SERCO®

Vehicle Restraints

PitBull® SAFETY-LOC®

SL60, SL70, SL80 and SL90

This manual applies to PitBull® SAFETY-LOC® 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. 824-231J

TABLE OF CONTENTS

INTRODUCTION

Welcome and thank you for choosing this vehicle restraint from SERCO®.

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.

SAFETY SIGNAL WORDS

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

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

⚠DANGER

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

⚠WARNING

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

⚠CAUTION

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

NOTICE

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

SAFETY PRACTICES

⚠WARNING

Read these safety practices before installing, operating or servicing the PitBull® SAFETY-LOC®. 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 PITBULL® SAFETY-LOC®. If you do not understand the instructions, ask your supervisor to teach you how to use the vehicle restraint.

Be certain to follow the instructions in this manual.

INSTALLATION AND OPERATION

Do not use this vehicle restraint until you have received proper training. Improper use could result in property damage, bodily injury and/or death. Read and follow the complete OPERATING INSTRUCTIONS on pages 19 and 20 before use. If you do not understand the instructions, ask your supervisor to explain them to you or call your authorized SERCO® distributor.

DO NOT USE THE VEHICLE RESTRAINT IF IT APPEARS DAMAGED OR DOES NOT OPERATE PROPERLY. Inform your supervisor immediately.

Do not operate the vehicle restraint until all bystanders are clear of all moving parts.

Do not install the vehicle restraint anchor bolts into aged or unsound concrete. Improper installation of the vehicle restraint could result in death or serious injury to dock workers or other users of the vehicle restraint.

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

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

MAINTENANCE AND SERVICE

If the vehicle restraint does not operate properly using the procedures in this manual, BE CERTAIN TO CHOCK THE VEHICLE WHEELS AND ENSURE THE BRAKES ARE SET BEFORE LOADING OR UNLOADING. Call your local SERCO® distributor for service.

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

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

Do not use the vehicle restraint as a step.

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

If equipped with heater there is a possible burn hazard if turned on.

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

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

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

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

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 the 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 surface on which the vehicle restraint will be mounted must be flat to prevent binding of the mechanism. If the mounting surface is not flat it may be necessary to use shims or physically modify the dock face or driveway to provide a flat mounting surface.

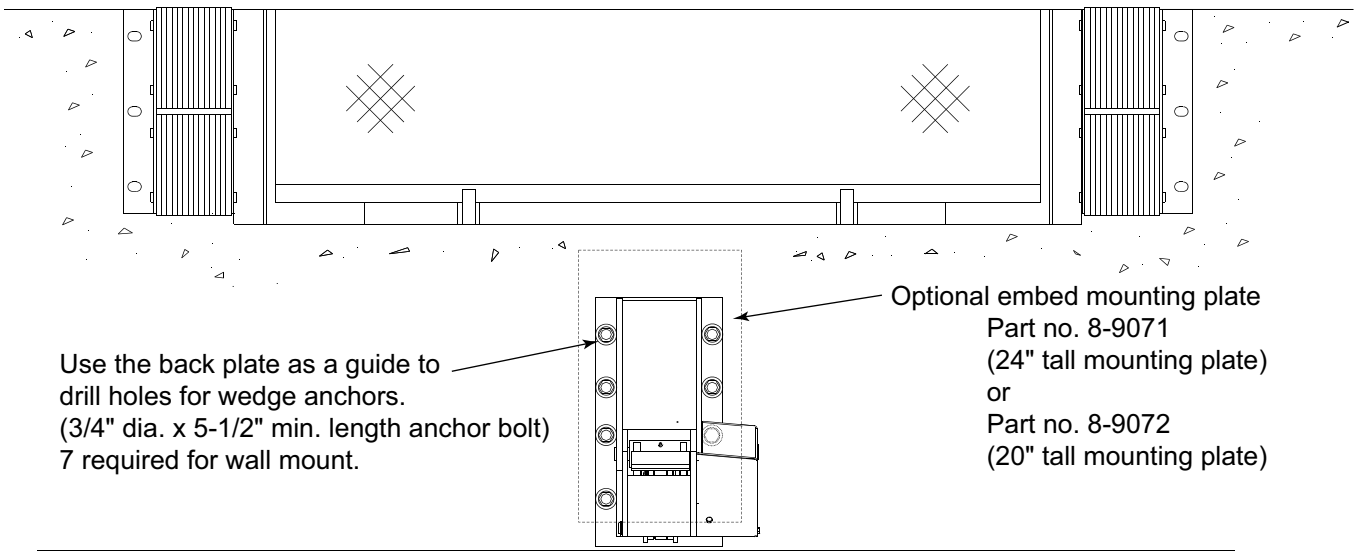
   PitBull® Safety-Loc® restraints require a 4" bumper projection from the front of the bumper to the rear of the back plate of the restraint (the mounting surface). Less than 4" of projection can allow vehicle RIG bar to damage the restraint.

2. The standard anchors included with this product may only be used on docks constructed of solid concrete. Docks constructed with other materials require special mounting consideration. Contact your local SERCO® distributor for information.

TOOLS REQUIRED

- Welder
- Impact or rotary hammer drill with 3/4" diameter concrete drill bit, (also 7/8" diameter if driveway mount option is to be installed)
- 1-1/8" inch wrench
- General hand tools
- Touch up paint (Cold spray galvanizing)
- Torque wrench (110 ft-lb min.)
- 1-1/8" deep socket
- Rebar cutting drill bit (3/4" or 7/8") with rotary-only drill motor
- Threaded rod installation tool for rotary hammer drill with 3/4" coupler (driveway mount only).

Fig. 1 **CONCRETE DOCK FACE** (Standard installation)



⚠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. Never allow anyone to stand on or near the restraint when it 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, which could result in death or serious injury.

Fig. 2 **ANCHOR TO DOCKFACE**

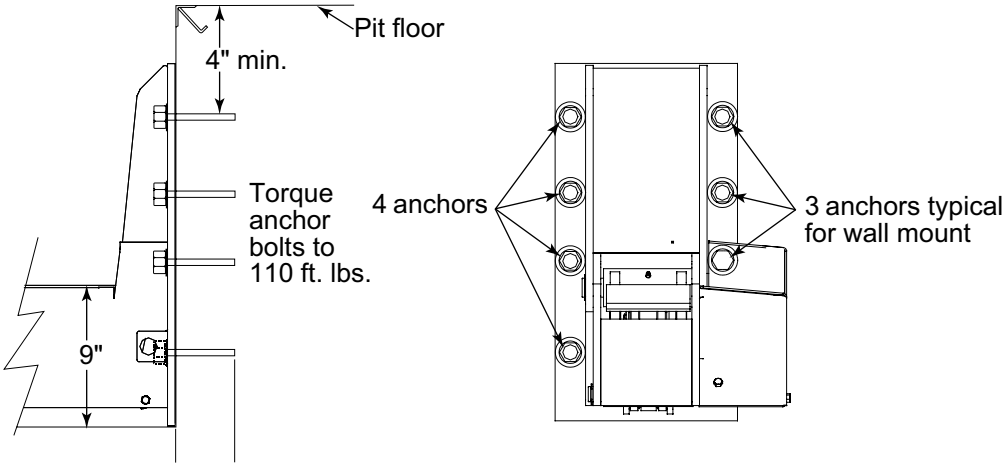
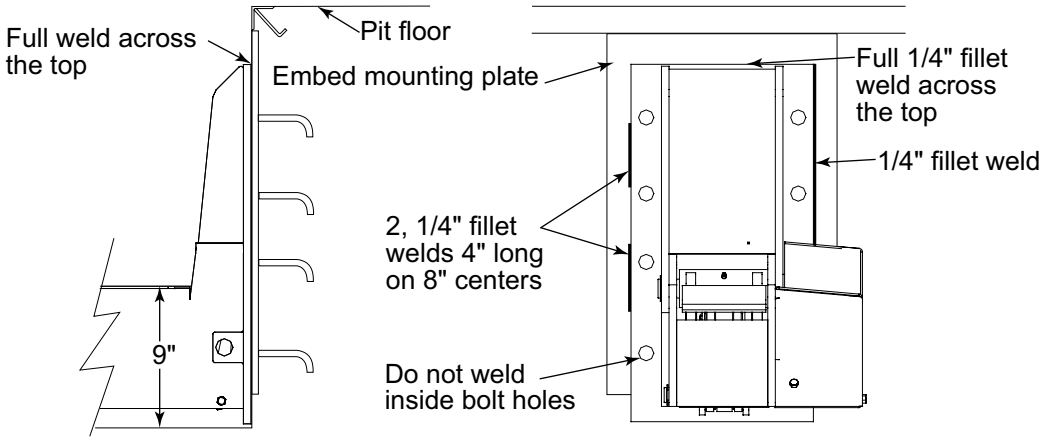


Fig. 3 **WELD TO EMBED MOUNTING PLATE** (Optional, applies to 2" stand-off bracket weld on)



INSTALLATION, continued

⚠ 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 or vehicle restraint.

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

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, which could result in death or serious injury.

Improper installation that allows the pendant dock leveler lip to support the weight of the dock leveler on the vehicle restraint could result in death or serious injury.

WALL MOUNT (Standard Installation)

1. Place the vehicle restraint on the driveway. See Fig. 1. Center it on the dock position. Operate the dock leveler with the vehicle restraint in its intended position to assure there is no interference. Make sure the lip, when in the storage position, does not interfere. Use the back plate as a guide to drill the 7 holes for the 3/4" diameter wedge anchors, see Fig. 2 and 11. Install the wedge anchors per installation instructions on page 10. Place the anchors in the holes as they are drilled to prevent the vehicle restraint from shifting during drilling. Ensure back plate lies flat with dock face - shim if necessary. Torque the anchors to 110 ft. lbs.

⚠ WARNING

Improper installation that allows a pendant dock leveler lip to be supported by the restraint could result in death or serious injury. Install lip deflector plate(s) as required to avoid any chance of the pendant lip storing on top or behind the restraint backplate (see Fig. 4). Materials supplied by the installer.

2. If steel embed plate is used, see instructions in Fig. 1 and 3.

⚠ WARNING

Ensure area is well ventilated when welding galvanized metal, fumes may be toxic.

3. For low dock installations reference Fig. 4-6. If the top anchor positions are less than 4" from the pit floor do not install them. Install pit floor mounting plate (Requires four 3/4" anchors, supplied by others) and weld to the back of the restraint as shown in Fig. 5 and 6.

INSTALLATION WITH EDGE-OF-DOCK TYPE LEVELERS

4. Stand-off or edge-of-dock levelers require a special stand-off to be used between the vehicle restraint and the dock face to maintain the min. 4" bumper projection from the front of the bumper to the rear of the back plate of the restraint (the mounting surface). See Fig. 7 and 8.

DRIVEWAY MOUNT (Optional Installation)

1. If the dock face is not suitable for anchoring, a driveway mount option is available. A special concrete pad must be poured if sound concrete at least 8" thick is not available on the driveway. See Fig. 9 and 10 for pad details. Place the vehicle restraint on the driveway, Center it on the dock position. Operate the dock leveler with the vehicle restraint in its intended position to assure there is no interference. Make sure the lip when in the storage position does not interfere.

2. Use the restraint rear base plate as a guide to drill the four 7/8" diameter x 6-5/8" deep holes for the four chemical anchors supplied by SERCO®. Use the front base plate as a guide for drilling the 3/4" diameter holes for the two 3/4" x 7" wedge anchors supplied by SERCO®. See Fig. 9, 10 and 12. Place the front anchors in the holes as they are drilled to prevent the vehicle restraint from shifting during drilling. Torque the wedge anchors to 110 ft. lbs.

3. Install the chemical anchors per installation instructions on page 11.

Fig. 4 **LOW DOCK HEIGHT**

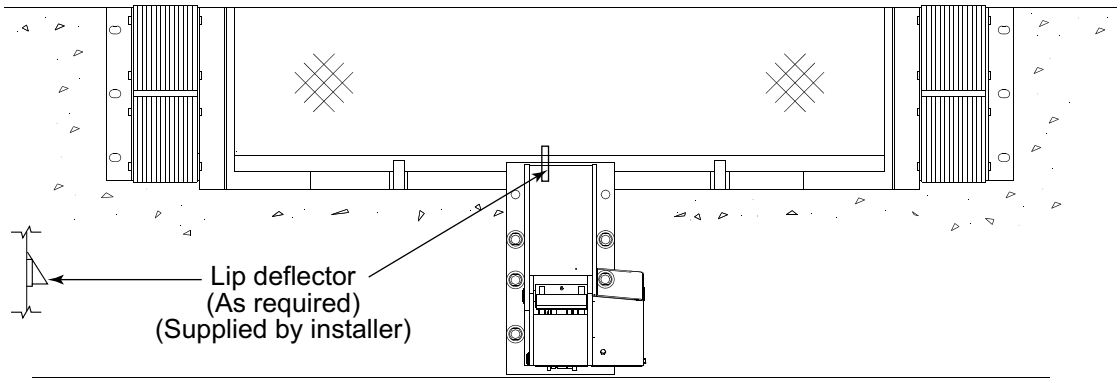
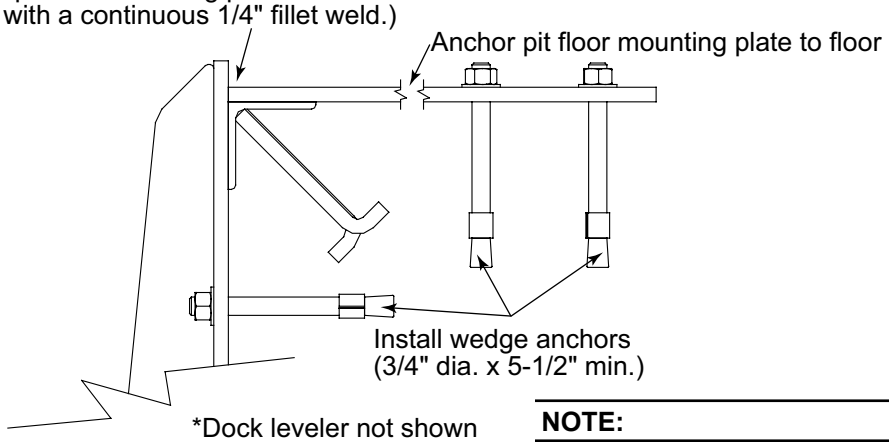


Fig. 5



NOTE:

If top anchor positions in the mounting plate are less than 4" from the pit floor do not install as concrete may fracture. Install pit floor mounting plate (requires 4 anchors) and weld to the back of the mounting plate or to the curb angle as shown. (pit floor mounting plate part no. 586-2935)

Fig. 6

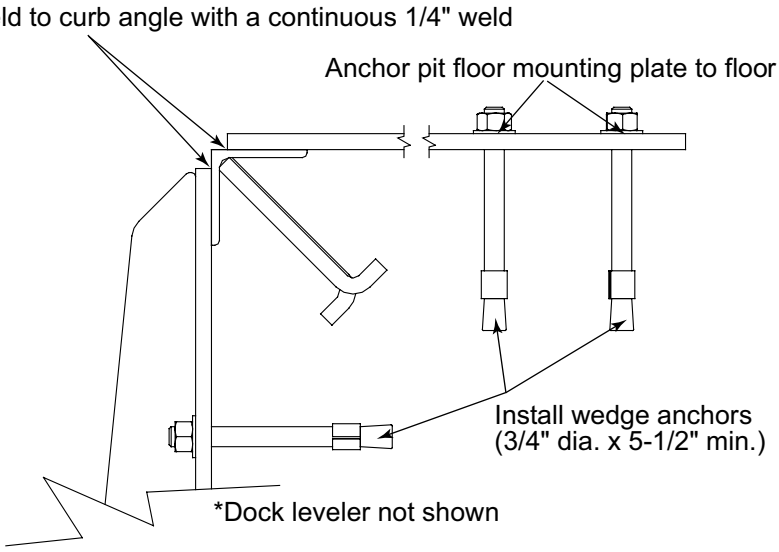


Fig. 7

CANTILEVERED OR EDGE-OF-DOCK LEVELER

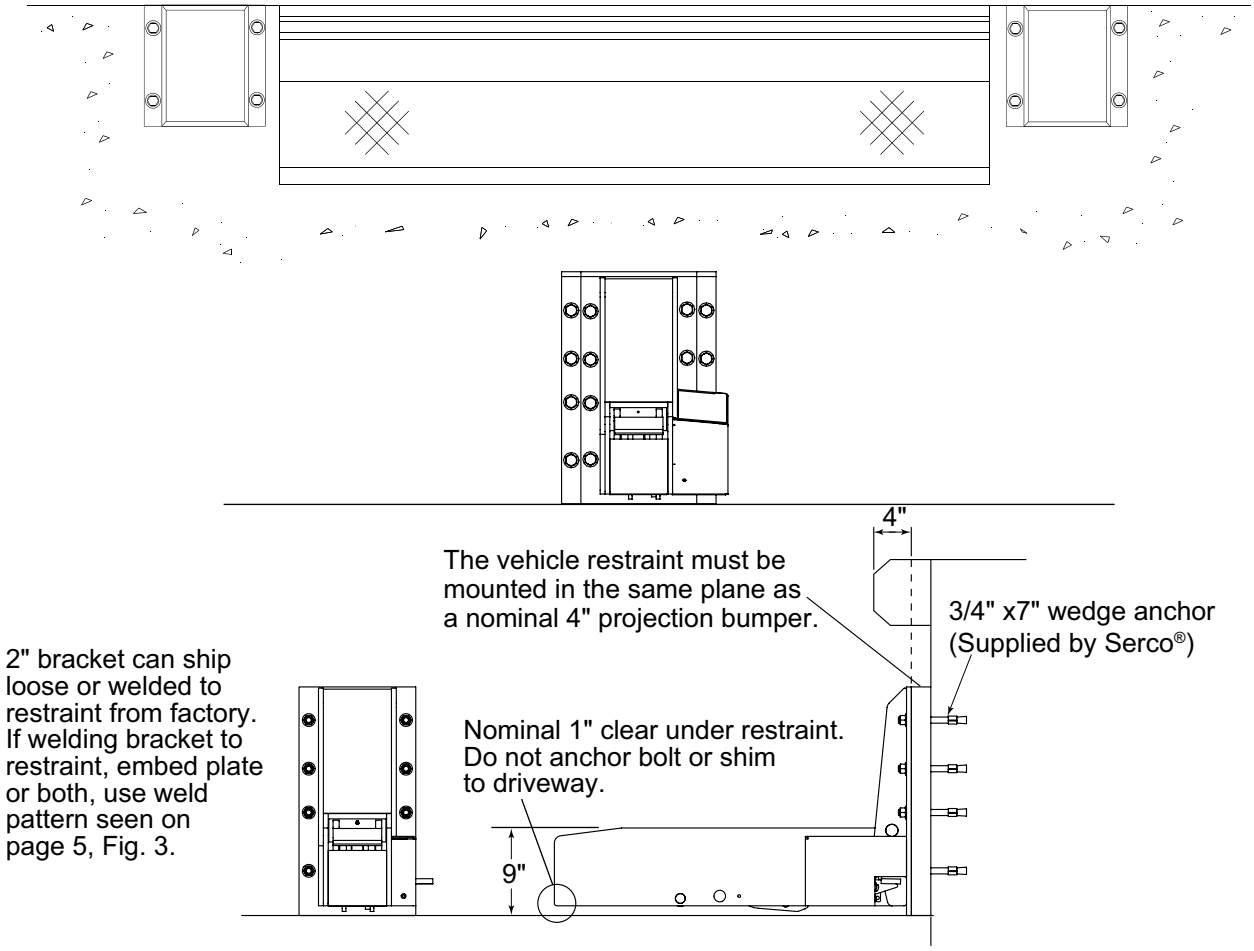
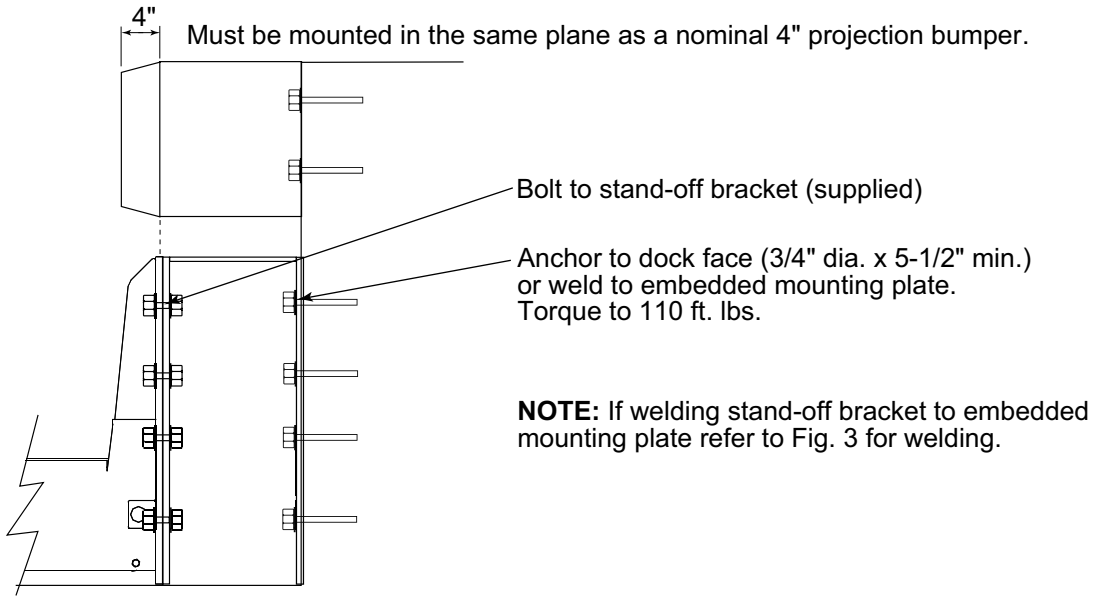


Fig. 8



⚠WARNING

Concrete pad size shown is a general recommendation in size so that the vehicle weight is on pad. Due to different soil, drainage and drive conditions a civil engineer must be consulted to detail the correct pad size for the particular application. Failure to do so may cause the pad to fail to hold the restraint in place and could result in death or serious injury.

Fig. 9 **DRIVEWAY MOUNT** (Recommended when dock face is not suitable for lock mounting)

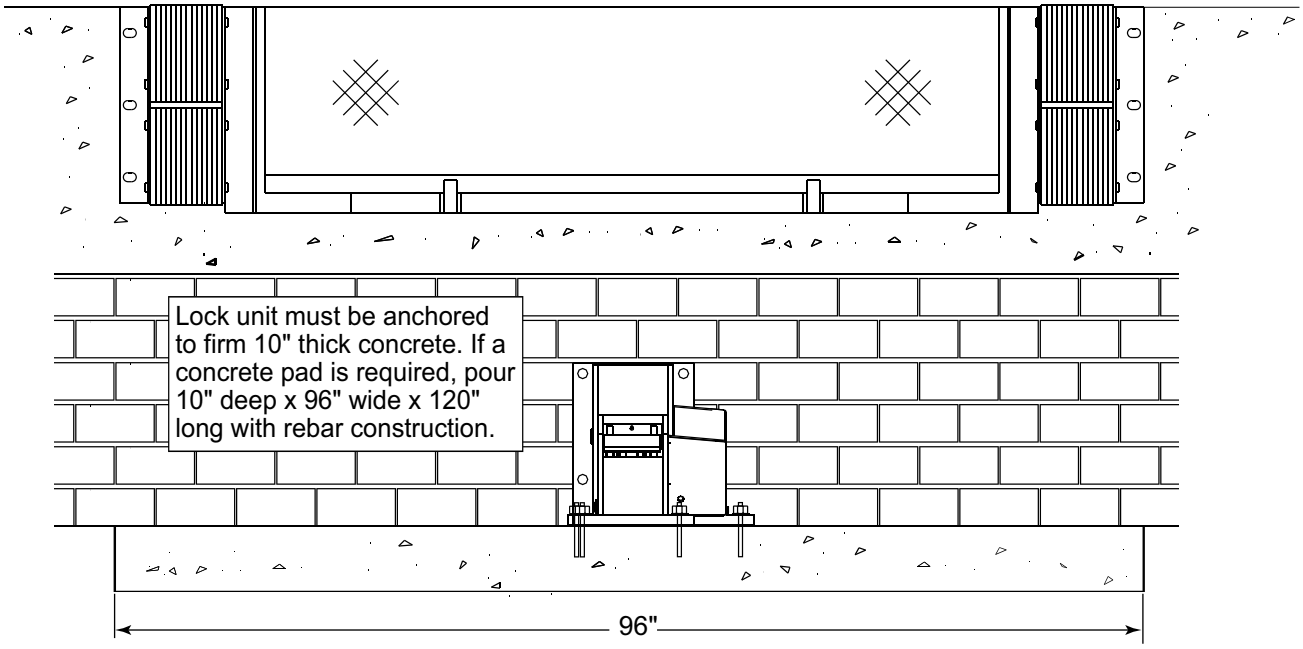
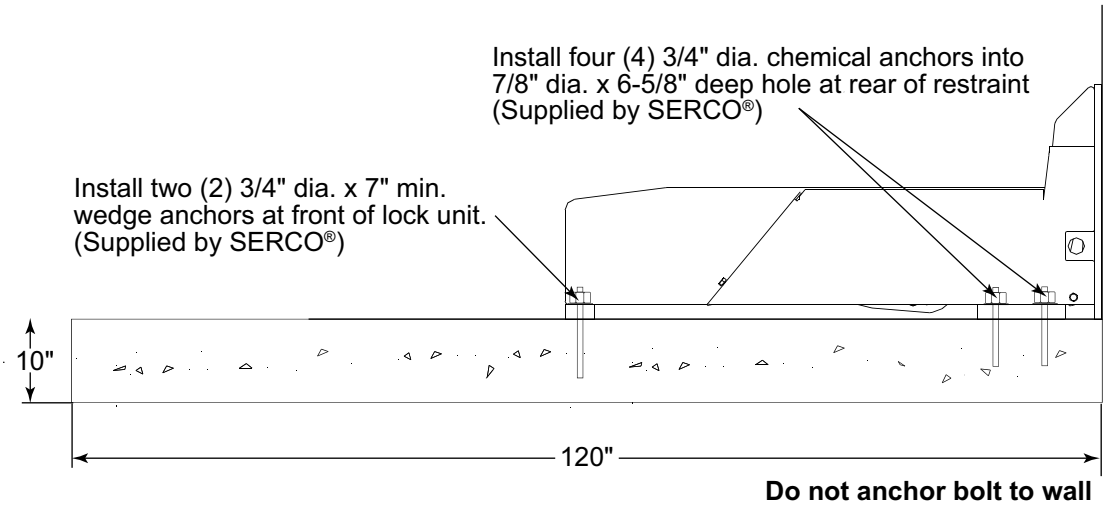


Fig. 10



Do not anchor bolt to wall

WEDGE ANCHOR INSTALLATION (STANDARD INSTALLATION)

⚠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

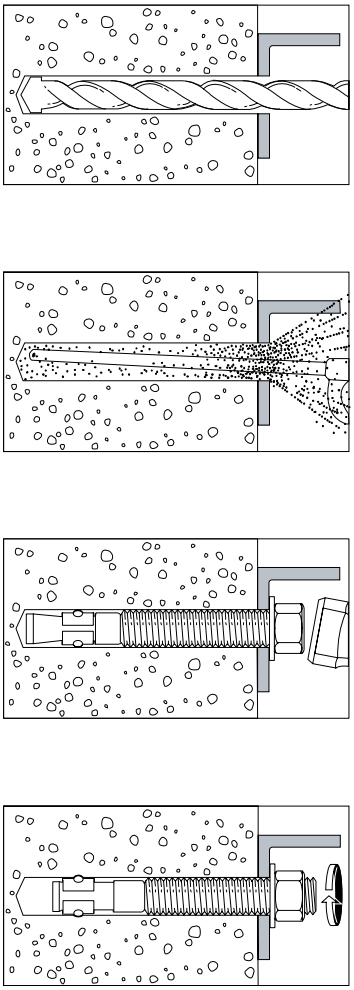
Oversized holes in the base material will make it difficult to set the anchor and will reduce the anchor's load capacity.

NOTICE

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

Drill a hole in the concrete using a carbide drill bit the same diameter as the nominal diameter of the anchor to be installed. Drill the hole to the specified embedment depth and blow it clean using compressed air. Alternatively, drill the hole deep enough to accommodate embedment depth and dust from drilling. Assemble the anchor with nut and washer so the top of the nut is flush with the top of the anchor. Place the anchor in the fixture and drive into the hole until washer and nut are tight against fixture. Torque to 110 ft. lbs. See Fig. 11.

Fig. 11



CHEMICAL ANCHOR INSTALLATION (GROUND MOUNTING ONLY)

⚠WARNING

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

Drill 4 holes 7/8" dia x 6-5/8" deep. Clean hole with compressed air or wire brush and blow-out bulb.

Insert the capsule into the hole.

Thread the hex nut onto the stud leaving 3-4 threads exposed above the nut. Then thread the coupler onto the nut/stud assembly until tight.

Insert the drive unit into the rotary percussion hammer drill. Engage the drive unit into the coupler/stud assembly. At a drill speed of 250-500 rpm, break the glass capsule with the chamfered end of the stud and drive the stud into the bottom of the of the hole. Turn off the drill motor immediately and disengage.

To remove the coupler, hold the hex nut with a wrench, and with a second wrench, turn the couple counter-clockwise to release the friction lock. Then unthread the coupler from the assembly.

Allow Chem-Stud to cure for specified time (see table below) before loading stud.

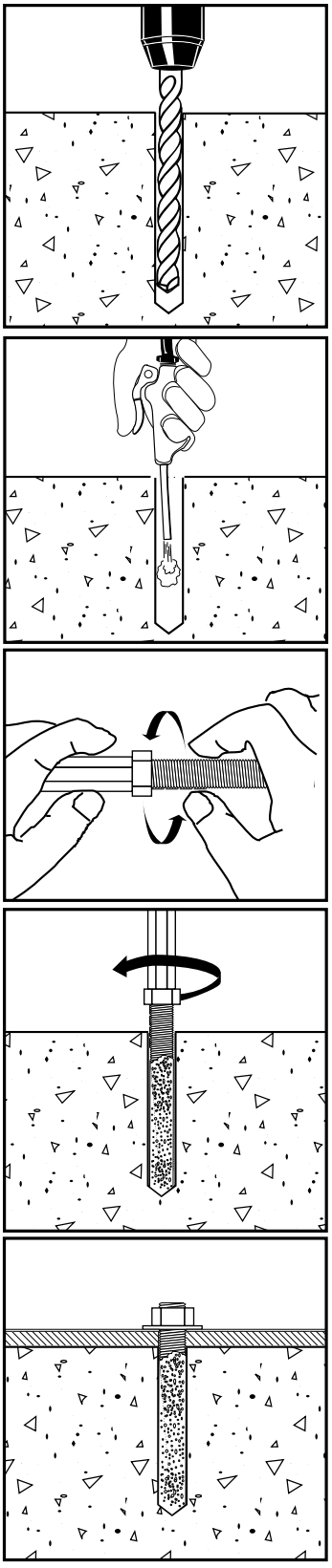
RECOMMENDED CURING TIME

Concrete Temperature	Minimum Cure Time
68°F and over	10 minutes
50°F to 68°F	20 minutes
32°F to 50°F	1 hour
23°F to 32°F	5 hours
Below 23°F	Not Recommended

STORAGE RECOMMENDATIONS

Chem-Stud Anchors have a shelf life of 2-4 years providing they are stored in their original containers in a cool (under 70°F) dry area and are not exposed to direct sunlight. To determine the usability of the product after a long storage period, invert the capsule several times and if the resin is in liquid state and flows, the capsule may be used.

Fig. 12



⚠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.

Do not route control wiring for any other device through this control box unless properly shielded.

Be certain power is off when wiring to the control box or signal lights. Failure to do so could result in electrical shock, death or serious injury.

ELECTRICAL INSTALLATION

NOTE:

Reference wiring diagrams on pages 41 and 42 for all field connections.

1. Mount control box inside the building 5 feet above the floor, to the left of the doorway. See Fig. 13.

NOTICE

Connecting 24V lights to the 120V control panel terminals 10, 11, OL1 or OL2 will destroy the light fixture.

NOTE:

For 120V exterior lights, use wiring kit 6003336. Installation instructions are included in the kit.

2. **Standard 24V exterior compact LED lights.**
   Mount and wire outside 24V LED signal light assembly into the control box to terminals 7 for RED, 8 for GREEN and 9 for common. Terminals are located on the Pitbull Output Board. Always mount the light with the RED light on top and the GREEN light on the bottom.

3. Run 3/4" conduit from the vehicle restraint to the control panel. Junction box optional (supplied by others).

4. Run the six, color coded, factory connected wires from the terminal strip on the restraint to the control panel. Do not leave excessive slack in the wires or they will be damaged by moving parts. See Fig. 13 and 14.

5. **Activation of the Auto-Engage feature for SL80 and SL90 Restraints:**
   To enable the Auto-Engage feature move the Input Board dip switch position “4” to the on position. Input 11 on the PLC will illuminate. See Fig. 41, item 5.

NOTE:

For the Auto Engage feature, you must have a vehicle presence sensor installed. See page 41 for wiring, page 37 for mounting and page 21 for operations.

6. **The leveler interlock (optional for all)**
   For installation of leveler interlock/termination to control panel:
   6.1 Identify interlock control circuit wiring from dock leveler (1 pair of wires).

   6.2 Terminate these 2 wires from the leveler to terminals 13 and 14 on the Pitbull Output Board Connector terminals in the control panel.

NOTE:

Termination is not polarity sensitive allowing installation to either terminal with either wire. This interlock circuit is fused at 2 amps.

7. **The Optional Heater Kit**
   (This option is factory installed when ordered with the restraint. Below are field installation instructions, if added at a later time.)
   For Heater Kit 6003334 installation in control panel.
   7.1 With Power to the panel switched off plug the Heater Control Board into the Output boards Heater Output Socket located on the right side.

   7.2 Field wires for the heater element are landed on the two screw terminals on the Heater Control Board. Two wires, one purple and one gray are included.

   7.3 The Heater Control Board applies a 24 VAC signal to the heater element. This 24 VAC signal is turned off whenever the SL actuator motor is running. Heater is on when PLC output #7 is on.

   7.4 A 3AG 8 amp fuse and a status LED is located on the Heater Control Board. Should the 8 amp fuse fail, the LED will turn off.

   7.5 A thermostatic switch is located on the SL frame and is wired in series with the heater element. This switch closes at 30 (+ or – 5) degrees Fahrenheit and below. At 50 (+ or -5) degrees Fahrenheit and above the switch opens, breaking the circuit to the heater element.

8. **The Optional Audible Alarm Kit (Optional on SL60-SL80; Standard on SL90)**
   (This option is factory installed when ordered with the restraint. Below are field installation instructions, if added at a later time.)
   For Audible Alarm Kit 6003335 installation in control panel.
   - 8.1 Remove knockout from bottom of panel. (knockout is approximately 1-1/8" in diameter).
   - 8.2 Remove threaded collar from alarm face.
   - 8.3 Feed face of Audible Alarm through hole (knockout) from inside the panel.
   - 8.4 Screw plastic collar over face of alarm. Tighten collar to secure alarm.
   - 8.5 Plug the 2 pin plug into the Output boards Alarm Socket.

9. **The Vehicle Presence Sensor (optional for SL90, standard on SL70, SL80)**
   For Vehicle presence sensor installation/termination to control panel see page 37, 41 and 42.
   - 9.1 The sensor is a 4 wire device. First terminate the Positive lead (brown wire) to any “RC” terminal on the Input Board.
   - 9.2 Terminate the Negative lead (blue wire) to any “0V” terminal on the Input Board.
   - 9.3 Terminate the load lead (black wire) to “3” terminal on the Input Board.
   - 9.4 Tape (insulate) the unused white wire.

10. **The Leveler Stored Sensor (Leveler Option)**
    For leveler stored sensor installation/termination to control panel.
    - 10.1 To enable the leveler stored sensor feature flip the input board dip switch position “3” to the OFF position. Input 10 LED on the PLC will go out.
    - 10.2 The sensor 625-203 is a 4 wire device. First terminate the Positive lead (brown wire) to any “RC” terminal on the input board.
    - 10.3 Terminate the Negative lead (blue wire) to any “OV” terminal on the input board.
    - 10.4 Terminate the Load or Switched lead (black wire) to the “19” terminal on the input board.
    - 10.5 Tape (insulate) the unused white wire.

11. Permanently mount the vehicle driver’s instruction sign on the outside wall below the signal light when installing RED/GREEN Light Assembly. See Fig. 13.

12. Wire power to the control box through a fused disconnect (supplied by others) using terminals provided in the control box. See Fig. 13 and wiring diagram on page 41 and 42. Turn the power on.

13. Program the Security Keypad (standard on SL90, optional on SL60, SL70 and SL80) per instructions on page 22.

14. Operate the vehicle restraint following the operating instructions on pages 19-20. Check for proper light operation, alarm operation (if equipped) and smooth operation according to the operating instructions.

15. Instruct the dock workers how to use the vehicle restraint using the operating procedures on pages 19-20.

INSTALLATION, continued

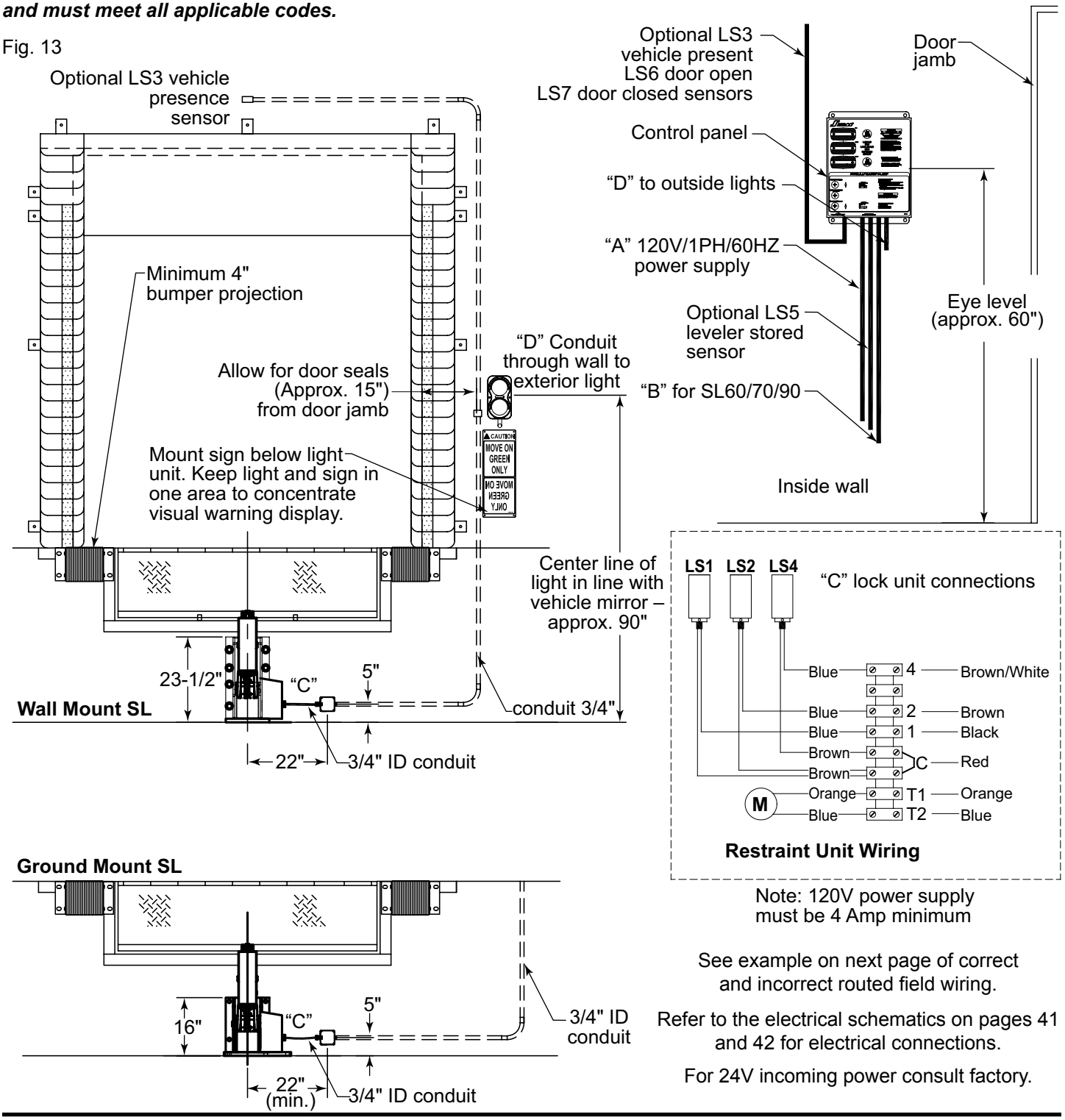
⚠DANGER

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.

⚠DANGER

Be certain power is off when wiring to the control box or signal lights. Failure to do so could result in electrical shock, death or serious injury.

Fig. 13



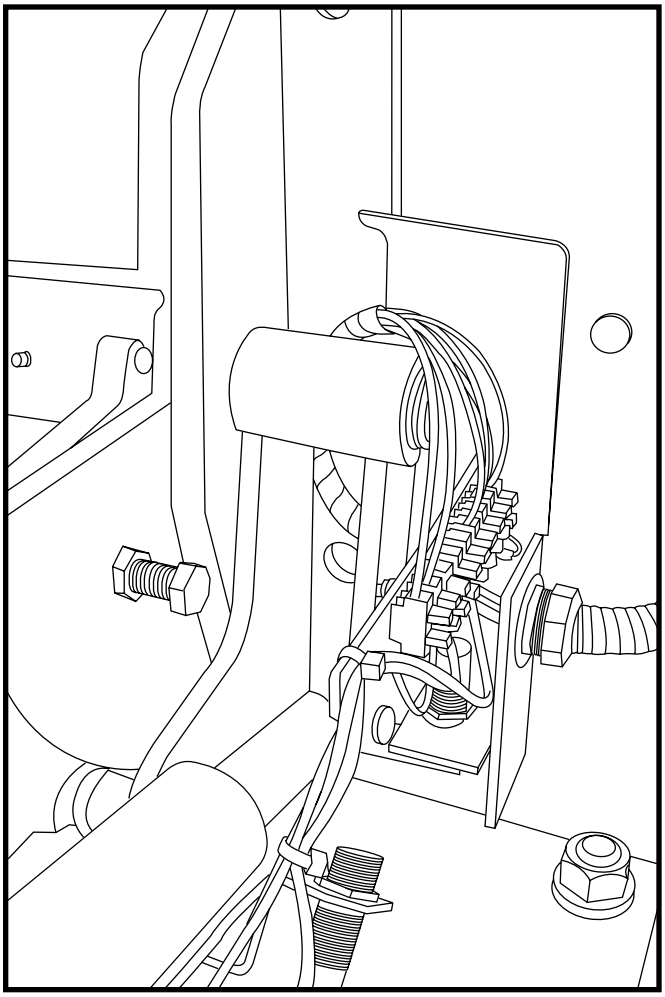
Note: 120V power supply must be 4 Amp minimum

See example on next page of correct and incorrect routed field wiring.

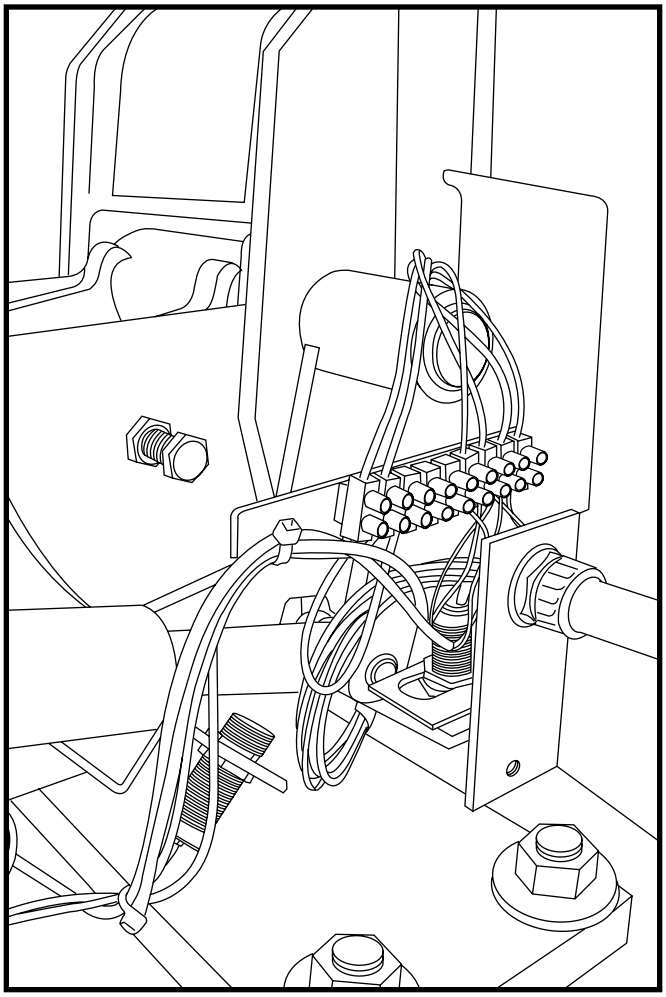
Refer to the electrical schematics on pages 41 and 42 for electrical connections.

For 24V incoming power consult factory.

Fig. 14



NEATLY ROUTED FIELD WIRING.
The control wires protected by the factory-supplied spiral-wrap sweep up behind and over the top of the Sector Plate. This will give years of reliable service.



BADLY ROUTED FIELD WIRING.
Note how the six wires from the control panel are of excessive length. The Sector Plate will quickly shred these wires.

FINAL INSTALLATION

LEVELER STORED SENSOR - LS5 (Optional)

The leveler stored sensor offers an optional interconnection between the dock leveler and the vehicle restraint. When installed the vehicle restraint cannot be lowered or released from lights only until the dock leveler has been stored.

Typical pit leveler installation for SERCO® hydraulic levelers (except PAL). For all others, call your authorized distributor.

Assembly Number 99851

- A leveler stored sensor can be mounted beneath SERCO® hydraulic dock levelers that have lip keepers as shown in Fig. 15.
- Weld the leveler stored sensor bracket as shown. Attach the face of the sensor so when the lip is stored the face of the sensor is 3/4" from lip for 6' and 8' levelers and 1" for 10' levelers.
- Switch the input board dip switch position # 3 to the "OFF" position and wire the leveler stored switch to the panel as shown in the schematic on page 41 and 42.
- PLC input 10 will now turn on only when the leveler is in the stored position.

VEHICLE PRESENCE SENSOR - LS3 - PHOTOELECTRIC (Standard on models SL70, SL80, Optional SL90)

Mount the switch as shown in Fig. 32 on page 27.

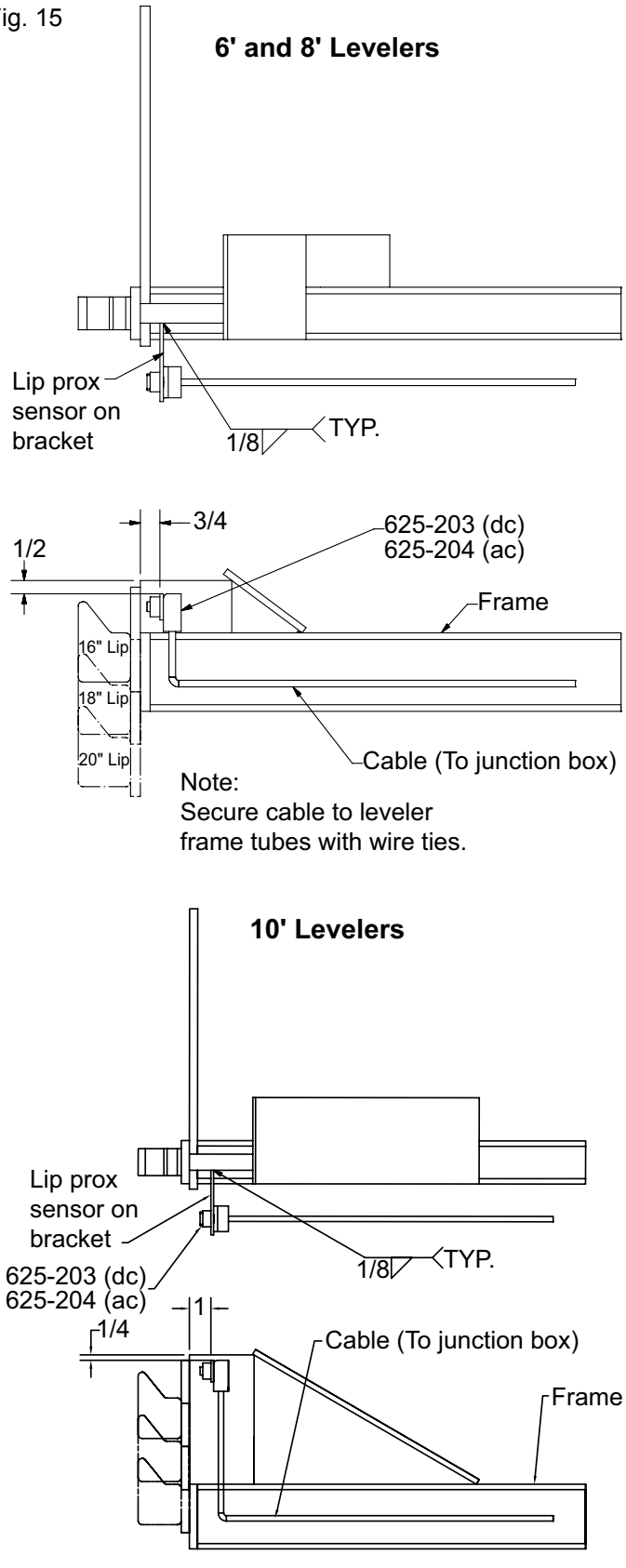
Ensure the LS3 sensor's logic switch is set to L/O (Light Operate)

- The switch is located on the top of the sensor under a clear plastic cover.

Wire the switch into the panel as per the schematic on page 41 and 42.

- When a vehicle is present at the door, PLC input 3 will go on.
- PLC input 3 will now turn on only when a vehicle is present at the door.
- Occasionally the photoelectric truck sensor will read the reflective black/yellow tape on the SL, causing a false signal. Should this occur, rotate the sensor clockwise very slightly so the reflective tape will not be 'seen' by the sensor.

Fig. 15



COMPONENTS AND SPECIFICATIONS

The main components of the vehicle restraint are shown below. See the parts list for specific part numbers.

Fig. 16

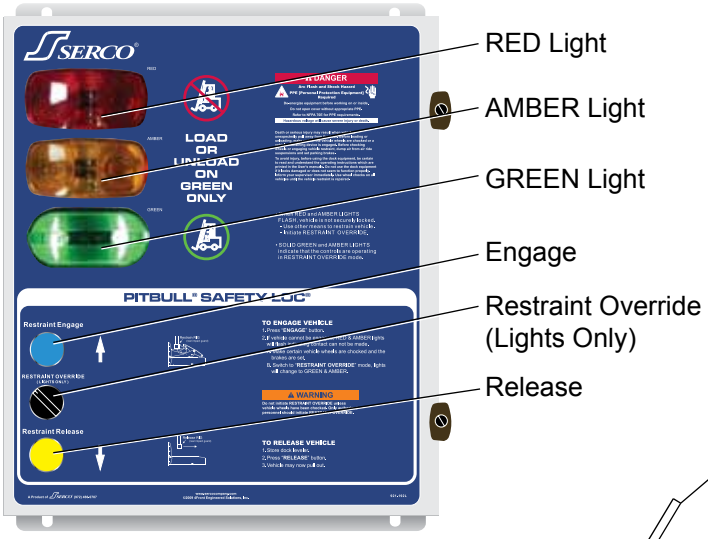
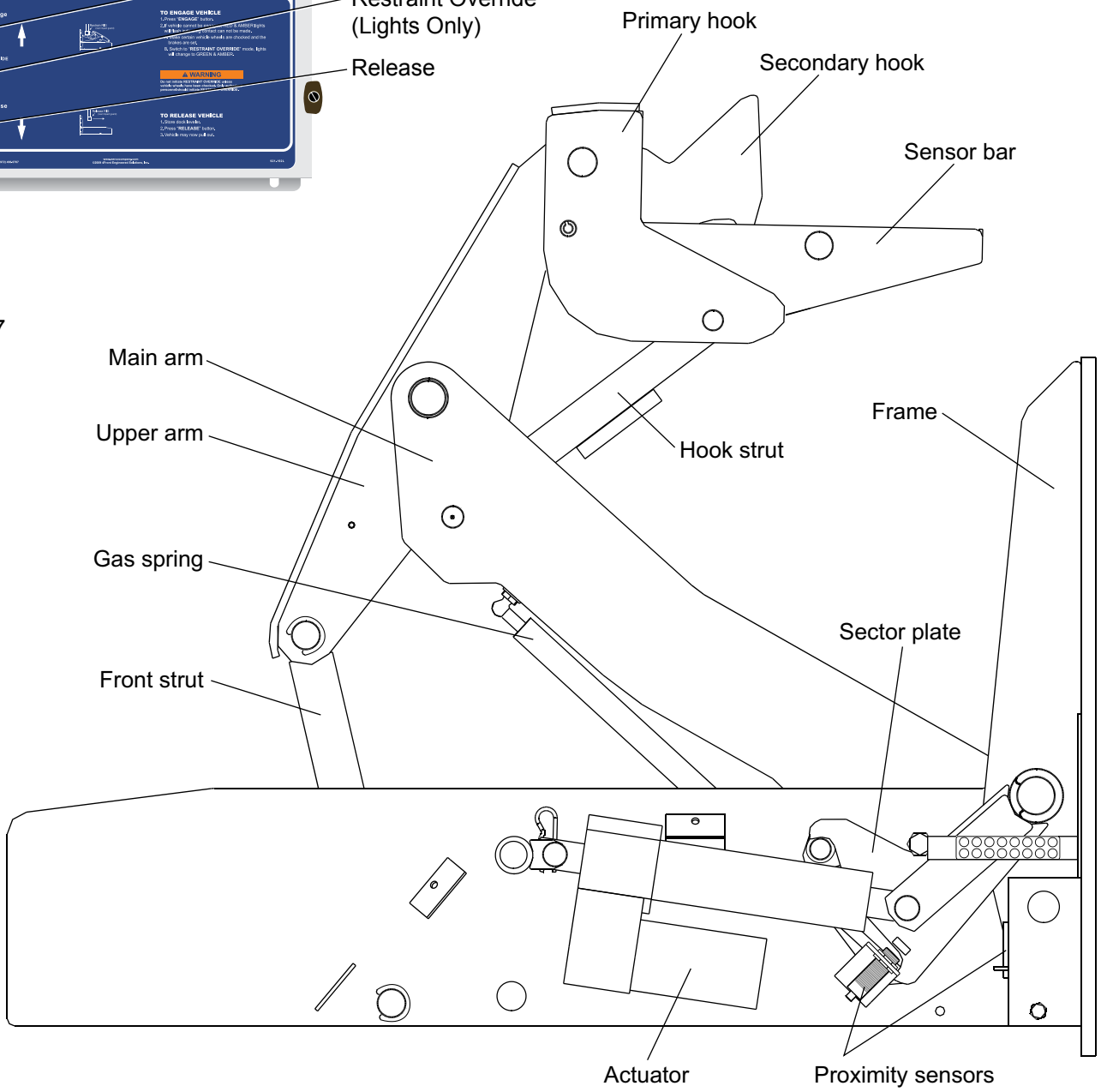


Fig. 17



COMPONENTS AND SPECIFICATIONS, continued

Control Panel - NEMA 12, Solid state PLC (Programmable Logic Controller), 120 vac, Primary supply fused at 4 amps, UL and UL-C listed panel and components.

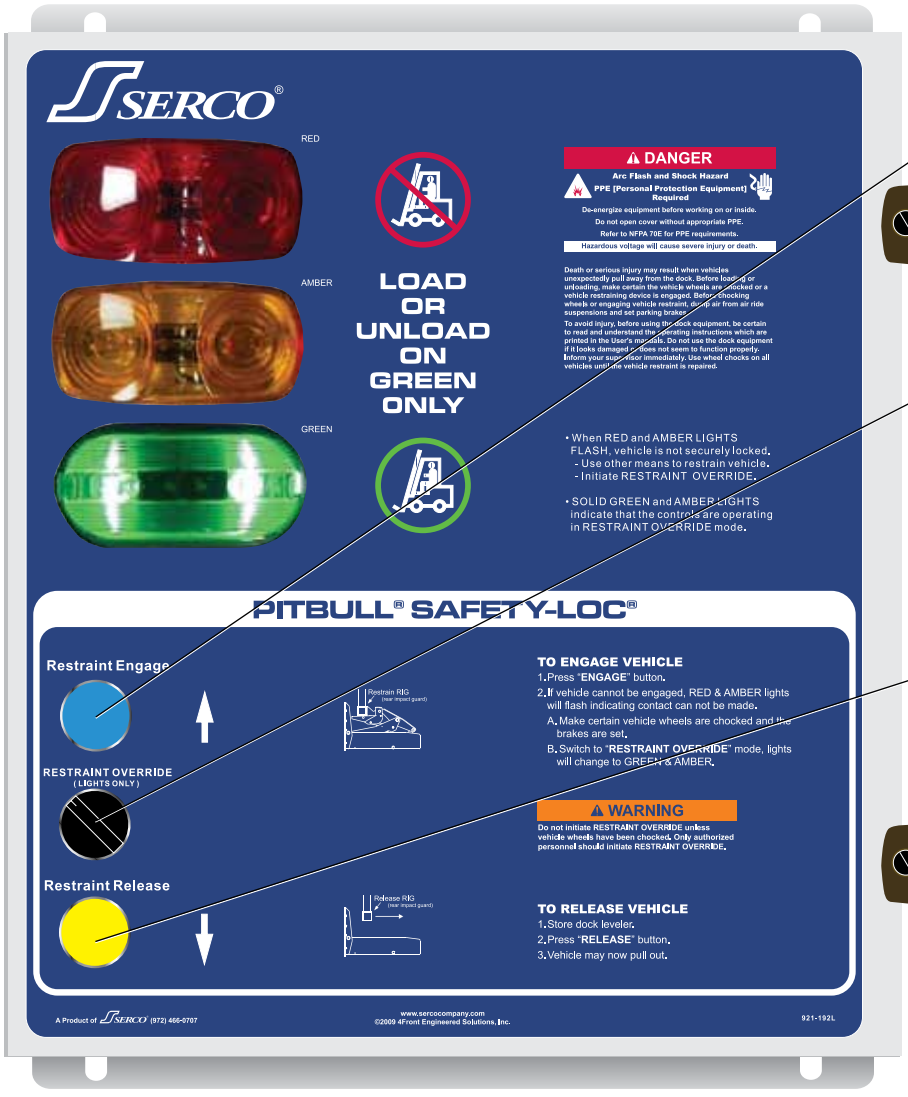
Proximity Sensors - NEMA 6P, normally open, with LED pilot light.

Linear Actuator (Raise/Lower) - 1000 lb load capacity, 24 vdc, 14 full load amps, holding brake.

ELECTRICAL SYSTEM OPERATION

The following describes the operation of the electrical system when the controls are activated:

Fig. 18



ENGAGE
Press in
- Actuator starts.
- Hook raises to engage the RIG bar.
- Actuator stops when proximity sensor LS2 is reached.

RESTRAINT OVERRIDE (Lights Only)
Turn Clockwise (Spring Return)
- Turn switch to right and release.
- Power is cut off from motor circuit.
- Power is supplied to outside RED light and inside GREEN and AMBER lights.

RELEASE
Press in
- Actuator starts.
- Hook lowers to stored position.
- Actuator stops when proximity sensor LS1 is reached.
- Returns system from **RESTRAINT OVERRIDE (Lights Only)** to normal operating condition.

⚠ WARNING

Before operating the vehicle restraint, read and follow the Safety Practices, Warnings, and Operating Instructions in this manual. Use by untrained people could result in death or serious injury.

Do not load or unload any vehicle unless you make certain the vehicle restraint has securely engaged the vehicle's RIG (rear impact guard) bar and set the brakes. If the vehicle restraint does not engage the RIG bar for any reason, BE CERTAIN TO CHOCK THE VEHICLE WHEELS AND SET THE BRAKES 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 every time the vehicle is entered, if the GREEN light goes out at any time during loading or unloading operations, immediately check the vehicle restraint to ensure that it is securely hitched. 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.

ENGAGING VEHICLE

1. When the vehicle restraint is stored, the outside GREEN light and inside RED lights will be on. See Fig. 19.

NOTE:

If equipped with optional LS3, inside solid AMBER will turn on when vehicle backs in and will remain on until the vehicle leaves or restraint successfully engages the RIG bar.

2. To secure the vehicle at the dock, press the **ENGAGE** button. The outside lights immediately change from GREEN to RED. The restraining hook will begin to raise. See Fig. 20.

NOTE:

If equipped with optional LS3 and Auto Engage, the hook will raise automatically after 60 seconds.

3. The restraining hook will raise until it contacts the RIG of the vehicle. When the restraint has fully engaged the RIG bar, the inside lights will change from RED to GREEN. Visually check that the hooks have engaged the RIG bar to ensure that the vehicle is now safe to load or unload. See Fig. 21.

Fig. 19

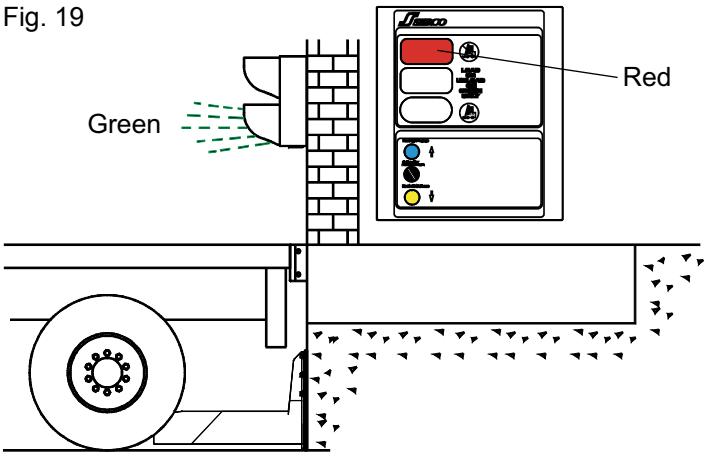


Fig. 20

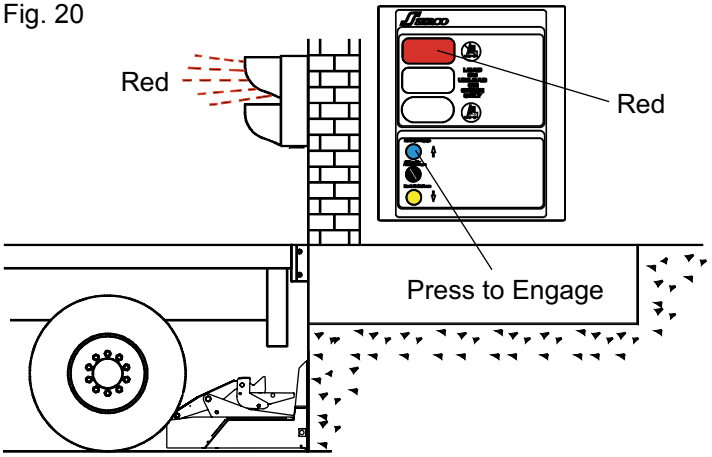
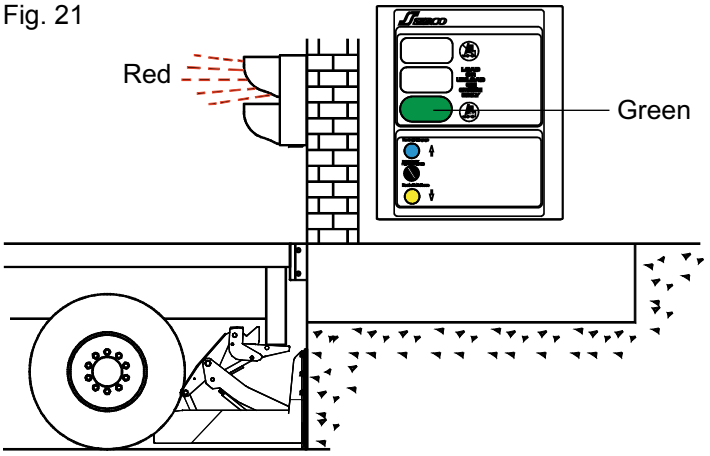


Fig. 21



OPERATING INSTRUCTIONS, continued

RELEASING VEHICLE

1. Store dock leveler.

2. To release the vehicle from the dock, press the **RELEASE** button. The inside lights immediately change from GREEN to RED. The restraining hook will lower until it is stored. The outside lights will change from RED to GREEN. See Fig. 22.

NOTE:

If optional LS5 leveler stored switch is installed the leveler must be stored before restraint will release.

If optional LS3 is installed inside lights will display solid RED and AMBER once restraint hook is lowered until the vehicle leaves, when AMBER light will turn off.

⚠ WARNING

Do not initiate RESTRAINT OVERRIDE (LIGHTS ONLY) unless vehicle wheels have been chocked. Only authorized trained personnel should initiate RESTRAINT OVERRIDE (LIGHTS ONLY).

NO RIG (Rear Impact Guard)

1. If the hook raises without making contact with the RIG, it will lower to the stored position. At this time the inside RED and AMBER lights will flash indicating that the vehicle could not be secured. Chock the wheels, and then turn the selector switch to the **RESTRAINT OVERRIDE (Lights Only)** position. The outside lights change from GREEN to RED, the inside lights change to GREEN and AMBER. The vehicle is now safe to load or unload. When loading is completed, remove the wheel chocks and press the **RELEASE** button to return to the normal operation. The inside lights change to RED and the outside lights change to GREEN. See Fig. 23.

HIGH RIG (Rear Impact Guard)

1. If during unloading, the vehicle raises and the restraint hook looses contact with the RIG, the inside light will change from GREEN to RED and flashing AMBER to indicate a possible safety hazard. The restraint will remain in the raised position. Chock the wheels and then turn the selector switch to **RESTRAINT OVERRIDE (Lights Only)**. When loading is completed, remove the wheel chocks and press the **RELEASE** button to return to the normal operation. See Fig. 24.

Fig. 22

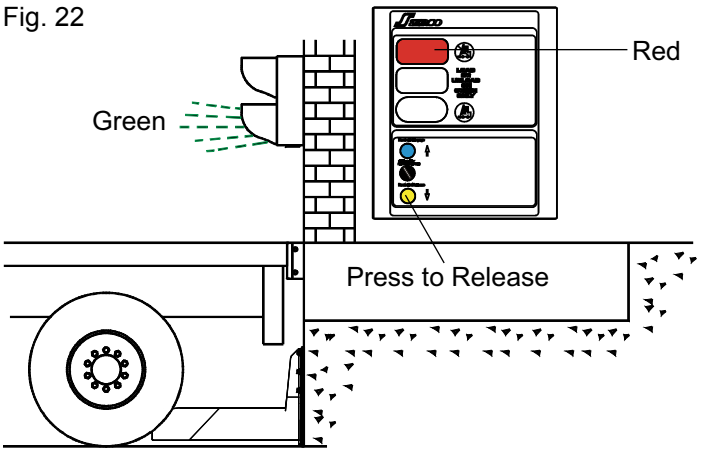


Fig. 23

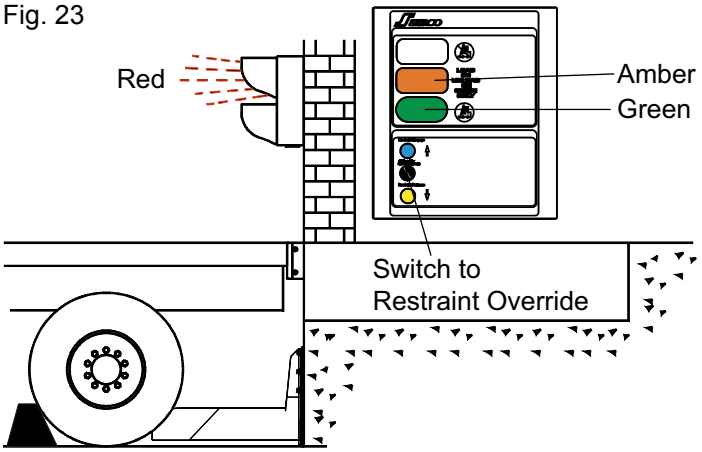
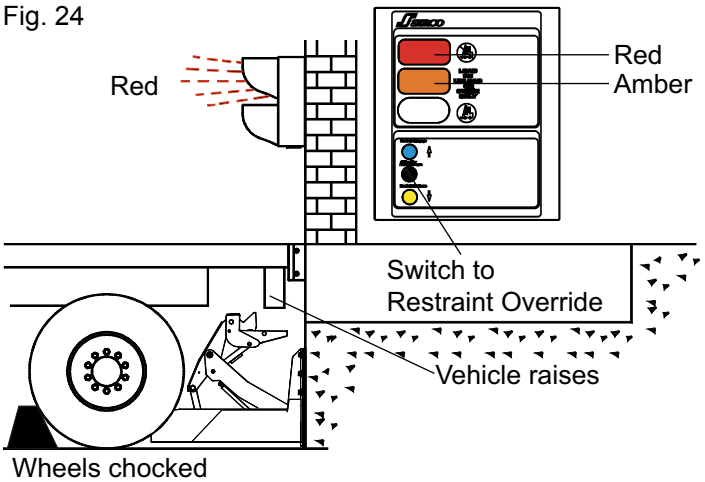


Fig. 24



AUXILLIARY POWER DOWN
(Standard for SL60, SL70, SL80 and SL90)

The auxilliary power down connector, when wired to a 12V battery, allows the operator to power the vehicle restraint down using the battery through the control panel in the event of a power outage. This will allow the restraint to release the vehicle when power is not available. (See item 29, page 46.)

ACTIVE SYSTEM COUNTER
(Optional for SL70 and SL80, Standard for SL90)

The active system counters consist of two electronic counters that keep track of two cycle count values. The counters are mounted within the enclosure and are tagged “C1” and “C2”.

Counter “C1” displays the total cycles the restraint has operated. A cycle equals one restraint raise +1 restraint lower.

Counter “C2” displays the total successful engagements the restraint has made. A successful engagement is recorded only when the restraint has raised and the RIG was successfully hooked.

Reset counters by pressing the “RST” button located on the face of the counters

AUTO ENGAGE
(Standard for SL80, Optional for SL90)

When a vehicle backs in at the dock the LS3 will detect that it has arrived.

- Inside lights will change to solid RED and AMBER.
- 60 seconds after the vehicle is present, the restraint will raise and engage the RIG.
    - The outside lights will change to Flashing RED.
    - Inside lights will change to Solid GREEN.

If the restraint fails to engage the RIG or no RIG is present, the restraint will lower back into the housing and the inside lights will change to Flashing RED and AMBER.

- Manually chock the wheels and switch to **RESTRAINT OVERRIDE (Lights Only)**.

NOTE:

A Trailer Presence Sensor is required for this option.

KEYPAD PROGRAMMING INSTRUCTIONS

Standard on SL90; Optional on SL60, SL70 and SL80.

SECURITY KEYPAD, TWIDO PLC CONTROL

The security keypad prevents unauthorized operation of the vehicle restraint. A separate numeric password must be entered to release the restraint hook, or change to the **RESTRAINT OVERRIDE (Lights Only)** mode of operation. Due to the sensitive nature of the operation of this device, passwords will be issued only to authorized personnel as dictated by the end user.

KEYPAD OPERATIONS

The security keypad is a 4 x 3 matrix standard telephone configuration with numeric keys labeled 0 to 9 and two special function keys, "*" and "#". Audible queues will be issued to aid in the keypad's programming (note that the control panel must be equipped with an optional audible alarm to hear audible tones). The **RESTRAINT OVERRIDE (Lights Only)** and **RESTRAINT RELEASE** functions will be initiated by four digit passwords entered from the keypad. For normal operation such as **RESTRAINT OVERRIDE (Lights Only)** and **RESTRAINT RELEASE**, simply enter the programmed four digit password to activate the desired function. The default (factory programmed) passwords are:

- **RESTRAINT OVERRIDE (Lights Only)**: 0001
- **RESTRAINT RELEASE**: 0002

No audible alerts are issued during normal operations. If the user pauses for more than a second between key entries the system will reset and require the user to reinitiate the entry sequence.

To re-program the passwords, enter the program mode. Press and hold the "*" key for three seconds. There will be two short audible tones issued when the program mode is active. Next enter the existing password followed by the new password. Press the "#" key to accept the changes. There will be three short audible tones issued when the new password has been successfully stored. The unit will then return to the normal operating mode. The program mode can be canceled by pressing the "#" key anytime during the programming sequence prior to entering the complete string of digits. If the user pauses for more than ten seconds between key entries the system will exit the program mode without storing any new password values.

If the password is forgotten, a PLC cold boot procedure will restore the default passwords (consult the factory for details on how to perform a cold boot procedure).

OPERATION WITH KEYPAD

Standard on SL90; Optional on SL60, SL70 and SL80.

RESTRAINT ENGAGE (Without Auto Engage)

Press the **RESTRAINT ENGAGE** button.

- Outside lights will change to RED. The lock will raise to engage the vehicle RIG.
- If contact is made inside lights will change to solid GREEN.
- If the restraint cannot engage the RIG, the restraint will lower, the horn will sound (if equipped) and the inside RED and AMBER lights will flash.

RESTRAINT ENGAGE (With Optional Auto Engage)

Vehicle is present at the dock, inside lights change to solid AMBER.

- Outside lights will change to RED. The lock will raise to engage the vehicle RIG after 60 seconds.
- If contact is made, inside lights will change to solid GREEN.
- If the restraint cannot engage the RIG the restraint will lower, the horn will sound (if equipped) and the inside RED and AMBER lights will flash.

⚠WARNING

Do not initiate RESTRAINT OVERRIDE (LIGHTS ONLY) unless vehicle wheels have been chocked. Only authorized trained personnel should initiate RESTRAINT OVERRIDE (LIGHTS ONLY).

RESTRAINT OVERRIDE (Lights Only)

Make certain the vehicle wheels are chocked and the brakes are set.

- The operator can change the system to **RESTRAINT OVERRIDE (Lights Only)** by entering the programmed four-digit "**Restraint Override (Lights Only)**" code.
- The horn (if equipped) will stop sounding and the lights will change.
- The outside lights will display flashing RED and the inside lights will display solid GREEN and AMBER.

RESTRAINT RELEASE OR RESTRAINT OVERRIDE

To release restraint, enter the programmed four-digit "**Release**" code.

- The outside lights will switch to display flashing GREEN and the inside lights will display solid RED (if equipped with optional LS3, inside lights will display solid RED and AMBER until vehicle leaves when lights will change to solid RED only).

PREVENTIVE MAINTENANCE

⚠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.

To ensure the continued proper operation of your vehicle restraint, perform the following preventive maintenance procedures.

DAILY

1. Check all lights on the control panel and outside to ensure they are functioning.

2. Inspect dock bumpers. Missing bumpers must be replaced.

WEEKLY

1. Remove all debris from the vehicle restraint to ensure operation is unobstructed.

2. Inspect operation of the RIG sensor bar to ensure it pivots freely.

3. Inspect the vehicle restraint for damage that may weaken the anchoring strength. Re-tighten the concrete anchors if necessary.

QUARTERLY

1. Remove the side cover of the restraint and remove any debris.

2. Inspect the proximity sensors for proper adjustment. Refer to pages 34-38.

3. Lubricate and clean as shown in Fig. 25 on page 25.

4. Raise the restraint and inspect the mechanism for any signs of wear, distortion or cracked welds.

5. Check all operating, warning, and caution labels and signs (refer to pages 43 and 49) and be sure they can be read. Replace as necessary.

6. Inspect operation of the RIG sensor bar to ensure it pivots freely.

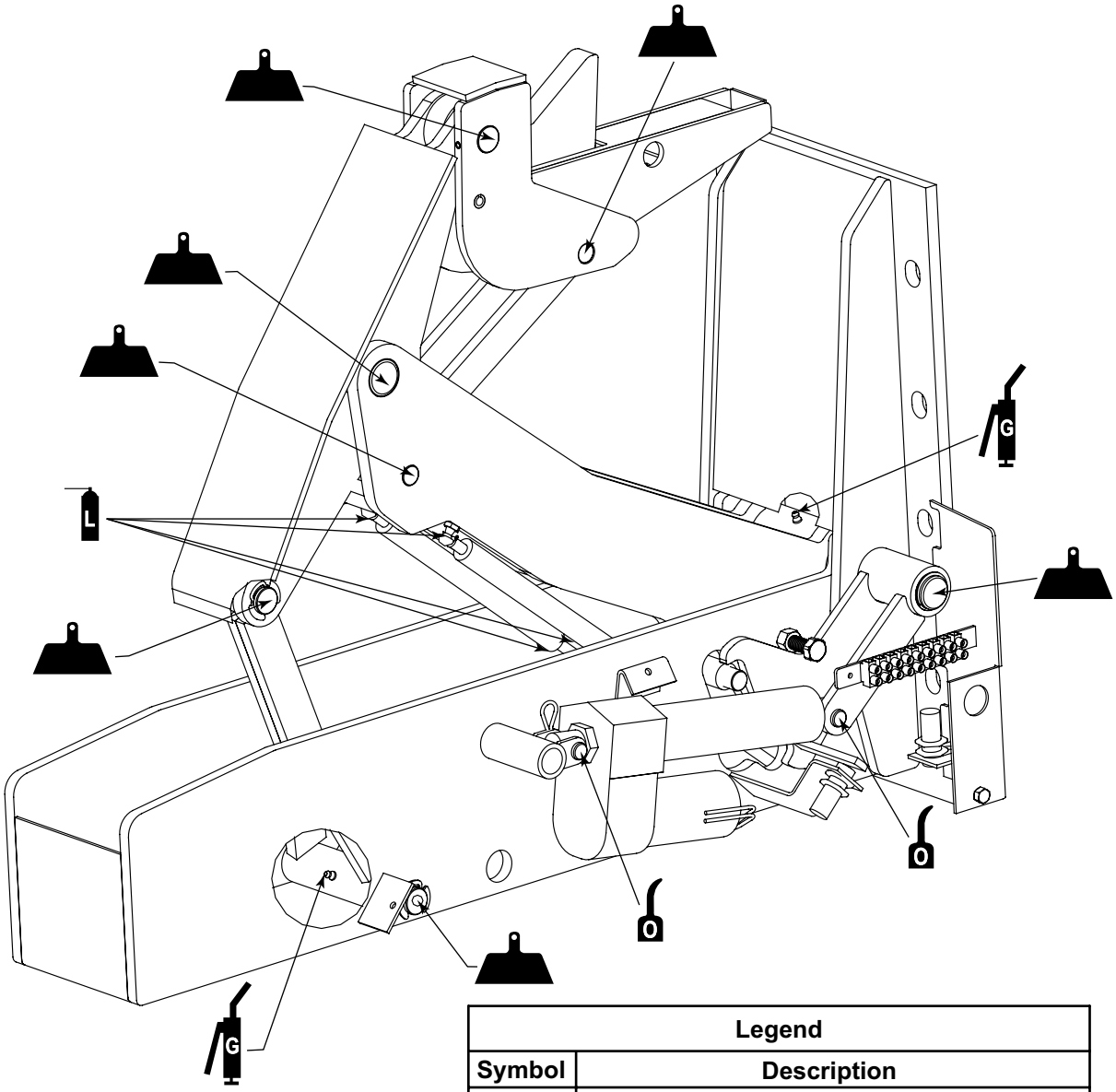
7. Inspect the vehicle restraint for damage that may weaken the anchoring strength. Re-tighten the concrete anchors if necessary.

8. Inspect all mechanical pivot points on the restraint. If necessary clean and remove foreign material with brush and penetrating oil.

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

LUBRICATION

Fig. 25



Legend	
Symbol	**Description**
O	Lubricate main arm pin and front strut pin with bearing grease. Apply at grease zerk.
G	Lubricate actuator pivot pins with SAE 30W oil.
L	Lubricate gas spring ball studs with spray type lithium grease (both ends).
	Clean and remove foreign material from all pivot points using a brush and penetrating oil.

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.

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 30-33 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.	a) Check for 120V supply at terminals L and N.
	b) Primary 4 amp fuse blown.	b) Replace fuse.
2. Primary fuse blows continually.	a) Faulty transformer, faulty PLC or faulty Pitbull 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 Pitbull Output Board.
3. No lights on panel. Some PLC LED inputs on. No Pitbull Output Board lights on.	a) Failed FU2 fuse.	a) Check fuse FU2. If faulty replace fuse.
	b) Loss of PLC connectivity.	b) If fuse is good re-seat the I/O boards by pressing them firmly against the back plate.
	c) Faulty transformer.	c) Check for 24VAC across transformer secondary terminals. Replace if faulty.

RESTRAINT DOES NOT RAISE OR LOWER, continued

PROBLEM	POSSIBLE CAUSE	SOLUTION
4. No lights on panel. Some PLC LED inputs on. No PLC LED output lights on. Pitbull Output Board LED's on.	a) Program Error.	a) Cycle control panel power OFF/ON to reload program. If program does not reload automatically, contact the factory.
5. Motor does not run. All panel lights and diagnostic LED's are correct.	a) Faulty wiring to actuator or faulty actuator.	a) Plug DC voltmeter leads into the top of the Pitbull 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.
	b) Faulty Pitbull Output Board.	b) If no voltage is found between Pitbull 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 Pitbull Output Board.
	c) Faulty PLC.	c) If no 20-24VDC is not present when the outputs are on then replace the faulty PLC.
6. Restraint stored. PLC input 1 and 4 on. Inside RED light on and inside AMBER light flashing.	a) Hook stuck down.	a) Free hook. If it cannot be freed in the stored position, remove the wire from terminal 4, raise the restraint, and turn circuit breaker off before working on the sensor bar.
7. No lights on panel. Some PLC LED inputs on. No Pitbull Output Board lights on.	a) Proximity sensors LS1 and LS2 both on at the same time. One proximity sensor failed on.	a) If restraint is stored, LS2 is faulty. If restraint is raised, LS1 is faulty. Replace or adjust proximity sensor.
8. Restraint does not raise (may be accompanied by actuator clutch slip or blown motor fuse).	a) LS1 is adjusted incorrectly, causing restraint to "bottom out" and jam the actuator.	a) Free up the actuator by driving out the 1/2" clevis pin (Item 30, Fig. 36). Adjust LS1 per adjustment instructions, page 35.

TROUBLESHOOTING GUIDE, continued

RESTRAINT DOES NOT RAISE PROPERLY

PROBLEM	POSSIBLE CAUSE	SOLUTION
1. Restraint stored. PLC LED input 4 on. Inside RED light on and inside AMBER light repeats 2 flashes.	a) RIG sensor bar stuck down.	a) Free sensor bar. If it cannot be freed in the stored position, remove the wire from terminal 4, raise restraint. Turn power off to panel before adjusting proximity sensor LS4.
2. Restraint restores after it reaches raised position. PLC LED input 1 on. Inside RED light and inside AMBER light flashes.	a) No RIG. b) Sensor bar problem. c) Faulty proximity sensor LS4	a) Check vehicle for presence of the RIG. b) Open control panel and check if PLC LED input 4 indicator light is on when sensor bar is depressed. Replace or adjust proximity sensor LS4 if required. c) Check if LED on LS4 indicates. If no signal, check wiring from PLC to LS4. Replace or adjust proximity sensor LS4 as required.
3. Restraint raises, ratchets, then restores. Inside RED light on and inside AMBER light repeats 3 flashes.	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 off. Inside RED light on and inside AMBER light repeats 4 flashes.	a) Obstruction in mechanism prevents lowering. b) No signal from proximity sensor LS1, causes actuator clutch to slip. c) Faulty proximity sensor LS1. d) Damaged sector plate assembly.	a) Check for obstruction preventing restraint from restoring. b) Open control panel and check if PLC LED input 1 indicator light is on when LS1 is engaged. Replace or adjust LS1 as required. c) Check if LED on LS1 indicates. If no signal, check wiring from PLC to LS1. Replace or adjust proximity sensor LS1 as required. d) Replace sector plate assembly.

RESTRAINT DOES NOT RESTORE PROPERLY, continued

PROBLEM	POSSIBLE CAUSE	SOLUTION
2. Restraint stops above top of frame. PLC LED input 1 on.	a) Proximity sensor LS1 indicates too soon.	a) Adjust proximity sensor LS1 to stop restraint below top of frame. If maximum adjustment does not correct, check if sector plate has been damaged. Replace as required.
	b) Damaged sector plate assembly.	b) Replace sector plate assembly.

LIGHT PROBLEMS

1. No panel face lights.	a) LED light(s) burned out.	a) Check lights. Replace if necessary.
	b) Disconnected or damaged wires.	b) Look at the Pitbull 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.	a) Light(s) burned out.	a) Check lights. Replace if necessary.
	b) Disconnected or damaged wires.	b) Look at the Pitbull 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) LED polarity incorrectly wired.	c) Reverse polarity.
3. Outside light(s) do not flash.	a) “Flash/Do Not Flash” switch on Pitbull Output Board is set to “Do Not Flash” position.	a) Change the switch to the “Flash” position. See Fig. 41, item 17.
	b) Faulty Pitbull Output Board.	b) If changing the switch position does not cause the lights to start flashing replace the faulty Pitbull 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.

⚠WARNING

Keep hands and feet away from the restraint when in JOG Mode. Operation may return as soon as the fault is cleared. Failure to keep clear 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 (Lights Only)**
1 - Lowered proximity switch – LS1
2 - Raised proximity switch – LS2
3 - Vehicle present sensor (optional) – LS3
4 - RIG sensor bar – LS4
5 - Unused Input
6 - **ENGAGE** push-button
7 - **RELEASE** push-button
8 - Unused input
9 - Optional door closed LS switch – Note 1
10 - Leveler stored LS switch (optional) – Note 2
11 - Signal Input – Enables restraint auto rise when DIP switch position 4 is set on. (Standard for SL80, optional for SL90) See page 12 for details.
12 - Unused Input
13 - VSL error signal (optional for VSL integration) – Note 3

The face of the PLC has LED indicator lights which show the status of each input and output.

OUTPUT FUNCTIONS

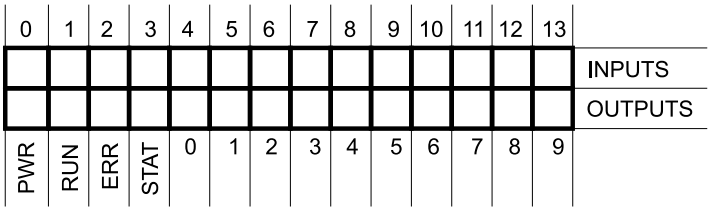
0 - RED light - panel face
1 - AMBER light - panel face
2 - GREEN light - panel face
3 - Exterior light relay (RED = off)
4 - Restraint raise contactor and total cycle counter
5 - Restraint lower contactor
6 - Audible alarm (optional)
7 - Restraint heater (optional)
8 - Restraint Engaged cycle counter
9 - Leveler interlock

Note 1: Dip switch #2 turns on input 9 and must be ON if door closed limit switch is NOT used.

Note 2: Dip switch #3 turns on input 10, and must be ON if leveler stored switch is NOT used.

Note 3: Consult factory for VSL integration.

Fig. 26

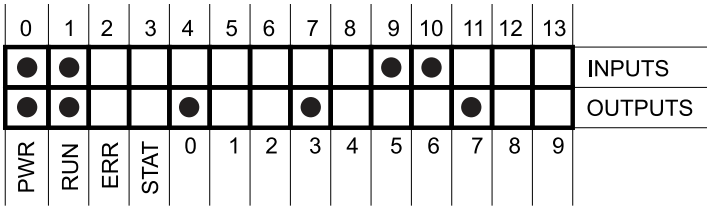


The chart below shows all of the valid conditions for the standard unit in normal operation.

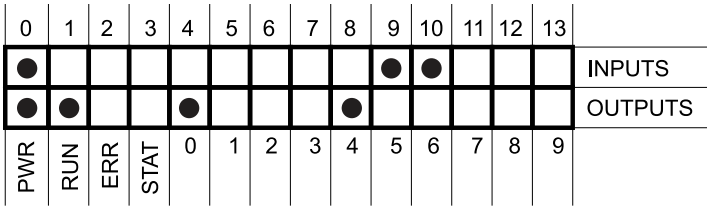
● Solid LED display

○ Flashing LED display

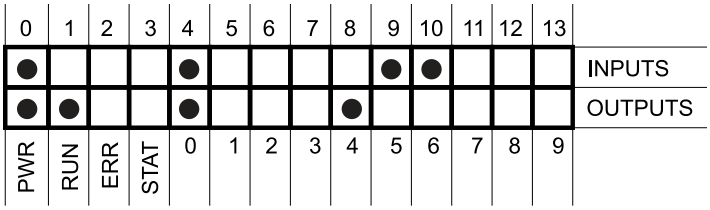
RESTRAINT STORED
Communication Lights: Outside GREEN, Inside RED



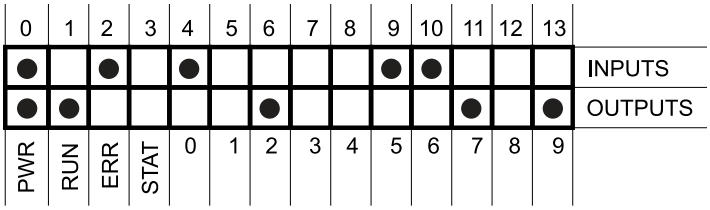
RESTRAINT RAISING (Before contacting RIG)
Communication Lights: Outside RED, Inside RED



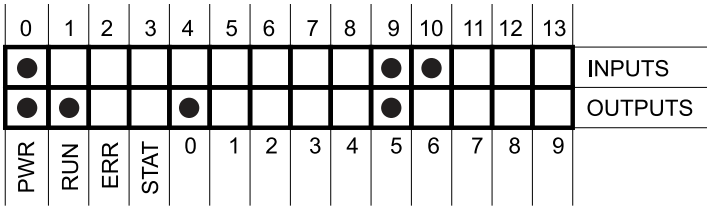
RESTRAINT RAISING (After contacting RIG)
Communication Lights: Outside RED, Inside RED



RESTRAINT FULLY RAISED (RIG contacted)
Communication Lights: Outside RED, Inside GREEN

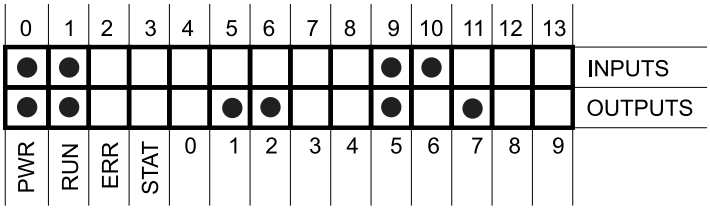


RESTRAINT LOWERING
Communication Lights: Outside RED, Inside RED



PLC DIAGNOSTICS, continued

LIGHTS ONLY (Restraint lowered)
Communication Lights: Outside RED, Inside GREEN and AMBER

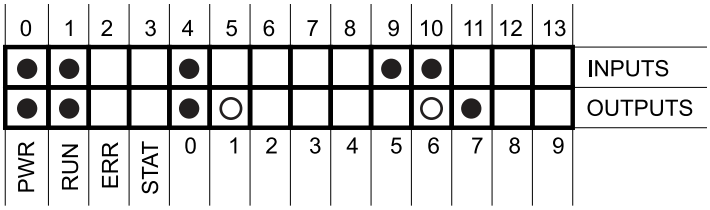


DIAGNOSTIC MODE – PLC LED DISPLAY

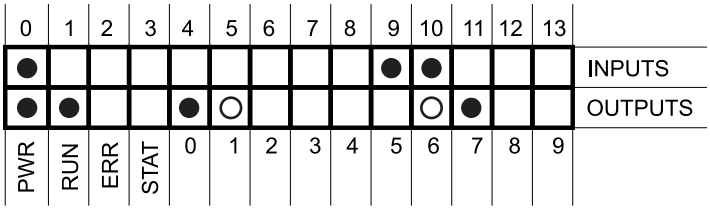
This is caused by an obvious system error that halts the proper function of the vehicle restraint. When this happens the RED outside lights will be on and the AMBER light on the control panel is programmed to display a coded description of the problem that has occurred. Match the PLC LED display with the chart to determine the error that has occurred and check the corresponding equipment for problems.

Jog Mode may accompany a Diagostic error in which case 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 ocurred. Use this to position the restraint, but turn the circuit breaker off before attempting to clear debris or make adjustments.

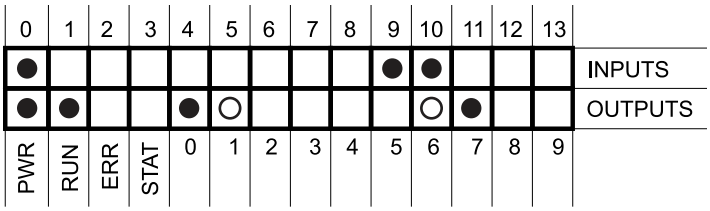
RIG sensor bar (LS4) is on when the hook is in the fully lowered position.
AMBER - 2 flashes repeated
Outside RED, Inside RED



Raised proximity switch LS2 is not being indicated 6 seconds after the ENGAGE button was pushed.
AMBER - 3 flashes repeated
Outside RED, Inside RED



Lowered proximity switch LS1 is not being indicated 6 seconds after the RELEASE button was pushed.
AMBER - 4 flashes repeated
Outside RED, Inside RED



Raised LS2 and Lowered LS1 proximity switches are on at the same time.
AMBER - 5 flashes repeated
Outside RED, Inside RED

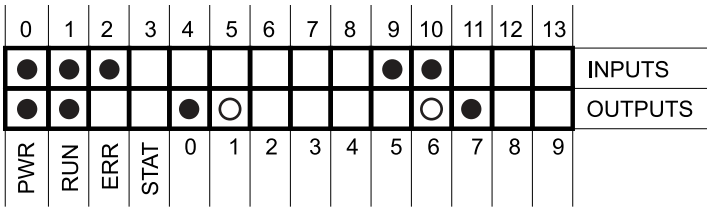
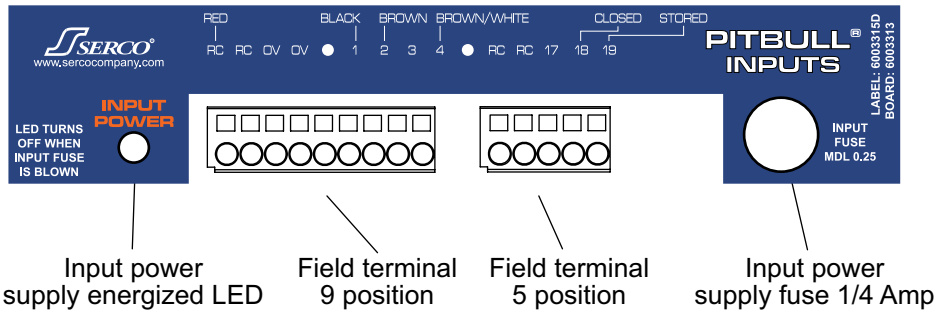
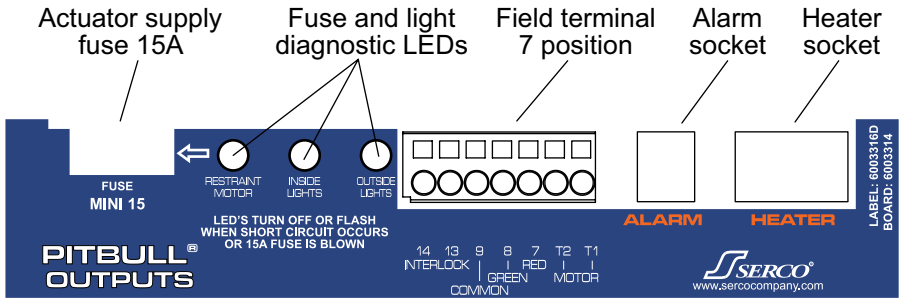


Fig. 27

Pitbull Input Board





Pitbull Output Board

ADJUSTMENTS

Use these instructions to adjust the vehicle restraint.

PROXIMITY SENSOR LOCATIONS

Three proximity sensors are used to sense the various positions of the vehicle restraint. The sensors are solid state proximity devices which close the electrical circuit when they sense the presence of a steel target. The locations of these sensors are shown below. LS1 and LS2 sensors are located within slotted holes for variable positioning. Adjust the position of the proximity sensors using two 15/16" (24mm) open end wrenches to loosen the holding nuts. Then slide the proximity sensor towards the front or back of the slot and gently tighten the nuts to 3.7 ft. lb (5 Nm) to secure the sensor. The face of the proximity sensor must be between 1/16" - 1/8" (1.6 - 3mm) from the target plate without making contact.

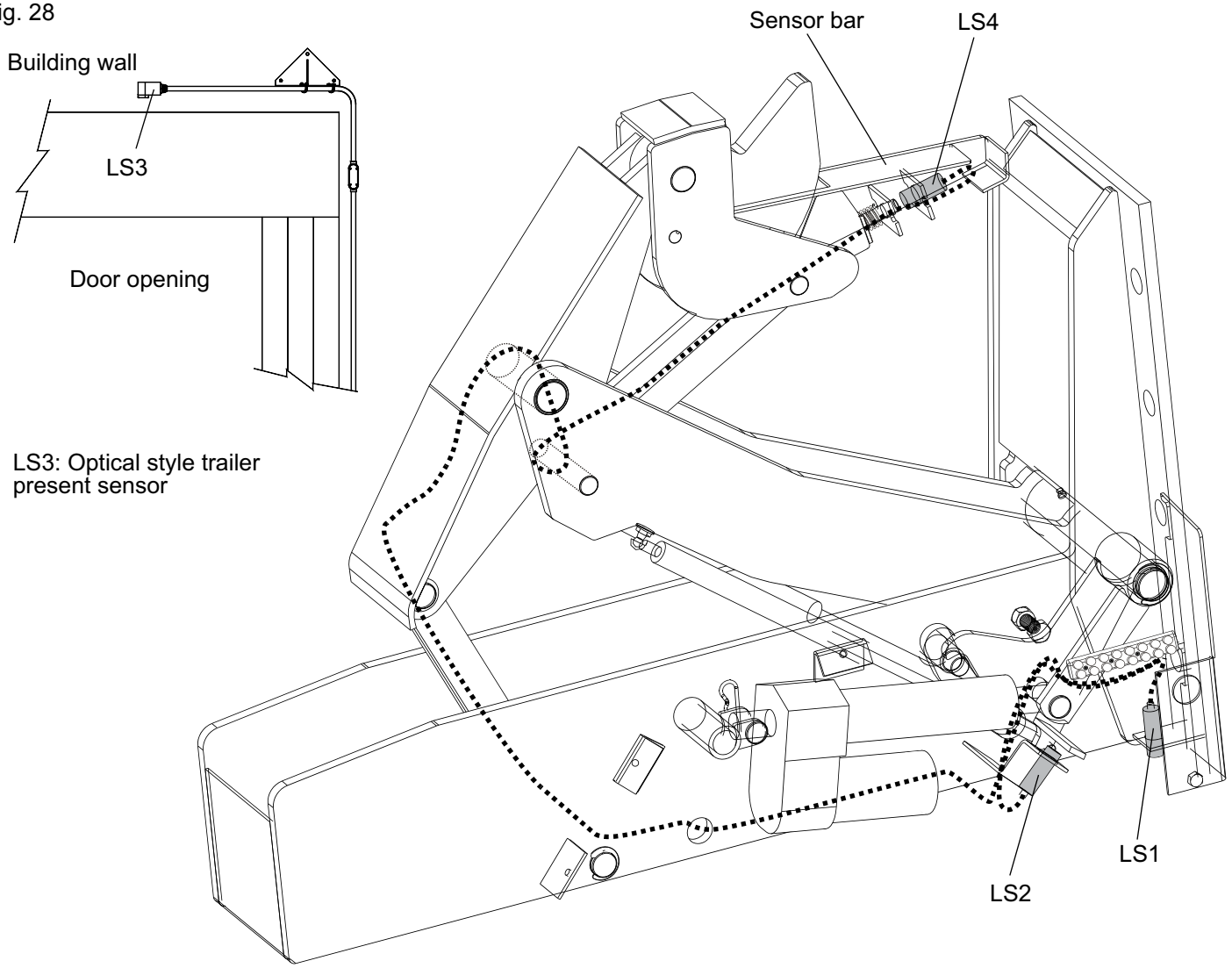
⚠ WARNING

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.

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

Keep hands and feet away from moving parts when making adjustments.

Fig. 28



RESTRAINT STORED SENSOR – LS1

Proximity sensor LS1 controls the lowered position of the restraining hook by stopping the motor when the restraint is lowered. The correct stored position is when the top of the primary hook is approx. 3/16" below the frame housing. Equally important, when the restraint is stored there must be some slight movement felt when you push down on the top of the primary hook. To adjust proximity sensor LS1:

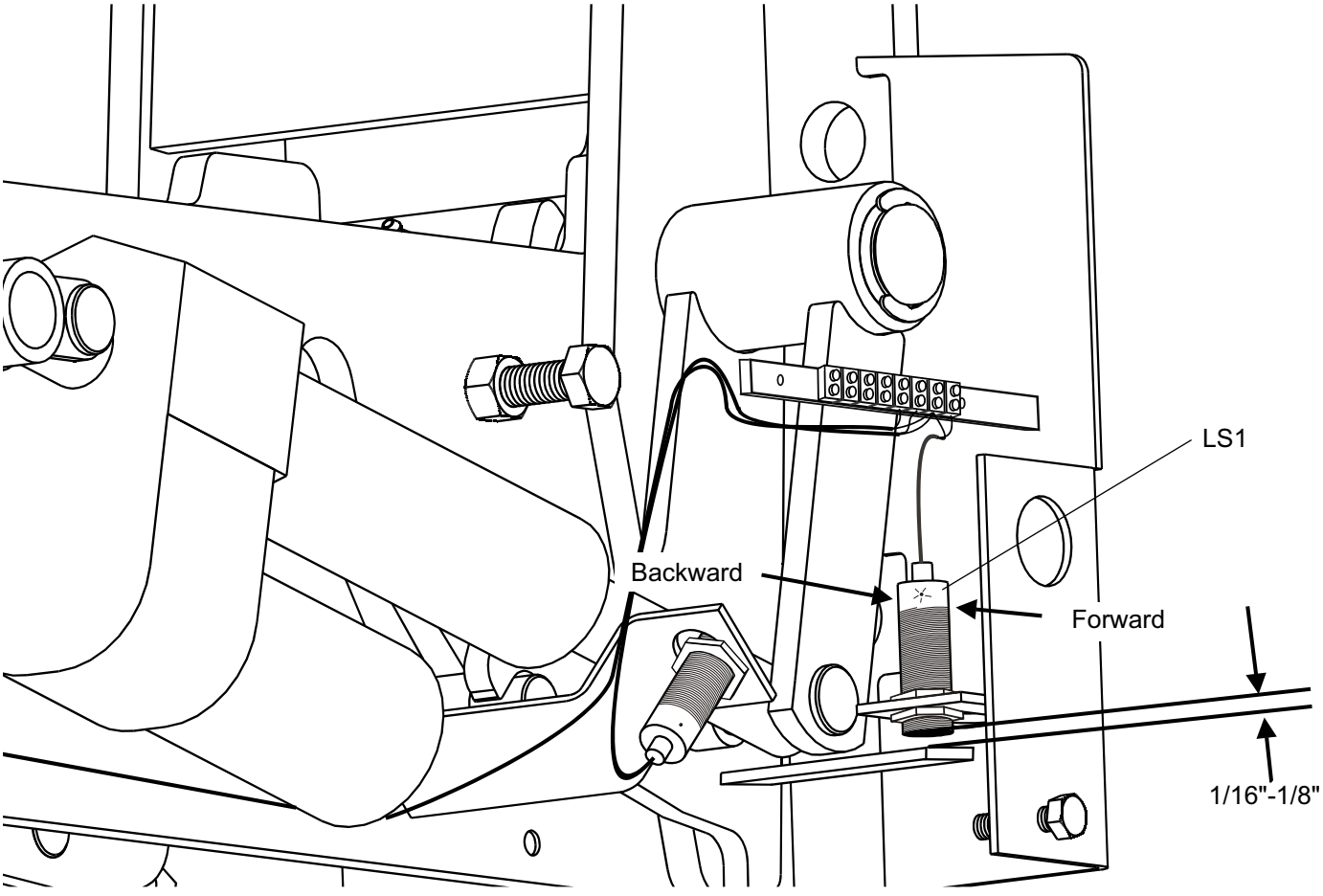
1. Raise the restraint and disconnect power.
2. Remove side cover.
3. Loosen nuts holding LS1.
4. Move proximity sensor backward in the slot to lower the stored position.
5. Move proximity sensor forward in the slot to raise the stored position.
6. Tighten nuts.
7. Reconnect power to the restraint. Return the restraint to the stored position. If the stored position is not correct, repeat steps 1-7.
8. Reinstall side cover.

If the actuator clutch slips and makes a ratcheting sound when the restraint is lowered, the proximity sensor LS1 is not closing. Move the sensor forward slightly and check the operation again.

NOTE:

Proper torque specification for tightening LS1 is 3.7ft. lb.

Fig. 29



ADJUSTMENTS, continued

RESTRAINT RAISED SENSOR – LS2

Proximity sensor LS2 shuts off power to the linear actuator when the sector plate is fully raised and resting against the 1/2" stop bolt that acts as a physical limit for sector plate travel (see Fig. 29). To check the proper setting, press the engage button. As the restraint raises press and hold down the sensor bar turning on LS4 (RIG sensor). LS2 is properly adjusted if the linear actuator shuts off without ratcheting and the restraint reaches its fully raised height with sector plate resting on the 1/2" stop bolt.

NOTE:

Proper torque specification for tightening LS2 is 3.7ft. lb.

TO ADJUST THE PROXIMITY SENSOR LS2:

1. Remove side cover of restraint.
2. Disable proximity sensor LS2 by disconnecting wire from terminal R2 on terminal strip (see page 9).
3. Raise restraint until the linear actuator ratchets with the sector plate resting against the 1/2" stop bolt, then turn off power to the restraint.
4. Loosen sensor retaining nuts holding LS2.
5. Move proximity sensor until it is centered on the sector plate sensor target and the face of the sensor is 1/16"-1/8" away from the target (see Fig. 30 and 31).
6. Tighten retaining nuts.
7. Reconnect wire to terminal R2.
8. Turn on power to restraint and lower unit by pressing the **RELEASE** button.
9. Raise the restraint and verify the setting. Repeat steps 2 through 9 if required.
10. Reinstall side cover.

Fig. 30

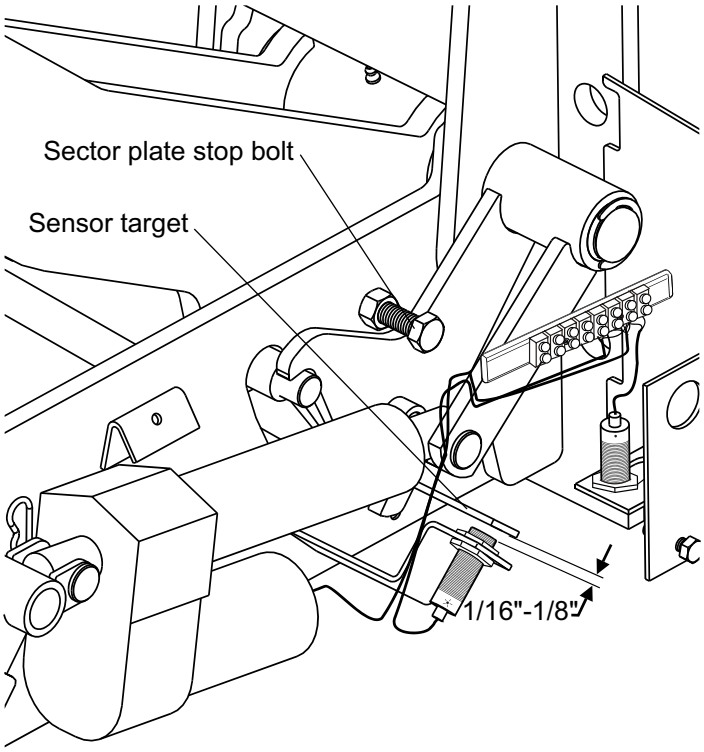
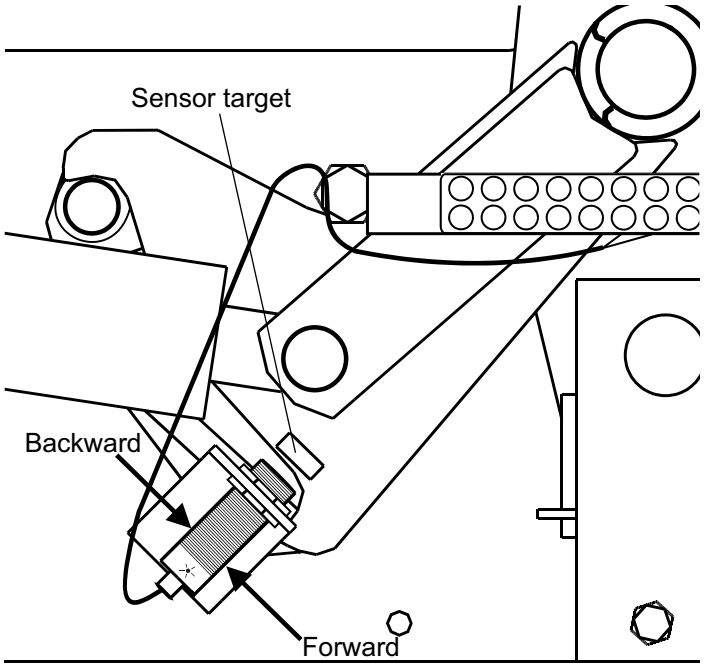


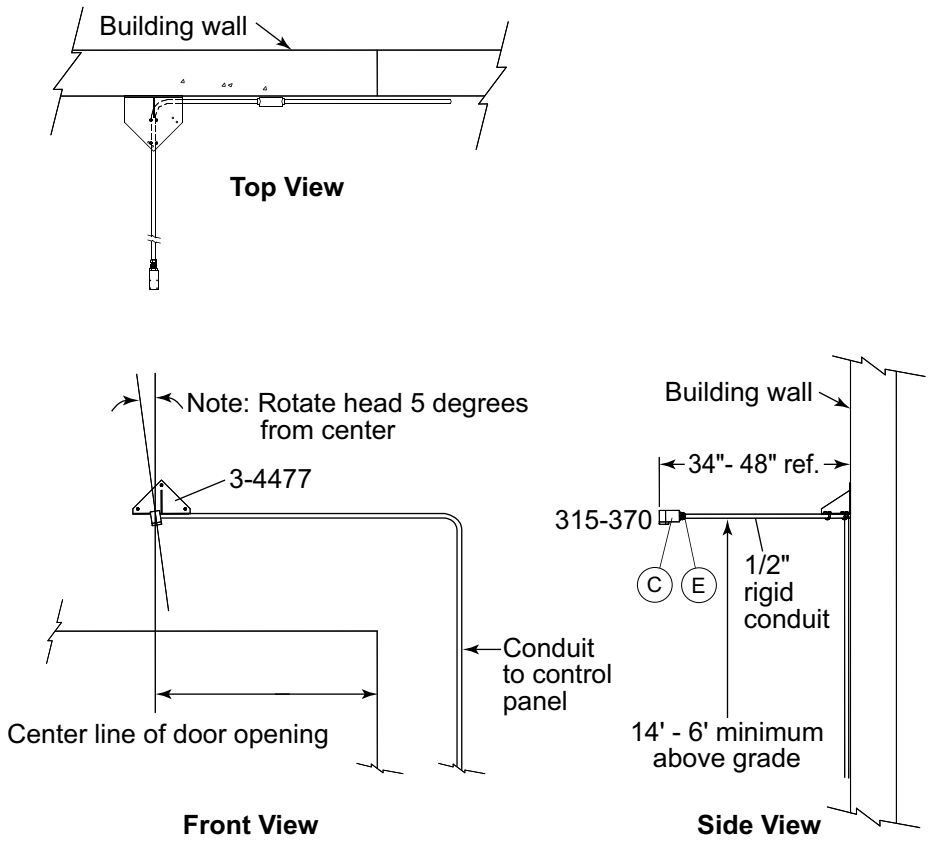
Fig. 31



TRAILER PRESENT SENSOR – LS3

LS3 senses a vehicle at the dock and transmits a signal to the control panel. This turns on the panel face AMBER light. Standard on SL70 and SL80. Optional on SL90. Auto engagement of the vehicle restraint will occur after a 60 second delay. Standard on SL80 optional on SL90.

Fig. 32



OPERATIONS

No Trailer Present

- Inside lights display Solid RED outside display GREEN.

Trailer Arrives

- Inside lights switch to Solid AMBER and RED, outside lights continue to display GREEN.

Operator engages vehicle restraint

- Inside lights switch to Solid GREEN, outside lights switch to display RED.

OR (with SL80 standard or SL90 optional Auto Engage)

After a 60 second delay the Restraint will automatically attempt to engage the vehicles RIG.

- Inside lights switch to Solid GREEN, outside lights switch to display RED.

Operator releases vehicle restraint

- Inside lights switch to Solid AMBER and RED, outside lights continue to display GREEN.

Trailer Departs

- Inside lights display Solid RED outside display GREEN.

NOTE:

If auto engagement is enabled (SL80 standard or SL90 optional) the vehicle restraint will not attempt to re-engage until the previously engaged vehicle is removed from the dock and a new vehicle arrives.

ADJUSTMENTS, continued

RIG SENSOR BAR – LS4

Proximity sensor LS4 senses when the restraining hook has contacted an RIG. LS4 is properly adjusted if the flashing AMBER light turns off when the restraint is raised and the sensor bar is depressed.

Raise the restraint and press down on the sensor bar before the motor stops. The restraint will remain raised. Releasing the sensor bar will cause the AMBER light to flash.

The proper setting of LS4 is 1/16"-1/8" between sensor target and proximity sensor while the sensor bar is depressed.

NOTE:

Proper torque specification for tightening LS4 is 3.7ft. lb.

To adjust LS4, order the special tool from your local SERCO® distributor. P/N: **AP2632** - VEHICLE RESTRAINT LS4 15/16" WRENCH SET or make your own tool using the following instructions:

1. Buy a 15/16" combination wrench (one end open-end, other end 12-point box)
2. Using an abrasive cutoff wheel or “chop saw”, cut the wrench in half, in the middle of the handle.
3. Carefully remove a 0.708" - 0.750" section from the box “ring”, directly opposite the handle. This is important, as the wrench must pass over the 18mm body of the proximity sensor.
4. Sand any sharp edges or burrs.

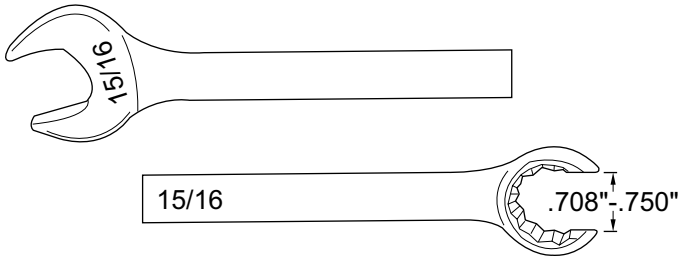
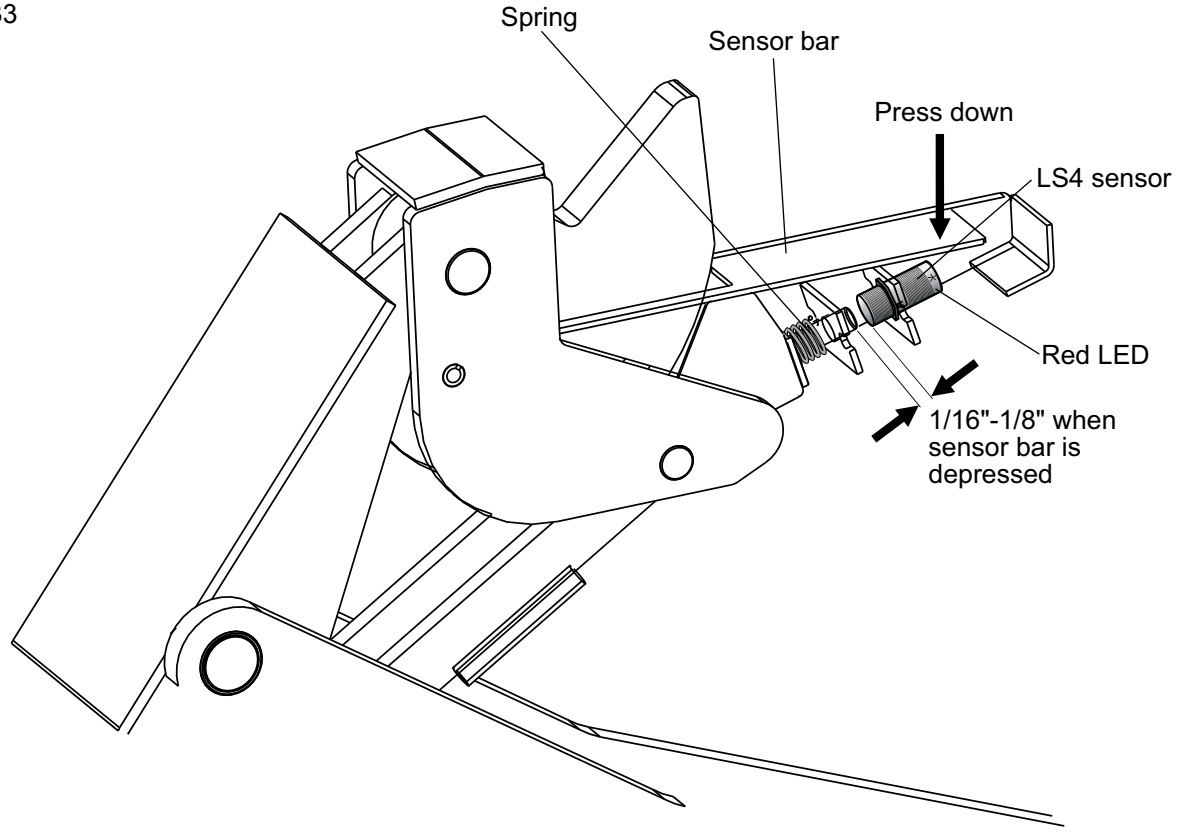


Fig. 33



GAS SPRING REPLACEMENT

TO REPLACE GAS SPRINGS ON THE PITBULL® SAFETY-LOC® SERIES RESTRAINT

Two gas springs are used on the PitBull® SAFETY-LOC® series restraints to bias the moving parts upward. Gas springs contain high pressure compressed nitrogen, and must be handled with care. The gas springs are charged with approx. 200 lbs. of force, and must BOTH be changed if either gas spring weakens or is damaged. To successfully replace gas springs, you must follow the instructions below.

1. Remove the side cover from the restraint with the restraint in the lowered position.

2. Remove the sector plate stop bolt.

3. Disable the LS2 sensor by removing its BLUE wire from the terminal strip.

4. Push the **ENGAGE** button to raise the restraint. When the hook reaches the top of the stroke and begins to make a 'ratcheting' sound you must turn off the power.

5. Disconnect the ORANGE wire from the motor side of the terminal strip on the restraint. Insulate the bare end of this wire with a 'wire-nut' or electrical tape. This will make it impossible to lower the restraint electrically while you are working on it.

6. Cut a piece of 2x4 lumber to length and fit it tightly between the frame and the underside of the main arm (see Fig. 34). The length of this 2x4 must allow the gas springs to reach their free length.

⚠ WARNING

The moving parts of the restraint are very heavy, and are supported by the gas springs. Great care must be taken to support the weight of these parts while removing or replacing the gas springs.

7. Remove the klipring from one end of the pin that joins the front strut assembly to the upper arm assembly. Carefully slide out the pin while replacing it with a 1/4" diameter shaft screwdriver. This will allow the gas springs to extend to their free length so that they can be removed.

NOTE:

You may have to use the supporting wood to force the main arm assembly upwards even further than before you removed the pin.

8. Replace the gas springs one at a time beginning with the most obviously damaged gas spring. This may help to counterbalance some of the weight while you are working on the unit. Place a small dab of grease in each ball socket before you push the socket onto the ball stud. Make sure the rod end of the gas spring points downward.

GAS SPRING REPLACEMENT, continued

NOTE:

Make sure the ball sockets are properly aligned – hold the gas spring in your hand and using pliers tighten the barrel end socket snug. Next hold the barrel in your hand as you use pliers on the rod end ball socket. Rotate the rod clockwise as you index the rod to proper orientation.

NOTICE

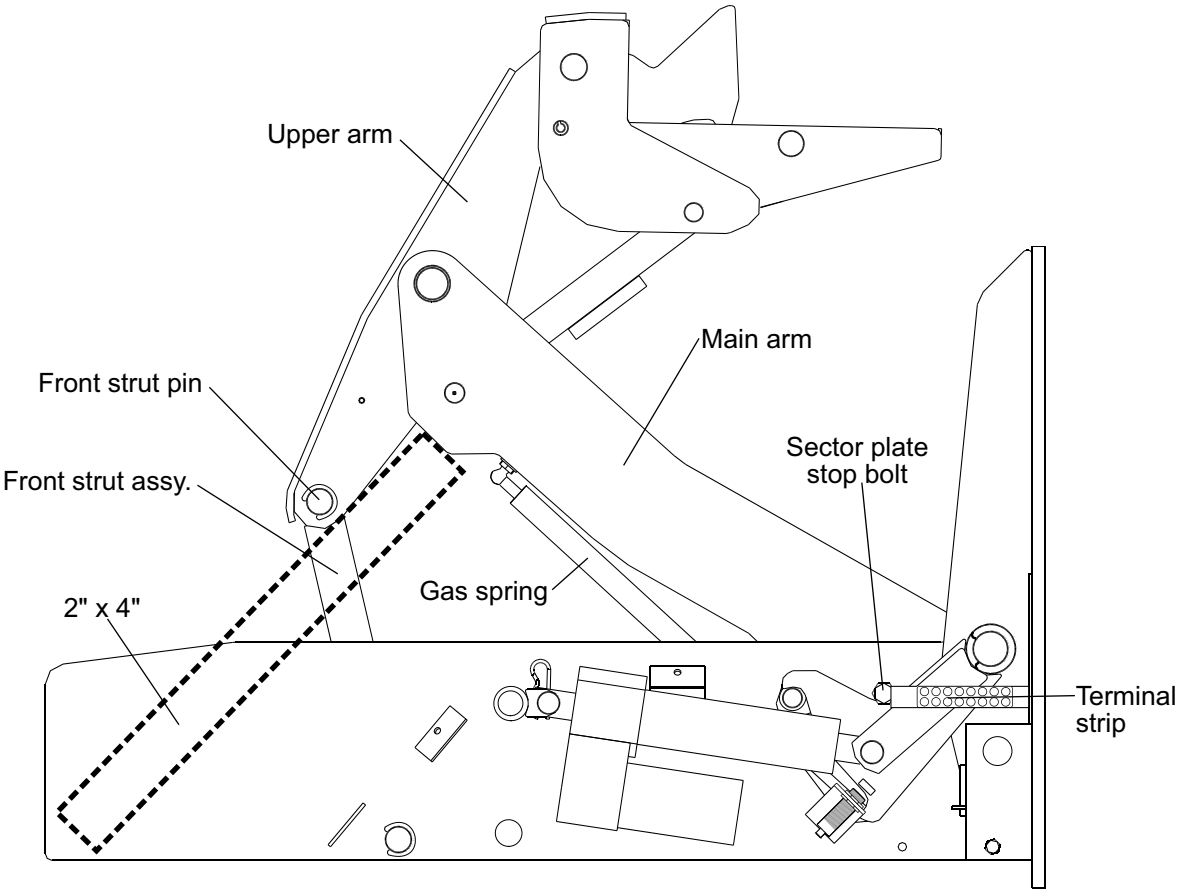
Do NOT use pliers on the chrome rod surface!

9. With both gas springs installed and the retainer clips in place, you can remove the 2x4 support, replace the front strut pin and kliprings.

10. Replace the ORANGE motor wire, and the BLUE LS2 wire into the appropriate terminal strip connections. Install the sector plate stop bolt. Turn the power on and push the **RELEASE** button to restore the restraint.

11. Test the unit and reinstall the side cover.

Fig. 34



ELECTRICAL SCHEMATIC

6003333 (Push-button Release, Switch Override)

Fig. 35A

NOTE:

For 24V incoming power consult factory.

DANGER

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

(Standard 24V exterior lights shown)

(For optional 110V exterior lights, see Fig. 35B)

Power Supply Terminals

L1, N — 120V/1PH/60HZ Incoming power

Green G — Ground

Field Terminals (Inputs)

Red RC, RC — PLC +24VDC for restraint switches

OV, OV — PLC -24VDC for optional switches

Black 1 — Restraint lowered proximity switch - LS1

Brown 2 — Restraint raised proximity switch - LS2

3 — Optional trailer presence sensor - LS3

Brown/White 4 — ICC bar engaged proximity switch - LS4

18 — Optional door closed switch - LS6

19 — Optional leveler stored switch - LS5

Field Terminals (Outputs)

7 — Red outside light (24volt positive)

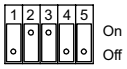
8 — Green outside light (24volt positive)

9 — 24volt outside lights common (negative)

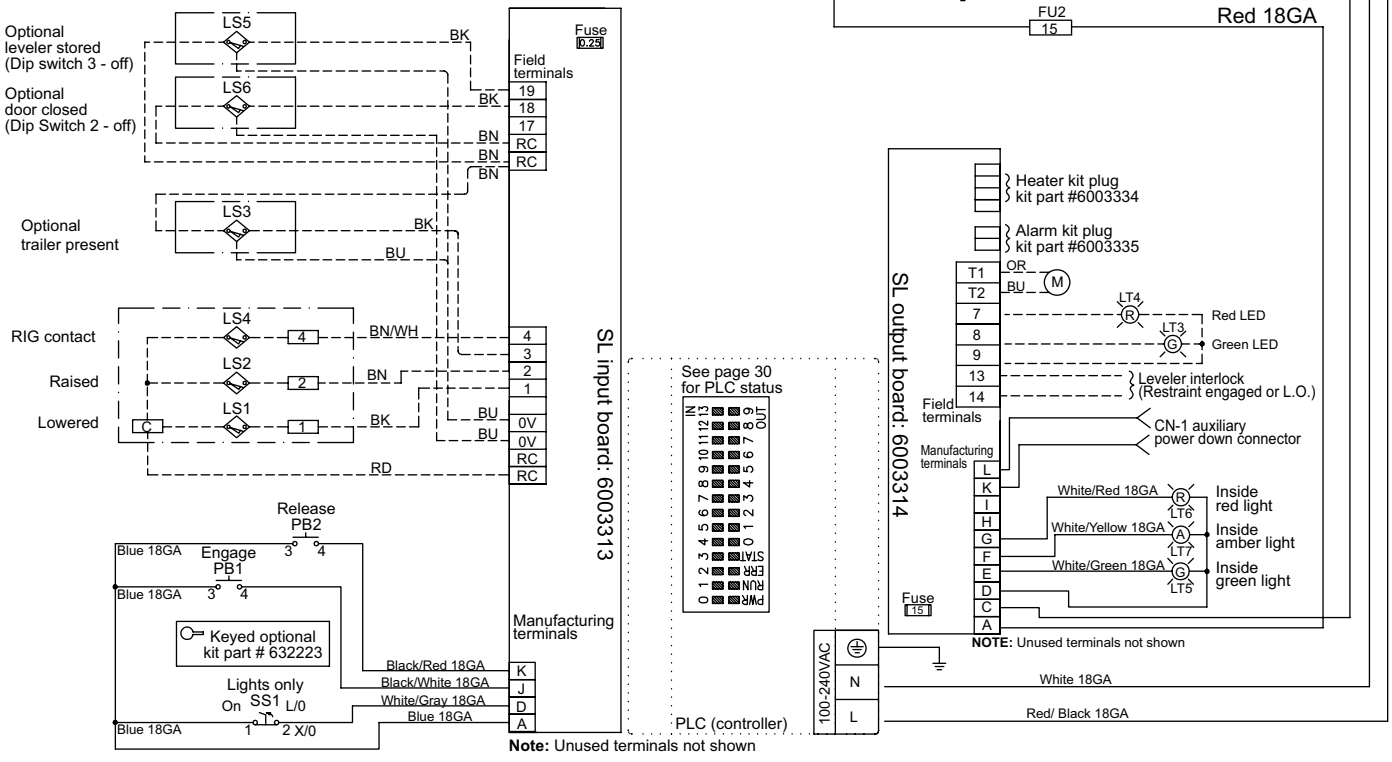
13, 14 — Leveler interlock

Orange T1, Blue T2 — Restraint motor

Dip switch located on side of board standard switch positions shown.



Input board switch settings



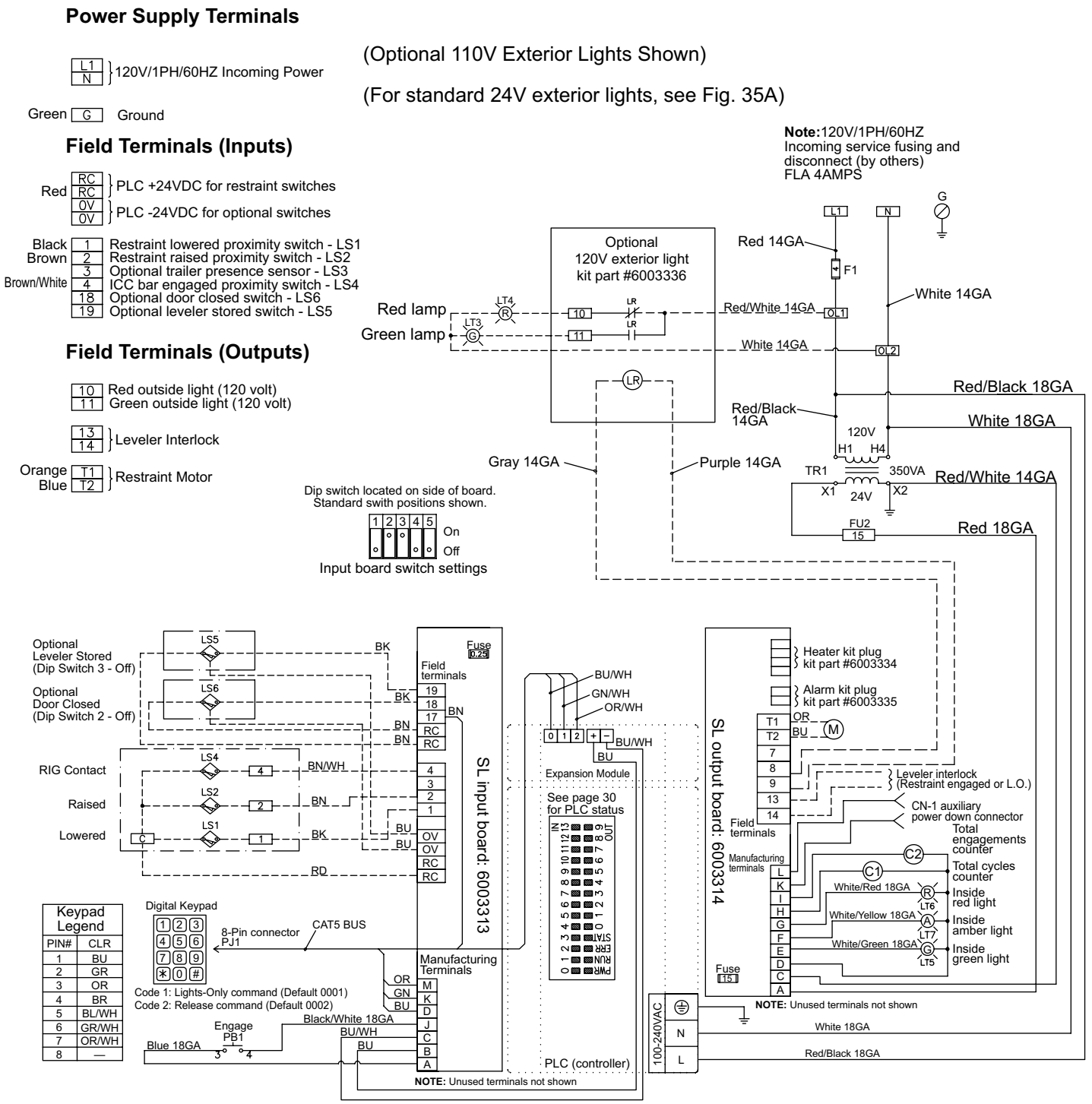
ELECTRICAL SCHEMATIC

6003301 (keypad release and override)

Fig. 35B

NOTE:

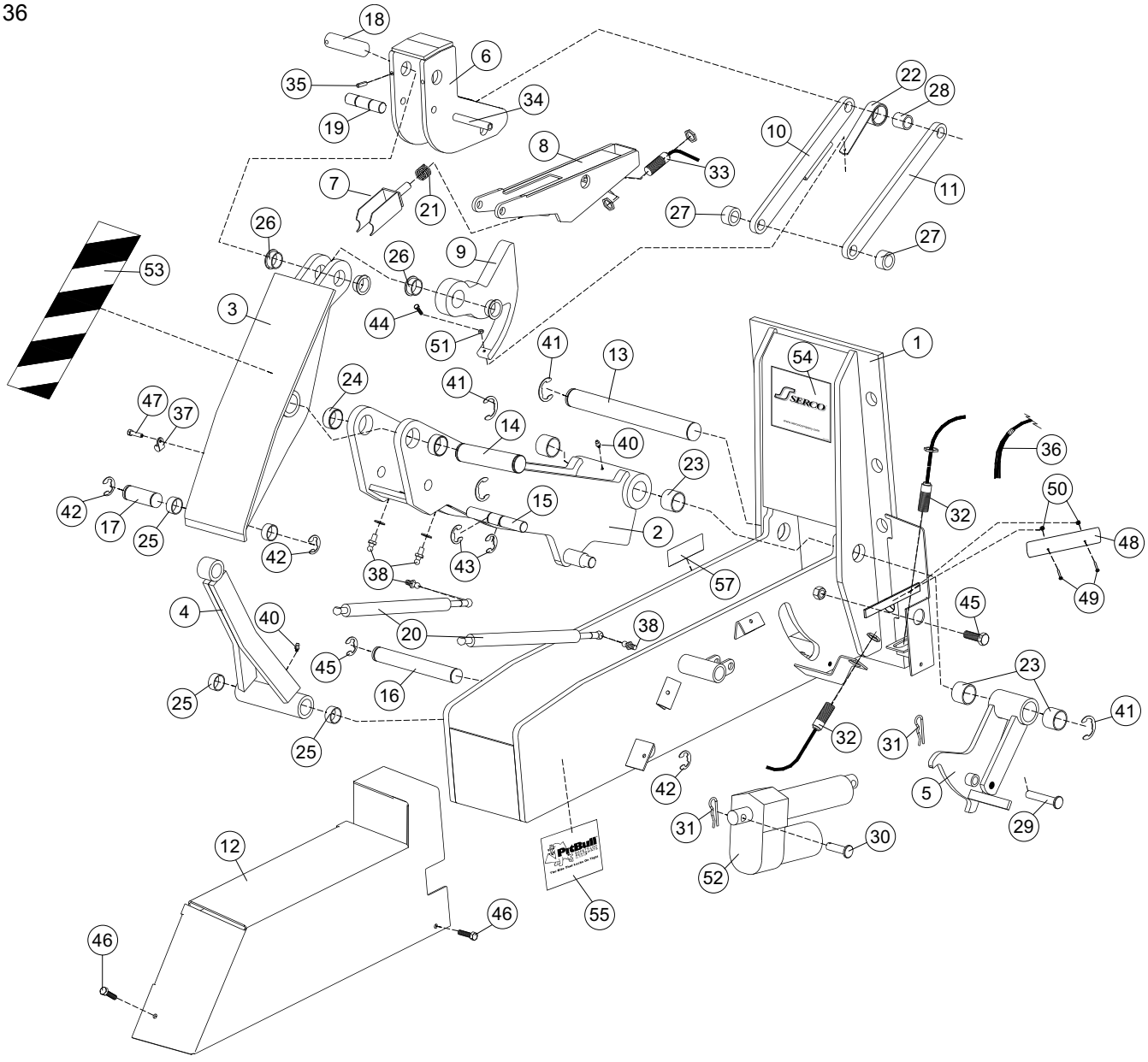
For 24V incoming power consult factory.



⚠WARNING

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

Fig. 36



PARTS LIST — VEHICLE RESTRAINT, continued

Item	Quantity	Part Description	Part Number
1	1	Frame Assembly, Includes Items 38 and 45	9-0001
2	1	Main Arm Assembly, Includes Items 23, 24, 38 and 40	9-0003
3	1	Upper Arm Assembly, Includes Items 25 and 26	6001535
4	1	Front Strut Assembly, Includes Items 25 and 40	9-0007
5	1	Sector Plate Assembly, Includes Item 23	9-0009
6	1	Primary Hook Assembly	9-0011
7	1	Sensor Target Assembly	9-0027
8	1	Sensor Bar Assembly	9-0028
9	1	Secondary Hook Assembly, Includes Item 26	9-0015
10	1	Hook Strut Assembly	9-0030
11	1	Hook Strut	485-0240
12	1	Housing Cover	9-0029
13	1	Pin - 1-1/4 OD	485-0056
14	1	Pin, Upper Arm-Main Arm, 1-1/4" OD, SL10-90	6001534
15	1	Pin-Main Arm, 3/4 OD	485-0035
16	1	Pin-Frame, 1" OD	485-0038
17	1	Pin-Front Strut, 1" OD	485-0037
18	1	SL-Pin-Primary Hook, 1" Dia.	485-0108
19	1	SL Primary Hook Pin, 1" Dia.	485-0119
20	2	Gas Spring	338-018
21	1	Spring (LS4)	333-047
22	1	Spring (Constant Force)	338-009
23	4	Bushing - 1-1/4"	821-032
24	2	Bushing - 1-1/4"	821-035
25	4	Bushing - 1"	821-034
26	4	Bushing - 1" (Flange)	821-033
27	2	Spacer - Main Arm	485-0026
28	1	Nylon Roller	485-0235
29	1	Clevis Pin - 1/2" Dia. x 2-3/4" lg.	231-502
30	1	Clevis Pin - 1/2" Dia. x 1-25/32" lg.	231-505
31	2	Hitch Pin Clip	231-503
32	2	LS1, LS2 Proximity Switch (c/w hardware)	625-036
33	1	LS4 Proximity Switch (c/w hardware) 18mm - Low Temp	625-043

Item	Quantity	Part Description	Part Number
34	1	Tension Pin - 1/2" Dia. x 3-1/4" lg.	231-205
35	1	Tension Pin - 1/4" Dia. x 3/4" lg.	231-128
36	1	SL60 Wiring Harness Kit	9-9855
37	1	Cable Clip	441-125
38	4	Ball Stud	821-037
39	N/S	Heater Kit (Optional) Installs on Restraint	99726
40	2	Grease Fitting (c/w ball check)	417-113
41	4	Cresring - 1-1/4"	236-123
42	4	Klipring - 1"	236-114
43	2	Klipring - 3/4"	236-110
44	1	HHMS 10-32 x 3/4" lg.	211-820
45	1	HHMB 1/2-13 x 1-1/2" lg.	212-204
46	2	HH-STS 5/16-18 x 1/2" lg.	216-460
47	1	TEKS-4 Screw 12-24 X 7/8	6000285
48	1	Terminal Block - 9 Pole	541006
49	2	RHMS 8-32UNF x 7/8" lg.	6000582
50	2	Lock Nut 8-32 UNF Nylock	241-107
51	1	LN 10-32 Nylock	214-123
52	1	Linear Actuator	341-008
53	1	Hazard Stripe	6008556
54	1	Product Identifier Label SL	921-185
55	1	PitBull® Logo	921-247
56	1	Trailer Present Sensor Kit (Optional - not shown)	9-9221
57	1	Punch Tag - SERCO® Vehicle Restraints	921-249
58a	7	Anchor Bolt, 3/4 UNC x 5-1/2 (not shown) (Wall mount only)	6001187
58b†	2	Anchor Bolt, 3/4 UNC x 7 (not shown) Ground mount	6001334
59†	4	Epoxy Anchor Rod - 3/4 RAWL (not shown)	235406
60†	4	Epoxy Capsule - 3/4, RAWL #65 (not shown)	235407

† Ground mount kit.

PARTS LIST — CONTROL PANEL

Push-button Release, Switch Override

Fig. 37

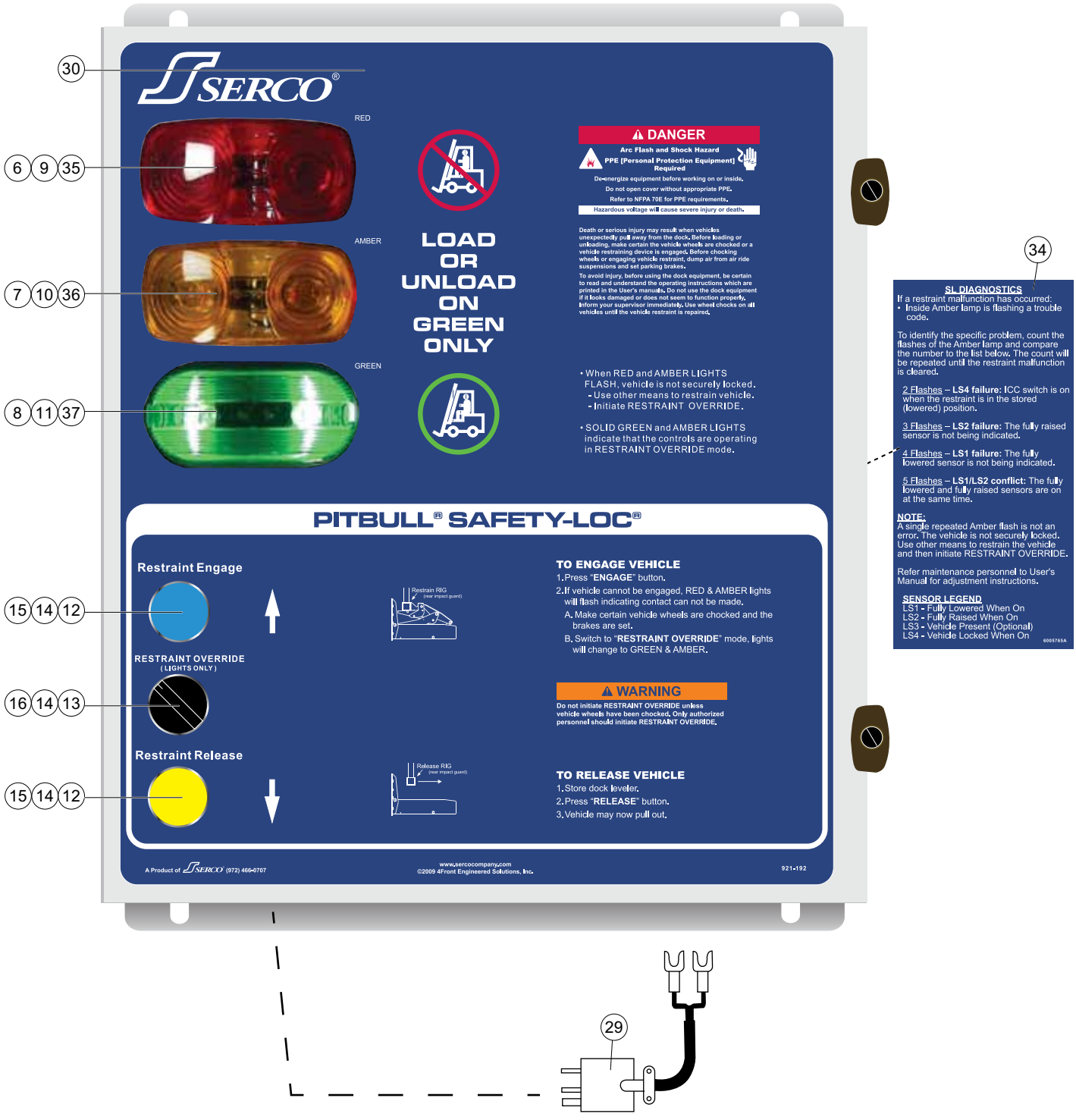
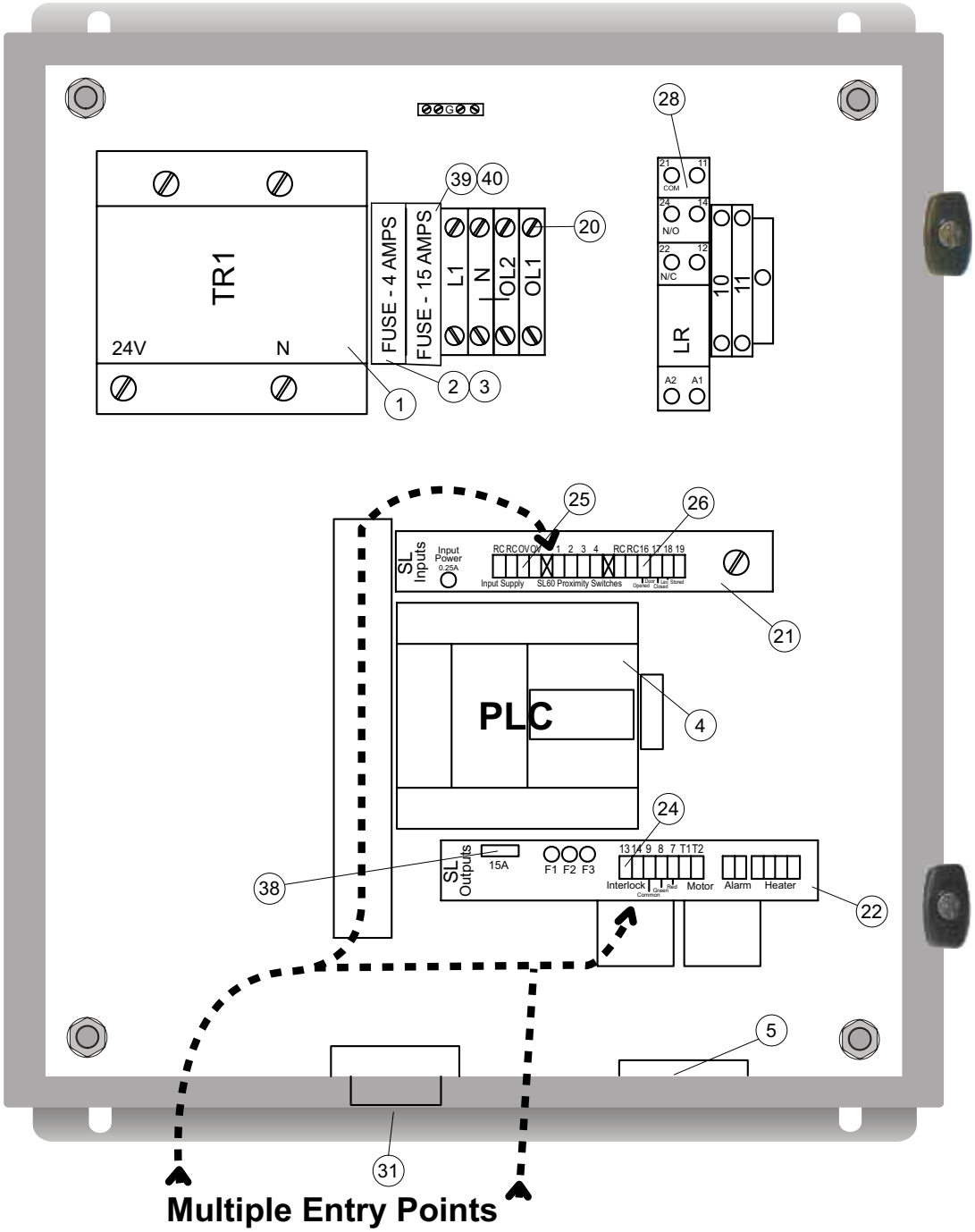


Fig. 38



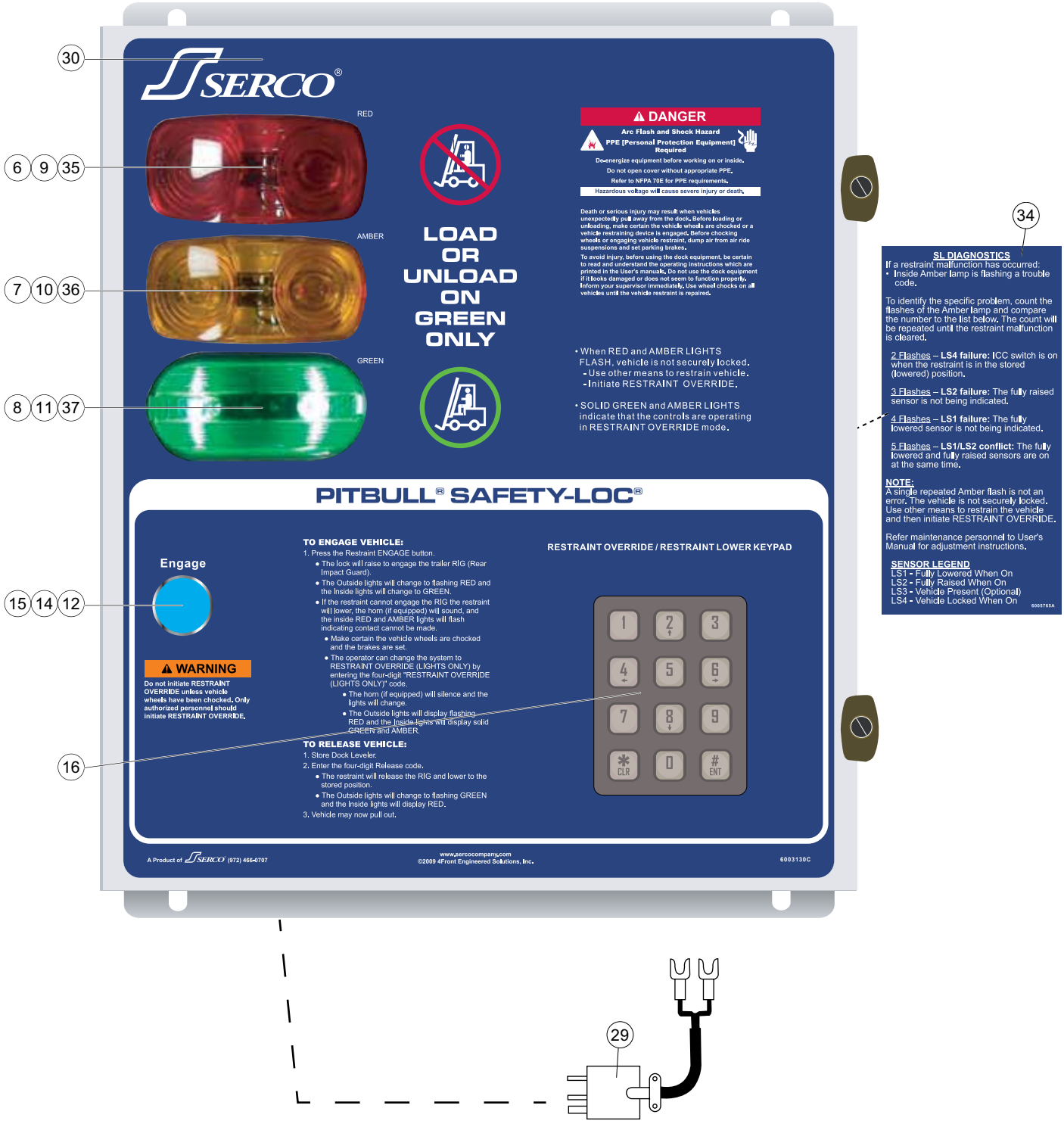
- - - - Field Wiring
Use wire duct and dress wire clean of PLC face.

PARTS LIST — CONTROL PANEL, continued

Push-button Release, Switch Override

Item	Quantity	Part Description	Part Number
	1	Complete Control Panel	6003333
1	1	Transformer 350VA 120 - 24Volt	6000443
2	1	Gould CC Class fuse holder	6003299
3	1	CC Class fuse 4 amps	FNQ-R-4
4	1	TWIDO PLC	6001056
5	1	Connector, Cinch (Aux. Power Down For Restraint)	632266
6	1	Light base, RED	823107
7	1	Light base, AMBER	823107
8	1	Light base, GREEN	823111
9	2	LED, RED	6006375
10	2	LED, AMBER	6006376
11	2	LED, GREEN	6006377
12	2	Push-button, Universal	6000506
13	1	Switch, Spring Return Selector, 2 Position	632219
14	3	Body, Mounting Collar	6000515
15	2	Block, Contact, Normally Open	6000516
16	1	Block, Contact, Normally Closed	6000517
17	1	Operating Label (not shown)	6000534
18	2	Terminal, Endplate (not shown)	6000539
19	1	Plain Marker (not shown)	6000540
20	4	Terminal, 2 Conductor	6000542
21	1	SL60-90 Input Board Assembly	6003313
22	1	SL60-90 Output Board Assembly	6003314
23	2	18 Pole Female Backplate Panel Mount Plug (not shown)	6003315
24	1	7 Pole Female Field Terminal	6004802
25	1	9 Pole Female Field Terminal	6004803
26	1	5 Pole Female Field Terminal	6004801
27	3	Terminal Tool	6004806
28	1	120V Exterior Light wiring kit (Optional)	6003336
29	1	Auxilliary Power Down Plug and Cable	823206
30	1	SERCO® Label - Standard for SL60-80	921-192
31	1	Audible Alarm Kit (Optional on SL60-80, Standard on SL90)	6003335
32	N/S	Counter (Optional on SL70, SL80)	6010904
33	N/S	Heater Control Board	6003306
34	1	Diagnostics Label	6005765
35	1	Lens Only, RED, Rectangular	823100
36	1	Lens Only, AMBER, Rectangular	823102
37	1	Lens Only, GREEN, Oval	AP0027
38	1	Fuse	ATM-15
39	1	Fuse Holder	6000538
40	1	Fuse	MDA15

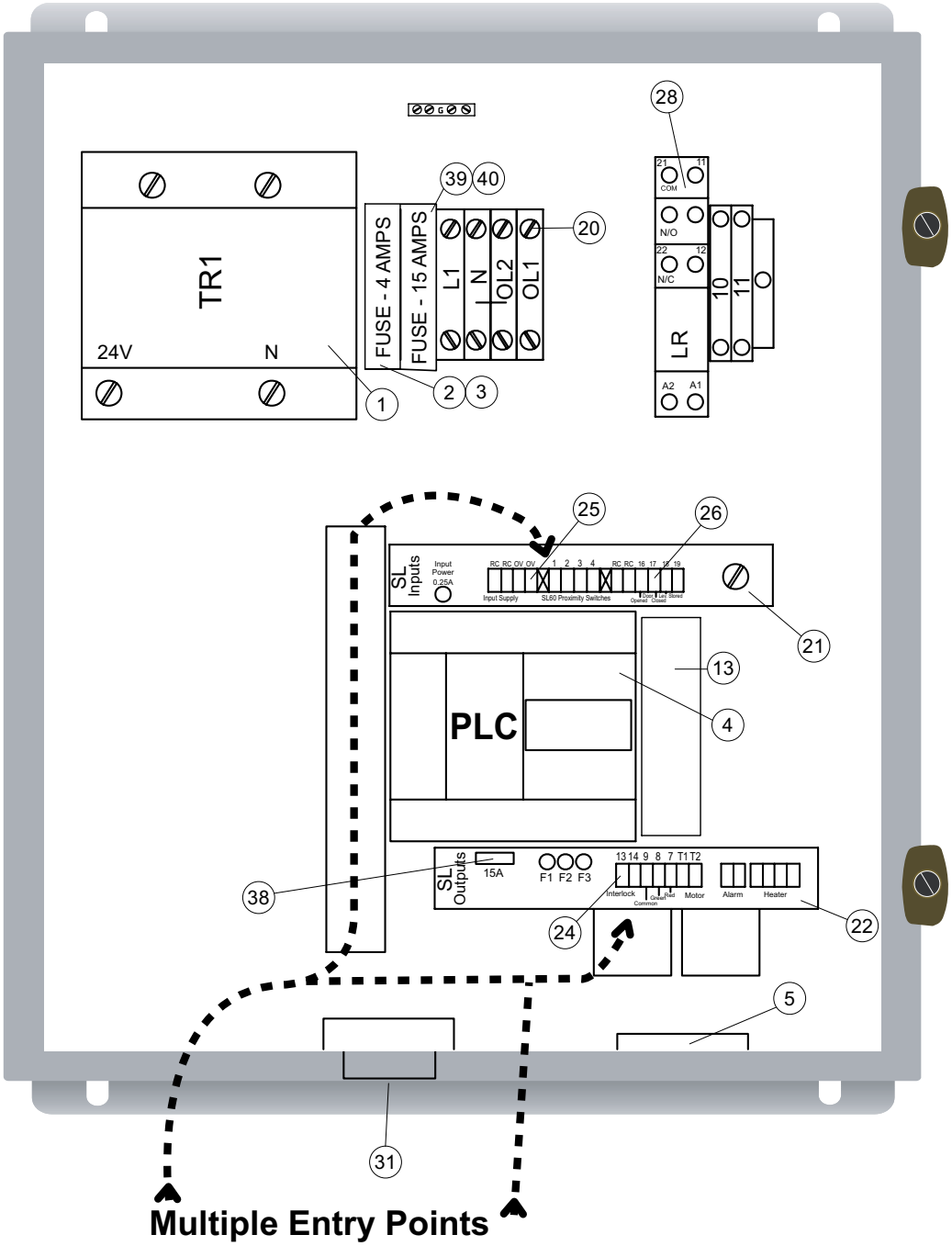
Fig. 39



PARTS LIST — CONTROL PANEL, continued

Keypad Release and Override

Fig. 40



- - - - Field Wiring
Use wire duct and dress wire clean of PLC face.

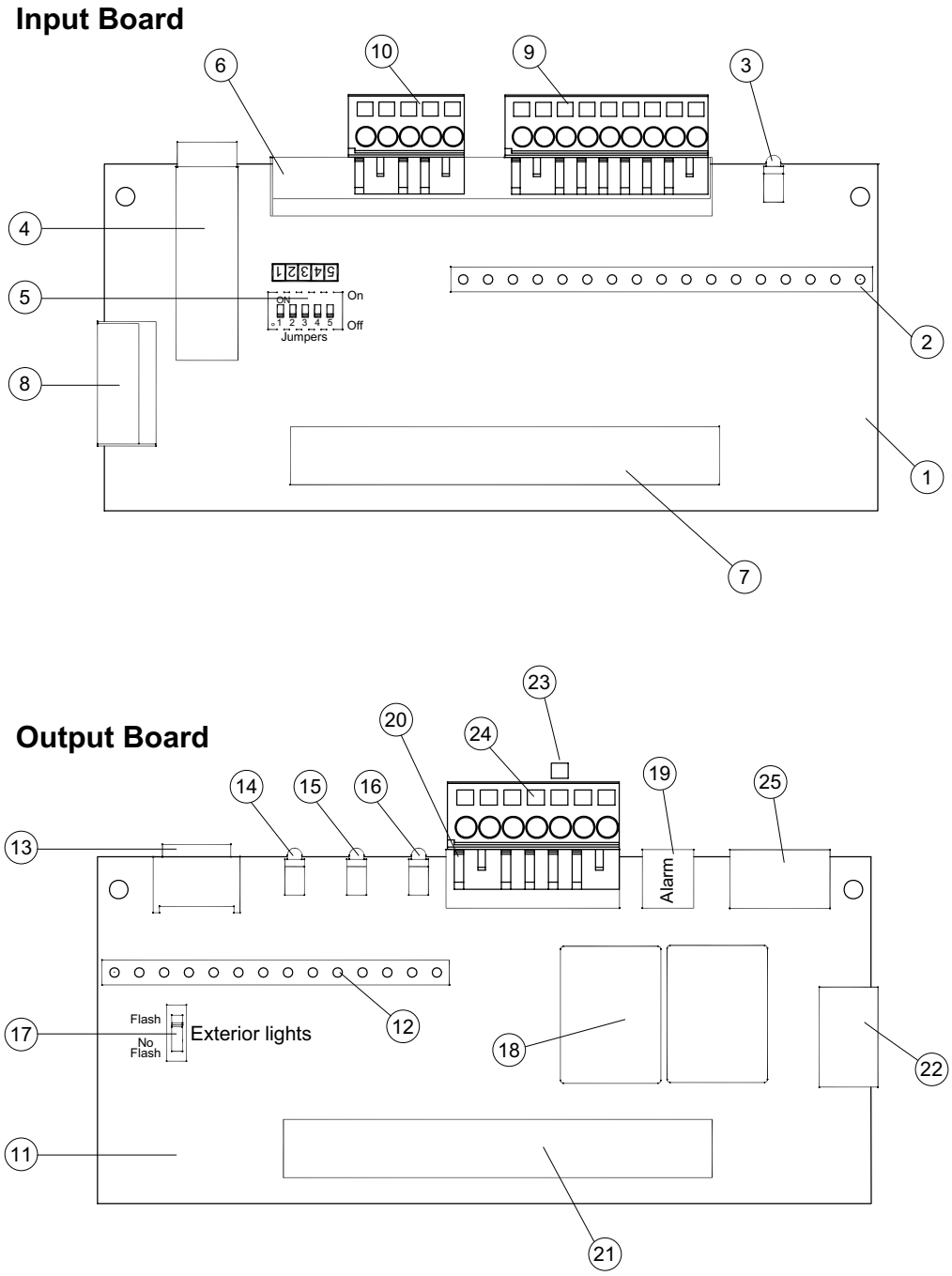
PARTS LIST — CONTROL PANEL, continued

Keypad Release and Override

Item	Quantity	Part Description	Part Number
	1	Complete Control Panel	6003301
1	1	Transformer 350VA 120 - 24Volt	6000443
2	1	Gould CC Class fuse holder	6003299
3	1	CC Class fuse 4 amps	FNQ-R-4
4	1	TWIDO PLC	6001056
5	1	Connector, Cinch (Aux. Power Down For Restraint)	632266
6	1	Light base, RED	823107
7	1	Light base, AMBER	823107
8	1	Light base, GREEN	823111
9	2	LED, RED	6006375
10	2	LED, AMBER	6006376
11	2	LED, GREEN	6006377
12	2	Push-button, Universal	6000506
13	1	Expansion Module (8 Source Out)	6001054
14	3	Body, Mounting Collar	6000515
15	2	Block, Contact, Normally Open	6000516
16	1	12-Key Keypad	6010903
17	1	Operating Label (not shown)	6000534
18	2	Terminal, Endplate (not shown)	6000539
19	1	Plain Marker (not shown)	6000540
20	4	Terminal, 2 Conductor	6000542
21	1	SL60-90 Input Board Assembly	6003313
22	1	SL60-90 Output Board Assembly	6003314
23	2	18 Pole Female Backplate Panel Mount Plug (not shown)	6003315
24	1	7 Pole Female Field Terminal	6004802
25	1	9 Pole Female Field Terminal	6004803
26	1	5 Pole Female Field Terminal	6004801
27	3	Terminal Tool (not shown)	6004806
28	1	120V Exterior Light wiring kit (Optional)	6003336
29	1	Auxilliary Power Down Plug and Cable	823206
30	1	SERCO® Label - Standard for SL90	6003130
31	1	Audible Alarm Kit (Optional on SL60-80, Standard on SL90)	6003335
32	N/S	Counter (Optional on SL70, SL80)	6010904
33	N/S	Heater Kit (Optional)	6003306
34	1	Diagnostics Label	6005765
35	1	Lens Only, RED, Rectangular	823100
36	1	Lens Only, AMBER, Rectangular	823102
37	1	Lens Only, GREEN, Oval	AP0027
38	1	Fuse	ATM-15
39	1	Fuse Holder	6000538
40	1	Fuse	MDA15

PARTS LIST — INPUT/OUTPUT BOARDS

Fig. 41



Item	Quantity	Part Description	Part Number
1	1	Complete SI Input Card Assy.	6003313
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 SL60-90 Output Card Assembly	6003314
12	1	PLC Interface Header*	—
13	1	Actuator Supply Fuse - 15 AMP	ATM-15
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	Optional 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	6004802
25	1	Optional Restraint Heater Kit Socket*	—

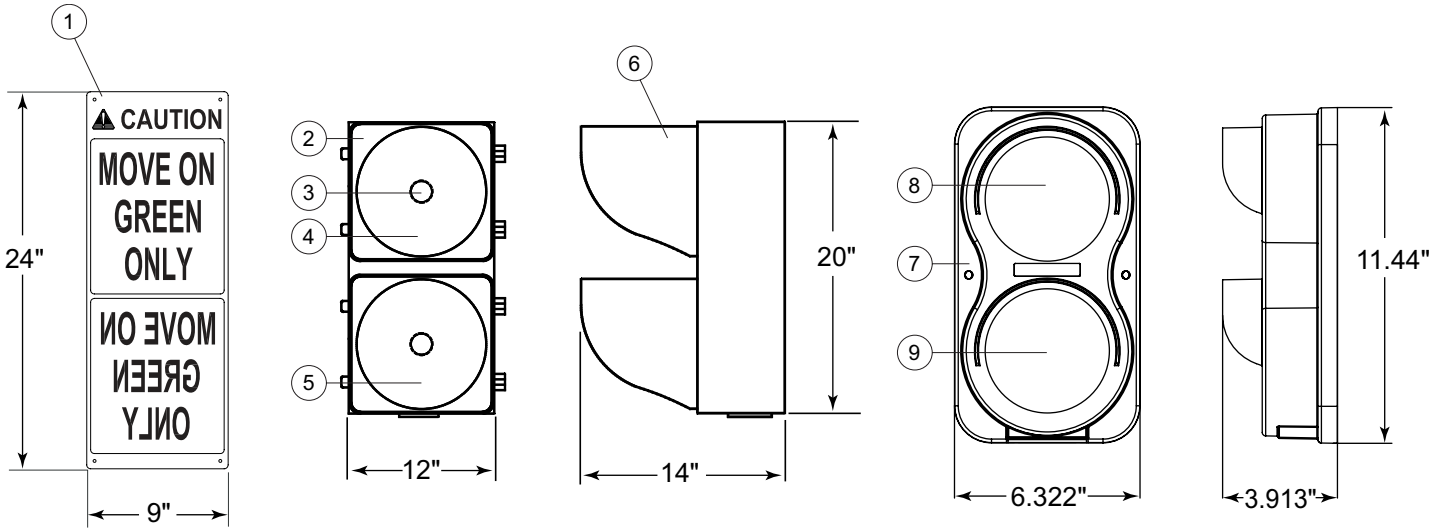
**** Included in Assy. 6003313***

NOTE:

For 24V incoming power consult factory.

PARTS LIST — EXTERIOR SIGNS AND LIGHTS

Fig. 42



Item	Quantity	Part Description	Part Number
1	1	Outside Sign - Normal Lettering	709-832
2	1	Light Assembly - Complete (Traffic Lights)	8-9519
3*	2	Light Bulb 120V, 69 Watt	823-072
4*	1	Lens - RED	823-043
5*	1	Lens - GREEN	823-044
6*	2	Visor	823-042
7	1	Light Assembly - Complete (LEDs) 24 VDC	6007798
8†	1	RED LED Light Assy. 24 VDC	6007800
9†	1	GREEN LED Light Assy. 24 VDC	6007801

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

† Part of Item 7 (Light Assembly – Complete).

LIMITED WARRANTY INFORMATION

SERCO® warrants that this VEHICLE RESTRAINT will be free from defects 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 SERCO®, 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 Owner's Manual. In the event that this VEHICLE RESTRAINT proves defective in material or workmanship within the applicable limited warranty period, SERCO® will, at its option:

1. Replace the VEHICLE RESTRAINT, or the defective 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. SERCO® 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. SERCO® sole obligation with regard to a VEHICLE RESTRAINT that proves to be defective in material or workmanship shall be as set forth in its standard warranty above (i.e., SERCO® 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 SERCO® warranty department within ninety (90) days after the product defect is discovered. Parts requiring replacement due to damage resulting from vehicle impact, abuse, or improper operation are not covered by this warranty. SERCO® 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.

SERCO® warranties extend only to the VEHICLE RESTRAINT itself.

SERCO® DISCLAIMS all warranties, express or implied, responsibility or liability for loss or damage of any kind associated with the installation or maintenance of the VEHICLE RESTRAINT, including any liability for premature product wear, product failure, property damage or bodily injury arising from improper installation or maintenance of the VEHICLE RESTRAINT.

Please direct questions about your vehicle restraint to your local distributor or to SERCO® Technical Service.

Your local SERCO® distributor is:

Corporate Head Office:

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

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By SERCO®

The Bite That Locks On Tight

SERCO® Part No. 824-231J