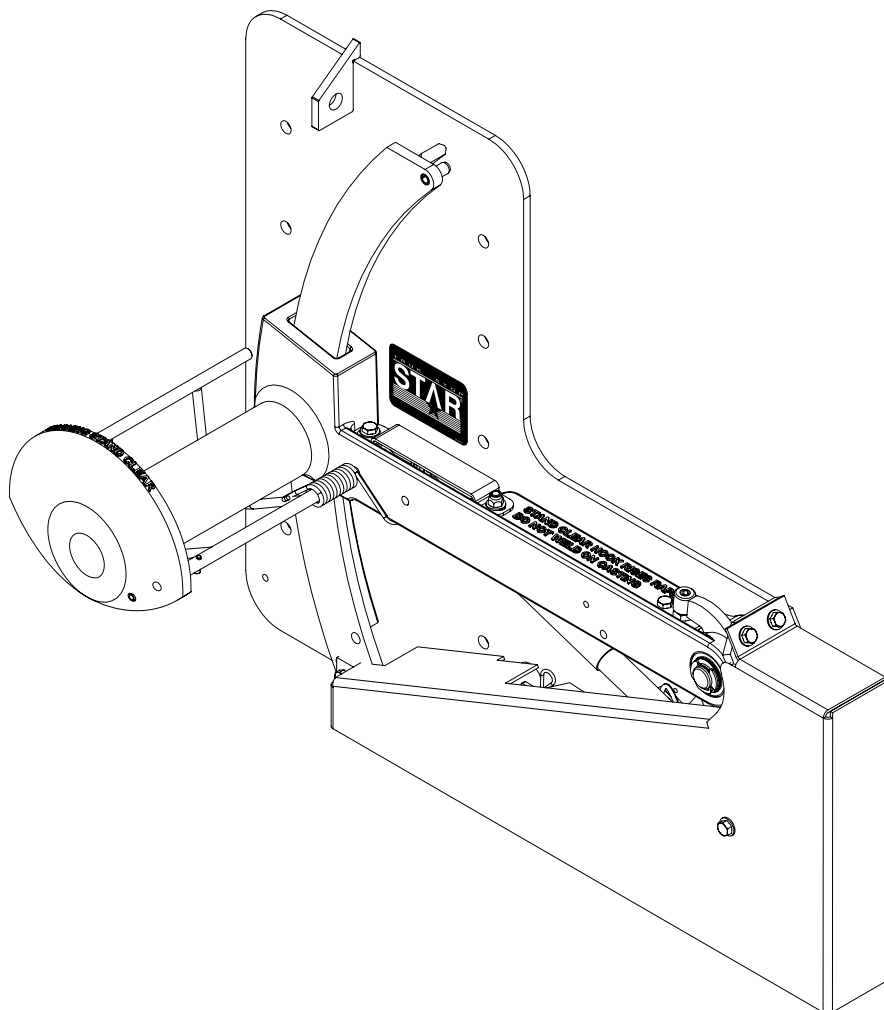




# STAR<sup>®</sup> TRUK STOP<sup>®</sup> Vehicle Restraint STAR<sup>®</sup> 4 LA



This manual applies to vehicle restraints manufactured beginning February 2013 with the serial numbers 61070042 and higher.

**▲ WARNING**

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

## User's Manual

Installation, Operations,  
Maintenance and Parts

Part No. 6005639H

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## INTRODUCTION

Welcome, and thank you for buying this vehicle restraint from Kelley®.

This User's Manual contains information that you need to safely install, operate and maintain the vehicle restraint. 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 vehicle restraint.

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## SAFETY SIGNAL WORDS

You may find safety signal words such as DANGER, WARNING, or CAUTION 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.*

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# SAFETY PRACTICES

## **▲ WARNING**

***Read these safety practices before installing, operating or servicing the vehicle restraint. Failure to follow these safety practices could result in death or serious injury.***

READ AND FOLLOW THE OPERATING INSTRUCTIONS IN THIS MANUAL BEFORE OPERATING THE VEHICLE RESTRAINT. If you do not understand the instructions, ask your supervisor to teach you how to use the vehicle restraint.

Improper installation of vehicle restraint could result in death or serious injury to dock workers or other users of the vehicle restraint.

Be certain to follow the installation instructions in this manual.

## **OPERATION**

Use by untrained people can cause property damage, bodily injury and/or death. Your supervisor should teach you the safe and proper way to use the vehicle restraint. Read and follow the complete OPERATION PROCEDURE on page 12 before use. **DO NOT USE THE VEHICLE RESTRAINT IF IT IS NOT WORKING RIGHT.** Tell your supervisor it needs repair.

Be certain bystanders in the driveway stand clear when vehicle restraint is operated.

Do not load or unload any vehicle unless you make certain the vehicle restraint has securely hitched the vehicle's rear impact guard (RIG) and set the brakes. If the vehicle restraint does not hitch the vehicle's RIG for any reason, **BE CERTAIN TO CHOCK THE VEHICLE WHEELS BEFORE LOADING OR UNLOADING.**

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

## **INSTALLATION, MAINTENANCE AND SERVICE**

If the vehicle restraint does not operate properly using the procedures in this manual, **BE CERTAIN TO CHOCK THE VEHICLE WHEELS BEFORE LOADING OR UNLOADING.** Call your local Kelley distributor for service.

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

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

Do not use the vehicle restraint as a step.

Do not install the vehicle restraint anchor bolts into aged or unsound concrete.

Keep hands and feet clear of guide tracks and moving parts at all times.

Do not weld on ductile iron hook casting (item 1, page 28).

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

Before doing any electrical work (including changing bulbs), make certain the power is disconnected and properly tagged or locked off.

If it is necessary to make troubleshooting checks inside the control box with 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.

If you have any problems or questions, contact your local Kelley distributor for assistance.

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# INSTALLATION

## MOUNTING CONSIDERATIONS

### **▲ WARNING**

***Before installation read and follow the Safety Practices on page 3. Failure to follow these safety practices could result in death or serious injury.***

***READ AND FOLLOW THE OPERATION INSTRUCTIONS IN THIS MANUAL BEFORE OPERATING THE VEHICLE RESTRAINT. If you do not understand the instructions, ask your supervisor to teach you how to use the vehicle restraint.***

***Improper installation of the vehicle restraint could result in death or serious injury to dock workers or other users of the vehicle restraint.***

***Place barricades around pit on dock floor and drive while installing, maintaining or repairing vehicle restraining device.***

***Be certain bystanders in the driveway stand clear when vehicle restraint is operated.***

***Be certain to follow the installation instructions in this manual.***

***Do not install the vehicle restraint anchor bolts into aged or unsound concrete.***

1. The dock face on which the vehicle restraint will be mounted must be flat to prevent binding of the mechanism. If the dock face is not flat it may be necessary to use shims or physically modify the dock face to provide a flat mounting surface. If shimming is required it is necessary to shim behind the pivot pin as well as at the anchor bolts.

Vehicle restraints require a 4" bumper projection from the front of the bumper to the rear of the back plate of the restraint (the mounting surface). Less than 4" of projection can allow vehicle RIG to damage the restraint. Some lip saddle type dock levelers may require modifications – consult factory.

2. The standard anchors provided with this product may only be used on docks constructed of solid concrete. For mounting to block walls refer to Service Bulletin #1023. Docks constructed with other materials require special mounting consideration. Contact your local Kelley distributor for information.

3. Docks 46" and lower may require a specially modified vehicle restraint or operation of the dock leveler may need to be restricted. Contact your local Kelley distributor for information.
4. A 3/8" min. gap is required between the dock leveler front frame and pit floor to install the horizontal mounting plate.
5. Do not install the vehicle restraint anchor bolts into aged or unsound concrete.

### **NOTICE**

***If the driveway beneath the vehicle restraint is affected by frost heave:***

1. ***Raise restraint sufficient distance to prevent damage, or***
2. ***Modify driveway to provide additional clearance.***

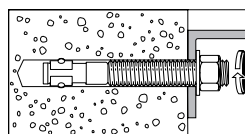
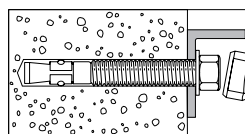
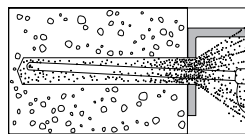
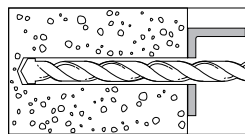
***Consult registered architect or professional engineer.***

## TOOLS REQUIRED

- Welder
- Impact or rotary drill with 1/2" diameter concrete drill bit
- 9/16" wrench
- General hand tools
- Touch up paint (Gold)
- Torque wrench (45 ft-lb min.)
- 1/2" dia. rebar cutting drill
- Rebar cutting drill bit with rotary only drill motor.

### WEDGE ANCHOR INSTALLATION (STANDARD INSTALLATION)

Fig. 1



#### **⚠ WARNING**

*Do not install the vehicle restraint anchor bolts into aged or unsound concrete.*

*Use standard anchors on smooth 4,000 PSI concrete walls only. For aggregate, cinder block or tilt walls - consult factory.*

#### **⚠ CAUTION**

*Oversized holes in the base material will make it difficult to set the anchor and will reduce the anchor's load capacity.*

#### **NOTICE**

*Do not use an impact wrench to set or tighten the wedge anchors.*

1. Using a 1/2" diameter bit, drill a hole into the base material to a depth of at least 1/2" deeper than the embedment. The minimum embed depth of the 1/2" anchor is 3-3/8". The tolerances of the drill bit should meet the requirements of ANSI Std. B212.15.
2. Blow the hole clean of dust and other material. Do not expand the anchor or screw the bolt in the anchor assembly prior to installation.
3. Drive the anchor through the fixture into the anchor hole until the bolt head is firmly seated against the fixture. Be sure the anchor attains the minimum embed depth of 3-3/8".
4. Tighten the anchor by applying 40 ft. lbs. torque. See Fig 1.

# INSTALLATION, continued

## INSTALLATION WITH PIT TYPE DOCK LEVELERS

### **⚠ WARNING**

*Do not install, operate or service this product unless you have read and followed the Safety Practices, Warnings, and Installation and Operating Instructions contained in this manual. Failure to do so could result in death or serious injury. ALWAYS USE DOCK LEVELER SUPPORT WHEN WORKING UNDER A DOCK LEVELER RAMP OR LIP.*

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

*Improper installation of anchoring devices or installation into aged or unsound concrete could result in death or serious injury.*

1. Insert the horizontal mounting plate into the gap between the dock leveler front angle and the pit floor.

### **NOTE:**

When used with older style Kelley Mechanical "MK" or "K" series and Kelley Hydraulic EHD 60,000 lb. capacity dock levelers, the mounting plate must be mounted to the left of the dock leveler centerline as shown in Fig. 2. This off-center mounting is to allow for dock leveler spring adjustment and to prevent interference with lip rod lugs. For other dock levelers the horizontal mounting plate may be centered with the dock leveler. See Fig. 3.

If the horizontal mounting plate cannot be used, the top portion of the vehicle restraint must be welded to the dock leveler front angle and additional anchor plates installed to fasten the dock leveler subframe securely to the pit floor. A dock leveler reinforcing kit Kelley part number 901-323 is available for this purpose. Recommended reinforcing is illustrated on page 28.

2. Check access to the horizontal mounting plate anchor holes. A minimum of four (4) anchor holes spaced across the plate must be accessible. Drill additional 9/16" diameter anchor holes through the mounting plate if required. See Fig. 4.

Fig. 2

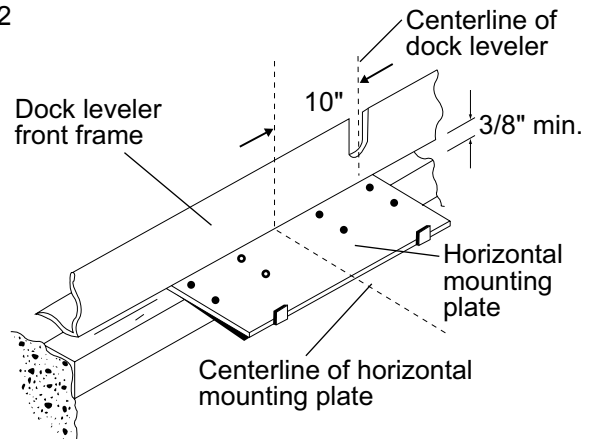


Fig. 3

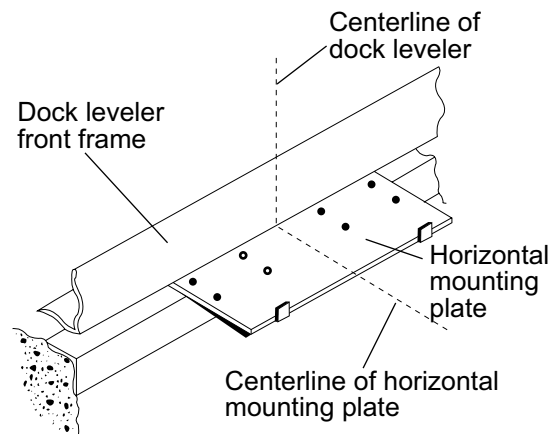
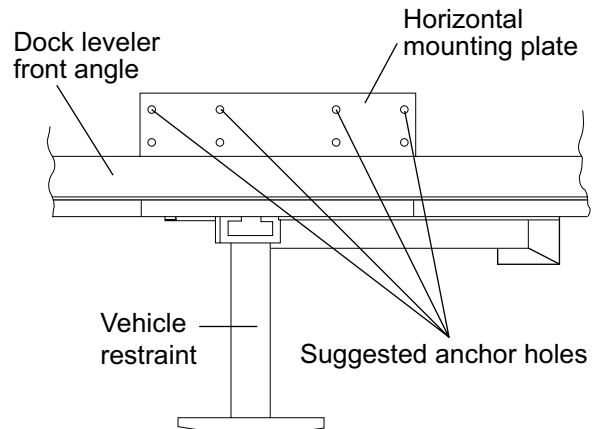


Fig. 4



## INSTALLATION, continued

### **⚠ 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 500 lbs for the lifting angle used. Never allow anyone to stand on or near the restraint when it is lifted or positioned. Stand clear of the vehicle restraint when it is positioned. Failure to follow this warning can allow the restraint to fall, tip, or swing into people, causing death or serious injury.*

3. Place the bottom edge of vehicle restraint 1/2" above the driveway and align the backplate with the horizontal mounting plate. See Fig. 5. If the driveway is affected by heaving from frost, follow NOTICE on page 4 to prevent damage from the driveway movement.
4. Tack the vehicle restraint to the horizontal mounting plate using the tabs on the front of the plate. See Fig. 5.
5. Pull the vehicle restraint and mounting plate away from the dock and weld the full width of the horizontal mounting plate with a 1/4" fillet weld on the top side. Paint welded area to prevent rust. See Fig. 6.
6. Slide the vehicle restraint mounting plate assembly back into position on the dock. See step 1, page 6 for location. If shimming is required it is necessary to shim behind the pivot pin as well as at the anchor bolts. The pivot pin is shimmed to prevent bending the back plate if the pivot area is struck. The pivot pin area must not be fastened but left free to float.
7. Before anchoring vehicle restraint, operate the dock leveler with the vehicle restraint in its intended mounting position. Check that the vehicle restraint does not interfere with below dock operation and that the pendant dock leveler lip does not support the weight of the dock leveler on any part of the vehicle restraint. Operate in the below dock and dock level end load position with the lip pendant and with the lip extended. Store the dock leveler several times to be sure the pendant lip does not come to rest supporting the weight of the dock leveler on the vehicle restraint. Readjust mounting position as required. The vehicle restraint may be moved such that the horizontal mounting plate is up to 12" off center.

Fig. 5

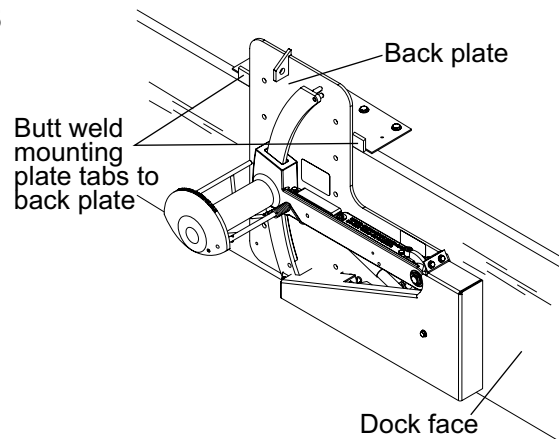
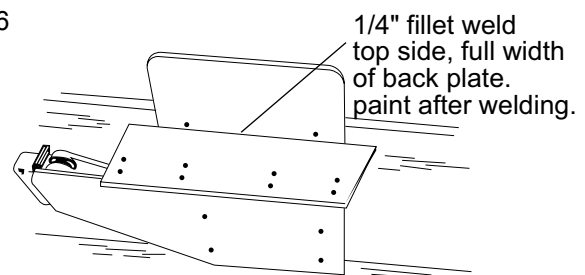


Fig. 6



## INSTALLATION, continued

### ⚠ WARNING

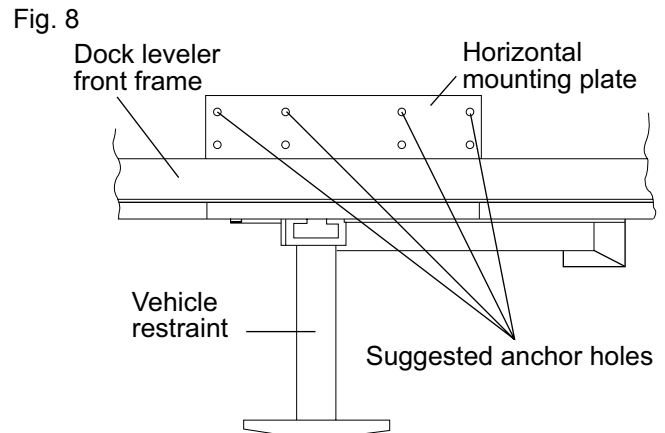
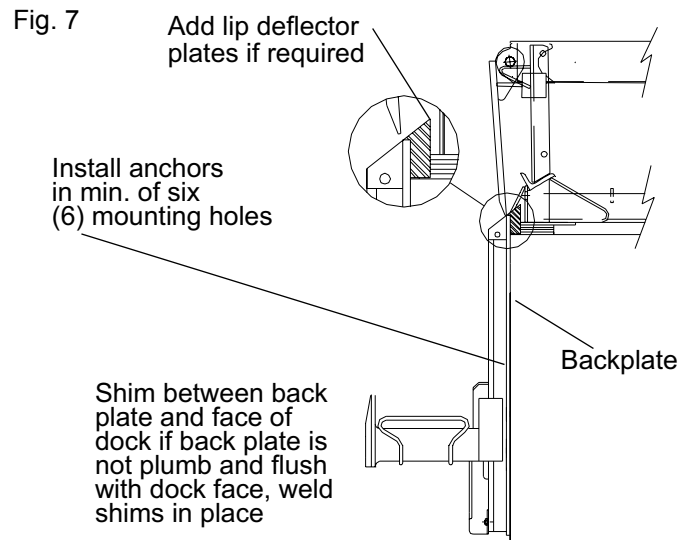
*Improper installation that allows a pendant dock leveler lip to be supported by the restraint could result in death or serious injury. It is sometimes necessary to install lip deflector plates as indicated in Fig. 7 to avoid any chance of the pendant lip storing on top of or behind the backplate. Materials supplied by installer.*

*Anchors must be installed in a minimum of six (6) back plate mounting holes. The anchor bolts should be installed as the holes are drilled to prevent the vehicle restraint from shifting.*

### NOTICE

*The anchor bolt heads must be tight against the back plate to prevent interference with the hook arm and gas spring.*

- Anchor the vehicle restraint back plate to the dock face using the anchors provided. The anchor bolts must be torqued to 40 ft-lbs to achieve maximum holding strength. See Fig. 7 and wedge anchor installation instructions on page 5.
- Anchor the horizontal mounting plate to the pit floor using the concrete anchors provided with the vehicle restraint. The anchor bolts must be torqued to 40 ft-lbs to achieve maximum holding strength. A minimum of (4) anchors across the plate must be used. See Fig. 8 and wedge anchor installation instructions on page 5.
- Move the hook up and down to be certain the hook does not bind on the track. Washers on the pivot pin may be moved from front to rear or vice versa to shim hook in or out as required. See "PARTS REPLACEMENT INSTRUCTIONS - Hook and Gas Spring" on page 25 for instructions on how to remove the hook to gain access to the rear shim washers.





## INSTALLATION, continued

### ⚠ WARNING

**Before doing any electrical work, make certain the power is disconnected and properly locked or tagged off. Failure to do so may result in death or serious injury. All electrical work must be done by a qualified technician and must meet applicable codes.**

11. Mount control box inside the building 60" above the floor, to the left of the doorway. See Fig. 9 and 16.
12. Mount and wire outside signal light assembly into the control box using terminal 7 for red, 8 for GREEN and 9 for common. Terminals are located on the STAR 4 output board in the control panel. See Fig. 10 and wiring diagram on page 24.
13. Mount electrical junction box (not supplied) near vehicle restraint. See Fig. 11 and 16.
14. Route supplied wires from the terminal strip on the STAR backplate through conduit to the junction box and then to the control panel terminals as shown in the wiring diagram on page 24. See Fig. 16.
15. If this installation includes an optional dock leveler lip limit switch, wire per instructions contained in the limit switch kit and connect leads to terminals marked "19" and "C" on the STAR input board in the control panel. Change the DIP switch setting on the input board in the control panel on switch 3 from ON to OFF.

When limit switch is installed, the unit will function in Semi-Automatic mode. See page 14.

If no lip limit switch is to be used, leave the DIP switch 3 setting in the factory ON position. The unit will function in Manual mode. See page 13.

16. Wire power to the control box using terminals provided in the control box. See Fig. 16 and Electrical Schematic on page 24.
17. Permanently mount the vehicle driver's instruction signs on the outside wall under the signal light when installing RED/GREEN Light Assembly. See Fig. 16.
18. Operate the vehicle restraint following the Operation instructions on page 13. Check for smooth operation and proper light operation according to the Operation instructions on page 13.
19. Install Pivot Pin Guard Kit per instructions on page 37.

Fig. 9

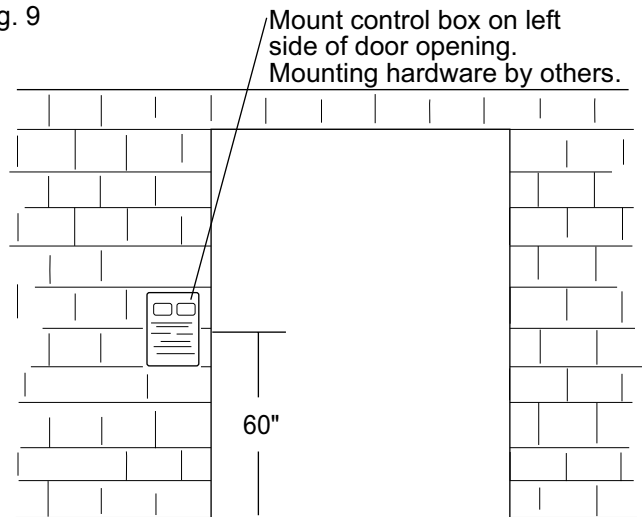


Fig. 10

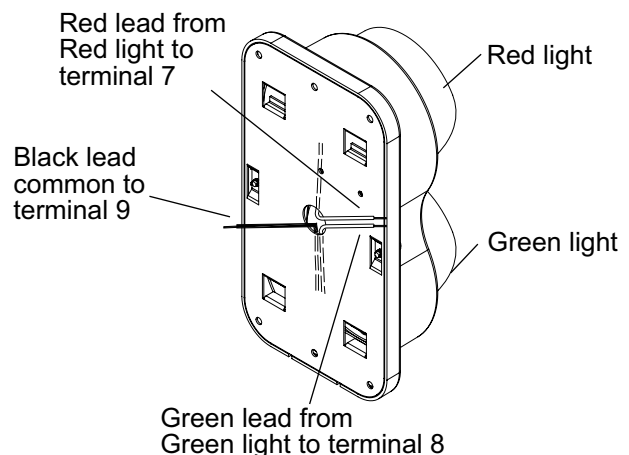
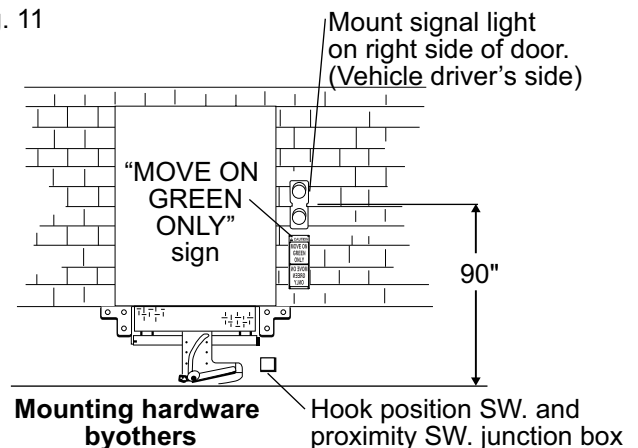


Fig. 11



## INSTALLATION, continued

20. Instruct the dock workers how to use the vehicle restraint using the operation procedures on page 13.

### INSTALLATION WITH EOD TYPE DOCK LEVELERS AND LOADHOG DOCK BRIDGES

#### **▲ WARNING**

*Do not install, operate, or service this product unless you have read and followed the Safety Practices, Warnings, and Installation and Operating Instructions contained in this manual. Failure to do so could result in death or serious injury. ALWAYS USE DOCK LEVELER SUPPORT WHEN WORKING UNDER A DOCK LEVELER RAMP OR LIP.*

*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 500 lbs for the lifting angle used. Never allow anyone to stand on or near the restraint when it is lifted or positioned. Stand clear of the vehicle restraint when it is positioned. Failure to follow this warning can allow the restraint to fall, tip, or swing into people, causing death or serious injury.*

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

*Improper installation of anchoring devices or installation into aged or unsound concrete could result in death or serious injury.*

1. Position the stand-off so that it is centered on the dock face in front of the dock leveler. See Fig. 12.
2. Place the bottom edge of vehicle restraint 1/2" above the driveway. Anchor the stand-off to the dock face using the 10 anchors provided. The anchors must be torqued to 40 ft-lbs to achieve maximum holding strength. See wedge anchor installation instructions on page 5.
3. Position and anchor the pin support as shown in Fig. 12 using the remaining anchor fasteners. The pin support is used to prevent bending of the back plate if the pin area is struck. The pivot pin area must not be fastened but left free to float.
4. Bolt the vehicle restraint to the stand-off. See Fig. 13.
5. Bolt the lip deflector (if supplied) to the STAR lip deflector using 5/8-11 x 2" bolt and nut. See Fig. 14.

Fig. 12

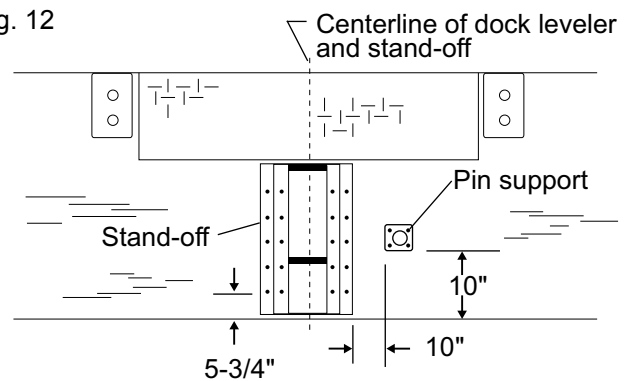
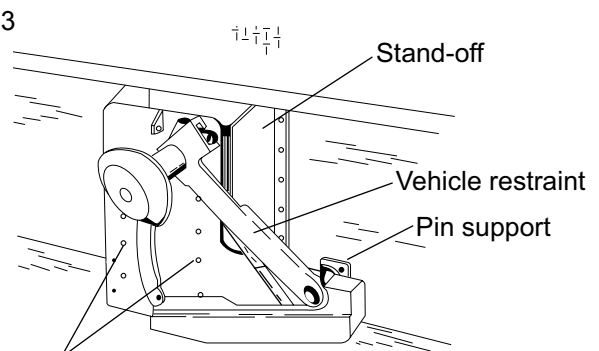
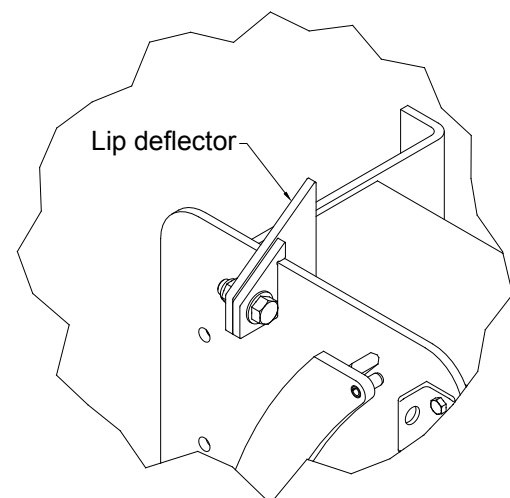


Fig. 13



- (10) 1/2-13 x 1-1/2" capscrews,
- (10) 1/2 -13 locknuts,
- (20) 1/2 flat washers
- (Supplied by others)

Fig. 14



# INSTALLATION, continued

6. Move the hook up and down to be certain the hook does not touch the track. Washers on the pivot pin may be moved from front to rear or vice versa to shim hook in or out as required. See "PARTS REPLACEMENT INSTRUCTION – Hook Arm and Gas Spring" on page 24 for instructions on how to remove the hook to gain access to the rear shim washers.
7. Follow instructions 11 through 20 on pages 9-10.
8. Consult factory for size of stand off.

## OPTIONAL STANCHION MOUNTING (For Open Docks)

1. Anchor the stanchion to the dock floor, at the left side of the dock position, in a location so that the signal light assembly will be easily visible to the vehicle driver.
2. Permanently mount the driver's instruction signs on the dock wall under the signal light assembly. See Fig. 15.
3. Mount the control box to the stanchion. See Fig. 15.
4. Mount the signal light assembly to the stanchion. See Fig. 15.

### **▲ WARNING**

**Before doing any electrical work, make certain the power is disconnected and properly locked or tagged off. Failure to do so may result in death or serious injury. All electrical work must be done by a qualified technician and must meet all applicable codes.**

**All motor power wires or other high voltage wires must be run in a separate conduit from all low voltage control circuit wiring.**

5. Follow instructions 12 through 20, pages 9-10.

## OPTIONAL SNOW PLOW GUARD PLACEMENT

If desired, install concrete filled posts for protection from damage that may be caused by snow removal equipment. See Fig. 16 for suggested placement.

Fig. 15

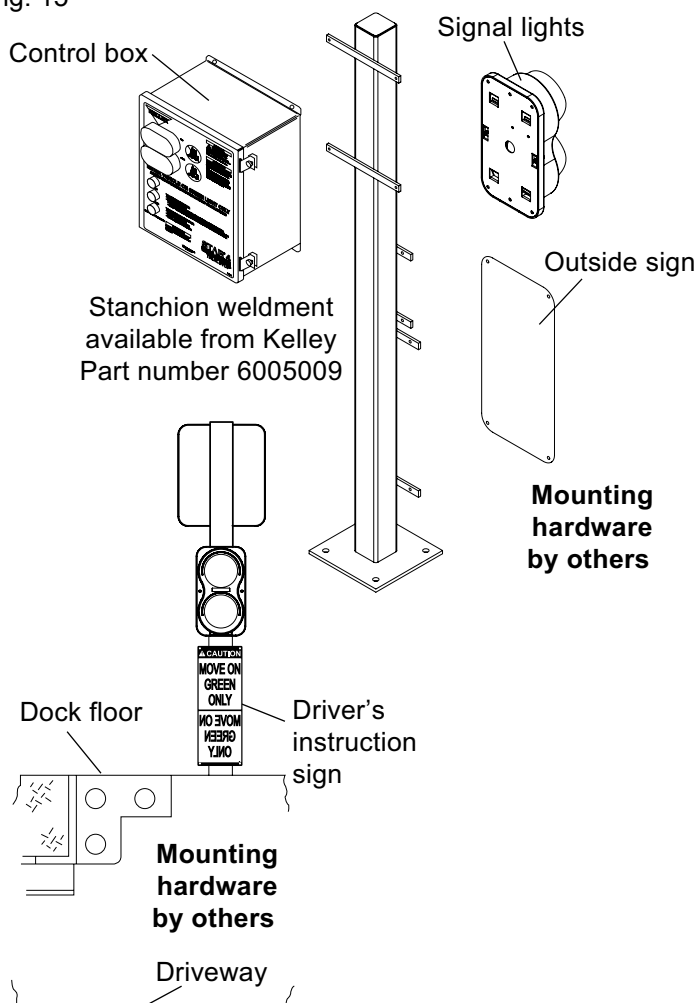
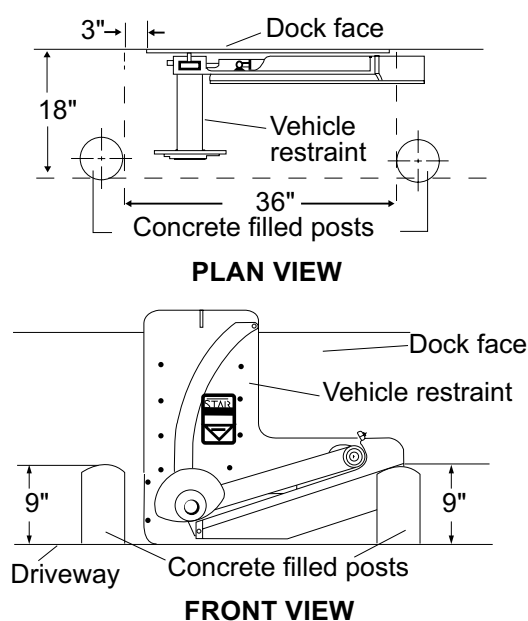
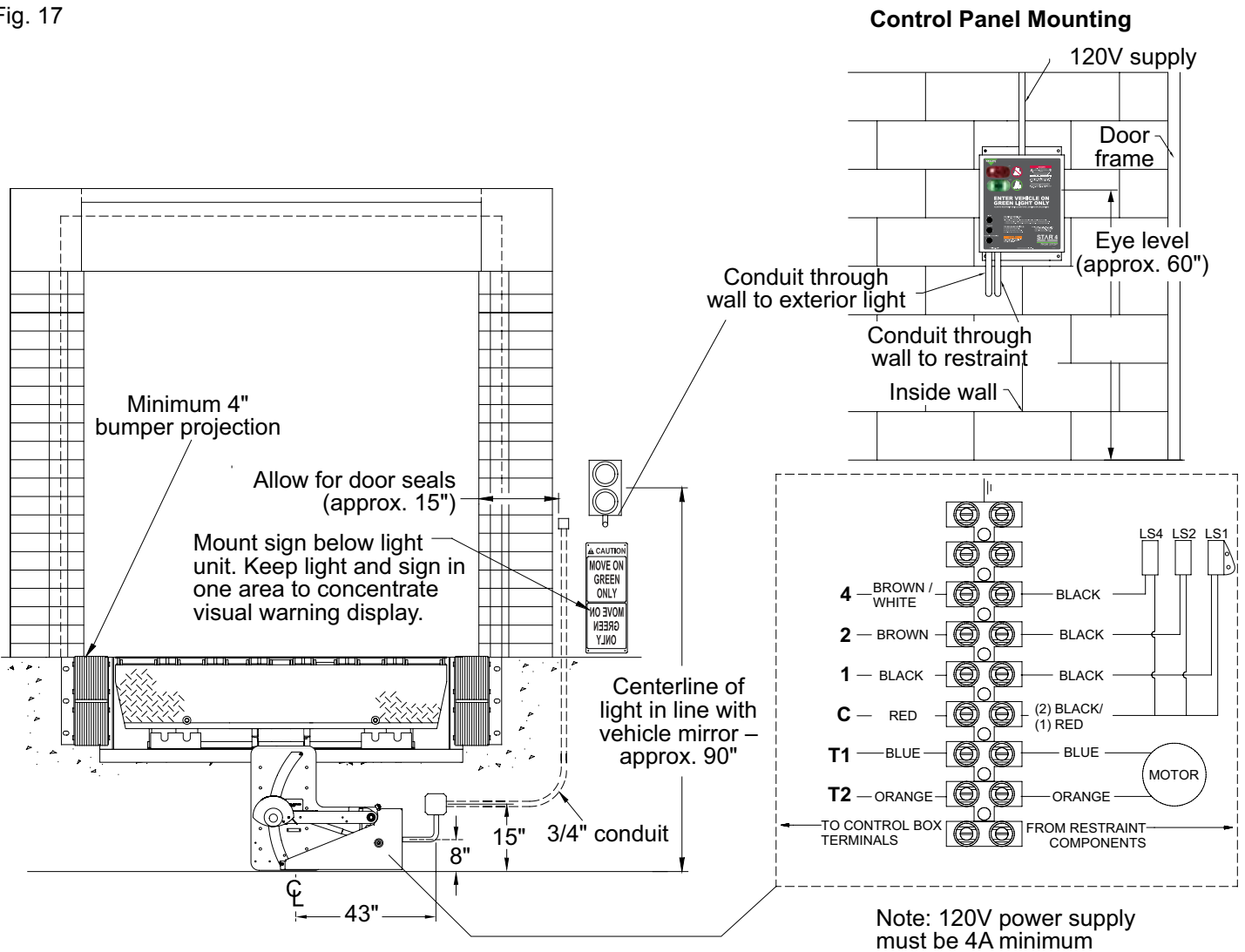


Fig. 16



# INSTALLATION, continued

Fig. 17



# OPERATION

## ⚠ WARNING

Before operating the vehicle restraining device, read and follow the Safety Practices, Warnings, and Operation instructions contained in this manual. Use by untrained people could result in death or serious injury.

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

Do not load or unload any vehicle unless you make certain the vehicle restraint has securely hitched the vehicles RIG and set the brakes. If the vehicle restraint does not hitch the vehicle's RIG for any reason, **BE CERTAIN TO CHOCK THE VEHICLE WHEELS BEFORE LOADING OR UNLOADING.**

Enter the vehicle only when the green signal light on the control box is on. You must check the green signal light each time that the vehicle is entered. If the green light goes off at any time during loading operations, immediately cease loading operations and check the vehicle restraint to ensure that it is securely hitched.

If power to the vehicle restraint is interrupted, immediately cease operations and check the unit.

Vehicles leaving or moving when loading and unloading are in process could result in death or serious injury.

Failure to place the hook in the stored position when not in use could result in damage to the vehicle restraint and incoming vehicles. Be certain bystanders in the driveway stand clear when the vehicle restraint is operated.

## MANUAL OPERATION (See Fig. 18, 19 and 20)

### TO HITCH VEHICLE

1. Press **HITCH** push-button.
2. If vehicle cannot be hitched, RED light will continue to flash. **ENTER VEHICLE ON GREEN LIGHT ONLY.**
  - a. Be certain wheels are chocked and the brakes are set.
  - b. Press **RESTRAINT OVERRIDE** push-button. Lights will flash RED/GREEN.

Fig. 18

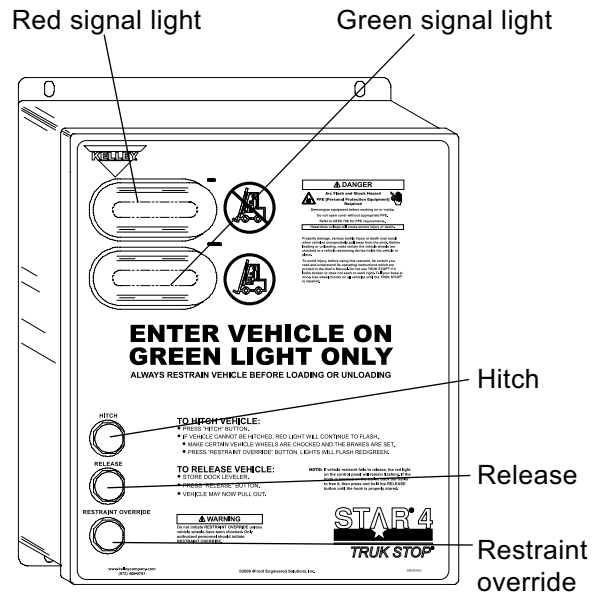
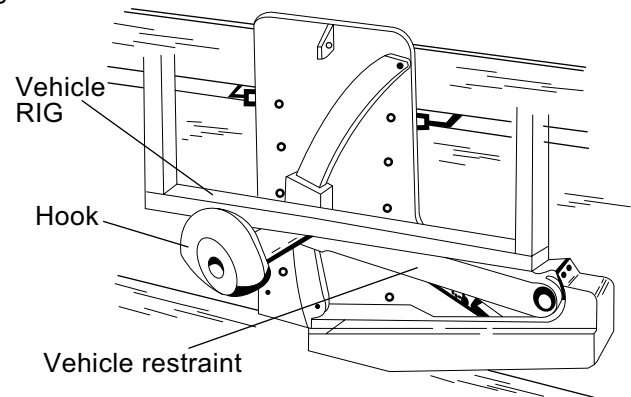


Fig. 19



### HITCHED REAR IMPACT GUARD (RIG)

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## OPERATION, continued

### TO RELEASE VEHICLE

1. Store dock leveler.
2. Press **RELEASE** push-button.
3. Vehicle may now pull out.

### SEMI-AUTOMATIC OPERATION (See Fig. 18, 19 and 20)

#### TO HITCH VEHICLE

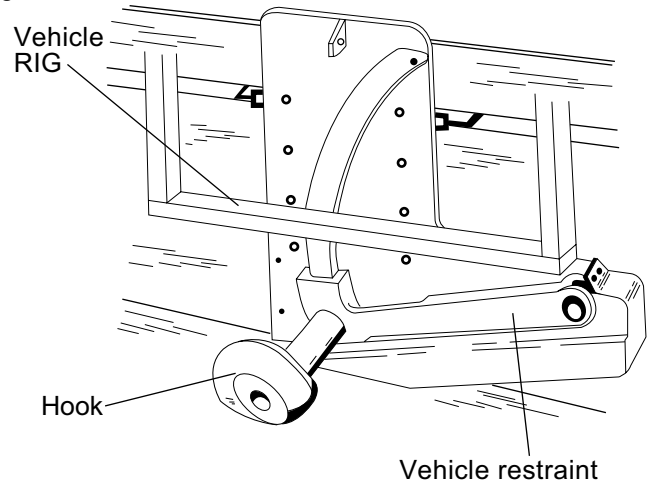
1. Press **HITCH** push-button or extend dock leveler lip (if the dock leveler is interlocked with restraint).
2. If vehicle cannot be hitched, RED light will continue to flash. **ENTER VEHICLE ON GREEN LIGHT ONLY.**
  - a. Be certain wheels are chocked and the brakes are set.
  - b. Press **RESTRAINT OVERRIDE** push-button. Lights will flash RED/GREEN.

#### TO RELEASE VEHICLE

1. Store dock leveler.
2. Press **RELEASE** push-button.
3. Vehicle may now pull out.

If the vehicle restraint fails to release, the RED light on the control panel will remain flashing. If the hook is jammed on the trailer, back the trailer to free it, then press and hold the **RELEASE** button until the hook is properly stored.

Fig. 20



**RELEASED REAR IMPACT GUARD (RIG)**

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# OPERATIONAL CHECKS

## **▲ DANGER**

***Before doing any electrical work (including changing lights), make certain the power is disconnected and properly tagged or locked off.***

## **▲ WARNING**

***Do not service this product unless you have read and followed the Safety Practices, Warnings, and Operation instructions contained in this manual. Failure to follow these safety practices could result in death or serious injury.***

***After checking lights, be certain lights are returned to the proper display. If no vehicle is at the dock, or the vehicle is not hitched, the red inside light should be lit and green outside light should be flashing. If a vehicle is at the dock and is hitched or wheels are chocked, the green inside light should be lit and the red outside light should be flashing.***

## **DAILY**

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1. Operate the vehicle restraint to assure that it operates smoothly and that the hook moves freely along the entire length of track.
2. Check the lights on the control box. The RED or GREEN light must be on at all times. Push button on control box to be certain both lights are working. Replace LEDs as required.
3. Check the outside signal lights. A RED or GREEN light must be flashing at all times. Push button on the control box to be certain both lights are working. Replace LEDs as required.
4. Inspect dock bumpers. Missing bumpers must be replaced.

## **WEEKLY**

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Inspect the vehicle restraint for damage which may weaken the anchoring strength. Retighten the concrete anchors if necessary. (40 ft-lbs.)

## **MONTHLY**

---

Check all operating, warning, and caution labels and signs to be sure they can be read. Replace them if required. See the Parts List beginning on page 29 for part numbers.

## **QUARTERLY**

---

Inspect dock bumpers. 4" of protection is required. Worn, torn, or missing bumpers must be replaced.

## **YEARLY**

---

Perform the hook arm adjustment checks described on page 26 of this manual.

# TROUBLESHOOTING GUIDE

## ⚠ WARNING

**Before servicing the vehicle restraint, read and follow the Safety Practices on page 3 and the Operation section in this manual. Failure to do so could result in death or serious injury.**

## ⚠ DANGER

**Before doing any electrical work, make certain the power is disconnected and properly tagged or locked off.**

The functions of the vehicle restraint are controlled by a Programmable Logic Controller (PLC) which has LED indicator lights to display errors and the state of input and output signals. The PLC also has fuses to protect various electrical circuits. For PLC LED diagnostics please refer to pages 20-23 in this manual.

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

### RESTRAINT DOES NOT RAISE OR LOWER

PROBLEM	POSSIBLE CAUSE	SOLUTION
1. Restraint does not operate. No Inside lights. No PLC LED indicator lights.	a) No power to control panel. b) Primary 4 amp fuse blown.	a) Check for 120V supply at terminals L and N. b) Replace fuse.
2. Primary fuse blows continually.	a) Faulty transformer, faulty PLC or faulty STAR 4 output board.	a) Disconnect the RED 24V wire from transformer secondary side and the RED/BLACK 120V supply wire from the PLC. Cap the 120V wire and replace fuse. If fuse still blows replace the transformer. If fuse does not blow reconnect the transformer and PLC supply wiring and unplug the entire PLC/Boards assembly from the backplate, replace fuse. If fuse blows replace the PLC. If fuse does not blow replace the STAR 4 Output Board.
3. Restraint does not operate. No lights on panel. Some PLC LED inputs on. Not STAR 4 Output Board lights on.	a) Failed FU2 fuse. b) Loss of PLC connectivity. c) Faulty transformer.	a) Check fuse FU2. If faulty replace fuse. b) If fuse is good re-seat the I/O boards by pressing them firmly against the back plate. c) Check for 24VAC across transformer secondary terminals. Replace if faulty.
4. Restraint does not operate. No lights on panel. Some PLC LED inputs on. No PLC LED output lights on. STAR 4 Output Board LED's on.	a) Program Error. b) Loss of PLC connectivity.	a) Cycle control panel power OFF/ON to reload program. If program does not reload automatically, contact the factory. b) Re-seat the I/O boards by pressing them firmly against the back plate.



# TROUBLESHOOTING GUIDE, continued

## RESTRAINT DOES NOT RAISE OR LOWER, continued

PROBLEM	POSSIBLE CAUSE	SOLUTION
<p>5. Restraint does not operate. Motor does not run. All panel lights and diagnostic LED's are correct.</p>	<p>a) Faulty wiring to actuator or faulty actuator.</p> <p>b) Faulty STAR 4 Output Board.</p> <p>c) Faulty PLC.</p>	<p>a) Plug DC voltmeter leads into the top of the STAR 4 Output Board terminals T1 and T2. When outputs 4 and 5 are on there should be 20-24VDC indicated on the meter. If yes then also check for 20-24VDC at then actuator. If yes then replace the faulty actuator. If no then check the wiring to the actuator for damage and replace as required.</p> <p>b) If no voltage is found between STAR 4 Output Board terminals T1 and T2. Then check for 20-24VDC between the PLC output terminal 4 and ground and 5 and ground when the outputs are on. (Note: you will see ~10VDC between the PLC output terminals and ground when the outputs are off) If 20-24VDC is present when the outputs are on then replace the STAR 4 Output Board.</p> <p>c) If 20-24VDC is not present when the outputs are on then replace the faulty PLC.</p>
<p>6. Restraint does not operate. Restraint stored. PLC input 1 off and 4 on. Inside RED light on and GREEN inside light flashing. PLC stat LED is flashing</p>	<p>a) Sensor bar stuck down.</p>	<p>a) Free sensor bar.</p>
<p>7. Restraint does not operate. PLC input 1 off and 2 on. PLC stat LED is flashing.</p>	<p>a) Proximity sensors LS1 and LS2 both active at the same time. One proximity sensor failed on.</p>	<p>a) If restraint is stored, LS2 is faulty. If restraint is raised, LS1 is faulty. Replace or adjust proximity sensor.</p>

# TROUBLESHOOTING GUIDE, continued

## RESTRAINT DOES NOT RAISE PROPERLY

PROBLEM	POSSIBLE CAUSE	SOLUTION
1. Restraint raises, ratchets, then after 6 seconds, PLC stat LED is flashing.	a) No signal from proximity sensor LS2, causes actuator clutch to slip.	a) Open control panel and check if PLC LED input 2 indicator light is on when LS2 is engaged. Replace or adjust LS2 as required.
	b) Faulty proximity sensor LS2	b) Check if LED on LS2 indicates. If no signal, check wiring from PLC to LS2. Replace or adjust proximity sensor LS2 as required.

## RESTRAINT DOES NOT RESTORE PROPERLY

1. Restraint restores, ratchets, then stops. PLC LED input 1 on. Inside RED light flashes. PLC stat LED is flashing.	a) Obstruction in mechanism prevents lowering.	a) Check for obstruction preventing restraint from restoring.
	b) Signal from proximity sensor LS1, causes actuator clutch to slip.	b) Open control panel and check if PLC LED input 1 indicator light is off when LS1 is engaged. Replace or adjust LS1 as required.
	c) Faulty proximity sensor LS1.	c) Check if LS1 LED on. If signal present, check LS1 for short circuit. Replace or adjust proximity sensor LS1 as required.

# TROUBLESHOOTING GUIDE, continued

## RESTRAINT RAISES AND LOWERS BUT LIGHTS ARE PROBLEMATIC

PROBLEM	POSSIBLE CAUSE	SOLUTION
1. No panel face lights.	<ul style="list-style-type: none"> <li>a) LED light(s) burned out.</li> <li>b) Disconnected or damaged wires.</li> </ul>	<ul style="list-style-type: none"> <li>a) Check lights. Replace if necessary.</li> <li>b) Look at the STAR 4 Output Board "Inside Lights" status LED. If the LED is out a short circuit of the lights or wiring has occurred. Check for faulty or damaged light wiring. Replace as required. Cycling the control panel power OFF/ON will automatically reset the fuse.</li> </ul>
2. Outside light(s) do not come on.	<ul style="list-style-type: none"> <li>a) Light(s) burned out.</li> <li>b) Disconnected or damaged wires.</li> <li>c) LED polarity incorrectly wired.</li> </ul>	<ul style="list-style-type: none"> <li>a) Check lights. Replace if necessary.</li> <li>b) Look at the STAR 4 Output Board "Outside Lights". If the LED is out a short circuit of the lights or wiring has occurred. Check for faulty or damaged light wiring. Replace as required. Cycling the control panel power OFF/ ON will automatically reset the fuse.</li> <li>c) Reverse polarity.</li> </ul>
3. Outside light(s) do not flash.	<ul style="list-style-type: none"> <li>a) "Flash/No Flash" switch on STAR 4 Output Board is set to "No Flash" position.</li> <li>b) Faulty STAR 4 Output Board.</li> </ul>	<ul style="list-style-type: none"> <li>a) Change the switch to the "Flash" position. See Fig. 33, item 18.</li> <li>b) If changing the switch position does not cause the lights to start flashing replace the faulty STAR 4 Output Board.</li> </ul>

# PLC DIAGNOSTICS

## ⚠ WARNING

*Do not service this product unless you have read and followed the Safety Practices, Warnings, and Operating Instructions in this manual. Failure to follow these safety practices could result in death or serious injury.*

## CONTROL PANEL – LED DISPLAY

The vehicle restraint is controlled by a solid state Programmable Logic Controller (PLC) which reads input signals from the push-buttons and proximity sensors, and closes the appropriate output relays to the motor and to the warning lights.

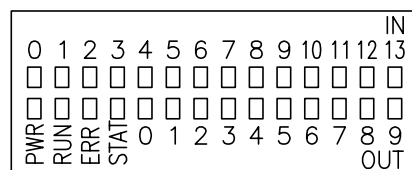
### INPUT SIGNALS

- 0 - Restraint Override push-button
- 1 - LS1 Lowered proximity switch (normally closed)
- 2 - LS2 Raised Proximity Switch
- 3 - Unused Input
- 4 - LS4 RIG sensor bar
- 5 - Unused Input
- 6 - Hitch push-button
- 7 - Release push-button
- 8 - Unused input
- 9 - Optional door closed switch
- 10 - Lip limit switch (optional)
- 11 - Unused input
- 12 - Unused input
- 13 - VSL error signal (optional for VSL integration)

### OUTPUT FUNCTIONS

- 0 - Red Light - Panel Face
- 1 - Spare
- 2 - Green Light - Panel Face
- 3 - Exterior Light Relay (Red = Off)
- 4 - Restraint Raise
- 5 - Restraint Lower
- 6 - Audible Alarm
- 7 - Spare
- 8 - Spare
- 9 - Interlock - Restraint Engaged or Restraint Override

The face of the PLC has LED indicator lights which show the status of each input and output. The STAT LED will indicate when an error condition exists.



▨ LED on    □ LED off    ◻ LED flashing

# PLC DIAGNOSTICS, continued

The chart below shows all of the valid conditions for the standard unit in normal operation.

▨ LED on    □ LED off    ◻ LED flashing

## HOME

Hook stored

															IN
0	1	2	3	4	5	6	7	8	9	10	11	12	13		
□	□	□	□	□	□	□	□	□	▨	▨	□	□	□		
▨	▨	□	□	▨	□	□	▨	□	□	□	▨	□	□		
PWR	RUN	ERR	STAT	0	1	2	3	4	5	6	7	8	9		OUT

## STEP 1

Hook raising (attempting hitch)

															IN
0	1	2	3	4	5	6	7	8	9	10	11	12	13		
□	▨	□	□	□	□	▨	□	□	▨	▨	□	□	□		
▨	▨	□	□	F	□	□	□	▨	□	□	□	□	□		
PWR	RUN	ERR	STAT	0	1	2	3	4	5	6	7	8	9		OUT

## STEP 2

Hook raised (LS2 contact)

															IN
0	1	2	3	4	5	6	7	8	9	10	11	12	13		
□	▨	▨	□	□	□	□	□	□	▨	▨	□	□	□		
▨	▨	□	□	F	□	□	□	□	□	□	▨	□	□		
PWR	RUN	ERR	STAT	0	1	2	3	4	5	6	7	8	9		OUT

## STEP 3

Hook raised (LS4 contact)

															IN
0	1	2	3	4	5	6	7	8	9	10	11	12	13		
□	▨	▨	□	▨	□	□	□	□	▨	▨	□	□	□		
▨	▨	□	□	□	□	▨	□	□	□	□	▨	□	▨		
PWR	RUN	ERR	STAT	0	1	2	3	4	5	6	7	8	9		OUT

## STEP 4

Lowering (releasing)

															IN
0	1	2	3	4	5	6	7	8	9	10	11	12	13		
□	▨	□	□	□	□	□	▨	□	▨	▨	□	□	□		
▨	▨	□	□	F	□	□	□	□	▨	□	□	□	□		
PWR	RUN	ERR	STAT	0	1	2	3	4	5	6	7	8	9		OUT

# PLC DIAGNOSTICS, continued

LED on   
  LED off   
  LED flashing

## DIAGNOSTIC ERROR

LS4 contact while hook is lowered

														IN
0	1	2	3	4	5	6	7	8	9	10	11	12	13	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	F	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
PWR	RUN	ERR	STAT	0	1	2	3	4	5	6	7	8	9	OUT

## SYSTEM ERROR

(See controller fault conditions)

														IN
0	1	2	3	4	5	6	7	8	9	10	11	12	13	
F	F	F	F	F	F	F	F	F	F	F	F	F	F	
<input checked="" type="checkbox"/>	F	F	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
PWR	RUN	ERR	STAT	0	1	2	3	4	5	6	7	8	9	OUT

## TNF

Truck not found or rear impact guard (RIG) lost (hook raised)

														IN
0	1	2	3	4	5	6	7	8	9	10	11	12	13	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	F	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	F	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
PWR	RUN	ERR	STAT	0	1	2	3	4	5	6	7	8	9	OUT

## OVERRIDE

Lights override (hook lowered)

														IN
0	1	2	3	4	5	6	7	8	9	10	11	12	13	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	F	<input type="checkbox"/>	F	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
PWR	RUN	ERR	STAT	0	1	2	3	4	5	6	7	8	9	OUT

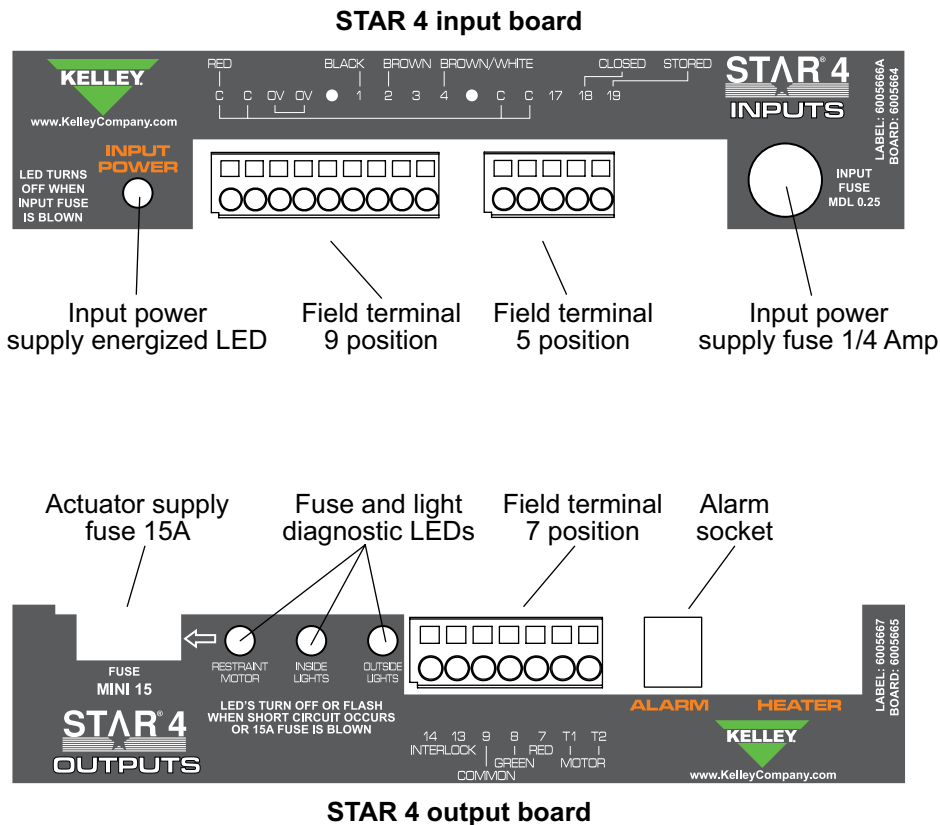
## RESTRAINT ERRORS

Match the PLC LED display with the chart to determine the error that has occurred and check the corresponding equipment for problems.

When the PLC is in Jog Mode, the restraint will raise or lower only while a button is pressed and will stop when the button is released. Jog Mode is entered when a failure to find LS1 while lowering has occurred. Use this to position the restraint, but disconnect power before attempting to make adjustments.

If the vehicle restraint fails to release, the RED light on the control panel will remain flashing. If the hook is jammed on the trailer, back the trailer to free it, then press and hold the **RELEASE** button until the hook is properly stored.

Fig. 21



# ELECTRICAL SCHEMATIC

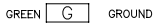
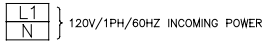
6005663

Fig. 22

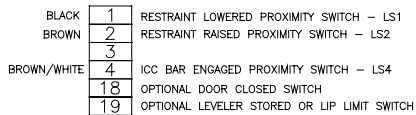
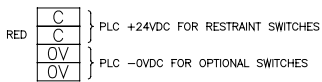
## NOTE:

For 24V incoming power consult factory.

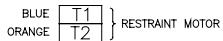
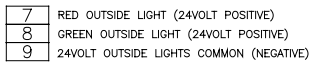
### POWER SUPPLY TERMINALS



### FIELD TERMINALS (INPUTS)

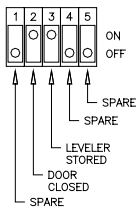


### FIELD TERMINALS (OUTPUTS)

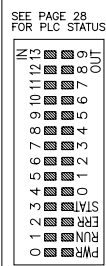
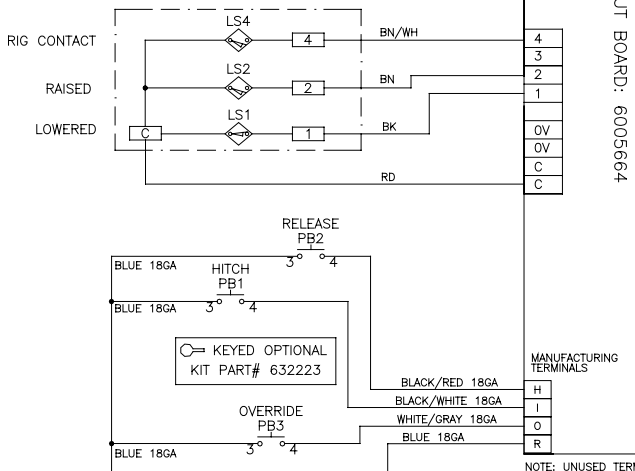
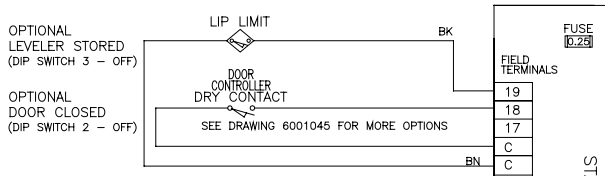
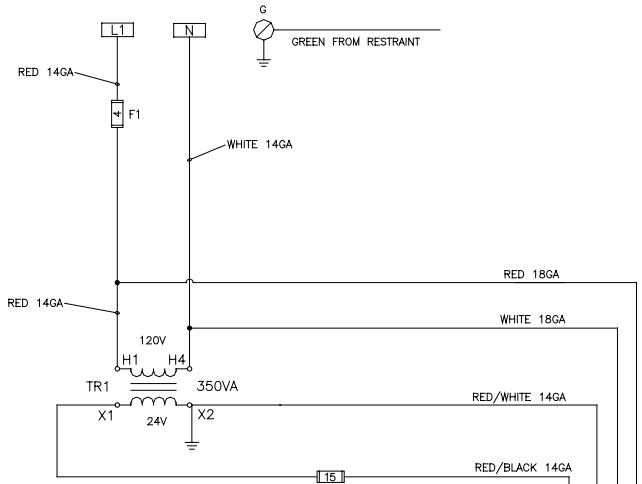


### INPUT BOARD SWITCH SETTINGS

DIP SWITCH LOCATED ON SIDE OF BOARD  
STANDARD SWITCH POSITIONS SHOWN.



NOTE: 120V/1PH/60HZ  
INCOMING SERVICE  
FUSING AND DISCONNECT (BY OTHERS)  
FLA 4AMPS



NOTE: UNUSED TERMINALS NOT SHOWN



# PARTS REPLACEMENT INSTRUCTIONS

## **▲ WARNING**

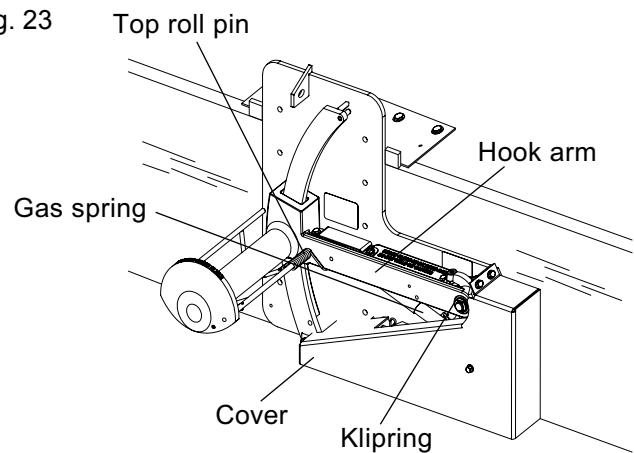
**Do not service this product unless you have read and followed the Safety Practices, Warnings, and Operation instructions contained in this manual. Failure to follow these safety practices could result in death or serious injury.**

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

## **HOOK ARM AND GAS SPRING**

1. Remove BLACK cover.
2. Disconnect linear actuator rod from lever. If linear actuator rod is not retracted it is necessary to push down on the hook to release tension on linear actuator linkage.
3. Hold hook arm down and remove top spring pin.
4. Slowly release the hook arm to allow the gas spring to fully extend.
5. Support the hook so that it does not fall when the gas spring is removed. Carefully pry the gas spring off of the ball stud on each end of the gas spring.
6. Remove the klipping from the pivot pin.
7. Disconnect actuating linkage.
8. With the hook in its highest position, carefully slide arm from pin.
9. Reverse above sequence to replace parts. Lubricate the following parts: pivot pin, ball studs, and linkage pivot pins.

Fig. 23

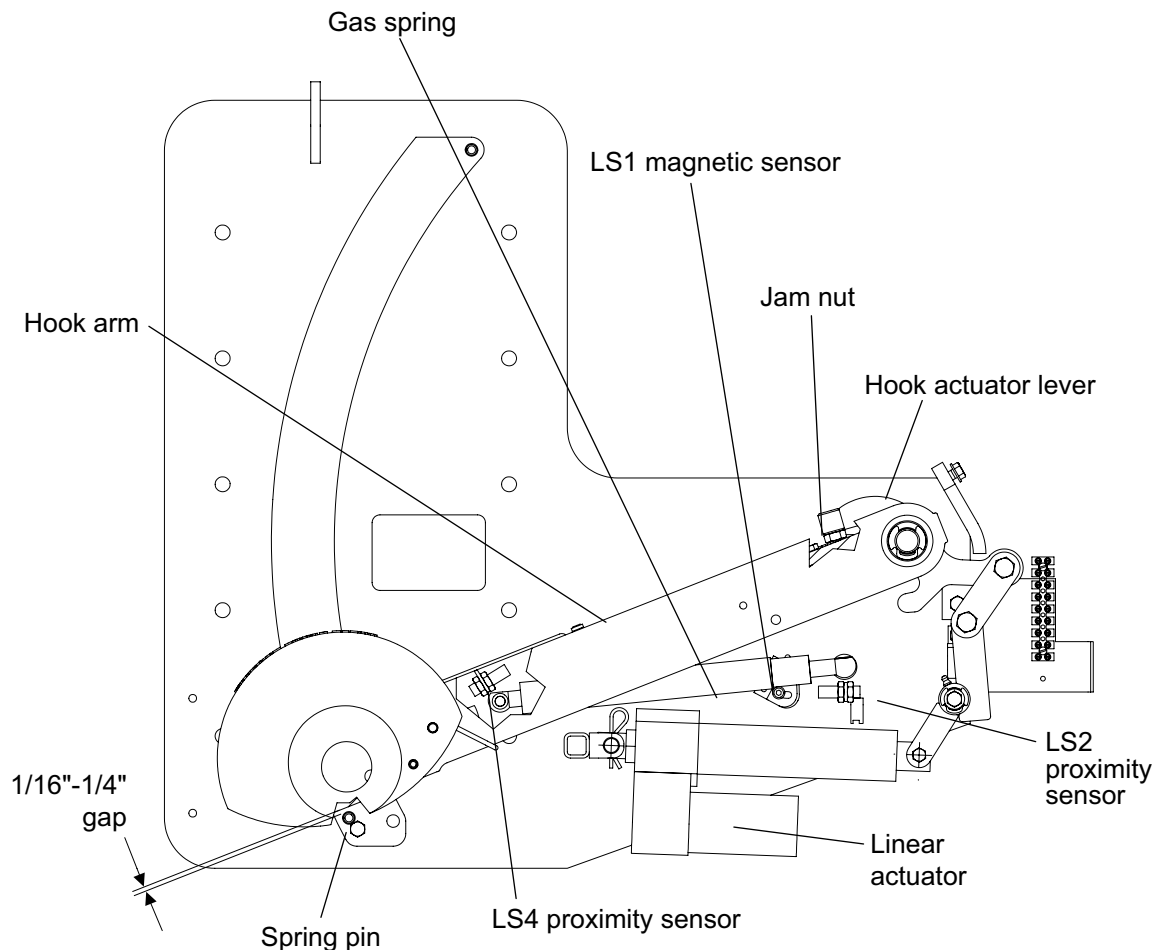


# ADJUSTMENTS

## HOOK ARM ADJUSTMENT

1. The hook arm may require adjustment if the linear actuator is fully retracted and the gap between the hook arm and the lower spring pin on the T-rail is greater than 1/4". If this occurs, loosen the jam nut on the hook actuator lever and then turn the socket head cap screw counterclockwise until the hook arm is 1/16" from the spring pin shown. Verify LS1 is made (LS1 senses the stored position of the hook arm by sensing the position of the gas spring). LS1 is made when PLC input 1 is off. If it is not made, loosen the two screws that hold the switch to the back plate and then rotate the switch clockwise until PLC input 1 turns off. Cycle the restraint returning it to the stored position. The hook arm and LS1 switch have been properly adjusted when the following are true upon restoring the restraint: LS1 is made (PLC input 1 goes off), the linear actuator does not bottom out (not fully retracted) and the gap between the hook arm and the lower T-rail spring pin is 1/16"-1/4". Repeat adjustments until the above is true.

Fig. 24



## SENSOR BAR SWITCH ADJUSTMENT

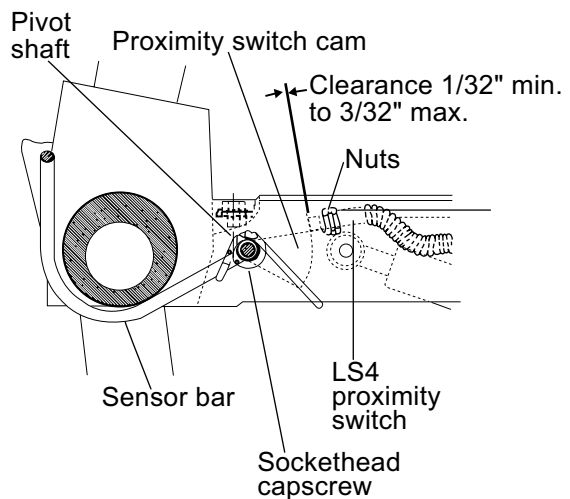
The operation range for RIG sensing of the vehicle restraints is from 11" to 30" above the drive. If the 11" minimum specification cannot be achieved, the proximity switch cam and sensor bar have come out of adjustment. When properly adjusted, a slight (about 3/16") deflection of the sensor bar will turn the proximity switch LS4 on. Readjustment is accomplished as follows:

1. Loosen the socket head cap screw that locks the proximity switch can to the pivot shaft. See Fig. 25. This screw is located in place at the factory with Loctite 222 and may have to be heated to loosen the Loctite and prevent breaking the screw.
2. Apply Loctite 222 to the screw threads. Keep the sensor bar up against the bottom of the hook and rotate the proximity switch cam counterclockwise until the proximity switch turns on and then clockwise until the switch just turns off. At this position tighten the socket head cap screw to 60 inch pounds.

Check to make sure that the proximity switch LS4 does not turn on until the sensor bar is deflected slightly. Readjust the cam as necessary to achieve a slight (approximately 3/16") deflection of the sensor bar before the proximity switch turns on.

Stepping on the sensor arm or otherwise manually deflecting the sensor arm farther than possible in normal operation can cause this out of adjustment problem.

Fig. 25



# SUBFRAME REINFORCING KIT

## ⚠ WARNING

*Do not install this product unless you have read and followed the Safety Practices, Warnings, and Operation instructions contained in this manual. Failure to follow these safety practices could result in death or serious injury.*

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

## SUBFRAME REINFORCING KIT

Use the dock leveler Reinforcing Kit 901-323 when a horizontal mounting plate cannot be used to anchor the top of the vehicle restraint. This kit provides brackets that can be used to securely anchor the dock leveler to the pit so that the vehicle restraint can be anchored to the dock leveler. See Fig. 26, 27 and 28.

Weld reinforcing bars between the back of the vehicle restraint back plate and the front of the subframe front angle. Reinforcing bars provided by the installer. See Fig. 29.

Fig. 26

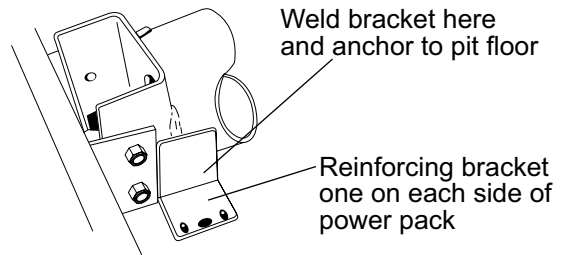


Fig. 27

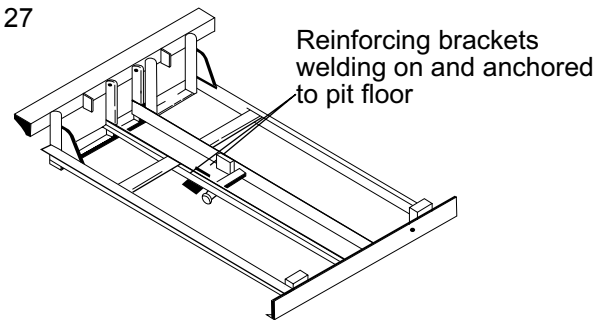


Fig. 28

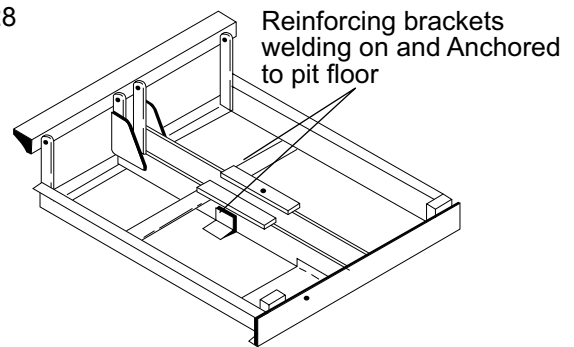
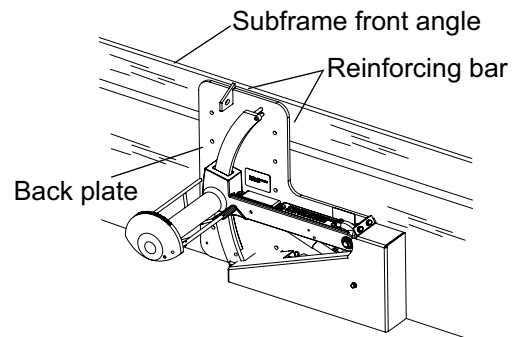


Fig. 29

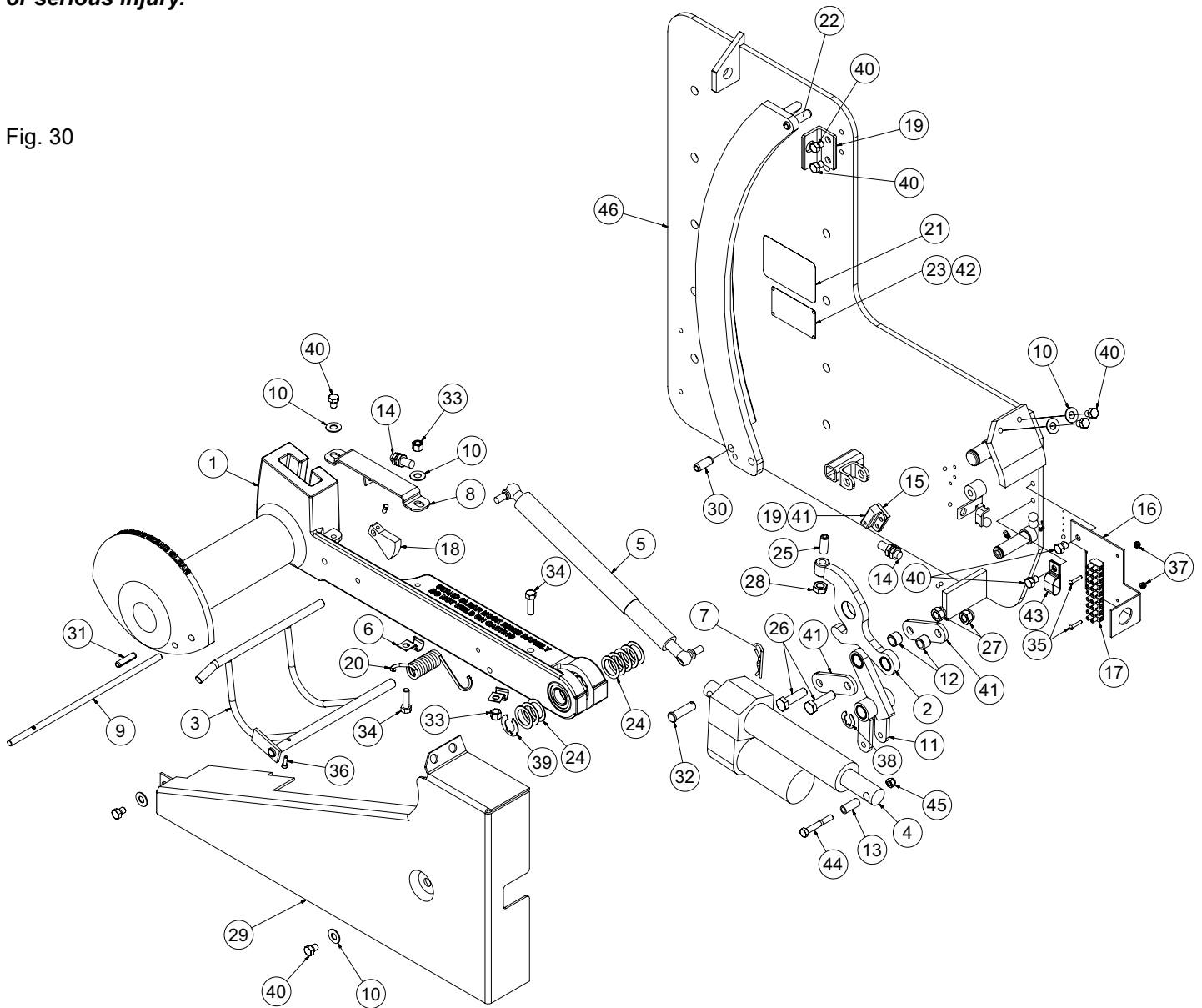


# PARTS LIST — RESTRAINT

## ⚠ 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 any way alter the product from its normal working condition at the time of purchase from KELLEY® could result in product malfunction, breakdown, premature wear, death or serious injury.

Fig. 30



## PARTS LIST — RESTRAINT, continued

Item	Quantity	Description	Part Number
1	1	HOOK ARM, BEARING ASSEMBLY	675411
2	1	LEVER ASSY, HOOK ACTUATOR PLATED, STAR4, LA	6005085
3	1	WELDMENT, SENSOR BAR, STAR 4 & 5 TRUK STOPS	712914
4	1	LINEAR ACTUATOR	341008
5	1	GAS SPRING	709472
6	2	CLIP, WIRE - .562 DIA. 1/2 ROUND	154202
7	1	1/8 DIA. HITCH PIN CLIP	231503
8	1	BRACKET, PROX. SWITCH	154134
9	1	SHAFT, SENSOR BAR	155643
10	6	PW 3/8 - .4375ID x 0.062 OD	234101
11	1	LINK ASSY, ACTUATOR, STAR4, LA	6005088
12	2	BUSHING, .503 I.D. X .748 O.D. X .563 LONG	154485
13	1	BUSHING, ACTUATOR, STAR4LA	6005093
14	2	SWITCH, PROXIMITY, 12-36V	061551
15	1	SWITCH, MAGNETIC READ	061812
16	1	BRACKET, T-STRIP MOUNT, STAR4LA	6005084
17	1	TERMINAL STRIP, NINE POLE	6013766
18	1	CAM ASSEMBLY - PROXIMITY SWITCH	713384
19	1	BRKT, STAR LIFTING	6007732
20	1	SPRING, TORSION - SENSOR BAR	101079
21	1	LABEL, STAR LOGO	709624
22	1	ROLL PIN, 1/2 DIA. X 2 LONG	6006267
23	1	TAG, SAFETY PRODUCTS	711266
24	8	PW 1 1/16 - 1.062ID x 1.5 OD	000064
25	1	HEX SOC SET SCR OVAL, 1/2-13 UNC x 1.25	131519
26	2	HHMB 1/2-13 UNC X 1-3/4 ZINC	131370
27	2	1/2-13 UNC LOCK NUT	000035
28	1	HJN - 1/2-13 UNC	214242
29	1	COVER, STEEL, STAR4, LA	6005095
30	1	ROLL PIN, 1/2 DIA. X 1-1/4 LONG	35100
31	1	RP - 3/8 x 1.1/2	35031
32	1	CLEVIS PIN	231505
33	2	NLN - 3/8-16 UNC	214538
34	2	HHMB 3/8-16 X 1-1/4 ZINC	212104

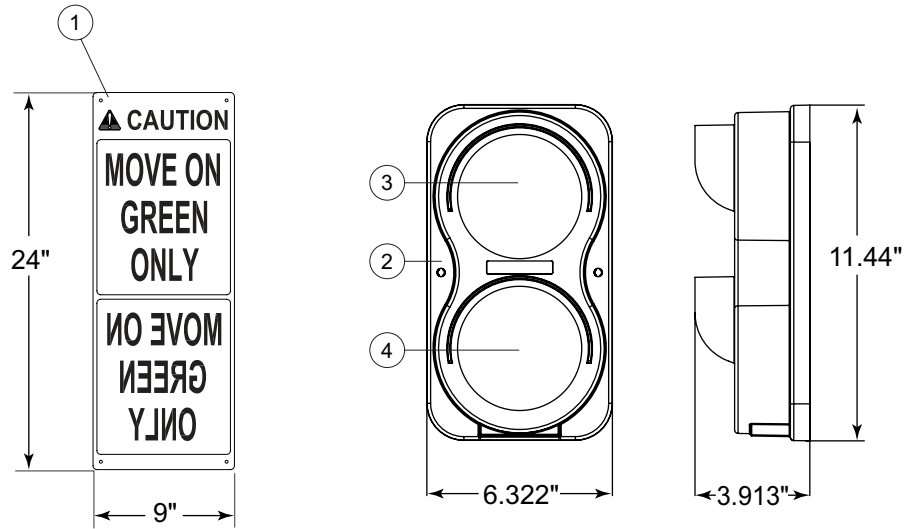
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## PARTS LIST — RESTRAINT, continued

Item	Quantity	Description	Part Number
35	2	RHMS 4-40 UNF X 3/4 LONG	6013767
36	1	SCREW, SOCKET HEAD HD #10-24 X 5/8 LONG	131250
37	2	LN 4-40 UNF NYLOCK	214107
38	1	KLIPRING, TRUARC - 3/4 in, T5304-75	236110
39	1	KLIPRING, TRUARC - 1 in, T5304-100	236114
40	9	HB 3/8-16 UNC - 0.5 - GR	000310
41	2	LINK, HOOK ACTUATOR PLATED	6005083
42	4	METAL TACK - AMTACK #3126	G0324
43	1	CLAMP, DOUBLE TUBE, 9/16" DIA.	709683
44	1	HHMB 5/16-18 UNC X 2-1/4 LONG, GR8 ZINC	6005097
45	1	LN 5/16-18 NYLOCK	214522
46	1	BACK PLATE ASSEMBLY, STAR 4, LA	6005071

# PARTS LIST — EXTERIOR SIGNS AND LIGHTS

Fig. 31



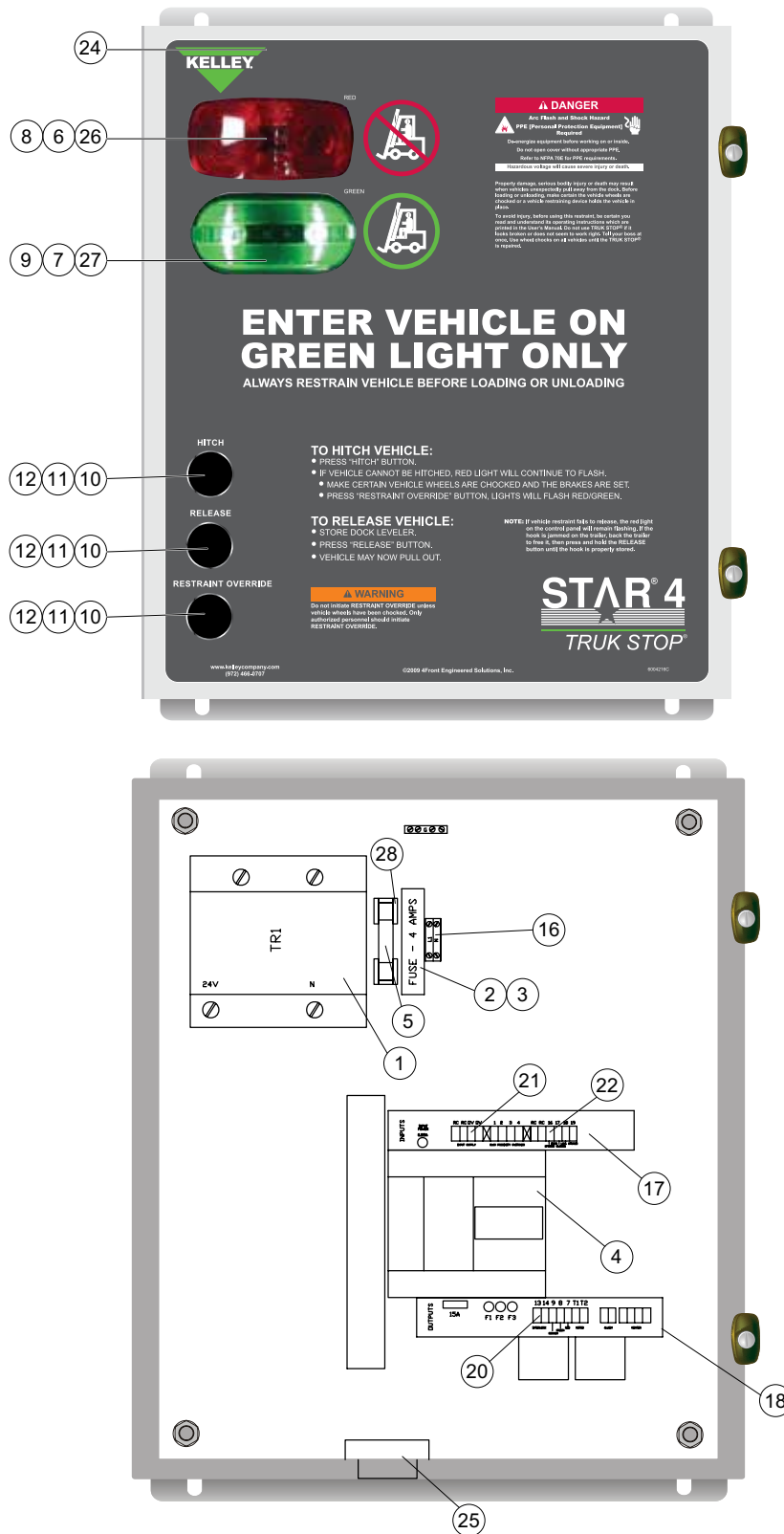
Item	Quantity	Part Description	Part Number
1	1	Outside Sign - Normal Lettering	709-832
2	1	Light Assembly - Complete (LEDs), 24VDC	6007798
3*	1	Red LED Light Assy., 24VDC	6007800
4*	1	Green LED Light Assy., 24VDC	6007801

\*Part of Item 2 (Light Assembly – Complete).



# PARTS LIST — CONTROL PANEL

Fig. 32



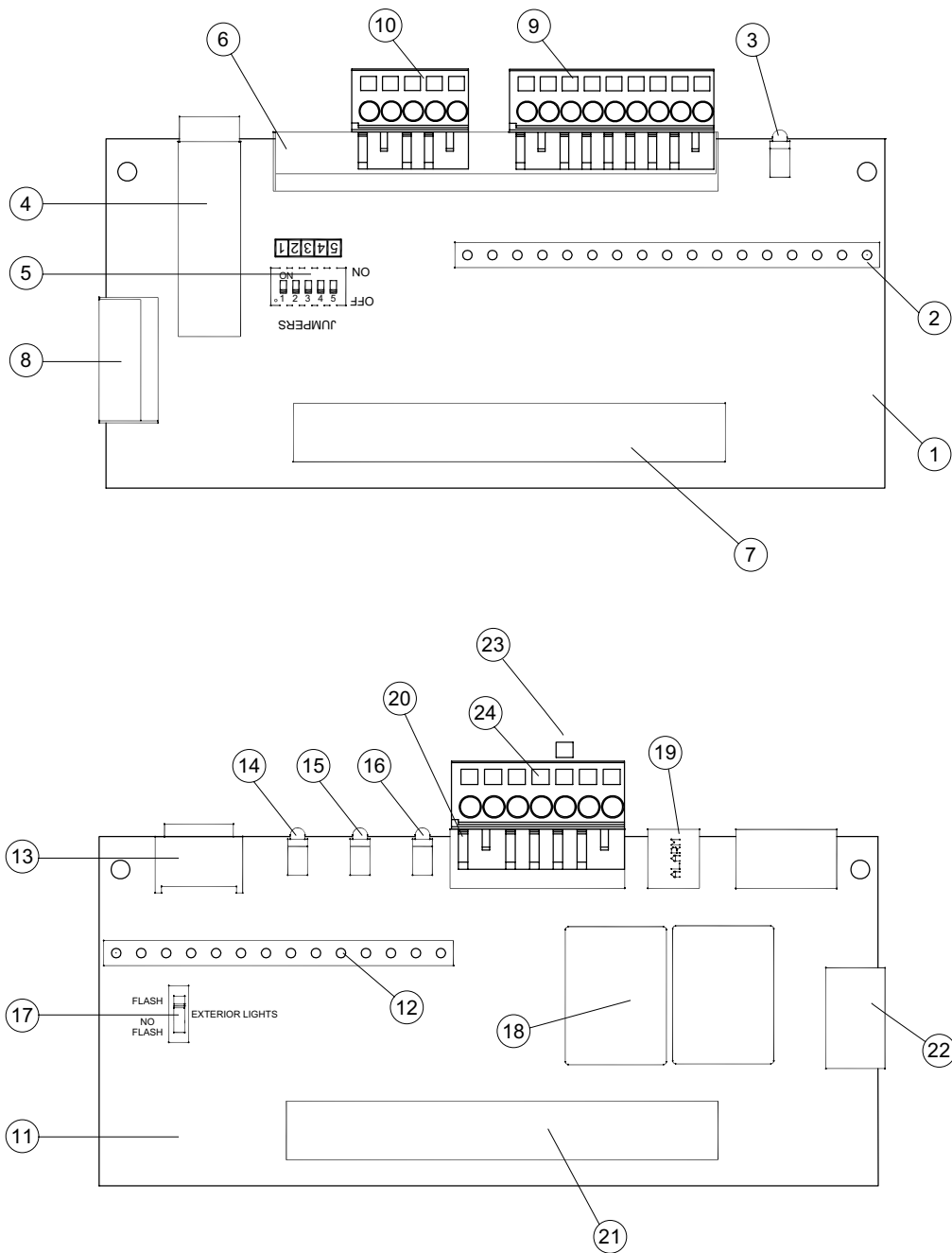
## PARTS LIST — CONTROL PANEL, continued

Item	Quantity	Part Description	Part Number
1	1	Transformer 350VA 120 - 24V	6000443
2	1	Gould CC Class fuse holder	6003299
3	1	CC Class fuse 4 amps (FU1)	FNQ-R-4
4	1	TWIDO PLC	6001056
5	1	Fuse (FU1)	MDA15
6	1	Light base — rectangle	823107
7	1	Light base — oval	823111
8*	2	LED, Red	6006375
9*	2	LED, Green	6006377
10	3	Push-button, Universal	6000506
11	3	Body, Mounting Collar	6000515
12	3	Block, Contact, Normally Open	6000516
13	1	Operating Label (not shown)	6000534
14	2	Terminal, Endplate (not shown)	6000539
15	1	Plain Marker (not shown)	6000540
16	2	Terminal, 2 Conductor	6000542
17	1	STAR 4 Input Board Assembly	6005664
18	1	STAR 4 Output Board Assembly	6005665
19	2	18 Pole Female Backplate Panel Mount Plug (not shown)	6003315
20	1	9 Pole Female Field Terminal	6003316
21	1	7 Pole Female Field Terminal	6003317
22	1	5 Pole Female Field Terminal	6003318
23	3	Push-button For Wago Field Terminals (not shown)	6003319
24	1	STAR 4 Control Panel Label	6004216
25	1	Audible Alarm	6003335
26	1	Lens Only, RED, Rectangular	823100
27	1	Lens Only, GREEN, Oval	AP0027
28	1	Fuse holder	6000538

\*2 each included in replacement bulb kit AP1579 LRU package.

# PARTS LIST — INPUT/OUTPUT BOARDS

Fig. 33



## PARTS LIST — INPUT/OUTPUT BOARDS, continued

Item	Quantity	Part Description	Part Number
1	1	Complete Input Card Assy.	6005664
2	1	PLC Interface Header*	—
3	1	Input Card Power Supply Fuse LED*	—
4	1	Input Card Power Supply Fuse- 0.25A	3AG 0.25A
5	1	Dip Switch - Input Option Selection*	—
6	1	Field Terminal Connector*	—
7	1	Manufacturing Terminal Connector*	—
8	1	Input Expansion*	—
9	1	9 Position Field Terminal Block	6004803
10	1	5 Position Field Terminal Block	6004801
11	1	Complete Output Card Assembly	6005665
12	1	PLC Interface Header*	—
13	1	Actuator Supply Fuse - 15 AMP	AST 15A 32V
14	1	Actuator Fuse LED Indicator*	—
15	1	Outside Lights Supply LED Indicator*	—
16	1	Inside Lights Supply LED Indicator*	—
17	1	Outside Lights Flasher Control Switch*	—
18	1	Raise and Lower Control Relays*	—
19	1	Audible Alarm Kit Socket*	—
20	1	Field Terminal Connector*	—
21	1	Manufacturing Terminal Connector*	—
22	1	Output Expansion Card Port*	—
23	1	Field Terminal Opening Push Lever	6004806
24	1	7 Position Field Terminal Block	6004807

\*Included in assy. 6005664

# PIVOT PIN GUARD KIT INSTRUCTIONS

## INSTALLATION INSTRUCTIONS

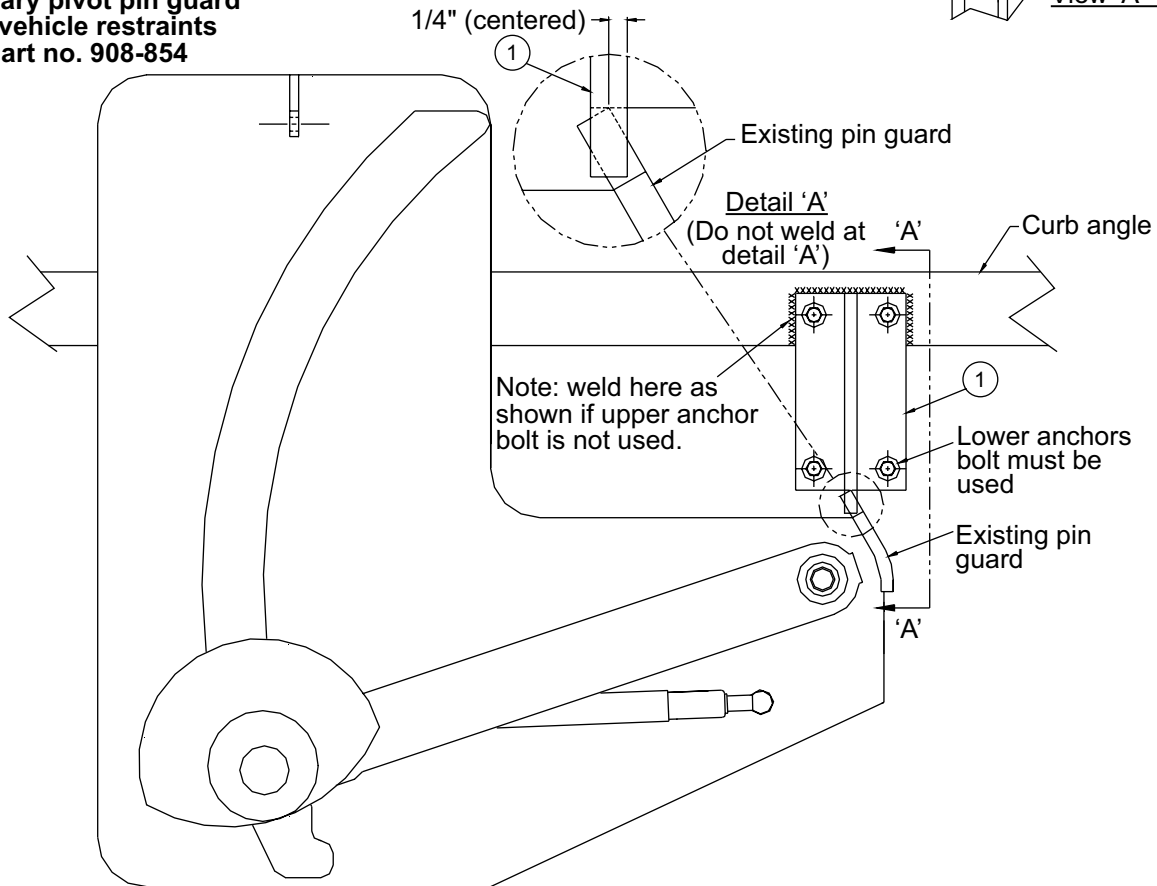
1. Place hook in the down position.
2. Located Item 1 directly above the existing pin guard. (See Fig. 34.) with its bottom edge aligned as shown in detail 'A'.
3. Using Item 1 as a template drill four 1/2" dia. x 3-1/2" deep mounting holes.
4. Fasten Item 1 to the dock face using the 4 anchor bolts (two anchor bolt if welding) torqued to 40 ft-lbs. See Wedge Anchor installation instructions on page 5.
5. Grind smooth the mating surfaces of Item 1 and existing pin guard. Repaint this area and any welds to prevent rust.

### NOTE:

To Eliminate drilling through the curb angle, weld the upper end of the pin guard to the curb angle as noted below. Do not weld Item 1 to the existing pin guard. This area of the restraint must be free to move.

Fig. 34

**Installation instructions  
auxiliary pivot pin guard  
for vehicle restraints  
part no. 908-854**



Item	Quantity	Description	Part Number
1	1	Pivot Pin Guard	712-634
2	4	Anchor Bolt, 1/2 x 3-1/2	131-260



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## LIMITED WARRANTY

KELLEY® warrants that this VEHICLE RESTRAINT 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 KELLEY®, or 2) the date of installation of the VEHICLE RESTRAINT by the original purchaser, provided that the owner maintains and operates the VEHICLE RESTRAINT in accordance with this User's Manual. In the event that this VEHICLE RESTRAINT proves deficient in material or workmanship within the applicable limited warranty period, KELLEY® will, at its option:

1. Replace the VEHICLE RESTRAINT, or the deficient portion of either, without charge to the owner (excluding any cost of removal or reinstallation which shall be the sole responsibility of the purchaser); or
2. Alter or repair the VEHICLE RESTRAINT, on site or elsewhere, without charge to the owner.

The limited warranty stated in the preceding paragraph IS EXCLUSIVE AND IT IS IN LIEU OF ANY OTHER GUARANTEES AND WARRANTIES, EXPRESS OR IMPLIED. The limited warranty does not cover any failure caused by improper installation, abuse, negligence, or failure to maintain and adjust the VEHICLE RESTRAINT properly. Parts requiring replacement due to damage resulting from vehicle impact, abuse, or improper operation are not covered by this warranty. KELLEY® disclaims any responsibility or liability for any loss or damage (including, without limitation, direct, indirect or consequential damages, or lost profits or production time) that results from the use of unauthorized replacement parts or modification of the VEHICLE RESTRAINT. KELLEY® sole obligation with regard to a VEHICLE RESTRAINT that proves to be deficient in material or workmanship shall be as set forth in its standard warranty above (i.e., KELLEY® will, at its option, repair or replace the VEHICLE RESTRAINT or portion thereof, without charge to the purchaser.).

This limited warranty does not cover any failure caused by improper installation, abuse, negligence, or failure to properly maintain and adjust the VEHICLE RESTRAINT. This limited warranty will be void or of no effect if the original purchaser does not notify KELLEY® warranty department within ninety (90) days after the product deficiency is discovered. Parts requiring replacement due to damage resulting from vehicle impact, abuse, or improper operation are not covered by this warranty. KELLEY® disclaims any responsibility or liability for any loss or damage that results from the use of unauthorized replacement parts or modification of the VEHICLE RESTRAINT.

**THERE ARE NO WARRANTIES, EXPRESS OR IMPLIED, WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF, AND THERE IS NO WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.**

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Please direct questions about your vehicle restraint to your local distributor or to 4Front Engineered Solutions, Inc.

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Carrollton, TX. 75006

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