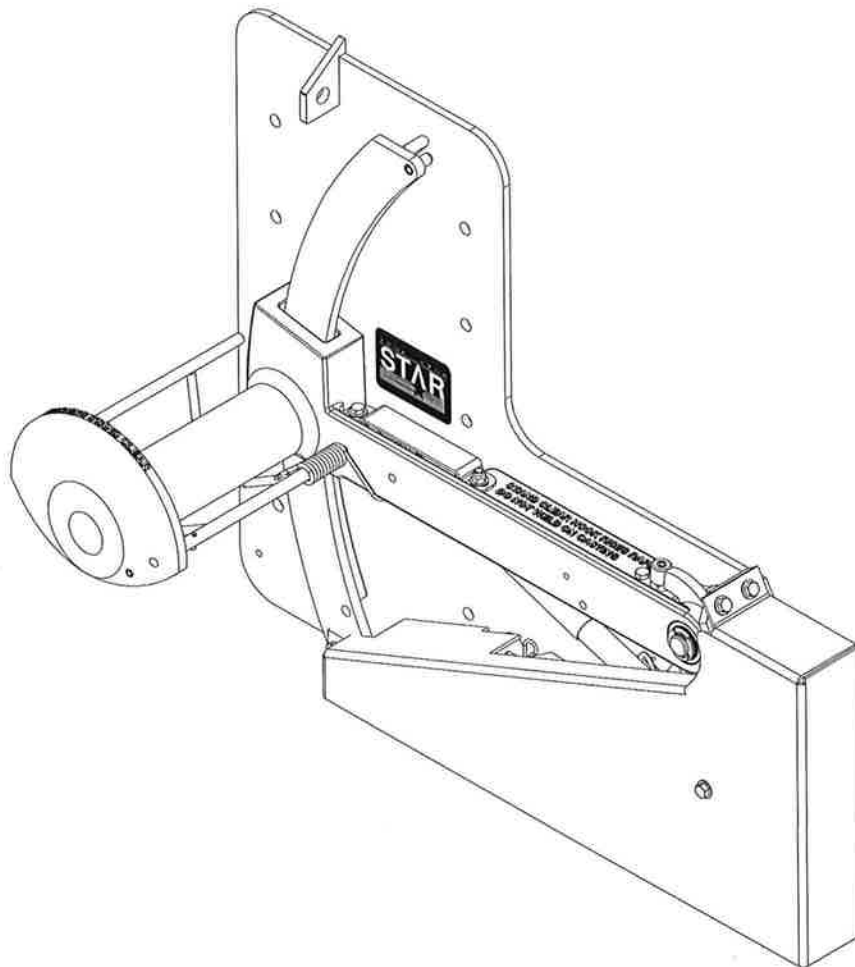




KELLEY[®]

STAR[®] TRUK STOP[®] Vehicle Restraint STAR[®] 4 LA



This manual applies to vehicle restraints manufactured beginning December 2010 with the serial numbers 61000001 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. 6005639G

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. b) Faulty proximity sensor LS2	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) 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. b) Signal from proximity sensor LS1, causes actuator clutch to slip. c) Faulty proximity sensor LS1.	a) Check for obstruction preventing restraint from restoring. 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) Check if LS1 LED on. If signal present, check LS1 for short circuit. Replace or adjust proximity sensor LS1 as required.
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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"> a) LED light(s) burned out. b) Disconnected or damaged wires. 	<ul style="list-style-type: none"> a) Check lights. Replace if necessary. 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.
2. Outside light(s) do not come on.	<ul style="list-style-type: none"> a) Light(s) burned out. b) Disconnected or damaged wires. c) LED polarity incorrectly wired. 	<ul style="list-style-type: none"> a) Check lights. Replace if necessary. 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. c) Reverse polarity.
3. Outside light(s) do not flash.	<ul style="list-style-type: none"> a) "Flash/No Flash" switch on STAR 4 Output Board is set to "No Flash" position. b) Faulty STAR 4 Output Board. 	<ul style="list-style-type: none"> a) Change the switch to the "Flash" position. See Fig. 33, item 18. b) If changing the switch position does not cause the lights to start flashing replace the faulty STAR 4 Output Board.

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.

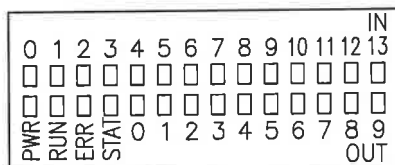
INPUT SIGNALS

- 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

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

STEP 1

Hook raising (attempting hitch)

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

STEP 2

Hook raised (LS2 contact)

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

STEP 3

Hook raised (LS4 contact)

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

STEP 4

Lowering (releasing)

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

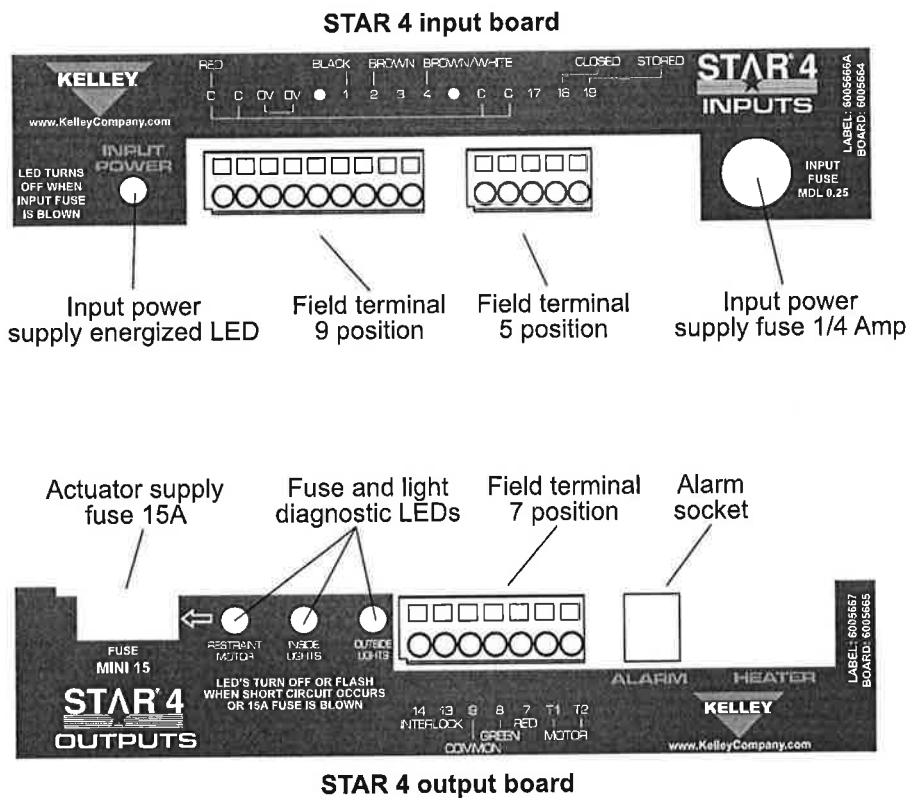
RESTRAINT ERRORS

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

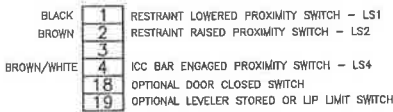
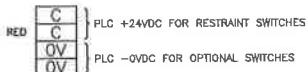
NOTE:

For 24V incoming power consult factory.

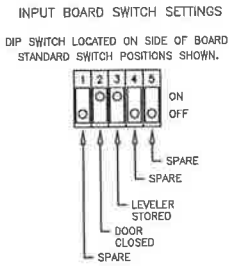
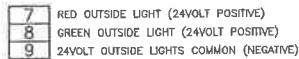
POWER SUPPLY TERMINALS



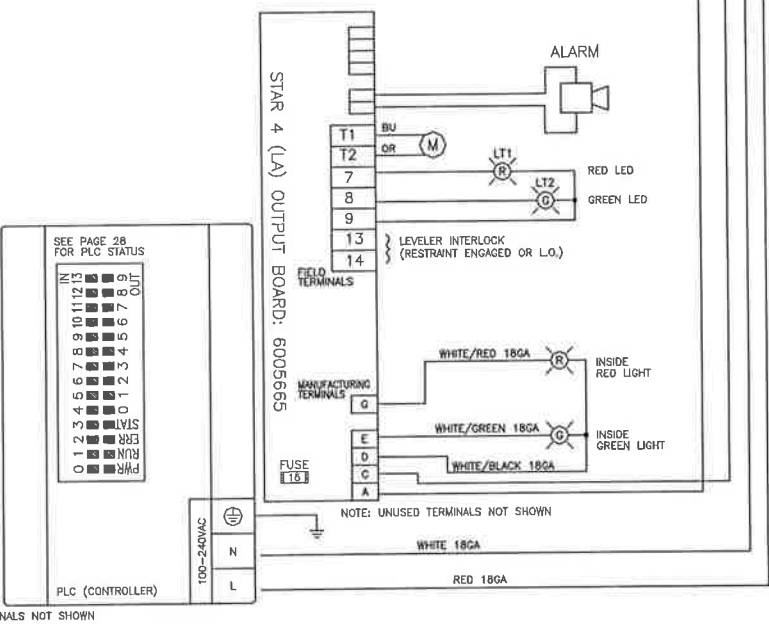
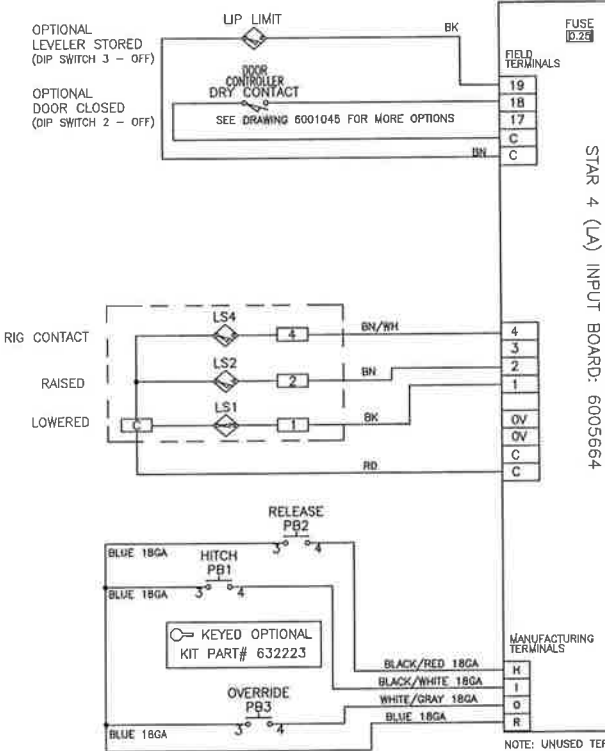
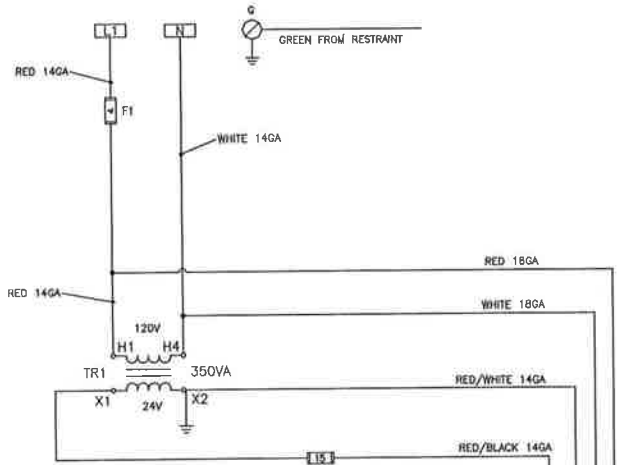
FIELD TERMINALS (INPUTS)



FIELD TERMINALS (OUTPUTS)



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



PARTS REPLACEMENT INSTRUCTIONS

▲ WARNING

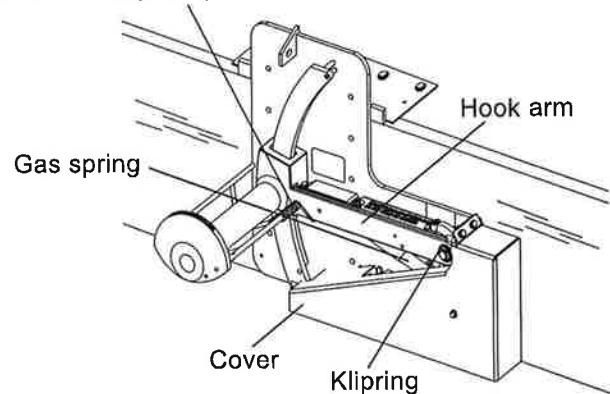
Do not service this product unless you have read and followed the Safety Practices, Warnings, and Operation instructions contained in this manual. Failure to follow these safety practices could result in death or serious injury.

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 klipring 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 Top roll pin

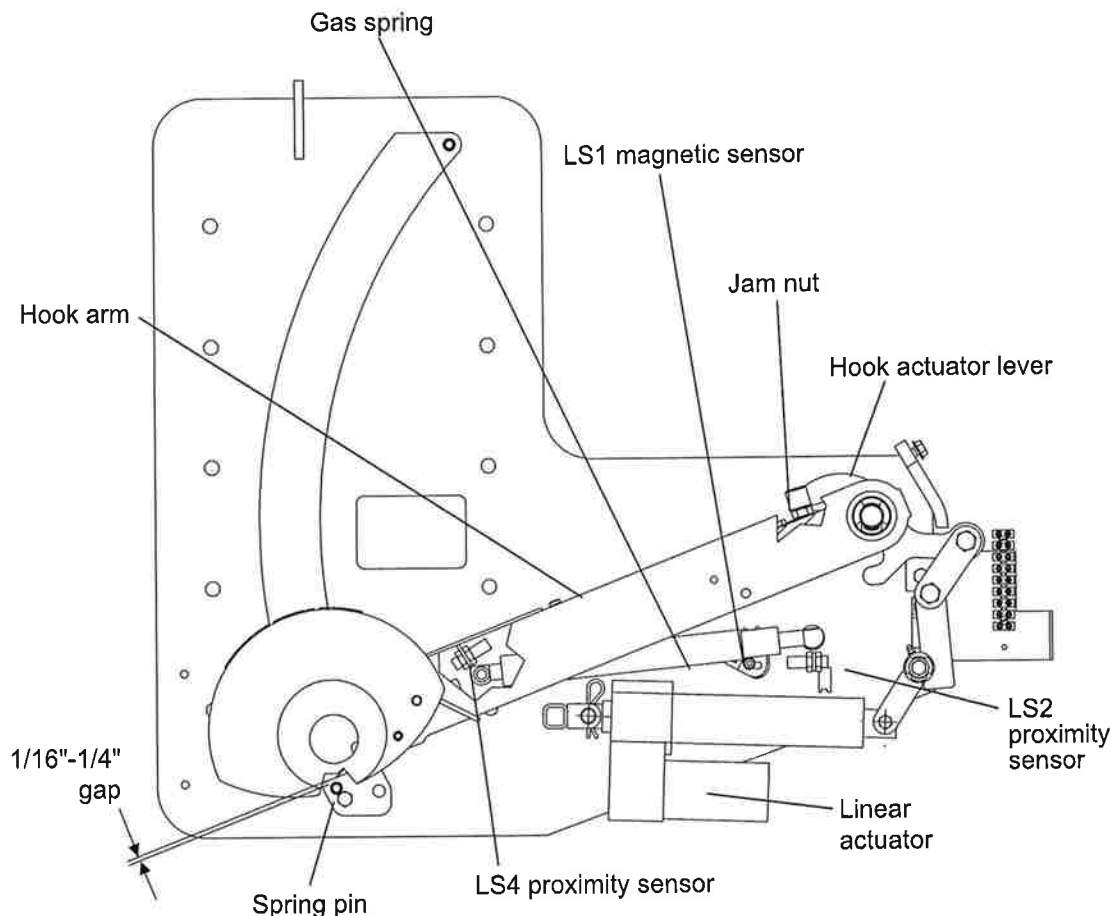


ADJUSTMENTS

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

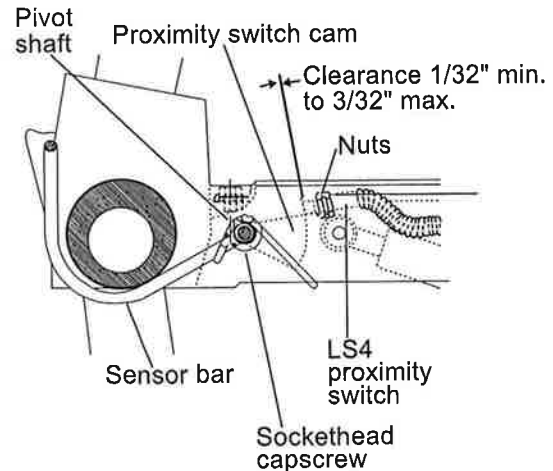
The operation range for RIG sensing of the vehicle restraints is from 11" to 30" above the drive. If the 11" minimum specification cannot be achieved, the proximity switch cam and sensor bar have come out of adjustment. When properly adjusted, a slight (about 3/16") deflection of the sensor bar will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

1. Loosen the socket head cap screw that locks the proximity switch cam 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

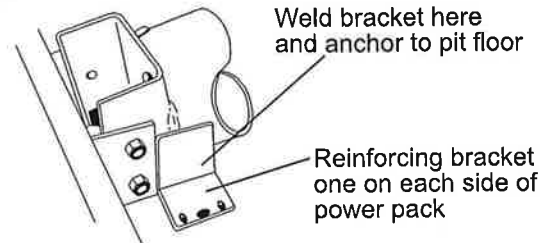


Fig. 27

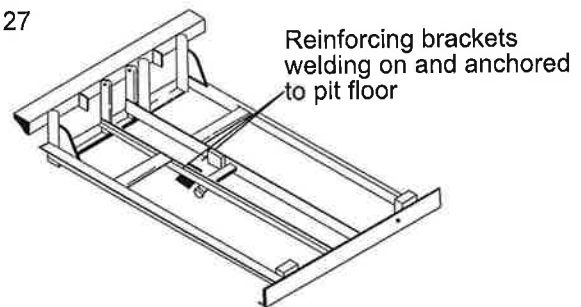


Fig. 28

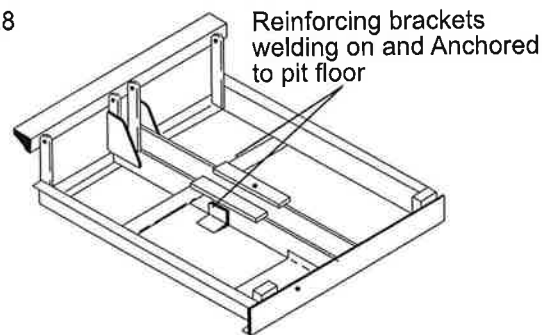
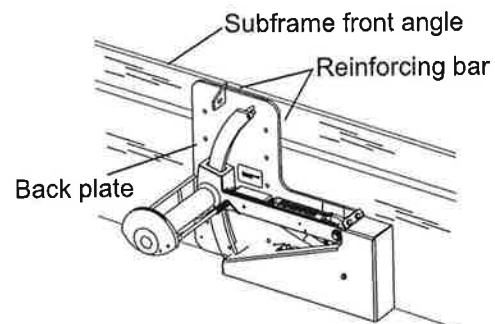


Fig. 29

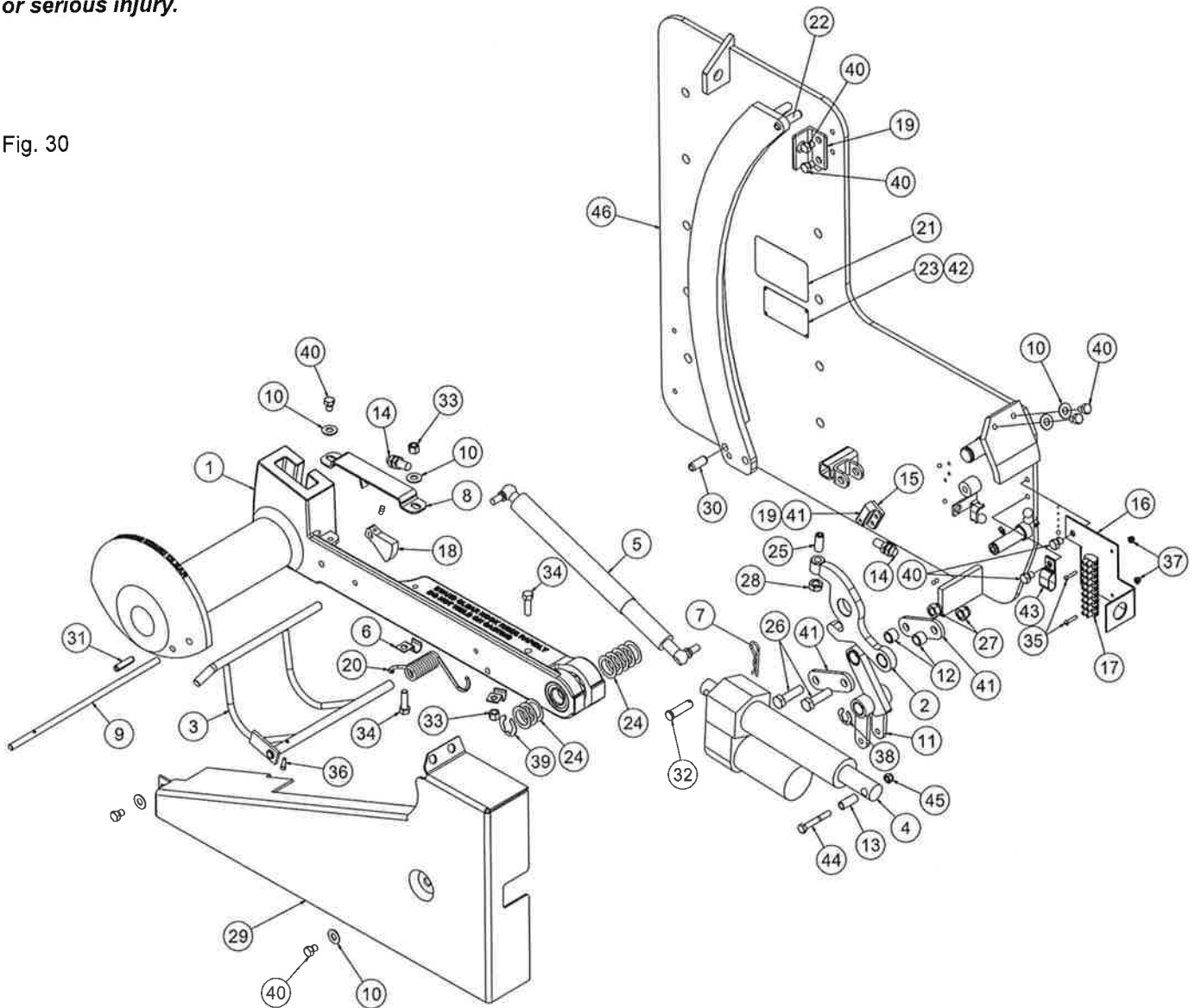


PARTS LIST — RESTRAINT

⚠ 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

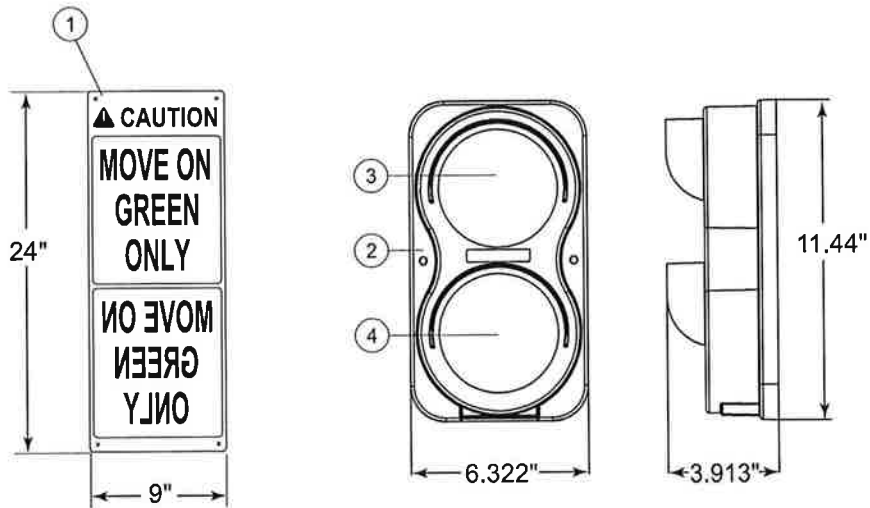
Item	Quantity	Description	Part Number
1	1	HOOK ARM, BEARING ASSEMBLY	675411
2	1	LEVER ASSY, HOOK ACTUATOR PLATED, STAR4, LA	6005085
3	1	WELDMENT, SENSOR BAR, STAR 4 & 5 TRUK STOPS	712914
4	1	LINEAR ACTUATOR	341008
5	1	GAS SPRING	709472
6	2	CLIP, WIRE - .562 DIA. 1/2 ROUND	154202
7	1	1/8 DIA. HITCH PIN 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	541006
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

PARTS LIST — RESTRAINT, continued

Item	Quantity	Description	Part Number
35	2	RHMS 8-32 UNF X 7/8 LONG	6000582
36	1	SCREW, SOCKET HEAD HD #10-24 X 5/8 LONG	131250
37	2	LN 8-32 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

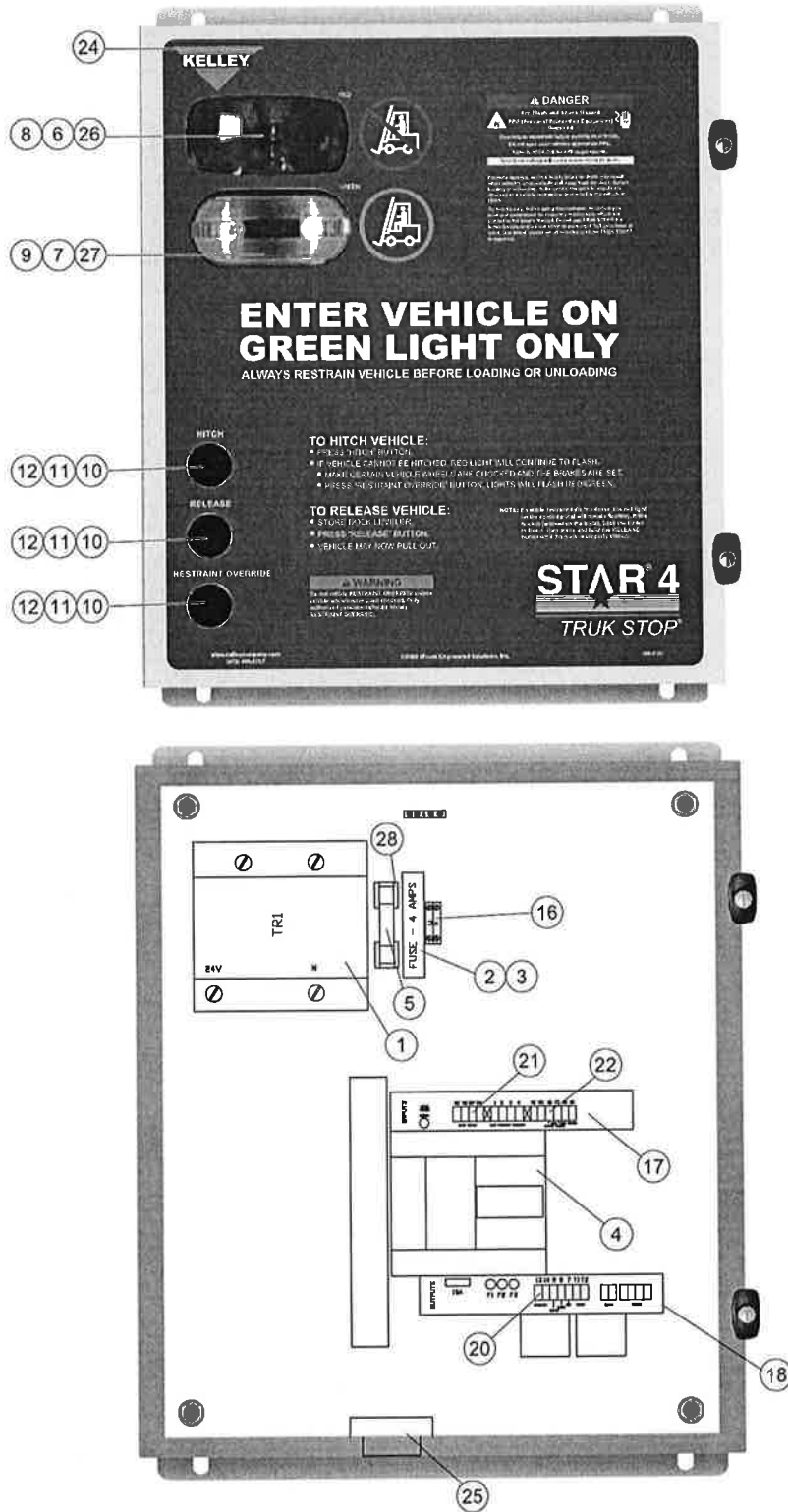


Item	Quantity	Part Description	Part Number
1	1	Outside Sign - Normal Lettering	709-832
2	1	Light Assembly - Complete (LEDs), 24VDC	6007798
3*	1	Red LED Light Assy., 24VDC	6007800
4*	1	Green LED Light Assy., 24VDC	6007801

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

PARTS LIST — CONTROL PANEL

Fig. 32



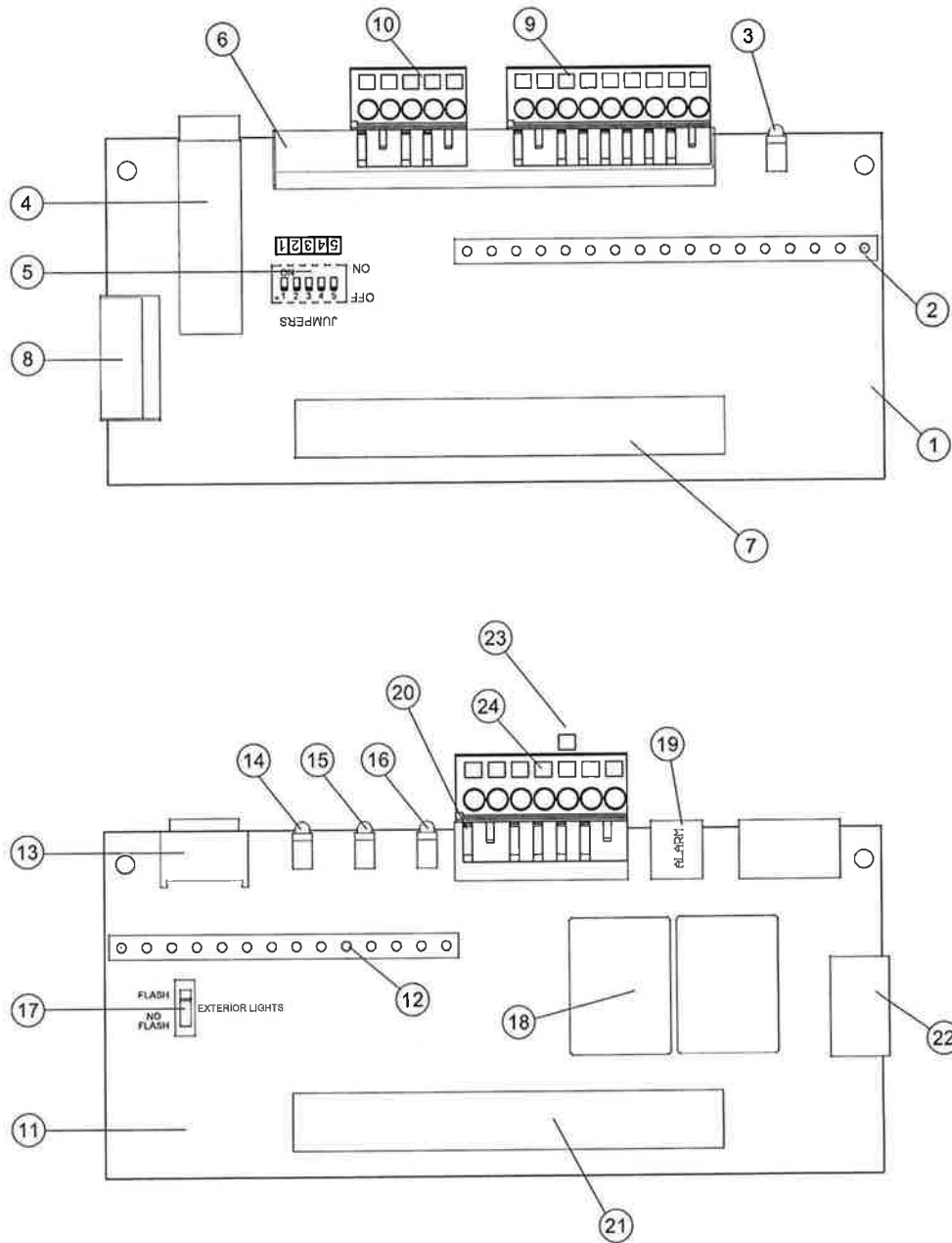
PARTS LIST — CONTROL PANEL, continued

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

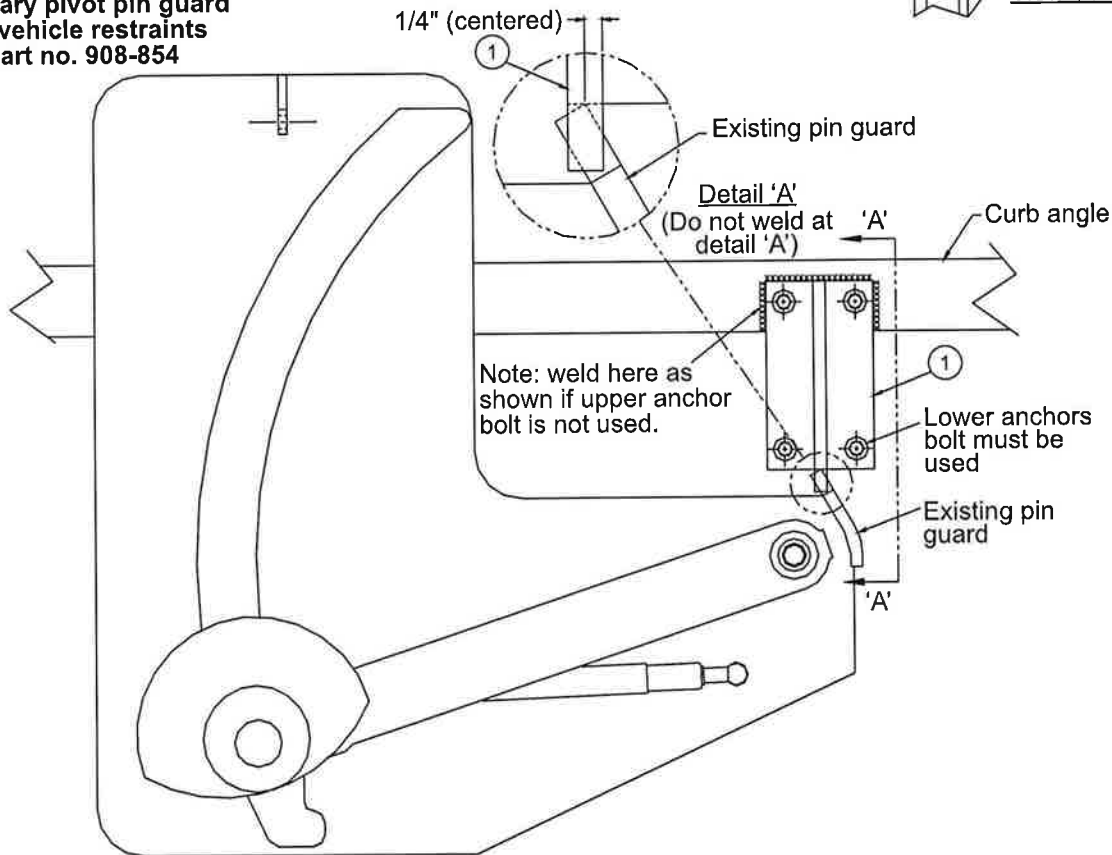
1. Place hook in the down position.
2. Located Item 1 directly above the existing pin guard. (See Fig. 34.) with its bottom edge aligned as shown in detail 'A'.
3. Using Item 1 as a template drill four 1/2" dia. x 3-1/2" deep mounting holes.
4. Fasten Item 1 to the dock face using the 4 anchor bolts (two anchor bolt if welding) torqued to 35-45 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 3-3/4	131-260