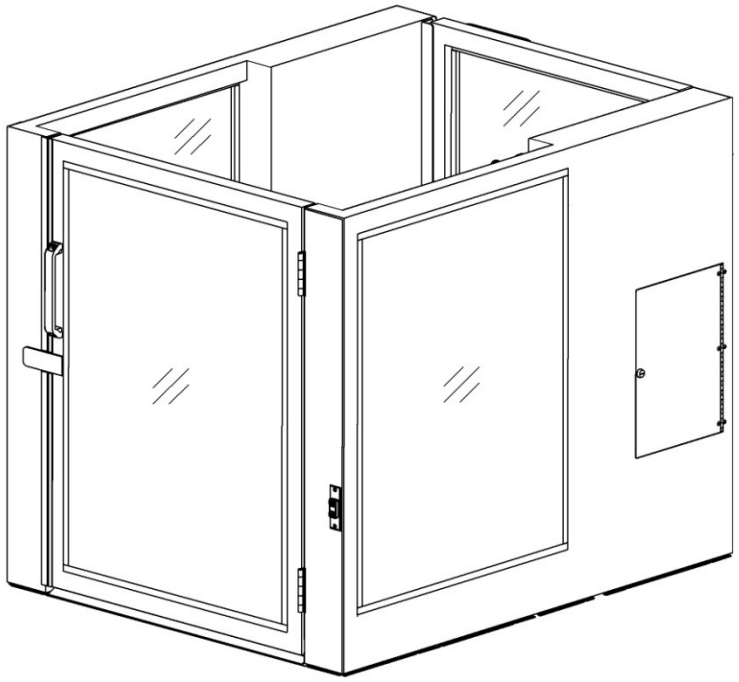
ASCENSION PROTEGE
PORTABLE WHEELCHAIR LIFT
MODEL 5442P

MAINTENANCE & REPAIR MANUAL



Patented – see www.ascension-lift.com/patents

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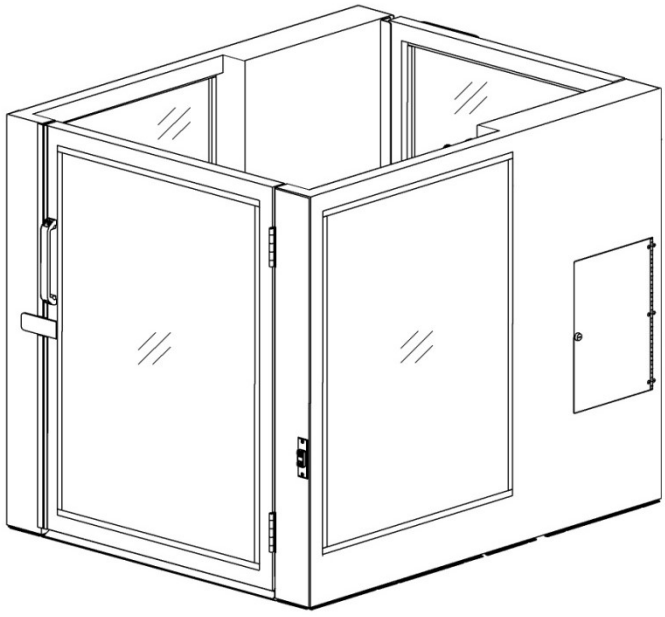

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TABLE OF CONTENTS

INTRODUCTION

The purpose of this manual is to provide the necessary information to perform maintenance and repairs on the Ascension PROTEGE portable wheelchair lift. This manual is intended to be used by skilled technicians who have experience working on electro-mechanical systems and devices. Furthermore, these personnel should be well-versed in standard industrial safety practices and procedures. The appropriate sections should be read through completely before any repairs are begun.

About This Manual

This manual is divided into six sections:

Section 1 defines terms that are used throughout the remainder of this manual.

Section 2 describes the recommended procedures for performing routine maintenance.

Section 3 covers mechanical repair. This includes component replacement, as well as detailed procedures to disassemble, test, and reassemble major components.

Section 4 covers electrical testing.

Section 5 describes how to compress the lift so that it can be rolled through a narrow doorway and then expanded again for normal use.

Section 6 is a troubleshooting guide. It provides information for locating and correcting any problems with the lift.

Additional Information

The following sources of information supplement this manual:

Operating Manual An *Operating Manual* is supplied with each lift and includes all the necessary information to set up, break down, store, and transport the lift. It also includes the general safety precautions that should be observed.

Setup and Operation Video A short video on setup and operation can be found at the following web address: https://ascension-lift.com/lift-setup/.

Getting Help

If you have a question or problem with the lift, please try to find the solution in this manual. In particular, be sure to review the troubleshooting guide in Section 6. If you are not able to resolve the problem, please contact Ascension as indicated below, making sure that you have the serial number of your lift ready. The serial number can be found on the data plate located inside the platform on the upper right rail. Also, it is recommended that you contact Ascension while in the immediate vicinity of your lift, as this will reduce the time required to properly diagnose the problem.

Contacting Ascension

Ascension's business hours are 8 a.m. to 5 p.m. Mountain Standard Time, Monday through Friday.

Telephone:	800-459-0400	Mailing Address:	Ascension
Fax:	520-881-4983		Customer Service
Email:	sales@ascension-lift.com		PO Box 40020
Website:	www.ascension-lift.com		Tucson, AZ 85717-0020

SECTION 1 Terminology

To effectively use this manual, you need to be familiar with the following terms. Refer to the figure on the following page for identification of components. Not all components are shown in the figure.

Access Panel The hinged panels (four total) that provide access to the machinery cabinets.

Back End The end of the lift where the upper landing gate is located.

Base The steel frame that rests on the floor when the casters are removed and supports the operating mechanism.

Control Panel The electrical panel for the lift which contains the power supply, control system relay, and the main power relay. The control panel is located inside the right-hand machinery cabinet.

Dock Plate The hinged plate that bridges the gap between the platform floor and the upper landing surface when the platform is at the upper landing.

Front End The end of the lift where the lower landing gate is located.

Lower Landing Gate The gate that serves the lower landing (ground level).

Machinery Cabinet The enclosures in which the lifting and control mechanisms are located. There is one cabinet on each side of the lift. The contents of the machinery cabinets are accessible through the access panels.

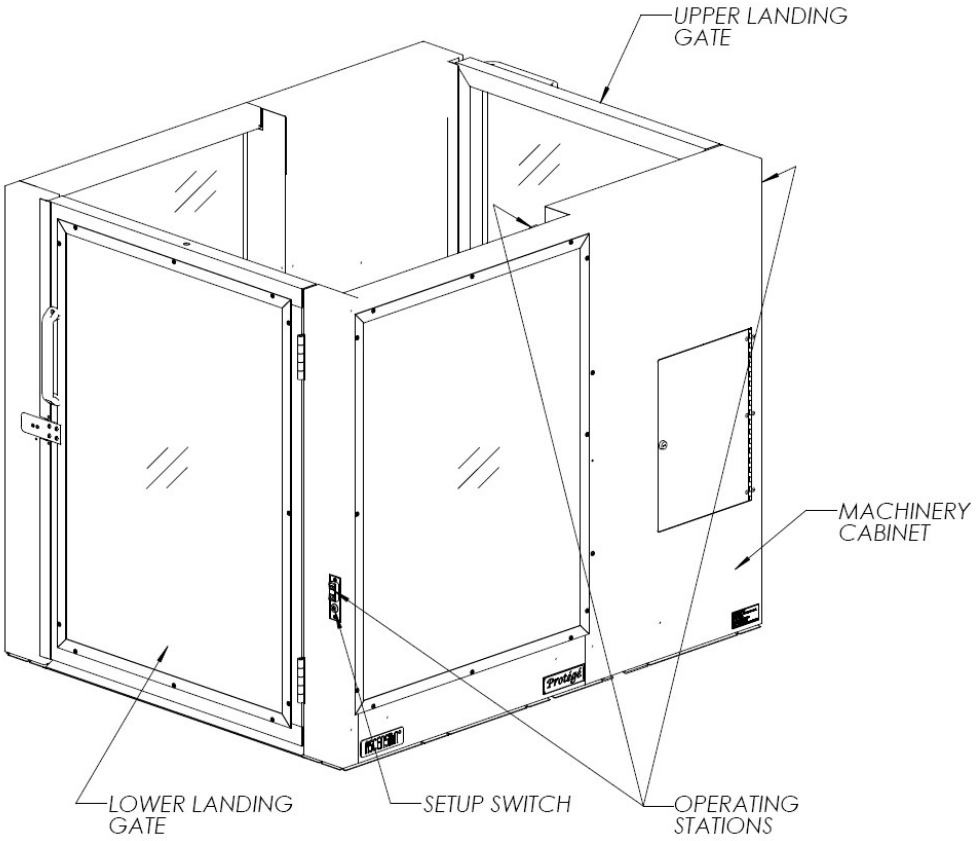
Operating Stations The controls for raising and lowering the platform. All three operating stations are located on the right side of the platform. The operating station inside the platform has an emergency stop switch.

Platform The compartment in which the passenger rides.

Skins The sheet metal panels that enclose the operating machinery.

Upper Landing The stage, platform, or riser that the lift serves.

Upper Landing Gate The gate that serves the upper landing, or stage.


UPPER LANDING GATE
MACHINERY CABINET
LOWER LANDING GATE
SETUP SWITCH
OPERATING STATIONS

SECTION 2 Routine Maintenance

2.1 Hydraulic System

The fluid level of the hydraulic system should be checked every six months. Before checking the fluid level, make sure the platform is at ground level (i.e., at the lower landing) and off its casters. Then open one of the access panels in the right-hand machinery cabinet and verify that the fluid level in the reservoir is between the min-max marks on the reservoir.

Inspect the condition of the hydraulic fluid. Change the fluid if it has darkened, appears dirty, or has a strong acrid or burnt odor.

If you need to add hydraulic fluid to the lift, use an ISO 32 grade hydraulic oil, such as Texaco Rando® HD32 or 76 Unax AW32 filtered to 10 microns. The reservoir cap is located just above the min-max marks on the reservoir. Remove the cap and use a funnel and rubber hose to add hydraulic fluid to the reservoir.

2.2 Cleaning

All parts of the lift except the windows may be cleaned with soap and water or general purpose household cleaners. Use a sponge or soft cloth dampened with cleaning solution. Wipe dry with a cloth after cleaning. *Do not* expose any part of the lift to a direct liquid stream or spray, such as from a water hose.

To clean the windows, Windex® or Formula 409® brand window cleaners may be used. To remove scratches, Plastic Polish 2 or 3 is recommended. Plastic Polish is available from Novus, Inc., Minneapolis, Minnesota, item numbers PC-20 and PC-30 respectively.

SECTION 3 Mechanical Disassembly and Repair

3.1 Important Preliminary Information

The repairs in this section are to be performed by a skilled technician who has experience working on electro-mechanical systems. Furthermore, the technician should be well-versed in standard industrial safety practices and procedures. In the United States of America, electrical safety procedures are established in OSHA's *Lockout/Tagout – Hazardous Energy Sources Standard* (29 CFR 1910.147).

Familiarity with the setup and operation of the lift is required to effectively perform the repairs listed in this section. This information can be found in the *Operating Manual* provided with the lift.

3.2 Electrically Isolating the Lift

This section describes the procedures for electrically isolating the lift, which is necessary in order to safely perform some of the repairs covered in this manual.

To electrically isolate the lift, perform the following steps in the order listed:

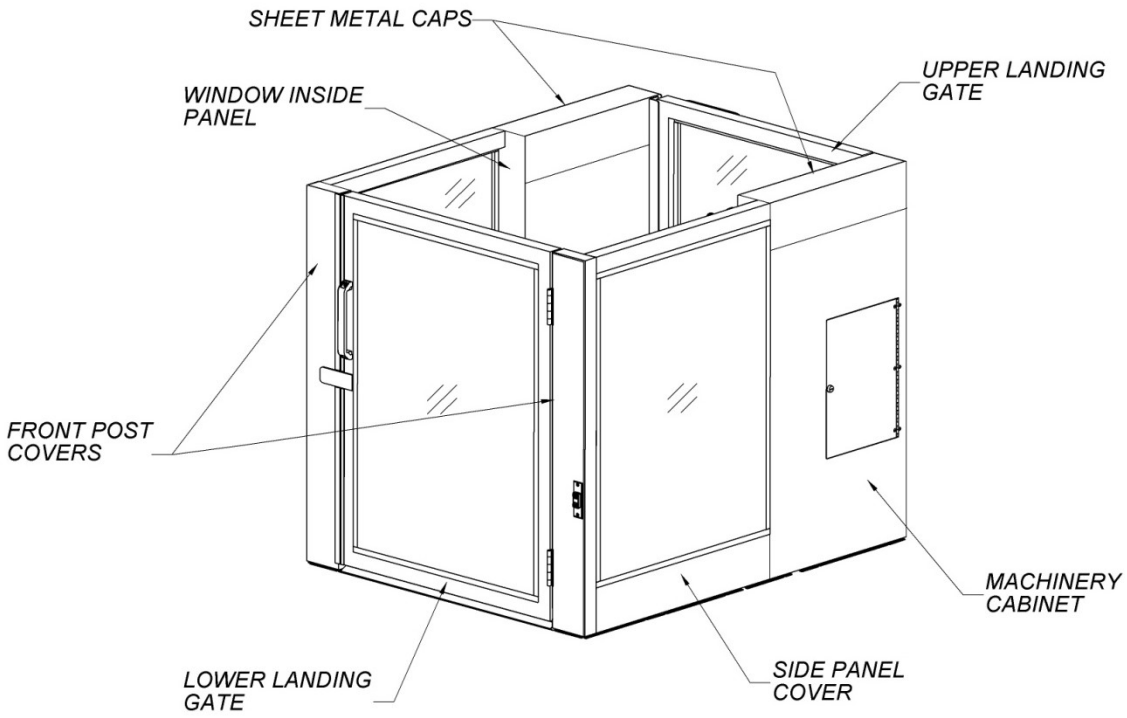
1. Turn the disconnect switch in the power cord to the 'OFF' position. Secure it with a lockout hasp and/or padlock.

OR

1. Remove the lift's power cord from the wall outlet.
2. Attach a DANGER tag to the end of the power cord and lock out the cord according to the procedures established in OSHA's *Lockout/Tagout – Hazardous Energy Sources Standard* (29 CFR 1910.147).
3. Coil the electrical cord and place it inside the platform.

3.3 Removing the Sheet Metal Skins

For some of the repairs described in this manual, it is necessary to gain access to the inner components of the lift beyond what is possible with the sheet metal "skins" still on the lift. The figure below shows the skins and their positions.



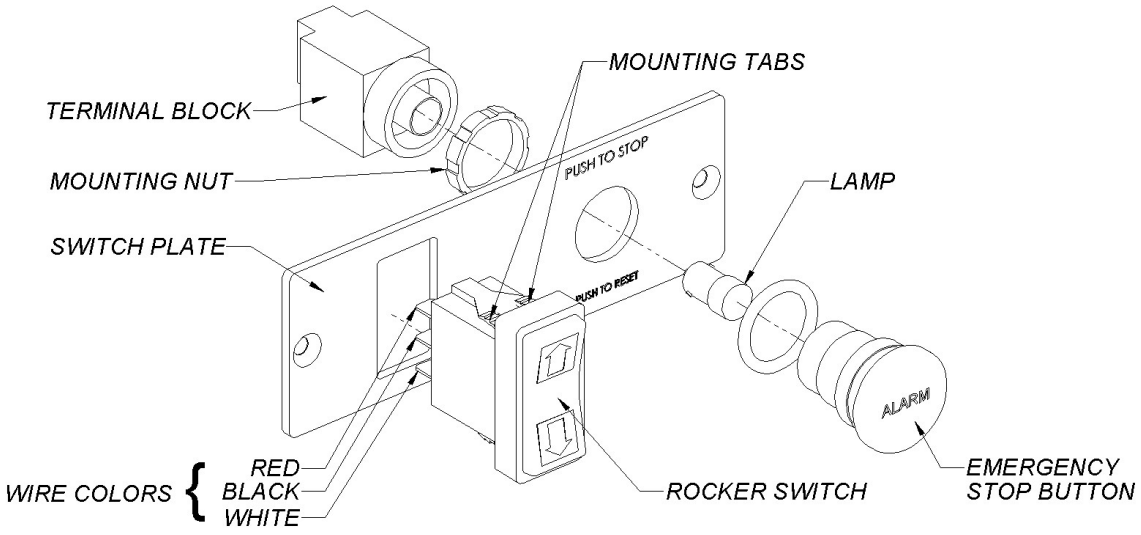
All of the skins are attached to the frame with screws that can be removed with a Phillips screwdriver. Additionally, it may be necessary to remove the grab bar or a window first before removing some of the skins. To remove the grab bar, remove the Phillips head screws that secure it to the lift. To remove a window, refer to Section 3.12.

3.4 Operating Stations

The operating stations house the UP/DOWN rocker switches and, on the station inside the platform, the emergency stop button. To test or remove either of these switches, use a Phillips screwdriver to remove the two (2) screws that secure the switch plate to the platform and pull the plate away from the platform. A standard multi-meter can be used to test the switches.

To remove the rocker switch, depress the mounting tabs and push the switch out of its mounting cutout.

To remove the emergency stop button, use the release lever on the contact block to disengage the block from the back of the operator then pull it off. Remove the mounting nut to free the operator from the switch plate.



LIFT CAR OPERATING STATION SHOWN

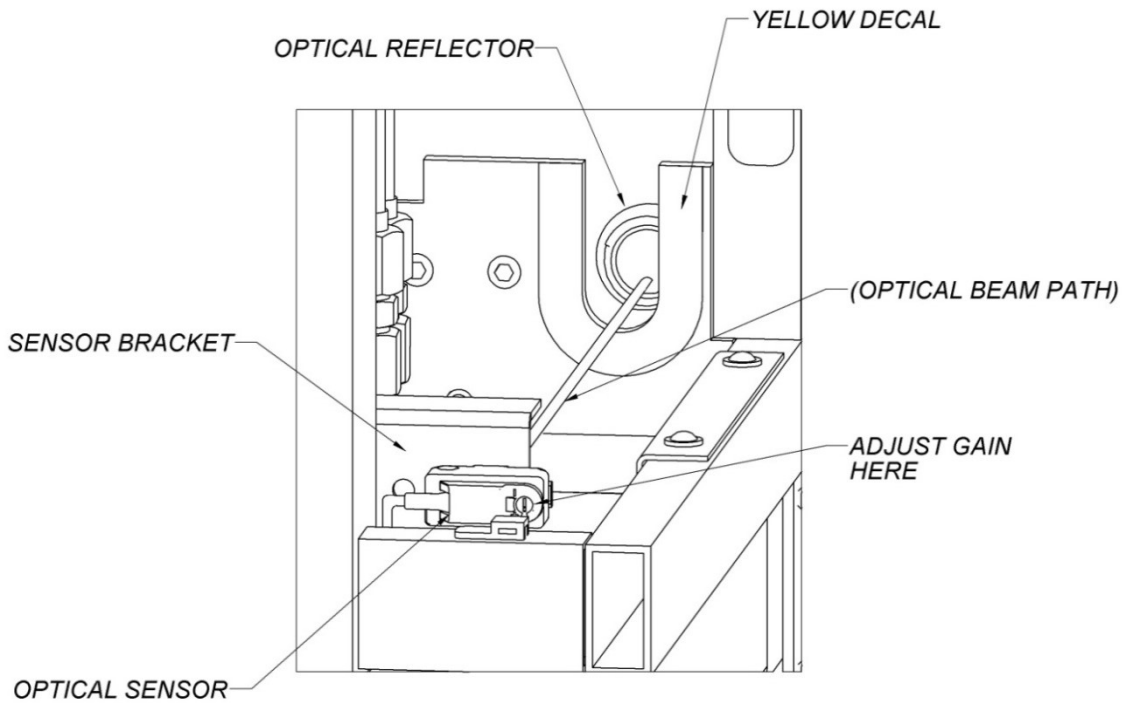
3.5 On/Off Switch

The On/Off rocker switch may be set to ‘OFF’ to prevent operation of the lift at the owner’s discretion. The lift will only operate when the switch is set to ‘ON.’

The On/Off rocker switch is located in the right side machinery cabinet across from the motor. To remove it, remove the (2) screws fastening the sheet metal switch mounting bracket to the lift frame and snap the switch out of the bracket.

3.6 Upper Stop Sensor

The upper stop sensor sets the height at which the platform stops at the upper landing. This section describes the procedures for adjusting the upper stop sensor in the case that it has come out of adjustment. If you are only looking for instructions on setting up the lift to stop at the correct height, refer to the section titled "Setup Instructions" in the *Operating Manual*.



INSIDE OF LEFT MACHINERY CABINET

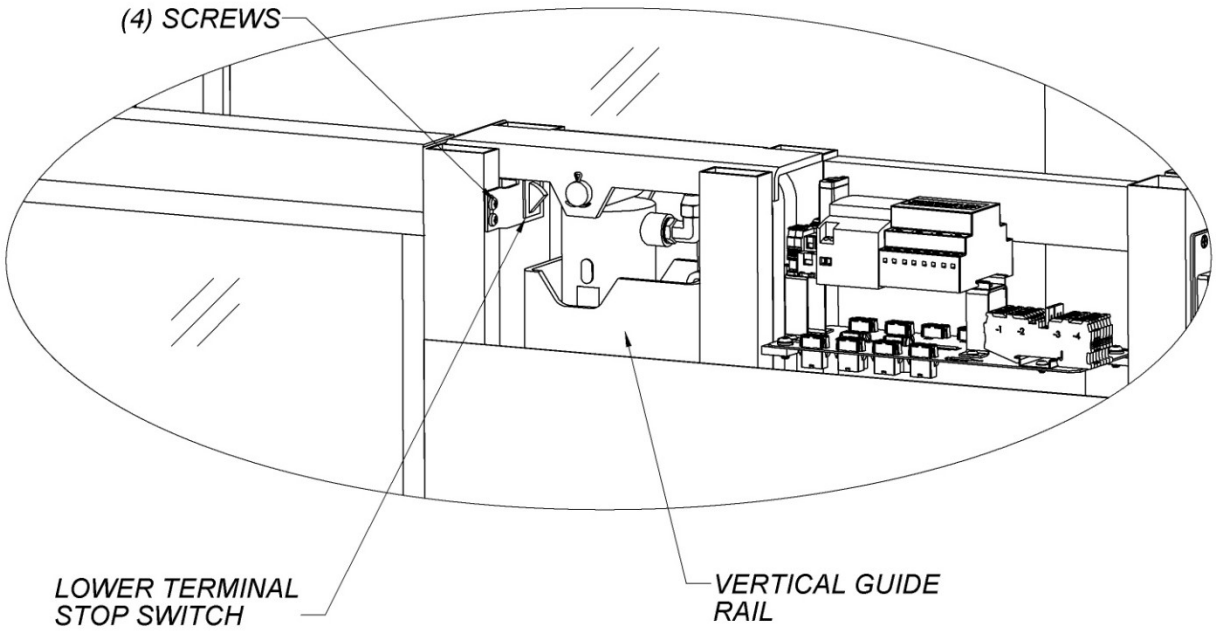
The optical beam must always pass through the area marked with the yellow decal, shown in the figure above. The following procedure can be used if the optical sensor is misaligned:

1. Remove the outer left sheet metal skin to gain access to the height sensor.
2. To adjust vertical alignment, loosen the two (2) screws holding the sensor bracket to the frame and shift the sensor bracket until the beam passes through the area marked with the yellow decal.
3. To correct horizontal alignment, gently bend the sensor bracket until the beam passes through the area marked with the yellow decal.

The platform should stop when the optical beam strikes the lower edge of the optical reflector. If the platform does not stop correctly, it may be necessary to adjust the gain on the optical sensor so that the platform stops when the beam strikes the optical reflector. The gain is a small black dial on the sensor (see the figure on the previous page) that can be adjusted with a small standard screwdriver.

3.7 Lower Terminal Switch

The lower terminal switch notifies the controller that the platform has reached ground level. It is actuated by the right vertical guide rail when the platform is less than 0.5 inches [13 mm] above the ground, which allows for the front gate to be opened and makes sure the lift stops properly when it reaches the ground.



RIGHT SHEET METAL CAP REMOVED

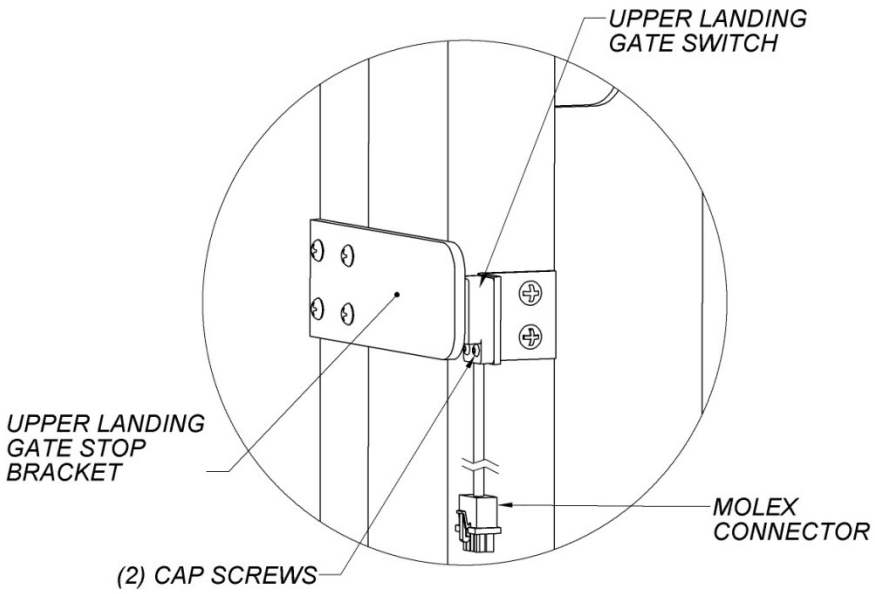
The lower terminal switch can be accessed by removing the right sheet metal cap (see Section 3.3) and is located near the vertical guide rail. To remove the lower terminal switch for testing, use a Phillips screwdriver to remove the two (2) screws holding its bracket to the platform frame. It is of the normally open (NO) type and can be tested with a standard multi-meter.

3.8 Upper Platform Gate Switch

The upper platform gate switch detects whether the upper platform gate is open or closed. The switch is only visible with the machinery cabinet sheet metal skin on the handle side of the gate removed, and is located on the lift frame about 26" [660 mm] from the platform floor. Refer to the figure below. The switch is of the normally open (NO) type and can be tested with a standard multi-meter.

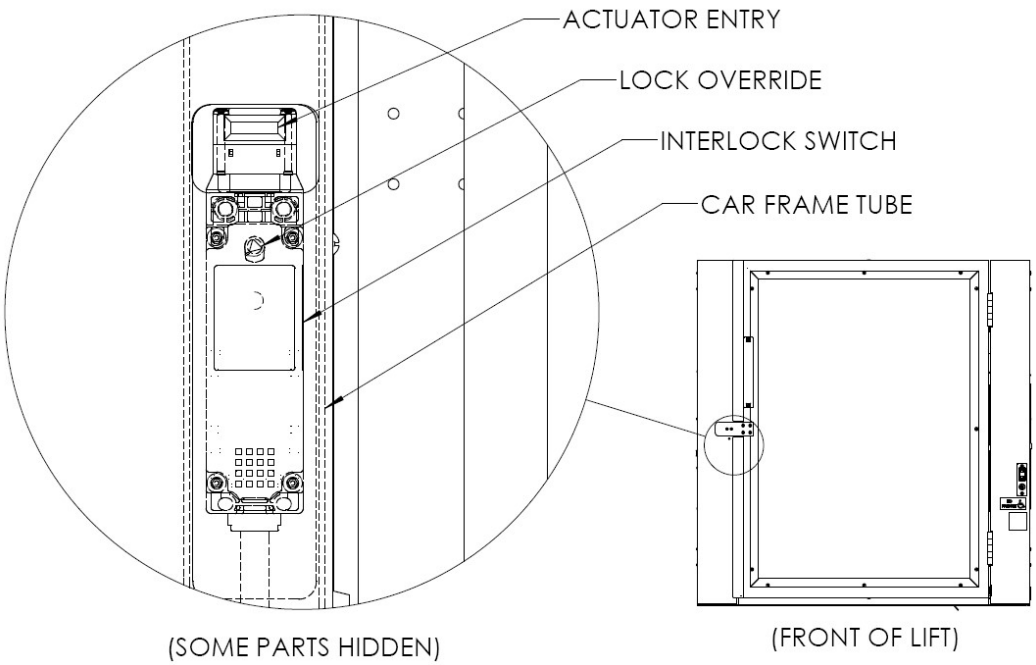
The upper platform gate switch is in correct adjustment if the platform will operate only when the gate is closed. The switch itself can only have its position adjusted by using a Phillips screwdriver to loosen the two (2) screws on the bracket and by sliding it to either side.

To remove the switch, first remove the machinery cabinet sheet metal skin on the handle side of the gate (see Section 3.3). Then, using a 1/16" hex key, remove the two (2) cap screws holding the switch to its bracket. Finally, disconnect the Molex connector at the end of the switch harness.



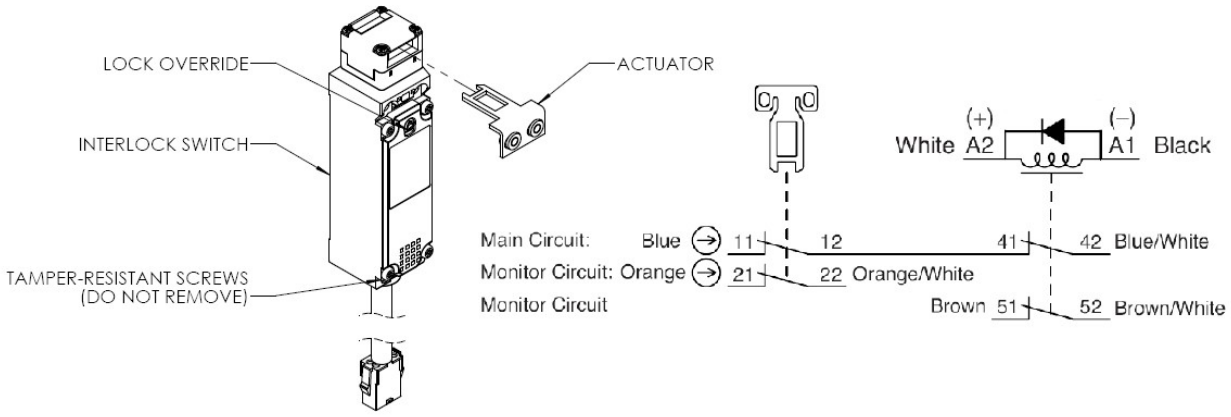
3.9 Front Gate Interlock Switch

The front (lower landing) gate is equipped with an interlock switch performs two functions: first, it prevents the lift from operating unless the gate is closed and locked, and second, it prevents the gate from being opened while the lift is in use. The interlock switch is visible only when the front post cover on the handle side of the gate is removed. Refer to the figure below for its location.



The interlock switch includes a safety circuit that closes only when the gate is closed and locked, as well as a secondary circuit that closes when the gate is closed (regardless of the state of the lock contacts). The locking pin inside the switch is engaged by a spring, and unlocks when the solenoid is energized. The interlock actuator may be inserted even when the solenoid is de-energized.

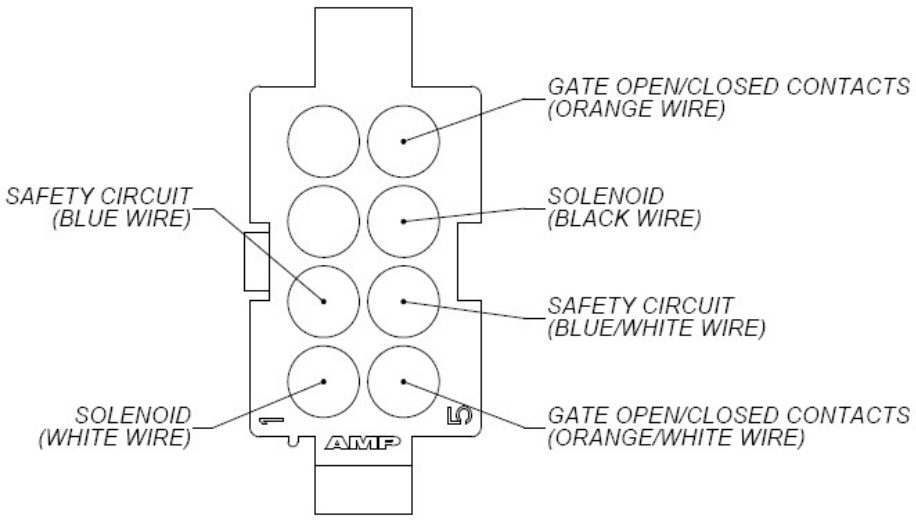
The solenoid is only energized to unlock the gate when the platform is at the lower landing (determined by the lower terminal switch; see Section 3.7). If the platform is at the lower landing and the gate is locked, press "Down" on an operating switch to unlock the gate.



To remove the interlock switch, perform the following steps:

1. Remove the front and rear sheet metal covers on the strike side of the gate.
2. Disconnect the Molex connector that is wired to the interlock switch.
3. Remove the (2) flat head screws fastening the interlock through the back of the frame tube. Take care to ensure that the (2) lock nuts holding the front of the interlock do not drop into the lift frame when the screws are removed.
4. Pull the interlock out of the lift frame, passing the Molex connector through the cable clearance hole.

To reattach the solenoid, perform the above steps in reverse order.



3.10 Tilt Sensor

The tilt sensor is located at the bottom of the right-hand machine cabinet, below the hydraulic power unit.

The tilt sensor is set to allow operation on level ground, but disable operation when the lift is set on an incline greater than 5%. The status of the switch can be determined by a light on the switch. See the following for identifying and interpreting the light depending on the style of tilt sensor installed on your lift:

- If an external light is visible, then green will indicate that operation is enabled. Red will indicate that operation is disabled.
- If no external light is visible, open the sensor cover. If the internal red/orange light is illuminated, it means that the lift senses excessive tilt and will not operate.

3.11 Hydraulic Valves

The hydraulic valves are located inside the right-hand machinery cabinet. It may be necessary to remove the machinery cabinet skins per Section 3.3 to access some of the valves.

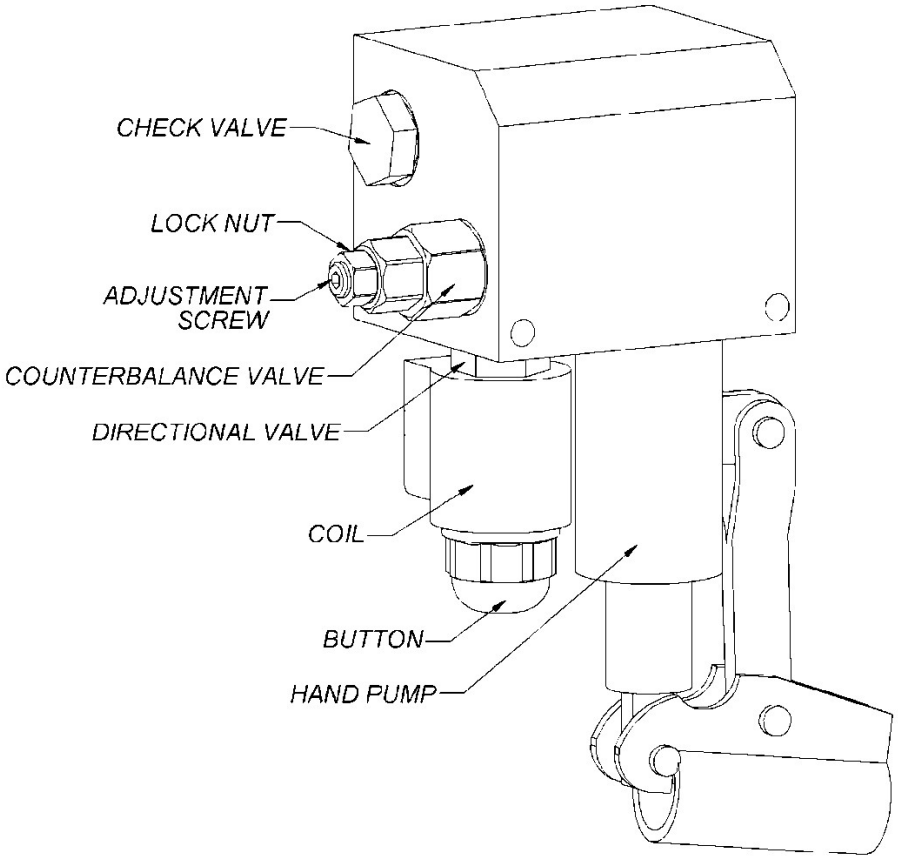
Refer to the following instructions for adjusting or removing any of the four components located in the manifold. It is recommended that you place paper towels below the component to be removed to catch the several ounces of hydraulic fluid that will drip from the manifold as the component is removed. Refer to the figure on the following page for component identification. Please also note that the hydraulic power unit is attached to the lift frame with flexible mounts, and it is normal for it to move around significantly when the hand pump is used.

⚠ WARNING!
The platform MUST be either at the lower landing or secured in place before the COUNTERBALANCE VALVE or CHECK VALVE is loosened or removed. Failure to do so could result in the platform dropping and/or high pressure hydraulic oil leaks.

- Counterbalance Valve: If the platform "bounces" as it descends while fully loaded, then the adjustment screw on this valve may need to be tightened. To do so, loosen the lock nut using a 1/2" wrench, turn the adjustment screw clockwise 1/4 turn using a 5/32" hex key, and then retighten the lock nut. Test and repeat as necessary until the "bouncing" has been eliminated. To remove this valve, use a 7/8" wrench. When reinstalling the counterbalance valve, torque it to 18.5-22.0 ft-lbs [13.6-16.2 N*m].
- Check Valve: This valve cannot be adjusted. Use a 7/8" wrench to remove the valve from the manifold. When reinstalling the valve, torque it to 25-30 ft-lbs [19-22 N*m].
- Directional Valve: This valve cannot be adjusted. This valve can be removed while the platform is not at the lower landing provided that the counterbalance valve is working correctly. However, if the platform starts to descend while you are turning this valve out of the manifold, immediately tighten the valve back into the manifold;

the counterbalance valve is malfunctioning and must be replaced (with the platform at the lower landing). Before removing this valve, pull the electrical harness connectors off of the coil terminals. Then remove the black button by turning it counterclockwise, and pull the coil off the valve. Finally, use a 7/8" wrench to remove the valve from the manifold. When reinstalling the directional valve, torque it to 18.5-22.0 ft-lbs [13.6-16.2 N*m].

- Hand Pump: The hand pump cannot be adjusted. The hand pump can be removed while the platform is not at the lower landing provided that the counterbalance valve is working correctly. However, if the platform starts to descend while you are turning the pump out of the manifold, immediately tighten it back into the manifold; the counterbalance valve is malfunctioning and must be replaced (with the platform at the lower landing). Use a 1-1/4" wrench to remove the hand pump from the manifold. When reinstalling the hand pump, torque it to 25-30 ft-lbs [19-22 N*m].



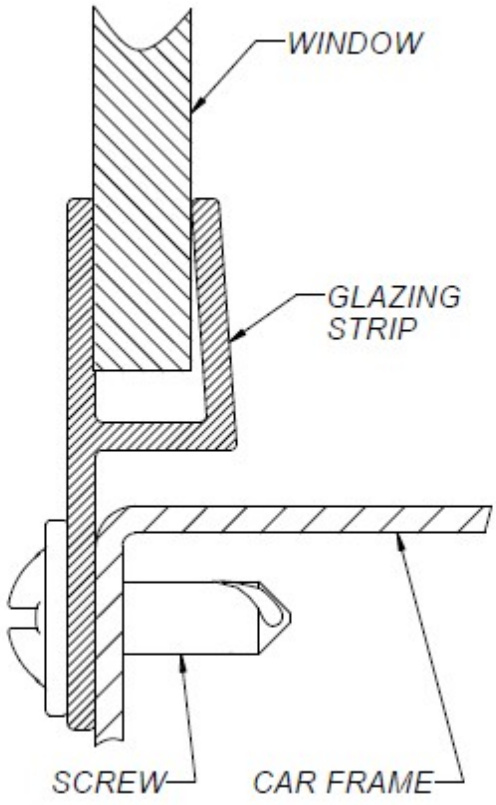
HYDRAULIC MANIFOLD WITH VALVES

3.12 Windows

The windows on the lift are pinched in the channel of a glazing strip which is attached to the lift frame with screws. See the figure below.

To remove a window, remove each of the screws attaching the four glazing strips to the lift's exterior. The window and strips can then be removed as a single unit.

To reinstall a window, position the window assembly in its original installation orientation and reinstall screws. Note that in some locations there may be a gap between the bottom of the glazing strip channel and the lift frame to allow clearance for the fillet welds at the corners of the frame; this is normal.



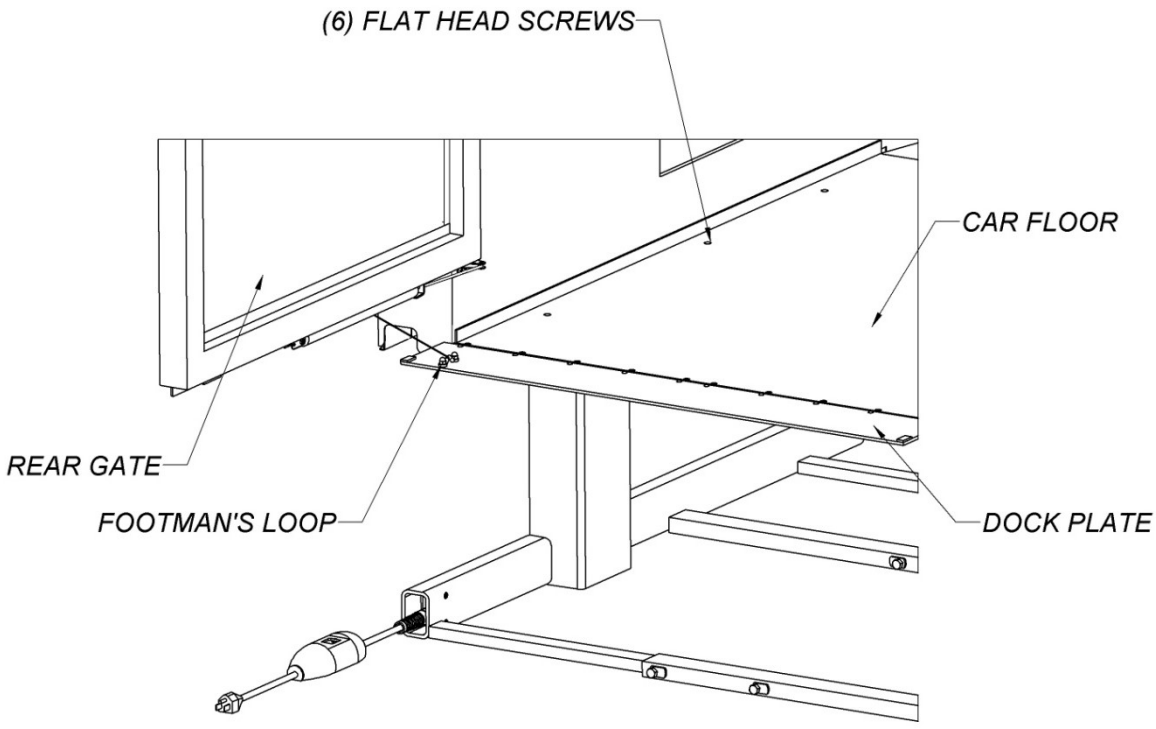
GLAZING SYSTEM CROSS SECTION

3.13 Platform Floor Removal

> ***⚠ WARNING!***
> ***Use caution when removing the platform floor, as it is large and weighs approximately 80 pounds. It is recommended that two (2) people remove the floor.***

The platform floor must be removed in order to compress the lift to move it through a narrow doorway. It also may need to be removed to service the hydraulic hoses or electrical harnesses running under the platform floor. To remove the platform floor, perform the following procedure:

1. Make sure the platform is at ground level and the lift is resting securely on its base (not on its casters).
2. Open the front and rear gates and use the gate closer hold-open washers to hold them fully open.
3. Disconnect the tether from the dock plate by using a Phillips screwdriver and 3/8" wrench to remove the two (2) flat head screws and nuts holding the footman's loop to the dock plate.
4. Use the hand pump to raise the platform approximately six (6) inches [150 mm] above the ground. For instructions on using the hand pump, refer to the section "Operating the Lift Without Power" in the *Operating Manual*.
5. Use a Phillips screwdriver (powered recommended) to remove the six (6) flat head screws holding the floor to the platform cross-members.

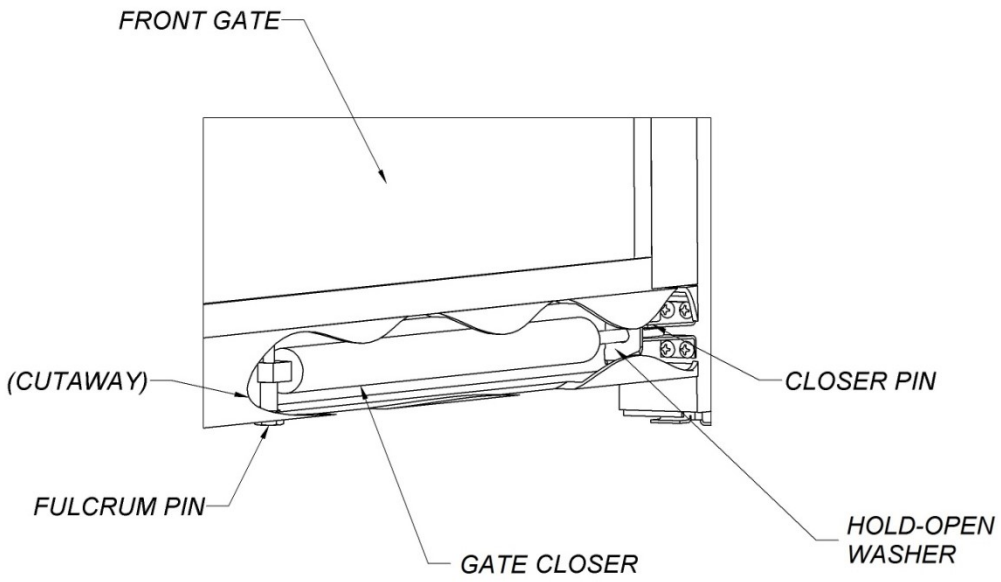


To reinstall the floor, perform the above steps in reverse order. If the platform floor is being reinstalled for the expansion procedure, instead refer to Section 5.2.

3.14 Lower Gate Closer Adjustment

The lower gate is closed by a spring closer with hydraulic damping to control closing speed. When the lower gate closer is properly adjusted, the gate will close in approximately five (5) seconds.

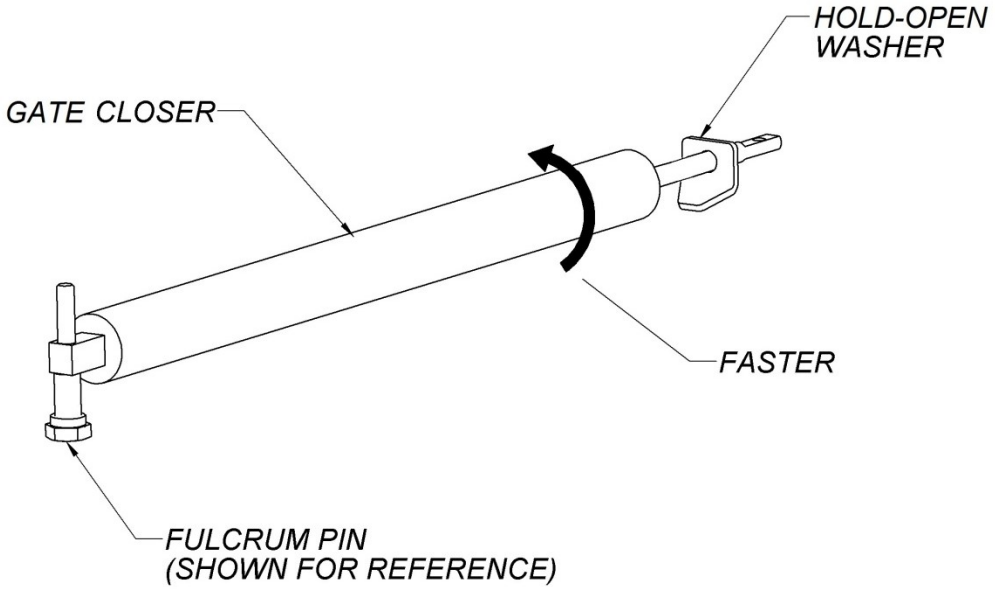
The lower platform gate closer is located inside of the bottom of the front gate. See the figure below for clarification.



The closer must be removed from inside the gate in order to perform any adjustments. The following procedure can be used to remove and adjust the gate closer:

1. Fully open the gate and use gate closer hold-open washer to hold the gate open.
2. Remove the pin holding the gate closer to the closer bracket.
3. Use a 3/16" hex key or a 9/16" wrench to remove the fulcrum pin. Threadlocker was applied to the fulcrum pin threads during manufacture of the lift, so it may be difficult to break the pin loose the first time.
4. Remove the gate closer from the gate.

5. Pull the closer arm until it is fully extended and then allow it to retract fully. In order for the gate to close in five (5) seconds as desired, the closer rod should take approximately seven (7) seconds to fully retract when not attached to the gate. To adjust the closing speed, hold the closer ends stationary and rotate the closer body. Refer to the figure below for the correct direction of rotation.

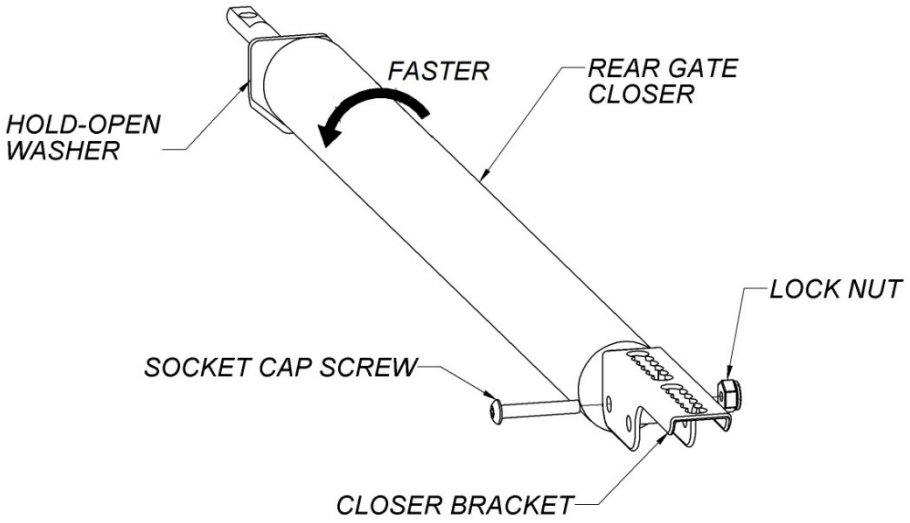


6. Fully extend the closer arm and lock it into place with the hold-open washer.
7. Reattach the gate closer to the lift using the fulcrum pin and the pin. Then move the hold-open washer to allow the gate to fully close. Use the short leg of the 3/16" hex key used in Step 3 to pull the washer out of the gate tube.

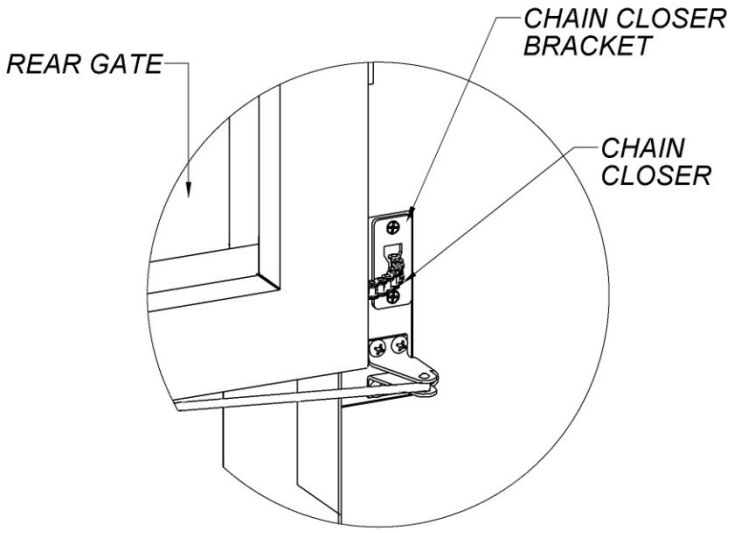
3.15 Upper Gate Closer Adjustment

The upper gate has two (2) closers: a hydraulic closer and a chain closer. The upper gate will close in approximately five (5) seconds if the closers are functioning properly.

The hydraulic closer is located on the bottom of the rear gate. It can be adjusted by rotating the closer body. Refer to the figure below for the correct direction of rotation.



The chain closer is located inside of the bottom of the rear gate. The chain passes between the gate and the frame, with one link of the chain closer held in the chain closer bracket as shown in the figure below.



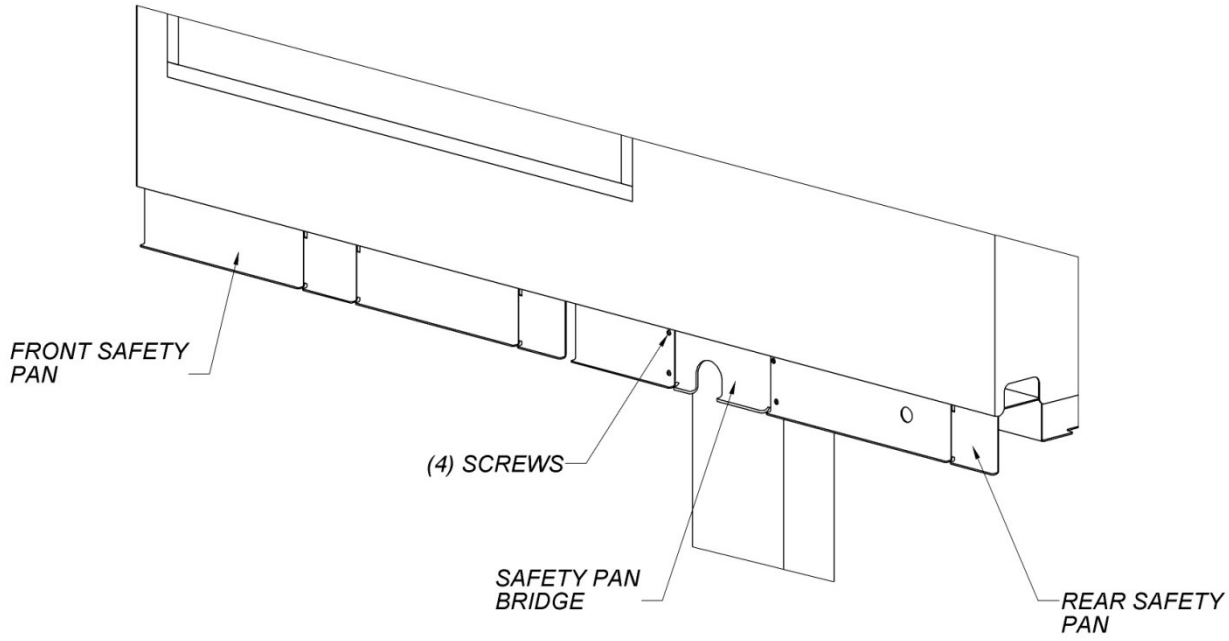
It is not recommended to adjust the chain closer. To remove the chain closer, perform the following procedure:

1. Open the upper platform gate approximately halfway and use the hold-open washer on the hydraulic closer to hold the gate open.
2. Using a small screwdriver or similar tool, pin the chain near where it exits the bottom of the upper platform gate to prevent it from retracting into the gate.
3. Move the hold-open washer on the hydraulic closer to allow the gate to close slightly, taking all tension off the chain closer.
4. Push the chain upward until the chain moves to the larger portion of the key slot on the chain closer bracket.
5. Open the gate slightly until the chain comes free from the bracket.
6. Exit the platform, fully open the upper platform gate, and use the hold-open washer on the hydraulic closer to hold the gate open.
7. Using a Phillips screwdriver, remove the two (2) screws holding the chain closer to the gate. The chain closer can now be removed from inside of the bottom of the gate.

To reinstall the chain closer, reverse the above procedure.

3.16 Safety Pan Switches

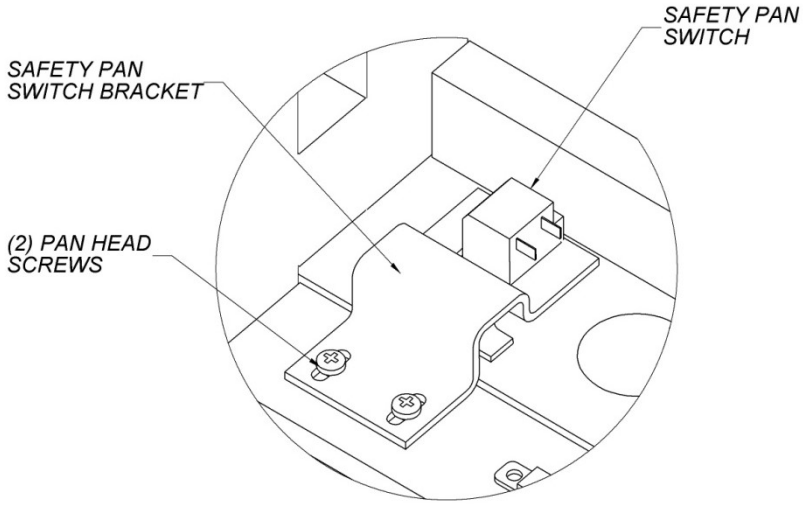
The safety pan assembly is in place to make sure that the area under the platform is clear of obstructions while the platform is descending. The safety pan consists of four main components: the front safety pan, the rear safety pan, and two safety pan bridges.



There are eight (8) normally closed (NC) switches that monitor when the safety pan has struck an obstruction. When functioning properly, the switches are actuated only when the safety pan has run into an obstruction, which stops all motion of the platform. The single exception to this is when the platform is within approximately 1/2 inch [13 mm] of the ground, in which case the switches are turned off so that the platform can fully descend to the ground.

The only way to gain access to all of the safety pan switches is to remove most of the sheet metal skins (see Section 3.3). Each of the switches is attached to a bracket that is attached to the frame (see the figure on the next page). To remove a safety pan

switch, disconnect the switch from the safety pan harness and remove the mounting screw holding the safety pan to the bracket (see Section 3.17). Then use a Phillips screwdriver to remove the two (2) pan head screws holding the bracket to the frame. The bracket and switch can now be removed.

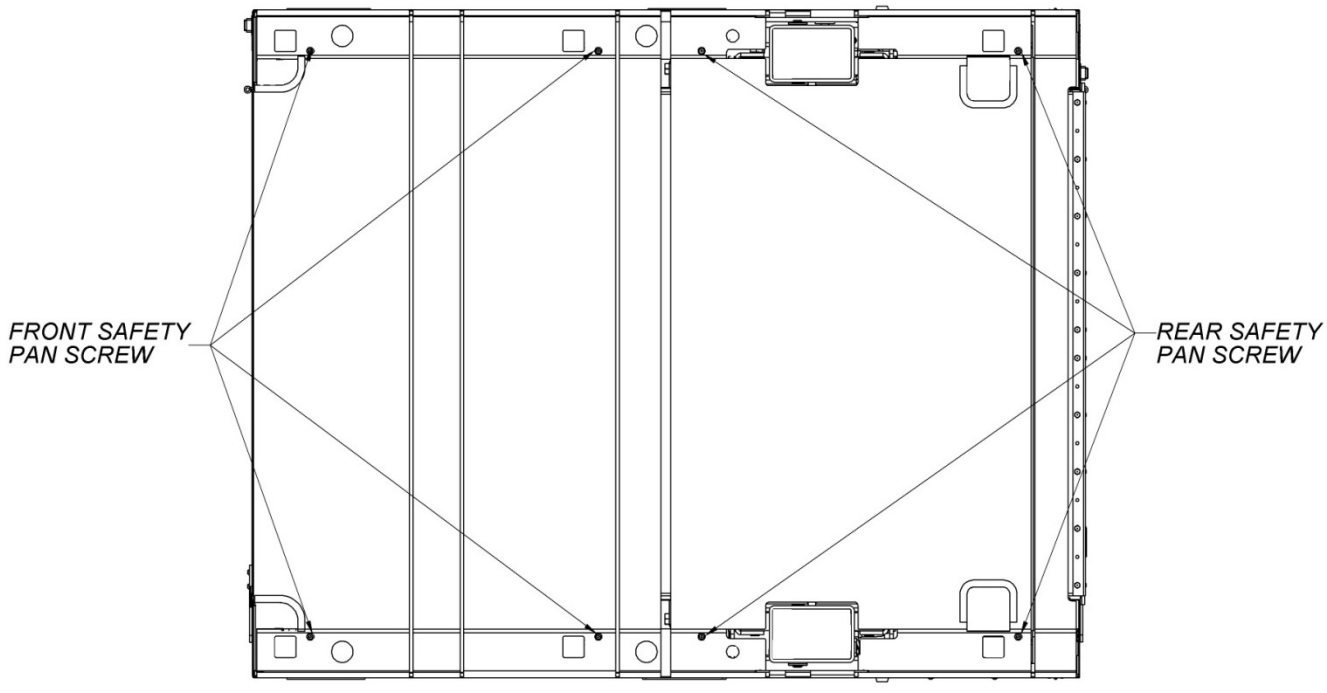


SAFETY PAN SWITCH/BRACKET ORIENTATION
TYPICAL (8) PLACES

3.17 Safety Pan Removal

The safety pan assembly must be removed to compress the lift and move it through a narrow doorway. To remove the safety pan, perform the following procedure:

1. Make sure the platform is at ground level and the lift is resting securely on its base (not on its casters).
2. Run the platform up to approximately 36” [915 mm] above the ground. It may be necessary to move the upper height optical reflector if the lift stops before reaching 36”. Refer to the setup instructions in the *Operating Manual* if you need instructions on moving the upper height optical reflector.
3. Detach the rear safety pan from the lift by loosening the four (4) hex shoulder mounting screws with a 6” long 1/8" hex key. Each screw is recessed in a 0.5" diameter hole (see the figure below). When all four (4) shoulder screws have been removed, slide the rear safety pan down the guide rails to the floor.



4. Using a Phillips screwdriver, remove the four (4) small screws from each of the two (2) safety pan bridges and lift the rear safety pan out from under the lift. Set the rear safety pan, two (2) bridges, and eight (8) screws aside.
5. Detach the front safety pan from the lift by loosening the four (4) hex shoulder mounting screws using the same hex key used in Step 3. Set the front safety pan aside.

To reattach the safety pan assembly to the platform, reverse the above procedure. After the safety pan has been attached to the platform, confirm that the safety pans slide freely on the shoulder screws. If the safety pan is binding, loosen the shoulder screw that appears to be binding, gently bend the safety pan in the direction that will eliminate the binding, and then retighten the shoulder screw. If this does not solve the problem, you will need to remove cabinet skins and shift the mounting brackets slightly.

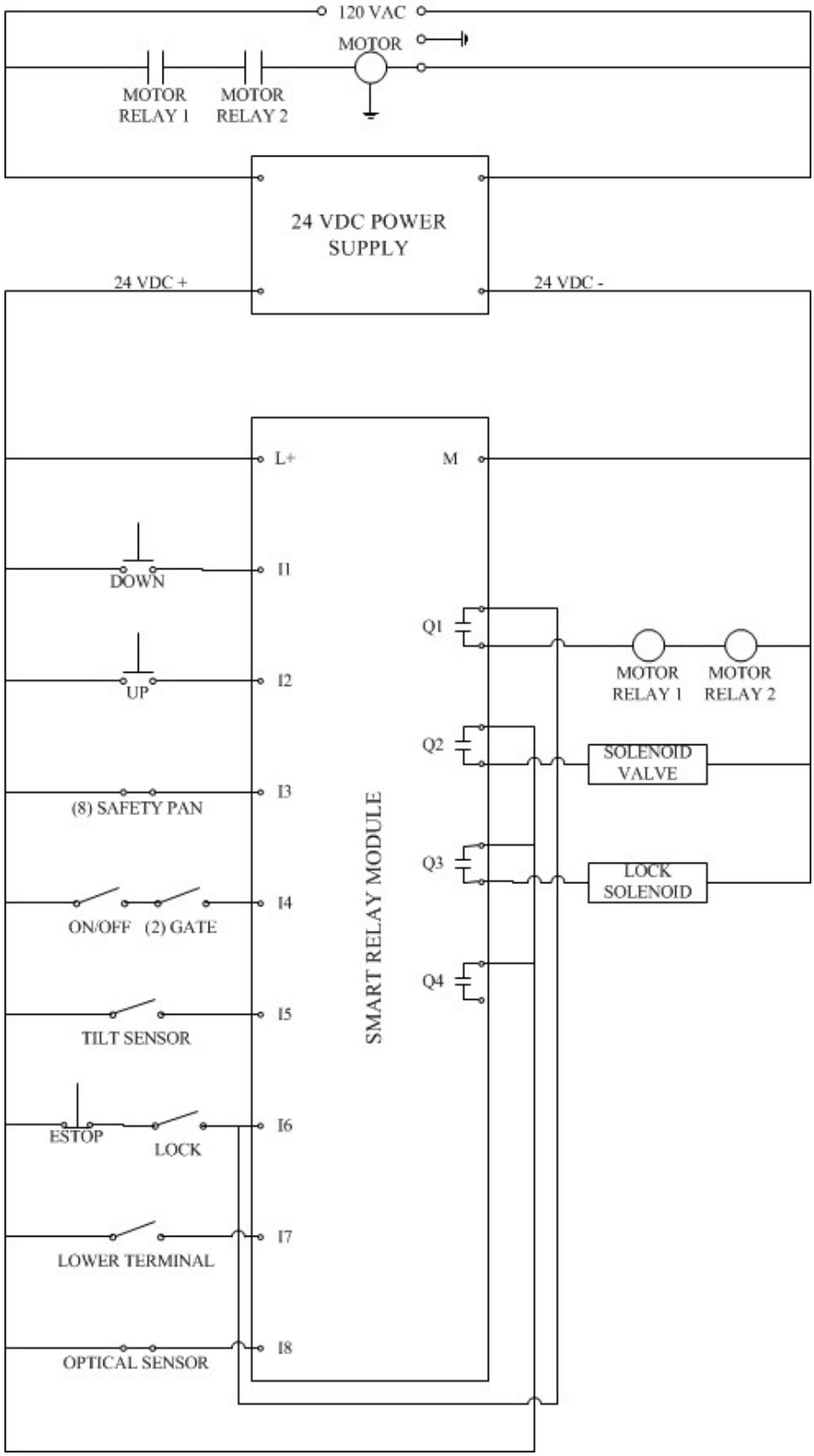
SECTION 4 Electrical Testing

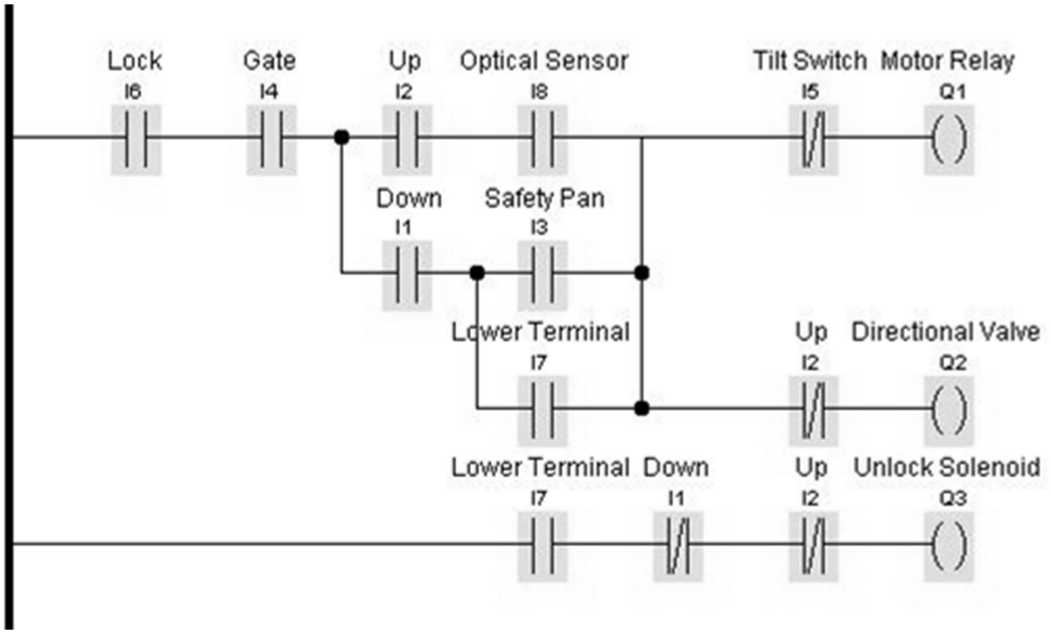
This section contains information that will enable a skilled and experienced electrician to service the lift. The electrical and logic diagrams for the lift are shown on the following pages.

⚠ *CAUTION!*

When working on any part of the electrical system, industrial electrical safety practices should be rigorously adhered to, including:

- ***Danger Tags: While repairs are underway, a danger tag should be attached to the plug of the electrical cord to advise personnel that the lift is being serviced. Additionally, the plug should be locked out according to the procedures established in OSHA's Lockout/Tagout – Hazardous Energy Sources Standard (29 CFR 1910.147).***
- ***Two-man rule: As a minimum, two (2) people should be present while repairs and tests are being performed.***
- ***Do not leave the lift unattended with the plug connected to the service outlet while the electrical system components are exposed. Remove the plug if it is necessary to leave the lift, no matter how briefly.***
- ***Be cognizant as to the electrical status of the lift (i.e., whether it is powered or not). When in doubt as to whether a circuit or component is powered, test it first!***


120 VAC
MOTOR
MOTOR RELAY 1
MOTOR RELAY 2
24 VDC POWER SUPPLY
24 VDC +
24 VDC -
L+
M
I1
DOWN
I2
UP
I3
(8) SAFETY PAN
I4
ON/OFF
(2) GATE
I5
TILT SENSOR
I6
ESTOP
LOCK
I7
LOWER TERMINAL
I8
OPTICAL SENSOR
SMART RELAY MODULE
Q1
Q2
Q3
Q4
MOTOR RELAY 1
MOTOR RELAY 2
SOLENOID VALVE
LOCK SOLENOID



RELAY MODULE LOGIC

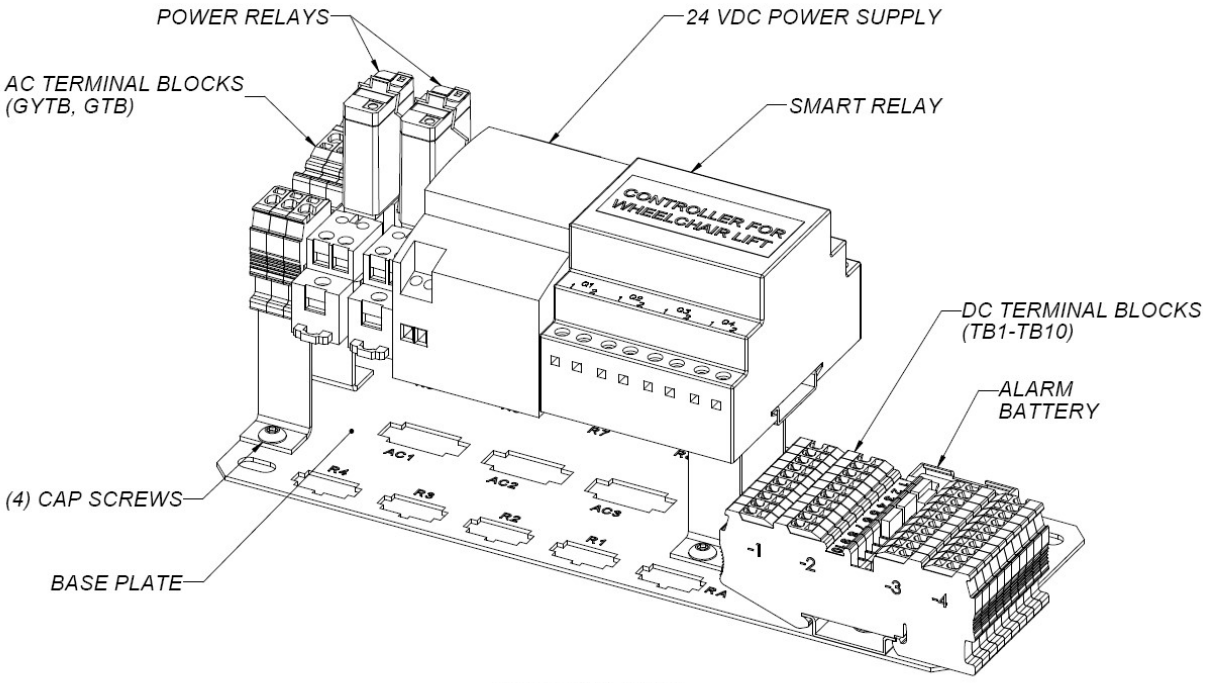
Notes:

1. The logic diagram above does not include any of the timers or more complicated components of the logic circuit. Rather, it only shows the contacts that must be maintained for the platform to run up or down.
2. For clarification, the solenoid valve (Q2) is the directional valve on the hydraulic manifold (see Section 3.11) and the lock solenoid (Q3) is the front gate locking mechanism (see Section 3.9).

4.1 Access to the Electrical Panel

The electrical panel can be accessed by removing the right sheet metal cap. Refer to Section 3.3.

Refer to the figure below for identification of the major components on the electrical panel.



ELECTRICAL PANEL
WIRING HARNESSES AND CONNECTORS NOT SHOWN

4.2 Testing the Switches

Each of the lift's switches can be tested by locating the switch, removing the switch from the lift if necessary, and checking for continuity across the contacts on the back of the switch. See the table below for information on each switch and which section of this manual provides information on accessing the switch.

Switch	Type	Section
Upper Stop Sensor	Retroreflective Optical Sensor	3.4
Lower Terminal Switch	SPST, NO	3.7
Safety Pan Switches	Push-to-break	3.16
Interlock Switch	SPST, NO	3.9
Emergency Stop Switch	Push-to-break	3.4
Operating Switch	(Mom. On)-Off-(Mom. On)	3.4
ON/OFF Switch	On-Off	3.5
Tilt Sensor	SPDT, NO circuit used	3.10

Alternately, most of the lift's switches can be tested at the smart relay, which operates on 24 VDC power. Before performing any checks at the smart relay, verify that the module itself is receiving power (refer to Section 4.3). If the module is receiving power, then the function of the lift's switches can be verified by testing for continuity across the smart relay's contacts as shown in the table below.

Component	Smart Relay Contacts	Circuit is closed when:	Circuit is open when:
Operating Switch	I1-L	Rocker is pushed down	Rocker is at rest or pushed up
	I2-L	Rocker is pushed up	Rocker is at rest or pushed down
Safety Pan Switches	I3-L	Safety pan is not pressed up (unobstructed)	Safety pan is pressed up (obstructed)
Upper/Lower Landing Gate Switches and ON/OFF Switch	I4-L	Both gates are closed and ON/OFF switch is ON	One or both gates open or ON/OFF switch is OFF

Component	Smart Relay Contacts	Circuit is closed when:	Circuit is open when:
Tilt Sensor	I5-L	Lift is on level ground	Lift is out of level
Interlock Switch	I6-L	Interlock is engaged	Interlock is disengaged
Lower Terminal Switch	I7-L	Platform is more than 0.5" off the ground	Platform is less than 0.5" off the ground
Upper Stop Sensor	I8-L	Sensor does not detect reflector (platform is not at the upper landing)	Sensor detects reflector (platform is at the upper landing)

4.3 Testing the Smart Relay

The smart relay is located on the electrical panel. See Section 4.1.

A green light on the smart relay indicates that it is receiving power and is ready for use. Note that the smart relay requires 6-8 seconds to initialize after it receives power (i.e., the lift is plugged in), during which time the relay light is red. Always give it time to initialize before performing any testing on it.

To test the function of the smart relay, refer to the logic diagram on page 31.

If the smart relay is not receiving power, check for and correct the following conditions as necessary:

1. The lift is not plugged in. Plug the lift in.
2. The service outlet does not have power. Plug the lift into an outlet that does have power.
3. The GFCI on the power cord has been tripped. Reset the GFCI.
4. The power supply is not supplying 24 VDC. Refer to Section 4.4 to check it.
5. There has been a wiring harness or connector failure. See the Electrical Diagram on page 30 to continue troubleshooting, or contact Ascension.

4.4 Testing the Power Supply

The power supply is located on the control panel. See Section 4.1. The AC power must be on to conduct the following tests.

If the green LED is illuminated, the unit is supplying 24 VDC. If the LED is not illuminated, check to see that the AC supply is on. If AC power is being supplied, use a multi-meter to check for the voltage drop between a “+” and a “–” terminal on the power supply. The potential should be close to 24 VDC.

To detach the power supply from the control panel, pull out on the orange tabs with a flat head screw driver. The power supply can then be removed from the DIN rail.

4.5 Testing the Power Relay

The power relays are located on the outer electrical panel. See Section 4.1.

The AC power must be on to perform the following tests.

Before testing the power relay, the following two conditions must be met:

1. The power relays must be receiving power. To verify this, check for a 120 VAC[†] drop across the "9" and "5" contacts on the power relay closer to the AC terminal blocks.
2. The smart relay must be receiving power (see Section 4.3). If it is not, take the steps listed in Section 4.3 to restore power.

⚠ CAUTION!
The following step may cause the platform to rise.

To test the power relay, connect a jumper from the "L+" contact on the smart relay to the "14" contact on the power relay. If this causes the platform to rise, then the power relay is functional. If it does not, then measure the voltage drop across the same power

[†] Electrical ratings may differ on lifts outside the USA. Check lift data plate for electrical ratings.

relay contacts indicated in Step 1 above while jumping from the "L+" contact on the smart relay to the "14" contact on the power relay. If the voltage drop does not go to approximately 0 VAC, then the power relay is not functioning correctly and needs to be replaced. If the voltage drop does go to approximately 0 VAC but the platform does not move upward, then the motor or motor harness has a fault.

To replace the power relay, electrically isolate the lift according to the procedures in Section 3.2. Then, remove the "ice cube" style relay from its base. The replacement relay will only fit into the relay block in one orientation.

SECTION 5 Lift Compression/Expansion

The PROTEGE lift can be compressed to a width of 33” [838mm] in order to move it through a narrow doorway. This section describes the procedures for compressing the lift and then expanding it again. A toolkit is available for purchase from Ascension that contains several of the tools required for the process; however, the owning facility may use its own tools in place of the kit if desired.

The following tools are required for the compression/expansion process. Items with an asterisk (*) are included in the Ascension Toolkit.

- Operating Manual
- 1/8" hex key, 6" Length*
- 9/16"-3/4" double open-end wrench*
- Safety glasses for all personnel
- Phillips screwdriver (powered recommended)
- Hammer (dead-blow recommended)*
- Strap with ratchet buckle*
- 60" [1525 mm] long spreader tube* or bar or 2x4 board (optional)

Be sure to read through all of the instructions in SECTION 5 before starting the process.

5.1 Compressing the Lift

To compress the lift, complete the following steps in the order listed.

> ***⚠ CAUTION!***
> ***Take care when placing any part of your body under the platform.***

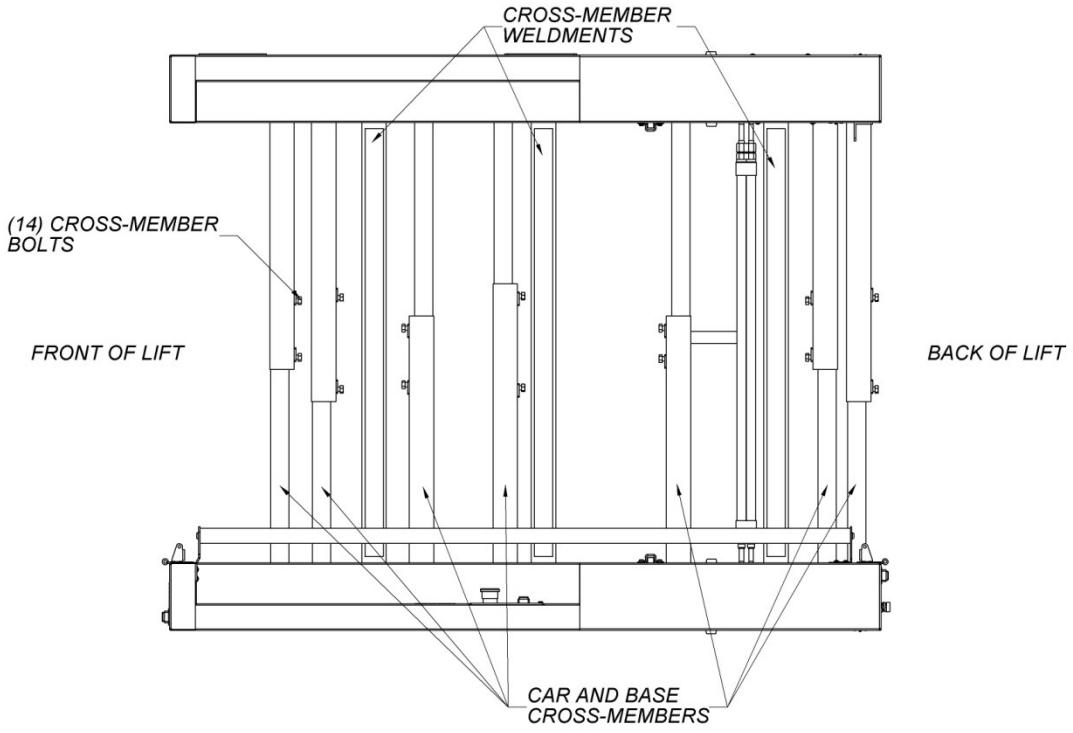
> ***⚠ CAUTION!***
> ***Wear safety glasses at all times while performing the following procedures.***

1. To prepare for compression, the lift should be positioned away from any obstructions. Allow six (6) feet [2m] in each direction to provide clearance for the procedure. The lift should be sitting on its base (not on its casters).

> ***⚠ WARNING!***
> ***Without the safety pan installed, the platform presents a crushing hazard. Make sure the underside of the platform is clear when operating the lift without the safety pan.***

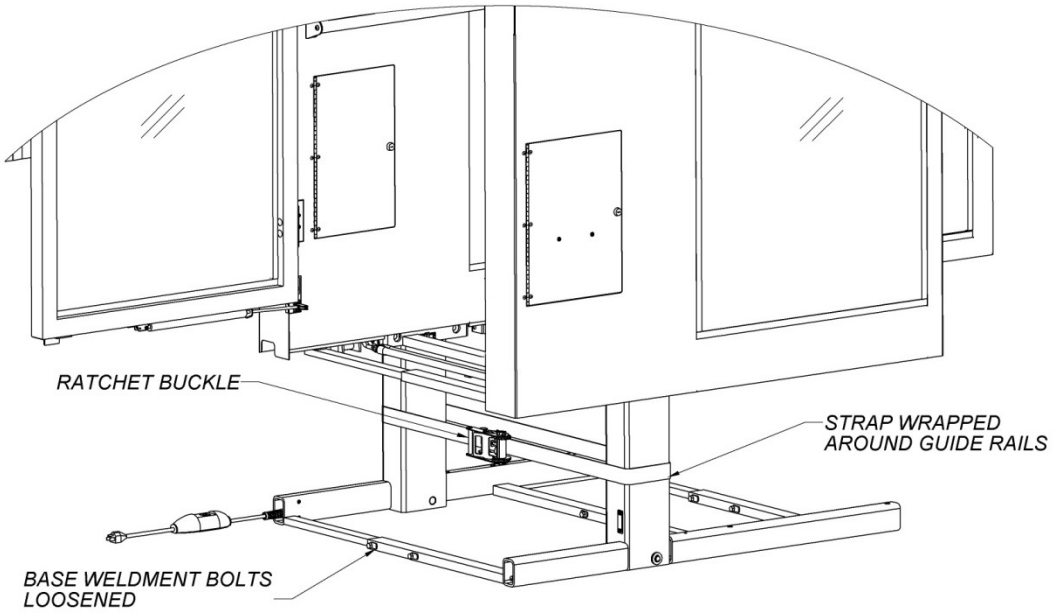
2. Remove the safety pan assembly and platform floor. See Sections 3.13 & 3.17 for instructions. Then fully lower the platform to the ground.
3. Open both gates and use the hold-open washer on each closer to keep both gates locked in the fully open position.
4. Use the hand pump to raise the lift to approximately 12” [305mm] above the ground. For instructions on using the hand pump, refer to the section "Operating the Lift Without Power" in the *Operating Manual*.
5. (Refer to the figure on the following page) Remove the three (3) cross-member weldments by removing the two (2) hex bolts holding each weldment in place using a 3/4" open-end wrench. Be sure to note the original location and position of each cross-member weldment and mark them for reinstallation, as the cross-members are not interchangeable and must be positioned correctly to properly reinstall the platform floor.

6. Loosen the eight (8) platform cross-member bolts and six (6) base cross-members with a 9/16" open-end wrench until the bolts can be comfortably turned by hand (approximately 0.5" [13 mm] of thread should be visible).



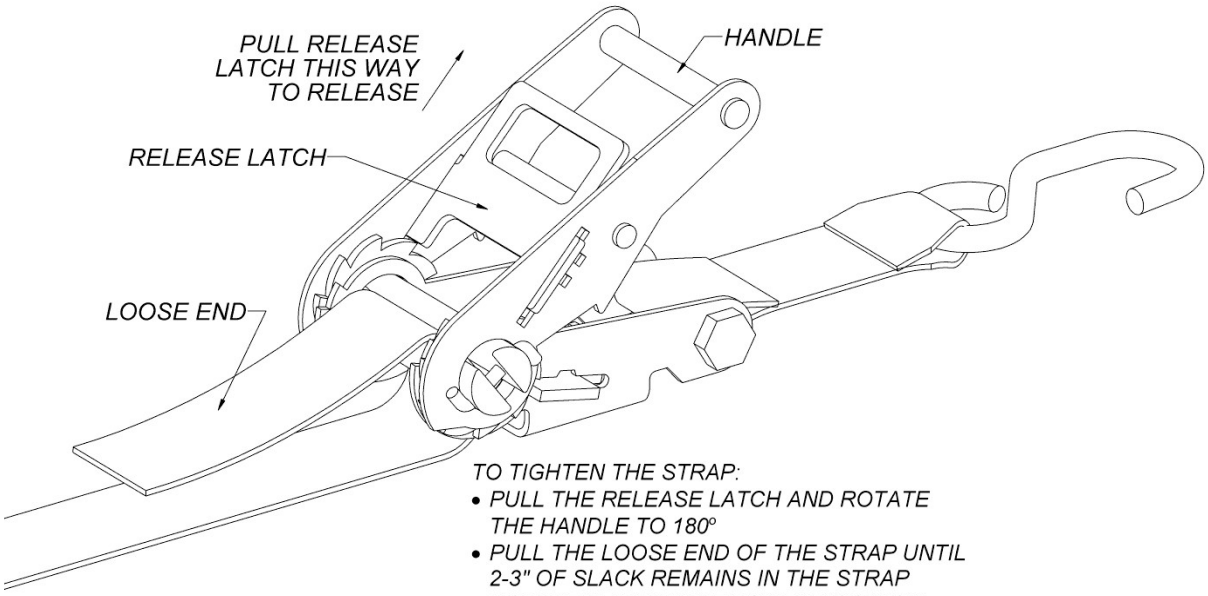
CAR FLOOR AND SAFETY PAN ASSEMBLY REMOVED, FRONT AND REAR GATE NOT SHOWN FOR CLARITY

7. Position a ratcheting strap so the strap wraps around the two (2) vertical guide rails as shown in the figure on the following page.



FLOOR, CROSS-MEMBER WELDMENTS, AND SAFETY PAN ASSEMBLY REMOVED

8. Use the ratcheting strap to compress the lift to the desired width. During this process, it may be necessary for a second person to assist by pushing the lift base inward from either side. The lift can be compressed to a minimum width of 33” [838mm].
9. Remove the strap from the guide rails.
10. Install the casters. Refer to the section titled "Installing the Casters for Portability" in the *Operating Manual* for instructions.
11. The lift is ready for compressed transport.



Ratchet buckle instructions for the strap supplied with the Ascension Toolkit

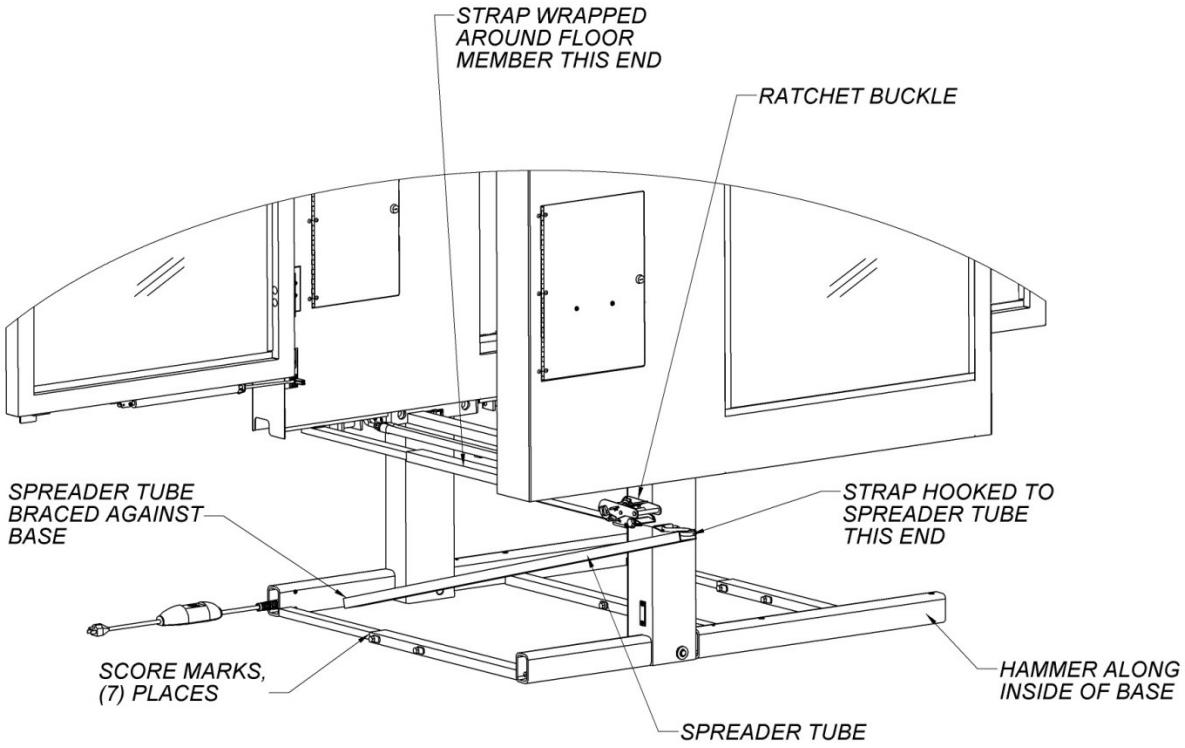
5.2 Expanding the Lift

To expand the lift from its compressed state, complete the following steps in the order listed.

> ***⚠ CAUTION!***
> ***Take care when placing any part of your body under the platform.***

> ***⚠ CAUTION!***
> ***Wear safety glasses at all times while performing the following procedures.***

1. To prepare for expansion, the lift should be positioned away from any obstructions. Allow 6’ in each direction to provide clearance for the procedure.
2. Use the hand pump to raise the lift so the platform is approximately 12” above the ground and then remove the casters.
3. To expand the lift, position the spreader bar and strap as shown in the figure on the following page. Use the ratchet to spread the lift. If the lift does not appear to be spreading when the strap is tightened, use a dead-blow hammer to hit the base members where shown.
4. Expand the lift until all seven (7) score marks are visible on the platform and base frame cross-members. Use the dead-blow hammer to bring the lift into its final position so the score marks on all seven (7) cross-members are visible and aligned exactly with the edges of the larger cross members.
5. Install the three (3) cross-member weldments, being sure to install each one in the same location and orientation from which it was removed. Each cross-member is secured with two (2) 1/2" hex bolts, which can be installed with a 3/4" open-end wrench.
6. Tighten the fourteen (14) cross-member bolts using a 9/16" wrench.



TO SPREAD THE LIFT CAR USING A STRAP AND SPREADER TUBE:
1. BRACE THE SPREADER TUBE AGAINST THE BASE AS SHOWN
2. WRAP THE STRAP AROUND THE FLOOR MEMBER SHOWN AND HOOK IT TO ITSELF
3. HOOK THE OTHER END OF THE STRAP TO THE SPREADER TUBE
4. OPERATE THE RATCHET BUCKLE TO PULL THE CAR APART
NOTE: THIS IS MOST EFFECTIVE AT THE MIDDLE OF THE LIFT AS SHOWN, BUT CAN BE DONE AT ANY LOCATION FRONT-TO-BACK ON THE LIFT

7. Slide the platform floor into the platform through the back of the lift (rear gate should be locked open). The floor should be positioned so the six (6) floor screw holes line up with the holes in the platform cross-member weldments. Secure the floor in place by using a Phillips screwdriver to install the six (6) floor screws.
8. Use the hand pump to lower the platform to the ground.
9. Restore power to the lift.
10. Move the gate closer hold-open washers to allow both gates to fully close. For the lower landing gate, use the short leg of a hex key to pull the washer out of the front gate tube (the 6" long 1/8" hex key provided in the Ascension Toolkit is recommended, but any long hex key will suffice). It also may be required to press the "Down" button on an operating switch to retract the lower platform lock and allow the gate to fully close (platform must be at ground level).

11. Reattach the safety pan assembly. Refer to Section 3.17 for instructions.
12. Close and lock all four (4) access panels, if open.

> ***⚠ WARNING!***
> ***Verify the correct operation of the lift, as described in Section 5.3, before using the lift. Failure to do so could result in serious injury to the user.***

5.3 Verification of Operation

Before the lift can be used to transport passengers, its correct operation must be verified. After the lift has been set up in the desired location, its operation must satisfy the following requirements:

1. With both gates closed, pressing "Up" on any of the three (3) operating switches causes the platform to rise. The platform should stop when the height target sensor is reached.
2. With one (1) of the gates open, pressing either direction on any of the three (3) operating switches does not result in the lift moving.
3. The front gate lock is engaged whenever the platform is not at ground level.
4. The front gate lock disengages when a "Down" button is pressed and the platform is on the ground.
5. Run the platform up to at least twenty (20) inches [500 mm] above the ground. Press "Down" on an operating switch and actuate the safety pan by pressing up on an edge of the pan. Repeat this for all edges of both the front and rear safety pans. The lift should stop moving whenever the pan is actuated and resume motion when the safety pan is no longer pressed upon.

⚠ WARNING!

DO NOT use the lift until its correct operation has been verified. It is absolutely imperative for the safety of the lift passenger that the lift is functioning correctly. If any of the above conditions is not met, and the problem cannot be corrected by reviewing or repeating the reassembly steps, remove the lift from service and contact Ascension immediately.

SECTION 6 Troubleshooting

The table below presents the necessary information to perform basic troubleshooting on the lift. The numbers in the Section column refer to sections within this manual. For the sake of completeness, many of the items in this table are of a setup and operational nature and are not specifically addressed in this manual. Please refer to the *Operating Manual* for these items.

Problem	Possible Cause	Remedy	Section
Platform will not elevate or lower when an operating switch is activated	Electrical cord is not plugged in	Plug in electrical cord	N/A
	GFCI is tripped	Reset the GFCI	N/A
	Cord disconnect switch is OFF	Turn disconnect switch to ON	N/A
	No power at the service outlet	Check breaker OR plug electrical cord into a different outlet	N/A
	Emergency Stop is depressed	Turn it clockwise to reset it	N/A
	Lift is turned off	Turn the lift on	3.5
	One or both gates are open	Close both gates	N/A
	Lift is set up on incline greater than 5%	Move lift to level surface	3.10
	Lower landing gate interlock switch is not engaging correctly	Adjust the lower gate interlock switch actuator position	3.9
	Upper landing gate switch is out of adjustment	Adjust the upper landing gate switch position	3.8
	Safety pan is obstructed (or lift is on casters)	Remove obstruction and/or remove casters to set up lift	3.16
	Component failure	Electrical testing and possible component replacement	4.2
Platform will elevate but will not lower	Operating switch failure	Try alternate operating switch; replace switch if necessary	3.4
	Directional valve failure	Replace directional valve	3.11
	Smart relay failure	Electrical testing and possible component replacement	4.3
Platform elevates but then stops	Lower terminal switch out of adjustment	Check the lower terminal switch to make sure it is not stuck or broken	3.7

Problem	Possible Cause	Remedy	Section
suddenly	Upper height stop reflector is positioned incorrectly	Set the upper height stop reflector properly per the *Operating Manual*	N/A
Platform does not stop automatically at the upper landing	Upper height stop reflector is positioned incorrectly	Set the upper height stop reflector properly per the *Operating Manual*	N/A
	Upper stop sensor beam path is blocked	Remove blockage	3.4
	Upper stop sensor is out of adjustment	Adjust upper stop sensor	3.4
Motor runs but platform does not elevate	Directional valve is in override position	Return the directional valve to normal position per the hand pump instructions in the *Operating Manual*	N/A
	Hydraulic fluid level is low	Fill hydraulic fluid reservoir	2.1
	Break in hydraulic circuit	Repair break and fill hydraulic fluid reservoir	2.1
	Directional valve stuck open	Replace directional valve	3.11
	Platform is overloaded	Reduce load on platform until load is equal to or less than the rated load	N/A

Notes:

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