SERCO

ENTRE//MATIC

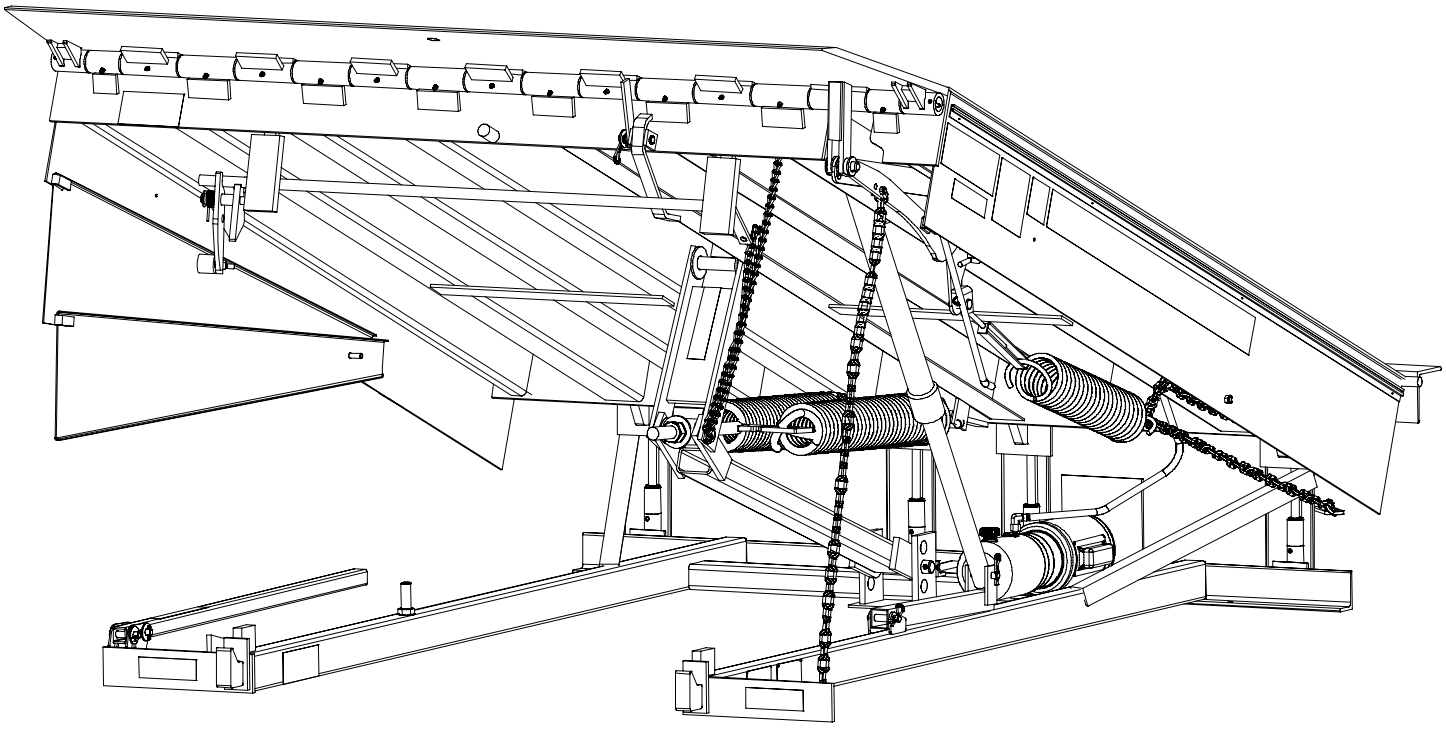
PAL POWER-ASSISTED LEVELER®

Power Assisted Levelers

PAL Series

30K-50K Capacity

SAFE T FRAME®



This manual applies to PAL dock levelers manufactured beginning March 2016 with the serial numbers 61194078 and higher.

⚠WARNING

Do not install, operate or service this product unless you have read and understand the Safety Practices, Warnings, Installation and Operating Instructions contained in this User's Manual. Failure to do so could result in death or serious injury.

User's Manual

Installation, Operations, Maintenance and Parts

Part No. 6004757E

TABLE OF CONTENTS

INTRODUCTION

Welcome and thank you for choosing this dock leveler from Serco.

This User's Manual contains information that you need to safely install, operate and maintain the dock leveler. It also contains a complete parts list and information about ordering replacement parts. Please keep and read this User's Manual before using your new dock leveler.

This dock leveler may be equipped with the optional ENERGY GUARD® dock leveler sealing system.

SAFETY SIGNAL WORDS

You may find safety signal words such as DANGER, WARNING, CAUTION or NOTICE throughout this User's Manual. Their use is explained below:

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible death or injury.

⚠DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠CAUTION

Indicates a potentially hazardous situation which, if not avoided may result in minor or moderate injury.

NOTICE

Notice is used to address practices not related to personal injury.

SAFETY PRACTICES

⚠WARNING

Read these Safety Practices before installing, operating or servicing the dock leveler. Failure to follow the safety practices could result in death or serious injury.

If you do not understand the instructions, ask your supervisor to explain them to you or call local Serco® distributor.

OPERATION
Use restricted to trained operators.

Follow procedures on placard posted near dock leveler.

Do not use this unit to service vehicles outside its intended working range which is 12" above and 12" below dock on 6' and 8' long levelers and 15" above and 12" below dock on 10' long levelers.

Do not operate the dock leveler with equipment, material or people on the ramp or lip.

Do not operate the dock leveler when anyone is in front of it unless they are securing the maintenance strut.

Stay clear of the dock leveler when it is moving.

STAY CLEAR OF HINGES AT ALL TIMES. Do not use hands to position dock leveler ramp or lip in vehicle or to store dock leveler.

Stay clear of leveler unless lip supported by the vehicle bed or the ramp is supported by both lip keepers; unsupported leveler can lower unexpectedly.

Inspect leveler prior to use. Do not use if operating instructions placard or other parts are missing, leveler looks broken or damaged or does not seem to work right, and tell your supervisor leveler needs repair right away.

Do not stand in the driveway between the dock leveler and a backing vehicle.

Before chocking wheels or engaging vehicle restraint, dump air from air ride suspensions and set parking brakes.

Chock vehicle wheels or lock vehicle in place with a vehicle restraining device and set brakes before loading or unloading.

OPERATION (continued)
Ensure lip avoids contact with vehicle sides and cargo. If lip does not lower to vehicle bed, reposition vehicle.

Do not use a fork truck or other material handling equipment to lower the ramp.

Move all equipment, material or people off dock leveler and store dock leveler at dock level before allowing the vehicle to pull out.

Store dock leveler at dock level after below dock end loading.

INSTALLATION, MAINTENANCE AND SERVICE
Service of dock leveler restricted to trained personnel.

If the dock leveler does not operate properly using the procedures in this manual, call your local distributor for service.

Place barricades on the dock floor around the dock leveler pit and in the driveway in front of the pit while installing, maintaining or repairing the dock leveler.

Do not operate the dock leveler when anyone is in front of it unless they are securing the maintenance strut.

Do not enter pit or do any maintenance or repair under dock leveler unless leveler is securely supported by maintenance strut.

Disconnect the power and properly tag or lock off before climbing into the dock leveler pit or doing any maintenance or repair under the dock leveler.

All electrical troubleshooting or repair must be done by a qualified technician and must meet applicable codes.

Disconnect the power and properly tag or lock off before doing any electrical work.

If it is necessary to make troubleshooting checks inside the control box with the power on, USE EXTREME CAUTION! Do not place fingers or uninsulated tools inside the control box. Touching wires or other parts inside the control box could result in electrical shock, death or serious injury.

OWNER'S RESPONSIBILITIES

The owner should recognize the inherent danger of the interface between dock and transport vehicle. The owner should, therefore, train and instruct operators in the safe use of dock leveling devices, and take appropriate steps to prevent their use by untrained individuals. Further information regarding selecting and training operators can be found in ANSI MH30.1 available at www.mhi.org/lodem. The owner shall verify the manual(s) containing the manufacturer's installation, operation, and maintenance, is made available for instruction and training personnel entrusted with such responsibilities.

When a transport vehicle is positioned as closely as practicable to a dock leveling device, there shall be at least 4" of overlap between the front edge of the lip and the edge of the floor or sill of the transport vehicle.

Manufacturer's recommended periodic maintenance and inspection procedures in effect at date of shipment shall be followed, and written records of the performance of these procedures should be kept. Only trained and authorized personnel shall be permitted to maintain, repair, inspect and adjust the dock leveler. Use only original equipment manufacturer parts, manuals, maintenance instructions and labels; or their equivalent.

Dock leveling devices that are structurally damaged or have experienced a sudden loss of support while under load, such as might occur when a transport vehicle is pulled out from under the dock leveling device, shall be removed from service, inspected by the manufacturer's authorized representative, and repaired as needed or recommended by the manufacturer before being placed back into service.

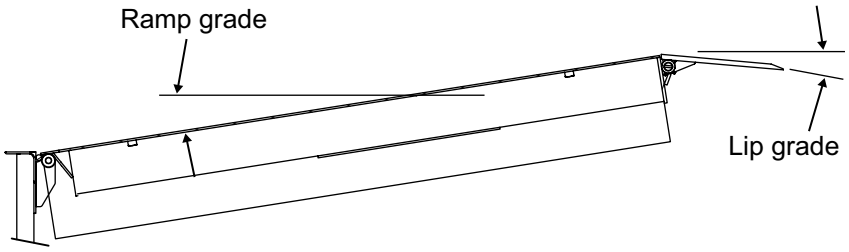
The owner shall see that all nameplates, cautions, instructions, and posted warnings are in place and legible and shall not be obscured from the view of operating or maintenance personnel for whom such warnings are intended.

Modifications or alterations of dock leveling devices shall be made only with written permission of the original manufacturer.

When industrial vehicles are driven on and off transport vehicles during the loading and unloading operation, the brakes on the transport vehicle shall be applied, and whenever possible, air-ride suspension systems should have the air exhausted and wheel chocks or positive restraints that meet the requirements of ANSI MH30.3 shall be engaged. For more detailed information regarding vehicle restraints see "ANSI MH30.3 Vehicle restraining devices: Performance and Testing" available at www.mhi.org/lodem.

The dock leveler should never be used outside its vertical working range or vertical lifting range or outside the manufacturer's labeled rated capacity. It must also be compatible with the loading equipment and other conditions relating to the dock.

RAMP AND LIP GRADES



VEHICLE BED POSITION from DOCK, (in.)		RAMP and LIP grades, % for each Dock leveler length					
		6' Leveler		8' Leveler		10' Leveler	
		RAMP	LIP	RAMP	LIP	RAMP	LIP
A	18.0	--	--	--	--	16.5	10.1
B	16.0	--	--	--	--	14.8	8.4
O	14.0	--	--	--	--	13.0	6.7
V							
E	12.0	19.1	12.6	14.2	7.9	11.4	5.0
	10.0	16.2	9.8	12.1	5.8	9.7	3.4
D	8.0	13.3	7.0	10.0	3.7	8.0	1.7
O							
C	6.0	10.5	4.2	7.9	1.6	6.3	-0.0
K	4.0	7.8	1.5	5.8	-0.5	4.7	-1.6
	2.0	5.0	-1.3	3.8	-2.5	3.0	-3.3
	0.0	2.2	-4.0	-4.6	-4.6	1.3	-4.9
B	-2.0	-0.5	-6.8	6.7	-17.2	-0.3	-6.6
E	-4.0	-3.3	-9.6	-8.8	-20.4	-2.0	-8.3
L	-6.0	-6.0	-12.4	-10.8	-18.6	-3.6	-9.9
O							
W	-8.0	-8.8	-15.2	-12.9	-16.8	-5.3	-11.6
	-10.0	-11.6	-18.0	-15.1	-15.0	-7.0	-13.3
D	-12.0	-14.4	-20.9	-17.2	-13.3	-8.6	-15.0
O							
C							
K							

Ramp and lip grade, 4° lip crown, 16" lip.

VEHICLE BED POSITION from DOCK, (in.)		RAMP and LIP grades, % for each Dock leveler length					
		6' Leveler		8' Leveler		10' Leveler	
		RAMP	LIP	RAMP	LIP	RAMP	LIP
A	18	--	--	--	--	17.3	4.6
B	16	--	--	--	--	15.6	2.9
O	14	--	--	--	--	13.9	1.2
V							
E	12	20.5	7.7	15.3	2.6	12.2	-0.4
	10	17.6	4.9	13.2	0.5	10.5	-2.1
D	8.0	14.8	2.1	11.1	-1.6	8.8	-3.8
O							
C	6.0	11.9	-0.7	9.0	-3.6	7.2	-5.4
K	4.0	9.2	-3.4	6.9	-5.7	5.5	-7.1
	2.0	6.4	-6.2	4.8	-7.8	3.8	-8.8
	0.0	3.6	-9.0	2.7	-9.9	2.2	-10.4
B	-2	0.9	-11.8	0.6	-12.0	0.5	-12.1
E	-4	-2.1	-14.6	-1.4	-14.1	-1.1	-13.8
L	-6	-4.7	-17.4	-3.5	-16.2	-2.8	-15.5
O							
W	-8	-7.4	-20.3	-5.6	-18.3	-4.5	-17.2
	-10.0	-10.2	-23.2	-7.7	-20.5	-6.1	-18.9
D	-12.0	-13.0	-26.1	-9.8	-22.7	-7.8	-20.6
O							
C							
K							

Ramp and lip grade, 7° lip crown, 16" lip.

INSTALLATION

PIT CHECK

1. Inspect the pit and remove all loose trash and construction debris. Prepare the rear of the pit for the leveler mounting feet. Using a chisel, remove any high spots visible within 6" of the rear wall below the rear curb angle. Verify that the pit matches the pit details for your leveler. (Reference publication 826-001). See the Installation Troubleshooting section if the pit varies from the specification.

LEVELER CHECK PRIOR TO INSTALLATION

1. Visually check that the 4 rear hinge pins and retaining clips are in place.

2. Visually check that the lip pin retainers are in place on both ends of the lip rod.

3. Visually check that both the lip maintenance bar and maintenance strut are undamaged and pins securely attached.

4. Visually check that the foot assemblies at the rear of the leveler are in place and undamaged.

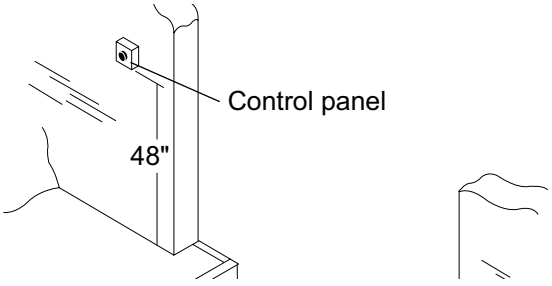
INSTALLATION OF DOCK LEVELER

⚠WARNING

Place barricades around pit on dock floor and drive while installing, maintaining or repairing dock leveler.

For AC applications, power to control box must be from fused disconnect supplied by others. Fuse size for a dual element motor protected time delay type fuse can be no greater than 225% of motor FLA. Before doing any electrical work, make certain the power is disconnected and properly tagged or locked out. All electrical work must be done by a qualified technician and must meet all applicable codes. If it is necessary to make troubleshooting checks inside the control panel with the power on, USE EXTREME CAUTION. Do not place fingers or uninsulated tools inside the control panel. Touching wires or other parts inside the control panel could cause electrical shock, death or serious injury.

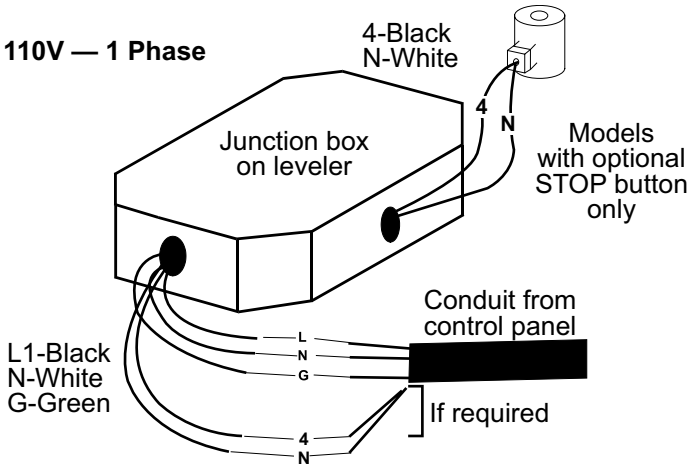
Fig. 1



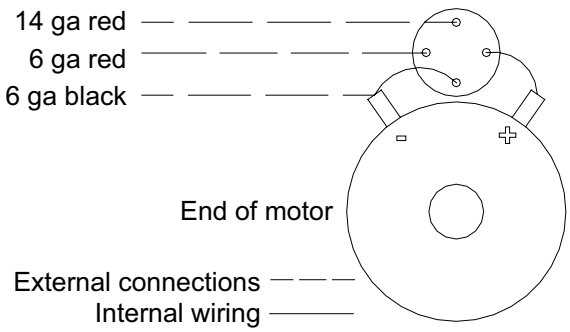
⚠WARNING

Before installing the dock leveler, read and follow the Safety Practices on Page 3. Failure to follow the safety practices could result in death or serious injury.

Fig. 2 — (see page 31-33 for pump/motor connections)



24V DC motor



1. Mount and wire control box. See Fig. 1 and 2. See wiring diagram located on the inside cover of the control or wiring diagrams in this manual. Follow the wiring instructions to set control for proper voltage.

NOTE:

No shims are required for the back frame in standard applications. However, shims are required for the front support pads.

2. Hold the leveler closed with the bolt through the lip plate and/or shipping banding securing the lip plate to the frame. Install two load centering eye bolts into the front and rear of the top plate and hoist the leveler into the pit. The dock leveler should not be lifted in any other manner when placed into the pit. See Fig. 3.

3. Place the dock leveler into the pit. Leave room between the rear of the dock leveler frame and the rear of the pit so that electrical wires can be connected to frame mounted junction box.

⚠WARNING

Inadequate lifting equipment or practices can cause a load to fall unexpectedly. Make sure the lifting chain or other lifting devices are in good condition and have a rated capacity of at least 3500 lbs for the lifting angle used. Never allow anyone to stand on or near the dock leveler when it is lifted or placed into the pit. Stand clear of the dock leveler when it is placed into the pit. Failure to follow this warning can allow the dock leveler to fall, tip, or swing into people, causing death or serious injury.

4. Connect wires to frame mounted junction box. Do not remove straps from lip yet. See Fig. 4.

5. Position the dock leveler in the pit so that the gaps along both sides of the leveler are equal (+ or - 1/8") and the rear of the leveler frame touches the rear pit curb angle.

Fig. 3

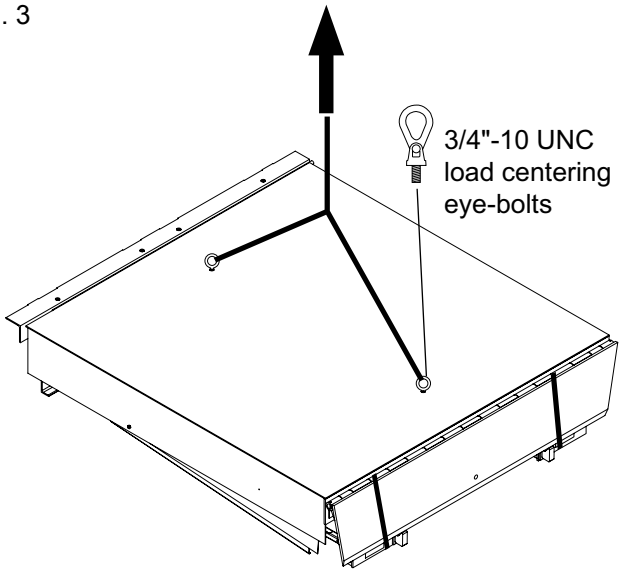
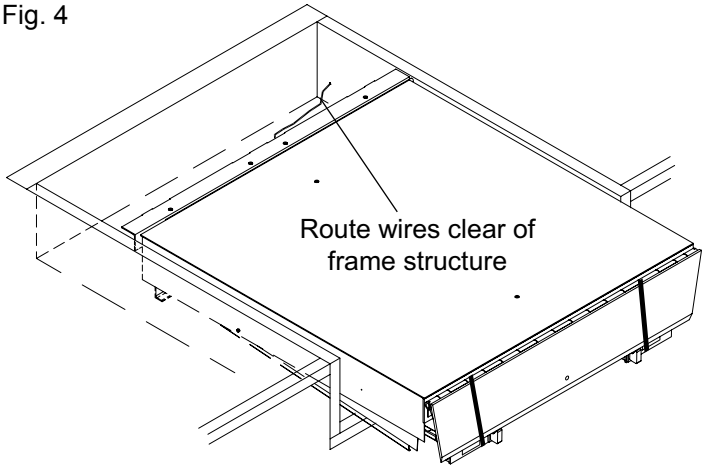


Fig. 4



Confirm wire route is clear
of frame and possible impingement

INSTALLATION, continued

NOTE:

The rear frame angle should be about 3/4" lower than the pit curb angle. This is normal. See Fig. 6.

6. To level the rear frame, use a 1/2" square drive (1/2" ratchet or impact tool). Work from one side to the other. Turn each of the leveling screws on the rear angle, counter clockwise until the top surface of the rear angle is level with the rear pit curb angle. Repeat on each screw until all feet are in contact with the pit floor and the top frame angle is flush with the rear curb angle. See Fig. 7.

NOTICE

Welding with the dock leveler's power connected can damage electrical components. If the dock leveler has previously been electrically connected, turn off power to the control box and disconnect all dock leveler electrical wires from junction box on leveler frame before welding. Ground welder to dock leveler frame. Failure to do so can result in product damage.

7. Verify placement of the leveler in the pit is such that the rear frame angle is touching the rear pit curb angle and the gaps along both sides of the leveler are equal (+ or - 1/8")

⚠WARNING

The rear edge of the dock leveler should be level or slightly (1/16" max.) below dock level.

NOTE:

If the pit is out-of-square, the resulting gap between the rear frame and the rear curb angle should be shimmed as necessary. Use steel shim(s) and weld in place. See Installation Troubleshooting on page 12.

8. Tack weld the rear angle in place in 4 places min. 3/8", at or near each leveling screw. See Fig. 8.

NOTE:

Do not drag leveler out of pit with legs extended. Do not do anymore than tack welds on the rear angle until after setting the front lip keepers.

Fig. 5

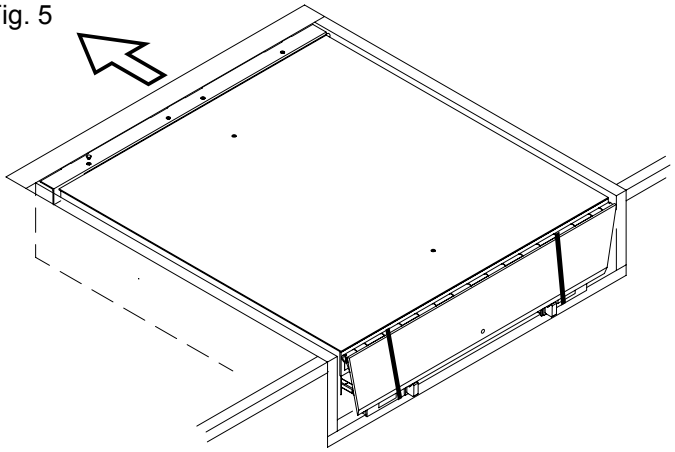


Fig. 6

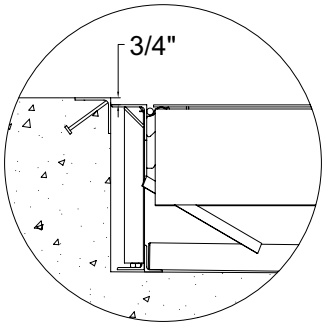


Fig. 7

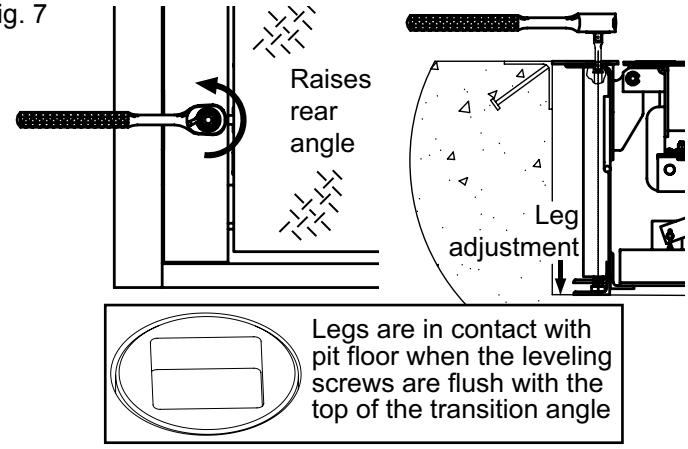
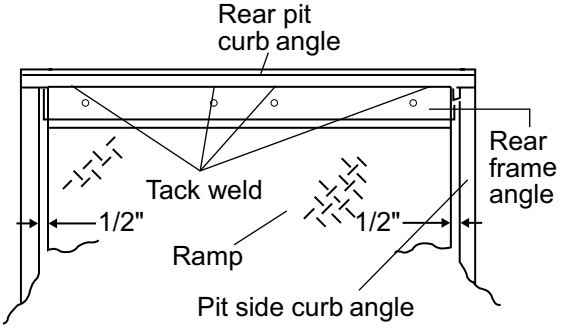


Fig. 8



NOTE:

The top surface of the dock leveler should be level and a smooth transition with the dock floor curb angle. The front end should be level and parallel with the rear frame angle for proper operation. Unequal shimming of the front supports may be required to obtain a level front edge.

9. Remove and discard the shipping tie down straps located at the front hinged lip assembly. See Fig. 5.

NOTICE

Before welding the rear frame, cover the weather seals with a sheet of steel to prevent setting fire to the weather seals. Failure to do so may result in property damage.

NOTICE

Welding with the dock leveler's power connected can damage electrical components. If the dock leveler has previously been electrically connected, turn off power to the control box and disconnect all dock leveler electrical wires from junction box on leveler frame before welding. Ground welder to dock leveler frame. Failure to do so can result in product damage.

Be certain that the rear hinge assembly is held tightly against the rear pit curb angle before welding.

If front and rear pit curb angles are not parallel do not attempt to shim dock leveler supports to match pit angles. The lip keepers and lip plate must be parallel for proper operation of the dock leveler. Add or subtract shims as required.

NOTE:

Shims must be placed under the maintenance strut bracket and behind the lip keepers on 18" and 20" lips, shims must also be welded in between the lip keepers and the vertical face of the curb angle.

10. Position the dock leveler level with the dock floor. Use 4" x 4" shims to shim under the subframe tubes behind both lip keepers and under the maintenance strut bracket. See Fig. 9. These shims should be flush with the front of the leveler frame below or behind the lip keepers. Ensure the leveler is level with the finished floor.

11. Verify that the reflex leg roller is properly aligned. See Fig. 10. Reposition subrafme tube and shims as needed.

12. Tack weld the front subrame tubes and shims to the front curb angle as shown in Fig. 9.

Fig. 9

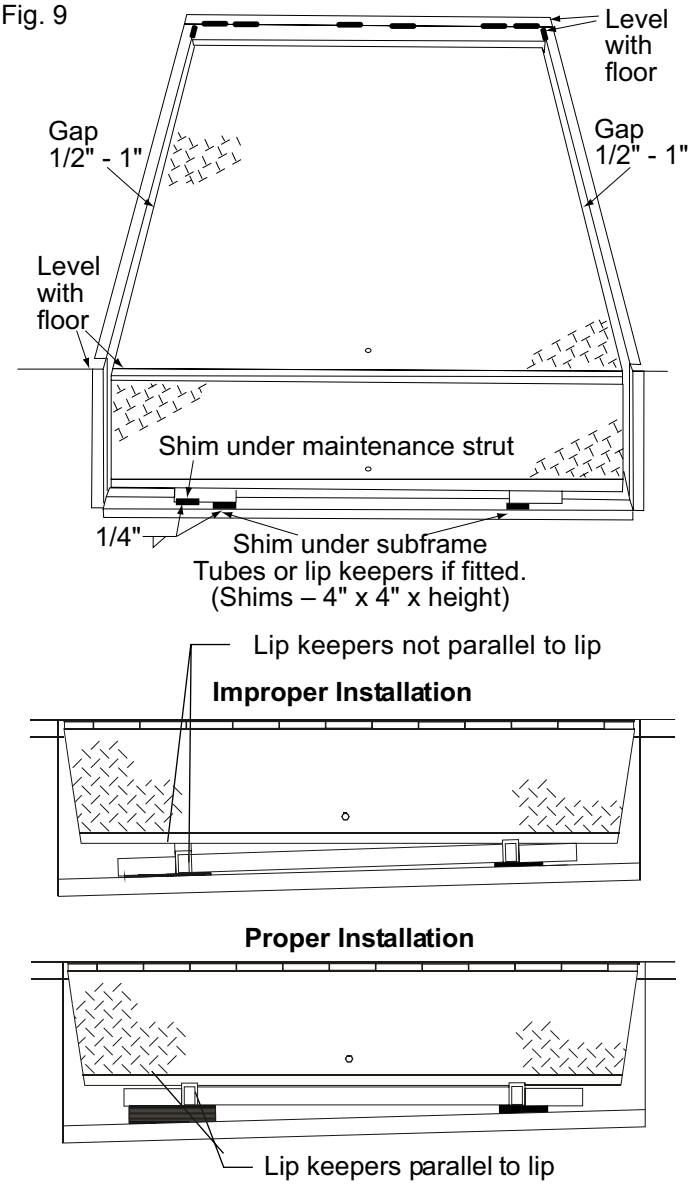
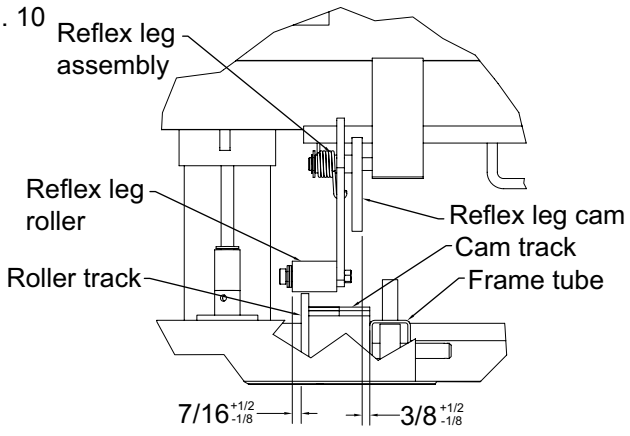


Fig. 10



INSTALLATION, continued

13. Place leveler securely on the maintenance strut. If electrical power is available, use the electrical controls to raise the ramp and lip to their full above dock position. See operating instructions in this manual. If electrical power is not available, use a chain or other suitable lifting device. Refer to page 13 for proper procedure for using the maintenance strut.

⚠DANGER

Hydraulic pressure or mechanical support must be maintained on the ramp to hold it in the raised position until the maintenance strut is in place. DO NOT WORK UNDER THE DOCK LEVELER RAMP OR LIP UNLESS THE MAINTENANCE STRUT IS SECURELY SUPPORTING THE LEVELER (See page 13).

NOTE:

If the pit width conforms to the certified pit drawing, there will be a 1/8" gap between the ends of the dock leveler's rear frame angle and the pit side curb angles. If this is not the case, the ends of the rear frame angle may require trimming to allow the gaps along both sides of the leveler to be equal (+ or - 1/8").

14. Finish weld the rear hinge to the rear curb angle using 1/4" "V" joint in the grooves provided. Follow weld size and location noted in Fig. 11.

15. Finish weld shims under the maintenance strut bracket and under the subframe tubes behind the lip keepers with 3" min. long fillet welds in 3 places each. For 18" or 20" lips, also weld shims between the lip keepers and the vertical face of the front curb angle with 1/4" fillet welds.

16. After the rear frame angle is welded, check that all leveling feet are in contact with the floor of the pit. Once all feet are in contact with the floor, torque each leveling screw to 25-40 ft.-lbs. See Fig. 7.

17. Remove shipping cotter pins from telescopic toe guards (if equipped). See Fig. 13.

Fig. 11

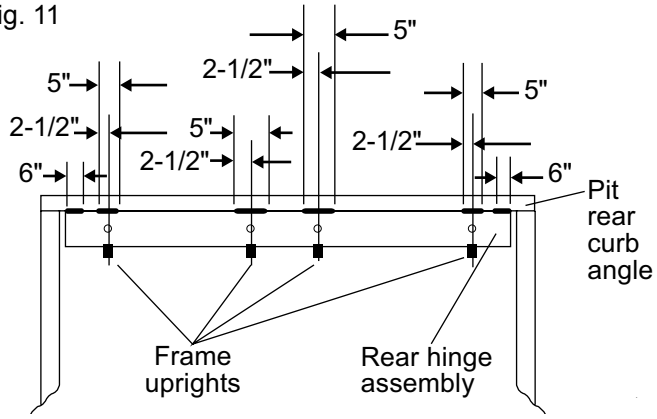


Fig. 12

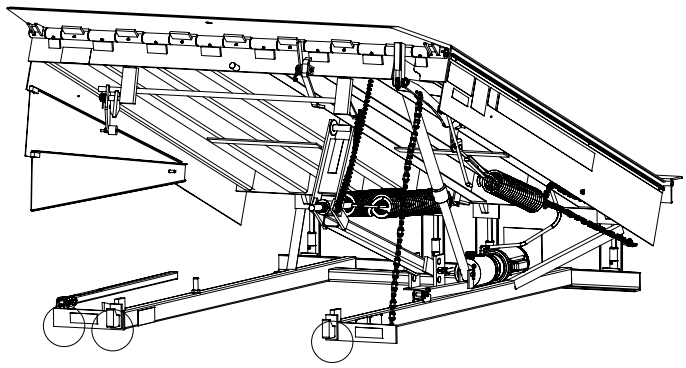
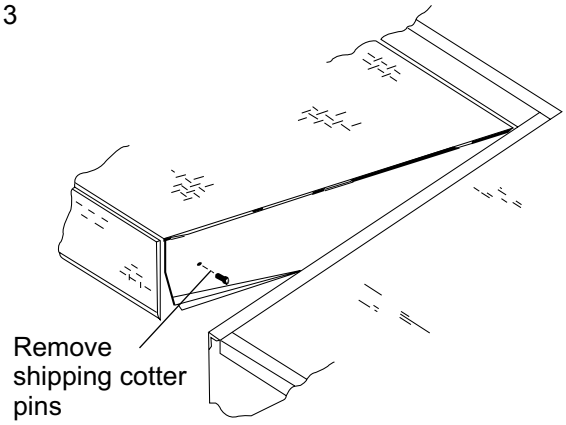


Fig. 13



18. Mount dock bumpers to face of dock. See Fig. 14.

19. Read Safety Practices on page 3 and Operating Instructions on pages 16-19. With electrical power available, use the controls to operate the dock leveler through the complete cycle to check operation. Ensure leveler operates properly.

20. Permanently mount the laminated dock leveler safety placard on the wall near the dock leveler controls. Make sure the customer gets the user's manual and is properly trained. See Fig. 15.

⚠WARNING

Keep hands, fingers and head away from the lip when the raise button is released. The lip and dock leveler are free to move downward when hydraulic pressure is removed from cylinders.

21. Operate the dock leveler four more times through the complete cycle to check operation.

22. Where applicable, install rear angle cap plugs (part number 6004488) into adjustment socket holes. Use hammer to drive cap flush with top surface to rear angle. See Fig. 16.

ACTUATION ROD WALL MOUNT ASSEMBLY

23. Anchor wall mount bracket to dock wall approximately as shown in Fig. 15. (anchors supplied by others).

24. Hang manual activation rod on bracket.

Fig. 14

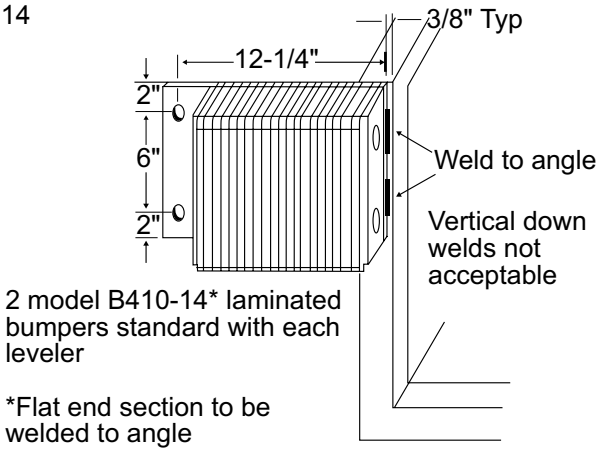


Fig. 15

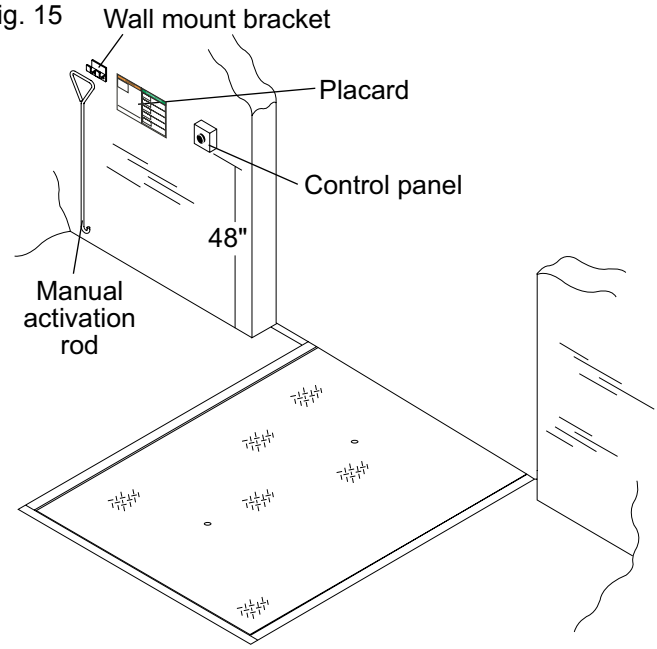
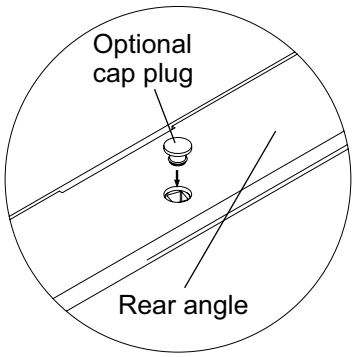


Fig. 16



INSTALLATION, continued

INSTALLATION TROUBLESHOOTING

The following procedures apply after the leveler is level in the pit.

PROBLEM	POSSIBLE CAUSE	SOLUTION
1) Leveler will not fit properly in pit.	a) Pit is out of square with the sides.	a) Align the sides of the leveler so that both sides are equal (+ or - 1/8"). With the leveler's rear frame angle touching the rear curb angle, any gaps between the frame and the rear curb angle must be filled with steel shims of appropriate thickness and length equal to the frame's beveled weld locations. See Fig 17.
	b) One side and rear angle is out of square.	b) If the gap between the leveler and the side of the pit is less than 1/2" at any point, the performance of the leveler may be impaired - especially if weatherseal is attached to the leveler. Please consult Entrematic Technical Services should this be the case.
	c) Pit floor irregular in rear.	c) If large deformations exist in the concrete work, attempt to flatten out the rough surface using a chisel or grinder to take out the large obstructions. The rear leveling legs can be installed on out of plane surfaces up to 1/8" at each leg. See Fig. 19.
	d) Pit is too deep.	d) Weld 4" x 4" shims to the bottom of the adjustable legs as shown in Fig 3.

Fig. 17

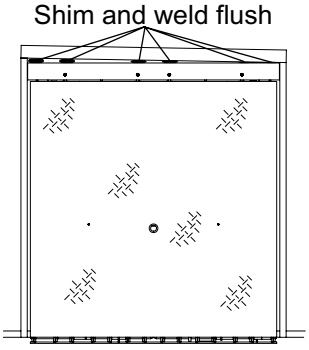


Fig. 18

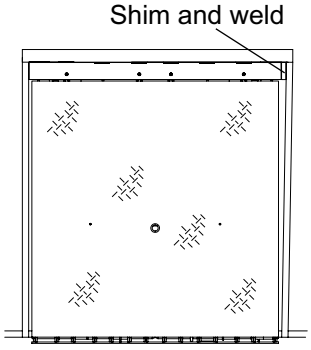
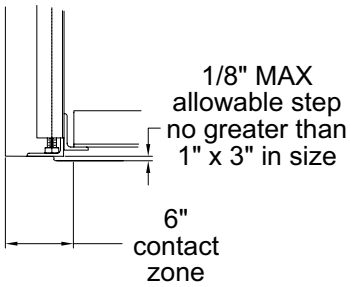


Fig. 19



⚠DANGER

Be certain, before climbing into the dock leveler pit or doing any maintenance or repair under the dock leveler, that THE MAINTENANCE STRUT IS SECURELY SUPPORTING THE DOCK LEVELER.

⚠WARNING

Before servicing the dock leveler, read and follow the Safety Practices on page 3 and the operation section of this manual.

MAINTENANCE STRUT

1. To raise the maintenance strut two people are needed:
   a. Push and hold the **RAISE** button on the control panel so leveler is fully raised.

   b. Second person can pull on the strut and lift the end up.

   c. Push down on the maintenance strut to lock it in its vertical position.

   d. Release the **RAISE** button.

2. To lower the maintenance strut from its locked upright position two people are needed:
   a. Push and hold the **RAISE** button on the control panel.

   b. Second person slides maintenance strut up to unlock from the vertical position.

   c. Push back to lower the maintenance strut.

   d. Release the **RAISE** button.

LIP MAINTENANCE BAR

1. To raise the lip maintenance bar:
   a. Support the lip manually and swing up the lip maintenance bar so the lip will rest on it. Ensure the strut is wedged in properly before releasing the lip. See Fig. 21.

2. To release the lip maintenance bar:
   a. Support the lip manually and pull the lip maintenance bar down. LIP WILL DROP with out manual support. Ensure your head and fingers are away from the lip and any moving parts.

Fig. 20

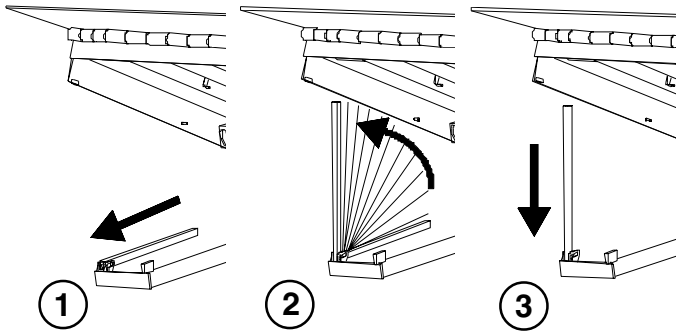


Fig. 21

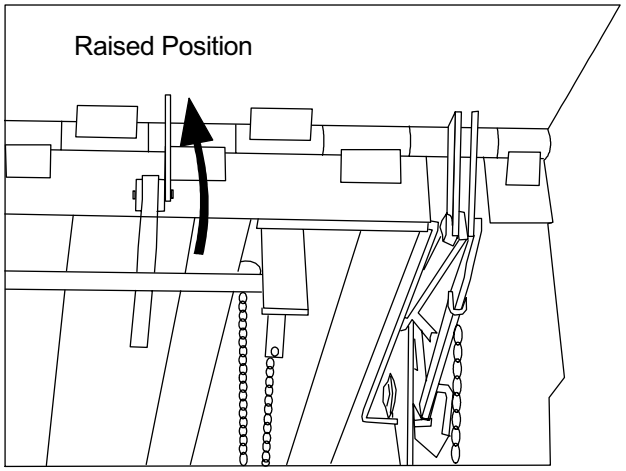
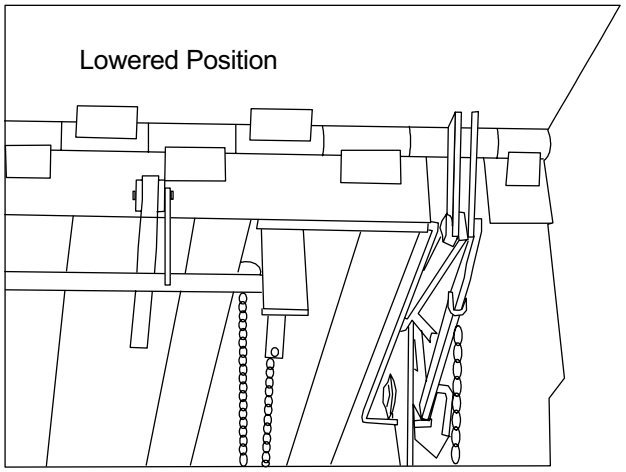


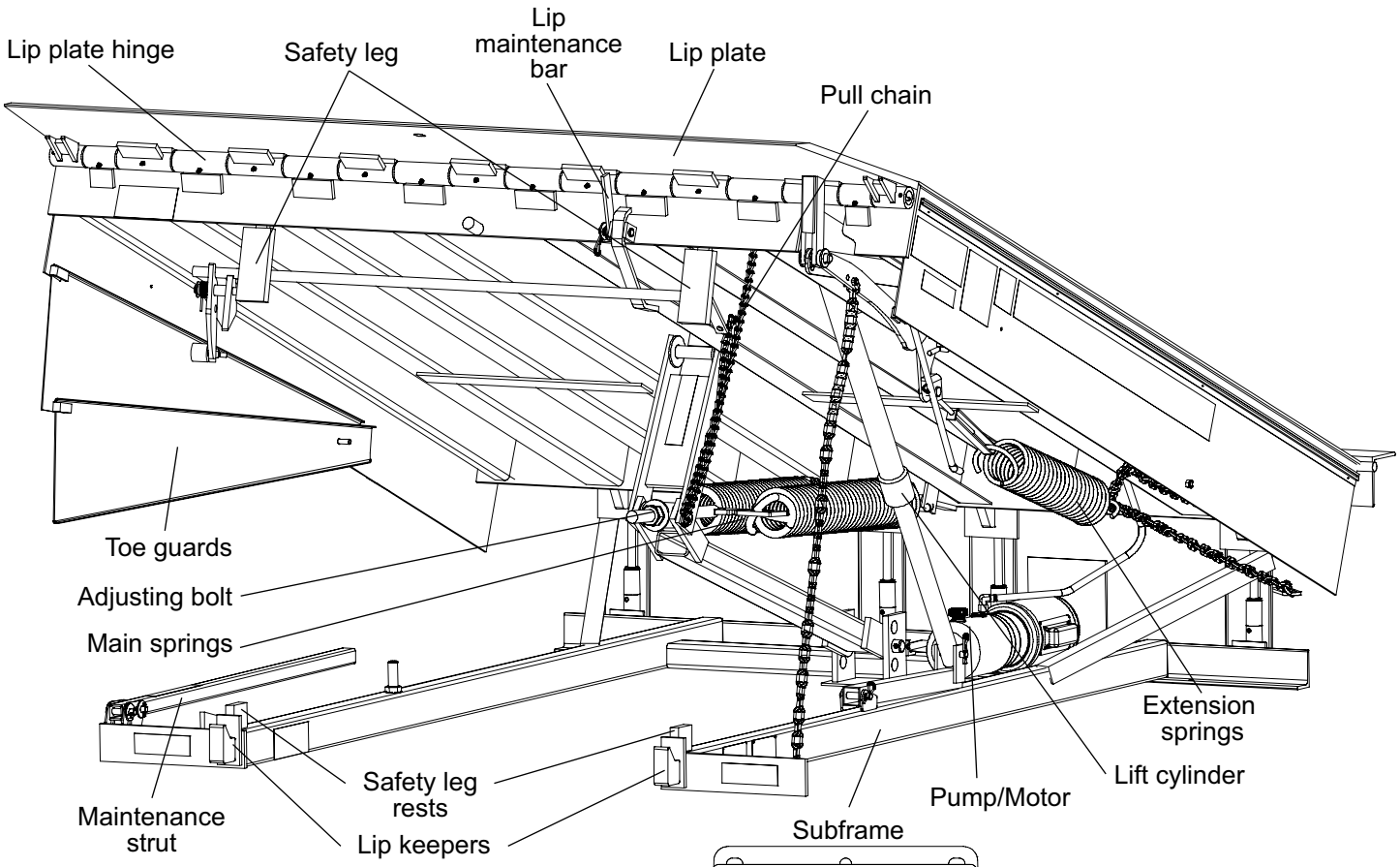
Fig. 22



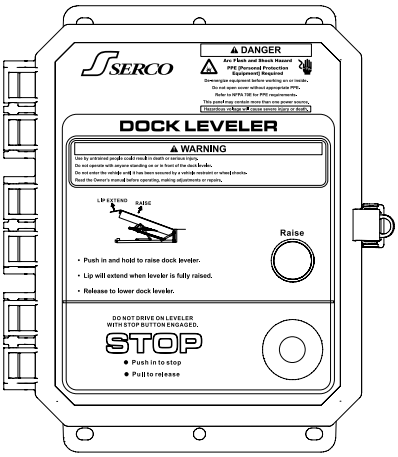
COMPONENTS AND SPECIFICATIONS

The main components of the dock leveler are shown below. See the Parts List for specific part numbers.

Fig. 23



Standard PAL control panel



Optional PAL control panel with Stop button

Control Panel - NEMA 4, 120V, 1 Phase, 60 Hz or 24V DC.

Motor - NEMA Standard T.E.N.V. / 48 YZ frame, 1/3 h.p., single.

Pump - Fixed displacement gear pump, 0.4 gpm @ 1800 rpm, primary relief valve factory set at 900 psi.

Reservoir Capacity - .33 U.S. gal., (1.25 L)

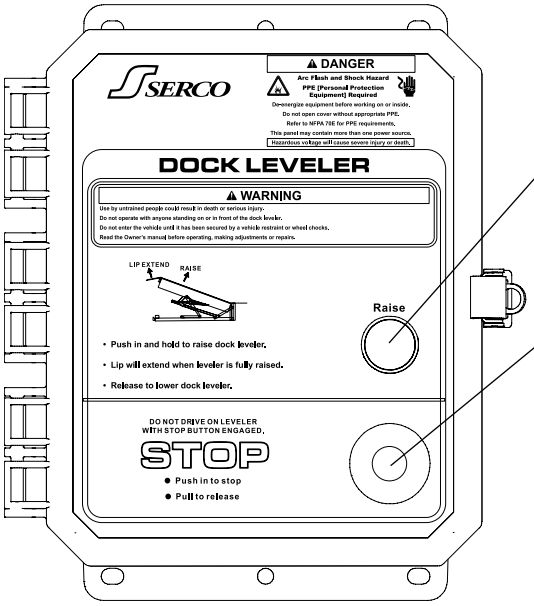
Hydraulic Fluid - An all weather hydraulic fluid with a viscosity of 15 CSt at 40°C (100°F), such as:

Shell Tellus T 15
Mobil Aero HFA (49011)
Exxon Univis: HV13, N15, J13
Texaco Aircraft Oil #1554
U.S. Oil Co.,Inc #ZFI-5606 (Low Temp.)

HYDRAULIC SYSTEM OPERATION

The following describes the operation of the hydraulic system when the control is activated:

Fig. 24



RAISE

Press in

- Pump starts and cylinder starts to raise leveler.

Release

- Pump stops and cylinder retracts to lower leveler.

STOP BUTTON (Optional)

Press in

- Solenoid valve shifts, locking hydraulic cylinder.
- Power is cut off from motor circuit.
- Leveler is held in position by hydraulic cylinder as long as **STOP** button is held in.

NOTE:

DO NOT DRIVE ON LEVELER WITH THE STOP BUTTON ENGAGED.

OPERATIONS

⚠WARNING

Before operating the dock leveler, read and follow the Safety Practices on page 3.

Use of dock leveler restricted to trained operators.

Follow procedures on placard posted near dock leveler.

Inspect leveler prior to use. Do not use if operating instructions placard or other parts are missing, leveler looks broken or damaged or does not seem to work right, and tell your supervisor leveler needs repair right away.

Before pressing button, ensure lip avoids contact with trailer sides and cargo. If lip does not lower to vehicle bed, reposition vehicle.

Stay clear of leveler unless lip is supported by vehicle bed or the leveler is stored at dock level. Visually check that the lip is supported by the vehicle bed or the ramp is supported by both lip keepers or safety legs before driving or walking on the ramp. Unsupported dock levelers can lower unexpectedly.

Before chocking wheels or engaging vehicle restraint, dump air from air ride suspensions and set parking brakes.

Always be certain that the vehicle wheels are chocked, or that the vehicle is locked in place by a vehicle restraining device and the brakes are set before loading or unloading. Vehicles pulling away from the dock unexpectedly can cause uncontrolled drop of the dock leveler which can result in death or serious injury.

The maximum uncontrolled drop of a Serco PAL leveler, from 3-1/4" above dock is to the safety legs (slightly below dock level), or if below 3-1/4" above dock the leveler will drop to the full below dock position.

Always return the dock leveler to its dock level (stored) position before allowing the vehicle to leave the dock. If the vehicle pulls away from the dock before the dock leveler is stored, the lip will fall to its pendant position and the ramp will drop. In addition, failure to properly store the leveler may leave the leveler in a position below the level of the dock floor. This condition may result in unexpected drop of personnel or material handling equipment and result in death or serious injury.

Failure to follow these instructions could result in death or serious injury to operators and/or bystanders.

INTRODUCTION

The Serco PAL dock leveler is designed to span and compensate for space and height differences between a loading dock and freight carrier to allow safe, efficient freight transfers.

The Serco PAL dock leveler uses a push-button control to position the ramp. Pushing and holding the **RAISE** button operates a hydraulic cylinder to raise the ramp. Releasing the **RAISE** button allows the ramp to lower.

A mechanical linkage extends the dock leveler lip as the ramp is being raised from its stored position, and the leveler with its lip extended settles onto the vehicle bed forming a bridge.

After loading pressing and holding the **RAISE** button allows the ramp to raise. The lip will retract as the leveler is raised. Releasing the **RAISE** button lowers the ramp into its level, stored position.

With the dock leveler in its stored position, Lip Keepers support the dock leveler ramp at a position level with the dock floor.

For below dock end loads the lip can be extended beyond the lip keepers by pulling the below dock chain, located at the left front side of the deck before the deck lowers past dock level.

In the event of power failure the leveler can still be operated using a manual activation rod which is shipped with the dock leveler and should be stored nearby.

⚠WARNING

Do not drive on dock leveler or lip until it is fully extended and supported by the vehicle bed.

Never use a fork truck or other material handling equipment to lower the ramp and lip sections.

RAISING LEVELER

Ensure a vehicle restraining device is engaged or wheel chocks in place before operating the dock leveler.

1. **Press and hold the RAISE button** on control panel to raise the leveler. See Fig. 25.

2. Continue to **hold the raise button**. When the leveler is fully raised, the lip will automatically extend. See Fig. 26.

3. When the lip is fully extended, **release the RAISE button**. The leveler will slowly float down to the vehicle bed. If the leveler is equipped with the optional Stop, push the **STOP button** at any time to stop the leveler. Pull the leveler **STOP button** to resume operation.

NOTICE

Never drive on dock leveler with STOP button pressed.

Fig. 25

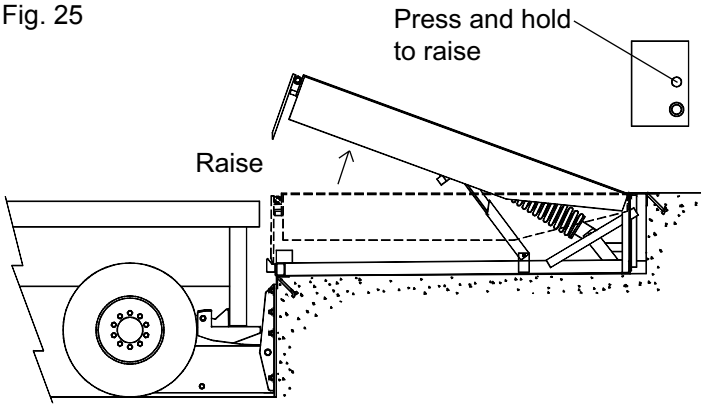


Fig. 26

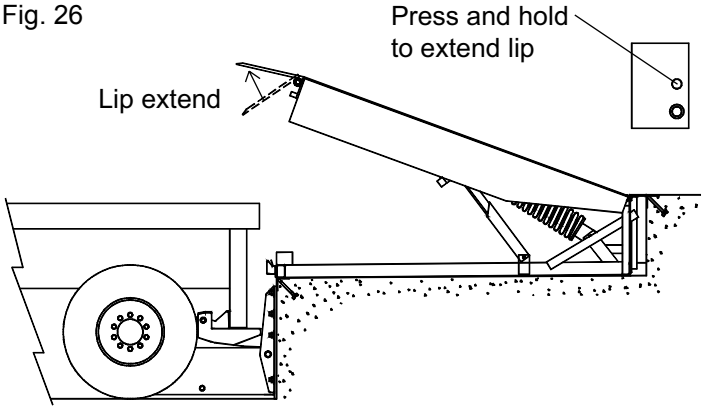
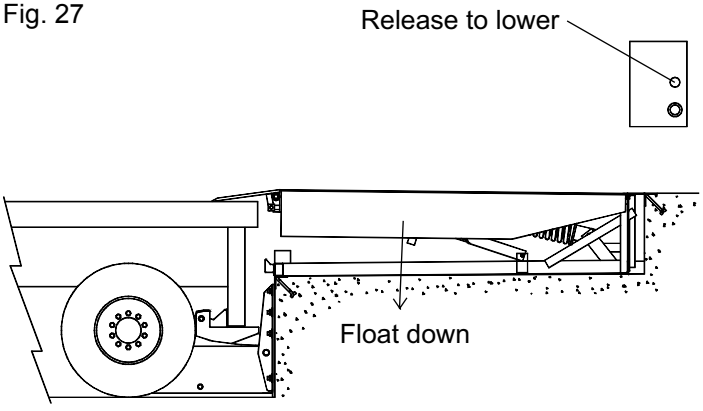


Fig. 27



OPERATIONS, continued

⚠WARNING

Before allowing vehicle to leave always return the dock leveler to its dock level (stored) position with the lip stored in both lip keepers. See Fig. 28. Failure to do so may leave the dock leveler in a position below the level of the dock floor. This condition may result in unexpected drop of personnel or material handling equipment and could result in death or serious injury.

STORING LEVELER

1. To return the leveler to the stored position, **press and hold the RAISE button**. As the leveler raises the lip will retract. When the lip is fully retracted, **release the RAISE button**. The leveler will float down to the stored position. See Fig. 28.

BELOW DOCK END LOADING

1. **Press and hold the RAISE button** until leveler is partially raised, release button and then **pull the below dock chain** to extend the lip beyond the lip keepers. Leveler will float down for end loading. See Fig. 29.

Fig. 28

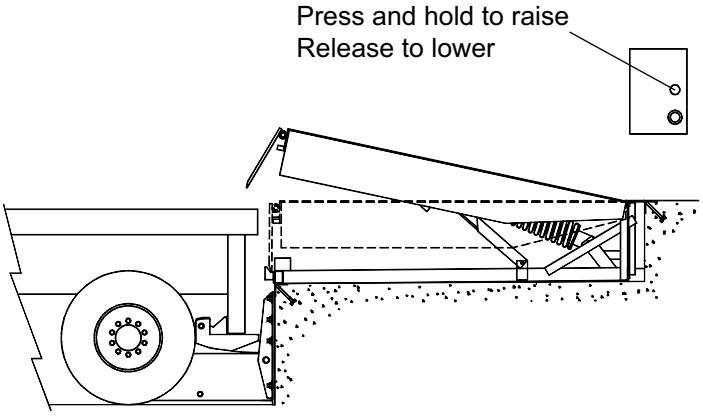
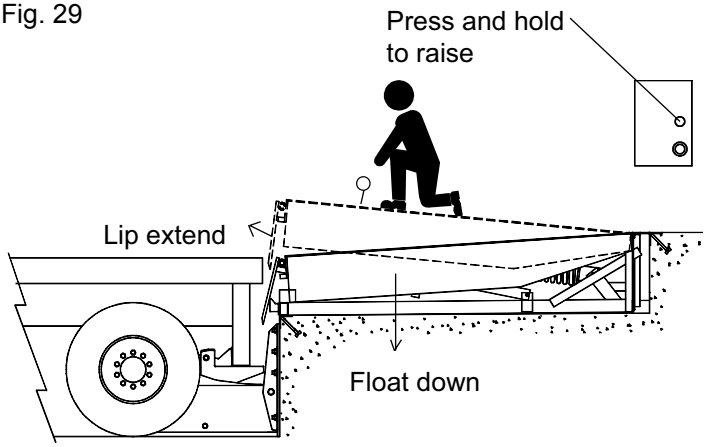


Fig. 29



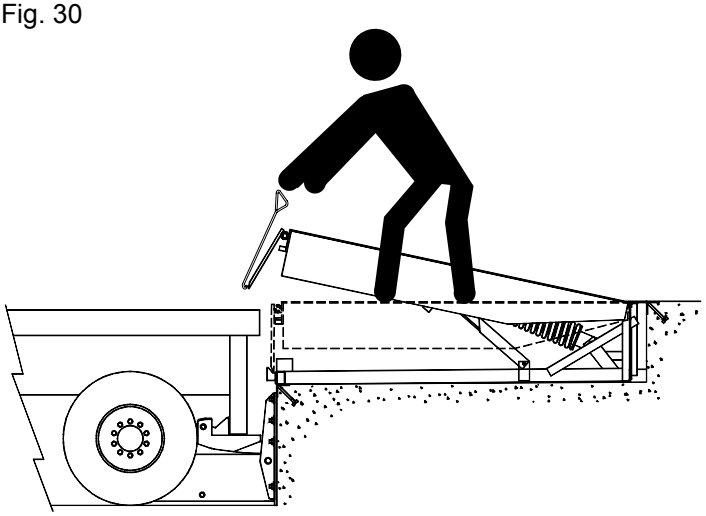
LOST POWER OPERATION

RAISING LEVELER

With the leveler in the stored position,

1. Remove the 328-970 manual activation rod from its storage location.
2. Standing alongside the leveler, hook the activation rod under the edge of the lip. See Fig 30.
3. Pull up briskly on rod. Leveler will rise to the limit of the activation chain and lip will extend.
4. Leveler will float down to rest on vehicle bed.
5. Restore rod to storage location.
6. Begin loading/unloading operations.

Fig. 30

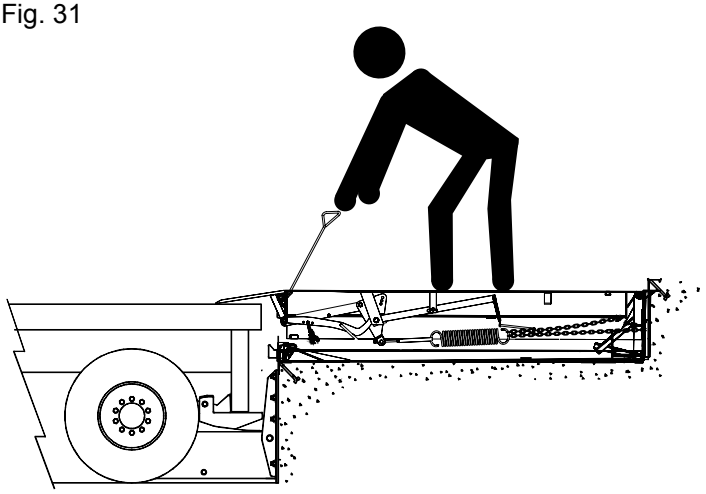


STORING LEVELER

With the leveler lip extended and resting on the vehicle bed.

1. Remove the 328-970 manual activation rod from its storage location.
2. Standing alongside the leveler, hook the activation rod under the leading edge of the deck at the junction of the deck and lip. See Fig 31.
3. Pull up on rod. Leveler will rise and lip will begin rotating to pendant position.
4. Continue pulling until lip clears vehicle bed and falls fully pendant.
5. Leveler will float down to stored position.
6. Remove rod from leveler and store.

Fig. 31



PREVENTIVE MAINTENANCE

⚠DANGER

Be certain, before climbing into the dock leveler pit or doing any maintenance or repair under the dock leveler, that: 1) THE MAINTENANCE STRUT is securely supporting the leveler and the power is disconnected and properly tagged or locked out.

⚠WARNING

Before servicing the dock leveler, read and follow the Safety Practices on page 3 and the operation section of this manual.

Place barricades on the dock floor around the dock leveler pit and in the driveway in front of the pit while installing, maintaining or repairing the dock leveler.

WEEKLY

1. Inspect for debris in lip hinge. Clean as required.

2. Inspect for debris in rear hinge area of the leveler and between the sides and curb angles to ensure smooth operation. Clean as required. Inspect the safety leg system for free operation, structural defects, pull chain and return spring operation.

3. Inspect the operation of the telescopic toe guards to ensure they are not distorted or binding when operating the leveler.

4. Check the full operation of the leveler to ensure that there is no hesitation in the hydraulic system.

QUARTERLY

1. Inspect all warning labels and placards. See page 22. Replace as necessary.

2. Clean away any debris from the rear hinge and pit area. If washing out, take care not to direct spray at any electrical parts.

3. Inspect and lubricate all mechanical pivot points on the leveler with a light oil such as S.A.E. 30. See Fig. 32 on page 21.

4. Raise and then lower the leveler down to full below dock position with the lip extended. Ensure that the latch bar will disengage and the lip will fall to the pendant position automatically. (See pages 23-24 for adjustment)

QUARTERLY (continued)

5. Inspect the lip push out arm and lip counterbalance assemblies for damage and check the chain and springs for elongation. Inspect lip latch adjustment as per procedures on pages 23-24, make adjustments as necessary.

6. Inspect all welds under the leveler for fatigue or failure, particularly the lip plate hinge and top plate beams and front hinge bar.

7. Check the full operation of the leveler. Make any adjustments required.

8. Lubricate the lip hinge tubes with molybdenum disulfide grease NLGI #2. Do not over grease. Stop when grease begins to ooze out of the hinge tube ends. Wipe off excess grease. See Fig. 32 on page 21.

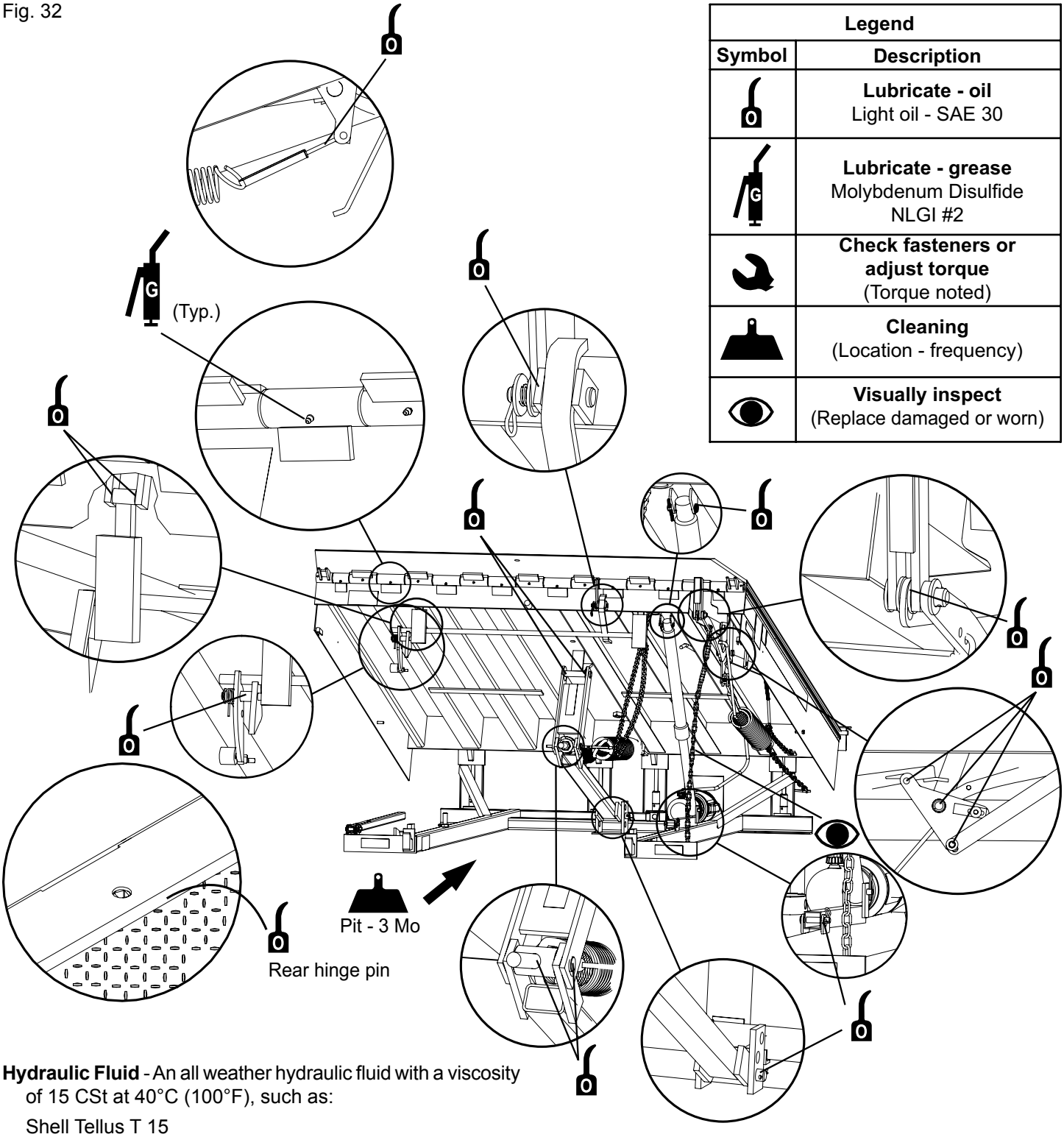
9. Inspect the hydraulic cylinder and hose for any fluid leaks and check reservoir level with the leveler resting on the maintenance strut, add fluid as required. See **Hydraulic Fluid Level** on page 256.

10. Inspect dock bumpers. Four inches (4") of bumper protection is required. Worn, torn, loose or missing bumpers must be replaced.

NOTE:

See Fig. 32 on page 21 for lubrications points.

Fig. 32



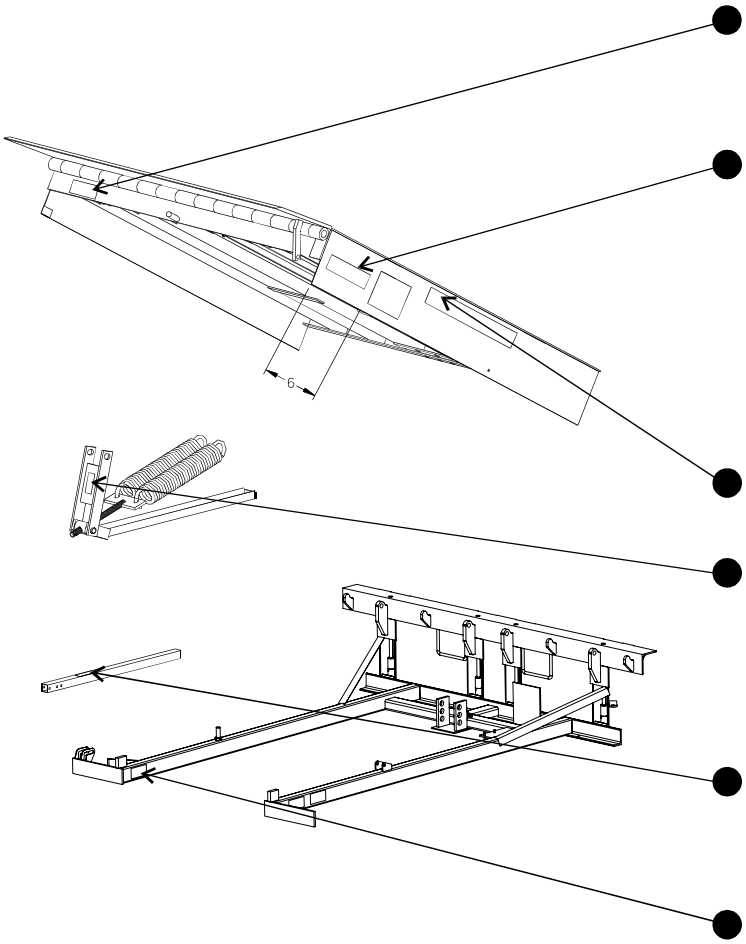
Hydraulic Fluid - An all weather hydraulic fluid with a viscosity of 15 CSt at 40°C (100°F), such as:

Shell Tellus T 15
Mobil Aero HFA (49011)
Exxon Univis: HV13, N15, J13
Texaco Aircraft Oil #1554
U.S. Oil Co.,Inc #ZFI-5606 (Low Temp.)

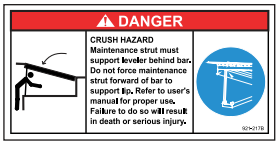
PREVENTIVE MAINTENANCE, continued

Every 90 days (quarterly) inspect all safety labels and tags to ensure they are on the dock leveler and are easily legible. If any are missing or require replacement, please call your local Serco distributor for replacements.

Fig. 33



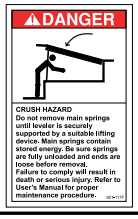
921-217

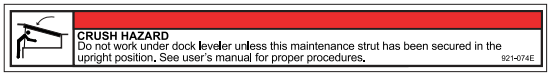


6008485 (x2)

138-837 (x2)

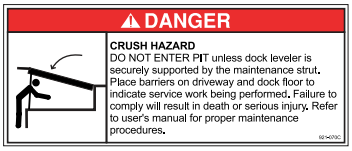
921-117



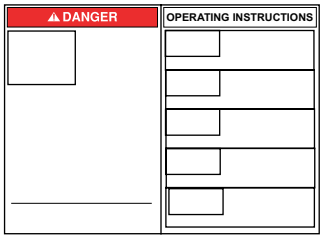


921-074

921-070



824-183



WARNING AND OPERATION PLACARD
(MOUNTED ON WALL NEAR LEVELER)

LIP LATCH ADJUSTMENT

⚠DANGER

Always make sure that the maintenance strut is securely supporting the leveler in the raised position before working under a dock leveler. See page 13.

⚠WARNING

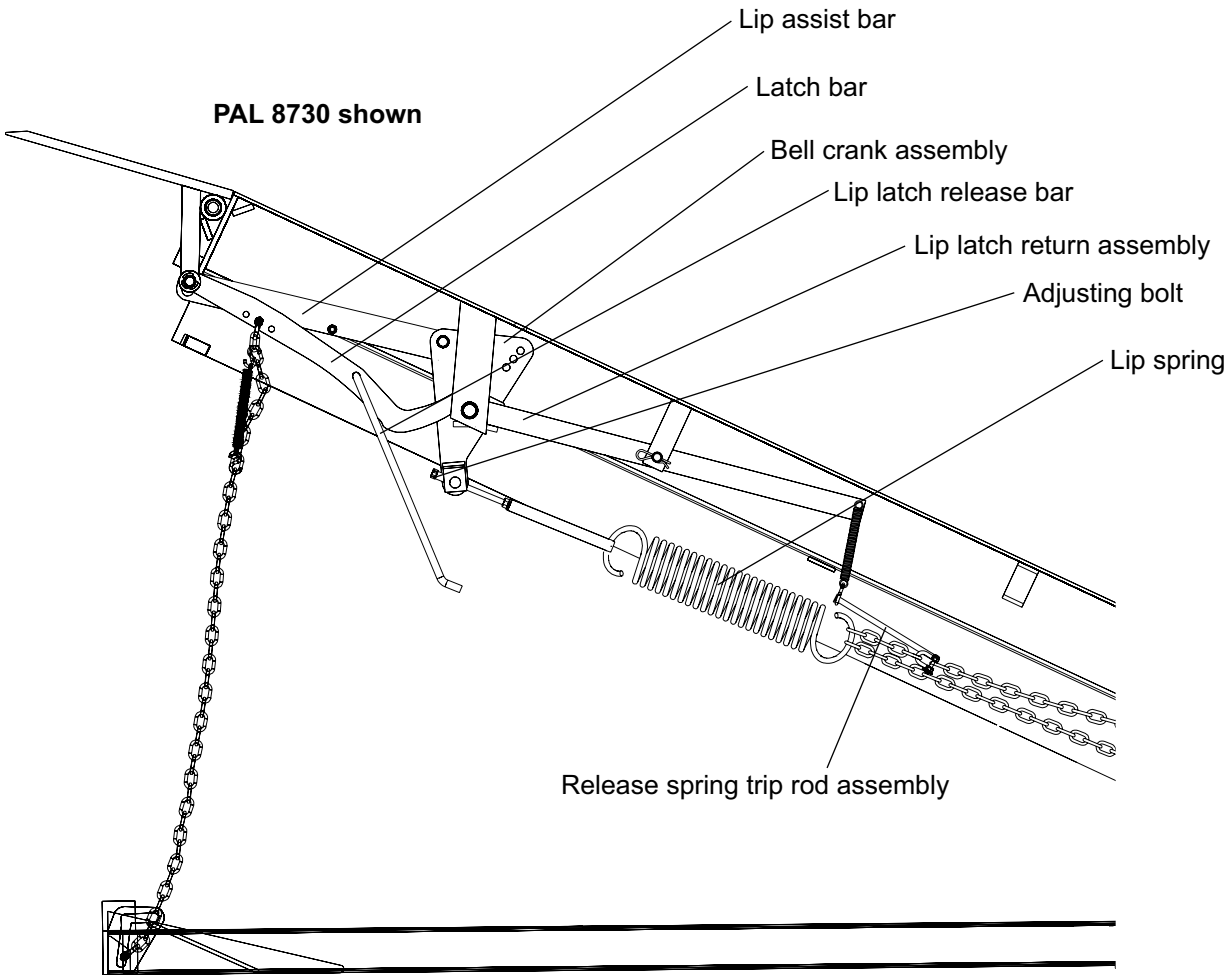
1) Always position traffic cones or a barricade behind and in front of the dock leveler to warn fork truck operators, vehicle traffic and pedestrians away from the dock leveler.

2) Always notify a foreman or supervisor that you are working under the equipment.

NOTE:

Hydraulic or main spring assemblies not shown. No adjustment required to hydraulic or main spring assemblies for this application.

Fig. 34



LIP LATCH ADJUSTMENT, continued

The lip spring acts through the bell crank and the lip assist bar to counter balance the weight of the lip. The lip spring is attached by two chains to both the deck and to the frame. The upper chain to the deck maintains a minimum tension force in the spring to partially counter balance the lip. The lower chain is attached to the frame and provides an additional tension force that increases as the deck is raised. This increased spring force will fully counter balance the weight of the lip as it is rotated to the extended position. The lip latch bar will be in the engaged (lowered) position but the weight of the lip will be fully supported by the lip spring.

As the deck lowers with the lip extended, the lower chain slackens and the lip spring tension is reduced. When the lip and deck have lowered ten inches from the highest position, the lip must fall on to the lip latch to hold the latch in the engaged position. When leveler is lowered to the working height (approx. 12" above dock) the lower chain will be slack and the upper chain will tighten and extend the lip latch release spring. As long as the lip is resting on the lip latch the latch will not release. When the lip is supported by the bed of a vehicle, the release spring will rotate the latch release bar and raise the latch bar to the released position. When the leveler is raised, or the vehicle leaves, the lip will then fall to the stored position.

LIP LATCH AND LIP SPRING ADJUSTMENT

NOTE:

A remote, normally open push-button service switch is required to perform the following steps. If this switch is not available, two people are required for the following steps. One person must remain at the control panel while the other is adjusting the dock leveler.

1. Fully raise the leveler, extend the lip and raise the maintenance strut. Lower the deck to rest on the raised maintenance strut. Raise the lip maintenance support to prevent the lip from falling. Check that the lip latch bar has locked into position. Lubricate all pivots with S.A.E. 30 oil and lip hinge tubes with general purpose grease.

2. If the lip does not fully extend, check for binding of the latch bar, debris in the lip hinge, or improper attachment of the lip chain and lip spring. There are three holes in the lip latch bar. The lip chain is normally attached to the middle hole. If the chain is attached to the front hole leave it there. If the chain is attached to the middle hole and the lip has been properly cleaned and lubricated and will not start to extend, move the chain to the front hole.

3. With the maintenance strut still raised, press the **RAISE** button until the leveler is fully raised. The lip should be held extended by the lip spring and the lip latch should be free to move. If the lip is resting on the lip latch, increase the tension of the lip spring by turning the adjusting bolt clockwise.

4. When the **RAISE** button is released and the leveler is being lowered, the lip spring tension will be reduced. The lip must fall on to the lip latch within 10 inches from the fully raised position. If the lip does not fall onto the latch bar, reduce tension of the lip spring by turning the adjusting bolt counter-clockwise. There may be very little movement of the lip when it falls on to the lip latch. The movement can be seen more easily by watching the gap between the rear edge of the lip and the front edge of the deck.

5. Raise the leveler and lower the maintenance strut and the lip maintenance support. Allow the leveler to lower. As it reaches the working height, the upper chain will tighten and extend the lip latch release spring. Lifting up on the end of the lip will allow the lip latch to release, and the lip will fall when it is released.

6. The operation of the lip latch and release can be further tested by using a sturdy post cut to the length of the dock height plus 10 inches. Raise the dock leveler, extend the lip and lower the leveler so that the end of the lip is resting on the post. Then raise the leveler again. As the leveler is raised, the lip should fall to the stored position.

ADJUST MAIN SPRING COUNTERBALANCE

NOTE:

Adjusting of the main spring cylinder on the PAL leveler is normally never required. In the unlikely event it does need to be done, use the following procedure. Before adjusting the main spring:

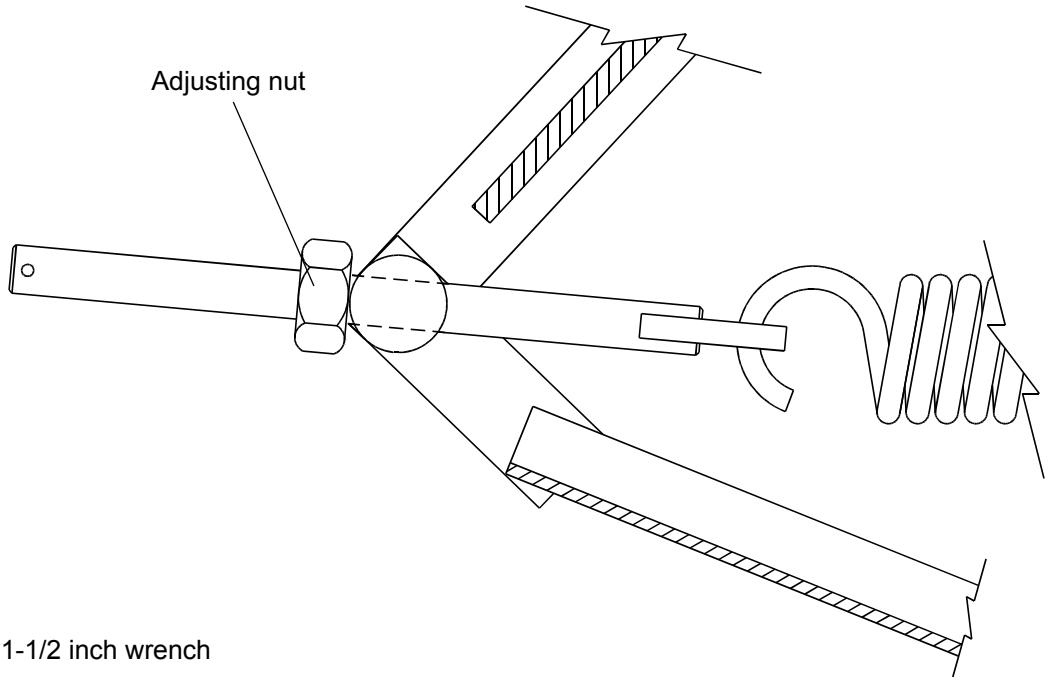
1. Make sure that the hydraulic system has proper oil level. See Page 26. Low oil level may cause the leveler to raise too slowly.

2. Make sure that the lip hinge is lubricated and is operating freely. Excessive friction in the lip hinge may prevent the lip from raising easily.

⚠DANGER

Extended springs contain stored energy. Never attempt to remove main springs without completely removing the load from the springs first. Do not remove the main springs until the leveler and the lip are securely supported by a suitable lifting device.

Fig. 35



Tools Required: 1-1/2 inch wrench

1. With the lip extended and the leveler near dock level, approximately 50 to 70 pounds should be required at the end of the lip to support the dock leveler.

2. To adjust the main spring, raise the leveler, raise the maintenance strut and rest the leveler on the maintenance strut.

3. To decrease the weight of the dock leveler, turn the adjusting nut clockwise. To increase the weight of the dock leveler, turn the adjusting nut counter-clockwise.

4. Lower the maintenance strut and lower the dock leveler to dock level. Re-check the weight of the leveler and adjust as required.

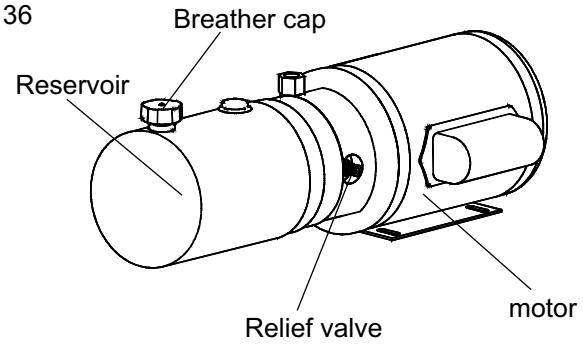
HYDRAULIC POWER UNIT ADJUSTMENT

⚠DANGER

Turn off electrical power at source or switch off circuit breaker in the control panel to prevent accidental operation while making adjustments.

Do not enter the leveler pit unless the leveler is securely supported and barriers are in place.

Fig. 36



Description	Purpose	Adjustment
Relief Valve	Controls maximum pressure in the hydraulic system and protects the other components from excessive force. Relief pressure is factory set at 900 PSI and should not require adjustment.	(A pressure gauge is necessary) Loosen jam nut – counterclockwise, turn screw clockwise to increase pressure and counterclockwise to decrease pressure, tighten jam nut to 50 in-lb torque. Check pressure after jam nut is tight and readjust if necessary.
Integral Shuttle Valve	Directs fluid to the cylinder when the pump is running. Prevents fluid from returning to reservoir when valve is in on position and power failure occurs.	No adjustment required.

Hydraulic Fluid Level

The hydraulic fluid level should be checked when the leveler is resting on the maintenance strut. The fluid level in reservoir should be approximately 1/2 full. See Fig. 37. If the level is low, fill to the halfway point using an approved oil from the list on page 15.

Fig. 37

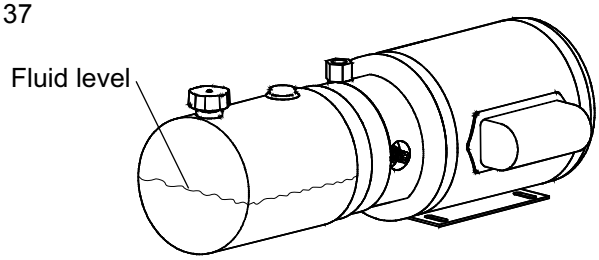
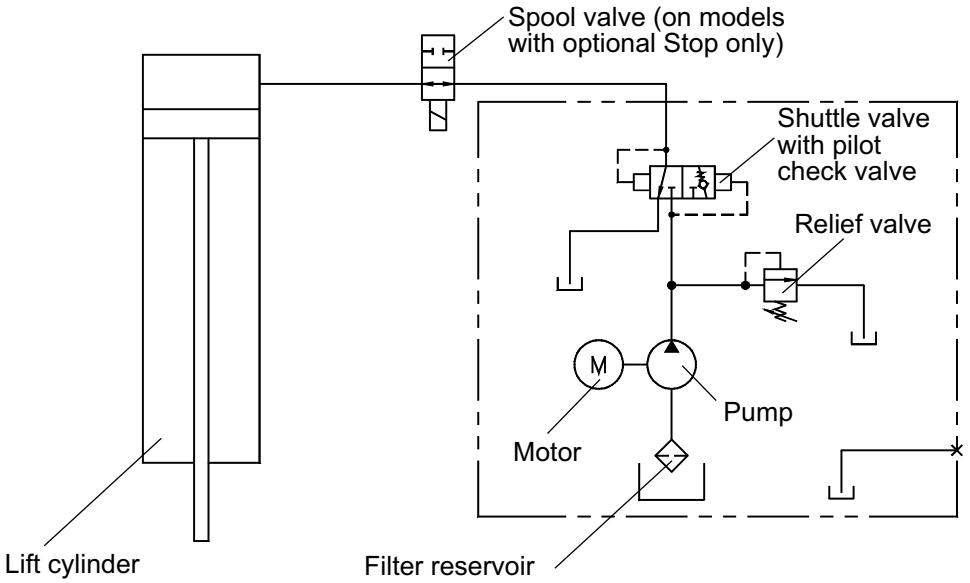


Fig. 38



TROUBLESHOOTING GUIDE

Use the Troubleshooting Guide if ever the leveler fails to perform properly. Find the condition that most closely matches your situation, and make the recommended adjustments.

⚠DANGER

Be certain, before climbing into the dock leveler pit or doing any maintenance or repair under the dock leveler, that the maintenance strut is raised and securely supporting the dock leveler in case of emergency.

⚠WARNING

Before servicing the dock leveler, read and follow the Safety Practices on page 3 and the Operating Instruction section in this manual.

Failure to do so could result in death or serious injury.

Problem	Possible Cause	Solution
1. Leveler does not raise, motor is silent.	a) No electrical power to control panel.	a) Check that voltage is present at terminal connections to the control panel.
	b) Electrical connections incorrect or broken.	b) Check that wiring matches the wiring diagram.
2a. Leveler does not raise; motor starts then stops, motor starter relay chatters.	a) Overload relay, main circuit breaker or leveler control circuit breaker tripping out.	a) Check overload setting and current draw.
	b) Voltage drop due to long wiring distance from power source.	b) Check voltage when motor is started. Voltage drop is more often a problem on single phase motors. See conductor specifications in installation instructions.
2b. Leveler does not raise. Motor hums.	a) Voltage drop.	a) See above.
2c. Leveler does not raise. Motor runs.	a) Low fluid level in reservoir.	a) Check fluid level with leveler fully raised. Add fluid if required and check for leaks.
	b) Pump not running or pressure insufficient.	b) Remove the hose from main lift cylinder and point free end into reservoir opening. If no oil is pumped, check pump drive shaft coupler or replace pump.
	c) Primary relief valve setting too low.	c) Set primary relief valve setting to 900 PSI. See page 26.

Problem	Possible Cause	Solution
3. Overload relay tripping.	a) Overload relay set too low.	a) Check full load amperage and relay setting.
4. Leveler will not lower.	a) Main spring adjustment incorrect. b) Shuttle valve blocked or incorrectly adjusted.	a) Check main spring adjustment. Adjust main spring tension if required. See page 25. b) Check adjustment. If required, remove shuttle valve and inspect for contamination.
5. Leveler floats down too slowly.	a) Shuttle valve incorrectly adjusted. b) Main spring adjustment incorrect.	a) Adjust shuttle valve to increase lower speed. b) Check main spring adjustment. Adjust main spring if required.
6. Lip plate will not fold.	a) Lip hinge is binding. b) Lip spring adjustment incorrect. c) Latch bar not releasing.	a) Clean and lubricate the lip hinge. b) Adjust lip spring to decrease tension. See pages 23-24. c) Inspect that latch bar return spring is present and not broken. Replace if required.
7. Lip plate will not start to extend when leveler is raised.	a) Lip chain is disconnected. b) Lip hinge is binding. c) Lip chain attached too far back on latch bar. d) Oil level is too low.	a) Inspect and repair as required. b) Clean and lubricate the lip hinge. c) Move chain shackle forward one hole. d) Check oil level and fill reservoir to manufacturers specifications.

TROUBLESHOOTING GUIDE, continued

Problem	Possible Cause	Solution
8 . Lip plate starts to extend when leveler is raised but does not fully extend.	a) Main Spring adjustment incorrect. b) Lip hinge is binding. c) Lip spring not properly adjusted. d) Hydraulic fluid level is too low. e) Lip chain attached too far forward on latch bar.	a) Adjust main spring to increase tension. See page 25. b) Clean and lubricate the lip hinge. c) Adjust lip spring to increase tension. See pages 23-24. d) Check fluid level and fill reservoir to manufacturers specifications. e) Move chain shackle back one hole.
9. Lip plate will not stay out / falls as leveler is lowering.	a) Chain spring disconnected. b) Lip not extending fully. c) Lip spring tension too high.	a) Re-connect chain spring. b) See problems 7 and 8. c) Adjust lip spring to decrease tension. See pages 23-24.

* For solar power units consult factory.

ELECTRICAL SCHEMATIC

120 VOLT, 1 PHASE (6007076)

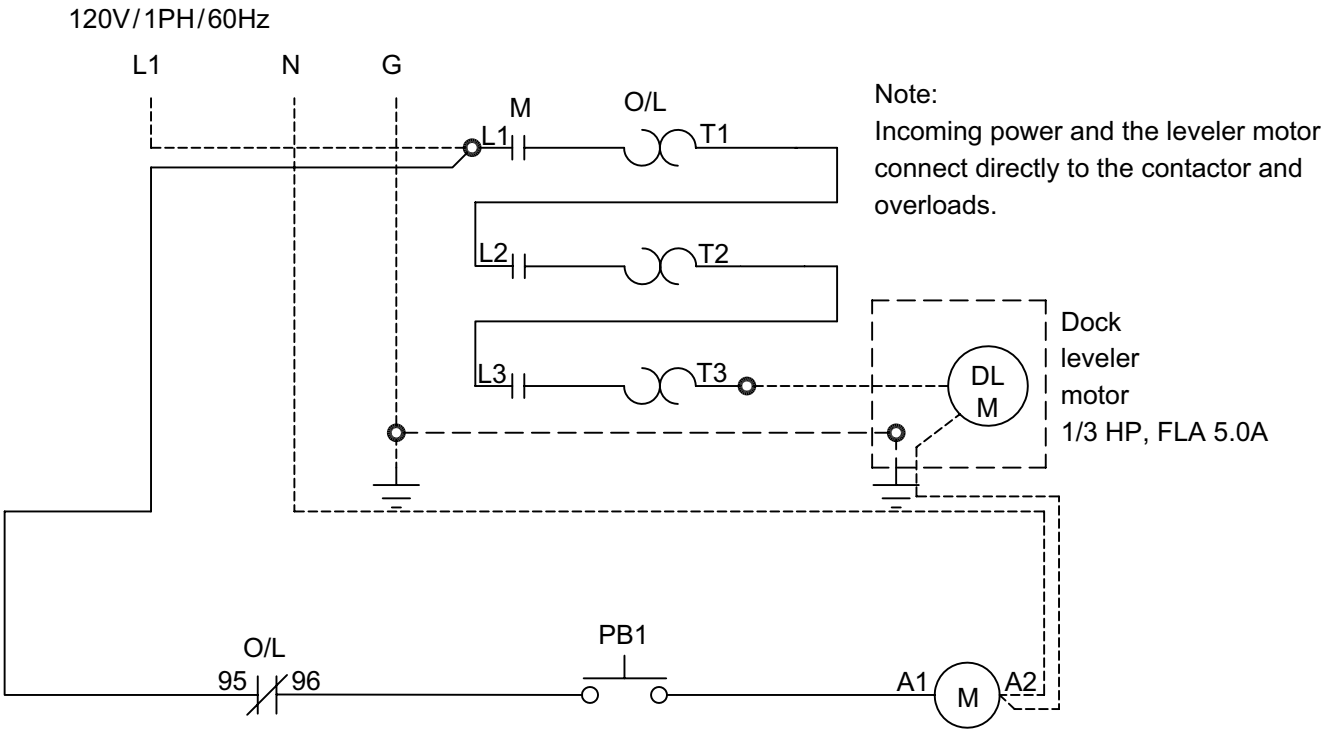
Fig. 39

NOTE:

For 24V incoming power consult factory.

DANGER

Before doing any electrical work, make certain the power is disconnected and properly tagged or locked off. All electrical work must be done by a qualified technician and meet all applicable codes. If it is necessary to make troubleshooting checks inside the control box with the power on, USE EXTREME CAUTION. Do not place your fingers or uninsulated tools inside the control box. Touching wires or other parts inside the control box could result in electrical shock, death or serious injury.



Primary fusing and disconnect device by others

LEGEND

External connections - - - - - - - -

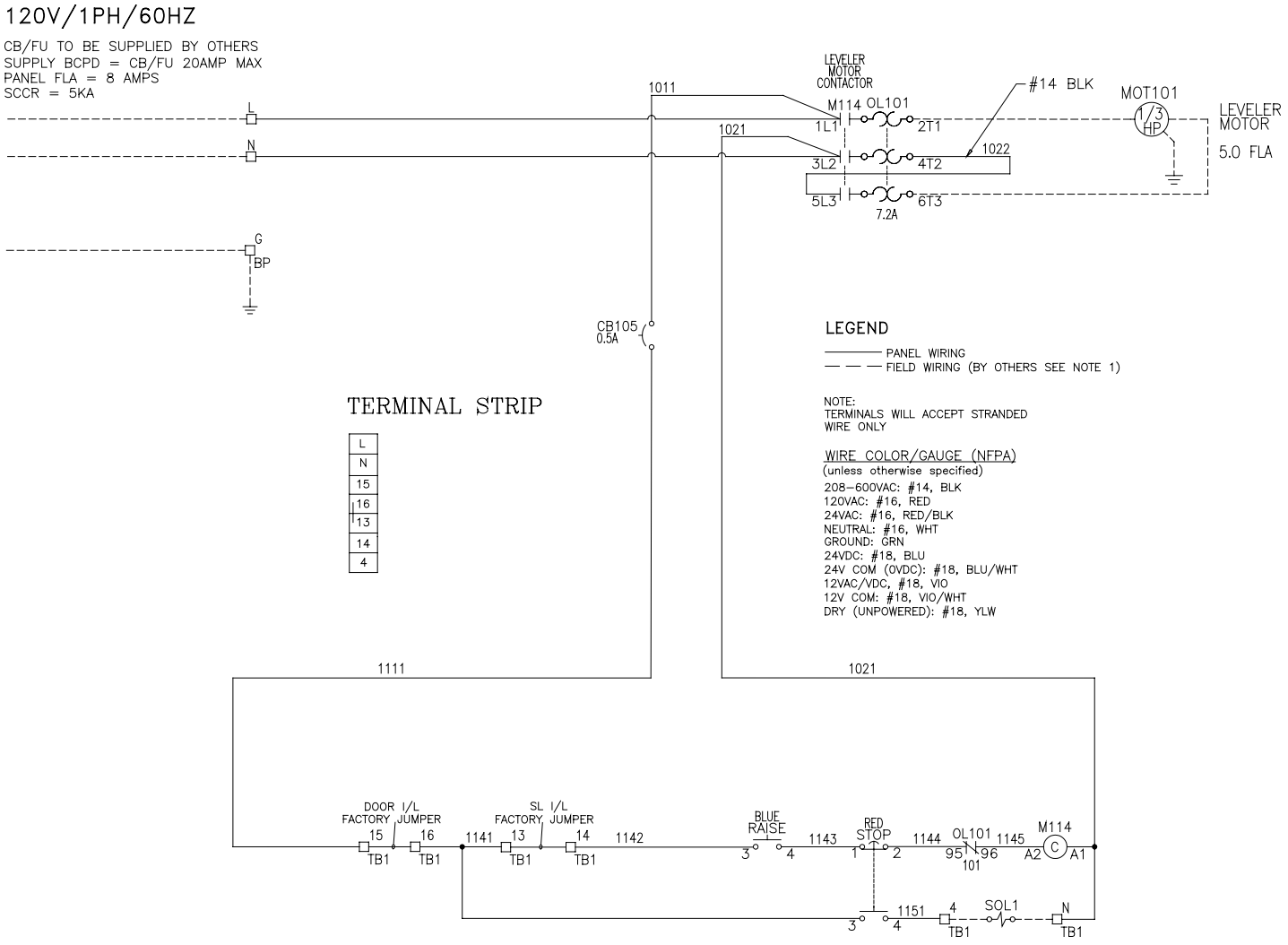
Internal wiring ————————

M	Dock leveler contactor
PB1	Leveler raise
○	Direct device connection

ELECTRICAL SCHEMATIC, continued

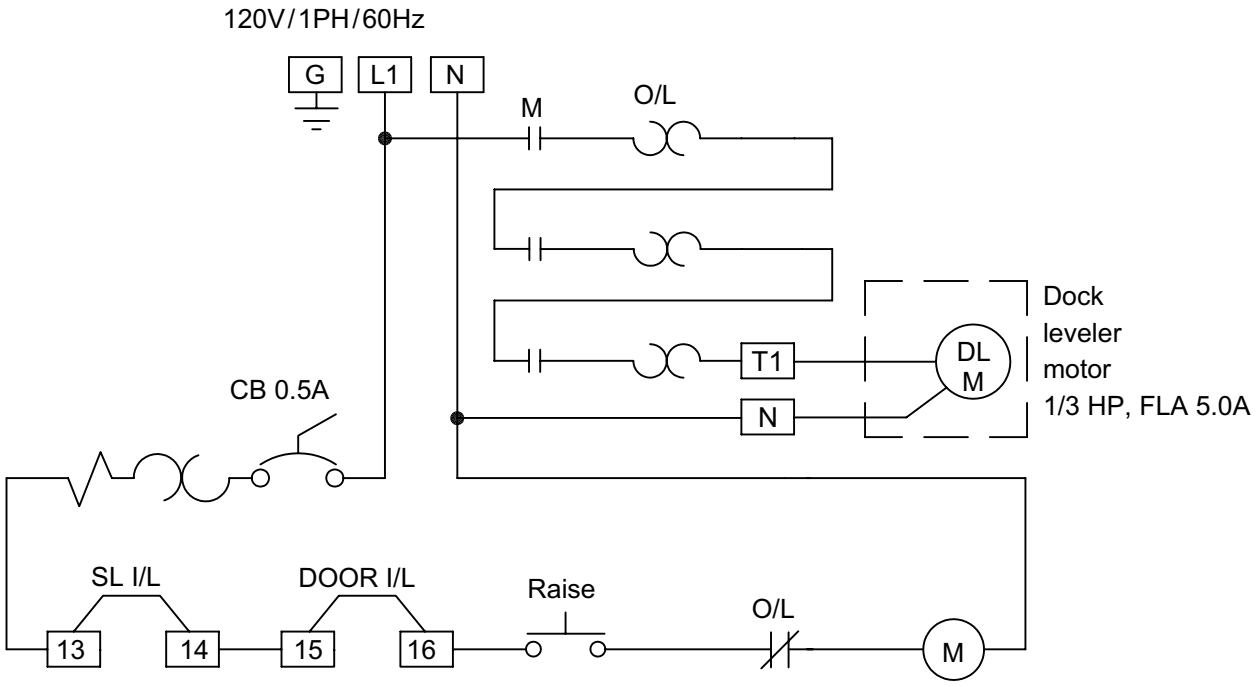
120 VOLT, 1 PHASE WITH STOP BUTTON (6008131)

Fig. 40



1. FIELD TERMINAL WIRING: 90 DEGREE WIRE, MIN 16AWG FOR SIGNAL WIRING, MIN 14AWG FOR INCOMING POWER, SEE CHART IN PANEL FOR TORQUE REQUIREMENTS
2. DOOR INTERLOCK: LEVELER WILL NOT OPERATE UNLESS DOOR IS FULLY RAISED. DOOR SWITCH SUPPLIED BY OTHERS.
3. SOLENOID VALVE (313–546) IS LOCATED ON TOP OF PUMP HOUSING AND IS WIRED INTO FRAME MOUNTED JUNCTION BOX.

Fig. 41



Primary fusing and disconnect device by others

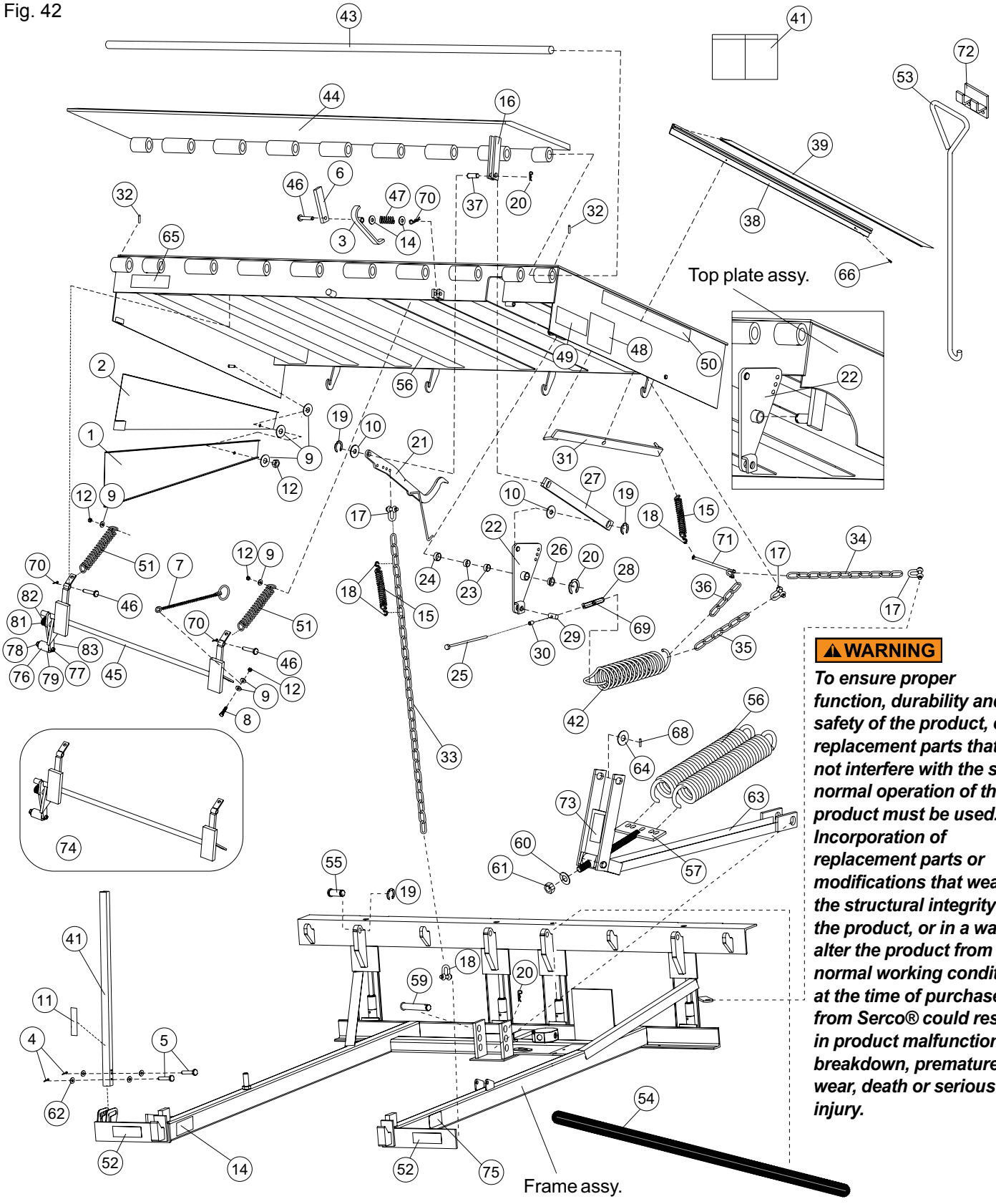
All devices shown in de-energized state

LEGEND

M	Dock leveler contactor
PB1	Leveler raise

PARTS LIST — DOCK LEVELER

Fig. 42



⚠WARNING

To ensure proper function, durability and safety of the product, only replacement parts that do not interfere with the safe, normal operation of the product must be used. Incorporation of replacement parts or modifications that weaken the structural integrity of the product, or in a way alter the product from its normal working condition at the time of purchase from Serco® could result in product malfunction, breakdown, premature wear, death or serious injury.

Item	Quantity	Part Description	PAL 600	PAL800	PAL 1000
1	1 1	TOE GUARD, 2ND STAGE, LEFT TOE GUARD, 2ND STAGE, RIGHT	568-1659 586-1660	586-0040 586-0441	586-1045 586-1044
2	1 1	TOE GUARD, 1ST STAGE, LEFT TOE GUARD, 1ST STAGE, RIGHT	586-1657 586-1658	586-0438 586-0439	586-1043 586-1042
3	1	PUSHER ASSY	3-4666	3-4666	3-4666
4	2	COTTER PIN 1/8 X 3/4	231-341	231-341	231-341
5	2	CLEVIS PIN 1/2" DIA X 2-1/4 LG	231-506	231-506	231-506
6	1	LIP PLATE MAINTENANCE BAR - CP	586-2969	586-2969	586-2969
7	1	SAFETY LEG CHAIN ASSEMBLY	8-9610	8-9610	8-9610
8	1	HEX BOLT - 3/8" - 16 UNC X 1 1/4" LG	234-104	234-104	234-104
9	10	PW 3/8" BOLT SIZE - 7/16 HOLE	234-101	234-101	234-101
10	1	PLAIN WASHER - 13/16" I.D.	234-141	234-141	234-141
11	1	DANGER LABEL - MAINTENANCE STRUT	921-074	921-074	921-074
12	5	HEX NUT - 3/8" NYLOCK	214-538	214-538	214-538
13	2	PLAIN WASHER - 9/16" ID	234-121	234-121	234-121
14	1	DANGER LABEL - ENTERING PIT	921-070	921-070	921-070
15	1	SPRING, DAMPER	333-042	333-042	333-042
16	1 1	LATCH ASSIST ARM - 30-35K LATCH ASSIST ARM - 40-50K	586-2272 586-2638	586-2272 586-2638	586-2272 586-2638
17	SEE P/N	CHAIN SHACKLE	442-800(3)	442-800(4)	442-800(4)
18	3	“S”- HOOK	238-202	238-202	238-202
19	4	RETAINING RING (5304-75)	236-110	236-110	236-110
20	1	COTTER PIN	236-114	236-114	236-114
21	1 1	LATCH BAR ASSY - AB/HLM/PAL LATCH BAR ASSY - 24" PIT	6000694 6001202	6000694 6001202	6001202 6001202
22	1	BELL CRANK WELDMENT - LL-CP	3-4735	3-4735	3-4735
23	2	DU BUSHING - 16DU08	821-034	821-034	821-034

PARTS LIST — DOCK LEVELER, continued

Item	Quantity	Part Description	PAL 600	PAL800	PAL 1000
24	1	BELL CRANK ROLLER ASSY	3-4745	3-4745	3-4745
25	1	BOLT ROD ASSY - CP	3-4737	3-4737	3-4737
26	1	DU BUSHING - FLANGED: 16FDU08	821-033	821-033	821-033
27	1	FLAT BAR - LIP ASSIST	328-685	328-685	328-685
28	1	SPRING ADJUSTER LOOP	586-3009	586-3009	586-3009
29	1	YOKE PIN	596-1998	586-1998	586-1998
30	1	ROD SPACER	586-1999	586-1999	586-1999
31	1	LIP LATCH RETURN ASSY.	6000708	6000708	6000708
32	2	PIN SLOTTED SPRING	231-123	231-123	231-123
33	1	CHAIN - LIP LATCH (36/44/45 LINKS)	6012841	6012842	6012843
34	1	CHAIN - FROM LIP EXT SPRING TO TOP PLT (20/44)	—	6000826	6000825
35	1	CHAIN - FROM LIP EXT SPRING TO FRAME (9/33/57)	586-3016	586-2270	586-3430
36	1	CHAIN - LIP LATCH RETURN (4/6 LINKS)	586-3015	6000827	6000827
37	1	PIN - 3/4 DIA X 2 1/8 GR-RNG	583-0003	583-0003	583-0003
38	2	WEATHER SEAL MOUNTING STRIP	328-897	328-898	328-899
39	2 2 2 2	WEATHER SEAL - NARROW PROJ - RUBBER WEATHER SEAL - WIDE PROJ - RUBBER WEATHER SEAL - NARROW PROJ - BRUSH WEATHER SEAL - WIDE PROJ - BRUSH	152-324(5FT) 152-325(5FT) 328-886 328-907	152-324(7FT) 152-325(7FT) 328-887 328-908	152-324(9FT) 152-325(9FT) 328-888 328-909
40	1	MAINTENANCE STRUT 600 - C.P.	9-9506	9-9506	9-9506
41	1	PAL PLACARD	824-183	824-183	824-183

CAPACITY/ PART NUMBER

Item	Qty	Description	30,000	35,000	40,000	45,000	50,000
42	1	EXTENSION SPRING, LIP - 16IN	333-043	333-043	333-043	333-043	333-043
		EXTENSION SPRING, LIP - 18IN	333-043	333-043	333-043	333-043	333-043
		EXTENSION SPRING, LIP - 20IN	333-044	333-044	333-044	333-044	333-044

CAPACITY/ PART NUMBER

Item	Qty	Description	30,000	35,000	40,000	45,000	50,000
43	1	LIP HINGE PIN - 6FT WIDE	586-0017	586-0017	586-0287	586-0287	586-0287
		LIP HINGE PIN - 6.5FT WIDE	586-1494	586-1494	586-1495	586-1495	586-1495
		LIP HINGE PIN - 7FT WIDE	586-0201	586-0201	586-0392	586-0392	586-0392
44	1	LIP ASSEMBLY: 6 FT X 16 IN	30845	30848	30851	30854	30857
		LIP ASSEMBLY: 6 FT X 18 IN	30846	30849	30852	30855	30858
		LIP ASSEMBLY: 6 FT X 20 IN	30847	30850	30853	30856	30859
		LIP ASSEMBLY: 6.5 FT X 16 IN	30863	30866	30869	30872	30875
		LIP ASSEMBLY: 6.5 FT X 18 IN	30864	30867	30870	30873	30876
		LIP ASSEMBLY: 6.5 FT X 20 IN	30865	30868	30871	30874	30877
		LIP ASSEMBLY: 7 FT X 16 IN	35487	35490	35493	35496	35499
		LIP ASSEMBLY: 7 FT X 18 IN	35488	35491	35494	35497	35500
		LIP ASSEMBLY: 7 FT X 20 IN	35489	35492	35495	35498	35501
		LIP ASSEMBLY: 6.5 FT X 16 IN (3" TAPER)	33645	33648	33651	33654	33657
		LIP ASSEMBLY: 6.5 FT X 18 IN (3" TAPER)	33646	33649	33652	33655	33658
		LIP ASSEMBLY: 6.5 FT X 20 IN (3" TAPER)	33647	33650	33653	33656	33659
		LIP ASSEMBLY: 7 FT X 16 IN (3" TAPER)	33663	33666	33669	33672	33675
		LIP ASSEMBLY: 7 FT X 18 IN (3" TAPER)	33664	33667	33670	33673	33676
		LIP ASSEMBLY: 7 FT X 20 IN (3" TAPER)	33665	33668	33671	33674	33677
		LIP ASSEMBLY: 7 FT X 16 IN (3" ELLIPSE)	33707	33710	33713	33716	33719
		LIP ASSEMBLY: 7 FT X 18 IN (3" ELLIPSE)	33708	33711	33714	33717	33720
		LIP ASSEMBLY: 7 FT X 20 IN (3" ELLIPSE)	33709	33712	33715	33718	33721

PARTS LIST — DOCK LEVELER, continued

Item	Quantity	Part Description	PAL 600	PAL800	PAL 1000
45	1	SAFETY LEG ASSY. — ANTI-STUMP	6000608	6000608	6000608
46	3	CLEVIS PIN - 1/2" DIA X 2-3/4 LG	231-502	231-502	231-502
47	1	COMPRESSION SPRING	333-069	333-069	333-069
48	2	BRAND IDENTIFIER LABEL - SERCO	921-185	921-185	921-185
49	2	DANGER LEVELER INFORMATION LABEL	6008485	6008485	6008485
50	2	TRIP WARNING LABEL	138-837	138-837	138-837
51	2	SAFETY LEG SPRING	333-055	333-055	333-055
52	1	SERCO LABEL	824-002	824-002	824-002
53	1	MANUAL ACTUATION ROD	328970	328970	328970
61	1 1 1	REAR WEATHERSEAL CP 6FT. REAR WEATHERSEAL CP 6.5FT. REAR WEATHERSEAL CP 7FT.	6015410 6015411 6015594	6015410 6015411 6015594	6015410 6015411 6015594
55	4	DECK TOGGLE PIN	586-1467	586-1467	586-1467

600 **CAPACITY**

Item	Part Description	30,000	35,000	40,000	45,000	50,000
56*	MAIN SPRING, EXT - 6 FT X 16 IN MAIN SPRING, EXT - 6 FT X 18 IN MAIN SPRING, EXT - 6 FT X 20 IN	333-049(3) 333-049(3) 333-049(3)	333-049(3) 333-049(3) 333-049(3)	333-049(3) 333-049(3) 333-049(3)	333-049(3) 333-049(3) 333-049(3)	333-049(3) 333-049(3) 333-049(3)
56*	MAIN SPRING, EXT - 6.5 FT X 16 IN MAIN SPRING, EXT - 6.5 FT X 18 IN MAIN SPRING, EXT - 6.5 FT X 20 IN	333-049(3) 333-049(3) 333-049(3)	333-049(3) 333-049(3) 333-049(3)	333-049(3) 333-049(3) 333-049(3)	333-049(3) 333-049(3) 333-049(3)	333-049(3) 333-049(3) 333-054(2)
56*	MAIN SPRING, EXT - 7 FT X 16 IN MAIN SPRING, EXT - 7 FT X 18 IN MAIN SPRING, EXT - 7 FT X 20 IN	333-049(3) 333-049(3) 333-049(3)	333-049(3) 333-054(3) 333-049(3)	333-049(3) 333-049(3) 333-049(3)	333-049(3) 333-049(3) 333-049(3)	333-054(2) 333-054(2) 333-054(2)
57	MAIN SPRING, SUPPORT ASSY - WL 6-800	3-5073(1)	3-5073(1)	3-5073(1)	3-5073(1)	3-5073(1)

* For levelers equipped with Dock-Guard™ barrier lip consult factory.

800 **CAPACITY**

Item	Part Description	30,000	35,000	40,000	45,000	50,000
56*	MAIN SPRING, EXT - 6 FT X 16 IN	333-054(2)	333-054(2)	333-054(2)	333-054(2)	333-054(2) 333-049(1)
	MAIN SPRING, EXT - 6 FT X 18 IN	333-054(2)	333-054(2)	333-054(2)	333-054(2)	333-054(2) 333-049(1)
	MAIN SPRING, EXT - 6 FT X 20 IN	333-054(2)	333-054(2)	333-054(2)	333-054(2)	333-054(2) 333-049(1)
56*	MAIN SPRING, EXT - 6.5 FT X 16 IN	333-054(2)	333-054(2)	333-054(2)	333-054(2)	333-054(2) 333-049(1)
	MAIN SPRING, EXT - 6.5 FT X 18 IN	333-054(2)	333-054(2)	333-054(2)	333-054(2)	333-054(2) 333-049(1)
	MAIN SPRING, EXT - 6.5 FT X 20 IN	333-054(2)	333-054(2)	333-054(2) 333-049(1)	333-054(2) 333-049(1)	333-054(2) 333-049(1)
56*	MAIN SPRING, EXT - 7 FT X 16 IN	333-054(2)	333-054(2)	333-054(2)	333-054(2)	333-054(2) 333-049(1)
	MAIN SPRING, EXT - 7 FT X 18 IN	333-054(2)	333-054(2)	333-054(2) 333-049(1)	333-054(2) 333-049(1)	333-054(2) 333-049(1)
	MAIN SPRING, EXT - 7 FT X 20 IN	333-054(2)	333-054(2)	333-054(2) 333-049(1)	333-054(2) 333-049(1)	333-054(2) 333-049(1)
57	MAIN SPRING, SUPPORT ASSY - WL 6-800	3-5073(1)	3-5073(1)	3-5073(1)	3-5073(1)	3-5073(1)

1000 **CAPACITY**

Item	Part Description	30,000	35,000	40,000	45,000	50,000
56*	MAIN SPRING, EXT - 6 FT X 16 IN	333-054(2) 333-049(1)	333-054(2) 333-049(1)	333-054(3)	333-054(2)	333-054(3) 333-049(1)
	MAIN SPRING, EXT - 6 FT X 18 IN	333-054(2) 333-049(1)	333-054(2) 333-049(1)	333-054(3)	333-054(2)	333-054(3) 333-049(1)
	MAIN SPRING, EXT - 6 FT X 20 IN	333-054(2) 333-049(1)	333-054(2) 333-049(1)	333-054(3)	333-054(2)	333-054(3) 333-049(1)
56*	MAIN SPRING, EXT - 6.5 FT X 16 IN	333-054(2) 333-049(1)	333-054(2) 333-049(1)	333-054(3)	333-054(3)	333-054(3) 333-049(1)
	MAIN SPRING, EXT - 6.5 FT X 18 IN	333-054(3)	333-054(3)	333-054(3)	333-054(3)	333-054(3) 333-049(1)
	MAIN SPRING, EXT - 6.5 FT X 20 IN	333-054(3)	333-054(3)	333-054(3)	333-054(3)	333-054(4)
56*	MAIN SPRING, EXT - 7 FT X 16 IN	333-054(3)	333-054(3)	333-054(3)	333-054(3)	333-054(4)
	MAIN SPRING, EXT - 7 FT X 18 IN	333-054(3)	333-054(3)	333-054(3)	333-054(3)	333-054(4)
	MAIN SPRING, EXT - 7 FT X 20 IN	333-054(3)	333-054(3)	333-054(3)	333-054(3) 333-049(1)	333-054(4) 333-049(1)
57	MAIN SPRING, SUPPORT ASSY - WL 6-800	3-5073(1)	3-5073(1)	3-5073(1)	3-5073(1) (3-5254 ON 10740 WITH 20" LIP)	3-5073(1) (3-5254 ON 10745 WITH 20" LIP)

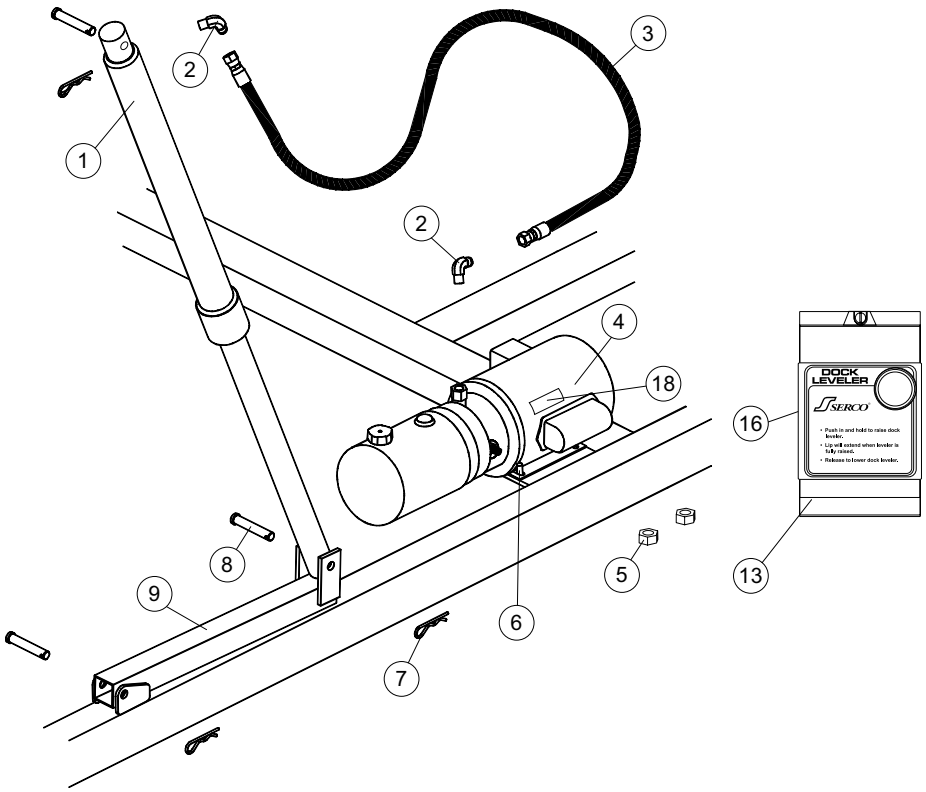
* For levelers equipped with Dock-Guard™ barrier lip consult factory.

PARTS LIST — DOCK LEVELER, continued

Item	Quantity	Part Description	PAL 600	PAL800	PAL 1000
58	1	COTTER PIN - 1/8 X 3/4, ZINC	231-341	231-341	231-341
59	1	PIN - 1" DIA 5 1/2 GR-RNG	586-1070	586-1070	586-1070
60	2	PW - 1" BOLT SIZE - 1 1/16" HOLE SIZE	234-161	234-161	234-161
61	1	HEX NUT 1" - 8	214-241	214-241	214-241
62	4	PLAIN WASHER - 1/2" ID	234-260	234-260	234-260
63	1	LIFT ARM ASSY.	3-1132	3-1132	3-1132
64	2	PW 3/4" ID X 1 1/2" OD	234-143	234-143	234-143
65	1	DANGER - MAINT STRUT - HEADER - LABEL	921-217	921-217	921-217
66	SEE P/N	SCREW - SELF TAPPING, #12-24 X 3/4 TEKS	215-702 (6)	215-702 (8)	215-702 (8)
67	1	COTTER PIN - 5/32 X 2, ZINC	6001832	6001832	6001832
68	1	SPRING PIN	231-123	231-123	231-123
69	1	SQ.NUT 3/8-16 UNC PLAIN	214-826	214-826	214-826
70	3	1180 HITCH PIN CLIP	231-503	231-503	231-503
71	1	RETURN SPRING TRIP ROD ASSY.	6000692	6000692	6000692
72	1	WALL MOUNT ASSY	8-9909	8-9909	8-9909
73	1	DANGER LABEL — CRUSH HAZARD	921-117	921-117	921-117
74	1	REFLEX LEG ASSEMBLY (COMPLETE)	6006643	6006643	6006643
75	1	SERIAL TAG	6009761	6009761	6009761
76	2	PLAIN WASHER — 1/2" - SAE	234-260	234-260	234-260
77	1	3/8" NYLON INSERT LOCKNUT	214-538	214-538	214-538
78	1	BOLT, SHOULDER, 1/2"X2-1/2"X3/8X16	6006650	6006650	6006650
79	1	ROLLER, CAM	6001341	6001341	6001341
80	1	TRUARC EXTR. KLIPRING — 5/8" THIN	049-060	049-060	049-060
81	1	PW 5/8" ID X 1-5/16" OD X 1/8" THICK	6000614	6000614	6000614
82	1	SPRING TORSION — DLS CAM	101-091	101-091	101-091
83	1	WELDMENT, ROLLER ARM PAL S/L	6006647	6006647	6006647

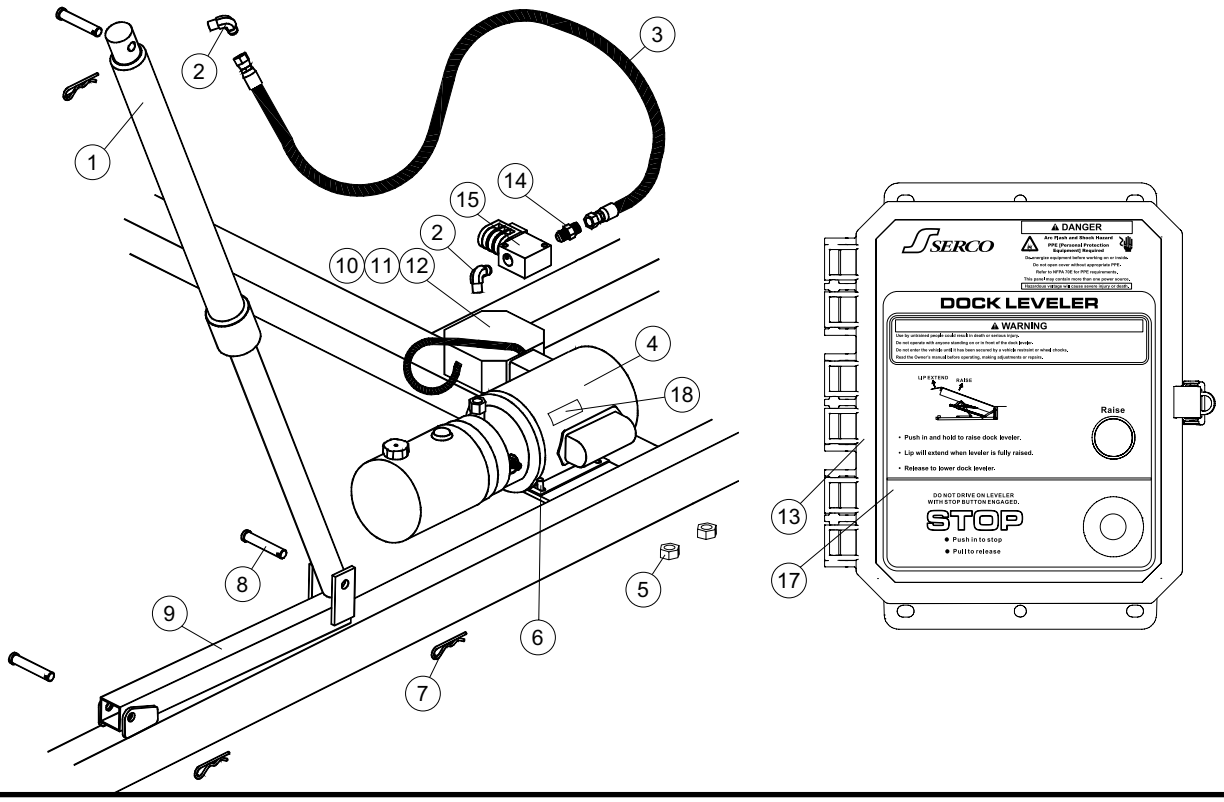
PARTS LIST — HYDRAULIC AND ELECTRICAL
STANDARD

Fig. 43



PARTS LIST — HYDRAULIC AND ELECTRICAL
WITH STOP BUTTON

Fig. 44



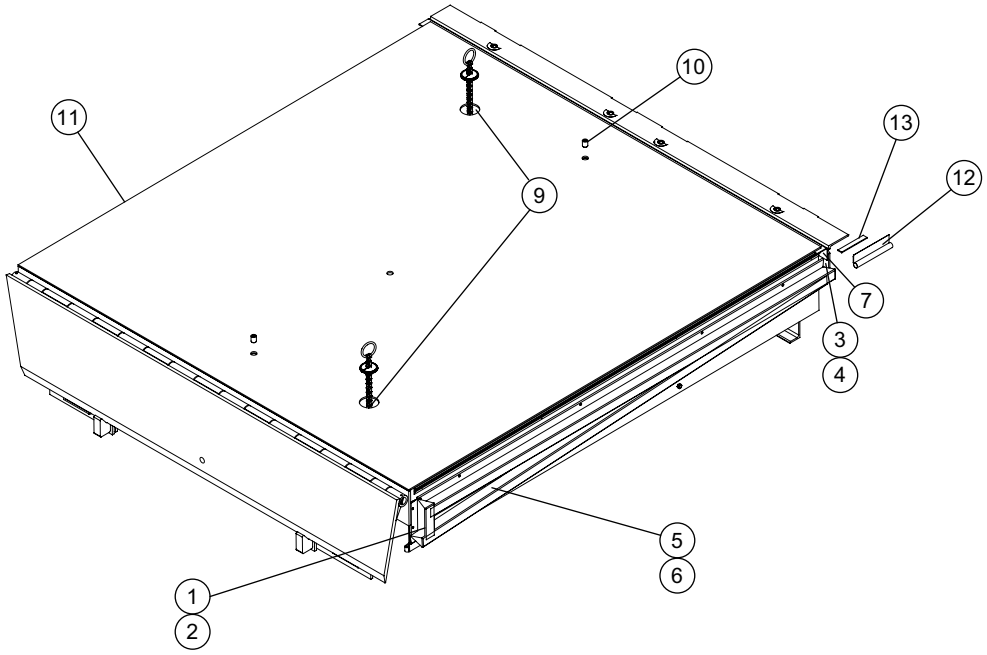
PARTS LIST — HYDRAULIC AND ELECTRICAL, continued

Item	Quantity	Part Description	PAL 600	PAL800	PAL 1000
1	1	CYLINDER, 1.75" X 1.5" X 18" STROKE	313-596	313-596	313-596
2	2	ELBOW NIPPLE - 1/4 NPT - 9/16 JIC	313-106	313-106	313-106
3	1	EH HOSE ASSY - EXTEND	3-1245	6000724	3-1246
4	1	120V HYDRAULIC POWER UNIT 24V HYDRAULIC POWER UNIT	313-602 6008711	313-602 6008711	313-602 6008711
5	4	HEXNUT 5/16-18 FINISHED ZINC PLATED	313-106	313-106	313-106
6	4	HHMB 5/16 X 1" GRADE 2 ZINC PLATED	212-054	212-054	212-054
7	3	1/8 DIA. HITCH PIN CLIP	231-503	231-503	231-503
8	3	CLEVIS PIN DIA. 1/2 X 2-3/4 LG	231-502	231-502	231-502
9	1	LINKAGE ASSY	3-1244	3-1244	3-1244
10	1	ELEL 51 CONNECTOR	521-110	521-110	521-110
11	1	JUNCTION BOX 4 X 4 X 2-1/8	521-327	521-327	521-327
12	1	4 X 4 JUNCTION BOX COVER	521-328	521-328	521-328
13	1	CONTROL PANEL - PAL - 120/1PH	6007076	6007076	6007076
13*	1	CONTROL PANEL - PAL-STOP 120/1PH	6008131	6008131	6008131
13*	1	CONTROL PANEL - PAL-INTRLK 120/1PH (NS)	6007077	6007077	6007077
14†	1	HYD. FTG-STRAIGHT THREAD CONNECTOR	313-598	313-598	313-598
15†	1	2 POS, 2 WAY, N/O SPOOL VALVE, BODY	313-599	313-599	313-599
16	1	CONTROL PANEL LABEL — STD.	6006436	6006436	6006436
17†	1	CONTROL PANEL LABEL — OPT. STOP BUTTON	6015271	6015271	6015271
18	1	VOLTAGE LABEL — 120V VOLTAGE LABEL — 24V	921-051 6010601	921-051 6010601	921-051 6010601

*Optional Control Panels

†Note: Item # 14, 15 and 17 are used with Control Panel part #6008131 only.

Fig. 37



Item	Description	Quantity									Part Number
		6x6 6008228	6.5x6 6008229	6x7 6008230	6x8 6008231	6.5x8 6008232	7x8 6008233	6x10 6008234	6.5x10 6008235	7x10 6008236	
1	5-1/2" Front seal	2	2	2	2	2	2	2	2	2	6008166
2	Vertical seal	2	2	2	2	2	2	2	2	2	6008173
3	6' Upper seal 8' Upper seal 10' Upper seal	2	2	2	2	2	2	2	2	2	6008167 6008169 6008171
4	Aluminum strip 53-1/2" Aluminum strip 77-1/2" Aluminum strip 101-1/2"	2	2	2	2	2	2	2	2	2	6008175 6008177 6008179
5	6' Lower seal 8' Lower seal 10' Lower seal.	2	2	2	2	2	2	2	2	2	6008168 6008170 6008172
6	Aluminum strip 6' upper Aluminum strip 8' upper Aluminum strip 10' upper	2	2	2	2	2	2	2	2	2	6008174 6008176 6008178
7	6' Serco rear seal 6.5' Serco rear seal 7' Serco rear seal	1	1	1	1	1	1	1	1	1	6007674 6007675 6007676
8	Tech screws (not shown)	26	26	26	26	26	26	28	28	28	215702
9	Chain cup seal	2	2	2	2	2	2	2	2	2	0392
10	3/4-10 Set screw	2	2	2	2	2	2	2	2	2	6008249
11	W/seal 600 W brush W/seal 800 W brush W/seal 600 W brush cut	2	2	2	2	2	2	2 2	2 2	2 2	328907 328908 328910
12	Corner bulb seal	2	2	2	2	2	2	2	2	2	6009507
13	Transition angle seal (optional)	2	2	2	2	2	2	2	2	2	6008247

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LIMITED WARRANTY

THIS LIMITED WARRANTY IS ENTREMATIC'S SOLE AND EXCLUSIVE WARRANTY WITH RESPECT TO THE DOCK LEVELER AND IS IN LIEU OF ANY OTHER GUARANTEES OR WARRANTIES, EXPRESS OR IMPLIED

ENTREMATIC warrants that this DOCK LEVELER will be free from flaws in material and workmanship under normal use for a period of one (1) year from the earlier of 1) 60 days after the date of initial shipment by ENTREMATIC, or 2) the date of installation of the DOCK LEVELER by the original purchaser, provided that the owner maintains and operates the DOCK LEVELER in accordance with this User's Manual.

Main Spring Warranty — All main springs are warranted to cover the cost of replacement parts and freight only for an extended period of four (4) years after the initial 1 yr. warranty period.

Hydraulic Limited Warranty: The hydraulic power unit and cylinders for this dock leveler are warranted to cover the cost of replacement costs only for an extended period of four (4) years beyond the base warranty period.

Parts warranty — All spare or replacement parts are warranted to cover the cost of replacement parts and freight only for ninety (90) days from the date of shipment.

In the event that this DOCK LEVELER proves deficient in material or workmanship within the applicable Limited Warranty period, owner shall so notify ENTREMATIC, and ENTREMATIC will, at its option:

1. Replace the DOCK LEVELER, or the deficient portion(s) thereof, without charge to the owner; or

2. Alter or repair the DOCK LEVELER, on site or elsewhere, without charge to the owner.

This Limited Warranty does not cover any failure caused by improper installation, abuse, improper operation, negligence, or failure to maintain and adjust the DOCK LEVELER properly. Parts requiring replacement due to damage resulting from vehicle impact, abuse, or improper operation are not covered by this warranty. ENTREMATIC DISCLAIMS ANY RESPONSIBILITY OR LIABILITY FOR ANY LOSS OR DAMAGE OF ANY KIND (INCLUDING WITHOUT LIMITATION, DIRECT, INDIRECT, CONSEQUENTIAL OR PUNITIVE DAMAGES, OR LOST PROFITS OR LOST PRODUCTION) arising out of or related to the use, installation or maintenance of the DOCK LEVELER (including premature product wear, product failure, property damage or bodily injury resulting from use of unauthorized replacement parts or modification of the DOCK LEVELER). ENTREMATIC's sole obligation with regard to a DOCK LEVELER that is claimed to be deficient in material or workmanship shall be as set forth in this Limited Warranty. This Limited Warranty will be null and void if the original purchaser does not notify ENTREMATIC's warranty department within ninety (90) days after the product deficiency is discovered. .

THERE ARE NO WARRANTIES, EXPRESS OR IMPLIED, WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF, INCLUDING, BUT NOT LIMITED TO, A WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE, ALL OF WHICH ENTREMATIC HEREBY DISCLAIMS.

Please direct questions about your dock leveler to your local distributor or to Entrematic.

Your local Serco distributor is:

Corporate Head Office:

1612 Hutton Dr. Suite 140
Carrollton, TX. 75006
Tel. (972) 466-0707
Fax (972) 323-2661

PAL POWER-ASSISTED LEVELER®

SAFE T FRAME®

Clean Frame®

ENERGY GUARD®

HYDRA-CAM™

SafeTFrame™

REFLEX™

Part No. 6004757E