

OLD

POWERAMP®

**POWERHOOK
INSTALLATION
& OPERATION
MANUAL**

Job Name _____
Job Number _____
Serial Numbers _____

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Table of Contents

Safety	1
Safety Alert Symbols.....	1
General Safety Precautions	1
Introduction	2
Installation.....	4
KS5 Installation	4
Additional Installation Instructions for KS5 When Dock Leveler Is Powered By a CENTRAPOWER System.....	11
Additional Installation Instructions for KS5 When Dock Leveler Is Powered By a Remote Power Pack	11
Additional Installation Instructions for KS5 Powered By a Remote POWER PACK.....	11
POWERHOOK KS6 and KS7 Installation Instructions.....	12
Adjustment and Testing	16
Operating Instructions.....	19
Controls and Signals.....	19
Normal Operation.....	21
Bypass Operation	22
Below Dock End Load Operation.....	23
Special Instructions for KS5.....	25
Options.....	26
Dock Leveler and Truck Restraint Interlock	26
Lip Control.....	27
Emergency Stop	27
Audible Alarm.....	27
Operation Key Switch	28
Auto Return to Dock.....	28
Preventive Maintenance	29
Service Under the Dock Leveler	29
Recommended Hydraulic Fluids.....	29
Daily Maintenance	29
Weekly Maintenance.....	29
Monthly Maintenance.....	30
Lubrication Chart.....	30
Troubleshooting Guide.....	32
Parts Lists	44
Drawings.....	Attached
Dock Leveler Modification Drawing(s), KS5 Installation Only Electrical Drawings	

Safety Alert Symbols



This Safety Alert Symbol Means ATTENTION is Involved!

The Safety Alert Symbol identifies important safety messages on equipment, safety signs, in manuals, or elsewhere. When you see this symbol, be alert to the possibility of personal injury or death. Follow the instructions in the safety message.



WARNING

The use of the word "Warning" signifies the presence of hazards or unsafe practices which could result in severe personal injury or death if instructions, including recommended precautions, are not followed.

CAUTION

The use of the word "Caution" signifies possible hazards or unsafe practices which could result in minor injury, product or property damage if instructions, including recommended precautions, are not followed.

General Safety Precautions

1. Do not operate this equipment until you read and understand the operating instructions and become thoroughly familiar with the equipment and its controls.
2. Never operate a machine while a safety device or guard is removed or disconnected.
3. Never remove Warning or Caution signs or decals on the equipment unless they are to be replaced.
4. Do not start the equipment until all other personnel in the area have been warned and have moved outside the operating zone.
5. Remove any tools or other foreign objects from the operating zone before starting.
6. Keep operating zone free of obstacles that could cause a person to trip or fall.
7. If so equipped, know EMERGENCY STOP procedures before operating.
8. Hydraulic and electrical power must be off when servicing equipment.
Note: For maximum protection, all power sources should be locked out using a lock for which only you have the key. This prevents anyone from accidentally turning on the power while you are servicing the machine.
9. Keep alert and observe indicator lights and audible alarms.
10. Do not operate faulty equipment. Make certain proper service and maintenance procedures have been performed.
11. Avoid placing fingers, hands, or any part of your body near moving parts.

Introduction

This manual covers three models of POWERHOOK™ truck restraints: KS5, KS6 and KS7. See Figures 1, 2 and 3.

In addition to the hydraulically actuated truck restraint, POWERHOOK has a programmable electronic controller and DOCKALERT™, a dock communication system.

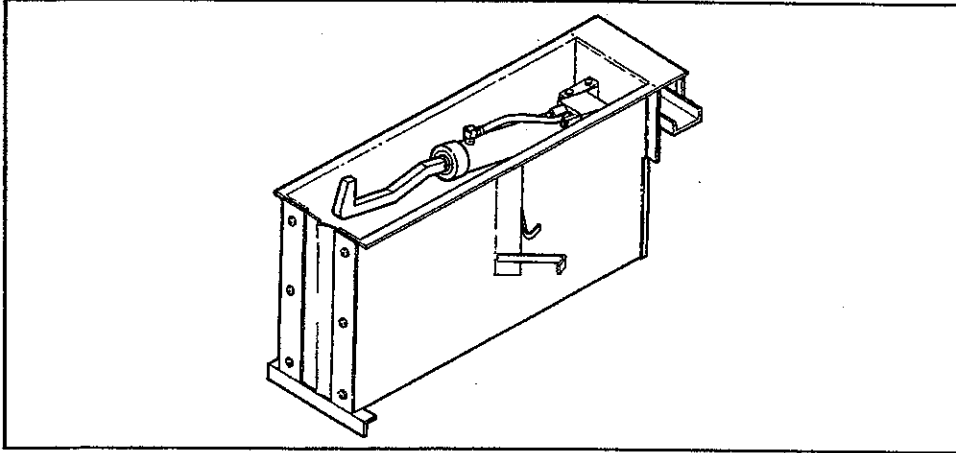


Fig. 1. KS5 POWERHOOK (Installed In Pit of New or Existing Dock Leveler)

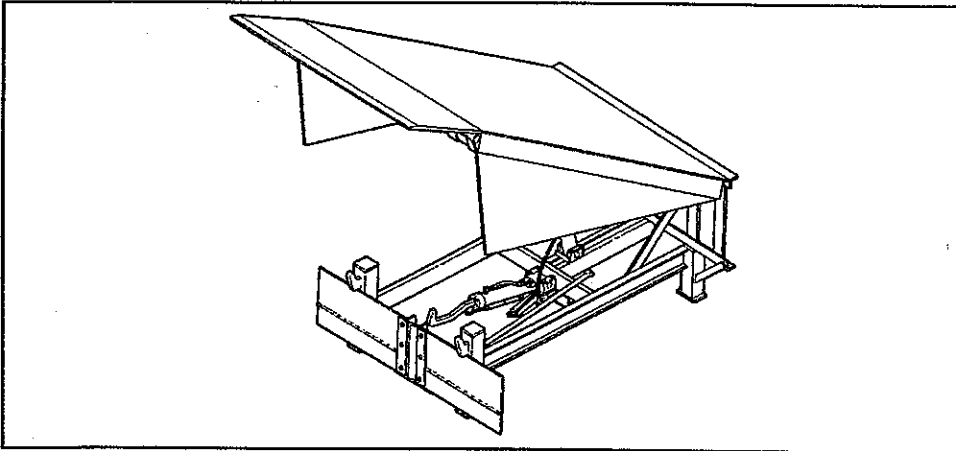


Fig. 2. KS6 Full Pit Depth Stand Mounted POWERHOOK/POWERAMP

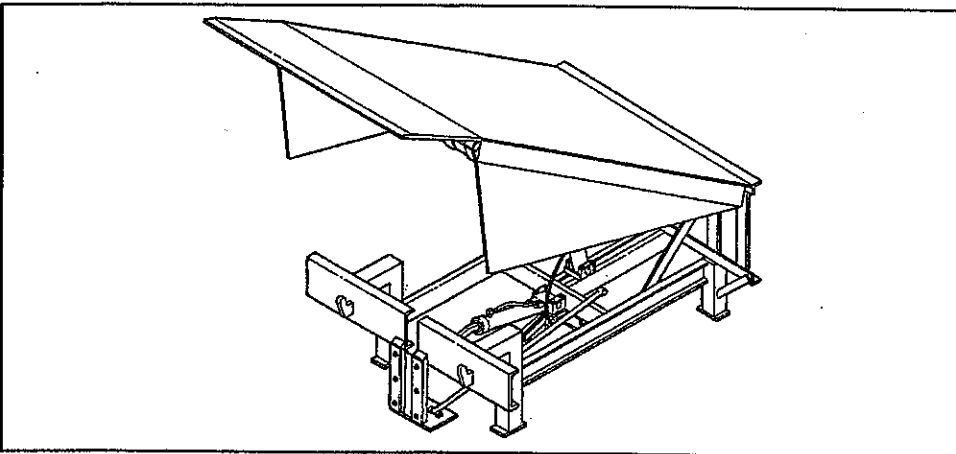


Fig. 3. KS7 Recessed Front Stand Mounted POWERHOOK/POWERAMP

Introduction

The POWERHOOK truck restraint seeks, finds and maintains a tight, continuous hold on the ICC bar of trucks throughout loading and unloading operations. It is programmed to operate both vertically and horizontally to eliminate any gap between the hook and ICC bar, effectively eliminating "trailer creep". As an optional safety feature, the dock leveler and truck restraint can be interlocked, preventing operation of the dock leveler until the hook engages the truck ICC bar.

The truck restraint is firmly anchored in the loading dock pit for maximum holding power. The hook remains protected behind the pit wall until activated. The POWERHOOK restraint is designed to withstand a pulling force of 35,000 lbs.

When not in use, POWERHOOK stores in the pit, concealed and out of the way, enabling dock workers to clear the driveway approach of snow or debris.

The POWERHOOK control assembly performs all POWERHOOK functions. It can be programmed to combine with existing security and energy conservation systems, as well as new operational procedures and additional equipment.

The DOCKALERT is a three-light system which coordinates dock activities enabling drivers and dock personnel to communicate clearly.

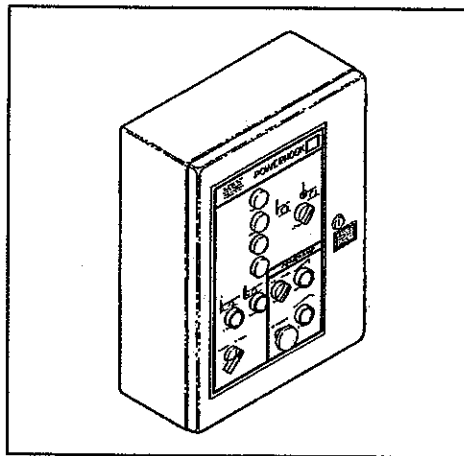


Fig. 4. POWERHOOK Control Assembly

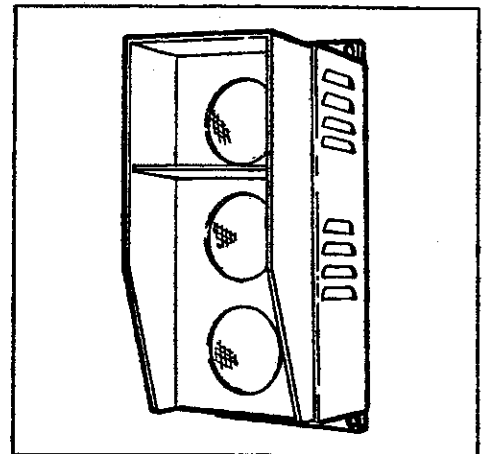


Fig. 5. DOCKALERT Outside Signal Light Assembly

Installation

KS5 Installation

These installation instructions are written for retrofitting a POWERAMP™ or CHALLENGER™ hydraulic dock leveler with integral power pack with a POWERHOOK KS5 TRUCK RESTRAINT.

If you are not adding the POWERHOOK to an existing dock leveler of the above type, some steps may not be needed or additional procedures may be required, as follows:

- When installing in new construction (i.e., new POWERHOOK and new POWERAMP hydraulic dock leveler in a newly prepared pit), skip steps 1 through 16. Platform modifications, step 6, were completed prior to shipment.
- When installing POWERHOOK with a POWERAMP or CHALLENGER hydraulic dock leveler which is powered by a remote power pack or a CENTRAPOWER™ system, refer to the manuals provided with those units as well as to page 11 in this manual.
- When installing POWERHOOK with a mechanical dock leveler or a hydraulic dock leveler manufactured by another company, the POWERHOOK must be equipped with a remote hydraulic power pack. See page 11 in this manual.

1. Review the Field Wiring Drawing and the certified Pit Drawing attached to this manual. The POWERHOOK KS5 truck restraint with a hydraulic dock leveler requires two separate 3/4" conduit runs from the control assembly to the junction box located at the rear pit wall. An additional conduit, if required, may be run either in a trench dug in the concrete or in a space between the pit walls and the dock leveler. The dock leveler will be removed from the pit (steps 9–14) and reinstalled in the pit (step 21). If additional conduit is to be imbedded in the concrete, it may be best to do so when the dock leveler is not in the pit. If a surface route is planned, it may be better to install the conduit after returning the dock leveler to the pit.
2. Raise the platform, following instructions in the dock leveler owner's manual, and support it on the maintenance prop.
3. Attach lifting plates, supplied by others, to the outboard joists on both sides of the dock leveler. Use front hole on one side and rear hole on the other. See Figure 6.

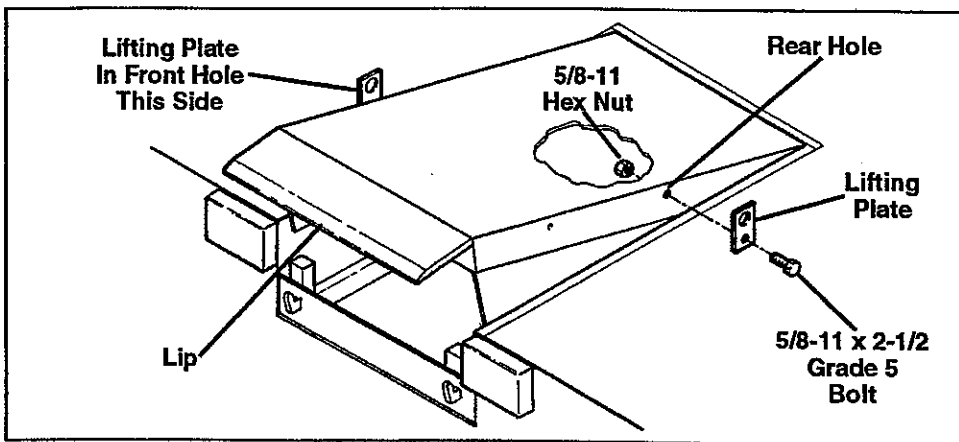


Fig. 6. Lifting Plate Location



WARNING

Barricade the work area to prevent unauthorized use of the unit before installation has been completed.



WARNING

Do not ground welding equipment to any hydraulic or electrical components of the unit.

Do not make any final electrical connections until all welding is complete.

All welding required for installation is at the frame of the unit. Always ground to the frame to prevent possibility of hydraulic or electric component failure. Failure to follow these warnings could result in injury or death.



WARNING

Be sure power supply circuit is opened at main service box or circuit breaker box prior to electrical installation. Failure to disconnect power supply could result in equipment damage and/or personal injury or death.

CAUTION

Have all electrical work performed only by qualified electricians.



WARNING

Do not grind or weld if hydraulic fluid or other flammable liquids are present. Always keep a fire extinguisher of the proper type nearby.

4. Shut off all power to dock leveler control assembly.
 5. Disconnect all wires at the junction box located on the rear pit wall.
 6. Modify the underside of the dock leveler platform as indicated on the "Dock Leveler Modification Drawing(s)" attached to this manual.
 7. Remove hydraulic fluid. To do so, locate the return port at the drive plate for the hydraulic pump. Set a catch vessel below the port. Remove the hose at the return port and allow the hydraulic fluid to drain from the reservoir. When the reservoir is empty, reinstall the hose. Dispose of the fluid properly.
 8. Use a fork truck (or other method) to raise and hold the dock leveler platform. Remove the maintenance prop.
 9. Burn or grind all welds where the dock leveler frame is welded to steel imbedded in the pit. All welds that would prevent the removal of the leveler from the pit must be removed.
- NOTE:** Frame removal on 10' and 12' long CLEANPIT® units may not be necessary. Consult factory.
10. This step is only required if the dock leveler is a CLEANPIT model.
 - A. Burn or grind off welds where the maintenance prop and hoist cylinder trunnion box are welded to any steel imbedded in the pit.
 - B. Refer to the CLEANPIT Installation Instructions in the dock leveler owner's manual. The center angle and the front angle, which were removed during the original installation, are to be reinstalled.
- NOTE:** If the angles are supplied by Systems, Inc., the angles are shipped with the truck restraint pan unit.
11. Set the leveler platform in the cross traffic position (the lip fully folded, inside the lip keepers, and the platform level with the dock floor). See Figure 7.
 12. Place a shipping band through the lip hinge and around the front frame angle of the leveler. Secure the banding. The banding is to secure the frame angle to the platform when the leveler is removed from the pit. See Figure 8.
 13. Burn or grind all welds where the top rear frame angle of the dock leveler is welded to the rear pit curb angle. All welds that would prevent the removal of the leveler from the pit must be removed.
 14. Hoist the dock leveler out of the pit with a chain/sling, using the lifting plates attached in step 3.
 15. Cut the pit for the truck restraint pan unit as indicated on the Pit Drawing attached to this manual.

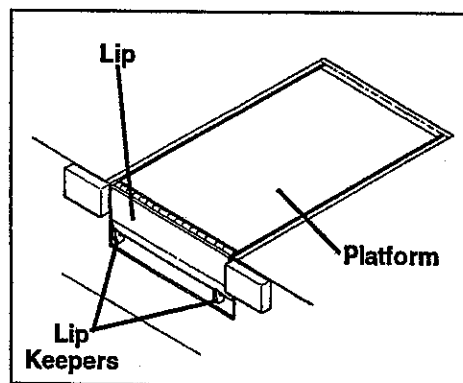


Fig. 7. Dock Leveler In Cross Traffic Position

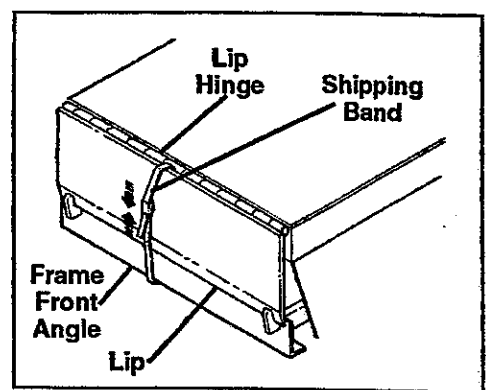


Fig. 8. Shipping Band Location

Installation

16. Cut out or chip concrete to accommodate 3/8" x 16" x 16" hoist cylinder trunnion plate(s) which must be imbedded into the pit floor as shown on the Pit Drawing. If the existing dock leveler is a CLEANPIT model, it may be possible to reuse the existing plate. On eight foot long dock levelers the plate is an integral part of the truck restraint pan and a separate plate is not required. See Table below.

EXISTING DOCK LEVELER		Hoist Cylinder Trunnion Plates
Length	CLEANPIT Model	
6, 10 or 12 Feet	No	Supplied by others or available from Systems, Inc. at extra cost.
8 Feet	No.	Supplied by Systems, Inc. (attached to KS5 pan).
6 Feet	Yes	<ul style="list-style-type: none"> Existing plate(s) must be removed since it is partially located in the area of the concrete that is to be removed for the pan. Existing plate(s) can be reused if the integrity of the plate has not been altered during its removal and if all the old concrete is chipped away from the anchors. A new plate(s) is supplied by others or is available from Systems, Inc. at extra cost.
8 Feet	Yes	Existing plate(s) must be removed since it is located in the area of the concrete that is to be removed for the pan. A new plate(s) is supplied by Systems, Inc. (attached to pan). Dispose of old, existing plate properly.
10 or 12 Feet	Yes	Existing plate(s) does not have to be removed since it is not in the area of the concrete that is to be removed for the pan. Existing plate(s) to be reused.

17. Set the truck restraint pan into the pit. Insert 13" x 2" x 4" spreader into pan to reinforce during concrete pouring. Make sure that the pan is square in the pit and flush with the pit floor and front dock wall. See Figure 9.

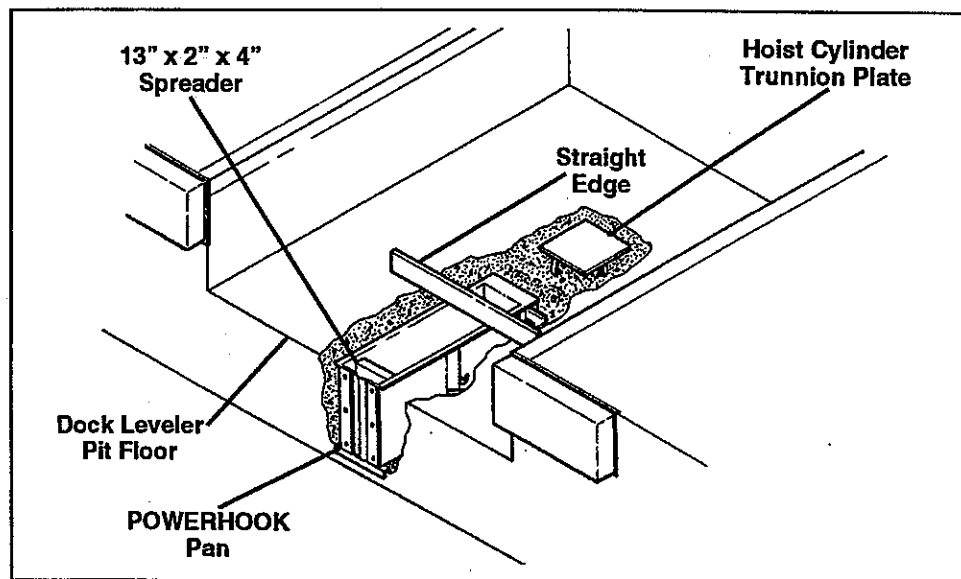


Fig. 9. POWERHOOK Pan and Trunnion Plate In Pit

18. Pour concrete around the truck restraint pan and hoist cylinder trunnion plate(s) that is to be imbedded in the pit floor if the plate is separate from the pan.

IMPORTANT: Make sure no concrete enters the pan as this could cause abnormal operation or damage the unit.

19. Allow sufficient time for the concrete to set.
20. Assemble truck restraint. This step is only required if the truck restraint pan was shipped separately from the hook cylinder and hold down cylinder assemblies.

A. Remove the two cylinder keepers for each cylinder. The keepers are located on the trunnion weldments inside the pan. See Figure 10.

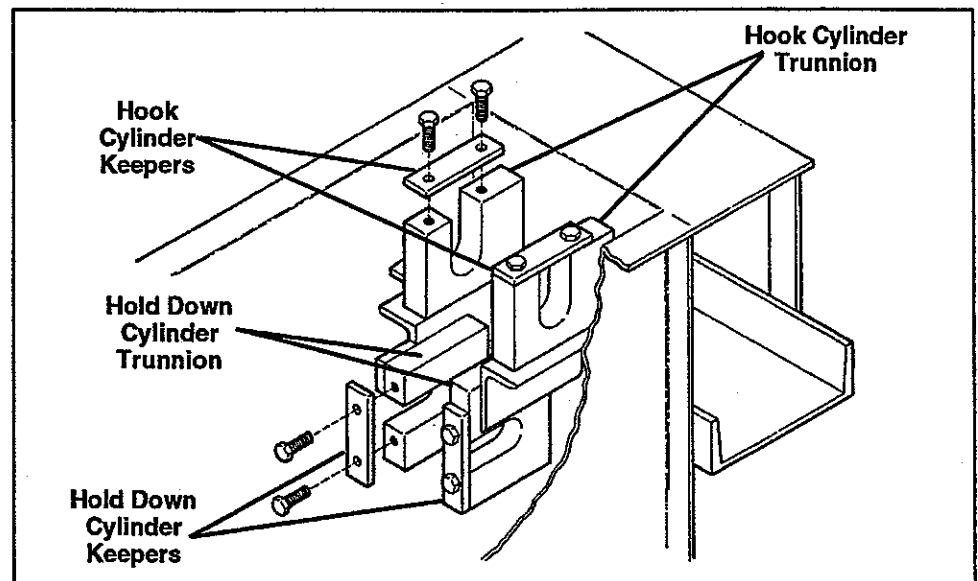


Fig. 10. Cylinder Trunnions and Keepers

- B. Grease cylinder trunnions with Lithium grease.
- C. Install both cylinder assemblies into the trunnions.
- D. Install and tighten the two keepers for the hook cylinder. (Do not install the keepers for the hold down cylinder at this time since future adjustments may be necessary.)
- E. Set the proximity switch into the bracket that is located on the hook cylinder trunnion in the pan. See Figure 11.

NOTE: The proximity switch is shipped with the hook cylinder assembly.

- F. Position the proximity switch target in front of the proximity switch. See Figure 12. Tighten the proximity switch into the bracket so that the switch is 1/8" away from the target.

IMPORTANT: Maximum tightening torque for lock nuts of proximity switch is 35 N.m (25 ft-lbs). Damage to switch will occur if maximum tightening torque is exceeded.

NOTE: It may be necessary to remove the target in order to tighten the switch into the bracket.

NOTE: Switch should be installed in bracket so that the indicator light on the switch is visible.

Installation

Rotate the switch target in front of the proximity switch to ensure that the target does not come into direct contact with the switch. Finger tighten the target at the 12 o'clock position. See Figure 12.

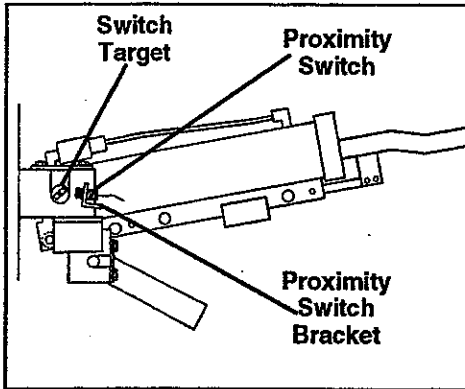


Fig. 11. Proximity Switch

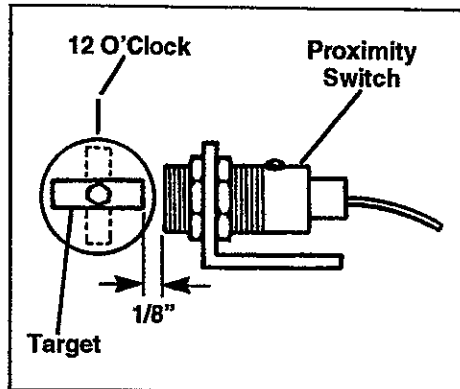


Fig. 12. Proximity Switch Target

- G. Check the storage height of the hook. Push down on the hook cylinder several times to allow the hook to raise to a "natural" height. The storage height, when measured from the floor of the pan to the top of the hook, should be approximately 26". See Figure 13.
- H. To adjust storage height, lift up on the hook cylinder assembly allowing the hold down cylinder to exit the trunnion.
- I. While holding the hook cylinder in the up position, loosen the jam nut on the threaded eye. See Figure 14. If the storage height is greater than 26", turn the hold down cylinder counterclockwise. If the storage height is less than 26", turn the hold down cylinder clockwise. One full turn of hold down cylinder results in 1/2" adjustment at tip of hook.

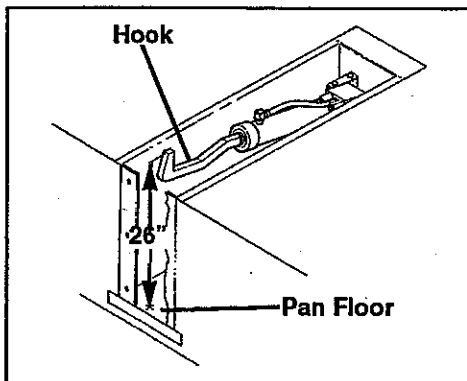


Fig. 13. Hook Storage Height

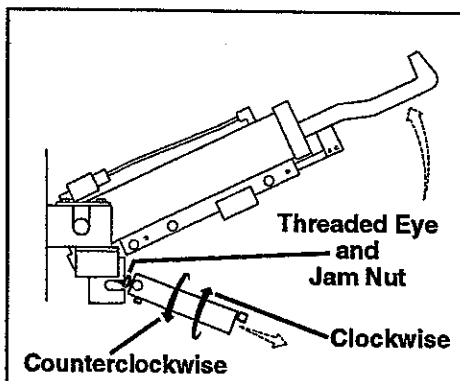


Fig. 14. Adjusting Storage Height

- J. Lower the hook cylinder, allowing the hold down cylinder to set in the trunnion. Push down on the hook cylinder several times to allow the hook to raise to a "natural" height.
- K. Re-check the storage height. If further adjustment is necessary, repeat steps G through J.
- L. When adjustment is complete, tighten the jam nut on the threaded eye, set the hold down cylinder into the trunnion and install and tighten the trunnion keepers for the hold down cylinder.

IMPORTANT: Make sure that the breather on the hold down cylinder is facing down (towards the pit floor) and the hose port is facing up.



WARNING

Be sure to securely block platform in raised position before entering pit to weld shims. Do not use maintenance prop to support raised platform until shims have been welded beneath maintenance prop support plate.

21. Reinstall the dock leveler as indicated in the dock leveler owner's manual. DO NOT make electrical connections as indicated in the Installation Instructions at this time.

NOTE: The leveler CANNOT be raised using a temporary electrical connection as indicated in the Installation Instructions. A fork truck (or other method) must be used to raise the platform of the leveler.

NOTE: The shims under the hoist cylinder support(s) should be welded to the support(s) and to the hoist cylinder trunnion plate(s) either imbedded in the pit floor or attached to the pan. Hoist cylinder must be shimmed so that it is perpendicular.

22. Modify dock leveler frame as shown on "Dock Leveler Modification Drawing" attached to this manual.

Hydraulic Installation

23. Connect the hoses as indicated on the Hydraulic Component drawing, Figure 15.

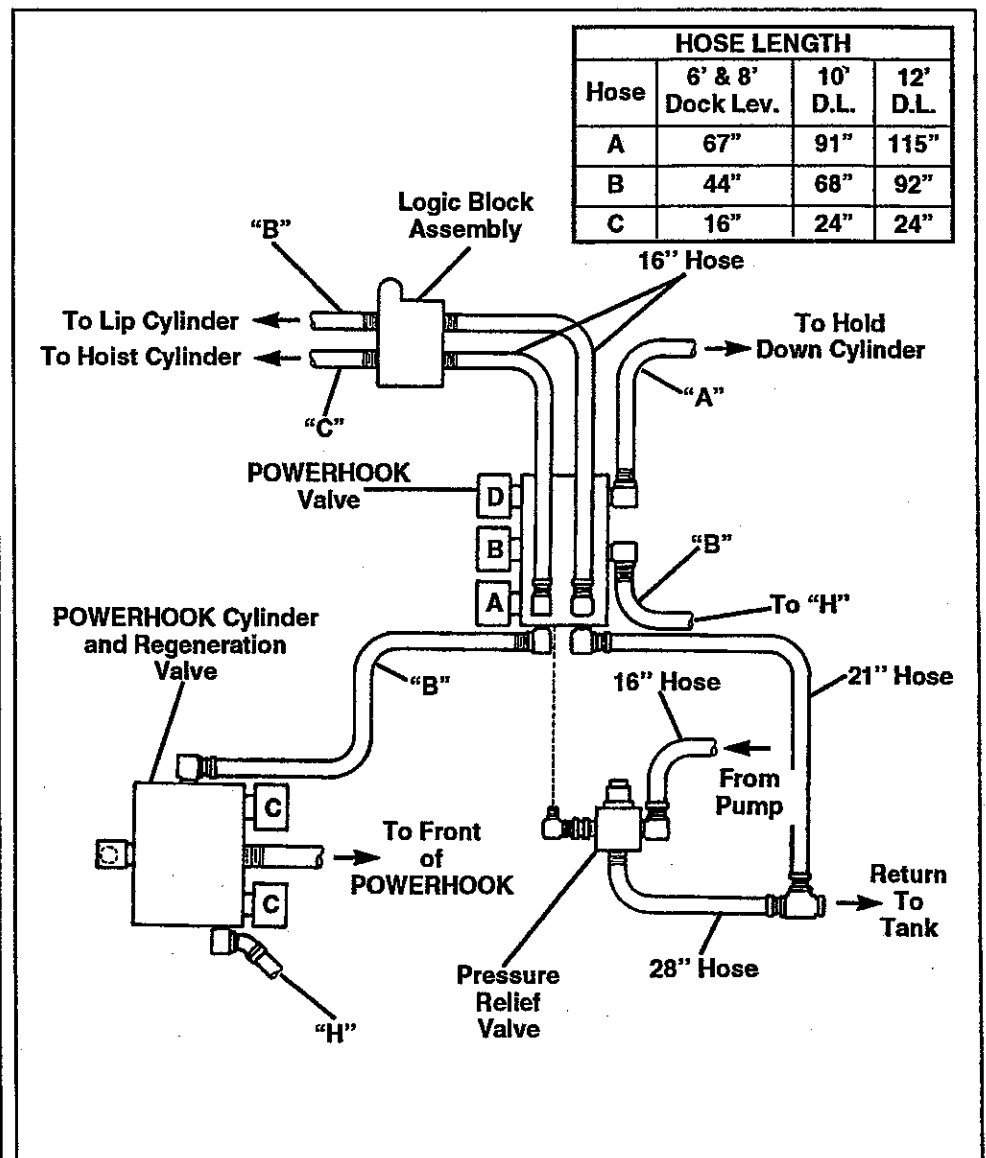


Fig. 15. Hydraulic Components

Installation

24. Add appropriate hydraulic fluid to the reservoir. See Preventative Maintenance section, page 29.
25. If the electrical installation is to be performed at a later date, use a fork truck (or other method) to raise the dock leveler platform to allow removal of the maintenance prop or other blocking. Set the leveler in the cross traffic position (the lip fully folded, inside the keepers, and the platform level with the dock floor).

Electrical Installation

26. If the dock leveler is in the cross traffic position (see Figure 7), use a fork truck (or other method) to raise the platform and set it on the maintenance prop.
27. Install control assembly on inside wall beside dock door or on other secure support. Refer to pit drawing attached to this manual.
28. Install outside signal light assembly on outside wall or other support 8' above drive on truck drivers side of dock leveler. Refer to pit drawing and Figure 16.
29. Wire units per wiring diagrams attached to this manual.

IMPORTANT:

- Make sure that the power supply requirements as shown on the dock leveler serial plate, on the decal affixed to the control assembly, and on the attached wiring diagrams are the correct requirements for the application.
 - For 3 phase applications, check motor rotation if the unit does not begin to operate within four seconds after the hydraulic pump motor is energized.
30. Install the outside "Caution" signs. See pit drawing and Figure 16.
 31. Adjust and test unit as shown on pages 16-18.



WARNING

Be sure power supply circuit is opened at main service box or circuit breaker box prior to electrical installation. Failure to disconnect power supply could result in equipment damage and/or personal injury or death.

CAUTION

Have all electrical work performed only by qualified electricians.

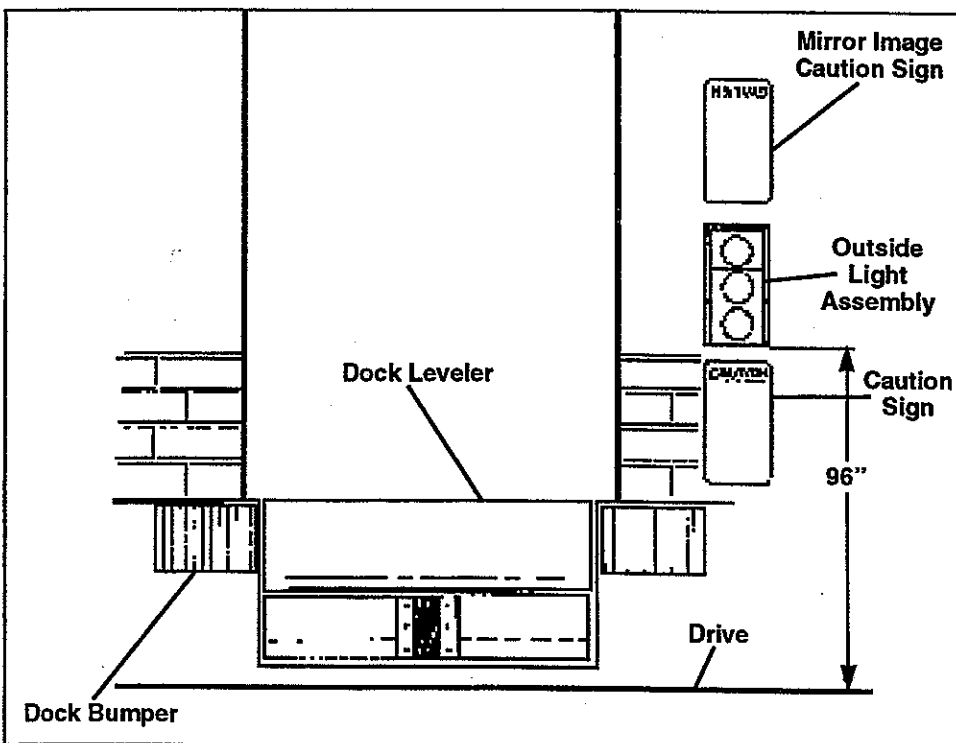


Fig. 16. Outside Signal Light Assembly and Sign Location

Additional Installation Instructions for KS5 When Dock Leveler Is Powered By a CENTRAPOWER System

1. Following step 4 of normal retrofit instructions, page 5, disconnect and label the hydraulic hoses attached to the CENTRAPOWER hydraulic valve assembly. The valve assembly is typically attached to the rear frame of the dock leveler. CAP OFF all open fittings to prevent contaminants from entering the system. Place the hoses in a location that will allow removal of the leveler from the pit without damaging the hoses.

IMPORTANT: Contaminants in the hydraulic system will cause abnormal operation of the unit. Make sure all open fittings are CAPPED OFF.

2. Skip step 7, page 5.
3. Following step 20, page 7, be sure hoses are in a position that will allow reinstallation of the dock leveler into the pit without damaging hoses.
4. Following step 21, page 9, reattach hydraulic hoses to CENTRAPOWER hydraulic valve assembly.

Additional Installation Instructions for KS5 When Dock Leveler Is Powered By a Remote Power Pack

1. Following step 5 of the normal retrofit instructions, page 5, disconnect and label hydraulic hoses that are attached to the logic block. The logic block is attached to the underside of the dock leveler platform. CAP OFF all open fittings to prevent contaminants from entering the system. Place the hoses in a location that will allow removal of the leveler from the pit without damage to the hoses.

IMPORTANT: Contaminants in the hydraulic system will cause abnormal operation of the unit. Make sure open fittings are CAPPED OFF.

2. At step 7, drain power pack following instructions in the dock leveler owner's manual.
3. Following step 20, page 7, be sure hoses are in a position that will allow reinstallation of the dock leveler into the pit without damaging the hoses.
4. Following step 22, page 9, reattach hydraulic hoses to the logic block on the underside of the platform.
5. At step 24, refill power pack following instructions included with dock leveler owner's manual.

Additional Installation Instructions for KS5 Powered By a Remote Power Pack

These instructions assume that the POWERHOOK will not be interlocked with the dock leveler and that the power pack will be mounted in the pit beneath the dock leveler. Consult the factory if either of these assumptions is untrue.

1. Remove dock leveler and prepare pit per KS5 installation instructions, page 4 and pit drawing attached. Prior to removing dock leveler, locate area on pit floor on which power pack can be mounted. Consult factory if another location is desired.

NOTE: Junction box referenced in step 1 of normal retrofit instructions, page 4, is not used. Junction box is provided on power pack.

2. Connect hydraulic lines to truck restraint following dock leveler reinstallation, step 22, page 9.

Installation

POWERHOOK KS6 and KS7 Installation Instructions

Additional installation procedures not given in this manual are required if the unit is part of a CENTRAPOWER system or if the unit has a power pack mounted in a location that is remote from the unit.

Preparation

1. Some units are shipped with the control assembly, bumpers, and outside signal light assembly attached to the unit. Remove these items from the unit prior to installing unit in pit. DO NOT remove the shipping bands at this time.
2. Remove all debris from the pit.
3. Check the pit dimensions with the certified Pit Drawing attached to this manual. Make sure that the walls of the pit are plumb and square with no bulges. Make sure the dock height, the location of the plates imbedded in the pit, and the location of the junction box are as specified on the Pit Drawing.

Installing Unit In Pit

4. Place the shims for the front and rear legs on the plates imbedded in the pit floor. Position the shims so that the legs will rest firmly on the shims when the unit is lowered into the pit. Shim so that dimension from top of shims to dock floor is as shown in Figure 17. Recommended shim stock sizes are given in Figure 18.

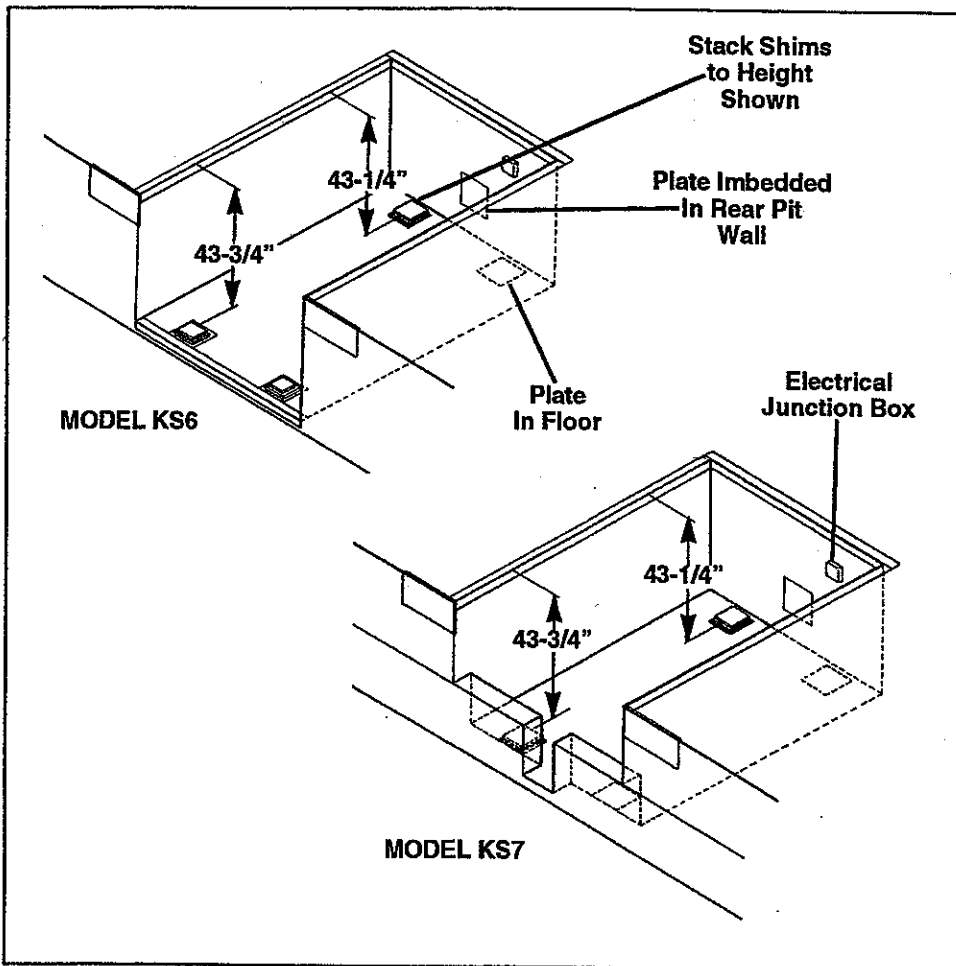


Fig. 17. Shim Height

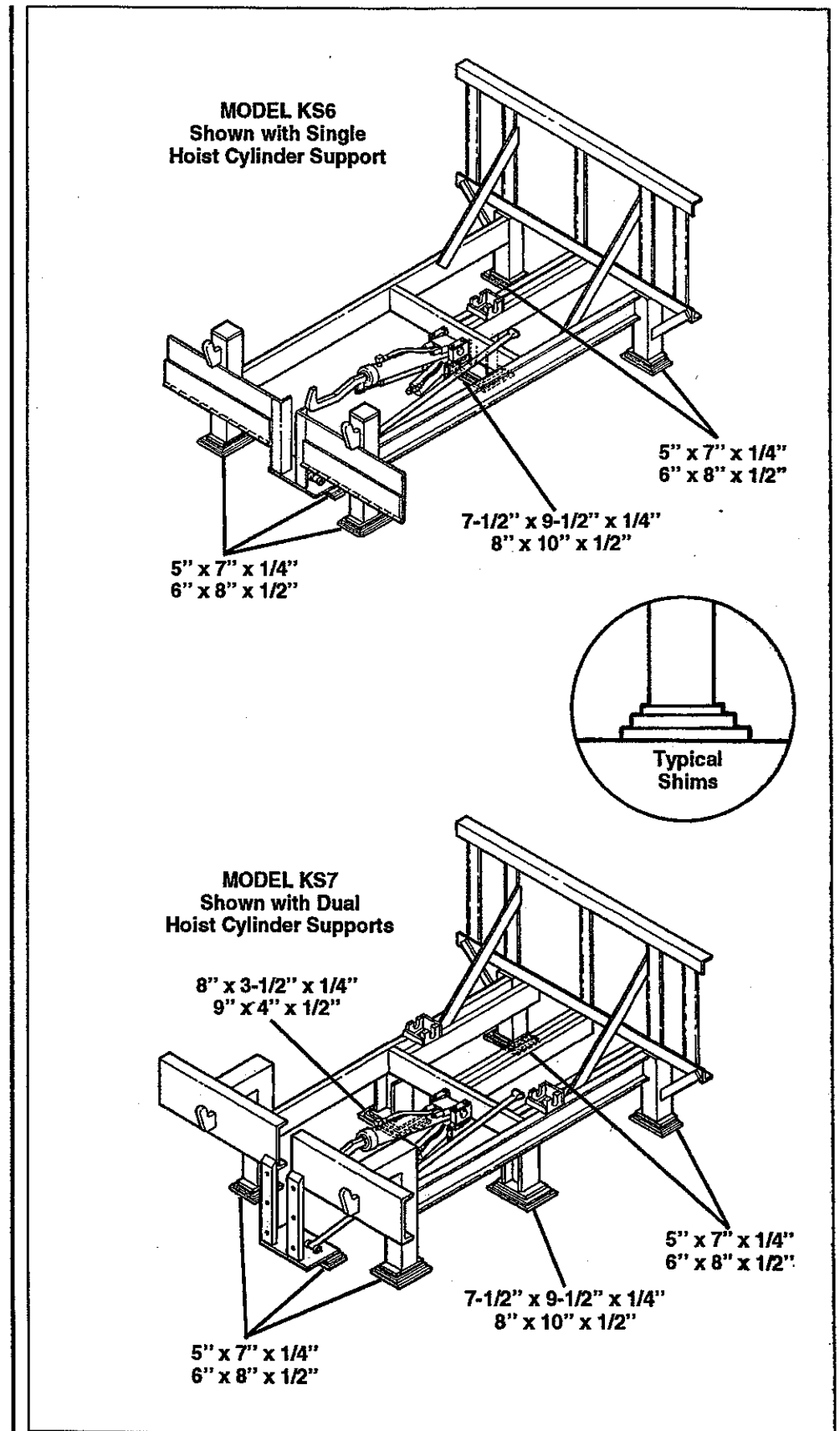


Fig. 18. Shim Sizes and Locations

Installation

5. Hoist the unit into the pit with a chain/sling using the lifting plates on the sides of the dock leveler platform. Perform the following checks when setting the unit into the pit:
 - A. Make sure the front and rear legs will rest securely on the shims set on the pit floor.
 - B. Make sure the top rear frame angle of the dock leveler is tight against the rear pit curb angle and is flush with the dock floor.
 - C. Make sure there is equal clearance between the sides of the leveler platform and the pit walls.
6. Remove the shipping bands from the unit.
7. Use fork truck (or other method) to raise dock leveler platform.
8. Position shims under the hinge tubes of the maintenance prop so that the front panel support weldment is level. Recommended shim stock sizes are given in Figure 18. DO NOT weld shims.
9. Use a fork truck (or other method) to raise dock leveler platform to a height that will allow use of the maintenance prop. The maintenance prop is accessible when the platform is raised. The top of the prop should be positioned directly behind the front header plate of the platform. See Figure 19.
10. Make sure that the front and rear legs are resting firmly and securely on the shims set on the pit floor. DO NOT weld shims.
11. Use a fork truck (or other method) to raise the dock leveler platform. Remove the maintenance prop. Set the platform in the cross traffic position (lip fully folded, inside the keepers, and the platform level with the dock floor). See Figure 20.

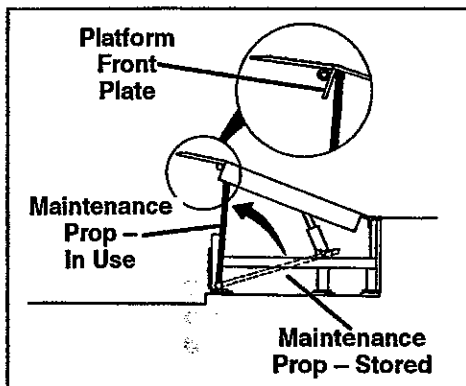


Fig. 19. Maintenance Prop In Position

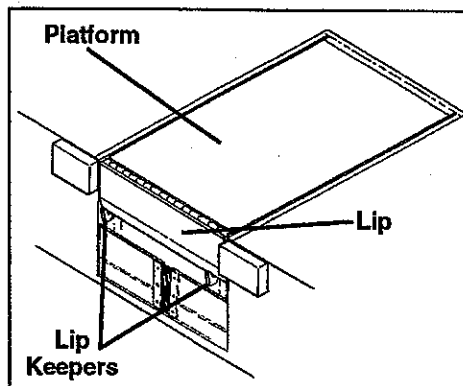


Fig. 20. Dock Leveler In Cross Traffic Position

12. Make sure the dock leveler deck is flush with the dock floor and that the top rear frame angle of the unit is tight against and flush with the rear pit curb angle. Raise platform and add or subtract shims if required. Make sure that there is equal clearance between the sides of the platform and the pit walls.
13. Weld the top rear frame angle to the rear pit curb angle. Weld behind each hinge tube of the leveler platform. See Figure 21.
14. Refer to Figure 18. For POWERHOOK KS6 units only: Tack weld the shims under the front legs to the legs, the plates imbedded in the pit floor, and to the pit front curb angle. This should be done from outside the pit prior to raising platform.



WARNING

Be sure power supply circuit is opened at main service box or circuit breaker box prior to electrical installation. Failure to disconnect power supply could result in equipment damage and/or personal injury or death.

CAUTION

Have all electrical work performed only by qualified electricians.

15. Repeat step 9.
16. Finish weld all shims to unit and, where possible, to plates or pit curb angles. Weld shims together where stacked.
17. Refer to Figure 18.
 - A. On units with single hoist cylinder, shim under the hoist cylinder support so that the center channels are level. Weld shims in place.
 - B. On units with dual hoist cylinders, shim under the cylinder supports so that the side channels are level. In addition, shim under the center beam support so that the center beam is level. Weld all shims in place.
18. Weld fish plates to the center channels of the unit and to the plate imbedded in the rear pit wall. Refer to Figure 22 for recommended fish plate sizes and location.
19. Clean and paint all welds.
20. Weld and/or bolt bumpers in place on face of dock. Refer to certified Pit Drawing.

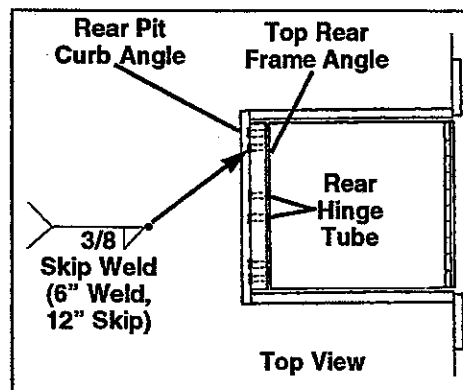


Fig. 21. Weld at Rear Frame Angle

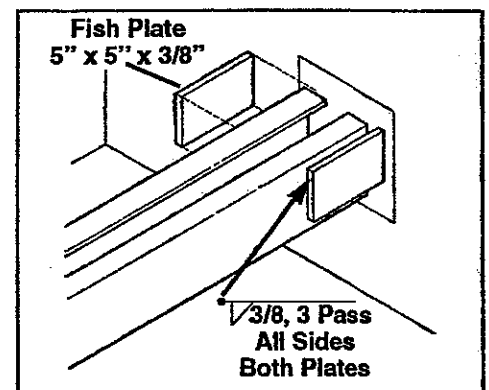


Fig. 22. Fish Plate Size and Location

Hydraulic Installation

21. If unit is part of a CENTRAPOWER system or if the power pack is located remotely, connect the hydraulic hoses to the dock leveler as indicated in separate CENTRAPOWER or remote power pack instructions.
22. Check the hydraulic fluid level. Standard units are shipped with the reservoir full. However, fluid level should be checked before operating unit for the first time to make sure no fluid loss occurred during shipment or installation. See the Preventative Maintenance section, page 29, of this manual.

NOTE: For CENTRAPOWER or remote power pack units, see appropriate instructions.
23. If the electrical installation is to be performed at a later date, use a fork truck to set the unit in the cross traffic position (lip fully folded, inside the lip keepers, and the platform level with the dock floor).

Electrical Installation: See KS5 Installation, steps 26 through 30, page 10.

Adjustment and Testing

NOTE: Test operating range of POWERHOOK without truck/trailer backed into dock.

1. Turn selector switch on control assembly to "NORMAL".
2. Momentarily press the "LOCK" push button. Hook should lower, fully extend, fully raise, partially retract, lower, and then fully retract. Alarm should activate during area of movement shown in diagram, Figure 23.
3. Measure upper and lower limits of operating range. The upper and lower limits of the vertical operating range should be 34"-35" and 8"-9" respectively. See Figure 24.

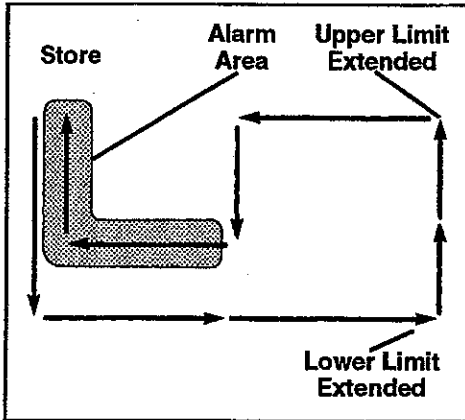


Fig. 23. Hook Movement Diagram

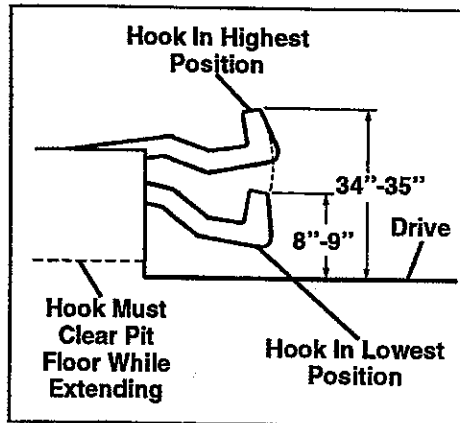


Fig. 24. Hook Vertical Operating Range

NOTE: Hook cannot be stopped while cycling. Obtain measurements by placing tape measure next to slowly moving hook.

IMPORTANT: The upper and lower limits of the operating range given in this step are for the dock height and pit depth indicated on the pit drawing. These limits may not be attainable if variations in dock height and/or pit depth exist. Consult factory if this situation occurs.

4. Adjust the upper vertical limit of hook operating range if necessary.
 - A. Locate the hook cylinder assembly and the hold down cylinder assembly. See Figure 25. The length of the threaded eye on the hold down cylinder will determine the upper vertical limit of hook movement.

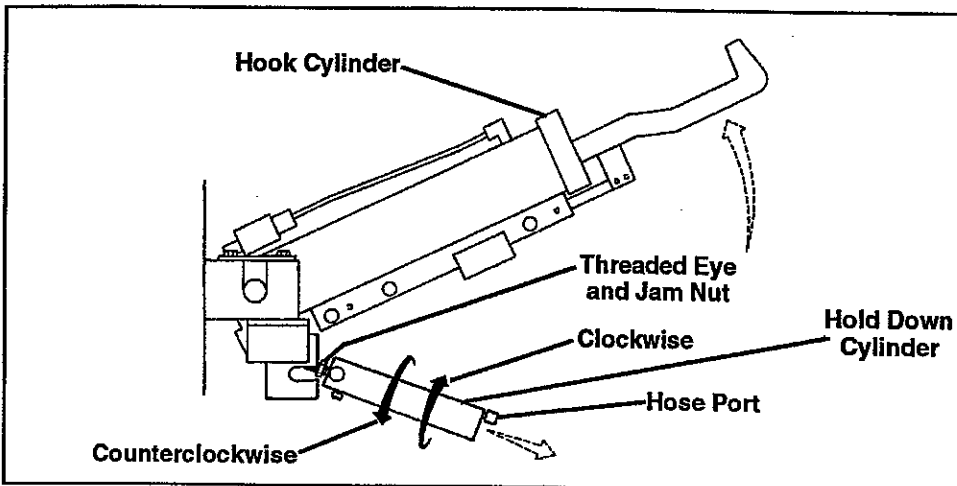


Fig. 25. Adjusting Upper Vertical Limit of Operating Range

Adjustment and Testing

- B. Disconnect the hydraulic hose from the hold down cylinder. Cap off the open fittings to prevent fluid loss and to prevent contamination from entering the system.
- C. Remove the keepers from the hold down cylinder trunnion. See Figure 26.

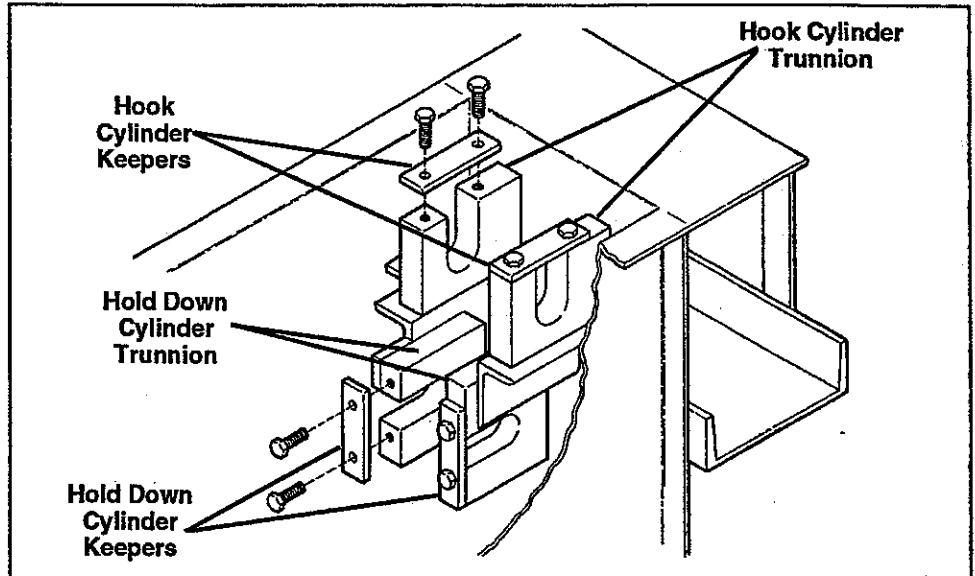


Fig. 26. Cylinder Trunnions and Keepers

- D. Lift up on the hook cylinder. This will allow the hold down cylinder to exit the trunnion.
 - E. While holding the hook cylinder up, loosen the jam nut that is on the threaded eye of the hold down cylinder.
 - F. Turn the hold down cylinder counterclockwise if the upper limit of the hook, as previously measured, was greater than 35". Turn the hold down cylinder clockwise if the upper limit was less than 34". Each full turn of the cylinder results in approximately 1/2" of vertical adjustment.
 - G. Tighten the jam nut on the threaded eye, set the hold down cylinder into the trunnion, and reinstall the trunnion keepers.
- IMPORTANT:** Make sure that the breather on the hold down cylinder is facing down (towards the pit floor) and the hose port is facing up.
- H. Reattach the hydraulic hose to the hold down cylinder.
 - I. Repeat steps B through H until the upper vertical limit of the hook is 34"-35" above the driveway.
5. Adjust the lower vertical limit of hook operating range if necessary.
- A. Locate the proximity switch that is mounted in a bracket located on the trunnion for the hook cylinder. Locate the target for the switch. See Figure 27.

The position of the target in relation to the switch will determine the lower travel limit of the hook. When the hook lowers, the target is positioned into the sensing area of the proximity switch. The switch is activated when the target is sensed, at which time the indicator light on the switch should be ON. At no time should the target come into direct contact with the switch.

Adjustment and Testing

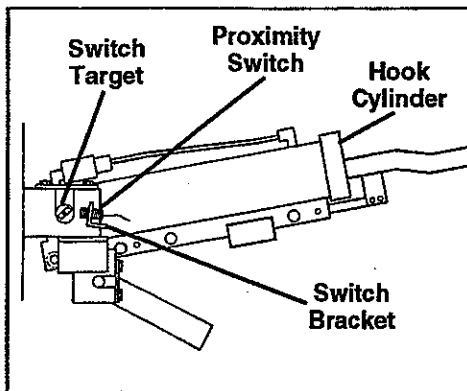


Fig. 27. Proximity Switch and Target

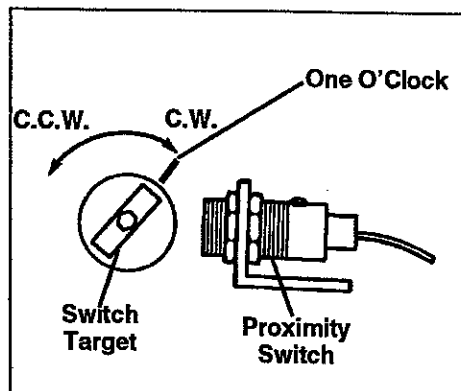


Fig. 28. Adjusting Lower Travel Range

The typical factory set position for the target is approximately at the one o'clock position (looking at it from the side, with the proximity switch at three o'clock). See Figure 28.

- B. Loosen the bolt that holds the target.
 - C. Turn the target 2° – 4° counterclockwise if the lower limit of the hook is greater than 9". The hook will lower but will not extend if the target is adjusted too far counterclockwise. See Figure 28.
 - D. Turn the target clockwise if the lower limit of the hook is less than 8". The hook will extend without lowering if the target is adjusted too far clockwise. See Figure 28.
 - E. Repeat steps C or D until the lower vertical limit of the hook is 8"-9" above the driveway. When adjustments are completed hold the target in place and tighten the bolt.
6. Back a truck/trailer with ICC bar into dock.
 7. Momentarily press the "LOCK" pushbutton. Truck restraint hook should lower, extend, raise, and retract until it locks onto ICC bar. Power pack should then shut off.
 8. Check lights. Inside light should be GREEN and outside light RED.
 9. Test dock leveler operation. See dock leveler owner's manual (if KS5 retrofit) or page 21, steps 4–6 of this manual.
 10. Checking of alarm and white outside light can be done by having truck attempt to pull away from dock with hook engaged.
 11. Momentarily press the "UNLOCK" pushbutton. Truck restraint hook should disengage from ICC bar and restore behind dock wall. Power pack should then shut off.
 12. Check lights. Inside light should be RED and outside light GREEN.
 13. Turn selector switch to "BYPASS". Inside light should be AMBER and outside light should be RED.
 14. Turn selector switch to "NORMAL".

NOTE: Additional adjustment and testing procedures may be required for some options. See "Options" section, page 26.



WARNING

Do not operate the unit if any personnel are on or in front of the unit.

Do not operate the unit until the truck/trailer is parked squarely against the dock bumpers.

Do not enter the truck/trailer unless:

1. The dock leveler lip is resting securely on the truck/trailer bed.
2. The outside signal light is red, and inside signal light is green when in "NORMAL" or amber when in "BYPASS".
3. Either the truck/trailer ICC bar is engaged by the truck restraint or the truck/trailer wheels have been chocked.

Truck/trailer wheels must be chocked if the truck restraint is not utilized.

Failure to follow these instructions could result in serious personal injury or death.

Controls and Signals

Figure 29 shows a standard control assembly.

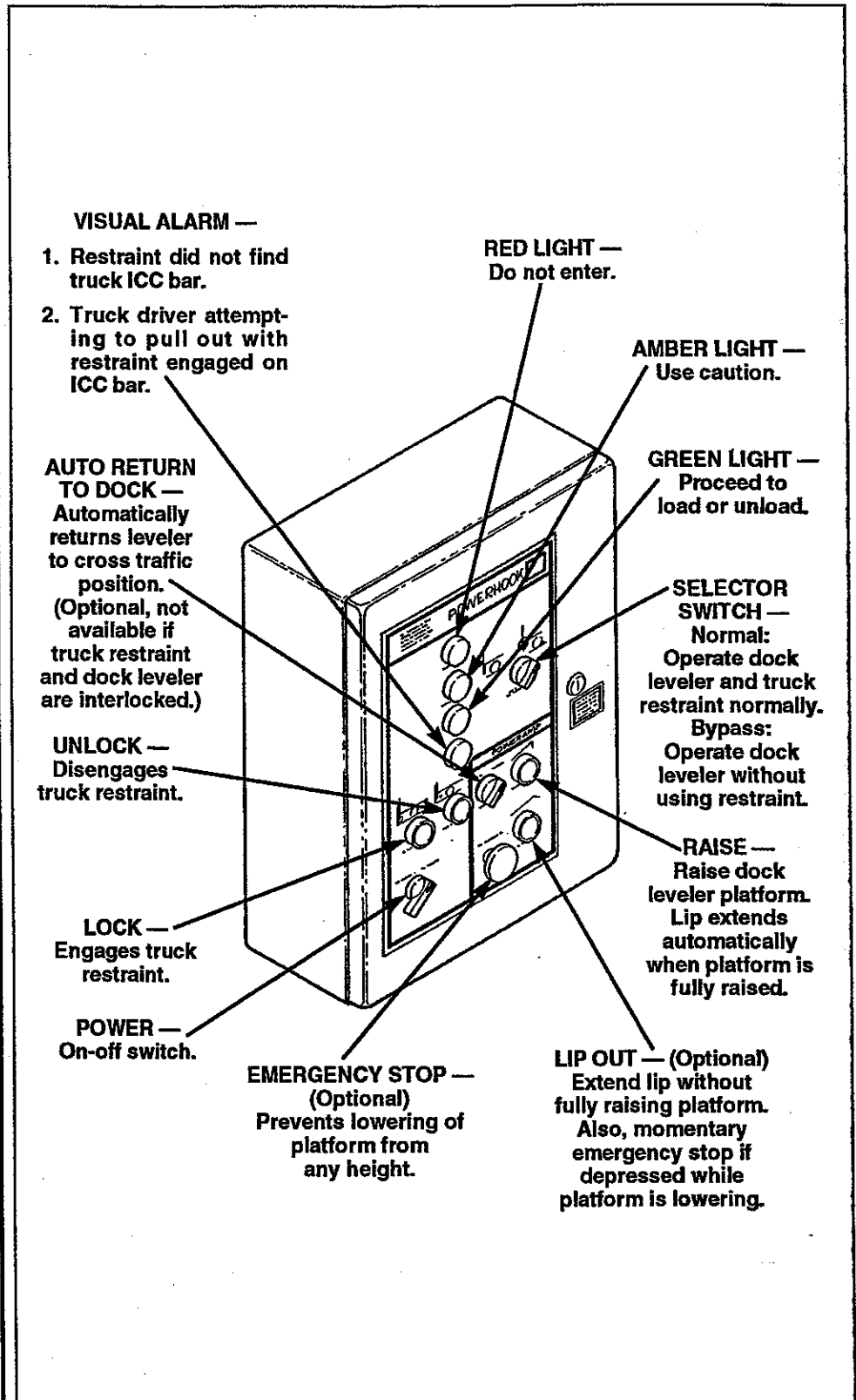


Fig. 29. Control Assembly Functions

Operating Instructions

Controls and Signals

Only momentary pressure is required on the LOCK and UNLOCK pushbuttons to operate the truck restraint. Constant pressure is required on the RAISE pushbutton to operate the dock leveler.

The OPERATION switch on standard units determines the operating mode of the unit. The NORMAL operating mode is used to operate the truck restraint and the dock leveler. The BYPASS operating mode is used to operate the leveler only. The unit should only be operated in BYPASS if the truck/trailer does not have an ICC bar, or the ICC bar is not within the operating range of the restraint. The restraint cannot be operated in the BYPASS mode. The inside light remains AMBER and the outside light remains RED at all times while the switch is in BYPASS.

Standard units come with inside and outside signal lights that serve as a visual indication for the dock attendant and the truck driver. RED, AMBER and GREEN signal lights are located on the control assembly cover for dock attendant use. RED, WHITE and GREEN signal lights are located in the outside signal light assembly for truck operator use. When the light is ON, it indicates the following condition:

-
- | | |
|-----------------------|---|
| RED inside light – | DO NOT ENTER the truck/trailer at any time. |
| AMBER inside light – | Enter the truck/trailer with CAUTION only if:
(1) Truck/trailer wheels have been chocked.
(2) The dock leveler lip is resting securely on the truck/trailer bed (when not performing below dock end load operations).
(3) The outside signal light is RED. |
| GREEN inside light – | ENTER the truck/trailer only if:
(1) The dock leveler lip is resting securely on the truck/trailer bed, and
(2) The outside signal light is RED. |
| RED outside light – | DO NOT DRIVE truck/trailer AWAY from the dock at any time. |
| WHITE outside light – | CEASE ATTEMPTS AT DRIVING truck/trailer AWAY from the dock because the truck restraint is engaged at the truck/trailer ICC bar. |
| GREEN outside light – | OKAY TO DRIVE truck/trailer AWAY from the dock or INTO the dock. |
-

Standard units also have an alarm light that indicates to the dock attendant that the truck restraint did not find a truck/trailer ICC bar (e.g., the truck/trailer does not have an ICC bar, or the ICC bar is not in the operating range of the restraint). The alarm will turn ON as the restraint returns to the stored position. The alarm light will turn OFF automatically after a short time or it can be turned OFF by setting the OPERATION switch to BYPASS.

The alarm light will also indicate to the dock attendant that the truck is attempting to pull away from the dock while the restraint is engaged to the truck/trailer ICC bar. The alarm light is ON at the same time the WHITE outside light is ON. The alarm light will stay ON until the truck operator ceases attempts at driving away.



WARNING

If the unit is equipped with the auto return to dock option, make sure that the AUTO RETURN selector switch is OFF.

CAUTION

Do not operate truck restraint or dock leveler until you read and understand the operating instructions and become fully familiar with the equipment and its controls.



WARNING

If truck restraint does not engage ICC bar, turn operation switch to BYPASS and securely chock truck/trailer wheels. Failure to follow these instructions could result in serious personal injury or death.



WARNING

Check to make sure truck restraint hook is engaged with ICC bar before loading end loads. If restraint has been disengaged by dock leveler lip, chock truck wheels before loading end loads.

If the unit is equipped with the leveler/restraint interlocking option, the dock leveler pull-ring MUST be used for operating the dock leveler for below dock end load operations. A light pull on the ring will raise the leveler platform. A strong pull on the ring will extend the leveler lip at any time during the raise cycle. See Figure 36.

Standard units have provisions for interlocking the unit with an overhead door. A limit switch, provided by others, is used to indicate the position of the door. The switch should be installed so that the truck restraint and the dock leveler cannot operate unless the door is at the fully raised position. See the electrical Interconnection Drawing for more details of how to interlock the unit with an overhead door.

Normal Operation

1. Set the "OPERATION" switch to NORMAL. The inside light is RED, the outside light is GREEN.
2. After the truck has backed into the dock, momentarily press the "LOCK" pushbutton. The truck restraint automatic engage cycle will be activated, the inside light will change to AMBER, and the outside light will change to RED.
 - A. If the truck restraint engages the truck/trailer ICC bar, the unit will automatically shut OFF and the inside light will change to GREEN (the outside light remains RED). Proceed with step 3.
 - B. If the truck restraint does not engage the truck/trailer ICC bar, the unit will automatically return to the stored position where it will automatically shut OFF. The inside light will change to RED, the outside light will change to GREEN, and the alarm will turn ON. Follow the BYPASS operation in-

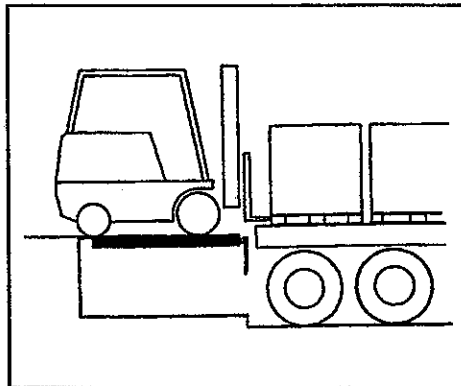


Fig. 30. Removing End Loads

structions, page 22.

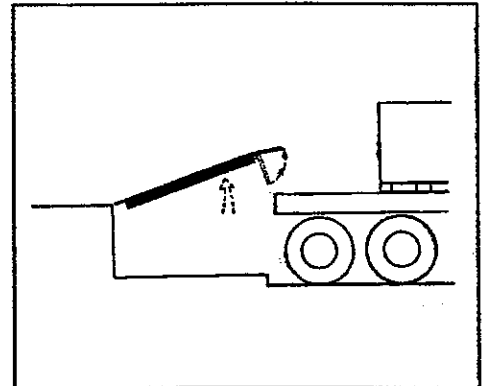


Fig. 31. Raising Dock Leveler

3. If truck is loaded completely to the rear, preventing dock leveler lip from entering truck, remove end loads before actuating dock leveler. See Figure 30. If truck bed is below dock level, see Below Dock End Load Operation, page 23.
4. Press the "RAISE" pushbutton. The dock leveler will raise. When the leveler platform is fully raised and the lip is fully extended, release the "RAISE" pushbutton. The leveler will descend until the lip contacts the truck/trailer bed. See Figure 31.

Operating Instructions

5. Make sure that the dock leveler lip is resting securely on the truck/trailer bed and that the inside light is GREEN. See Figure 32. Complete loading/unloading operations.

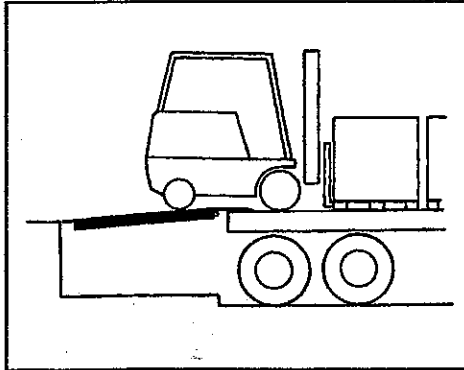


Fig. 32. Lip Securely On Truck

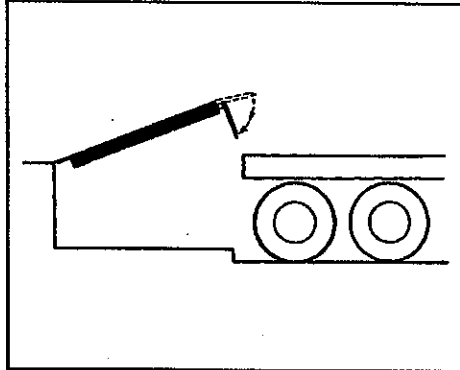


Fig. 33. Storing Dock Leveler

6. When loading/unloading is completed, or if end loads (pallets which prevent use of the lip) must be loaded, press the "RAISE" pushbutton. The dock leveler platform will raise and the lip will fold. When the leveler lip is fully folded, release the "RAISE" pushbutton. The leveler will descend to the cross traffic position (the lip fully folded, inside the keepers, and the platform level with the dock floor). See Figure 33.

7. Load end loads if required.

NOTE: If end load must be placed on a below dock level truck, see steps 3, 4, 6-8, Below Dock End Load section, page 23.

8. Momentarily press the "UNLOCK" pushbutton. The truck restraint automatic disengage cycle will be activated, and the inside light will change to AMBER (the outside light will remain RED). When the restraint reaches the stored position, the unit will shut OFF, the inside light will change to RED, and the outside light will change to GREEN.

Bypass Operation

NOTE: Use BYPASS operation only when truck restraint hook does not engage the truck/trailer ICC bar. See Normal Operation section, step 2B.

1. Set the OPERATION switch to BYPASS. The inside lights will remain AMBER and the outside lights will remain RED at all times while the switch is in BYPASS.
2. CHOCK TRUCK/TRAILER WHEELS. The truck restraint cannot be operated while the OPERATION switch is in BYPASS. See Figure 34.

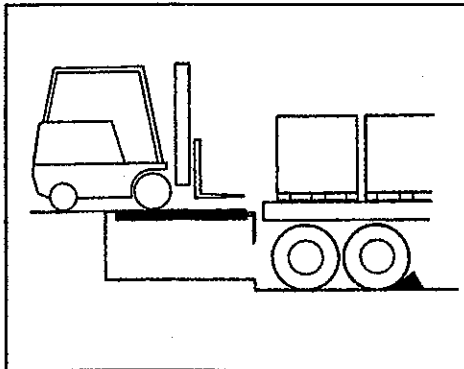


Fig. 34. Chock Truck Wheels

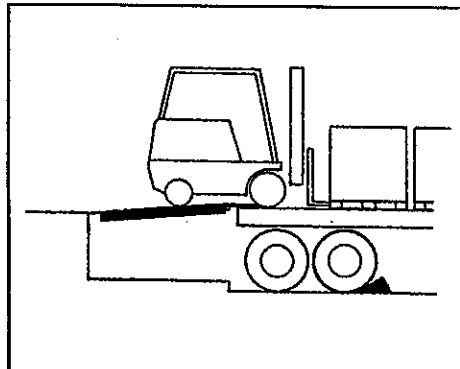


Fig. 35. Lip On Truck



WARNING

If the unit is equipped with the auto return to dock option, make sure that the AUTO RETURN selector switch is OFF.



WARNING

In bypass operation, failure to securely chock truck/trailer wheels while loading or unloading could result in serious personal injury or death.



WARNING

If the unit is equipped with the auto return to dock option, make sure that the AUTO RETURN selector switch is OFF.



WARNING

If truck restraint does not engage ICC bar, turn selector switch to BYPASS and securely chock truck/trailer wheels. Failure to follow these instructions could result in serious personal injury or death.



WARNING

Check to make sure truck restraint hook is engaged with ICC bar. Securely chock truck/trailer wheels before loading or unloading end loads.

3. If truck is loaded completely to the rear, preventing dock leveler lip from entering truck, remove end loads before actuating dock leveler. See Figure 30. If truck bed is below dock level, see steps 3 through 8, Below Dock End Load Operation, page 23.
4. Press the RAISE pushbutton. The dock leveler will raise. When the leveler platform is fully raised and the lip is fully extended, release the RAISE pushbutton. The leveler will descend until the lip contacts the truck/trailer bed. See Figure 31.
5. Make sure that the dock leveler lip is resting securely on the truck/trailer bed. Make sure that the truck/trailer wheels are chocked. Complete loading/unloading operations. See Figure 35.
6. When loading/unloading is completed, or if end loads (pallets which prevent use of the lip) must be loaded, press the "RAISE" pushbutton. The dock leveler platform will raise and the lip will fold. When the leveler lip is fully folded, release the "RAISE" pushbutton. The leveler will descend to the cross traffic position (the lip fully folded, inside the keepers, and the platform level with the dock floor). See Figure 33.
7. Load end loads if required.
NOTE: If end load must be placed on a below dock level truck, see steps 3, 4, 6-8, Below Dock End Load section, page 23.
8. Remove chocks from truck/trailer wheels.
9. Set the OPERATION switch to NORMAL. The inside light changes to RED, the outside light to GREEN.

Below Dock End Load Operation

1. Set the OPERATION switch to NORMAL. The inside light is RED, the outside light is GREEN.
2. After the truck has backed into the dock, momentarily press the "LOCK" pushbutton. The truck restraint automatic engage cycle will be activated, the inside light will change to AMBER, and the outside light will change to RED.
 - A. If the truck restraint engages the truck/trailer ICC bar, the unit will automatically shut OFF and the inside light will change to GREEN (the outside light remains RED). Proceed with step 3.
 - B. If the truck restraint does not engage the truck/trailer ICC bar, the unit will automatically return to the stored position where it will automatically shut OFF. The inside light will change to RED, the outside light will change to GREEN, and the alarm light will turn ON. If this happens, set the OPERATION switch to BYPASS and securely chock the truck wheels. The inside light will change to AMBER and the outside light will change to RED.
3. Pull up lightly on the pull-ring operator located at the rear of the dock leveler. The leveler will raise. If the unit is equipped with the leveler/restraint interlocking option, the inside light will change to AMBER (the outside light will remain RED). If the unit is not equipped with the interlocking option, the inside light will remain GREEN (the outside light will remain RED). When the leveler is approximately 4 inches above the dock floor, give a strong pull on the ring. The leveler lip will extend beyond the lip keepers. When the lip is extended beyond the keepers, release the ring. The leveler will descend to the full below dock position (the lip partially extended, resting against the keepers, and the platform below the dock floor).

Operating Instructions

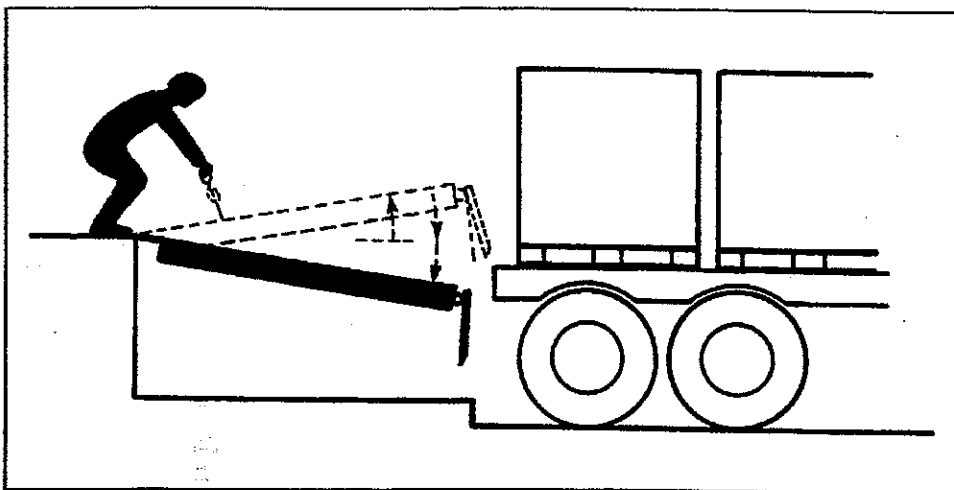


Fig. 36. Pull Ring to Operate Dock Leveler



WARNING

If the unit is equipped with the auto return to dock option, make sure that the AUTO RETURN selector switch is OFF.

NOTE: If the unit is equipped with the leveler/restraint interlocking option, the inside light will change from GREEN to AMBER during this step because a situation could occur where the dock leveler lip will contact the truck restraint, possibly disengaging the restraint from the truck/trailer ICC bar. This situation is only likely to occur on levelers with long lips and truck/trailers with high ICC bars. If restraint is disengaged, securely chock truck/trailer wheels before proceeding.

4. Complete loading/unloading of end load.
5. Follow this step if unloading operation is not complete. Follow step 6 if operation is complete.

Press the RAISE pushbutton. The dock leveler will raise. The leveler lip will fold as the platform raises. When the leveler platform is fully raised and the lip is fully extended, release the RAISE pushbutton. The leveler will descend until the lip contacts the truck/trailer bed.

NOTE: If the unit is equipped with the leveler/restraint interlocking option, the inside light will change from AMBER to GREEN when the lip fully folds as the leveler raises from the full below dock position. If the unit is not equipped with the interlocking option, the inside light will remain GREEN during the entire raise cycle.

Make sure that the dock leveler lip is resting securely on the truck/trailer bed and that the truck/trailer wheels are chocked. Complete unloading operation.

6. When loading/unloading is completed, press the "RAISE" pushbutton. The dock leveler platform will raise and the lip will fold. When the leveler lip is fully folded, release the "RAISE" pushbutton. The leveler will descend to the cross traffic position (the lip fully folded, inside the keepers, and the platform level with the dock floor).
7. If truck restraint was engaged, momentarily press the "UNLOCK" pushbutton. The truck restraint automatic disengage cycle will be activated. When the restraint reaches the stored position, the unit will automatically shut OFF, the inside light will change to RED, and the outside light will change to GREEN.
8. If the truck restraint was not engaged, remove wheel chocks and set the OPERATION switch to NORMAL.

Special Instructions for Model KS5 When Not Used With POWERAMP or CHALLENGER Hydraulic Dock Leveler

A POWERHOOK Model KS5 truck restraint retrofit to a POWERAMP or CHALLENGER dock leveler is operated the same as the KS6 or KS7. For operating instructions, see page 19.

A POWERHOOK Model KS5 installed with another type or model dock leveler is operated as follows:

1. Make sure the OPERATION switch is set to NORMAL. The inside light will switch to RED, the outside light to GREEN.
2. After the truck has backed into the dock, momentarily press the "LOCK" pushbutton. The truck restraint automatic engage cycle will be activated, the inside light will change to AMBER, and the outside light will change to RED.
 - A. If the truck restraint engages the truck/trailer ICC bar, the unit will automatically shut OFF and the inside light will change to GREEN (the outside light remain RED). Proceed with step 3.
 - B. If the truck restraint does not engage the truck/trailer ICC bar, the unit will automatically return to the stored position where it will automatically shut OFF. The inside light will change to RED, the outside light will change to GREEN, and the alarm light will turn ON. Set OPERATION switch to "BYPASS". This turns inside light to AMBER, outside light to RED. Chock truck wheels before loading or unloading.
3. Operate dock leveler as shown in dock leveler instructions.
4. When loading/unloading is completed, momentarily press the "UNLOCK" pushbutton. The truck restraint automatic disengage cycle will be activated, and the inside light will change to AMBER (the outside light will remain RED). When the restraint reaches the stored position, the unit will shut OFF, the inside light will change to RED, and the outside light will change to GREEN.

NOTE: If operation switch was turned to "BYPASS", it should be returned to "NORMAL" after chocks are removed.

Options

Dock Leveler and Truck Restraint Interlock

The dock leveler is interlocked with the truck restraint so that the leveler cannot be operated until the restraint has engaged the truck/trailer ICC bar when the OPERATION switch is in NORMAL.

The truck restraint is interlocked with the dock leveler so that the restraint cannot be operated until the leveler is in the cross traffic position (the lip fully folded, inside the keepers, and the platform level with the dock floor).

Leveler and restraint interlocking are overridden when the OPERATION switch is in BYPASS. This allows the independent operation of the leveler (the restraint cannot be operated in BYPASS).

This option is not available on units equipped with the auto return to dock option.

Adjustment and Testing

1. The dock leveler should be in the cross traffic position before beginning tests.
2. Back a truck/trailer with ICC bar into dock.
3. Press the RAISE pushbutton. The dock leveler should **NOT** raise. If the leveler did not raise, proceed with step 4. If the leveler did raise, decrease dimension "A" or "B", Figure 37, so that the target is in the sensing range of the switch. Typical factory settings for "A" and "B" are approximately 3/4" and 1/8" respectively. Make adjustments at switch (dimension B) and/or target (dimension A) until leveler does not raise when the truck restraint is not engaged at truck/trailer ICC bar.

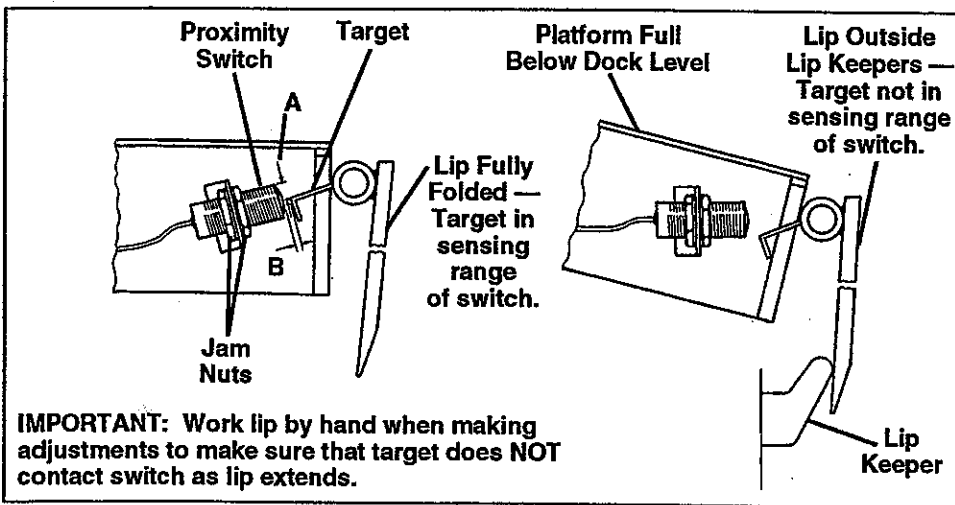


Fig. 37. Proximity Switch Adjustment

4. Momentarily press the LOCK pushbutton. The truck restraint automatic engage cycle will be activated and the restraint will engage the truck/trailer ICC bar.
5. See Figure 36, page 24. Pull up lightly on the pull-ring operator located at the rear of the dock leveler. The leveler will raise. When the leveler is approximately 2" above the dock floor, give a strong pull on the ring. The leveler lip will extend beyond the lip keepers. When the lip is extended beyond the keepers, release the ring. The leveler will descend to the full below dock position.
6. Press the UNLOCK pushbutton. The truck restraint should **NOT** disengage from the truck/trailer ICC bar. If the restraint did not disengage, proceed with step 7. If the restraint did disengage, move the switch farther from the target or bend the target down so that the target is not in the sensing range of the

switch as shown in Figure 37. Make adjustments at switch and/or target until restraint does not disengage truck/trailer ICC bar when the dock leveler is at the full below dock position.

IMPORTANT: If adjustments are required in this step, make sure that the interlocking described in step 3 is still in effect after step 6 adjustments are complete.

7. Press the RAISE pushbutton. The dock leveler will raise. The leveler lip will fold as the platform raises. When the lip is fully folded, release the RAISE pushbutton. The leveler will descend to the cross traffic position.
8. Momentarily press the UNLOCK pushbutton. The truck restraint automatic disengage cycle will be activated and the restraint will return to the stored position.

Lip Control

The dock leveler lip can be extended at any time during the raise cycle of the leveler by simultaneously pressing the "RAISE" and "LIP OUT" pushbuttons. Maintained pressure is required on both pushbuttons.

Adjustment and Testing

1. Set OPERATION switch to "BYPASS".
2. Press "RAISE" pushbutton.
3. When dock leveler platform has raised approximately 6" above dock, press "LIP-OUT" button while maintaining pressure on the "RAISE" pushbutton. Lip should extend.

Emergency Stop

When E-STOP is activated, all downward motion of the dock leveler platform is prevented, and the inside and outside lights are RED at all times. The hydraulic pump motor can be energized while the E-STOP device is activated so the dock leveler platform can be raised, the leveler lip can be extended, and the truck restraint can be operated.

Adjustment and Testing

1. Set OPERATION switch to "BYPASS". Inside light should be AMBER, outside light RED.
2. Press "RAISE" pushbutton. The dock leveler will raise and lip will extend.
3. When lip is fully extended, release "RAISE" pushbutton.
4. As leveler is descending, press "EMERGENCY STOP" button. Dock leveler platform will stop descending. Inside and outside lights should be RED.
5. Pull "EMERGENCY STOP" button. Leveler platform will descend. Inside light should be AMBER, outside light RED.

Audible Alarm

An audible alarm can be used rather than the standard visual alarm. The audible alarm cannot be used in outdoor and/or hazardous location applications and those applications requiring a NEMA rating for the operator interface devices.

Operation Key Switch

A 2 position key switch, with key removal from NORMAL only, is used rather than the standard 2 position selector switch. The option can prevent unauthorized use of the unit in the BYPASS operating mode.

Options

Auto Return to Dock

The dock leveler will automatically return to the cross traffic position (the lip fully folded, inside the keepers, and the platform level with the dock floor) when the AUTO RETURN switch is ON and when the OPERATION switch is in NORMAL.

This option is not available on units equipped with the dock leveler/truck restraint interlocking option.

Adjustment and Testing

1. The dock leveler should be in the cross traffic position before beginning tests.
2. Set the OPERATION switch to NORMAL and the AUTO RETURN switch to ON. Wait 10 seconds. The dock leveler should **NOT** raise. If the leveler did not raise, proceed with step 3. If the leveler did raise, increase dimension "A" or "B", Figure 38, so that the target is not in the sensing range of the switch. Typical factory settings for dimensions "A" and "B" are approximately 3/4" and 3/16" respectively. Make adjustments at switch (dimension B) and/or target (dimension A) until leveler does not raise when in the cross traffic position.

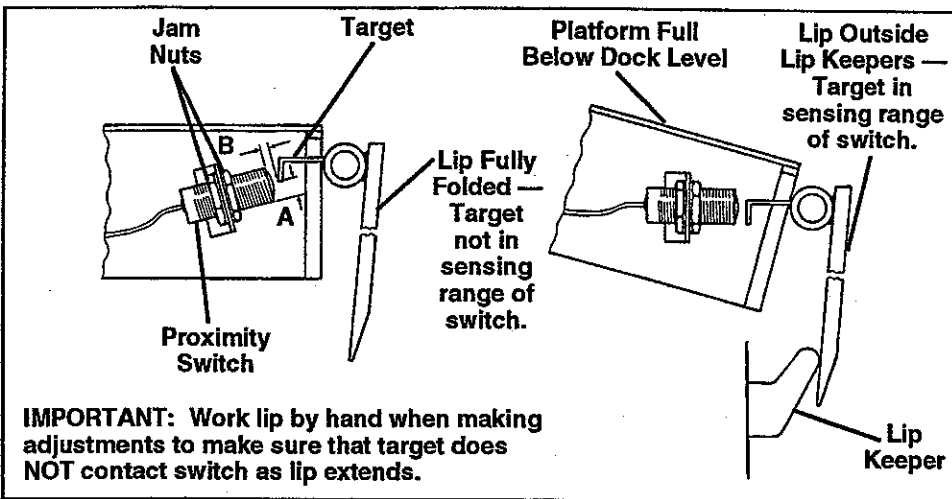


Fig. 38. Proximity Switch Adjustment

3. Set the AUTO RETURN switch to OFF.
4. Press the RAISE pushbutton. The dock leveler will raise. When the leveler platform is fully raised and the lip is fully extended, release the RAISE pushbutton. The leveler will descend to the full below dock position.
5. Set the AUTO RETURN switch to ON. After approximately 6–8 seconds, the dock leveler should automatically return to the cross traffic position. If the leveler does auto return, proceed with step 6. If the leveler does not auto return, move the switch closer to the target or bend the target so that the target is in the sensing range of the switch as shown in Figure 38. Make adjustments at switch and/or target until leveler automatically returns to dock level.

IMPORTANT: If adjustments are required in this step, make sure that the leveler will not raise as described in step 2 after step 5 adjustments are complete.

6. Set the AUTO RETURN switch to OFF.



WARNING

Always barricade the work area to prevent unauthorized use of the unit before maintenance is complete.

Always lock off all electrical disconnects after raising platform and setting maintenance prop when service under the unit is required. More than one electrical disconnect switch may be required to de-energize the equipment.

Always stand clear of the dock leveler lip when working in front of the unit.



WARNING

Failure to check, and repair or replace if required, lights and alarm will jeopardize dock attendant safety.

Service Under the Dock Leveler

Set the dock leveler on the maintenance prop if the maintenance (or troubleshooting) to be performed requires access to the unit from in the pit. Follow the BYPASS operation instructions to raise the leveler. Position the prop behind the front header plate of the leveler as indicated in Figure 19 of the Installation Instructions. **STAY CLEAR OF LIP** — The lip will fold after the platform rests on the prop.

Recommended Hydraulic Fluids

To assure normal operation of the unit, the following hydraulic fluids are recommended:

- Aero Shell fluid #4 Code #60421 by Shell Oil Co.
- Mobil Aero HFA Mil-Hs606A by Mobil Oil Co.
- Texaco Type BB
- Filmite No. 530
- Exxon "Univis J13"

Use of hydraulic fluids with equivalent specifications to those listed above are acceptable. Use of fluids that do not have equivalent specifications will result in abnormal operation of the unit and possible voiding of warranty.

Daily Maintenance

Make sure that all of the inside and outside signal lights work. Make sure the alarm works.

Weekly Maintenance

1. At least once each week, operate the unit through all of its operating cycles to maintain lubrication.
2. Inspect the dock leveler platform hinge area and lip hinge area. The hinge areas should be kept free of debris and dirt. Build-up of foreign material in the hinge areas will cause abnormal operation of the unit.

NOTE: Set the dock leveler to the full below dock position to thoroughly inspect the platform (rear) hinge area. Set the OPERATION switch to BYPASS and follow step 3, Below Dock End Load Operation, page 23 to set the leveler to the full below dock position.

Preventive Maintenance

Monthly Maintenance

1. Lubricate the unit as shown in Figure 39. Failure to properly lubricate the unit will cause abnormal operation of the unit.

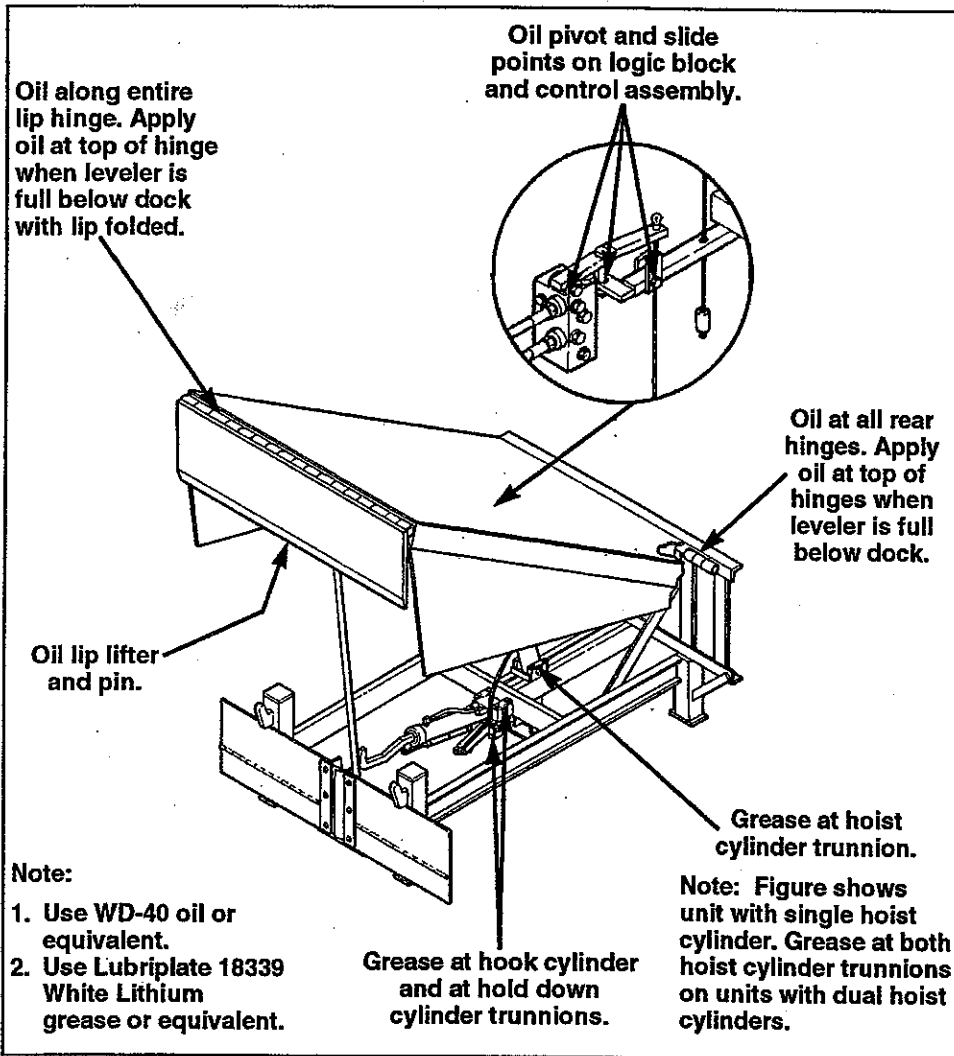


Fig. 39. Lubrication Chart

2. Check the hydraulic fluid level in the reservoir of the power pack (i.e., motor/pump/reservoir) when the dock leveler is at the full below dock position. A low fluid level or the use of non-recommended fluids will cause abnormal operation of the unit.
 - A. See the CENTRAPOWER addendum if the unit is part of CENTRAPOWER system.
 - B. See the Remote Powerpack addendum if the unit has the power pack mounted in a location remote from the unit.Steps 2C or 2D are for units not identified in 2A or 2B.

Preventive Maintenance

- C. If the dock leveler is a 6 foot long model, follow the procedures as given below.
 1. Set the dock leveler on the maintenance prop. The truck restraint should be in a completely retracted, raised position (i.e., stored position). The leveler lip should be fully folded.
 2. Locate the power pack. Remove the breather cap from the reservoir.
 3. Check fluid level. Fluid level should be approximately 5 inches from the top of the reservoir. If necessary, use a hand pump or similar device to add fluid through the breather cap opening in the reservoir. **ADD ONLY A RECOMMENDED TYPE FLUID.** Refer to page 29.
 4. When finished checking the fluid level, replace the breather cap and set the leveler in the cross traffic position (the lip is fully folded, inside the keepers, and the platform level with the dock floor).
 - D. If the dock leveler is a 8, 10 or 12 foot long model, follow the procedures as given below.
 1. Set the OPERATION switch to BYPASS and follow step 3, Below Dock End Load Operation, page 23 to set the dock leveler to the full below dock position. The truck restraint should be in a completely retracted, raised position (i.e., stored position).
 2. Remove the access plate that is located in the dock leveler deck at the rear of the platform.
 3. Remove the breather cap from the reservoir.
 4. Check fluid level. Fluid level should be approximately 1 inch from the top of the reservoir. If necessary, add fluid through the breather cap opening in the reservoir. **ADD ONLY A RECOMMENDED TYPE FLUID.**
 5. When finished checking the fluid level, replace the breather cap and inspection plate and set the dock leveler in the cross traffic position (the lip is fully folded, inside the keepers, and the platform is level with the dock floor).
3. Check the upper and lower limits of the truck restraint operating range. See page 16, Adjustment and Testing.

Troubleshooting Guide



WARNING

Always barricade the work area to prevent unauthorized use of the unit during repair or maintenance procedures.

Always lock off all electrical disconnects after raising platform and setting maintenance prop when service under the unit is required. More than one electrical disconnect switch may be required to de-energize the equipment.

Always stand clear of the dock leveler lip when working in front of the unit.



WARNING

Always check, repair or replace lights. Failure to do so could jeopardize dock attendant's safety.

To facilitate detailed electrical troubleshooting, the programmable logic controller (PLC), located in the control assembly, is equipped with both input and output indicator lights for each function. These lights provide visual tracking of the various control and motion circuits. Refer to ladder diagram, attached to manual, for specific input/output indicator lights for each function. For more information, consult factory.

Perform the following procedures prior to beginning detailed troubleshooting:

- A. Check all fuses inside the control assembly(s). Replace any bad fuse with one of equivalent specifications.
- B. Confirm presence of all necessary voltages inside the control assembly(s). (NOTE: A standard 3 phase unit requires 2 voltages; 115V, 1 phase for the controls, and the 3 phase application voltage for the motor.) Check branch circuit fuses and/or circuit breakers if all voltages are not present.
- C. Make sure that the RUN indicator light on the controller (PLC) is ON continuously. A RUN light that is OFF or flashing indicates a potential PLC problem. Consult factory.

TRUCK RESTRAINT		
Problem	Cause(s)	Solution(s)
Inside and outside signal lights do not operate. Controller (PLC) RUN indicator light ON. Unit operates as normal.	1. Bad flasher.	1. Replace flasher with wire. If lights operate (lights will not flash), replace flasher.
Restraint does not operate. Motor does not energize.	1. Motor overload device tripped. 2. Motor starter (3 phase) or motor relay (1 phase) not energizing.	1. Reset overload relay (3 phase) or replace fuse (1 phase). Determine cause of device tripping. NOTE: If replacing fuse, replace with device of equal specifications. 2A. Check overhead door switch if used. Switch should be closed when door is open. An open switch will interrupt the signal to the starter or relay. NOTE: Consult factory if unit has special door interlocking. 2B. Check controller output that sends a signal to starter or relay. Output may have failed OPEN. Use meter to check for contact closure when output ON.

Troubleshooting Guide

TRUCK RESTRAINT (Continued)		
Problem	Cause(s)	Solution(s)
Restraint does not operate. Motor energizes but does not run (motor hums, overload device should trip).	<ol style="list-style-type: none"> 3 phase units only — voltage at one line is absent (motor being single phased). 1 phase units only — motor centrifugal switch faulty. 	<ol style="list-style-type: none"> Fuses at motor branch circuit over-current device only — check for tripped fuse. Replace fuse. Determine cause of fuse tripping. Check motor starter for component failure. Disconnect wires at load side of starter. Use voltmeter to read line-to-line voltages at line side and load side of starter. Line side and load side voltage values should be nearly identical. Replace starter if values not identical. Check all wiring to motor for high resistance (loose) or no connection. <ol style="list-style-type: none"> Replace motor.
Restraint operates slowly.	<ol style="list-style-type: none"> Low hydraulic fluid. Pressure relief valve set too low. Damaged or blocked hydraulic hose(s). 	<ol style="list-style-type: none"> Add fluid, see Preventive Maintenance section, page 29. Locate valve. Turn valve out all the way CCW. While operating the restraint, slowly turn valve in CW, increasing the valve set point, until the restraint lowers and begins to extend. Turn valve in an additional 1/2 turn CW. NOTE: The valve set point should NOT be set at a level that will cause the motor operating current to exceed its full load amp value at any time, including when the unit is operated in pressure relief. Replace damaged hose(s). Remove blockage from hose(s).
Restraint does not fully extend or motor overcurrent device and/or overload device continuously tripping.	<ol style="list-style-type: none"> Low hydraulic fluid. 	<ol style="list-style-type: none"> Add fluid. See Preventive Maintenance section, page 29.
Restraint lowers, fully extends but does not raise. Pump operates in pressure relief.	<ol style="list-style-type: none"> Solenoid "D" spool stuck ON. 	<ol style="list-style-type: none"> Locate solenoid. Remove coil from spool and spool from valve block. Check spool for contaminants and/or damage. Replace spool if damaged. Carefully wipe off spool with clean rag (do not damage "O" rings on spool). Check valve block for contaminants. Replace spool in block and coil on spool. DO NOT overtighten spool into block. Maximum tightening torque for spool is 35-40 lb/ft. DO NOT overtighten coil on spool. Operate the unit. Replace spool if problem persists and all other troubleshooting procedures performed.

Troubleshooting Guide

TRUCK RESTRAINT (Continued)		
Problem	Cause(s)	Solution(s)
Restraint lowers, fully extends but does not raise. Pump operates in pressure relief. (Continued)	2. Proximity switch on guide track that senses when restraint fully extended out of adjustment.	2. Locate switch. Observe indicator light on switch and at controller input that receives signal from switch. Both lights should turn OFF when restraint is fully extended. Check switch position and/or slide guide track "back", towards rear pit wall. Switch should be positioned so that the face is approximately 1/4" from the inside wall of the track. Make sure the switch face does not extend further than the guide track mounting bars welded to the cylinder. Switch to be positioned so that face will not come into contact with guide rod. Tighten nuts to secure switch. DO NOT overtighten nuts. Maximum tightening torque is 25 lb/ft. Loosen 2 bolts on guide track to slide track back. DO NOT slide track too far back as this will cause the unit not to automatically shut off when fully retracted.
Restraint extends from stored position without fully lowering.	1. Proximity switch at trunnion that senses when restraint lowered target out of adjustment.	1. Locate switch. Observe indicator light on switch and at controller input that receives signal from switch. Both lights should only turn ON when restraint fully lowered. If this does not occur, adjust target counterclockwise. See Adjustment and Testing section, page 17, step 5.
Restraint extends from stored position without lowering at all.	1. Proximity switch at trunnion that senses when restraint lowered target out of adjustment. 2. Solenoid "B" spool stuck OFF.	1. Locate switch. Observe indicator light on switch and at controller input that receives signal from switch. Both lights should only turn ON when restraint fully lowered. If this does not occur, adjust target counterclockwise. See Adjustment and Testing section, page 17, step 5. 2. Locate solenoid. Remove coil from spool and spool from valve block. Check spool for contaminants and/or damage. Replace spool if damaged. Carefully wipe off spool with clean rag (do not damage "O" rings on spool). Check valve block for contaminants. Replace spool in block and coil on spool. DO NOT overtighten spool into block. Maximum tightening torque for spool is 35-40 lb/ft. DO NOT overtighten coil on spool. Operate the unit. Replace spool if problem persists and all other troubleshooting procedures performed.

Troubleshooting Guide

TRUCK RESTRAINT (Continued)		
Problem	Cause(s)	Solution(s)
Restraint extends from stored position without lowering at all. (Continued)	<p>3. Solenoid "B" coil not receiving signal to energize. A solenoid that is energized will act like a magnet. Place a metal tool on coil of solenoid to determine if coil is receiving signal.</p> <p>4. Solenoid "B" coil receiving signal but not energizing.</p>	<p>3A. Check controller output that sends a signal to solenoid. Output may have failed OPEN. Use meter to check for contact closure when output ON.</p> <p>3B. Check all wiring to solenoid for high resistance (loose) or no connection.</p> <p>4. Coil failed OPEN. Consult factory.</p>
Restraint does not lower at all from stored position. Pump operates in pressure relief (restraint does not extend).	<p>1. Solenoid "D" spool stuck OFF.</p> <p>2. Solenoid "D" coil not receiving signal to energize. A solenoid that is energized will act like a magnet. Place a metal tool on coil of solenoid to determine if coil is receiving signal.</p> <p>3. Solenoid "D" coil receiving signal but not energizing.</p> <p>4. Obstruction preventing the restraint from lowering.</p> <p>5. Fluid flow to positioning cylinder blocked.</p> <p>6. Binding inside positioning cylinder.</p>	<p>1. Locate solenoid. Remove coil from spool and spool from valve block. Check spool for contaminants and/or damage. Replace spool if damaged. Carefully wipe off spool with clean rag (do not damage "O" rings on spool). Check valve block for contaminants. Replace spool in block and coil on spool. DO NOT overtighten spool into block. Maximum tightening torque for spool is 35-40 lb/ft. DO NOT overtighten coil on spool. Operate the unit. Replace spool if problem persists and all other troubleshooting procedures performed.</p> <p>2A. Check controller output that sends a signal to solenoid. Output may have failed OPEN. Use meter to check for contact closure when output ON.</p> <p>2B. Check all wiring to solenoid for high resistance (loose) or no connection.</p> <p>3. Coil failed OPEN. Consult factory.</p> <p>4. Remove obstruction.</p> <p>5. Locate the needle valve that controls fluid flow to the cylinder. Turn valve out all the way CCW. Turn valve in all the way CW. Turn valve out 1-1/2 turn CCW from full CW.</p> <p>6. Locate the positioning cylinder and the hook weldment. Pushing down on the hook weldment should extend the positioning cylinder and releasing the weldment should allow the positioning cylinder to retract. Consult factory if this does not occur.</p>

Troubleshooting Guide

TRUCK RESTRAINT (Continued)		
Problem	Cause(s)	Solution(s)
Restraint only partially lowers from stored position. Pump operates in pressure relief (restraint does not extend).	<ol style="list-style-type: none"> 1. Obstruction preventing the restraint from lowering. 2. Fluid flow to positioning cylinder blocked. 3. Binding inside positioning cylinder. 	<ol style="list-style-type: none"> 1. Remove obstruction. 2. Locate the needle valve that controls fluid flow to the cylinder. Turn valve out all the way CCW. Turn valve in all the way CW. Turn valve out 1-1/2 turn CCW from full CW. 3. Locate the positioning cylinder and the hook weldment. Pushing down on the hook weldment should extend the positioning cylinder and releasing the weldment should allow the positioning cylinder to retract. Consult factory if this does not occur.
Restraint fully lowers from stored position but does not extend.	<ol style="list-style-type: none"> 1. Proximity switch at trunnion that senses when restraint lowered target and/or switch out of adjustment. 2. Solenoid "B" spool stuck ON, or solenoid(s) "C" (C1 at Phook valve assy.; C2, C3 at regenerating valve assy.) OFF. Start "C" solenoid check at C1. 3. Solenoid(s) "C" (C1 at Phook valve assy.; C2, C3 at regenerating valve assy.) coil(s) not receiving signal to energize. A solenoid that is energized will act like a magnet. Place a metal tool on coils of solenoids to determine if coil(s) is receiving signal. 4. Solenoid(s) "C" coil(s) receiving signal but not energizing. 	<ol style="list-style-type: none"> 1. Locate switch. Observe indicator light on switch and at controller input that receives signal from switch. Use a screwdriver as a temporary target to test switch. Replace switch if screwdriver is present but switch and controller lights are not ON. (NOTE: Check glass fuse inside control assembly before replacing switch. Switch will not operate if fuse bad. Replace with fuse of equivalent specifications.) Both lights should turn ON when restraint is fully lowered. If this does not occur, adjust target clockwise and/or move switch closer to target. See Adjustment and Testing section, page 17, step 5, and Installation section, page 7, step 20F. 2. Locate solenoid. Remove coil from spool and spool from valve block. Check spool for contaminants and/or damage. Replace spool if damaged. Carefully wipe off spool with clean rag (do not damage "O" rings on spool). Check valve block for contaminants. Replace spool in block and coil on spool. DO NOT overtighten spool into block. Maximum tightening torque for spool is 35-40 lb/ft. DO NOT overtighten coil on spool. Operate the unit. Replace spool if problem persists and all other troubleshooting procedures performed. 3A. Check controller output that sends a signal to solenoids. Output may have failed OPEN. Use meter to check for contact closure when output ON. 3B. Check all wiring to solenoids for high resistance (loose) or no connection. 4. Coil(s) failed OPEN. Consult factory.

Troubleshooting Guide

TRUCK RESTRAINT (Continued)		
Problem	Cause(s)	Solution(s)
Restraint does not tightly engage truck/trailer ICC bar (inside lights turn GREEN but gap exists between ICC bar and restraint).	<ol style="list-style-type: none"> 1. Pressure switch trip point set too low. 2. Incorrect type of hydraulic fluid used. 	<ol style="list-style-type: none"> 1. Locate switch. Increase switch trip point by turning adjustment on switch CW 1/16 turn. Operate restraint. Make further adjustments at switch as is necessary. Adjust switch until the restraint tightly engages ICC bar and the unit automatically shuts OFF. DO NOT set switch trip point too high as this will cause abnormal operation of the restraint and/or may cause restraint to remove ICC bar from truck/trailer. NOTE: Switch trip point may have to be adjusted as climatic conditions change. 2. Consult factory.
Restraint engages truck/trailer ICC bar but does not automatically shut OFF. Pump operates in pressure relief or ICC bar removed from truck.	<ol style="list-style-type: none"> 1. Pressure switch trip point set too high. 	<ol style="list-style-type: none"> 1. Locate switch. Decrease switch trip point by turning adjustment on switch CCW 1/16 turn. Operate restraint. Make further adjustments at switch as is necessary. Adjust switch until the restraint tightly engages ICC bar and the unit automatically shuts OFF. NOTE: Switch trip point may have to be adjusted as climatic conditions change.
Restraint extends from ICC bar engaged position, fully lowers but does not retract.	<ol style="list-style-type: none"> 1. Solenoid "B" spool stuck ON, or solenoid(s) "C" (C1 at Phook valve assy.; C2, C3 at regenerating valve assy.) stuck ON. Start "C" solenoid check at C1. 	<ol style="list-style-type: none"> 1. Locate solenoid. Remove coil from spool and spool from valve block. Check spool for contaminants and/or damage. Replace spool if damaged. Carefully wipe off spool with clean rag (do not damage "O" rings on spool). Check valve block for contaminants. Replace spool in block and coil on spool. DO NOT overtighten spool into block. Maximum tightening torque for spool is 35-40 lb/ft. DO NOT overtighten coil on spool. Operate the unit. Replace spool if problem persists and all other troubleshooting procedures performed.

Troubleshooting Guide

TRUCK RESTRAINT (Continued)		
Problem	Cause(s)	Solution(s)
Restraint extends from ICC bar engaged position, fully lowers but does not retract. (Continued)	2. Proximity switch at trunnion that senses when restraint lowered target and/or switch out of adjustment.	2. Locate switch. Observe indicator light on switch and at controller input that receives signal from switch. Use a screwdriver as a temporary target to test switch. Replace switch if screwdriver is present but switch and controller lights are not ON. (NOTE: Check glass fuse inside control assembly before replacing switch. Switch will not operate if fuse bad. Replace with fuse of equivalent specifications.) Both lights should turn ON and stay ON when restraint is fully lowered. If this does not occur, adjust target clockwise and/or move switch closer to target. See Adjustment and Testing section, page 17, step 5, and Installation section, page 7, step 20F.
Lowered restraint returns to fully retracted position but unit does not automatically shut OFF. Pump operates in pressure relief. Restraint remains lowered.	1. Proximity switch on guide track that senses when restraint fully retracted out of adjustment.	1. Locate switch. Observe indicator light on switch and controller input that receives signal from switch. Both lights should turn ON when restraint is fully retracted. Check switch position and/or slide guide track "forward", towards front of pit. Switch should be positioned so that the face is approximately 1/4" from the inside wall of the track. Make sure the switch face does not extend further than the guide track mounting bars welded to the cylinder. Switch to be positioned so that face will not come into contact with guide rod. Tighten nuts to secure switch. DO NOT overtighten nuts. Maximum tightening torque is 25 lb/ft. Loosen 2 bolts on guide track to slide track forward. DO NOT slide track too far forward as this will cause the unit not to raise when fully extended.

Troubleshooting Guide

TRUCK RESTRAINT (Continued)		
Problem	Cause(s)	Solution(s)
Restraint fully retracted but does not raise, even when ON-OFF switch turned OFF.	<ol style="list-style-type: none"> 1. Solenoid "D" spool stuck ON. 2. Binding inside positioning cylinder. 	<ol style="list-style-type: none"> 1. Locate solenoid. Remove coil from spool and spool from valve block. Check spool for contaminants and/or damage. Replace spool if damaged. Carefully wipe off spool with clean rag (do not damage "O" rings on spool). Check valve block for contaminants. Replace spool in block and coil on spool. DO NOT overtighten spool into block. Maximum tightening torque for spool is 35-40 lb/ft. DO NOT overtighten coil on spool. Operate the unit. Replace spool if problem persists and all other troubleshooting procedures performed. 2. Locate positioning cylinder. Place pan under hose connected to cylinder to catch fluid. SLOWLY loosen hose since fluid may exit cylinder rapidly (cylinder is spring loaded with spring compressed when lowered). A cylinder that is not binding will raise as fluid leaves the cylinder. A cylinder that is binding will remain lowered, even when the hose is completely removed from the cylinder. Replace a cylinder that is binding.
Units with restraint/leveler interlocking only. Restraint will not disengage truck/trailer ICC bar when leveler in cross traffic position (lip is in keepers). SEE APPENDIX A IF TRUCK IS LOCKED AT DOCK.	<ol style="list-style-type: none"> 1. Interlock proximity switch that senses when leveler lip fully folded target and/or switch out of adjustment. Consult factory if interlock switch is a limit switch. 	<ol style="list-style-type: none"> 1. Locate switch. Observe indicator light on switch and at controller input that receives signal from switch. Both lights should be ON when the leveler lip is fully folded. Adjust target and/or switch so that target is in sensing range of switch when leveler lip fully folded. See Options section, Interlock Adjustment and Testing, page 26.
Signal light(s) do not function on control assembly or on outside light assembly.	<ol style="list-style-type: none"> 1. Bulb burned out. 2. Wire disconnected or unit improperly wired. 	<ol style="list-style-type: none"> 1. Replace bulb. 2. Check wiring per wiring diagram attached to this manual. Repair.

Troubleshooting Guide

DOCK LEVELER		
Problem	Cause(s)	Solution(s)
Leveler does not operate. Motor does not energize.	<ol style="list-style-type: none"> 1. Motor overload device tripped. 2. Motor starter (3 phase) or motor relay (1 phase) not energizing. 	<ol style="list-style-type: none"> 1. Reset overload relay (3 phase) or replace fuse (1 phase). Determine cause of device tripping. NOTE: If replacing fuse, replace with device of equal specifications. 2A. Check overhead door switch if used. Switch should be closed when door is open. An open switch will interrupt the signal to the starter or relay. NOTE: Consult factory if unit has special door interlocking. 2B. Check controller output that sends a signal to starter or relay. Output may have failed OPEN. Use meter to check for contact closure when output ON.
Leveler does not operate. Motor energizes but does not run (motor hums, overload device should trip).	<ol style="list-style-type: none"> 1. 3 phase units only — voltage at one line is absent (motor being single phased). 2. 1 phase units only — motor centrifugal switch faulty. 	<ol style="list-style-type: none"> 1A. Fuses at motor branch circuit over-current device only — check for tripped fuse. Replace fuse. Determine cause of fuse tripping. 1B. Check motor starter for component failure. Disconnect wires at load side of starter. Use voltmeter to read line-to-line voltages at line side and load side of starter. Line side and load side voltage values should be nearly identical. Replace starter if values not identical. 1C. Check all wiring to motor for high resistance (loose) or no connection. 2. Replace motor.
Leveler will not raise in NORMAL or BYPASS (or-RUN). Restraint will retract in NORMAL and lower in BYPASS (or-RUN).	<ol style="list-style-type: none"> 1. Solenoid "A" spool stuck OFF. 2. Solenoid "A" coil not receiving signal to energize. A solenoid that is energized will act like a magnet. Place a metal tool on coil of solenoid to determine if coil is receiving signal. 3. Solenoid "A" coil receiving signal but not energizing. 	<ol style="list-style-type: none"> 1. Locate solenoid. Remove coil from spool and spool from valve block. Check spool for contaminants and/or damage. Replace spool if damaged. Carefully wipe off spool with clean rag (do not damage "O" rings on spool). Check valve block for contaminants. Replace spool in block and coil on spool. DO NOT overtighten spool into block. Maximum tightening torque for spool is 35-40 lb/ft. DO NOT overtighten coil on spool. Operate the unit. Replace spool if problem persists and all other troubleshooting procedures performed. 2A. Check controller output that sends a signal to solenoid. Output may have failed OPEN. Use meter to check for contact closure when output ON. 2B. Check all wiring to solenoid for high resistance (loose) or no connection. 3. Coil failed OPEN. Consult factory.

Troubleshooting Guide

DOCK LEVELER (Continued)		
Problem	Cause(s)	Solution(s)
Leveler will not raise. Pump operates in pressure relief.	1. Load on platform.	1. Remove load. Unit is designed to raise no more than its own weight as a safety feature.
Leveler operates slowly.	1. Low hydraulic fluid. 2. Pressure relief valve set too low. 3. Damaged or blocked hydraulic hose(s).	1. Add fluid. See Preventive Maintenance section, page 29. 2. Locate valve. Turn valve out all the way CCW. While operating the unit, slowly turn valve in CW, increasing the valve set point, until the restraint lowers and begins to extend and the leveler raises at an acceptable speed. Turn valve in an additional 1/2 turn CW. NOTE: The valve set point should NOT be set at a level that will cause the motor operating current to exceed its full load amp value at any time, including when the unit is operating in pressure relief. 3. Replace damaged hose(s). Remove blockage from hose(s).
Leveler platform does not raise to its full height OR platform raises to full height but lip does not fully extend OR motor over-current device and/or overload device continuously tripping.	1. Low hydraulic fluid.	1. Add fluid. See Preventive Maintenance section, page 29.
While leveler is descending it locks into "safety". Lip drops to vertical position.	1. Platform down-speed is too fast.	1. Slow speed as follows: Remove inspection plate. Loosen jam nut in radius of fluid logic block. Using 1/8" Allen wrench, turn Allen screw clockwise approximately one full turn; tighten jam nut. Check down-speed. If leveler still descends too rapidly, repeat above. If leveler descends TOO SLOWLY repeat above, BUT turn Allen screw counterclockwise.
Platform reaches full height, but lip does not automatically extend when pushbutton pressed. Lip extends if lanyard (pull-ring) activated (if unit equipped with lanyard).	1. Weight on operating arm cable has slipped down on cable.	1. Loosen setscrews on operating cable weight. DO NOT LOSE steel ball under each screw. Raise weight 1/2" to 3/4" and secure screws. If spring is worn, replace.
Lip extends almost immediately when pushbutton pressed. Platform will raise after lip extends.	1. Spool extending through top of logic block stuck ON. Operating arm binding causing arm to prematurely press down on and activate spool.	1. Remove inspection plate. Free-up operating arm. If necessary, detach arm from logic block. Spray WD-40 penetrating oil or equivalent over top of logic block. Work spool to free-up spool. Replace spool if arm not contacting spool and problem persists.

Troubleshooting Guide

DOCK LEVELER (Continued)		
Problem	Cause(s)	Solution(s)
Lip does not extend.	1. Spool extending through top of logic block stuck OFF. Operating arm binding so that arm will not press down on and activate spool.	1. Remove inspection plate. Free-up operating arm and spool. If necessary, detach arm from logic block. Spray WD-40 penetrating oil or equivalent over top of logic block. Work spool to free-up spool.
Leveler will not automatically return to cross traffic position (if unit so equipped).	1. Auto return proximity switch that senses when leveler lip at below dock target and/or switch out of adjustment.	1. Locate switch. Observe indicator light on switch and at controller input that receives signal from switch. Both lights should only be ON when the unit is at the full below dock position (lip resting against keepers). Adjust switch and/or target so that target is in sensing range of switch when unit at below dock. See Options section, Auto Return to Dock Adjustment and Testing, page 28.

Override of Restraint With Leveler Interlock

The truck restraint with dock leveler interlocking can be overridden in the event that the interlock switch fails or becomes out of adjustment. The interlock switch is located at the lip of the leveler. The switch closes and sends a signal to the controller when the leveler lip is fully folded.

The absence of a signal from the interlock switch, even if the lip is fully folded, will cause the controller to perform as if the lip was not fully folded. If this situation occurs, the controller will prevent the restraint from operating even though the leveler lip is fully folded.

The following procedures will allow the truck restraint with dock leveler interlocking to be overridden:

Units equipped with a 2 position "OPERATION" switch.

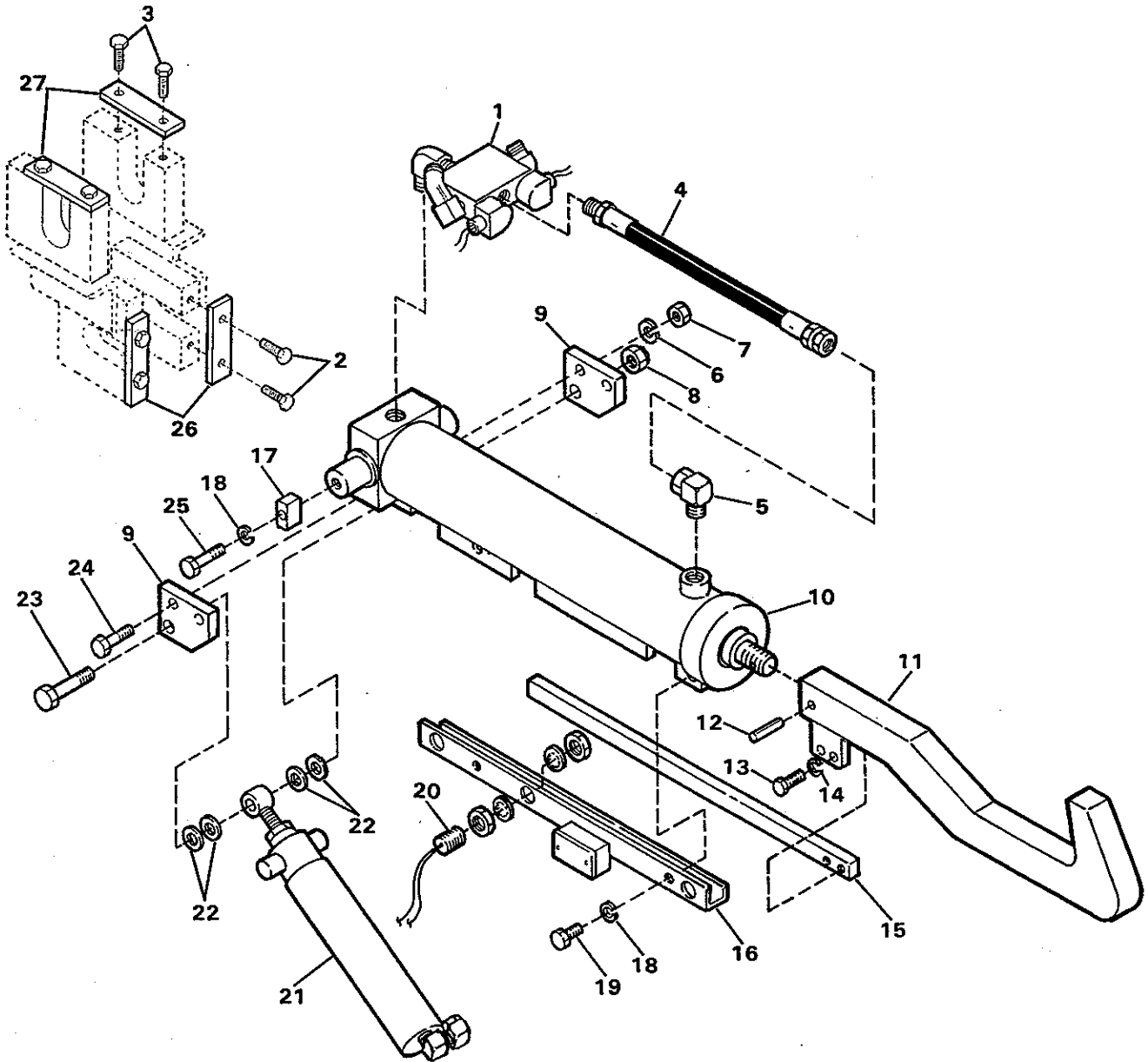
1. Set the "OPERATION" switch to "BYPASS".
2. Momentarily press the "UNLOCK" pushbutton. The restraint automatic disengage cycle will be activated.
3. Wait for the restraint to automatically shut OFF. This will occur when the restraint reaches the stored position.
4. Set the "OPERATION" switch to "NORMAL". The outside signal lights will change to GREEN which will indicate to the truck operator that it is okay to pull away from the dock.
5. Determine cause of the interlock switch failure. See Troubleshooting Guide.

Units equipped with a 3 position "OPERATION" switch.

1. Set the "OPERATION" switch to "DISENGAGE".
2. At the same time — turn the "OVERRIDE" switch to "RUN" and press the "RAISE" pushbutton. The restraint automatic disengage cycle will be activated. Release switch and pushbutton when disengage cycle is activated.
3. Wait for the restraint to automatically shut OFF. This will occur when the restraint reaches the stored position.
4. Set the "OVERRIDE" switch to "NORMAL". The outside signal lights will change to GREEN which will indicate to the truck operator that it is okay to pull away.
5. Determine cause of the interlock switch failure. See Troubleshooting Guide.

Parts Lists

POWERHOOK



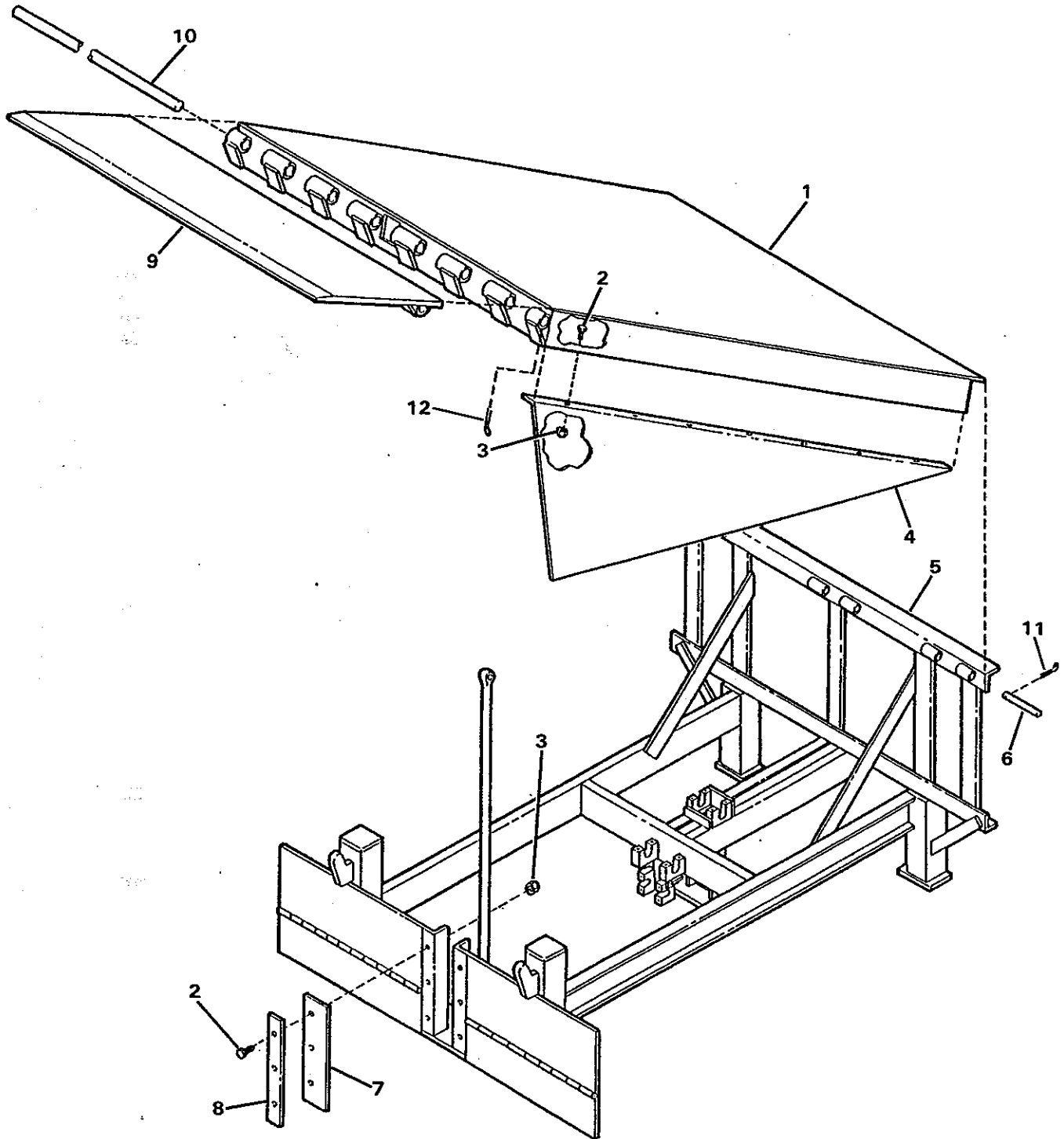
When ordering, use part numbers and description to help identify the item ordered. Do not use "ITEM" numbers which serve only to help you locate the position of the parts. Always give MODEL NUMBER and/or SERIAL NUMBER.

POWERHOOK Parts

ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	8585-0004	VALVE, Regenerating (complete assembly) See exploded view, page 50	1
2	2101-0009	CAPSCREW, Hex Head 5/16-18 x 3/4	4
3	2101-0011	CAPSCREW, Hex Head 5/16-18 x 1	4
4	9904-0015	HOSE, Hydraulic	1
5	0521-0030	FITTING, Hydraulic 90°	1
6	2101-0055	WASHER, Lock 1/2	2
7	2101-0041	NUT, Hex 1/2-13 UNC	2
8	2101-0053	LOCKNUT 5/8-11 UNC	1
9	0522-0062	TRUNNION PLATE	2
10	0521-0027	CYLINDER, Hook	1
11	7054-0001	HOOK WELDMENT	1
12	0521-0005	PIN, Roll 1/4 x 1-1/2	1
13	2101-0012	CAPSCREW, Hex Head 5/16-18 UNC x 1-1/4	2
14	2101-0058	WASHER, Lock 5/16	2
15	0522-0061	ROD, Guide	1
16	0522-0059	TRACK, Guide	1
17	7052-0005	TARGET, Proximity Switch	1
18	2101-0058	WASHER, Lock 5/16	3
19	2101-0057	CAPSCREW, Hex Head 5/16-18 UNC x 1/2	2
20	0961-0073	SWITCH, Proximity (includes lockwashers and nuts)	4
21	0525-0052	CYLINDER, Positioning	1
22	2101-0054	WASHER, Flat 5/8	4
23	2101-0052	CAPSCREW, Hex Head 3/8-11 UNC x 2-1/2	1
24	2101-0051	CAPSCREW, Hex Head 1/2-13 UNC x 2-1/2	2
25	2101-0013	CAPSCREW, Hex Head 5/16-18 UNC x 2	1
26	7942-0001	KEEPER, Trunnion, Hold Down Cylinder	2
27	7054-0002	KEEPER, Trunnion, Hook Cylinder	2

Parts Lists

KS6 and KS7 Frame and Platform



When ordering, use part numbers and description to help identify the item ordered. Do not use "ITEM" numbers which serve only to help you locate the position of the parts. Always give MODEL NUMBER and/or SERIAL NUMBER.

KS6 and KS7 Frame and Platform Parts

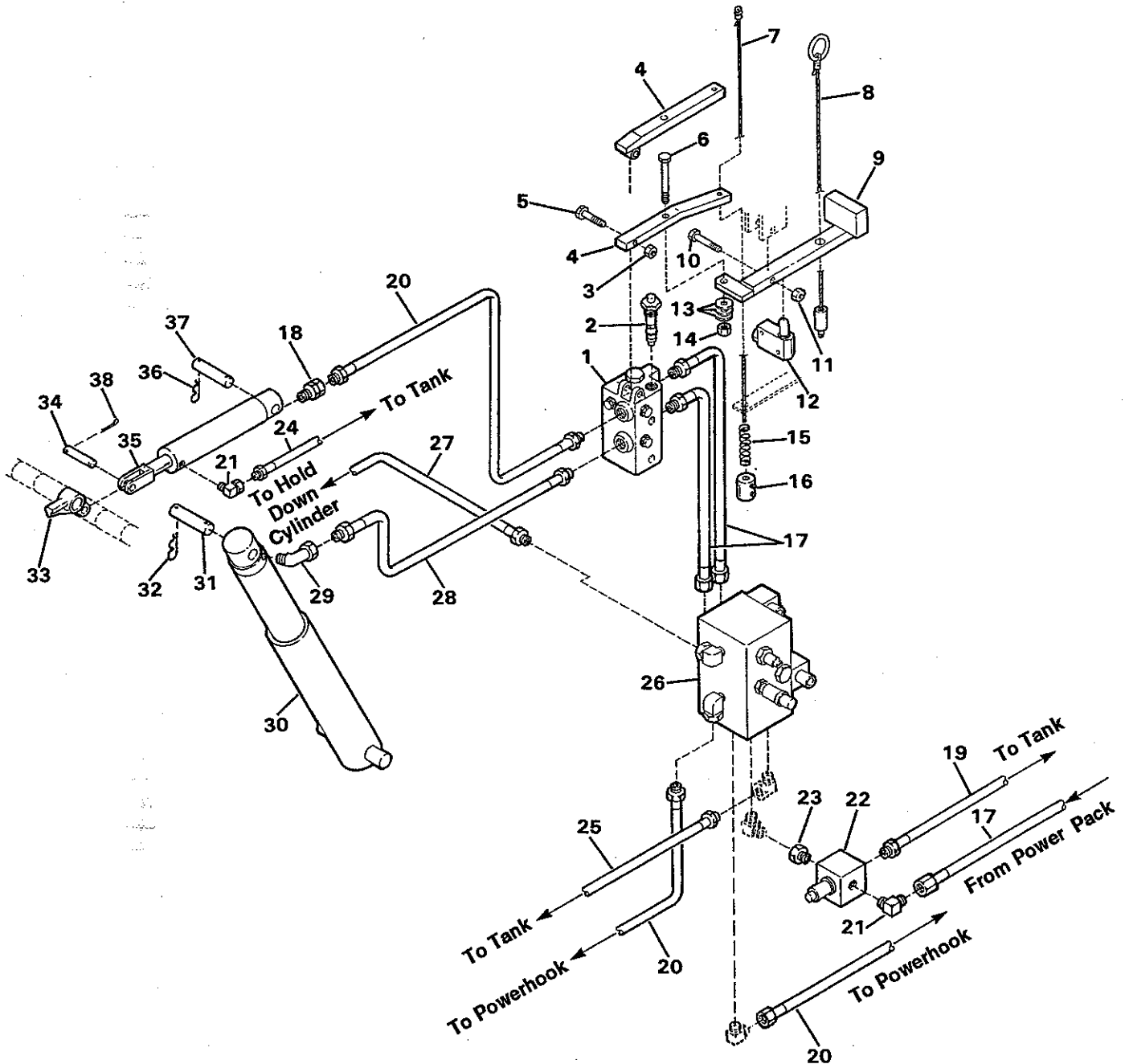
ITEM NO.	PART NO.	DESCRIPTION	QTY.
1		PLATFORM (specify length, width, capacity and whether single or dual hoist cylinders)	1
2	2101-0011	CAPSCREW, Hex Head, 5/16-18 x 1 (used without weatherseal)	*
	2101-0012	CAPSCREW, Hex Head, 5/16-18 x 1-1/4 (used with weatherseal)	*
3	2101-0039	LOCK NUT, Hex, 5/16-18	*
4	0012-0071	TOE GUARD, 6', Left Side	1
	0012-0072	TOE GUARD, 6', Right Side	1
	0012-0031	TOE GUARD, 8', Left Side	1
	0012-0032	TOE GUARD, 8', Right Side	1
	0012-0077	TOE GUARD, 10', Left Side	1
	0012-0078	TOE GUARD, 10', Right Side	1
	Consult Factory	TOE GUARD, 12', Left or Right Side	1 Each
5	Consult Factory	FRAME, KS6 (specify length, width and whether single or dual hoist cylinder)	1
	Consult Factory	FRAME, KS7 (not shown) (specify length, width and whether single or double hoist cylinder)	1
6	9202-0002	HINGE PIN, Rear	2
7	0191-0002	DUST SHIELD, Rubber	2
8	8432-0234	PLATE, Dust Shield	2
9	Consult Factory	LIP (specify length, width and capacity)	1
10	Consult Factory	PIN, Lip Hinge (specify unit width)	1
11	2101-0047	PIN, Cotter	6
12	2101-0046	PIN, Cotter	2

*Capscrews and Lock Nuts Required

Dock Leveler Length	Quantity Without Weatherseals	Quantity With Weatherseals
6'	14	14
8'	18	20
10'	20	24

Parts Lists

KS6 & KS7 Hydraulic System



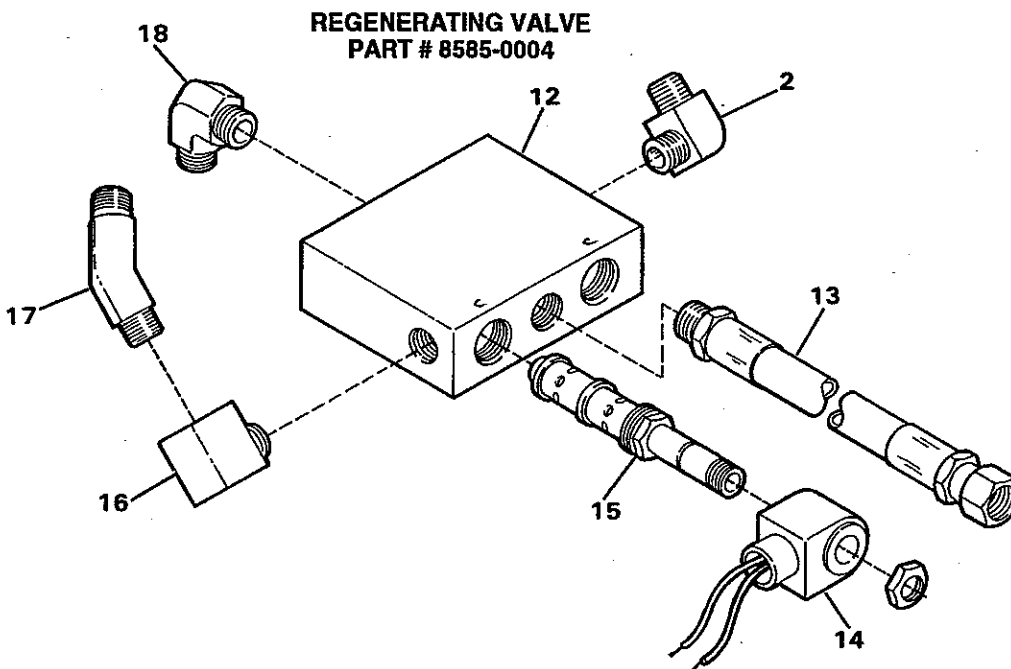
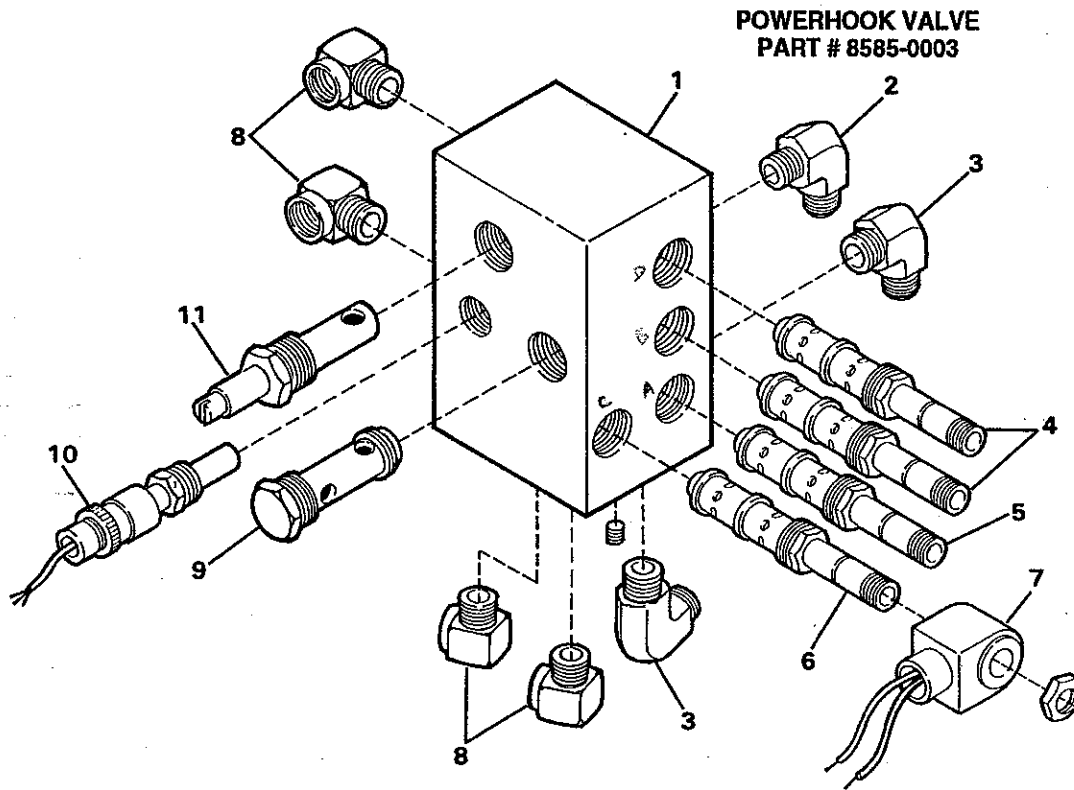
When ordering, use part numbers and description to help identify the item ordered. Do not use "ITEM" numbers which serve only to help you locate the position of the parts. Always give MODEL NUMBER and/or SERIAL NUMBER.

KS6 & KS7 Hydraulic System Parts

ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	9575-0001	LOGIC BLOCK ASSEMBLY (includes spool, item 2; specify spool type)	1
2	9574-0001	• SPOOL (standard)	1
	9574-0002	• SPOOL, with Boot and Spacer (optional — for highly corrosive environments)	1
3	2101-0039	NUT, Hex	1
4	5455-0001	OPERATING ARM, Logic Block (use with spool 9574-0001)	1
	5455-0004	OPERATING ARM, Logic Block (use with optional spool 9574-0002)	1
5	2101-0014	CAPSCREW, Hex Head 5/16-18 x 2-1/4	1
6	2101-0015	CAPSCREW, Hex Head 5/16-18 x 3-1/4	1
7	7952-0001	CABLE ASSEMBLY, Logic Block Operating Arm	1
8	5265-0001	PULL RING AND CABLE ASSEMBLY	1
9	5405-0001	LEVER, Auxiliary Operation	1
10	2101-0013	CAPSCREW, Hex Head	1
11	2101-0039	NUT, Hex Lock	1
12	0961-0014	SWITCH, Limit	1
13	2101-0060	WASHER, Flat 3/8"	3
14	2101-0039	NUT, Hex Lock	1
15	9572-0004	SPRING, Operating Arm Cable	1
16	8102-0001	WEIGHT, Operating Arm Cable	1
17	9904-0001	HOSE ASSEMBLY, 16"	3
18	0521-0015	ADAPTER, Straight Hose	1
19	9904-0003	HOSE ASSEMBLY, 28"	1
20	9904-0004	HOSE ASSEMBLY, 44" (6' and 8' dock levelers)	3
	9904-0005	HOSE ASSEMBLY, 68" (10' dock levelers)	3
	9904-0032	HOSE ASSEMBLY, 90" (12' dock levelers)	3
21	9301-0007	ELBOW, Street	3
22	8583-0013	PRESSURE RELIEF VALVE ASSEMBLY	1
23	0521-0032	SWIVEL, Female, 3/8 NPT to 1/2 JIC	1
24	5202-0001	HOSE ASSEMBLY, Drain Line	1
25	9904-0002	HOSE ASSEMBLY, 21"	1
26	8585-0003	POWERHOOK VALVE (complete assembly) See exploded view page 50	1
27	9904-0005	HOSE ASSEMBLY, 68" (6' and 8' dock levelers)	1
	9904-0032	HOSE ASSEMBLY, 90" (10' dock levelers)	1
	9904-0031	HOSE ASSEMBLY, 115" (12' dock levelers)	1
28	9904-0001	HOSE ASSEMBLY, 16" (6' and 8' dock levelers)	1-2
	9904-0006	HOSE ASSEMBLY, 24" (10' and 12' dock levelers)	1-2
29	0521-0016	ADAPTER, 45° Hose, Hoist Cylinder	1-2
30	0525-0045	HOIST CYLINDER ASSEMBLY	1-2
31	9202-0005	PIN, Hoist Cylinder	1-2
32	9201-0002	CLIP, Spring	2-4
33	0522-0006	LIFTER, Lip	1
34	0522-0005	PIN, Front Lip Cylinder	1
35	0525-0050	LIP CYLINDER ASSEMBLY, Short	1
	0525-0051	LIP CYLINDER ASSEMBLY, Long	1
36	9201-0001	CLIP, Spring	2
37	9202-0004	PIN, Rear Lip Cylinder	1
38	2101-0045	PIN, Cotter	1

Parts Lists

POWERHOOK Valve Blocks



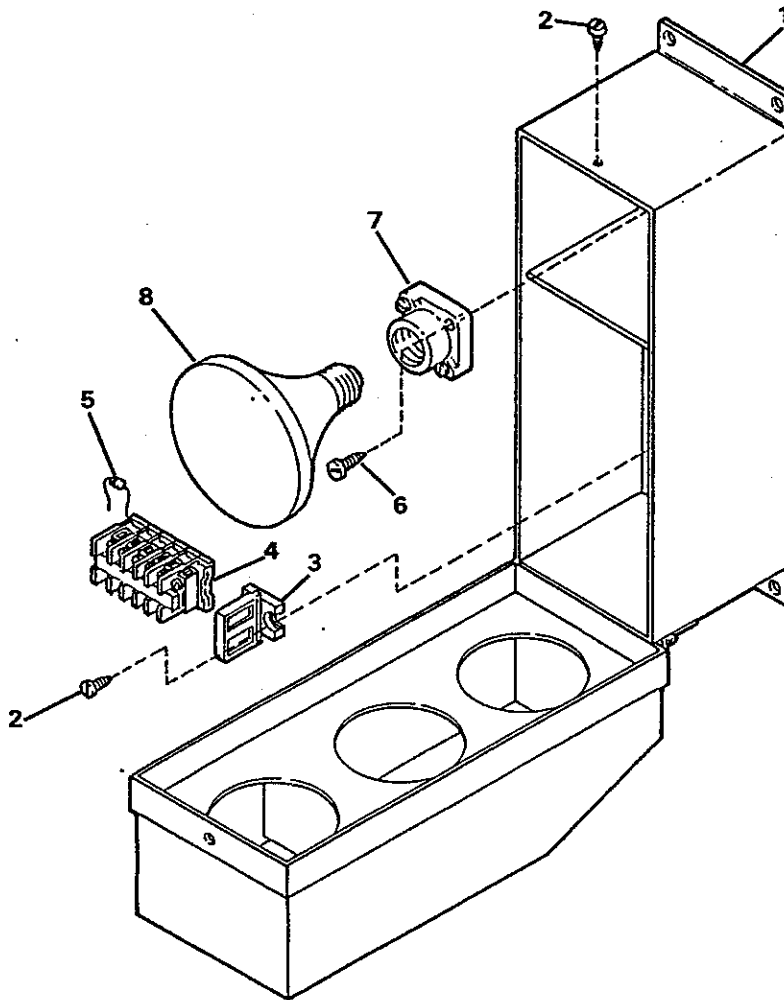
When ordering, use part numbers and description to help identify the item ordered. Do not use "ITEM" numbers which serve only to help you locate the position of the parts. Always give MODEL NUMBER and/or SERIAL NUMBER.

POWERHOOK Valve Blocks Parts

ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	8582-0006	VALVE BLOCK, POWERHOOK	1
2	0521-0017	HOSE ADAPTOR, 90°, 3/8 NPT to 1/2 JIC.....	2
3	0521-0031	HOSE ADAPTOR, 90°, 1/4 NPT to 1/2 JIC.....	2
4	8581-0039	SPOOL, 3 Way, 2 Position.....	2
5	8581-0042	SPOOL, 4 Way, 2 Position.....	1
6	8581-0040	SPOOL, N.O., 2 Way, Poppet.....	1
7	Consult Factory	SOLENOID COIL	4
8	9301-0007	STREET ELBOW, 90°, 3/8 NPT	4
9	8581-0036	CHECK VALV E.....	1
10	0961-0088	PRESSURE SWITCH	1
11	8581-0038	NEEDLE VALVE	1
12	8582-0005	VALVE BODY	1
13	9904-0015	HOSE ASSEMBLY.....	1
14	Consult Factory	SOLENOID COIL	2
15	8581-0041	SPOOL, 2 Way, N.C.	2
16	9301-0007	STREET ELBOW, 90°, Hyd. 3/8 to 3/8 NPT	1
17	0521-0016	HOSE ADAPTOR, 3/8 NPT, 45°	1
18	0521-0029	MALE PIPE ELBOW, 3/4 NPT	1

Parts Lists

Outside Light Assembly

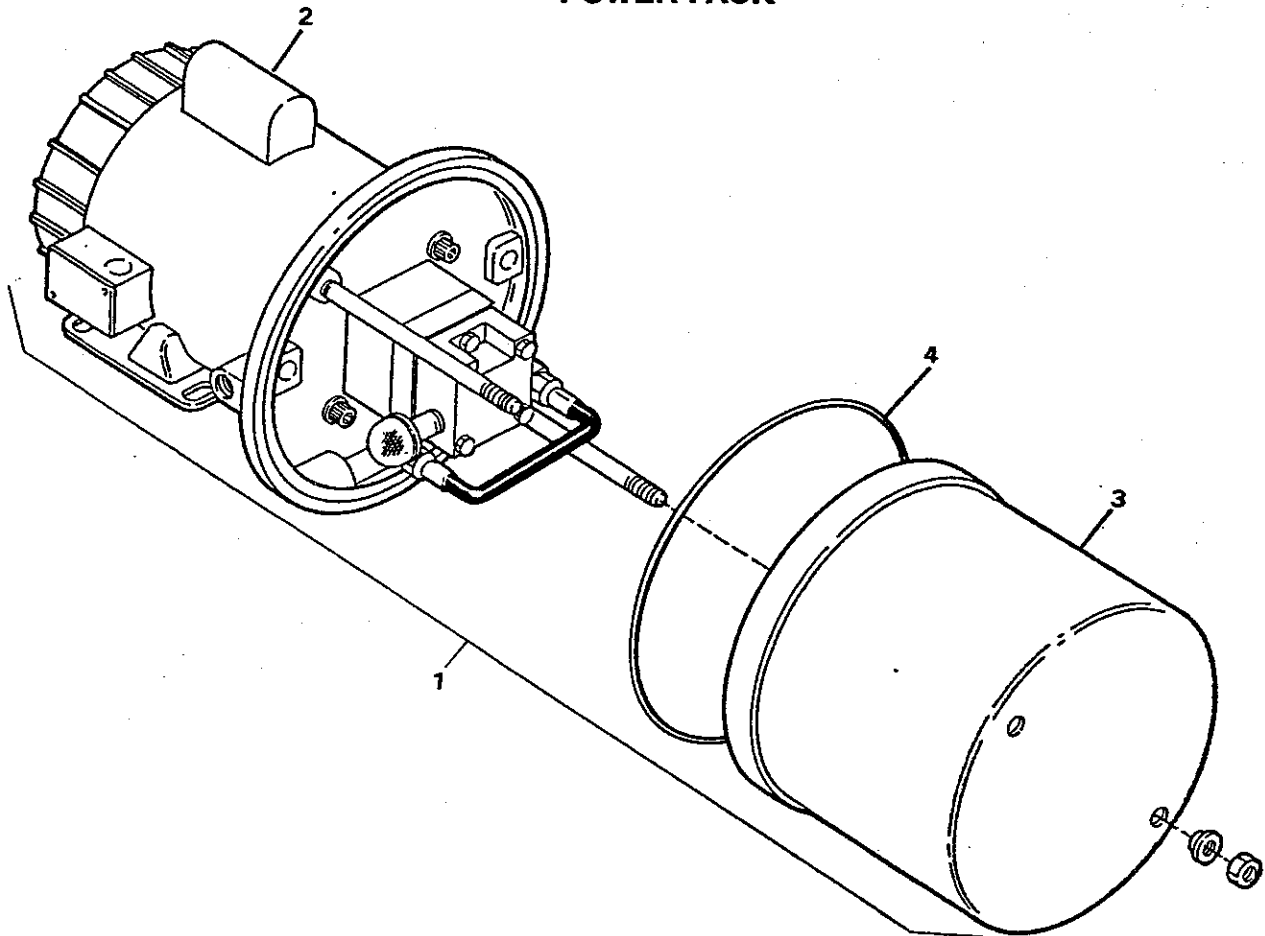


When ordering, use part numbers and description to help identify the item ordered. Do not use "ITEM" numbers which serve only to help you locate the position of the parts. Always give MODEL NUMBER and/or SERIAL NUMBER.

Outside Light Assembly Parts

ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	2751-0045	HOUSING, Outside Light	1
2	2101-0021	SCREW, 8-32 x 3/8.....	3
3	1431-0002	TERMINAL, Block End.....	1
4	1431-0001	TERMINAL BLOCK, Modular.....	6
5	3051-0015	RECTIFIER	1
6	2101-0026	SCREW.....	6
7	3051-0016	HOLDER, Lamp	3
8	3051-0017	LAMP, Red 85W	1
	3051-0019	LAMP, White 85W.....	1
	3051-0018	LAMP, Green 85W.....	1

POWER PACK



When ordering, use part numbers and description to help identify the item ordered. Do not use "ITEM" numbers which serve only to help you locate the position of the parts. Always give MODEL NUMBER and/or SERIAL NUMBER.

POWER PACK Parts

ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	9395-0023	POWER PACK, Complete (includes 9301-0087 pump, 3φ motor, 9302-0014 reservoir and fittings*)	1
	9395-0011	POWER PACK, Complete (includes 9301-0005 pump, 3φ motor, 9302-0015 reservoir and fittings*)	1
	9395-0010	POWER PACK, Complete (includes 9301-0005 pump, 3φ motor, 9302-0014 reservoir and fittings*)	1
	9395-0009	POWER PACK, Complete (includes 9301-0005 pump, 1φ motor, 9302-0014 reservoir and fittings*)	1
2	*	MOTOR	1
3	9302-0014	RESERVOIR, for Single Hoist Cylinder	1
	9302-0015	RESERVOIR, for Dual Hoist Cylinders	1
4	9301-0027	O-RING	1

*When ordering POWER PACK or motor, specify motor voltage, phase, frequency, RPM, and frame size.

POWERAMP/POWERHOOK TROUBLESHOOTING GUIDE. "NORMAL" OPERATING MODE. "LOCK" AND "RAISE" OPERATING CYCLES. SEE PAGE 3 FOR BELOW DOCK END LOADS.

CHART FOR TELEMECANIQUE TSX 171 2028 PROGRAMMABLE LOGIC CONTROLLER (PLC1). CHART SHOWS STATUS OF PLC1 I/O (INPUT/OUTPUT) LED'S (LIGHT EMITTING DIODES) AT DIFFERENT PARTS OF THE OPERATING CYCLE DURING THE VARIOUS OPERATING MODES.

- = LED "ON"
- ◻ = LED THAT WAS NOT "ON" DURING THE PREVIOUS PART OF THE OPERATING CYCLE
- ◻ = LED "ON" OR "OFF"

I/O DEVICE DESCRIPTION	ICC BAR ENGAGED											NO ICC BAR ENGAGED								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
LOCK BUTTON	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻
UNLOCK BUTTON	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻
NORMAL-BYPASS SW	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻
HOOK LOWERED PROX SW	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻
HOOK EXTENDED PROX SW	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻
HOOK WORKING ZONE PROX SW	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻
HOOK RETRACTED PROX SW	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻
PRESSURE SW	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻
RAISE BUTTON	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻
LANYARD (PULL RING)	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻
INTERLOCK (LIP) SW (4)	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻
SPARE	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻
MOTOR STARTER OR RELAY (5)	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻
LEVELER SOLENOID	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻
LOWER HOOK SOLENOID	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻
EXTEND HOOK SOLENOIDS	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻
HOLD HOOK LOWERED SOLENOID	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻
LIGHT RELAY	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻
HOOK ENG'D ON ICC BAR RELAY	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻
PULL AWAY WARNING LIGHTS (ALARM)	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻	◻

PLC1 I/O IDENTIFICATION

PLC1 INPUTS-24VDC

PLC1 OUTPUTS-115VAC

(1) AUTO ENGAGE CYCLE ACTIVATED. LOCK BUTTON ONLY REQUIRES MOMENTARY PRESSURE.

(2) AUTO SHUT-OFF OF SYSTEM OCCURS.

(3) LED "ON" WHEN NOT FULLY EXTENDED AND "OFF" WHEN FULLY EXTENDED (I.E., INPUT "ON/OFF/ON/OFF").

(4) SWITCH ONLY ON UNITS EQUIPPED WITH LEVELER AND RESTRAINT INTERLOCKING FEATURE.

(5) STARTER M1 IF 3 PHASE, RELAY MR1 IF 1 PHASE.

(6) LED MAY TURN "ON" THEN "OFF" (I.E., BLINK).

(7) LED TURNS "ON" AFTER APPROXIMATELY 10 SECONDS AFTER REACHING THE FULLY LOWERED POSITION.

POWERAMP "ERHOOK TROUBLESHOOTING GUIDE.

CHART FOR TELEMECHANIQUE TSX 171 2028 PROGRAMMABLE LOGIC CONTROLLER (PLC1). CHART SHOWS STATUS OF PLC1 I/O (INPUT/OUTPUT) LED'S (LIGHT EMITTING DIODES) AT DIFFERENT PARTS OF THE OPERATING CYCLE DURING THE VARIOUS OPERATING MODES.

- = LED "ON"
- = LED THAT WAS NOT "ON" DURING THE PREVIOUS PART OF THE OPERATING CYCLE.
- = LED "ON" OR "OFF"

I/O DEVICE DESCRIPTION LEGEND

LOCK BUTTON	PB1
UNLOCK BUTTON	PB2
NORMAL-BYPASS SW	SS2
HOOK LOWERED PROX SW	LS1
HOOK EXTENDED PROX SW	LS2
HOOK WORKING ZONE PROX SW	LS3
HOOK RETRACTED PROX SW	LS4
PRESSURE SW	PS1
RAISE BUTTON	PB3
LANYARD (PULL RING)	LS5
INTERLOCK (LIP) SW (4)	LS6
SPARE	-----

PLC1 INPUTS-24VDC

I/O DEVICE DESCRIPTION	"NORMAL" OPER MODE. "UNLOCK" AND "RAISE" ...ATING CYCLES.											"BYPASS" OPERATING MODE. "RAISE" OPERATING CYCLE.							
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
LOCK BUTTON	0																		
UNLOCK BUTTON	1				○														
NORMAL-BYPASS SW	2																		
HOOK LOWERED PROX SW	3					○													
HOOK EXTENDED PROX SW	4						○												
HOOK WORKING ZONE PROX SW	5							○											
HOOK RETRACTED PROX SW	6								○										
PRESSURE SW	7					○													
RAISE BUTTON	8															○			
LANYARD (PULL RING)	9																		
INTERLOCK (LIP) SW (4)	10																		
SPARE	11																		
MOTOR STARTER OR RELAY (5)	0																		
LEVELER SOLENOID	1																		
LOWER HOOK SOLENOID	2																		
EXTEND HOOK SOLENOIDS	3																		
HOLD HOOK LOWERED SOLENOID	4																		
LIGHT RELAY	5																		
HOOK ENG'D ON ICC BAR RELAY	6																		
PULL AWAY WARNING LIGHTS (ALARM)	7																		

PLC1 OUTPUTS-115VAC

- (1) AUTO DISENGAGE CYCLE ACTIVATED. UNLOCK BUTTON ONLY REQUIRES MOMENTARY PRESSURE.
- (2) THIS CHART DOES NOT DESCRIBE STATUS OF LED'S FOR UNITS THAT HAVE A SAWTOOTH MOTION DURING THE "UNLOCK" OPERATING CYCLE.
- (3) AUTO SHUT-OFF OF SYSTEM OCCURS.
- (4) SWITCH ONLY ON UNITS EQUIPPED WITH LEVELER AND RESTRAINT INTERLOCKING FEATURE.
- (5) STARTER M1 IF 3 PHASE, RELAY MR1 IF 1 PHASE.
- (6) LED MAY TURN "ON" AND THEN "OFF" (I.E., BLINK).

POWERAMP/POWERHOOK TROUBLESHOOTING GUIDE.

CHART FOR TELEMECHANIQUE TSX 171 2028 PROGRAMMABLE LOGIC CONTROLLER (PLC1). CHART SHOWS STATUS OF PLC1 I/O (INPUT/OUTPUT) LED'S (LIGHT EMITTING DIODES) AT DIFFERENT PARTS OF THE OPERATING CYCLE DURING THE VARIOUS OPERATING MODES.

- = LED "ON"
- ◐ = LED THAT WAS NOT "ON" DURING THE PREVIOUS PART OF THE OPERATING CYCLE
- ◑ = LED "ON" OR "OFF"

I/O DEVICE DESCRIPTION	LEGEND	BELOW DOCK END LOADS, "NORMAL" OPERATING MODE, "LOCK" AND "RAISE" OPERATING CYCLES.											BELOW DOCK END LOADS, "BYPASS" OPERATING MODE, "RAISE" OPERATING CYCLE.							
		HOOK ACTIVATED, ICC BAR ENGAGED											PLC1 I/O IDENTIFICATION							
		40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	
LOCK BUTTON	PB1																			
UNLOCK BUTTON	PB2																			
NORMAL-BYPASS SW	SS2																			
HOOK LOWERED PROX SW	LS1																			
HOOK EXTENDED PROX SW	LS2																			
HOOK WORKING ZONE PROX SW	LS3																			
HOOK RETRACTED PROX SW	LS4																			
PRESSURE SW	PS1				(3)															
RAISE BUTTON	PB3																			
LANYARD (PULL RING)	LS5																			
INTERLOCK (LIP) SW (1)	LS6																			
SPARE	*****																			
MOTOR STARTER OR RELAY (2)	M1-MR1																			
LEVELER SOLENOID	SOL A																			
LOWER HOOK SOLENOID	SOL B																			
EXTEND HOOK SOLENOIDS	SOL C1-C3				ON/OFF									ON/OFF						
HOLD HOOK LOWERED SOLENOID	SOL D																			
LIGHT RELAY	CR1																			
HOOK ENG'D ON ICC BAR RELAY (4)	CR2																			
PULL AWAY WARNING LIGHTS (ALARM)	PL4 & LT3																			

- (1) SWITCH ONLY ON UNITS EQUIPPED WITH LEVELER AND RESTRAINT INTERLOCKING FEATURE.
- (2) STARTER M1 IF 3 PHASE, RELAY MR1 IF 1 PHASE.
- (3) LED MAY TURN "ON" THEN "OFF" (I.E., BLINK).
- (4) THIS CHART DESCRIBES STATUS OF OUTPUT 6 LED FOR UNITS EQUIPPED WITH LEVELER AND RESTRAINT INTERLOCKING FEATURE. FOR UNITS NOT EQUIPPED WITH THIS FEATURE, OUTPUT 6 LED IS "ON" FOR COLUMNS 42, 43, 44 AND 45.

POW MP/POWERHOOK TROUBLESHOOTING GUIDE.

CHART FOR TELEMECANIQUE TSX 171 2028 PROGRAMMABLE LOGIC CONTROLLER (PLC1). CHART SHOWS STATUS OF PLC1 I/O (INPUT/OUTPUT) LED'S (LIGHT EMITTING DIODES) AT DIFFERENT PARTS OF THE OPERATING CYCLE DURING THE VARIOUS OPERATING MODES.

- = LED "ON"
- ◐ = LED THAT WAS NOT "ON" DURING THE PREVIOUS PART OF THE OPERATING CYCLE
- = LED "ON" OR "OFF"

I/O DEVICE DESCRIPTION		LEGEND	
LOCK BUTTON	PB1		
UNLOCK BUTTON	PB2		
NORMAL-BYPASS SW	SS2	■	
HOOK LOWERED PROX SW	LS1	■	
HOOK EXTENDED PROX SW	LS2	◐	
HOOK WORKING ZONE PROX SW	LS3	■	
HOOK RETRACTED PROX SW	LS4	■	
PRESSURE SW	PS1	□	
RAISE BUTTON	PB3		
LANYARD (PULL RING)	LS5		
INTERLOCK (LIP) SW (4)	LS6	□	
SPARE	-----		
PLC1 INPUTS-24VDC			
MOTOR STARTER OR RELAY (5)	M1-MR1	◐	
LEVELER SOLENOID	SOL A	■	
LOWER HOOK SOLENOID	SOL B	◐	
EXTEND HOOK SOLENOIDS	SOL C1-C3	◐	
HOLD HOOK LOWERED SOLENOID	SOL D	◐	
LIGHT RELAY	CR1	■	
HOOK ENG'D ON ICC BAR RELAY	CR2	■	
PULL AWAY WARNING LIGHTS (ALARM)	PL4 & LT3		
PLC1 OUTPUTS-115VAC			
	0	■	
	1		
	2	◐	
	3	◐	
	4	■	
	5	■	
	6		
	7		

**"BYPASS" OPERATING MODE.
"UNLOCK" OPERATING CYCLE.**

PLC1 I/O IDENTIFICATION	58	59	60	61	62	63	64	65
HOOK ENGAGED ON ICC BAR, LEVER STORED, POWER ON, SYSTEM AT REST.	■							
UNLOCK BUTTON MOMENTARILY PRESSED, HOOK EXTENDS. (1)		◐						
HOOK REACHES FULLY EXTENDED POSITION, HOOK LOWERS. (2)		■						
HOOK REACHES FULLY LOWERED POSITION, HOOK RETRACTS. (2)		◐						
HOOK LEAVES FULLY EXTENDED POSITION.		■						
HOOK LEAVES FULLY WORKING ZONE.		■						
HOOK REACHES FULLY RETRACTED POSITION, HOOK RAISES TO STORED POSITION. (3)							◐	
HOOK STORED, LEVER STORED, SYSTEM AT REST.								□

- (1) AUTO DISENGAGE CYCLE ACTIVATED. UNLOCK BUTTON ONLY REQUIRES MOMENTARY PRESSURE.
- (2) THIS CHART DOES NOT DESCRIBE STATUS OF LED'S FOR UNITS THAT HAVE A SAWTOOTH MOTION DURING THE "UNLOCK" OPERATING CYCLE.
- (3) AUTO SHUT-OFF OF SYSTEM OCCURS.
- (4) SWITCH ONLY ON UNITS EQUIPPED WITH LEVELER AND RESTRAINT INTERLOCKING FEATURE.
- (5) STARTER M1 IF 3 PHASE, RELAY MR1 IF 1 PHASE.
- (6) LED MAY TURN "ON" THEN "OFF" (I.E., BLINK).