Manual Price \$35.00

POWER DRIVEN POWER DRIVEN MEDIUM DUTY LIFT TRUCK Serial Number 374575 and Higher

Operation Maintenance Repair Parts List

Big Joe Manufacturing Company • Lincolnwood, IL 60646

MANUAL NO. 901356 REV A 05/31/05

WARNING

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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OPERATOR INSTRUCTIONS

WARNING

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

PREPARATION FOR USE

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

Remove cardboard banded to truck. Check lift truck for scratches and dents. Check to make sure that the lift chains are free of slack. Inspect for oil leaks and loose wiring connections. Make certain that all accessories and attachments that were ordered are supplied. Before the lift truck is moved, the battery must be checked, recharged if necessary, and connected. Refer to "Battery Care" in Section 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.

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.

Users shall comply with all requirements indicated in applicable OSHA standards and current edition of A.N.S.I. B56.1 part II. By following these requirements and 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.

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 228).

1-5. SAFETY SYMBOLS.

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

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

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



Figure 1-2 Serial Number and Decal Location



Figure 1-3 PDM Lift Truck

SECTION 2 OPERATION

SEE SUPPLEMENT 220 FOR TRANSISTOR SPEED CONTROL TRUCKS

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.
- 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.
- 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.



Figure 2-1 Load Center

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 SEC-TION 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.

ITEM	PROCEDURE	ITEM	PROCEDURE
Transmission and hydraulic sys-	Check for signs of fluid leakage.	Hydraulic con- trols	Check operation of lift and lower to their maximum positions.
tems. Forks	Check for cracks and damage; and, that they are properly secured.	Brakes	Check that brakes actuate when steering arm is raised to upright position, and when lowered to horizontal position. Check that
Chains, cables and hoses	Check that they are in place, secured correctly, functioning properly and free of binding or damage.		dynamic brake (if so equipped) actuates when dynamic brake pushbutton on control handle is pressed.
Guards and load backrest	Check that safety guards are in place, properly secured and not damaged.	Deadman/Park- ing brake	Check that steering arm raises to upright position when released and brake applies.
Safety signs	Check that warning labels, nameplate, etc., are in good con- dition and legible.	Battery discon- nect	Check that battery can be disconnected and reconnected. Check for connector damage.
Horn	Check that horn sounds when operated.	Battery charge	Check that battery capacity meter (if equipped) is on "F".
Steering	Check for binding or looseness in steering arm when steering.	High speed limit switch	Allow for enough space to oper- ate truck in high speed. Elevate
Travel controls	Check that speed controls on control handle operate in all speed ranges in forward and reverse and that belly button switch functions.		forks approximately two feet, then test drive truck to check if high speed is cut out.
Wheels	Check drive wheel for cracks or damage. Move truck to check load and caster wheels for free- dom of rotation.		

Table 2-1 Operator Checks

IGJOE De Manufacturing Company	Daily Ope	rator Check-Off List
Date	Operato	r
Truck No.	Model N	0
Dept	Shift	
Hour Meter Reading—Drive	Hoist _	
Check	О.К. (v)	Need Maintenance
Tires		
Load Wheels		
Horn	_	
Lift—Lower Control		
Attachment Operation		
Stooring		
Electrical Brakes		
Mechanical Brake		
Hydraulic Leaks, Cylinders, Valves, Hoses, Etc.		

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

SEE SUPPLEMENT 220 FOR TRANSISTOR SPEED CONTROL TRUCKS.		
Туре	Part Numbers.	
Standard	505050-01	
Remote Lift in Handle	505050-02	
Remote Lift and Lower in Handle	505050.03	



Figure 2-3 Control Handle

2-4.2. Lift/Lower.

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

2-4.3. Battery Disconnect.

A battery disconnect is mounted near the 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

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.
- Steering arm in horizontal position (See Figure 2-6): Lowering the steering arm to the horizontal position applies brake pad pressure to the brake disc. Lowering the steering arm below the horizontal position increases the braking force and de-energizes the controls.
- 3. Steering arm in vertical position (See Figure 2-6): Raising the steering arm to near vertical position applies brake pad pressure to the brake disc. Further vertical positioning increases the braking force and de-energizes the controls. This position serves as a parking brake. As a safety precaution, the steering arm is spring loaded to return to the vertical position in the event the driver releases

the control handle during operation. This is known as deadman braking.

- 4. **Dynamic brake:** The dynamic brake serves as a secondary braking system completely independent from the mechanical brake. Pressing the dynamic brake pushbutton applies a constant DC voltage across the drive motor field coils to stop the motor.
- **CAUTION:** The dynamic brake pushbutton should not be held in place longer than one or two seconds. Excessive use may blow the 40 Amp fuse, which will render dynamic brake inoperative.

2-5.4. Parking.

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

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



Figure 2-6 Steering Arm Braking Position

2-5.5. Battery Charging

Refer to Document 245 for battery safety and maintenance.



NOTE: Battery charging instructions are contained in SECTION 3.

2-5.6. Load Handling.

- **WARNING:** Handle only loads arranged for stability, and always use caution. Raise and lower the load smoothly to prevent the load from falling.
- **WARNING:** Always be sure the load and load center are within the capacity of the truck. If in doubt, check the nameplate.
- 1. Approach the load slowly.
- 2. Stop the truck when the forks are just in front of the load.
- 3. Adjust the forks to the maximum practical width to support the load to be lifted.
- 4. Raise or lower the forks until they are properly aligned with the pallet openings.
- 5. Move the truck slowly into position so that the forks are centered about the load.

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

2-5.7. Moving a Disabled Truck

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

NOTES

SECTION 3 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
- **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.

3-5. LIFT CHAIN MAINTENANCE

Fully raise and lower lift carriage while observing chains they move over all chain sheaves. Ensure chain is aligned and tracking properly and all links are pivoting freely. With carriage fully lowered, spray or brush on a film of ASAE 30 or 40 engine oil.

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, lubrication & operation (see paragraph 3-5.)	
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	
Semi-annually	Inspect for chain wear (See SECTION 8)	

Table 3-2 Recommended Lubricants and Olls

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 guart)	
	055784 (Note)	
No. 4	SAE 30 or 40 engine oil	
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	



Figure 3-1 Lubrication Diagram

Figure 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) (If Equipped)	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.
6	LIft Chains	Brush or Spray	N0. 4	See paragraph 3-5.

NOTES

SECTION 4 TROUBLESHOOTING

1. SEE SUPPLEMENT 220 FOR CONTROL HEAD ON TRANSISTOR TRUCKS

2. SEE SUPPLEMENT 230 FOR CONTROLLER HEAD ON TRANSISTOR TRUCKS

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.

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 connec- tion may be the cause of malfunc- tion.	Tighten all loose connections before fur- ther troubleshooting.
Truck does not run forward or reverse. Everything else is	a. 15-Amp control circuit fuse blown.	Check fuse and replace if defective.
normal.	 Shorted dynamic brake switch or dynamic brake relay. 	Check brake switch and relay and replace if defective.
	c. Defective dead-man brake switch.	Check and replace if required.
	d. Main wire harness cut.	Replace.
	e. Belly button switch defective.	Replace.
	f. Shorted optional travel cutout.	Check and replace if required.
Truck runs forward, but not in reverse.	a. Defective speed control switch or defective contactor.	Check for positive DC voltage at number 1-wire on reverse contactor. If not present when steering arm is in operating position and speed control is in reverse, speed control switch is defective. If voltage is present, contactor is defective.
	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.

Table 4-1 Troubleshooting Chart

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
Truck runs forward and in reverse at slow speed; will not	a. Third speed cutout switch out of adjustment or defective.	Adjust or replace.
run at nigner speeds.	 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	a. Defective 2nd or 3rd speed contactor.	Check for shorted contacts on 2nd or 3rd speed contactor.
first speed position. Every- thing else is normal.	b. Defective speed control switch.	Check switches.
3 - - - - - - - -	c. Shorted speed control resistor.	Check wiring of resistor.
TROUBLE WITH BRAKING		
Mechanical brake does not stop truck properly.	 Brake linkage in need of adjustment. 	Adjust mechanical brake (see paragraph 6-1.).
	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 6-1.).
Dynamic brake does not stop	a. 40-Amp fuse blown.	Check and replace fuse.
truck.	 Defective brake switch, brake relay, or brake resistor. 	If click is heard when dynamic brake push- button is pressed, check brake resistor and relay contacts. If no click, 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 res- ervoir so that oil is shown full on dipstick (approximately 2 inches from top of reser- voir) with the lift carriage fully lowered, before further troubleshooting. Tighten all electrical connections.

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
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 nor- mal.	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 pres- sure 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 hydrau- lic 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 car- riage is in the lowest position.
Squealing sounds when forks	a. Oil level too low.	Add oil to reservoir.
are raised.	b. Dry channels in mast.	Apply grease.
	c. Defective bearing.	Replace bearing.
Forks do not lift to top. Pump	a. Oil level too low.	Add oil to reservoir.
motor runs.	b. Load heavier than capacity.	Refer to nameplate for maximum load capacity.
	c. Defective pump or motor.	Replace.
Oil leaks at throttle valve release cam.	Defective O-rings in throttle valve body.	Replace O-rings around release cam.
Control valve spring- cen-	a. Broken springs.	Replace springs.
to neutral.	b. Foreign particles.	Clean system and valve.
	c. Misalignment of operating link- age.	Check linkage for binding condition.

MALFUNCTION	PROBABLE CAUSE		CORRECTIVE ACTION
Load drops when LIFT control is moved from neutral to UP position.	a. Dirt or betwee and se	foreign particles lodged on check valve poppet at.	Disassemble, clean and reassemble.
	b. Scored	check ball.	Replace check ball.
	c. Defecti valve b	ve check ball seat in ody.	Lap new check ball body seat.
No motion, slow or jerky action of hydraulic system.	a. Load h	eavier than capacity.	Refer to nameplate for maximum lift capacity.
	b. Defecti	ve lift cylinder.	Rebuild or replace.
MISCELLANEOUS			
Steering arm does not return to the upright position.	a. Return adjuste	spring improperly ed.	Readjust spring tension (see paragraph 5-6.).
	b. Binding trical ca	y brake linkage or elec- able.	Check and free the binding item.
	c. Broken	spring	Replace.
Truck moves forward in low speed when arm is pulled	a. Belly-b defectiv	utton reversing switch ve.	Check for short, and repair or replace as necessary.
down.	b. First sp defectiv	beed forward switch ve.	Replace.
	c. Forwar closed	d contactor stuck	Repair or replace.
Steering arm jerks exces- sively when starting or stop-	a. Worn p	vivot tube bushings.	Replace upper and lower pivot tube bush- ings.
ріпу ше тиск.	b. Drive ti incorre	re worn or mounted ctly.	Repair or replace.

NOTES



Figure 4-1. Electrical Wiring Diagram, 12 Volt (Sheet 1)



Figure 4-1. Electrical Wiring Diagram, 12 Volt (Sheet 2)



Figure 4-2. Electrical Schematic, 12 Volt (Sheet 1)



Figure 4-2. Electrical Schematic, 12 Volt (Sheet 2)



Figure 4-3. Electrical Schematic, 24 Volt Transistor (Sheet 1)



Figure 4-3. Electrical Schematic, 24 Volt Transistor (Sheet 2)

NOTES

SECTION 5 STEERING ARM AND CONTROL HEADS SERVICING.

SEE SUPPLEMENT 220 FOR TRANSISTOR SPEED CONTROL TRUCKS

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.

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.



Figure 5-2 Location of Resistors and Thermal Cutout Switch

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


Figure 5-4 Control Head Assembly





- 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).
- Disconnect speed control switches (4, Figure 5-4).
- Remove four screws (17) securing handle guard (36) to control head.
- Remove two socket head screws (18) and caps (29) from handle guard (36).
- 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).
- 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).
- Install handle guard (36), with two brackets (33 and 39) and switches (4) attached, and secure with two caps (29) and screws (18).
- 19. Install four screws (17) through handle guard and into control head.
- 20. Reconnect speed control switches (4).
- 21. Install top cover (15, 16 or 17, Figure 5-5) with four screws (14).
- 22. Reconnect connector (25, Figure 5-6).
- 23. Install control head onto steering arm with four socket head screws (17).
- 24. Reconnect battery.

5-6. STEERING ARM RETURN SPRING ADJUSTMENT.

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

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

5-7. STEERING ARM RETURN SPRING REPLACEMENT.

- **NOTE:** The steering arm return spring is replaced while the steering arm is in the upright position.
- 1. Disconnect battery.
- **NOTE:** The steering arm has a tendency to fall downward when the tension on the return spring is released.
- 2. Hold steering arm (12, Figure 5-6) in upright position and make sure the arm cannot fall.
- 3. Insert a 5/16 allen wrench through hole in bottom of steering arm and loosen screw (15).



Figure 5-6 Steering Arm and Pivot Cap

- **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.
- With a pair of vise-grip pliers, grip the flat surfaces of spring tube assembly (1), and slowly pull it free from the steering arm, pivot cap and tube clamp (10).
- **NOTE:** Steering arm return spring (2) will remain inside the spring tube assembly (1).

- Remove steering arm return spring (2) from spring tube assembly (1). If spring is severely jammed and will not come loose, punch and drive the 1/4-inch diameter roll pin (14) into the tube. Save pin for reuse. Remove the spring. Tap roll pin back into place.
- 8. Lubricate the ends and outer surface of the new steering arm return spring (2) with a lithium base general purpose grease.
- 9. Insert spring into spring tube assembly and press in, making sure that one spring loop eye fits over the 3/8-inch roll pin (13) at the closed end of the spring tube assembly.

- 10. Slide spring tube assembly into pivot cap (3) and steering arm (12) through tube clamp (10) and through loop of electrical cable.
- 11. Align radial position of spring tube assembly in accordance with line drawn in step 5. Slowly rotate spring tube assembly a few degrees each way until the steering arm return spring snaps into place over spring pins (6 and 7) then tighten screw (15).
- 12. Apply engine lubricating oil (No. 2) to the steering arm elbow.
- 13. Remove block from under steering arm.
- 14. Adjust tension on steering arm return spring as explained in paragraph 5-6.
- 15. Reconnect battery.

5-8. PIVOT TUBE REPLACEMENT.

- **NOTE:** All electrical connections and cabling should be tagged with identifying labels before disconnecting.
- **NOTE:** A chain hoist is required for this procedure. It should be in position above the pivot tube before disassembly.
- 1. Remove the transmission as described in SECTION 7.
- 2. Position a support under pivot tube (7, Figure 5-8).
- 3. Remove pivot cap cover (21, Figure 5-6).
- 4. Remove electrical control cable, steering arm and control head from pivot tube assembly.
- 5. Remove snap ring (26) and pin (27).
- 6. Remove pivot cap (3).
- 7. Position a chain hoist above the pivot tube.
- 8. 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.



Figure 5-7 Pivot Tool Removal Tool

- 9. Remove cotter pin (10, Figure 5-8) and pull out spring support pin (12).
- 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) and support ring (14).
- 12. Remove three screws (2) securing bushing (3).
- 13. Remove lower pivot bushing (3).
- 14. Remove upper pivot bushing (5).
- 15. Inspect the bearing (6) for wear. If worn, replace with new bearing.
- 16. Discard the two old bushings (3 and 5).
- **NOTE:** When installing the new parts, refer to Figure 5-8 to be sure they are positioned on the pivot tube in the proper order.
- 17. Install bushing (3) with screws (2).
- 18. Install bushing (5).
- 19. Install support ring (14), thrust bearing (6), spring (13) and spring support (11).
- 20. Route support chain through pivot weldment and through support ring (14) (If Equipped), thrust bearing (6), spring (13) and spring support (11).

- 21. Attach hoist chain to pivot tube as described in step 8.
- 22. Install the pivot tube (7) through the bottom of the truck and position a support under pivot tube.
- 23. Attach spring support (11) to pivot tube with spring support pin (12).
- 24. Secure spring support pin (12) with cotter pin (10).
- 25. Remove hoist chain and the two pivot cap cover screws or pivot tube tool as applicable.
- **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.
- 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.
- Use Amp Extraction Tool part number 900750 to push out and disconnect wire pins from connector (8).
- 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.

- 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).
- 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.







PIVOT TUBE

4(REF)

2(REF)

NOTES

SECTION 6 BRAKE SERVICING

6-1. 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:

- 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. 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 6-1 Brake Engage/Disengage



Figure 6-2 Adjustment

- 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.
- 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 deadman brake switch (42, Figure 6-3) 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. REPLACEMENT OF DISC BRAKEPARTS

- 1. Disconnect battery connections.
- 2. Block the wheels to prevent the truck from rolling.
- 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 6-3) and link pin (7), then swing the clevis (13) up out of the way.
- 6. Remove two nuts (28) and lockwasher (29).
- 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).
- Remove the retaining C-ring (34), washer (35), spring (36), bracket (38), lever (39), and washer (40) from the brake pad (37).
- 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.
- 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 6-1.
- 19. Install the base access cover.
- 20. Reconnect battery connections.



Figure 6-3 Parts Replacement

6-3. Replacement of Brake Disc.

- 1. Disconnect the battery.
- 2. Block the wheels to prevent the truck from rolling.
- 3. Remove the base access cover.
- 4. Position the steering arm to the left as far as possible, and secure the steering arm down from its park position so that the mechanical brake is disengaged.
- 5. Remove the cotter pin (2, Figure 6-3) 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 6-1.
- 19. Reconnect the battery.

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

7-1. TRANSMISSION REMOVAL AND DISASSEMBLY

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

 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

- 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).
- 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 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.



Figure 7-2 Transmission Removal

7-3. CASTER WHEELS.

- 1. Unload the truck and block the drive wheel and load wheels.
- 2. Disconnect the battery.
- 3. Raise the rear of the lift truck with a jack or another lift truck and place supporting boards or steel bars under the body approximately six inches in front of the caster wheel that is to be changed.
- 4. Lower the lift truck onto the support.
- 5. Remove the 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).



Figure 7-3 Caster Wheel Assembly 901610

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.
- 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.
- Remove the snap ring (5, Figure 7-4), 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.
- 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.



Figure 7-4 Load Wheels

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 (12 Volt)

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.
- Slacken the lift chains by loosening the nut (19, Figure 8-1) below the chain adjusting bolt (16) on the lift carriage.
- 4. Lift the lift chains (7) off the ram head (13) and lay on the mast support.
- 5. Remove screw (12) and lock washer (11) and lift the ram head (13) off the lift cylinder.
- 6. Reinstall ram head in reverse order of removal.
- 7. Adjust lift chains as described in paragraph 8-5.



Figure 8-1 Standard Masts (12 Volt Non-Telescopic)

8-2.2. Telescopic Trucks (12 Volt With 12 Inch Free Lift)

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.
- Slacken the lift chains by loosening the nut (24, Figure 8-2) below the chain adjusting bolt (14) on the lift carriage.

- 4. Lift the lift chains (29) off the ram head (20) and lay on the mast support.
- 5. Remove screw (18), lockwasher (19), from top of ram head (20).
- 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 8-5.



Figure 8-2 Standard Masts (12 Volt Telescopic With 12 Inch Free Lift)

8-2.3. Telescopic Trucks (24 Volt With 12 Inch Free Lift)

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.
- Slacken the lift chains by loosening the nut (24, Figure 8-3) below the chain adjusting bolt (14) on the lift carriage.

- 4. Lift the lift chains (29) off the ram head (20) and lay on the mast support.
- 5. Remove screw (18), lockwasher (19), from top of ram head (20).
- 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 8-5.



Figure 8-3 Standard Masts (24 Volt Telescopic With 12 Inch Free Lift)

8-2.4. Telescopic Trucks (12 Volt Without 12 Inch Free Lift)

- **WARNING:** Before attempting any service make certain power is disconnected.
- 1. Lower the lift carriage fully.
- 2. Disconnect the battery.
- Slacken the lift chains by loosening the nut (20, Figure 8-4) below the chain adjusting bolt (18) on the lift carriage.
- 4. Lift the lift chains (6) off the sheaves of ram head (16) and lay on the mast support.
- 5. Remove screw (13), lockwasher (12), from top of ram head (16).
- 6. Remove screws (11), and lockwashers (2) and lift the ram head (16) off the lift cylinder.
- 7. Reinstall ram head in reverse order of removal.
- 8. Adjust lift chains as described in paragraph 8-5.



Figure 8-4 Standard Masts (12 Volt Telescopic Without 12 Inch Free Lift)

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.
- Slacken the lift chains by loosening the nut (21, Figure 8-5) 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 8-5.



Figure 8-5 Inner and Outer Masts (Full Free Lift)

8-4. LIFT CHAIN WEAR INSPECTION

Both lift chains should be replace when either chain is worn enough to increase it's length by 3% or more. To make this determination proceed as follows.

Using a section of chain that sees the most frequent operation over the chain sheaves, isolate a vertical portion under tension from the weight of carriage and forks.

Measure the distance between pin centers on 20 vertical links. If the section measures 12.88" or more, the chain should be replaced.

New chain anchor pins should be installed when chains are replaced. Never replace a partial section of chain and never repair a damaged chain. Refer to paragraph 8-6. when installing new chain.

8-5. 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.

8-5.1. Telescopic and Non-Telescopic Trucks

- 1. Fully lower lift carriage.
- 2. Disconnect the battery.
- Loosen jam nut (17, Figure 8-1 or Figure 8-4; or 24, Figure 8-2 or Figure 8-3) on chain adjusting bolt on the lift carriage.
- Take up slack by tightening nut (19, Figure 8-1; 16, Figure 8-2 or Figure 8-3; or 20, Figure 8-4) 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 (17, Figure 8-1 or Figure 8-4; or 24, Figure 8-2 or Figure 8-3).
- 6. Reconnect battery.
- 7. Test chain by operating carriage. If slack is still apparent repeat above procedure.

8-5.2. Full Free Lift Trucks

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

- 3. Loosen jam nut (23, Figure 8-5) on chain adjusting bolt on the back of the lift carriage.
- 4. Take up slack by tightening nut (21) 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 (23).
- 6. Reconnect battery.
- 7. Test chain by operating carriage. If slack is still apparent repeat above procedure.

8-6. LIFT CHAIN REPLACEMENT

8-6.1. Non-Telescopic and 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.
- Remove the cotter pin (8 Figure 8-1; 11, Figure 8-2 or Figure 8-3; or 4, Figure 8-4) and clevis pin (6, Figure 8-1; 12, Figure 8-2 or Figure 8-3; or 5, Figure 8-4) from end of chain connected to mast cross brace.
- Remove the cotter pin (8 Figure 8-1; or 11, Figure 8-2 or Figure 8-3; or 4, Figure 8-4) and clevis pin (6, Figure 8-1; or 12, Figure 8-2 or Figure 8-3; or 5, Figure 8-4) from end of chain connected to lift carriage.
- 5. Remove chain from ram (13, Figure 8-1; or 20, Figure 8-2 or Figure 8-3; or 16, Figure 8-4) and lay aside for repair.
- 6. Position new chain in place on sheave.
- Connect end of chain to lift carriage adjusting bolt (16, Figure 8-1; or 14, Figure 8-2 or Figure 8-3; or 18, Figure 8-4) with the clevis pin (6, Figure 8-1; 12, Figure 8-2 or Figure 8-3; or 5, Figure 8-4) and cotter pin (8, Figure 8-1; or 11, Figure 8-2 or Figure 8-3; or 4, Figure 8-4).
- Connect end of chain to chain anchor on mast cross brace with the clevis pin (6, Figure 8-1; or 12, Figure 8-2 or Figure 8-3; or 5, Figure 8-4) and cotter pin (8, Figure 8-1; or 11, Figure 8-2 or Figure 8-3; or 4, Figure 8-4).

9. Adjust chain according to paragraph 8-5.

8-6.2. Full Free Lift Trucks

- 1. Place a solid block on floor under the vertical members nearest the center of the lift carriage.
- 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 8-5) and clevis pin (13) from end of chain connected to cylinder.
- 4. Remove the cotter pin (22) and clevis pin (13) from end of chain connected to lift carriage.
- 5. Remove chain from sheave (18) and lay aside for repair.
- 6. Position new chain in place on sheave.
- 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).
- 9. Adjust chain according to paragraph 8-5.

8-7. LIFT CYLINDER REMOVAL.

8-7.1. 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 (14, Figure 8-1) by removing nuts (15) and lockwashers (2).
- 10. Remove screw (1, Figure 8-1; 3, Figure 8-2 or Figure 8-3; or 1, Figure 8-4) and washers (2 and 3, Figure 8-1; or 1 and 2, Figure 8-2 or Figure 8-3; or 2 and 3, Figure 8-4) from bottom of lift cylinder.
- 11. Raise the lift cylinder up and out of the truck.
- NOTE: Disassembly of lift cylinder is covered in SEC-TION 9.
- 12. Reinstall lift cylinder in reverse order of removal.
- 13. Adjust chain according to paragraph 8-5.

8-7.2. 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, (8, Figure 8-5) lock washer (7) and flat washer (25) securing the top of lift cylinder to the inner mast.
- Remove the hex head cap screw, (8) lock washer
 (7) and flat washer (6) securing the bottom of lift cylinder.
- **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 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 SEC-TION 9.
- 12. Reinstall lift cylinder in reverse order of removal.
- 13. Adjust lift chains as described in paragraph 8-5.

8-8. INNER MAST REMOVAL.

- 1. Remove the lift carriage as described in paragraph 8-9.
- **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.
- Remove lift cylinder as described in paragraph 8-7.
- 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.
- Lubricate the newly installed mast as described in paragraph 8-10.

8-9. LIFT CARRIAGE AND MAST REPLACEMENT.

- 1. Place a solid block on floor under the vertical members nearest the center of the lift carriage.
- 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 8-7), 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 8-6).
 - 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 8-5.

8-10.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
- Apply a Lithium base general purpose grease with a brush to the full length of masts where rollers touch.

8-11.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 using silicone grease part number 005753 as shown in Figure 8-8.



Figure 8-6 Llft Carriage (Shaft Type) (Telescopic, Non-Telescopic and FFL)

- **CAUTION:** Both straddles must be adjusted with equal number of holes exposed on each side.
- 5. Retighten the straddle bolts to 200 ft. lbs.

8-12.BASE AND FRAME

8-12.1. Cabinet Door Latch

- 1. Install spring latch (29, Figure 8-9) on cabinet door (24) using two screws (33) and nuts (25).
- 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).

8-12.2. Battery Compartment Cover Removal

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

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

8-12.3. Battery Connector Replacement

- 1. Disengage battery connectors (23, Figure 8-9) by pulling up on handle (30).
- 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.



Figure 8-7 ITA Lift Carriages



Figure 8-8 Adjustable Straddle Frame



Figure 8-9 Base and Frame

SECTION 9 HYDRAULIC SYSTEM SERVICING

9-1. RELIEVING SYSTEM PRESSURE.

- **WARNING:** Hydraulic system pressure must be relieved before removing hydraulic system components. Use the following procedure to relieve system pressure:
- 1. Fully lower the lift carriage unless the procedure for a component directs differently.
- 2. Disconnect battery.
- **CAUTION:** Use rags and a suitable container to catch any dripping oil when the hydraulic lines are disconnected. Wipe off any spilled oil immediately.
- 3. Obtain a suitable container to catch any oil that may escape when opening a line.
- 4. Open the low pressure line at any convenient connection near the component that is to be repaired or replaced.

9-2. 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 (21, Figure 9-3) and drain hydraulic oil into a suitable container.
- 2. Remove the leaking line or fitting and replace it with a new one. Refer to Figure 9-1, Figure 9-2 and Figure 9-3.
- 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 (21, Figure 9-3) and drain hydraulic oil into a suitable container.
- 4. Remove short section of vinyl hose (14) that connects filter to the pump.
- 5. Unscrew filter (16) 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 (15) 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.



Figure 9-1 Hydraulic Installation (TEL and NON-TEL)



Figure 9-2 Hydraulic INstallation (FFL)



Figure 9-3 Panel Assembly

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).
- Place a strong support under the inner mast on telescopic models or under lift carriage on nontelescopic models and lower forks so that inner mast or lift carriage rests on the support.
- **WARNING:** Before disconnecting any hydraulic lines, make certain the system is not under pressure. Refer to paragraph 9-1.
- 3. Disconnect battery.
- 4. Disconnect hose assembly (20, Figure 9-3) at fitting (4, Figure 9-1 or Figure 9-2).
- 5. Remove flow control valve (5, Figure 9-1 or 7, Figure 9-2).
- 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.
- 12. Raise and lower the lift carriage and check for leaks.

9-5. HYDRAULIC PUMP AND MOTOR ASSEMBLY

The hydraulic pump and motor assembly may be repaired. Pump motor repair is covered in SECTION 10. If the hydraulic pump and motor assembly is disassembled, the pump shaft seal (9, 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 (21, Figure 9-3) 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 (23, Figure 9-3), attaching pump and motor assembly to panel and remove pump and motor assembly.
- 5. Remove the pump bolts (13, Figure 9-5) 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.
- **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.



Figure 9-4 Hydraulic Pump and Motor Assembly - 12 Volt



9-6. CONTROL VALVE SERVICE

Repair parts for the control valve are illustrated in Figure 9-6.

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 (21, Figure 9-3) and drain hydraulic oil into a suitable container.
- 10. Label and disconnect the electrical wires from the switch (12, Figure 9-6) 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 9-6) 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.


Figure 9-6 Hydraulic Control Valve Assembly

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.
- Loosen the upper nut (9, Figure 9-6) on the lift control lever (7) being careful that the clamp (10) does not come off the cam (3) and that the handle return spring (11) remains secure at the roll pins (8) to keep the lever centered and in a neutral position.
- 3. Note the point where the handle knob (6) and lever (7) come together as a reference point for the next few steps.
- 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 9-6) 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 SEC-TION 8.
- **CAUTION:** Use proper pipe clamp-type vise. The cylinder will be distorted if the vise is tightened too much.
- Secure lift cylinder tube assembly in vise and remove gland nut (3, Figure 9-7), 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 piston (14), 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 (15) be replaced.
- 6. Reassemble the cylinder in reverse order of disassembly.



Figure 9-7 Lift Cylinder - Non-Telescopic and Telescopic Trucks

9-7.2. Full Free Lift

NOTE: Removal procedures are covered in SEC-TION 8.

Refer to Figure 9-8 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.
- 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.
- 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.
- 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).
- 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 9-8 (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.



Figure 9-8 Lift Cylinder - Full Free Lift

NOTES

SECTION 10 ELECTRICAL COMPONENTS

10-1.ELECTRICAL CONTROL PANELS.

SEE SUPPLEMENT 228 FOR 12 VOLT TRANSISTOR SPEED CONTROL TRUCKS

The 12-volt resistor panel part number 505862 is shown in Figure 12-37. The 24-volt transistor panel part number 505922 is shown in Figure 12-38. These Figures identify parts associated with the complete electrical control panel assembly.

10-2.12 Volt Resistor Contactor Servicing.

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

10-2.1.2nd Speed, 3rd Speed, Dynamic Brake Single Pole Contactor Disassembly. (Refer to Figure 10-1)

- **NOTE:** Order contactor tip kit **part number 900531-08**. One kit repairs one 2nd or 3rd speed contactor or the dynamic brake contactor. Kit includes items (3, 5, 8 and 12).
- 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).
- 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).
- Attach coil (11) to frame (2) with flat washer and 5/8 inch long hex head bolt. Be sure braid assembly (3) has been attached to frame (2) with 3/4 inch bolt, flat washer, lock washer and nut. Use 10mm wrench on nut.
- 3. Attach frame (2) to base molding (1) by engaging slots at bottom of frame (2) behind flanges near lower edge of base molding (1).
- 4. Snap slots of top of front molding (4) into flanges of base (1). Coil assembly should now securely attach to base (1).
- 5. Install spacer (13) in front molding (4) and install front contact (12) secure with washer, lock washer and hex nut. Use 10 mm wrench on nut.
- 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).



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

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).
- Remove nut bolt and washer securing bus bar (14), (if used) to back contact (16).
- 3. Slide back contact (16) up as far as possible then squeeze sides of rear molding (17) together and lift off frame (2). Separate two sides of rear molding and remove back contact (16).
- 4. Remove nut holding armature plate retainer (5) and remove retainer by squeezing in on tabs and lifting up.

- 5. Slide braid assembly (3) off contact (8) and remove contact (8) and armature plate (9) and spring (6).
- 6. Use a 10 mm wrench to remove nut holding front contact (12) and remove contact.
- **NOTE:** If only contacts are to be replaced, no further disassembly is required. Proceed to step 7. to replace coil.
- 7. Remove spacer (13).
- 8. Squeeze sides of front molding (4) and pull forward to disengage from base molding (1). Remove base molding and remove front molding from frame (2).
- 9. Coil can now be removed from frame (2) by removing 3/4 inch long hex head screw and flat washer.



Figure 10-2 Double Pole Contactor, Forward, Reverse

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

- 5. Install spacer (13) in front molding (4) and install front contact (12) secure with washer, lock washer and hex nut. Use a 10 mm wrench on nut.
- 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 mold-ing all the way down.
- Release back molding and press back contact (16) down into position. Armature will need to be pressed down to position back contact.
- 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).

10-3.PUMP MOTORS.

NOTE: Removal procedures are covered in SEC-TION 8.

Refer to Figure 12-33 or Figure 12-34 for motor disassembly.

10-4.DRIVE MOTOR.

NOTE: Removal procedures are covered in SEC-TION 6.

Refer to Figure 12-35 or Figure 12-36 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 (24, Figure 12-10 or Figure 12-11).
- 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.
- 7. 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 battery charger wiring diagram is shown in Figure 10-4. Parts identification information is shown in Figure 12-43.



Figure 10-3 High Speed Llmit Switch



Figure 10-4 Smart Battery Charger Schematic Diagram

SECTION 11 OPTIONAL EQUIPMENT

11-1.KEYSWITCH

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

11-2.HOUR METER

The hour meter is attached to the motor circuits to indicate actual usage of the drive and lift function. Refer to Figure 12-44 for replacement parts and to the schematic diagram, Figure 4-1 and Figure 4-2 for wiring information.

11-3.BATTERY CAPACITY INDICATOR.

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

11-4.REMOTE CONTROL.

Refer to Figure 12-29 and Figure 12-30 for removal and parts identification of the remote control option.

NOTES

SECTION 12 ILLUSTRATED PARTS BREAKDOWN

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



Figure 12-1 Control Head Assembly

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

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





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

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

AR - AS REQUIRED



Figure 12-3 Control Head Cold Conditioning

INDEX	PART		NO.
NO.	NO.		REQD.
1	018909	RESISTORS	2
2	068187	SCREW	2
3	023014	WIRE	AR
4	400544	BRACKET, RESISTOR	1
5	018214	INSULATOR, SWITCH	1
6	402829	BRACKET	1
7	077007	WASHER, FLAT	2
8	077204	SPLIT LOCK WASHER #6	2

INDEX NO.	PART NO.	PART NAME	NO. REQD.
9	072400-01	HEX HD. SLOTTED SCREW, 6-32 X 1/2	2
10	059632	NUT, HEX, 5-40	2
11	400044	BRACKET THERMAL CUTOUT	1
12	020736	THERMAL CUTOUT SWITCH	1
13	005643	CONTACT PIN	2
14	403372	INSULATION BUSHING	2

AR - AS REQUIRED



Figure 12-4 Steering Arm and Pivot Cap

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	505765-01	CONTROL ARM ASSEMBLY	1
1	065569	. SOCKET HEAD SCREW, 7/16-14 X 2-1/4	1
2	401127	. SPACER	1
3	504364	. CLAMP ASSY	1
4	501371 *	. SPRING TUBE ASSY	1
5	075060 *	. STEERING ARM RETURN SPRING	1
6	059426 *	. HEX NUT, 5/16-18	2
7	077210 *	. LOCK WASHER, 5/16	2
8	060417	. COTTER PIN, 3/32 X 3/4	2
9	060300	. PIN, CLEVIS	1
10	052876	. BUMPER	1
11	071337	. SCREW, 10-32 X 3/4	3
12	056200	. CLEVIS	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
13	800275	. STEERING ARM	1
14	285302 *	. SPRING PIN, 1/4	1
15	285303 *	. SPRING PIN, 3/8	1
16	800204	. TUBE CLAMP	1
17	402363	. PIVOT CAP	1
18	052925	FLANGED BEARING	1
19	052922	FLANGED BEARING	1
20	501673	. BRAKE ROD	1
21	069478	. PHILLIPS FLAT HD. SCREW, 1/4-20 X 3/4	2
22	402459	PIVOT CAP COVER	1
23	061716	SNAP RING	2
24	402452	PIN	1
25	065481	SOCKET HEAD SCREW, 1/4-20 X 1	4

HANDLE RETURN SPRING KIT 901325

*



Figure	12-5	Pivot Tube	Assembly
			,

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	—	TRANSMISSION (FIGURE 12-7)	REF
2	065538	SCREW, 5/16-18 X 5/8	1
3	053107	BUSHING, PIVOT	1
4	061000	ROLL PIN, 1/4 X 3/4	1
5	053108	BUSHING PIVOT	1
6	051146	BEARING, THRUST	1
7	505682-01	PIVOT TUBE WELDMENT (SEE NOTE)	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
8	064709	SCREW, HEX HEAD, 1/2-13 X 1-1/2	4
9	077412	LOCK WASHER EXTERNAL	4
10	060417	COTTER PIN	1
11	283902	SPRING SUPPORT	1
12	800005	SPRING SUPPORT PIN	1
13	075022	TRACTION SPRING	1
14	401695	SUPPORT RING	1

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



Figure 12-6 Brake and Linkage

INDEX	PART		NO.
NO.	NO.	PART NAME	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	0602186	CLEVIS PIN, 1/4	1
8	500202	BRAKE ROD	1
9	505206	LEVER ASSEMBLY	1
10	505199	BRACKET	1
11	060300	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	074328-01	SHIM, BROWN, 0.010	A/R
20	074328-02	SHIM, PINK, 0.020	A/R
20	074328-03	SHIM, CORAL, 0.030	A/R
21	059645	LOCKNUT, 5/8-18	1
22	077210	LOCK WASHER, 5/16	3
		1	

	PART		NO.
110.	NO.		nLQD.
23	063560	SCREW, CAP, HEX HD,	3
24	077211	LOCK WASHER, 3/8	2
25	064605	HEX HEAD CAP SCREW, 3/8-16 X 1, HEAT TREATED	1
26	800119	CLEVIS	1
27	052821	DISC BRAKE CALIPER ASSY	1
28	059421	. HEX NUT, 1/4-20	2
29	077209	. LOCK WASHER	2
30	901189	. BOLT	2
31	901190	. SPACER	2
32	901191	. SPRING	2
33	901188	. BRAKE PAD	1
34	901198	. C-RING	1
35	901197	. WASHER	1
36	901196	. SPRING	1
37	901192	. BRAKE PAD WITH PIN	1
38	901195	. BRACKET	1
39	901194	. LEVER	1
40	901193	. WASHER	1
41	068336	ROUND HEAD SCREW, 6-32 S 1-1/2	2
42	—	SWITCH-DEADMAN (FIGURE 12-10)	REF
REF	—	HORN 12V (FIGURE 12-10)	1
REF	—	HORN 24V (FIGURE 12-11)	1





	INDEX	PART		NO.
	NO.	NO.	PART NAME	REQD.
		501720	TRANSMISSION ASSY (12 VOLT)	1
	—	503195	TRANSMISSION ASSY, HIGH TORQUE (24 VOLT)	1
	1	050700	. AXLE SHAFT	1
	2	073504	. OIL SEAL	1
	3	051112	. ROLLER BEARING CONE	2
	4	051111	. ROLLER BEARING CUP	2
	5	026302	. DRAIN PLUG	1
	6	057210	. SPUR GEAR	1
	7	077600	. LOCK WASHER	1
	8	059680	. LOCKNUT	1
	9	051126	. BALL BEARING	1
	10	057902	. SQUARE KEY, 5/16 X 1-3/8	1
	11	057211	. SPUR PINION	1
	12	057233*	. INTERMEDIATE GEAR	1
	12	057246**	. INTERMEDIATE GEAR (HIGH TORQUE)	1
	13	074701	. PINION SPACER	1
	14	051125	. BALL BEARING	1
	15	074706	. BEARING SPACER	1
	16	036105	. COVER GASKET	1
	17	800073	. TRANSMISSION COVER	1
	18	077211	. LOCK WASHER 3/8	11
	19	064611	. HEX HEAD CAP SCREW, 3/8-16 X 1-3/4	7
	20	036106	. BEARING COVER GASKET	1
	21	051159	. BEARING COVER	1
	22	063555	. HEX HEAD CAP SCREW, 5/16-18 X 1	4
	23	077210	. LOCK WASHER, 5/16	4
	24	064620	. HEX HEAD CAP SCREW, 3/8-16 X 3-3/4	2
I		1	1	

INDEX NO.	PART NO.	PART NAME	NO. REQD.
25	064615	. HEX HEAD CAP SCREW, 3/8-16 X 2-1/4	2
26	060428	. COTTER PIN	1
27	059745	. HEX NUT, 5/8-18	1
28	057234*	. MOTOR PINION SPUR	1
28	057247**	. MOTOR PINION SPUR (HIGH TORQUE)	1
29		. NOT USED	1
30	060585	. DOWEL PIN	3
31	800072	. TRANSMISSION HOUSING	1
32	026304	. FILL PLUG	1
	500940	DRIVE WHEEL ASSY	1
33	800025	. HUB	1
34	079161	. RUBBER WHEEL, 10-1/2 IN.	1
35	077215	LOCK WASHER, 5/8	5
36	064828	HEX HEAD CAP SCREW, 5/8-18 X 1	5
37	042114	O-RING	1
38	—	DRIVE MOTOR 12V (FIGURE 12-35)	REF
38	—	DRIVE MOTOR 24V (FIGURE 12-36)	REF
39	026704	STREET ELBOW, 3/8	1
40	076701	VENT	1
41	_	NOT USED	
42	021226	TERMINAL BLOCK (RESISTOR SPEED CONTROL)	1
43	068185	SCREW	4
44	077203	LOCK WASHER	4
45	059410	HEX NUT	4

* USED IN TRANSMISSION PART NUMBER 501720

* USED IN TRANSMISSION PART NUMBER 501195



Figure 12-8 Base and Frame (Type E)

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	069478	SCREW, FLAT HD, 1/4-20 X 3/4	15
2	111142	PLATE, ACCESS, BASE	1
3	069461	SCREW, FL HD, 5-40 X 1/2	2
4	058108	LATCH, DOOR, SPRING	1
5	059632	NUT, HEX, LOCK, 5-40	2
6	077209	WASHER, LOCK, SPLIT	17
7	059421	NUT, HEX, 1/4-20	17
8	500754	CABINET DOOR ASSY	1
9	506188	DOOR WELDMENT, LH	1
10	057511	GROMMET	1
11	059423	NUT, HEX, ACORN CAP, 1/4-20	4

INDEX NO.	PART NO.	PART NAME	NO. REQD.
12	077031	WASHER, FLAT	10
13	506114	SCREEN GUARD ASSY	1
14	401790	BRACKET, STOP, DOOR	1
15	061002	PIN, ROLL, 1/4 X 3/4	1
16	058100	LATCH, DOOR	2
17	077208	WASHER, LOCK, SPLIT, 3/16	4
18	071376	SCREW, TRUSS HD, 10-32 X 1/2	4
19	506113	COVER, HDY COMPT	1
20	506189	DOOR WELDMENT, RH	1
21	401425	BRACKET, SPACER, BATT	2
22	403605	PAD, SPACING	2



Figure 12-9 Base and Frame (Type EE)

INDEX NO.	PART NO.	PART NAME	NO. REQD
1	069478	SCREW, FLAT HD, 1/4-20 X 3/4	15
2	111142	PLATE, ACCESS, BASE	1
3	069461	SCREW, FL HD, 5-40 X 1/2	2
4	058108	LATCH, DOOR, SPRING	1
5	059632	NUT, HEX, LOCK, 5-40	2
6	077209	WASHER, LOCK, SPLIT	17
7	059421	NUT, HEX, 1/4-20	17
8	500754	CABINET DOOR ASSY	1
9	506188	DOOR WELDMENT, LH	1
10		NOT USED	
11	059423	NUT, HEX, ACORN CAP, 1/4-20	4
12	077031	WASHER, FLAT	10
13	500757	SCREEN GUARD ASSY	1
14	401790	BRACKET, STOP, DOOR	1

REQD.
/4 X 3/4 1
0R 2
DCK, SPLIT, 3/16 4
JSS HD, 10-32 X 1/2 4
COMPT 1
DMENT, RH 1
PACER, BATT 2
BATTERY 2
A/R
32 X 1/2 2
ER 1
6-32 2
DCK, #6 2



Figure 12-10 Base and Frame - Electrical -12 Volt

INDEX	PART		NO.	1	INDEX	PART	
NO.	NO.	PART NAME	REQD.		NO.	NO.	PART NAME
1	—	PANEL ASSEMBLY	REF		26	056135	CLAMP
		(FIGURE 12-37)			27	076200	WRAP, ZIPPER
2	023025	HARNESS ASSEMBLY	1		29	068480	SCREW, 1/4-28 X 1
3	021724	TERMINAL BOARD	1		30	070476	SCREW, 1/4-20 X 1/2
4	023083	CONTROL CABLE	1		31	059422	NUT, BRASS, 1/4-20
5	504154-07	CABLE ASSEMBLY	1		32	077105	WASHER, BRASS
6	504154-06	CABLE ASSEMBLY	1		33	068185	SCREW, #5-40 X 1-3/8
7	506115	CONNECTOR ASSEMBLY	1		34	077203	LOCK WASHER, #5
8	506116	CONNECTOR ASSEMBLY	1		35	059410	NUT, HEX, #5-40
9	010614	STANDOFF	1		36	069478	SCREW, 1/4-20 X 3/4
10	504154-04	CABLE ASSEMBLY	1		37	504364	CLAMP AND NUT ASSEMBLY
11	504154-05	CABLE ASSEMBLY	1		38	056122	CLAMP
12	005450	HANDLE	1		39	069470	SCREW. 10-24 X 1/2
13	077209	LOCK WASHER, 1/4	11		40	059418	NUT, 10-24
14	059421	HEX NUT, 1/4-20	3		41	077030	WASHER
15	059429	HEX NUT, 3/8-16	2		42	056113	WIRE HARNESS TIE
16	072211	LOCK WASHER, 3/8	2		43	063478	SCREW, 1/4-20 X 3/4
17	005405	BUSHING, RELIEF	2		44	021210	TERMINAL
17	019910 *	BUSHING, RELIEF	2		45	021204	TERMINAL
18	020703	LIMIT SWITCH	1		46	023018	WIRE, 16 GA
18	020689 *	LIMIT SWITCH	1		47	021718	TERMINAL
19	020729	DEADMAN SWITCH	1		48	056142-01	CLAMP, DOUBLE
19	020690 *	DEADMAN SWITCH	1		49	075620	STUD-BRASS, 1/4-20
20	800082	HORN, 12 V	1		50	077031	WASHER
21	023117	CABLE ASSEMBLY	1		51	070475	SCREW
22	077007	WASHER	2		52	003128	BATTERY, 150 AMP (PDM-20, -25)
23	062503	RUBBER CHANNEL	A/R		52	003149	BATTERY, 200 AMP (PDM-30)
24	403845	BRACKET	1		—	—	LIFT MOTOR SOLENOID
25	077208	LOCK WASHER, #10	1				(FIGURE 12-26)

AR - AS REQUIRED * TRUCKS EQUIPPED WITH COLD CONDITIONING

NO. REQD.

REF



Figure 12-11 Base and Frame - Electrical -24 Volt

INDEX	PART		NO.	INDEX
NO.	NO.		REQD.	NO.
1	—	PANEL ASSEMBLY	REF	27
		(FIGURE 12-37)		28
2	023025		1	29
3	021724	TERMINAL BOARD	1	30
4	023196	HARNESS ASSEMBLY	1	31
5	506096	CABLE ASSEMBLY	1	32
6	504154-06	CABLE ASSEMBLY	1	33
7	506115	CONNECTOR ASSEMBLY	1	34
8	506117	CONNECTOR ASSEMBLY	1	35
9	010614	STANDOFF	2	36
10	504154-04	CABLE ASSEMBLY	1	37
11		NOT USED		38
12		NOT USED		39
13	077209	LOCK WASHER, 1/4	11	40
14	059421	HEX NUT, 1/4-20	3	41
15	059529	HEX NUT, 3/8-16	2	42
16	072211	LOCK WASHER, 3/8	2	43
17	005405	BUSHING, RELIEF	2	44
17	019910 *	BUSHING, RELIEF	2	45
18	020703	LIMIT SWITCH	1	46
18	020689 *	LIMIT SWITCH	1	47
19	020729	DEADMAN SWITCH	1	48
19	020690 *	DEADMAN SWITCH	1	49
20	800083	HORN, 24 V	1	50
21	023117	CABLE ASSEMBLY	1	51
22	077007	WASHER	2	52
23	062503	RUBBER CHANNEL	A/R	53
24	403845	BRACKET	1	54
25	077208	LOCK WASHER, #10	1	55
26	056135	CLAMP	1	56

INDEX NO.	PART NO.	PART NAME	NO. REQD.
27	076200	WRAP, ZIPPER	1
28		NOT USED	
29	068480	SCREW, 1/4-28 X 1	2
30	070476	SCREW, 1/4-20 X 1/2	2
31	059422	NUT, BRASS, 1/4-20	2
32	077105	WASHER, BRASS	4
33	068185	SCREW, #5-40 X 1-3/8	2
34	077203	LOCK WASHER, #5	2
35	059410	NUT, HEX, #5-40	2
36	069478	SCREW, 1/4-20 X 3/4	3
37	504364	CLAMP AND NUT ASSEMBLY	3
38	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	2
45	505881	RESISTOR ASSY	1
46	402553	SPACER	2
47	077056	WASHER	2
48	021210	TERMINAL	2
49	504096	SUPPRESSOR ASSY	1
50	504097	SUPPRESSOR ASSY	1
51	070475	SCREW	2
52	075620	STUD-BRASS, 1/4-20 UNC	2
53	056142-01	CLAMP - DOUBLE	2
54	077031	WASHER	2
55		BATTERY	2
56		BATTERY CHARGER	
		(FIGURE XX)	

AR - AS REQUIRED

* TRUCKS EQUIPPED WITH COLD CONDITIONING



Figure 12-12 Cold Conditioning Electrical

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	—	BATTERIES (Figure 12-10)	2
2	005471	CRIMP SPLICE	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
3	023011	WIRE, 10 AWG BLACK	A/R
4	021238	TERMINAL	1


Figure 12-13	Optional	Quick	Disconnect	Cable I	nstallation
--------------	----------	-------	------------	---------	-------------

INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	505626	QUICK DISCONNECT CABLE KIT	
1	505624	CONNECTOR ASSEMBLY - BATTERY	4
2	505620	CORD ASSY-CHARGING, EXTERNAL	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
3	505627-01	CONNECTOR ASSEMBLY - BATTERY	1
4	505627-02	CONNECTOR ASSEMBLY - BATTERY	1



Figure 12-14 Decals, Paint and Serial NUmbers

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	056631	BIG JOE DECAL	1
2	061299	TYPE "E" NAMEPLATE	1
3	066050	SCREW, ROUND HEAD DRIVE	8
4	056564	CAUTION DECAL	2
5	056626	DECAL, OIL LEVEL	1
6	056625	WARNING DECAL	1
7	056633	MAST DECAL	2

INDEX	PART		NO.
NO.	NO.	PART NAME	REQD.
8	056478	LIFT DECAL	1
9	056499	NO RIDER DECAL	1
10	056591	SAFETY DECAL	1
11	056494	CAUTION DECAL	1
12	061334	NAMEPLATE (STANDARD)	1
12	061335	NAMEPLATE (WITH ATTACH)	1
13	—	TYPE EE STENCIL	1



Figure 12-15 Adjustable Straddle Frame

	PART	PART NAME	NO.
4			HEQD.
1	505778	(SINGLE WHEEL)	1
2	505780	RIGHT STRADDLE	1
-		(TANDEM WHEEL)	-
	505779	LEFT STRADDLE	1
		(SINGLE WHEEL)	
	505781	LEFT STRADDLE	1
		(TANDEM WHEEL)	
	063870	BOLT	4
	077217	LOCKWASHER	4



NO. PART NAME REQD. 078409 4 IN. POLYURETHANE LOAD WHEEL AND BEARING ASSEMBLY (STANDARD) 2 078409 4 IN. POLYURETHANE LOAD WHEEL AND BEARING ASSEMBLY (PDM 30 TAN- DEM) 4 1 078435 .LOAD WHEEL 1 2 051128 .ROLLER BEARING 1 3 077033 SPACER 2 4 270306 AXLE 1 5 061725 SNAP RING 2 6 060974 ROLL PIN 1 7 077038 SEAL WASHER 2 8 025712 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 051136 .BALL BEARING ASSEMBLY (OPTIONAL) (3) IN. WIDE STRADDLE) 1 1 800032 .LOAD WHEEL, 2 IN. FACE 1 2 051136 .BALL BEARING ASSEMBLY (OPTIONAL) 2 3 <	INDEX	PART		NO.
078409 4 IN. POLYURETHANE LOAD 2 WHEEL AND BEARING ASSEMBLY (STANDARD) 4 078409 4 IN. POLYURETHANE LOAD 4 WHEEL AND BEARING ASSEMBLY (PDM 30 TAN- DEM) 1 1 078435 . LOAD WHEEL 1 2 051128 . ROLLER BEARING 1 3 077033 SPACER 2 4 270306 AXLE 1 5 061725 SNAP RING 2 6 060974 ROLL PIN 1 7 077038 SEAL WASHER 2 8 025712 GREASE FITTING 1	NO.	NO.		REQD.
	_	078409	4 IN. POLYURETHANE LOAD WHEEL AND BEARING ASSEMBLY (STANDARD)	2
1 078435 . LOAD WHEEL 1 2 051128 . ROLLER BEARING 1 3 077033 SPACER 2 4 270306 AXLE 1 5 061725 SNAP RING 2 6 060974 ROLL PIN 1 7 077038 SEAL WASHER 2 8 025712 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 051136 . BALL BEARING 2 3 077033 . SPACER 2 4 050710 AXLE 1 5 061725 SNAP RING 2 6 060974 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 ASSEMBLY (OPTIONAL) 2 1 07	_	078409	4 IN. POLYURETHANE LOAD WHEEL AND BEARING ASSEMBLY (PDM 30 TAN- DEM)	4
2 051128 . ROLLER BEARING 1 3 077033 SPACER 2 4 270306 AXLE 1 5 061725 SNAP RING 2 6 060974 ROLL PIN 1 7 077038 SEAL WASHER 2 8 025712 GREASE FITTING 1 \$01165 4 IN. POLYURETHANE LOAD WHEEL AND BEARING ASSEMBLY (OPTIONAL) (3 IN. WIDE STRADDLE) 4 1 800032 . LOAD WHEEL, 2 IN. FACE 1 2 051136 . BALL BEARING 2 3 077033 . SPACER 2 4 050710 AXLE 1 5 061725 SNAP RING 2 6 060974 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 ASSEMBLY (OPTIONAL) 2 1 078230 . LOAD WHEEL, 2-3/4 IN. FACE 1 <td>1</td> <td>078435</td> <td>. LOAD WHEEL</td> <td>1</td>	1	078435	. LOAD WHEEL	1
3 077033 SPACER 2 4 270306 AXLE 1 5 061725 SNAP RING 2 6 060974 ROLL PIN 1 7 077038 SEAL WASHER 2 8 025712 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 051136 . BALL BEARING 2 3 077033 . SPACER 2 4 050710 AXLE 1 5 061725 SNAP RING 2 6 060974 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 ASSEMBLY (OPTIONAL) 2 1 078230 . LOAD WHEEL, 2-3/4 IN. FACE 1 2 051130 BALL BEARING ASSEMBLY (OPTIONAL) 2	2	051128	. ROLLER BEARING	1
4 270306 AXLE 1 5 061725 SNAP RING 2 6 060974 ROLL PIN 1 7 077038 SEAL WASHER 2 8 025712 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 051136 . BALL BEARING 2 3 077033 . SPACER 2 4 050710 AXLE 1 5 061725 SNAP RING 2 6 060974 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 ASSEMBLY (OPTIONAL) 2 1 078230 . LOAD WHEEL, 2-3/4 IN. FACE 1 2 051130 . BALL BEARING ASSEMBLY (OPTIONAL) 2 3 077033 . SPACER 2	3	077033	SPACER	2
5 061725 SNAP RING 2 6 060974 ROLL PIN 1 7 077038 SEAL WASHER 2 8 025712 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 051136 . BALL BEARING 2 3 077033 . SPACER 2 4 050710 AXLE 1 5 061725 SNAP RING 2 6 060974 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 ASSEMBLY (OPTIONAL) 2 1 078230 . LOAD WHEEL, 2-3/4 IN. FACE 1 2 051130 . BALL BEARING 2 . RETAINERS 2 3 077033 . SPACER 2 3 077033 . SPACER	4	270306	AXLE	1
6 060974 ROLL PIN 1 7 077038 SEAL WASHER 2 8 025712 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 051136 . BALL BEARING 2 3 077033 . SPACER 2 4 050710 AXLE 1 5 061725 SNAP RING 2 6 060974 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 ASSEMBLY (OPTIONAL) 2 1 078230 . LOAD WHEEL, 2-3/4 IN. FACE 1 2 051130 . BALL BEARING 2 3 077033 . SPACER 2 3 077033 . SPACER 2 3 077033 . SPACER 2 4	5	061725	SNAP RING	2
7 077038 SEAL WASHER 2 8 025712 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 051136 . BALL BEARING 2 3 077033 . SPACER 2 4 050710 AXLE 1 5 061725 SNAP RING 2 6 060974 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 ASSEMBLY (OPTIONAL) 2 1 078230 . LOAD WHEEL, 2-3/4 IN. FACE 1 2 051130 . BALL BEARING 2 . RETAINERS 2 3 077033 . SPACER 2 3 077033 . SPACER 2 2 4 270306 AXLE 1 1 5 061725	6	060974	ROLL PIN	1
8 025712 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 051136 . BALL BEARING 2 3 077033 . SPACER 2 4 050710 AXLE 1 5 061725 SNAP RING 2 6 060974 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 ASSEMBLY (OPTIONAL) 2 1 078230 . LOAD WHEEL, 2-3/4 IN. FACE 1 2 051130 . BALL BEARING ASSEMBLY (OPTIONAL) 2 3 077033 . SPACER 2 4 270306 AXLE 1 5 061725 SNAP RING 2	7	077038	SEAL WASHER	2
501165 4 IN. POLYURETHANE LOAD WHEEL AND BEARING ASSEMBLY (OPTIONAL) (3 IN. WIDE STRADDLE) 4 1 800032 . LOAD WHEEL, 2 IN. FACE 1 2 051136 . BALL BEARING 2 3 077033 . SPACER 2 4 050710 AXLE 1 5 061725 SNAP RING 2 6 060974 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 ASSEMBLY (OPTIONAL) 2 1 078230 . LOAD WHEEL, 2-3/4 IN. FACE 1 2 051130 . BALL BEARING ASSEMBLY (OPTIONAL) 2 3 077033 . SPACER 2 3 077033 . SPACER 1 4 270306 AXLE 1 1	8	025712	GREASE FITTING	1
1 800032 . LOAD WHEEL, 2 IN. FACE 1 2 051136 . BALL BEARING 2 3 077033 . SPACER 2 4 050710 AXLE 1 5 061725 SNAP RING 2 6 060974 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 ASSEMBLY (OPTIONAL) 2 3 077033 . SPACER 2 4 270306 AXLE 1 5 061725 SNAP RING 2	_	501165	4 IN. POLYURETHANE LOAD WHEEL AND BEARING ASSEMBLY (OPTIONAL) (3 IN. WIDE STRADDLE)	4
2 051136 . BALL BEARING 2 3 077033 . SPACER 2 4 050710 AXLE 1 5 061725 SNAP RING 2 6 060974 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 . RETAINERS 2 3 077033 . SPACER 2 4 270306 AXLE 1 5 061725 SNAP RING 2	1	800032	. LOAD WHEEL, 2 IN. FACE	1
3 077033 . SPACER 2 4 050710 AXLE 1 5 061725 SNAP RING 2 6 060974 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 . RETAINERS 2 3 077033 . SPACER 2 4 270306 AXLE 1 5 061725 SNAP RING 2	2	051136	. BALL BEARING	2
4 050710 AXLE 1 5 061725 SNAP RING 2 6 060974 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 . RETAINERS 2 3 077033 . SPACER 2 4 270306 AXLE 1 5 061725 SNAP RING 2	3	077033	. SPACER	2
5 061725 SNAP RING 2 6 060974 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 . RETAINERS 2 3 077033 . SPACER 2 4 270306 AXLE 1 5 061725 SNAP RING 2	4	050710	AXLE	1
6060974ROLL PIN10782563 IN. POLYURETHANE LOAD WHEEL AND BEARING ASSEMBLY (OPTIONAL)21078230. LOAD WHEEL, 2-3/4 IN. FACE12051130. BALL BEARING . RETAINERS23077033. SPACER24270306AXLE15061725SNAP RING2	5	061725	SNAP RING	2
0782563 IN. POLYURETHANE LOAD WHEEL AND BEARING ASSEMBLY (OPTIONAL)21078230. LOAD WHEEL, 2-3/4 IN. FACE12051130. BALL BEARING . BALL BEARING23077033. SPACER24270306AXLE15061725SNAP RING2	6	060974	ROLL PIN	1
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 061725 SNAP RING 2	_	078256	3 IN. POLYURETHANE LOAD WHEEL AND BEARING ASSEMBLY (OPTIONAL)	2
2 051130 . BALL BEARING 2 . RETAINERS 2 3 077033 . SPACER 2 4 270306 AXLE 1 5 061725 SNAP RING 2	1	078230	. LOAD WHEEL, 2-3/4 IN. FACE	1
. RETAINERS 2 3 077033 . SPACER 2 4 270306 AXLE 1 5 061725 SNAP RING 2	2	051130	. BALL BEARING	2
3 077033 . SPACER 2 4 270306 AXLE 1 5 061725 SNAP RING 2			. RETAINERS	2
4 270306 AXLE 1 5 061725 SNAP RING 2	3	077033	. SPACER	2
5 061725 SNAP RING 2	4	270306	AXLE	1
	5	061725	SNAP RING	2
6 060974 ROLL PIN 1	6	060974	ROLL PIN	1



INDEX NO.	PART NO.	PART NAME	NO. REQD.
—	901610	CASTER AND WHEEL ASSY	2
1	077082	. CASTER MOUNTING SPACERS	4
2	901612	. AXLE AND NUT	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
3	901611	. WHEEL AND BEARING	1
		ASSEMBLY	
4	901621	. AXLE INSERT (BUSHING)	2
5	901613	. THREAD GUARD	2



INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	064605	HEX HEAD CAP SCREW, 3/8-16 X	1
0	077011		7
2	077211	LOCK WASHER, 3/8	/
3	077076	FLAT WASHER 1-1/2 X 13/32 X 7	1
4	061023	PIN	1
5	—	CYLINDER (Figure 12-31)	REF
6	402055	CLEVIS PIN, 0.200 DIA. X 1	4
7	402034	LIFT CHAIN (LIFT HEIGHT 60 1N., CHAIN LENGTH 50-1/2 IN. ADJUSTABLE STRADDLE 54-1/2 IN.	2
8	060402	COTTER PIN, 1/16 X 3/8	4
9	403951	SHIM, BLOCK, STOP	A/R
10	403952	BLOCK, STOP	2
11	077213	LOCK WASHER, 1/2	1
12	064711	HEX HEAD CAP SCREW	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
13	505807	RAM HEAD	1
14	101072	CYLINDER CLAMP	1
15	059429	HEX NUT 3/8-16	2
16	402051	ADJUSTING BOLT	2
17	059545	JAM NUT, 5/8-18	2
18	025712	GREASE FITTING	4
19	059445	HEX NUT, 5/8-18	2
19	VAR	OUTER MAST	1
20	077215	LOCK WASHER, 5/8	2
21	053012	THRUST WASHER, 3/32 THK	A/R
21	053013	THRUST WASHER, 1/8 THK	A/R
21	053014	THRUST WASHER, 5/32 THK	A/R
21	053015	THRUST WASHER, 3/16 THK	A/R
22	—	DECAL (FIGURE 12-14)	REF

NOTES



Figure 12-19 Standard Mast (12 Volt Telescopic with 12 Inch Free Lift)

INDEX	PART		NO.
NO.	NO.	PART NAME	REQD.
1	077076	FLAT WASHER 1-1/2 X 13/32 X 7	1
2	077211	LOCK WASHER, 3/8	5
3	064605	HEX HEAD CAP SCREW, 3/8-16 X 1, HEAT TREATED	1
5	500166	ROLLER ASSEMBLY	2
	243401	. ROLLER	1
	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.	A/R
6	053015	THRUST WASHER, 3/16 THK.	A/R
7	064607	HEX HEAD CAP SCREW,	4
		3/8-16 X 1-1/4	
8	500167	ROLLER ASSEMBLY	2
—	401046	. ROLLER	1
	051145	. BEARING	1
9	025712	GREASE FITTING	4
10	239520	CLAMP BAR	1
11	060402	COTTER PIN, 1/16 X 3/8	4
12	402055	CLEVIS PIN, 0.200 DIA. X 1	4
13	069483	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

	PART		NO.
10	064700		1
10	064709	1/2-13 X 1-1/2	1
19	077213	LOCK WASHER 1/2	1
20	501290	BAM HEAD	1
	051120	BEARING	2
	074251		2
	074251		2
_	077022	. FLAT WASHER	2
	061727		2
21	VAR	OUTER MAST	1
22	VAR	INNER MAST	1
23	236001	SPINDLE	4
24	059545	JAM NUT, 5/8-18	2
25	191089	STOP BLOCK	2
26	—	LIFT CYLINDER (Figure 12-31)	REF
27	077215	LOCK WASHER, 5/8	2
28	059421	HEX NUT	4
29	402034	LIFT CHAIN LIFT HEIGHT 106 IN.,	2
		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.,	
		STRADDI ES 135-3/4 IN	
30	_	LIET CARRIAGE (Figure 12-23)	REE
30			NEF



Figure 12-20 Standard Mast (24 Volt Telescopic with 12 Inch Free Lift)

INDEX	PART		NO.
NO.	NO.	PART NAME	REQD
1	077076	FLAT WASHER 1-1/2 X 13/32 X 7	1
2	077211	LOCK WASHER, 3/8	5
3	064605	HEX HEAD CAP SCREW, 3/8-16 X 1, HEAT TREATED	1
4	500167	ROLLER ASSEMBLY	6
—	401046	. ROLLER	1
	051145	. BEARING	1
5	500166	ROLLER ASSEMBLY	2
	243401	. ROLLER	1
	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.	A/R
6	053015	THRUST WASHER, 3/16 THK.	A/R
7	064607	HEX HEAD CAP SCREW, 3/8-16 X 1-1/4	4
9	025712	GREASE FITTING	6
10	404453	CLAMP BAR	1
11	060402	COTTER PIN, 1/16 X 3/8	4
12	402055	CLEVIS PIN, 0.200 DIA. X 1	4
13	069483	FLAT HEAD SCREW	4
14	402051	ADJUSTING BOLT	2
15	077209	LOCK WASHER, 1/4	4

INDEX	PART		NO.
NO.	NU.		REQD.
16	059445	HEX NUT, 5/8-18	2
17	100016	SPACER	2
18	064711	SCREW, HEX HEAD	1
19	077213	LOCK WASHER, 1/2	1
20	506252	RAM HEAD	1
21	VAR	OUTER MAST	1
22	VAR	INNER MAST	1
23	236001	SPINDLE	4
24	059545	JAM NUT, 5/8-18	2
25	191089	STOP BLOCK	2
26	—	LIFT CYLINDER (Figure 12-31)	REF
27	077215	LOCK WASHER, 5/8	2
28	059421	HEX NUT	4
29	402034	LIFT CHAIN LIFT HEIGHT 106 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	—	LIFT CARRIAGE (Figure 12-23)	REF
31	—	ROLL PIN (Figure 12-31)	REF



Figure 12-21 Standard Masts (12 Volt Telescopic without 12 Inch Free Lift)

	PART		NO.
1	064605	HEX HEAD CAP SCREW,	1
2	077211	LOCK WASHER, 3/8	3
3	077076	FLAT WASHER 1-1/2 X 13/32 X 7	1
4	060402	COTTER PIN, 1/16 X 3/8	4
5	402055	CLEVIS PIN, 0.200 DIA. X 1	4
6	402034	LIFT CHAIN LIFT HEIGHT 106 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
7	053012	THRUST WASHER, 3/32 THK.	A/R
7	053013	THRUST WASHER, 1/8 THK.	A/R
7	053014	THRUST WASHER, 5/32 THK.	4
7	053015	THRUST WASHER, 3/16 THK.	2

INDEX	PART		NO.
NO.	NO.	PART NAME	REQD.
8	500167	ROLLER ASSEMBLY	2
—	401046	. ROLLER	1
	051145	. BEARING	1
9	025712	GREASE FITTING	2
10	VAR	INNER MAST	1
11	064607	SCREW, HEX HEAD	2
12	077213	LOCK WASHER, 1/2	1
13	063717	SCREW, HEX HEAD,	1
14	403951	SHIM, BLOCK, STOP	A/R
15	403952	BLOCK, STOP	2
16	505807	RAM HEAD	1
17	059545	JAM NUT, 5/8-18	2
18	402051	ADJUSTING BOLT	2
19	077215	LOCK WASHER, 5/8	2
20	059445	HEX NUT, 5/8-18	2
21	061023	PIN	1
22	500166	ROLLER ASSEMBLY	2
—	243401	. ROLLER	1
—	051145	. BEARING	2
23	—	CYLINDER (Figure 12-31)	1



Figure 12-22 Inner and Outer Masts - Full Free Lift

INDEX NO.	PART NO.	PART NAME	NO. REQD.	INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	053012	THRUST WASHER, 3/32 THK.	A/R	12	025715	GREASE FITTING	4
1	053013	THRUST WASHER, 1/8 THK.	A/R	13	402055	CLEVIS PIN, 0.200 DIA. X 1	4
1	053014	THRUST WASHER, 5/32 THK.	A/R	14	800246	YOKE SHEAVE	2
1	053015	THRUST WASHER, 3/16 THK.	A/R	15	061729	EXTERNAL RETAINING RING	4
2	051145	. BEARING	2	16	401639	SHEAVE PIN	2
3	500167	ROLLER ASSEMBLY	2	17	065555	CAP SCREW, 5/16-18	4
—	051145	. BEARING	2	18	289205	HEAVY DUTY SHEAVE	2
—	401046	. ROLLER	1	19	402051	ADJUSTING BOLT	2
4	500166	ROLLER ASSEMBLY	2	20	077215	LOCK WASHER, 5/8	2
—	051145	. BEARING	1	21	059445	HEX NUT, 3/4-16	2
—	243401	. ROLLER	1	22	060402	COTTER PIN, 1/16 X 3/8	4
5	025712	GREASE FITTING	4	23	059545	JAM NUT, 5/8-18	2
6	077076	FLAT WASHER 1-1/2 X 13/32 X 7	1	24	061023	PIN, ROLL, 5/16 X 3/4	1
7	077211	LOCK WASHER, 3/8	2	25	800297	WASHER	1
8	064603	HEX HEAD CAP SCREW,	2	26	073460	SET SCREW	1
		3/8-16 X 3/4, HEAT TREATED		27	VAR	INNER MAST	1
9	063482	SCREW, 1/4-20 X 1-1/4	4	28	402034	LIFT CHAIN	A/R
10	403339	STOP BLOCK	2	29	—	CYLINDER (Figure 12-32)	4
11	077209	LOCK WASHER, 1/4	4				

AR - AS REQUIRED





INDEX NO.	PART NO.	PART NAME	NO. REQD.	INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	504539-06	LIFT CARRIAGE ASSEMBLY	1	5	053015	THRUST WASHER, 3/16 THK.	A/R
		1-1/4 IN SHAFT, TELESCOPIC		—	500167	ROLLER ASSEMBLY (TELESCOPIC)	4
1	504539-05	LIFT CARRIAGE ASSEMBLY	1	6	051145	. BEARING	1
		1-1/4 IN SHAFT,		7	401046	. ROLLER	1
1	504539-01		1	—	500166	ROLLER ASSEMBLY (NONTELESCOPIC)	2
		1-1/4 IN SHAFT,		6	051145	. BEARING	1
2	276604	FORK SHAFT 1-1/4 IN DIA	1	7	243401	. ROLLER	1
3	061729	SNAP BING	2	8	025712	GREASE FITTING	4
4	507119-02	EOBK 36 IN (PDM 20 & 25)	2	9	402034	LIFT CHAIN	A/R
4	507119-03	FORK 42 IN (PDM 20 & 25)	2	10	402051	ADJUSTING BOLT	2
4	507119-04	FORK 48 IN (PDM 20 & 25)	2	11	060402	COTTER PIN, 1/16 X 3/8	2
4	500330	FORK 36 IN (PDM 30)	2	12	402055	CLEVIS PIN, 0.200 DIA. X 1	2
4	500331		2	13	059545	JAM NUT, 5/8-18	2
4	500332	FORK 48 IN (PDM 30)	2	14	077215	LOCK WASHER, 5/8	2
5	053012	THBUST WASHER 3/32 THK	A/R	15	059445	HEX NUT, 5/8-18	2
5	053013	THRUST WASHER, 1/8 THK.	A/R	16	500126	SPINDLE, 1-1/4 IN.	4
5	053014	THRUST WASHER, 5/32 THK.	A/R				



Figure 12-24 ITA Lift Carriage (Optional)

INDEX	PART		NO.
NO.	NO.	PART NAME	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	PART		NO.
NO.	NO.		REQD.
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, 5/8-18	2
12	402055	CLEVIS PIN, 0.200 DIA. X 1	2
13	060402	COTTER PIN, 1/16 X 3/8	2
14	402051	ADJUSTING BOLT	2
15	402034	LIFT CHAIN	A/R
16	503752	LOAD BACKREST,	1
		1-1/2 IN FORKS 28 IN. WIDE	
16	401527	FORK RETAINER BAR	2
		(TRUCKS WITHOUT LOAD	
		BACKREST)	
17	077215	LOCK WASHER, 5/8	2
18	063820	HEX HEAD CAP SCREW,	2
		5/8-11 X 1-1/4	
19	077066	ROUND WASHER	4
20	507739	ITA FORK HINGE KIT	2
21	500126	SPINDLE, 1-1/4 IN.	4



Figure 12-25 Lift Control Valve Assembly 504216-02 - Standard 503209 - Cold Conditioning

INDEX	VALVE PAR	T NUMBER		NO.
NO.	504216-02	503209	PART NAME	REQD.
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	257401	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
	DEDAID KIT 600122			

PART OF REPAIR KIT 600132



Figure 12-26 Hydraulic Installation (TEL AND NON -TEL)

INDEX	PART		NO.
NO.	NO.	PART NAME	REQD.
1	—	HYDRAULIC PANEL ASSEMBLY (FIGURE 12-28)	REF
2	063603	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	025538	ELBOW, 90°, 3/8 MALE	1
7	025501	ELBOW, 1/4, NPT TUBE, 90 $^{\circ}$	2

INDEX NO.	PART NO.	PART NAME	NO. REQD.
8	282500	TUBING, VINYL, 1/4 OD - 1/8 ID	A/R
9	057510	GROMMET	1
10	057508	GROMMET	1
11	077056	WASHER, FLAT, 3/8	2
12	VAR	LIFT CYLINDER	REF
		(FIGURE 12-31)	
13	020419	LIFT MOTOR SOLENOID 12 V	1
13	020715	LIFT MOTOR SOLENOID 24 V	1

AR - AS REQUIRED



Figure 12-27 Hydraulic Installation (FFL)

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1		HYDRAULIC PANEL ASSEMBLY (FIGURE 12-28)	REF
2	063603	SCREW, 3/8-16 X 3/4	2
3	077211	LOCK WASHER, 3/8	2
4	026711	ELBOW, 45 $^{\circ}$	1
5	026109	NIPPLE	1
6	026504	REDUCER	2
7	047107	VALVE, FLOW CONTROL	1
8	025513	ELBOW, 45 $^{\circ}$	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
9	057508	GROMMET	1
10	026203	PLUG	1
11	VAR	LIFT CYLINDER (FIGURE 12-32)	REF
12	077056	WASHER, FLAT, 3/8	2
13	056142-01	CLAMP	1
14	077030	WASHER	1
15	077209	LOCK WASHER	1
16	070475	SCREW, 1/4-20 X 3/8	1



Figure 12-28 Hydraulic Panel Assembly

INDEX NO.	PART NO.	PART NAME	NO. REQD.	INDEX NO.	PART NO.	PART NAME	NO. REQD.
	504200	PDM HYDRAULIC PANEL	REF	12	025113	. STRAIGHT CONNECTOR, 1/4	1
		ASSEMBLY - 12 VOLT		13	056118	. SPRING HOSE CLAMP	2
—	505972	PDM HYDRAULIC PANEL	REF	14	290005	. VINYL TUBING	AR
		ASSEMBLY - 24 VOLT		15	026131	. CLOSE NIPPLE, 1/4 X 1 NPT	1
1	500690	. HYDRAULIC PANEL	1	16	035106	. FILTER	1
2	500689	. RESERVOIR	1	17	025128	. ADAPTER	1
3		. PUMP AND MOTOR ASSEMBLY	REF	18	026109	. NIPPLE, HOSE, 3/8	1
		12 VOLI (FIGURE 12-34)		19	027107	. TEE, 3/8 NPT	1
3	_	24 VOLT (EIGURE 12-34)	REF	20	504199-12	. HOSE ASSEMBLY	1
1	_		REE	21	026302	. MAGNETIC PLUG, 3/8 NPT	1
-		ASSEMBLY WITH SWITCH (FIGURE 12-25)	11	22	500422	. BREATHER CAP AND DIPSTICK ASSEMBLY	1
5	077477	. PHILLIPS RD HD SCREW	4	23	069712	. FLAT HD SCREW, 3/8-16 X 3/4	2
		1/4-20 X 5/8		24	069478	. FLAT HD SCREW, 1/4-20 X 3/4	2
6	026704	. ELBOW, STREET, 3/8 NPT, 90 $^\circ$	1	25	059421	. HEX NUT, 1/4-20	2
7	026128	. NIPPLE, HOSE, 3/8	1	26	077209	. LOCK WASHER,	6
8	056110	. CLAMP	2	—		. LIFT MOTOR SOLENOID	REF
9	278804	. VINYL TUBING	1			(FIGURE 12-26)	
10	025107	. SWIVEL CONNECTOR	1	—	900893	HYDRAULIC OIL (QUART)	AR
11	504199-01	. HOSE ASSEMBLY	1		900855	HYDRAULIC OIL (GALLON)	AR



Figure 12-29 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

INDEX NO.	PART NO.	PART NAME	NO. REQD.
6	058501	. MAGNET	1
7	077209	. LOCK WASHER, 1/4	1
8	059421	. HEX NUT, 1/4-20	1
9	3140032	. COIL CORD, 3 FEET	1
10	017801	. MALE PLUG	1
11	052905	. STRAIN RELIEF	1

NOTES



Figure 12-30 Remote Installation (Continued)

ITEM	504363-01	504363-02	504363-03	504363-04	504363-05	504363-06	504363-07
	LIFT	LIFT & LOWER					
	IN HEAD	IN HEAD	IN HEAD	BOX	BOX	IN HEAD &	IN HEAD &
	ONLY	(RES)	(TRANS)	(RES)	(TRANS)	BOX (RES)	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	



Figure 12-31 Lift Cylinder (TEL AND NON-TEL)

INDEX									NO
				130 INCH	130 INCH	154 INCH	154 INCH		NU.
NO									REQ
		(NOTE 1)	(NOTE 2)	(NOTE 1)	(NOTE 2)	(NOTE 1)	(NOTE 2)		D.
_	503568-01	503568-05	503568-21	503568-07	503568-22	503568-11	503568-23	LIFT CYLINDER ASSY	1
1	—	—	—	—	—	—	—	. TUBE ASSY	1
2	049509 *	049509 *	049509 *	049509 *	049509 *	049509 *	049509 *	. WIPER RING	1
3	800024	800024	800024	800024	800024	800024	800024	. GLAND NUT	1
4	042113 *	042113 *	042113 *	042113 *	042113 *	042113 *	042113 *	. TOP O-RING	1
5		—						. RAM ROD	1
6	300501	300501	403814	300501	403814	300501	403814	. RAM STOP	1
7	042105 *	042105 *	042105 *	042105 *	042105 *	042105 *	042105 *	. BOTTOM O-RING	1
8		—						. NOT USED	
9	_					_	_	. NOT USED	
10								. NOT USED	1
11	059547	059547	800293	059547	800293	059547	800293	. JAM NUT	1
12	061023	061023	061023	061023	061023	061023	061023	. ROLL PIN, 5/16 X 3/4	1
13		—						. NOT USED	A/R
14	403864	403864	403864	403864	403864	403864	403864	. PISTON	1
15	042205-02 *	042205-02 *	042205-02 *	042205-02 *	042205-02 *	042205-02 *	042205-02 *	. PSP SEAL	1

* INCLUDED IN KIT NO. 907121 NOTE 1: FOR TRUCKS WITH 12 INCH FREE LIFT. NOTE 2: FOR TRUCKS WITHOUT 12 INCH FREE LIFT.

WHEN ORDERING LIFT CYLINDER OR PARTS, BE SURE TO SPECIFY TRUCK MODEL NUMBER, LIFT HEIGHT, AND SERIAL NUMBER.

NOTES

Figure 12-32 Lift Cylinder (FFL)

INDEX	PART		NO.
NO.	NO.	PART NAME	REQD.
	503996-01	FFL CYLINDER ASSEMBLY	1
		106 IN. LIFT HEIGHT	
—	503996-02		1
	500005 01		
1	503995-01	106 IN. LIFT HEIGHT	I
1	503995-02	. FFL CYLINDER WELDMENT	1
		130 IN. LIFT HEIGHT	
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	059128	. 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	A/R
—	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.

Figure 12-33 Pump and Motor Assembly - 12 Volt

INDEX	PART NO.	PART NAME	NO. REQD.
NO.			
_	016939	PUMP AND MOTOR ASSEMBLY 12 VOLT	1
1	906001	. DC MOTOR 12V 2 TERMINAL	1
2	906002	DC MOTOR BRUSH KIT	1
3	—	BRUSH SPRING KIT	1
4	—	COMMUTATOR END BEARING	1
5	901521	. MOTOR ADAPTER	1
6	901522	. PUMP ADAPTER	1
7	901523	. PUMP ADAPTER BOLTS	4
8	901524	. COUPLING	1
9	901525	. PUMP SHAFT SEAL	1
10	—	. DRIVE END BEARING	1
11	048132	. REMOTE VALVE (OPTIONAL)	1
12	901530	. PUMP	1
13	901526	. PUMP BOLTS	2
—	—	LIFT MOTOR SOLENOID (FIGURE 12-26)	REF

NEED INFO

R

Figure 12-34 Pump and Motor Assembly - 24 Volt

INDEX NO.	PART NO.	PART NAME	NO. REQD.
	016941	PUMP AND MOTOR ASSEMBLY 24 VOLT	1

Figure 12-35 Drive Motor - 12 Volt

INDEX NO.	PART NO.	PART NAME	NO. REQD.
	016042	MOTOR ASSEMBLY, 12 VOLT	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	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	901254	. 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

INDEX NO.	PART NO.	PART NAME	NO. REQD.
_	016053	MOTOR ASSEMBLY, 24 VOLT	1
1	—	. SEAL	1
2	_	. DRIVE ENDHEAD	1
3	BR-203	. BEARING	1
4	—	. RETAINING RING	1
5	_	. ARMATURE ASSSEMBLY	1
6		. FRAME & FIELD ASSEMBLY	1
7	—	. BRUSHLEAD & TERMINAL	1

INDEX NO.	PART NO.	PART NAME	NO. REQD.
8	—	. BRUSH BOX ASSEMBLY	1
9	—	. BRUSH, SPRING	4
10	—	. BRUSH	1
11	BR-305	. BEARING	1
12	—	. WAVE WASHERR	1
13	—	. COMMUTATOR, ENDHEAD	1
14	—	. HEADBAND ASSEMBLY	1

Figure 12-37 Contactor Panel Assembly - 12 Volt

INDEX NO.	PART NO.	PART NAME	NO. REQD
	505862	PANEL ASSEMBLY, 12 VOLT	1
1	505860	. BASE PLATE	1
2	401181	. BUS BAR	3
3	070491	. SCREW, RH HD, 8-32 X 1	10
4	077205	. SPLIT LOCK WASHER, #8	10
5	-	. CONTACTOR, DOUBLE POLE (FIGURE 12-40)	2
6	504150-16	. CABLE, ASSY.	1
7	068179	. SCREW, RD HD, #5-40 X 5/8	3
8	077203	. LOCK WASHER	5
9	059410	. HEX NUT	5
10	021226	. TERMINAL BLOCK, SPADE TYPE	1
11	071376	. PAN HEAD SCREW, 10-32 X 1/2	1
12	077207	. SPLIT LOCK WASHER, #10	3
13	018921	. SPEED CONTROL RESISTOR	1
14	504150-16	. CABLE, ASSY.	1
15	504150-15	. CABLE, ASSY.	2
16	063478	. SCREW	3
17	021238	. TERMINAL RING TYPE, 1/4	4
18	018411	. RELAY	1
18	018412	. RELAY	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"	2
23	018907	. ELECTRICAL BRAKE RESISTOR	1
24	_	. CONTACTOR, SINGLE POLE (FIGURE 12-39)	3

INDEX	PART		NO.
NO.	NO.	PART NAME	REQD.
25	008906	. 300 AMP FUSE	1
26	056507	. FUSE, DECAL, 300 AM, 0.020	1
		ALUM.	
27	008917	. FUSE, 40 AMP, DYNAMIC BRAKE	1
28	056515	. DECAL FUSE, DYNAMIC BRAKE	1
29	077105	. FLAT BRONZE WASHER	4
30	077209	. LOCK WASHER, 1/4	11
31	075620	. STUD-THREADED, BRASS,	2
		1/4-20 X 1-1/4	
32	070488	. SCREW, RH HD, 1/4-20 X 3/8	4
33	010614	. 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	077030	. WASHER, FLAT	1
39	504150-05	. CABLE, ASSY.	2
40	504150-19	. CABLE, ASSY.	1
41	504150-04	. CABLE, ASSY.	1
42	023249	. WIRE HARNESS ASSY	1
43	059421	. NUT-HEX, 1/4-20	5
44	504150-07	. CABLE, ASSY.	1
45	070489	. SCREW	2
46	077031	. WASHER, FLAT	4
47	059416	. NUT, HEX, 12-32	2
48	504150-12	. CABLE ASSY.	
49	077045	. WASHER, FLAT	4

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

Figure 12-38 Contactor Panel Assembly - 24 Volt
INDEX	PART		NO.
NO.	NO.	PART NAME	REQD
	505922	PANEL ASSEMBLY, 24 VOLT	1
1	506044	. PANEL, WELDMENT	1
2	008904	. FUSEHOLDER	1
3	008910	. FUSE, 15 AMP	1
4	068177	. SCREW, RD HD, 5-40 X 3/8	3
5	077203	. LOCK WASHER	2
6	077007	. WASHER 5/32" O.D. X 5/16"	2
7	056504	. DECAL, FUSE, 15A	1
8	023262	. WIRE HARNESS ASSY -PANEL	1
9	005422	. CONNECTOR, IN LINE	2
10	505927	. CABLE ASSY - LIMIT SWITCH	1
11	018411	. RELAY	1
12	305407	. BUSBAR	1
13	070491	. SCREW, RD HD, 8-320 X 7/8	4
14	077205	. LOCK WASHER, SPLIT #8	4
15	077032	. WASHER, FLAT, 3/16 ID	4
16	005657	. CONTACTOR, 24 VOLT	2
17	504150-15	. CABLE, ASSY BUSS	2
18	504150-21	. CABLE, ASSY MTR A2	1
19	504150-22	. CABLE, ASSY MTR S2	1
20	504150-23	. CABLE, ASSY MTR A1	1

	PART		NO.
NO.	NO.		REQD.
21	505181-47	. CABLE, ASSY B+	1
22	504181-10	. CABLE, ASSY MTR S1	1
23	504150-01	. CABLE, ASSY A2	1
24	505084-14	. CABLE, ASSY POS	1
25	505181-50	. CABLE, ASSY NEG	1
26	063552	. SCREW, HX HD, 5/16-18 X 5/8	3
27	077210	. LOCK WASHER, SPLIT 5/16	4
28	059426	. NUT-HEX, 5/16-18	4
29	063553	. SCREW, HX HD, 5/16-18 X 3/4	1
30	005468	. CONTROLLER - SPEED, TRANS	1
31	069477	. SCREW, FL HD, 1/4-20 X 1/2	2
32	016614	. STANDOFFFF - INSULATOR	2
33	077105	. WASHER, BRONZE	4
34	077209	. LOCK WASHER, SPLIT 1/4	4
35	059426	. NUT-HEX, 1/4-20	2
36	075620	. STUD - THREADED, 1/4-20	2
37	070475	. SCREW, RD HD, 1/4-20 X 3/8	3
38	008906	. 300 AMP FUSE	1
39	056507	. DECAL, FUSE, 300A	1
40	005976	. DIODE.	2

AR - AS REQUIRED



Figure 12-39 Single Pole Contactor, 2nd Speed, 3rd Speed Dynamic Brake

INDEX NO.	PART NO.	PART NAME	NO. REQD.
	005658	CONTACTOR SINGLE POLE,	1
		100 AMP. 12V	
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

INDEX NO.	PART NO.	PART NAME	NO. REQD.
7	905017	. SPRING STUD	1
8	905029 *	. MOVING CONTACT ASSEMBLY	1
9	905019	. ARMATURE PLATE	1
10	905020	. POLE PIECE	1
11	905021	. COIL ASSEMBLY 12-VOLT	1
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.



Figure 12-40 Double Pole Contactor, Forward, Reverse

	INDEX NO.	PART NO.	PART NAME	NO. REQD.
Γ	—	005656	CONTACTOR DOUBLE POLE,	1
			100 AMP. 12V	
	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

INDEX NO.	PART NO.	PART NAME	NO. REQD.
8	905018 *	. 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	1
		OF CONTACTOR)	
16	905026 *	. BACK CONTACT	1
17	905027	. REAR MOLDING	1

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



PART		NO.		INDEX	PART		NO.
NO.	PART NAME	REQD.		NO.	NO.	PART NAME	REQD.
800300-01	SMART CHARGER, 12V, 120V	1		2	018412	RELAY	1
	(Figure 12-42)			3	059412	NUT, HEX, 6-32	2
800300-02	SMART CHARGER, 12V, 230V	1		4	077204	WASHER, LOCK, SPLIT, #6	2
	(Figure 12-42)			5	069478	SCREW, PH FL HD, 1/4-20 X 3/4	4
800300-03	SMART CHARGER, 24V, 120V	1		6	005455	CONNECTOR, INLET, FLANGE	1
800300-04	(Figure 12-42) SMART CHARGER, 24V, 230V (Figure 12-42)	1		7	504599	CORD, ASSY CHARGER	1
	PART NO. 800300-01 800300-02 800300-03 800300-04	PART NO. PART NAME 800300-01 SMART CHARGER, 12V, 120V (Figure 12-42) 800300-02 SMART CHARGER, 12V, 230V (Figure 12-42) 800300-03 SMART CHARGER, 24V, 120V (Figure 12-42) 800300-04 SMART CHARGER, 24V, 230V (Figure 12-42)	PART NO. NO. PART NAME NO. REQD. 800300-01 SMART CHARGER, 12V, 120V (Figure 12-42) 1 800300-02 SMART CHARGER, 12V, 230V (Figure 12-42) 1 800300-03 SMART CHARGER, 24V, 120V (Figure 12-42) 1 800300-04 SMART CHARGER, 24V, 230V (Figure 12-42) 1 800300-04 SMART CHARGER, 24V, 230V (Figure 12-42) 1	PART NO. NO. PART NAME NO. REQD. 800300-01 SMART CHARGER, 12V, 120V (Figure 12-42) 1 800300-02 SMART CHARGER, 12V, 230V (Figure 12-42) 1 800300-03 SMART CHARGER, 24V, 120V (Figure 12-42) 1 800300-04 SMART CHARGER, 24V, 230V (Figure 12-42) 1 800300-04 SMART CHARGER, 24V, 230V (Figure 12-42) 1	PART NO. NAME NO. REQD. 800300-01 SMART CHARGER, 12V, 120V (Figure 12-42) 1 2 800300-02 SMART CHARGER, 12V, 230V (Figure 12-42) 1 3 800300-03 SMART CHARGER, 12V, 230V (Figure 12-42) 1 4 800300-03 SMART CHARGER, 24V, 120V (Figure 12-42) 1 6 800300-04 SMART CHARGER, 24V, 230V (Figure 12-42) 1 6	PART NO. NAME NO. REQD. INDEX NO. PART NO. 800300-01 SMART CHARGER, 12V, 120V 1 2 018412 (Figure 12-42) 1 3 059412 800300-02 SMART CHARGER, 12V, 230V 1 4 077204 (Figure 12-42) 1 5 069478 800300-03 SMART CHARGER, 24V, 120V 1 6 005455 800300-04 SMART CHARGER, 24V, 230V 1 7 504599	PART NO. PART NAME NO. REQD. 800300-01 SMART CHARGER, 12V, 120V (Figure 12-42) 1 800300-02 SMART CHARGER, 12V, 230V (Figure 12-42) 1 800300-03 SMART CHARGER, 24V, 120V (Figure 12-42) 1 800300-03 SMART CHARGER, 24V, 120V (Figure 12-42) 1 800300-03 SMART CHARGER, 24V, 120V (Figure 12-42) 1 800300-04 SMART CHARGER, 24V, 230V (Figure 12-42) 1 800300-05 SMART CHARGER, 24V, 230V (Figure 12-42) 1 800300-04 SMART CHARGER, 24V, 230V (Figure 12-42) 1



Figure 12-42 Smart Charger Rework

INDEX	PART		NO.
NO.	NO.	PART NAME	REQD.
	800300-01	SMART CHARGER, 12V, 120V)	1
	800300-02	SMART CHARGER, 12V, 230V	1
	800300-03	SMART CHARGER, 24V, 120V	1
	800300-04	SMART CHARGER, 24V, 230V	1
1	004983-01	SMART CHARGER, 12V, 120V	1
		(Figure 12-43)	
1	004983-04	SMART CHARGER, 12V, 230V	1
		(Figure 12-43)	
1	004984-01	SMART CHARGER, 24V, 120V	1
		(Figure 12-43)	
1	004984-02	SMART CHARGER, 24V, 230V	1
		(Figure 12-43)	

INDEX NO.	PART NO.	PART NAME	NO. REQD.
2	021249	. TERMINAL	1
3	023018	. WIRE, STRANDED, 16 GA BLK	AR
4	005649	. CONNECTOR, SPLICE, TAP	2
5	023000	. WIRE, STRANDED, 16 GA WHT	AR



Figure 12-43 Smart Charger

INDEX NO.	PART NO.	PART NAME	NO. REQD.
	004983-01	SMART CHARGER, 12V, 120V	1
—	004983-02	(SEE NOTE) SMART CHARGER, 12V, 230V (SEE NOTE)	1
_	004984-01	SMART CHARGER, 24V, 120V	1
_	004984-02	SMART CHARGER, 24V, 230V	1
1	900462	. AMMETER, 0-30 AMP	1
2	—	. CAPACTOR MOUNTING STRAP	1
3	900465	. CAPACITOR, 4 MFD, 440 VAC	1
4	904825	. CIRCUIT CARD, 12V/120V	1
		STANDARD	

INDEX	PART		NO.
NO.	NO.		REQD.
5	904830	. AC CORD	1
6	904831	. DC CORD, W/TERMINALS	1
7	907036	. FUSE HOLDER	1
8	904828	. FUSE HOLDER, AUTOMOTIVE	1
9	900847	. FUSE, 10 AMP GLASS	1
10	904829	. FUSE, 60A, AUTOMOTIVE	1
11	900467	. RECTIFIER ASSY, HEATSINK	1
		WITH M1168 DIODE	
12	900468	. STRAIN RELIEF	1
13	—	. TRANSFORMER	1
14	—	. SHOULDER WASHER	2

NOTE:REMOVE PLUG FROM CHARGER CORD.



Figure 12-44 Optional Hour Meter Switch Installatio

INDEX	PART		NO.
NO.	NO.	PART NAME	REQD.
—	504189	HOUR METER INSTALLATION	1
1	068179	. SCREW, RD HD, #5-40 X 5/8	3
2	077203	. LOCK WASHER	5
3	059410	. HEX NUT	5
4	015604	. METER, HOUR	1
5	068177	. SCREW, RD HD, #5-40 X 3/8	2
6	005422	. CONNECTOR, INLINE, INSUL	4

	PART		NO.
NO.	NO.		nequ.
7	021204	. TERMINAL, SLIDE CLIP, 1/4	4
8	010610	. PAD, INSUL, DIODE	1
9	005987	. DIODE ASSEMBLY	1
10	005976	DIODE	3
—	010606	MOUNTING PANEL	1
—	023018	WIRE, BLACK, #16 STRANDED	A/R

AR - AS REQUIRED



Figure 12-45	Battery Capacity	Indicator Wiring	Diagram	Without Lift Lockout

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



Figure 12-46	Batterv	Capacity	Indicator	Wiring	Diagram	With	Lift	Lockout
1 iguic 12-40	Dattery	Capacity	maicator	winnig	Diagram	WW ILII	Ent i	LOCKOUL

INDEX	PART		NO.	INDEX	PART		NO.
NO.	NO.	PART NAME	REQD.	NO.	NO.	PART NAME	REQD.
1	021718	CONNECTOR	3	4	021207	TERMINAL	1
2	021203	TERMINAL	1	5	010618-01	INDICATOR, 12V BAT CAPACITY	1
3	021206	TERMINAL	1				



Figure 12-47 Optional Key Switch

INDEX NO.	PART NO.	PART NAME	NO. REQD.
1	020725	SWITCH KEY	1
2	021203	TERMINAL, RING	2
3	021204	TERMINAL, QUICK DISCONNECT, FEMALE	2

INDEX NO.	PART NO.	PART NAME	NO. REQD.
4	005422	CONNECTION, IN-LINE, INSULATED	1
5	023014	WIRE	AR

AR - AS REQUIRED



Big Joe Manufacturing Company