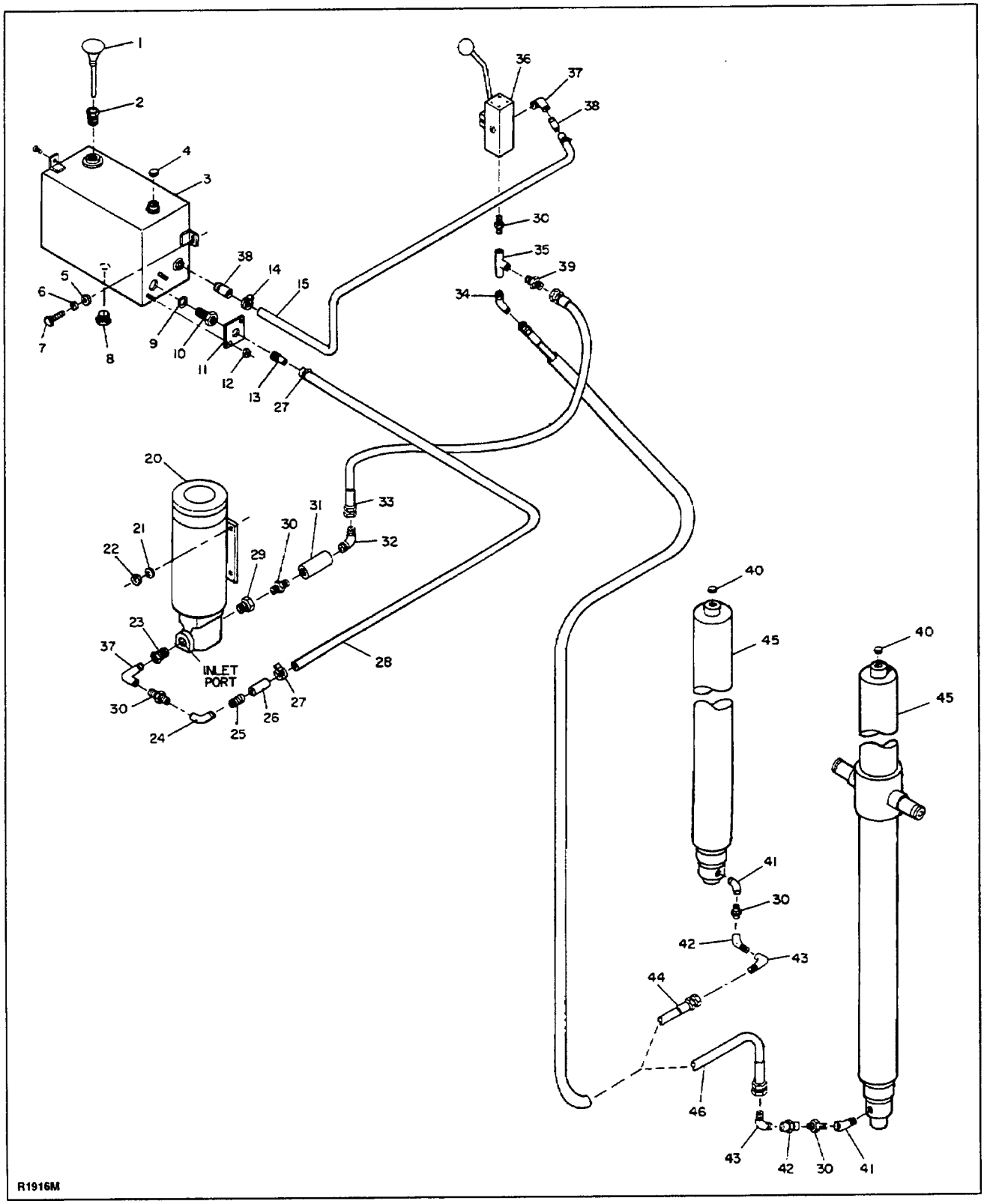


Figure 9-7. Hydraulic System (FFL and TRIMAST) (PDH-20, -25, -30)

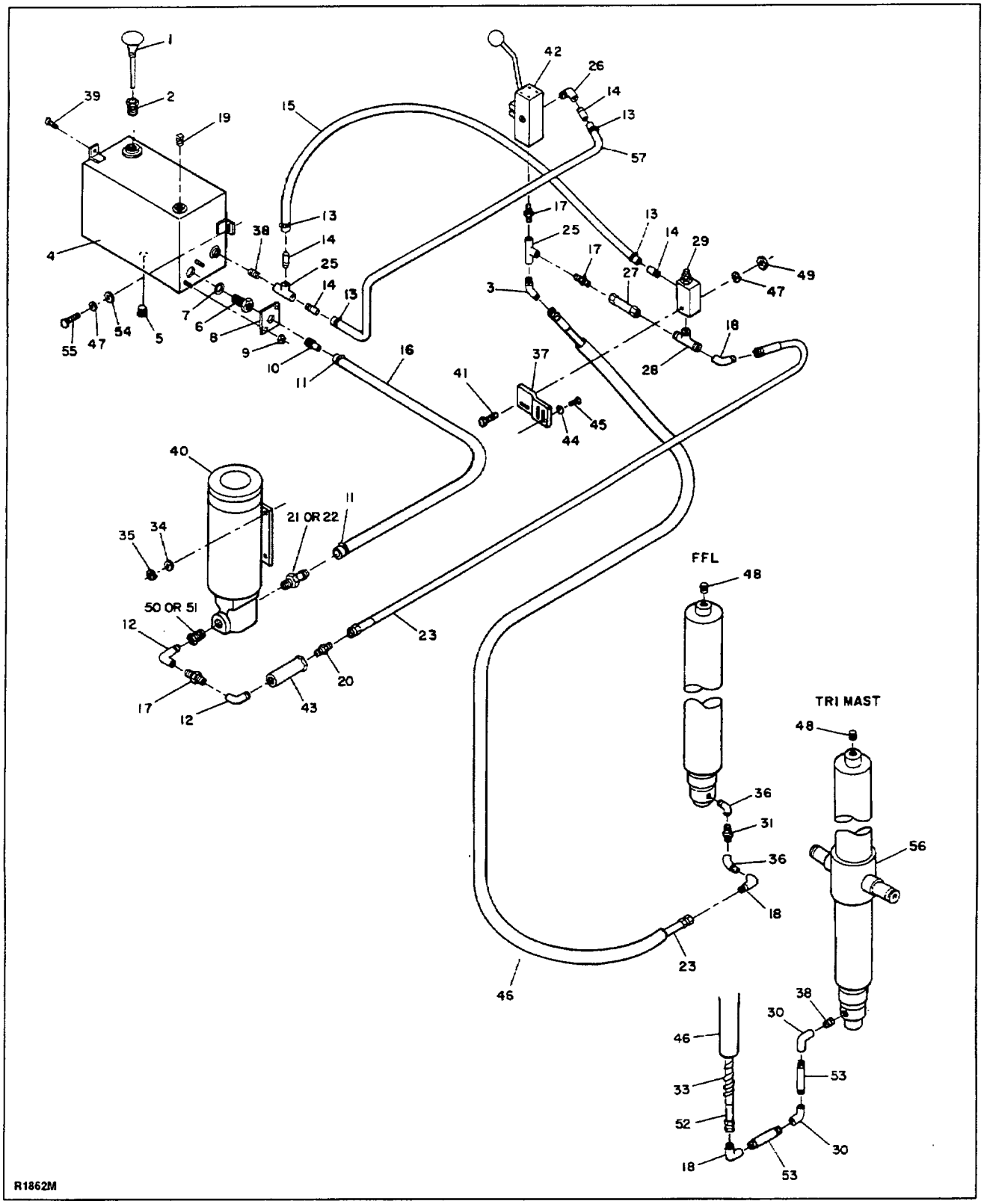


Figure 9-8. Hydraulic System
(FFL and TRIMAST) (PDH-40)

9-4.2. In-Line High Pressure Filter Element (FFL and TRIMAST).

WARNING: Before disconnecting any hydraulic lines, make certain the system is not under pressure. Refer to paragraph 9-1.

1. Lower the lift carriage fully.
2. **Disconnect the battery.**
3. Remove reservoir drain plug (8, Figure 9-7 or 5, Figure 9-8) and drain hydraulic oil into a suitable container.

NOTE: Hold filter with another wrench so that twisting force is not against hose and fittings but wrench against wrench.

4. Disconnect nipple from the OUT end of in-line filter (Figure 9-9) using a suitable open end or tubing wrenches.
5. Remove hex end plug from filter body .
6. Remove sintered bronze filter element from filter body and clean or discard.
7. Unscrew filter body on IN end of filter if filter body is to be replaced.
8. Check that spring is in place in filter body then install the filter element in the filter body and install hex end plug of filter body.
9. Reinstall filter in truck.
10. Clean the drain plug thoroughly.
11. Reinstall the drain plug.

NOTE: Refill only with Big Joe hydraulic oil, and only while the lift carriage is completely lowered. Refill until oil is to the "FULL" mark on the dip stick. Refer to Section 3 for oil capacities.

12. Remove the reservoir vent cap, fill the reservoir to the "FULL" mark on the dip stick, and replace the vent cap.
13. Reconnect battery.
14. Operate the hydraulic controls and check for leaks.

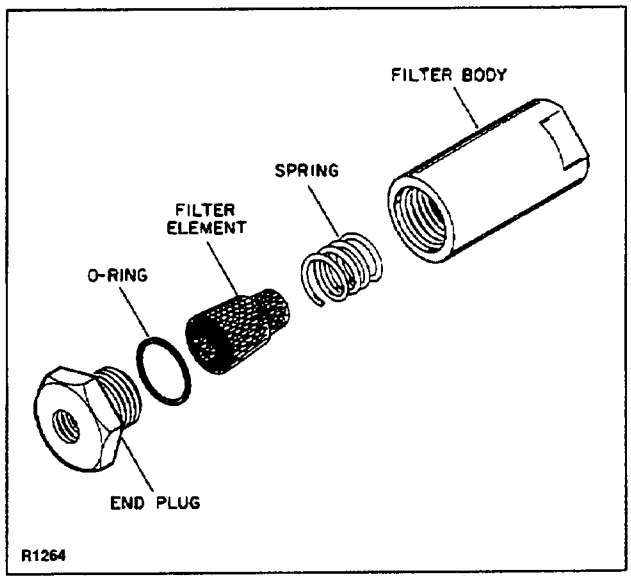


Figure 9-9. In-Line Filter

9-5. HYDRAULIC PUMP AND MOTOR ASSEMBLY

The hydraulic pump and motor assembly may be repaired. Pump motor repair is covered in Section 10. If the hydraulic pump and motor assembly is disassembled, the gasket (3, Figure 9-10) must be replaced.

WARNING: Before disconnecting any hydraulic lines, make certain the system is not under pressure. Refer to paragraph 9-1.

1. Remove reservoir drain plug (5, Figure 9-5, 9-6, or 9-8 or 8, Figure 9-7) and drain hydraulic oil into a suitable container.
2. Disconnect hydraulic lines from pump.
3. Disconnect electrical wires from motor.
4. Remove the four hex nuts (7, Figure 9-10), lock washers (6) and pump and motor assembly.
5. Remove the four screws (6) and lock washers (5) to disassemble the pump from the motor. On 12 Volt assemblies discard gasket (3); save drive connector (2) for reuse.
6. If the pump is defective, install a new pump. If motor is defective, a new motor may be installed, or motor may be rebuilt (see section 10).

NOTE: Neither drive connector or gasket are used with 24-volt motor and pump.

7. Reassemble using a new gasket (3) (12 volt only) and reuse drive connector (2).
8. Reinstall assembly in truck and connect hydraulic lines to pump and electrical wires to motor.

9. Clean the drain plug thoroughly.
10. Reinstall the drain plug.

NOTE: Refill only with Big Joe hydraulic oil, and only while the platform is completely lowered. Refill until oil is to the "FULL" mark on the dip stick. Refer to Section 3 for oil capacities.

11. Remove the reservoir vent cap, fill the reservoir to the "FULL" mark on the dip stick, and replace the vent cap.
12. Reconnect battery.
13. Operate the hydraulic controls and check for leaks.

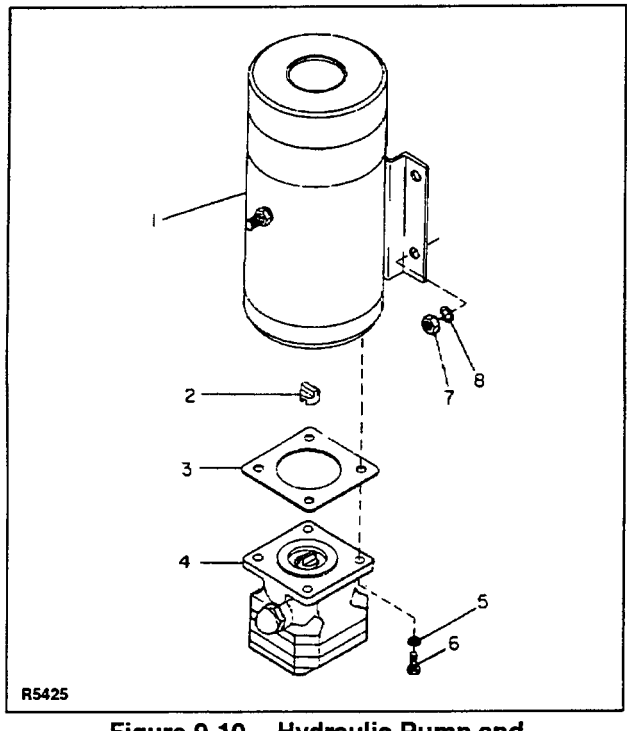


Figure 9-10. Hydraulic Pump and Motor Assembly

9-6. CONTROL VALVE SERVICE

Repair parts for the control valve are illustrated in Figure 9-11.

9-6.1 Control Valve Replacement

WARNING: Before disconnecting any hydraulic lines, make certain the system is not under pressure. Refer to paragraph 9-1.

1. Lower the forks as far as possible.
2. Disconnect the battery.
3. Open cabinet door.
4. Remove hydraulic compartment cover.
5. Remove reservoir drain plug (5, Figure 9-5, 9-6, or 9-8 or 8, Figure 9-7) and drain hydraulic oil into a suitable container.
6. Label, disconnect and plug the hydraulic lines from the control valve. Label and disconnect the electrical wires from the switches (19, Figure 9-11) at the bottom of the control valve.
7. Remove the control valve by removing the four screws (15) and washers (16).
8. Install new or repaired control valve and secure with the four screws (15) and washers (16).
9. Connect the wires and hoses to the control valve.
10. Reinstall hydraulic compartment cover making certain dust cover is in place.
11. Reinstall the drain plug.

NOTE: Refill only with Big Joe hydraulic oil, and only while the platform is completely lowered. Refill until oil is to the "FULL" mark on the dip stick. Refer to Section 3 for oil capacities.

12. Remove the reservoir vent cap, fill the reservoir to the "FULL" mark on the dip stick, and replace the vent cap.
13. Reconnect battery.
14. Operate the hydraulic controls and check for leaks.
15. Close cabinet door.
16. Clean the drain plug thoroughly.

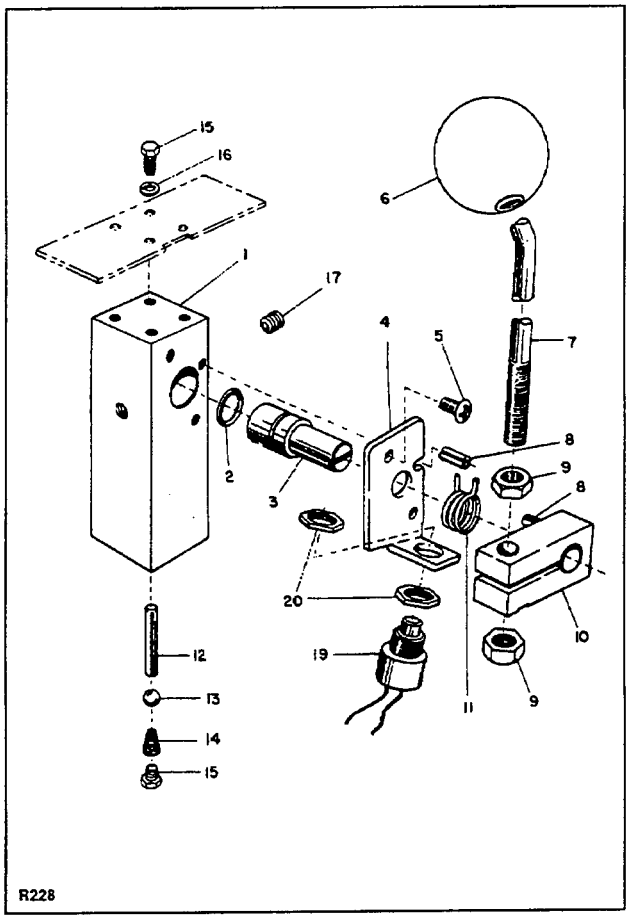


Figure 9-11. Lift Control Valve Assembly

9-6.2 Disassembly of Lift Control Valve

To disassemble the lift control valve proceed as follows:

1. Loosen the lower nut (9, Figure 9-11) to release lift control lever (7) and valve clamp (10), from release cam shaft (3).
2. Remove lever and clamp from the release cam (3) and remove the handle return spring (11).
3. If it is necessary to remove the motor contact switch assembly (19), remove the nut (20).
4. Remove switch bracket (4)
5. Remove nipple (15) to free compression spring (14), check ball (13), and valve pin (12).
6. The release cam (3) and O-ring (2) can now be pulled from the valve body (1).
7. Assemble and install the lift control valve by reversing the preceding procedures.

9-6.3 Control Valve Microswitch Adjustment

The lift control valve is properly adjusted, inspected, and checked thoroughly before leaving the factory. The valve should rarely need readjusting, but if adjustment is necessary, the following procedure should be used to set the valve and the hydraulic pump switch.

1. With the ball seat assembly in place and the valve installed in the hydraulic system raise the life carriage part way with a moderate load on the forks to build up pressure in the hydraulic system.
2. Loosen the upper nut (9, Figure 9-11) on the lift control lever (7) being careful that the clamp (10) does not come off the cam (3) and that the handle return spring (11) remains secure at the roll pins (8) to keep the lever centered and in a neutral position.
3. Note the point where the handle knob (6) and lever (7) come together as a reference point for the next few steps.
4. Using the reference point noted in step 3, push the handle forward 3/4 inch from neutral position. With a screwdriver in slot of release cam (3), rotate 1/8 inch clockwise. This is to make sure that check ball (13) is seated in the valve seat.
5. With a screwdriver, turn the release cam (3) counterclockwise until a definite resistance is felt. (Resistance is felt as the pin resting on the ball pushes against the hydraulic pressure in the system). At this point, the release cam action has moved the valve pin (12) down against the check ball (13). Rotation of the release cam beyond this point pushes the ball away from the valve seat and opens the system allowing the lift carriage to descend.
6. When resistance is felt and, with the handle pushed forward 3/4 inch, tighten upper nut (9) down against the valve clamp (10). The valve should now be in proper adjustment. Test by pushing the handle forward 1 inch and the lift carriage should start to descend slowly.

9-6.4 Hydraulic Pump Motor Switch Adjustment

When the release cam (3, Figure 9-11) is properly set, it may be necessary to readjust the hydraulic pump motor switch (19). A clearance of approximately 0.010 inch should be maintained between the switch plunger and the valve clamp (10) for precise control of the lift carriage.

1. To adjust the switch for proper clearance, loosen the two nuts (20) supplied with the switch (19).
2. Raise or lower the position of the switch turning the upper nut.

3. When there is a clearance of 0.010 inch between the switch plunger and the valve clamp, tighten the lower nut on the switch.

9-7. FLOW CONTROL VALVE REPLACEMENT (Non-Telescopic and Telescopic)

1. Raise the forks high enough to gain access to the flow control valve (26, Figure 9-5 or 9-6).
2. Place a strong support under the inner mast on telescopic models or under lift carriage on non-telescopic models and lower forks so that inner mast or lift carriage rests on the support.

WARNING: Before disconnecting any hydraulic lines, make certain the system is not under pressure. Refer to paragraph 9-1.

3. Disconnect battery.
4. Disconnect hose assembly (44, Figure 9-5 or 23, Figure 9-6) at fitting(34, Figure 9-5 or 28, Figure 9-6).
5. Remove flow control valve (26).
6. Install new flow control valve making certain direction of free flow (as marked on valve) is toward lift cylinder.
7. Install fitting (34, Figure 9-5 or 28, Figure 9-6) and reconnect disconnected hose.
8. Reconnect battery.
9. Raise forks, then remove support.
10. Fully lower the lift carriage and check the hydraulic oil level.
11. Raise and lower the lift carriage and check for leaks.

9-8. LIFT CYLINDER REPAIR

9-8.1. Non-Telescopic and Telescopic

NOTE: Removal procedures are covered in Section 8.

CAUTION: Use proper pipe clamp-type vise. The cylinder will be distorted if the vise is tightened too much.

1. Secure lift cylinder tube assembly in vise and remove gland nut (3, Figure 9-12), then wiper ring (2), and top O-ring (4).
2. Pull out cylinder ram rod (5).
3. Remove lift cylinder tube assembly from vise.

CAUTION: Use proper pipe clamp-type vise with non-marring jaws to prevent damaging the finish on the ram.

4. Secure cylinder ram rod (5) in vise.
5. Remove nut (11) and pull off bottom washer (10), flat washer (13), packing assembly (9), piston (8), and bottom O-ring (7).

NOTE: Before reassembling the hydraulic lift cylinder, it is recommended that the wiper ring (2), O-rings (4, 7) and packing assembly (9) be replaced.

6. Reassemble the cylinder in reverse order of disassembly.

9-8.2. Full Free Lift and TRIMAST Trucks FFL Serial Number 343730 and Higher 158 In Trimast Serial Number 342112 and Higher 194 In Trimast Serial Number 342112 and Higher

NOTE: Removal procedures are covered in Section 8. Refer to Table 9-1 and 9-2 for proper packing kit.

Refer to Figure 9-13 and proceed as follows.

CAUTION: Do not attempt to remove gland nuts with a hammer and punch. Gland nuts are a soft metal.

Three spanner wrenches are required to remove gland nuts.

McMaster Carr #5472A1
pin diameter 1/8" overall
length 6-3/8

McMaster Carr #5481A1
pin diameter 3/16" overall
length 6-3/8

McMaster Carr #5481A2
pin diameter 1/4" overall
length 8-1/4

CAUTION: Use proper clamp-type vise. The lift cylinder will be distorted if the vise is tightened too much.

1. Secure lift cylinder tube assembly in vise.
2. Unthread gland nut from outer cylinder.
3. Remove inner cylinder by sliding out of outer tube. Remove the other gland nut by unthreading.
4. Remove gland nut (on rod removed in Step 3) by unthreading.
5. Unthread gland nut from inner cylinder.
6. Inner inner cylinder can now be removed by sliding it out of the inner cylinder.

7. Remove rod fitting by unthreading it from the inner cylinder.

8. Remove snap ring. Flow regulator and o-ring can now be removed.

Assemble lift cylinder by reversing the disassembly procedure. **Be sure to use the proper seal kit.** For ease of assembly when assembling threaded parts, apply a coating of white lead replacement to threads.

9-8.3. Full Free Lift and TRIMAST Trucks
FFL Serial Number 335392 to 343729
158 In Trimast Serial Number 335478 to 342111
194 In Trimast Serial Number 335351 to 342111

NOTE: Removal procedures are covered in Section 8. Refer to Table 9-1 and 9-2 for proper packing kit.

Refer to Figure 9-14 and proceed as follows.

CAUTION: Use proper clamp-type vise. The lift cylinder will be distorted if the vise is tightened too much.

1. Secure lift cylinder tube assembly in vise.

CAUTION: Use proper spanner wrench when removing bearing housing (9) to prevent damage to cylinder.

2. Unthread bearing housing (9) from outside tube (1).

3. Remove primary rod (2) by sliding out of outside tube.

4. Remove gland nut (5) by unthreading from primary rod.

5. Secondary rod (3) can now be removed by sliding it out of the bottom of the primary rod.

6. Remove base (7) by unthreading it from the secondary rod.

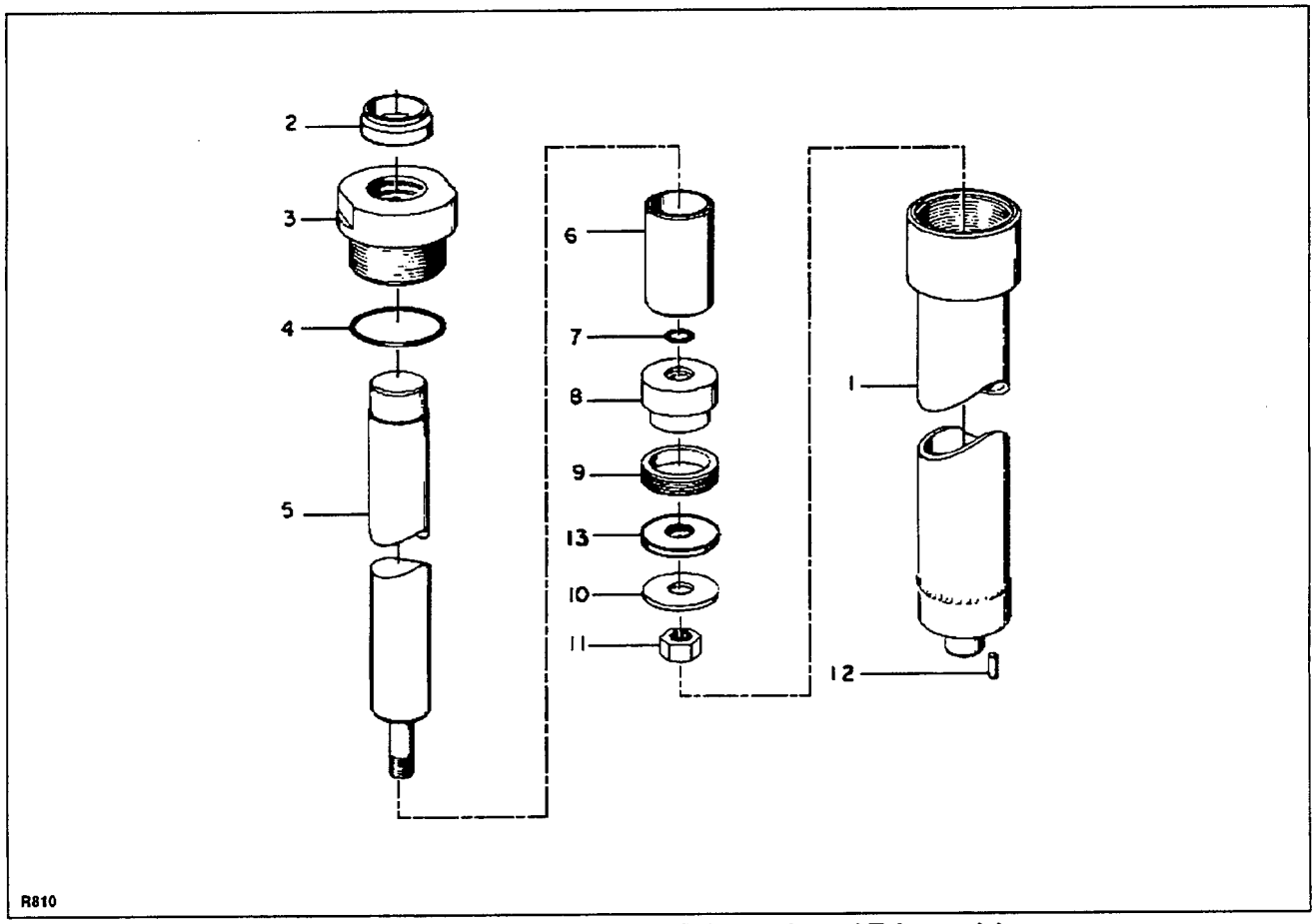


Figure 9-12. Lift Cylinder (Non-Telescopic and Telescopic)

7. Remove flow regulator (6) and o-ring.

Assemble lift cylinder by reversing the disassembly procedure. **Be sure to use the proper seal kit.** For ease of assembly when assembling threaded parts, apply a coating of white lead replacement to threads.

9-8.4. Full Free Lift and Trimast Trucks FFL Serial Number 333328 to 335391 158 In Trimast Serial Number 333328 to 335477 194 In Trimast Serial Number 333328 to 335350

NOTE: Removal procedures are covered in Section 8. Refer to Table 9-1 and 9-2 for proper packing kit.

Refer to Figure 9-15 and proceed as follows.

CAUTION: Use proper clamp-type vise. The cylinder will be distorted if the vise is tightened too much.

1. Secure lift cylinder tube assembly in vise.

CAUTION: Use proper spanner wrench when removing gland nut to prevent damage to cylinder.

2. Unthread gland nut (4) from outside tube (1).
3. Remove primary rod (2) by sliding out of outside tube (1).
4. Remove gland nut (5) by unthreading from primary rod (2).
5. Secondary rod (3) can now be removed by sliding it out of the primary rod (2).
6. Remove base (7) by unthreading it from the primary rod (2).
7. Remove flow regulator (6) and o-ring.

Assemble lift cylinder by reversing the disassembly procedure. For ease of assembly when assembling threaded parts, apply a coating of white lead replacement to the threads.

Table 9-1. FFL Lift Cylinders

LIFT HEIGHT	CYLINDER PART NO.	SERIAL NUMBER	FIG. NO.	PACKING KIT PART NO.
106	504488	343730 AND HIGHER	12-32	900962
106	505444-01	335392 TO 343729	12-33	901417
106	505190-01	333328 TO 335391	12-34	901180
130	504489	343730 AND HIGHER	12-32	900962
130	504444-02	335392 TO 343729	12-33	901417
130	505190-02	333328 TO 335391	12-34	901180

Table 9-2. TRIMAST Lift Cylinders

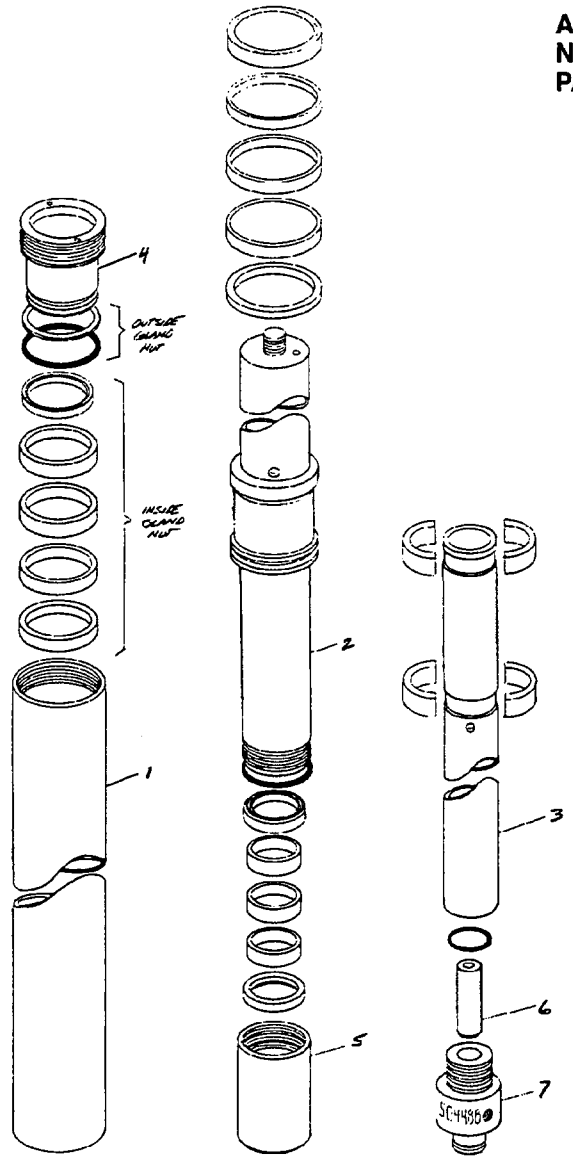
LIFT HEIGHT	CYLINDER PART NO.	SERIAL NUMBER	FIG. NO.	PACKING KIT PART NO.
158	504490	342112 AND HIGHER	12-32	900961
158	505445-01	335478 TO 342111	12-33	901409
158	505191-01	333328 TO 335477	12-34	901199
194	504491	342112 AND HIGHER	12-32	900961
194	505445-02	335351 TO 342111	12-33	901409
194	505191-02	333328 TO 335350	12-34	901199

106 AND 130 INCH FULL FREE LIFT TRUCKS SERIAL NUMBER 343730 AND HIGHER

158 INCH TRIMAST TRUCKS SERIAL NUMBER 342112 AND HIGHER

194 INCH TRIMAST TRUCKS SERIAL NUMBER 342112 AND HIGHER

ALL ILLUSTRATED PARTS NOT NUMBERED ARE IN PACKING KIT
900962 FFL
900961TRIMAST



R1898

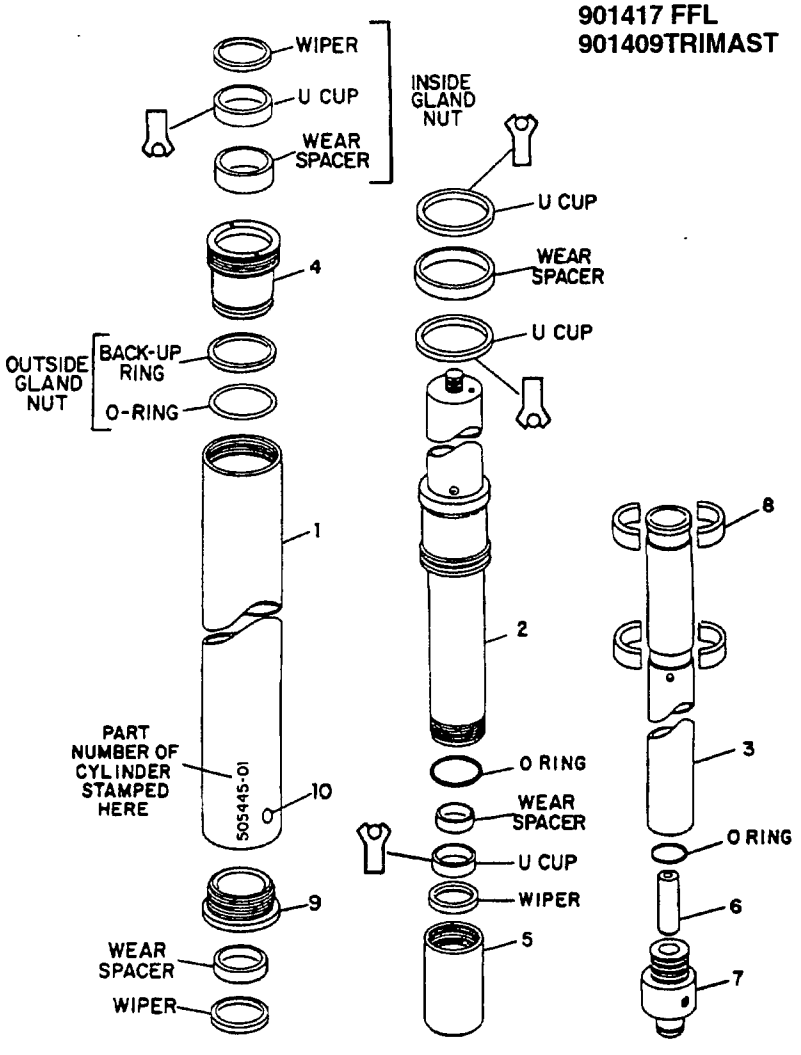
Figure 9-13 Lift Cylinder (Full Free Lift and TRIMAST)

106 AND 130 INCH FULL FREE LIFT TRUCKS SERIAL NUMBER 335392 TO 343729

158 INCH TRIMAST TRUCKS SERIAL NUMBER 335478 TO 342111

194 INCH TRIMAST TRUCKS SERIAL NUMBER 335351 TO 342111

ALL ILLUSTRATED PARTS NOT NUMBERED ARE IN PACKING KIT
901417 FFL
901409TRIMAST



R4335

Figure 9-14 Lift Cylinder (Full Free Lift and TRIMAST)

106 AND 130 INCH FULL FREE LIFT TRUCKS SERIAL NUMBER 333328 TO 335391.

158 INCH TRIMAST TRUCKS SERIAL NUMBER 333328 TO 335477.

194 INCH TRIMAST TRUCKS SERIAL NUMBER 333328 TO 335350.

ALL ILLUSTRATED PARTS NOT NUMBERED ARE IN PACKING KIT
901180 FFL
901199 TRIMAST

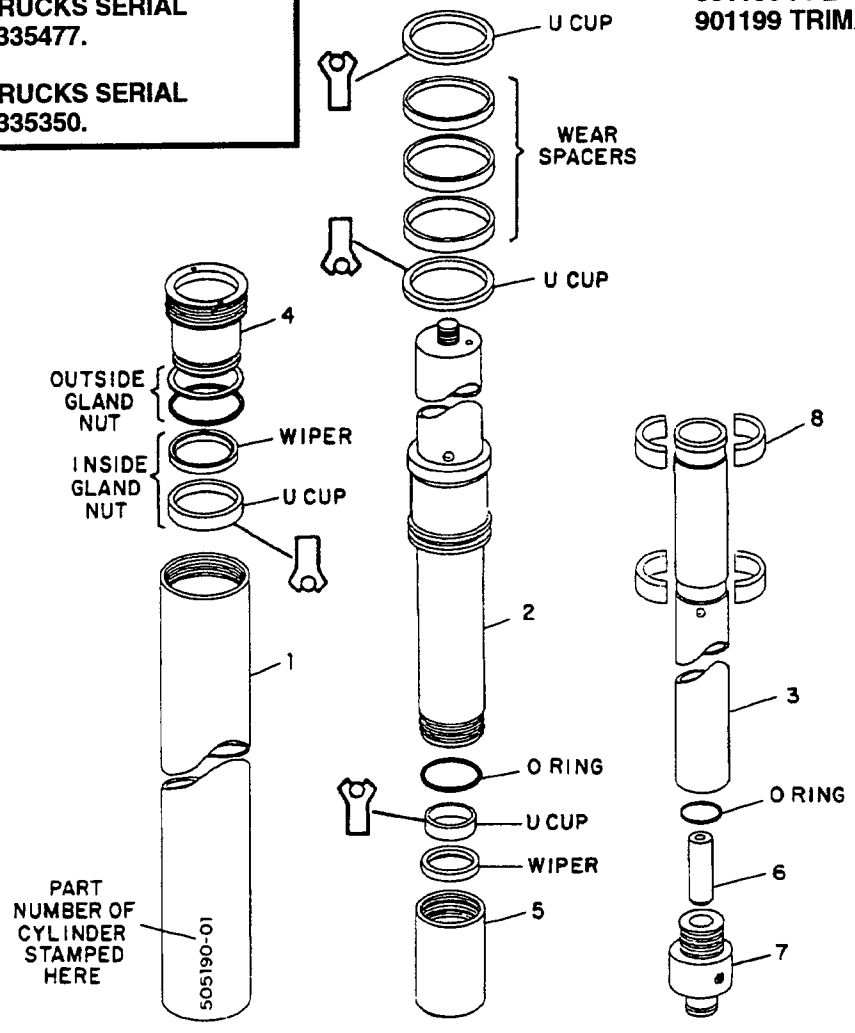


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Figure 9-15 Lift Cylinder (Full Free Lift and TRIMAST)

SECTION 10
ELECTRICAL COMPONENTS

10-1. ELECTRICAL CONTROL PANELS.

1. **SEE SUPPLEMENT 230 FOR TRANSISTOR TRUCKS SERIAL NUMBER 338442 AND HIGHER.**
2. **SEE SUPPLEMENT 187 FOR TRANSISTOR TRUCKS SERIAL NUMBER 333328 TO 338441.**

The 12-volt panel is shown in Figure 12-39. The 24-volt panel is shown in Figure 12-40.

There are two different control panels used in the resistor speed control trucks, **part numbers 504652** is used on 12-volt trucks **and 504653** is used on 24-volt trucks.

Figure 12-39 and 12-40 identify parts associated with the complete electrical control panel assembly.

10-2. Contactor Servicing.

NOTE: One contactor tip kit **part number 900531-01** contains the number of contacts required to service all contactors on a truck. Contactor tip kit **part number 900531-09** contains contacts for the forward-reverse contactor. Contactor tip kit **part number 900531-08** contains contacts for the 2nd and 3rd speed and dynamic brake contactors.

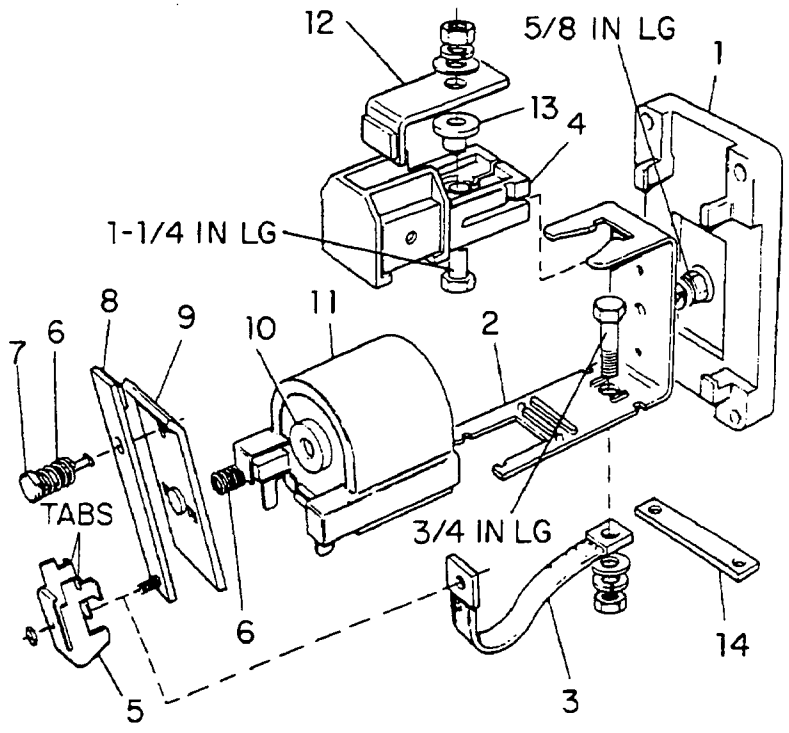
10-2.1. 2nd Speed, 3rd Speed, Dynamic Brake Single Pole Contactor Disassembly. (Refer to Figure 10-1)

NOTE: Order contactor tip kit **part number 900531-08**. One kit repairs one 2nd or 3rd speed contactor or the dynamic brake contactor. Kit includes items (3, 5, 8 and 12).

2ND SPEED
3RD SPEED
DYNAMIC BRAKE

CONTACTOR TIP KIT 900531-08 CONTAINS

ITEM	QTY
3	1
5	1
8	1
12	1



R1865

Figure 10-1. Single Pole; Contactor, 2nd Speed, 3rd Speed, Dynamic Brake

1. Remove spring stud (7) and spring (6).
2. Remove nut holding armature plate retainer (5) and remove retainer by squeezing in on tabs and lifting up.
3. Slide braid assembly (3) off contact (8) and remove contact (8) and armature plate (9) and spring (6).
4. Use a 10 mm wrench to remove nut and flat washer holding front contact (12) and remove contact.

NOTE: If only contacts are to be replaced, no further disassembly is required. Proceed to step 5 to replace coil.

5. Remove spacer (13).
6. Squeeze sides of front molding (4) and pull forward to disengage from base molding (1). Remove base molding and remove front molding from frame (2).
7. Coil can now be removed from frame (2) by removing 3/4 inch long hex head screw and flat washer.

10-2.2. 2nd Speed, 3rd Speed, Dynamic Brake Single Pole Contactor Reassembly. (Refer to Figure 10-1)

1. Place 1-1/4 inch long hex head bolt through bottom of front molding (4) and slide molding onto frame (2).
2. Attach coil (11) to frame (2) with flat washer and 5/8 inch long hex head bolt. Be sure braid assembly (3) has been attached to frame (2) with 3/4 inch bolt, flat washer, lock washer and nut. Use 10mm wrench on nut.
3. Attach frame (2) to base molding (1) by engaging slots at bottom of frame (2) behind flanges near lower edge of base molding (1).
4. Snap slots of top of front molding (4) into flanges of base (1). Coil assembly should now securely attach to base (1).
5. Install spacer (13) in front molding (4) and install front contact (12) secure with washer, lock washer and hex nut. Use 10 mm wrench on nut.
6. Place contactor on work surface with base molding down. Place spring (6) on center of pole piece (10).
7. Position armature plate (9) against frame (2).
8. Place moving contact assembly (8) on armature plate then attach braid assembly (3) to contact stud.
9. Place retainer (5) over contact stud and slip the two tabs on retainer (5) into the two slots in armature plate (9). Secure with hex nut.
10. Secure moving contact (8) to armature (9) with spring (6) and spring stud (7).

10-2.3. Forward-Reverse Double Pole Contactor Disassembly. (Refer to Figure 10-2)

NOTE: Order contactor tip kit **part number 900531-09**. One kit repairs one contactor. Kit includes items (3, 5, 8, 12 and 16).

1. Remove spring (7) and spring (6).
2. Remove nut bolt and washer securing bus bar (14), (if used) to back contact (16).
3. Slide back contact (16) up as far as possible then squeeze sides of rear molding (17) together and lift off frame (2). Separate two sides of rear molding and remove back contact (16).
4. Remove nut holding armature plate retainer (5) and remove retainer by squeezing in on tabs and lifting up.
5. Slide braid assembly (3) off contact (8) and remove contact (8) and armature plate (9) and spring (6).
6. Use a 10 mm wrench to remove nut holding front contact (12) and remove contact.

NOTE: If only contacts are to be replaced, no further disassembly is required. Proceed to step 7 to replace coil.

7. Remove spacer (13).
8. Squeeze sides of front molding (4) and pull forward to disengage from base molding (1). Remove base molding and remove front molding from frame (2).
9. Coil can now be removed from frame (2) by removing 3/4 inch long hex head screw and flat washer.

10-2.4. Forward-Reverse Double Pole Contactor Reassembly. (Refer to Figure 10-2)

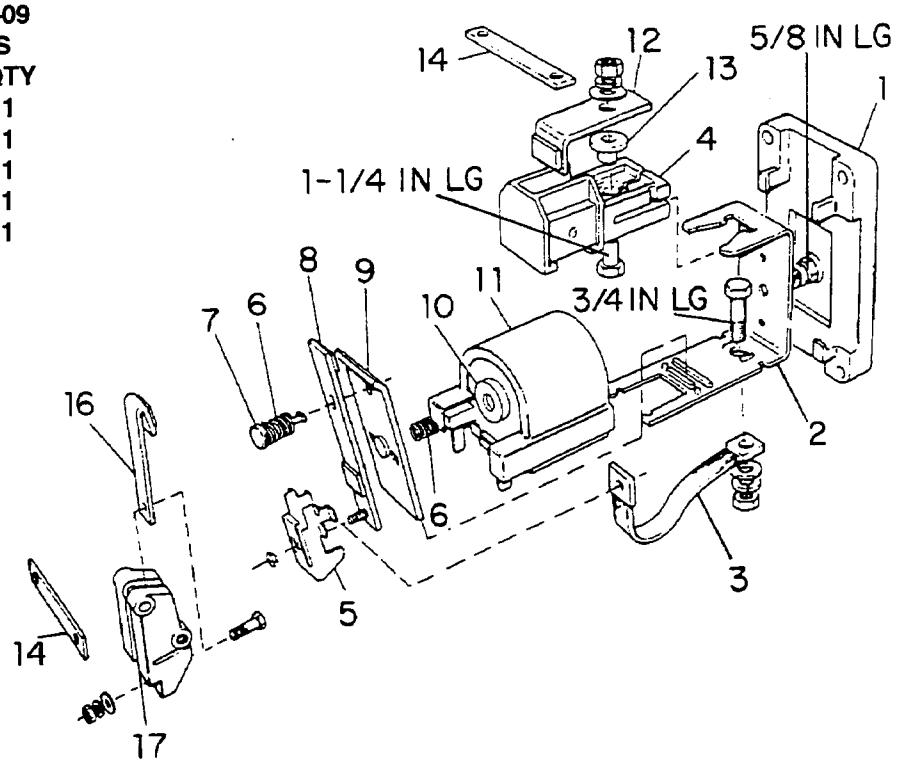
1. Place 1-1/4 inch long hex head bolt through bottom of front molding (4) and slide molding onto frame (2).
2. Attach coil (11) to frame (2) with flat washer and 5/8 inch long hex head bolt. Be sure braid assembly (3) has been attached to frame (2) with 3/4 inch bolt, lock washer, flat washer and nut. Use 10 mm wrench on nut.
3. Attach frame (2) to base molding (1) by engaging slots of bottom of frame (2) behind flanges near lower edge of base molding (1).
4. Snap slots at top of front molding (4) into flanges of base (1). Coil assembly should now be securely attached to base (1).

5. Install spacer (13) in front molding (4) and install front contact (12) secure with washer, lock washer and hex nut. Use a 10 mm wrench on nut.
6. Place contactor on work surface with base molding down. Place spring (6) on center of pole piece (10).
7. Position armature plate (9) against frame (2).
8. Place moving contact assembly (8) on armature plate then attach braid assembly (3) to contact stud.
9. Place retainer (5) on contact stud and slip the two tabs on retainer (5) into the two slots in armature plate (9). Secure with hex nut.
10. Place two parts of back molding (17) together and slide contact (16) into slot in molding.
11. Squeeze back molding together and place grooves in back molding on frame (2). Push molding all the way down.
12. Release back molding and press back contact (16) down into position. Armature will need to be pressed down to position back contact.
13. Reattach bus bar (14) (if used) to back contact (16) using hex nut and washers.
14. Secure moving contact (8) to armature (9) with spring (6) and spring stud (7).

FORWARD
REVERSE

CONTACTOR TIP KIT 900531-09 CONTAINS

ITEM	QTY
3	1
5	1
8	1
12	1
16	1



R1866

Figure 10-2. Double Pole Contactor, Forward, Reverse

10-3. PUMP MOTORS.

Five different pump motor assemblies have been used on the PDH Truck. Refer to the following chart to determine the proper pump motor.

VOLTS DC	PUMP MOTOR PART NO.	SERIAL NO. EFFECTIVITY
12	904030	PDH-20, 333328 AND HIGHER
12	901300	PDH-25,30,40, 334373 AND HIGHER
12	900960	PDH-25,30,40, 333328 TO 334372
24	905053	ALL 333512 AND HIGHER
24	900971	ALL 333328 TO 333511

NOTE: Removal procedures are covered in Section 8.

Refer to applicable Figure 12-33, 12-34, 12-35, 12-36 and 12-37 for motor disassembly.

10-4. DRIVE MOTORS.

Six different drive motors have been used on the PDH truck. Refer to the following chart to determine the proper pump motor.

VOLTS DC	DRIVE MOTOR PART NO.	SERIAL NO. EFFECTIVITY
12	016042	333583 AND HIGHER
12	016039	333328 TO 333582
24	016050	344056 AND HIGHER
24	016045	333562 TO 344055
24	016080	333328 TO 333561

NOTE: Removal procedures are covered in Section 6.

Refer to Figure 12-38 to 12-40 for motor disassembly.

10-5. BATTERIES.

1. Turn key to off, and remove from key switch.

NOTE: Batteries are heavy. Use care when lifting out of battery compartment.

2. Disconnect the battery quick disconnect (28, Figure 12-9).
3. Lift the battery out of the battery compartment.
4. Lower the new battery in the battery compartment.
5. Reconnect the battery quick disconnect (28).

10-6. HIGH SPEED LIMIT SWITCH.

1. Remove the two screws, two lockwashers, and two washers securing switch mounting bracket to frame.
2. Remove high speed limit switch (Figure 10-3) from bracket, and then disconnect wiring from the switch.
3. Connect the wiring to the new switch and install the switch onto the bracket.

NOTE: Bracket must be positioned so that switch is operated when lift carriage is down.

4. Position bracket with new switch in place on frame, and secure with two washers, two lockwashers, and two screws.

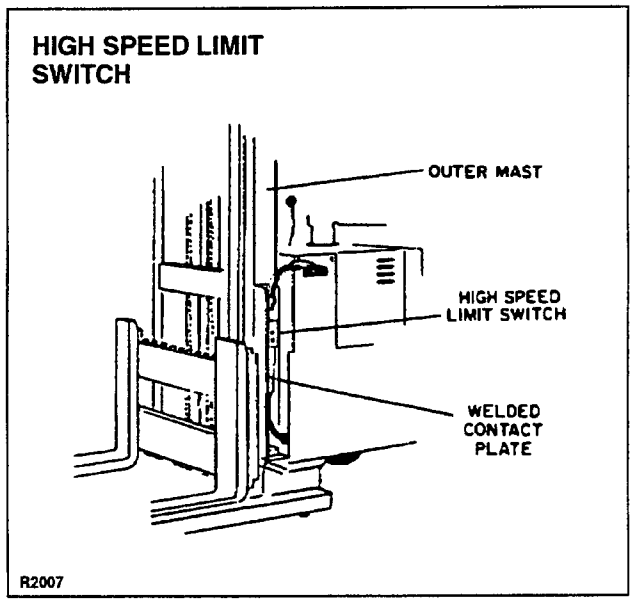


Figure 10-3. Mast Related Electrical Components

SECTION 11
OPTIONAL EQUIPMENT

11-1. KEYSWITCH

Those trucks which have a keyswitch installed will have the wiring modified. The modification and the schematic diagram are shown in Figure 12-47.

11-2. HOUR METER

The hour meter is attached to the motor circuits to indicate actual usage of the drive and lift function. Refer to Figure 12-44 for replacement parts and to the schematic diagram, Figure 4-1, for wiring information.

11-3. BATTERY CAPACITY INDICATOR.

Refer to Figure 12-45 and 12-46 for the battery capacity indicator replacement parts.

11-4. REMOTE CONTROL.

Refer to Figure 12-26 and 12-27 for removal and parts identification of the remote control option. Refer to Figure 11-1 for wiring diagram.

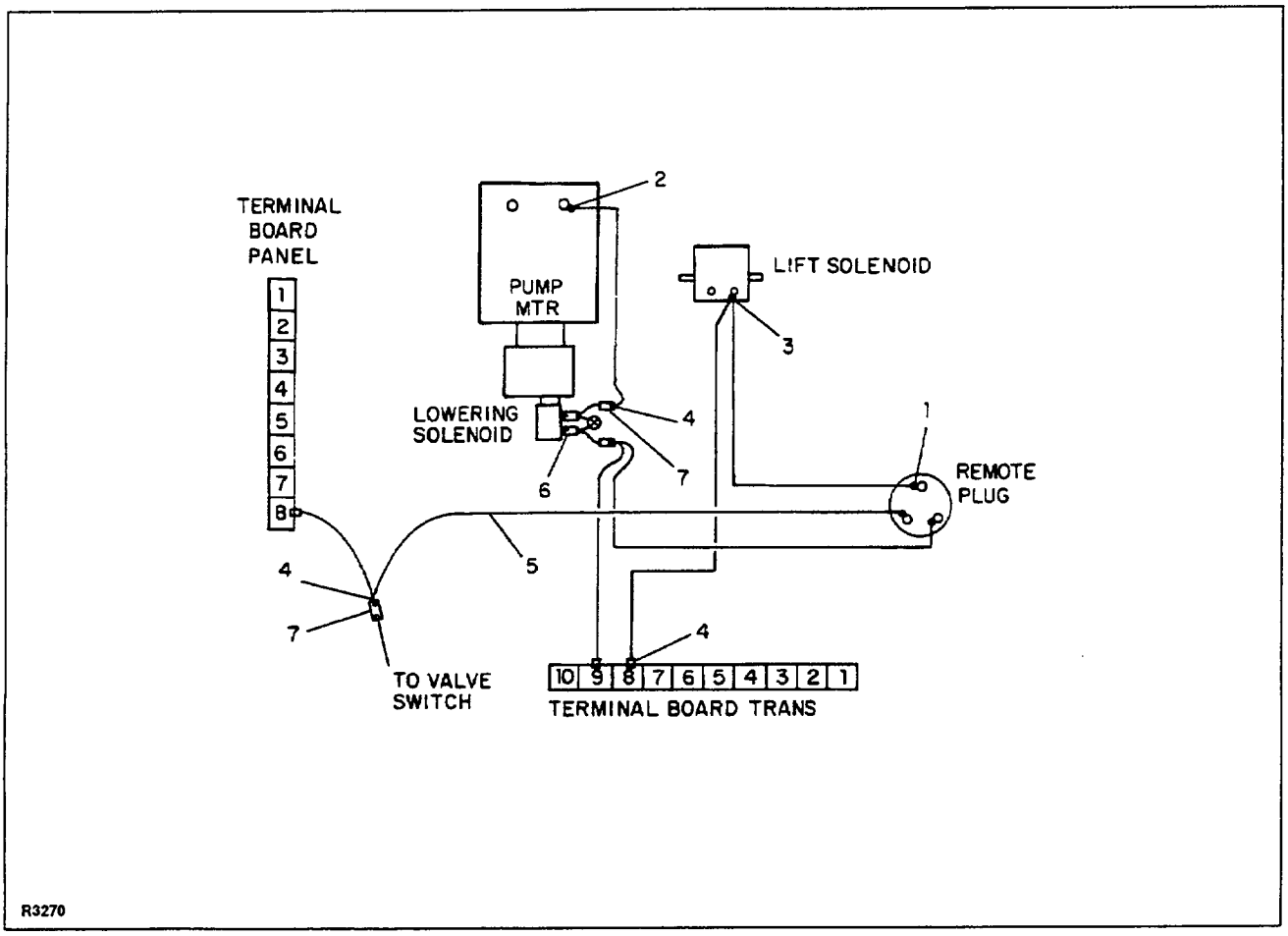


Figure 11-1. Optional Remote Control Wiring Diagram

NOTES

SECTION 12
ILLUSTRATED PARTS BREAKDOWN

Following is an illustrated parts breakdown of assemblies and parts associated with the PDH Lift Truck.

1. SEE SUPPLEMENT 220 FOR TRANSISTOR SPEED CONTROL TRUCKS SERIAL NUMBER 334631 AND HIGHER
2. SEE SUPPLEMENT 207 FOR TRANSISTOR SPEED CONTROL TRUCKS SERIAL NUMBER 333328 TO 334630

SEE FIGURE 12-2
FOR SWITCHES

SEE FIGURE 12-3
FOR COLD CONDITIONING

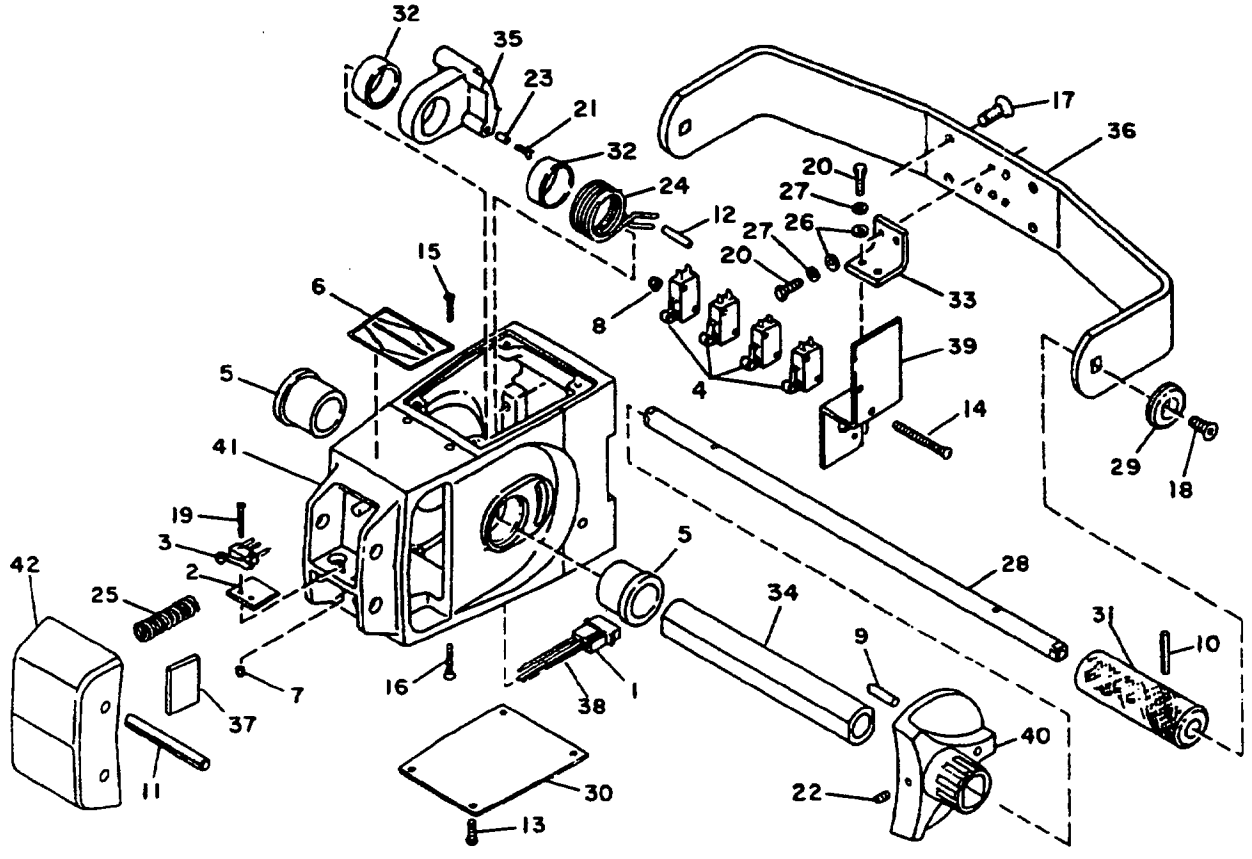


Figure 12-1 Control Head Assembly Part Number 505050

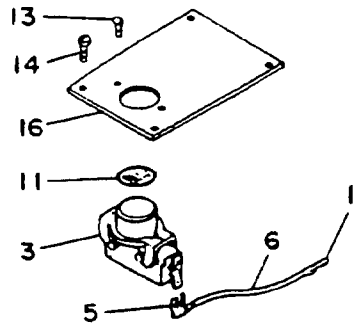
INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	505050-01	CONTROL HEAD STANDARD	1
—	505050-02	CONTROL HEAD REMOTE LIFT IN HANDLE	1
—	505050-03	CONTROL HEAD REMOTE LIFT LOWER IN HANDLE	1
1	005647	. CONNECTOR	1
2	018202	. SWITCH INSULATOR	1
3	020669	. MICRO SWITCH	1
4	020775	. MICRO SWITCH	4
5	052956	. FLANGED BEARING	2
6	056617	. FORWARD-REVERSE DECAL	1
7	059633	. HEX LOCKNUT, 2-56	2
8	059634	. HEX LOCKNUT, 4-40	2
9	060579	. DOWEL PIN, 1/4 X 15/16	2
10	060942	. ROLL PIN, 1/8 X 1-1/4	2
11	061016	. ROLL PIN, 1/4 X 3	2
12	061200-01	. SPIRAL PIN, 3/16 X 1	1
13	067416	. PAN HD. SCREW, 6-32 X 1/2	4
14	068189	. RD. HD. SCREW, 4-40 X 1-7/8	2
15	069462	. SLOTTED FLAT HD. SCREW, 6-32 X 3/4	2
16	069463	. SLOTTED FLAT HD. SCREW, 6-32 X 1	2
17	069478	. PHILLIPS FLAT HD. SCREW, 1/4-20 X 3/4	4
18	069715	. SOCKET FLAT HD. SCREW, 1/4-20 X 3/4	2

INDEX NO.	PART NO.	PART NAME	NO. REQD.
19	070486	. ROUND HD. SLOTTED MACHINE SCREW	2
20	072400-01	. HEX HD. SLOTTED SCREW, 6-32 X 1/2	4
21	072415	. PAN HD. SCREW, THREAD CUTTING	1
22	073461	. SOCKET SET SCREW	2
23	074711	. SPACER	1
24	075088	. RETURN SPRING	1
25	075510	. COMPRESSION SPRING	2
26	077007	. WASHER, FLAT	4
27	077204	. SPLIT LOCK WASHER #6	4
28	402827	. SHAFT	1
29	402828	. CAP	2
30	402830	. BOTTOM ACCESS COVER	1
31	402839	. TUBE	2
32	402836	. SPACER	2
33	402837	. BRACKET	1
34	403358	. TUBE	1
35	402840	. CAM	1
36	402841	. HANDLE GUARD	1
37	402843	. PAD	2
38	504538-01	. SWITCH WIRE ASSEMBLY	3
39	505052	. SWITCH BRACKET	1
40	800272	. CONTROL LEVER	2
41	800273	. CONTROL HANDLE	1
42	800274	. COVER	1

1. SEE SUPPLEMENT 220 FOR TRANSISTOR SPEED CONTROL TRUCKS SERIAL NUMBER 334631 AND HIGHER

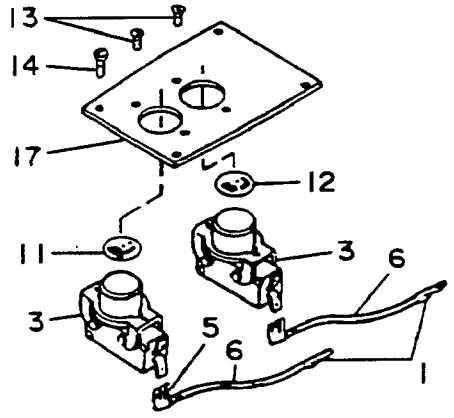
2. SEE SUPPLEMENT 207 FOR TRANSISTOR SPEED CONTROL TRUCKS SERIAL NUMBER 333328 TO 334630

PDH WITH LIFT ONLY 505050-02 (OPTION)



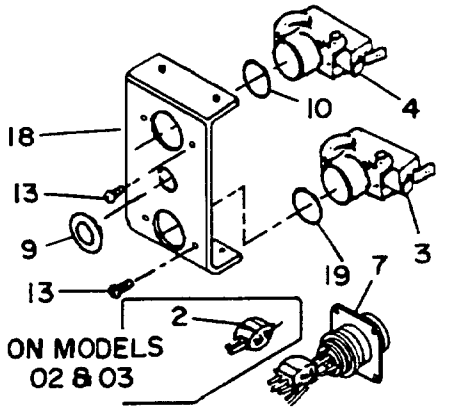
R5215

PDH WITH LIFT AND LOWER 505050-03 (OPTION)



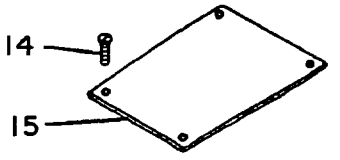
R5216

PDH WITH HORN AND BRAKE 505050-01, 02 & 03 (STANDARD)



R5217

PDH 505050-01 (STANDARD)



R5218

Figure 12-2. Control Head Pushbutton Switches

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	005643	CONTACT PIN	2 MAX.
2	005649	CONNECTOR	1
3	020697	PUSHBUTTON SWITCH - BLACK	2 MAX.
4	020698	PUSHBUTTON SWITCH - RED	1
5	021208	TERMINAL	4 MAX.
6	023014	WIRE	AR
7	023169	WIRE HARNESS ASSEMBLY	1
9	053215-03	HOLE PLUG	1
10	056619-01	HORN DECAL	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
11	056641-03	LIFT DECAL	1
12	056641-04	LOWER DECAL	1
13	067415	PAN HD. SCREW 6-32 X 1/4	AR
14	067416	PAN HD. SCREW, 6-32 X 1/2	4
15	402830	TOP COVER	1
16	402831	TOP COVER	1
17	402832	TOP COVER	1
18	402842	SWITCH PLATE	1
19	056641-02	BRAKE DECAL	1

AR - AS REQUIRED

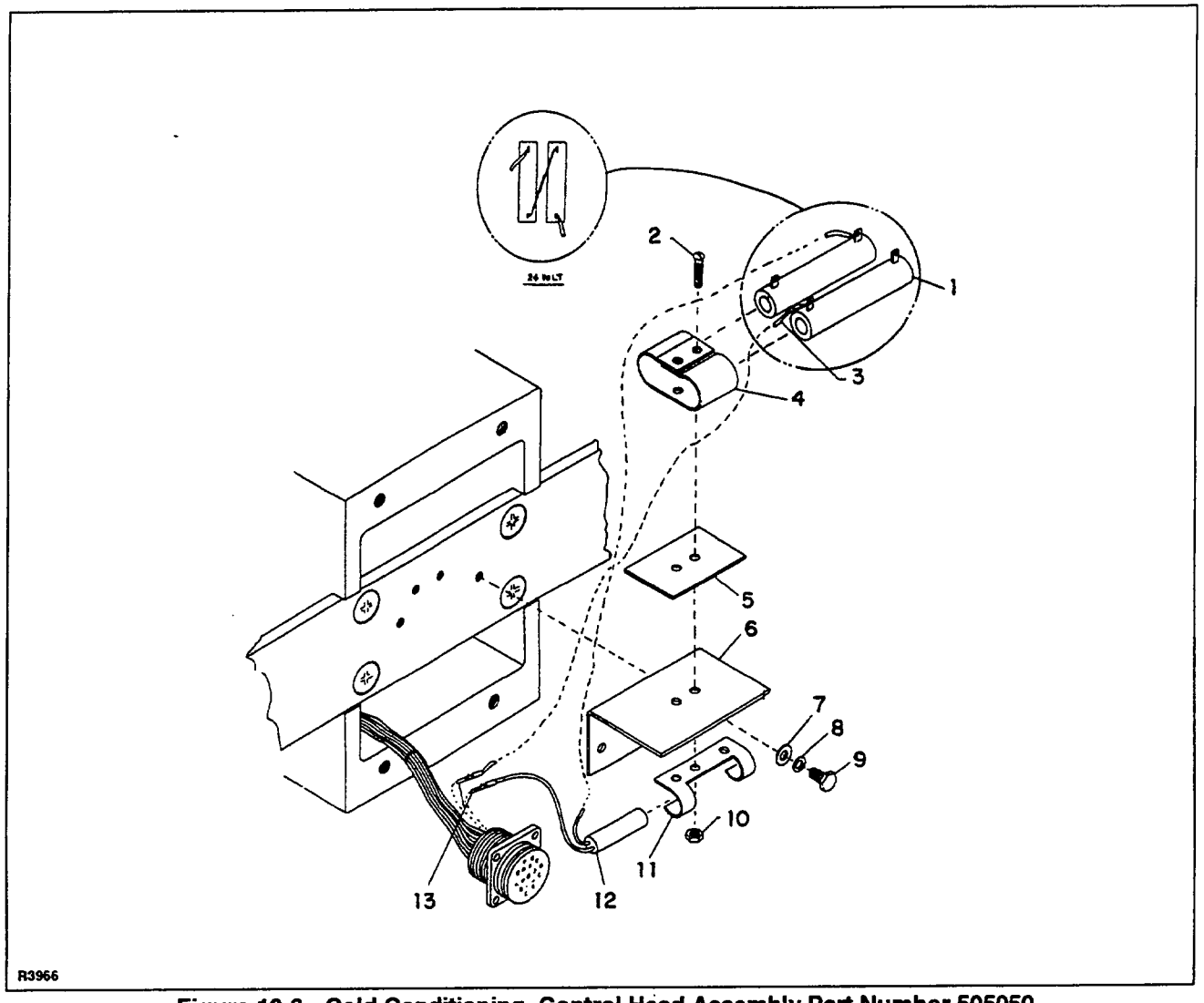


Figure 12-3 Cold Conditioning, Control Head Assembly Part Number 505050

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	018909	RESISTORS	2
2	068186	SCREW	2
3	023014	WIRE	AR
4	400544	BRACKET, RESISTOR	1
5	018214	INSULATOR, SWITCH	1
6	402829	BRACKET	1
7	077007	WASHER, FLAT	2

INDEX NO.	PART NO.	PART NAME	NO. REQD.
8	077204	SPLIT LOCK WASHER #6	2
9	072400-01	HEX HD. SLOTTED SCREW, 6-32 X 1/2	2
10	059632	NUT, HEX, 5-40	2
11	400044	BRACKET THERMAL CUTOUT	1
12	020736	THERMAL CUTOUT SWITCH	1
13	005643	CONTACT PIN	2

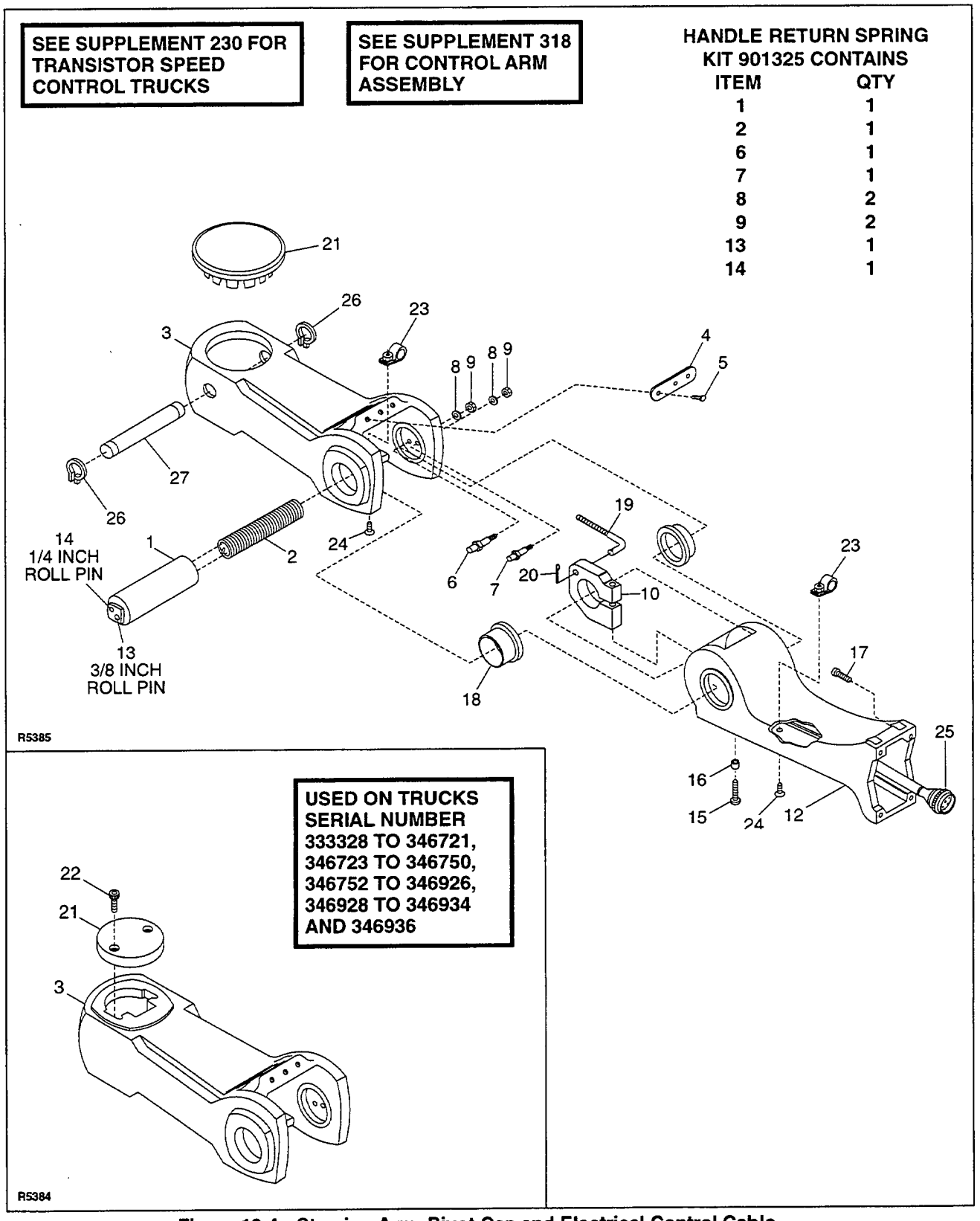


Figure 12-4 Steering Arm, Pivot Cap and Electrical Control Cable

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	501371*	SPRING TUBE ASSY	1
2	075060*	STEERING ARM RETURN SPRING	1
3	800206**	PIVOT CAP	1
3	402363***	PIVOT CAP	1
4	052876	BUMPER	1
5	071376	PAN HEAD SCREW, 10-32 X 1/2	3
6	285302*	SPRING PIN, 1/4	1
7	285303*	SPRING PIN, 3/8	1
8	077210*	LOCK WASHER, 5/16	2
9	059426*	HEX NUT, 5/16-18	2
10	800204	TUBE CLAMP	1
11	052922	FLANGED BEARING	1
12	800275	STEERING ARM	1
13	061050*	ROLL PIN, 3/8 X 1-1/4	1
14	061006*	ROLL PIN, 1/4 X 1-1/4	1
15	065569	SOCKET HEAD SCREW, 7/16-14 X 2-1/4	1
16	401127	SPACER	1
17	065481	SOCKET HEAD SCREW, 1/4-20 X 1	4
18	052925	FLANGED BEARING	1
19	501673	BRAKE ROD	
20	060417	COTTER PIN, 3/32 X 3/4	1
21	191045**	PIVOT CAP COVER	1
21	402459***	PIVOT CAP COVER	1
22	065603**	SOCKET HEAD SCREW, 3/8-16 x 3/4	2
23	503975	CABLE CLAMP AND NUT ASSY	2
24	069478	PHILLIPS FLAT HD. SCREW, 1/4-20 X 3/4	2
25	023083	CONTROL CABLE	1
26	061716***	SNAP RING	2
27	402452***	PIN	1

*** HANDLE RETURN SPRING KIT 901325**

**** USED ON TRUCKS SERIAL NUMBER 333328 TO 346721, 346723 TO 346750, 346752 TO 346926, 346928 TO 346934 AND 346936**

***** USED ON TRUCKS SERIAL NUMBER 346722, 346751, 346927, 346935, 346937 AND HIGHER**

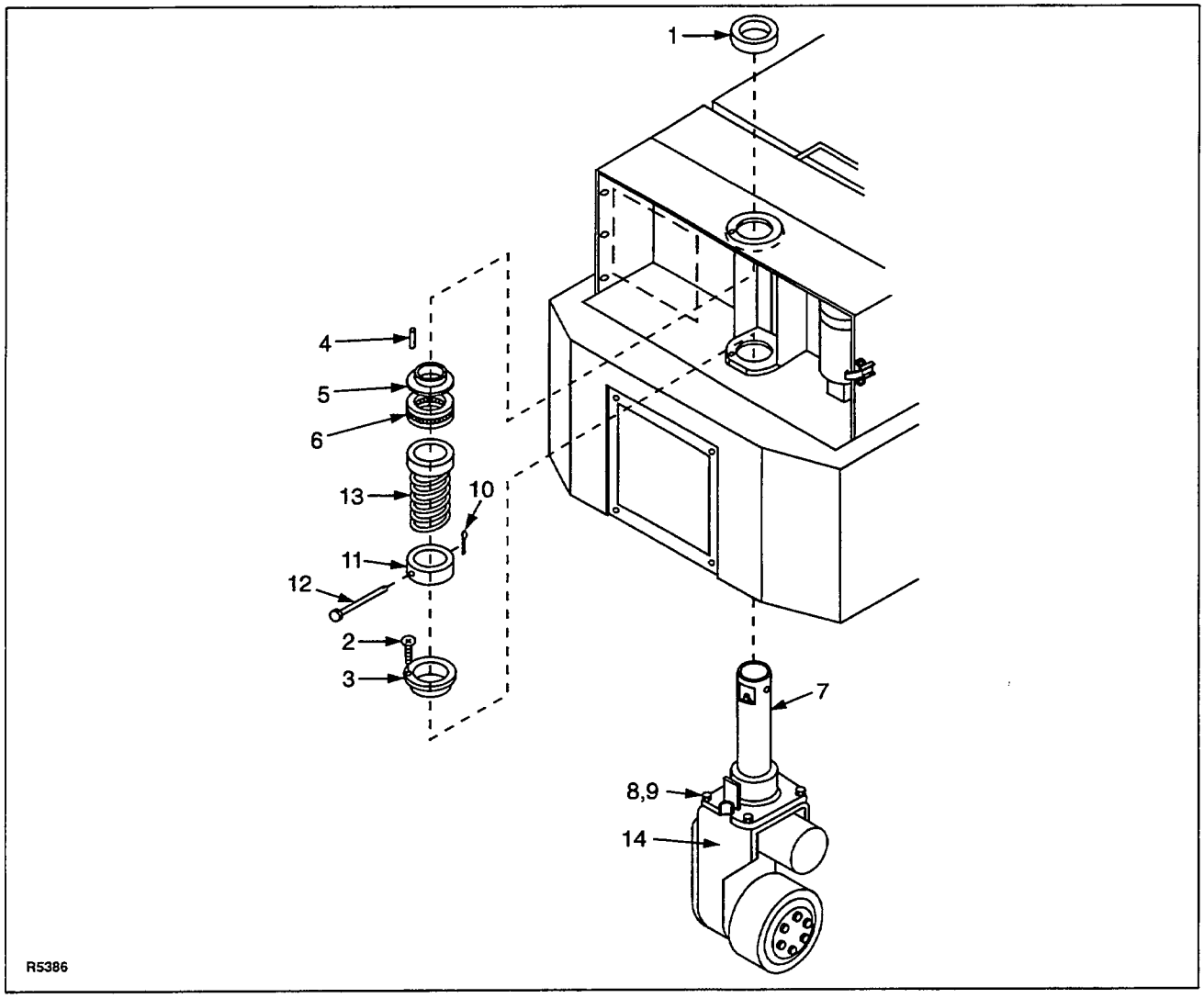


Figure 12-5. Pivot Tube Assembly

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	283901*	SPACER	1
1	402451**	SPACER	1
2	065538	SCREW, 5/16-18 X 5/8	1
3	053107	BUSHING, PIVOT	1
4	061000	ROLL PIN, 1/4 X 3/4	1
5	053108	BUSHING PIVOT	1
6	051146	BEARING, THRUST	1
7	500351***	PIVOT TUBE WELDMENT (SEE NOTE 1)	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
7	505682-01**	PIVOT TUBE WELDMENT (SEE NOTE 2)	1
8	064709	SCREW, HEX HEAD, 1/2-13 X 1-1/2	4
9	077412	LOCK WASHER EXTERNAL	4
10	060417	COTTER PIN	1
11	283902	SPRING SUPPORT	1
12	800005	SPRING SUPPORT PIN	1
13	075022	TRACTION SPRING	1
14	501720	TRANSMISSION (FIG. 12-8)	REF

NOTE 1: ORDER PIVOT TUBE KIT PART NUMBER 903277.

NOTE 2: TOOL KIT PART NUMBER 907151 REQUIRED FOR REMOVAL AND INSTALLATION OF PIVOT TUBE WELDMENT PART NUMBER 505682-01.

*** HANDLE RETURN SPRING KIT 901325**

**** USED ON TRUCKS SERIAL NUMBER 346722, 346751, 346927, 346935, 346937 AND HIGHER**

***** USED ON TRUCKS SERIAL NUMBER 333328 TO 346721, 346723 TO 346750, 346752 TO 346926, 346928 TO 346934 AND 346936**

NOTES

USED ON TRUCKS SERIAL NUMBER 333564 AND HIGHER

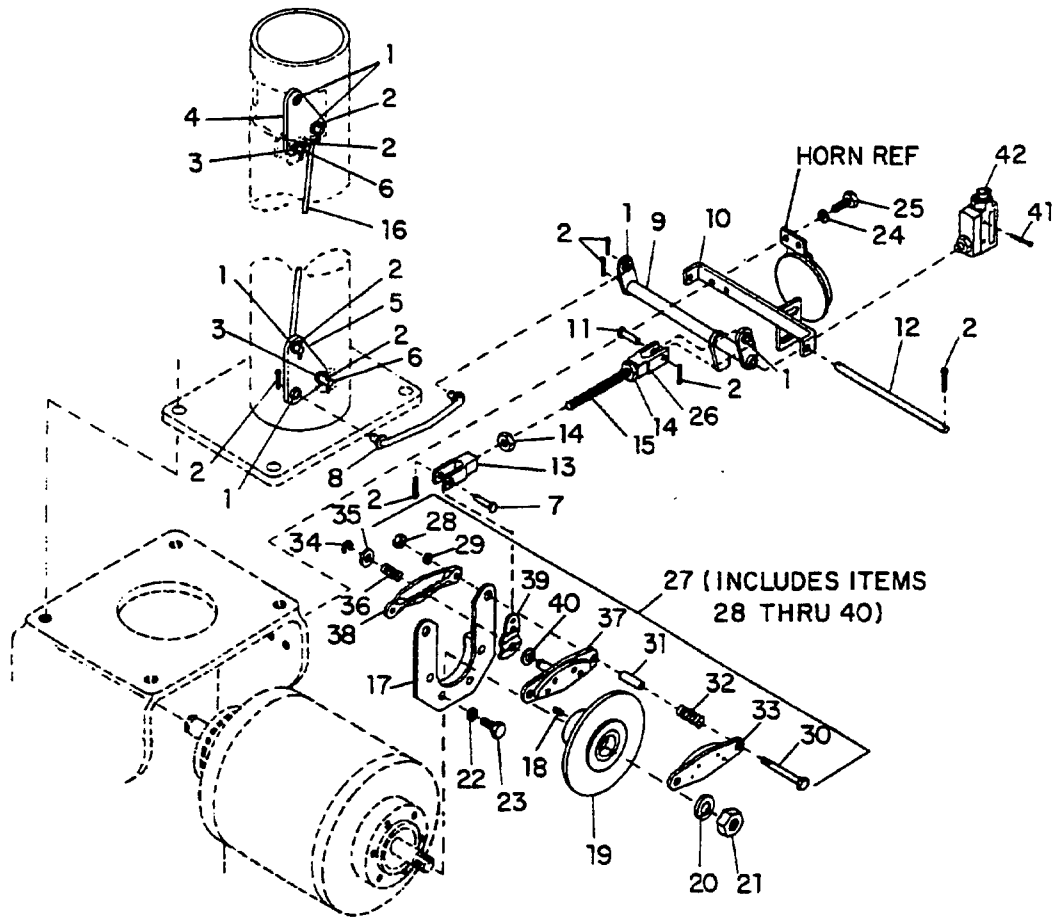


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Figure 12-6. Brake and Linkage

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	053109	LOCK BUSHING	6
2	060417	COTTER PIN, 3/32 X 3/4	10
3	053106	FLANGED BUSHING	2
4	111104	UPPER PIVOT PLATE	1
5	111105	LOWER PIVOT PLATE	1
6	060320	CLEVIS PIN	2
7	060316	CLEVIS PIN, 1/4 X 1	1
8	500202	BRAKE ROD	1
9	505206	LEVER ASSEMBLY	1
10	505199	BRACKET	1
11	060310	CLEVIS PIN	1
12	258127	PIN	1
13	800284	CLEVIS	1
14	059427	NUT, 5/16 - 24	2
15	258126	ROD, THREADED	1
16	500201	TUBE BRAKE ROD	1
17	505208	MOUNTING PLATE WELDMENT - BRAKE	1
18	057903	KEY, 1/4 X 1/4 X 1	1
19	505207	DISC ASSEMBLY	1
20	077215	LOCK WASHER, 5/8	6
21	059645	LOCKNUT, 5/8-18	1
22	077210	LOCK WASHER, 5/16	4
23	063557	SCREW, CAP, HEX HD, 5/16 - 18 X 1-1/4	4
24	077211	LOCK WASHER, 3/8	2

INDEX NO.	PART NO.	PART NAME	NO. REQD.
25	064605	HEX HEAD CAP SCREW, 3/8-16 X 1, HEAT TREATED	1
26	800119	CLEVIS	1
27	052821	DISC BRAKE CALIPER ASSY	1
28	059421	. HEX NUT, 1/4-20	2
29	077209	. LOCK WASHER	2
30	901189	. BOLT	2
31	901190	. SPACER	2
32	901191	. SPRING	2
33	901188	. BRAKE PAD	1
34	901198	. C-RING	1
35	901197	. WASHER	1
36	901196	. SPRING	1
37	901192	. BRAKE PAD WITH PIN	1
38	901195	. BRACKET	1
39	901194	. LEVER	1
40	901193	. WASHER	1
41	068336	ROUND HEAD SCREW, 6-32 X 1-1/2	2
42	020729	SWITCH-DEADMAN (FIG. 12-43)	REF
42	020690*	SWITCH-DEADMAN (FIG. 12-43)	REF
REF	009600	HORN 12V	1
REF	009602	HORN 24V	1

*** TRUCKS EQUIPPED WITH COLD CONDITIONING**

USED ON TRUCKS SERIAL NUMBER 333328 TO 333563

SEE SUPPLEMENT 319

BRAKE PAD KIT PART NUMBER 800182 CONTAINS

ITEM	QTY
22	1
23	1
24	2
25	2
26	2
37	2

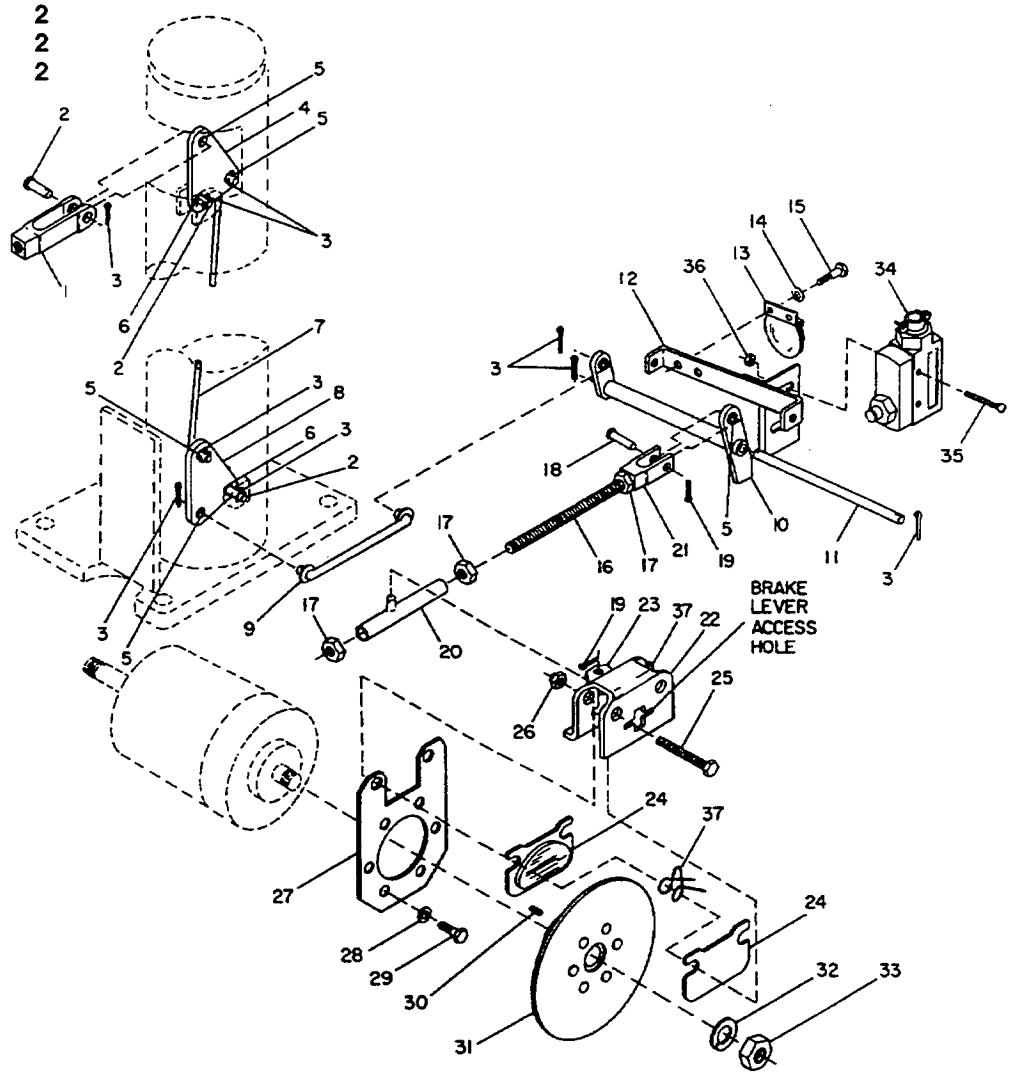


Figure 12-7. Brake and Linkage

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	056200	CLEVIS	1
2	060300	CLEVIS PIN	3
3	060417	COTTER PIN, 3/32 X 3/4	10
4	111104	UPPER PIVOT PLATE	1
5	053109	LOCK BUSHING	6
6	053106	FLANGED BUSHING	2
7	500201	TUBE BRAKE FOR	1
8	111105	LOWER PIVOT PLATE	1
9	500202	BRAKE ROD	1
10	500424	LOWER LEVER ASSY	1
—	053109	LOCK BUSHING	REF
11	258107	PIVOT PIN	1
12	500197	MOUNTING BRACKET ASSY	1
13	009600	HORN 12V	1
13	009602	HORN 24V	1
14	077211	LOCK WASHER 3/8	2
15	064605	HEX HEAD CAP SCREW, 3/8-16 X 1, HEAT TREATED	2
16	258121	ROD	1
17	059427	HEX NUT	3
18	060300	CLEVIS PIN	1
19	060417	COTTER PIN, 3/32 X 3/4	2
20	502814	WELDMENT TUBE	1
21	800119	CLEVIS	1
—	052857	CLAMP ASSY	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
22	052863*	CLAMP, BRAKE	1
23	052860*	LEVER, BRAKE	1
24	052859*	PAD, BRAKE	2
25	052861*	HEX HEAD BOLT	2
26	052862*	NUT, BRAKE	2
27	111706	PLATE, MOUNTING	1
28	077210	LOCK WASHER, 5/16	6
29	063552	HEX HEAD CAP SCREW, 5/16	6
30	057903	KEY, 1/4 X 1/4 X 1	1
31	503083	DISC ASSY	1
32	077215	LOCK WASHER, 5/8	1
33	059645	LOCKNUT, 5/8-18	1
34	020729	SWITCH-DEADMAN (FIG. 12-43)	REF
34	020690**	SWITCH-DEADMAN (FIG. 12-43)	REF
35	068336	ROUND HEAD SCREW, 6-32 X 1-1/2	2
36	059412	HEX NUT	2
37	075070*	SPRING	2

* **BRAKE PAD KIT PART NUMBER 800182**

** **TRUCKS EQUIPPED WITH COLD CONDITIONING**

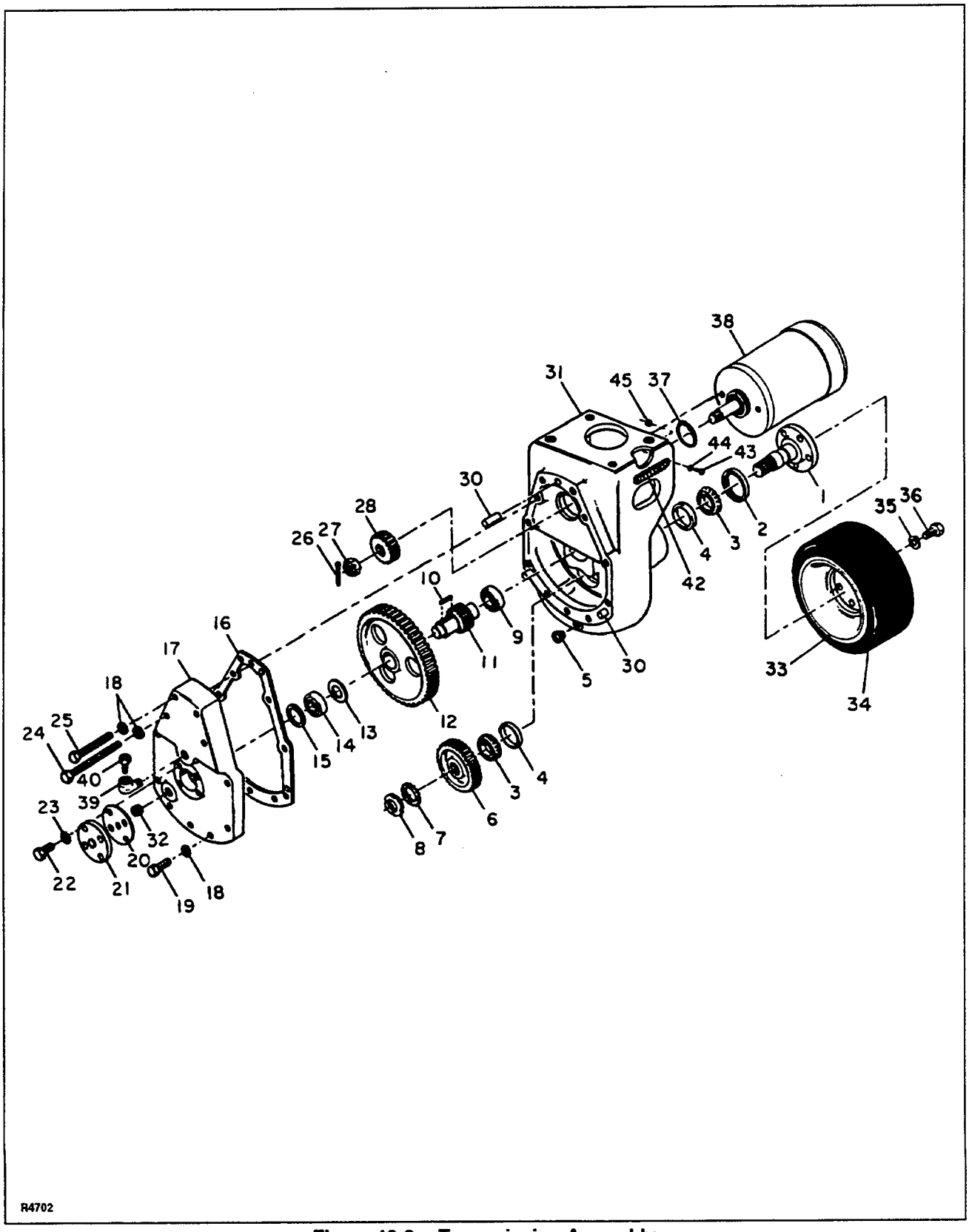


Figure 12-8. Transmission Assembly

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	501720	TRANSMISSION ASSY	1
1	050700	. AXLE SHAFT	1
2	073504	. OIL SEAL	1
3	051112	. ROLLER BEARING CONE	2
4	051111	. ROLLER BEARING CUP	2
5	026302	. DRAIN PLUG	1
6	057210	. SPUR GEAR	1
7	077600	. LOCK WASHER	1
8	059680	. LOCKNUT	1
9	051126	. BALL BEARING	1
10	057902	. SQUARE KEY, 5/16 X 1-3/8	1
11	057211	. SPUR PINION	1
12	057233	. INTERMEDIATE GEAR	1
13	074701	. PINION SPACER	1
14	051125	. BALL BEARING	1
15	074706	. BEARING SPACER	1
16	036105	. COVER GASKET	1
17	800073	. TRANSMISSION COVER	1
18	077211	. LOCK WASHER 3/8	11
19	064611	. HEX HEAD CAP SCREW, 3/8-16 X 1-3/4	7
20	036106	. BEARING COVER GASKET	1
21	051159	. BEARING COVER	1
22	063555	. HEX HEAD CAP SCREW, 5/16-18 X 1	4
23	077210	. LOCK WASHER, 5/16	4
24	064620	. HEX HEAD CAP SCREW, 3/8-16 X 3-3/4	2
25	064615	. HEX HEAD CAP SCREW, 3/8-16 X 2-1/4	2
26	060428	. COTTER PIN	1
27	059745	. HEX NUT, 5/8-18	1
28	057234	. MOTOR PINION SPUR	
29	—	. NOT USED	1
30	060585	. DOWEL PIN	3
31	800072	. TRANSMISSION HOUSING	1
32	026304	. FILL PLUG	1
	500933	DRIVE WHEEL ASSY	1
33	800035	. HUB	1
34	079114	. LUG, RUBBER TIRE ASSEMBLY	1
35	077215	LOCK WASHER, 5/8	5
36	064828	HEX HEAD CAP SCREW, 5/8-18 X 1	5
37	042114	O-RING	1
38	VAR	DRIVE MOTOR 12V (FIG. 12-38)	REF
39	026704	STREET ELBOW, 3/8	1
40	076701	VENT	1
41	—	NOT USED	
42	021226	TERMINAL BLOCK (RESISTOR SPEED CONTROL)	1
43	068185	SCREW	4
44	077203	LOCK WASHER	4
45	059410	HEX NUT	4

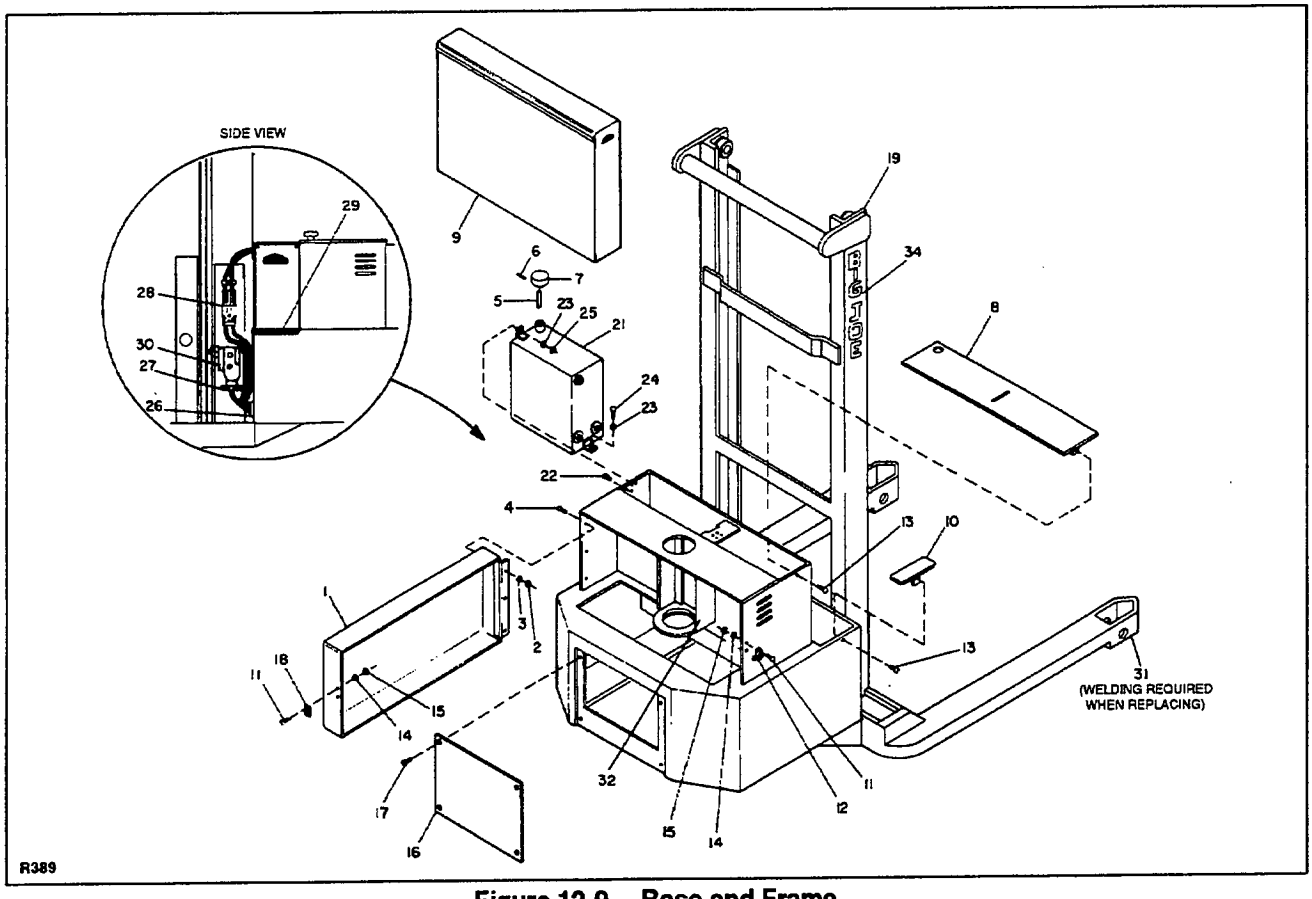


Figure 12-9. Base and Frame

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	503014	CONTROL CABINET DOOR	1
2	059421	HEX NUT 1/4-20.	3
3	077209	LOCK WASHER, 1/4	3
4	070476	ROUND HEAD MACHINE SCREW, 1/4-20 X 1/2	3
—	500422	BREATHER CAP AND DIPSTICK	REF
5	250720	. ASSY DIPSTICK	1
6	060937	. ROLL PIN, 1/8 X 5/8	1
7	029100	. BREATHER CAP	1
8	500397	HYDRAULIC ACCESS COVER	1
9	003108	BATTERY, 12V 375 AMP	1
9	003109	BATTERY, 12V 432 AMP	1
9	003124	BATTERY, 12V 510 AMP	1
9	003139	BATTERY, 24V 300 AMP	1
9	003140	BATTERY, 24V 340 AMP	1
9	003141	BATTERY, 24V 425 AMP	1
9	003134	BATTERY, 24V 510 AMP	1
10	500420	BATTERY SPACER ASSY (6-7/8 IN. WIDE)	2
10	501476	BATTERY SPACER ASSY (11-1/4 IN. WIDE)	2
10	501477	BATTERY SPACER ASSY (12-7/8 IN. WIDE)	2
11	071376	TRUSS HEAD MACHINE SCREW 10-32 X 1/2	4
12	058100	LATCH	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
13	069477	FLAT HEAD MACHINE SCREW 1/4-20 X 1/2	2
14	077208	LOCK WASHER, NO. 10	4
15	059416	HEX NUT, 10-32	4
16	111752	ACCESS COVER	1
17	069478	FLAT HEAD MACHINE SCREW 1/4-20 X 3/4	4
18	055500	LATCH	1
19	—	MAIN FRAME ASSY	1
21	503390	HYDRAULIC RESERVOIR	REF
22	069478	FLAT HEAD MACHINE SCREW 1/4-20 X 3/4	1
23	077209	LOCK WASHER	2
24	070476	SCREW, 1/4-20 X 1/2	1
25	059421	HEX NUT, 1/4-20	1
26	057508	GROMMET	1
27	052905	STRAIN RELIEF	1
28	005421	BATTERY QUICK DISCONNECT	1
29	005401	CONNECTOR	1
30	020703	LIMIT SWITCH	1
31	500279	HOUSING, 4 IN. STANDARD	1
31	501758	HOUSING, 4 IN. TANDEM	1
32	501828	TRACTION SPRING HOUSING	1

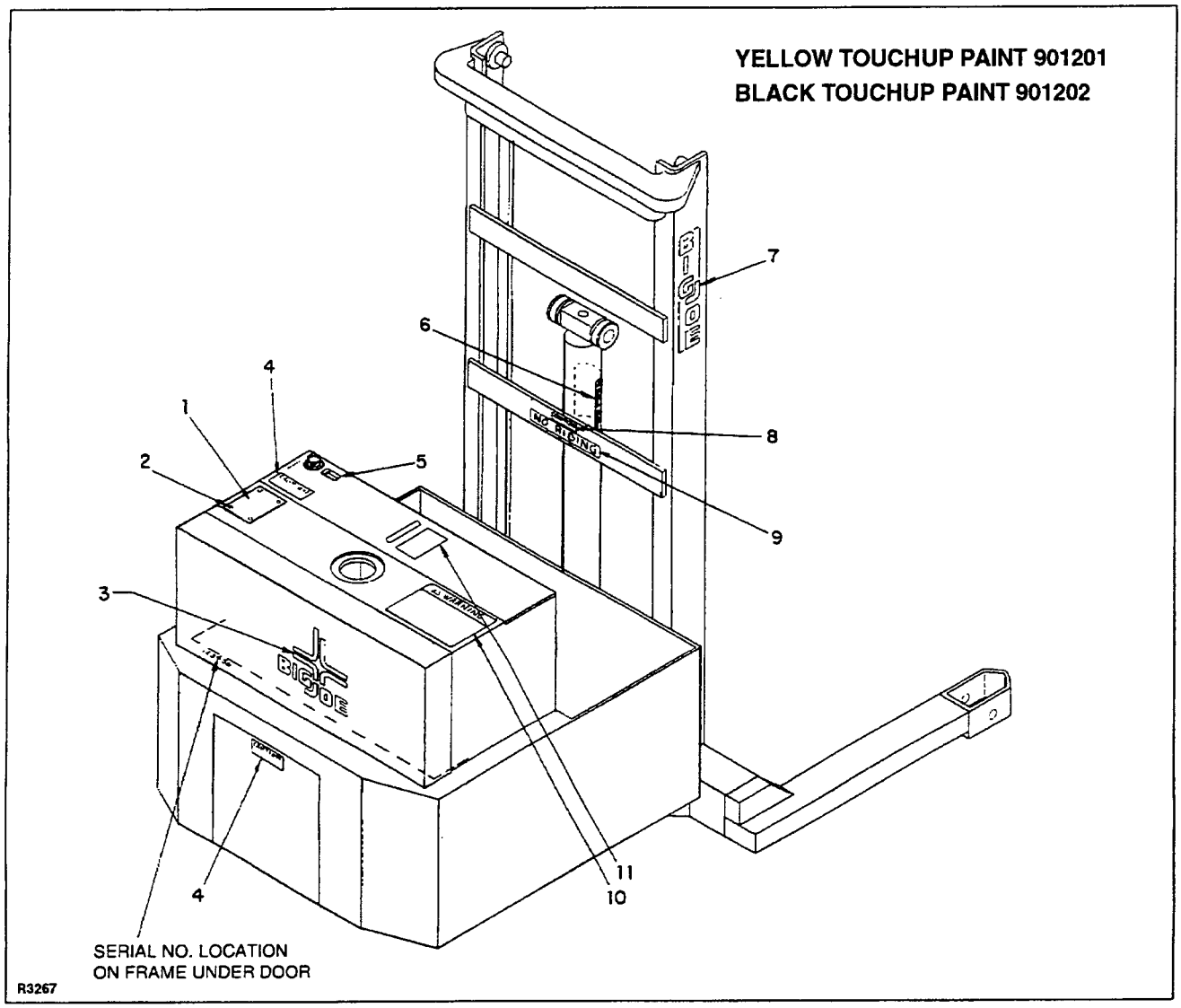


Figure 12-10. Decals and Paint

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	—	NAMEPLATE, STANDARD	1
1	—	NAMEPLATE, WITH ATTACHMENTS	1
2	066050	SCREW, ROUND HEAD DRIVE	4
—	900925	DECAL KIT	1
3	056631	. BIG JOE DECAL	1
4	056564	. CAUTION DECAL	2
5	056626	. OIL LEVEL DECAL	1
6	056625	. WARNING DECAL	1
7	056633	. MAST DECAL	2

INDEX NO.	PART NO.	PART NAME	NO. REQD.
8	056494	. CAUTION DECAL	1
9	056499	. NO RIDER DECAL	1
10	056590	. SAFETY DECAL	1
11	056478	. UP-DOWN DECAL	1
—	056617	. FORWARD/REVERSE DECAL	1
—	056619-01	. HORN SWITCH DECAL	1
—	056619-02	. BRAKE SWITCH DECAL	1
—	056619-03	. LIFT SWITCH DECAL	1
—	056619-04	. LOWER SWITCH DECAL	1
—	056634	TRIMAST DECAL	2

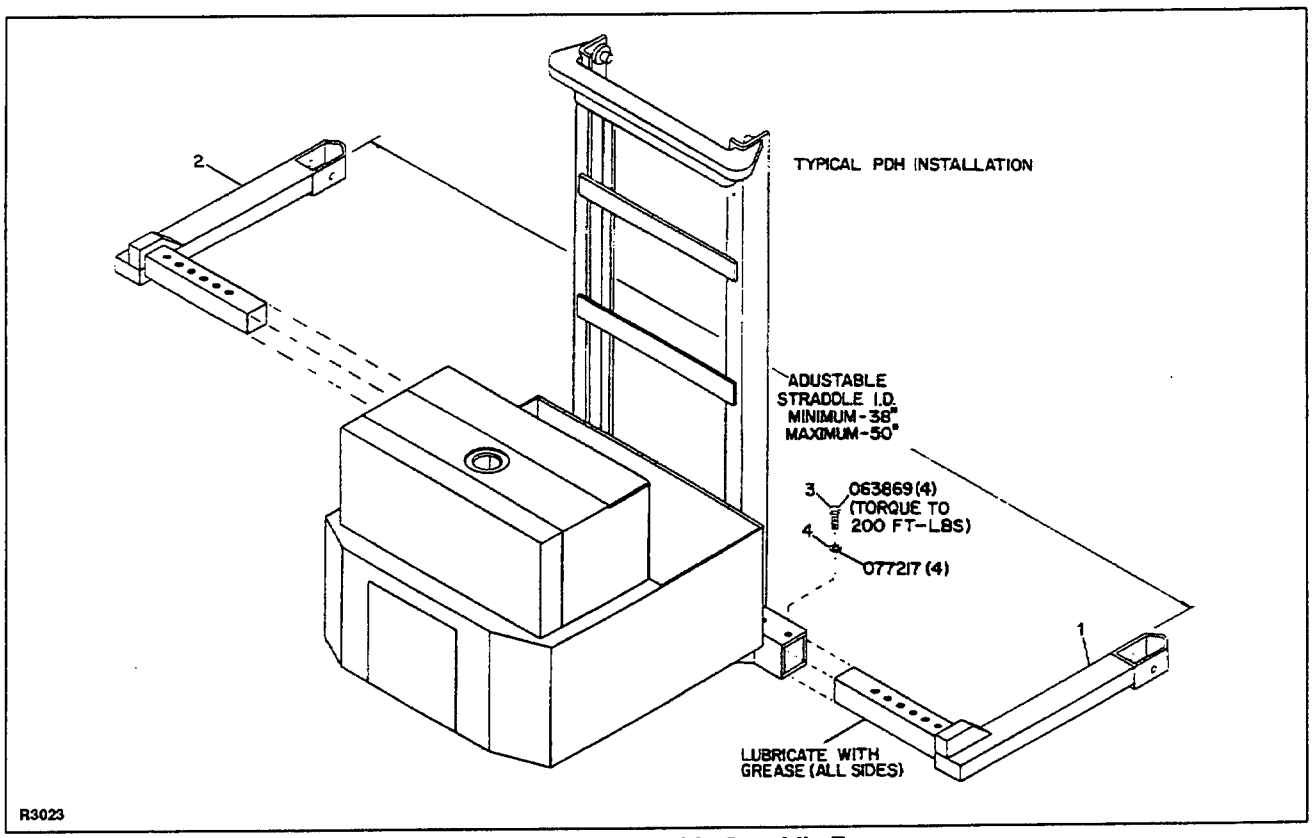


Figure 12-11. Adjustable Straddle Frame

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	504987-01	STRADDLE 4 IN. WHEEL SINGLE, RH	1
1	504987-02	STRADDLE 4 IN. WHEEL TANDEM, RH	1
1	504987-03	STRADDLE 6 IN. WHEEL SINGLE, RH	1
1	504987-04	STRADDLE 6 IN. WHEEL TANDEM, RH	1
2	504988-01	STRADDLE 4 IN. WHEEL SINGLE, LH	1
2	504988-02	STRADDLE 4 IN. WHEEL TANDEM, LH	1
2	504988-03	STRADDLE 6 IN. WHEEL SINGLE, LH	1
2	504988-04	STRADDLE 6 IN. WHEEL TANDEM, LH	1
3	063869	HEX CAP SCREW, 3/4-10 X 2	4
4	077217	LOCK WASHER, 3/4	4
—	057118-01	ITA FORK 30 IN. LONG (NOT SHOWN)	2
—	057118-02	ITA FORK 36 IN. LONG (NOT SHOWN)	2
—	057118-03	ITA FORK 42 IN. LONG (NOT SHOWN)	2
—	057118-04	ITA FORK 48 IN. LONG (NOT SHOWN)	2

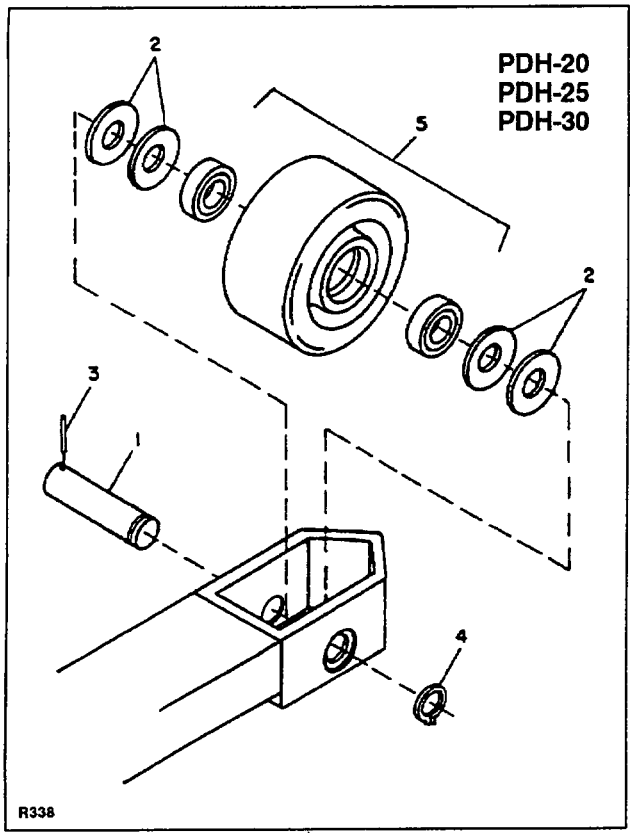


Figure 12-12A. Load Wheels (PDH-20, -25, -30)

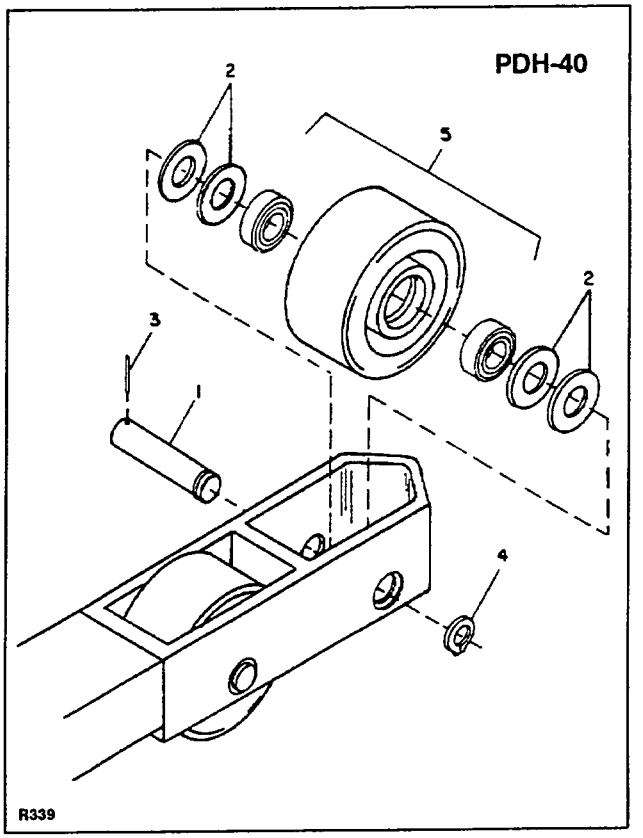


Figure 12-12B. Load Wheels (PDH-40)

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	050703	AXLE 4 IN. (STANDARD)	2
2	077033	WASHER, SPACER	4
3	060976	ROLL PIN	2
4	061725	SNAP RING	2
5	078414	WHEEL AND BEARING ASSEMBLY POLYURETHANE, 4 IN. DIA. (STANDARD)	2
—	078433	. WHEEL, POLYURETHANE, 4 IN. DIA.	1
—	051136	. BALL BEARING	2
5	078237	WHEEL AND BEARING ASSEMBLY POLYURETHANE, 3 IN. DIA.	2
—	078236	. WHEEL, POLYURETHANE, 3 IN. DIA.	1
—	051136	. BALL BEARING	2
5	078217	WHEEL AND BEARING ASSEMBLY POLYURETHANE, 3-3/8 IN. DIA.	2
—	078228	. WHEEL, POLYURETHANE, 3-3/8 IN. DIA.	1
—	051136	. BALL BEARING	2
5	078518	WHEEL AND BEARING ASSEMBLY POLYURETHANE, 5 IN. DIA.	2
—	078561	. WHEEL, POLYURETHANE, 5 IN. DIA.	1
—	051136	. BALL BEARING	2

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	050703	AXLE 4 IN. (STANDARD)	4
2	077033	WASHER, SPACER	8
3	060976	ROLL PIN	4
4	061725	SNAP RING	4
5	078414	WHEEL AND BEARING ASSEMBLY POLYURETHANE, 4 IN. DIA. (STANDARD)	4
—	078433	. WHEEL, POLYURETHANE, 4 IN. DIA.	1
—	051136	. BALL BEARING	2
5	078237	WHEEL AND BEARING ASSEMBLY POLYURETHANE, 3 IN. DIA.	4
—	078236	. WHEEL, POLYURETHANE, 3 IN. DIA.	1
—	051136	. BALL BEARING	2
5	078217	WHEEL AND BEARING ASSEMBLY POLYURETHANE, 3-3/8 IN. DIA.	4
—	078228	. WHEEL, POLYURETHANE, 3-3/8 IN. DIA.	1
—	051136	. BALL BEARING	2
5	078518	WHEEL AND BEARING ASSEMBLY POLYURETHANE, 5 IN. DIA.	4
—	078561	. WHEEL, POLYURETHANE, 5 IN. DIA.	1
—	051136	. BALL BEARING	2

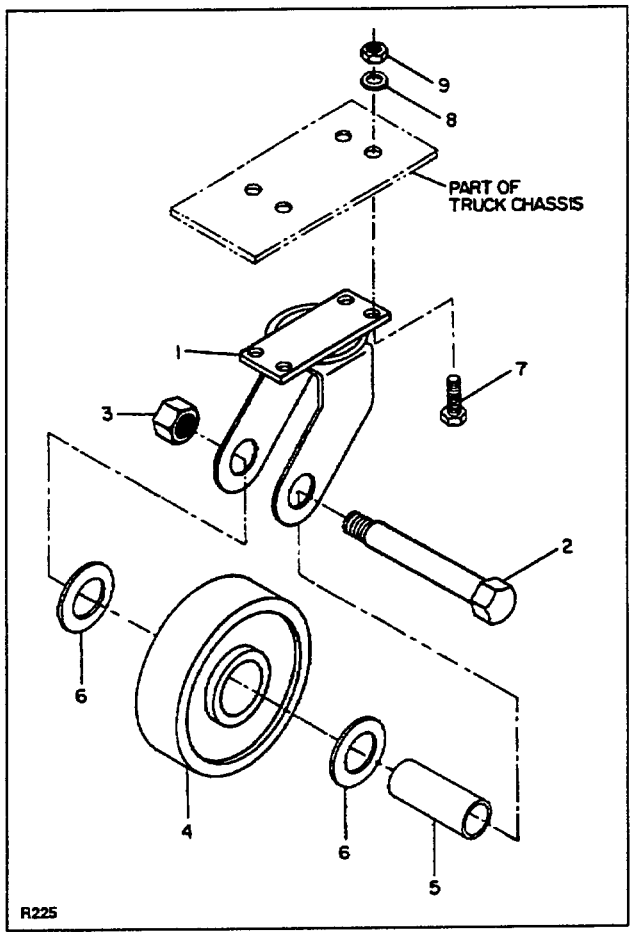


Figure 12-13. Caster Wheel

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	054607	CASTER & WHEEL ASSY, 6 IN. POLYURETHANE	
1	054608	. CASTER ASSY	1
2	050707	. AXLE	1
3	059650	. NUT	1
4	078614	. WHEEL & BEARING ASSY, 6 IN. POLYURETHANE	1
5	052904	. AXLE BUSHING	1
6	077033	. SPACER	2
7	063705	HEX HEAD CAP SCREW, 1/2-13 X 1-1/4	4
8	077213	LOCK WASHER, 1/2	4
9	059437	HEX NUT, 1/2-13	4

NOTES

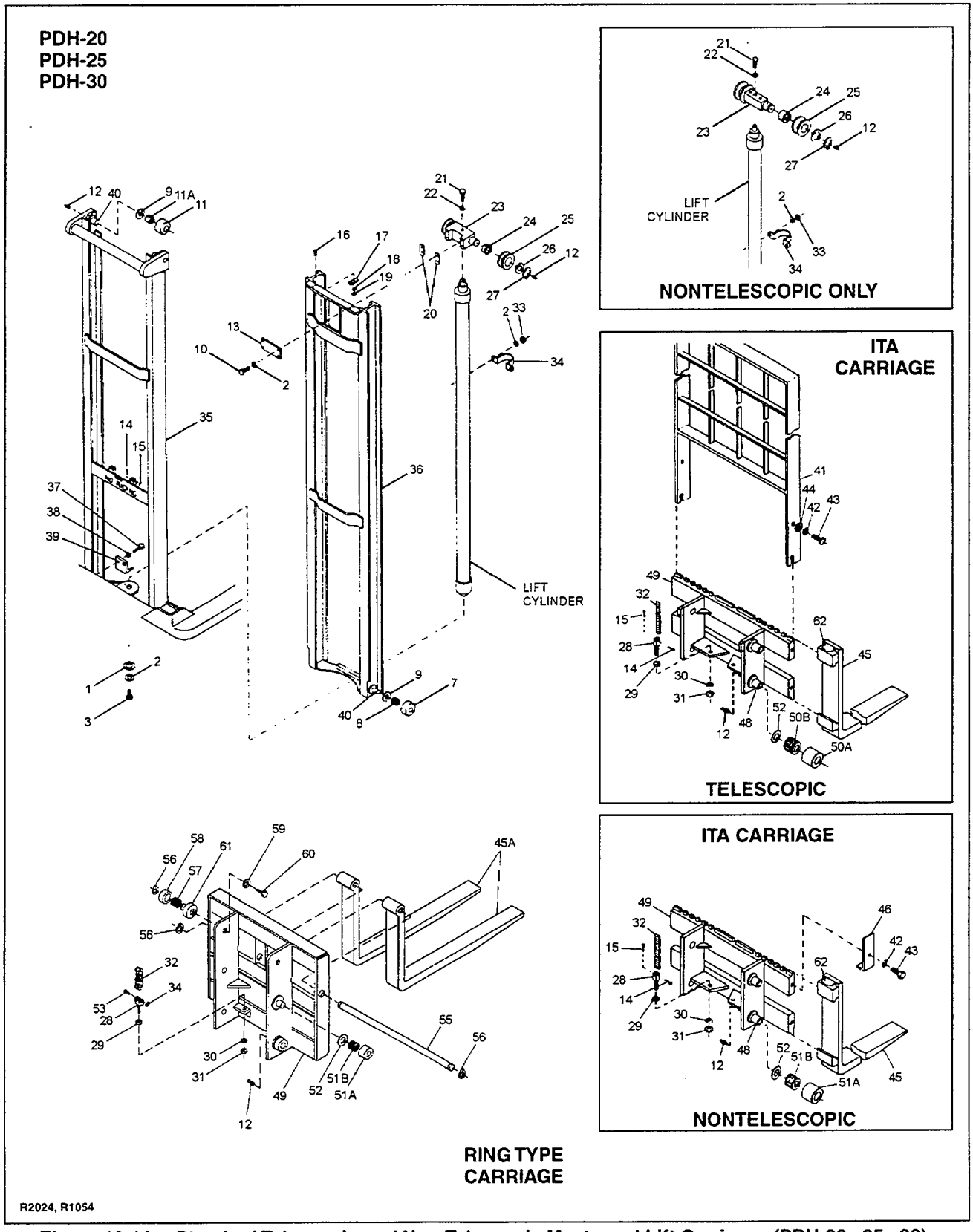


Figure 12-14. Standard Telescopic and Non-Telescopic Masts and Lift Carriages (PDH-20, -25, -30)

INDEX NO.	PART NO.	PART NAME	NO. REQD.
PARTS APPLICABLE TO ALL MODELS			
1	077076	FLAT WASHER 1-1/2 X 13/32 X 7	1
2	077211	LOCK WASHER, 3/8	5
3	064605	HEX HEAD CAP SCREW, 3/8-16 X 1, HEAT TREATED	1
—	500166	CARRIAGE MAST ROLLER ASSY	2
7	243401	. ROLLER	2
8	051145	. BEARING	2
9	053012	THRUST WASHER, 2-1/4 X 3/32 THK.	A/R
9	053013	THRUST WASHER, 2-1/4 X 1/8 THK.	A/R
9	053014	THRUST WASHER, 2-1/4 X 5/32 THK.	A/R
9	053015	THRUST WASHER, 2-1/4 X 3/16 THK.	A/R
10	064607	HEX HEAD CAP SCREW, 3/8-16 X 1-1/4	4
—	500167	CARRIAGE MAST ROLLER ASSY	2
11	401046	. ROLLER	2
11A	051145	. BEARING	2
12	025712	GREASE FITTING	4
13	239520	CLAMP BAR	1
14	060402	COTTER PIN	4
15	402055	PIN, CHAIN	4
16	069483	FLAT HEAD SCREW	4
17	191089	STOP BLOCK	2
18	077209	SPLIT LOCK WASHER, 1/4	4
19	059421	HEX NUT	4
20	100016	SPACER	2
22	077213	SPLIT LOCK WASHER, 1/2	1
28	402051	ADJUSTING BOLT	2
29	059545	JAM NUT, 5/8-18	2
30	077215	SPLIT LOCK WASHER, 5/8	2
31	059445	HEX NUT, 5/8-18	2
32	402034	CHAIN (60 IN. LIFT - 6.708 FT) (106 IN. LIFT - 12.42 FT) (130 IN. LIFT - 16.75 FT) (154 IN. LIFT - 20.83 FT) (168 IN. LIFT - 23.04 FT)	2
33	059429	HEX NUT, 3/8-16	1
34	101098	CYLINDER CLAMP	1
35	VAR	OUTER MAST	1
36	VAR	INNER MAST	1
40	236001	SPINDLE	4
41	503695	LOAD BACKREST 1-1/2 IN. FORKS, 24 IN WIDE	1
41	503696	LOAD BACKREST 1-1/2 IN. FORKS, 32 IN WIDE	1
41	503697	LOAD BACKREST 1-1/2 IN. FORKS, 35 IN WIDE	1
42	077215	SPLIT LOCK WASHER, 5/8	4
43	068820	HEX HEAD CAP SCREW	4
44	077066	ROUND WASHER	3
45	057115	HOOK-TYPE FORK, 30 X 1-1/2 ITA	2
45	057172	HOOK-TYPE FORK, 36 X 1-1/2 ITA	2
45	057173	HOOK-TYPE FORK, 42 X 1-1/2 ITA	2
45	057174	HOOK-TYPE FORK, 48 X 1-1/2 ITA	2
45A	500330	RING-TYPE FORK, 36 X 1-1/2	2
45A	500331	RING-TYPE FORK, 42 X 1-1/2	2
45A	500332	RING-TYPE FORK, 48 X 1-1/2	2
46	401527	BAR, FOR RETAINER (TRUCKS WITHOUT BACKREST)	2
48	500126	SPINDLE	4
49	VAR	LIFT CARRIAGE	1
53	060303	CLEVIS PIN	4
54	060402	COTTER PIN	4
55	276604	FORK SHAFT	1
56	061729	SNAP RING	2
—	906020	ROLLER ASSEMBLY	2
57	051145	. BEARING	2
58	906019	. ROLLER	2
59	077076	WASHER	1
60	069605	SCREW	1
61	236006	SPINDLE	1
62	900924	LATCH HANGER KIT	2
PARTS APPLICABLE TO TELESCOPIC MODEL			
21	064709	HEX HEAD CAP SCREW	1
—	501368	RAM HEAD ASSEMBLY	
23	501290	. RAM HEAD	1
24	051120	. BEARING	2
25	074251	. SHEAVE	2
26	077022	. FLAT WASHER	2
27	061727	. RETAINER RING	2
12	025712	. GREASE FITTING	1
37	064607	HEX HEAD CAP SCREW, 3/8-16 X 1-1/4	2
38	077211	LOCK WASHER	2
39	313001	ANGLE	1
—	500167	CARRIAGE MAST ROLLER ASSY	4
50A	401046	. CARRIAGE MAST ROLLER	4
50B	051145	. BEARING	4
52	053012	THRUST WASHER, 2-1/4 X 3/32 THK.	A/R
52	053013	THRUST WASHER, 2-1/4 X 1/8 THK.	A/R
52	053014	THRUST WASHER, 2-1/4 X 5/32 THK.	A/R
52	053015	THRUST WASHER, 2-1/4 X 3/16 THK.	A/R
PARTS APPLICABLE TO NON-TELESCOPIC MODELS			
21	064709	HEX HEAD CAP SCREW	1
—	500242	RAM HEAD ASSEMBLY	
23	057756	. RAM HEAD	1
24	051120	. BEARING	2
25	074251	. SHEAVE	2
26	077022	. FLAT WASHER	2
27	061727	. RETAINER RING	2
12	025712	. GREASE FITTING	1
—	500166	CARRIAGE MAST ROLLER ASSY	4
51A	243401	. CARRIAGE MAST ROLLER	4
51B	051145	. BEARING	4
52	053012	THRUST WASHER, 2-1/4 X 3/32 THK.	A/R
52	053013	THRUST WASHER, 2-1/4 X 1/8 THK.	A/R
52	053014	THRUST WASHER, 2-1/4 X 5/32 THK.	A/R
52	053015	THRUST WASHER, 2-1/4 X 3/16 THK.	A/R

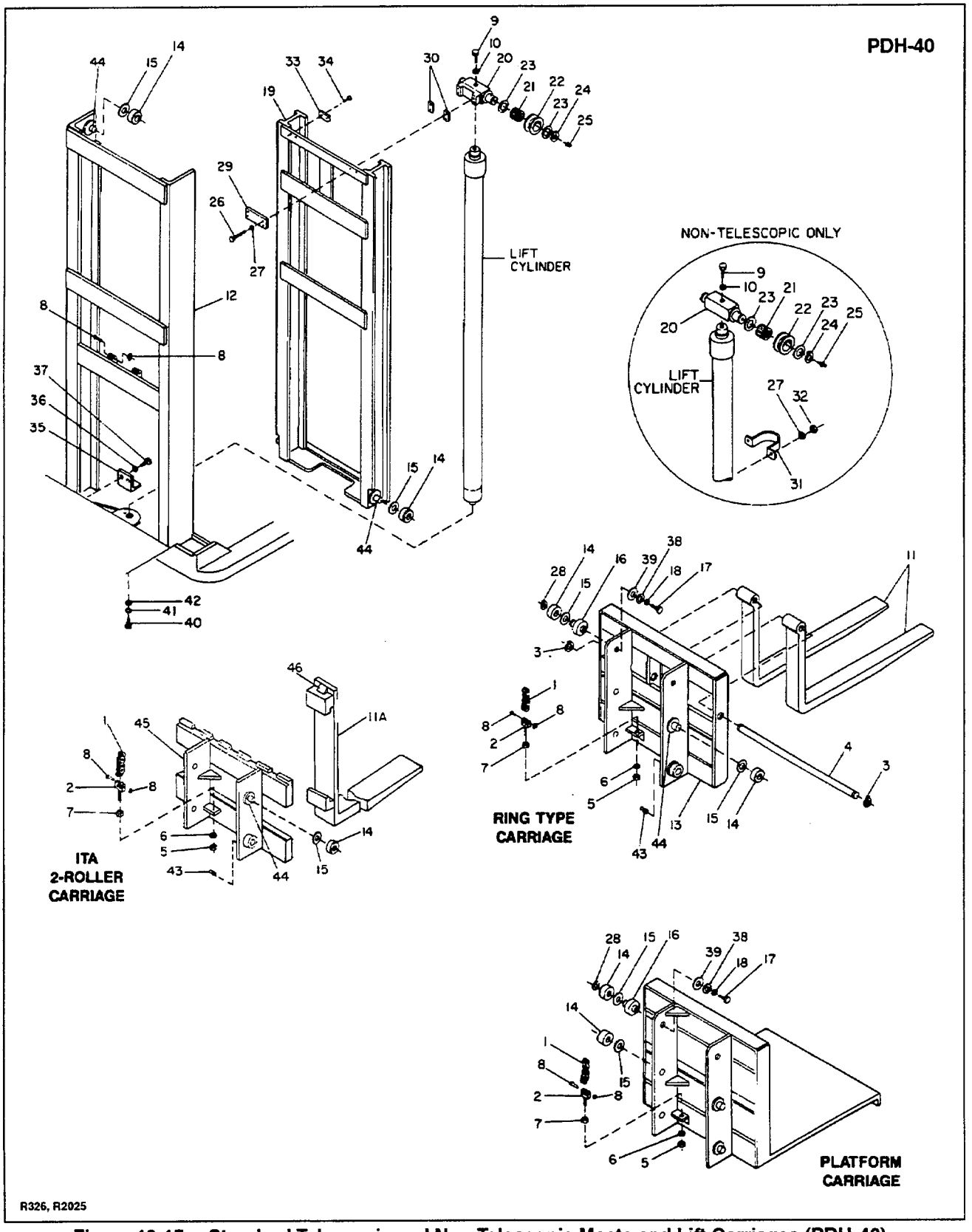


Figure 12-15. Standard Telescopic and Non-Telescopic Masts and Lift Carriages (PDH-40)

INDEX NO.	PART NO.	PART NAME	NO. REQD.
PARTS APPLICABLE TO ALL MODELS			
1	313200	CHAIN (60 IN. LIFT - 7.45 FT) (106 IN. LIFT - 14.83 FT) (130 IN. LIFT - 19.16 FT) (154 IN. LIFT - 22.79 FT) (168 IN. LIFT - 25.25 FT)	2
2	312203	LIFT CHAIN BOLT	2
3	061729	SNAP RING (RING TYPE CARRIAGE ONLY)	2
4	276604	FORK SHAFT (RING TYPE CARRIAGE ONLY)	2
5	059447	HEX NUT, 3/4-16	2
6	077217	LOCK WASHER, 3/4	2
7	059547	JAM NUT, 3/4-16	2
8	060314	CLEVIS PIN W/RETAINING RING	4
9	063709	HEX HEAD CAP SCREW, 1/2-13 X 1-1/2	1
10	077213	LOCK WASHER, 1/2	1
11	500333	RING-TYPE FORK, 36 X 2	2
11	500334	RING-TYPE FORK, 42 X 2	2
11	500335	RING-TYPE FORK, 48 X 2	2
11A	057159	ITA-TYPE FORK, 30 X 1-3/4	2
11A	057129	ITA-TYPE FORK, 36 X 1-3/4	2
11A	057112	ITA-TYPE FORK, 42 X 1-3/4	2
11A	057113	ITA-TYPE FORK, 48 X 1-3/4	2
12	VAR	OUTER MAST	1
44	303601	SPINDLE	4
PARTS APPLICABLE TO TELESCOPIC MODELS			
13	VAR	LIFT CARRIAGE ASSY	1
13	VAR	LIFT CARRIAGE ASSY, ITA.	1
14	062320	ROLLER ASSY	10
15	077077	SPACER 7 GA	A/R
15	077078	SPACER 9 GA	A/R
15	077079	SPACER 11 GA	A/R
15	077080	SPACER 14 GA	A/R
16	303602	SPINDLE	2
17	064607	HEX HEAD CAP SCREW, 3/8-16 X 1-1/4	2
18	077211	LOCK WASHER, 3/8	2
19	—	INNER MAST ASSY	1
20	501437	RAM HEAD	1
21	051210	BEARING	1
22	289202	SHEAVE	1
23	053013	WASHER	2
24	061729	SNAP RING	1
25	025712	GREASE FITTING	1
26	064609	HEX HEAD CAP SCREW, 3/4-10 X 3-3/4	4
27	077211	LOCK WASHER	4
28	061731	SNAP RING	2
29	239520	CLAMP BAR	1
30	100016	WEAR SPACER	1
33	191162	BAR DRILLED	2

INDEX NO.	PART NO.	PART NAME	NO. REQD.
34	069605	SCREW, FLAT HEAD, 3/8-16 X 1	4
35	313001	ANGLE BRACKET	1
36	077211	LOCK WASHER, 3/8	2
37	064607	HEX HEAD CAP SCREW, 3/8-16 X 1-1/4	2
38	077076	WASHER	2
39	053004	THRUST WASHER, 3/32 THK.	A/R
39	053005	THRUST WASHER, 1/8 THK.	A/R
39	053006	THRUST WASHER, 5/32 THK.	A/R
39	053007	THRUST WASHER, 3/16 THK.	A/R
43	025712	GREASE FITTING	4
46	900924	HANGER LATCH KIT	2
PARTS APPLICABLE TO NON-TELESCOPIC MODELS			
13	VAR	LIFT CARRIAGE ASSY	1
13	VAR	LIFT CARRIAGE ASSY, ITA.	1
14	062320	ROLLER ASSY	4
15	077077	SPACER 7 GA	A/R
15	077078	SPACER 9 GA	A/R
15	077079	SPACER 11 GA	A/R
15	077080	SPACER 14 GA	A/R
20	313101	RAM HEAD	1
21	051210	BEARING	2
22	289202	SHEAVE	2
23	053013	WASHER	4
24	061729	SNAP RING	1
25	025712	GREASE FITTING	2
27	077211	SPLIT LOCK WASHER	2
31	101098	CLAMP	1
32	059429	HEX NUT	2
40	064605	HEX HEAD CAP SCREW, 3/8-16 X 1	1
41	077076	FLAT WASHER 7 GA	1
42	077211	LOCK WASHER	1
43	025712	GREASE FITTING	4
46	900924	HANGER LATCH KIT	2
PARTS APPLICABLE TO PLATFORM LIFT			
14	062320	ROLLER ASSY	6
15	077077	SPACER 7 GA	A/R
15	077078	SPACER 9 GA	A/R
15	077079	SPACER 11 GA	A/R
15	077080	SPACER 14 GA	A/R
16	303602	SPINDLE	2
17	064607	HEX HEAD CAP SCREW, 3/8-16 X 1-1/4	2
18	077211	LOCK WASHER, 3/8	2
28	061731	SNAP RING	2
38	077076	WASHER	2
39	053004	THRUST WASHER, 3/32 THK.	A/R
39	053005	THRUST WASHER, 1/8 THK.	A/R
39	053006	THRUST WASHER, 5/32 THK.	A/R
39	053007	THRUST WASHER, 3/16 THK.	A/R
45	504664	CARRIAGE WELDMENT	1

PDH-20
PDH-25
PDH-30

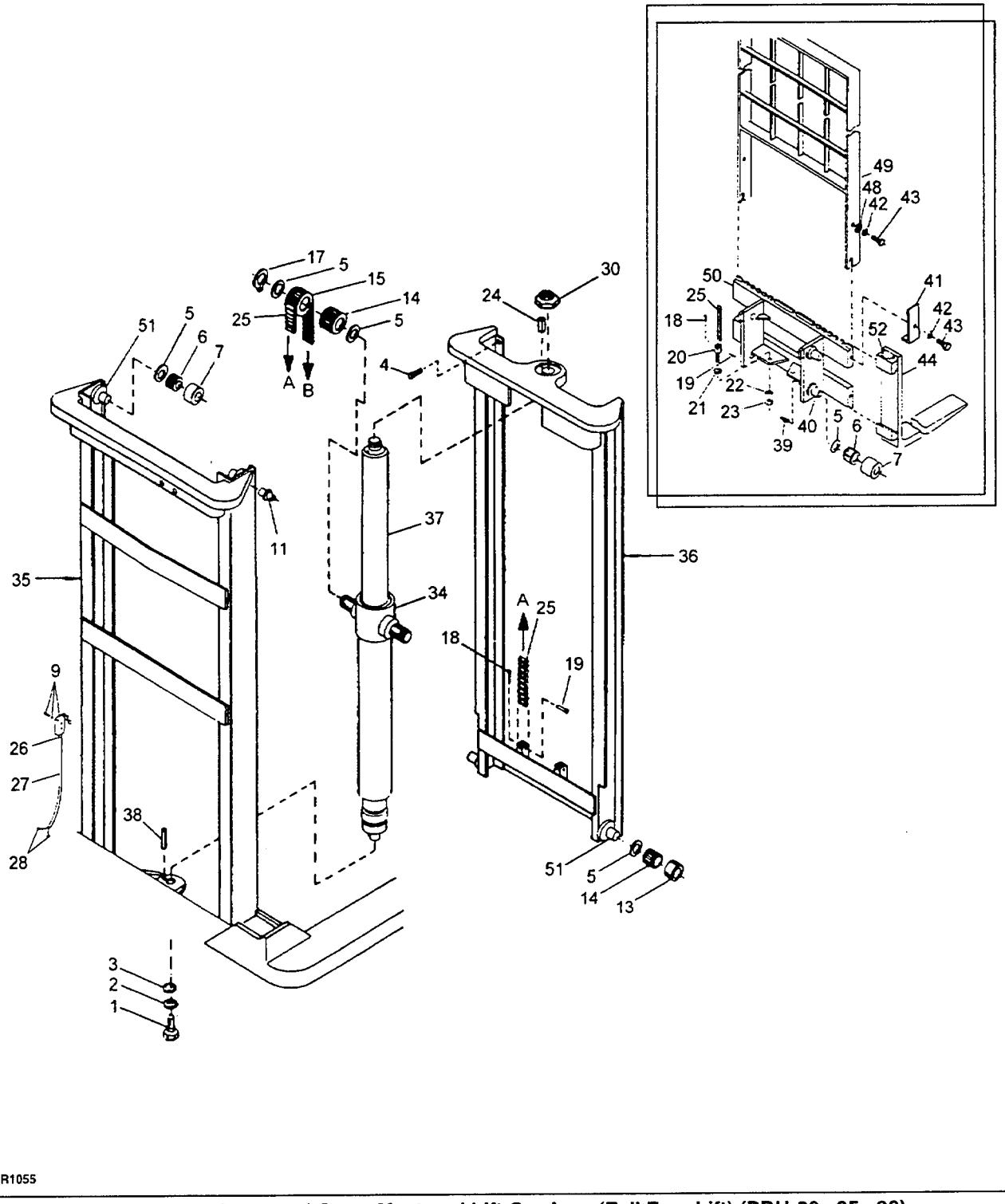
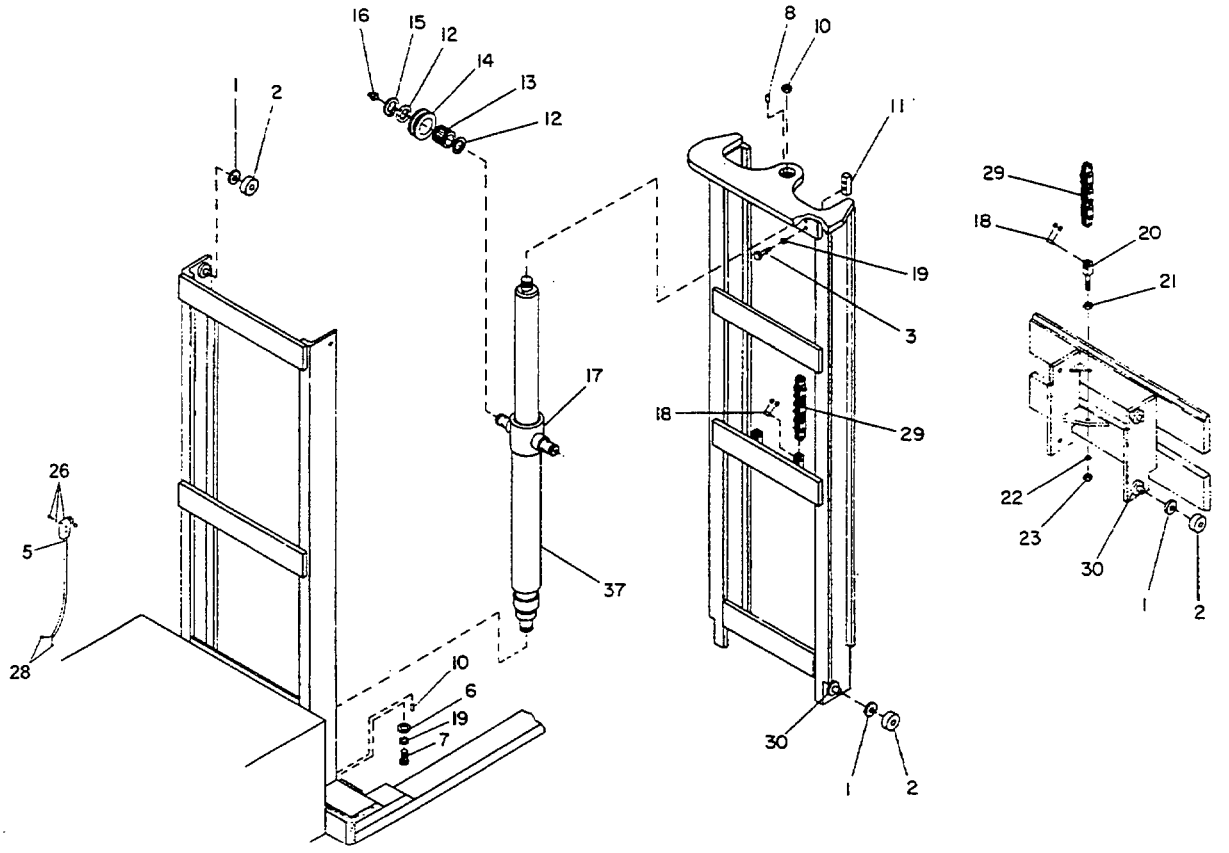


Figure 12-16. Inner and Outer Mast and Lift Carriage (Full Free Lift) (PDH-20, -25, -30)

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	064605	HEX HEAD CAP SCREW, 3/8-16 X 1, HEAT TREATED	1
2	077211	SPLIT LOCK WASHER	1
3	077076	FLAT WASHER 1-1/2 X 13/32 X 7	1
4	064603	HEX HEAD CAP SCREW, 3/8-16 X 3/4	2
5	053012	THRUST WASHER, 2-1/4 X 3/32 THK.	A/R
5	053013	THRUST WASHER, 2-1/4 X 1/8 THK.	A/R
5	053014	THRUST WASHER, 2-1/4 X 5/32 THK.	A/R
5	053015	THRUST WASHER, 2-1/4 X 3/16 THK.	A/R
—	500167	CARRIAGE MAST ROLLER ASSY	6
6	051145	. BEARING	6
7	401046	. CARRIAGE MAST ROLLER,	6
9	020703	MICROSWITCH	1
11	025712	GREASE FITTING	2
—	500166	OUTER MAST ROLLER ASSY	
13	243401	. OUTER MAST ROLLER	2
14	051145	. BEARING	2
15	074269	SHEAVE	2
17	061729	EXTERNAL RETAINING RING	2
18	060402	COTTER PIN, 1/16 X 3/8	4
19	402055	CHAIN CLEVIS PIN 0.200 DIA X 1	4
20	402051	CHAIN BOLT	2
21	059545	HEX JAM NUT, 5/8-18	2
22	077215	SPLIT LOCK WASHER, 5/8	2
23	059445	HEX NUT, 5-40	2
24	061020	ROLL PIN	1
25	402034	CHAIN (106 IN. LIFT - 11.75 FT) (130 IN. LIFT - 13.75 FT)	2
26	005405	STRAIN RELIEF	1
27	004724	CABLE	AR

INDEX NO.	PART NO.	PART NAME	NO. REQD.
28	021203	INSULATED RING TERMINAL	4
29	056114	CLAMP	3
30	059129	LOCK NUT	1
31	065525	HEX HEAD CAP SCREW, 1/4-20 X 5/8	3
32	077209	SPLIT LOCK WASHER, 1/4	3
33		NOT USED	
34	503712	SHEAVE COLLAR	1
35	VAR	OUTER MAST	1
36	VAR	INNER MAST	1
37	VAR	LIFT CYLINDER (FIG 12-30, 12-31, AND 12-32)	1
38	061023	ROLL PIN	1
39	025712	GREASE FITTING	4
40	501867	SPINDLE	4
41	401257	BAR FORK RETAINER	2
42	077215	SPLIT LOCK WASHER, 5/8	2
43	063820	HEX HEAD CAP SCREW	2
44	057115	HOOK-TYPE FORK, 30 X 1-1/2 ITA	2
44	057172	HOOK-TYPE FORK, 36 X 1-1/2 ITA	2
44	057173	HOOK-TYPE FORK, 42 X 1-1/2 ITA	2
44	057174	HOOK-TYPE FORK, 48 X 1-1/2 ITA	2
48	077066	WASHER	3
49	503695	LOAD BACKREST, 1-1/2 IN, FORKS 24 IN WIDE	1
49	503696	LOAD BACKREST, 1-1/2 IN, FORKS 32 IN WIDE	1
49	503697	LOAD BACKREST, 1-1/2 IN, FORKS 35 IN WIDE	1
50	VAR	LIFT CARRIAGE	1
51	236001	SPINDLE	4
52	900924	LATCH HANGER KIT	2



SEE FIGURE 12-15 FOR BACKREST AND FORK RETAINING BAR PARTS INFORMATION

R1856

Figure 12-17. Inner and Outer Mast and Lift Carriage (Full Free Lift) (PDH-40)

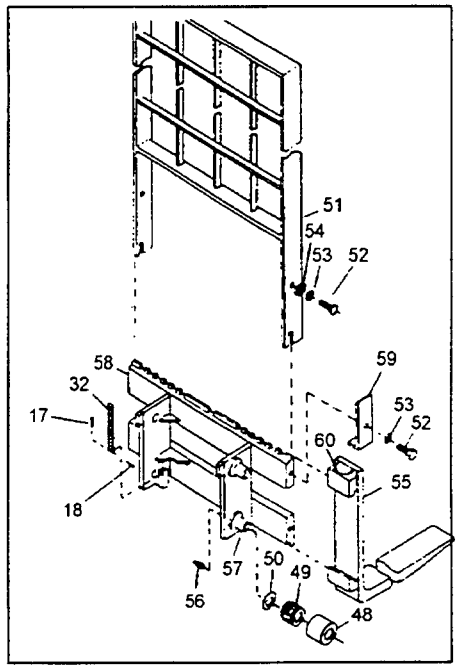
INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	077077	SPACER 7 GA	A/R
1	077078	SPACER 9 GA	A/R
1	077079	SPACER 11 GA	A/R
1	077080	SPACER 14 GA	A/R
2	062320	ROLLER ASSY	8
3	064607	HEX HEAD CAP SCREW, 3/8-16 X 1-1/4	4
5	005405	STRAIN RELIEF	1
6	077076	FLAT WASHER	1
7	064605	HEX HEAD CAP SCREW, 3/8-16 X 1, HEAT TREATED	1
8	061020	ROLL PIN	1
10	059129	LOCK NUT	1
11	401895	CARRIAGE STOP	2
12	053012	THRUST WASHER, 2-1/4 X 3/32 THK.	A/R
12	053013	THRUST WASHER, 2-1/4 X 1/8 THK.	A/R

INDEX NO.	PART NO.	PART NAME	NO. REQD.
13	051210	ROLLER BEARING	2
14	289202	SHEAVE-CHAIN	2
15	061729	EXTERNAL RETAINING RING	2
16	025712	GREASE FITTING	2
17	503712	SHEAVE COLLAR	1
18	060314	CLEVIS PIN W/ RETAINING RING	4
19	077211	SPLIT LOCK WASHER	5
20	312203	LIFT CHAIN BOLT	2
21	059547	JAM NUT, 3/4-16	2
22	077217	LOCK WASHER, 3/4	2
23	059447	HEX NUT, 3/4-16	2
26	020703	LIMIT SWITCH	1
28	021236	TERMINAL, RING	2
29	313200	CHAIN	A/R
30	303601	SPINDLE	6
37	VAR	LIFT CYLINDER (FIG 12-30, 12-31, AND 12-32)	1

PDH-20
PDH-25
PDH-30

A. ROUTED AROUND SHEAVE 36 TO LIFT CARRIAGE

B. ROUTED AROUND SHEAVE 23 TO CHAIN LUG 16 AT TOP OF OUTER MAST



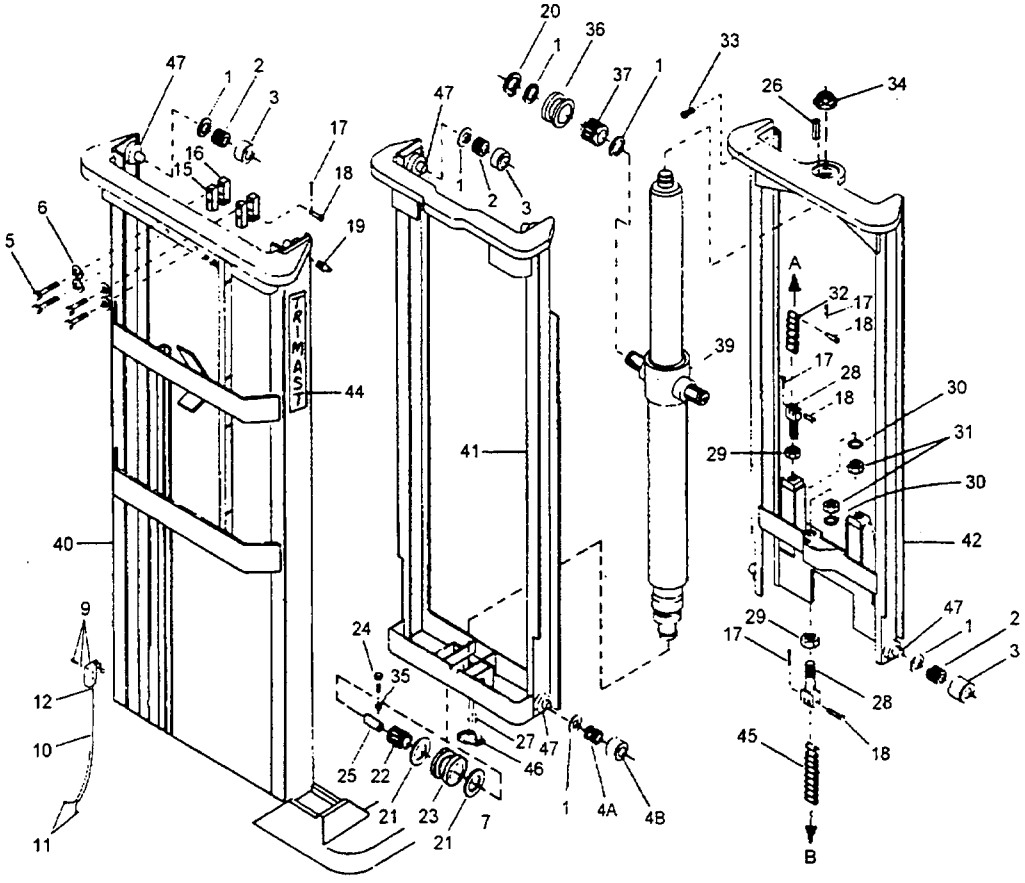


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Figure 12-18. Inner and Outer Mast and Lift Carriage (TRIMAST) (PDH-20, -25, -30)

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	053012	THRUST WASHER, 2-1/4 X 3/32 THK.	A/R
1	053013	THRUST WASHER, 2-1/4 X 1/8 THK.	A/R
1	053014	THRUST WASHER, 2-1/4 X 5/32 THK.	A/R
1	053015	THRUST WASHER, 2-1/4 X 3/16 THK.	A/R
—	500167	CARRIAGE MAST ROLLER ASSY	4
2	051145	. BEARING	4
3	401046	. CARRIAGE MAST ROLLER	4
—	500166	OUTER MAST ROLLER ASSY	2
4A	051145	. BEARING	2
4B	243401	. OUTER MAST ROLLER	2
5	063624	HEX HEAD CAP SCREW	4
6	077211	SPLIT LOCK WASHER, 3/8	4
9	020703	MICROSWITCH	1
10	004724	CABLE	2
11	021203	INSULATED RING TERMINAL	4
12	005405	CONNECTOR	1
15	201268	CHAIN LUG SPACER	2
16	402053	CHAIN LUG	2
17	060402	COTTER PIN, 1/16 X 3/8	4
18	402055	CHAIN CLEVIS PIN 0.200 DIA X 1	4
19	025712	GREASE FITTING	4
20	061729	EXTERNAL RETAINING RING	2
21	077022	MACHINE BUSHING WASHER	4
22	051222	ROLLER BEARING	2
23	074268	SHEAVE	2
24	063489	HEX HEAD CAP SCREW	2
25	400733	SHEAVE SHAFT	2
26	061020	ROLL PIN	1
27	061023	ROLL PIN, 5/15 X 3/4	1
28	402051	CHAIN BOLT	2
29	059545	HEX JAM NUT, 5/8-18	2
30	077215	SPLIT LOCK WASHER, 5/8	2
31	059445	HEX NUT, 5-40	2
32	402034	CHAIN (158 IN. LIFT-11.58 FT) (194 IN. LIFT - 13.42 FT)	2
33	064603	HEX HEAD CAP SCREW, 3/8-16 X 3/4	2
34	059129	LOCK NUT	1
35	077209	SPLIT LOCK WASHER, 1/4	2
36	074269	SHEAVE	2
37	051210	. ROLLER BEARING	2
39	503711	SHEAVE COLLAR	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
40	VAR	OUTER MAST	1
41	VAR	INNER MAST	1
42	VAR	INNER-INNER MAST	1
43	VAR	LIFT CYLINDER (FIG 12-30, 12-31, 12-32)	1
44	056585	DECAL (TRIMAST)	2
45	402034	CHAIN (158 IN. LIFT - 11.58 FT) (194 IN. LIFT - 13.42 FT)	2
46	061736	SNAP RING	1
47	236001	SPINDLE	4
—	500167	CARRIAGE MAST ROLLER	4
48	401046	. ROLLER	4
49	051145	. BEARING	4
50	053012	THRUST WASHER, 2-1/4 X 3/32 THK.	A/R
50	053013	THRUST WASHER, 2-1/4 X 1/8 THK.	A/R
50	053014	THRUST WASHER, 2-1/4 X 5/32 THK.	A/R
50	053015	THRUST WASHER, 2-1/4 X 3/16 THK.	A/R
51	503695	LOAD BACKREST, 1-1/2 IN, FORKS 24 IN WIDE	1
51	503696	LOAD BACKREST, 1-1/2 IN, FORKS 32 IN WIDE	1
51	503697	LOAD BACKREST, 1-1/2 IN, FORKS 35 IN WIDE	1
52	077215	SPLIT LOCK WASHER, 5/8	4
53	063820	HEX HEAD CAP SCREW	4
54	077066	WASHER	3
55	057115	HOOK-TYPE FORK, 30 X 1-1/2 ITA	2
55	057172	HOOK-TYPE FORK, 36 X 1-1/2 ITA	2
55	057173	HOOK-TYPE FORK, 42 X 1-1/2 ITA	2
55	057174	HOOK-TYPE FORK, 48 X 1-1/2 ITA	2
55	057116	HOOK-TYPE FORK, 60 X 1-1/2 ITA	2
56	025712	GREASE FITTING	2
57	501867	SPINDLE	4
58	VAR	LIFT CARRIAGE	1
59	401257	BAR FORK RETAINER (TRUCKS WITHOUT BACKREST	2
60	900924	LATCH HANGER KIT	2

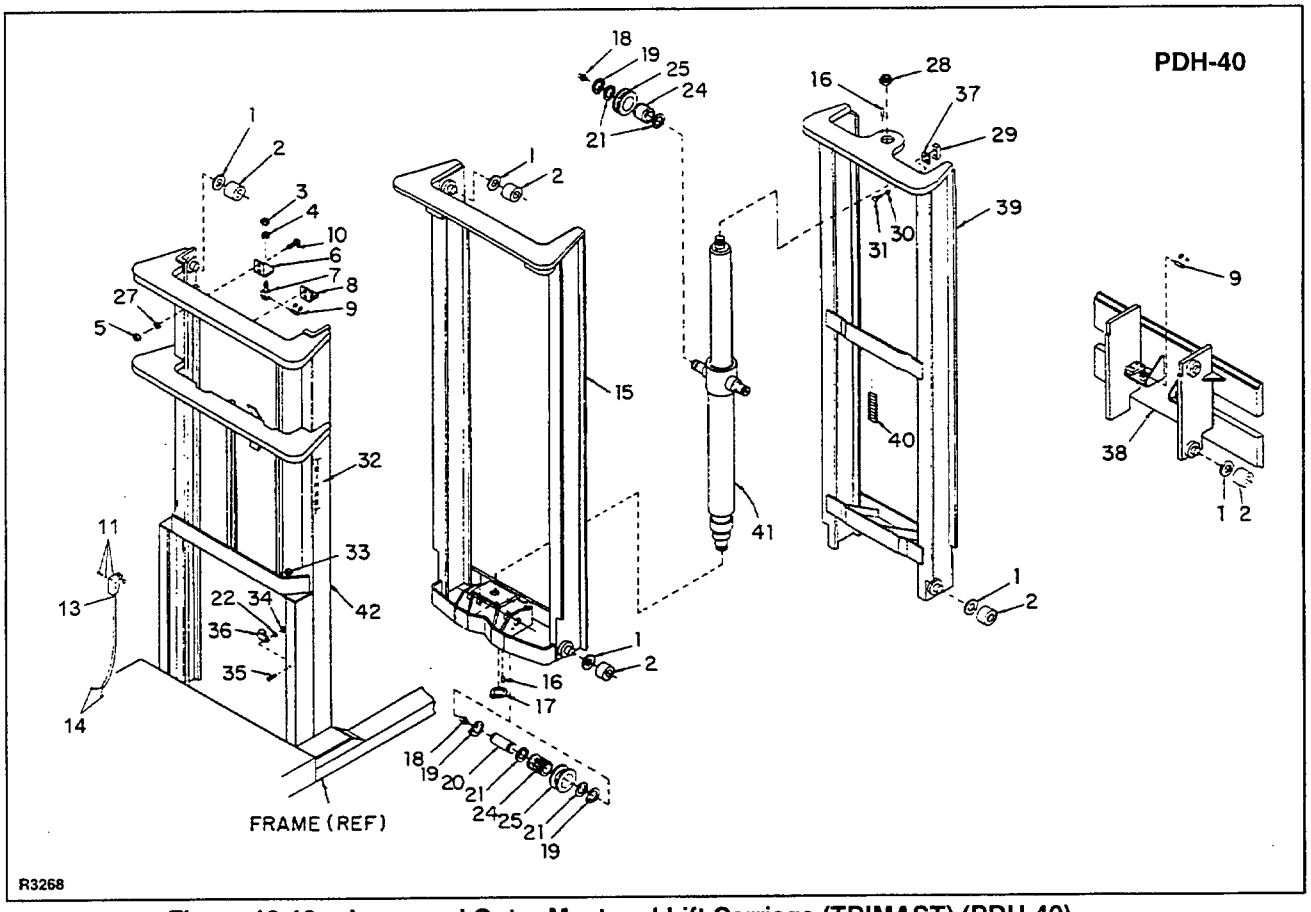


Figure 12-19. Inner and Outer Mast and Lift Carriage (TRIMAST) (PDH-40)

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	077077	SPACER 7 GA	A/R
1	077078	SPACER 9 GA	A/R
1	077079	SPACER 11 GA	A/R
1	077080	SPACER 14 GA	A/R
2	062320	ROLLER ASSY	12
3	059547	JAM NUT, 3/4-16	2
4	059900	WHEEL NUT, 3/4-16	2
5	059437	HEX NUT, 1/2-13	4
6	504334	CHAIN MOUNT LH	1
7	312203	LIFT CHAIN BOLT	2
8	504335	CHAIN MOUNT RH	1
9	060314	CLEVIS PIN W/ RETAINING RING	4
10	064711	HEX HEAD CAP SCREW, 1/2-13 X 5	4
11	020703	LIMIT SWITCH	1
13	005405	STRAIN RELIEF	1
14	021236	TERMINAL, RING	2
15	VAR	INNER MAST	1
16	061023	ROLL PIN, 5/15 X 3/4	1
17	061736	SNAP RING	1
18	025712	GREASE FITTING	4
19	061729	SNAP RING	6
20	401943	PIN SLEEVE	2
21	053013	THRUST WASHER, 2-1/4 X 1/8 THK.	A/R

INDEX NO.	PART NO.	PART NAME	NO. REQD.
21	053014	THRUST WASHER, 2-1/4 X 5/32 THK.	A/R
22	077209	SPLIT LOCK WASHER, 1/4	1
24	051210	ROLLER BEARING	4
25	289202	SHEAVE-CHAIN	4
27	077213	LOCK WASHER, 1/2	4
28	059129	LOCK NUT	1
29	401895	CARRIAGE STOP	2
30	077211	SPLIT LOCK WASHER, 3/8	4
31	064609	HEX HEAD CAP SCREW, 3/8-16 X 1-1/2	4
32	056585	DECAL (TRIMAST)	2
33	056110	CLAMP, HOSE	1
34	059421	HEX NUT 1/4-20	1
35	069480	FLAT HEAD SCREW, 1/4-20 X 1	1
36	056121	CLAMP, HOSE	1
37	403006	SPACER, CARRIAGE STOP	A/R
38	VAR	LIFT CARRIAGE	1
39	VAR	INNER-INNER MAST	1
40	313200	CHAIN	A/R
41	VAR	LIFT CYLINDER (FIG 12-30, 12-31 AND 12-32)	1
42	VAR	OUTER MAST	1

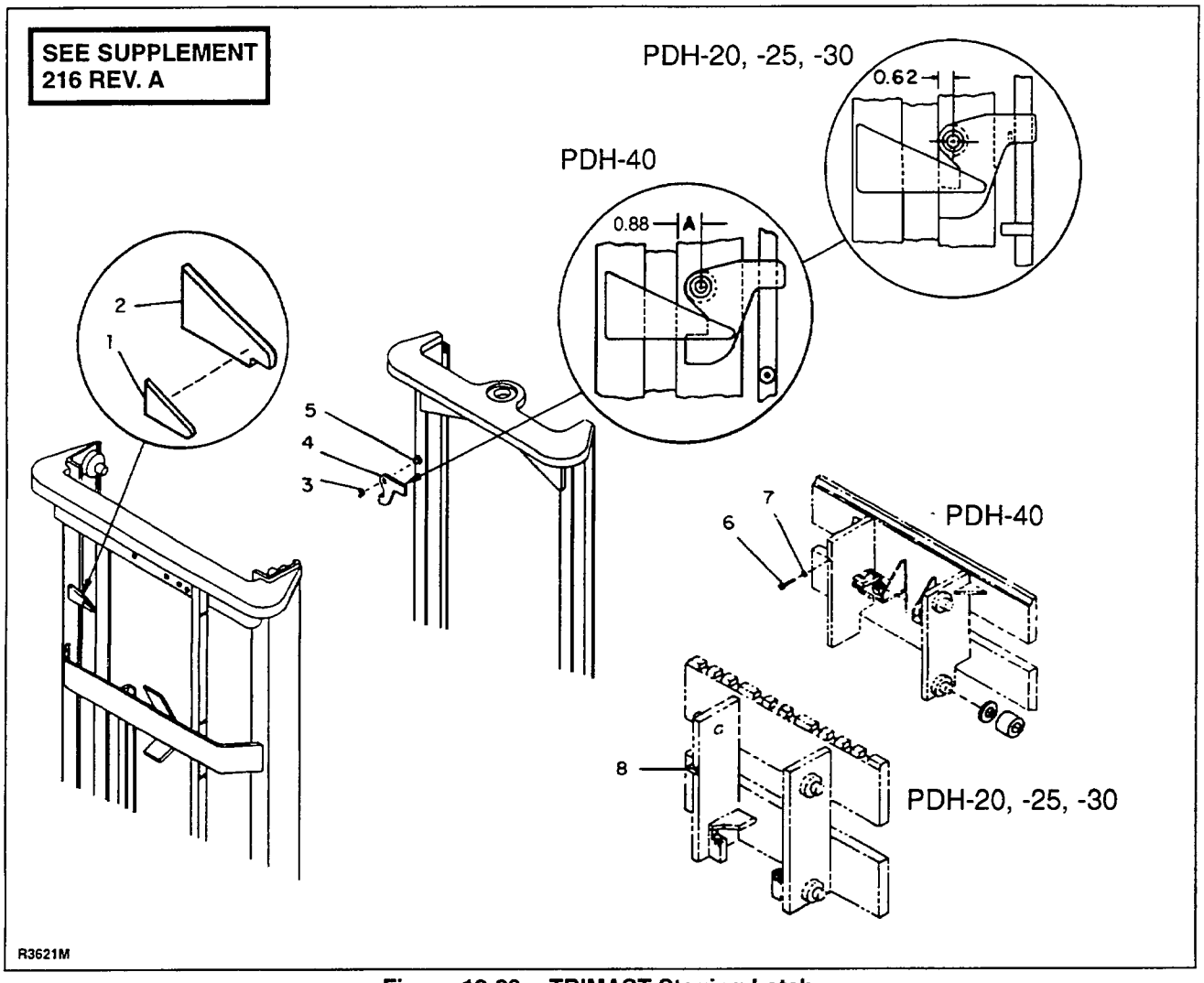


Figure 12-20. TRIMAST Staging Latch

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	403269	TAB-RETAINER	1
2	403212	STOP-LATCH	1
3	061713	RING-SNAP	1
4	505271	LATCH (PDH-20, -25, -30)	1
4	505254	LATCH (PDH-40)	1
5	403211	STUD-PIVOT	1
6	065603	BOLT (PDH-40)	1
7	077211	LOCK WASHER, 3/8 (PDH-40)	1
8	403264	TAB-LATCH (PDH-20, -25, -30)	1

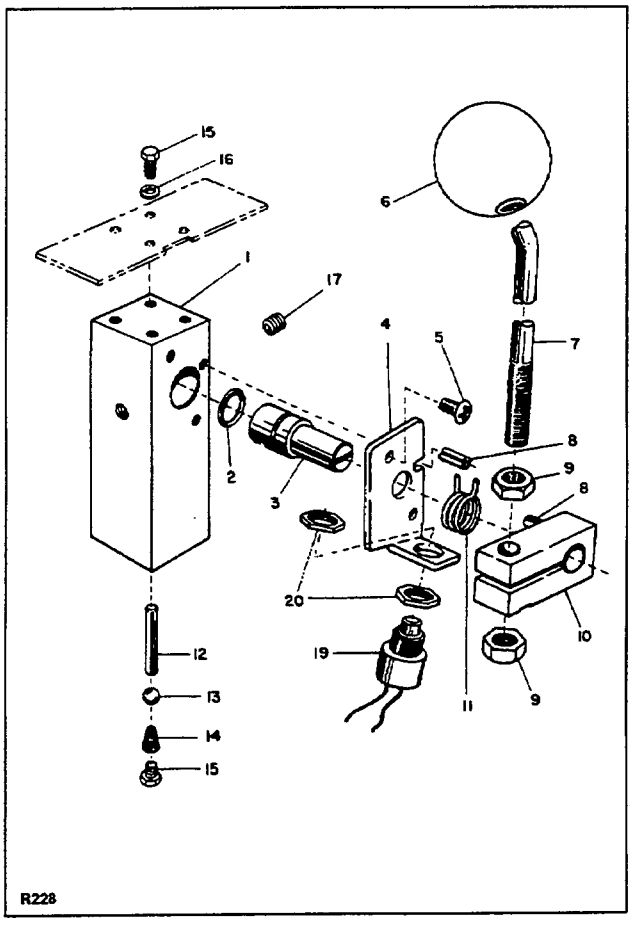


Figure 12-21. Lift Control Valve Assembly

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	504216-03	LIFT CONTROL VALVE ASSEMBLY WITH SWITCH	1
1	240501	. VALVE BODY	1
2	042104	. O-RING	1
3	304611	. RELEASE CAM	1
4	052803	. SWITCH BRACKET	1
5	070475	. MACHINE SCREW, 1/4-20 X 3/8	2
6	057952	. KNOB	1
7	057701	. LEVER	1
8	060937	. ROLL PIN	2
9	059529	. JAM NUT, 3/8-24	2
10	257401	. VALVE CLAMP	1
11	075015	. HANDLE RETURN SPRING	1
12	060608	. VALVE PIN 5/32 X 1-1/4	1
13	051404	. CHECK BALL, 3/8	1
14	075052	. COMPRESSION SPRING	1
15	063478	. HEX HEAD CAP SCREW, 1/4-20	4
16	077209	. LOCK WASHER,	4
17	026303	. PLUG,	1
18	026109	. NIPPLE WITH HEX NUT, 3/8	REF
19	500414	. SWITCH ASSEMBLY	1
20	059675	. SWITCH ADJUSTING NUT	2

NOTES

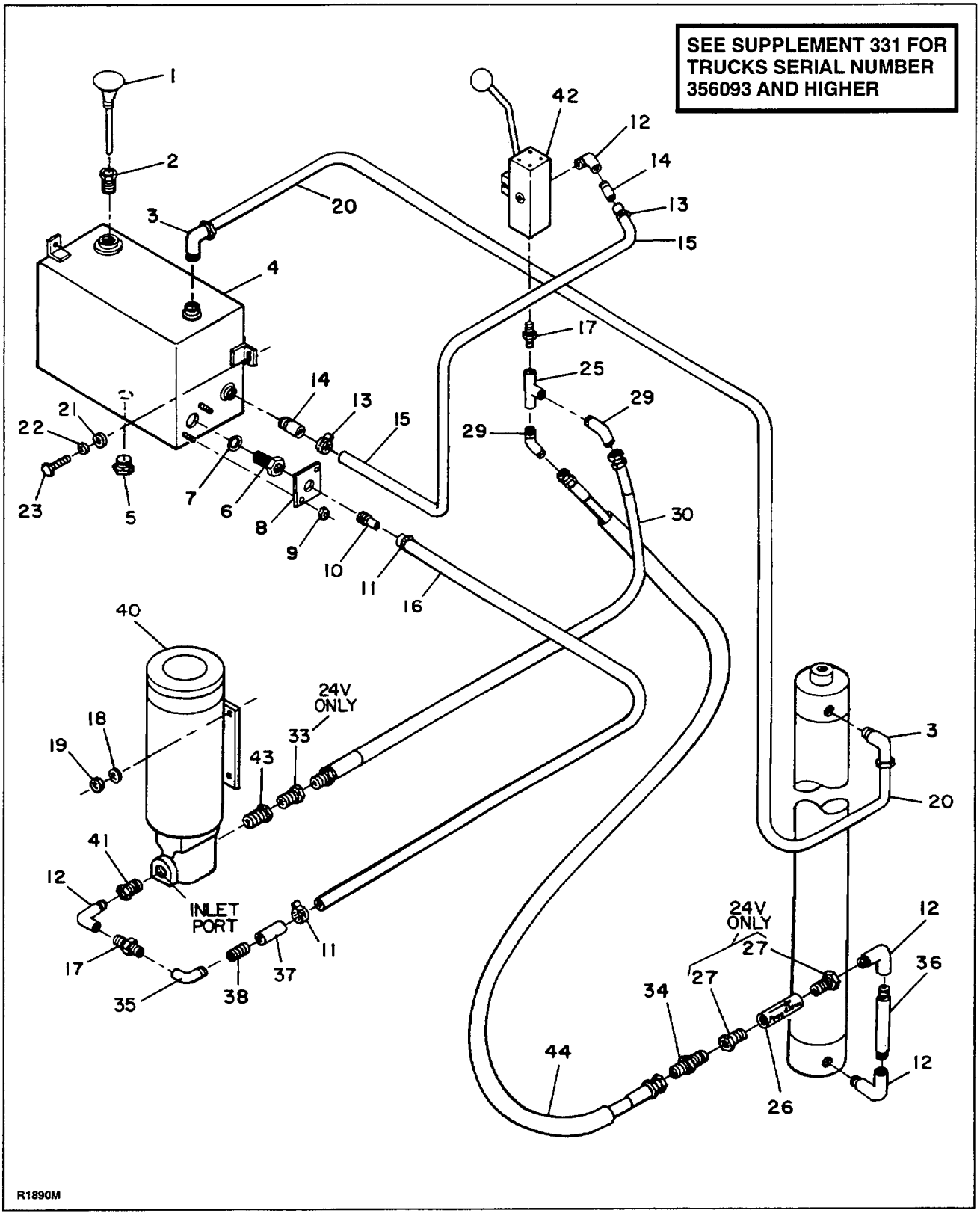


Figure 12-22. Hydraulic System
(Tel and Non-Tel) (PDH-20, -25, -30)

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	500422	BREATHER CAP AND DIPSTICK ASSEMBLY	1
2	026506	THREADED REDUCER	1
3	025501	ELBOW, 1/4, NPT TUBE, 90°	2
4	503390	RESERVOIR	1
5	026302	PLUG	1
6	035108	SUMP FILTER	1
7	042130	O-RING	1
8	400754	HOLD-DOWN PLATE	1
9	059628	HEX NUT, 5/16-18	2
10	800145	NIPPLE	1
11	056105	CLAMP	1
12	026707	ELBOW, STREET, 3/8 NPT, 90°	4
13	056110	CLAMP	2
14	026128	NIPPLE, HOSE, 3/8	2
15	308900	HOSE, 3/8 RUBBER, LOW PRESSURE (13 INCHES LONG)	1
16	318200	HOSE (17.7 INCHES, 12 V TRUCKS) (18.5 INCHES, 24V TRUCKS)	1
17	026109	NIPPLE	3
18	077211	LOCK WASHER	4
19	059429	NUT HEX	4
20	282500	TUBING, VINYL, 1/4 OD - 1/8 ID	A/R
21	077011	LOCK WASHER	2
22	026302	WASHER, FLAT	2
23	065538	SCREW, 5/16-18 X 5/8	2
24	—	NOT USED	

INDEX NO.	PART NO.	PART NAME	NO. REQD.
25	027107	TEE	1
26	047104	FLOW REGULATOR (12V TRUCKS)	1
26	047107	FLOW REGULATOR (24V TRUCKS)	1
27	026504	REDUCER BUSHING, 1/2 TO 3/8 (24V TRUCKS)	2
28	—	NOT USED	
29	025543	ELBOW	2
30	504313-05	HOSE ASSEMBLY	1
31	—	NOT USED	
32	—	NOT USED	
33	025107	FITTING (24V TRUCKS)	1
34	026912	FITTING	1
35	025505	ELBOW	2
36	026116	NIPPLE	1
37	800144	COUPLING	1
38	026143	NIPPLE	1
39	—	NOT USED	
40	VAR	PUMP AND MOTOR ASSEMBLY (SEE FIG 12-28)	1
41	025114	FITTING, SAE (12V TRUCKS)	1
41	025111	FITTING, SAE (24V TRUCKS)	1
42	504216-03	CONTROL VALVE	1
43	025131	FITTING, SAE (12V TRUCKS)	1
43	025114	FITTING, SAE (24V TRUCKS)	1
44	504264-01	HOSE ASSEMBLY (12V TRUCKS)	1
44	504264-02	HOSE ASSEMBLY (24V TRUCKS)	1

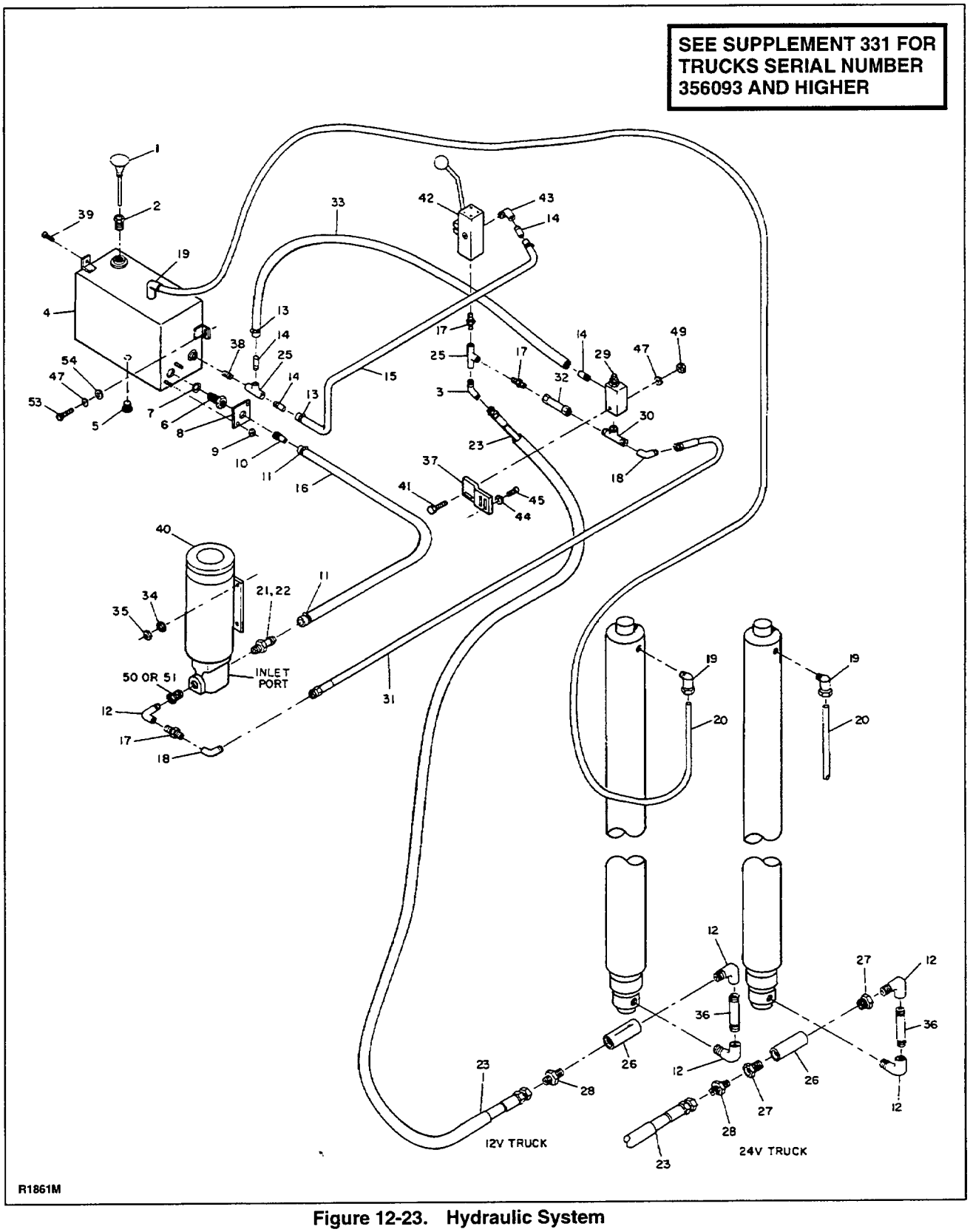


Figure 12-23. Hydraulic System (Tel and Non-Tel) (PDH-40)

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	500422	BREATHER CAP AND DIPSTICK ASSEMBLY	1
2	026506	THREADED REDUCER	1
3	025543	ELBOW	2
4	503390	RESERVOIR	1
5	026302	PLUG	1
6	035108	SUMP FILTER	1
7	042130	O-RING	1
8	400754	HOLD-DOWN PLATE	1
9	059628	HEX NUT, 5/16-18	2
10	800145	NIPPLE	1
11	056105	CLAMP	1
12	026707	ELBOW, STREET, 3/8 NPT, 90°	4
13	056110	CLAMP	2
14	026128	NIPPLE, HOSE, 3/8	2
15	308900	HOSE, 3/8 RUBBER, LOW PRESSURE (13 INCHES LONG)	1
16	318200	HOSE, (17.5 INCHES, 12 V TRUCKS) (18.5 INCHES, 24 V TRUCKS)	1
17	026109	NIPPLE	3
18	025542	ELBOW	1
19	025501	ELBOW	2
20	282500	TUBING, VINYL, 1/4 OD - 1/8 ID	A/R
21	025133	FITTING SAE (24V TRUCKS)	1
22	025132	FITTING SAE (12V TRUCKS)	1
23	504264-01	HOSE ASSEMBLY (12V TRUCKS)	1
23	504264-02	HOSE ASSEMBLY (24V TRUCKS)	1
24	—	NOT USED	
25	027107	TEE	1
26	047104	FLOW REGULATOR (12V TRUCKS)	1
26	047107	FLOW REGULATOR (24V TRUCKS)	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
27	026504	REDUCER BUSHING, 1/2 TO 3/8 (24V TRUCKS)	2
28	026912	FITTING	1
29	048160	RELIEF VALVE	1
30	027117	TEE	1
31	504312-13	HOSE ASSEMBLY	1
32	048111	VALVE, CHECK	1
33	308900	HOSE, 3/8 RUBBER, LOW PRESSURE (13 INCHES LONG)	1
34	077211	LOCK WASHER	4
35	059429	NUT HEX	4
36	026116	NIPPLE, 3/8 X 3	1
37	401929	BRACKET	1
38	026143	NIPPLE	1
39	070476	SCREW	1
40	VAR	PUMP AND MOTOR ASSEMBLY (SEE FIG 12-28)	1
41	063650	SCREW	1
42	504216-03	CONTROL VALVE	1
43	026704	ELBOW, STREET, 3/8 NPT, 90°	1
44	077208	WASHER	2
45	071376	SCREW	2
46	—	NOT USED	
47	077210	LOCK WASHER	1
48	—	NOT USED	
49	059426	NUT, HEX	1
50	025131	FITTING, SAE (12V TRUCKS)	1
51	025114	FITTING, SAE (24V TRUCKS)	1
52	—	NOT USED	
53	065538	SCREW	2
54	077011	WASHER, FLAT	2

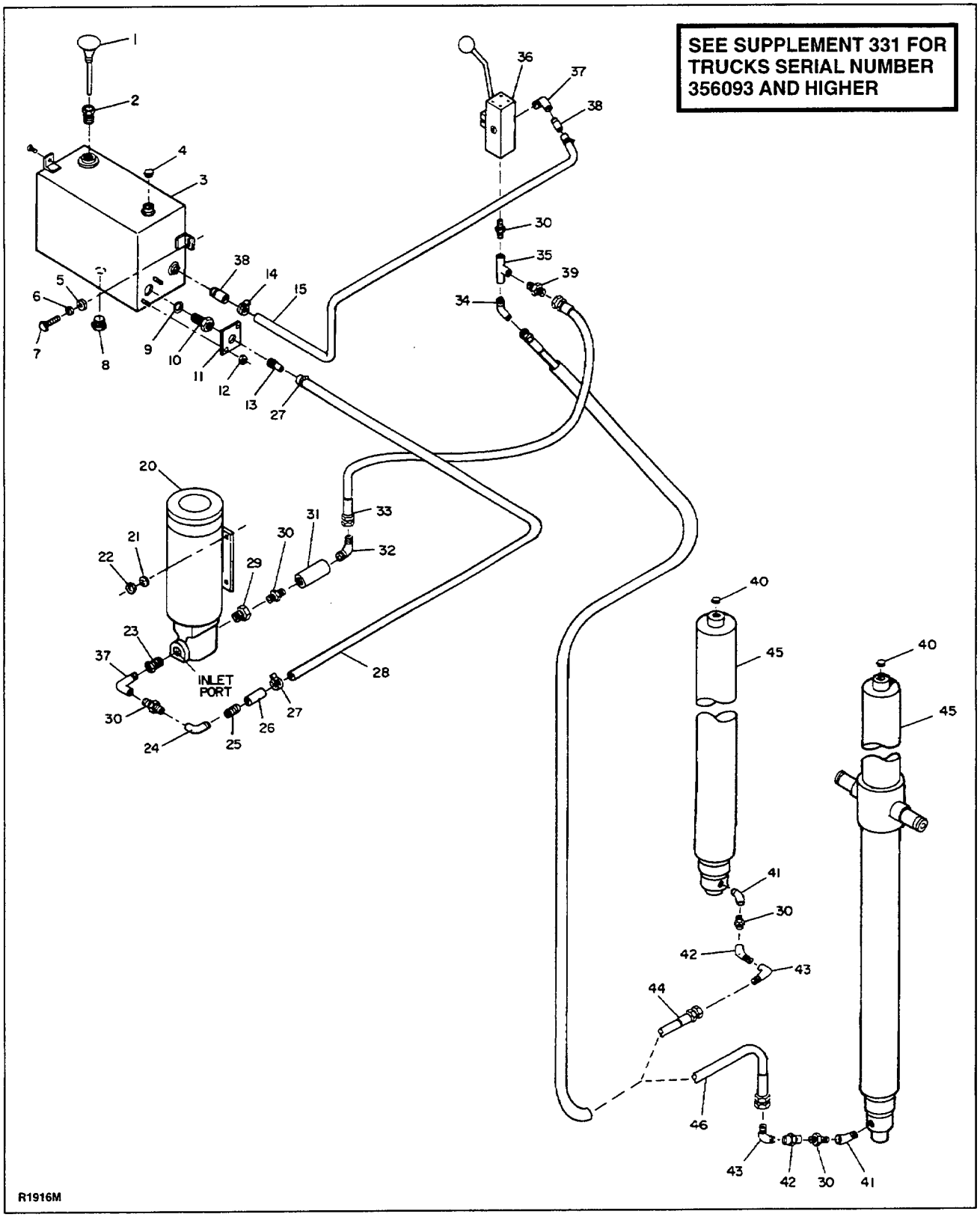


Figure 12-24. Hydraulic System (FFL and TRIMAST) (PDH-20, -25, -30)

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	500422	BREATHER CAP AND DIPSTICK ASSEMBLY	1
2	026506	THREADED REDUCER	1
3	503390	RESERVOIR	1
4	026303	PLUG, HEX SOC, 1/4	1
5	077011	WASHER, FLAT	1
6	077210	LOCK WASHER	2
7	065538	SCREW	1
8	026302	PLUG, SQ HD, MAGNETIC, 3/8	1
9	042130	O-RING	1
10	035108	SUMP FILTER	1
11	400754	HOLD-DOWN PLATE	1
12	059628	CENTER LOCKNUT	2
13	800145	NIPPLE	1
14	056110	CLAMP	2
15	308900	HOSE, 3/8 RUBBER, LOW PRESSURE (11.5 INCHES LONG)	1
16	—	NOT USED	
17	—	NOT USED	
18	—	NOT USED	
19	—	NOT USED	
20	VAR	PUMP AND MOTOR ASSEMBLY (SEE FIG 12-28)	1
21	077211	LOCK WASHER	4
22	059429	NUT HEX	4
23	025114	FITTING, SAE (12V TRUCKS)	1
23	025111	FITTING, SAE (24V TRUCKS)	1
24	025505	ELBOW	1
25	026143	NIPPLE	1
26	800144	COUPLING	1
27	056105	CLAMP, HOSE	2
28	318200	HOSE, (17.5 INCHES, 12 V TRUCKS) (18.5 INCHES, 24 V TRUCKS)	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
29	025131	FITTING, SAE (12V TRUCKS)	1
29	025114	FITTING, SAE (24V TRUCKS)	1
30	026109	NIPPLE	4
31	035113	FILTER	1
32	025525	ELBOW, 90°	1
33	504312-09	HOSE ASSEMBLY, 3/8	1
34	025543	ELBOW	1
35	027107	TEE	1
36	504216-03	CONTROL VALVE	1
37	026707	ELBOW, STREET, 3/8 NPT, 90°	2
38	026128	NIPPLE, HOSE, 3/8	2
39	026912	FITTING	2
40	026312	PLUG, PIPE, 1/8 NPT SOCKET	1
41	026711	ELBOW, STREET, 3/8 X 45°	1
42	026320	COUPLING W/ HEX, 3/8 NPT TRIMAST	1
42	026711	ELBOW, STREET, 3/8 X 45° FFL	1
43	025542	ELBOW, FEMALE, 90° FFL	1
43	025543	ELBOW, MALE, 45° TRIMAST	1
44	504264-03	HOSE ASSEMBLY, 3/8 (12V FFL ONLY)	1
44	504264-04	HOSE ASSEMBLY (24V FFL ONLY)	1
45	VAR	LIFT CYLINDER (FIG 12-30, 12-31, AND 12-32)	REF
46	504272-01	HOSE ASSEMBLY, 3/8 W/GUARD (158 INCH TRIMAST)	1
46	504272-02	HOSE ASSEMBLY, 3/8 W/GUARD (194 INCH TRIMAST)	1

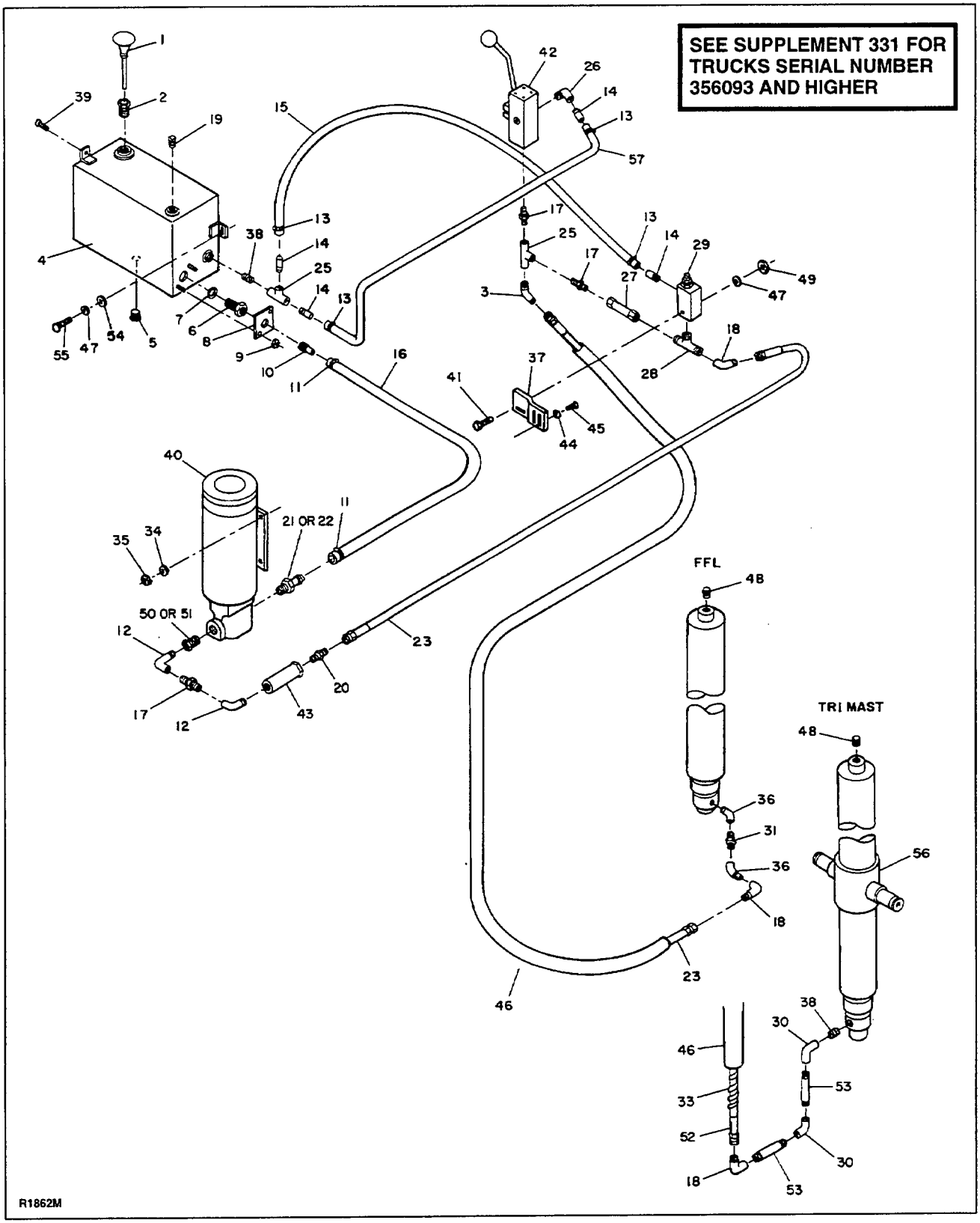


Figure 12-25. Hydraulic System (FFL and TRIMAST) (PDH-40)

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	500422	BREATHER CAP AND DIPSTICK ASSEMBLY	1
2	026506	THREADED REDUCER	1
3	025543	ELBOW	2
4	503390	RESERVOIR	1
5	026302	PLUG	1
6	035108	SUMP FILTER	1
7	042130	O-RING	1
8	400754	HOLD-DOWN PLATE	1
9	059628	HEX NUT, 5/16-18	2
10	800145	NIPPLE	1
11	056105	CLAMP	2
12	026707	ELBOW, STREET, 3/8 NPT, 90°	3
13	056110	CLAMP	4
14	026128	NIPPLE, HOSE, 3/8	4
15	308900	HOSE, 3/8 RUBBER, LOW PRESSURE (12 INCHES LONG)	1
16	318200	HOSE, (17.5 INCHES, 12 V TRUCKS) (18.5 INCHES, 24 V TRUCKS)	1
17	026109	NIPPLE	3
18	025542	ELBOW	3
19	026303	PLUG, HEX SOC, 1/4	1
20	026912	FITTING	1
21	025133	FITTING SAE (24V TRUCKS)	1
22	025132	FITTING SAE (12V TRUCKS)	1
23	504312-09	HOSE ASSEMBLY	1
24	—	NOT USED	
25	027107	TEE	2
26	026704	ELBOW, STREET, 3/8 NPT, 90°	1
27	048111	VALVE, CHECK	1
28	027117	TEE	1
29	048160	RELIEF VALVE	1
30	025505	ELBOW (TRIMAST)	2
31	026109	NIPPLE (FFL)	1
31	0261434	NIPPLE (TRIMAST)	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
32	—	NOT USED	
33	038500	SPRING GUARD (TRIMAST)	A/R
34	077211	LOCK WASHER	4
35	059429	NUT HEX	4
36	026711	ELBOW, STREET, 3/8 X 45° (FFL)	2
37	401929	BRACKET	1
38	026143	NIPPLE	2
39	070476	SCREW	7
40	VAR	PUMP AND MOTOR ASSEMBLY (SEE FIG 12-28)	1
41	063650	SCREW	1
42	504216-03	CONTROL VALVE	1
43	035113	FILTER	1
44	077208	WASHER	2
45	071376	SCREW	2
46	278900	TUBING (22 INCHES)	1
47	077210	LOCK WASHER	1
48	026312	PLUG, PIPE, 1/8 NPT SOCKET	1
49	059426	NUT, HEX	1
50	025131	FITTING, SAE (12V TRUCKS)	1
51	025114	FITTING, SAE (24V TRUCKS)	1
52	504264-03	HOSE ASSEMBLY, 3/8 (12V, FFL ONLY)	1
52	504264-04	HOSE ASSEMBLY (24V, FFL ONLY)	1
52	504272-01	HOSE ASSEMBLY, 3/8 W/GUARD (158 INCH TRIMAST)	1
52	504272-02	HOSE ASSEMBLY, 3/8 W/GUARD (194 INCH TRIMAST)	1
53	026119	NIPPLE (TRIMAST)	2
54	077011	WASHER, FLAT	2
55	065538	SCREW	2
56	503711	COLLAR	1

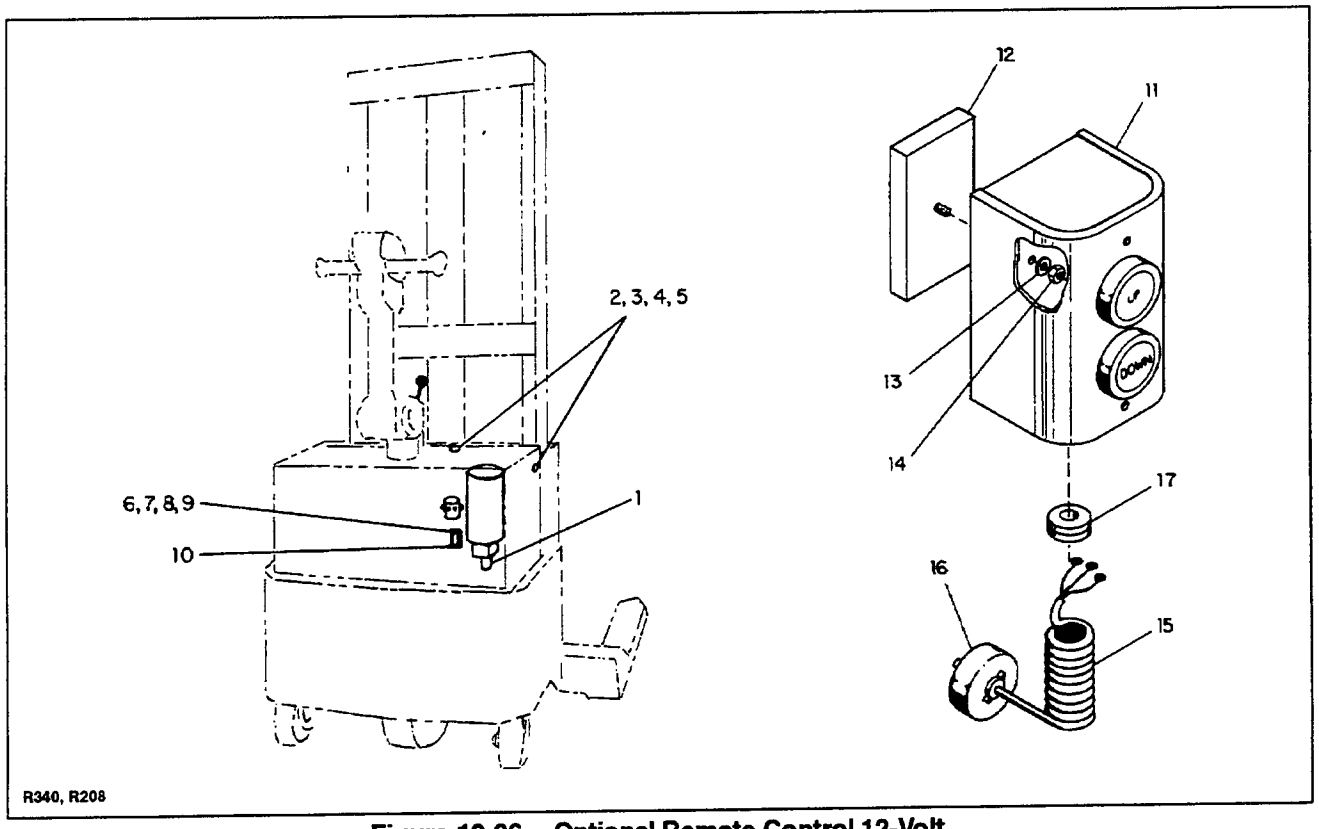


Figure 12-26. Optional Remote Control 12-Volt

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	048132	SOLENOID VALVE (12 VOLT)	1
1	048133	SOLENOID VALVE (24 VOLT)	1
2	017800	RECEPTACLE-FEMALE	1
3	068179	SCREW, 5-40 X 5/8	2
4	077203	LOCK WASHER #5	2
5	059410	HEX NUT, 5-40	2
6	008904*	FUSEHOLDER	1
7	068177*	SCREW 5-40 X 3/8	1
8	077203*	LOCK WASHER #5	1
9	059410*	HEX NUT, 5-40	1
10	008910*	FUSE, 15-AMP	1
—	501736	CONTROL STATION ASSEMBLY	1
11	800130	. CONTROL BOX	1
12	058501	. MAGNET	1
13	077209	. LOCK WASHER, 1/4	1
14	059421	. HEX NUT, 1/4-20	1
15	314002	. COIL CORD	1
16	017801	. MALE PLUG	1
17	052905	. STRAIN RELIEF	1

*** NOT USED WITH SIDE MOUNTED RECEPTACLES**

NOTES

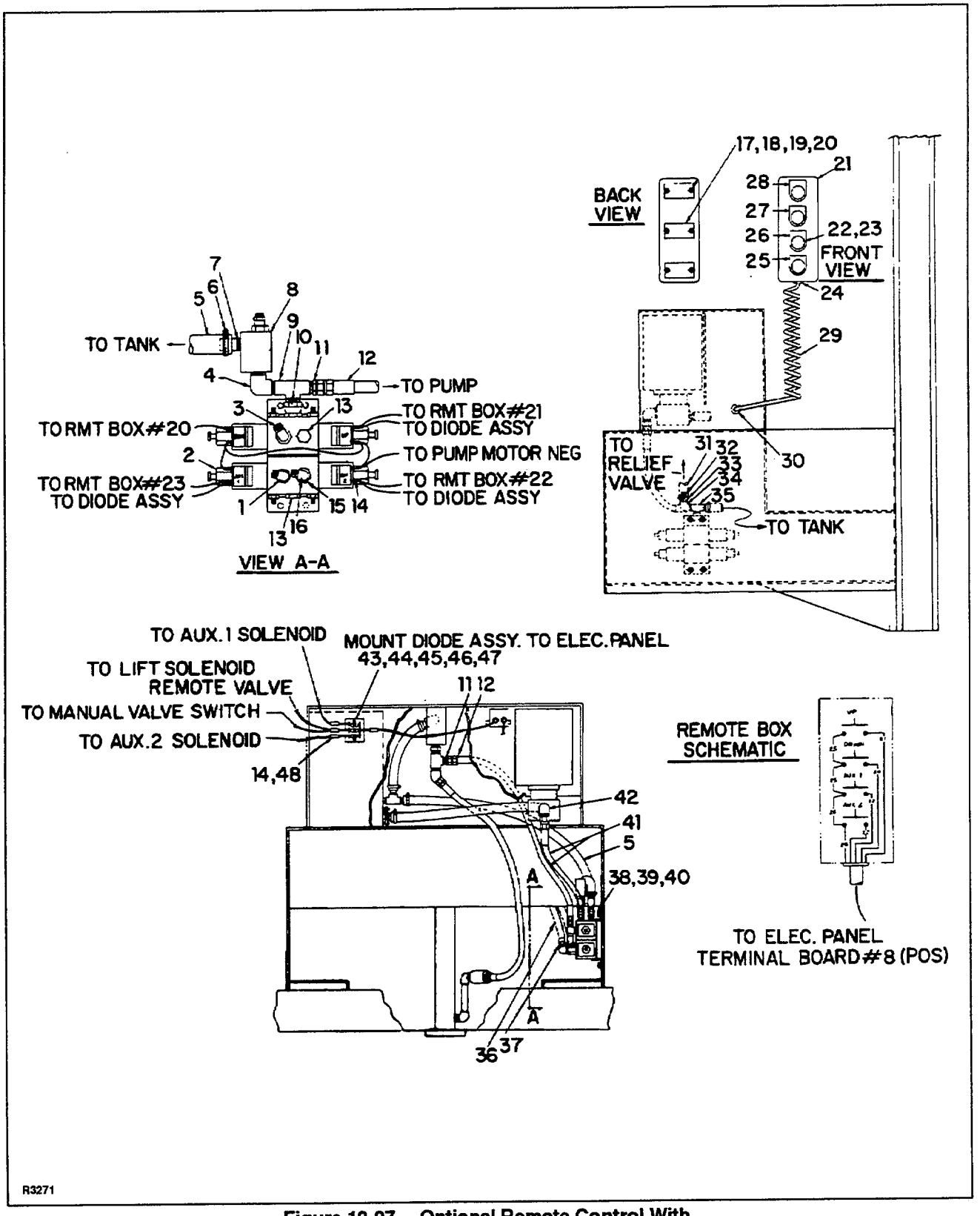


Figure 12-27. Optional Remote Control With Auxiliary Hydraulics (Sheet 1)

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	025536	ELBOW ADAPTER	1
2	048163-01	SOLENOID VALVE (12 VOLT)	1
2	048163-02	SOLENOID VALVE (24 VOLT)	1
3	025535	ELBOW ADAPTER	1
4	025538	ELBOW ADAPTER	1
5	308900	HOSE, 3/8 RUBBER, LOW PRESSURE	AR
6	056110	CLAMP	2
7	026128	NIPPLE, HOSE, 3/8	2
8	048160	RELIEF VALVE	1
9	027120	TEE, 3/8	1
10	025131	SWIVEL ADAPTER	2
11	026912	CONNECTOR, MALE	2
12	026917	HOSE FITTING	4
13	026309	PLUG	3
14	021204	RING TERMINAL	12
15	025124	REDUCING ADAPTER	1
16	025524	ELBOW, 1/4	1
17	058501	MAGNET	3
18	071376	TRUSS SCREW	6
19	077208	LOCK WASHER	6
20	059416	NUT	6
21	006002	SWITCH ENCLOSURE BOX	1
22	020653	CONTROL SWITCH	4
23	005630	CONTACT BLOCK	4
24	005414	STRAIN RELIEF	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
25	061286-ZZ	SWITCH PLATE	1
26	061286-ZZ	SWITCH PLATE	1
27	061287	SWITCH PLATE	1
28	061286	SWITCH PLATE	1
29	004729	CABLE	1
30	005405	STRAIN RELIEF	1
31	308900	RUBBER HOSE	1
32	026128	NIPPLE	2
33	056110	CLAMP	2
34	026707	ELBOW, STREET, 3/8 NPT, 90°	1
35	027120	TEE, 3/8	1
36	282700	HOSE	A/R
37	026916	HOSE FITTING	2
38	069480	FLAT HEAD SCREW	4
39	077209	LOCK WASHER	4
40	059421	HEX NUT, 1/4-20	4
41	282900	HOSE	A/R
42	025535	ADAPTER ELBOW (12 VOLTS)	1
42	025121	ADAPTER ELBOW (24 VOLTS)	1
43	005987	DIODE	1
44	068177	ROUND HEAD SCREW	2
45	010610	PAD, INSULATING DIODE	1
46	077203	LOCK WASHER	2
47	059410	HEX NUT	2
48	005422	INLINE CONNECTOR	4

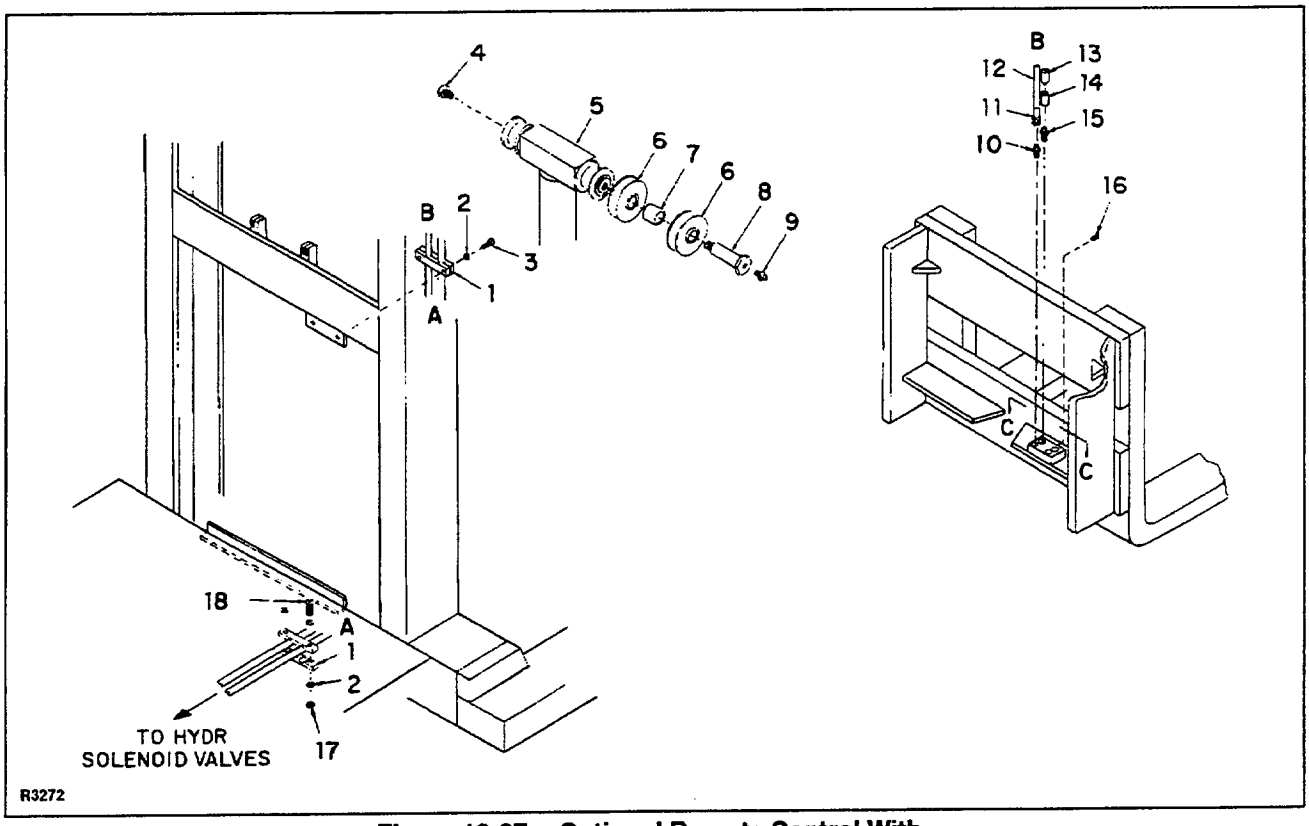


Figure 12-27. Optional Remote Control With Auxiliary Hydraulics (Sheet 2)

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	401204	HOSE CLAMP	4
2	077209	LOCK WASHER	4
3	063482	SCREW, HEX HEAD, 1/4-20 X 3/4	2
4	800095	BOLT, PLUG	1
5	504024	RAMHEAD (TEL)	1
5	313104	RAMHEAD (NON-TEL)	1
6	074260	IDLER SHEAVE	2
7	401206	SPACER	1
8	401552	SHOULDER BOLT	1
9	024712	GREASE FITTING	1
10	026910	MALE CONNECTOR, 1/4	2
11	026916	FITTING, HOSE, 1/4 JIC SWIVEL	2
12	282700	HOSE, 1/4	A/R
13	025333	QUICK DISCONNECT COUPLING	2
14	025332	QUICK DISCONNECT COUPLING	2
15	026110	NIPPLE, 1/4	2
16	026303	PLUG	2
17	059421	NUT, 1/4-20	2
18	069481	PHILLIPS HEAD SCREW, 1/4-20 X 1-1/4	2

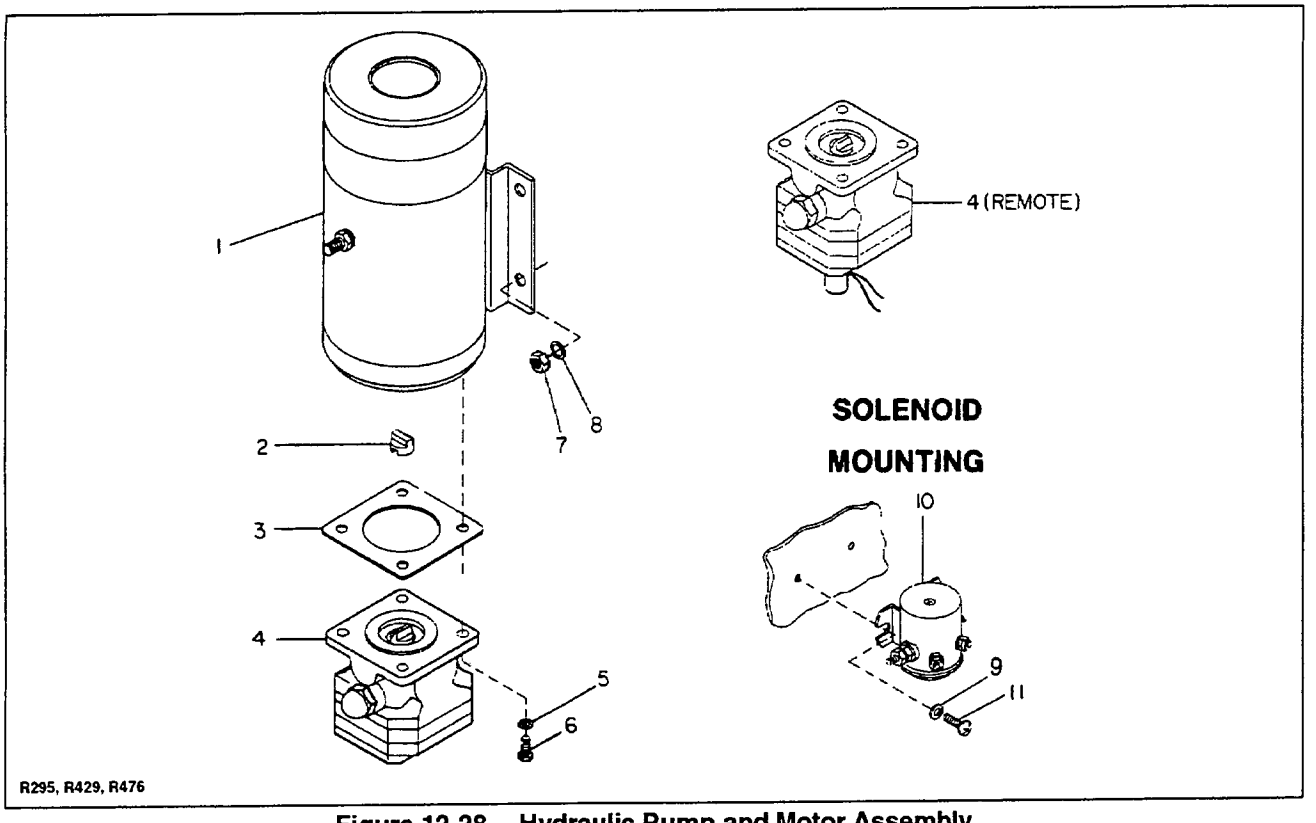


Figure 12-28. Hydraulic Pump and Motor Assembly

INDEX NO.	PART NAME	NO. REQD	PART NUMBERS				
			12 V PDH-20	12 V PDH-25, -30, -40		24 V PDH	
			S/N 333328 & HIGHER	S/N 334373 & HIGHER	S/N 333328 THRU 334372	S/N 333512 & HIGHER	S/N 333328 THRU 333511
—	PUMP AND MOTOR ASSEMBLY	REF	016967	016933	016965	016913	016923
—	PUMP AND MOTOR ASSEMBLY WITH REMOTE CONTROL	REF	016968	—	016966	—	—
1	. PUMP MOTOR	1	904030	901300	900960	905053	900971
2	. DRIVE CONNECTOR	1	056353	056353	056353	+++	+++
3	. GASKET	1	036107	036107	036107	+++	+++
4	. PUMP (COMPLETE)	1	900896-04	900896-10	900896-10	900896-10	900896-10
4	. PUMP AND SOLENOID (COMPLETE) FOR REMOTE	1	046571	046556	046556	—	—
—	. . CONTROL SOLENOID VALVE	1	048132	048132	048132	—	—
5	. LOCK WASHER, 5/16	4	077210	077210	077210	077210	077210
6	. HEX HEAD CAP SCREW 5/16-18 X 3/4	4	063557	063557	063557	063557	063557
7	. HEX NUT, 3/8-16	4	059429	059429	059429	059429	059429
8	. LOCK WASHER, 3/8	4	077211	077211	077211	077211	077211
9	. LOCK WASHER, 3/16	4	077208	077208	077208	077208	077208
10	. SOLENOID	1	020719	020719	020719	020715	020715
11	. TRUSS HEAD SCREW, 10-32 X 1/2	2	071376	071376	071376	071376	071376

+ + + PUMP AND MOTOR ASSEMBLY IS DIRECT DRIVE, THEREFORE NO GASKET OR DRIVE CONNECTOR IS REQUIRED.

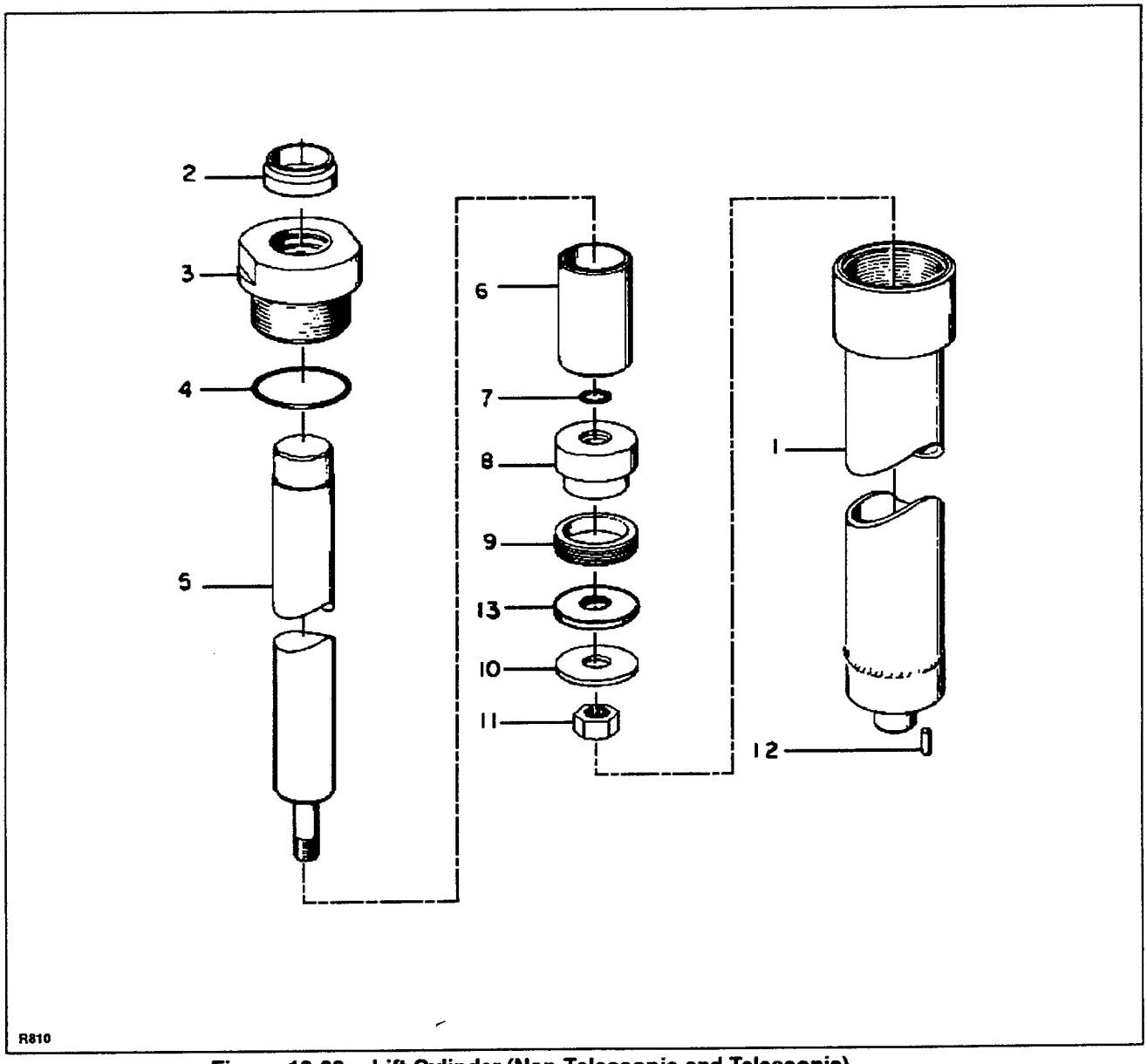


Figure 12-29. Lift Cylinder (Non-Telescopic and Telescopic)

2000, 2500 and 3000-lb. Lift (2-1/2-inch I.D. cylinder with 2-inch diameter rod)

INDEX NO.	60 INCH LIFT	106 INCH LIFT	130 INCH LIFT	154 INCH LIFT	168 INCH LIFT	PART NAME	NO. REQD.
—	503568-09	503568-05	503568-07	503568-11	503568-12	LIFT CYLINDER ASSY	1
1	—	—	—	—	—	. TUBE ASSY	1
2	049509*	049509*	049509*	049509*	049509*	. WIPER RING	1
3	800024	800024	800024	800024	800024	. GLAND NUT	1
4	042113*	042113*	042113*	042113*	042113*	. TOP O-RING	1
5	—	—	—	—	—	. RAM ROD	1
6	300501	300501	300509	300509	300509	. RAM STOP	1
7	042105*	042105*	042105*	042105*	042105*	. BOTTOM O-RING	1
8	045102	045102	045102	045102	045102	. PISTON	1
9	043108*	043108*	043108*	043108*	043108*	. PACKING ASSY	1
10	077005	077005	077005	077005	077005	. FLAT WASHER	1
11	059547	059547	059547	059547	059547	. JAM NUT, 3/4-16	1
12	061023	061023	061023	061023	061023	. ROLL PIN, 5/16 X 3/4	1
13	077036	077036	077036	077036	077036	. FLAT WASHER	A/R

*** INCLUDED IN KIT NO. 900142**

4000-lb. Lift (2-3/4-inch I.D. cylinder with 2-1/4-inch diameter rod)

INDEX NO.	60 INCH LIFT	106 INCH LIFT	130 INCH LIFT	154 INCH LIFT	168 INCH LIFT	PART NAME	NO. REQD.
—	504368-01	504368-02	504368-03	504368-04	504368-05	LIFT CYLINDER ASSY	1
1	—	—	—	—	—	. TUBE ASSY	1
2	049502*	049502*	049502*	049502*	049502*	. WIPER RING	1
3	800049	800049	800049	800049	800049	. GLAND NUT	1
4	042114*	042114*	042114*	042114*	042114*	. TOP O-RING	1
5	—	—	—	—	—	. RAM ROD	1
6	272215	272216	272216	272216	272216	. RAM STOP	1
7	042105*	042105*	042105*	042105*	042105*	. BOTTOM O-RING	1
8	306901	306901	306901	306901	306901	. PISTON	1
9	043119*	043119*	043119*	043119*	043119*	. PACKING ASSY	1
10	077067	077067	077067	077067	077067	. FLAT WASHER	1
11	059547	059547	059547	059547	059547	. JAM NUT, 3/4-16	1
12	061023	061023	061023	061023	061023	. ROLL PIN, 5/16 X 3/4	1
13	077036	077036	077036	077036	077036	. FLAT WASHER	A/R

*** INCLUDED IN KIT NO. 900116**

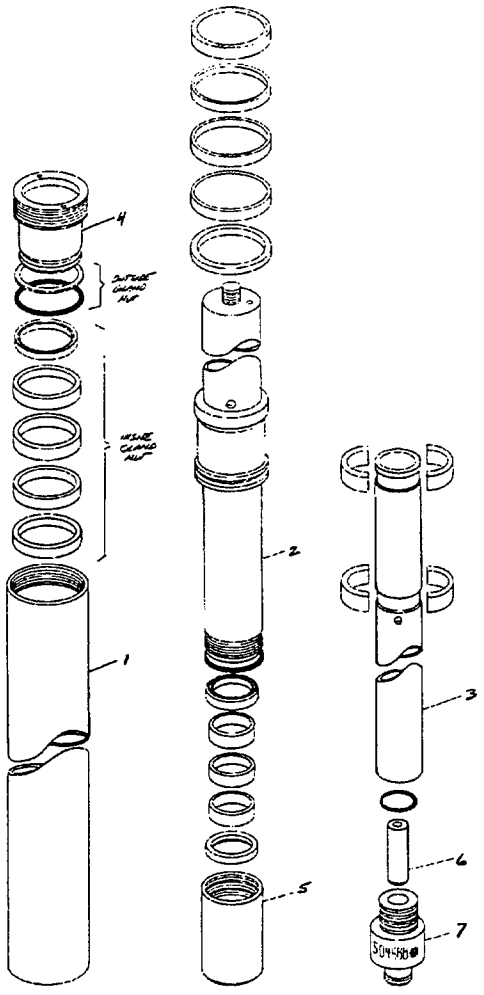
NOTE: 4000-LB TRUCKS WITH 3-INCH I.D. CYLINDER AND 2-1/4 INCH DIAMETER ROD ORDER PACKING KIT PART NUMBER 900187

106 AND 130 INCH
FULL FREE LIFT TRUCKS
SERIAL NUMBER 343730
AND HIGHER

158 INCH TRIMAST
TRUCKS SERIAL NUMBER
342112 AND HIGHER

194 INCH TRIMAST
TRUCKS SERIAL NUMBER
342112 AND HIGHER

ALL ILLUSTRATED
PARTS NOT
NUMBERED ARE IN
PACKING KIT
900962 FFL
900961 TRIMAST



R1898

Figure 12-30. Lift Cylinder (Full Free Lift and TRIMAST)

INDEX NO.	LIFT HEIGHT				PART NAME	NO. REQD.
	FFL		TRIMAST			
	106	130	158	194		
—	504488	504489	504490	504491	CYLINDER ASSY	1
1	906048	906049	906050	906051	. OUTSIDE TUBE	1
2	906052	906053	906054	906055	. PRIMARY ROD	1
3	906056	906057	906058	906059	. SECONDARY ROD	1
4	906060	906060	906061	906061	. GLAND NUT	1
5	906062	906062	906063	906063	. GLAND NUT	1
6	906064	906064	906065	906065	. FLOW REGULATOR	1
7	906066	906066	906067	906067	. BASE	1

106 AND 130 INCH
FULL FREE LIFT TRUCKS
SERIAL NUMBER 335392
TO 343729

158 INCH TRIMAST
TRUCKS SERIAL NUMBER
335478 TO 342111

194 INCH TRIMAST
TRUCKS SERIAL NUMBER
335351 TO 342111

ALL ILLUSTRATED
PARTS NOT
NUMBERED ARE IN
PACKING KIT
901417 FFL
901409 TRIMAST

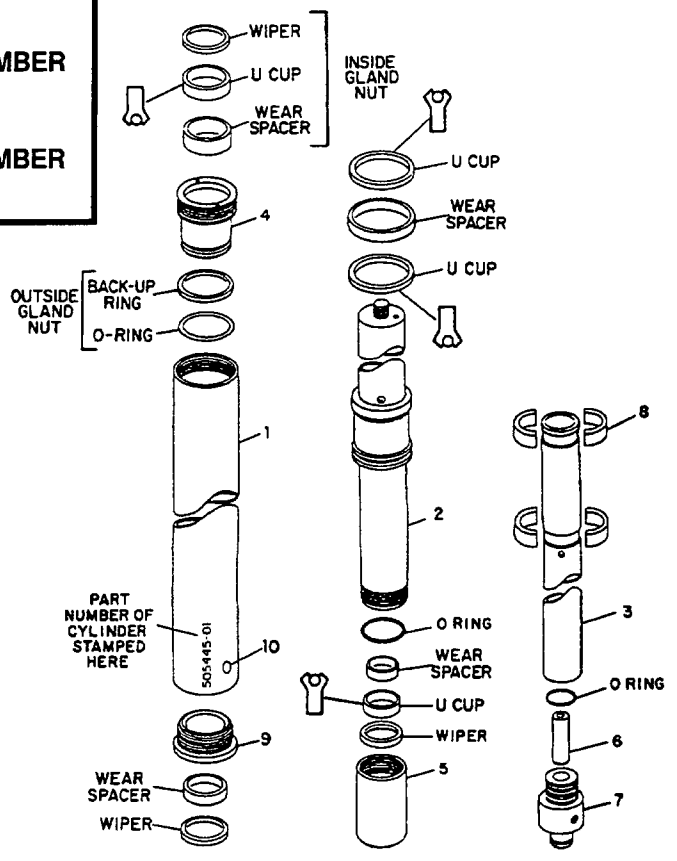


Figure 12-31. Lift Cylinder (Full Free Lift and TRIMAST)

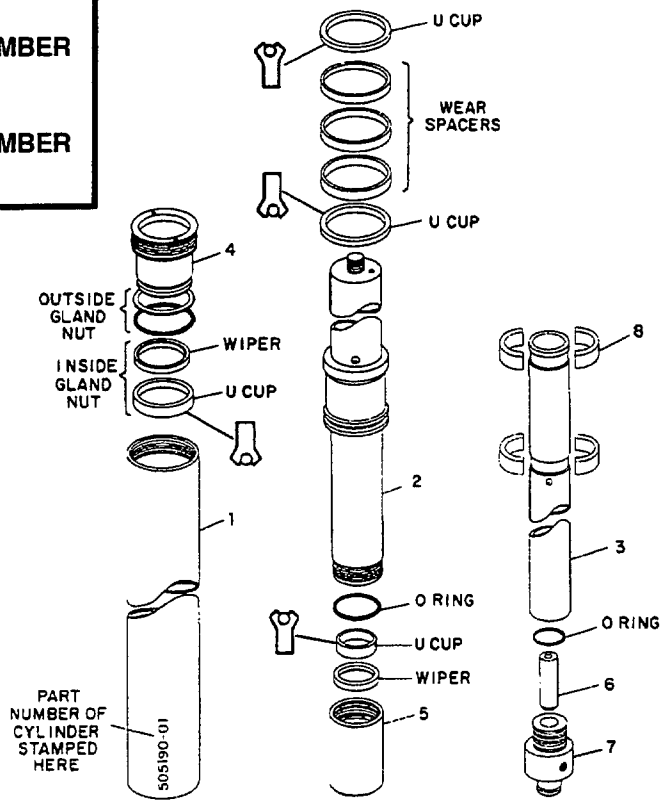
INDEX NO.	LIFT HEIGHT				PART NAME	NO. REQD.
	FFL		TRIMAST			
	106	130	158	194		
—	505444-01	505444-02	505445-01	505445-02	CYLINDER ASSY	1
1	901410	901411	901402	901403	. OUTSIDE TUBE	1
2	901412	901413	901404	901405	. PRIMARY ROD	1
3	901279	901280	901281	901282	. SECONDARY ROD	1
4	901414	901414	901406	901406	. GLAND NUT	1
5	901415	901415	901407	901407	. GLAND NUT	1
6	901294	901294	901294	901294	. FLOW REGULATOR	1
7	901295	901295	901296	901296	. BASE	1
8	901297	901297	901298	901298	. WEAR RINGS	2
9	901416	901416	901408	901408	. BEARING HOUSING	1
10	901444	901444	901444	901444	. BREATHER	1

106 AND 130 INCH
FULL FREE LIFT TRUCKS
SERIAL NUMBER 333328
TO 335391

158 INCH TRIMAST
TRUCKS SERIAL NUMBER
333328 TO 335477

194 INCH TRIMAST
TRUCKS SERIAL NUMBER
333328 TO 335350

ALL ILLUSTRATED
PARTS NOT
NUMBERED ARE IN
PACKING KIT
901180 FFL
901199 TRIMAST



R3631A

Figure 12-32. Lift Cylinder (Full Free Lift and TRIMAST)

INDEX NO.	LIFT HEIGHT				PART NAME	NO. REQD.
	FFL		TRIMAST			
	106	130	158	194		
—	505190-01	505190-02	505191-01	505191-02	CYLINDER ASSY	1
1	901271	901272	901273	901274	. OUTSIDE TUBE	1
2	901275	901276	901277	901278	. PRIMARY ROD	1
3	901279	901280	901281	901282	. SECONDARY ROD	1
4	901283	901283	901284	901284	. GLAND NUT	1
5	901285	901285	901293	901293	. GLAND NUT	1
6	901294	901294	901294	901294	. FLOW REGULATOR	1
7	901295	901295	901296	901296	. BASE	1
8	901297	901297	901298	901298	. WEAR RINGS	2

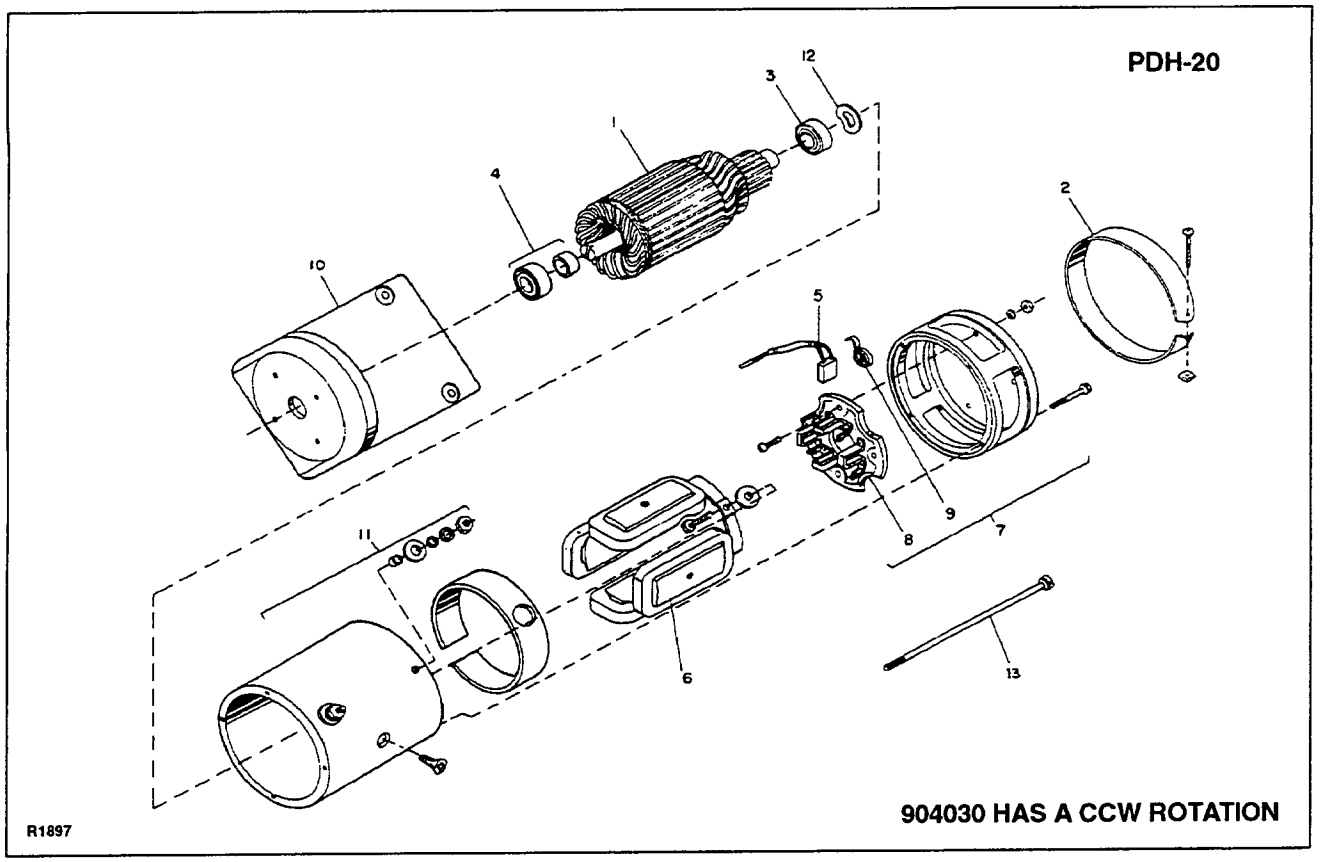


Figure 12-33. 12-Volt Pump Motor

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	904030	MOTOR, PUMP (TYPE ML5002) CCW ROTATION	1
1	900969	. ARMATURE	1
2	900964	. BAND, COVER	1
3	051165	. BEARING, COMMUTATOR END	1
4	900495	. BEARING, DRIVE END	1
5	003706	. BRUSH SET	1
6	900959	. FIELD COIL PACKAGE (POLE SHOE SCREWS INCLUDED)	1
7	900966	. HEAD ASSEMBLY (COMMUTATOR END)	1
8	003503	. . PLATE ASSEMBLY, BRUSH	1
9	003714	. . SPRING SET, BRUSH	1
10	009405	. HEAD DRIVE END	1
11	904034	. TERMINAL, STUD PKG.	1
12	900968	. WASHER, SPRING (COMMUTATOR END BEARING)	1
13	900165	THRU BOLT PKG	1

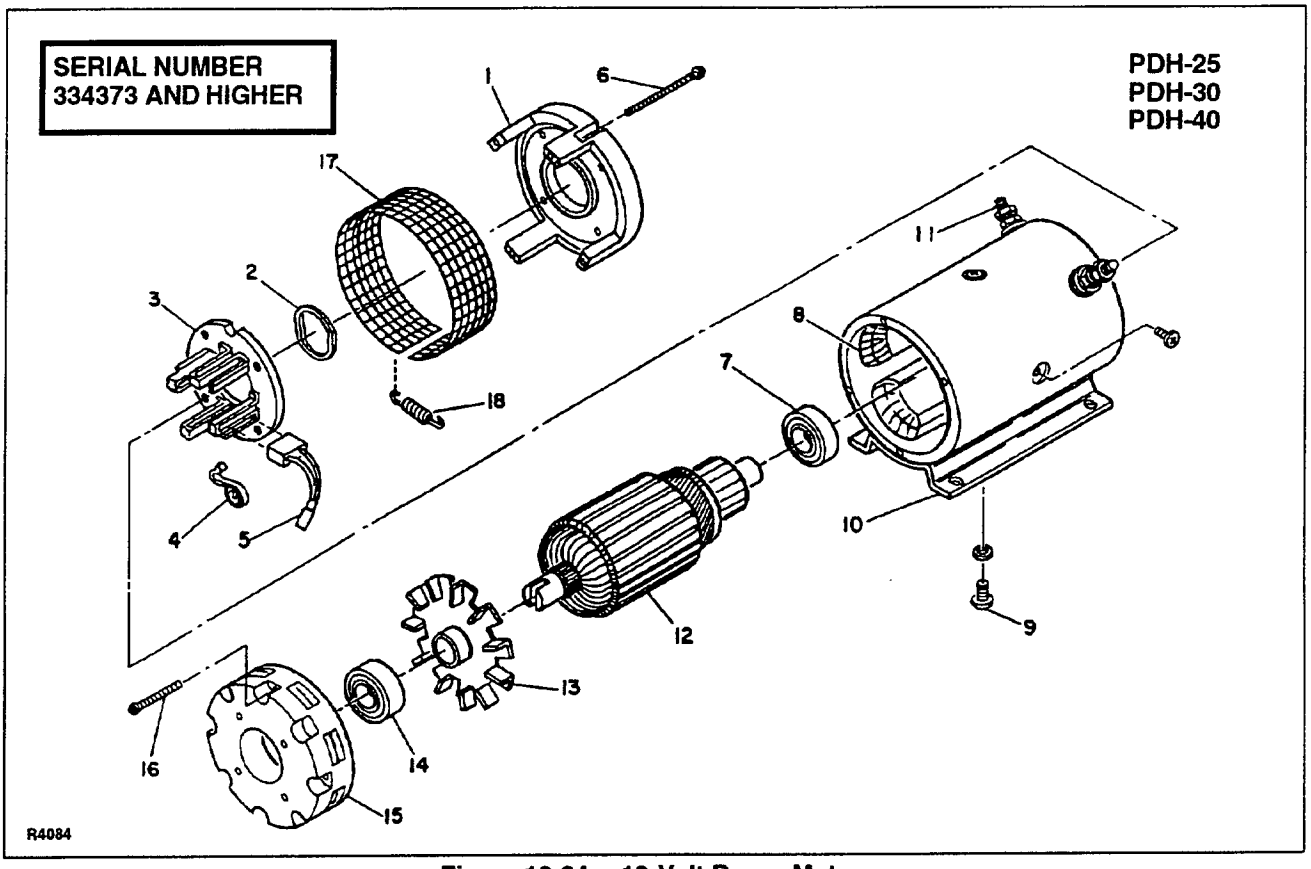
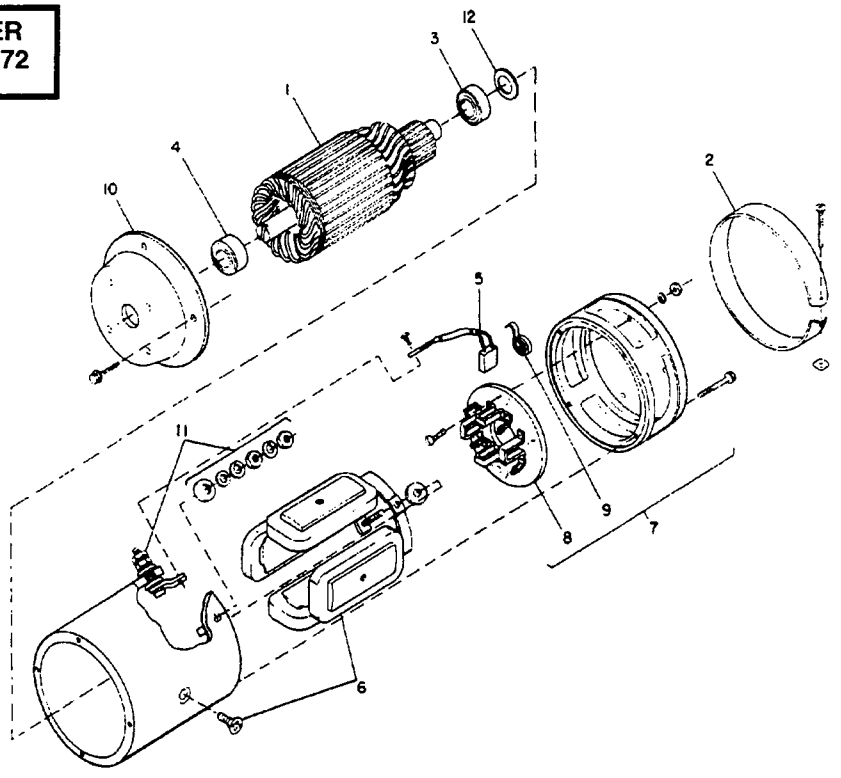


Figure 12-34. 12-Volt Pump Motor

INDEX NO.	PART NO.	PART NAME	NO. REQD.
	901300	MOTOR, PUMP	1
1	901380	. COMMUTATOR END HEAD ASSY	1
2	901381	. WAVE WASHER	1
3	901382	. BRUSH HOLDER	1
4	003714	. SPRING (SET OF 4)	1
5	003706	. BRUSH (SET OF 4)	1
6	—	. SCREW, 10 X 24	4
7	901383	. BEARING COMMUTATOR END	1
8	901384	. FIELD COIL KIT	1
9	—	. SCREW, OVAL PHIL HD, 3/8-16 X 5/8	8
10	901385	. MOUNTING BRACKET	1
11	901386	. TERMINAL KIT	1
12	901387	. ARMATURE	1
13	901388	. FAN	1
14	901389	. BEARING DRIVE END	1
15	009403	. DRIVE END HEAD	1
16	—	. SCREW, 10 X 24	4
17	901390	. COVER BAND - VENT	1
18	901391	. SPRING - COVER BAND	1

SERIAL NUMBER
333328 TO 334372

PDH-25
PDH-30
PDH-40



R1732

Figure 12-35. 12-Volt Pump Motor

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	900960	MOTOR, PUMP (TYPE MDR5001 OR MMZ5001)	1
1	900963	. ARMATURE	1
2	900964	. BAND, COVER	1
3	051165	. BEARING, COMMUTATOR END	1
4	900495	. BEARING, DRIVE END	1
5	003706	. BRUSH SET	1
6	900965	. FIELD COIL PACKAGE (POLE SHOE SCREWS INCLUDED)	1
7	900966	. HEAD ASSEMBLY (COMMUTATOR END)	1
8	003503	. . PLATE ASSEMBLY, BRUSH	1
9	003714	. . SPRING SET, BRUSH	1
10	009403	. HEAD DRIVE END	1
11	900967	. TERMINAL, STUD PKG.	1
12	900968	. WASHER, SPRING (COMMUTATOR END BEARING)	1

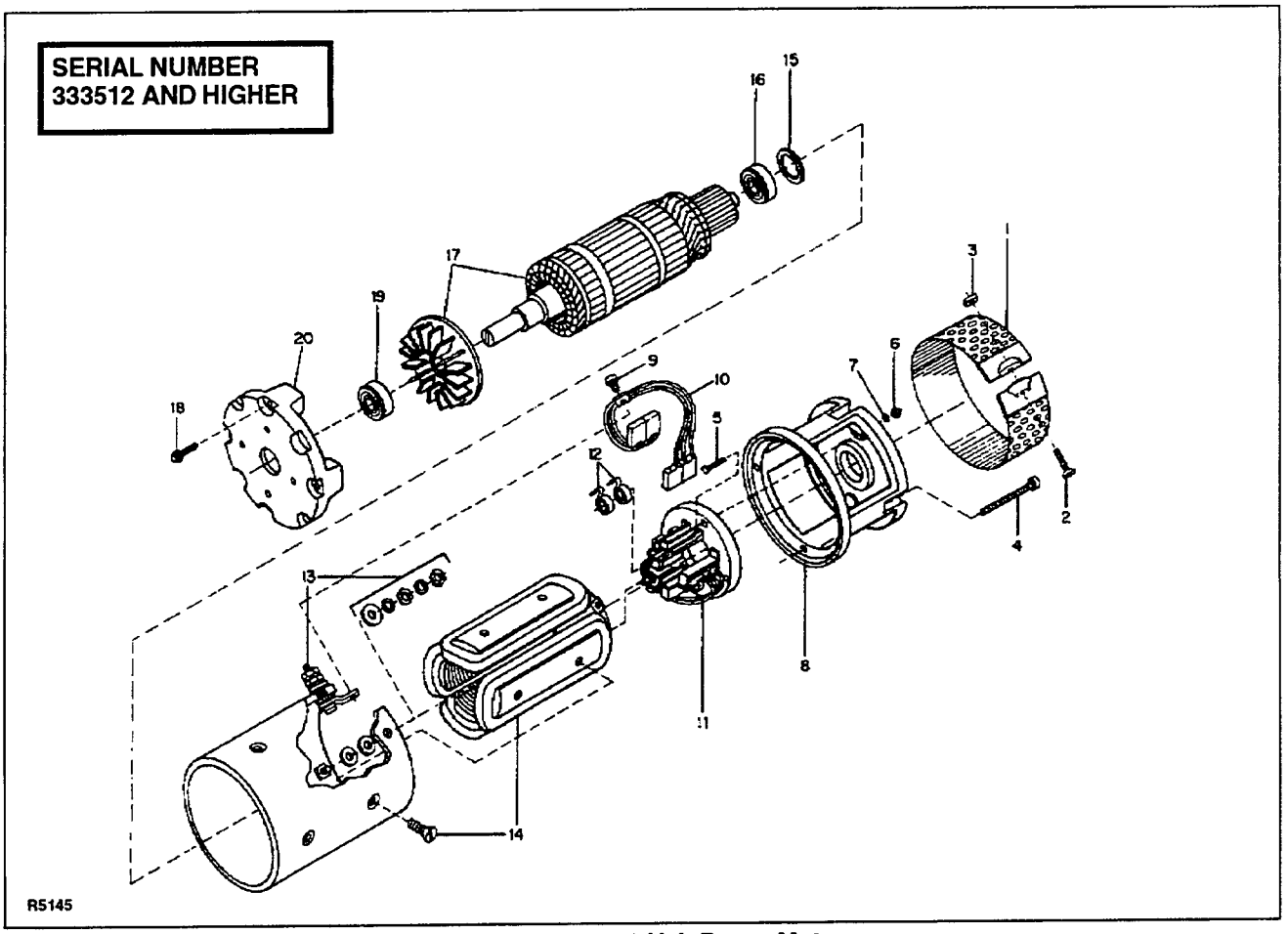


Figure 12-36. 24-Volt Pump Motor

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	905053	MOTOR, PUMP	1
1	905055	. BAND, COVER	1
2	—	. . SCREW, RD. HEAD, 10-32 X 1-3/4	1
3	—	. . NUT, SQUARE, 10-32	1
4	905056	. SCREW, HEX HD THD ROLLING, 10-32 X 2	4
5	905057	. BOLT, SQUARE NECK, 10-32 X 7/8	4
6	—	. NUT, HEX, 10-32	4
7	—	. LOCK WASHER, #10	4
8	905058	. HEAD, COMMUTATOR END	4
9	—	. SCREW, RD HEAD, 1/4-20 X 3/8	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
10	905059	. BRUSH SET, SERVICE	1
11	905060	. BRUSH HOLDER PLATE	1
12	905061	. SPRING SET, BRUSH	1
13	905063	. TERMINAL, STUD PKG.	1
14	905064	. FIELD COIL (INCLUDES HARDWARE)	1
15	905065	. WASHER, SPRING	1
16	905066	. BEARING, COMMUTATOR END	1
17	905067	. ARMATURE & FAN ASSY	1
18	—	. SCREW, FILLISTER HEAD, 10-32 X 3/4	8
19	905068	. BEARING, DRIVE END	1
20	905069	. HEAD, DRIVE END	1

NOTE: INDEX NUMBERS 6, 7, 8, 9, 10, 11 & 12 ARE AVAILABLE AS A KIT PART NUMBER 905062.

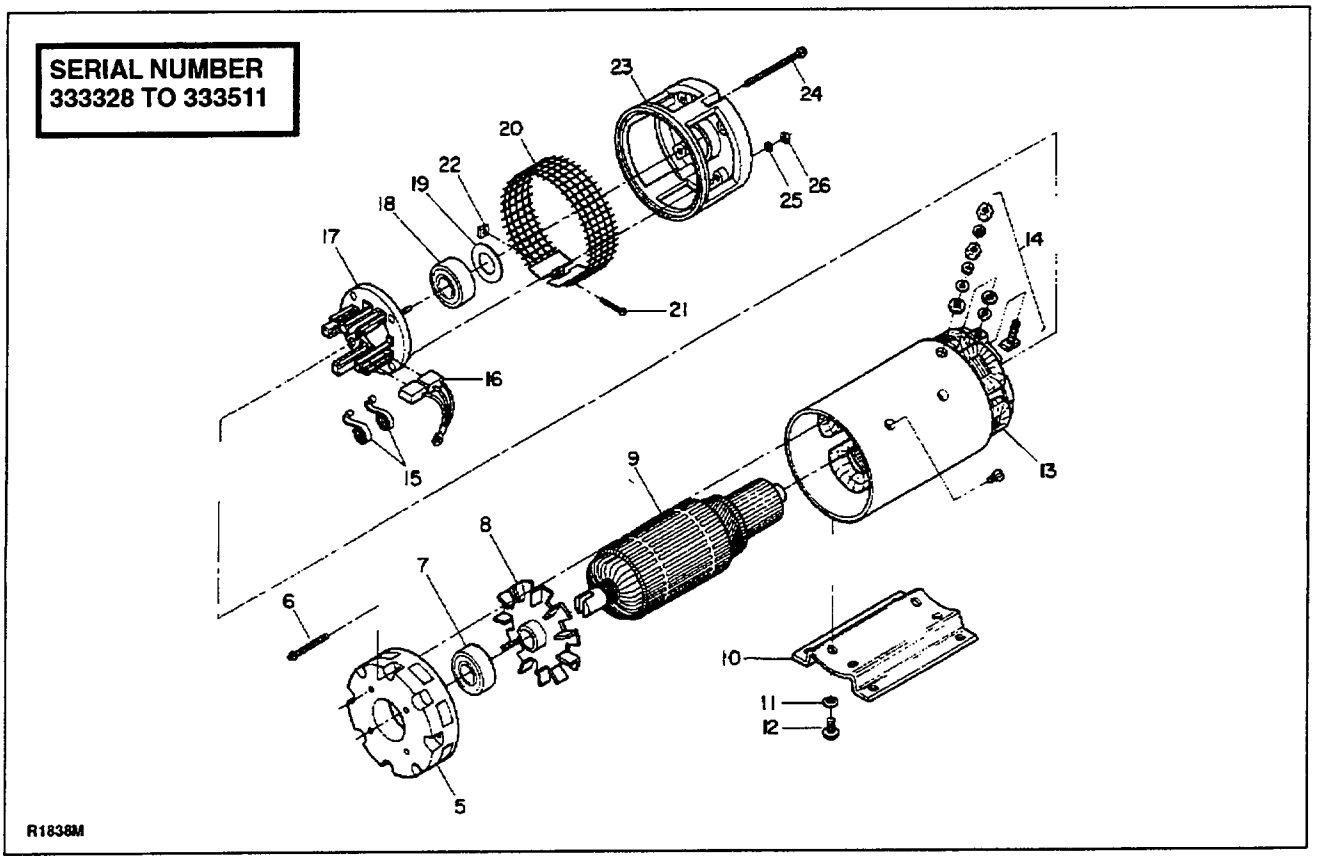


Figure 12-37. 24-Volt Pump Motor

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	900971	MOTOR, PUMP (MBD-5107A)	1
5	009402	. HEAD, DRIVE END	1
6	—	. SCREW	4
7	051164	. BEARING, DRIVE END	1
8	900973	. FAN	1
9	900972	. ARMATURE	1
10	—	. MOUNTING	1
11	—	. LOCK WASHER	4
12	—	. SCREW	4
13	900808	. FIELD COIL PACKAGE	1
14	900200	. TERMINAL, STUD PKG.	1
15	900199	. SPRING SET, BRUSH	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
16	900806	. BRUSH SET	1
17	900807	. PLATE ASSEMBLY, BRUSH	1
18	905066	. BEARING, COMMUTATOR END	1
19	900809	. THRUST WASHER	1
20	900804	. BAND, COVER	1
21	—	. SCREW	1
22	—	. NUT	1
23	900805	. HEAD, COMMUTATOR END	1
24	—	. SCREW	4
25	—	. LOCK WASHER	4
26	—	. NUT, HEX	4

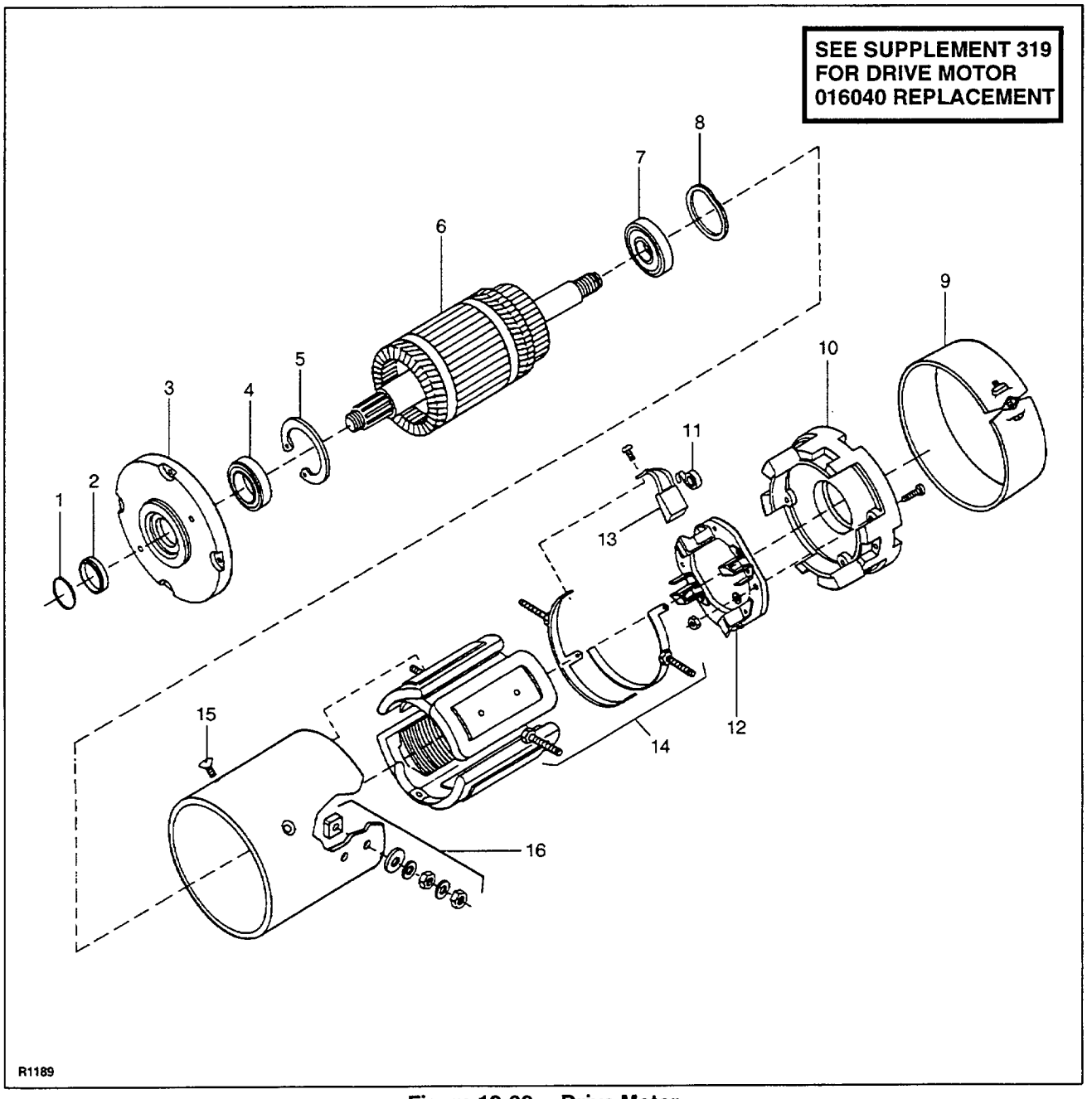


Figure 12-38. Drive Motor
016042-12 Volt 333583 and Higher
016039-12 Volt 333328 to 333582
016040-24 Volt 333328 to 333561
016045-24 Volt 333562 to 344055
016050-24 Volt 344056 and Higher

INDEX NO.	MOTOR PART NUMBER 016039	016040	016042	016045	016050	PART NAME	REQD.
1	900778	900778	901238	901238	901238	SPACER, DRIVE END	1
2	—	900778	901239	901239	901239	SEAL, SHAFT, DRIVE END	1
3	901119	901119	901240	901240	901240	HEAD ASSEMBLY, DRIVE END	1
4	901055	901055	901241	901241	901241	. BEARING, BALL, SEALED	1
5	—	—	901242	901242	901242	. RETAINER, BEARING	1
6	901122	901111	901243	901259	901593	ARMATURE	1
7	901113	901113	901244	901244	901244	BEARING, BALL, SEALED COMMUTATOR END	1
8	—	901158	901245	901245	901255	WASHER, SPRING COMMUTATOR END BEARING	1
9	901112	901112	901246	901246	901246	BAND, COVER	1
10	901124	901114	901247	901247	901247	HEAD ASSEMBLY, COMMUTATOR END	1
11	900136	901118	900136	900136	900136	. SPRING, BRUSH	1
12	901125	901116	901248	901248	901594	. BRUSH HOLDER	1
13	900787	901117	900787	900787	901595	BRUSH	1
14	901123	901115	901254	901254	901596	FIELD COIL SET	1
—	—	—	901250	901250	901250	. CONNECTOR AND STUD ASSEMBLY A2	1
—	—	—	901251	901251	901251	. CONNECTOR AND STUD ASSEMBLY A1	1
15	901056	901056	901253	90125	9012533	POLE SHOE, SCREW, 5/16-24 X 7/8 FL HD	8
16	901121	901121	901252	901252	901252	TERMINAL KIT (HARDWARE INCL.)	2
—	—	—	901257	901257	901257	SPACER, BRUSH HOLDER	4

1. SEE SUPPLEMENT 230 FOR TRANSISTOR TRUCKS SERIAL NUMBER 338442 AND HIGHER.
2. SEE SUPPLEMENT 187 FOR TRANSISTOR TRUCKS BELOW SERIAL NUMBER 338442.

CONTACTOR TIP SET
PART NO. 900531-01

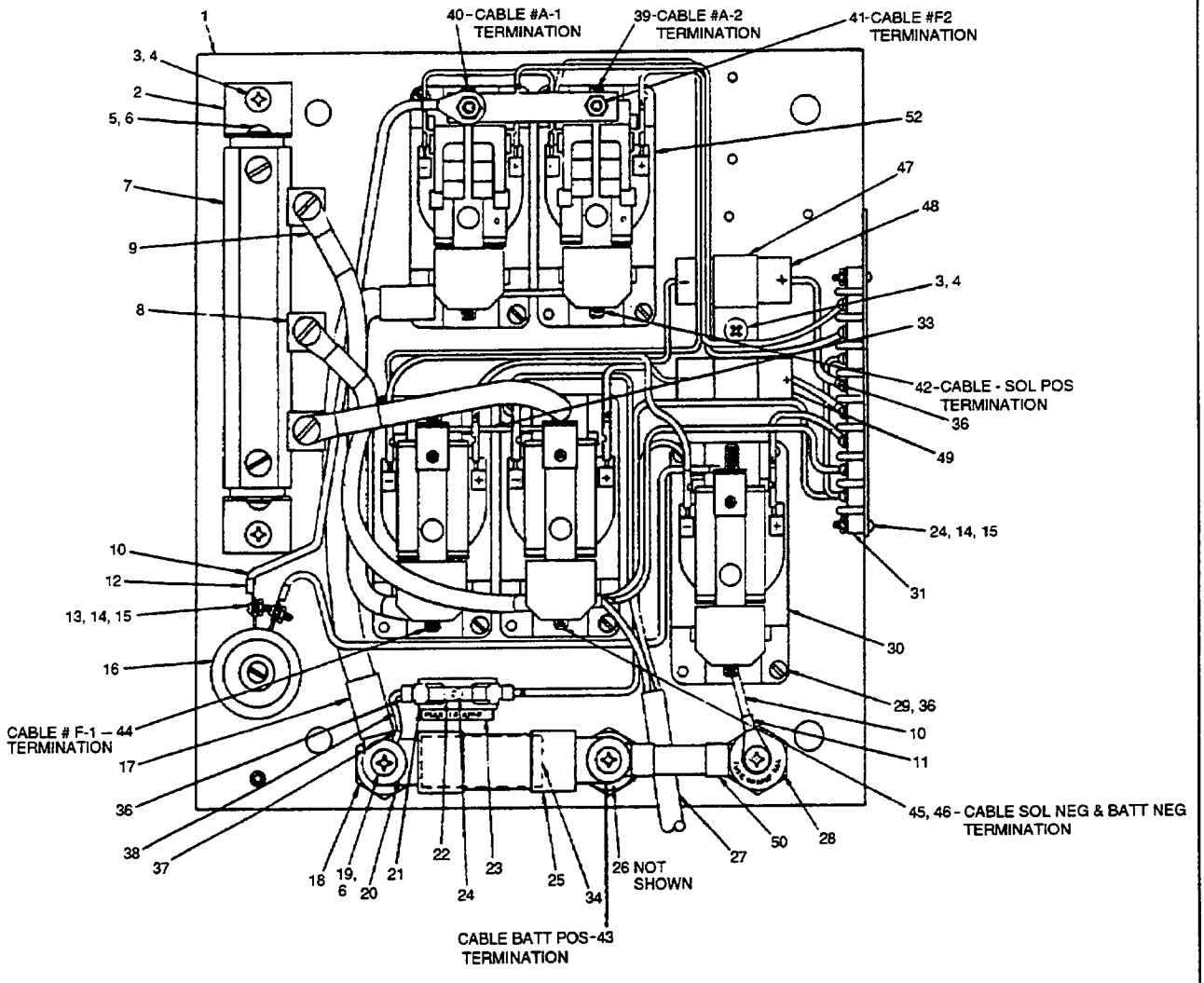


Figure 12-39. 12-Volt Contactor Panel

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	504652	12-VOLT ELECTRICAL PANEL	1
1	504638	. PANEL	1
2	250716	. SPEED CONTROL BRACKET	2
3	071376	. PAN HEAD SCREW, 10-32 X 1/2	2
4	077208	. SPLIT LOCK WASHER, 3/16	2
5	070475	. SCREW, FD HD, 1/4-20 X 3/8	4
6	077209	. LOCK WASHER, 1/4	10
7	018904	. 12V SPEED CONTROL RESISTOR	1
8	021221	. TERMINAL FOR USE WITH SPD CONTROL RESISTOR	3
9	503774	. CABLE, ASSY. PD	3
10	023026	. WIRE, 10 GA. WHITE	A/R
11	021238	. TERMINAL RING TYPE, 1/4	4
12	021237	. TERMINAL RING	2
13	068177	. SCREW, RD HD, #5-40 X 3/8	2
14	077203	. LOCK WASHER	5
15	059410	. HEX NUT	5
16	018907	. ELECTRICAL BRAKE RESISTOR	1
17	504639	. CABLE ASSEMBLY	1
18	010614	. STAND-OFF	3
19	070489	. SCREW, RH HD, 1/4-20 X 5/8	3
20	077105	. FLAT BRONZE WASHER	6
21	008904	. FUSE HOLDER	1
22	008910	. 15 AMP FUSE	1
23	056504	. DECAL, FUSE, 15A	1
24	068179	. SCREW, RD HD, #5-40 X 5/8	3
25	008906	. 300 AMP FUSE	1
26	070488	. SCREW, RH HD, 1/4-20 X 3/8	3

NOTE: FOR A COMPLETE SET OF CONTACTOR TIPS FOR ALL CONTACTORS ORDER PART NUMBER 900531-01.

INDEX NO.	PART NO.	PART NAME	NO. REQD.
27	023130	. WIRE HARNESS ASSY	1
28	056515	. DECAL FUSE, DYNAMIC BRAKE	1
29	070491	. SCREW, RH HD, 8-32 X 1	10
30	005658	. CONTACTOR, SINGLE POLE (FIG 12-41)	3
31	021226	. TERMINAL BLOCK	1
32	005656	. CONTACTOR, DOUBLE POLE (FIG 12-42)	2
33	401181	. BUS BAR	3
34	056507	. FUSE, DECAL, 300 AM, 0.020 ALUM.	1
35	077205	. SPLIT LOCK WASHER, #8	10
36	021204	. TERMINAL, SLIDE CLIP, 1/4	5
37	021206	. TERMINAL, RING, 1/4	1
38	023018	. WIRE, BLACK, #16 STRANDED	A/R
39	503965-37	. CABLE ASSY #2, A-2	1
40	503965-36	. CABLE ASSY #2, A-1	1
41	503965-42	. CABLE ASSY #2, F-2	1
42	503965-39	. CABLE ASSY #2	1
43	504277-01	. CABLE ASSY - BATT.	1
44	503965-38	. CABLE ASSY #2, F-1	1
45	503965-40	. CABLE ASSY #2	1
46	504277-02	. CABLE ASSY - BATT.	1
47	056120	. CLAMP	1
48	021712-01	. TIME DELAY, 1-SEC	1
49	021712-02	. TIME DELAY, 2-SEC	1
50	008917	. FUSE, 40 AMP, DYNAMIC BRAKE.	1

1. SEE SUPPLEMENT 230 FOR TRANSISTOR TRUCKS SERIAL NUMBER 338442 AND HIGHER.
2. SEE SUPPLEMENT 187 FOR TRANSISTOR TRUCKS BELOW SERIAL NUMBER 338442.

CONTACTOR TIP SET
PART NO. 900531-01

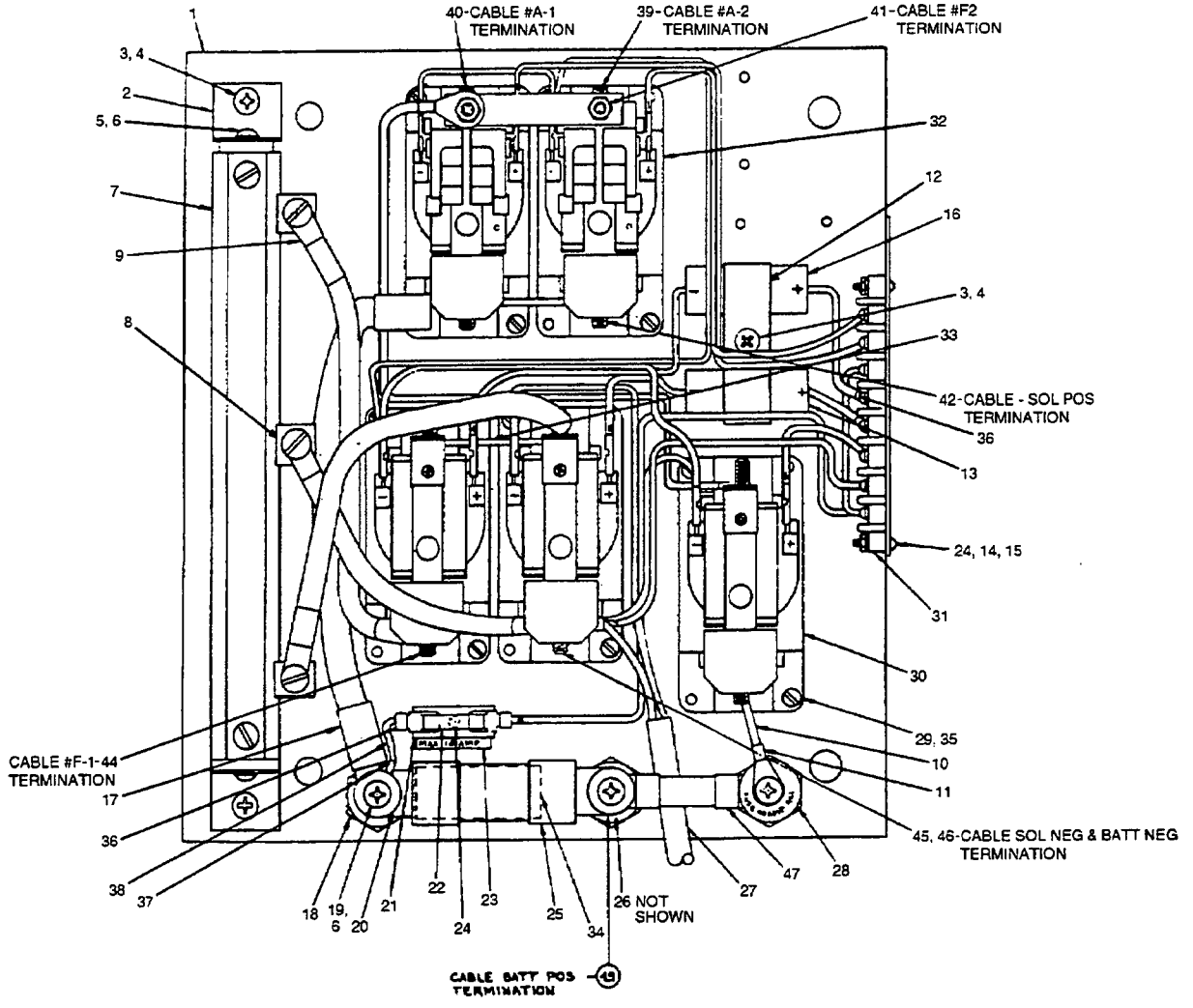


Figure 12-40. 24-Volt Contactor Panel

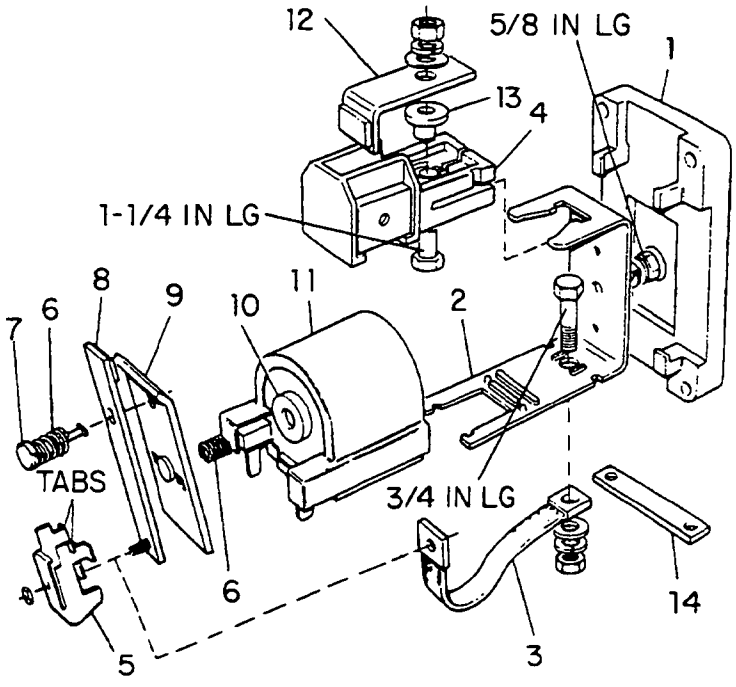
INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	504653	24-VOLT ELECTRICAL PANEL	1
1	504638	. PANEL	1
2	250716	. SPEED CONTROL BRACKET	2
3	071376	. PAN HEAD SCREW, 10-32 X 1/2	2
4	077208	. SPLIT LOCK WASHER, 3/16	2
5	070475	. SCREW, FD HD, 1/4-20 X 3/8	4
6	077209	. LOCK WASHER, 1/4	10
7	018900	. 24V SPEED CONTROL RESISTOR	1
8	021221	. TERMINAL FOR USE WITH SPD CONTROL RESISTOR	3
9	503774	. CABLE, ASSY. PD	3
10	023026	. WIRE, 10 GA. WHITE	A/R
11	021238	. TERMINAL RING TYPE, 1/4	4
12	056120	. CLAMP	1
13	021712-02	. TIME DELAY, 2-SEC	1
14	077203	. LOCK WASHER	5
15	059410	. HEX NUT	5
16	021712-01	. TIME DELAY, 1-SEC	1
17	504639	. CABLE ASSEMBLY	1
18	010614	. STAND-OFF	3
19	070489	. SCREW, RH HD, 1/4-20 X 5/8	3
20	077105	. FLAT BRONZE WASHER	6
21	008904	. FUSE HOLDER	1
22	008910	. 15 AMP FUSE	1
23	056504	. DECAL, FUSE, 15A	1
24	068179	. SCREW, RD HD, #5-40 X 5/8	3
25	008906	. 300 AMP FUSE	1

NOTE: FOR A COMPLETE SET OF CONTACTOR TIPS FOR ALL CONTACTORS ORDER PART NUMBER 900531-01.

INDEX NO.	PART NO.	PART NAME	NO. REQD.
26	070488	. SCREW, RH HD, 1/4-20 X 3/8	3
27	023130	. WIRE HARNESS ASSY	1
28	056515	. DECAL FUSE, DYNAMIC BRAKE	1
29	070491	. SCREW, RH HD, 8-32 X 1	10
30	005659	. CONTACTOR, SINGLE POLE (FIG 12-41)	3
31	021226	. TERMINAL BLOCK	1
32	005657	. CONTACTOR, DOUBLE POLE (FIG 12-42)	2
33	401181	. BUS BAR	3
34	056507	. FUSE, DECAL, 300 AM, 0.020 ALUM.	1
35	077205	. SPLIT LOCK WASHER, #8	10
36	021204	. TERMINAL, SLIDE CLIP, 1/4	5
37	021206	. TERMINAL, RING, 1/4	1
38	023108	. WIRE, BLACK, #16 STRANDED	A/R
39	503965-37	. CABLE ASSY #2, A-2	1
40	503965-36	. CABLE ASSY #2, A-1	1
41	503965-42	. CABLE ASSY #2, F-2	1
42	503965-39	. CABLE ASSY #2	1
43	504277-03	. CABLE ASSY - BATT.	1
44	503965-38	. CABLE ASSY #2, F-1	1
45	503965-40	. CABLE ASSY #2	1
46	504277-04	. CABLE ASSY - BATT.	1
47	008917	. FUSE, 40 AMP, DYNAMIC BRAKE.	1

CONTACTOR TIP KIT 900531-08 CONTAINS

ITEM	QTY
3	1
4	1
8	1
12	1



R1865

Figure 12-41. Single Pole Contactor, 2nd Speed, 3rd Speed Dynamic Brake

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	005658	CONTACTOR SINGLE POLE, 100 AMP. 12V	1
—	005659	CONTACTOR SINGLE POLE, 100 AMP, 24 V	1
1	905010	. BASE MOULDING	1
2	905024	. MAGNETIC FRAME	1
3	905013*	. BRAID ASSEMBLY	1
4	905025	. FRONT MOLDING WITH BLOWOUT	1
5	905015*	. ARMATURE PLATE RETAINER	1
6	905016	. COMPRESSION SPRING	2

INDEX NO.	PART NO.	PART NAME	NO. REQD.
7	905017	. SPRING STUD	1
8	905029*	. MOVING CONTACT ASSEMBLY	1
9	905019	. ARMATURE PLATE	1
10	905020	. POLE PIECE	1
11	905021	. COIL ASSEMBLY 12-VOLT	1
11	905028	. COIL ASSEMBLY, 24-VOLT	1
12	905022*	. FRONT CONTACT	1
13	905023	. SPACER	1
14	401181	. BUS BAR (NOT PART OF CONTACTOR)	1

*** CONTACTOR TIP KIT 900531-08. ONE KIT REPAIRS ONE CONTACTOR.**

CONTACTOR
TIP KIT 900531-09
CONTAINS

ITEM	QTY
3	1
5	1
8	1
12	1
16	1

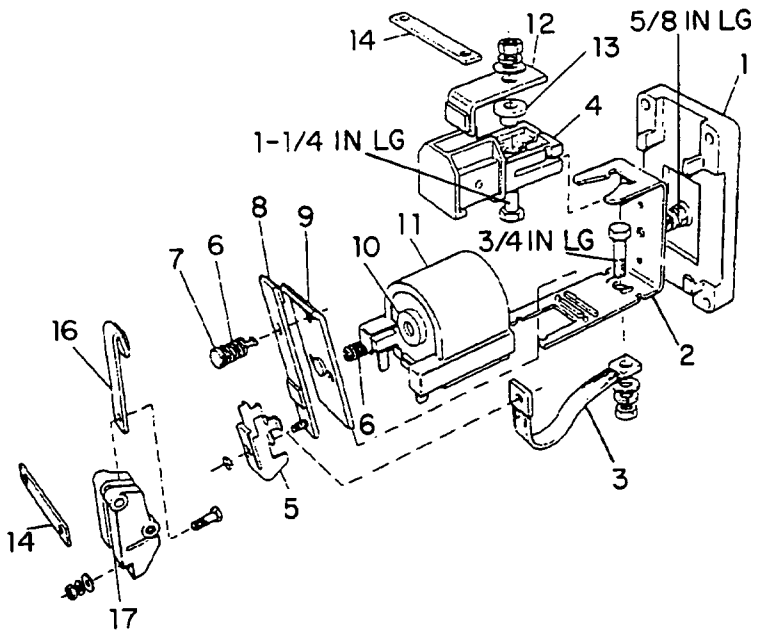


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Figure 12-42. Double Pole Contactor, Forward, Reverse

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	005656	CONTACTOR DOUBLE POLE, 100 AMP. 12V	1
—	005657	CONTACTOR DOUBLE POLE, 100 AMP, 24 V	1
1	905010	. BASE MOULDING	1
2	905024	. MAGNETIC FRAME	1
3	905013*	. BRAID ASSEMBLY	1
4	905025	. FRONT MOLDING WITH BLOWOUT	1
5	905015*	. ARMATURE PLATE RETAINER	1
6	905016	. COMPRESSION SPRING	2
7	905017	. SPRING STUD	1
8	905018*	. MOVING CONTACT ASSEMBLY	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
9	905019	. ARMATURE PLATE	1
10	905020	. POLE PIECE	1
11	905021	. COIL ASSEMBLY 12-VOLT	1
11	905028	. COIL ASSEMBLY, 24-VOLT	1
12	905022*	. FRONT CONTACT	1
13	905023	. SPACER	1
14	401181	. BUS BAR (NOT PART OF CONTACTOR)	1
16	905026*	. BACK CONTACT	1
17	905027	. REAR MOLDING	1

*** CONTACTOR TIP KIT 900531-09. ONE KIT REPAIRS ONE CONTACTOR.**

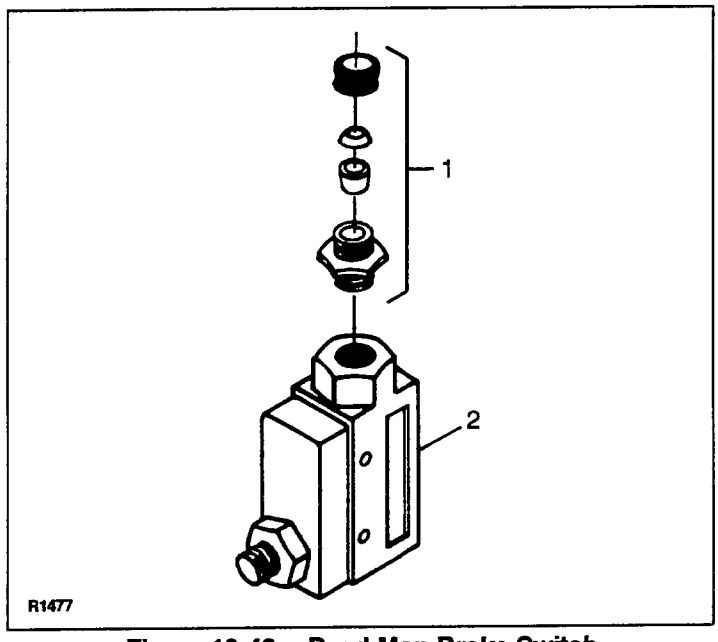

Figure 12-43. Dead-Man Brake Switch

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	019910	BUSHING, STRAIN RELIEF	1
2	020690	DEAD-MAN SWITCH (TRUCKS WITH COLD CONDITIONING)	1
2	020729	DEAD-MAN SWITCH	1

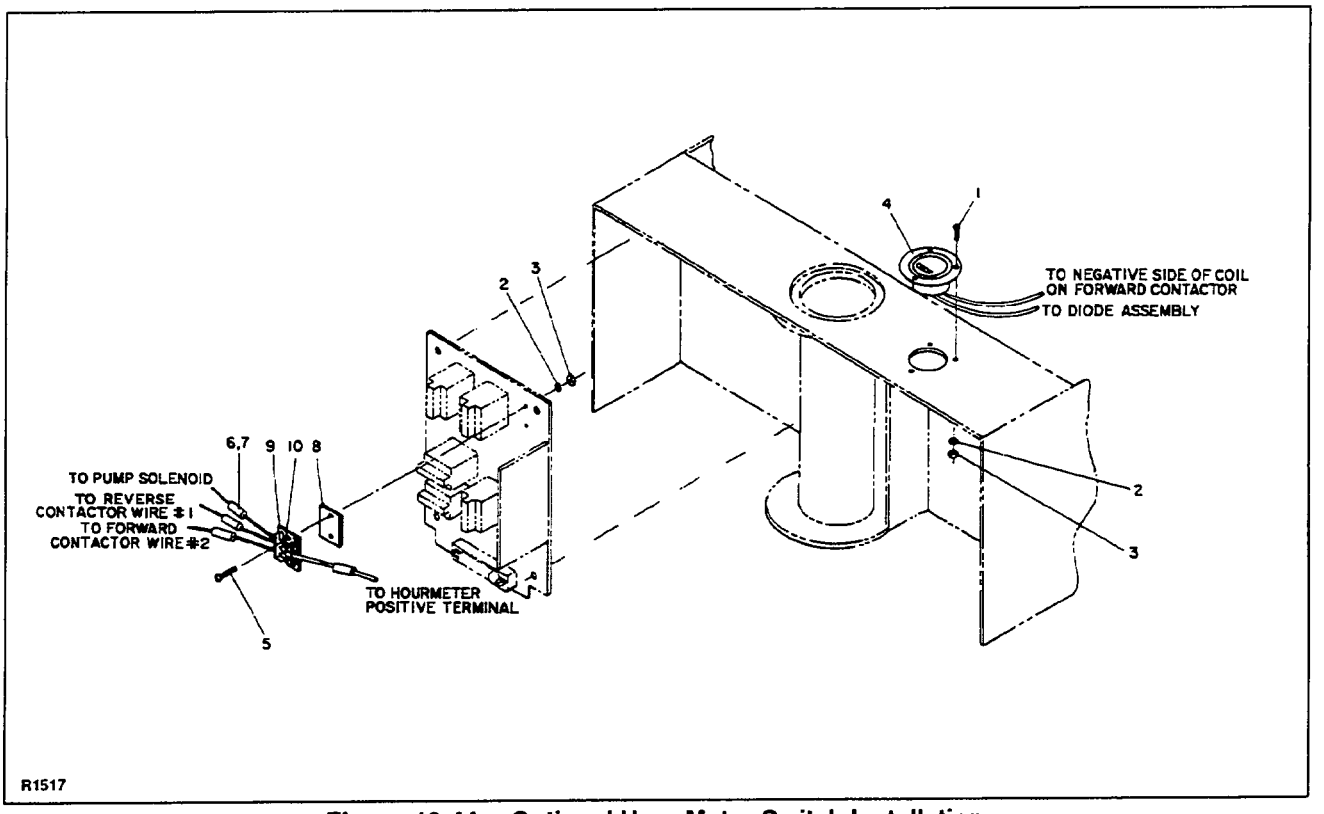

Figure 12-44. Optional Hour Meter Switch Installation

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	504189	HOUR METER INSTALLATION	1
1	068179	. SCREW, RD HD, #5-40 X 5/8	3
2	077203	. LOCK WASHER	5
3	059410	. HEX NUT	5
4	015604	. METER, HOUR	1
5	068177	. SCREW, RD HD, #5-40 X 3/8	2
6	005422	. CONNECTOR, INLINE, INSUL	4
7	021204	. TERMINAL, SLIDE CLIP, 1/4	4
8	010610	. PAD, INSUL, DIODE	1
9	005987	. DIODE ASSEMBLY	1
10	005976	. . DIODE	3
—	010606	. . MOUNTING PANEL	1
—	023018	. . WIRE, BLACK, #16 STRANDED	A/R

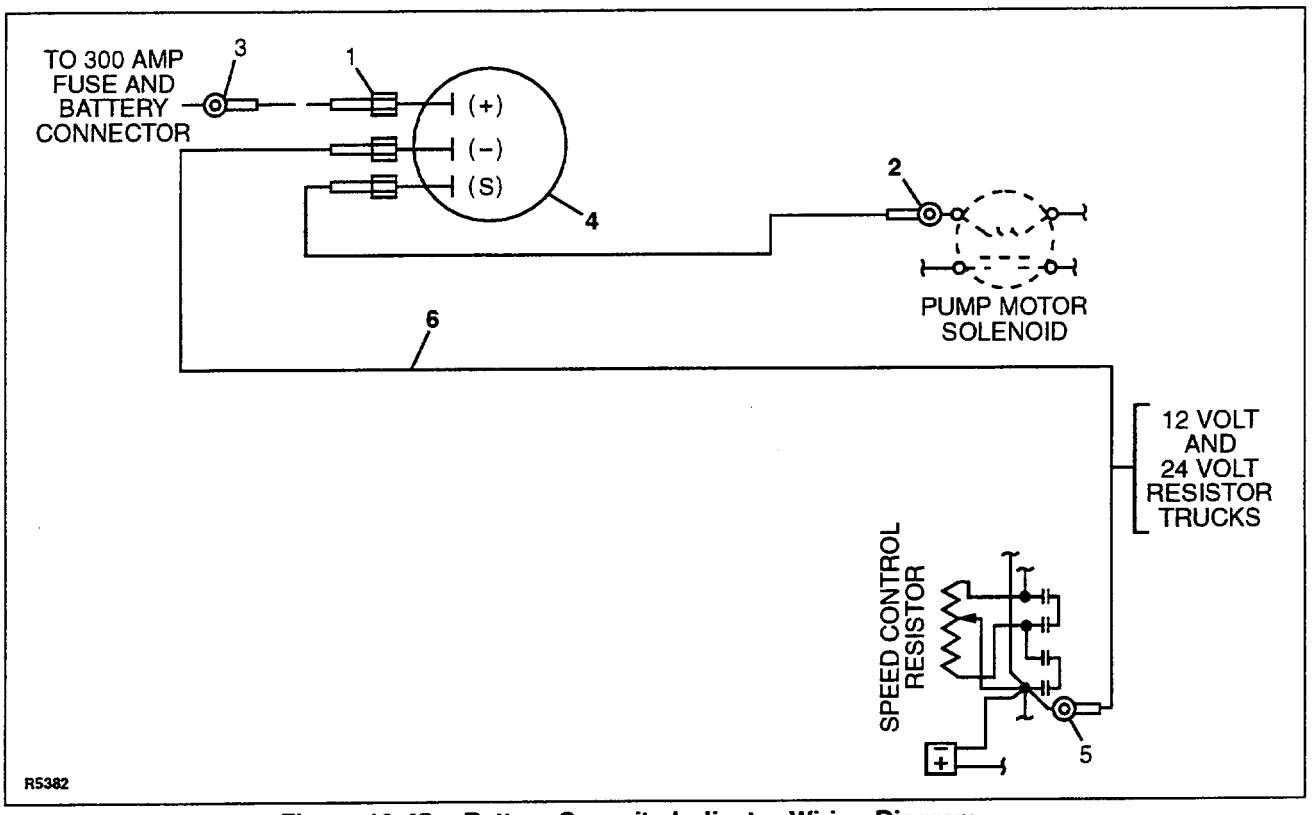

Figure 12-45. Battery Capacity Indicator Wiring Diagram Systems With Lockout

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	021718	CONNECTOR	3
2	021203	TERMINAL	1
3	021207	TERMINAL	1
4	010624-01	INDICATOR, 12V BAT CAPACITY	1
4	010624-02	INDICATOR, 24V BAT CAPACITY	1
5	021206	TERMINAL	1
6	023014	WIRE	A/R

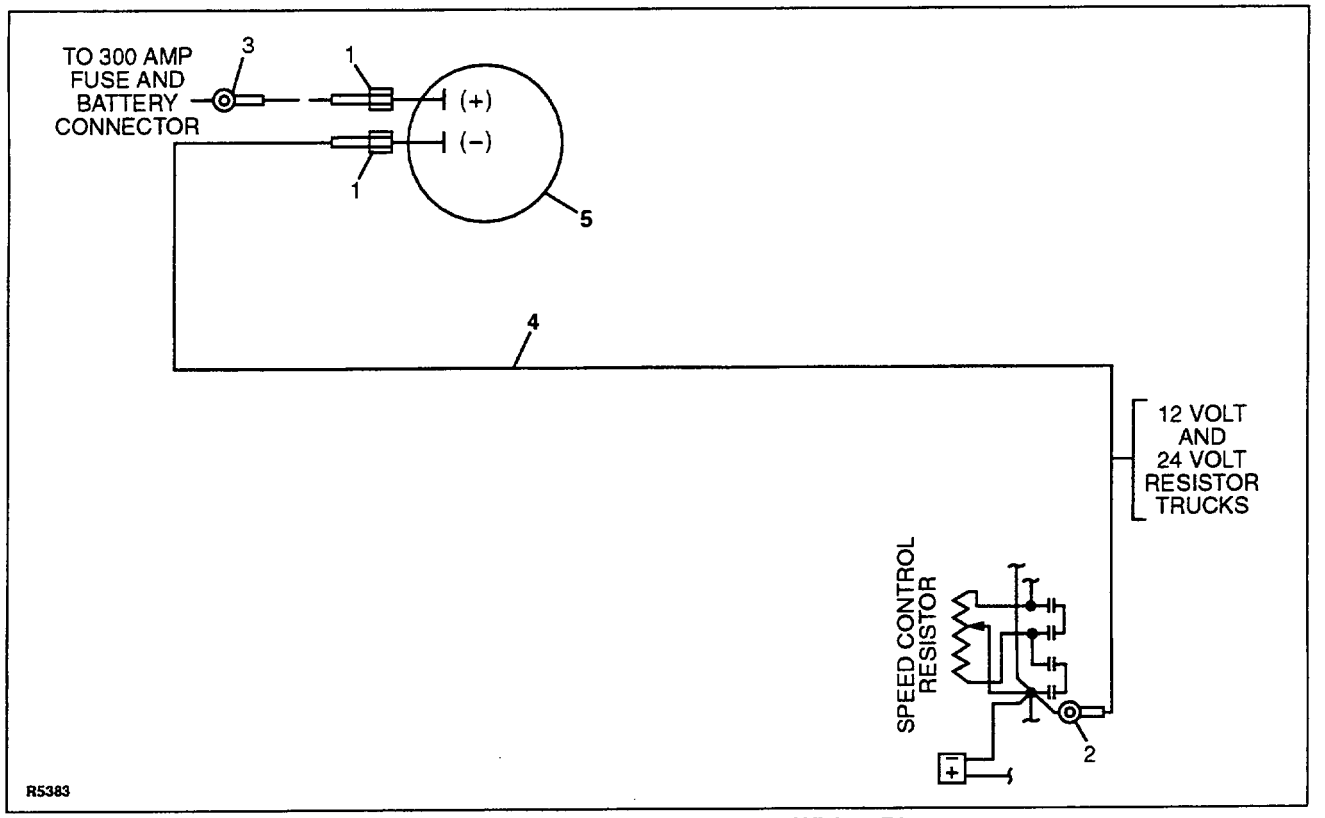

Figure 12-46. Battery Capacity Indicator Wiring Diagram
Systems Without Lockout

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	021718	CONNECTOR	2
2	021206	TERMINAL	1
3	021207	TERMINAL	1
4	023014	WIRE	AR
5	010619-01	INDICATOR, 12V BAT CAPACITY	1
5	010619-02	INDICATOR, 24V BAT CAPACITY	1

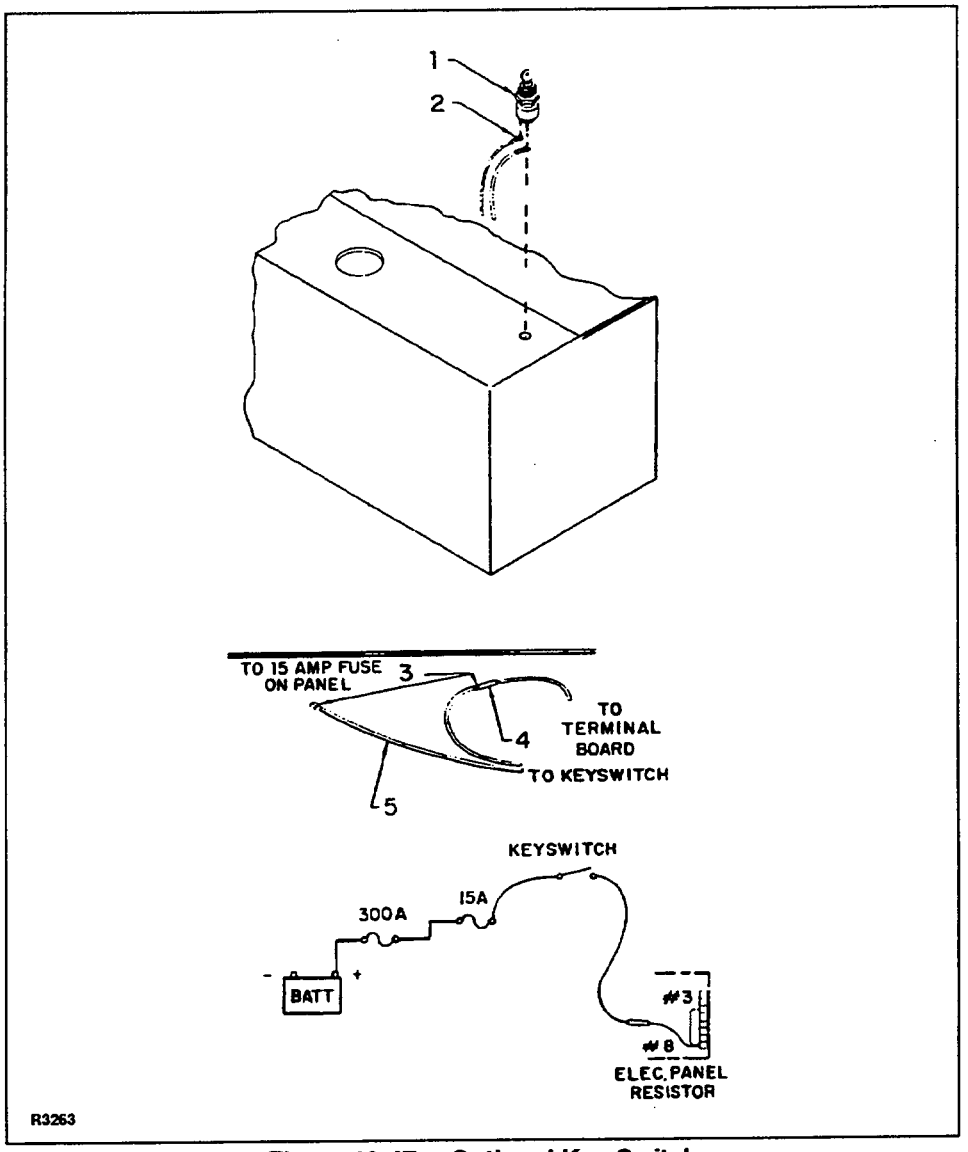

Figure 12-47. Optional Key Switch

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	020725	SWITCH KEY	1
2	021203	TERMINAL, RING	2
3	021204	TERMINAL, QUICK DISCONNECT, FEMALE	2
4	005422	CONNECTION, IN-LINE, INSULATED	1
5	023014	WIRE	A/R