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Manual **901353**
Model **PDM S/N 333620 and Higher**

This manual is affected by the following BULLETINS:
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Bulletin	Rev	Title
187		Transistor Speed Controller
207		Transistor Control Head
220	A	Transistor Control Head
228		Trans Controller/Contactor pan (Type E Trucks)
245		Battery Safety and Maintenance
272		Battery Quick Disconnect Cable kits
318		Control Arm Assembly
325		PDM Adjustable Straddle Supplement
329	A	Speed Resistor Retrofit
330		PDM Smart Charger 004983-01
333		PDM Pump & Motor 016939
342		PDM Wal-Mart Truck
356		Cylinder 503568 packing change
364		Alltrax 12V Controller 005467-03

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PDM SERIES
POWER DRIVEN
MEDIUM DUTY
LIFT TRUCK
Serial Number 333620 and Higher

Operation

Maintenance

Repair Parts List

Big Joe Manufacturing Company-Lincolnwood, IL 60646

MANUAL NO. 901353
02/09/2015

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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 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.

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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 3 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.

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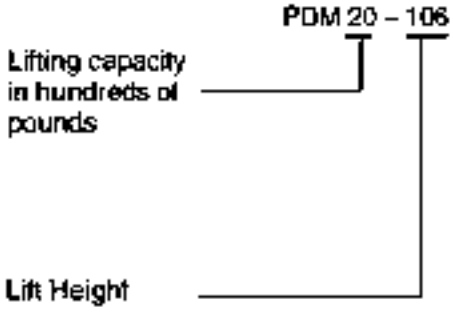
SECTION 1
DESCRIPTION

1-1. INTRODUCTION.

This publication describes the Power Driven Medium Duty (PDM) 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 location of the trucks serial number and name plate. Figure 1-3 shows the locations of the trucks main components and controls.

1-2. GENERAL DESCRIPTION.

The self-propelled PDM truck, Figure 1-3, lifts and transports payloads on adjustable forks. The PDM 20 can lift up to 2000 pounds, the PDM 25 can lift up to 2500 pounds, and the PDM 30 can lift up to 3000 pounds at 24 inch load centers.

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.

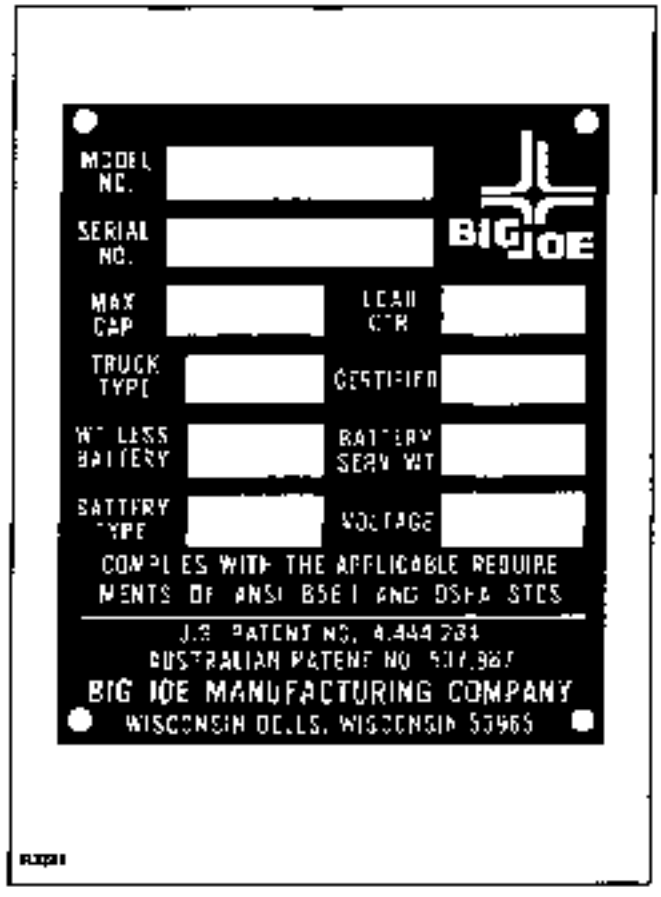


Figure 1-1. Name Plate

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 PDM 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 PDM 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.

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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 PDM 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 229 for trucks serial number 338388 and higher) (Refer to Supplement 187 for trucks serial number 333620 to 338387).

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.

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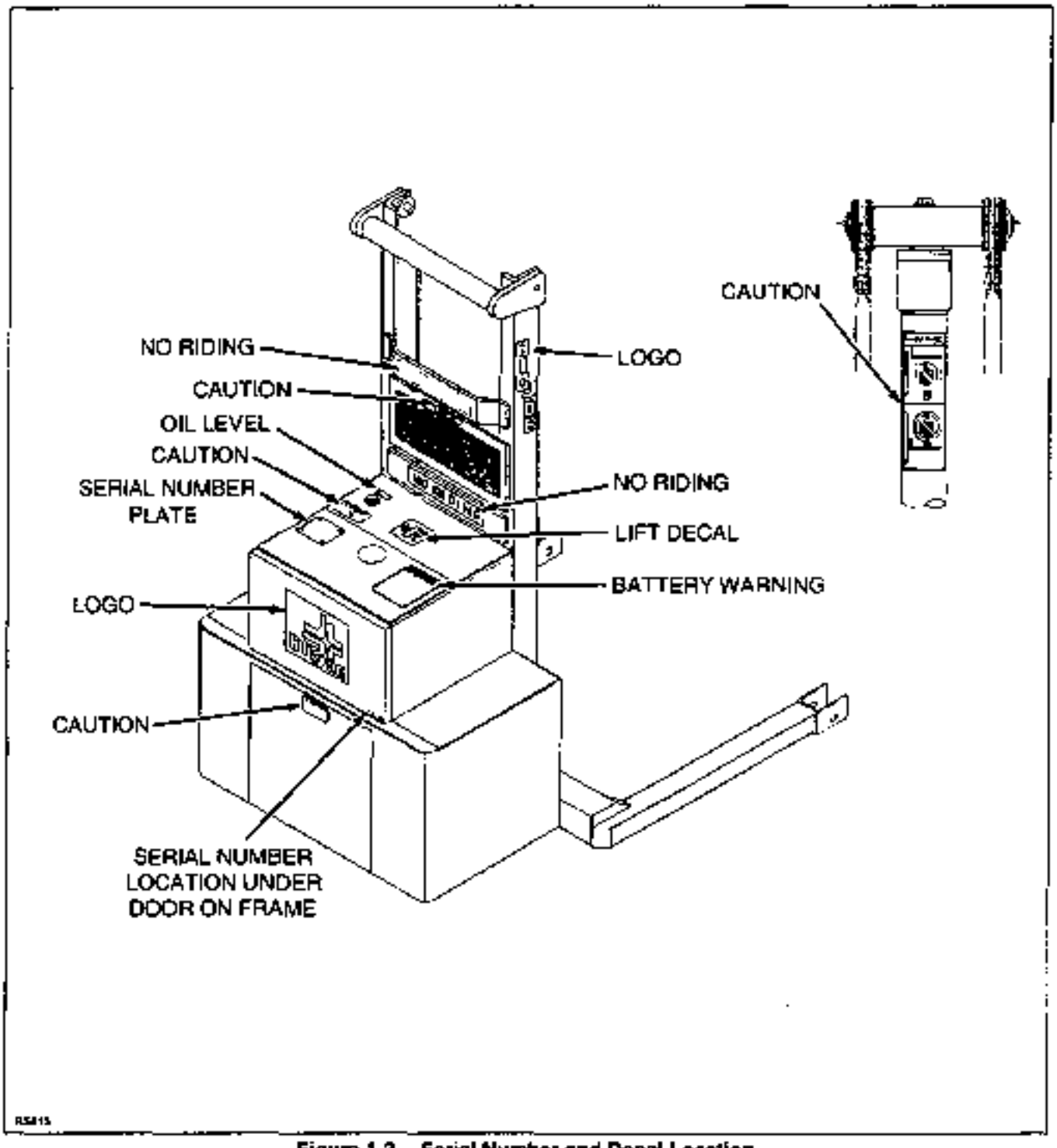

Figure 1-2. Serial Number and Decal Location

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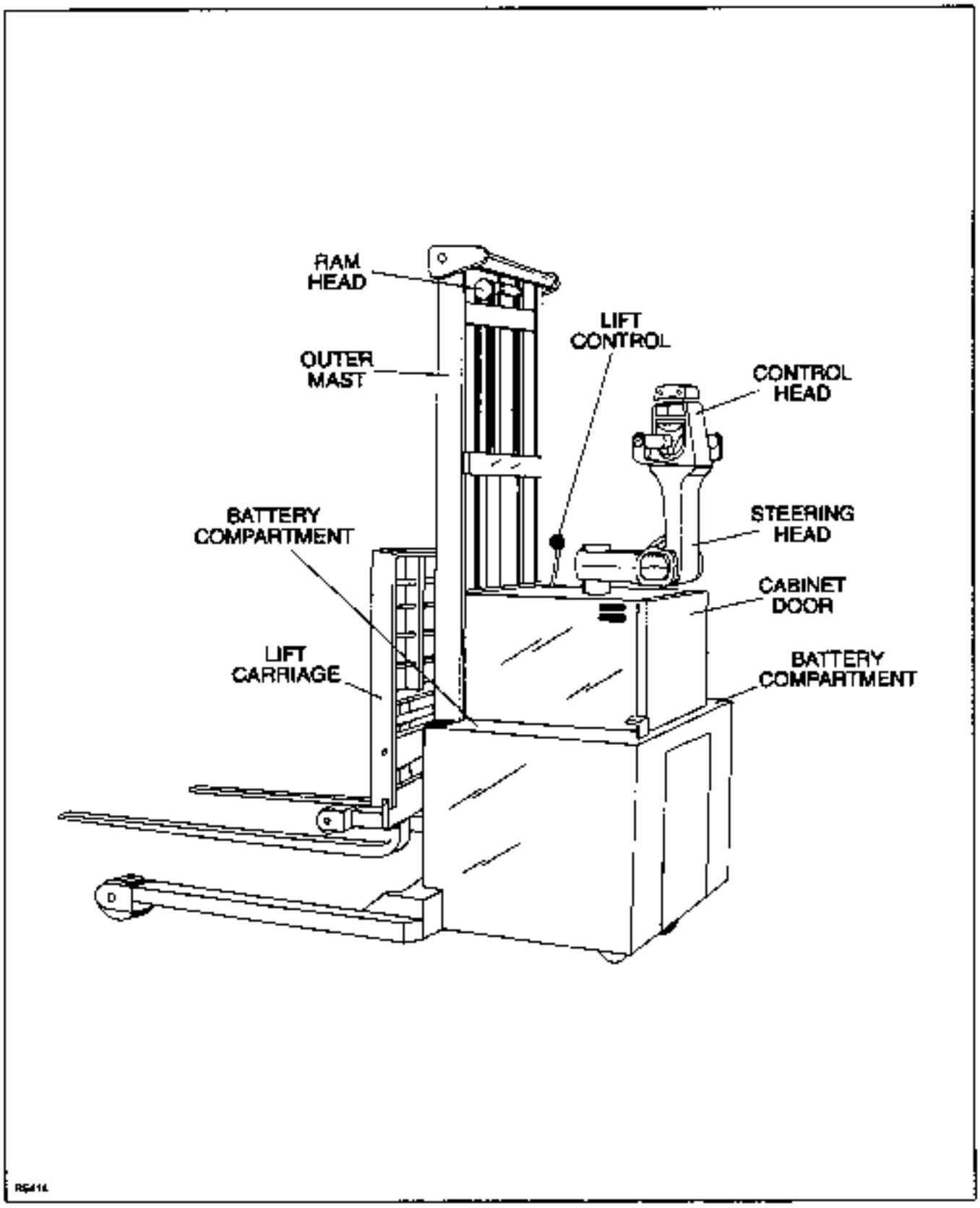

Figure 1-3. PDM Lift Truck

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SECTION 2
OPERATION

1. SEE SUPPLEMENT 220 FOR TRANSISTOR TRUCKS SERIAL NUMBER 334631 AND HIGHER.
2. SEE SUPPLEMENT 207 FOR TRANSISTOR TRUCKS SERIAL NUMBER 333620 TO 334630.

2-1. GENERAL.

This section gives detailed operating instructions for the PDM 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 PDM 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.

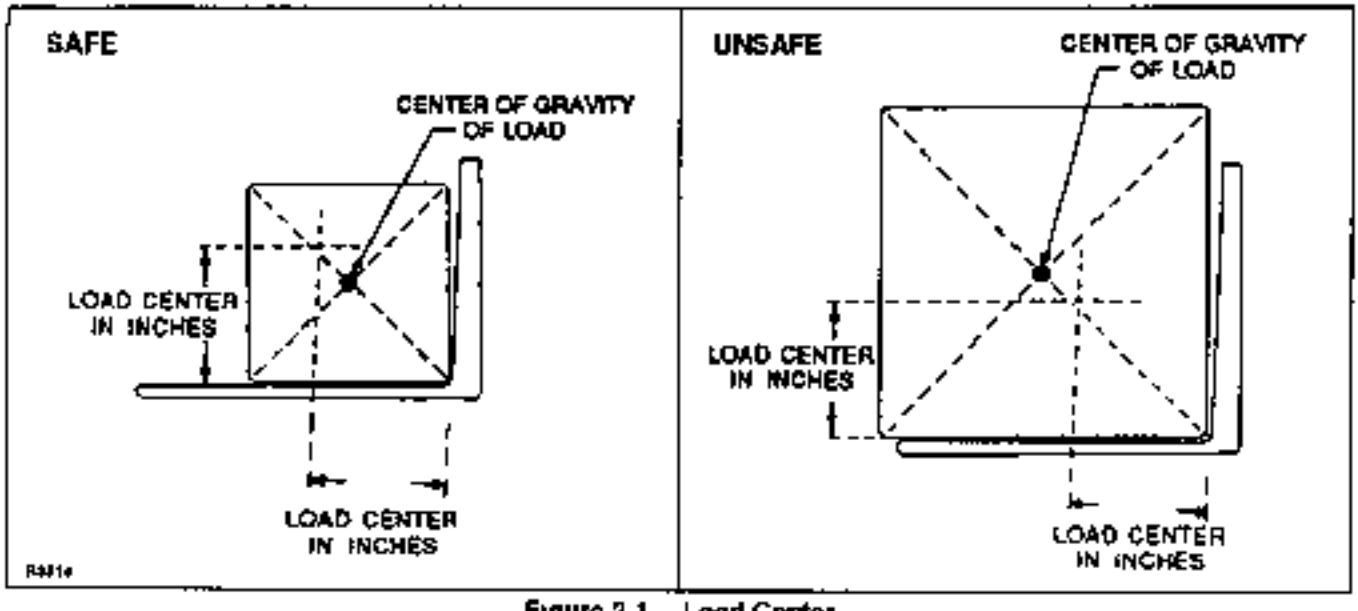

Figure 2-1. Load Center

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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 PDM 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 and caster wheels for freedom of rotation.
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.

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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		
Load Wheels		
Horn		
Lift—Lower Control		
Attachment Operation		
Forward & Reverse Controls		
Steering		
Electrical Brakes		
Mechanical Brake		
Hydraulic Leaks, Cylinders, Valves, Hoses, Etc.		

Figure 2-2. Sample of Operator Check List

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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 333620 TO 334630.

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

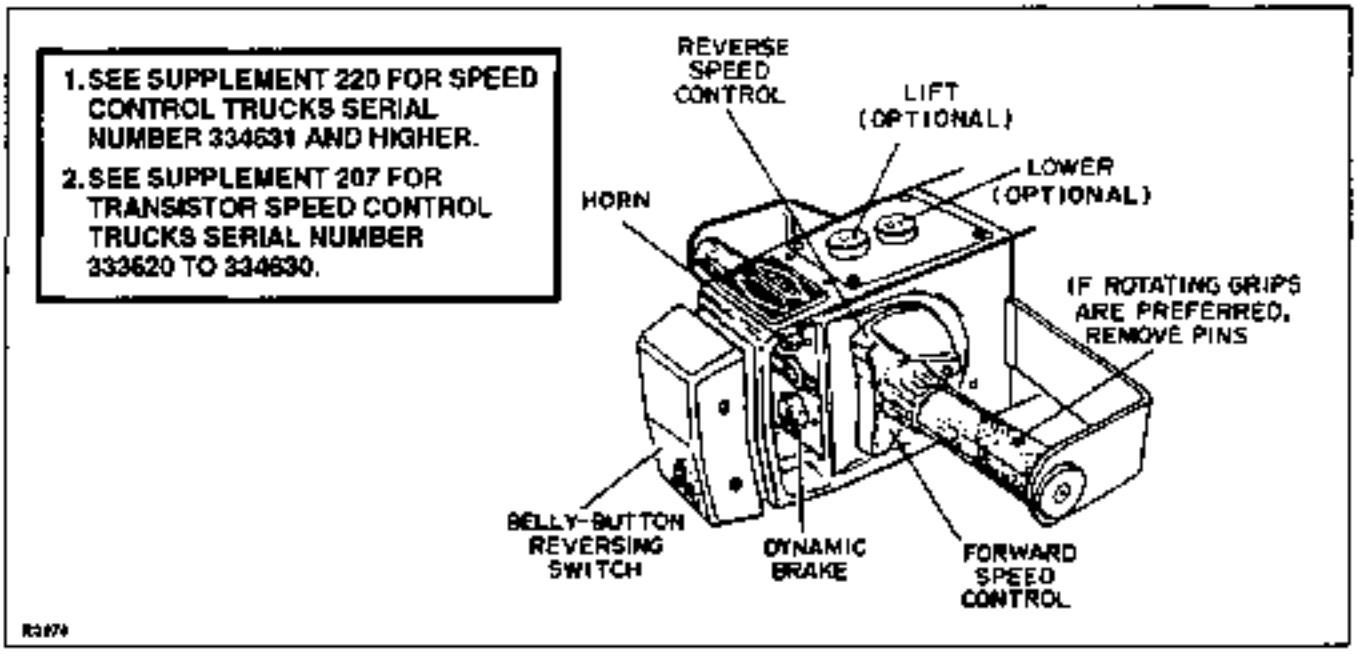

Figure 2-3. Control Handle

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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 rear of the battery compartment. 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 key switch, 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 key switch provides added security to the truck, preventing unauthorized personnel from operating the machine.

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.

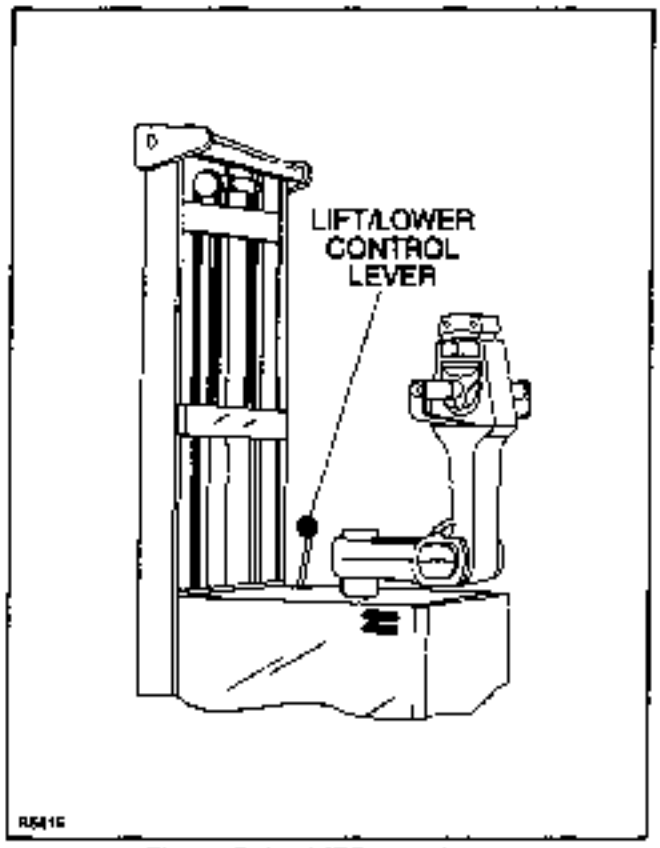

Figure 2-4. Lift/Lower Lever

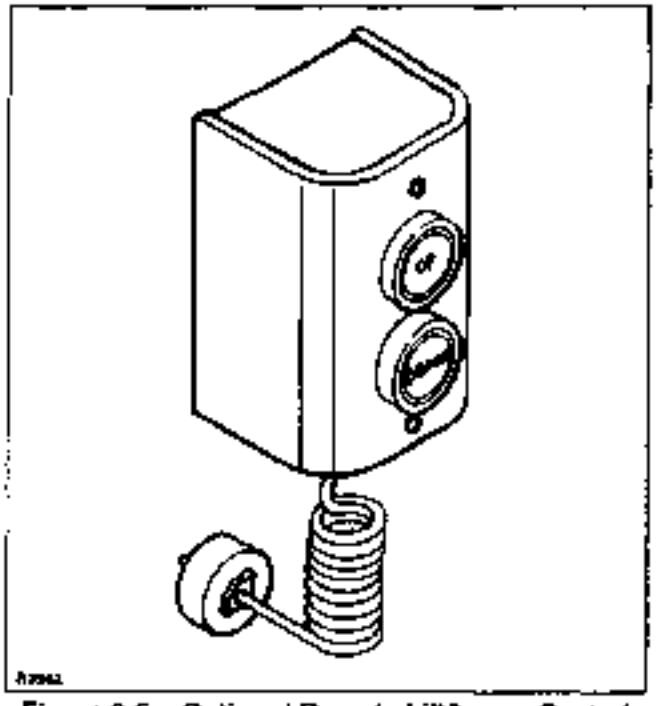

Figure 2-5. Optional Remote Lift/Lower Control

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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.

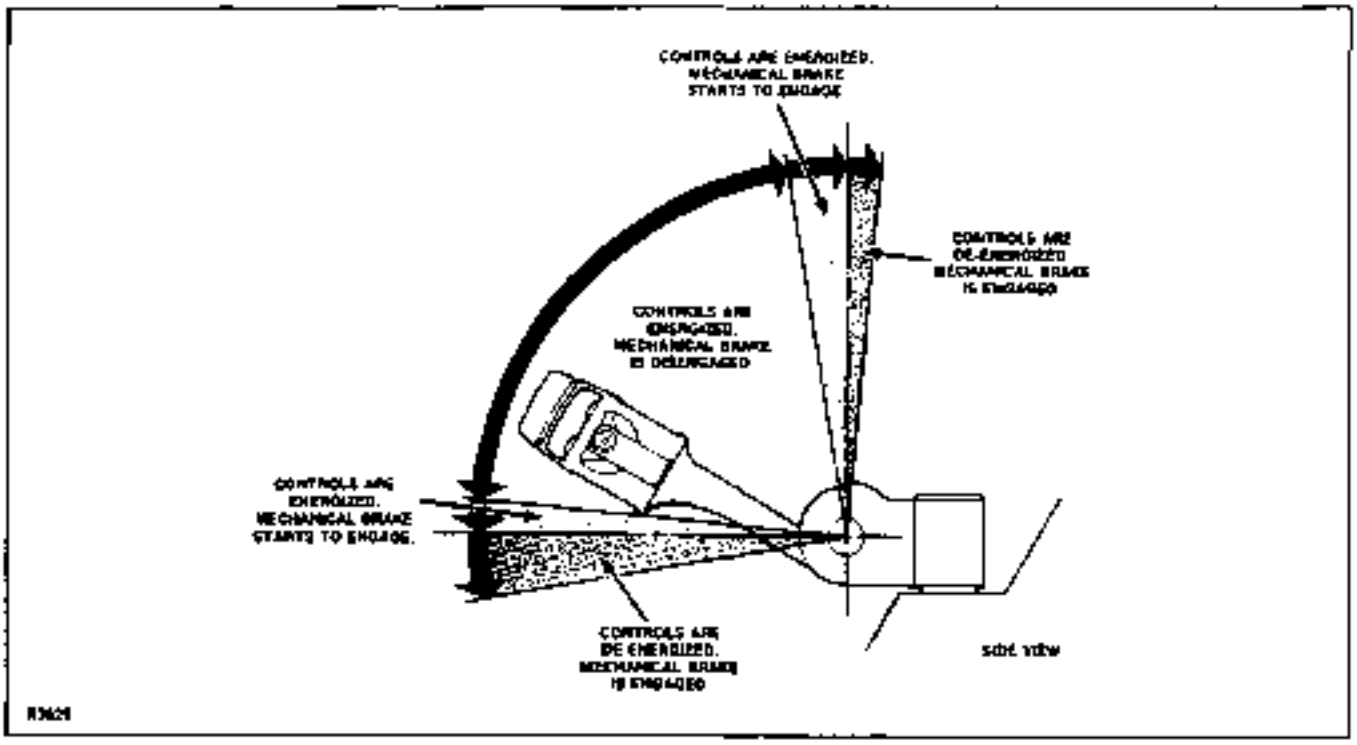

Figure 2-6. Steering Arm Braking Position

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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.

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SECTION 3
PLANNED MAINTENANCE

3-1. GENERAL.

Planned 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.

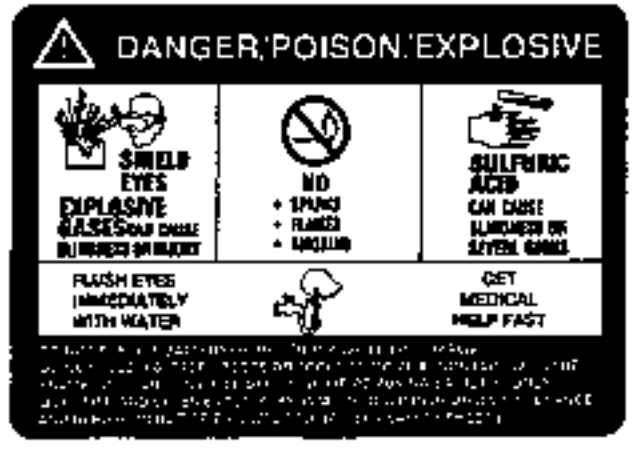
3-3. BATTERY CARE.

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

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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	10 qts
106 in	10 qts
106 in*	14 qts
130 in	10 qts
130 in*	14 qts
154 in	10 qts

* FFL trucks

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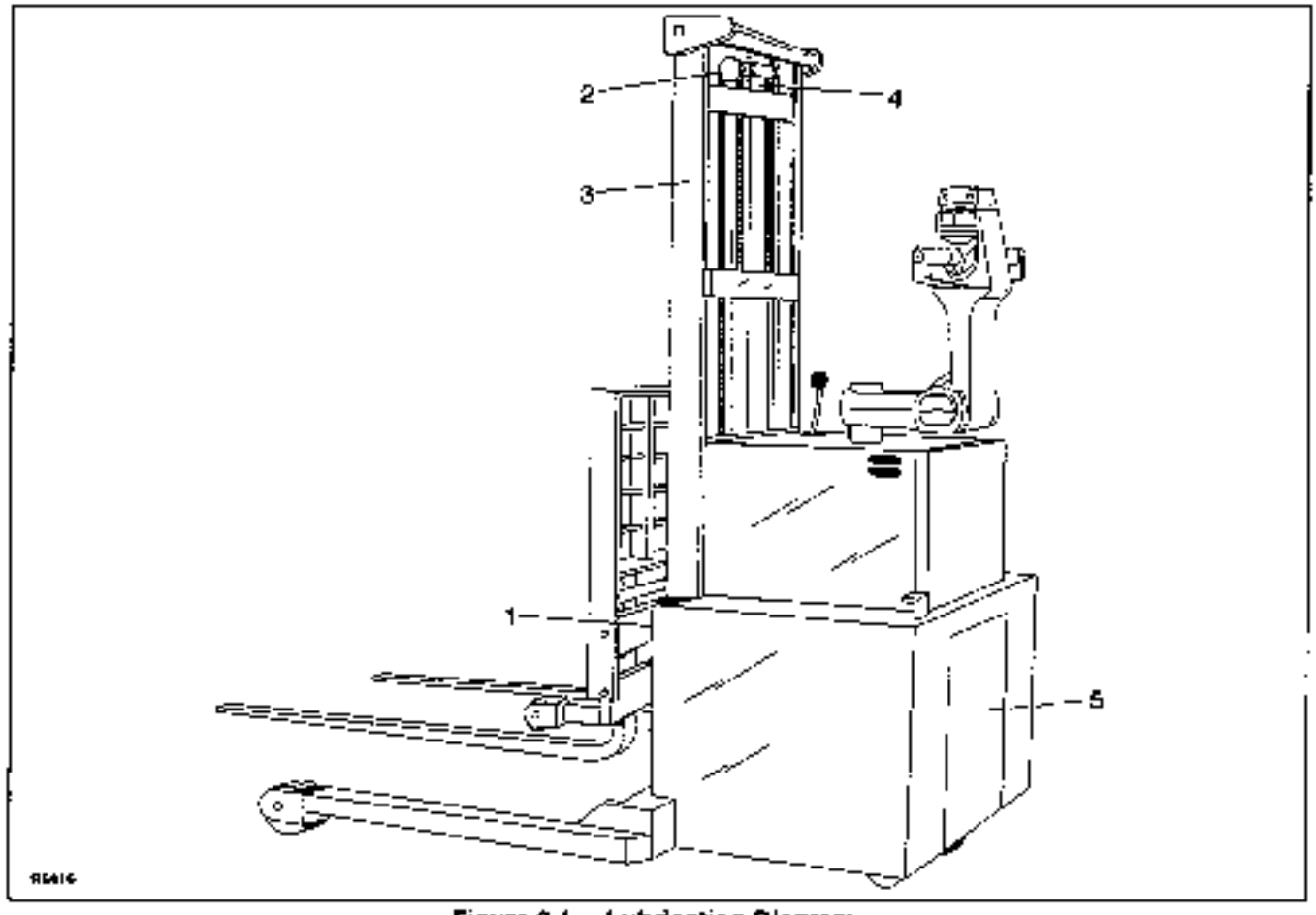

Figure 3-1. Lubrication Diagram

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	Clean off old grease and apply a thin coat the full length of mast where rollers touch
4	Free Lift Slide bar (Telescopic Trucks)	Brush	No 2	Clean off old grease and apply a thin coat the full length of slide bar where ram head touches.
5	Transmission	Can	No. 1	Fill to hex plug (fill level plug) level. Remove vent and fill through vent hole.

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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 333620 TO 334630.
3. SEE SUPPLEMENT 187 FOR CONTROLLER ON TRANSISTOR TRUCKS SERIAL NUMBER 333620 TO 338387.
4. SEE SUPPLEMENT 230 FOR CONTROLLER ON TRANSISTOR TRUCKS SERIAL NUMBER 338388 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 (Figure 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

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Table 4-1. Troubleshooting Chart (Continued)

		defective. If voltage is present, contactor is defective
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,

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Table 4-1. Troubleshooting Chart (Continued)

		check brake switch and coil of relay. Repair or replace defective part.
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.

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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.

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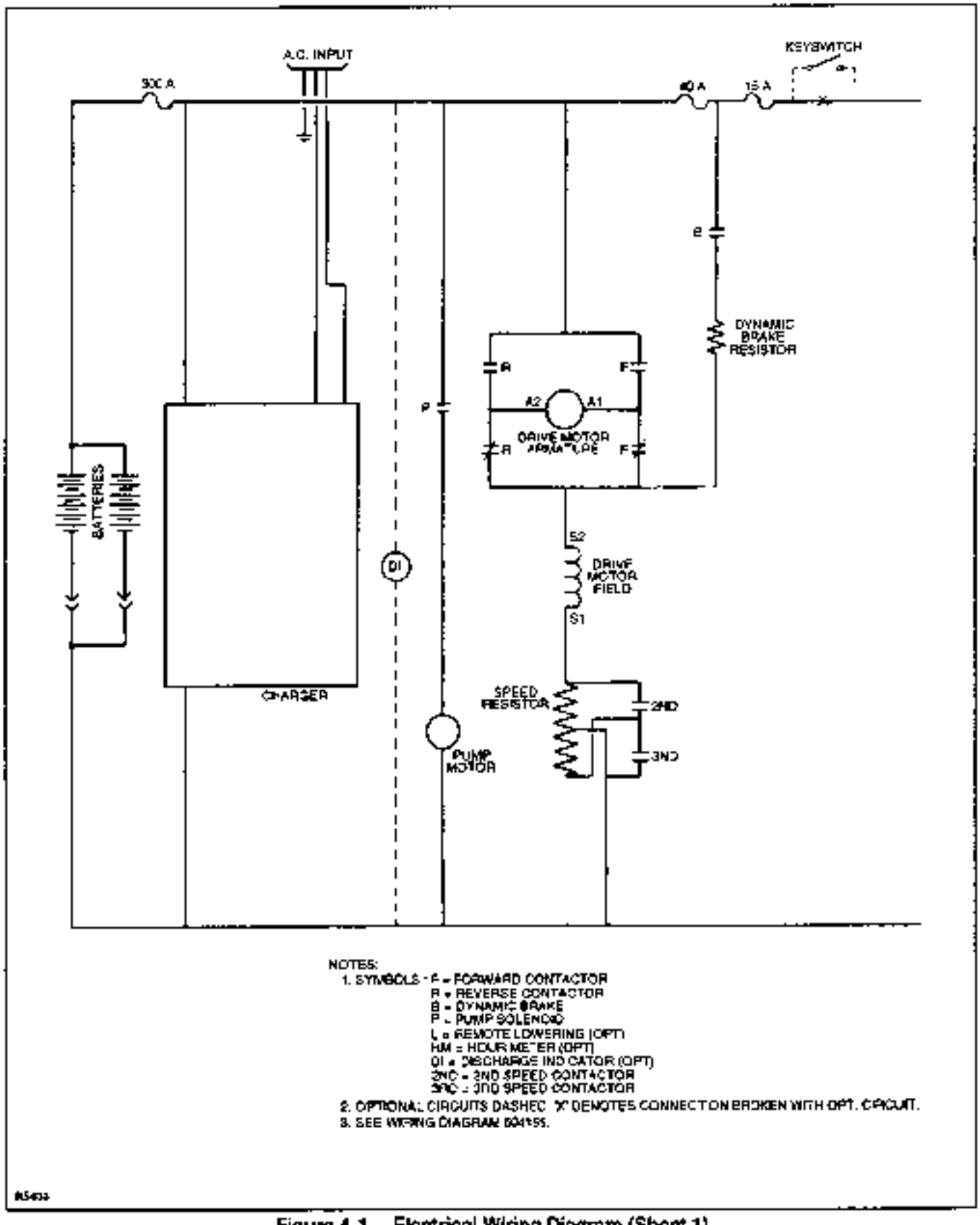

Figure 4-1. Electrical Wiring Diagram (Sheet 1)

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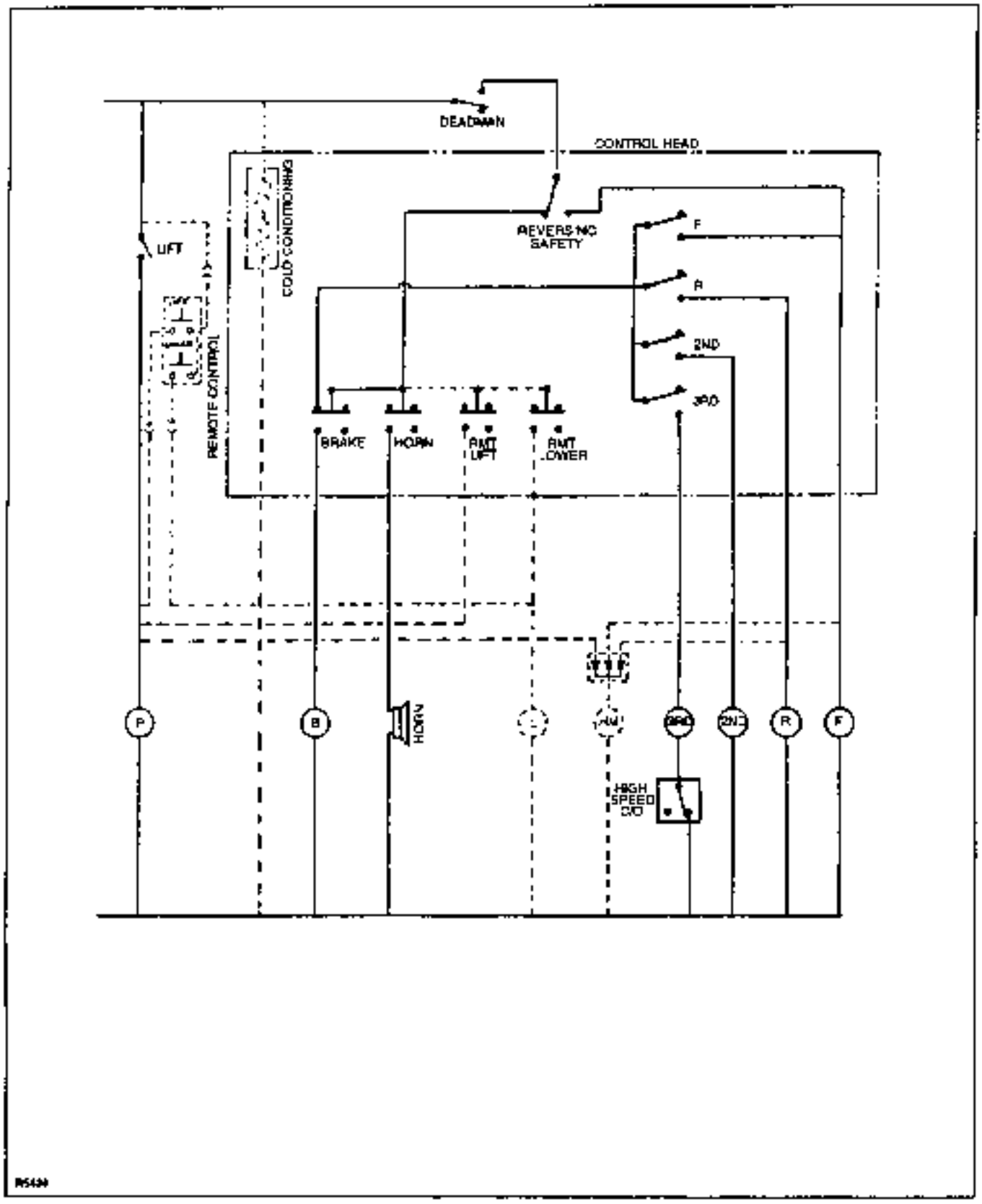

Figure 4-1. Electrical Wiring Diagram (Sheet 2)

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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 333620 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.

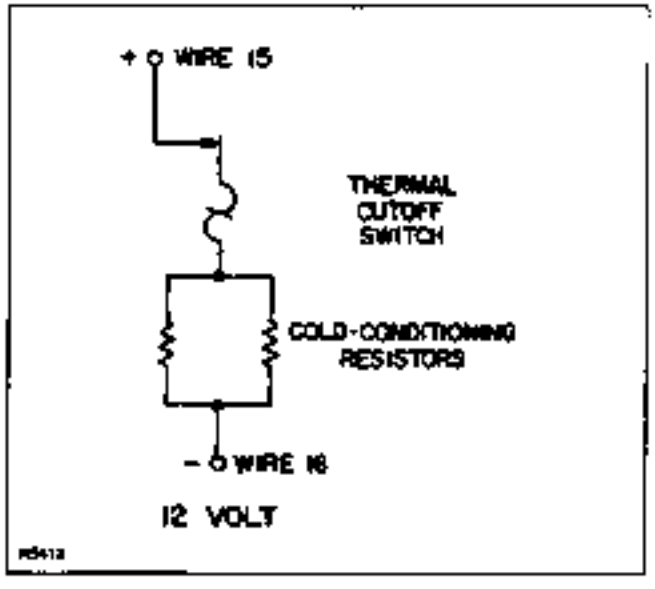

Figure 5-1. Schematic of Cold Conditioning Circuit

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 333620 TO 334630.

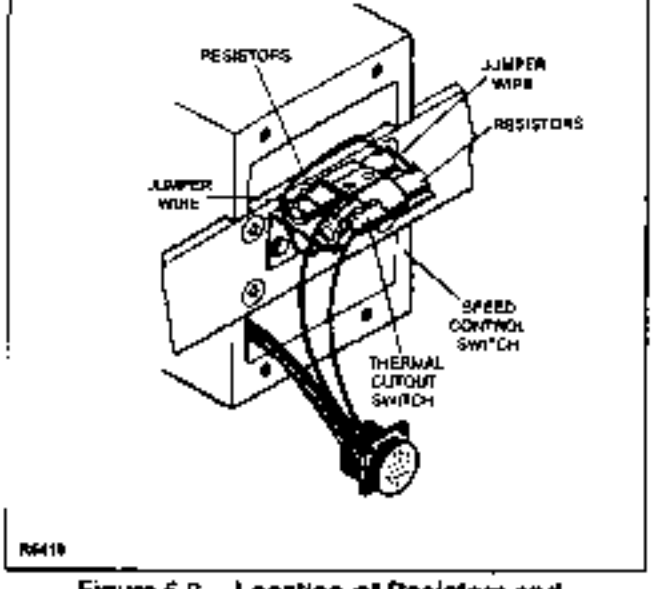

Figure 5-2. Location of Resistors and Thermal Cutout Switch

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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

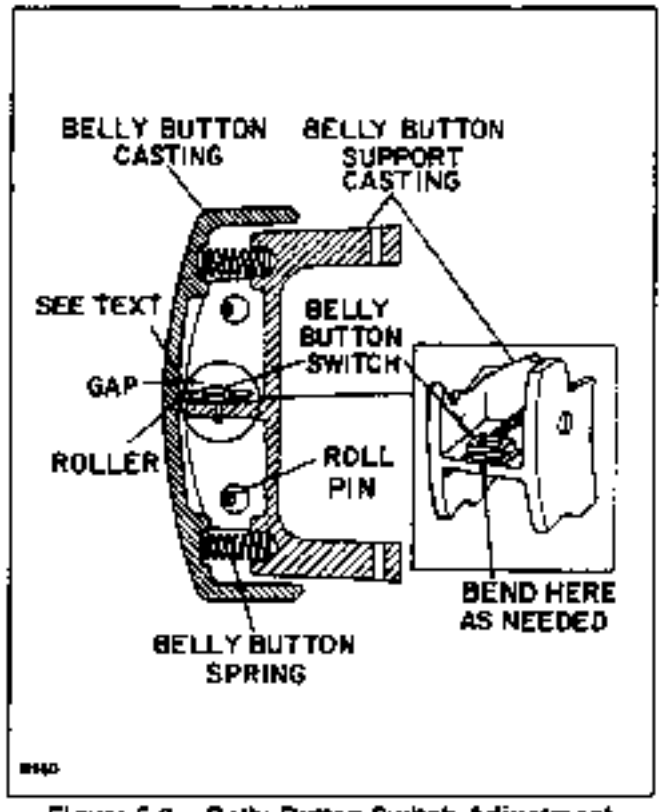

Figure 5-3. Belly-Button Switch Adjustment

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).

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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 333620 TO 334630

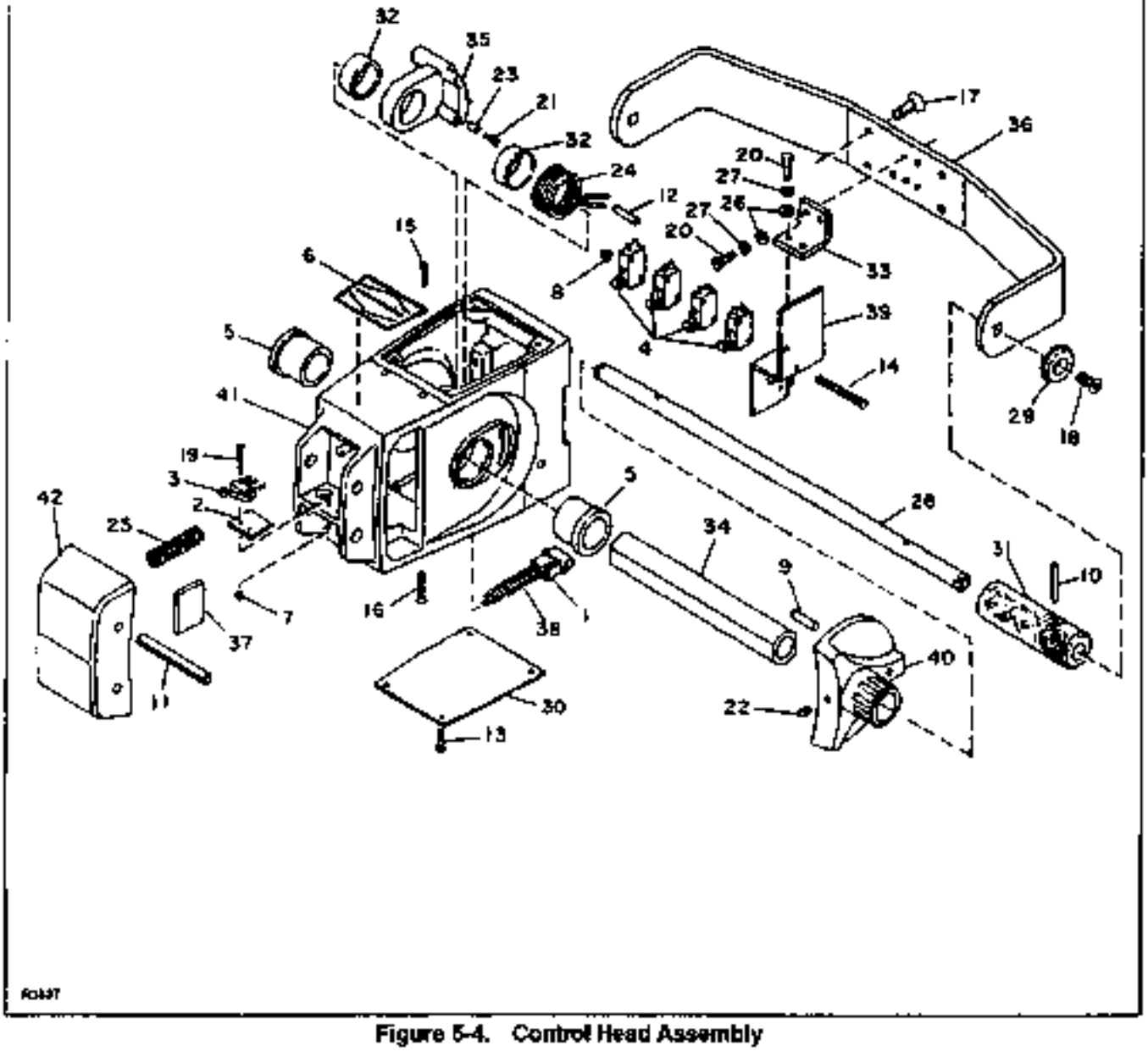

Figure 5-4. Control Head Assembly

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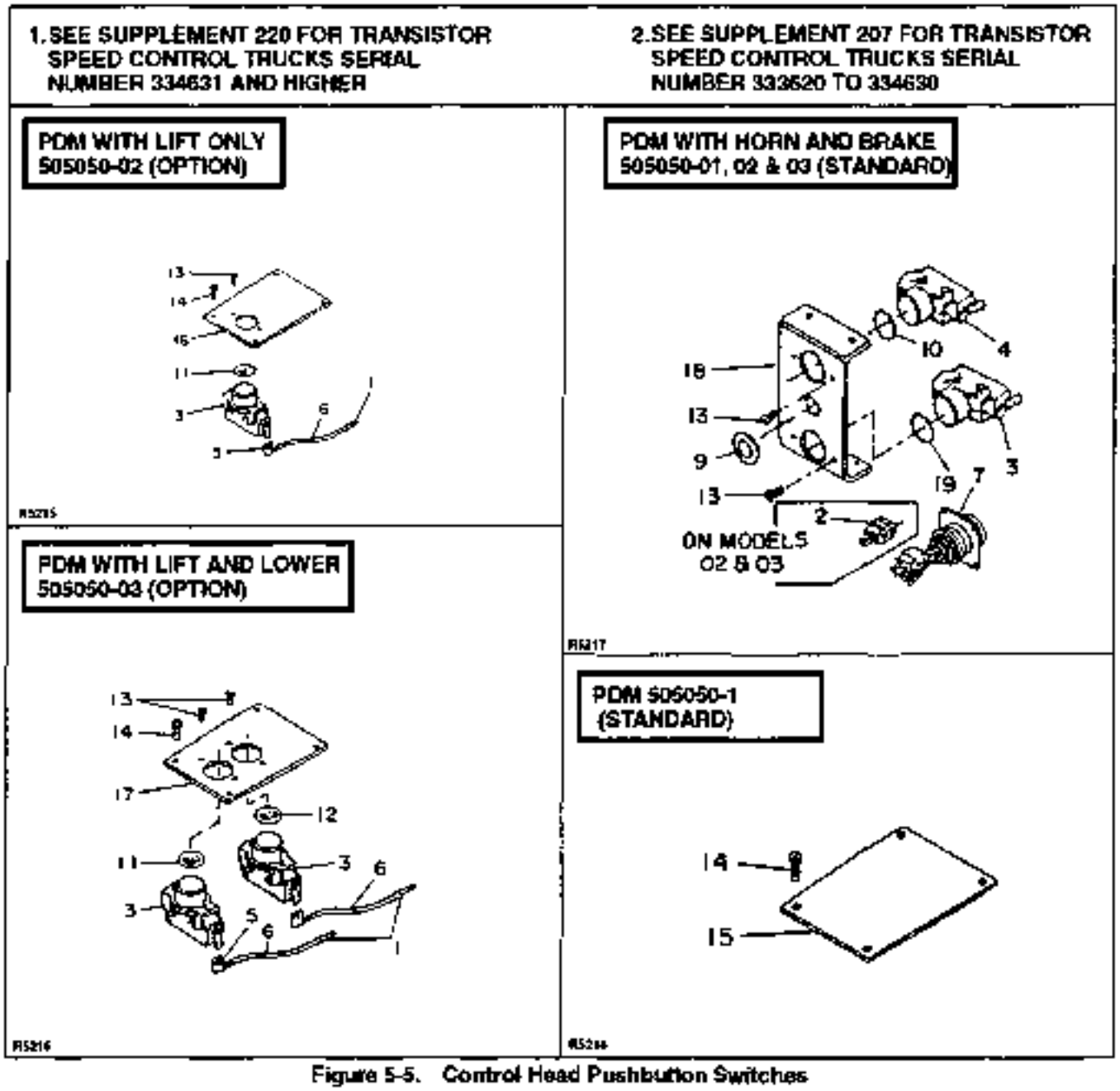

Figure 5-5. Control Head Pushbutton Switches

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).

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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 6-6).
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 6-6) 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.
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).

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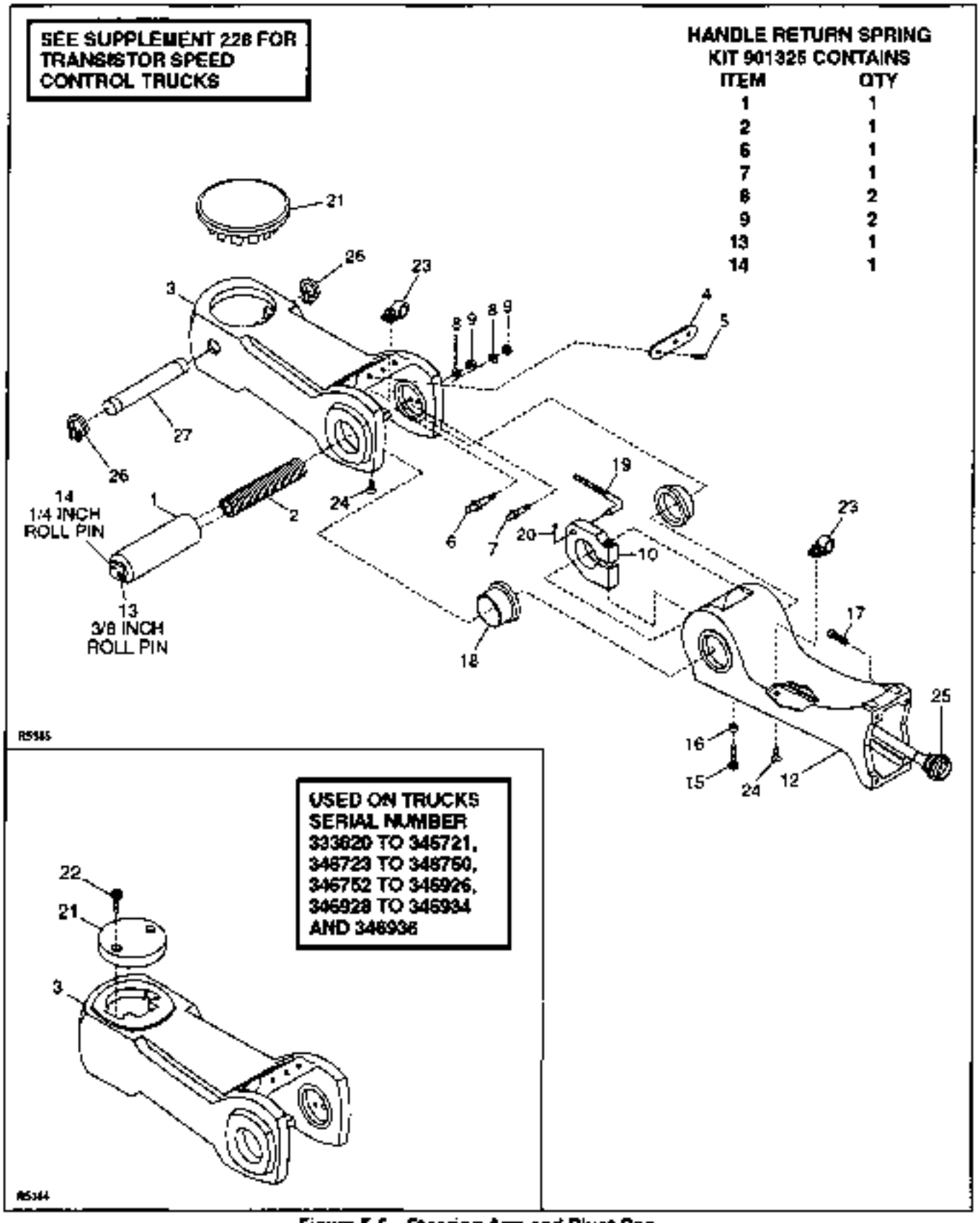

Figure 5-6 Steering Arm and Pivot Cap

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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 5-7).
3. On trucks serial number 339620 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 5-7).
7. Position a chain hoist above the pivot tube.
8. Connect chain to pivot tube as follows:
   a. For trucks serial numbers 339620 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).

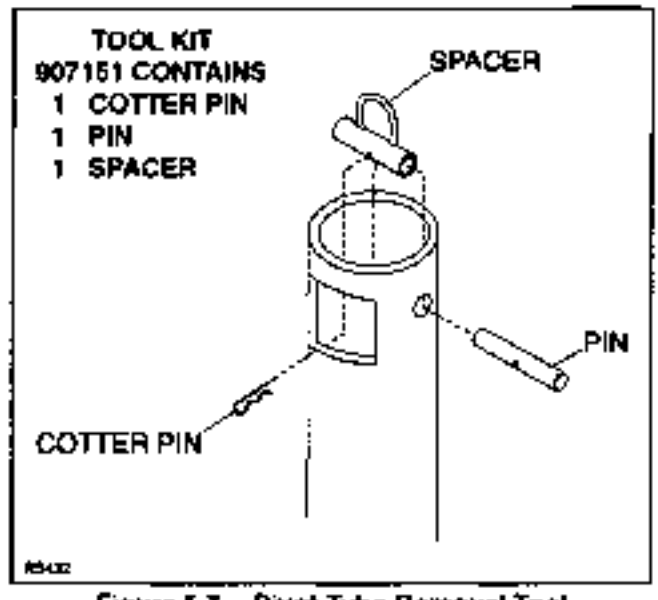

Figure 5-7. Pivot Tube Removal Tool

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).

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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.

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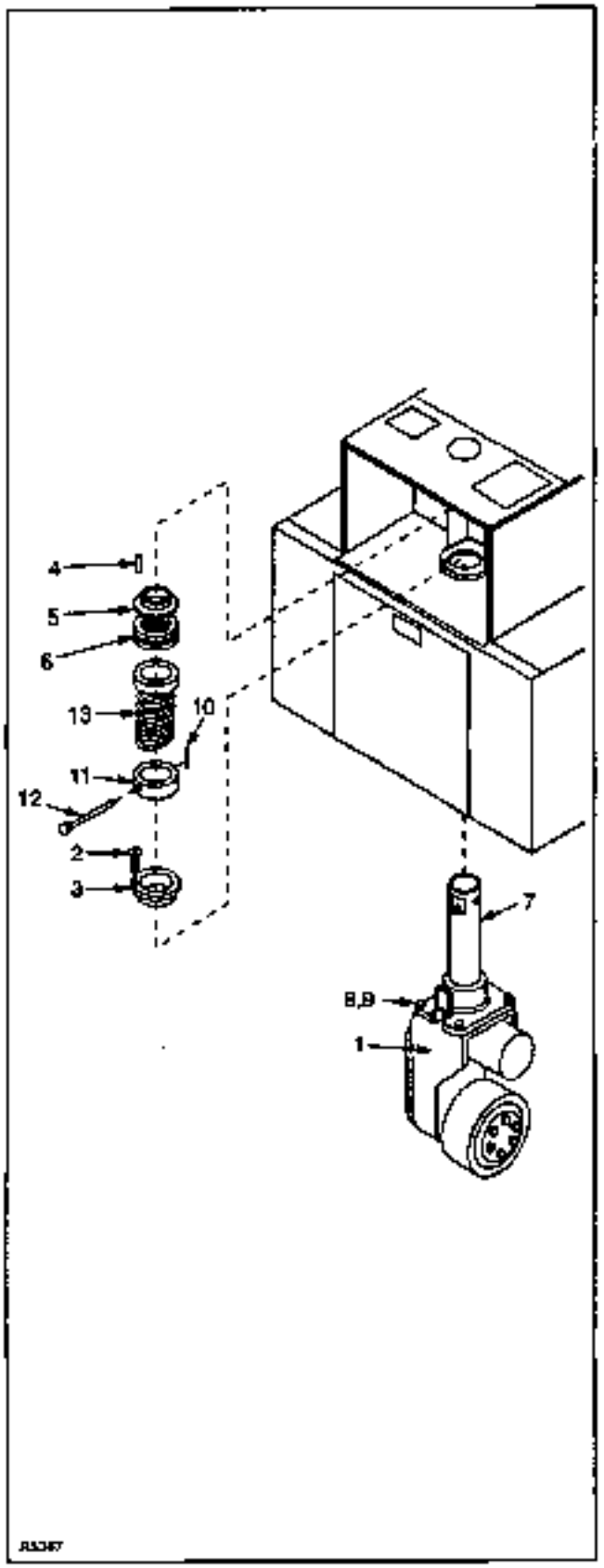

Figure 5-8. Pivot Tube Assembly

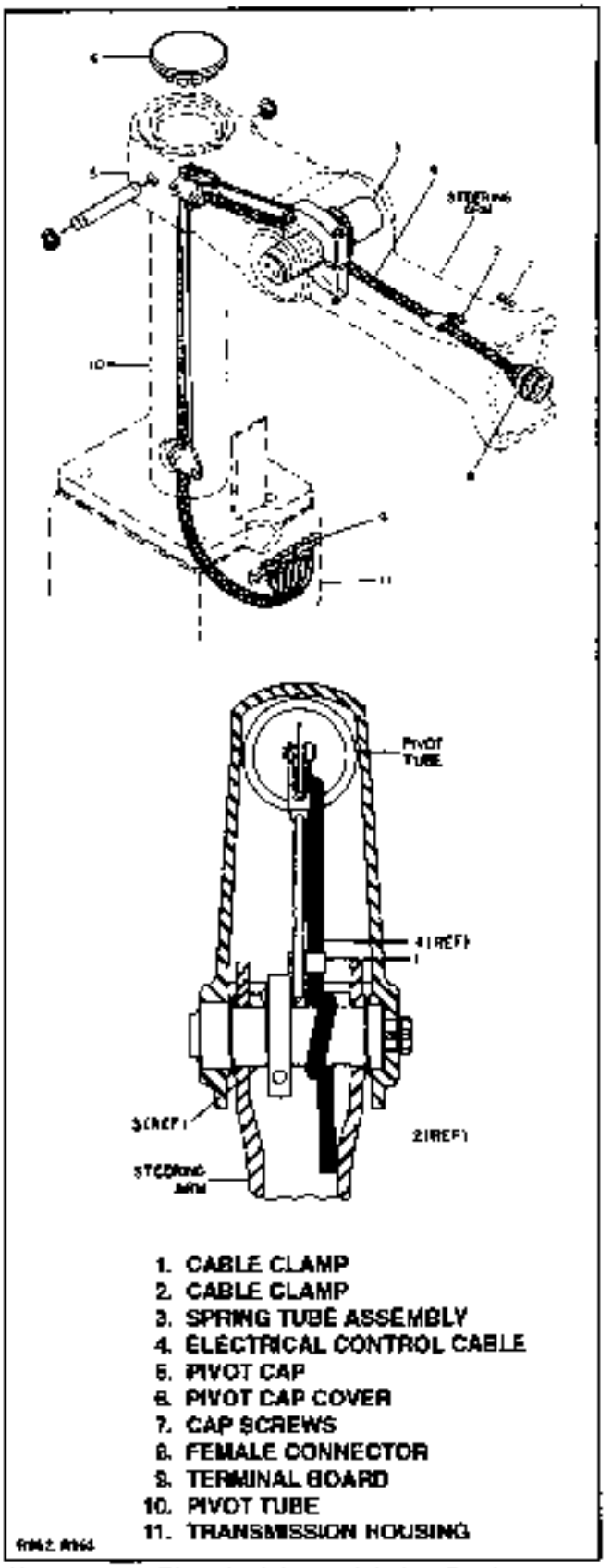

Figure 5-9. Electrical Control Cable Replacement

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NOTES

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SECTION 6
BRAKE SERVICING

6-1. GENERAL

There are two different brake systems: one is used on truck **serial numbers 333761 and higher,** and the other is used on truck **serial numbers 333620 to 333761.** 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 333761 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.

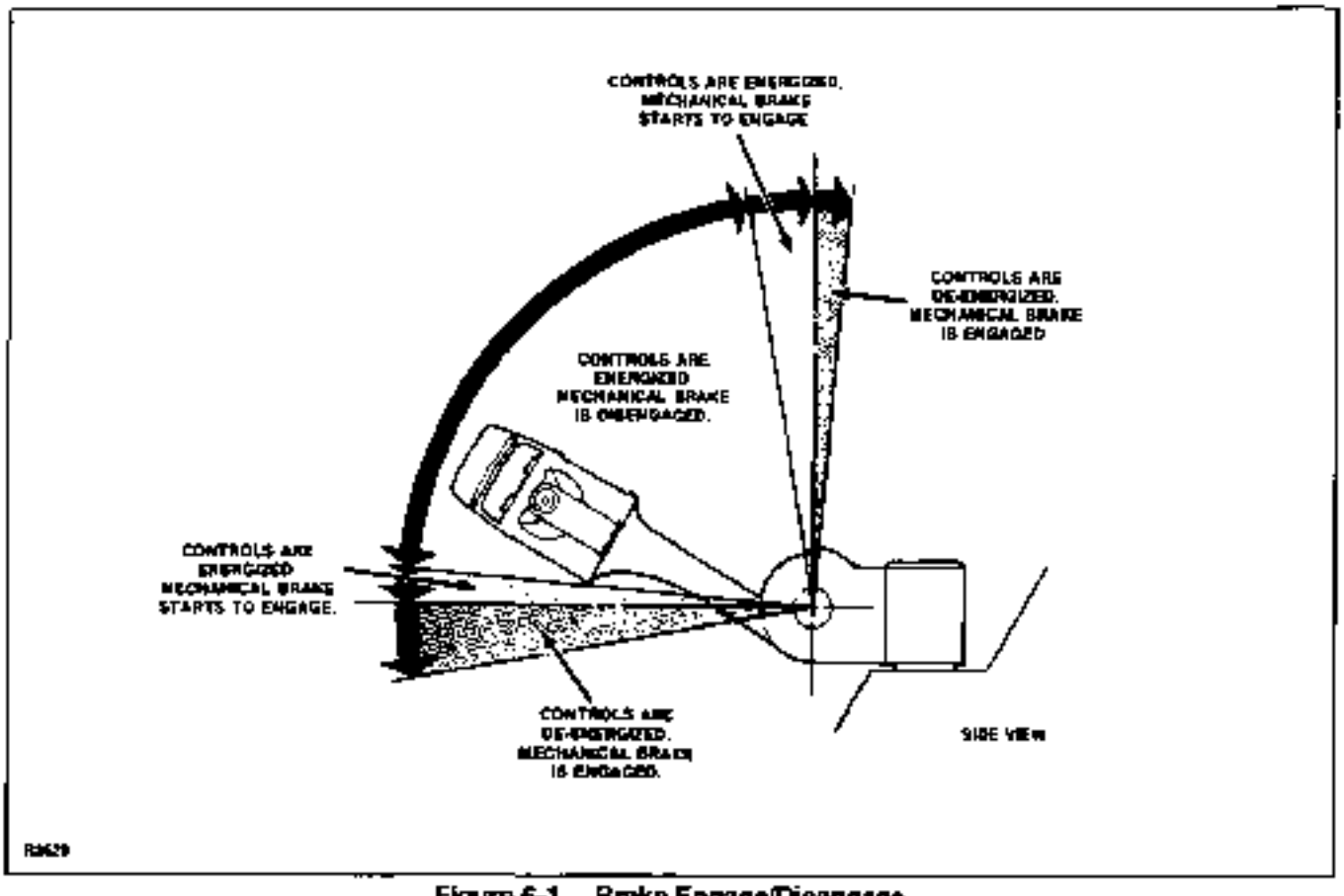

Figure 6-1. Brake Engage/Disengage

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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).

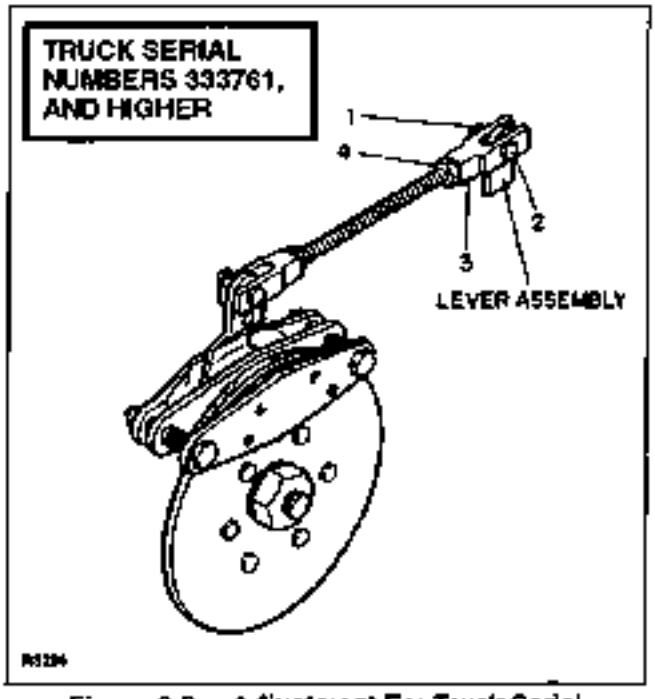

Figure 6-2. Adjustment For Truck Serial Numbers 333761 and Higher.

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 333620 to 333760.

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.

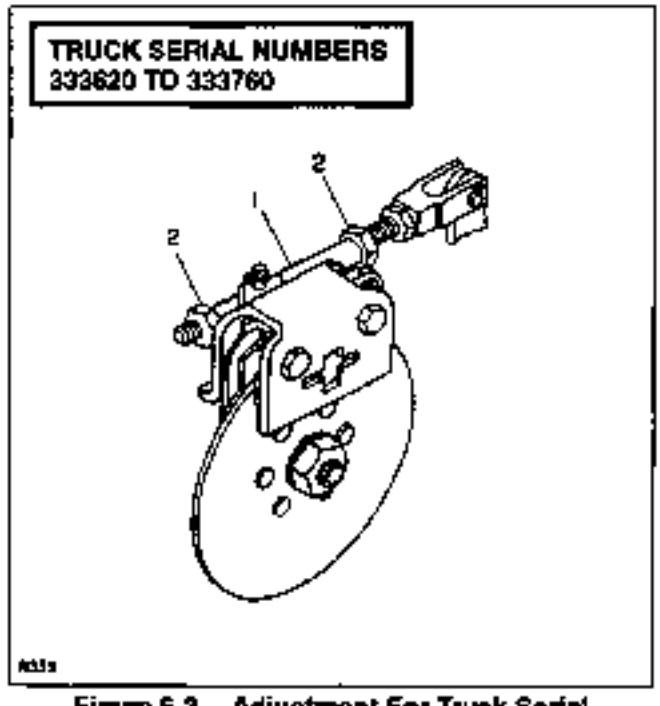

Figure 6-3. Adjustment For Truck Serial Numbers 333620 to 333760

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

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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 333761 And Higher.

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

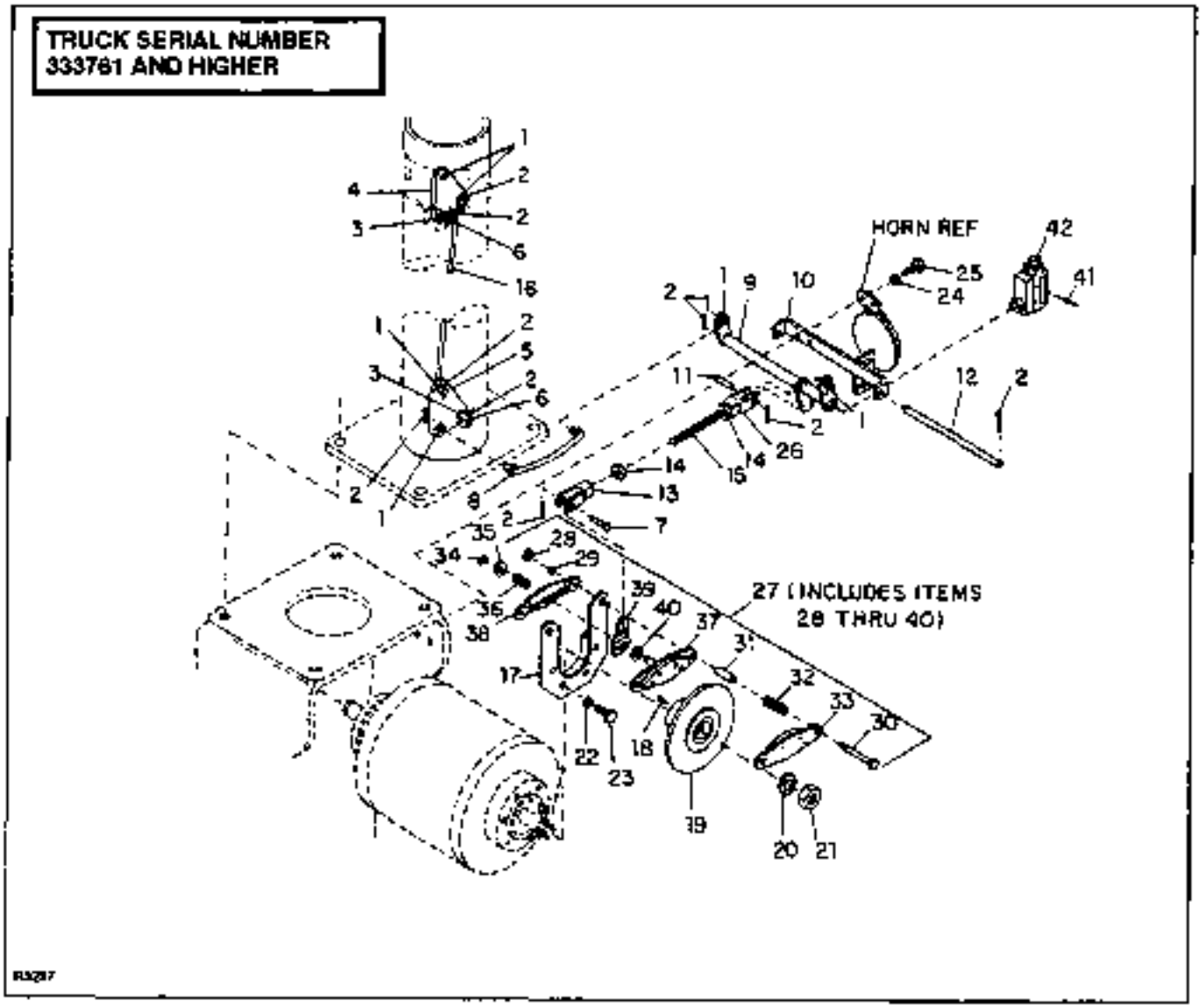

Figure 6-4. Parts Replacement for Truck Serial Numbers 333761 and Higher

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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 333620 to 333760.

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.

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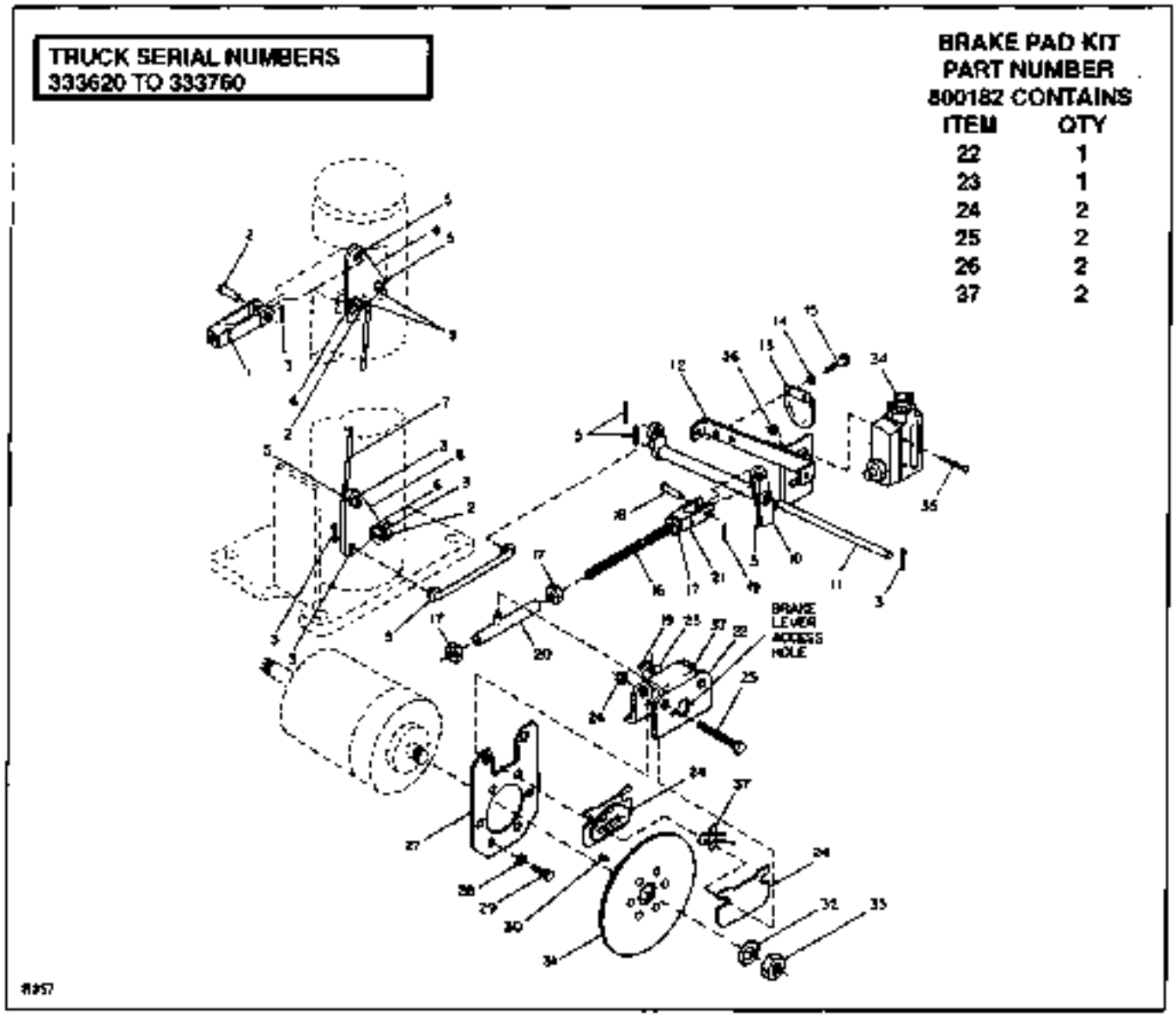

Figure 6-5. Parts Replacement for Truck Serial Numbers 333620 to 333760

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 333761 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.

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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 333620 to 333760.

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.

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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).

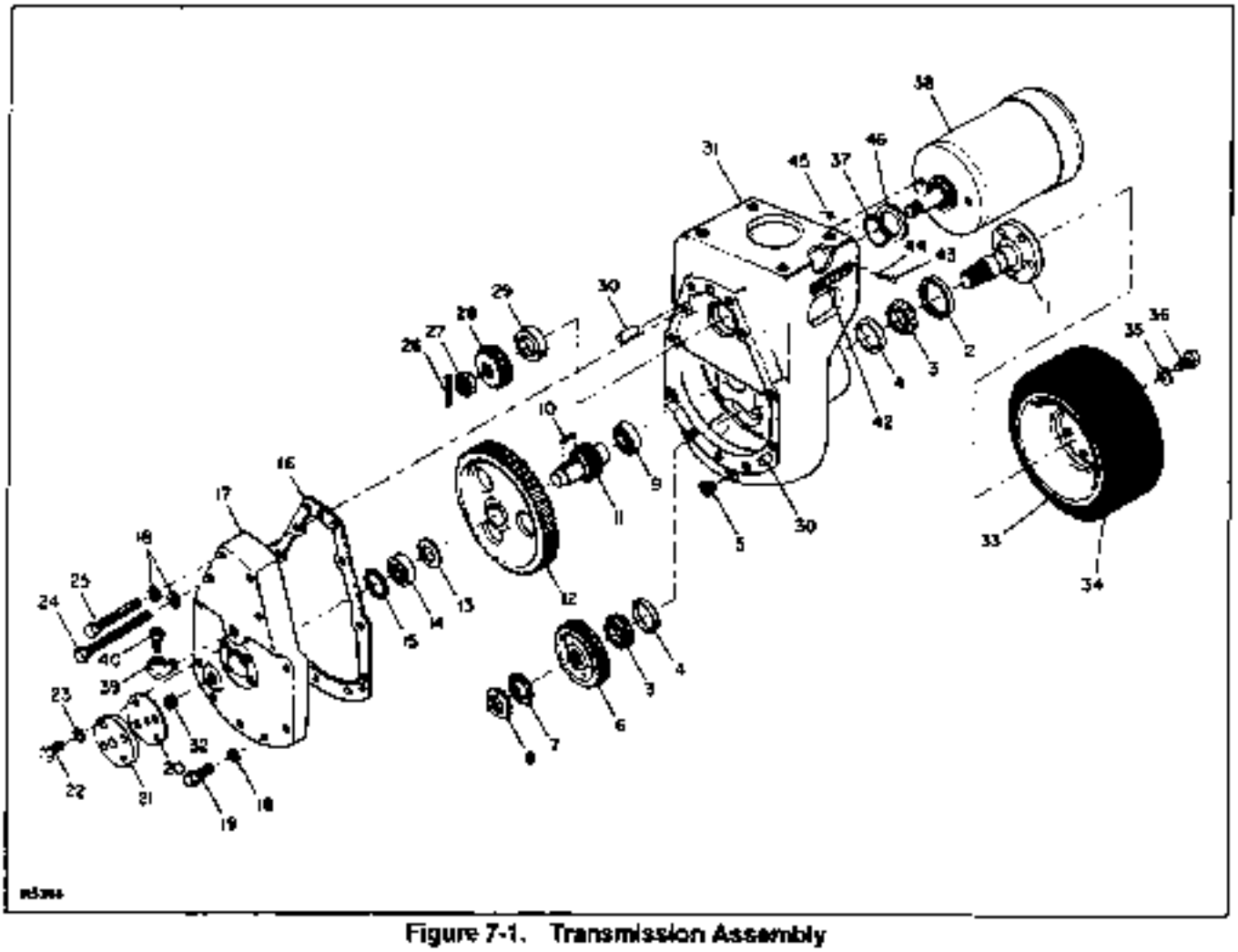

Figure 7-1. Transmission Assembly

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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 20 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. Torque screws (36) to 115-125 ft.-lbs.

7-3. CASTER WHEELS.

The caster wheel assembly 901610 is installed as original equipment on trucks **serial number 344859 and higher.** Caster assembly 901100 is used on trucks with lower serial numbers. Parts are available for servicing this older caster but the complete assembly is not available. Use the new caster for complete assembly replacement.

7-3.1 Caster Wheel Assembly 901610.

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 caster wheel axle and nut (2, Figure 7-3) to remove the caster wheel, and spacers (3 and 4).
6. Reassemble the caster wheel assembly, and spacers (3 and 4) with caster axle and nut (2).
7. Check wheel for free movement.
8. When replacing complete caster assembly be sure to install spacers (1).

7-3.2 Caster Wheels Assembly 901100.

NOTE: When replacing complete assembly replace with part number 901610.

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 caster wheel axle and nut (1, Figure 7-4) to remove the caster wheel, bearings, and bushing (2 through 4)
6. Clean bushing and check for defects
7. Apply lithium base general purpose grease to the bushing.

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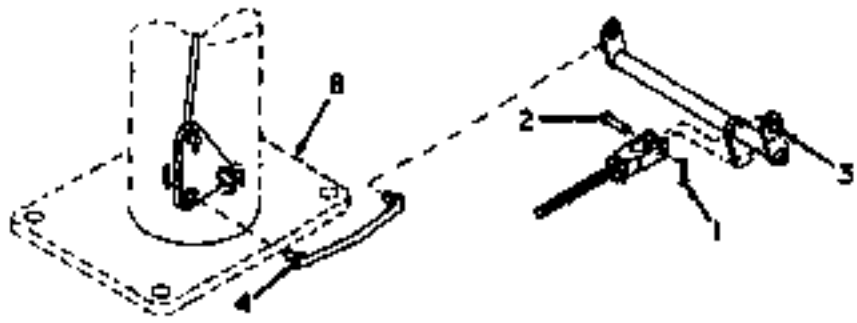
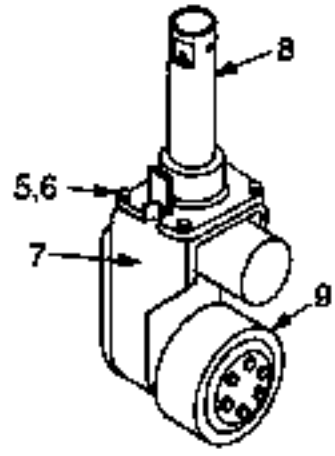
TRUCK SERIAL NUMBERS 333761 AND HIGHER



ALL TRUCKS



TRUCK SERIAL NUMBERS 333620 TO 333760

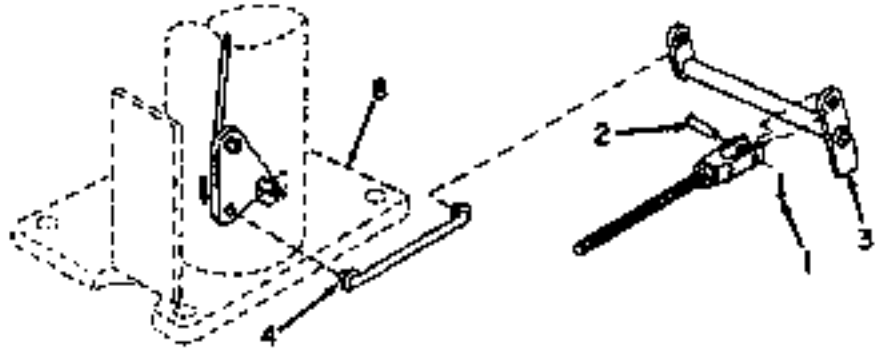


Figure 7-2. Transmission Removal

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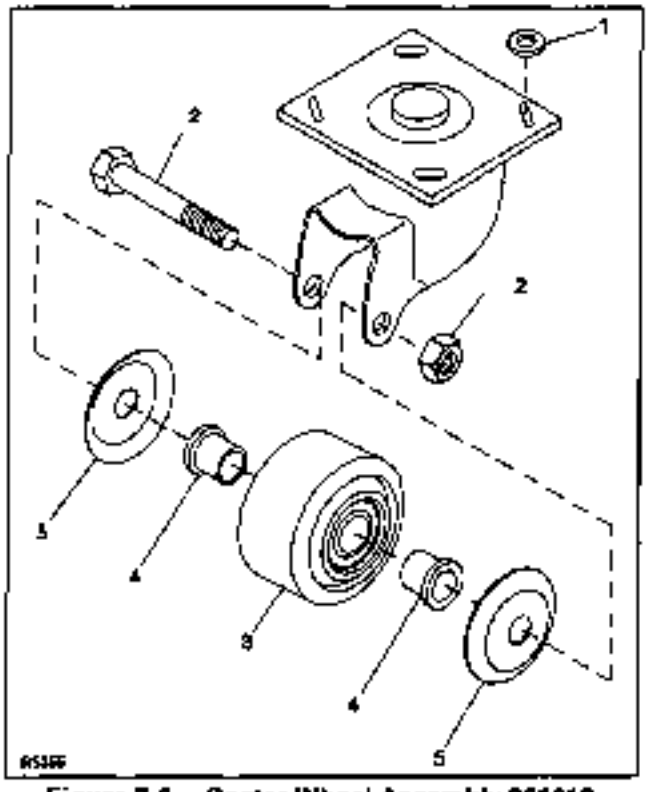

Figure 7-3. Caster Wheel Assembly 901610

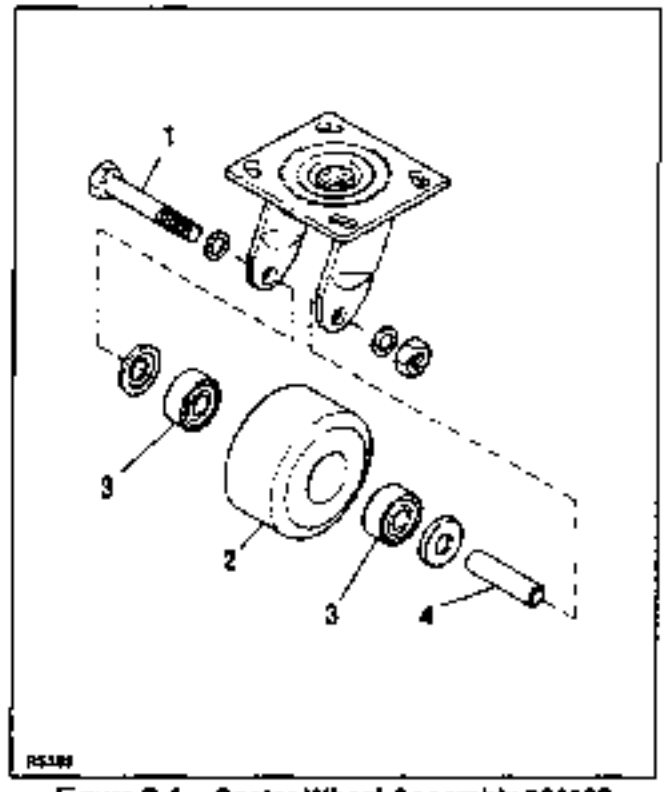

Figure 7-4. Caster Wheel Assembly 901100

8. Reassemble the caster wheel assembly, bushing, and bearings (2 through 4) with caster axle and nut (1).
9. Check wheel for free movement

7-4. LOAD WHEELS.

NOTE: Standard Model PDM-30 lift trucks have 4-inch 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 (5, Figure 7-5), roll pin (6), and remove the load wheel axle (4). The load wheel (1), bearing (2), spacers (3), and seal washers (7) (for 4-inch load wheels only) will fall out.

NOTE: 3-inch load wheels should be repacked with grease when required. 4-inch load wheels have grease fittings.

6. Check that bearing on replacement wheel turns freely and smoothly.
7. Reassemble the load wheel (1), bearings (2), spacers (3) and seal washers (7) (for 4-inch load wheels only) on the axle (1) and secure with roll pin (6) and snap ring (5)
8. Check wheel for free rotation.

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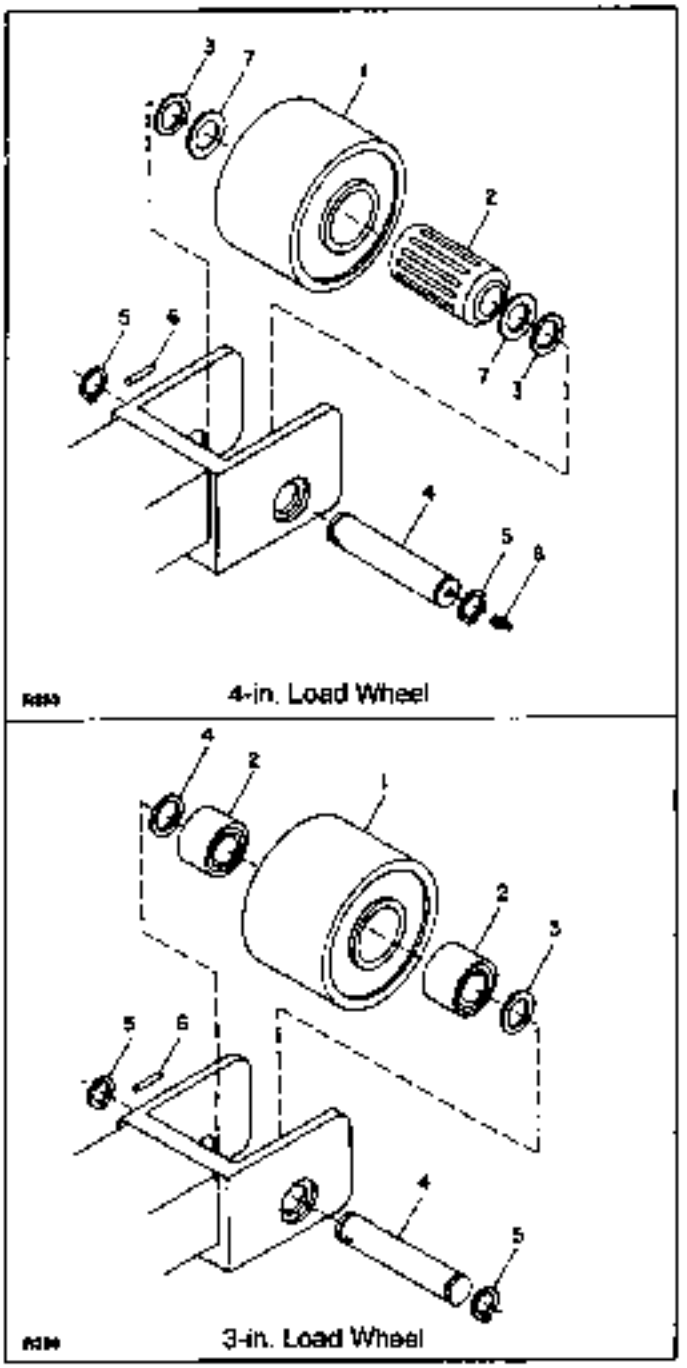

Figure 7-5. Load Wheels

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NOTES

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SECTION 8
ELEVATION SYSTEM SERVICING

8-1. GENERAL

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

8-2. RAM HEAD REPLACEMENT (Non-Telescopic and Telescopic Trucks)

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 (16, Figure 8-1) below the chain adjusting bolt (14) on the lift carriage.
4. Lift the lift chains (13) off the ram head sheaves (6) and lay on the mast support.
5. Remove screw (1) and lock washer (2) and lift the ram head (4) 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.
8. 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 (16, Figure 8-2) below the chain adjusting bolt (14) on the lift carriage.
4. Lift the lift chains (29) off the ram head sheaves (22) and lay on the mast support.
5. Remove screw (18), lockwasher (19), from top of ram head (20).
6. Remove screws (7), lockwashers (2), wear spacers (17) and clamp bar (10) and lift the ram head (20) 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. YOKE SHEAVE REPLACEMENT (Full Free Lift Trucks)

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 (23, Figure 8-3) below the chain adjusting bolt (19) on the lift carriage.
4. Lift the lift chains off the Yoke sheaves (18) and lay on the mast support.
5. Remove snap ring (15) and slide axle (16) out of yoke sheave (14). Sheave (18), bearing (2), and thrust washers (1) will fall free.
6. The yoke sheave (14) can now be removed by removing screw (17).
7. Reinstall Yoke Sheave in reverse order of removal.
8. Adjust lift chains as described in paragraph 8-4

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 (3, Figure 8-1 or 24, Figure 8-2) on chain adjusting bolt on the lift carriage.
4. Take up slack by tightening nut (16, Figure 8-1 or Figure 8-2) on the bottom of the chain adjusting bolt.

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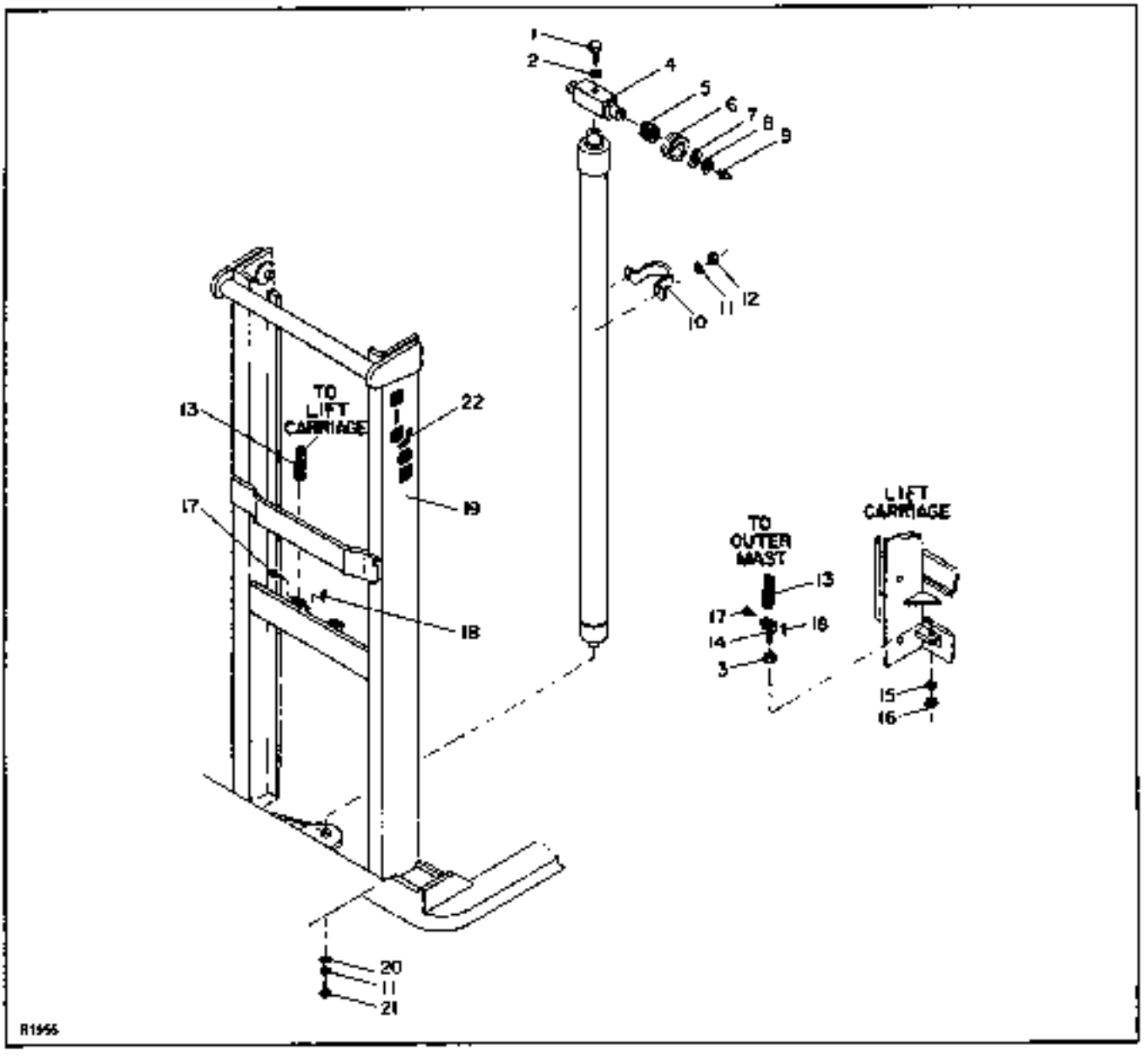

Figure 8-1. Standard Masts (Nontelescopic)

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

5. Secure adjustment by tightening nut (3, Figure 8-1 or nut 24, Figure 8-2).
6. Reconnect battery.
7. Test chain by operating carriage. If slack is still apparent repeat above procedure.

8-4.2. Full Free Lift Trucks

1. Fully lower lift carriage.
2. **Disconnect the battery.**
3. Loosen jam nut (21, Figure 8-3) 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.

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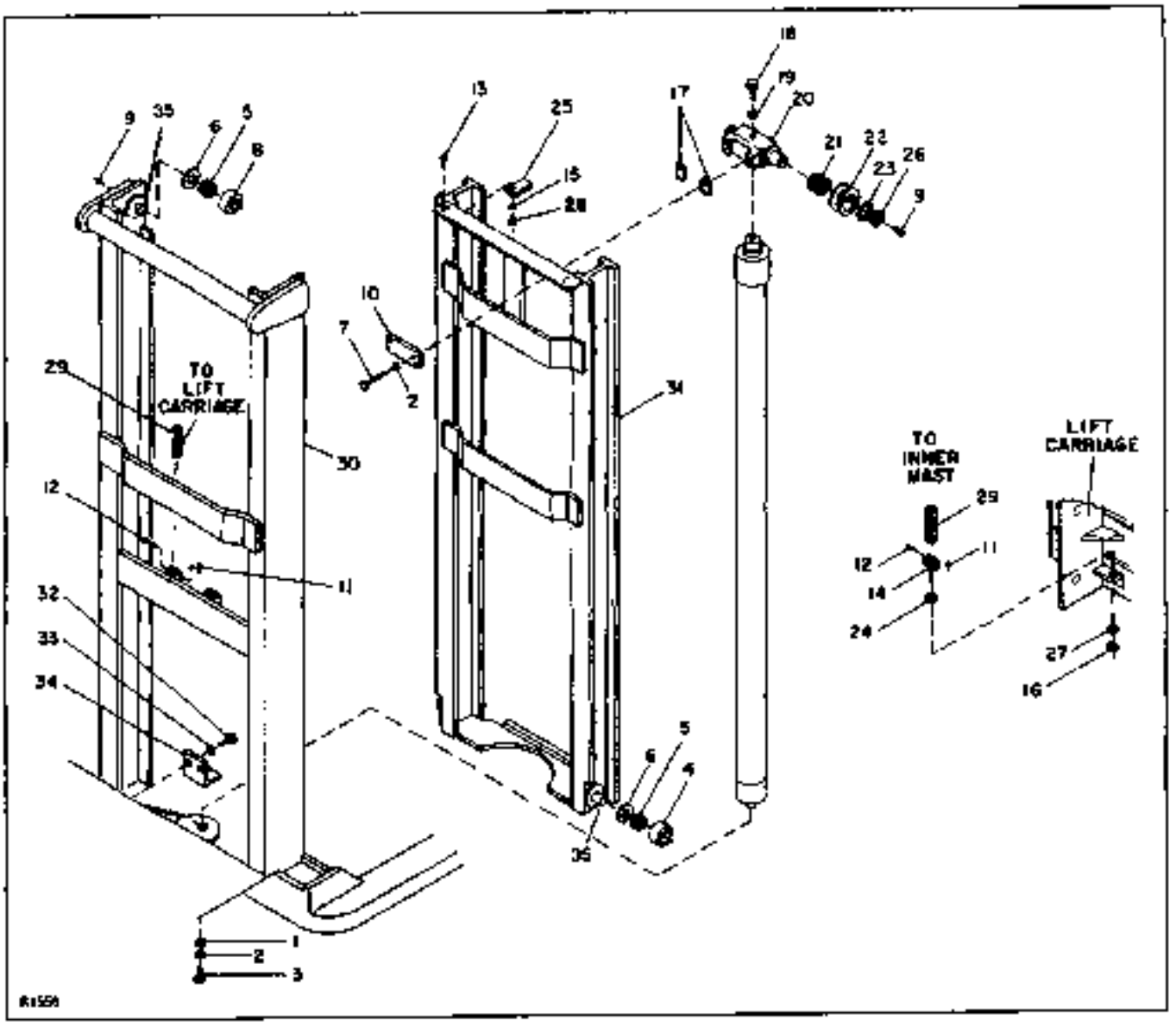

Figure 8-2. Standard Masts (Telescopic)

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. Remove the cotter pin (18 Figure 8-1 or 11, Figure 8-2) and clevis pin (17, Figure 8-1 or 17, Figure 8-2) from end of chain connected to mast cross brace.
4. Remove the cotter pin (18 Figure 8-1 or 11, Figure 8-2) and clevis pin (17, Figure 8-1 or 17, Figure 8-2) from end of chain connected to lift carriage.
5. Remove chain from sheave (6, Figure 8-1 or 22, Figure 8-2) and lay aside for repair.
6. Position new chain in place on sheave.
7. Connect end of chain to lift carriage adjusting bolt (14, Figure 8-1 or Figure 8-2) with the clevis pin (17, Figure 8-1 or 12, Figure 8-2) and cotter pin (18, Figure 8-1 or 11, Figure 8-2).

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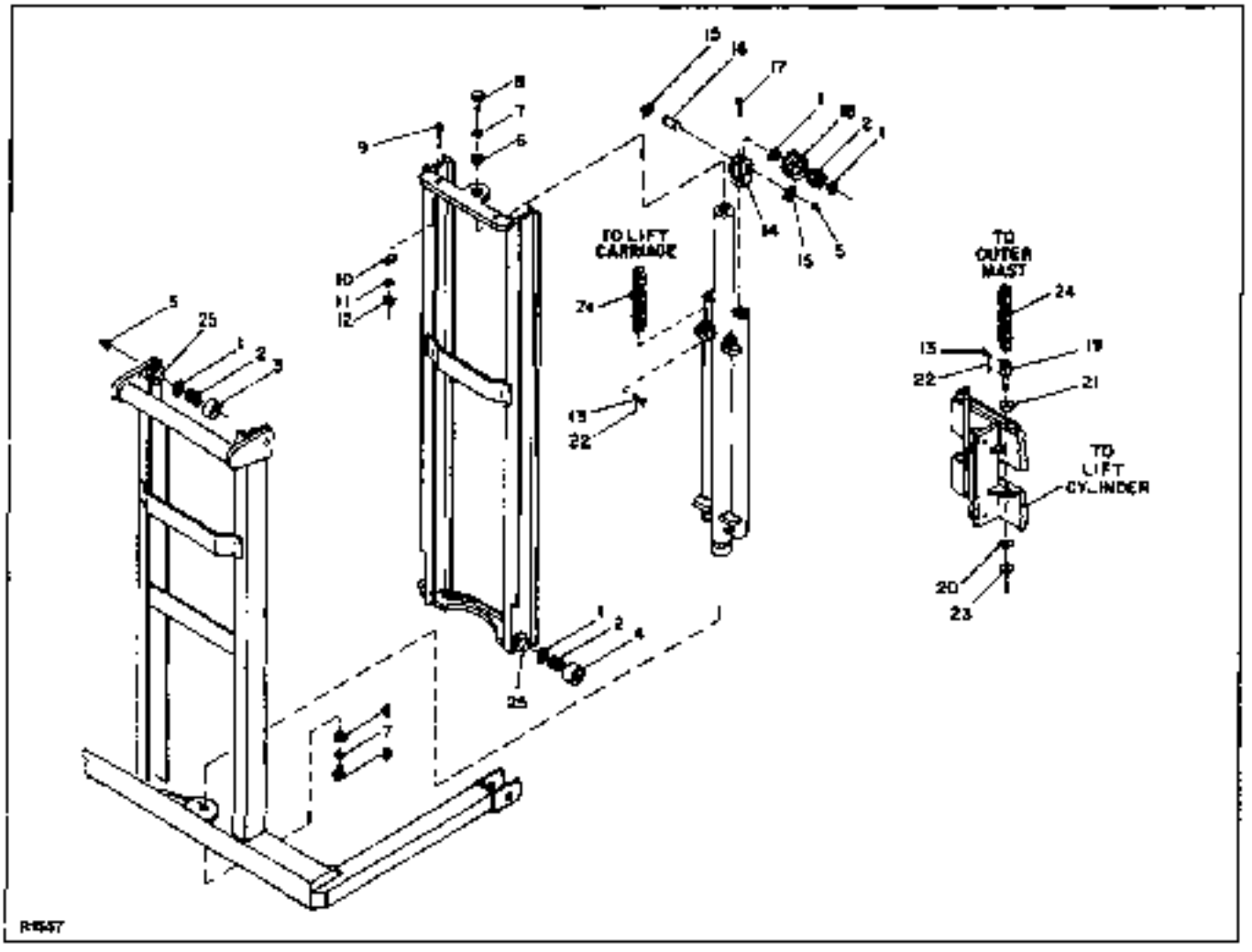

Figure 8-3. Inner and Outer Masts - Full Free Lift

8. Connect end of chain to chain anchor on mast cross brace with the clevis pin (17, Figure 8-1 or 12, Figure 8-2) and cotter pin (18, Figure 8-1 or 11, Figure 8-2).
9. Adjust chain according to paragraph 8-4.

8-5.2. Full Free Lift 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. Remove the cotter pin (22, Figure 8-3) and clevis pin (13) from end of chain connected to mast cross brace.
4. Remove the cotter pin (22) and clevis pin (13) from end of chain connected to lift carriage.
5. Remove chain from sheave (16) and lay aside for repair.
6. Position new chain in place on sheave.
7. Connect end of chain to lift carriage adjusting bolt (19) with the clevis pin (13) and cotter pin (22).
8. Connect end of chain to chain anchor on lift cylinder with the clevis pin (13) and cotter pin (22, Figure 8-2).
9. Adjust chain according to paragraph 8-4.

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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 (10, Figure 8-1) by removing nuts (12) and lockwashers (11).
10. Remove screw (21, Figure 8-1 or 3, Figure 8-2) and washers (11 and 20, Figure 8-1 or 1 and 2, Figure 8-2) 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 swivel elbow , reducer, and the flow control valve at the bottom of the lift cylinder.
5. Remove the nipple, reducer and street elbow from the bottom of the lift cylinder.
6. 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.
7. Remove the hex head cap screw (6) lock washer (7) and flat washer (8) securing the top of lift cylinder to the inner mast.
8. Remove the hex head cap screw. (6) lock washer (7) and flat washer (8) securing the bottom of lift cylinder to the outer mast (33).

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

9. Support lift cylinder and using another lift truck or suitable jack, raise inner mast (36) far enough to clear top of lift cylinder.
10. Lift cylinder up and out of truck.
11. Remove the yoke sheaves as described in paragraph 8-3.

NOTE: Disassembly procedures are covered in section 9.

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

8-7. INNER 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 from 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.

6. Installation of the mast is performed in the reverse order of removal.

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7. Lubricate the newly installed mast as described in paragraph 8-9.

8-8. LIFT CARRIAGE AND MAST 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. Remove cotter pin and clevis pin securing chain to lift carriage.
4. On telescopic and full free lift trucks remove stop blocks on top of mast.
5. On ITA lift carriages, remove hex cap screw (3, Figure 8-4), flat washer (19), lockwasher (2) and retainer bar (16).
6. For ITA lift carriages perform step a. for shaft type lift carriages perform substeps b through e.
   a. Loosen adjusting pins (20) on forks and slide forks from lift carriage.
   b. Remove snap ring (3, Figure 8-5).
   c. Place supports under forks.
   d. Slide shaft 2, out of carriage.
   e. Remove forks
7. Remove lift carriage from mast using a chain hoist.
8. Installation of new or modified lift carriage is performed in the reverse order of removal.
9. 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 on each side and slide the straddles to the dimension required (minimum 38 inches, maximum 50 inches).
4. Lubricate the straddles with grease as shown in Figure 8-6.

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

5 Retighten the straddle bolts to 200 ft lbs.

8-11. BASE AND FRAME

8-11.1. Cabinet Door Latch

1. Install spring latch (35, Figure 8-7) on cabinet door (24) using two screws (33) and nuts (25).
2. Install door stop bracket (19) and loosely attach with two nuts (17), lockwashers (16), flat washers (20) and screws (18).
3. Position bracket (19) as far toward cabinet opening as the slots will allow and tighten nuts (17) finger tight.
4. Close the cabinet door (24) until the door is flush with the frame.

NOTE: The door pushes the bracket in to its correct position.

5. Open the door without disturbing the position of the bracket. Tighten the nuts (17).

8-11.2. Battery Compartment Cover Removal

Compartment doors (8) are hinged and held in place with clamp-on latches (9).

1. Remove truss head screw (10) and washer (11) then latch (9).
2. To remove door, unscrew the flat head screw (18), hex nut (17) and lockwasher (16), then set door aside

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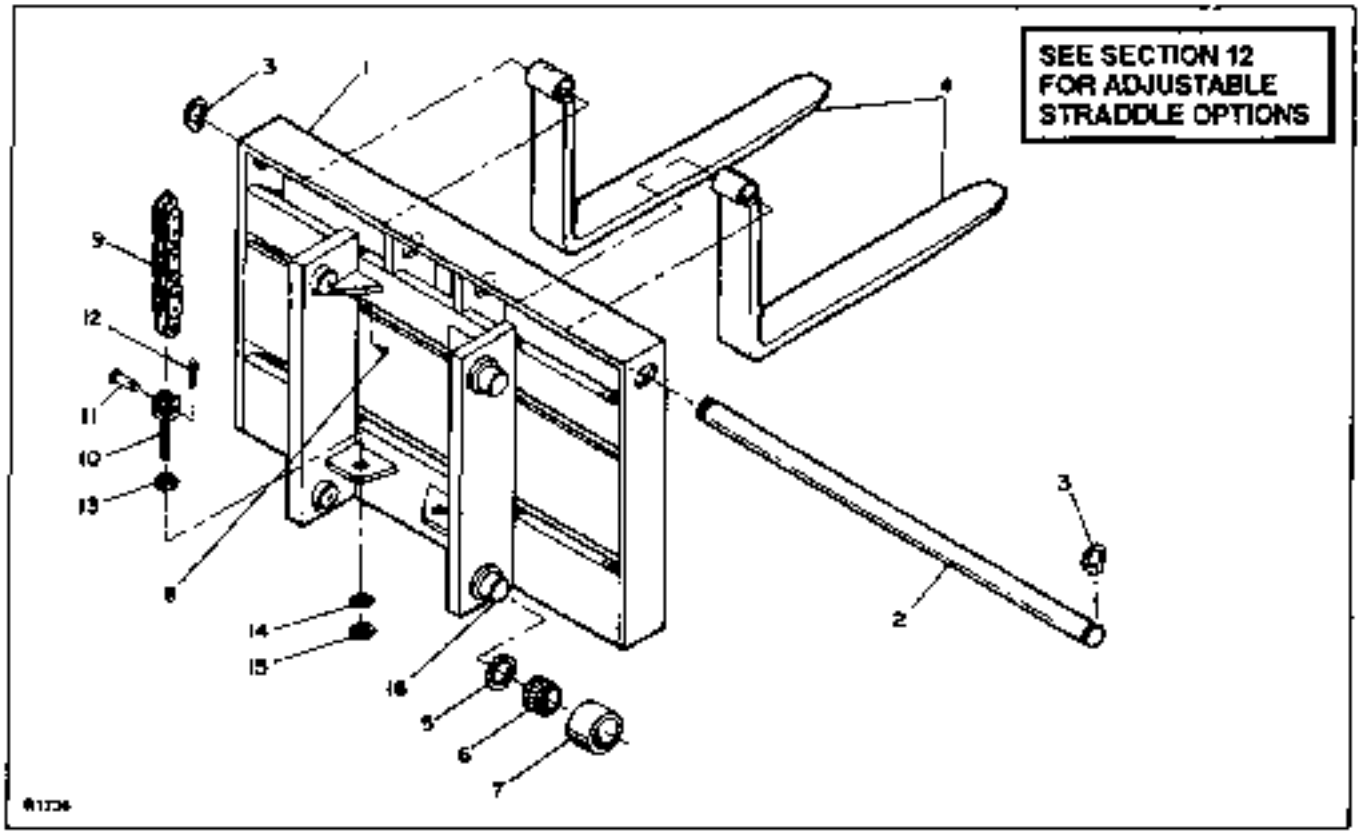

Figure 8-4. Lift Carriage (Shaft Type) Telescopic and Nontelescopic and FFL

8-11.3. Battery Connector Replacement

1. Disengage battery connectors (23) by pulling up on handle (30).
2. Remove lower connector (23) by removing screws (2).
3. Disconnect cables from connector.
4. To replace upper battery connector or handle, remove screws (5) and nuts (1).
5. Disconnect battery cables from connector.
6. Install new connector (23) or handle as applicable. Be sure to install Label (29) on replacement handle.

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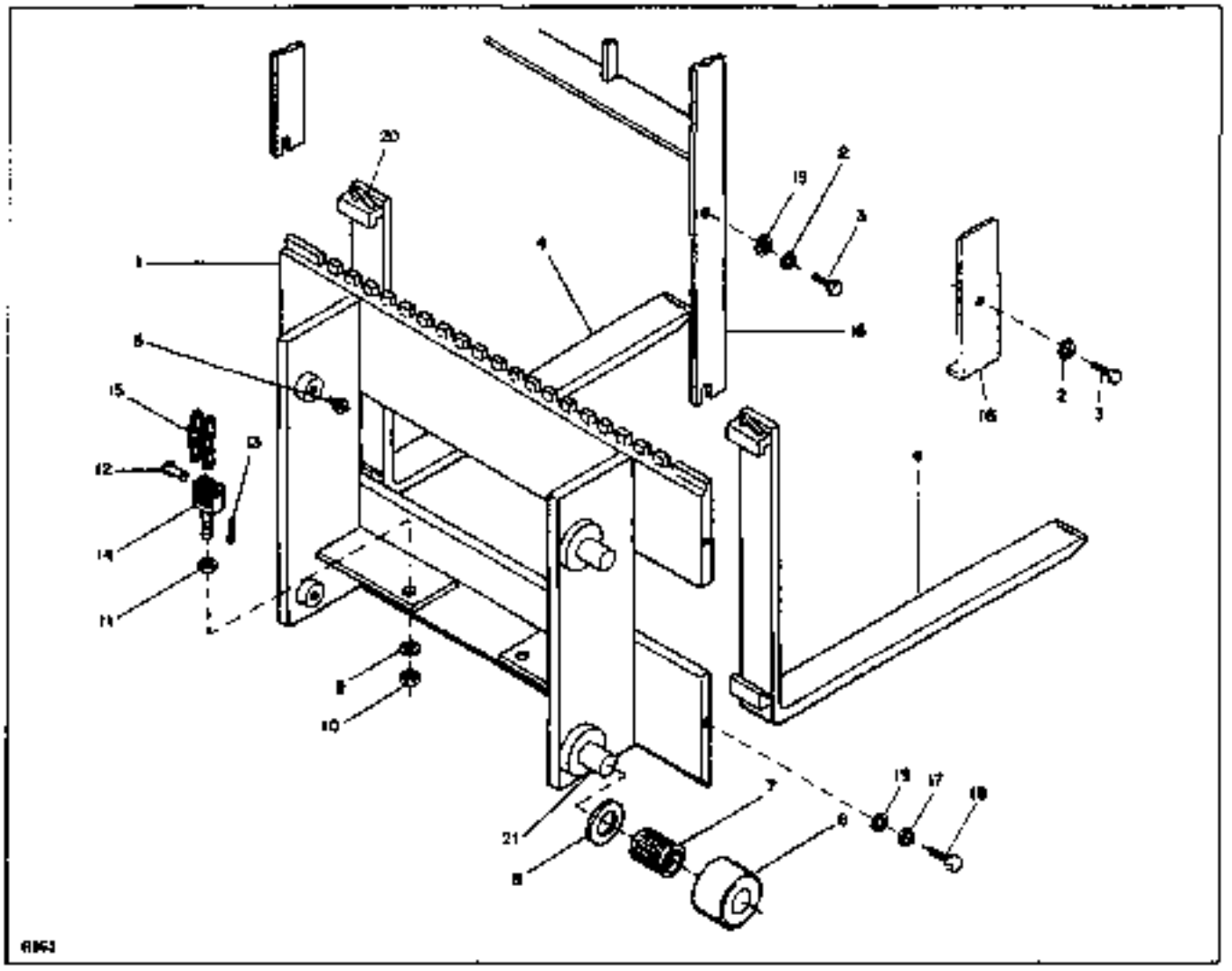

Figure 8-5. ITA Lift Carriages

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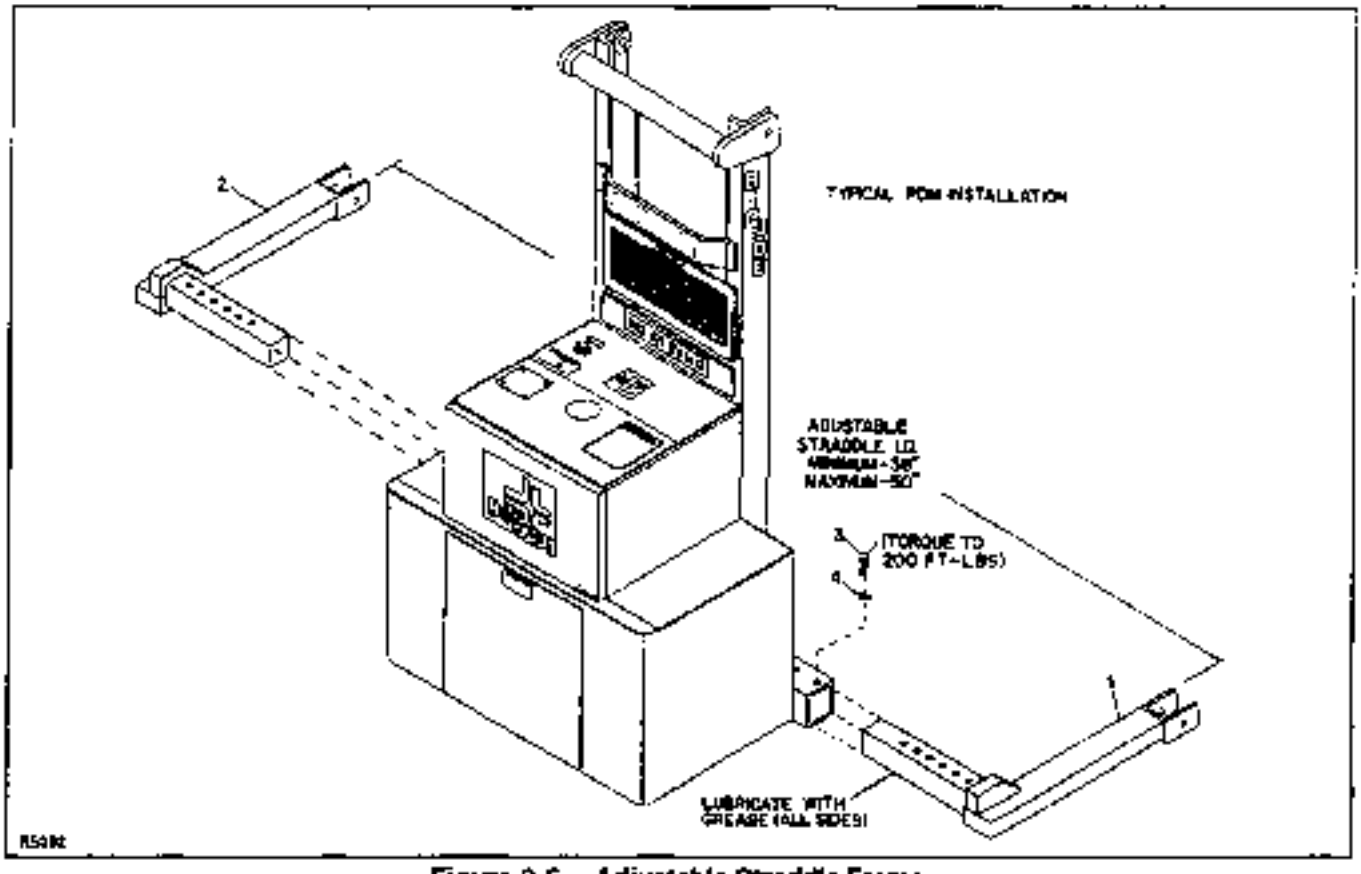

Figure 8-6. Adjustable Straddle Frame

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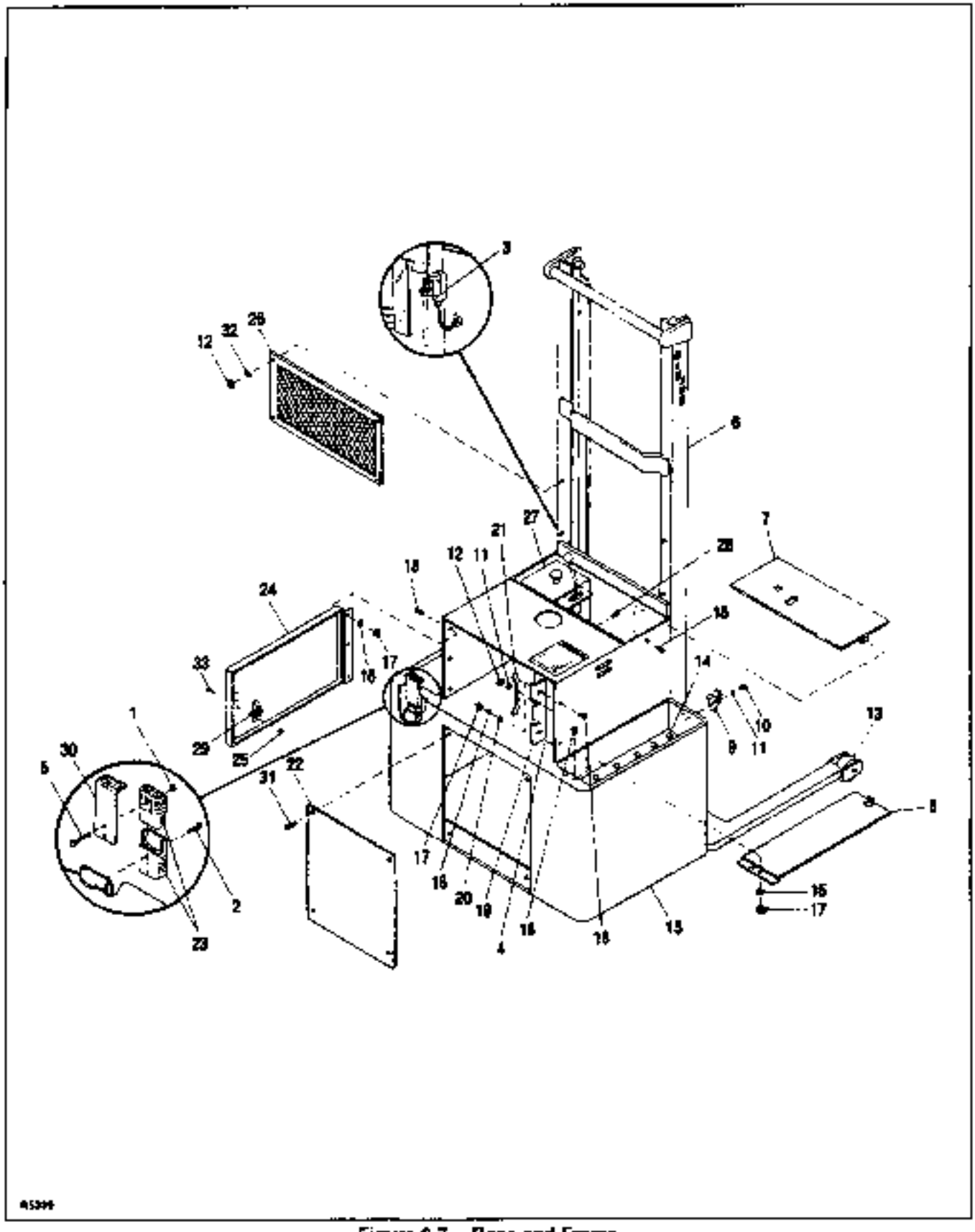

Figure 6-7. Base and Frame

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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. LINE, FITTING and HOSE REPLACEMENT.

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 (22, Figures 9-3 or 21, Figure 9-4) 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 9-1, 9-2, 9-3 and 9-4.
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.

9-3. FILTER REPLACEMENT.

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 (22, Figure 9-3 or 21, Figure 9-4) and drain hydraulic oil into a suitable container.
4. Remove short section of vinyl hose (15, Figure 9-3 or 14, Figure 9-4) that connects filter to the pump.
5. Unscrew filter (17, Figure 9-3 or 16, Figure 9-4) from reservoir (2).

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

6. Disconnect nipple (16, Figure 9-3 or 15, Figure 9-4) from the end of filter using a suitable open end or tubing wrenches.
7. Reinstall new filter in truck by reversing the above procedure.
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.

9-4. FLOW CONTROL VALVE

1. Raise the forks high enough to gain access to the flow control valve (5, Figure 9-1 or 7, Figure 9-2).
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.

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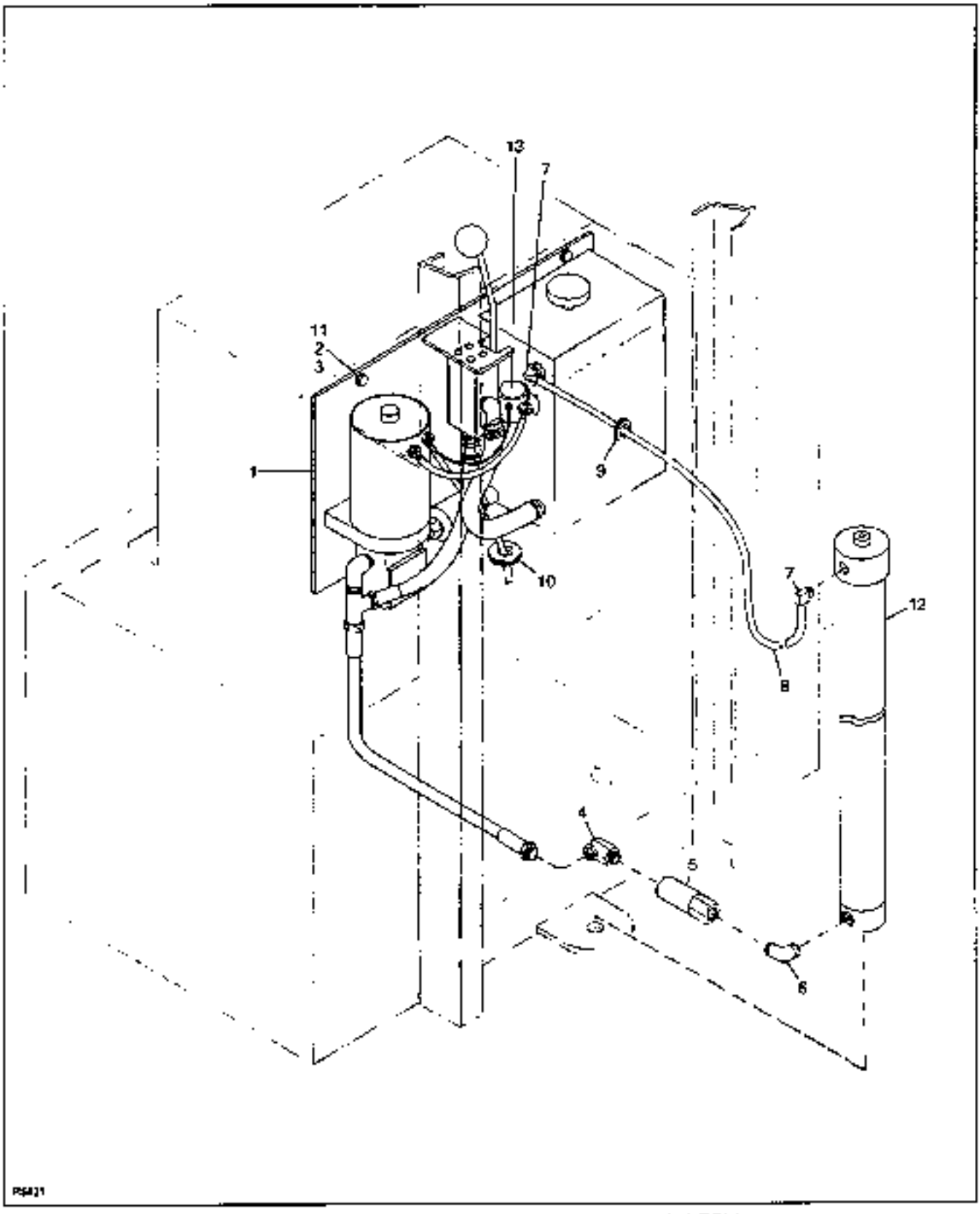

Figure 9-1. Hydraulic Installation (TEL AND NON-TEL)

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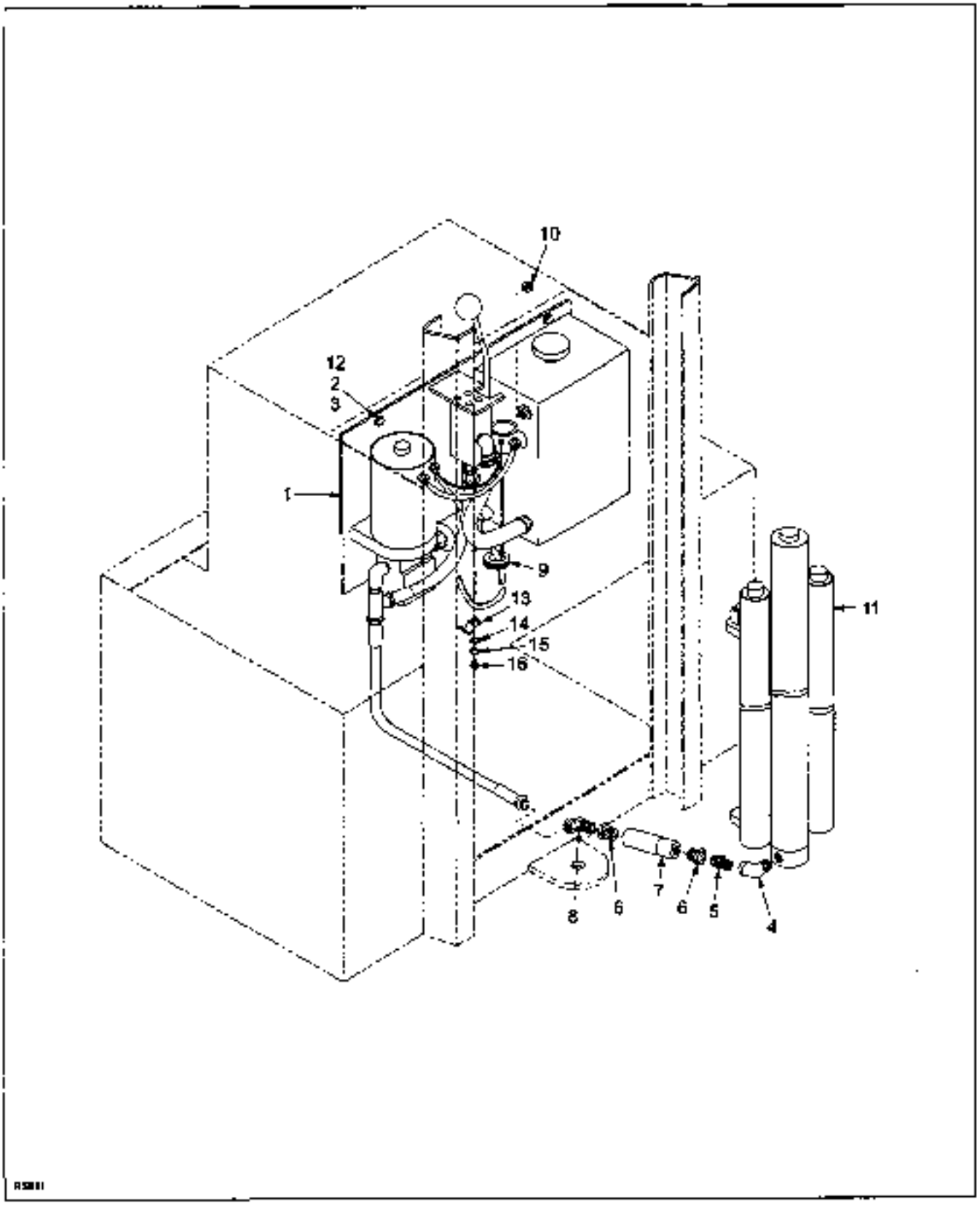

Figure 9-2. Hydraulic Installation (FFL)

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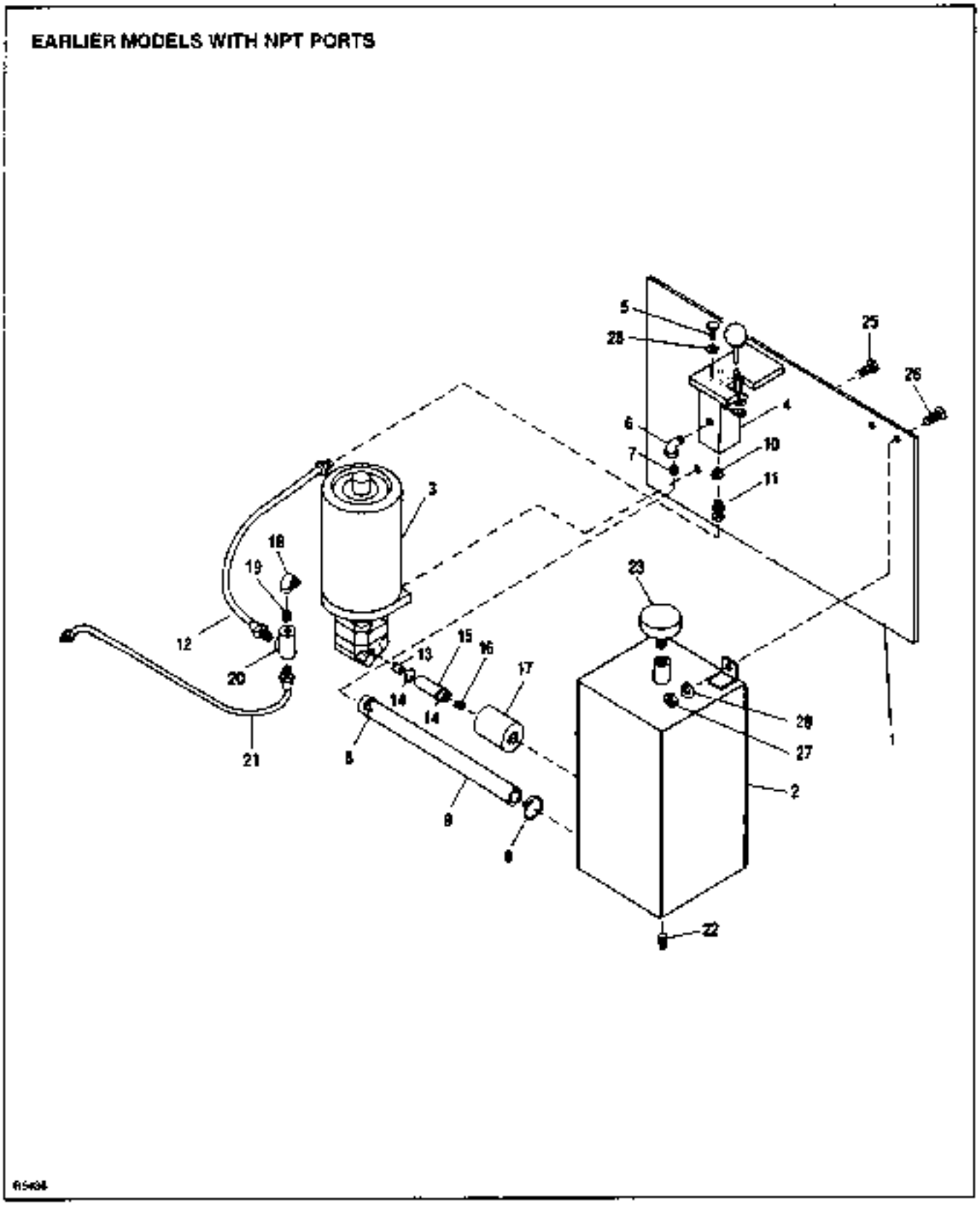

Figure 9-3. Panel Assembly

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LATER MODELS WITH SAE PORTS

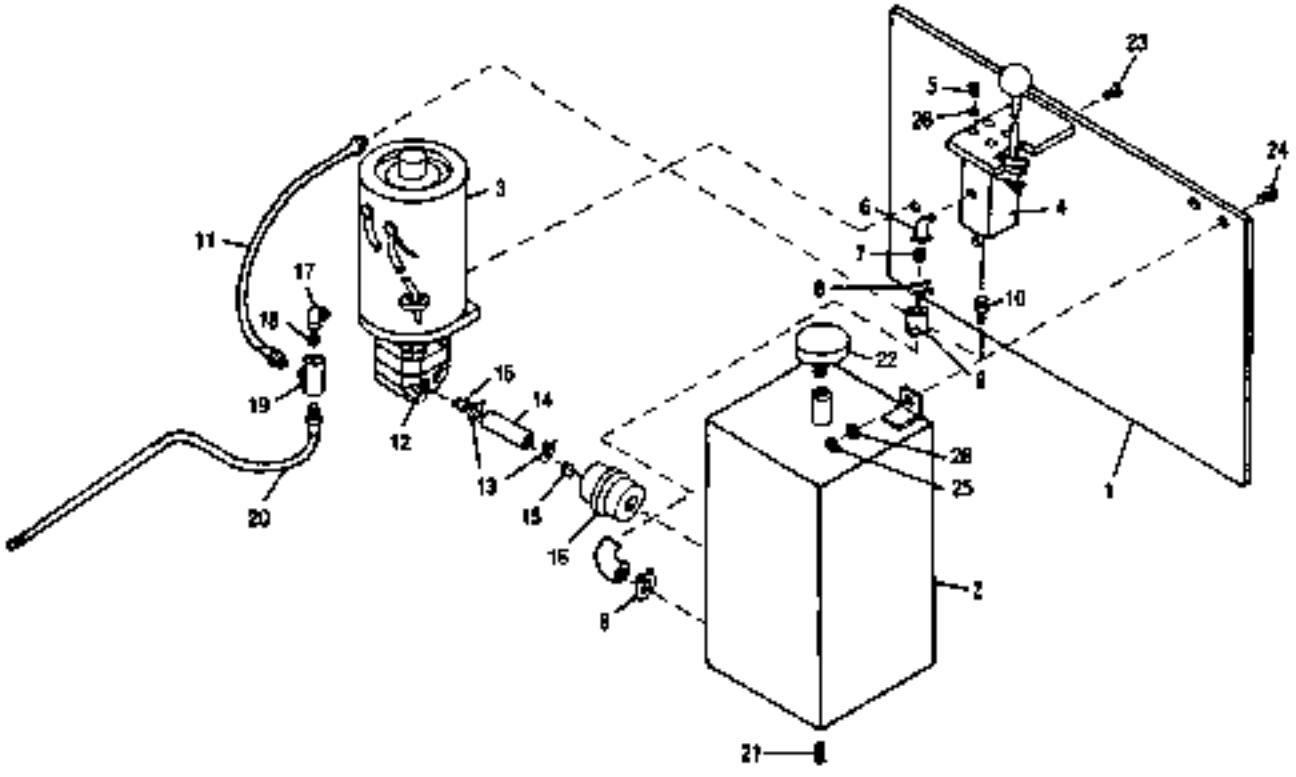

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Figure 9-4. Panel Assembly

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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 (21, Figure 9-3 or 20, Figure 9-4) at fitting (4, Figure 9-1 or 9-2).
5. Remove flow control valve (5, Figure 9-1 or 7, Figure 9-2).
6. Install new flow control valve making certain direction of free flow (as marked on valve) is toward lift cylinder.
7. Install reducer (6, Figure 9-2).
8. Install elbow (4, Figure 9-1 or 8, Figure 9-2) and reconnect disconnected hose.
9. Reconnect battery.
10. Raise forks, then remove support.
11. Fully lower the lift carriage and check the hydraulic oil level.
11. Raise and lower the lift carriage and check for leaks.

9-5. HYDRAULIC PUMP AND MOTOR ASSEMBLY

9-5.1. Pump and Motor Assembly 016912 and 016922.

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 (2, Figure 9-5) 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 (22, Figure 9-3 or 21, Figure 9-4) and drain hydraulic oil into a suitable container.
2. Disconnect hydraulic lines from pump.
3. Disconnect electrical wires from motor.
4. Remove the two screws (25, Figure 9-3 or 23, Figure 9-4), attaching pump and motor assembly to panel and remove pump and motor assembly.
5. Remove the four screws (5, Figure 9-5) and lock washers (4) to disassemble the pump from the motor. Discard gasket (2); save drive connector (3) 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).
7. Reassemble using a new gasket (2) and reuse drive connector (3).
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.

9-5.2. Pump and Motor Assembly 016936.

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 pump shaft seal (9, Figure 9-6) 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 (22, Figure 9-3 or 21, Figure 9-4) and drain hydraulic oil into a suitable container.
2. Disconnect hydraulic lines from pump.
3. Disconnect electrical wires from motor.
4. Remove the two screws (25, Figure 9-3 or 23, Figure 9-4), attaching pump and motor assembly to panel and remove pump and motor assembly.
5. Remove the pump bolts (13, Figure 9-6) to disassemble the pump from the pump adapter (6).
6. Remove the coupling (8) and shaft seal (9).
7. If the pump is defective, install a new pump. If motor is defective, a new motor may be installed, or motor may be rebuilt. Proceed with step 8 to remove the motor adapter and pump adapter.
8. Remove four screws (7) and take off pump adapter (6) and motor adapter (5). Motor can now be replaced or serviced (see section 10).
9. Reassemble using a new shaft seal (9).
10. Reinstall assembly in truck and connect hydraulic lines to pump and electrical wires to motor.
11. Clean the drain plug thoroughly.
12. Reinstall the drain plug.

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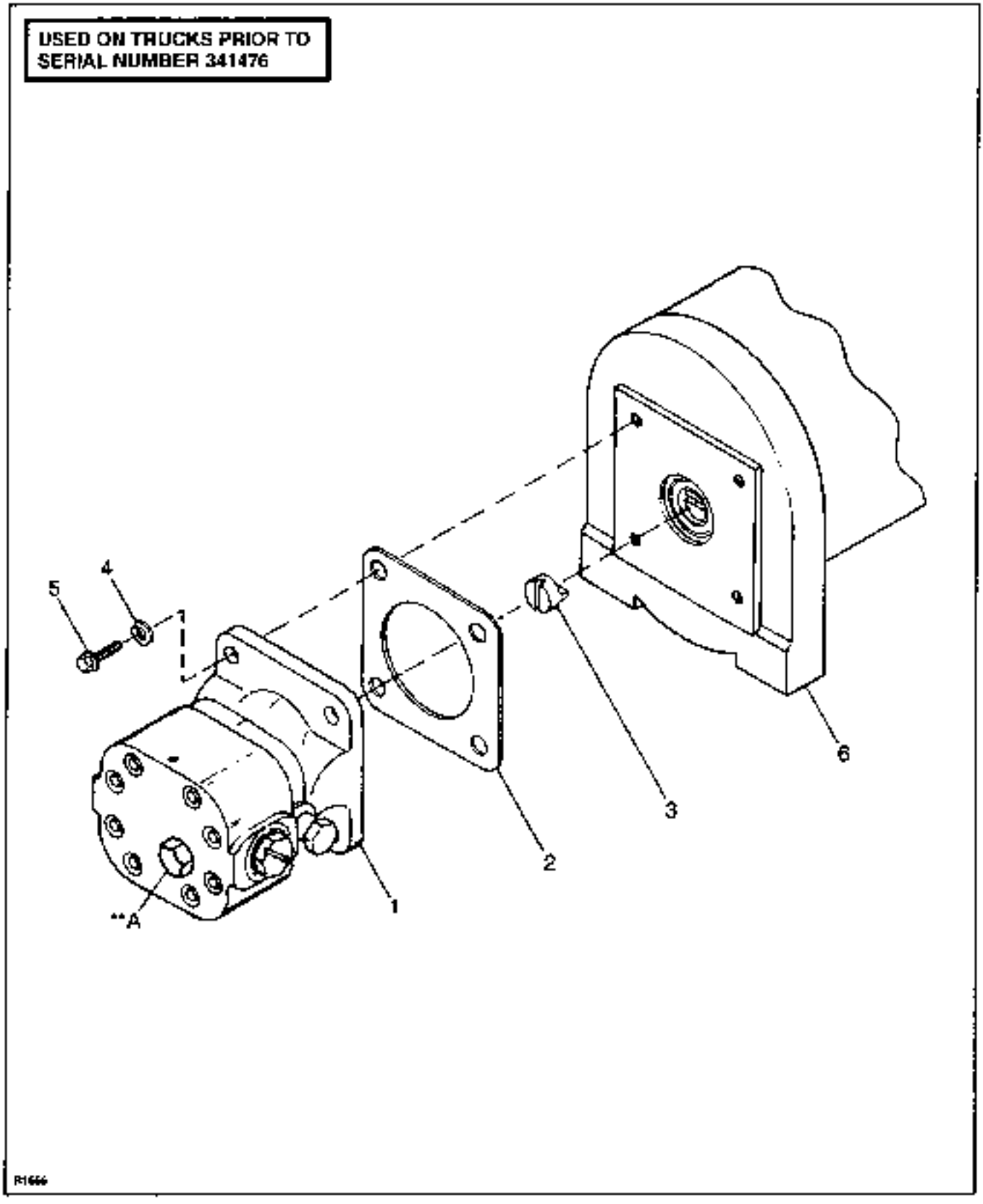

Figure 9-5. Hydraulic Pump 016912 and 016922

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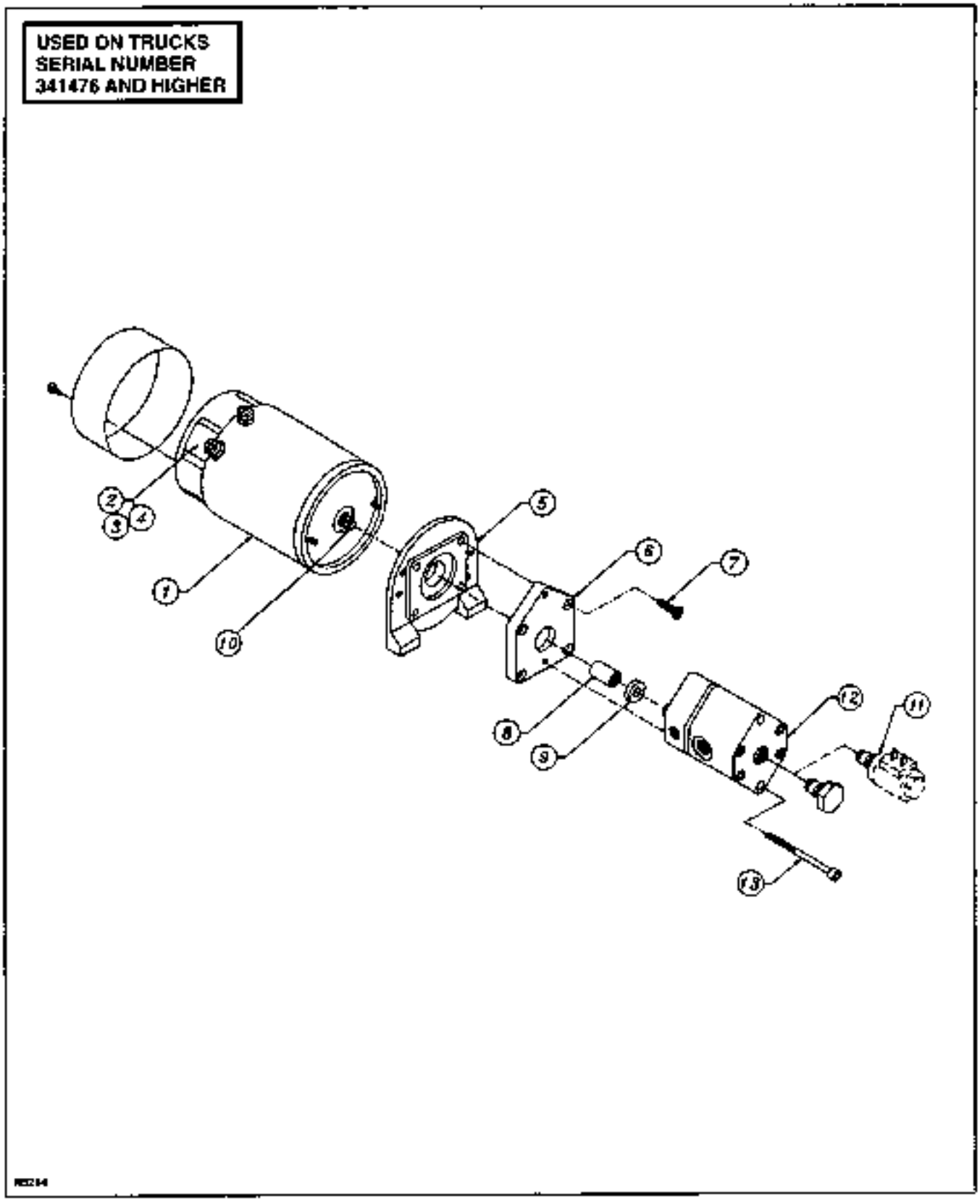

Figure 9-6. Hydraulic Pump and Motor Assembly 016936

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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.

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

9-6. CONTROL VALVE SERVICE

Repair parts for the control valve are illustrated in Figure 9-7.

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. Check that the battery charger is turned off and that the power cord to the charger is disconnected.
3. Disconnect the battery.
4. Remove the knob from the lift control and the breather cap from the hydraulic reservoir.
5. Remove the hydraulic compartment cover.
6. Disconnect the hydraulic line from the swivel connector at the lift control valve.
7. Disconnect wires connected to the hydraulic panel assembly.
8. Remove the hydraulic panel.
9. Remove reservoir drain plug (22, Figure 9-3 or 21, Figure 9-4) and drain hydraulic oil into a suitable container.
10. Label and disconnect the electrical wires from the switch (12, Figure 9-7) at the bottom of the control valve.
11. Remove the control valve by removing the four screws (17) and washers (18).
12. Install new or repaired control valve and secure with the four screws (17) and washers (18).
13. Connect the wires and hoses to the control valve.
14. Reinstall hydraulic panel and compartment cover.
15. Reinstall the drain plug.
16. Reinstall the knob on the control lever.

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.

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

9-6.2 Disassembly of Lift Control Valve

To disassemble the lift control valve proceed as follows:

1. Loosen the lower nut (9, Figure 9-7) 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 (12), remove the nut (16).
4. Remove switch bracket (4)
5. Remove reducer (20) to free compression spring (15), check ball (14), and valve pin (13).
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 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 9-7) 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 (6) to keep the lever centered and in a neutral position.
3. Note the point where the handle knob (5) and lever (7) come together as a reference point for the next few steps.

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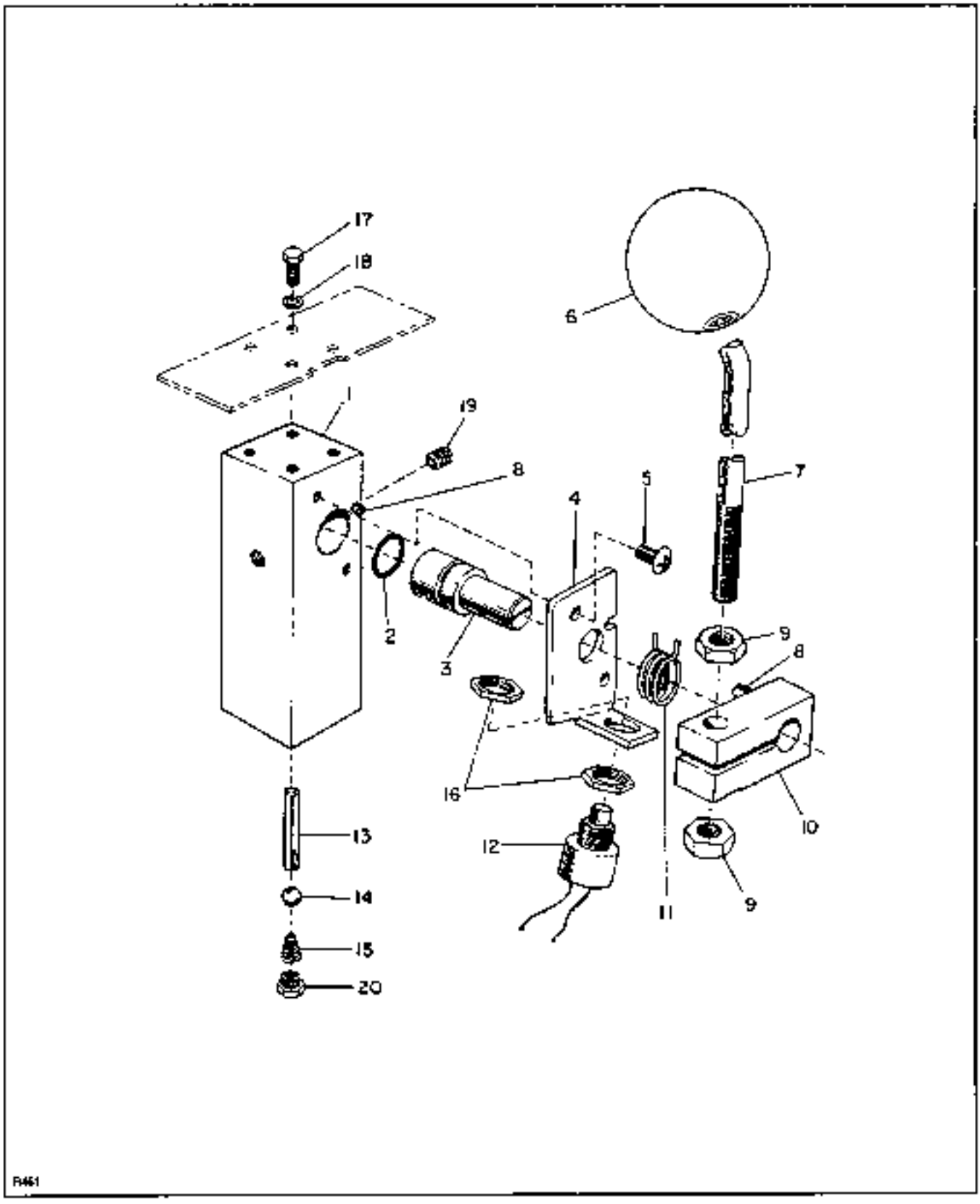

Figure 9-7. Hydraulic Control Valve Assembly

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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 (14) 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 (13) down against the check ball (14). 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 9-7) is properly set, it may be necessary to readjust the hydraulic pump motor switch (12). 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 (16) supplied with the switch (12).
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. LIFT CYLINDER REPAIR

9-7.1. 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 9-8), 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.

9-7.2. Full Free Lift

NOTE: Removal procedures are covered in Section 8.

Refer to Figure 9-9 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 weldment (1) in vise and remove the snap ring retainer (3) and square head pipe plug (2).
2. Pull outward on the cylinder base (9) until wear ring (14) contacts the cylinder base. Continued pulling will bring the cylinder head (4) out of the tube.
3. Use a strap wrench to hold the cylinder rod (13) and unscrew cylinder base (9) from cylinder rod. Remove cylinder head (4) from cylinder rod..

CAUTION: As cylinder rod (13) is pulled out of cylinder tube, catch the two halves of wear ring (14) which will be freed and may fall and be damaged.

4 The cylinder rod (13) may now be pulled out of the tube. Support it carefully and catch the two halves of the wear ring (14) as they are free. Continue to pull on the cylinder rod until the piston (12) is out of the tube.

5 If piston is worn or damaged hold the cylinder rod (13) with a strap wrench and take off Flexloc lock nut (11). Pull piston free of the rod.

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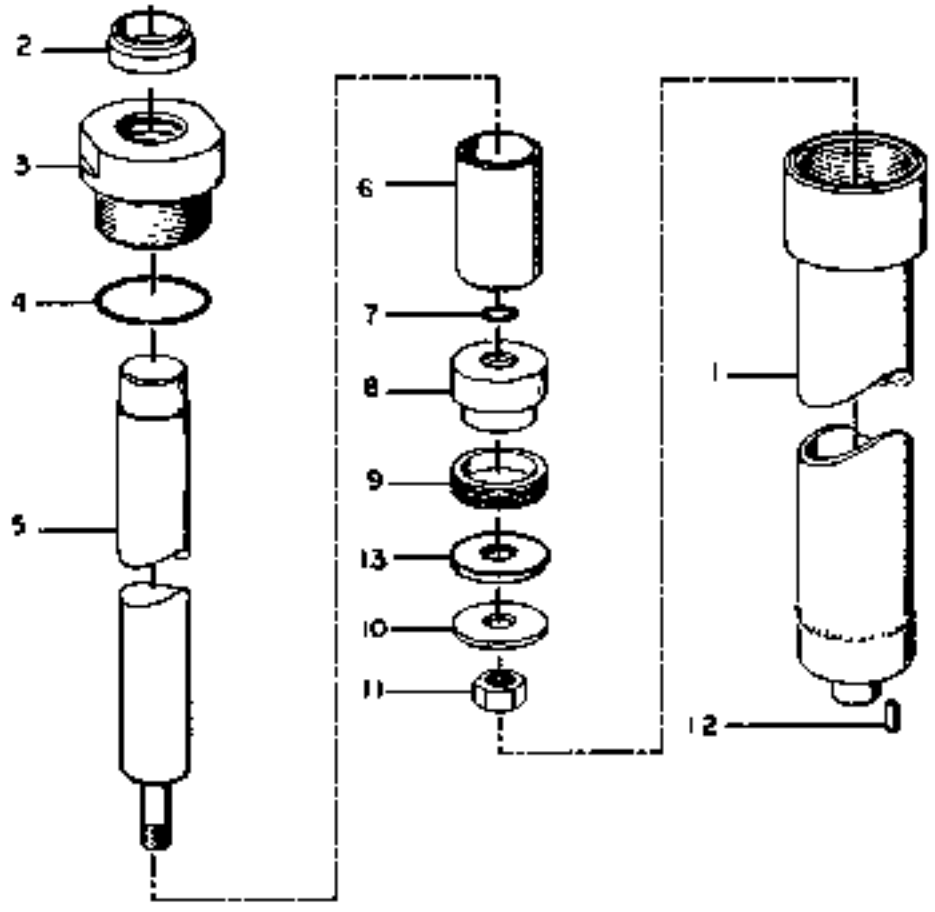

Figure 9-8. Lift Cylinder - Non-Telescopic and Telescopic Trucks

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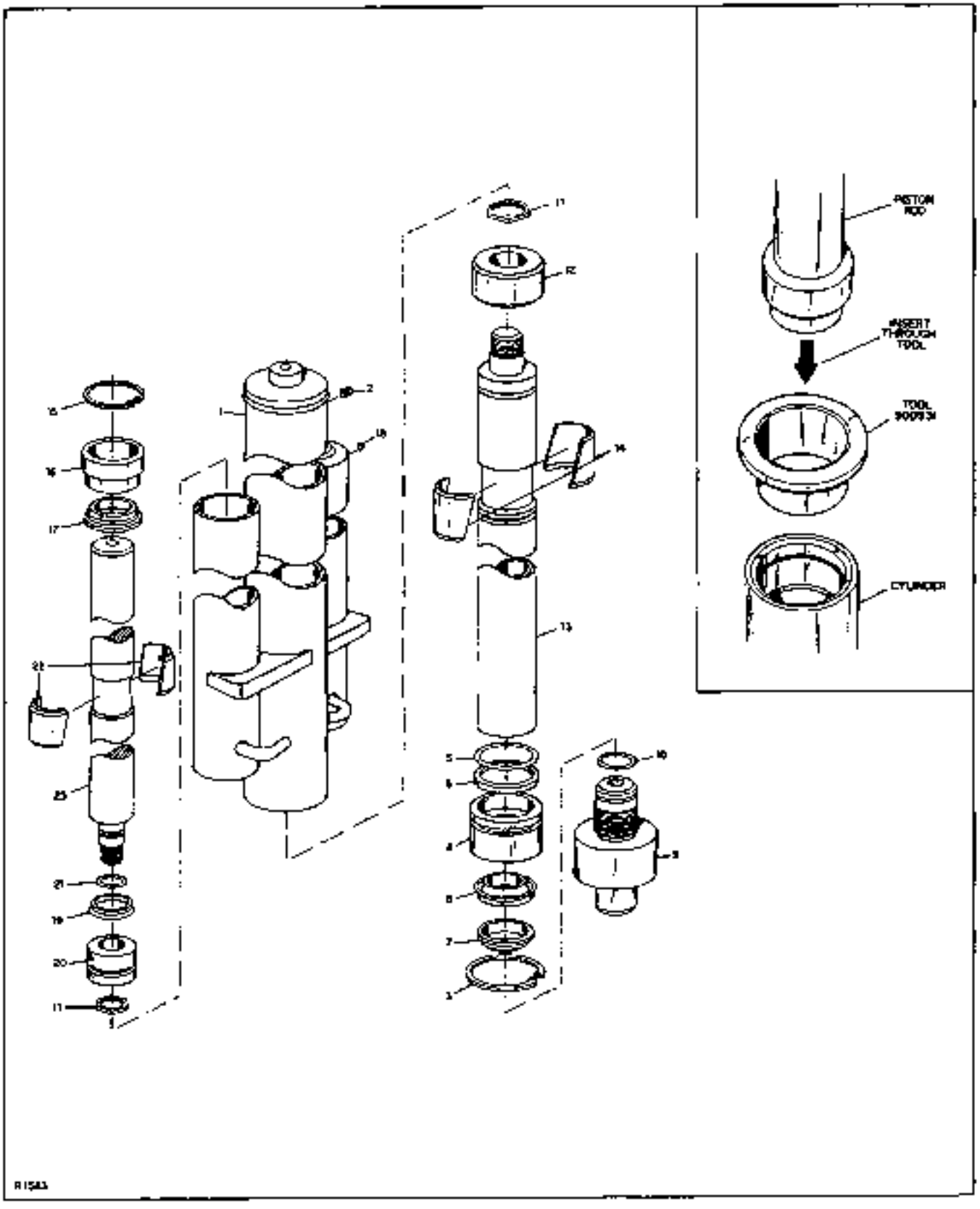

Figure 9-9. Lift Cylinder - Full Free Lift

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6. Examine bore of center cylinder tube of the cylinder assembly (1), and surfaces of the cylinder rod (13), piston (12), and wear ring halves (14). Replace all unsatisfactory parts and proceed with the following steps:

   a. Remove hydraulic cylinder wiper ring (7) and "U"-cup rod seal (8) from inside of cylinder head (4), and "O" ring (5) and back-up ring (6) from outside of cylinder head.

   b. Clean and dry all parts.

   c. Discard all used "O" rings and seals and replace them with new ones during reassembly.

   d. Coat all new "O" rings and seals with hydraulic fluid during reassembly.

7. Assemble FFL center cylinder by reversing the disassembly procedure. For ease of assembly when assembling threaded parts, apply a coating of white lead replacement to the threads--except for the threads of the cylinder base (9) which are to be coated with Loctite 222 adhesive (24).

8. If either or both of the outer cylinders of FFL cylinder assembly must be repaired, proceed as follows:

CAUTION: As cylinder rod of either outer cylinder is pulled out of cylinder tube, the two halves of wear ring (22) may fall free and be damaged hitting the floor. Be sure to catch these pieces.

   a. Remove snap ring retainer (15).

   b. Pull outward on the cylinder rod (23) until wear ring (22) pushes cylinder head (16) out of cylinder tube.

   c. A little more pulling will release the halves of the wear ring.

   d. Catch these pieces for reuse if in good conditions.

   e. Carefully support cylinder rod (23) and pull it outward to free it and piston (20) from the tube. If the piston is worn or damaged, or to replace "O" ring (21), hold the rod with a strap wrench and remove Flexloc lock nut (11) and pull piston free of rod.

   f. Examine bore of cylinder tube being repaired, surface of cylinder rod (23) and wear ring halves (22) for scoring, scratching, or other damage.

   g. Replace all unsatisfactory parts and proceed with the following steps:

      (1) Remove and discard "O" ring (21) and "U" cup seal (19).

      (2) Clean all parts and replace all "O" rings and seals during reassembly.

CAUTION: Reassembly of the lift cylinder requires the use of special tool, part number 900931, to prevent damage to cylinder packing.

      (3) Insert special tool part number 900931, into the end of the cylinder, as shown in Figure 9-9 (inset).

      (4) Coat rings and seals with hydraulic fluid during replacement.

      (5) Assembly FFL outer cylinder(s) by reversing the disassembly procedure. For ease of assembly, when assembling threaded parts, apply a coating of white lead replacement to the threads.

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SECTION 10
ELECTRICAL COMPONENTS

10-1. ELECTRICAL CONTROL PANELS.

1. SEE SUPPLEMENT 228 FOR TRANSISTOR TRUCKS SERIAL NUMBER 338388 AND HIGHER.
2. SEE SUPPLEMENT 187 FOR TRANSISTOR TRUCKS SERIAL NUMBER 333620 TO 338388.

The 12-volt panel part numbers 504659 is shown in Figure 12-34. Figure 12-34 identifies 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 900531-06 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 900531-06. One kit repairs one 2nd or 3rd speed contactor or the dynamic brake contactor. Kit includes items (3, 5, 8 and 12).

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 at 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.

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CONTACTOR TIP KIT 901531-08 CONTAINS

ITEM	QTY
3	1
4	1
8	1
12	1

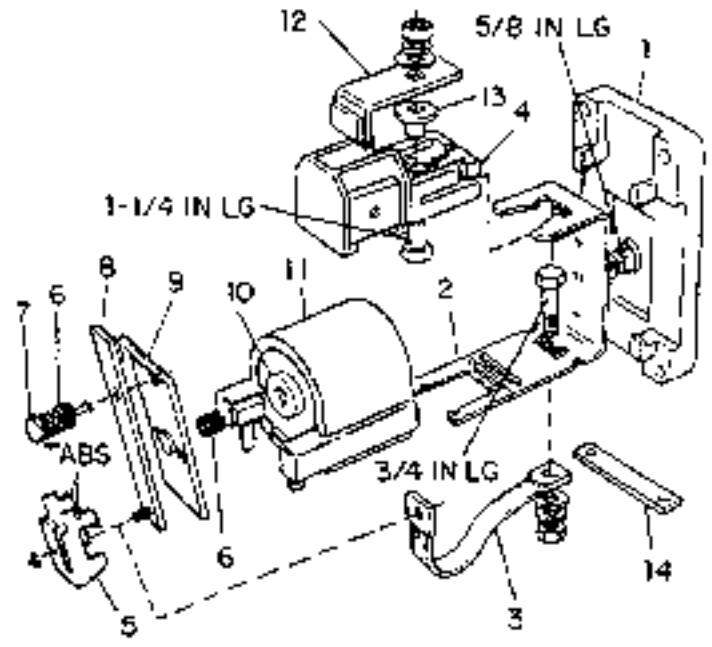

Figure 10-1. Single Pole Contactor, 2nd Speed, 3rd Speed Dynamic Brake

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).

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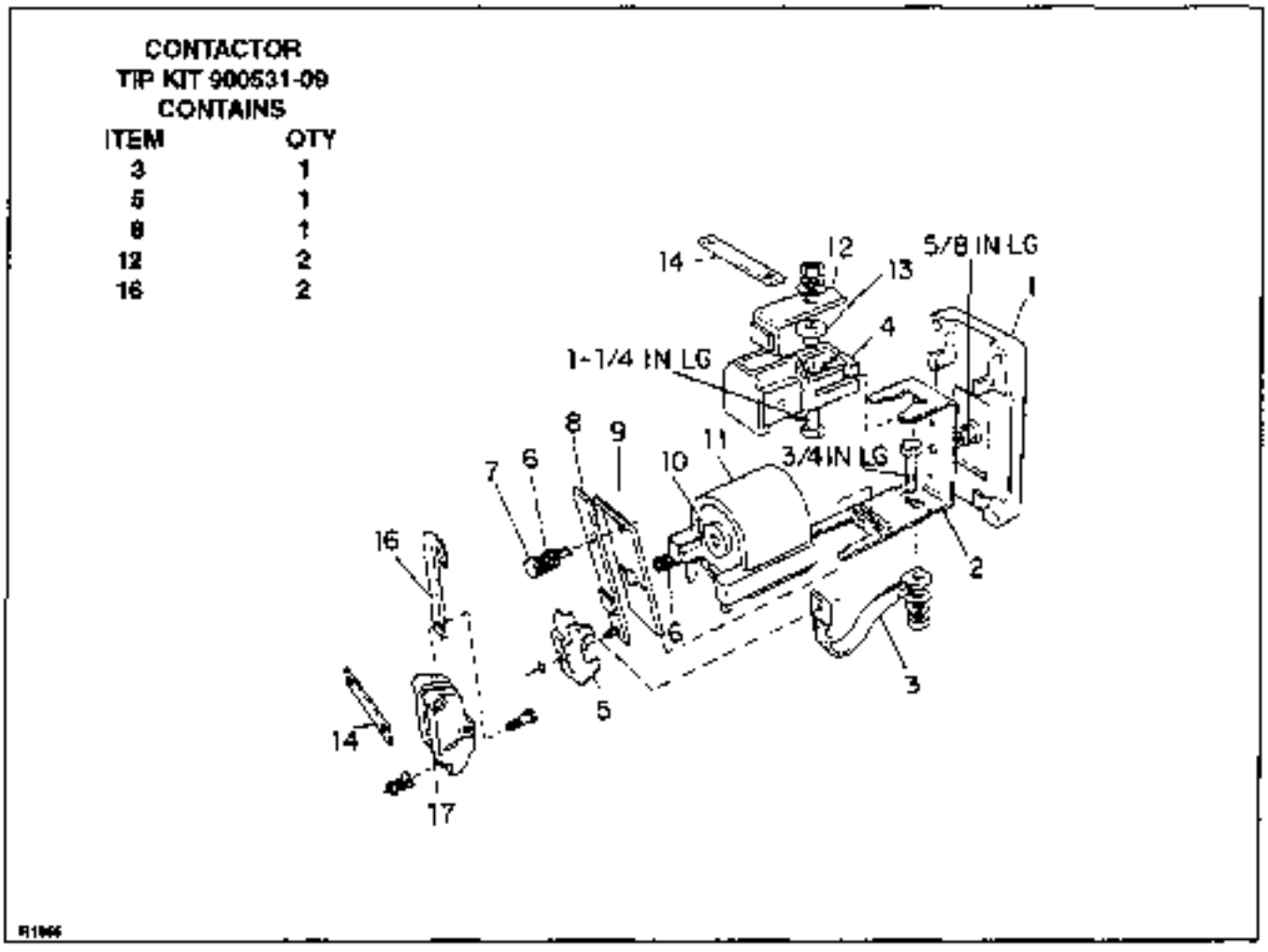

Figure 10-2. Double Pole Contactor, Forward, Reverse

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).

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10-3. PUMP MOTORS.

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

VOLTS DC	PUMP MOTOR PART NO.	SERIAL NO. EFFECTIVITY
12	901528	341476 AND HIGHER
12	905035	333620 THRU 333652 AND 333890 THRU 341475
12	904140	333653 THRU 333889

NOTE: Removal procedures are covered in Section 8.

Refer to applicable Figure 12-29, 12-31, and 12-32 for motor disassembly

10-4. DRIVE MOTORS.

NOTE: Removal procedures are covered in Section 6.

Refer to Figure 12-33 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 (10, Figure 12-10)
3. Disconnect the battery cables from the battery terminals.
4. Lift the battery out of the battery compartment.
5. Lower the new battery in the battery compartment.
6. Reconnect the battery cables to the battery terminals.
5. Reconnect the battery quick disconnect (28).

10-6. HIGH SPEED LIMIT SWITCH.

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

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

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

10-7. BATTERY CHARGERS.

The Smart Charger Part number 004975-01 is directly interchangeable and replaces the manual 30-Amp Timer Charger Part Number 004950. These charges operate on 120 V 60 Hz input. The timer Charger Part number 004951, operates on 230 V 50 Hz input. Schematic diagrams of the charges are shown in Figures 10-4 and 10-5. Parts identification information is shown in Figure 12-37 and 12-38.

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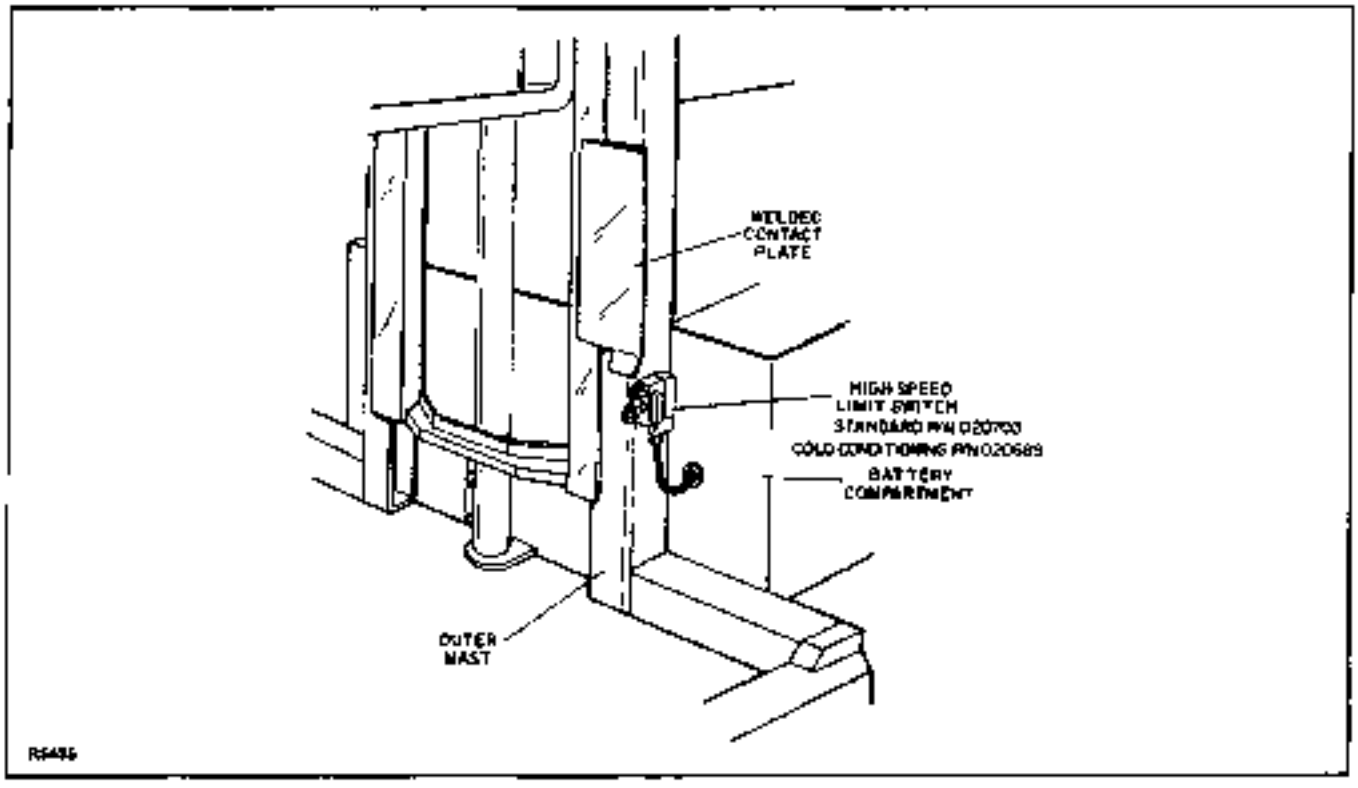

Figure 10-3. High Speed Limit Switch

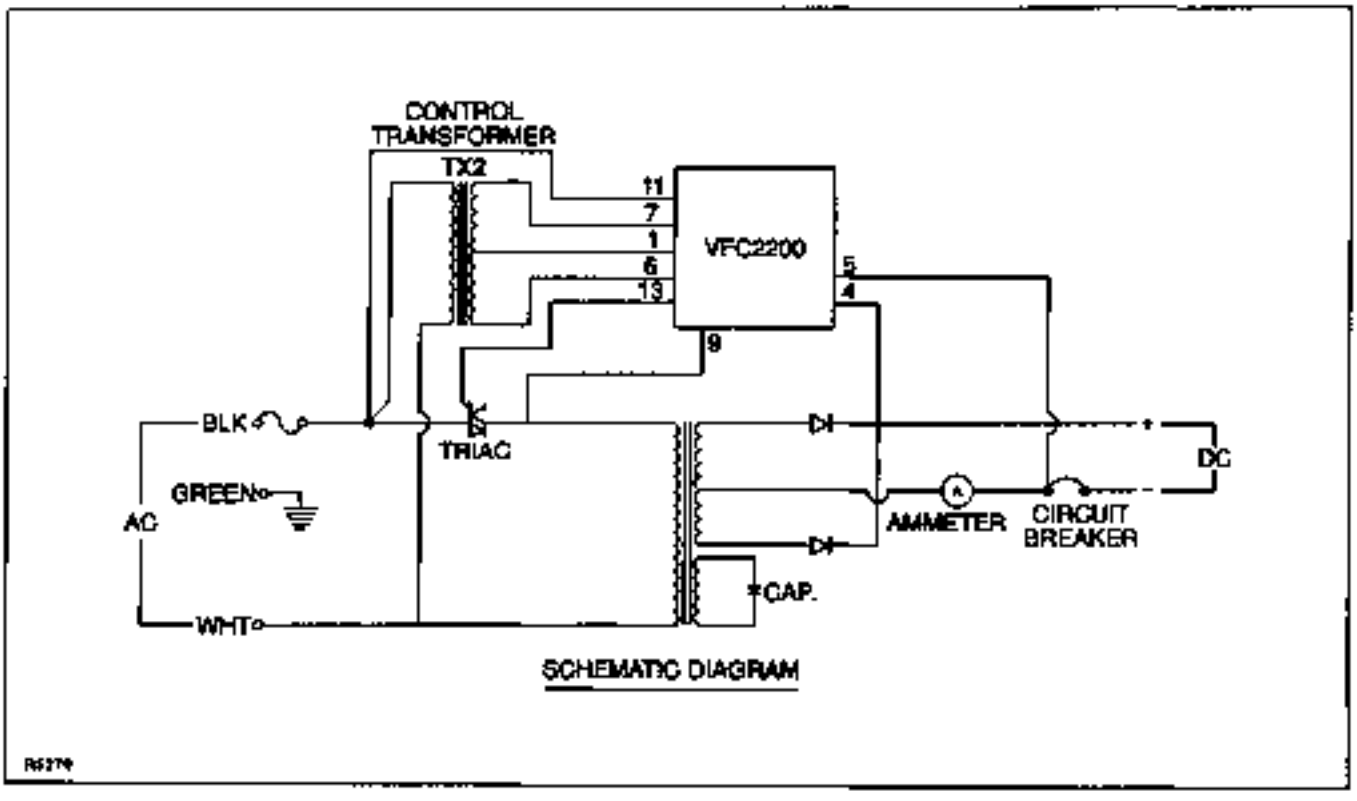

Figure 10-4. "SMART" Battery Charger 004976-01 Schematic Diagram

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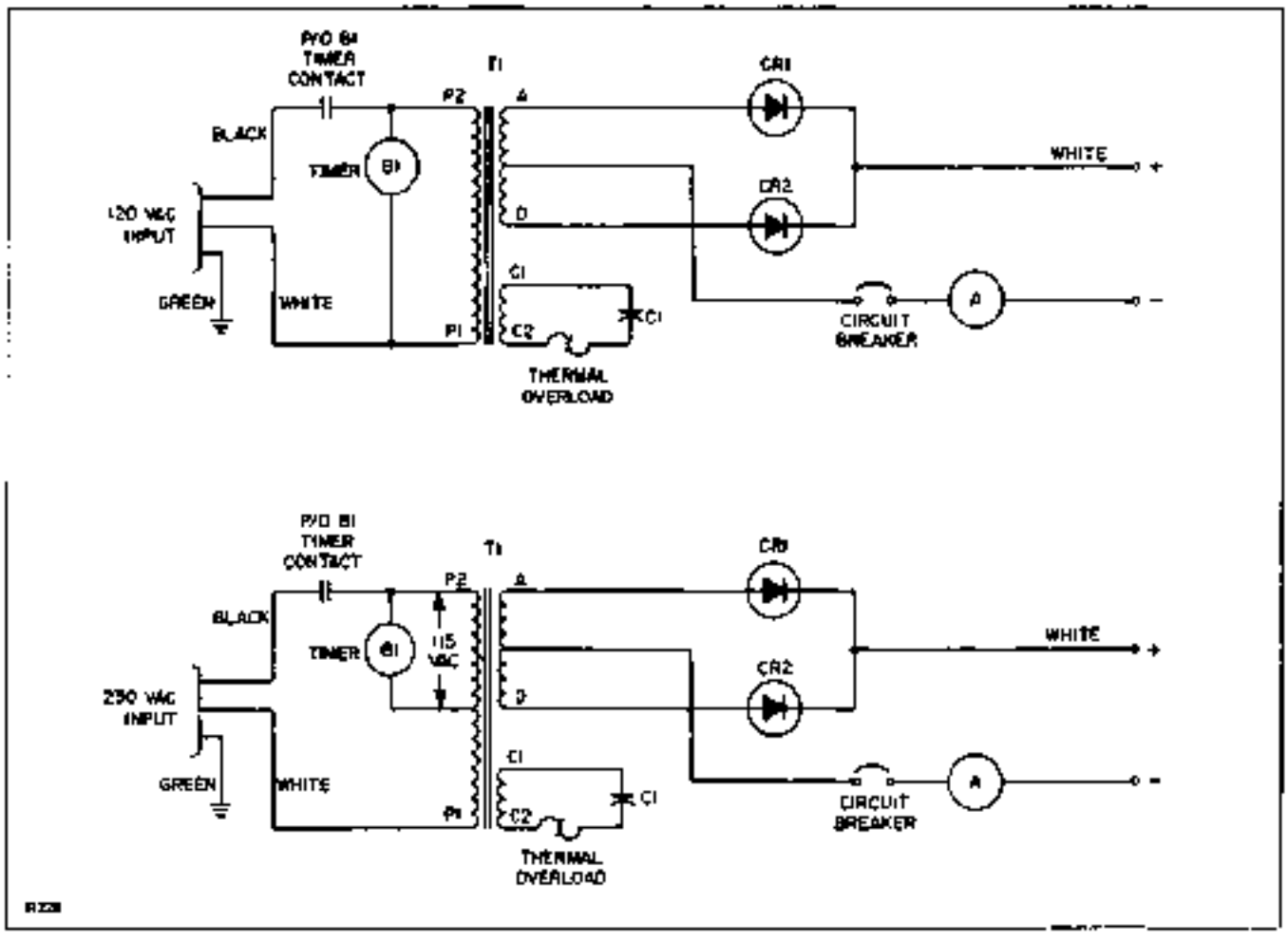

Figure 10-5. 30-Amp Timer Battery Charger Schematic

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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 12-42.

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 12-39 for replacement parts and to the schematic diagram, Figure 4-1 for wiring information.

11-3. BATTERY CAPACITY INDICATOR.

Refer to Figure 12-40 and 12-41 for the battery capacity indicator replacement parts.

11-4. REMOTE CONTROL.

Refer to Figure 12-25 and 12-26 for removal and parts identification of the remote control option.

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SECTION 12
ILLUSTRATED PARTS BREAKDOWN

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

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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 333620 TO 334630

SEE FIGURE 12-2
FOR SWITCHES

SEE FIGURE 12-3
FOR COLD CONDITIONING

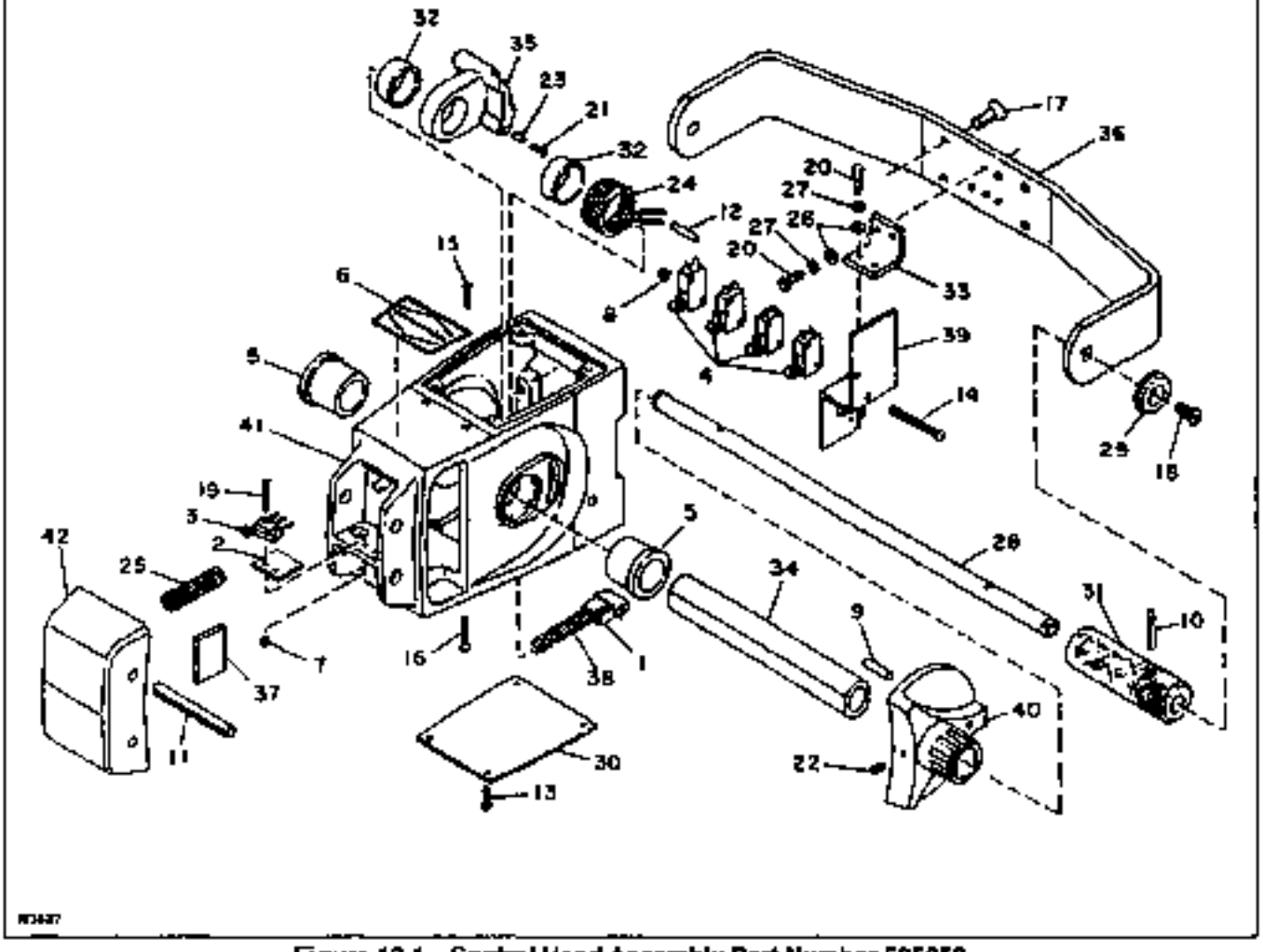

Figure 12-1 Control Head Assembly Part Number 505050

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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	403356	TUBE	2
32	402836	SPACER	2
33	402837	BRACKET	1
34	402839	TUBE	1
35	402840	CAM	1
36	402841	HANDLE GUARD	1
37	402843	PAD	2
38	504536-01	SWITCH WIRE ASSEMBLY	3
39	505052	SWITCH BRACKET	1
40	800272	CONTROL LEVER	2
41	800273	CONTROL HANDLE	1
42	800274	COVER	1

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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 333620 TO 334630

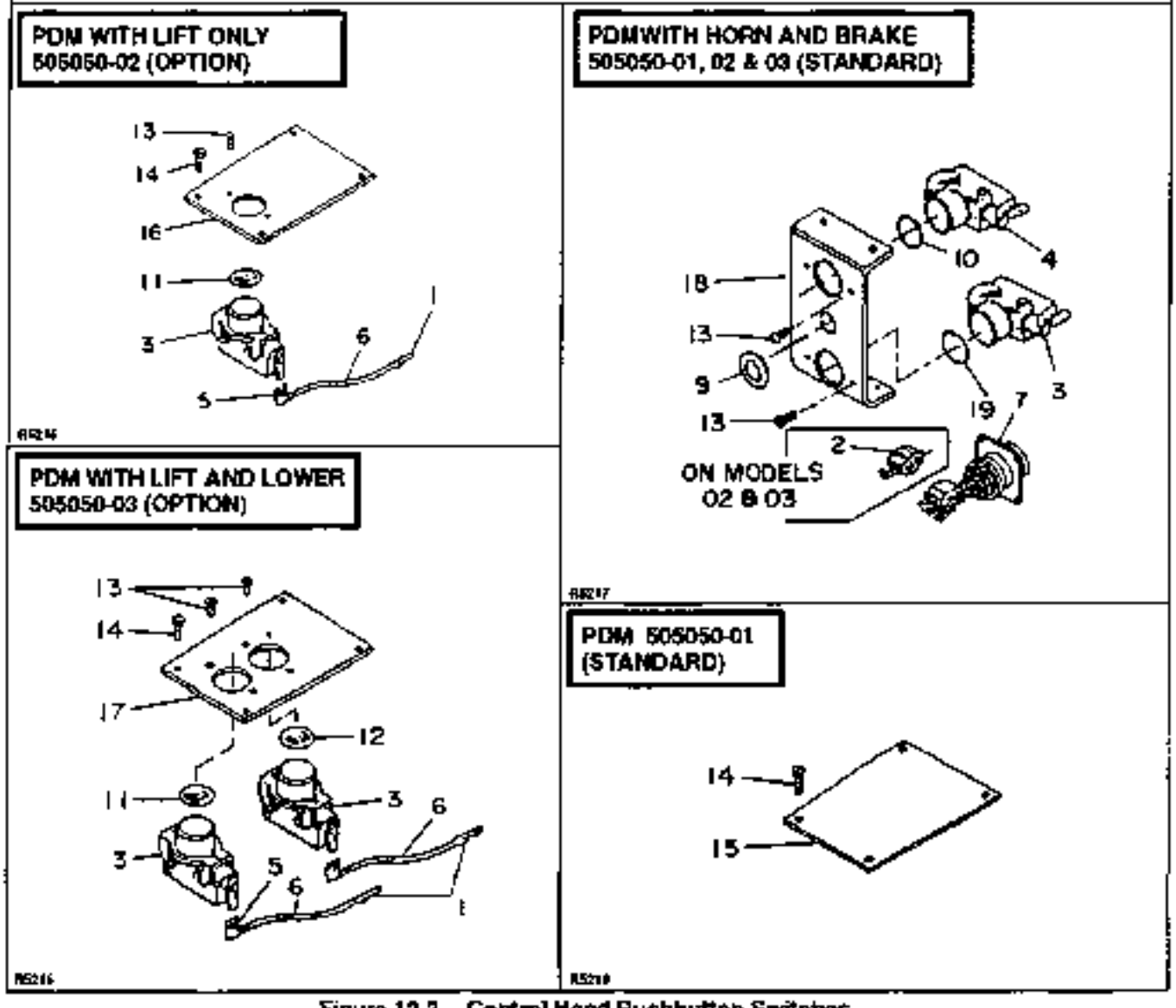

Figure 12-2. Control Head Pushbutton Switches

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	056519-01	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

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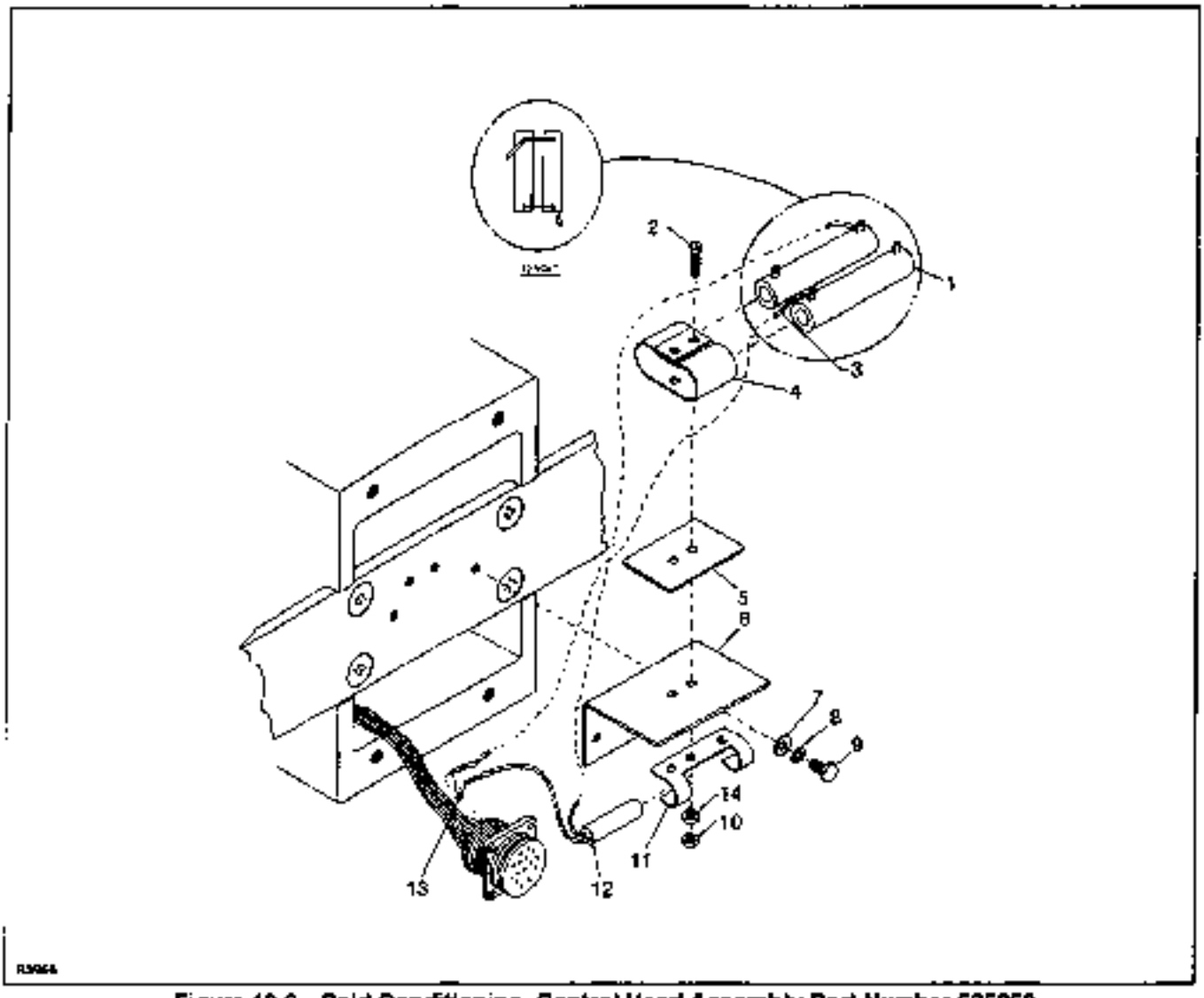

Figure 12-3 Cold Conditioning, Control Head Assembly Part Number 505050

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	018809	RESISTORS	2
2	068186	SCREW	2
3	023014	WIRE	AR
4	400544	BRACKET, RESISTOR	1
5	018214	INSULATOR, SWITCH	1
6	403829	BRACKET	1
7	077007	WASHER, FLAT	2
8	077204	SPLIT LOCK WASHER #6	2

INDEX NO.	PART NO.	PART NAME	NO. REQD.
9	372400-01	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
14	403372	INSULATION BUSHING	2

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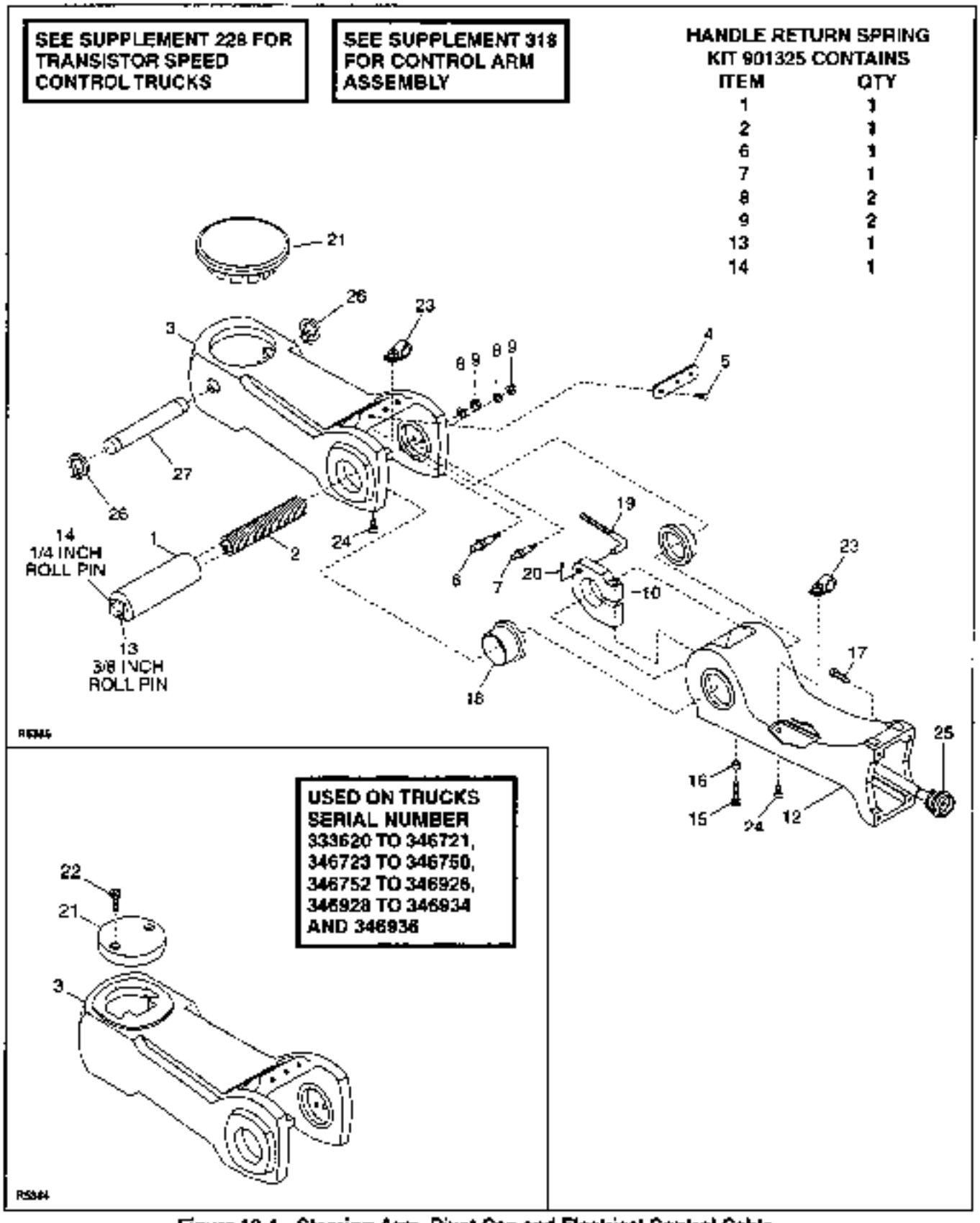

Figure 12-4 Steering Arm, Pivot Cap and Electrical Control Cable

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INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	501371*	SPRING TUBE ASSY	1
2	075960*	STEERING ARM RETURN SPRING	1
3	402363***	PIVOT CAP	1
3	800206**	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	052923	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	402458***	PIVOT CAP COVER	1
21	191045**	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 333620 TO 346721, 346723 TO 346750, 346752 TO 346926, 345928 TO 346934, AND 346936**

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

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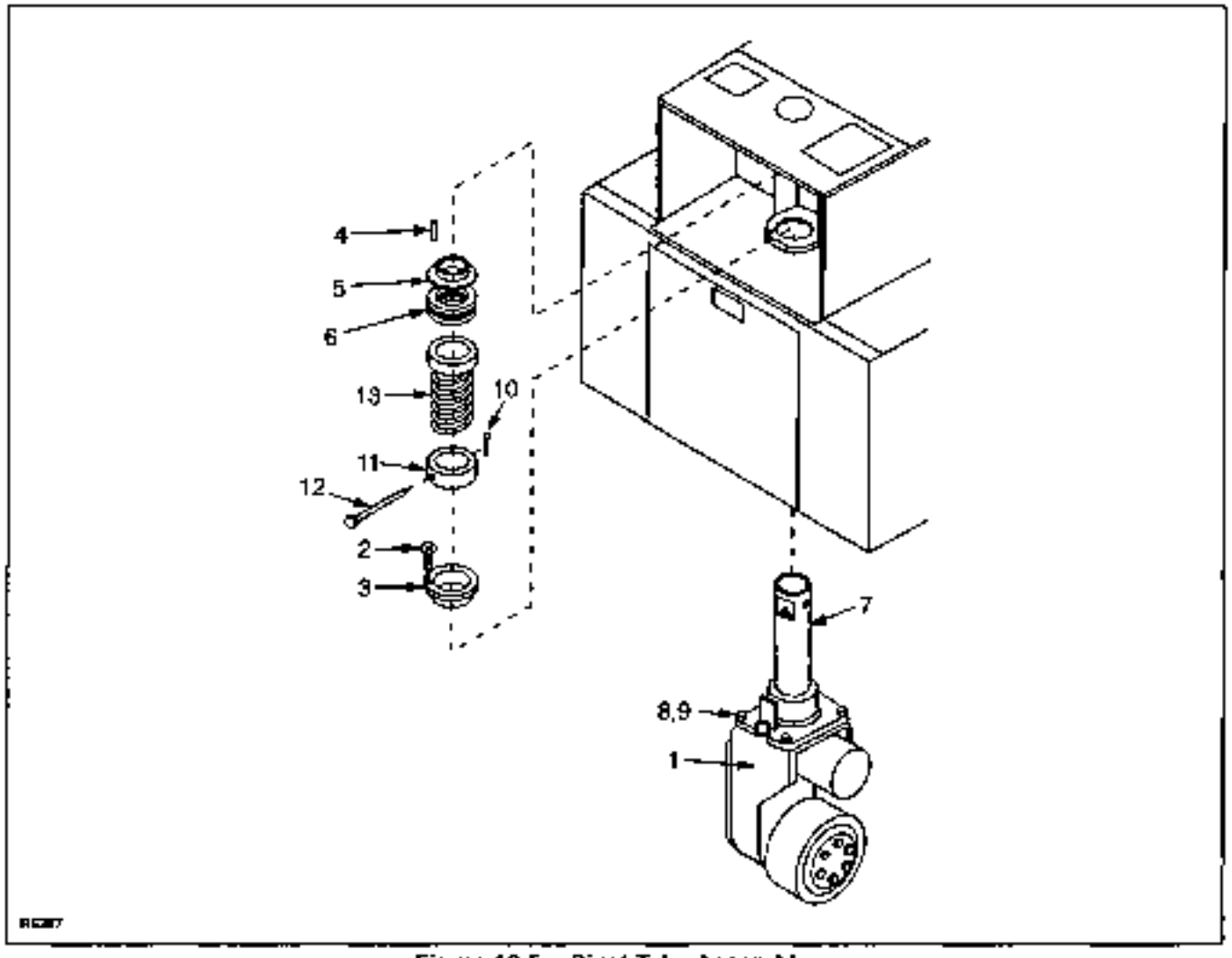

Figure 12-5. Pivot Tube Assembly

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	—	TRANSMISSION (FIG. 12-8)	REF
2	065536	SCREW, 5/16-18 X 5/8	1
3	053107	BUSHING, PIVOT	1
4	051000	ROLL PIN, 1/4 X 3/4	1
5	053108	BUSHING PIVOT	1
6	051145	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

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.

* USED ON TRUCKS SERIAL NUMBER 333620 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

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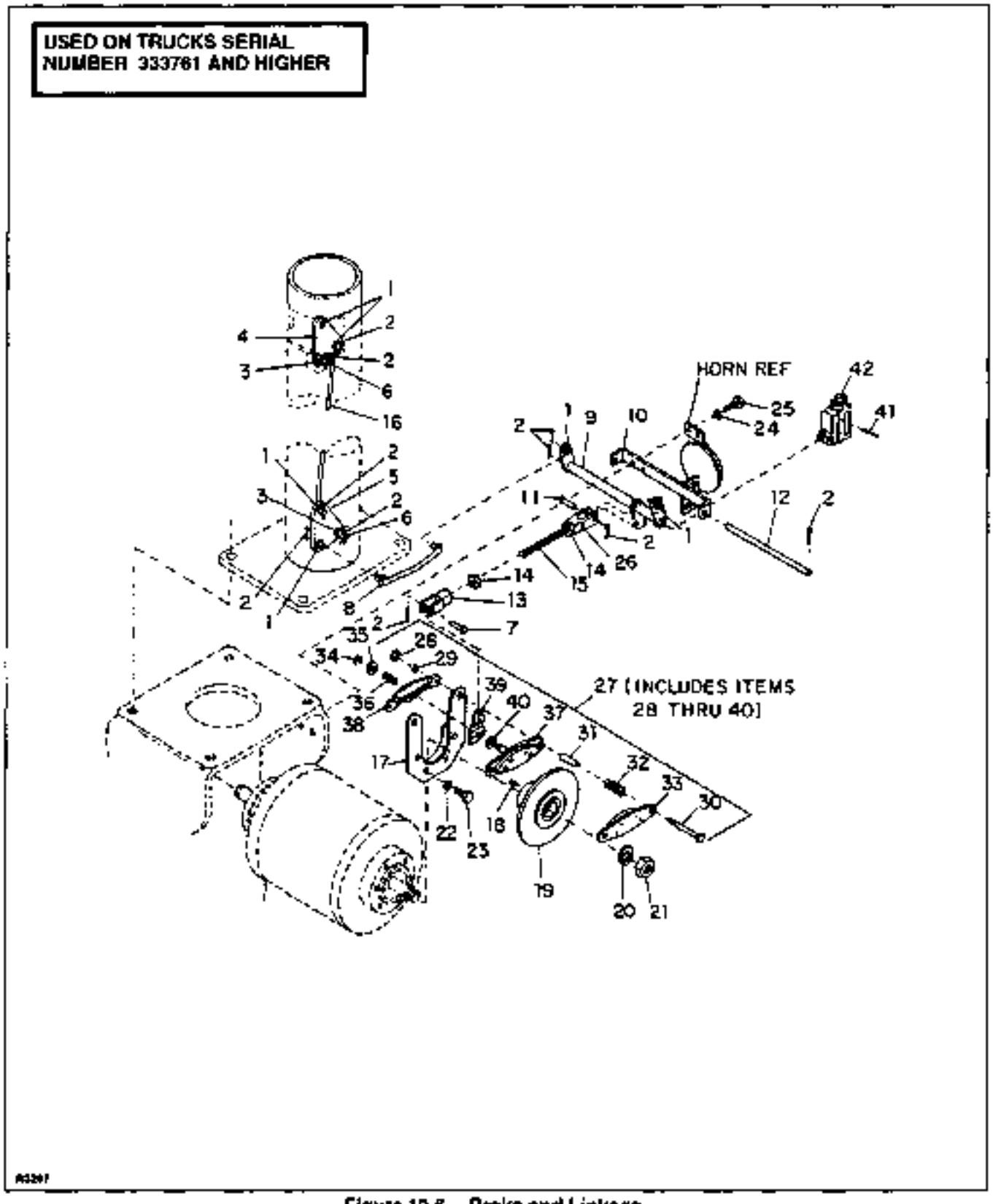

Figure 12-6. Brake and Linkage

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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	059545	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

INDEX NO.	PART NO.	PART NAME	NO. REQD.
24	077211	LOCK WASHER, 3/8	2
25	064505	HEX HEAD CAP SCREW, 5/8-16 X 1, HEAT TREATED	1
26	800119	CLEVIS	1
27	052821	DISC BRAKE CALIPER ASSY	1
28	058421	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	058336	ROUND HEAD SCREW, 8-32 S 1-1/2	2
42	—	SWITCH-DEADMAN (FIG. 12-10)	REF
REF	009500	HORN 12V	1

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USED ON TRUCKS
SERIAL NUMBER
333620 TO 333761

BRAKE PAD KIT
PART NUMBER
800182 CONTAINS

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

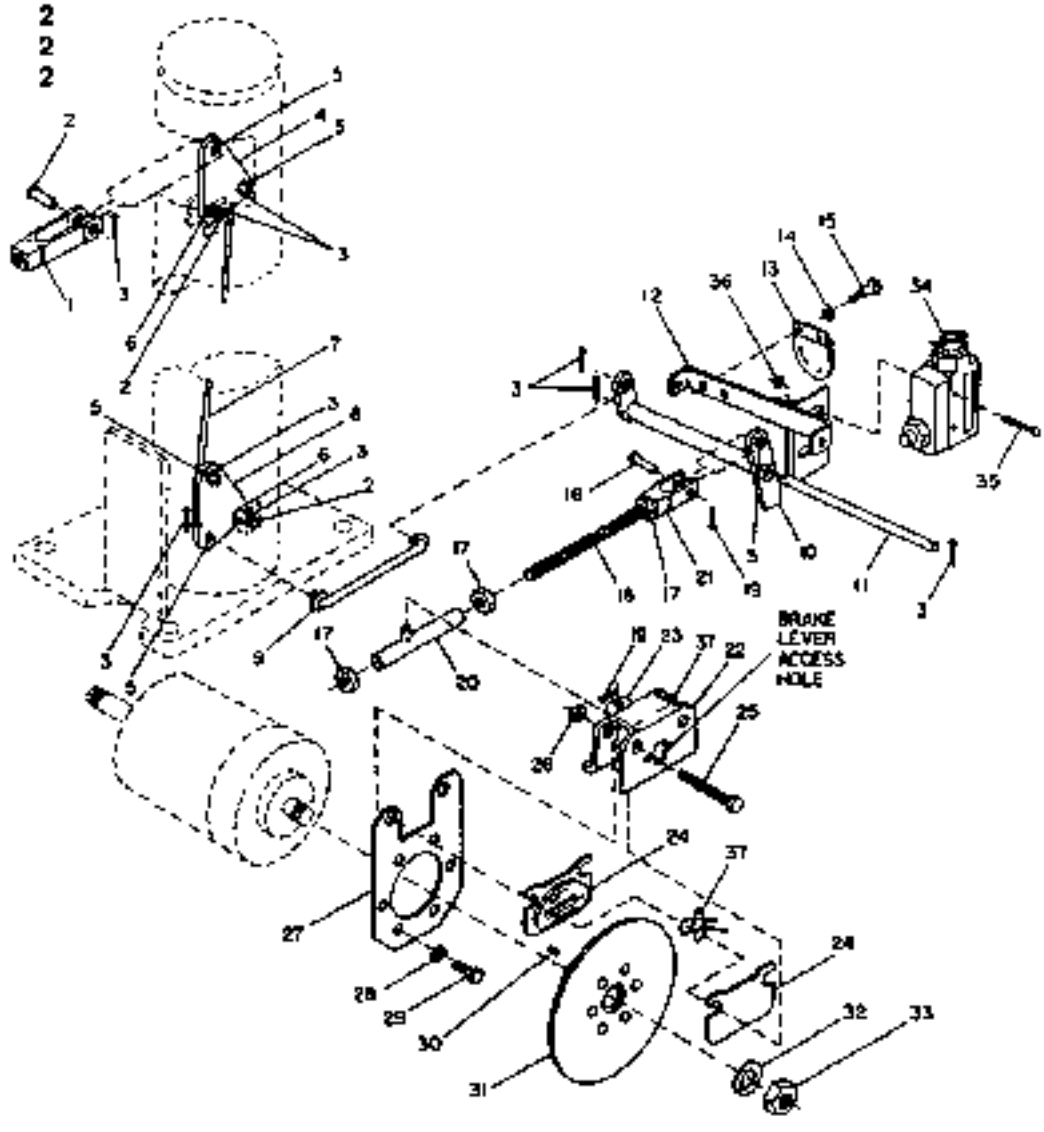

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Figure 12-7. Brake and Linkage

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INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	056200	CLEVIS	1
2	060300	CLEVIS PIN	3
3	060417	COTTER PIN, 5/32 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	—	HORN 12V (SHG 12-10)	REF
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, 5/32 X 3/4	2
20	502814	WELDMENT TUBE	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
21	800119	CLEVIS	1
—	052857	CLAMP ASSY	1
22	052859*	CLAMP, BRAKE	1
23	052860*	. LEVER, BRAKE	1
24	052858*	. 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	057900	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	—	SWITCH-DEADMAN (FIG. 12-10)	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**

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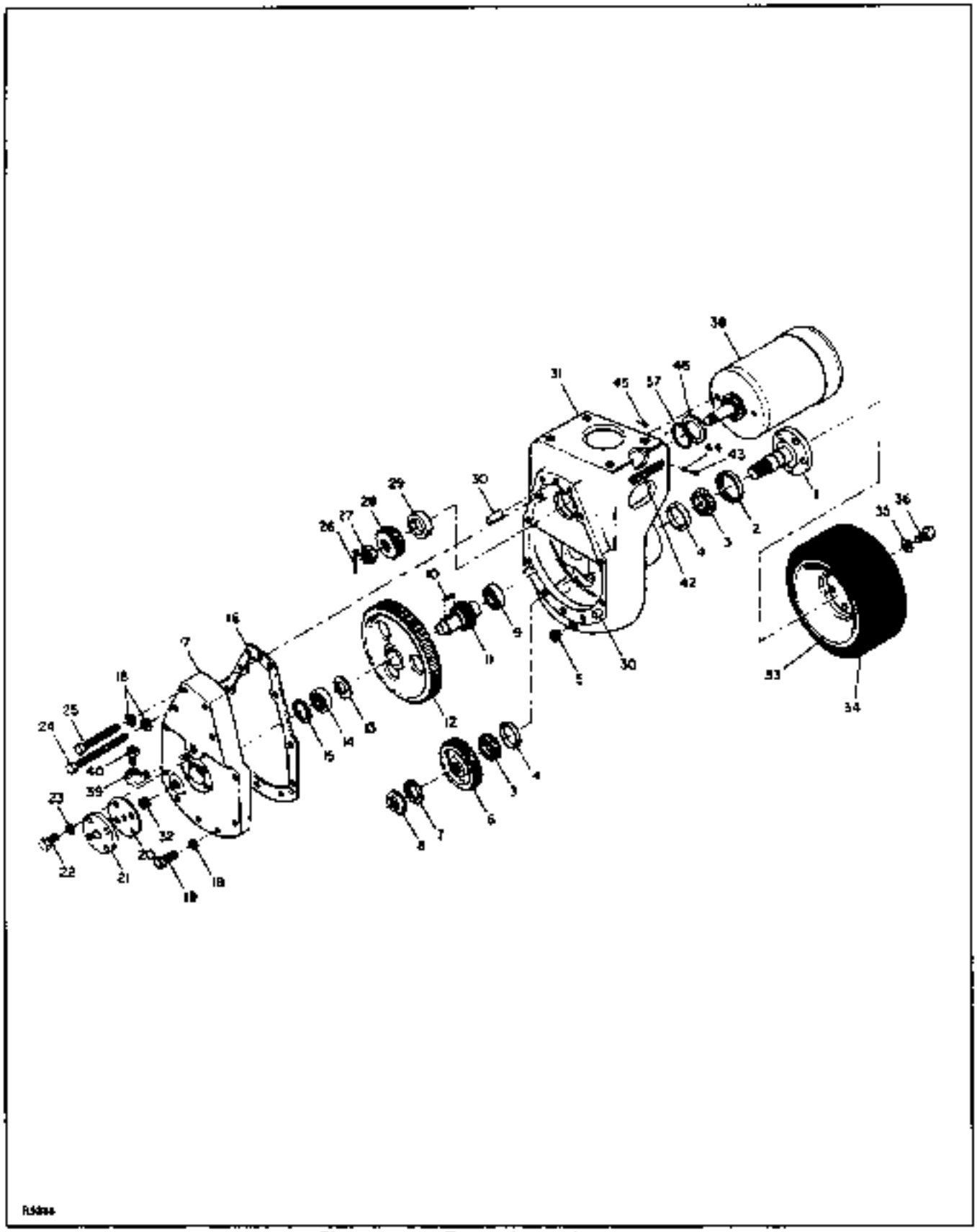

Figure 12-8. Transmission Assembly

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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	077800	. LOCK WASHER	1
8	059680	. LOCKNUT	1
9	051125	. BALL BEARING	1
10	067902	. 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	600073	. TRANSMISSION COVER	1
18	077211	. LOCK WASHER 3/8	11
19	054611	HEX HEAD CAP SCREW, 3/8-16 X 1-3/4	7
20	036106	BEARING COVER GASKET	1
21	051159	BEARING COVER	1
22	053555	HEX HEAD CAP SCREW, 5/16-18 X 1	4
23	077210	LOCK WASHER, 5/16	4
24	054620	HEX HEAD CAP SCREW, 3/8-16 X 3-3/4	2

INDEX NO.	PART NO.	PART NAME	NO. REQD.
25	054515	HEX HEAD CAP SCREW, 3/8-16 X 2-1/4	2
26	050428	COTTER PIN	1
27	059745	HEX NUT, 5/8-18	1
28	057234	MOTOR PINION SPUR	1
29	074702	MOTOR PINION SPACER	1
30	080585	. DOWEL PIN	2
31	600072	. TRANSMISSION HOUSING	1
32	026304	FILL PLUG	1
—	500940	DRIVE WHEEL ASSY	1
33	900025	. HUB	1
34	079161	. RUBBER WHEEL, 10-1/2 IN.	1
35	077215	LOCK WASHER, 5/8	5
36	054626	HEX HEAD CAP SCREW, 5/8-18 X 1	5
37	042114	O-RING	1
38	—	DRIVE MOTOR 12V (FIG. 12-33)	REF
39	026704	STREET ELBOW, 2/8	1
40	076701	VENT	1
41	—	NOT USED	
42	021226	TERMINAL BLOCK (RESISTOR SPEED CONTROL)	1
43	088185	SCREW	4
44	077203	LOCK WASHER	4
45	059410	HEX NUT	4

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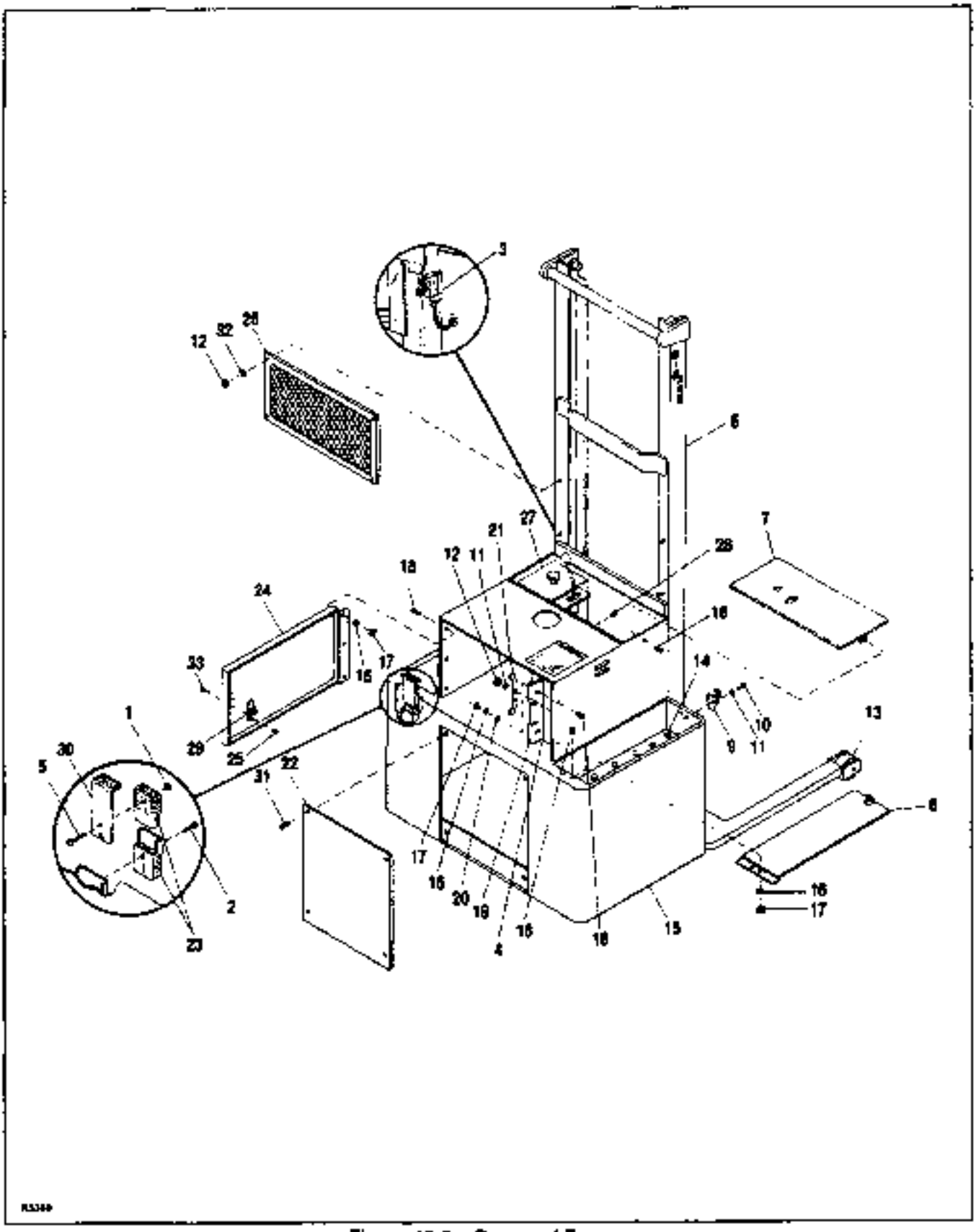

Figure 12-9. Base and Frame

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INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	359421	HEX NUT 1/4-20	2
2	068480	SCREW, 1/4-28 X 1	2
3	—	LIMIT SWITCH (FIG 12-10)	REF
4	—	BATTERY CHARGER 30-AMP (60 HZ) (FIG 12-37)	REF
4	—	BATTERY CHARGER 30-AMP (50 HZ) (FIG 12-38)	REF
4	—	BATTERY CHARGER 30-AMP (50 HZ) (FIG 12-38)	REF
5	069483	FLAT HEAD SCREW	2
6	VAR	OUTER MAST	1
7	500749	HYDRAULIC COMPARTMENT COVER	1
8	500743	BATTERY COMPARTMENT COVER	2
9	358100	LATCH	2
10	371376	TRUSS HEAD SCREW 10-32 X 1/2	4
11	077208	LOCK WASHER, NO. 3/16	6
12	359416	HEX NUT, 10-32	6
13	—	LOAD WHEEL AND BEARING ASSEMBLY (FIG 12-13)	REF
14	003128	BATTERY, 150 AMP (PDM-20, -25)	2
14	003149	BATTERY, 200 AMP (PDM-30)	2
15	501993	BASE ASSEMBLY	1
16	072209	LOCK WASHER, 1/4	7
17	059421	HEX NUT, 1/4-20	7
18	069478	FLAT HEAD MACHINE SCREW 1/4-20 X 3/4	9
19	401790	SIDE MOUNT RECEPTACLE	1
20	077031	WASHER, FLAT	2
21	101078	CORD WINDER	1
22	111142	BASE ACCESS PLATE	1
23	005401	CONNECTOR	1
24	500754	CABINET DOOR ASSEMBLY	1
25	059532	NUT	2
26	500757	SCREEN GUARD ASSEMBLY	1
27	—	HYDRAULIC PANEL ASSEMBLY (TEL AND NON-TEL) (FIG 12-23)	REF
27	—	HYDRAULIC PANEL ASSEMBLY (FFL) (FIG 12-24)	REF
28	068478	FLAT HD SCREW, 1/4-20	2
29	058107	LATCH DOOR SPRING	1
30	111653	HANDLE	1
31	072420	SCREW	4
32	077030	FLAT WASHER	4
33	058461	SCREW	2

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1. SEE SUPPLEMENT 228 FOR TRANSISTOR SPEED CONTROL TRUCKS SERIAL NUMBER 338388 AND HIGHER
2. SEE SUPPLEMENT 187 FOR TRANSISTOR SPEED CONTROL TRUCKS PRIOR TO SERIAL NUMBER 338388

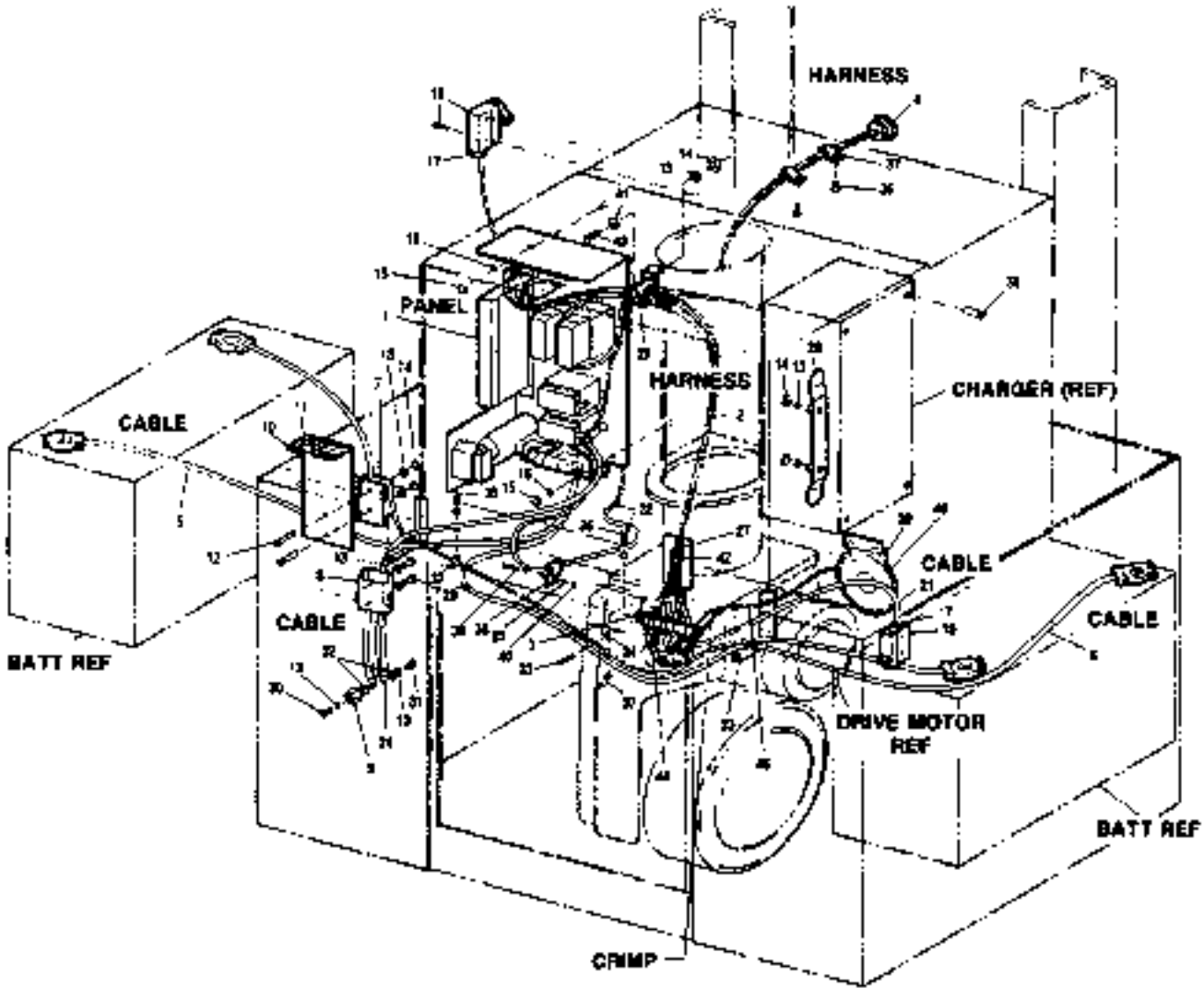

Figure 12-10. Base and Frame - Electrical

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INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	—	PANEL ASSEMBLY (FIG 12-34)	REF
2	023025	HARNESS ASSEMBLY	1
3	021724	TERMINAL BOARD	1
4	—	HARNESS ASSEMBLY (FIG 12-4)	REF
5	504154-01	CABLE ASSEMBLY	1
6	504154-02	CABLE ASSEMBLY	1
7	504159	CONNECTOR ASSEMBLY	1
7	—*	CONNECTOR ASSEMBLY (TRUCKS SERIAL NUMBER 346604 AND HIGHER) (FIG 12-10A)	1
8	504157	CONNECTOR ASSEMBLY	1
9	030814	STANDOFF	1
10	111653	HANDLE	1
11	—	NOT USED	
12	069483	SCREW, 1/4-20 X 3/8	2
13	077209	LOCK WASHER, 1/4	9
14	059421	HEX NUT, 1/4-20	5
15	059429	HEX NUT, 3/8-16	2
16	072211	LOCK WASHER, 3/8	2
17	005405	BUSHING, RELIEF	2
17	019510*	BUSHING, RELIEF	1
18	020703	LIMIT SWITCH	1
18	020699*	LIMIT SWITCH	1
19	020729	DEADMAN SWITCH	1
19	020690*	DEADMAN SWITCH	1
20	800082	HORN, 12 V	1
21	023117	CABLE ASSEMBLY	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
22	057510	GROMMET	2
23	082503	RUBBER CHANNEL	A/R
24	504150-07	CABLE ASSEMBLY	1
25	077208	LOCK WASHER, #10	1
26	056135	CLAMP	1
27	076200	WRAP, ZIPPER	1
28	101078	BRACKET, CORD	1
29	069480	SCREW, 1/4-28 X 1	2
30	070476	SCREW, 1/4-20 X 1/2	1
31	070489	SCREW, BRASS	1
32	077105	WASHER, BRASS	2
33	068186	SCREW, #5-40 X 1-3/8	2
34	077203	LOCK WASHER, #5	2
35	059410	NUT, HEX #5-40	2
36	069479	SCREW 1/4-20 X 3/4	8
37	504364	CLAMP AND NUT ASSEMBLY	4
99	056122	CLAMP	1
39	069470	SCREW 10-24 X 1/2	1
40	059418	NUT, 10-24	1
41	077030	WASHER	1
42	056113	WIRE HARNESS TIE	4
43	063478	SCREW 1/4-20 X 3/4	1
44	021204	TERMINAL	5
45	023018	WIRE, 16 GA	A/R
46	021203	TERMINAL	2
—	—	LIFT MOTOR SOLENOID (FIG 12-22)	REF

* TRUCKS EQUIPPED WITH COLD CONDITIONING

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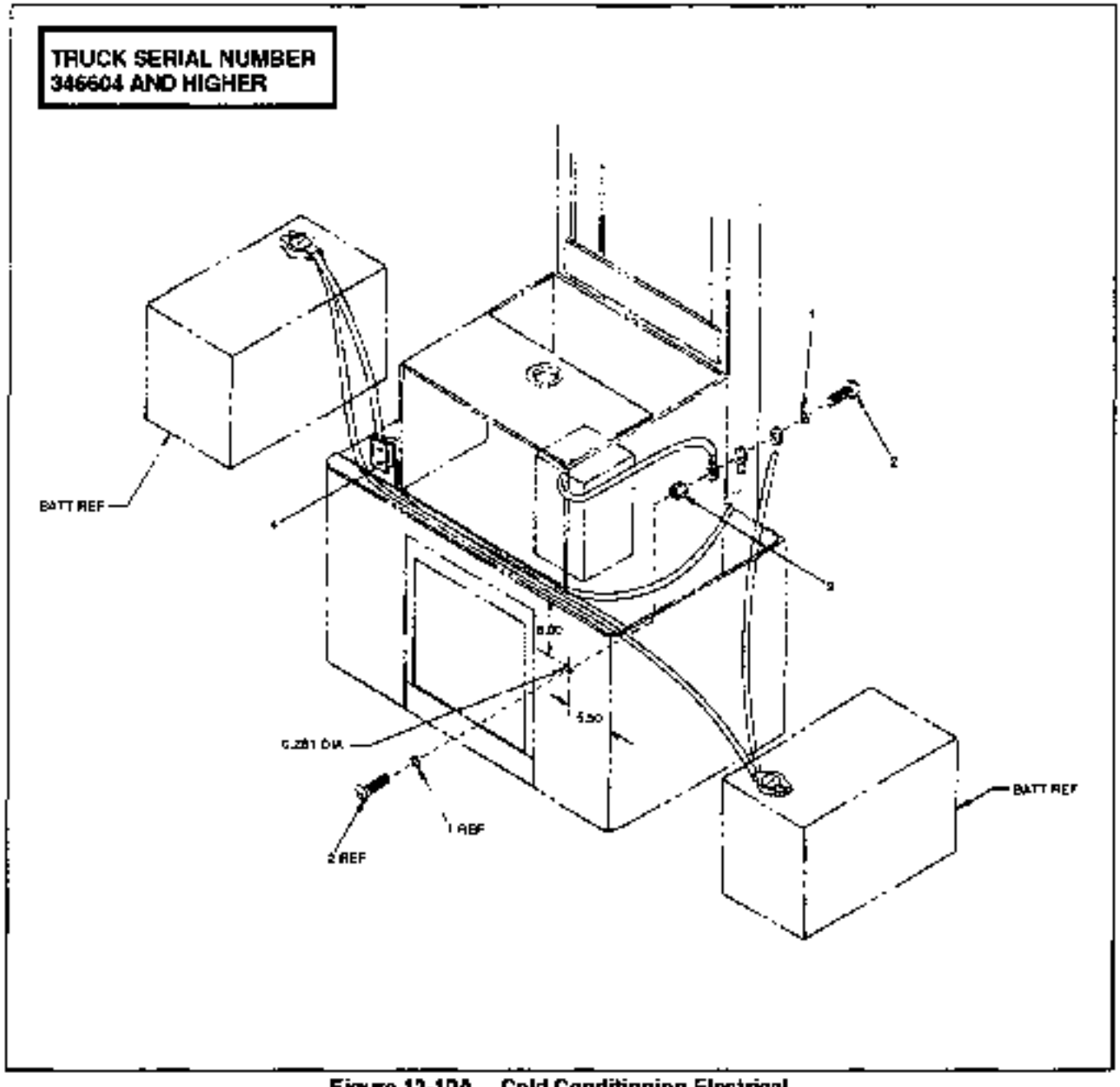

Figure 12-10A, Cold Conditioning Electrical

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	077209	LOCK WASHER, 1/4	2
2	070476	SCREW, 1/4-20 X 1/2	2
3	010614	STANDOFF, INSULATOR	1
4	505744	CONNECTOR ASSEMBLY	1

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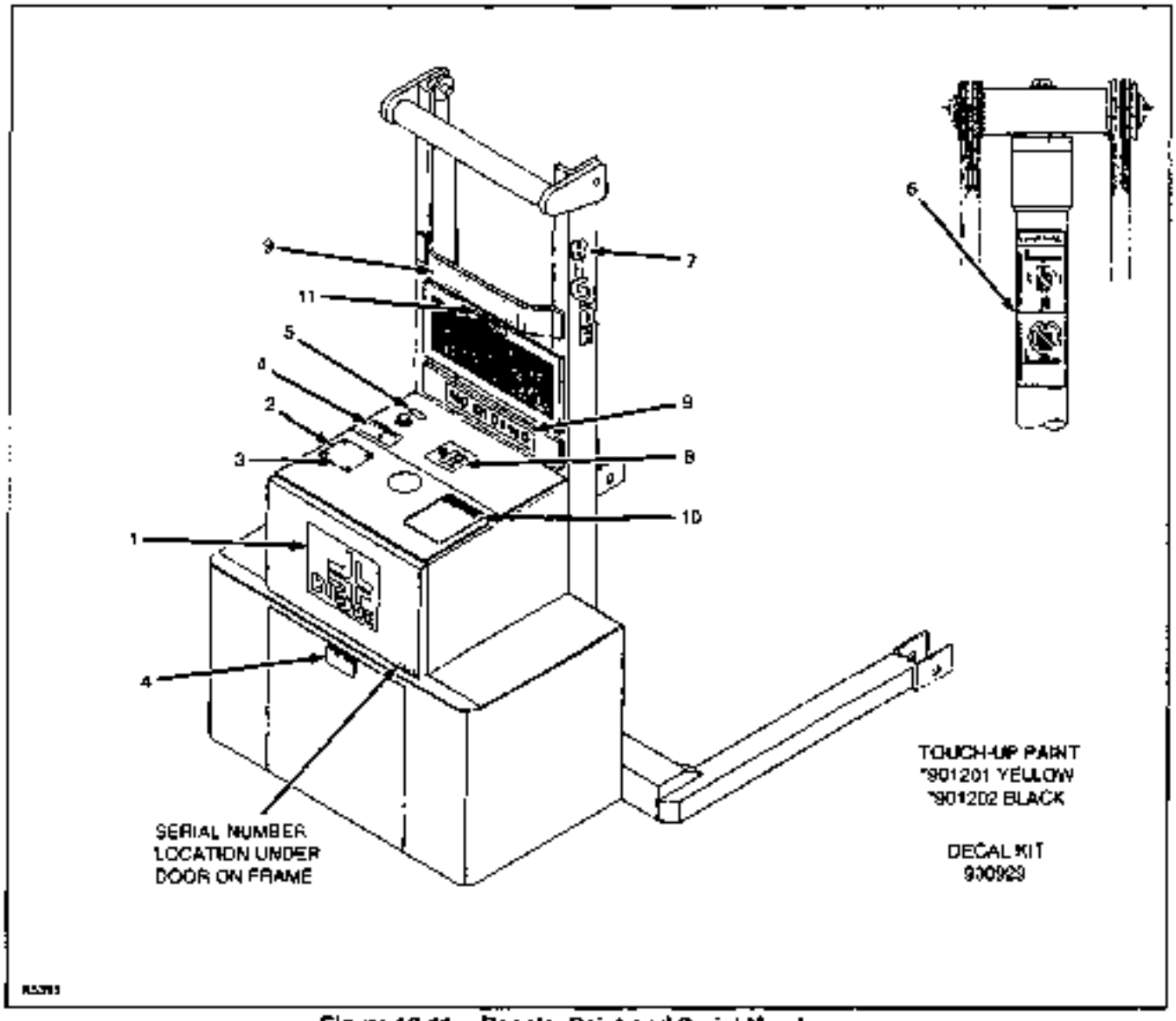

Figure 12-11. Decals, Paint and Serial Numbers

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	058631	BIG JOE DECAL	1
2	—	NAMEPLATE, STANDARD	1
2	—	NAMEPLATE, WITH ATTACHMENTS	1
3	068050	SCREW, ROUND HEAD DRIVE	4
4	058564	CAUTION DECAL	2
5	056626	DECAL, OIL LEVEL	1
6	056625	WARNING DECAL	1
7	056613	MAST DECAL	2
8	056478	LIFT DECAL	1
9	056498	NO RIDER DECAL	1
10	056581	SAFETY DECAL	1
11	056494	CAUTION DECAL	1

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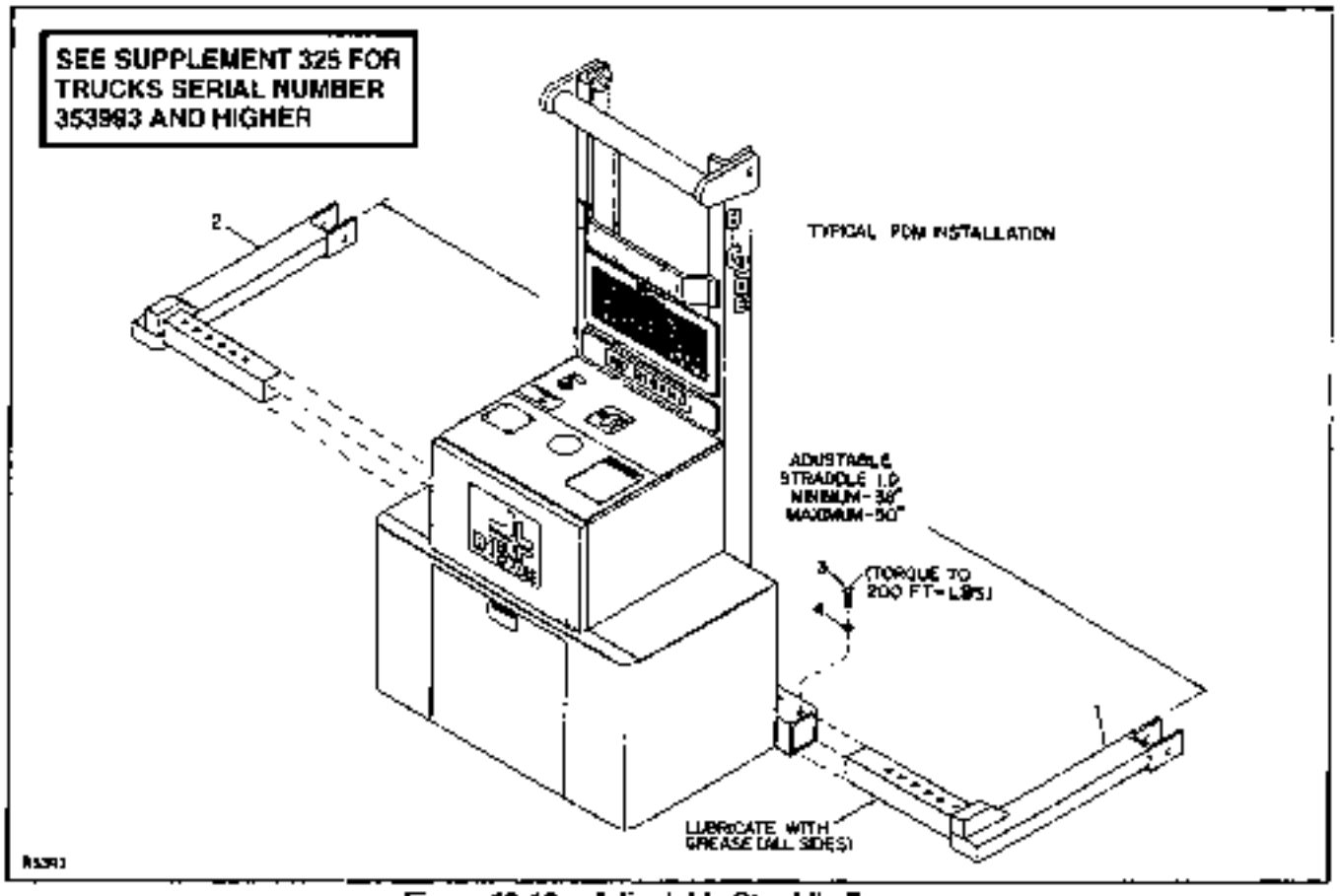

Figure 12-12. Adjustable Straddle Frame

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	504848	STRADDLE 4 IN WHEEL SINGLE, RH	2
1	504843	STRADDLE 4 IN WHEEL TANDEM, RH	2
2	504849	STRADDLE 4 IN. WHEEL SINGLE, LH	2
2	504844	STRADDLE 4 IN WHEEL TANDEM, LH	2
3	063870	HEX CAP SCREW, 3/4-10 X 2	4
4	077217	LOCK WASHER, 3/4	4
—	057117-01	ITA FORK 30 IN LONG	2
—	057117-02	ITA FORK 36 IN. LONG	2
—	057117-03	ITA FORK 42 IN LONG	2
—	057117-04	ITA FORK 48 IN. LONG	2
—	504827-01	RING FORK 30 IN. LONG) (PDM-20, -25)	2

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	504827-02	RING FORK 36 IN. LONG)) (PDM-20, -25)	2
—	504827-03	RING FORK 42 IN. LONG) (PDM-20, -25)	2
—	504827-04	RING FORK 48 IN. LONG) (PDM-20, -25)	2
—	504824-01	RING FORK 30 IN. LONG) (PDM-30)	2
—	504824-02	RING FORK 36 IN. LONG)) (PDM-30)	2
—	504824-03	RING FORK 42 IN LONG) (PDM-30)	2
—	504824-04	RING FORK 48 IN. LONG) (PDM-30)	2

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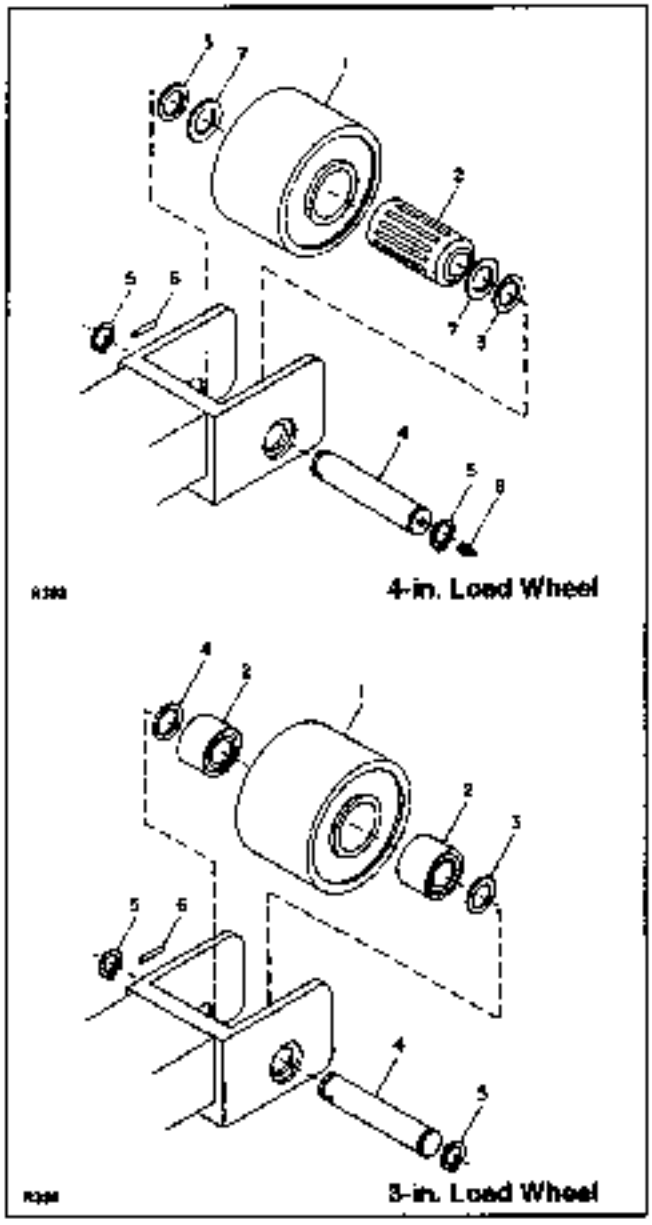

Figure 12-13. Load Wheels

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	078409	4 IN. POLYURETHANE LOAD WHEEL AND BEARING ASSEMBLY (STANDARD)	2
—	078409	4 IN. POLYURETHANE LOAD WHEEL AND BEARING ASSEMBLY (PDM 30 TANDEM)	4
1	078435	LOAD WHEEL	1
2	051128	ROLLER BEARING	1
3	077033	SPACER	2
4	270306	AXLE	1
5	051725	SNAP RING	2
6	050974	ROLL PIN	1
7	077038	SEAL WASHER	2
8	025718	GREASE FITTING	1
—	501165	4 IN. POLYURETHANE LOAD WHEEL AND BEARING ASSEMBLY (OPTIONAL) (3 IN. WIDE STRADDLE)	4
1	800032	LOAD WHEEL, 2 IN. FACE	1
2	051134	BALL BEARING	2
3	077033	SPACER	2
4	050719	AXLE	1
5	051725	SNAP RING	2
6	050974	ROLL PIN	1
—	078256	3 IN. POLYURETHANE LOAD WHEEL AND BEARING ASSEMBLY (OPTIONAL)	2
1	078230	LOAD WHEEL, 2-3/4 IN. FACE	1
2	051130	BALL BEARING	2
		RETAINERS	2
3	077033	SPACER	2
4	270306	AXLE	1
5	051725	SNAP RING	2
6	050974	ROLL PIN	1

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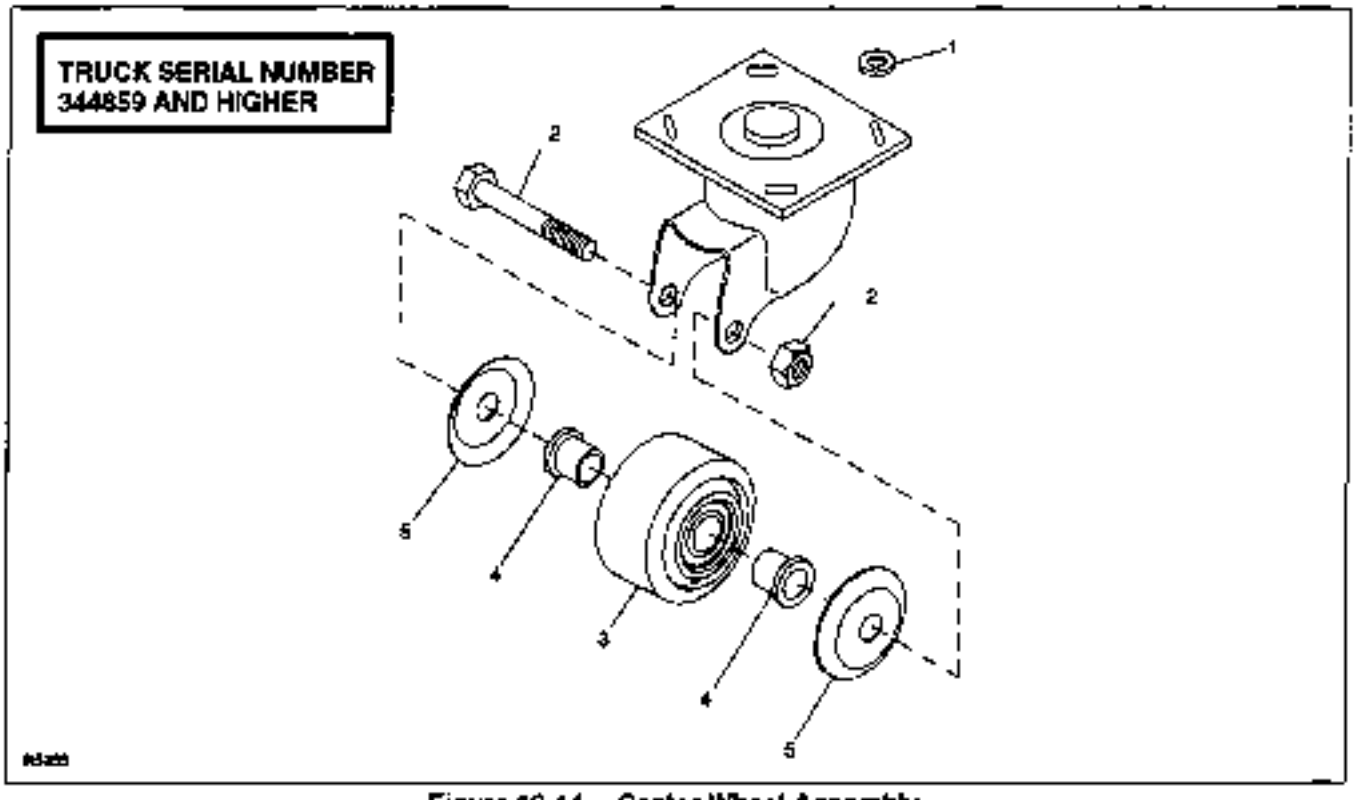

Figure 12-14. Caster Wheel Assembly

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	901810	CASTER AND WHEEL ASSY	2
1	077082	. CASTER MOUNTING SPACERS	4
2	901612	AXLE AND NUT	1
3	901611	WHEEL AND BEARING ASSEMBLY	1
4	901621	AXLE INSERT (BUSHING)	2
5	901613	. THREAD GUARD	2

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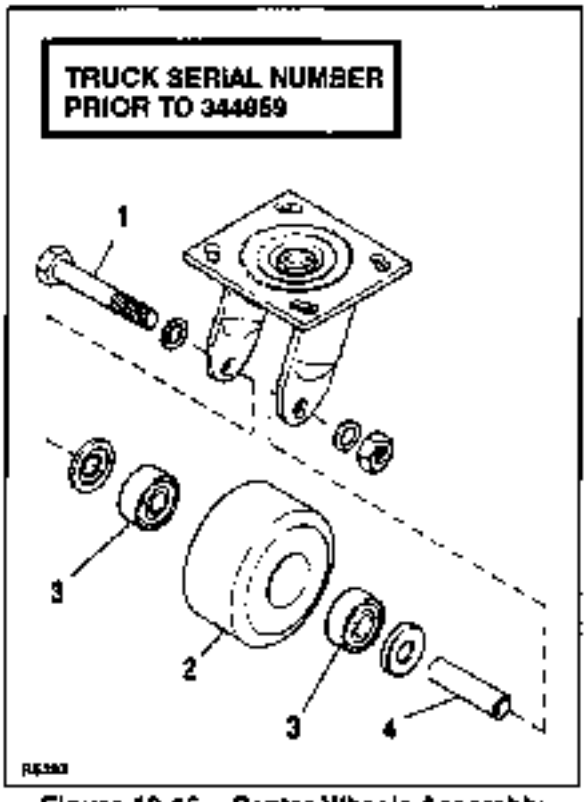

Figure 12-15. Center Wheels Assembly

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	901100	CASTER AND WHEEL ASSY	2
1	901103	AXLE	1
2	901101	WHEEL ASSEMBLY	1
3	051152	BEARING	2
3	901102	BUSHING	1

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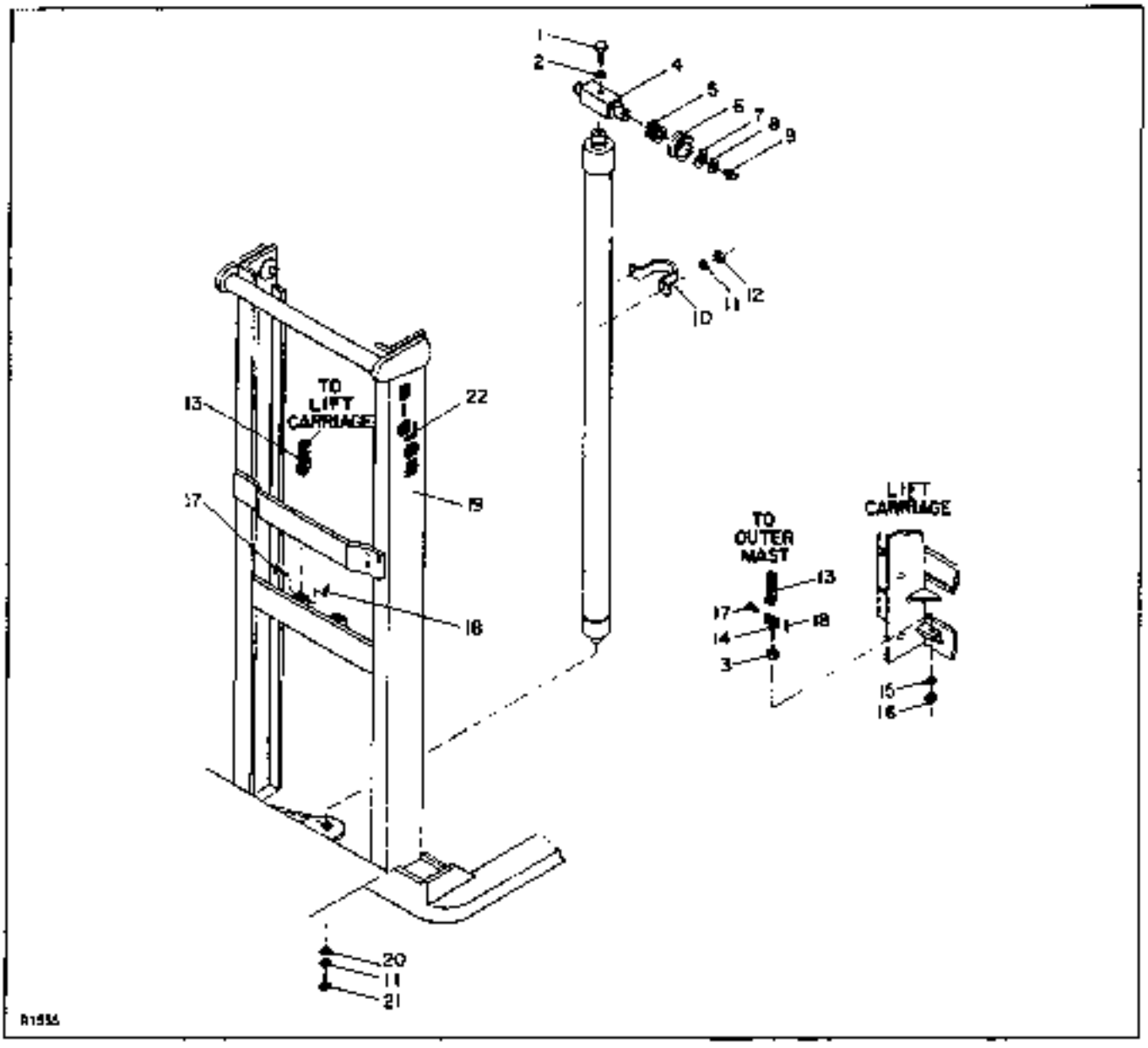

Figure 12-16. Standard Masts (Nontelescopic)

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	060709	HEX HEAD CAP SCREW	1
2	077213	LOCK WASHER, 1/2	1
3	059545	JAM NUT, 5/8-18	2
4	057756	RAM HEAD	1
5	051120	BEARING	2
6	074251	SHEAVE	2
7	077022	FLAT WASHER	2
8	061727	RETAINING RING	2
9	025712	GREASE FITTING	4
10	101098	CYLINDER CLAMP	1
11	077211	LOCK WASHER, 3/8	5
12	059429	HEX NUT 3/8-16	2
13	402034	LIFT CHAIN (LIFT HEIGHT 60 IN., CHAIN LENGTH 50-1/2 IN. ADJUSTABLE STRADDLE 54-1/2 IN.	2
14	402051	ADJUSTING BOLT	2
15	077215	LOCK WASHER, 5/8	2
16	059445	HEX NUT, 5/8-18	2
17	060402	COTTER PIN, 1/16 X 3/8	4
18	402055	CLEVIS PIN, 0.200 DIA. X 1	4
19	VAR.	OUTER MAST	1
20	077076	FLAT WASHER 1-1/2 X 13/32 X 7	1
21	054605	HEX HEAD CAP SCREW, 3/8-16 X 1, HEAT TREATED	1
22	—	DECAL (FIG 12-11)	REF

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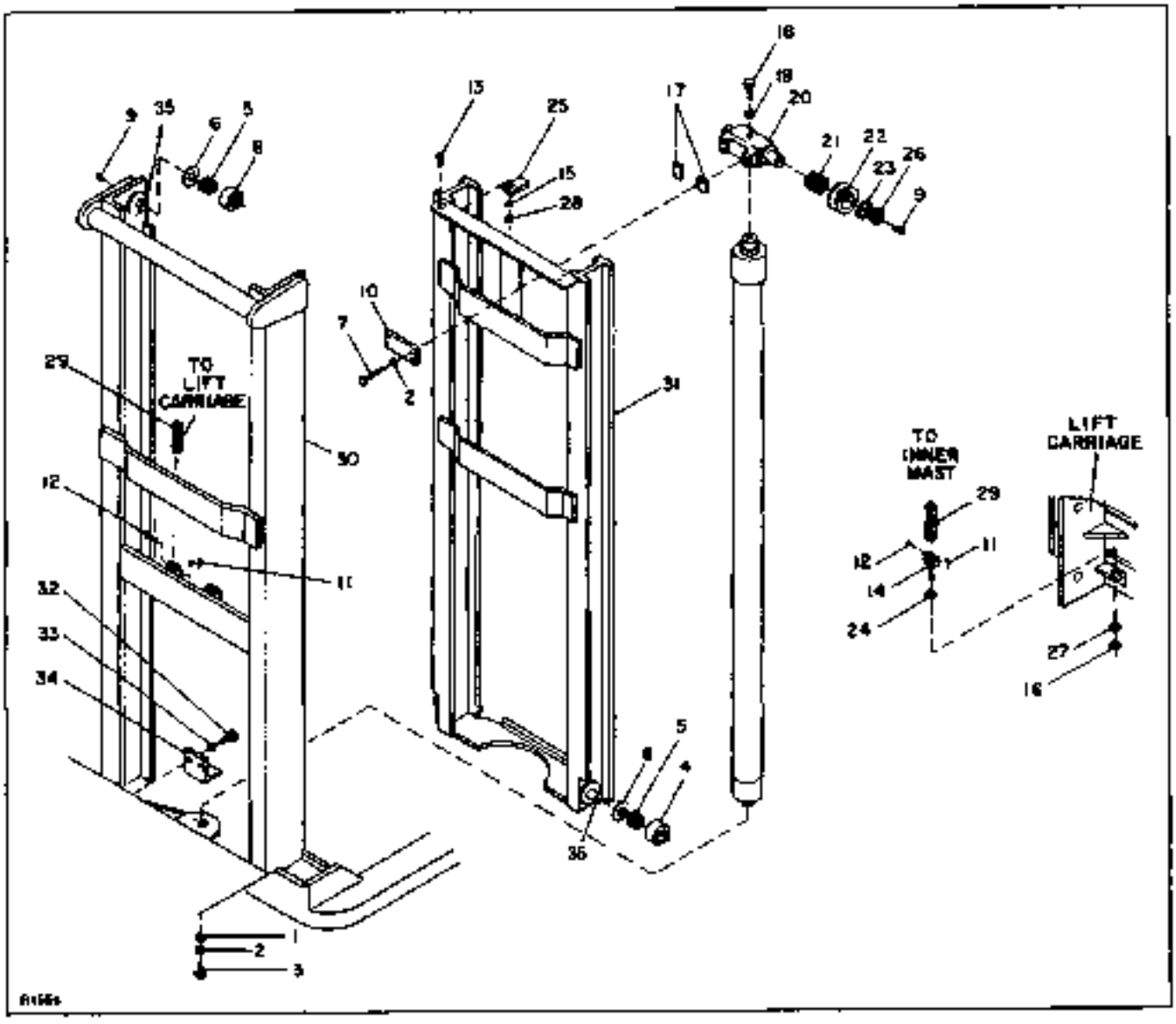

Figure 12-17. Standard Masts (Telescopic)

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INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	077076	FLAT WASHER 1-1/2 X 1 3/32 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	ROLLER ASSEMBLY	2
4	248431	ROLLER	1
5	051145	BEARING	2
6	053012	THRUST WASHER, 3/32 THK.	A/R
6	053013	THRUST WASHER, 1/8 THK.	A/R
6	053014	THRUST WASHER, 5/32 THK.	4
6	053015	THRUST WASHER, 3/16 THK.	2
7	064607	HEX HEAD CAP SCREW, 3/8-16 X 1-1/4	4
—	500167	ROLLER ASSEMBLY	2
8	401048	. ROLLER	1
	051145	. BEARING	1
9	025712	GREASE FITTING	4
10	238520	CLAMP BAR	1
11	060402	COTTER PIN, 1/16 X 3/8	4
12	402055	CLEVIS PIN, 0.200 DIA. X 1	4
13	065483	FLAT HEAD SCREW	4
14	402051	ADJUSTING BOLT	2
15	077209	LOCK WASHER 1/4	2
16	059445	HEX NUT, 5/8-18	2
17	100016	SPACER	2
18	064709	SCREW, HEX HEAD, 1/2-13 X 1-1/2	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
19	077213	LOCK WASHER, 1/2	1
20	501290	RAM HEAD	1
21	051120	BEARING	2
22	074251	SHEAVE	2
23	077022	FLAT WASHER	2
24	059545	JAM NUT, 5/8-18	2
25	191088	STOP BLOCK	2
26	061727	RETAINING RING	2
27	077215	LOCK WASHER, 5/8	2
28	059421	HEX NUT	4
29	402034	LIFT CHAIN LIFT HEIGHT 105 IN., 82-1/2 IN. WITH ADJ STRADDLES 86-3/4 IN LIFT HEIGHT 130 IN., 107-1/2 IN. WITH ADJ STRADDLES 111-3/4 IN LIFT HEIGHT 154 IN., 131-3/4 IN. WITH ADJ STRADDLES 135-3/4 IN	2
30	VAR	OUTER MAST	1
31	VAR	INNER MAST	1
32	063607	HEX HEAD CAP SCREW, 3/8-16 X 1/4	2
33	077211	LOCK WASHER, 3/8	5
34	312001	ANGLE	1
35	236001	SPINDLE	4

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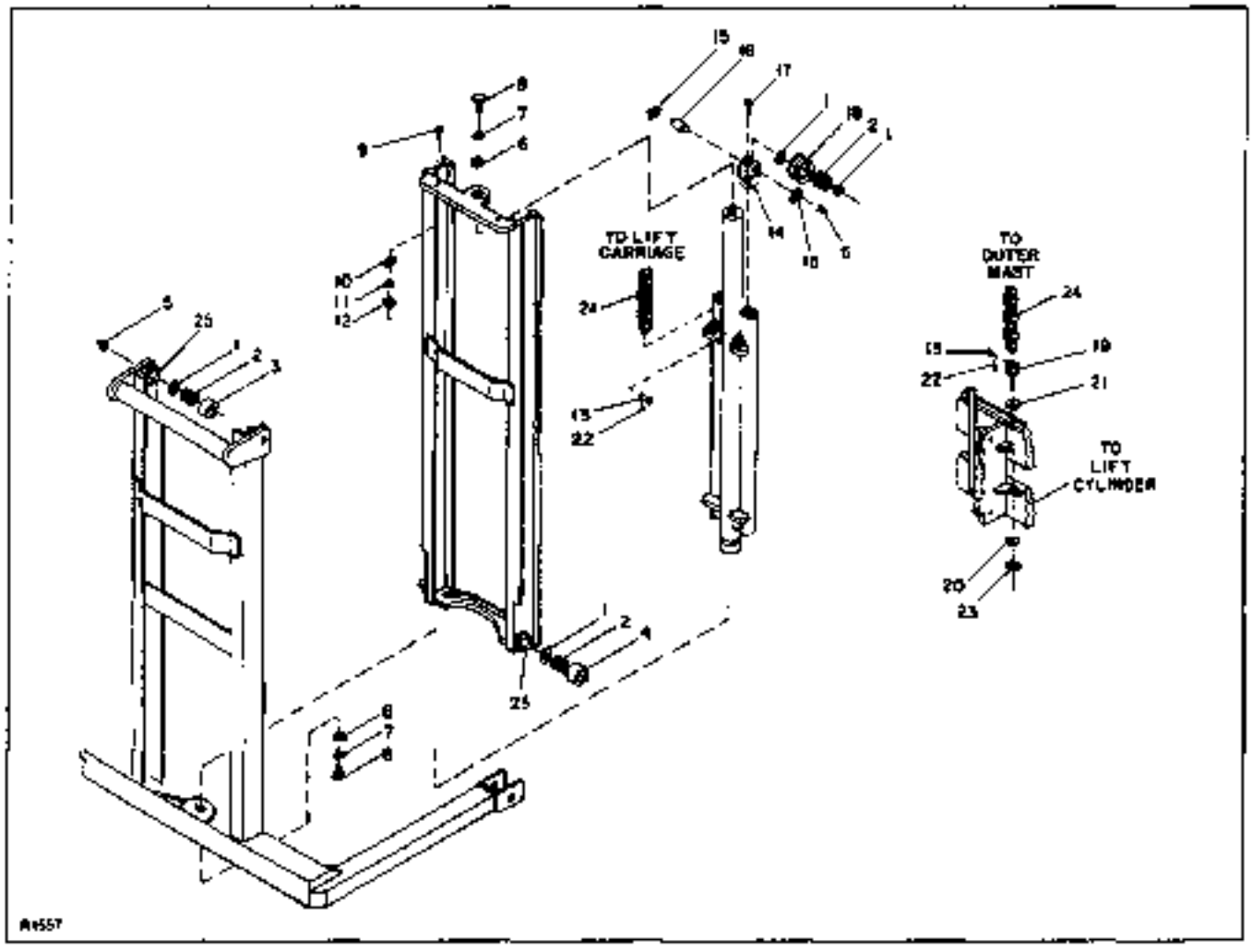

Figure 12-18. Inner and Outer Masts - Full Free Lift

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	053012	THRUST WASHER, 3/32 THK.	A/R
1	053013	THRUST WASHER, 1/8 THK.	A/R
1	053014	THRUST WASHER, 5/32 THK.	A/R
1	053015	THRUST WASHER, 3/16 THK	A/R
—	500167	ROLLER ASSEMBLY	2
2	051145	BEARING	2
3	401048	ROLLER	1
—	500168	ROLLER ASSEMBLY	2
4	051145	BEARING	1
	243401	. ROLLER	1
5	025712	GREASE FITTING	4
6	077076	FLAT WASHER 1-1/2 X 13/32 X 7	2
7	077211	LOCK WASHER, 3/8	5
8	064505	HEX HEAD CAP SCREW, 3/8-16 X 1, HEAT TREATED	2
9	069483	FLAT HEAD SCREW	4

INDEX NO.	PART NO.	PART NAME	NO. REQD.
10	181069	STOP BLOCK	2
11	077209	LOCK WASHER 1/4	4
12	059421	HEX NUT, 1/4-20	4
13	402055	CLEVIS PIN, 0.209 DIA. X 1	4
14	800246	YOKE SHEAVE	2
15	061729	EXTERNAL RETAINING RING	2
16	401639	SHEAVE PIN	2
17	065555	CAP SCREW, 5/16-18	4
18	289205	HEAVY DUTY SHEAVE	2
19	402051	ADJUSTING BOLT	2
20	077215	LOCK WASHER, 5/8	2
21	059545	JAM NUT, 5/8-18	2
22	060402	COTTER PIN, 1/16 X 3/8	4
23	059445	HEX NUT, 3/4-16	2
24	402034	LIFT CHAIN	A/R
25	286001	SPINDLE	4

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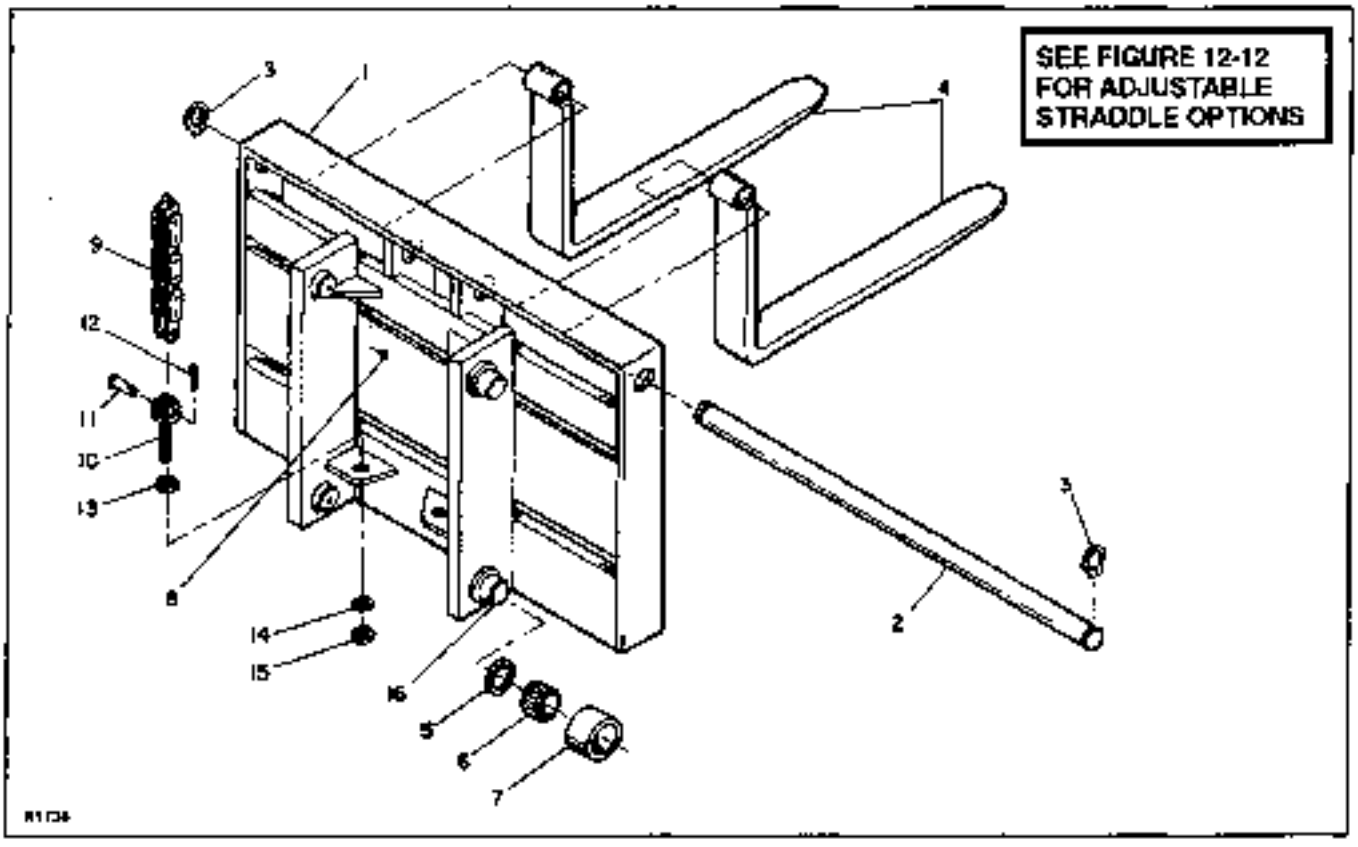

Figure 12-19. Lift Carriage (Shaft Type) Telescopic and Nontelescopic and FFL

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	504539-06	LIFT CARRIAGE ASSEMBLY 1-1/4 IN SHAFT, TELESCOPIC	1
1	504539-05	LIFT CARRIAGE ASSEMBLY 1-1/4 IN SHAFT, NONTELESCOPIC	1
1	504539-01	LIFT CARRIAGE ASSEMBLY 1-1/4 IN SHAFT, FULL FREE LIFT	1
2	276604	FORK SHAFT 1-1/4 IN D.A.	1
3	061729	SNAP RING	2
4	507119-02	FORK, 36 IN. (PDM 20 & 25)	2
4	507119-03	FORK, 42 IN. (PDM 20 & 25)	2
4	507119-04	FORK, 48 IN. (PDM 20 & 25)	2
4	500330	FORK, 36 IN. (PDM 30)	2
4	500331	FORK, 42 IN. (PDM 30)	2
4	500332	FORK, 48 IN. (PDM 30)	2
5	053012	THRUST WASHER, 3/32 THK.	A/R
5	053013	THRUST WASHER, 1/8 THK.	A/R
5	053014	THRUST WASHER, 5/32 THK.	A/R

INDEX NO.	PART NO.	PART NAME	NO. REQD.
5	053015	THRUST WASHER, 3/16 THK.	A/R
—	500167	ROLLER ASSEMBLY (TELESCOPIC)	4
6	051145	BEARING	1
7	401048	ROLLER	1
—	500166	ROLLER ASSEMBLY (NONTELESCOPIC)	2
6	051145	BEARING	1
7	249401	ROLLER	1
8	025712	GREASE FITTING	4
9	402034	LIFT CHAIN	A/R
10	402061	ADJUSTING BOLT	2
11	060402	COTTER PIN 1/16 X 3/8	2
12	402056	CLEVIS PIN, 0.200 DIA. X 1	2
13	059545	JAM NUT, 5/8-18	2
14	077215	LOCK WASHER 5/8	2
15	059445	HEX NUT, 5/8-18	2
16	500126	SPINDLE, 1-1/4 IN.	4

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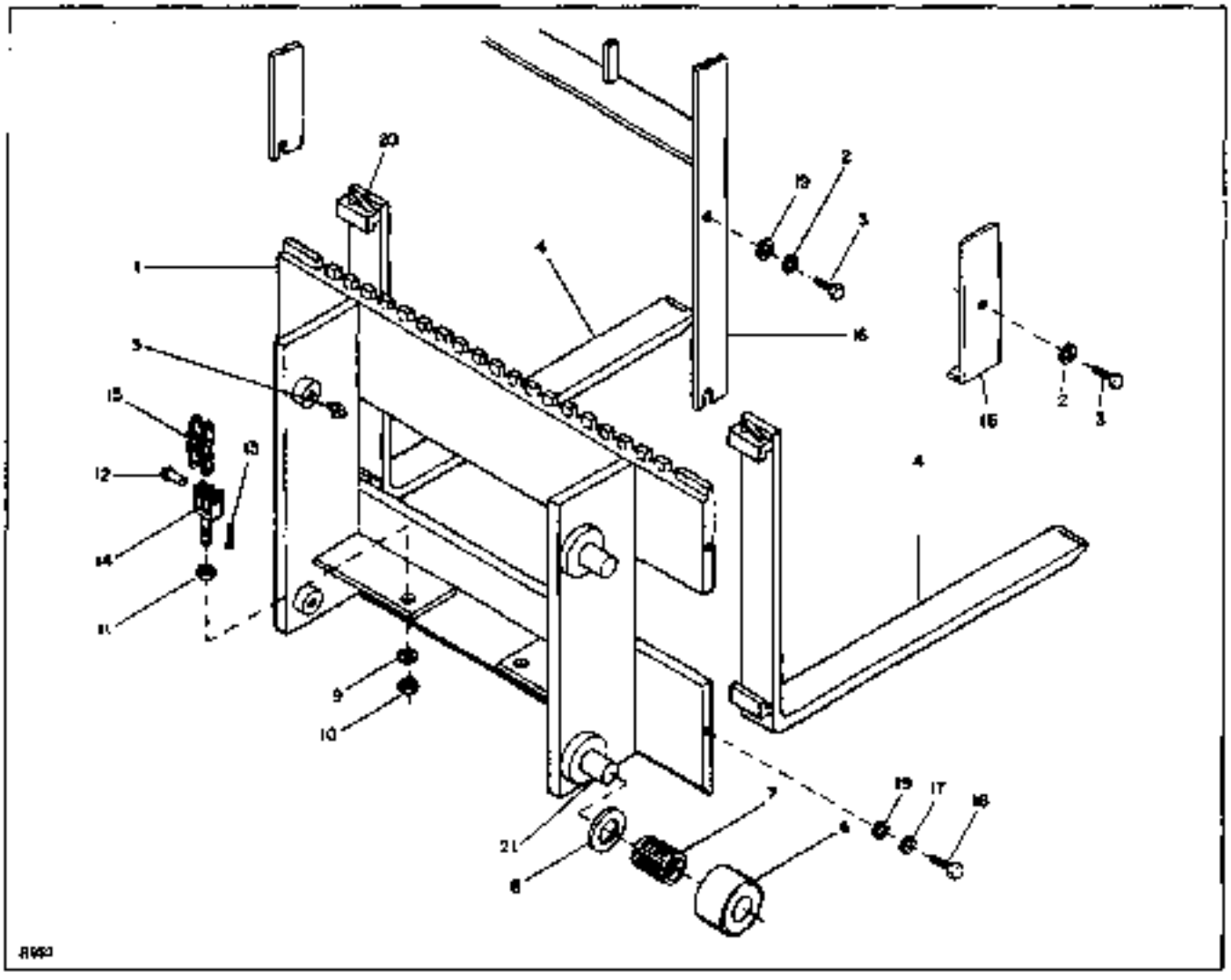

Figure 12-20. ITA Lift Carriages (Optional)

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INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	VAR	LIFT CARRIAGE ASSEMBLY	1
2	077215	LOCK WASHER, 5/8	2
3	063820	HEX HEAD CAP SCREW, 5/8-11 X 1-1/4	2
4	057115	FORK ASSEMBLY, 1-1/2 X 4 X 30 IN	2
4	057172	FORK ASSEMBLY, 1-1/2 X 4 X 36 IN	2
4	057173	FORK ASSEMBLY, 1-1/2 X 4 X 42 IN	2
4	057174	FORK ASSEMBLY, 1-1/2 X 4 X 48 IN	2
5	025712	GREASE FITTING	4
—	500167	ROLLER ASSEMBLY (TELESCOPIC)	4
6	051145	BEARING	1
7	401046	ROLLER	1
—	500166	ROLLER ASSEMBLY (NONTELESCOPIC)	4
6	051145	BEARING	1
7	243401	ROLLER	1
8	053012	THRUST WASHER, 3/32 THK	A/R

INDEX NO.	PART NO.	PART NAME	NO. REQD.
8	053013	THRUST WASHER, 1/8 THK.	A/R
8	053014	THRUST WASHER, 5/32 THK	A/R
8	053015	THRUST WASHER, 3/16 THK	A/R
9	077215	LOCK WASHER, 5/8	2
10	059445	HEX NUT, 5/8-18	2
11	059545	JAM NUT, 5/8-16	2
12	402055	CLEVIS PIN, 0.200 DIA. X 1	2
13	080402	COTTER PIN, 1/16 X 3/8	2
14	402051	ADJUSTING BOLT	2
15	402034	LIFT CHAIN	A/R
16	503752	LOAD BACKREST, 1-1/2 IN FORKS 28 IN WIDE	1
16	401527	FORK RETAINER BAR (TRUCKS WITHOUT LOAD BACKREST)	2
17	077215	LOCK WASHER, 5/8	2
18	063820	HEX HEAD CAP SCREW, 5/8-11 X 1-1/4	2
19	077066	ROUND WASHER	4
20	507799	ITA FORK HINGE KIT	2
21	500126	SPINDLE, 1-1/4 IN	4

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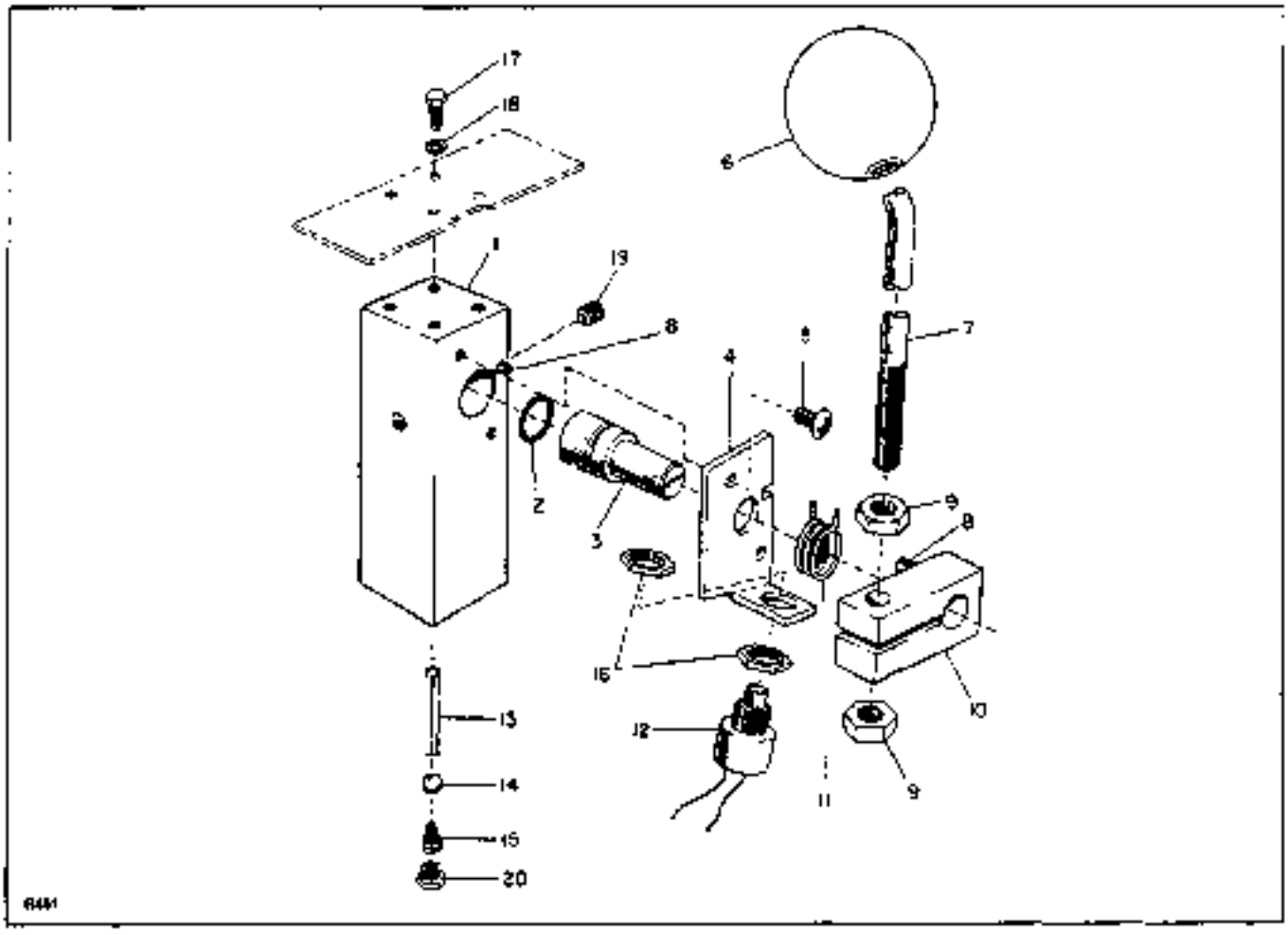

Figure 12-21. Lift Control Valve Assembly
504216-02 - Standard
503209 - Cold Conditioning

INDEX NO.	VALVE PART NUMBER		PART NAME	NO. REQD.
	504216-02	503209		
1	240501	240501	VALVE BODY	1
2	042104	042104	O-RING	1
3	304611	304611	RELEASE CAM	1
4	052803	400045	SWITCH BRACKET	1
5	070475	070475	MACHINE SCREW, 1/4-20 X 3/8	2
6	057952	057952	KNOB	1
7	057702	057701	LEVER	1
8	060937	060937	ROLL PIN	2
9	059530	—	JAM NUT, 3/8-24	2
9	—	059529	JAM NUT, 3/8-16	2
10	267401	400097	VALVE CLAMP	1
11	075015	075015	HANDLE RETURN SPRING	1
12	500942	504365	SWITCH ASSEMBLY	1
13	060608*	060608*	VALVE PIN, 5/32 X 1-1/4	1
14	051404*	051404*	CHECK BALL, 3/8	1
15	075052*	075052*	COMPRESSION SPRING	1
16	059675	—	SWITCH ADJUSTING NUT	2
17	063478	063478	HEX HEAD CAP SCREW, 1/4-20	REF
18	077209	077209	LOCK WASHER	REF
19	026303	026303	PLUG	1
20	026500	026500	REDUCER, 3/8 TO 1/4 NPT	REF

* PART OF REPAIR KIT 900132

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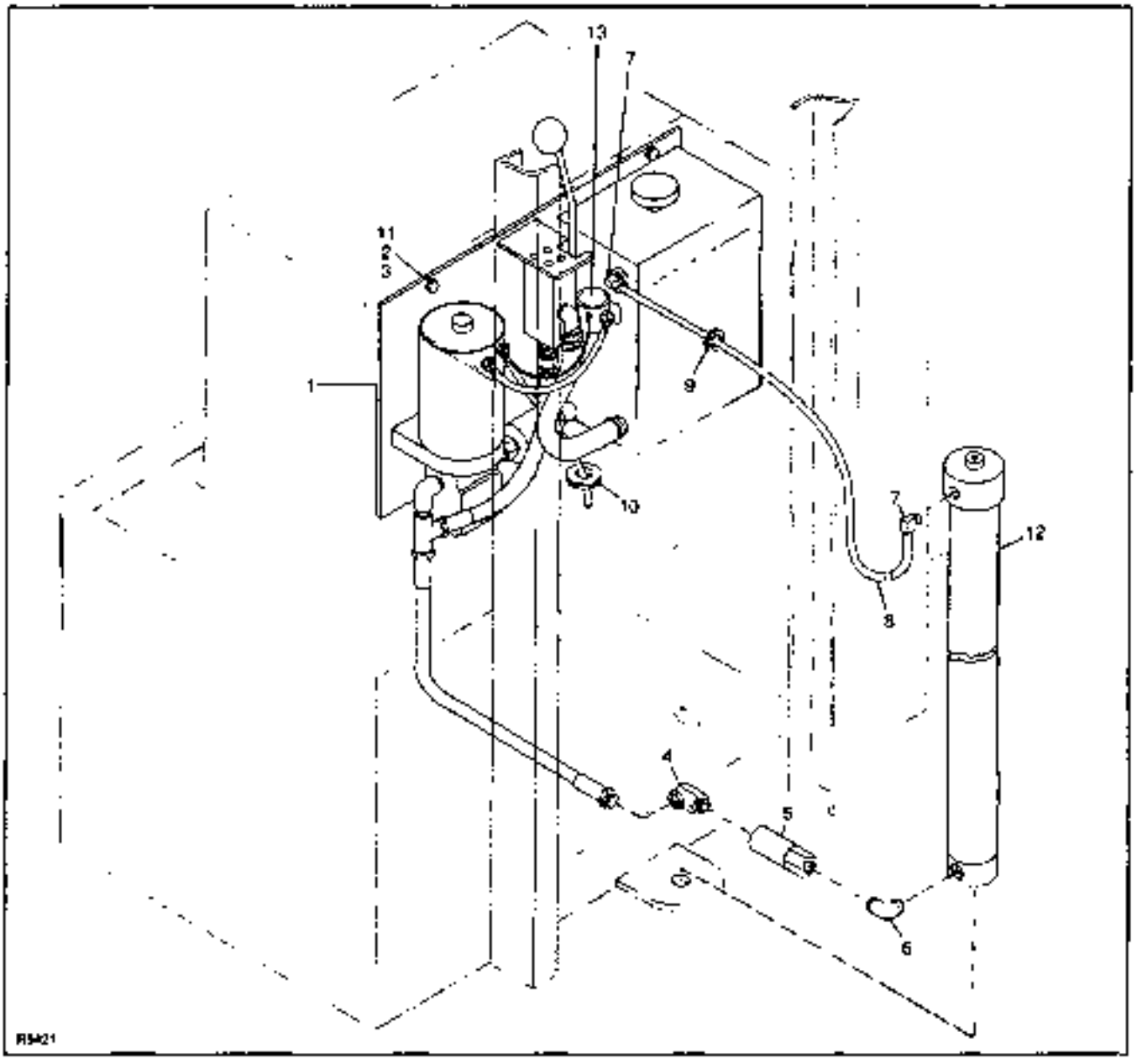

Figure 12-22A. Hydraulic Installation (TEL AND NON-TEL)

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	—	HYDRAULIC PANEL ASSEMBLY (FIG 12-23, 12-24)	REF
2	083603	SCREW, 3/8-16 X 3/4	2
3	077211	LOCK WASHER, 3/8	2
4	025516	ELBOW, SWIVEL, 3/8	1
5	047110	VALVE, FLOW CONTROL	1
6	025539	ELBOW, 90°, 3/8 MALE	1
7	025501	ELBOW, 1/4, NPT TUBE, 90°	2

INDEX NO.	PART NO.	PART NAME	NO. REQD.
8	282500	TUBING, VINYL, 1/4 OD - 1/8 ID	A/R
9	057511	GROMMET	1
10	057508	GROMMET	1
11	077056	WASHER, FLAT, 3/8	2
12	VAR	LIFT CYLINDER (FIG 12-27 & 12-28)	REF
13	020419	LIFT MOTOR SOLENOID	1

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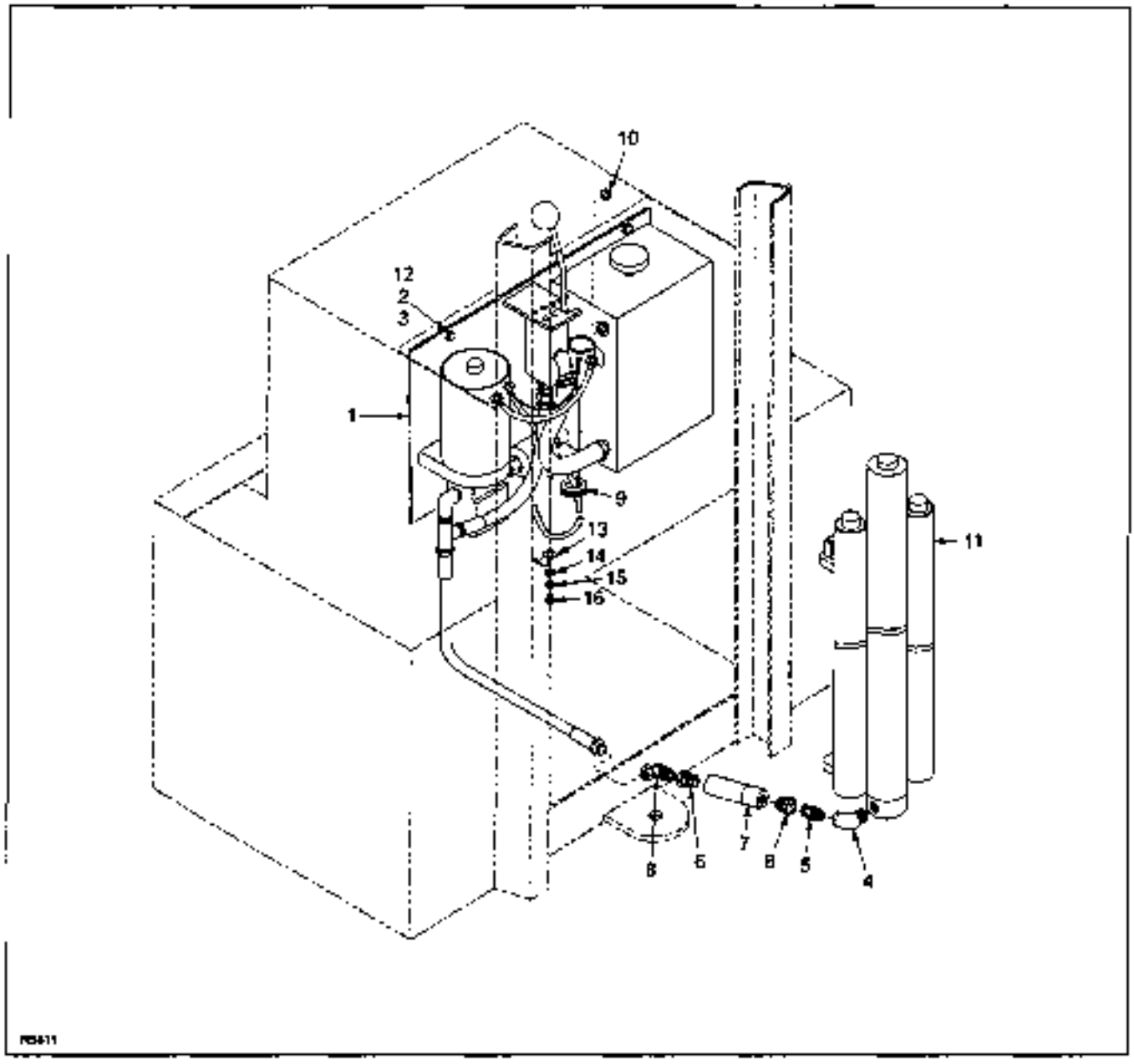

Figure 12-22B. Hydraulic Installation (FFL)

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	—	HYDRAULIC PANEL ASSEMBLY (FIG 12-24)	REF
2	053603	SCREW, 3/8-16 X 3/4	2
3	077211	LOCK WASHER, 3/8	2
4	026711	ELBOW, 45°	1
5	026109	NIPPLE	1
6	026504	REDUCER	2
7	047107	VALVE, FLOW CONTROL	1
8	025513	ELBOW, 45°	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
9	057508	GROMMET	1
10	028203	PLUG	1
11	VAR	LIFT CYLINDER (FIG 12-27 & 12-28)	REF
12	077056	WASHER, FLAT, 3/8	2
13	056116	CLAMP	1
14	077030	WASHER	1
15	077209	LOCK WASHER	1
16	053495	SCREW, 1/4-20 X 1/2	1

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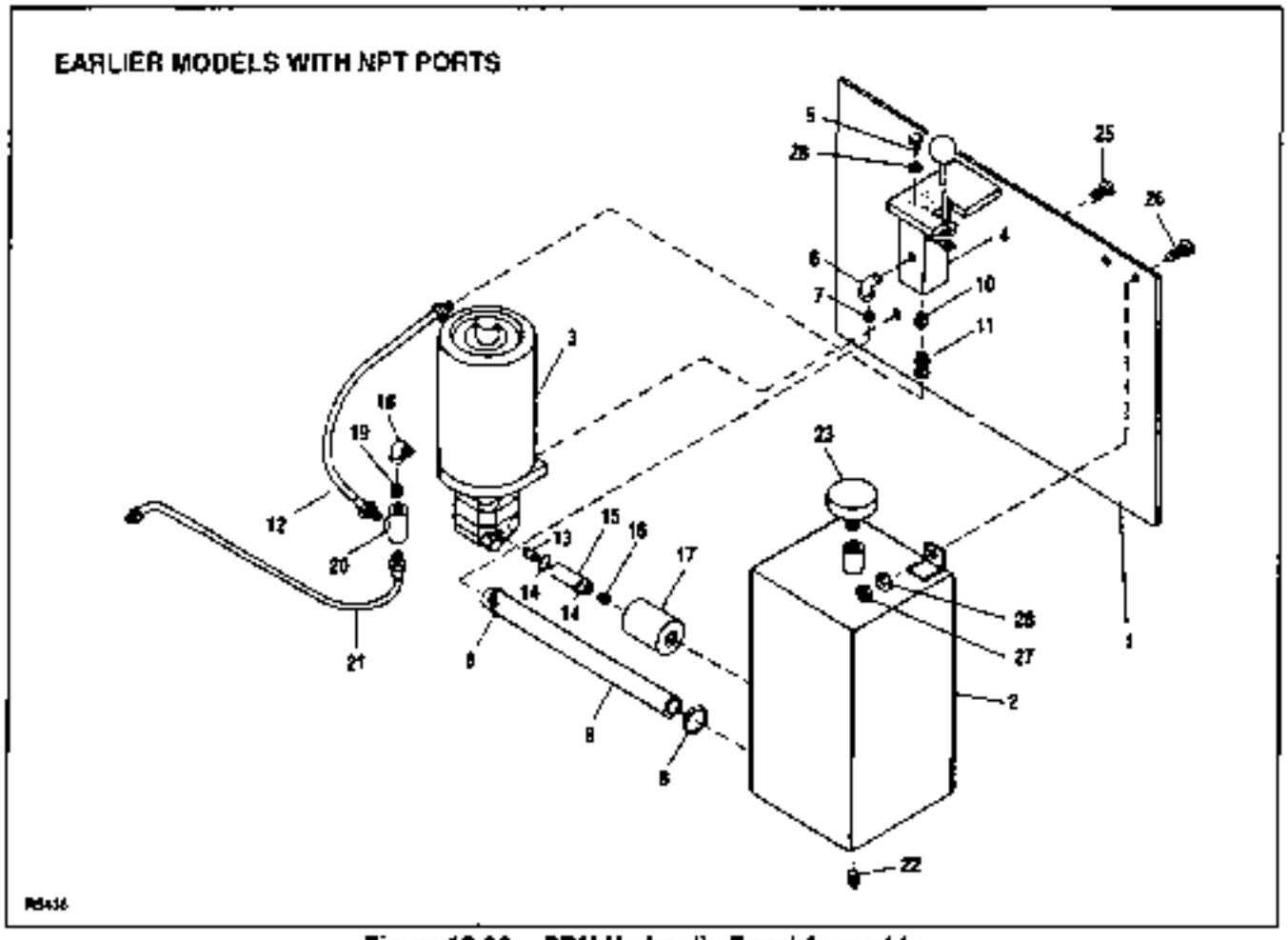

Figure 12-23. PDM Hydraulic Panel Assembly

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	504159	PDM HYDRAULIC PANEL ASEMBLY	REF
1	500590	. HYDRAULIC PANEL	1
2	500889	. RESERVOIR	1
3	—	. PUMP AND MOTOR ASSEMBLY (FIG 12-29, 12-30)	REF
4	—	. LIFT CONTROL VALVE ASSEMBLY WITH SWITCH (FIG 12-21)	REF
5	077477	. PHILLIPS RD HD SCREW 1/4-20 X 5/8	4
6	026704	. ELBOW, STREET, 3/8 NPT, 90°	1
7	026128	. NIPPLE, HOSE, 3/8	1
8	056110	. CLAMP	2
9	278804	. VINYL TUBING	1
10	026500	. PIPE REDUCER, 3/8 X 1/4 NPT	1
11	025313	. SWIVEL CONNECTOR	1
12	038104	. HOSE ASSEMBLY	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
13	026139	. HOSE NIPPLE	1
14	056118	. SPRING HOSE CLAMP	2
15	290003	. VINYL TUBING	1
16	026131	. CLOSE NIPPLE, 1/4 X 1 NPT	1
17	035106	. FILTER	1
18	026708	. ELBOW, 90°	1
19	026104	. CLOSE NIPPLE, 1/4 NPT	1
20	027102	. TEE 1/4 NPT	1
21	038110	. HOSE ASSEMBLY	1
22	026302	. MAGNETIC PLUG, 3/8 NPT	1
23	500422	. BREATHER CAP AND DIPSTICK ASSEMBLY	1
24	—	NOT USED	
25	059712	FLAT HD SCREW, 3/8-16 X 3/4	2
26	059478	. FLAT HD SCREW, 1/4-20 X 3/4	2
27	059421	. HEX NUT, 1/4-20	2
28	077209	. LOCK WASHER,	6
—	—	LIFT MOTOR SOLENOID (FIG 12-22)	REF
—	900893	HYDRAULIC OIL (QUART)	
—	900855	HYDRAULIC OIL (GALLON)	

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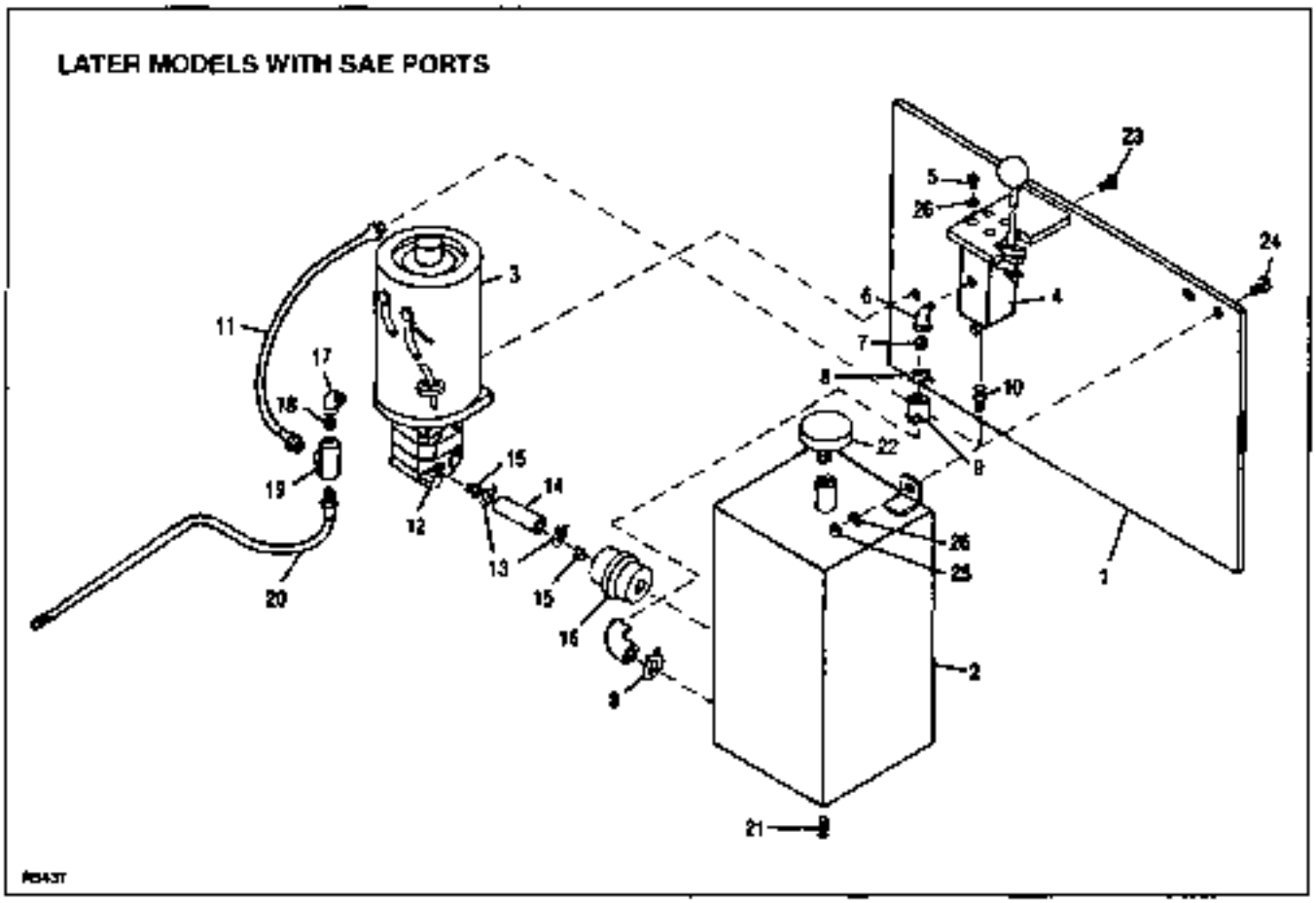

Figure 12-24. PDM Hydraulic Panel Assembly

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	504200	PDM HYDRAULIC PANEL ASEMBLY	REF
1	500890	. HYDRAULIC PANEL	1
2	500889	. RESERVOIR	1
3	—	. PUMP AND MOTOR ASSEMBLY (FIG 12-29, 12-30)	REF
4	—	. LIFT CONTROL VALVE ASSEMBLY WITH SWITCH (FIG 12-21)	REF
5	077477	PHILLIPS RD HD SCREW 1/4-20 X 5/8	4
6	026704	. ELBOW, STREET, 3/8 NPT, 90°	1
7	026128	. NIPPLE, HOSE, 3/8	1
8	056113	. CLAMP	2
9	278804	. VINYL TUBING	1
10	025107	. SWIVEL CONNECTOR	1
11	504199-01	. HOSE ASSEMBLY	1
12	025113	. STRAIGHT CONNECTOR, 1/4	1
13	056118	SPRING HOSE CLAMP	2
14	290005	. VINYL TUBING	1
15	028131	. CLOSE NIPPLE, 1/4 X 1 NPT	1
16	035106	. FILTER	1
17	025129	. ADAPTER	1
18	026109	NIPPLE, HOSE, 3/8	1
19	027107	. TEE, 3/8 NPT	1
20	504199-12	. HOSE ASSEMBLY	1
21	025302	MAGNETIC PLUG, 3/8 NPT	1
22	500422	. BREATHER CAP AND DIPSTICK ASSEMBLY	1
23	059712	. FLAT HD SCREW, 3/8-16 X 3/4	2
24	059478	. FLAT HD SCREW, 1/4-20 X 3/4	2
25	059421	. HEX NUT, 1/4-20	2
26	077209	. LOCK WASHER,	6
—	—	LIFT MOTOR SOLENOID (FIG 12-22)	REF
—	900893	HYDRAULIC OIL (QUART)	AR
—	900856	HYDRAULIC OIL (GALLON)	AR

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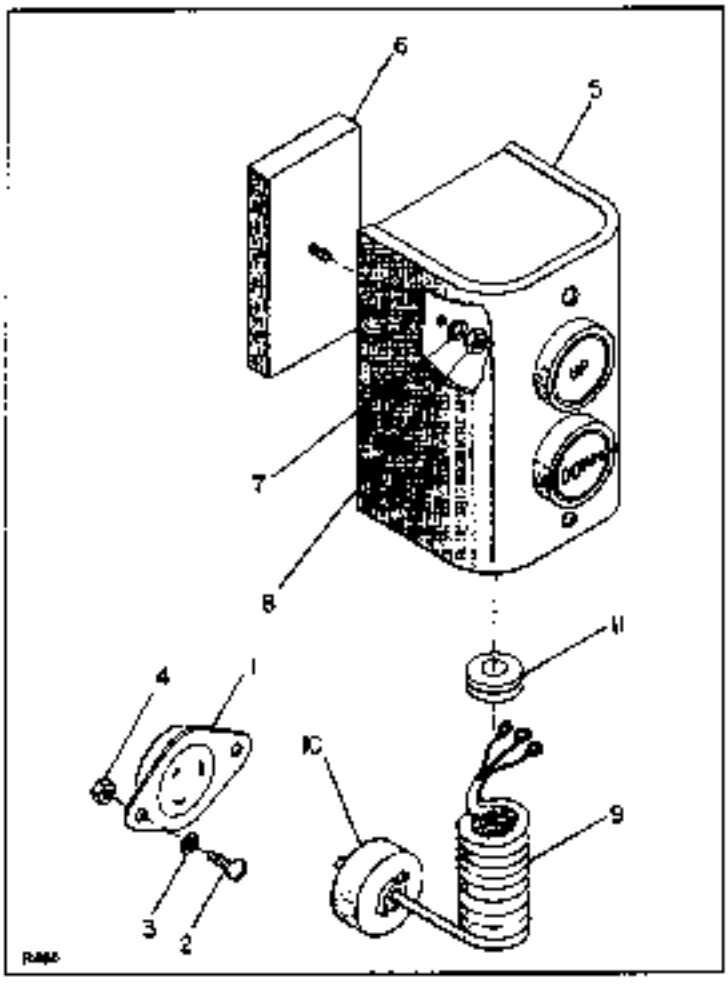

Figure 12-25. Remote Installation

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	017800	RECEPTACLE-FEMALE	1
2	068177	SCREW 5-40 X 3/8	2
3	077203	LOCK WASHER #5	2
4	059410	HEX NUT, 5-40	2
—	501736	CONTROL STATION ASSEMBLY	1
5	800130	CONTROL BOX	1
6	058501	. MAGNET	1
7	077209	. LOCK WASHER, 1/4	1
8	059421	. HEX NUT, 1/4-20	1
9	31400032	. COIL CORD, 3 FEET	1
10	017801	. MALE PLUG	1
11	052905	STRAIN RELIEF	1

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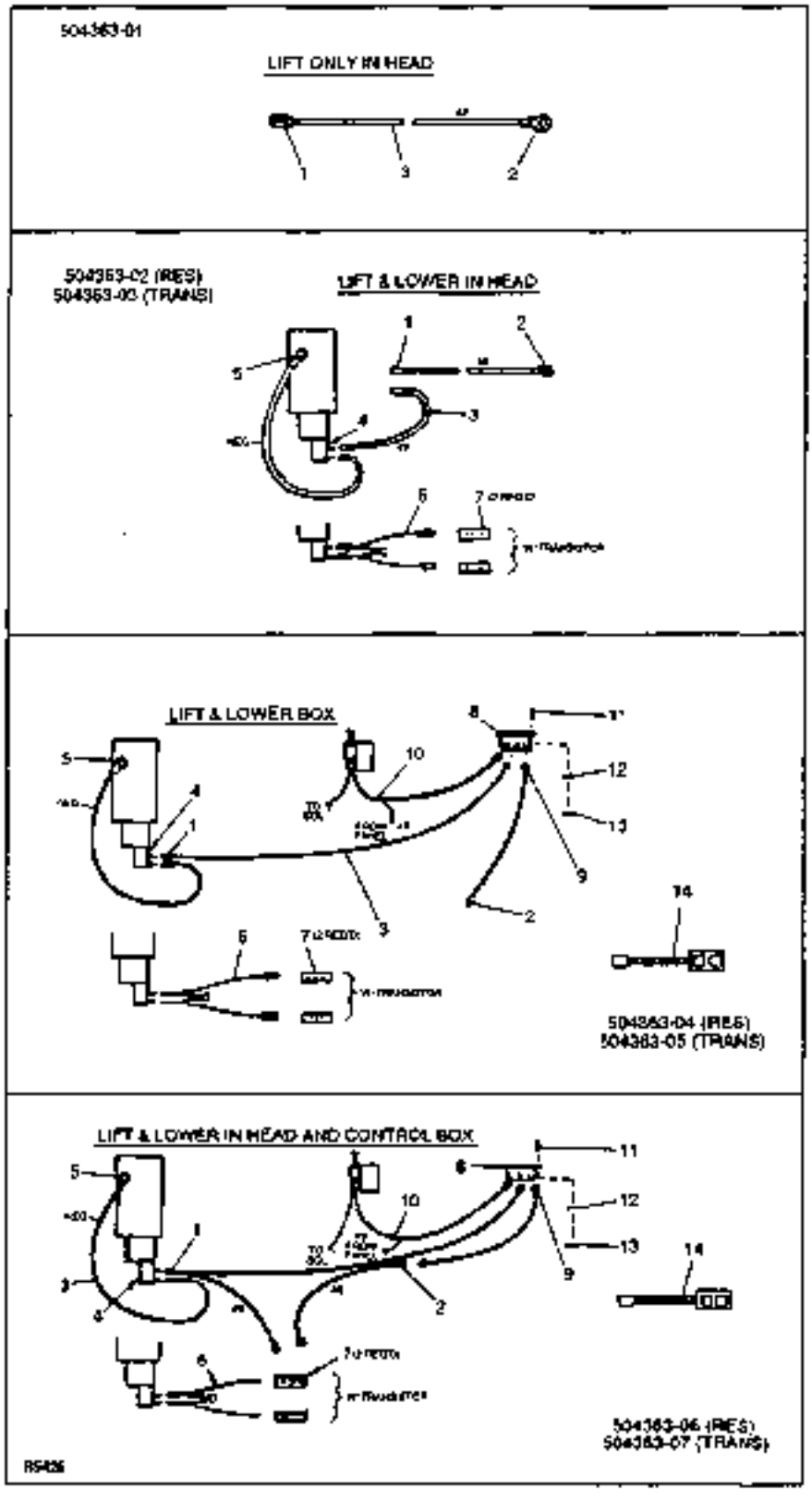

Figure 12-26. Remote Installation (Continued)

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ITEM	504363-01 LIFT IN HEAD ONLY	504363-02 LIFT & LOWER IN HEAD (RES)	504363-03 LIFT & LOWER IN HEAD (TRANS)	504363-04 LIFT & LOWER BOX (RES)	504363-05 LIFT & LOWER BOX (TRANS)	504363-06 LIFT & LOWER IN HEAD & BOX (RES)	504363-07 LIFT & LOWER IN HEAD & BOX (TRANS)
1	021204(1)	021204(4)	021204(4)	021204(2)	021204(2)	021204(4)	021204(4)
2	021203 (1)	021203 (1)	021203 (1)	021203 (1)	021203 (1)	021203 (2)	021203 (2)
3	023018	023018	023018	023018	023018	023018	023018
4		048132	048132	048132	048132	048132	048132
5		021207	021207	021207	021207	021207	021207
6		504116		504116	504116		
7		005422		005422	005422		
8			017800	017800	017800	017800	
9			021236 (3)	021236 (3)	021236 (3)	021236 (3)	
10			005433	005433	005433	005433	
11			068177 (2)	068177 (2)	068177 (2)	068177 (2)	
12			077203 (2)	077203 (2)	077203 (2)	077203 (3)	
13			059410 (2)	059410 (2)	059410 (2)	059410 (2)	
14			501736	501736	501736	501736	

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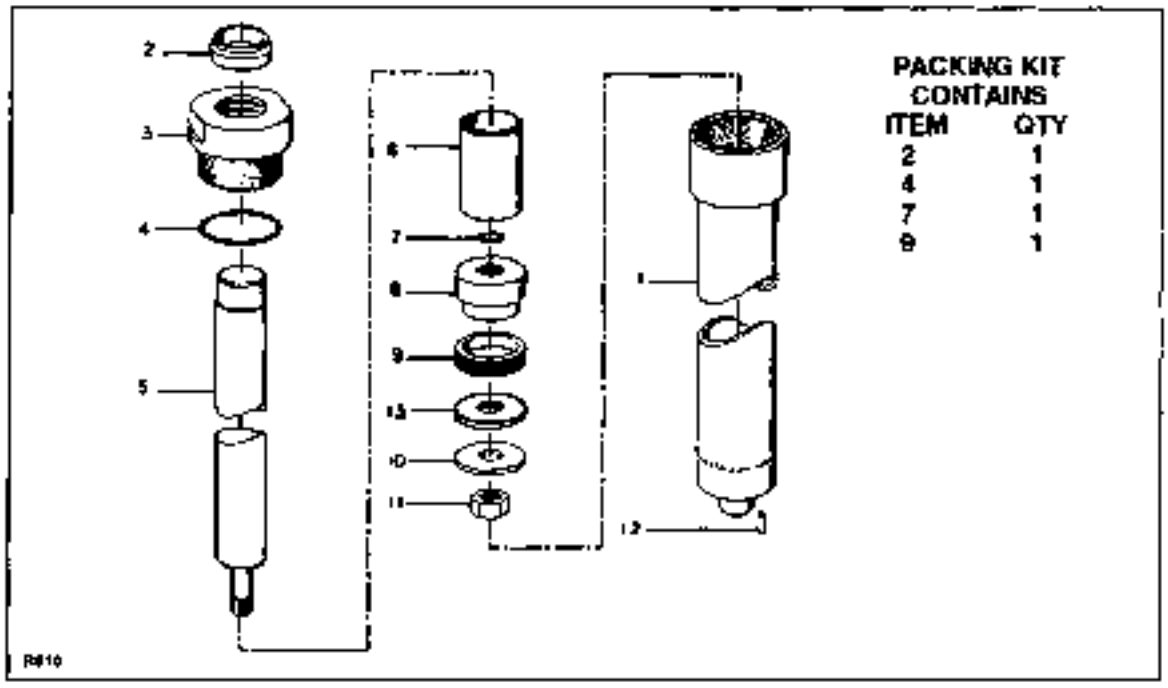

Figure 12-27. Lift Cylinder (TEL AND NON-TEL)

INDEX NO.	60 INCH LIFT	106 INCH LIFT	130 INCH LIFT	154 INCH LIFT	PART NAME	NO. REQD.
—	503568-01	503568-05	503568-07	503568-11	LIFT CYLINDER ASSY	1
1	—	—	—	—	. TUBE ASSY	1
2	049509*	049509*	049509*	049509*	. WIPER RING	1
3	800024	800024	800024	800024	GLAND NUT	1
4	042113*	042113*	042113*	042113*	. TOP O-RING	1
5	—	—	—	—	RAM ROD	1
6	300501	300501	300501	300501	. RAM STOP	1
7	042105*	042105*	042105*	042105*	. BOTTOM O-RING	1
8	045102	045102	045102	045102	PISTON	1
9	043108*	043108*	043108*	043108*	PACKING ASSY	1
10	077005	077005	077005	077005	. FLAT WASHER	1
11	059547	059547	059547	059547	JAM NUT, 3/4-16	1
12	061023	061023	061023	061023	ROLL PIN, 5/16 X 3/4	1
13	077036	077036	077036	077036	. FLAT WASHER	A/R

* Included in Packing Kit No. 800142.

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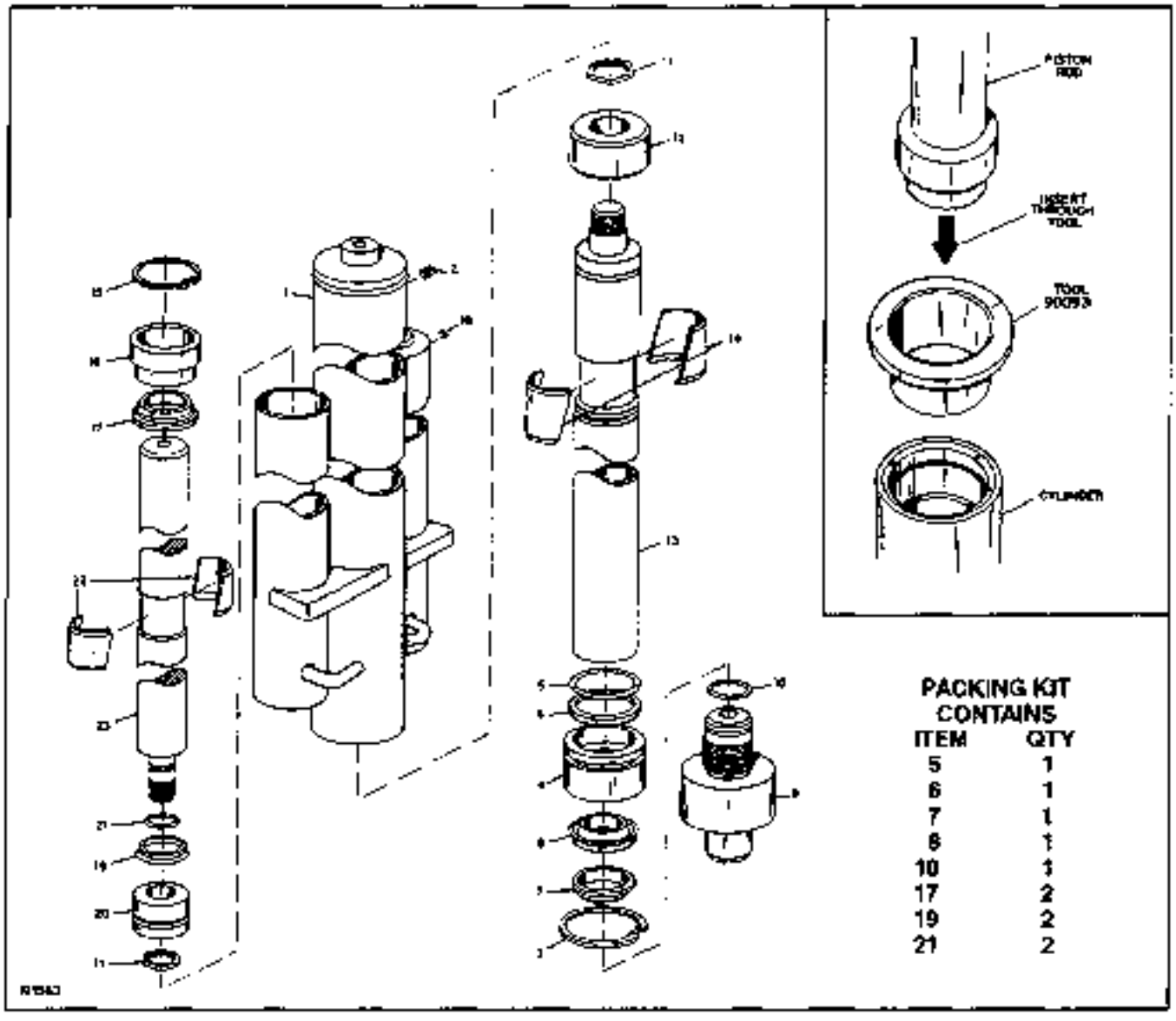

Figure 12-28. Lift Cylinders (FFL)

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INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	503996-01	FFL CYLINDER ASSEMBLY 106 IN. LIFT HEIGHT	†
—	503996-02	FFL CYLINDER ASSEMBLY 130 IN. LIFT HEIGHT	1
1	503995-01	. FFL CYLINDER WELDMENT 106 IN. LIFT HEIGHT	1
1	503995-02	FFL CYLINDER WELDMENT 130 IN. LIFT HEIGHT	1
2	026308	. SQUARE HD PLUG, 1/4 NPT	1
3	061825	. SNAP RING RETAINER	1
4	401645	. CYLINDER HEAD, 2.50 DIA.	1
5	042150*	. "O" RING	1
6	042151*	. BACK-UP RING	1
7	049517-02*	. HYDRAULIC CYLINDER WIPER RING	1
8	043132*	"U" CUP ROD SEAL	1
9	401652	. CYLINDER BASE, 2.50 DIA	1
10	042149*	. "O" RING	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
11	059126	FLEXLOC LOCK NUT	3
12	401642	. PISTON, 2.5 DIA.	1
13	503992-01	. CYLINDER ROD, 106 LIFT HT	1
13	503992-02	. CYLINDER ROD 130 LIFT HT	1
14	401641	. WEAR RING	1
15	061824	. SNAP RING RETAINER	2
16	401584	. CYLINDER HEAD, 2.00 DIA.	2
17	049517-01*	. CYLINDER HD WIPER RING	2
18	029103	. BREATHER PLUG	2
19	043130*	"U" CUP SEAL	2
20	401384	PISTON, 2.00 DIA.	2
21	042136*	"O" RING	2
22	401646	WEAR RING	2
23	401642-01	CYLINDER ROD, 106 LIFT HT	2
23	401642-02	CYLINDER ROD, 130 LIFT HT	2
—	055706	LOCTITE 222 ADHESIVE	AR
—	900893	HYDRAULIC OIL (QUART)	AR
—	900855	HYDRAULIC OIL (GALLON)	AR

*** INCLUDED IN PACKING KIT PART NUMBER 900949**

SPECIFY TRUCK MODEL NUMBER, LIFT HEIGHT, AND SERIAL NUMBER WHEN ORDERING LIFT CYLINDER PARTS.

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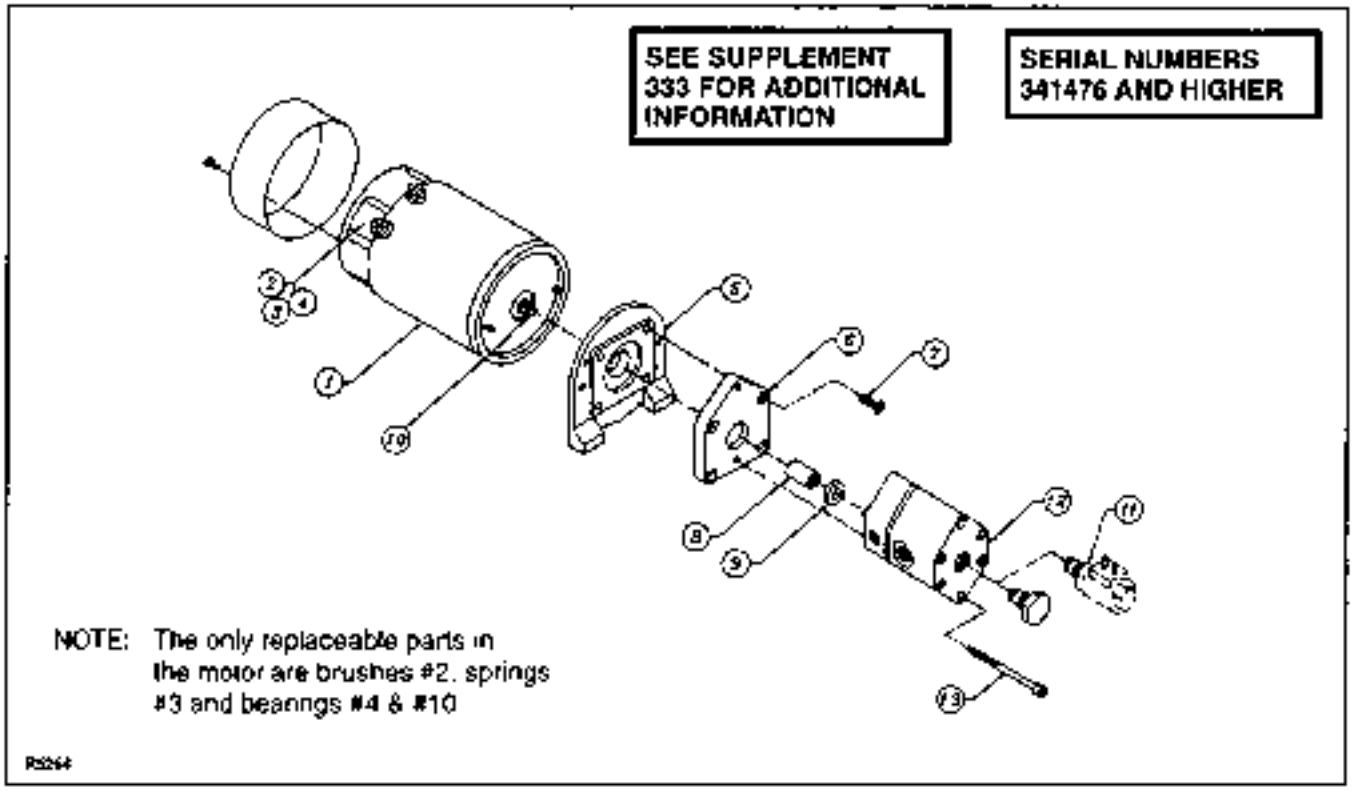

Figure 12-29. Pump and Motor Assembly 015936

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	015936	PUMP AND MOTOR ASSEMBLY	1
1	901528	. DC MOTOR 12V 2 TERMINAL	1
2	901529	. DC MOTOR BRUSH KIT	1
3	901534	BRUSH SPRING KIT	1
4	900945	. COMMUTATOR END BEARING	1
5	901521	MOTOR ADAPTER	1
6	901522	. PUMP ADAPTER	1
7	901523	. PUMP ADAPTER BOLTS	4

INDEX NO.	PART NO.	PART NAME	NO. REQD.
8	901524	COUPLING	1
9	901525	. PUMP SHAFT SEAL	1
10	901532	DRIVE END BEARING	1
11	049732	. REMOTE VALVE (OPTIONAL)	1
12	901530	PUMP	1
13	901526	PUMP BOLTS	2
—	—	LIFT MOTOR SOLENOID (FIG 12-22)	REF

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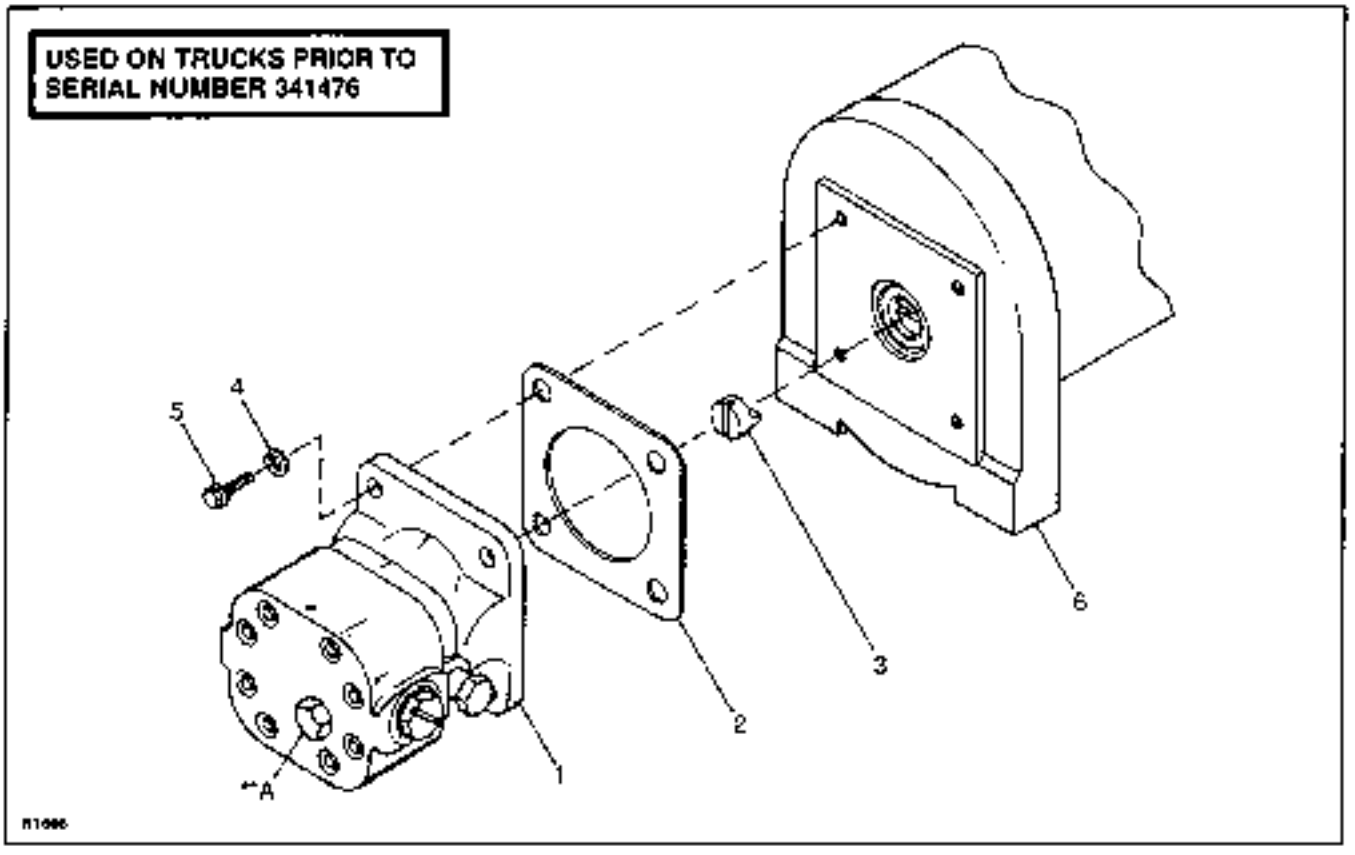

Figure 12-30. Hydraulic Pump

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	016912	PUMP AND MOTOR ASSEMBLY (TRUCKS SERIAL NUMBER 333620 THRU 333652 AND 333890 THRU 341475)	1
—	016922	PUMP AND MOTOR ASSEMBLY (TRUCKS SERIAL NUMBER 333653 THRU 333889)	1
1	900896-03	. PUMP	1
2	036107	. GASKET	1
3	056353	COUPLING	1
4	077210	. LOCK WASHER	4
5	083553	. HEX HD CAP SCREW	4
6	—	. PUMP MOTOR (FIG 12-31, 12-32)	1
—	—	LIFT MOTOR SOLENOID (FIG 12-22)	REF

** FOR REMOTE UNITS, REMOVE CAP A AND INSTALL 048132 SOLENOID VALVE.

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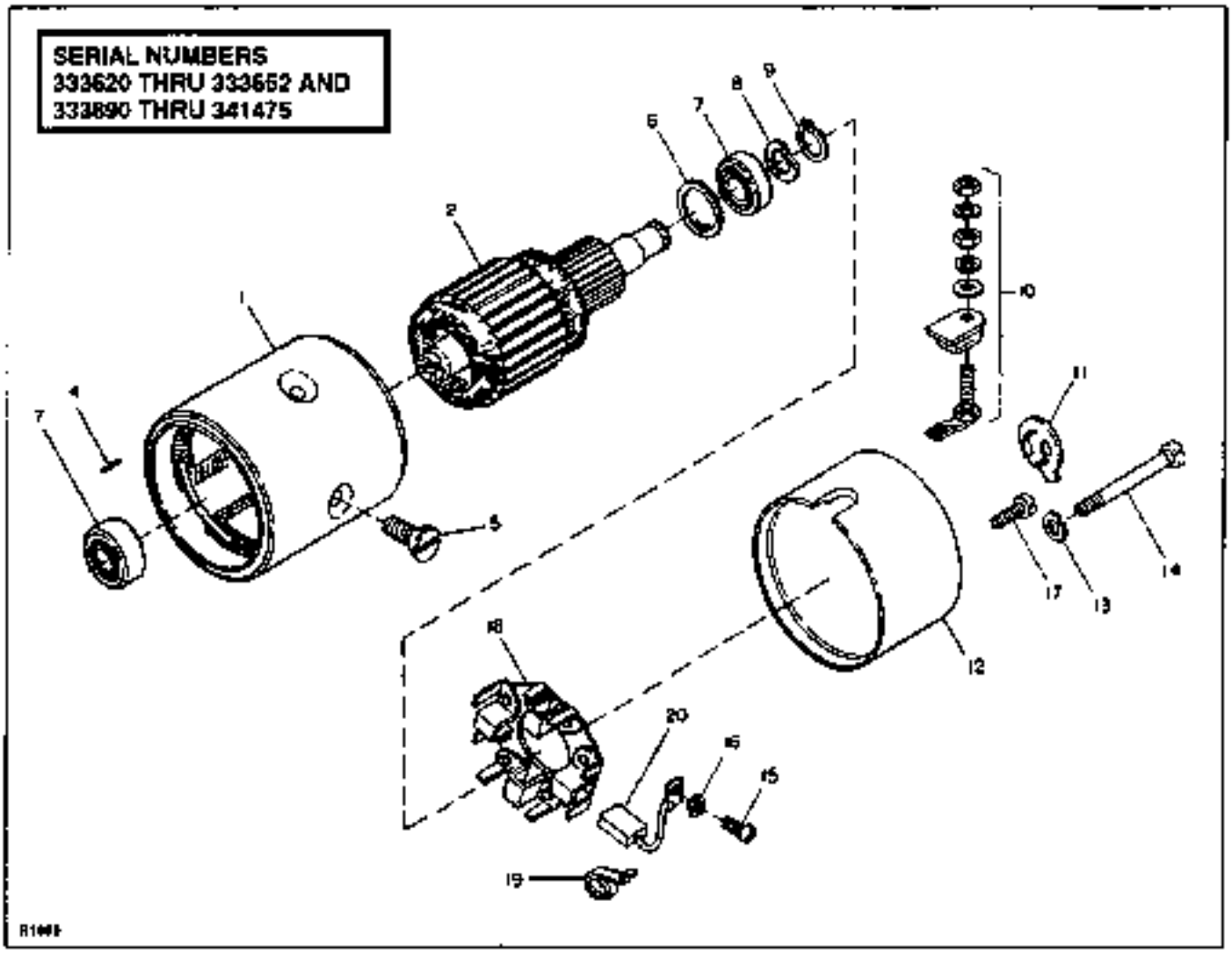

Figure 12-31. Pump Motor 905035

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	905035	MOTOR ASSEMBLY	1
1	905036	. FIELD COIL 12 VDC	1
2	905049	. ARMATURE	1
3	—	. NOT USED	
4	905045	. PIN	1
5	905051	. FLAT HEAD SCREW	4
6	905052	. RETAINER	1
7	900495	. BEARING	2
8	905030	SPRING WASHER	1
9	905031	. RETAINER	1
10	905032	. TERMINAL STUD PACKAGE	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
11	905033	PROTECTIVE CAP	1
12	905034	COMMUTATOR END	1
13	905037	RETAINER	1
14	905038	FILLISTER HEAD SCREW	2
15	905039	FILLISTER HEAD SCREW	4
16	905040	SPRING LOCK WASHER	4
17	905041	. FILLISTER HEAD SCREW	4
18	905042	. BRUSH HOLDER	1
19	905043	SPIRAL SPRING	4
20	905044	CARBON-BRUSH SET	1

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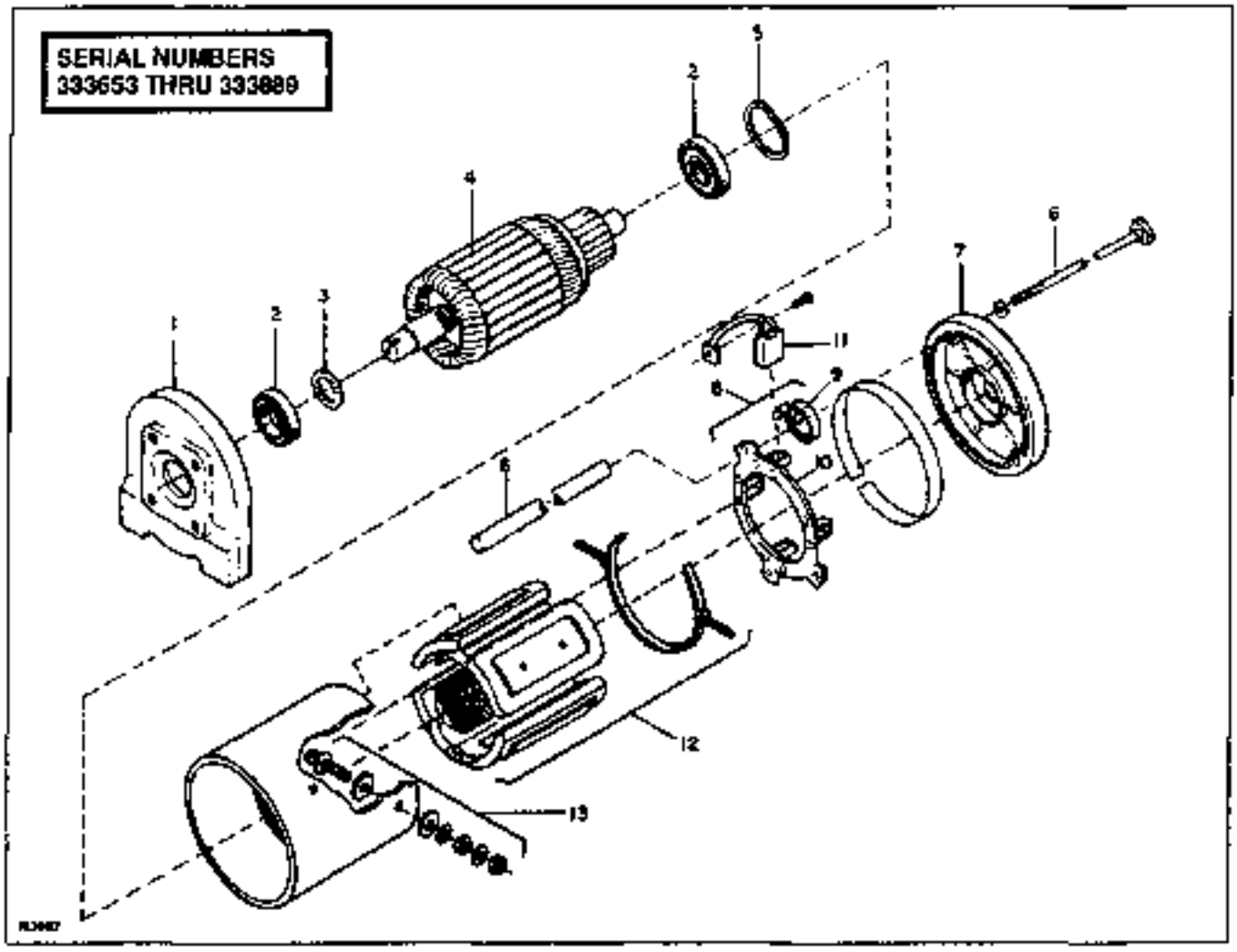

Figure 12-32. Pump Motor 904140

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	904140	MOTOR ASSEMBLY	1
1	900855	. DRIVE END HEAD	1
2	900495	. SEALED BALL BEARING	2
3	904172	. SPACER ARMATURE D.E.	2
4	904166	. ARMATURE	1
5	904175	SPRING WASHER	1
6	904174	. THRU BOLT AND INSULATION PACKAGE	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
7	904170	. HEAD, COMMUTATOR END	1
8	904171	. BRUSH PLATE ASSEMBLY	1
9	003714	. BRUSH SPRING SET	1
10	—	. BRUSH PLATE	1
11	904167	. BRUSH SET	1
12	904168	. FIELD COIL PACKAGE	1
13	904173	TERMINAL STUD PACKAGE	1

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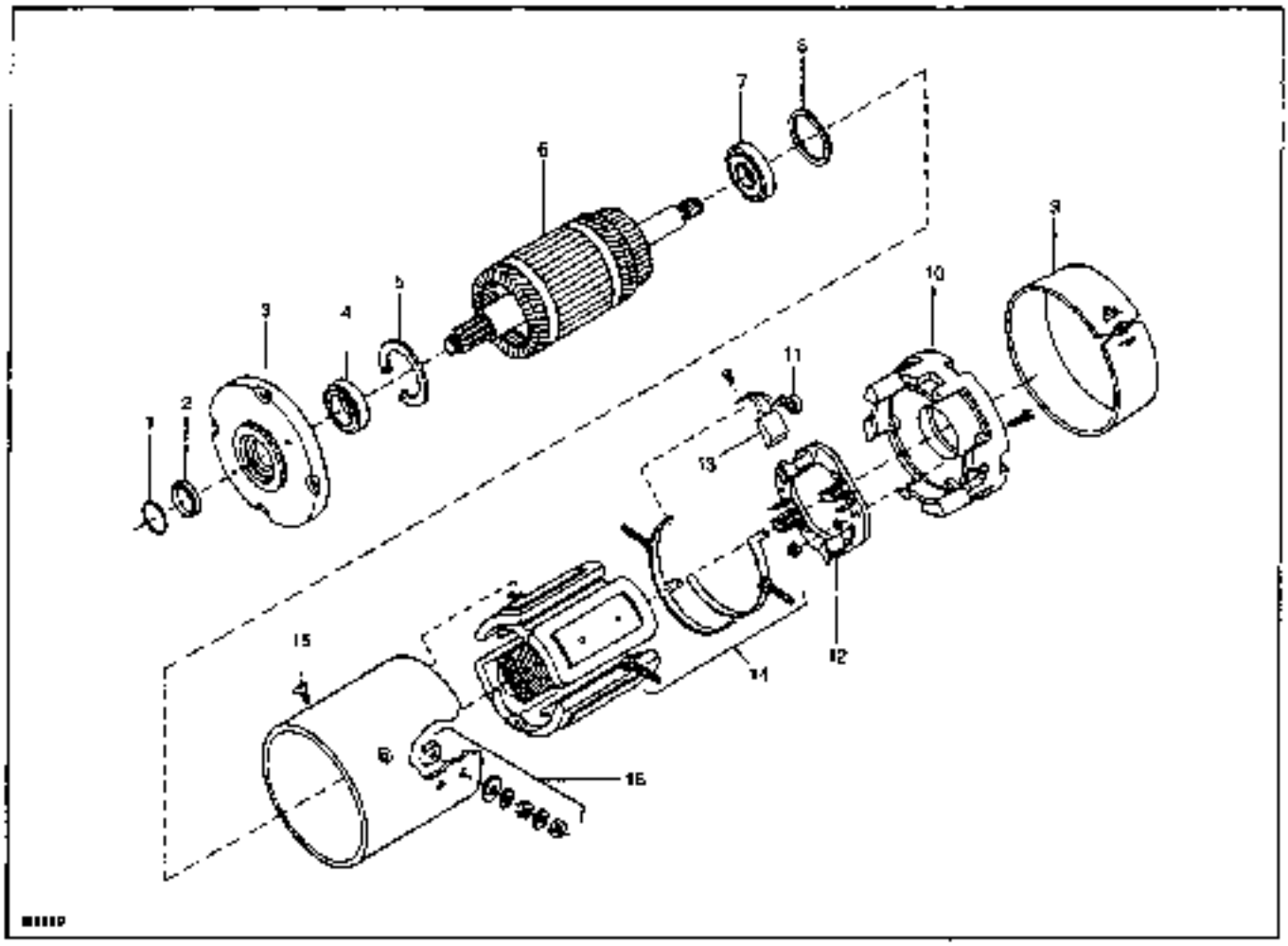

Figure 12-33. Drive Motor 016042

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	016042	MOTOR ASSEMBLY	1
1	901238	SPACER DRIVE END	1
2	901239	. SEAL, SHAFT, DRIVE END	1
3	901240	. HEAD ASSEMBLY, DRIVE END	1
4	901241	. . BEARING, BALL, SEALED	1
5	901242	. . RETAINER, BEARING	1
6	901243	. ARMATURE	1
7	901244	. BEARING, BALL, SEALED COMMUTATOR END	1
8	901245	WASHER, SPRING COMMUTATOR END BEARING	1
9	901246	. BAND, COVER	1
10	901247	. HEAD ASSEMBLY, COMMUTATOR END	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
11	900136	. . SPRING, BRUSH	1
12	901248	. . BRUSH HOLDER	1
13	900787	. BRUSH	1
14	901264	. FIELD COIL SET	1
—	901250	. . CONNECTOR AND STUD ASSEMBLY A2	1
—	901251	. . CONNECTOR AND STUD ASSEMBLY A1	1
15	901253	. POLE SHOE, SCREW 5/16-24 X 7/8 FL HD	8
16	901252	. TERMINAL KIT (HARDWARE INCL)	2
—	901257	. SPACER, BRUSH HOLDER	4

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1. SEE SUPPLEMENT 228 FOR TRANSISTOR TRUCKS SERIAL NUMBER 336368 AND HIGHER.
2. SEE SUPPLEMENT 187 FOR TRANSISTOR TRUCKS PRIOR TO SERIAL NUMBER 336368.

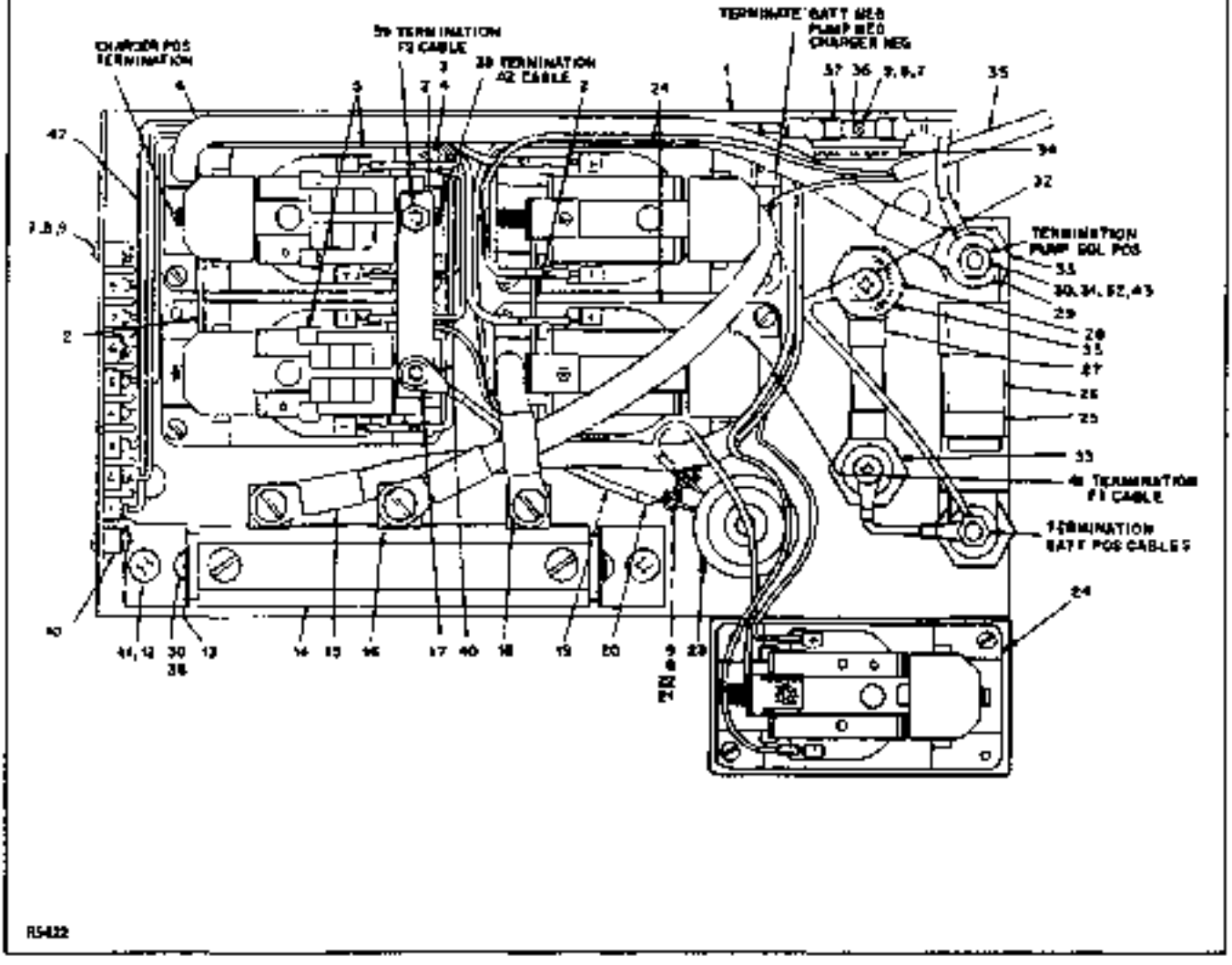

Figure 12-34. Contactor Panel Assembly

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INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	504659	PANEL ASSEMBLY	1
1	504657	. BASE PLATE	1
2	401181	BUS BAR	3
3	073491	SCREW, RH HD, 8-32 X 1	10
4	077205	SPLIT LOCK WASHER, #8	10
5	—	CONTACTOR, DOUBLE POLE (FIG 12-47)	2
6	504160-16	CABLE, ASSY.	1
7	068179	. SCREW, RD HD, #5-40 X 5/8	2
8	077203	. LOCK WASHER	5
9	069410	HEX NUT	5
10	021226	TERMINAL BLOCK, SPADETYPE	1
11	071376	PAN HEAD SCREW 10-32 X 1/2	2
12	077206	. SPLIT LOCK WASHER, 3/16	2
13	250716	. SPEED CONTROL BRACKET	2
14	018904	. SPEED CONTROL RESISTOR	1
15	504160-15	. CABLE, ASSY.	2
16	021221	. TERMINAL FOR USE WITH SPD CONTROL RESISTOR	3
17	021238	. TERMINAL RING TYPE, 1/4	4
18	504150-10	. CABLE, ASSY.	1
19	023026	WIRE, 10 GA. WHITE	A/R
20	021237	. TERMINAL RING	2
21	068177	. SCREW, RD HD, #5-40 X 3/8	2
22	077007	. WASHER 5/32" O.D. X 5/16" I.D 20 GAUGE	2

INDEX NO.	PART NO.	PART NAME	NO. REQD.
23	018907	. ELECTRICAL BRAKE RESISTOR	1
24	—	. CONTACTOR, SINGLE POLE (FIG 12-46)	3
25	008906	300 AMP FUSE	1
26	056507	. FUSE, DECAL, 300 AM, 0.020 ALUM	1
27	008917	FUSE, 40 AMP, DYNAMIC BRAKE	1
28	056515	DECAL FUSE, DYNAMIC BRAKE	1
29	077105	FLAT BRONZE WASHER	8
30	077209	LOCK WASHER, 1/4	12
31	075620	STUD-THREADED, BRASS, 1/4-20 X 1-1/4	2
32	073488	. SCREW, RH HD, 1/4-20 X 3/8	8
33	013614	. STAND-OFF	4
34	056504	. DECAL, FUSE, 15A	1
35	504658	. CABLE ASSY	1
36	008910	15 AMP FUSE	1
37	008904	FUSE HOLDER	1
38	070475	SCREW, FD HD, 1/4-20 X 5/8	4
39	504150-05	CABLE, ASSY	2
40	504150-02	CABLE, ASSY	1
41	504150-04	. CABLE, ASSY.	1
42	023432	. WIRE HARNESS ASSY	1
43	069421	. NUT-HEX, 1/4-20	2

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

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CONTACTOR TIP KIT 900531-08 CONTAINS

ITEM	QTY
3	1
4	1
8	1
12	1

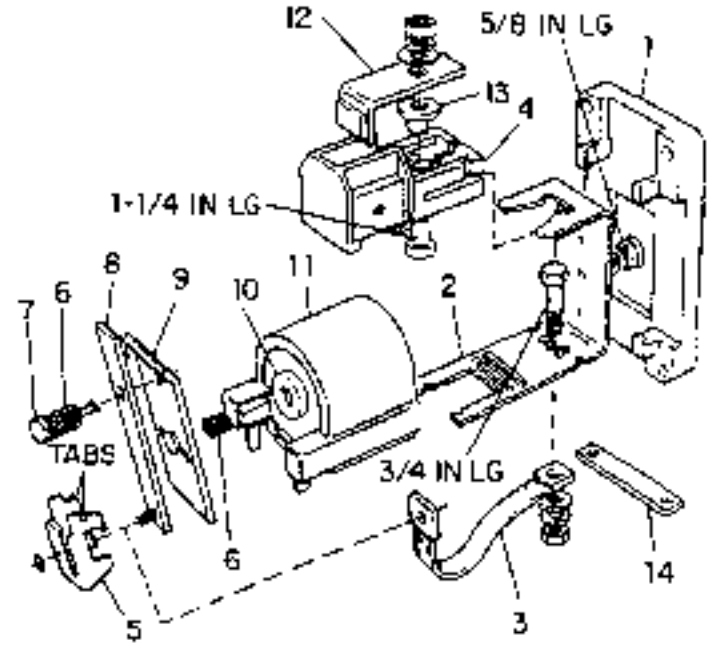

Figure 12-36. Single Pole Contactor, 2nd Speed, 3rd Speed Dynamic Brake

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	005658	CONTACTOR SINGLE POLE, 100 AMP. 12V	1
1	905010	BASE MOLDING	1
2	905024	MAGNETIC FRAME	1
3	905013*	BRAID ASSEMBLY	1
4	906025	FRONT MOLDING WITH BLOWOUT	1
5	905015*	. ARMATURE PLATE RETAINER	1
6	905016	. COMPRESSION SPRING	2
7	905017	SPRING STUD	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
8	905029*	. MOVING CONTACT ASSEMBLY	1
9	905019	ARMATURE PLATE	1
10	905020	. POLE PIECE	1
11	905021	. COIL ASSEMBLY 12-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.

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CONTACTOR TIP KIT 900531-09 CONTAINS

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

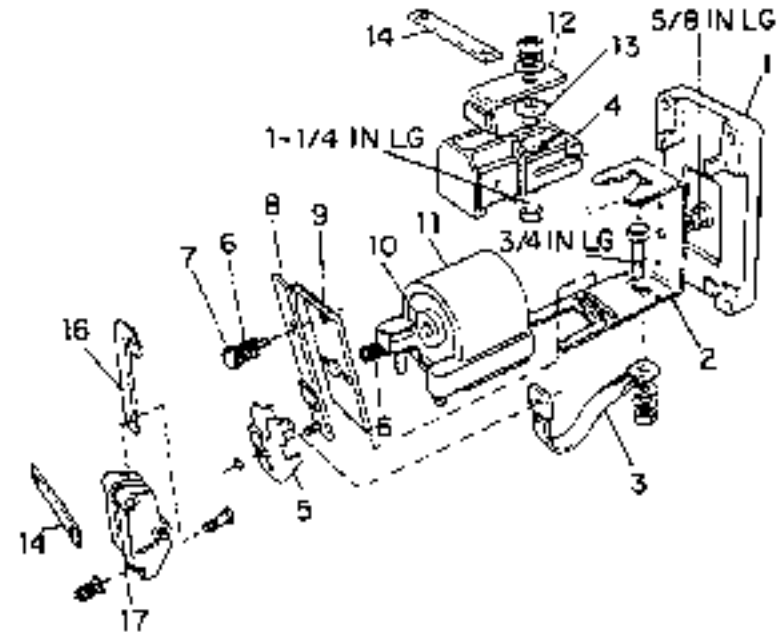

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Figure 12-36. Double Pole Contactor, Forward, Reverse

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	005858	CONTACTOR DOUBLE POLE, 100 AMP 12V	1
1	905010	BASE MOLDING	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
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.

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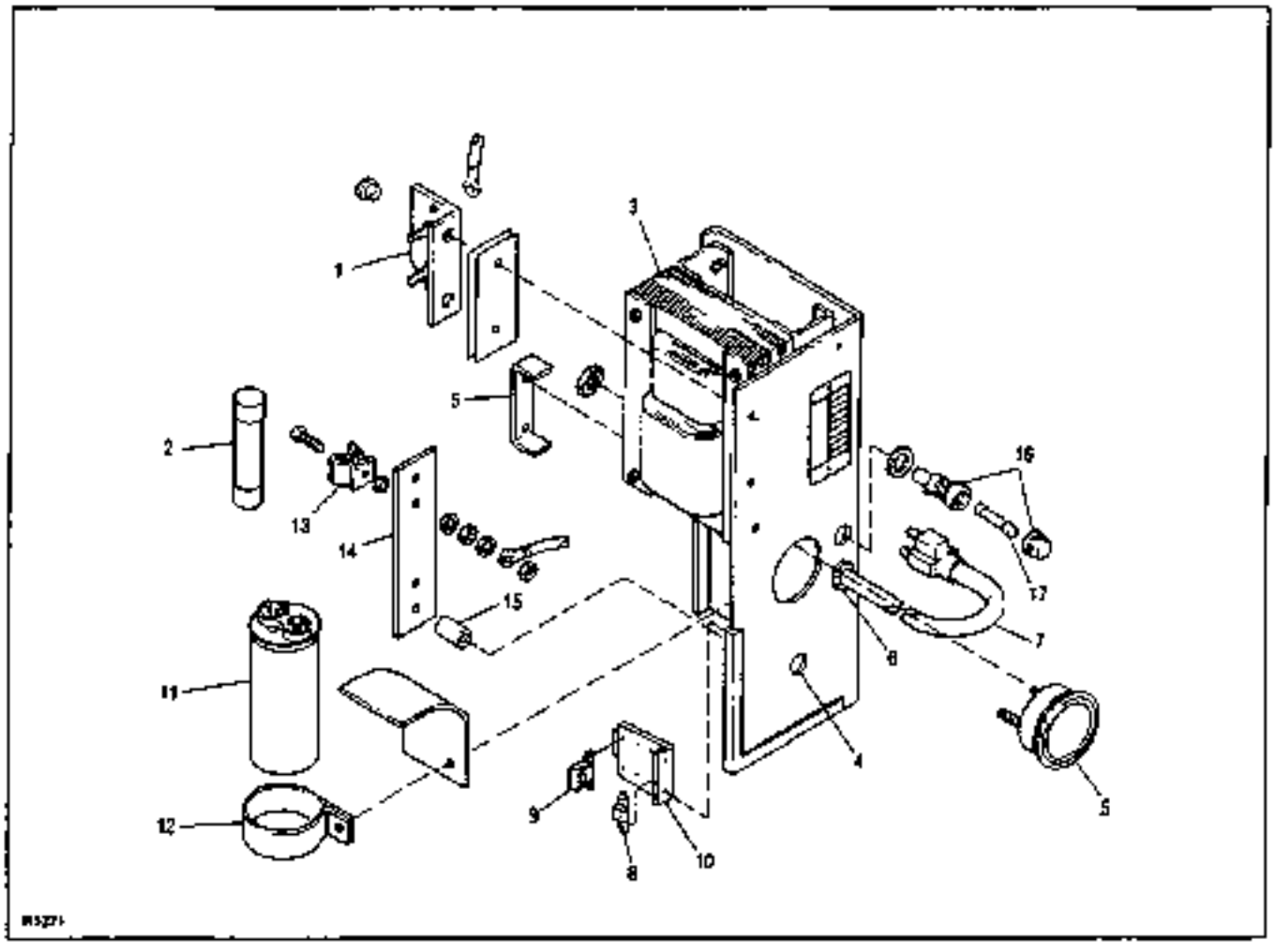

Figure 12-37. "SMART" Charger 004975-01

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	004975-01	SMART CHARGER	1
1	900467	. DIODE ASSEMBLY	1
2	900656	. FUSE NON-45	1
3	900887	. TRANSFORMER	1
4	900379	. PILOT LIGHT	1
5	900462	. AMMETER	1
6	052905	. STRAIN RELIEF	1
7	005802	. AC CORD	1
8	907077	. TRIAC	1
9	907078	TRANSFORMER (CIRCUIT BOARD)	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
10	907111	CONTROL CARD (CIRCUIT BOARD)	1
11	900465	CAPACITOR	1
12	900466	CAPACITOR STRAP	1
13	900655	. FUSE CLIP	1
14	900654	. INSULATOR PLATE	1
15	900653	. NYLON STANDOFF	1
16	907058	. FUSE HOLDER	1
17	900847	FUSE AGC10	1

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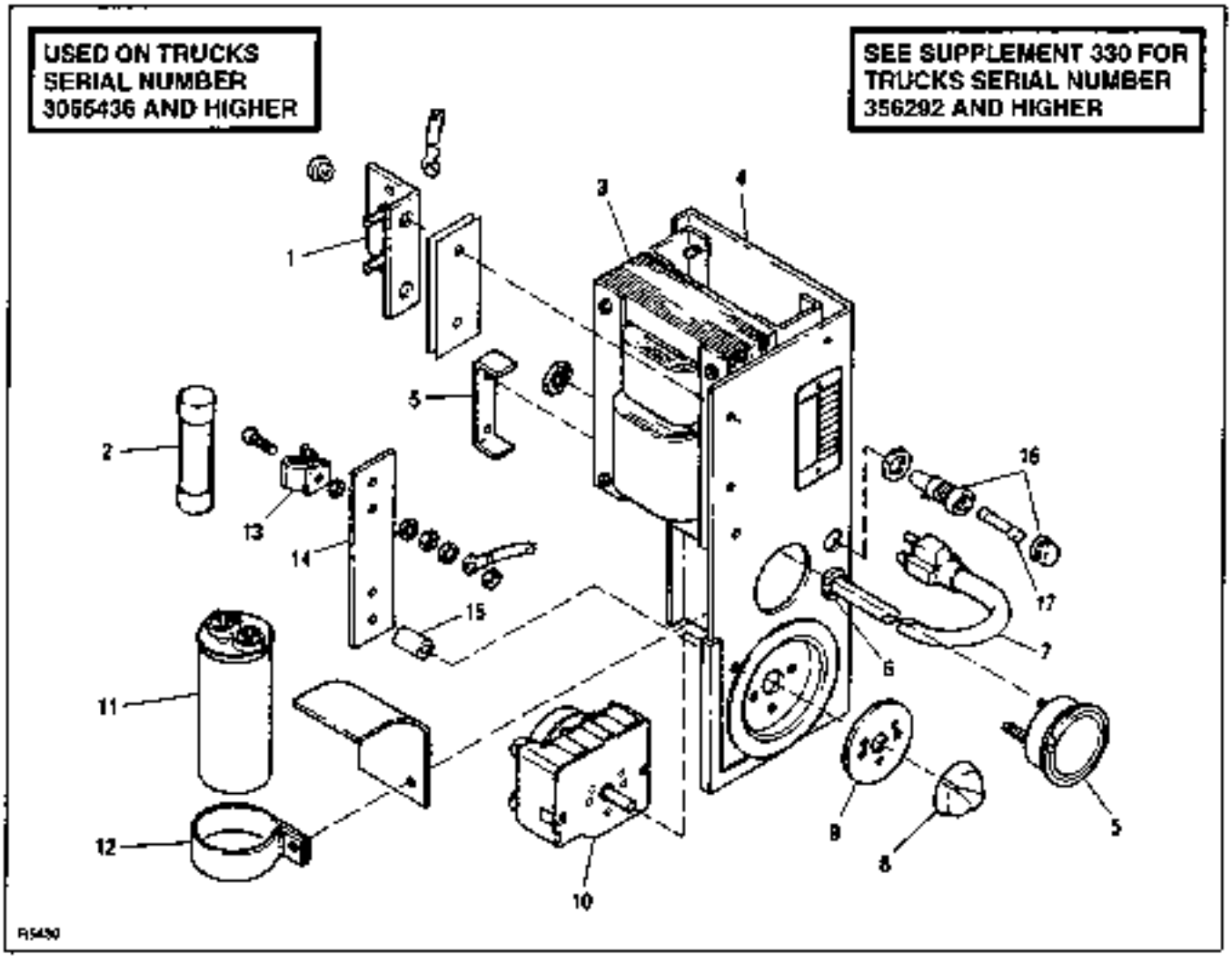

Figure 12-38. 30-Amp Timer Battery Charger

INDEX NO.	PART NO.	PART NAME	NO. REQD.
	004950	BATTERY CHARGER ASSEMBLY (30-AMP (60 HZ) INPUT)	1
—	004951	BATTERY CHARGER ASSEMBLY (30-AMP (50 HZ) INPUT)	1
1	900467	. RECTIFIER ASSEMBLY	1
	900527	. . HEAT SINK	1
2	900656	. FUSE, BUSSE, NON-45	1
3	900887	. TRANSFORMER (120 V, 60 HZ)	1
3	900889	. TRANSFORMER (120 V, 50 HZ)	1
4	—	CASE	1
5	900462	AMMETER	1
6	900364	. STRAIN RELIEF, AC CORD	1
7	005802	. AC CORD AND PLUG SET (120 V, 60 HZ)	1

INDEX NO.	PART NO.	PART NAME	NO REQD.
7	900892	. AC CORD AND PLUG SET (120 V, 50 HZ)	1
8	900376	. KNOB	1
9	900529	. DIAL	1
10	900375	. TIMER (120 V, 60 HZ)	1
10	900749	. TIMER (120 V, 50 HZ)	1
11	900465	. CAPACITOR	1
12	900466	. BRACKET	1
13	900655	. FUSE CLIP	2
14	900654	. INSULATOR PLATE	1
15	900653	. NYLON STANDOFF	2
16	907058	. FUSE HOLDER	1
17	900843	. FUSE	1

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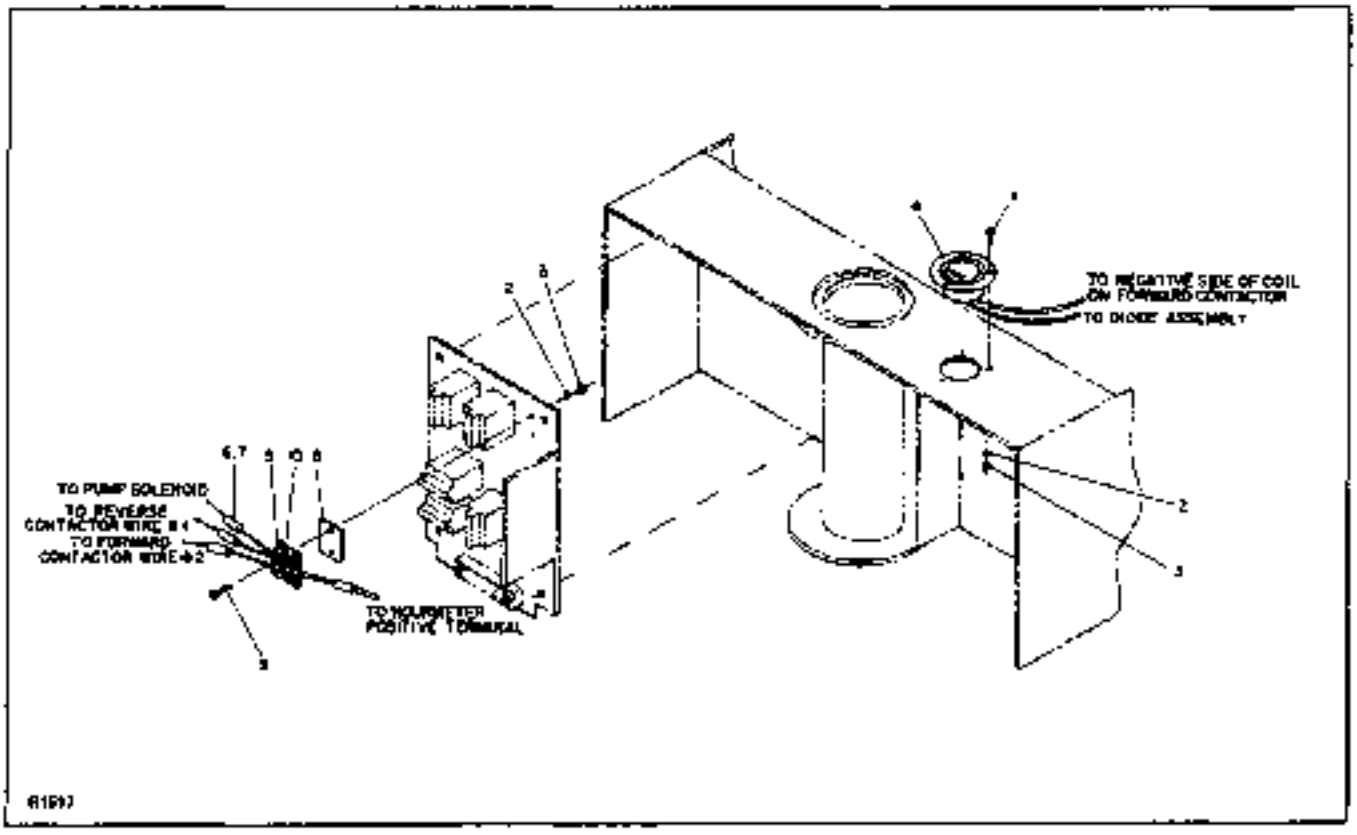

Figure 12-39. Optional Hour Meter Switch Installation

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	504189	HOUR METER INSTALLATION	1
1	058179	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	058177	. SCREW, RD HD, #5-40 X 3/8	2
6	005422	CONNECTOR, INLINE, INSUL	4

INDEX NO.	PART NO.	PART NAME	NO. REQD.
7	021204	TERMINAL, SLIDE CLIP, 1/4	4
8	010610	PAD, INSUL, DIODE	1
9	005997	. DIODE ASSEMBLY	1
10	005976	. . DIODE	3
—	010606	. . MOUNTING PANEL	1
—	023018	. . WIRE, BLACK, #16 STRANDED	A/R

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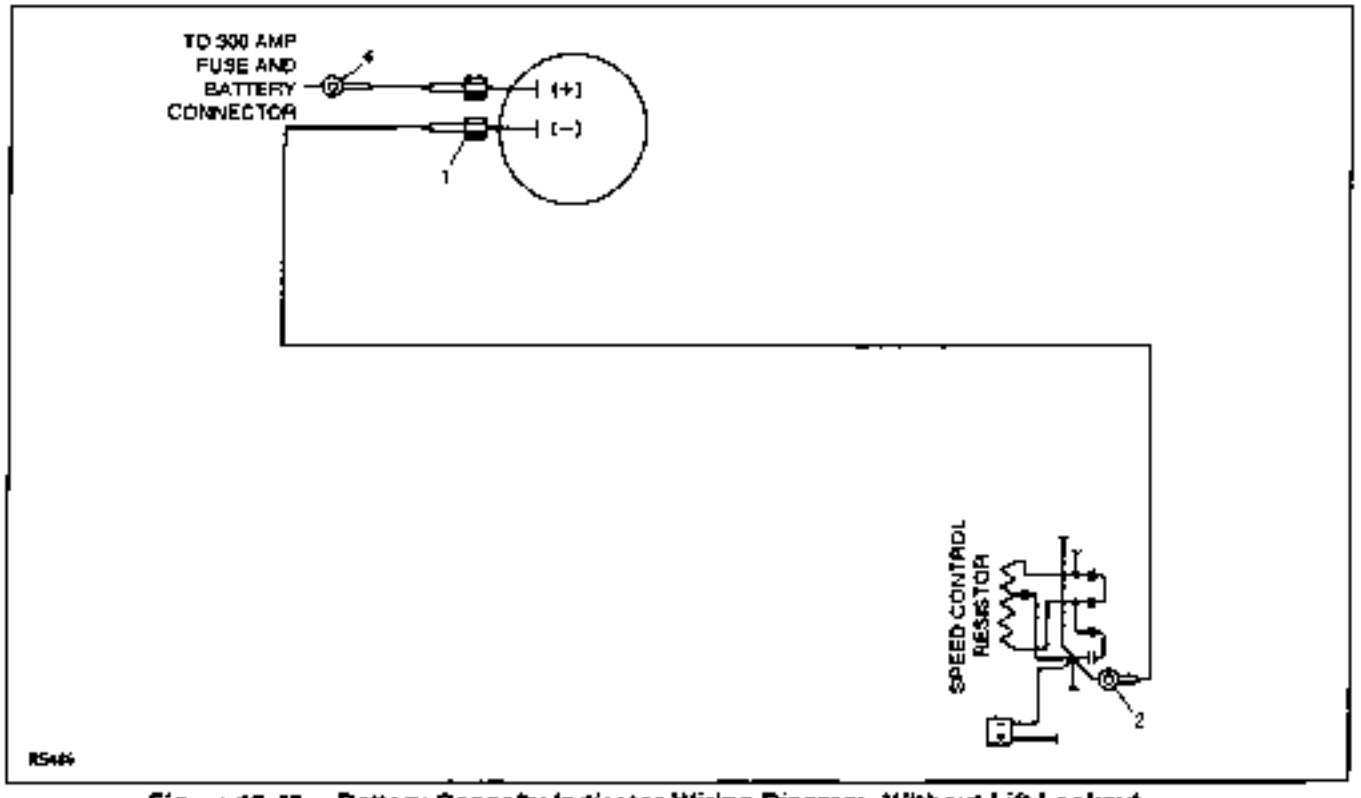

Figure 12-40. Battery Capacity Indicator Wiring Diagram Without Lift Lockout

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	021718	CONNECTOR	2
2	021206	TERMINAL	1
3	—	NOT USED	
4	021207	TERMINAL	1
5	010617-01	INDICATOR, 12V BAT CAPACITY	1

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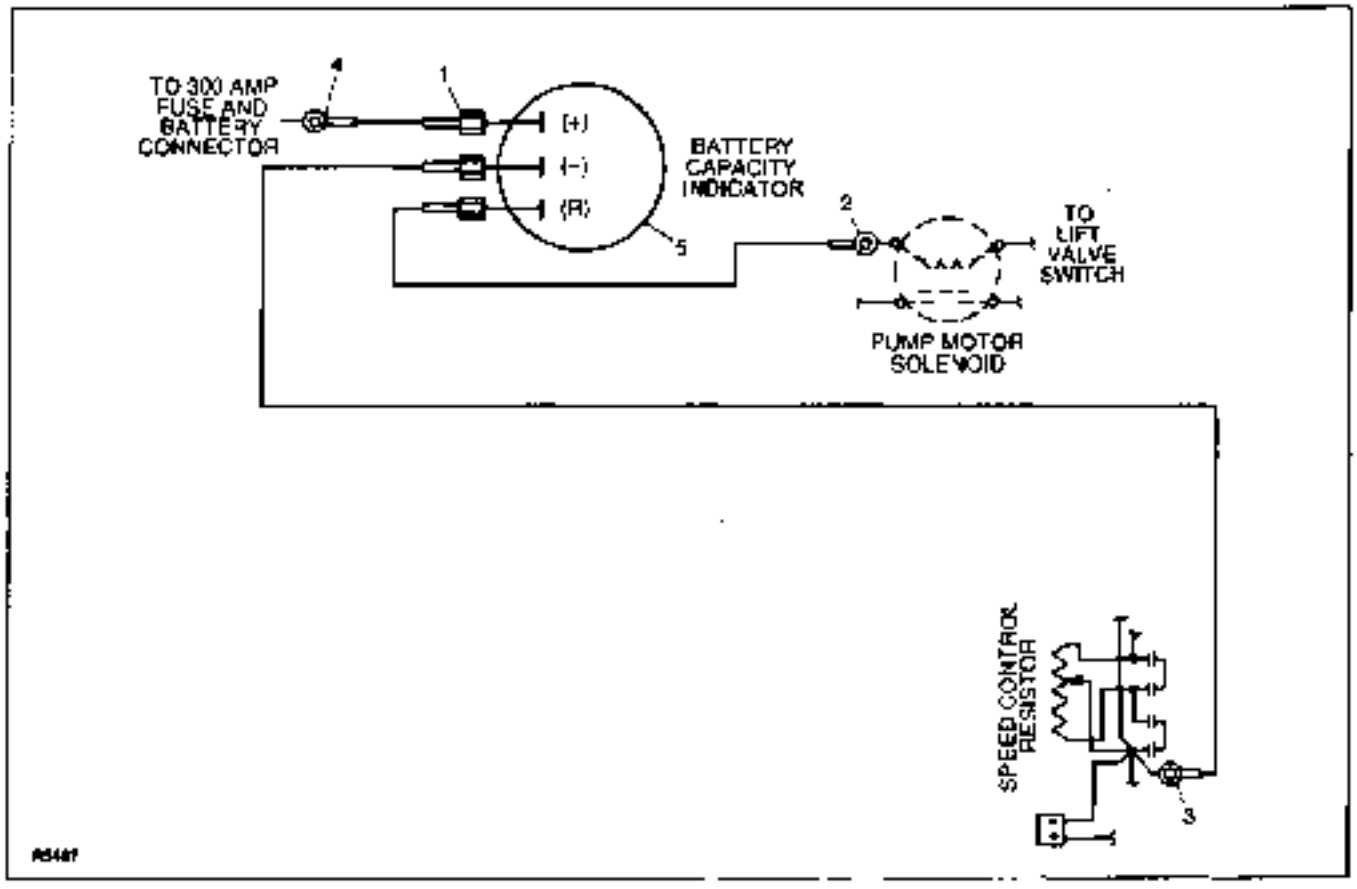

Figure 12-41. Battery Capacity Indicator Wiring Diagram With Lift Lockout

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	021716	CONNECTOR	3
2	021203	TERMINAL	1
3	021205	TERMINAL	1
4	021207	TERMINAL	1
5	010518-01	INDICATOR, 12V BAT CAPACITY	1

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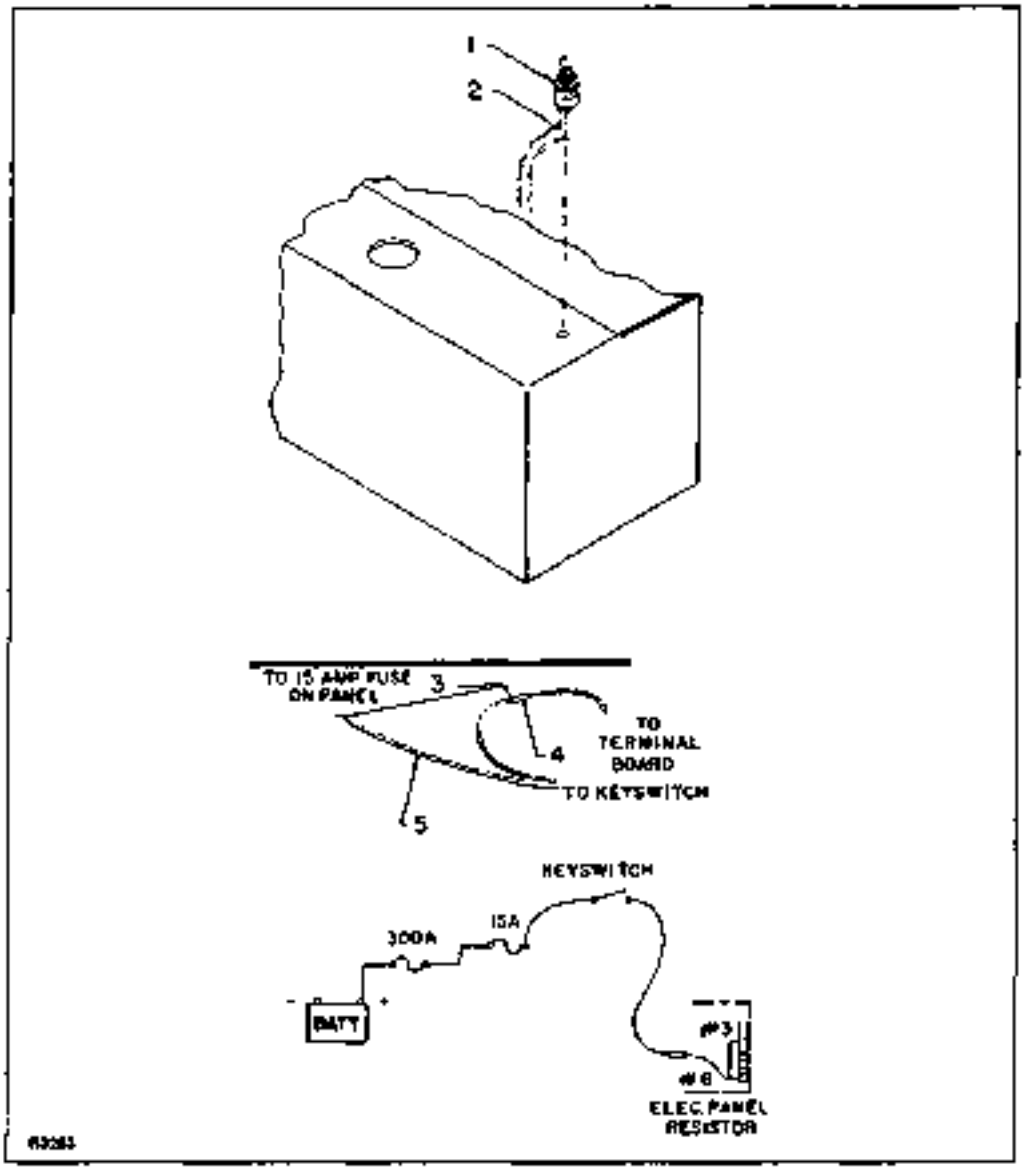

Figure 12-42. Optional Key Switch

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	AR

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