
# *PF7000 Series™*
## *Express Ramp for Custom Installation*

# Service Manual

01/08/08

32DPF702.A



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**This Ricon service manual is for use by qualified service technicians, and is not intended for use by non-professionals (do-it-yourselfers). The manual provides essential instructions and reference information, which supports qualified technicians in the correct installation and maintenance of Ricon products.**

**Qualified service technicians have to take the training classes and must have the knowledge necessary to perform maintenance work properly and safely.**

Customer Name:_____
Installing Dealer:_____
Date Installed:_____
Serial Number:_____

## REVISION RECORD

| REV | PAGES | DESCRIPTION OF CHANGE | ECR / ECO |
|---|---|---|---|
| 32DPF702.A | | NEW RELEASE | 500229 |
| **END OF LIST** | | | |

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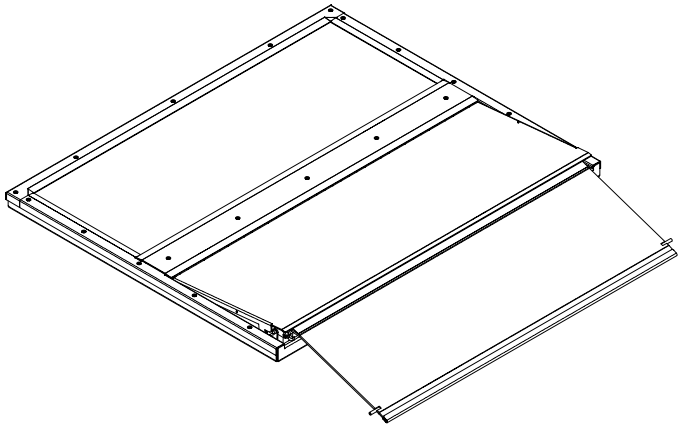
# I. INTRODUCTION

The RICON PF7000 Series Express Ramp is an electrically operated ramp that provides train access to people using mobility equipment (wheelchairs, scooters, etc). The ramp has been designed for custom installation into a passenger railcar and is operated by a railroad employee using a ramp control panel.



When the train is stopped with the doors open and the railroad employee holds the control switch in the DEPLOY position, the ramp extends from the train. After the passenger enters the train, the railroad employee holds the switch in the STOW position and the ramp retracts into the train. The rated load capacity is 800 pounds (363 kilograms).

This manual contains installation and maintenance instructions for the ramp. For operating instructions, please refer to the Operators Manual. It is important to user safety that the railroad employees be completely familiar with the operating instructions. Once the ramp is installed, it is very important that it be properly maintained by following the Ricon recommended cleaning, lubrication, and inspection instructions.

If there are questions about this manual, or additional copies are needed, please contact Ricon Product Support:

**Ricon Corporation**
**7900 Nelson Road**
**Panorama City, CA 91402, USA**
**Telephone ..... + 1 - 818-267-3000**
**Fax ..... + 1 - 818-267-3001**
**World Wide Website..... www.RiconCorp.com**

## A. RICON THREE-YEAR LIMITED WARRANTY

### RICON CORPORATION
### THREE-YEAR LIMITED WARRANTY

***Ricon Corporation (Ricon)*** warrants to the original purchaser of the product that Ricon will provide only the parts that fail due to defective workmanship along with the related freight charges for a period of three years. This warranty applies from the date the ramp is installed and delivered to the operating property or for a period of three years from the 151st day after the product leaves Ricon, whichever comes first.

***This Warranty does not Cover:***

- Labor, service charges, or related travel expenses.
- Malfunction or damage to product parts caused by accident, misuse, lack of proper maintenance, neglect, improper adjustment, modification, alteration, the mechanical condition of the vehicle, road hazards, overloading, failure to follow operating instructions, or acts of Nature (i.e., weather, lightning, flood).

**Note:** Ricon recommends that this product be inspected by an authorized Ricon service technician at least once every six months, or sooner if necessary. Any required maintenance should be performed at that time.

**⚠ WARNING!**

**THIS PRODUCT HAS BEEN DESIGNED AND MANUFACTURED TO EXACT SPECIFICATIONS. MODIFICATION OF THIS PRODUCT IN ANY RESPECT CAN BE DANGEROUS.**

***This Warranty is Void if:***

- The product has been installed or maintained by someone other than an authorized Ricon service technician.
- The product has been modified or altered in any respect from its original design without written authorization by Ricon.

***Ricon disclaims liability for any personal injury or property damage that results from operation of a Ricon product that has been modified from the original Ricon design. No person or company is authorized to change the design of this Ricon product without written authorization by Ricon.***

***Ricon's obligation under this warranty is exclusively limited to providing those parts that fail within the applicable warranty period.***

***Ricon assumes no responsibility for expenses or damages, including incidental or consequential damages.***

***Important: The warranty registration card and the installation verification inspection form must be completed and returned to Ricon within 20 days after installation of this Ricon product for the warranty to be valid. The warranty is not transferable.***

***The warranty gives specific legal rights.***

## B. SHIPMENT INFORMATION

- When the product is received, unpack the product and check for freight damage. Claims for any damage should be made to the carrier immediately.
- Be sure the installation kit contains all items listed on the kit packing list. Please report any missing items immediately to Ricon Product Support. The warranty registration card and the installation verification inspection form must be completed and returned to Ricon within 20 days for the warranty to be valid.

**NOTE:** The train manufacturer's Sales/Service Department Personnel must review the Warranty, the Operator Manual, and this Service Manual with the train property operating crew to be certain that they understand the safe operation of the product. Instruct the train property operating crew to follow the operating instructions without exception.

## C. GENERAL SAFETY PRECAUTIONS

The following general safety precautions must be followed during installation, operation, service, and maintenance:

- To avoid injury, always exercise caution when operating ramp, and be certain that hands, legs, feet, and clothing are not in the path of ramp movement.
- Read and thoroughly understand the operating instructions before attempting to operate.
- Inspect the product before each use. If an unsafe condition, unusual noise or movements exist, do not use until the problem is corrected.
- Keep other people clear during operation.
- The product requires regular periodic maintenance. A thorough inspection is recommended at least once every six months. The product must always be maintained at the highest level of performance.

## D. MAJOR RAMP COMPONENTS

The major components of the PF7000 Express Ramp are shown in **Figure 1-1**. A description of each of the components is in **Table 1-1**.

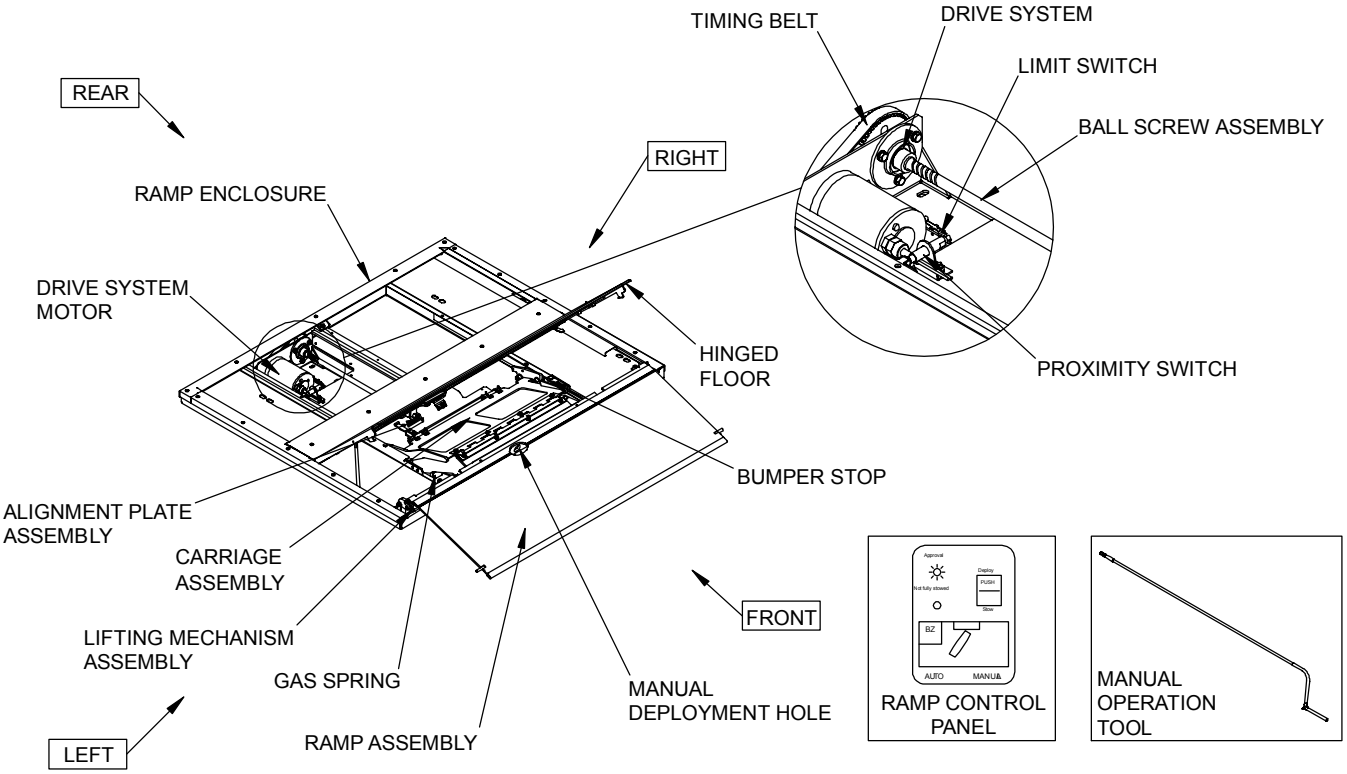



**FIGURE 1-1: MAJOR RAMP COMPONENTS**

| TABLE 1-1: PF7000 RAMP TERMINOLOGY | |
|---|---|
| **NAME** | **DESCRIPTION** |
| Front, Rear, Right, Left | Reference point from outside the train looking inward. |
| Alignment Plate Assembly | Assembly that keeps ramp aligned with frame during operation. |
| Ballscrew Assembly | Mechanical component of the drive system used to DEPLOY and STOW the ramp. |
| Carriage Assembly | Mechanical assembly that operates the ramp assembly. |
| Bumper Stop | (left and right) Soft rubber piece that stops advancement of carriage assembly during DEPLOY operation. |
| Drive System | Components used to DEPLOY and STOW the ramp. |
| Drive System Motor | Electric motor used to operate the ramp. |
| Hinged Floor | Floor panel that opens to allow ramp to DEPLOY. |
| Lifting Mechanism Assembly | (left and right) Mechanism that lifts hinged floor and ramp out of enclosure during DEPLOY operation, and lowers ramp and hinged floor during STOW operation. |
| Limit Switch | Device used to signal the ramp controller when the ramp is in the fully stowed position. |
| Manual Deployment Hole | Insertion point for the manual operation tool. Hole is located under ramp assembly. |
| Manual Operation Tool | Used to manually STOW and DEPLOY the ramp. Stored under hinged floor. |
| Proximity Sensor | Magnetic device used to signal the ramp controller when the ramp is fully stowed position. |
| Ramp Assembly | Assembly that DEPLOYs from under the hinged floor during ramp operation. |
| Ramp Control Panel | Contains controls to automatically or manually STOW and DEPLOY the ramp and shows the status of the ramp with indicator lights. |
| Ramp Controller | (Not shown) Electronically controls all of the ramp functions and safety features. |
| Ramp Enclosure | Cassette type enclosure, rigidly attached to the vehicle, which contains the ramp. |
| Gas Spring | (left and right) Assists in the deployment of ramp and locks the ramp in place when stowed. |
| Timing Belt | Rubber belt connected to ramp motor that turns ball screw assembly. |
| **END OF TABLE** | |

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# II. INSTALLATION

The RICON PF7000 Series Express Ramp has been engineered and designed for custom installations. Installation consists of the mounting of the ramp, installation of the electrical supply and control wiring, controller adjustment, and installation verification. This chapter provides installation guidelines and instructions. If a question arises that is not covered in this chapter, contact the Ricon Product Support Department for assistance.

## A. MECHANICAL INSTALLATION

### 1. RAMP LOCATION

The location of ramp depends on its path of motion. The ramp must be positioned so it can move unobstructed through its required range of travel.

### 2. RAMP INSTALLATION

a. Refer to **Figure 2-1**. Remove cover strip screws.

b. Refer to **Figure 2-1.** Remove cover strips.

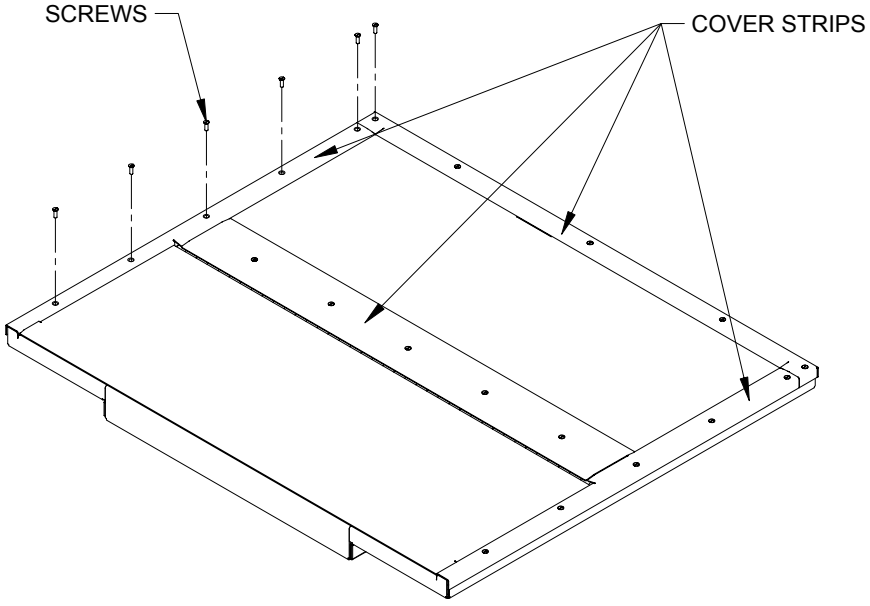


**FIGURE 2-1: REMOVAL OF COVER STRIPS**

| ⚠ WARNING! |
| --- |
| TAKE EXTREME CARE WHEN POSITIONING RAMP INTO TRAIN. BE SURE TO FOLLOW PROPER OPERATION AND SAFETY INSTRUCTIONS WHEN USING LIFTING DEVICE. |

c. Refer to **Figure 2-2**. Install eye bolts (provided in kit #39022) in the locations shown in **Figure 2-2**. Use crane or lifting hoist to place ramp into train.

d. Once ramp is properly placed into train, remove eye bolts.

e. Refer to **Figure 2-2.** Remove access panel.

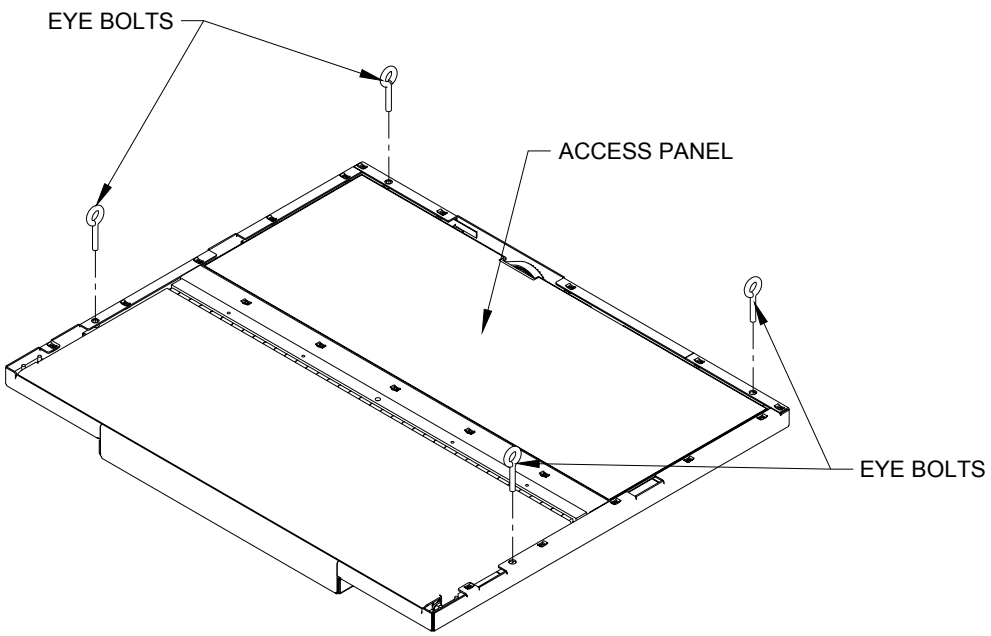


**FIGURE 2-2: EYE BOLT LOCATIONS**

f. Refer to **Figure 2-3**. Rotate timing belt approximately 25-30 times in the direction shown in **Figure 2-3** until the tip of the ramp appears approximately 50mm out of the enclosure.

| ⚠ WARNING! |
|---|
| VERIFY THAT THE HINGED FLOOR IS PROPERLY LOCKED IN A RAISED POSITION BEFORE ATTEMPTING TO INSTALL RAMP. THIS WILL HELP PREVENT INJURY WHILE INSTALLING THE RAMP. |

g. Refer to **Figure 2-3**. Use rod found under hinged floor to support and lock hinged floor in a raised position.

**NOTE:** Mechanical support of the ramp must be made using six provided attachment points located on three sides of the ramp. Each attachment point uses two bolts, for a total of 12 bolts, that must be a minimum of 10 mm diameter. Please use mounting hardware provided with the ramp in kit #39021.Please use mounting hardware provided with the ramp in kit #39021.

| ⚠ WARNING! |
|---|
| DURING RAMP INSTALLATION, BE SURE THERE ARE NO GAPS BETWEEN THE TRAIN'S RAMP FRAME BRACKET AND THE BOTTOM OF THE RAMP ENCLOSURE. IF GAPS EXIST, THE RAMP WILL DEFORM WHEN MOUNTING BOLTS ARE TIGHTENED. FLEXURE EXCEEDING +/- 1/25" (1mm) MAY CAUSE UNINTENDED OVER CURRENT CONDITIONS THAT WILL RESULT IN RAMP MALFUNCTION. RAMP WILL NOT DEPLOY OR STOW AUTOMATICALLY. |

h. Check for gaps between the train's ramp frame bracket and the bottom of the ramp enclosure. Should there be any gaps, insert spacers as needed (i.e. flat washers, etc.) to assure that the ramp enclosure does not deform when bolts are tightened.

i. Refer to **Figure 2-3**. Install 4 flat washers, spring washers and mounting bolts at rear end, two on each side.

j. Refer to **Figure 2-3**. Install 4 flat washers, spring washers and mounting bolts at mid section, two on each side.

k. Refer to **Figure 2-3**. Install 4 flat washers, spring washers and mounting bolts at front, two on each side.

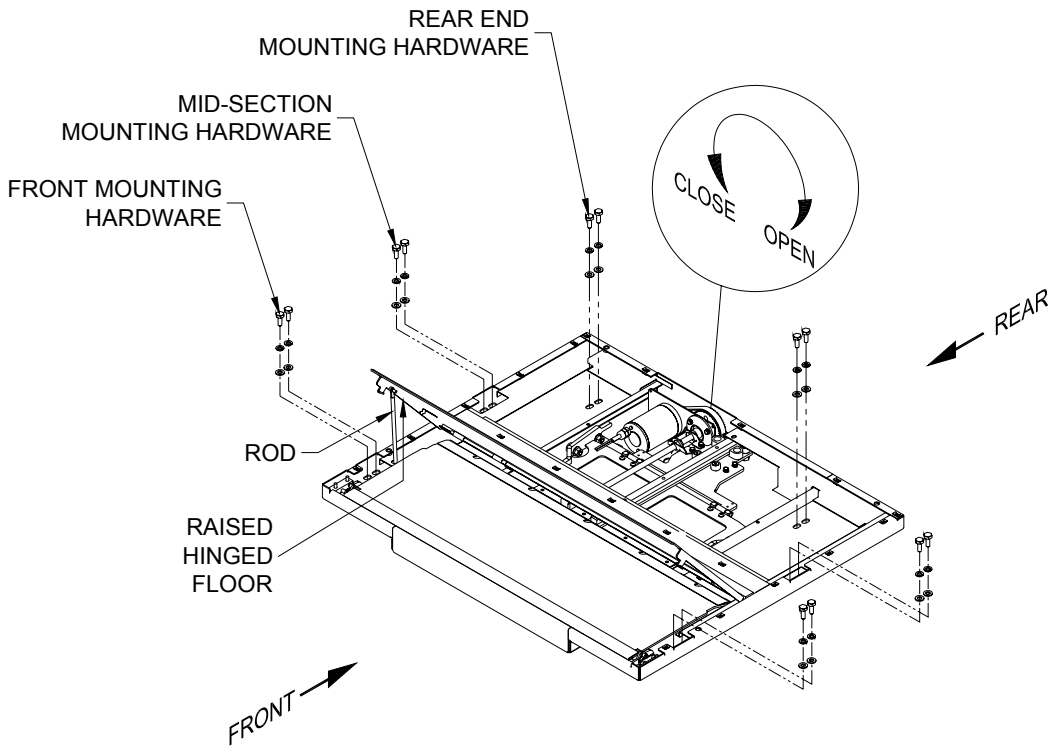


**FIGURE 2-3: INSTALLING MOUNTING FASTENERS**

l. Tighten mounting bolts in an alternating pattern in small increments, stepping up to the maximum value of 27 to 33Nm manually using a manual torque wrench. Do not tighten each bolt all at once. A pneumatic or any automatic device is not recommended.

m. Perform electrical installation before continuing with the following step. For electrical installation, please refer to the Electrical Installation section of this chapter.

n. Disengage rod under hinged floor and secure underneath with clip. Close hinged floor.

o. Rotate timing belt in opposite direction until the ramp is fully stowed.

p. Install access panel.

q. Install cover strips and hardware.

### 3. 3. FLUTTER DRAIN VALVE INSTALLATION

The purpose of the flutter valve is to allow fluid to drain out of enclosure, while keeping debris from entering. Flutter valve and hose clamp are provided with ramp in kit #39023.

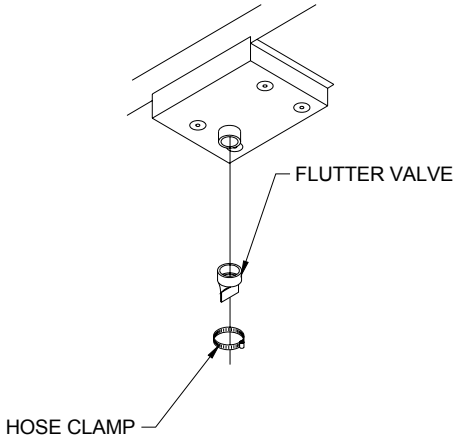


**FIGURE 2-4: FLUTTER VALVE INSTALLATION**

a. Refer to **Figure 2-4**. Slide flutter valve onto holder.
b. Refer to **Figure 2-4**. Place hose clamp over flutter valve and tighten to secure valve in place.

## B. ELECTRICAL INSTALLATION

### 1. GENERAL SAFETY PRECAUTIONS

**⚠WARNING!**

MAKE SURE THAT THE POWER SOURCE IS DISCONNECTED WHEN ROUTING WIRES. THERE IS DANGER OF ELECTRIC SHOCK IF THE POWER SOURCE IS NOT DISCONNECTED.

- Avoid interference with train parts and/or avoid touching the protuberance.
- Make sure wires or harnesses are protected and secured with cable ties every 18 inches (45 cm).
- Use caution to avoid tearing or other damage to the insulation on the wires.

### 2. MAIN WIRING

a. Refer to **Figure 2-5**. Locate motor cable and sensor cable inside ramp enclosure next to the motor.

**FIGURE 2-5: MOTOR AND SENSOR CABLES**

b. Refer to **Figure 2-6**. Run wire bundle into motor area through conduit connector near flutter valve.

**FIGURE 2-6: PASSING WIRE BUNDLE THROUGH HOLE**

c. Refer to **Figure 2-7**. Strip .350 - .370" (8.90 - 9.40mm) of insulation from end of the two 8 AWG (6 $mm^2$) wires. Use a crimping tool to crimp terminal onto both 8 AWG (6 $mm^2$) wires.

**FIGURE 2-7: CRIMPING 8 AWG WIRES**

d. Refer to **Figure 2-8**. Strip 1/4" (6.35 mm) of insulation from end of each 14 AWG (1.5 $mm^2$) wire. Use a crimping tool, to crimp terminal onto all six 14 AWG (1.5 $mm^2$) wires.

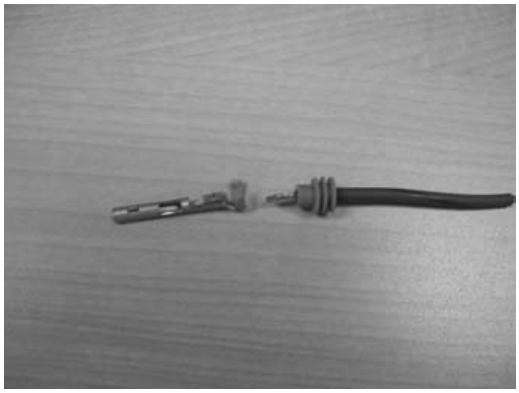

**FIGURE 2-8: CRIMPING 14 AWG WIRES**

e. Refer to **Figures 2-9** and **2-10**. Insert 8 AWG (6 $mm^2$) wires into Molex connector and connect to motor cable.

**FIGURE 2-9: WIRE TO MOLEX CONNECTOR**

**FIGURE 2-10: MOTOR CONNECTION**

f. Refer to **Figure 2-11**. Insert 14 AWG (1.5 $mm^2$) wires into connector and connect to sensor cable.

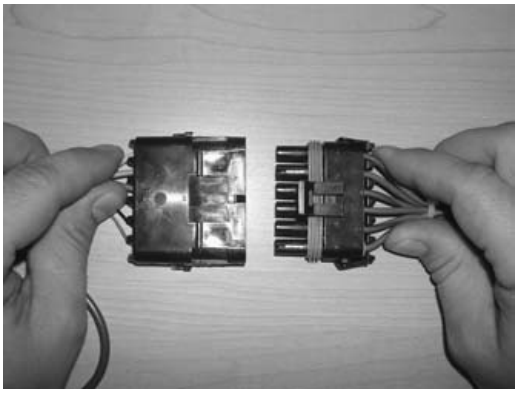

**FIGURE 2-11: CONNECTING SENSOR CABLE TERMINALS**

### 3. WIRING DIAGRAMS

Refer to **Figures 2-12**, **2-13**, and **2-14** on the following three pages.

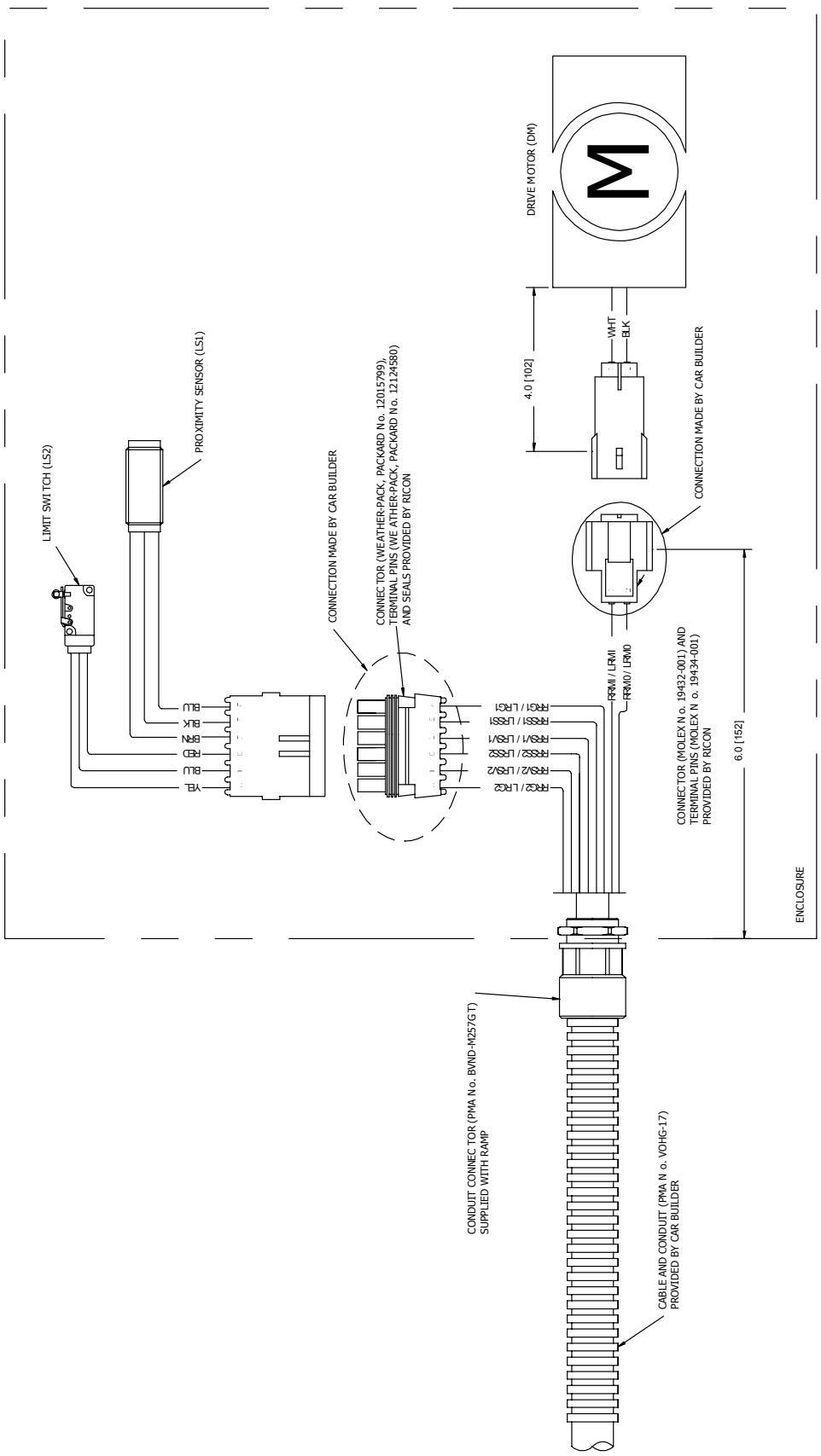


**FIGURE 2-12: CONTROLLER CONNECTION TO RAMP INTERFACE DIAGRAM**

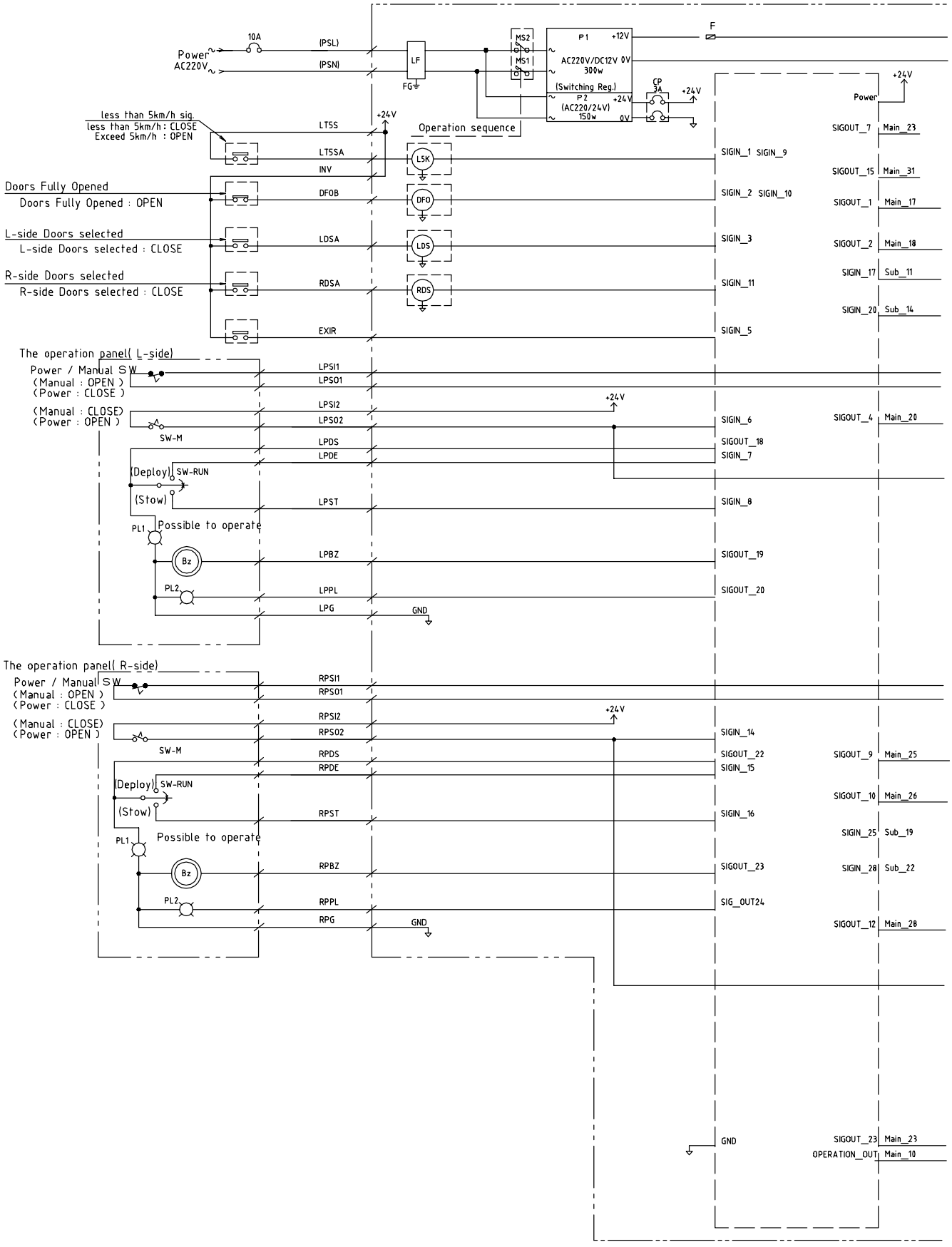


**FIGURE 2-13: RAMP WIRING DIAGRAM (SHEET 1 OF 2)**

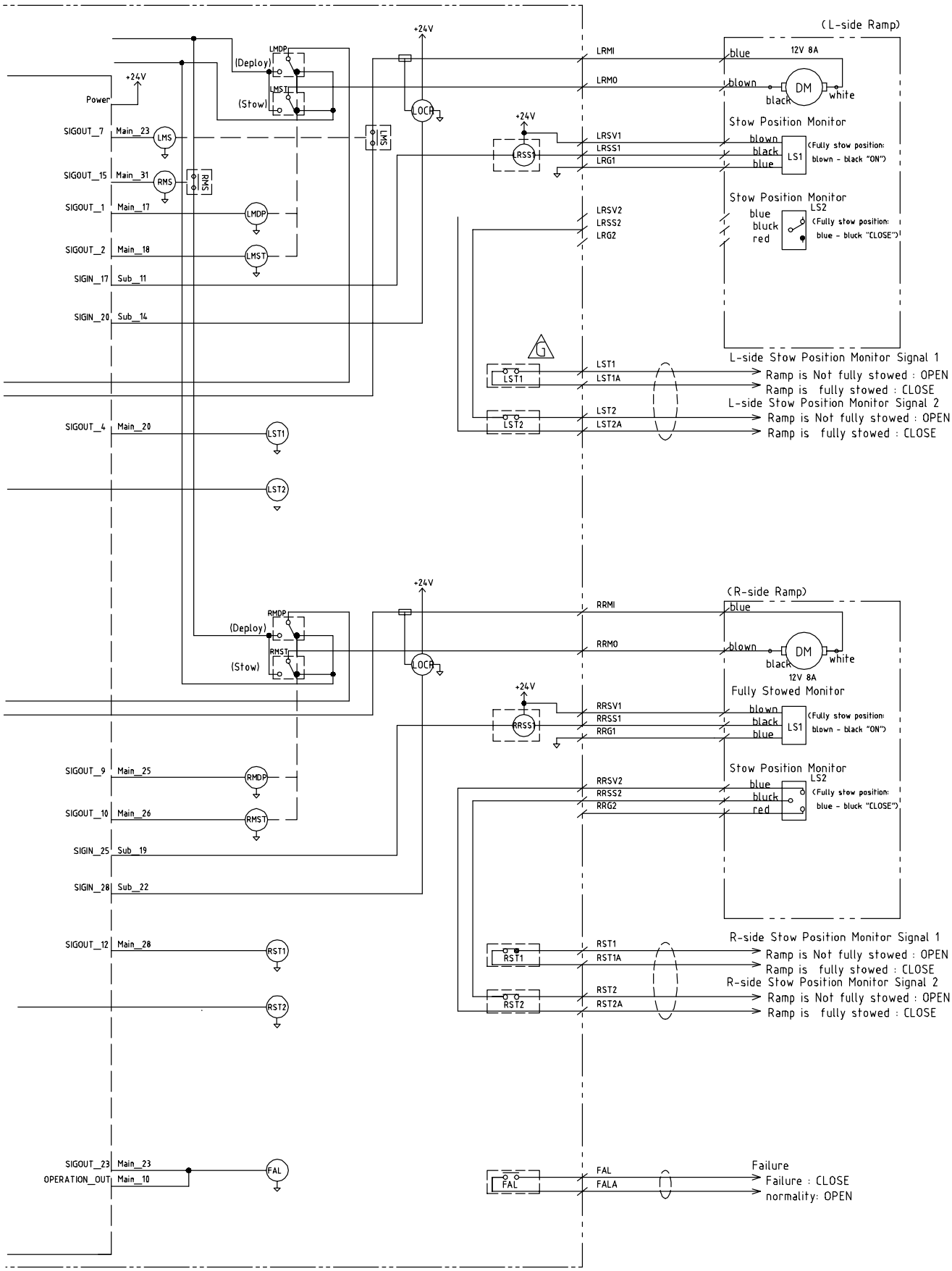


**FIGURE 2-14: RAMP WIRING DIAGRAM (SHEET 2 OF 2)**

## C. CONTROL PANEL INSTALLATION

### 1. GENERAL SAFETY PRECAUTIONS

| ⚠ WARNING! |
| --- |
| DO NOT TOUCH OR GO NEAR THE CONTROLLER WHILE IT IS POWERED. THERE IS A RISK OF ELECTRIC SHOCK AND/OR BURN INJURY. |

- Handle the controller with care. Do not throw or drop the controller, as doing so could damage components inside.
- Avoid contact with water. If water or excessive moisture is present, do not install or route the wires.
- Avoid areas with excessive dust.
- Never modify or dismantle the controller.
- Avoid getting any foreign objects in the controller during installation and wire routing.
- Install the controller inside a low voltage compartment box that is waterproof and dustproof.
- Refer to **Figure 2-15**. Hold tightly onto the handles that are located on the left and right side of the controller.
- Be sure that the orientation of the controller is in the correct direction. The controller should be placed so the terminal board is on the top.
- Install and tighten the M8 bolts on all six locations with a torque value of 13 ~15 Nm.
- Avoid interference with train parts and/or avoid touching the protuberance.
- Make sure wires or harnesses are protected and secured with cable ties every 18 inches (45cm).
- Use caution to avoid tearing or other damage to the insulation on the wires.

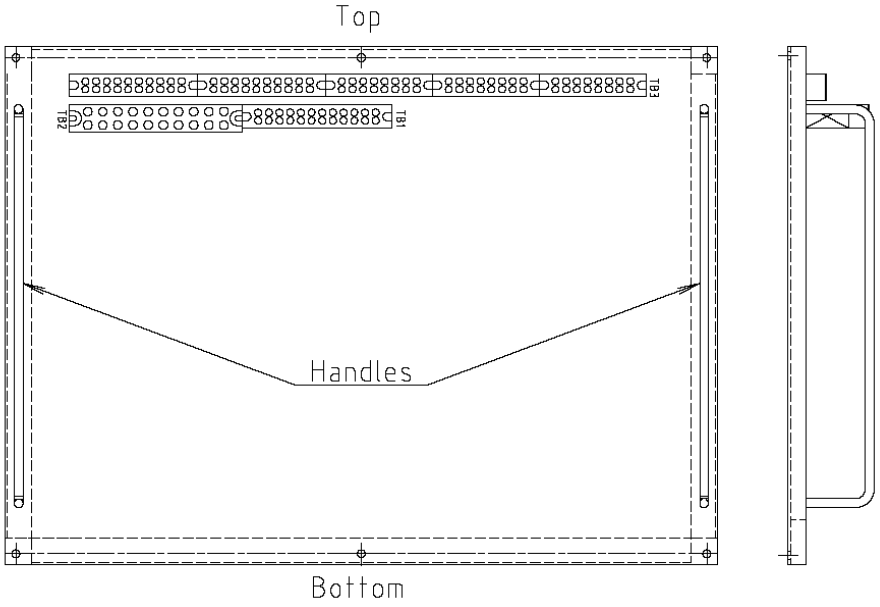


**FIGURE 2-15: CONTROLLER OUTLINE**

## 2. CONTROLLER WIRING

| ⚠ WARNING! |
| --- |
| MAKE SURE THAT THE POWER SOURCE IS DISCONNECTED WHEN ROUTING WIRES. THERE IS DANGER OF ELECTRIC SHOCK IF THE POWER SOURCE IS NOT DISCONNECTED. |

a. Route the train body wires to the wire numbers shown on the terminal board of the controller.

b. Refer to Crimped Ring sections for installation of crimped ring terminals, pages 2-12 and 2-13.

c. Refer to **Figure 2-16**. Remove the screw that is located on the terminal board. Make sure that the Phillips screwdriver is inserted perpendicular to the screw head.

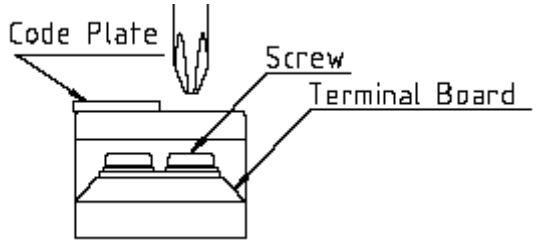


**FIGURE 2-16**

d. Refer to **Figure 2-17**. Insert the crimped ring terminal into the screw. Make sure that the crimped ring terminal is not angled.

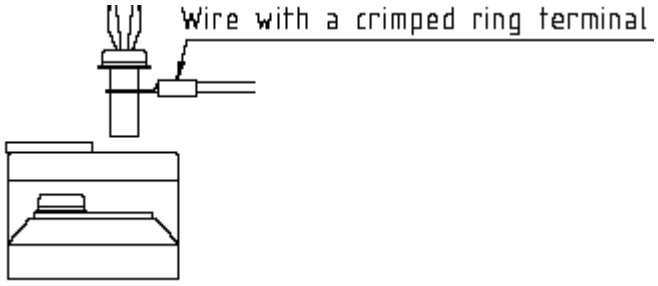


**FIGURE 2-17**

e. Refer to **Figure 2-18**. Reinstall the screw into the terminal board. Make sure that the Phillips driver is inserted perpendicular to the screw head.

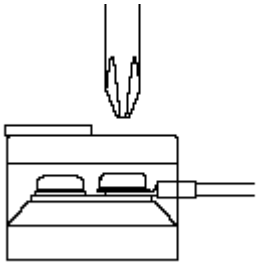

**FIGURE 2-18**

### 3. CRIMPED RING- 1.5mm$^2$ WIRE

a. Refer to **Figure 2-19**. Strip approximately 6.5 ~ 7.0mm of insulation by using the appropriate wire stripping tool for a 1.5mm$^2$ wire.

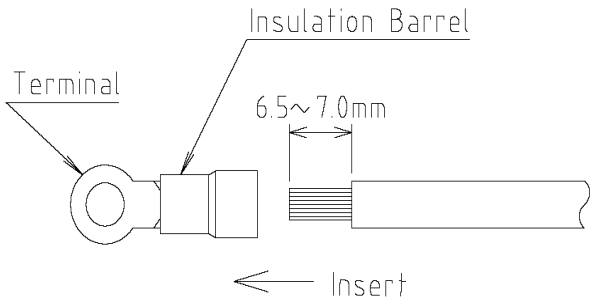


**FIGURE 2-19**

b. To easily insert the bare conductor into the terminal, straighten the tip of the wire.

c. Refer to **Figure 2-20**. Insert the bare conductor into the crimping terminal PS2-4.

**NOTE:** Make sure that the wire does not stick out from the insulation barrel.

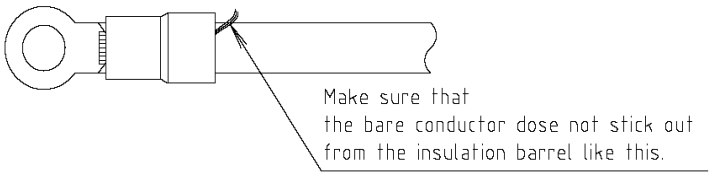


**FIGURE 2-20**

d. Crimp the wire using crimping tool H-7.

e. After crimping, verify that the wire does not readily pull out.

f. Refer to **Figure 2-21**. Make sure that the bare conductor is exposed about 0.5 ~ 1.0mm at the base of the terminal adjacent to the insulation barrel.

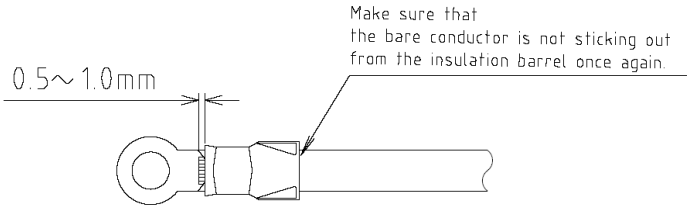


**FIGURE 2-21**

g. Visually inspect terminal to ensure that the crimping was done correctly. Verify that the bare conductor does not stick out from the insulation barrel.

**4. CRIMPED RING- 6mm$^2$ WIRE**

a. Refer to **Figure 2-22**. Strip approximately 9.0 ~ 9.5mm of the insulation by using the appropriate wire stripping tool for a 6mm$^2$ wire.

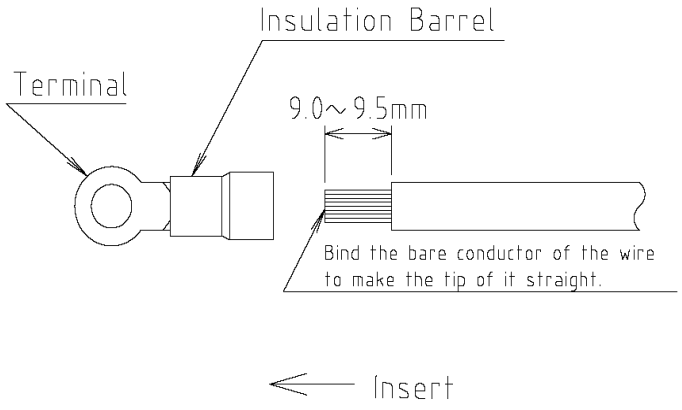


**FIGURE 2-22**

b. To easily insert the bare conductor into the terminal, straighten the tip of the wire.

c. Refer to **Figure 2-23**. Insert the wire into the crimping terminal PS5.5-5.

**NOTE:** Make sure that the wire does not stick out from the insulation barrel.

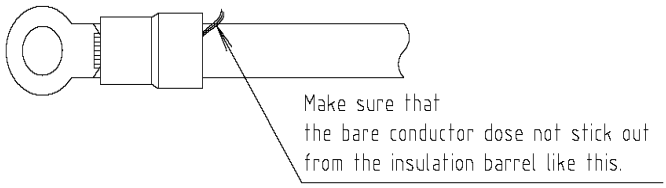


**FIGURE 2-23**

d. Crimp the wire using crimping tool H-8.

e. After crimping, verify that the wire does not readily pull out.

f. Refer to **Figure 2-24**. Make sure that the bare conductor is exposed about 0.5 ~ 1.0mm at the base of the terminal adjacent to the insulation barrel.

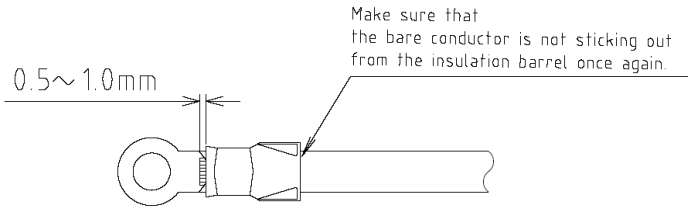


**FIGURE 2-24**

g. Visually inspect to ensure that the crimping was done correctly. Verify that the bare conductor does not stick out from the insulation barrel.

## D. CONTROL PANEL INSTALLATION

### 1. GENERAL SAFETY PRECAUTIONS

| ⚠ WARNING! |
| --- |
| DO NOT TOUCH THE REAR SIDE OF THE CONTROL PANEL WHILE IT IS POWERED. THERE IS A RISK OF ELECTRIC SHOCK AND/OR BURN INJURY. |

| ⚠ WARNING! |
| --- |
| DO NOT INSTALL THE CONTROL PANEL IN A LOCATION THAT IS ACCESIBLE TO THE GENERAL PUBLIC AND PASSENGERS. THE CONTROL PANEL SHOULD BE ONLY ACCESSIBLE TO THE OPERATOR WHICH WILL PREVENT UNINTENDED OPERATION WHICH CAN RESULT IN INJURY. |

- Handle the control panel with care. Do not throw or drop the control panel, as doing so could damage components inside.
- Avoid contact with water. If water or excessive moisture is present, do not install or route the wires.
- Avoid areas with excessive dust.
- Never modify or dismantle the control panel.
- Avoid getting any foreign objects in the control panel during installation and wire routing.
- Install the control panel in a location that is out of reach from the general public and passengers and is waterproof and dustproof. It is recommended that control panel be installed in a compartment with a key which is only available to the operator.
- Install and tighten the M3 bolts on all four locations with a torque value of 0.63 Nm.
- Avoid interference with train parts and/or avoid touching the protuberance.
- Make sure wires or harnesses are protected and secured with cable ties every 18 inches (45cm).
- Use caution to avoid tearing or other damage to the insulation on the wires.

## 2. CONTROL PANEL WIRING

| ⚠ WARNING! |
| --- |
| MAKE SURE THAT THE POWER SOURCE IS DISCONNECTED WHEN ROUTING WIRES. THERE IS DANGER OF ELECTRIC SHOCK IF THE POWER SOURCE IS NOT DISCONNECTED. |

a. Refer to **Figure 2-25**. Locate motor cable and controller signal cables located behind the control panel.

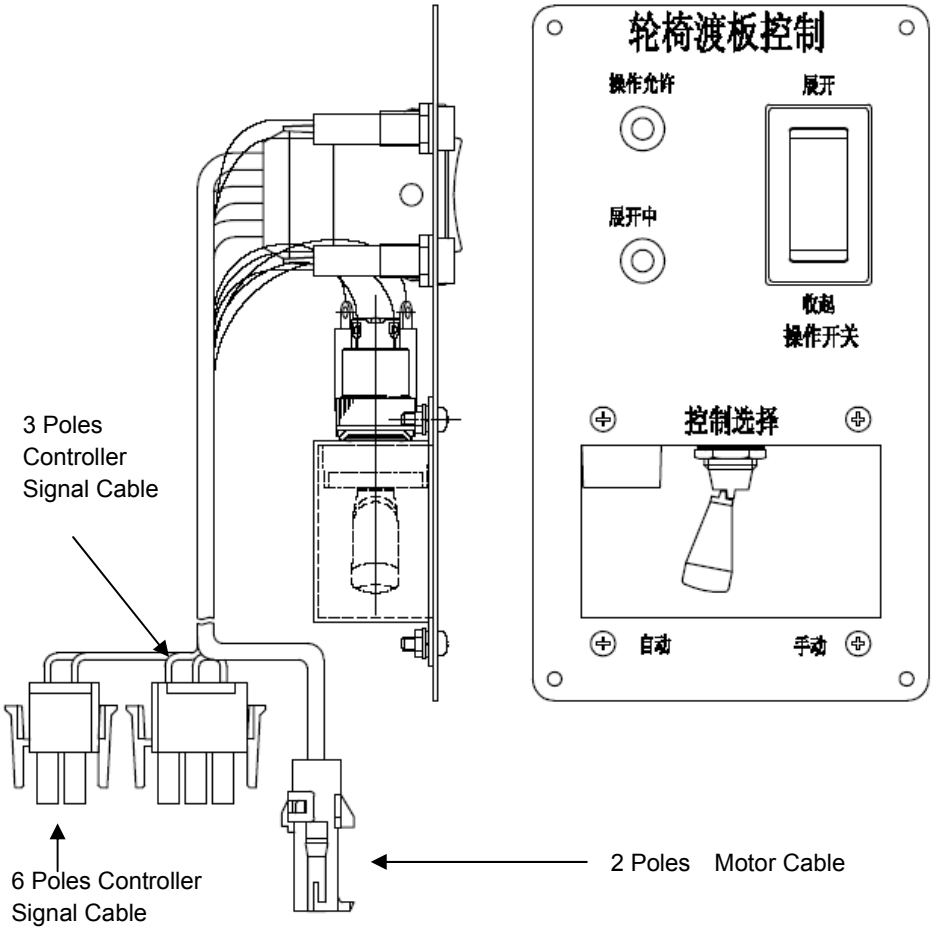


**FIGURE 2-25**

b. Refer to Crimped Terminal sections for installation of crimped terminals.

c. Refer to **Figure 2-26**. Connect the plugs and the caps of the connectors firmly as shown on **Figure 2-26**.

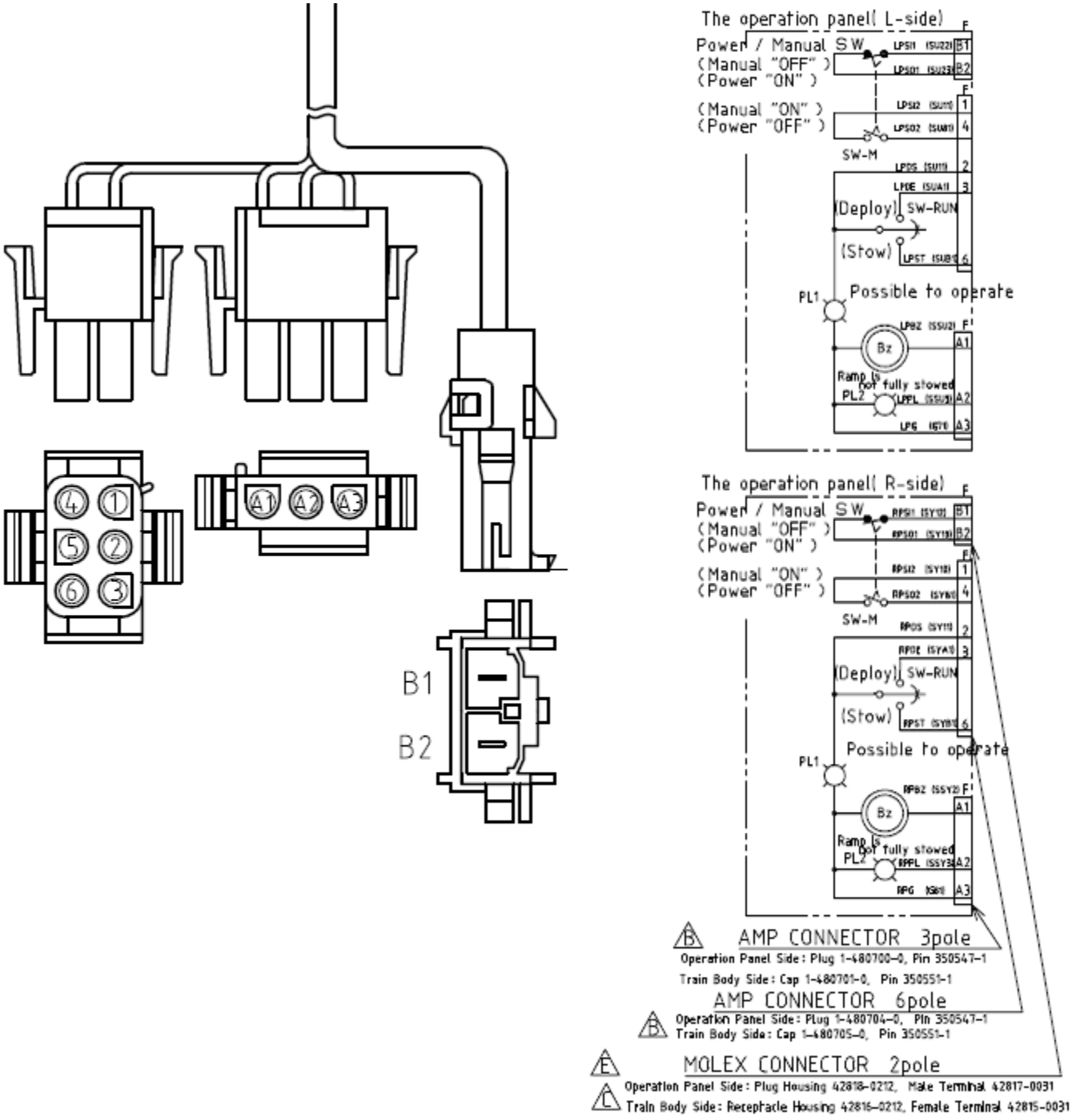
The operation panel( L-side)
Power / Manual SW
(Manual "OFF" )
(Power "ON" )
(Manual "ON" )
(Power "OFF" )
SW-M
(Deploy)
SW-RUN
(Stow)
PL1
Possible to operate
Bz
Ramp is not fully stowed
PL2
The operation panel( R-side)
Power / Manual SW
(Manual "OFF" )
(Power "ON" )
(Manual "ON" )
(Power "OFF" )
SW-M
(Deploy)
SW-RUN
(Stow)
PL1
Possible to operate
Bz
Ramp is not fully stowed
PL2
B1
B2
AMP CONNECTOR 3pole
Operation Panel Side: Plug 1-480700-0, Pin 350547-1
Train Body Side: Cap 1-480701-0, Pin 350551-1
AMP CONNECTOR 6pole
Operation Panel Side: Plug 1-480704-0, Pin 350547-1
Train Body Side: Cap 1-480705-0, Pin 350551-1
MOLEX CONNECTOR 2pole
Operation Panel Side: Plug Housing 42816-0212, Male Terminal 42817-0031
Train Body Side: Receptacle Housing 42815-0212, Female Terminal 42815-0031

**FIGURE 2-26**

### 3. CRIMPED - 1.5mm$^2$ WIRE

a. Refer to **Figure 2-27**. Strip approximately 4.75 ± 0.38mm of insulation by using the appropriate wire stripping tool for a 1.5mm$^2$ wire.


**FIGURE 2-27**

b. To easily insert the bare conductor into the terminal, straighten the tip of the bare conductor.

c. Refer to **Figure 2-28**. Insert the stripped wire and the pin 350551-1 into the crimping tool 91500-1 and crimp them accordingly.

**NOTE:** Make sure that the tip of the bare conductor is exposed about 0 ~ 1.0mm from the pin.

**NOTE:** Make sure that the pin's insulation barrel firmly holds the insulation.

**NOTE:** Make sure that the bare conductor does not stick out from the pin's wire barrel.

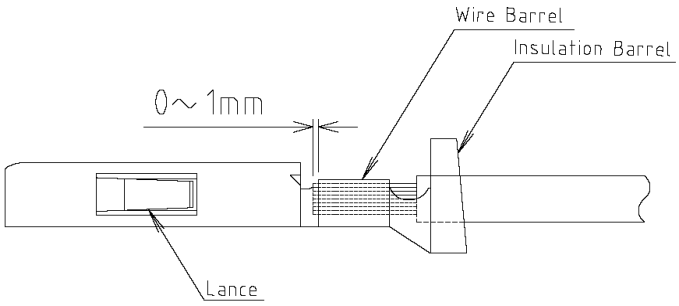


**FIGURE 2-28**

d. Insert the cap 1-480701-0 or 1-480705-0 into the prescribed location.

e. Refer to **Figure 2-28** and **2-29**. Push the cable into the cap until the lances of the pin get caught by the cap.

f. Verify that the cable does not readily pull out from the cap.

**NOTE:** If the pin was inserted incorrectly, pull the pin out of the cap by using the specified tool (1804030-1 amp). Pay attention not to squash the lances.

**NOTE:** If the lances were squashed or bent, crimp the pin once again.

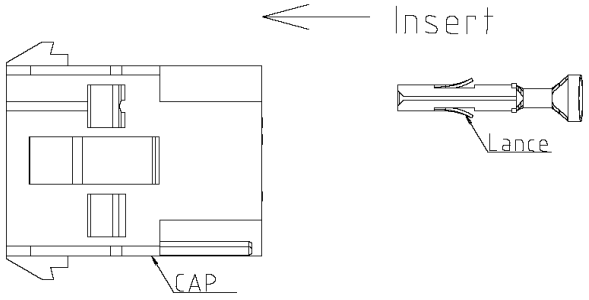


**FIGURE 2-29**

**4. CRIMPED - 6mm$^2$ WIRE**

a. Refer to **Figure 2-30**. Strip approximately 9.0 ~ 10.0mm of insulation by using the appropriate wire stripping tool for a 6mm$^2$ wire.

b. To easily insert the bare conductor into the female terminal, straighten the tip of the bare conductor.

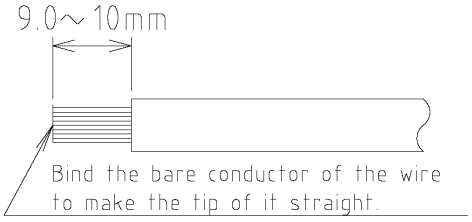


**FIGURE 2-30**

c. Refer to **Figure 2-31**. Insert the female terminal 42815-0031 and the stripped wire into the crimping tool 63811-1500 and crimp them accordingly.

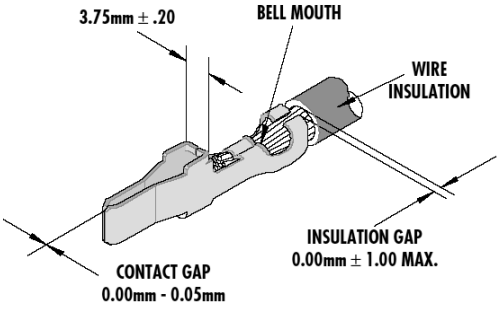


**FIGURE 2-31**

d. Refer to **Figure 2-32**. Insert the crimped wire into the receptacle housing 42816-0212.

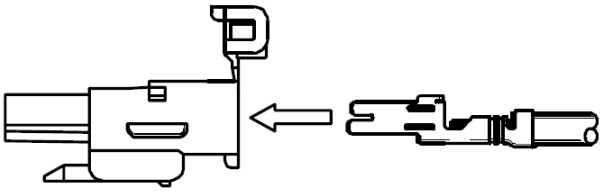

**FIGURE 2-32**

e. Refer to **Figure 2-33**. Insert the crimped wire into the receptacle housing until the terminal's latch is engaged. Remove the tab that is attached to the top of the housing.

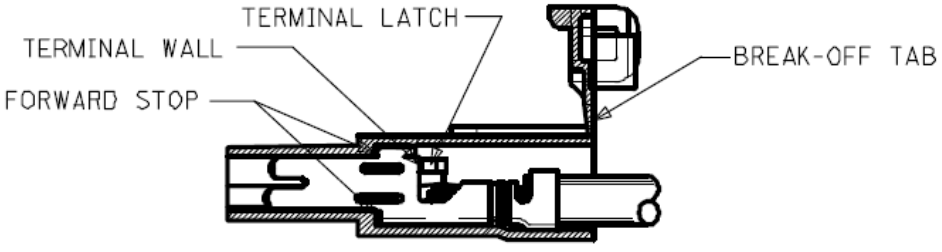


**FIGURE 2-33**

f. Refer to **Figure 2-34**. Install the tab that was removed from the housing as shown in **Figure 2-34**.

g. Insert the tab's retention strap into the housing retention ramp.

h. Verify that the cable does not readily pull out from the receptacle housing.

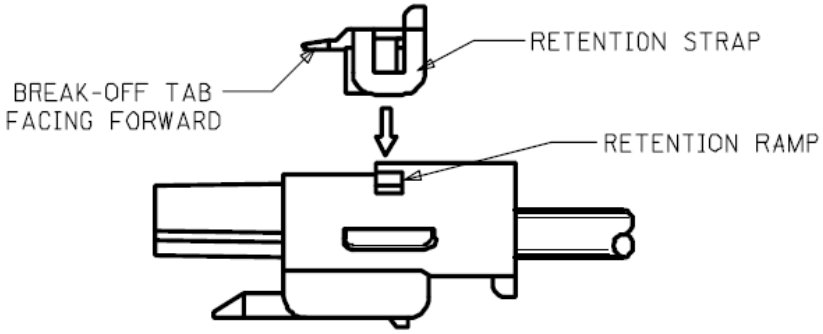


**FIGURE 2-34**

## E. DECALS

Refer to **Figure 2-9**. Verify that all decals are properly located and affixed as shown.

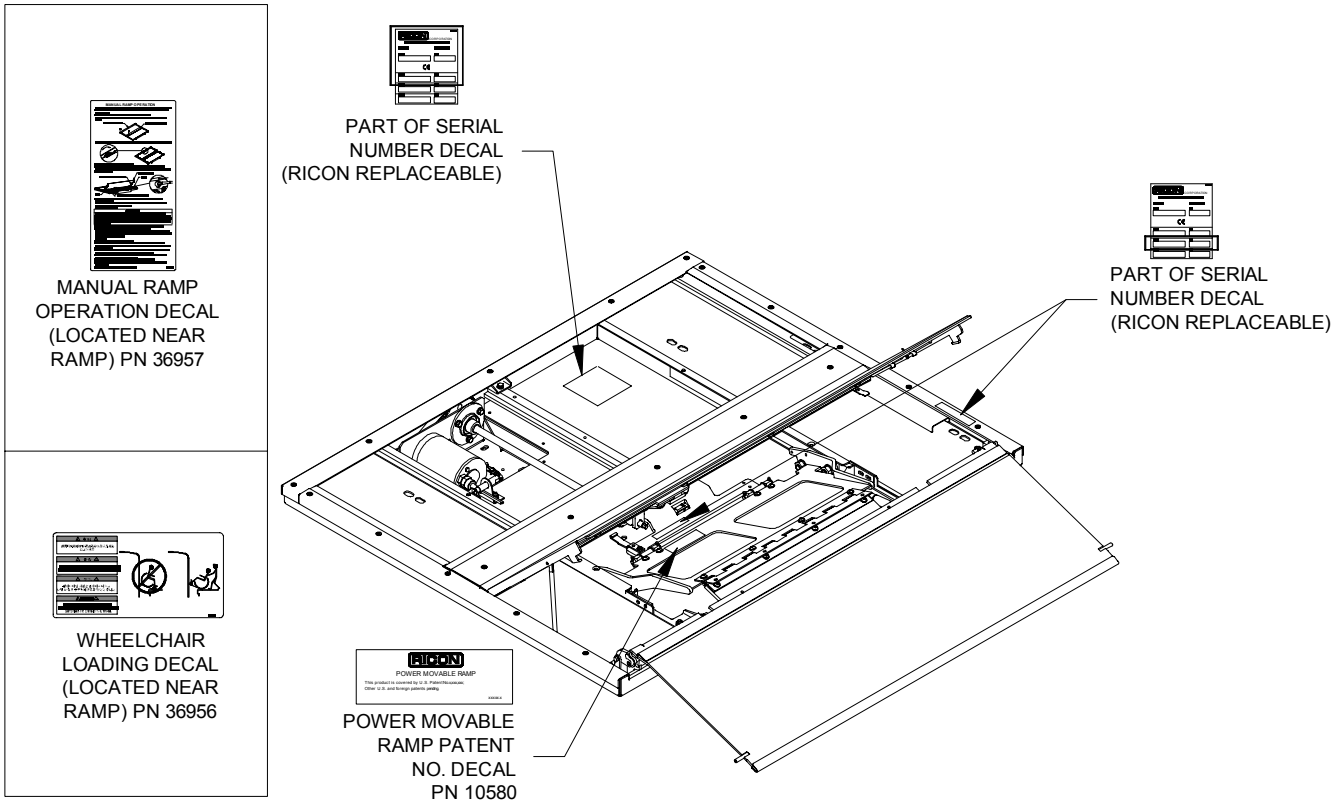


**FIGURE 2-35: DECAL LOCATIONS AND PART NUMBERS**

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# III. MAINTENANCEJ

Maintenance for the RICON PF7000 Series Express Ramp consists of a maintenance schedule, troubleshooting guide, and electrical wiring diagram. Routine maintenance and repairs should be performed by qualified service technicians.

## A. MAINTENANCE SCHEDULE

Refer to **Table 3-1**. Under conditions of heavy use (in excess of 20 cycles per day), maintenance should be performed more frequently. Modifying or failing to properly maintain the ramp will void the warranty and may result in unsafe operating conditions for the users. Safety inspections should be performed according to the following intervals:

**TABLE 3-1: MAINTENANCE SCHEDULE**

| SERVICE POINT | ACTION TO PERFORM |
|---|---|
| **DAILY SAFETY CHECK** | |
| General Appearance | • Inspect underside of train to verify that nothing is out of the ordinary.<br>• Verify that the bottom surfaces of the side channels are free of debris. |
| General Operation | • Verify ramp operates properly during deploy and stow modes without obstruction.<br>• Listen for any abnormal noises as the ramp deploys (i.e., grinding or scraping noises). If any abnormal noises exist, notify a qualified service technician immediately.<br>• Bumper stops are in place and stop ramp squarely. |
| Ramp Mounting and Support Points. | • Refer to **Figure 3-1**. Verify that all ramp mounting and support points under train are in proper order, free from damage and locked in position with proper fasteners.<br>• Verify that all mounting bolts are sufficiently tightened (27~33 Nm). |
| Main Pivot Points | Refer to **Figure 3-1**. Verify carriage/ramp pivot pins are installed properly, free from damage and locked in position with proper fasteners. |
| **4-MONTH SAFETY CHECK** | |
| Ramp Enclosure | Vacuum inside the ramp enclosure using an industrial vacuum cleaner. |
| Ramp Controller | Visually inspect the appearance of the parts. Replace them when the deformation, change in color, or damage are confirmed. |
| | Visually inspect the wires. Replace them if deterioration or damage are confirmed. |
| | Visually inspect the terminals. Correct them if deformation is confirmed. Replace them if corrosion, weld, changing colors, or cracks are confirmed. |
| | Verify that the terminal screws are sufficiently tightened. |
| | Inspect the terminal board. Replace it when deformation or cracks are confirmed. |
| **ANNUAL SAFETY CHECK** | |
| Ballscrew Assembly | Grease Ballscrew using low temperature grease such as Aeroshell Grease #22 Starfak EP, or equivalent. |

**CONTINUED ON PAGE 3-2**

| TABLE 3-1: MAINTENANCE SCHEDULE | |
|---|---|
| **SERVICE POINT** | **ACTION TO PERFORM** |
| **DCU** (inside ramp controller) | Inspect the connector. Replace it if deformation, looseness, or corrosion of the pins is confirmed. |
| **DP** (inside ramp controller, Indicator) | Inspect the connector. Replace it if deformation, looseness, or corrosion of the pins is confirmed. |
| **P1** & **P2** (inside ramp controller, Power Source) | Inspect the fan. Verify that it turns smoothly when the power is charged. |
| **EVERY 4-YEAR SAFETY CHECK** | |
| Bolts, Fasteners, Hinges, Pins | Verify that the bolts, fasteners, hinges, and pins are sufficiently tightened and secured in their appropriate locations. |
| Cam followers | Refer to **Figure 3-1**. Verify that the cam followers rotate normally and ensure that the cam follower fasteners are sufficiently tightened. Replace the cam followers when necessary. |
| Bumper stops | Replace bumper stops. |
| Flutter valve | Replace the flutter valve rubber. |
| Limit switch | Verify that the limit switch is activated when the ramp is fully stowed. Ensure that the limit switch bracket mounting bolts are sufficiently tightened.<br>Replace the limit switch when necessary. |
| Proximity sensor | Inspect the gap between the sensor and the detector and verify that it is 3.81mm MAX 1.52mm MIN. Verify that the bracket mounting bolts are sufficiently tightened.<br>Verify that the indicator light turns on when the ramp is fully stowed.<br>Replace the proximity sensor when necessary. |
| Ramp electrical components inside ramp enclosure | Verify that each connector and terminal is properly connected. |
| Gas spring | Replace gas springs. |
| Timing belt | Inspect the timing belt. Replace it if deformation, scars, or damage is confirmed. |
| **EVERY 8-YEAR SAFETY CHECK** | |
| Cam followers | Replace the cam followers. |
| Limit switch | Replace the limit switch. |
| Proximity sensor | Replace the proximity sensor. |
| Rail block | Replace the rail block. |
| Roller | Replace the roller. |
| Timing belt | Replace the timing belt. |
| Power Source P1 (inside Ramp Controller) | Replace P1. |
| Power Source P2 (inside Ramp Controller) | Replace P2. |
| **CONTINUED ON PAGE 3-3** | |

| TABLE 3-1: MAINTENANCE SCHEDULE | |
|---|---|
| **SERVICE POINT** | **ACTION TO PERFORM** |
| Relay (inside Ramp Controller) | Replace L5K, DFO, LDS, RDS, EXIR, LRSS1, RRLL1, LPDE, LMST, RPDE, RMST, and WDT relays. |
| Relay (inside Ramp Controller) | Replace 12V relay. |
| Relay (inside Ramp Controller | Replace LST1, LST2, RST1, RST2, FAL1 relays. |
| Relay (inside Ramp Controller) | Replace FAL2 relay. |
| Relay (inside Ramp Controller) | Replace LMS, RMS, LMST, LMDP, RMST, RMDP relays. |
| Magnetic Switch (inside Ramp Controller) | Replace MS. |
| **EVERY 12-YEAR SAFETY CHECK** | |
| Motor | Replace the motor. |
| Harness and Connectors | Replace the harness and connectors used inside the ramp enclosure. |
| **END OF TABLE** | |

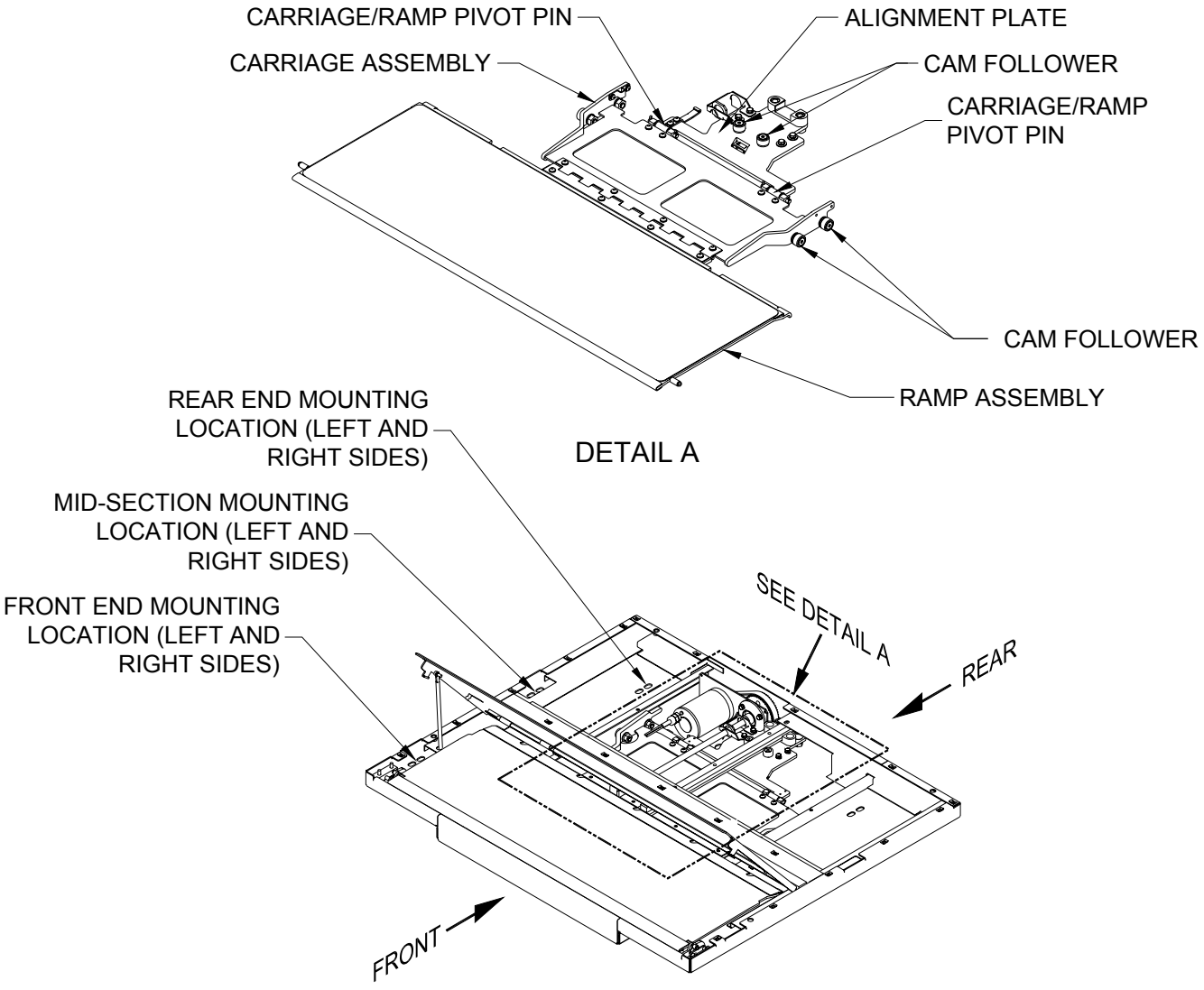


**FIGURE 3-1: RAMP SERVICE POINTS**

## B. TROUBLESHOOTING GUIDE

The troubleshooting guides are designed to provide logical starting points to locate general problems that could occur with the ramp. However, not all possible problems or combinations of problems are listed. The guides do not incorporate routine safety precautions or preliminary procedures and assume that the vehicle battery is fully charged and the battery terminals/connectors are clean and tight. For troubleshooting the ramp, refer to the following sections:

### 1. RAMP OPERATIONAL TROUBLESHOOTING

**TABLE 3-2: OPERATIONAL TROUBLESHOOTING GUIDE**

| SYMPTOM | POSSIBLE CAUSE | REMEDY |
|---|---|---|
| No ramp operation. | Main circuit breaker tripped. | Reset circuit breaker. |
| | Manufacturer's interlock circuitry. | Check manufacturers interlock circuitry. |
| | Electrical harness not connected properly. | Verify proper connection of electrical harness to ramp controller. |
| Hinged floor does not fully close. | Obstruction in door. | Remove obstruction and check for any damage. |
| | Bent ramp cam pin. | Contact a qualified service technician for repair. |
| | Damaged gas spring. | Inspect gas springs and contact a qualified service technician for repair if necessary. |
| | Damaged and/or misaligned hinged door. | Contact a qualified service technician for repair. |
| Excess noise during deploy and/or stow. | Faulty cam follower on traveling frame assembly and/or alignment plate assembly. | Contact a qualified service technician for repair. |
| | Debris in enclosure. | Remove debris. |
| | Improper alignment adjustment of traveling frame. | Contact a qualified service technician for repair. |
| | Improper alignment adjustment of drive system. | Contact a qualified service technician for repair. |
| Ramp motor operates, ramp does not deploy. | Broken drive belt. | Contact a qualified service technician for repair. |

**END OF TABLE**

## 2. CONTROLLER AND CONROL PANEL TROUBLESHOOTING

**TABLE 3-3: CONTROLLER AND CONTROL PANEL TROUBLESHOOTING GUIDE**

| SYMPTOM | POSSIBLE CAUSE | TEST AND INSPECTION | DETERMINATIONS |
|---|---|---|---|
| The APPROVAL light on the control panel does not turn on when the train is stopped (less than 5km/h) and the doors are fully opened on the side that the ramp is going to be used. | AC220V power input is not present. | 1. Measure the AC220V input voltage. Measure the voltage between the wire # PSN-PSL. | 1. If there is no AC220V present, check the fuse. |
| | | 2. Check if the LED on the DC24V power is off. | 2. If the fuse is broken, the following is the possible causes.<br>2.1 Deterioration of the fuse.<br>2.2 Failure on the filter LF.<br>2.3 Failure on the DC12V power P1.<br>2.4 Failure on the DC24V power P2. |
| | Failure on the input signals. | 1. Measure the voltage between the wire # L5SA-LPG (RPG). | If there is no DC24V present, then the speed signal (less than 5km/h) wire may be cut/damaged. |
| | | 2. Measure the voltage between the wire # DFOB-LPG (RPG). | If there is DC24V present, then the door fully opened signal has failure. |
| | | 3.1 For the left side door ramp, measure the voltage between the wire # LDSA-LPG (RPG). | If these is no DC24V present, then the left side door selection signal may be cut/damaged. |
| | | 3.2 For the right side door ramp, measure the voltage between the wire# RDSA-LPG (RPG). | If these is no DC24V present, then the right side door selection signal may be cut/damaged. |
| | DC24V output inside the controller is not present. | 1. Check if the failure indicator inside controller is not showing "0".<br>2. Check if the FAL contact closes even with the AC220V input. | 1. If the breaker CP is down,<br>2. If the breaker CP is not down, change the DC24V power P2. |
| | Failure on the input relays. | 2. Check the operation of the input relays.<br>・ Input relay L5K LED is ON<br>・ Input relay DFO LED is OFF<br>・ Input relay LDS LED is ON (when the left side door is selected)<br>・ Input relay RDS LED is ON (when the right side door is selected) | 1. Replace the relays if they are not functioning correctly as described on the left. |
| | Failure on the DCU. | 1. Check if the FAL contact closes even when DC24V output is present. | Replace DCU. |

**CONTINUED ON PAGE 3-6**

| TABLE 3-3: CONTROLLER AND CONTROL PANEL TROUBLESHOOTING GUIDE | | | |
|---|---|---|---|
| **SYMPTOM** | **POSSIBLE CAUSE** | **TEST AND INSPECTION** | **DETERMINATIONS** |
| The ramp does not deploy when the DEPLOY button is pressed on the control panel. | Mechanical Failure. | 1. Debris in enclosure.<br>2. Inspect and verify that motor drive belt, ballscrew, bearings, rail block, gas spring or lifting/locking mechanism are not worn or damaged. | 1. Remove debris.<br>2. If components are damaged, contact a qualified service technician for repair. |
| | Failure on the motor. | 1. Measure the voltage between the motor terminals.<br>For the left side door ramp, measure the voltage between the wire# LRMI-LRMO.<br>For the right side door ramp, measure the voltage between the wire# RRMI-RRMO. | If voltage (DC12V) is present, replace the motor. |
| | DC12V output inside the controller is not present. | 1. Measure 220V input into DC12V power P1 inside the controller. | 1. If AC220V is not present:<br>1.1 Replace the magnetic switch MS.<br>2. If AC220V is present:<br>2.1 Replace DC12V power P1 |
| | Failure on the motor control relay. | 1. Measure the voltage between the motor terminals.<br>For the left side door ramp, measure the voltage between the wire# LRMI-LRMO.<br>For the right side door ramp, measure the voltage between the wire# RRMI-RRMO. | 1. If voltage (DC12V) is not present, the motor control relay has failed.<br>1.1 For the left side door ramp, replace the relay LMDP, LMST, and LMS.<br>1.2 For the right side door ramp, replace the relay RMDP, RMST, and RMS.<br>2. If the situation does not improve after replacing these relays, replace DCU. |
| | Failure on DCU. | Check if FAL contact is closed. | Replace DCU. |
| Buzzer on the control panel does not sound. | Failure on the buzzer. | 1. Measure the voltage on the buzzer.<br>For the left side door ramp, measure the voltage between the wire# LPBZ-LPG.<br>For the right side door ramp, measure the voltage between the wire# RPBZ-RPG. | 1. If voltage (DC24V) is present:<br>Replace the buzzer. |

**CONTINUED ON PAGE 3-7**

| TABLE 3-3: CONTROLLER AND CONTROL PANEL TROUBLESHOOTING GUIDE | | | |
|---|---|---|---|
| **SYMPTOM** | **POSSIBLE CAUSE** | **TEST AND INSPECTION** | **DETERMINATIONS** |
| Buzzer on the control panel does not sound. | The wire to the buzzer is cut/damaged. | 2. Measure the voltage on the controller.<br>For the left side door ramp, measure the voltage between the wire# LPBZ-LPG.<br>For the right side door ramp, measure the voltage between the wire# RPBZ-RPG. | 1. When voltage is not present at the control panel but voltage is present at the controller:<br>The wire that goes to the buzzer is cut/damaged.<br>2. When voltage is not present either at the control panel or the controller:<br>Replace DCU. |
| NOT FULLY STOWED light on the control panel does not turn on. | Failure on the NOT FULLY STOWED light on the control panel. | 1. Measure voltage at the NOT FULLY STOWED light of the control panel.<br>For the left side, measure the voltage between the wire# LPPL-LPG.<br>For the right side, measure the voltage between the wire# RPPL-RPG. | 1. If the voltage (DC24V) is measured, the PL2 of the control panel has failed. Replace the PL2. |
| | The wire to the NOT FULLY STOWED light is cut or damaged. | 2. Measure voltage at the controller.<br>For the left side, measure the voltage between the wire# LPPL-LPG.<br>For the right side, measure voltage between the wire# RPPL-RPG. | 1. When the voltage does not exist at the control panel but it exists at the controller, the wire that goes to NOT FULLY STOWED is cut.<br>2. When the voltage does not exist at the control panel and the controller both, DCU has failed. Replace the DCU. |
| The ramp stops while deploying. | An obstacle is in the pass of the ramp. | Ensure that no obstacles are in the path of the ramp. | Remove the obstacle. |
| | Mechanical Failure. | 1. Debris in enclosure.<br>2. Inspect and verify that motor drive belt, ballscrew, bearings, rail block, gas spring or lifting/locking mechanism are not worn or damaged. | 1. Remove debris.<br>2. If components are damaged, contact a qualified service technician for repair. |
| The ramp does not stow when the STOW button is pressed on the control panel | Mechanical Failure. | 1. Debris in enclosure.<br>2. Inspect and verify that motor drive belt, ballscrew, bearings, rail block, gas spring or lifting/locking mechanism are not worn or damaged. | 1. Remove debris.<br>2. If components are damaged, contact a qualified service technician for repair. |

**CONTINUED ON PAGE 3-8**

| TABLE 3-3: CONTROLLER AND CONTROL PANEL TROUBLESHOOTING GUIDE | | | |
|---|---|---|---|
| **SYMPTOM** | **POSSIBLE CAUSE** | **TEST AND INSPECTION** | **DETERMINATIONS** |
| The ramp does not stow when the STOW button is pressed on the control panel | Failure on the motor. | 1. Measure voltage between the motor terminals<br>For the left side, measure voltage between the wire# LRMI-LRMO.<br>For the right side, measure voltage between the wire# RRMI-RRMO. | When the voltage (DC12V) exists, the motor has failed. Replace the motor. |
| | DC12V output inside the controller is not present. | 1. Measure AC220V input at the DC12V power source P1 of the controller. | 1. When AC220V does not exist<br>1.1 Replace the magnetic contactor MS<br>2. When AC220V exists<br>2.1 Replace the DC12V power source P1 |
| | Failure on the motor control relay. | 1. Measure voltage between the motor terminals.<br>For the left side, measure voltage between the wire# LRMI-LRMO.<br>For the right side, measure voltage between the wire# RRMI-RRMO. | 1. When the voltage (DC12V) does not exist, the motor control relay has failed.<br>1.1 For the left side, replace the relay LMDP, LMST and LMS<br>1.2 For the right side, replace the relay RMDP, RMST and RMS<br>2. When the situation does not improve after replacing the above mentioned relays, replace DCU. |
| | Failure on DCU. | Check if FAL contact is closed. | Replace DCU. |
| The ramp stops while stowing. | An obstacle is in the pass of the ramp. | Ensure that no obstacles are on the path of the ramp. | Remove the obstacles. |
| | Mechanical Failure. | 1. Debris in enclosure.<br>2. Inspect and verify that motor drive belt, ballscrew, bearings, rail block, gas spring or lifting/locking mechanism are not worn or damaged. | 1. Remove debris.<br>2. If components are damaged, contact a qualified service technician for repair. |
| FULLY STOW SIGNAL-1 does not become "fully stowed" when the ramp is actually stowed completely. | Mechanical Failure. | 1. Debris in enclosure.<br>2. Inspect and verify that proximity sensor is working properly.<br>2.1 Place a tool in the gap between the proximity sensor and target. LED should light.<br>2.2 Ensure that gap between the sensor and the detector is within 3.81mm MAX 1.52mm MIN. | 1. Remove debris.<br>2. If LED lights after inspection then adjust gap between sensor and detector.<br>2.1 If components are damaged, contact a qualified service technician for repair. |

**CONTINUED ON PAGE 3-9**

| TABLE 3-3: CONTROLLER AND CONTROL PANEL TROUBLESHOOTING GUIDE | | | |
|---|---|---|---|
| **SYMPTOM** | **POSSIBLE CAUSE** | **TEST AND INSPECTION** | **DETERMINATIONS** |
| FULLY STOW SIGNAL-1 does not become "fully stowed" when the ramp is actually stowed completely. | Failure on the output relays LST1/RST1. | 1. Measure voltage at the sensor.<br>For the left side: DC24V does not exist between LRSS1-LRG1.<br>Between LST1-LST1A is OPEN.<br>For the right side: DC24V does not exist between RRSS1-RRG1.<br>Between RST1-RST1A is OPEN. | 1. Replace the output relay LST1/RST1. |
| | Failure on the FULLY STOW SIGNAL SWITCH LS1 inside the controller. | 1. Measure voltage at the sensor.<br>For the left side: DC24V exists between LRSS1-LRG1.<br>For the right side: DC24V exists between RRSS1-RRG1. | 1. Replace the FULLY STOW SIGNAL SWITCH LS1. |
| | Failure on DCU. | FAL contact is closed. | Replace DCU. |
| FULLY STOW SIGNAL-2 does not become "fully stowed" when the ramp is actually stowed completely. | Mechanical Failure. | 1. Debris in enclosure.<br>2. Inspect and verify that limit switch is working properly.<br>2.1 Apply pressure to the limit switch sensor. Listen for click.<br>2.2 Ensure that sensor target is properly aligned with sensor. | 1. Remove debris.<br>2. If sensor does not make contact with target, adjust sensor forward or backward.<br>2.1 If components are damaged, contact a qualified service technician for repair. |
| | Failure on the output relay RST2/LST2. | 1. Measure voltage at the sensor<br>For the left side: Between LST2-LST2A is OPEN.<br>For the right side: Between RST2-RST2A is OPEN. | 1 Replace the output relay LST2/RST2.<br>2. When the situation does not improve after replacing the above mentioned relays, replace the FULLY STOW SIGNAL SWITCH LS2. |
| | Failure on DCU. | FAL contact is closed. | Replace DCU. |
| FULLY STOW SIGNAL-1 becomes "fully stowed" when the ramp is actually not stowed completely. | Mechanical Failure. | 1. Debris in enclosure.<br>2. Inspect and verify that proximity sensor is working properly.<br>2.1 Place a tool in the gap between the proximity sensor and target. LED should light.<br>2.2 Ensure that gap between the sensor and the detector is within 3.81mm MAX 1.52mm MIN. | 1. Remove debris.<br>2. If LED lights after inspection then adjust gap between sensor and detector.<br>2.1 If components are damaged, contact a qualified service technician for repair. |

**CONTINUED ON PAGE 3-10**

| TABLE 3-3: CONTROLLER AND CONTROL PANEL TROUBLESHOOTING GUIDE | | | |
|---|---|---|---|
| **SYMPTOM** | **POSSIBLE CAUSE** | **TEST AND INSPECTION** | **DETERMINATIONS** |
| FULLY STOW SIGNAL-1 becomes "fully stowed" when the ramp is actually not stowed completely. | Failure on the output relay LST1/RST1. | 1. Measure voltage at the sensor<br>For the left side: DC24V does not exist between LRSS1-LRG1.<br>For the right side: DC24V does not exist between RRSS1-RRG1. | 1. Replace the FULLY STOW SIGNAL SWITCH LS1. |
| FULLY STOW SIGNAL-2 becomes "fully stowed" when the ramp is actually not stowed completely. | Mechanical Failure. | 1. Debris in enclosure.<br>2. Inspect and verify that limit switch is working properly.<br>2.1 Apply pressure to the limit switch sensor. Listen for click.<br>2.2 Ensure that sensor target is properly aligned with sensor. | 1. Remove debris.<br>2. If sensor does not make contact with target, adjust sensor forward or backward.<br>2.1 If components are damaged, contact a qualified service technician for repair. |
| | Failure on the output relay RST2/LST2. | 1. Measure voltage at the sensor.<br>For the left side: Between LST2-LST2A is CLOSED.<br>For the right side: Between RST2-RST2A is CLOSED. | 1 Replace the output relay LST2/RST2.<br>2. When the situation does not improve after replacing the above mentioned relays, replace the FULLY STOW SIGNAL SWITCH LS2. |
| | Failure on DCU. | FAL contact is closed. | Replace DCU. |
| **END OF TABLE** | | | |

## C. FAILURE CONDITION INDICATIONS

The following failure codes 1 through 8 will be shown on the indicator DP inside the ramp controller.

The following table shows the conditions when the failure contact (FAL) closes.

Failure contact (FAL) resets itself when the power AC220V 50Hz shuts down.

When a problem exists, contact an authorized Ricon service technician for repair.

**TABLE 3-5: FAILURE CONDITIONS**

| FAILURE CODE | PROBLEM | CAUSE |
|---|---|---|
| **1** | Left door side ramp, Deployment Failure. | When DEPLOY switch is continuously pressed and the stow sensor does not sense the “not fully stowed” within two seconds. |
| **2** | Left door side ramp, Stow Failure. | When STOW switch is continuously pressed and the stow sensor does not sense the “fully stowed” within 10 seconds. |
| **3** | Right door side ramp, Deployment Failure. | When DEPLOY switch is continuously pressed and the stow sensor does not sense the “not fully stowed” within two seconds. |
| **4** | Right door side ramp, Stow Failure. | When STOW switch is continuously pressed and the stow sensor does not sense the “fully stowed” within 10 seconds. |
| **5** | Left door side ramp, Deployment Time Over. | When the ramp deployment time exceeds 10 seconds, the power to the motor shuts down. |
| **6** | Right door side ramp, Deployment Time Over. | When the ramp deployment time exceeds 10 seconds, the power to the ramp motor shuts down. |
| **7** | Magnetic switch failure. | A part failed. |
| **8** | DC12V power failure. | A part failed. |
| **9** | DCU inside the controller failure. | A part failed. |
| **10** | DC24V power failure. | A part failed. |

**END OF TABLE**

## D. RAMP CONTROL ADJUSTMENTS

### 1. DEPLOYMENT/STOW SPEED

**Refer to Figure 3-5**. Two voltage sensors (cream colored boxes that have two control knobs) are located near the center of the ramp controller. The speed of the ramp deployment can be adjusted by turning the knobs that are located on the top surface of these voltage sensors.

**⚠ CAUTION!**

- Do not touch the voltage sensors on the ramp controller when there is no problem with ramp movement.
- After operating the ramp for five continuous cycles, allow it to rest for one or two minutes before using it again.

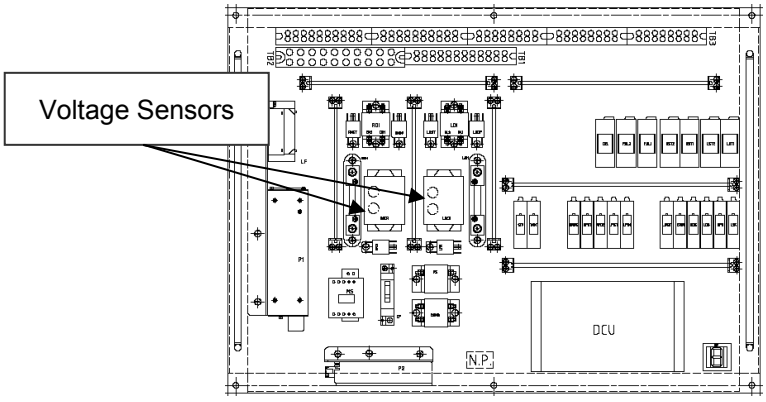


**FIGURE 3-3: RAMP CONTROLLER**

a. Verification points when adjusting the deployment speed:

1) Verify that the ramp deploys and stows smoothly.

2) If ramp does not deploy or stow smoothly, adjust the deployment speed of the ramp as necessary.

| ⚠ CAUTION! |
|---|
| If the deployment speed is adjusted to a lower level when the ambient temperature is high, the ramp may not deploy properly when the ambient temperature goes down. |

b. Refer to **Figure 3-4**. When the deployment speed is too slow (ramp movement is not smooth) adjust deployment speed:

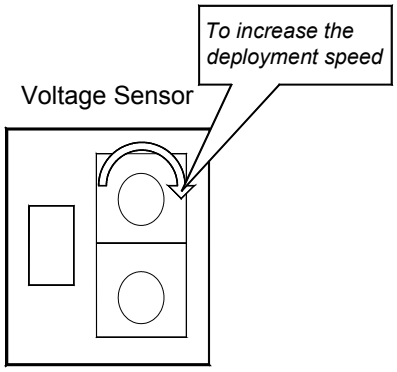


**FIGURE 3-4: INCREASING DEPLOYMENT SPEED**

1) Turn the speed dial one notch clockwise and check the movement of the ramp.

2) Repeat until the ramp moves smoothly.

c. Refer to **Figure 3-5**. When the deployment speed is too fast, adjust deployment speed:

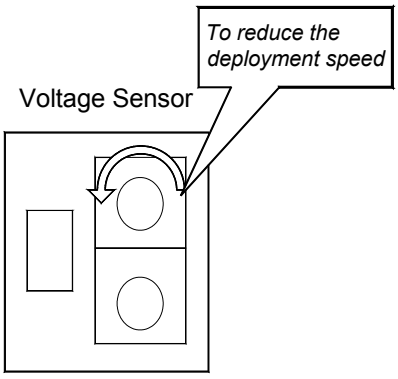


**FIGURE 3-5: REDUCING DEPLOYMENT SPEED**

1) Turn the speed dial one notch counterclockwise and check the movement of the ramp.

## E. REPAIRS

### 1. MAINTENANCE PARTS LIST

| TABLE 3-6: MAINTENANCE PARTS LIST | | |
|---|---|---|
| **NAME** | **QUANTITY** | **MAXIMUM USAGE** |
| Grease | N/A | 1 year |
| Gas Spring | 2 | 4 years |
| Bumper Stop | 2 | 4 years |
| Flutter Valve | 1 | 4 years |
| Timing Belt | 1 | 8 years |
| Rollers (inside diameter 8.5mm) | 4 | 8 years |
| Roller (Alignment Plate) | 1 | 8 years |
| Cam Followers (inside diameter 26mm) | 6 | 8 years |
| Rail Block | 1 | 8 years |
| Proximity Sensor | 1 | 8 years |
| Limit Switch | 1 | 8 years |
| Power Source P1 | 1 | 8 years |
| Power Source P2 | 1 | 8 years |
| Relay<br>L5K, DFO, LDS, RDS, EXIR, LRSS1, RRLL1, LPDE, LMST, RPDE, RMST, WDT | 12 | 8 years |
| Relay 12V | 1 | 8 years |
| Relay<br>LST1, LST2, RST1, RST2, FAL1 | 5 | 8 years |
| Relay FAL2 | 1 | 8 years |
| Relay<br>LMS, RMS, LMST, LMDP, RMST, RMDP | 6 | 8 years |
| Magnet Switch | 1 | 8 years |
| Motor | 1 | 12 years |
| Harness and Connectors | 1 | 12 years |
| **END OF TABLE** | | |

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# IV. REPAIR

This chapter contains descriptions and repair procedures for major systems of the RICON PF7000 Express Ramp. Perform the procedures carefully and in the order they are presented; do not eliminate any steps or modify the product.

## A. GENERAL SAFETY PRECAUTIONS AND WARNING

**⚠ WARNING!**

THIS RICON PRODUCT IS HIGHLY SPECIALIZED. MAINTENANCE AND REPAIRS MUST BE PERFORMED ONLY BY AN AUTHORIZED RICON SERVICE TECHNICIAN USING ONLY RICON REPLACEMENT PARTS. MODIFYING OR FAILING TO PROPERLY MAINTAIN THIS PRODUCT WILL VOID THE WARRANTY AND MAY RESULT IN UNSAFE OPERATING CONDITIONS.

The following general safety precautions must be followed during service and maintenance:

- Under no circumstances should installation, maintenance, repair, or adjustments be attempted without the immediate presence of a person capable of rendering aid.
- An injury, no matter how slight, should be attended to. Administer first aid or seek medical attention immediately.
- Protective eyeshields and appropriate clothing should be worn at all times.
- Exercise caution when operating ramp, and be certain that hands, feet, legs, and clothing are not in the path of the moving ramp.
- Batteries contain acid that can burn. If acid comes in contact with skin, immediately flush affected area with water and wash with soap.
- Work in a properly ventilated area. Do not smoke or use an open flame near battery.
- Do not lay anything metallic on top of battery.
- Check under vehicle before drilling to avoid damage to frame, subframe members, wiring, hydraulic lines, fuel lines, fuel tank, etc.
- Read and thoroughly understand the operating instructions (refer to PF7000 Series Operator Manual) before attempting to operate ramp.
- Keep others clear during ramp operation.

## B. RAMP SERVICE ACCESS

Access to internal components of ramp for service is from top side of unit. The motor access cover is located at rear of enclosure, underneath cover strips. Remove retaining screws (20) along right, left, middle, and rear cover strips then remove sub floor panel to gain access to internal components and motor.

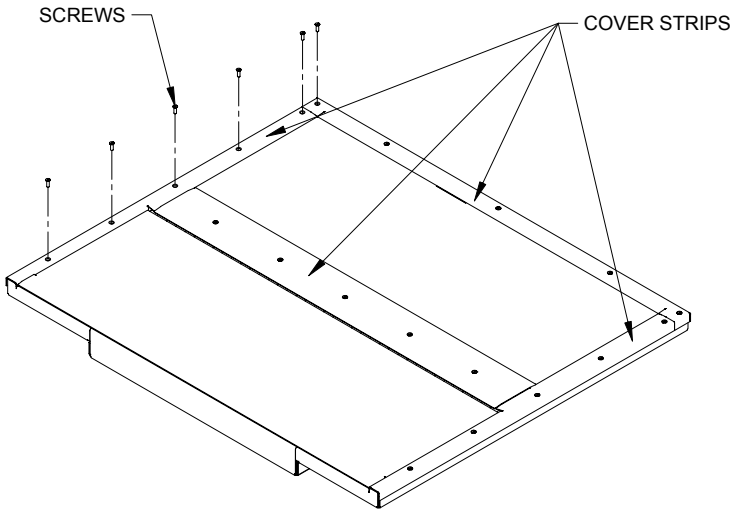



**FIGURE 4-1: COVER STRIPS**

## C. COMPONENT DESCRIPTIONS

Refer to **Figure 4-2**. The PF7000 Series Express Ramp drive system is composed of the drive system motor assembly, ballscrew assembly and traveling frame assembly. The drive system motor rotates the large pulley by pulling the timing belt, which in turn rotates the ballscrew assembly and moves the traveling frame assembly when stowed or deployed.

The traveling frame assembly consists of the alignment plate assembly, carriage assembly and ramp assembly. Lateral location of the ramp is fixed by the alignment plate cam followers which ride on an alignment rail while a ballnut retainer aligns the ballscrew assembly with the traveling frame assembly. Horizontal alignment of the ramp is fixed by a rail block which is attached to the alignment plate and glides along the alignment rail. The carriage assembly utilizes cam followers which ride on the inside of the enclosure, controls the angle of the ramp assembly and activates the lifting mechanism assembly when the ramp is stowed or deployed. Bumper stops, located inside of the ramp enclosure, stop the traveling frame assembly when the ramp is fully deployed.

The lifting mechanism assembly is controlled by the lateral movement of the traveling frame assembly when the ramp is fully deployed and is a locking mechanism when the ramp is fully stowed. Pins on each side of the ramp assembly, engage the lifting mechanism assembly which in turn disengages the hinged floor when the ramp is deployed and securely locks the ramp when it is completely stowed. Gas springs connected to the lifting mechanism retract the lifting mechanism assembly to its original position when the ramp is stowed.

A manual operation tool, located under the hinged floor, is used to manually stow or deploy the ramp. When the ramp is completely stowed, the manual operation tool is accessed by manually rotating the drive system motor to move the traveling frame assembly down the ballscrew and disengage the hinged floor from the lifting mechanism assembly. With the hinged floor propped open, lifting the ramp assembly will allow access and insertion of the manual operation tool to the end of the ballscrew through the manual deployment hole for manual operation.

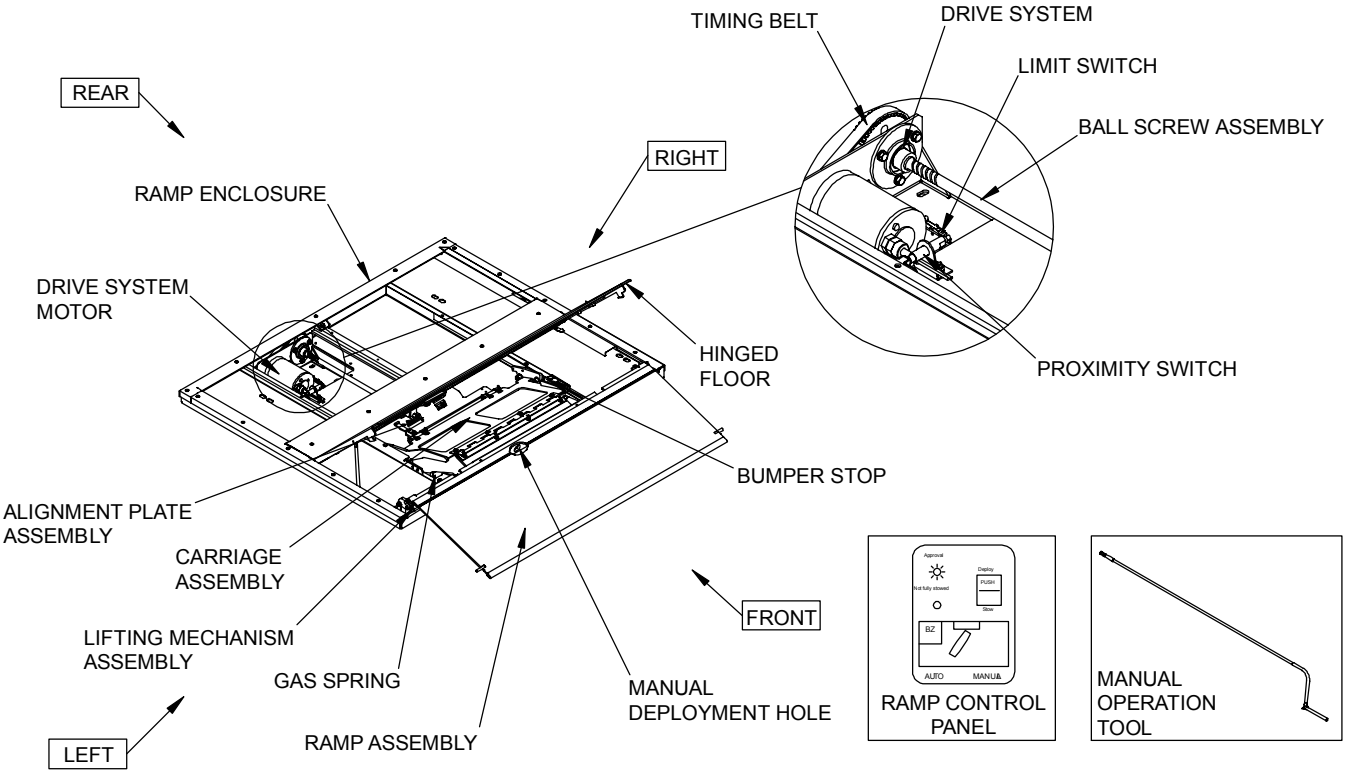



**FIGURE 4-2: COMPONENT DESCRIPTIONS**

## D. ENCLOSURE COMPONENTS

### 1. BUMPER STOP REMOVAL

a. Refer to **Figure 4-3**. Deploy ramp approximately 7.6cm in order to disengage ramp floor from the locking mechanism.

**NOTE:** Ramp floor must disengage from locking mechanism before hinged floor can open.

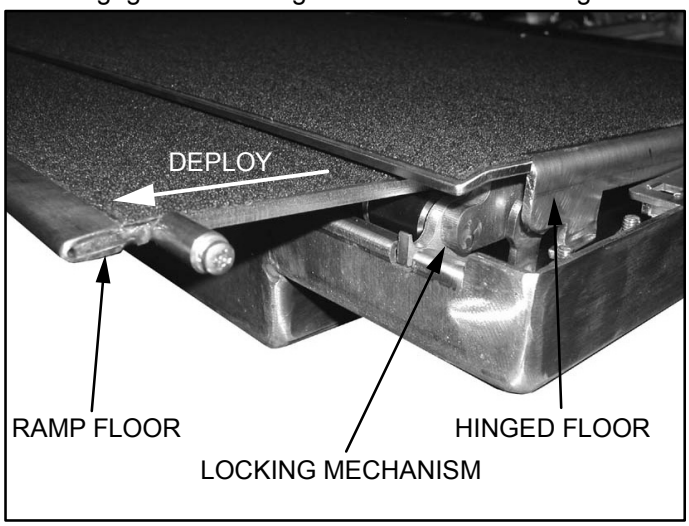



**Figure 4-3: DISENGAGE RAMP FLOOR**

b. Disconnect electrical power from ramp.
c. Lift hinged door to gain access to front enclosure.
d. Refer to **Figure 4-4**. Remove and retain two bolts, two washers and two nuts from bumper stop bracket then detach bumper stop.

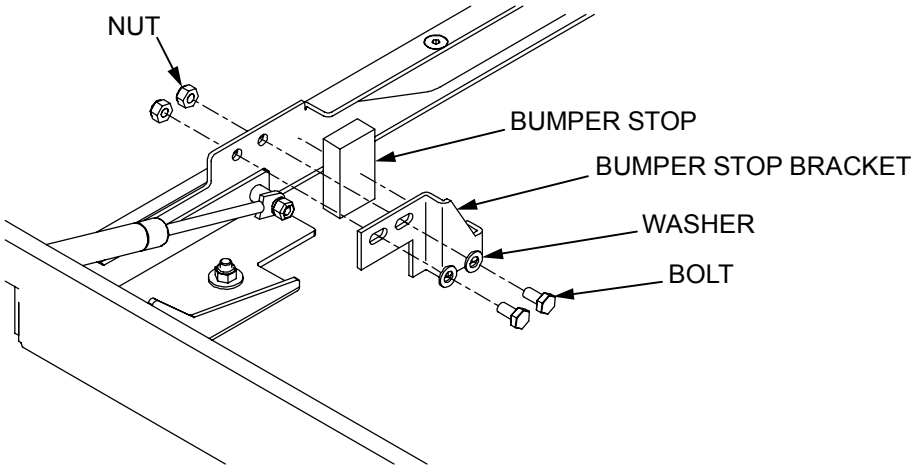



**FIGURE 4-4: BUMPER STOP REMOVAL**

e. Repeat bumper stop removal for opposite side.

### 2. BUMPER STOP INSTALLATION

**NOTE:** All removed bolts should have Loctite applied before reinstallation.

a. Refer to **Figure 4-3**. Deploy ramp approximately 7.6cm in order to disengage hinged floor from the locking mechanism.
b. Disconnect electrical power from ramp.
c. Lift hinged door to gain access to front enclosure.
d. Attach bumper stop to bumper stop bracket.
e. Install two bolts, two washers and two nuts then tighten.
f. Repeat bumper stop installation for opposite side.
g. Reconnect electrical power to ramp

### 3. FLUTTER VALVE (DRAIN) REMOVAL

a. Disconnect electrical power from ramp.

b. Gain access to underside of ramp.
c. Refer to **Figure 4-5**. Remove hose clamp.
d. Remove flutter valve.

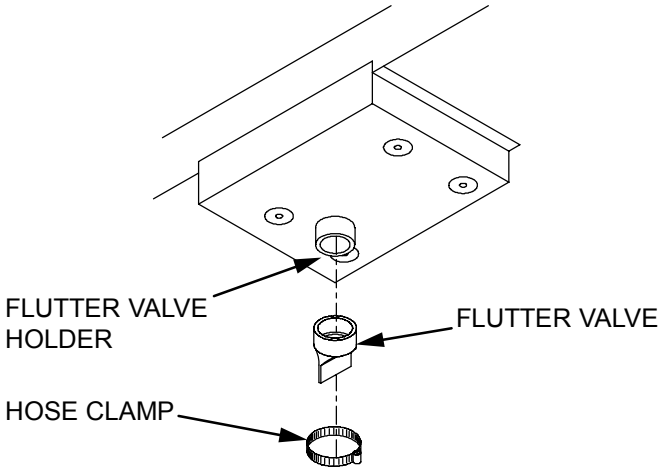



**FIGURE 4-6: FLUTTER VALVE**

**4. FLUTTER VALVE (DRAIN) INSTALLATION**

a. Install flutter valve holder over flange on underside of ramp enclosure.
b. Slide flutter valve onto holder.
c. Place hose clamp over flutter valve and tighten to secure valve in place.
d. Reconnect electrical power to ramp.

**5. GAS SPRING REMOVAL**

a. Refer to **Figure 4-3**. Deploy ramp approximately 7.6cm in order to disengage hinged floor from the locking mechanism.
b. Disconnect electrical power from ramp.
c. Refer to **Figure 4-6**. Lift ramp floor to gain access to front enclosure.

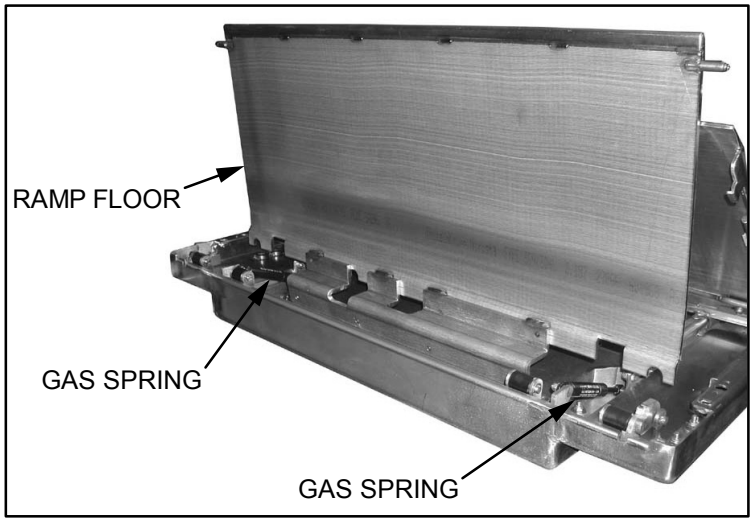



**FIGURE 4-6: FRONT ENCLOSURE ACCESS**

d. **Refer to Figure 4-7**. Remove and retain nut and washer that attach the gas spring to lifting mechanism bracket.

| ⚠ CAUTION |
| --- |
| The gas spring is highly pressurized and may cause injury or damage to lift if removed improperly. Use extreme caution when detaching gas spring. |

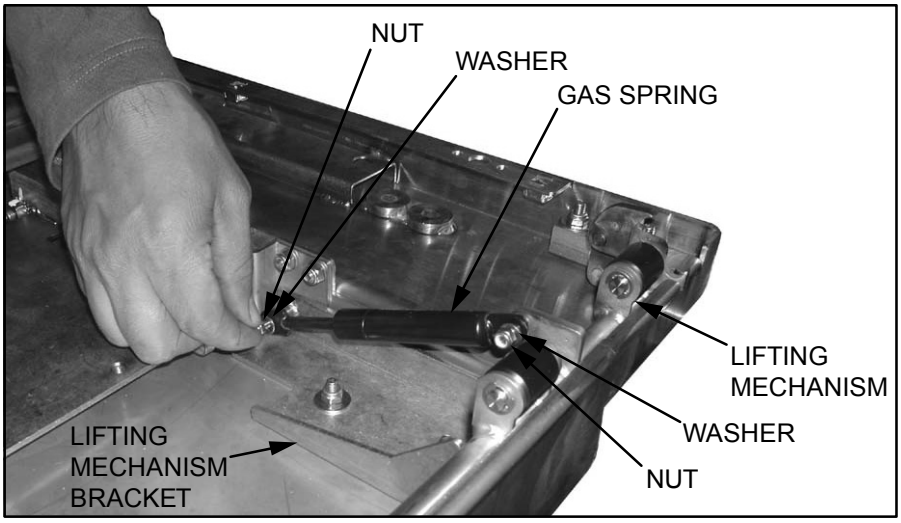



**FIGURE 4-7: GAS SPRING REMOVAL**

e. **Refer to Figure 4-7**. Remove and retain nut and washer that attach the gas spring to lifting mechanism.

## 6. GAS SPRING INSTALLATION

**NOTE:** All removed bolts should have Loctite applied before reinstallation.

a. Refer to **Figure 4-3**. Deploy ramp approximately 7.6cm in order to disengage hinged floor from the locking mechanism.
b. Disconnect electrical power from ramp.
c. Refer to **Figure 4-6**. Lift ramp floor to gain access to front enclosure.
d. Refer to **Figure 4-8**. Attach gas spring to lifting mechanism bracket then use a tool for leverage to attach the gas spring to the lifting mechanism.

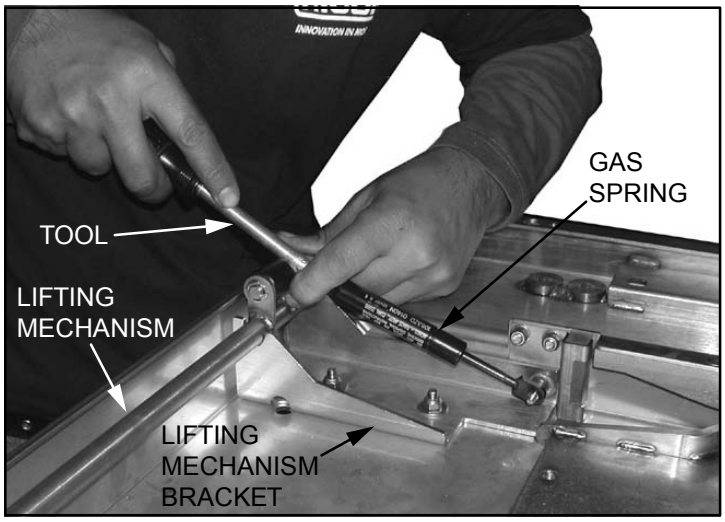



**FIGURE 4-8: GAS SPRING INSTALLATION**

e. Install washer and nut to the lifting mechanism bracket and tighten.
f. Install washer and nut to the lifting mechanism and tighten.
g. Reconnect electrical power to ramp.

## 7. LIFTING MECHANISM REMOVAL

a. Refer to **Figure 4-3**. Deploy ramp approximately 7.6cm in order to disengage hinged floor from the locking mechanism.
b. Disconnect electrical power from ramp.
c. Refer to **Figure 4-6**. Lift ramp floor to gain access to front enclosure.
d. Refer to **Figure 4-9**. Remove two nuts and two washers then remove lifting mechanism base block from welded stud.
e. Repeat step d for opposite side.
f. Lift and remove lifting mechanism from enclosure.

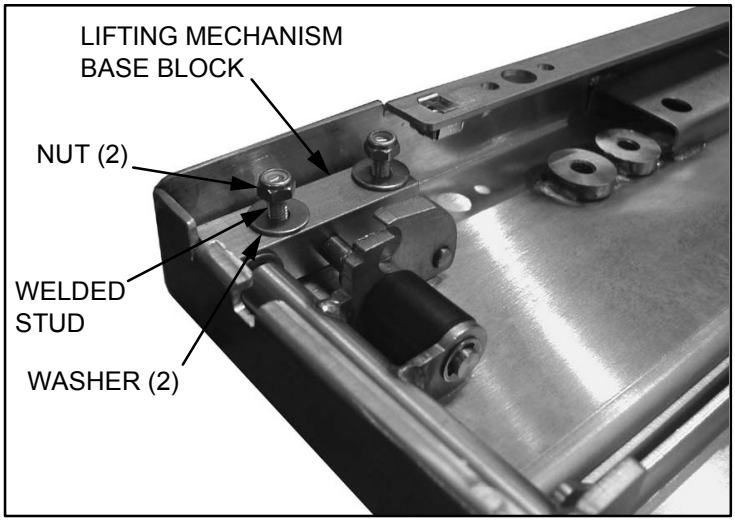



**FIGURE 4-9: LIFTING MECHANISM REMOVAL**

## 8. LIFTING MECHANISM INSTALLATION

**NOTE:** All removed bolts should have Loctite applied before reinstallation.

a. Refer to **Figure 4-3**. Deploy ramp approximately 7.6cm in order to disengage hinged floor from the locking mechanism.
b. Disconnect electrical power from ramp.
c. Refer to **Figure 4-6**. Lift ramp floor to gain access to front enclosure.
d. Refer to **Figure 4-10**. Guide and align lifting mechanism base blocks onto two welded studs, located on right and left sides of front enclosure.

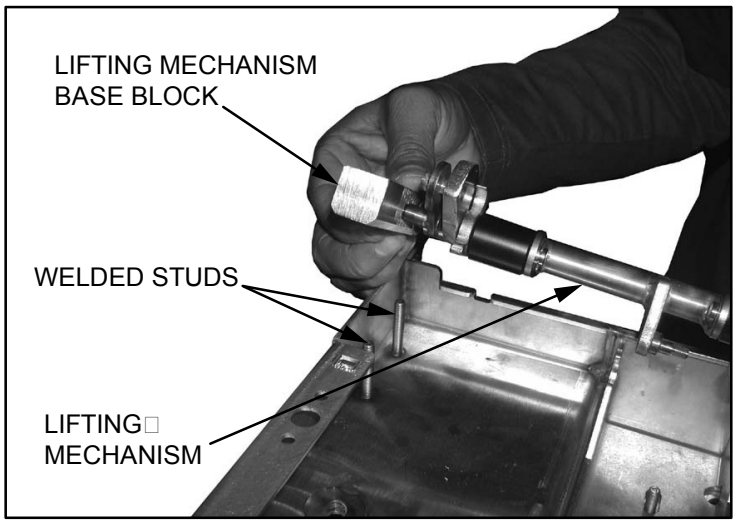



**FIGURE 4-10: LIFTING MECHANISM INSTALLATION**

e. Align lifting mechanism and ensure that lifting mechanism is functional before installing hardware.

**NOTE:** If lifting mechanism is not aligned and working properly, ramp and lifting mechanism will not function correctly.

f. Install two washers and two nuts onto welded studs and tighten.
g. Repeat step f for opposite side of lifting mechanism.
h. Ensure lifting mechanism assembly functions properly
i. Reconnect electrical power to ramp.

## 9. LIFTING MECHANISM ROLLER REMOVAL

a. Refer to **Figure 4-3**. Deploy ramp approximately 7.6cm in order to disengage hinged floor from the locking mechanism.
b. Disconnect electrical power from ramp.
c. Refer to **Figure 4-6**. Lift ramp floor to gain access to front enclosure.
d. Refer to **Section 9**, Lifting mechanism removal to remove lifting mechanism.
e. Refer to **Figure 4-11**. Remove and retain E type retaining ring from floor support weldment.
f. Remove and retain lifting mechanism base block, lifting mechanism link, floor support weldment and spacer to detach outer lifting mechanism roller.

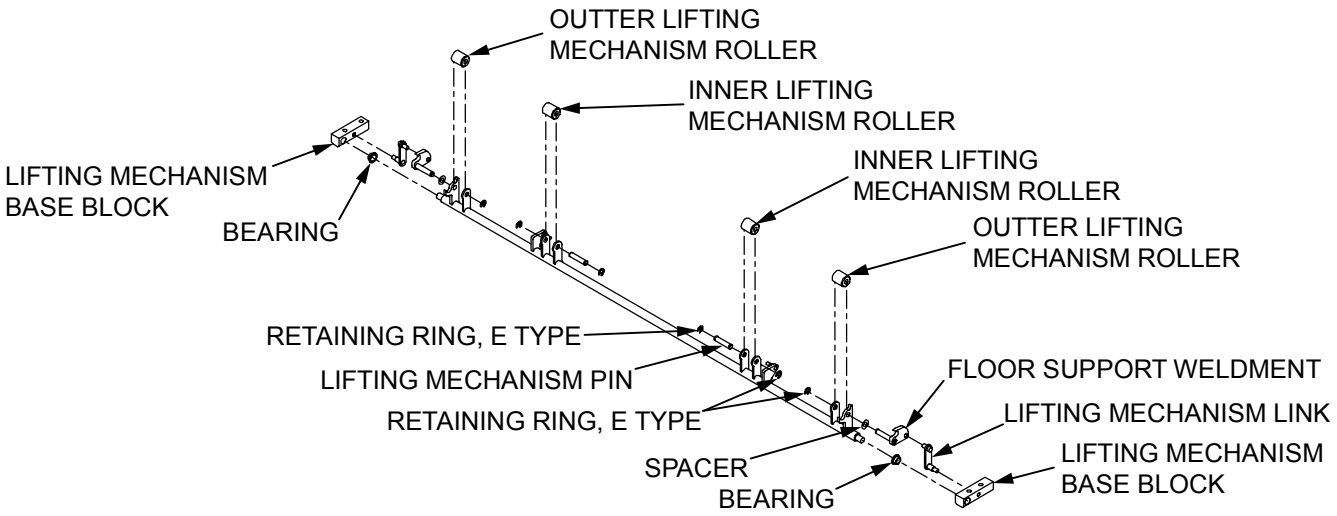



**FIGURE 4-11: LIFTING MECHANISM ROLLER**

g. Remove and retain two E type retaining rings from lifting mechanism pin to detach inner lifting mechanism roller.

**10. LIFTING MECHANISM ROLLER INSTALLATION**

**NOTE:** All removed bolts should have Loctite applied before reinstallation.

a. Refer to **Figure 4-3**. Deploy ramp approximately 7.6cm in order to disengage hinged floor from the locking mechanism.
b. Disconnect electrical power from ramp.
c. Refer to **Figure 4-6**. Lift ramp floor to gain access to front enclosure.
d. Assemble bearing, lifting mechanism link, floor support weldment and spacer to lifting mechanism block.
e. Slide floor support weldment through lifting mechanism slot and outer lifting mechanism roller then attach E type retaining ring.
f. Slide lifting mechanism pin through lifting mechanism slot and inner lifting mechanism roller then attach two E type retaining rings to each end of pin.
g. Repeat steps e and f as required for each lifting mechanism roller.
h. Refer to **Section 8**, Lifting mechanism installation to install lifting mechanism assembly to enclosure.

**11. PROXIMITY SENSOR REMOVAL**

a. Disconnect electrical power from ramp.
b. Remove cover strips to gain access to sub floor panel located on the rear side of the enclosure.
c. Remove sub floor panel to gain access to enclosure components.
d. Locate proximity sensor near the drive motor.
e. Refer to **Figure 4-12.** Remove and retain two 279mm hex nuts that attach the proximity sensor to the proximity sensor bracket.
f. Remove proximity sensor.

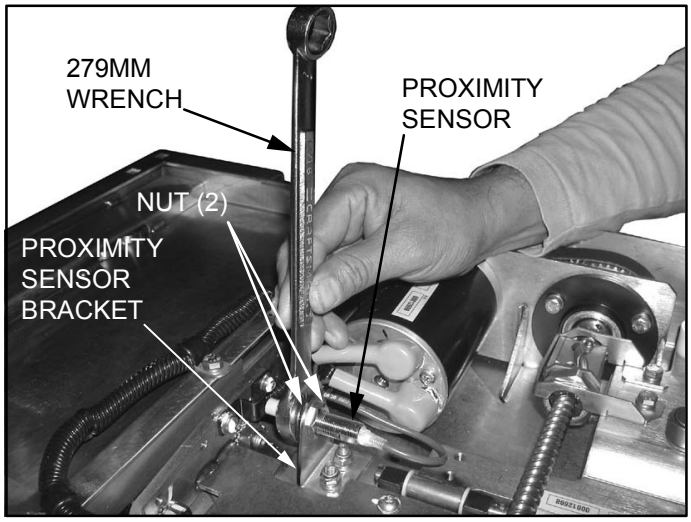



**FIGURE 4-12: PROXIMITY SENSOR**

### 12. PROXIMITY SENSOR INSTALLATION

**NOTE:** All removed bolts should have Loctite applied before reinstallation.

a. Disconnect electrical power from ramp.
b. Remove cover strips to gain access to sub floor panel located on the rear side of the enclosure.
c. Remove sub floor panel to gain access to enclosure components.
d. Refer to **Figure 4-12**. Slide the proximity sensor in through proximity sensor bracket.
e. Refer to **Figure 4-13**. Adjust and allow a maximum gap of 3.81mm to a minimum gap of 1.52mm in between the proximity sensor and proximity sensor bracket.

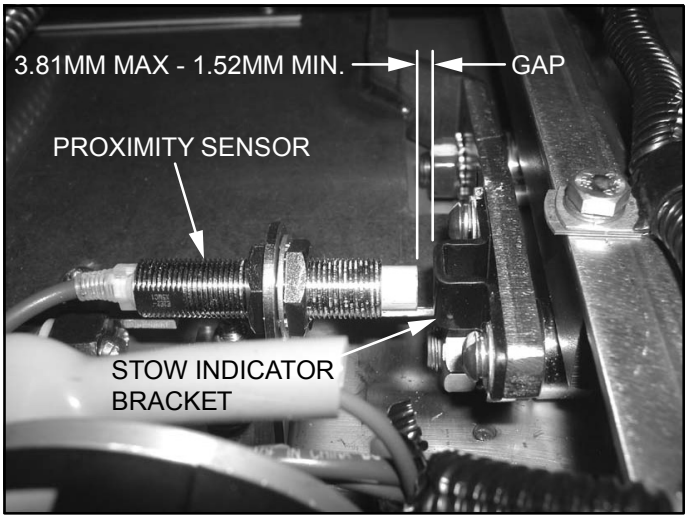



**FIGURE 4-13: PROXIMITY SENSOR GAP**

f. Install two 279mm hex nuts that attach the proximity sensor to the proximity sensor bracket.
g. Reconnect electrical power to ramp.

## E. DRIVE SYSTEM

### 1. MOTOR DRIVE ASSEMBLY REMOVAL

a. Remove twenty screws fastening left, right, rear and middle cover strips to enclosure.
b. Lift out rear subfloor panel.
c. Fully deploy ramp.
d. Disconnect electrical power from ramp.
e. Refer to **Figure 4-14**. Remove and retain four bolts and four washers that attach motor drive bracket to enclosure.

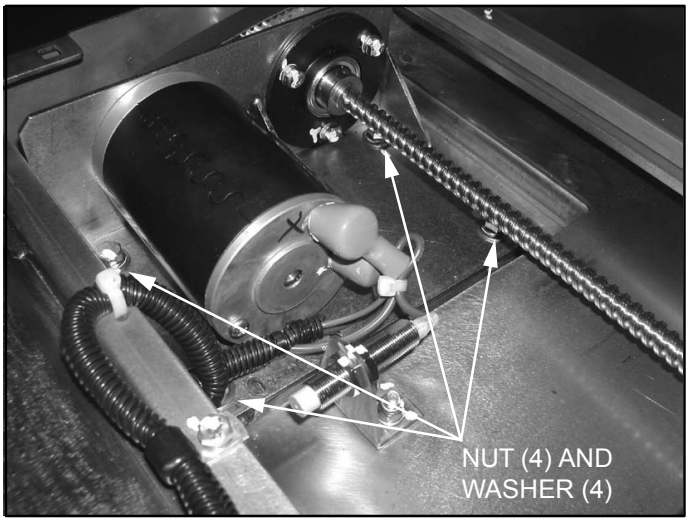



**FIGURE 4-14: MOTOR DRIVE HARDWARE**

f. Refer to **Figure 4-15**. Remove and retain two screws that attach the ballscrew bracket to the enclosure support beam.

**⚠ CAUTION!**

The ball screw is a precision assembly. Avoid damaging the screw surface; this may cause vibration during ramp operation.

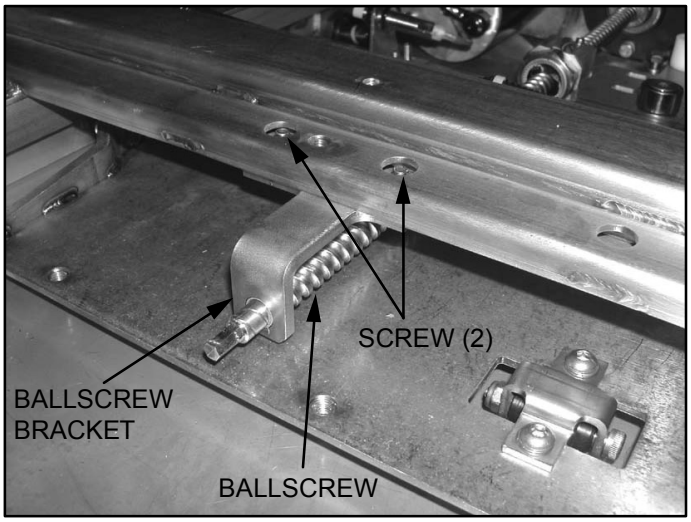



**FIGURE 4-15: BALLSCREW BRACKET**

g. Refer to **Figure 4-16**. Remove and retain two bolts and two washers that attach the ballnut retainer to the traveling frame alignment plate.

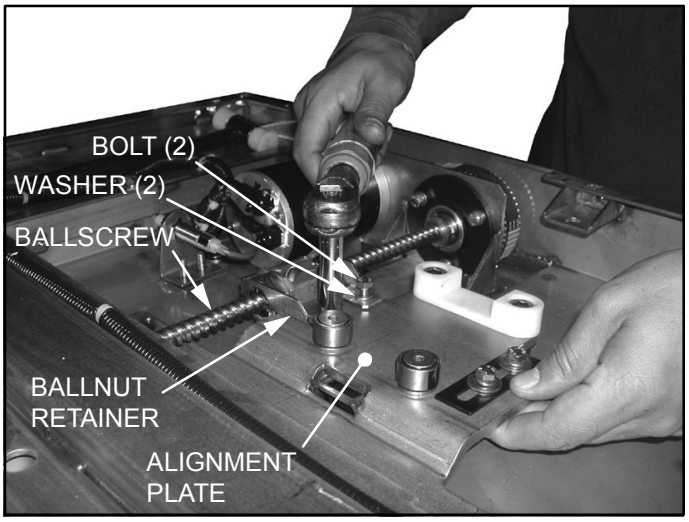



**FIGURE 4-16: BALLNUT RETAINER**

h. Refer to **Section D-11**. Proximity sensor removal.
i. Detach proximity sensor.
j. Remove two nuts and two washers to detach harness from motor drive.
k. Rotate and lift out motor drive assembly.

### 2. MOTOR DRIVE ASSEMBLY INSTALLATION

**NOTE:** All removed bolts should have Loctite applied before reinstallation.

a. Disconnect electrical power from ramp.
b. Rotate and lower drive motor assembly into enclosure.
c. Insert four bolts into motor bracket. Do not completely tighten.
d. Refer to **Figure 4-15**. Install two screws that attach the ballscrew bracket to the enclosure support beam.
e. Refer to **Figure 4-16**. Install two bolts and two washers that attach the ballnut retainer to the traveling frame alignment plate. Do not completely tighten.
f. Refer to **Figure 4-17**. Stow ramp manually by turning large pulley. This will re-align ball screw.
g. Verify the ball screw is in alignment with the traveling frame alignment plate.

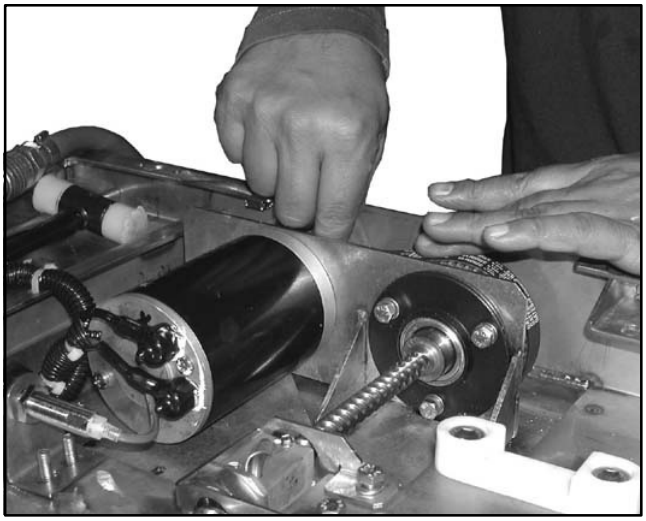


**FIGURE 4-17: MOTOR DRIVE PULLEY**

h. Tighten four bolts on motor drive bracket.
i. Tighten two bolts on ballnut retainer.
j. Refer to **Section D-12**. Proximity sensor installation
k. Install proximity sensor.
l. Install two nuts and two washers to attach harness to motor drive.
m. Install sub floor panel.
n. Install and tighten the twenty screws that fasten the left, right, rear and middle cover strips to enclosure.
o. Reconnect electrical power to ramp.

**3. MOTOR DRIVE BELT REMOVAL**

a. Remove twenty screws fastening left, right, rear and middle cover strips to enclosure.
b. Lift out rear subfloor panel.
c. Fully deploy ramp.
d. Disconnect electrical power from ramp.
e. Refer to **Figure 4-14**. Remove and retain four bolts and four washers that attach motor drive bracket to enclosure.
f. Refer to **Figure 4-15**. Remove and retain two screws that attach the ballscrew bracket to the enclosure support beam.
g. Refer to **Figure 4-16**. Remove and retain two bolts and two washers that attach the ballnut retainer to the travelling frame alignment plate.
h. Lift motor drive assembly to gain access to motor drive pulley.
i. Refer to **Figure 4-18**. Remove and retain nut and washer that attach the motor drive pulley to the motor drive.

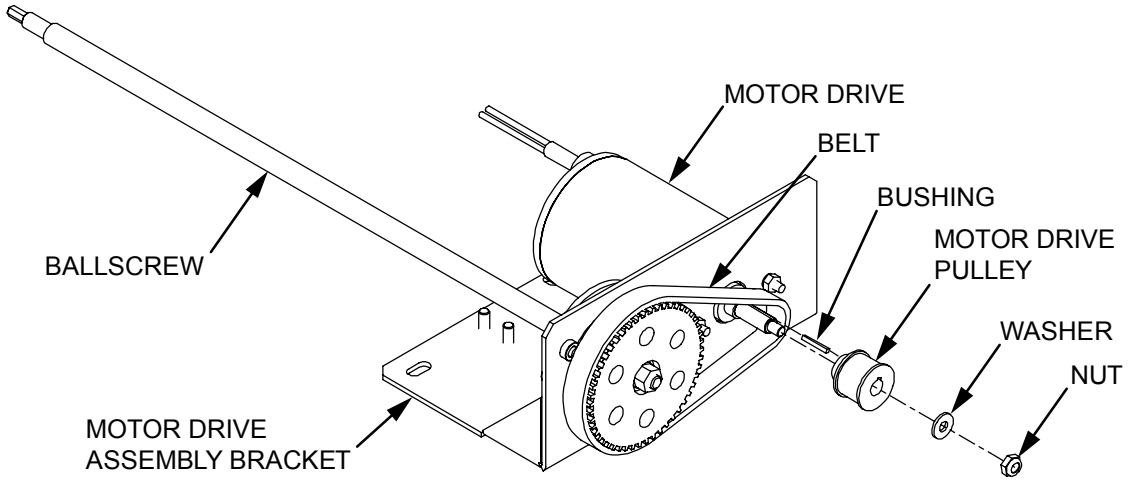



**FIGURE 4-18: MOTOR DRIVE ASSEMBLY**

j. Refer to **Figure 4-17**. Slip belt off large and small pulleys while turning both manually.

k. Slide motor drive pulley off of motor drive to remove belt.
l. Slip belt between motor drive assembly and enclosure for removal.

**4. MOTOR DRIVE BELT INSTALLATION**

**NOTE:** All removed bolts should have Loctite applied before reinstallation.

a. Disconnect electrical power from ramp.
b. Slip drive belt between motor drive assembly and enclosure.
c. Slide motor drive pulley completely through motor drive spindle.
d. Install bushing to motor drive pulley.
e. Install but do not tighten washer and nut to fasten motor drive pulley to motor drive
f. Slip drive belt over small and large pulleys while turning both pulleys manually.
g. Tighten nut and ensure that motor drive assembly turns without binding.
h. Insert four bolts into motor bracket. Do not completely tighten.
i. Refer to **Figure 4-15**. Install two screws that attach the ballscrew bracket to the enclosure support beam.
j. Refer to **Figure 4-16**. Install two bolts and two washers that attach the ballnut retainer to the traveling frame alignment plate. Do not completely tighten.
k. Refer to **Figure 4-17**. Stow ramp manually by turning large pulley. This will re-align ball screw.
l. Verify the ball screw is in alignment with the traveling frame alignment plate.
m. Tighten four bolts on motor bracket.
n. Tighten two bolts on ballnut retainer.
o. Install sub floor panel.
p. Tighten the twenty screws fastening left, right, rear and middle cover strips to enclosure.
q. Reconnect electrical power to ramp.

**5. BALLSCREW REMOVAL**

a. Remove twenty screws fastening left, right, rear and middle cover strips to enclosure.
b. Lift out rear subfloor panel.
c. Fully deploy ramp.
d. Disconnect electrical power from ramp.
e. Refer to **Figure 4-14**. Remove and retain four bolts and four washers that attach motor drive bracket to enclosure.
f. Refer to **Figure 4-15**. Remove and retain two screws that attach the ballscrew bracket to the enclosure support beam. Retain ballscrew bracket.
g. Refer to **Figure 4-16**. Remove and retain two bolts and two washers that attach the ballnut retainer to the travelling frame alignment plate. Retain ballnut bracket.
h. Lift motor drive assembly to gain access to large motor drive pulley hardware.

| ⚠ CAUTION! |
| --- |
| The ball screw is a precision assembly. Avoid damaging the screw surface; this may cause vibration during ramp operation. |

i. Remove and retain jam nut and washer from ballscrew end.
j. Refer to **Figure 4-19**. Remove and retain three bolts, three split washers and three flat washers that attach the 3 hole ball bearing to the motor drive bracket.

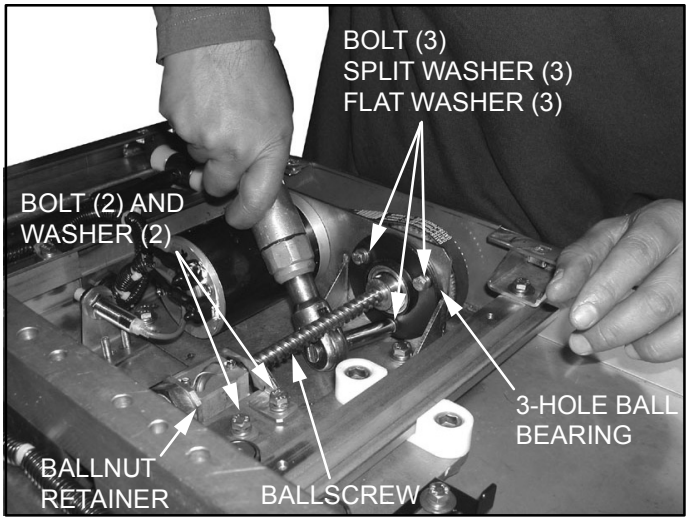



**FIGURE 4-19: BALLSCREW REMOVAL**

k. Guide ballscrew out from large pulley and 3 hole ball bearing.

l. Guide ballscrew out of enclosure and remove.

## 6. BALLSCREW INSTALLATION

**NOTE:** All removed bolts should have Loctite applied before reinstallation.

a. Disconnect electrical power from ramp.

b. Guide ballscrew into enclosure.

c. Refer to **Figure 4-20**. Slide ballscrew through two bushings, 3 hole ball bearing, motor drive bracket and large spindle then install nut and washer to ballscrew end.

d. Refer to **Figure 4-20**. Install 3 bolts, 3 split washers and 3 flat washers through 3 hole ball bearing and attach to motor drive bracket.

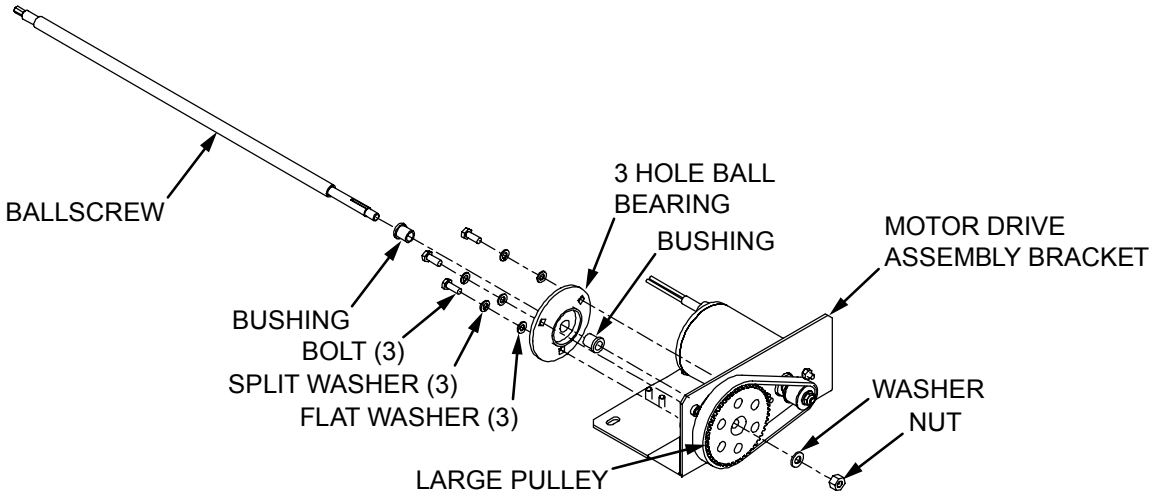



**FIGURE 4-20: BALLSCREW ASSEMBLY**

e. Refer to **Figure 4-15**. Install two screws that attach the ballscrew bracket to the enclosure support beam.

f. Refer to **Figure 4-16**. Install two bolts and two washers that attach the ballnut retainer to the traveling frame alignment plate. Do not completely tighten.

g. Refer to **Figure 4-17**. Stow ramp manually by turning large pulley. This will re-align ball screw.

h. Verify the ball screw is in alignment with the traveling frame alignment plate.

i. Tighten four bolts on motor drive bracket.

j. Tighten two bolts on ballnut retainer.

k. Install sub floor panel.

l. Tighten the twenty screws fastening left, right, rear and middle cover strips to enclosure.

m. Reconnect electrical power to ramp.

## F. TRAVELING FRAME ASSEMBLY

**⚠ WARNING!**

THE TRAVELING FRAME ASSEMBLY IS LARGE AND HEAVY AND REQUIRES DISASSEMBLY OF THREE SMALLER SUB ASSEMBLIES. DO NOT USE YOUR BACK MUSCLES TO LIFT THE WEIGHT; HOLD YOUR BACK UPRIGHT, BEND YOUR KNEES, AND USE YOUR LEG MUSCLES TO LIFT THE WEIGHT.

### 1. RAMP AND CARRIAGE DISASSEMBLY

a. Remove twenty screws fastening left, right, rear and middle cover strips to enclosure.

b. Refer to **Figure 4-3**. Deploy ramp approximately 7.6cm in order to disengage ramp floor from the locking mechanism.

**NOTE:** Ramp floor must disengage from locking mechanism before hinged floor can open.

c. Secure hinged floor in upright position to gain access to front enclosure components.

d. Fully deploy ramp.

e. Lift out rear subfloor panel to gain access to rear enclosure components.

f. Disconnect electrical power from ramp.

**NOTE:** The traveling frame assembly has three smaller sub assemblies that can be removed in three sections (Ramp Assembly, Carriage Assembly and Alignment Plate Assembly).

g. Refer to **Figure 4-21**. Remove and retain four screws and four washers that attach the hinge to the ramp assembly.

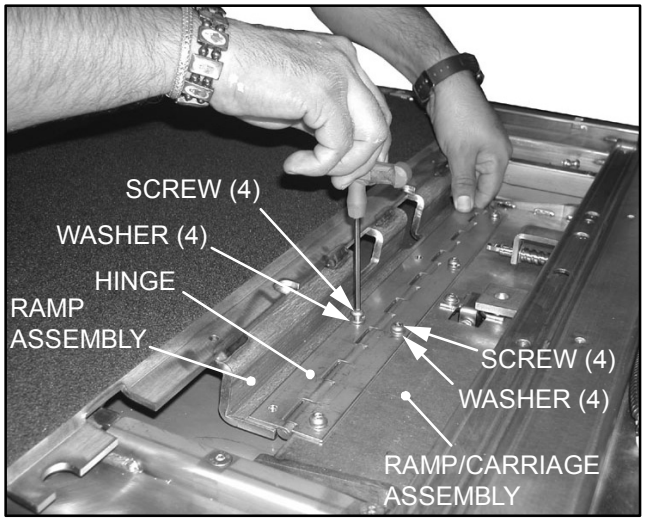



**FIGURE 4-21: RAMP/CARRIAGE ASSEMBLY**

h. Carefully detach and lift ramp assembly out of enclosure.

i. Refer to **Figure 4-21**. Remove and retain four screws and four washers that attach the hinge to the carriage assembly.

j. Remove and retain hinge.

k. Refer to **Figure 4-17**. Deploy ramp manually by turning large pulley to gain access to carriage assembly and alignment plate assembly.

l. Refer to **Figure 4-22**. Remove two cotter pins from each end of carriage pin.

m. Slide carriage pin out from alignment plate and two washers.

n. Repeat step l-m for opposite side of carriage assembly.

o. Carefully detach and lift out carriage assembly.

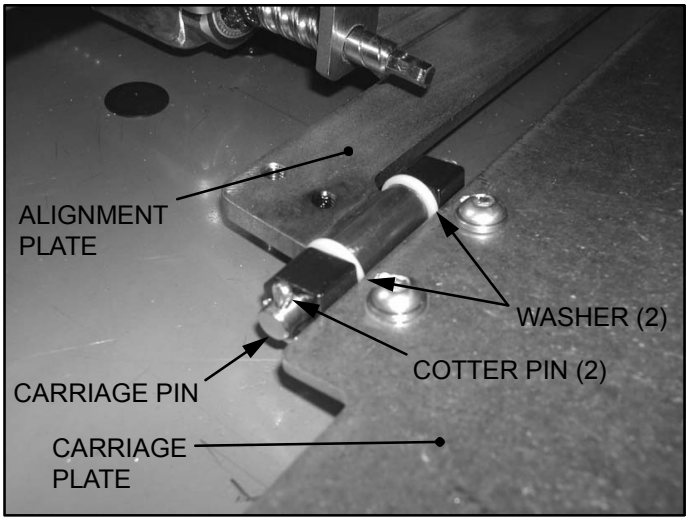



**FIGURE 4-22: CARRIAGE PIN**

**2. ALIGNMENT PLATE REMOVAL**

a. Refer to **Figure 4-17**. Stow ramp manually by turning large pulley to gain access to carriage assembly and alignment plate assembly.

| ⚠ CAUTION! |
|---|
| The ball screw is a precision assembly. Avoid damaging the screw surface; this may cause vibration during ramp operation. |

b. Refer to **Figure 4-15**. Remove and retain two screws that attach the ballscrew bracket to the enclosure support beam. Retain ballscrew bracket.

c. Refer to **Figure 4-16**. Remove and retain two bolts and two washers that attach the ballnut retainer to the travelling frame alignment plate. Retain ballnut bracket.

d. Guide and carefully lift out alignment plate assembly out of enclosure.

**3. CARRIAGE BLOCK RAIL REMOVAL**

a. Follow alignment plate removal procedure.

b. Refer to **Figure 4-23**. Remove two socket head screws.

c. Refer to **Figure 4-23**. Remove and retain hex nut and washer.

d. Detach carriage block rail.

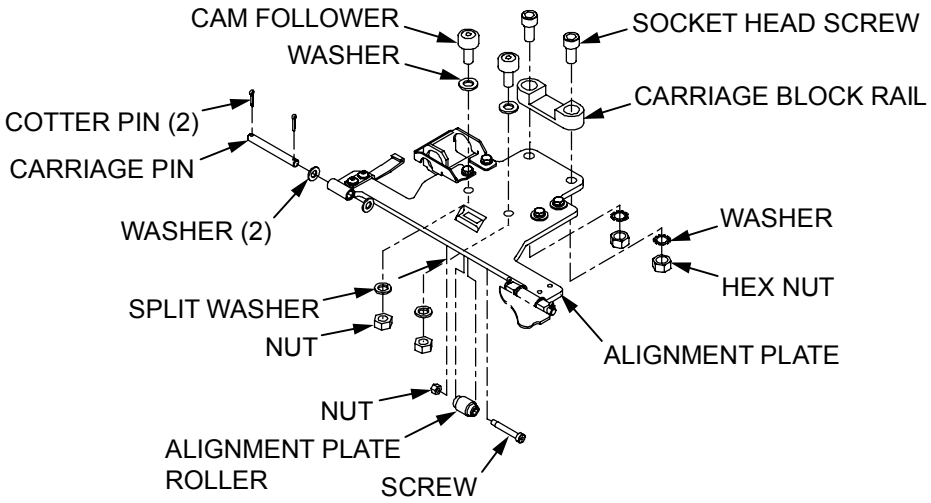



**FIGURE 4-23: ALIGNMENT PLATE ASSEMBLY**

**4. CARRIAGE BLOCK RAIL INSTALLATION**

**NOTE:** All removed bolts should have Loctite applied before reinstallation.

**5. ALIGNMENT PLATE ROLLER REMOVAL**

a. Follow alignment plate removal procedure.
b. Refer to **Figure 4-23**. Remove and retain screw and nut from under the alignment plate
c. Refer to **Figure 4-23**. Detach alignment plate roller.

**6. ALIGNMENT PLATE ROLLER INSTALLATION**

**NOTE:** All removed bolts should have Loctite applied before reinstallation.

a. Follow alignment plate removal procedure.
b. Refer to **Figure 4-23**. Align and attach alignment plate roller to alignment plate.
c. Refer to **Figure 4-23**. Slide screw in through alignment plate and alignment plate roller.
d. Refer to **Figure 4-23**. Install nut and tighten screw.

**7. CAM FOLLOWER REMOVAL**

a. Follow alignment plate removal procedure.
b. Refer to **Figure 4-23**. Remove and retain nut and washer from cam follower.
c. Refer to **Figure 4-23**. Detach cam follower.

**8. CAM FOLLOWER INSTALLATION**

**NOTE:** All removed bolts should have Loctite applied before reinstallation.

a. Follow alignment plate removal procedure.
b. Refer to **Figure 4-23**. Slide cam follower into position.
c. Refer to **Figure 4-23**. Install washer and nut then tighten.

**9. ALIGNMENT PLATE INSTALLATION**

a. Carefully guide alignment plate assembly into enclosure.
b. Ensure that alignment plate is aligned to alignment rail.

**⚠ CAUTION!**

The ball screw is a precision assembly. Avoid damaging the screw surface; this may cause vibration during ramp operation.

**NOTE:** All removed bolts should have Loctite applied before reinstallation.

c. Refer to **Figure 4-15**. Install two screws that attach the ballscrew bracket to the enclosure support beam.
d. Refer to **Figure 4-16**. Install two bolts and two washers that attach the ballnut retainer to the traveling frame alignment plate. Do not completely tighten.
e. Refer to **Figure 4-17**. Stow ramp manually by turning large pulley. This will re-align ball screw.
f. Verify the ball screw is in alignment with the traveling frame alignment plate.
g. Tighten two bolts on ballnut retainer.
h. Ensure that alignment plate assembly travels through ballscrew without binding.

**10. RAMP AND CARRIAGE ASSEMBLY**

a. Carefully guide carriage assembly into enclosure.
b. Refer to **Figure 4-17**. Deploy ramp manually by turning large pulley to gain access to alignment plate assembly
c. Refer to **Figure 4-22**. Slide carriage pin through alignment plate and two washers.
d. Refer to **Figure 4-22**. Slide two cotter pins through each end of carriage pin.
e. Repeat step c-d for opposite side of carriage assembly.

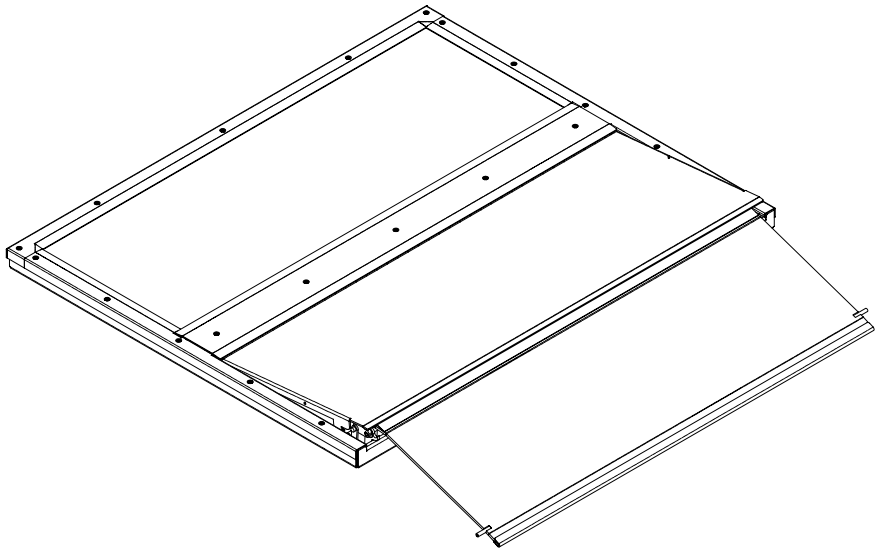
**NOTE:** All removed bolts should have Loctite applied before reinstallation.

f. Refer to **Figure 4-21**. Align hinge to carriage assembly then install four screws and four washers to attach the hinge to carriage assembly.
g. Refer to **Figure 4-21**. Remove and retain four screws and four washers that attach the hinge to the ramp assembly.

h. Carefully guide ramp assembly into enclosure.
i. Refer to **Figure 4-21**. Align ramp assembly to hinge then install four screws and four washers to attach the hinge to ramp assembly.
j. Reconnect electrical power to ramp.
k. Ensure that traveling frame assembly travels through ballscrew without binding.
l. Install sub floor panel.
m. Tighten the twenty screws fastening left, right, rear and middle cover strips to enclosure.

## V. PF7000 SERIES SPARE PARTS

This chapter contains parts lists for major assemblies of the RICON PF7000 Series Express Ramp. The part diagrams are exploded views of ramp assemblies, with individual parts and components referenced by numbers. Each accompanying parts list contains part reference numbers, part descriptions, quantities used, and the Ricon stock number. To order parts, locate part on an appropriate diagram and note the reference number. Find the reference number on the accompanying parts list and use the part number in the far right column. Refer to the DECAL LOCATIONS AND PART NUMBERS figure in **Chapter II** for decal part numbers.



| LIFT MODEL AND KIT NUMBERS | |
|---|---|
| PRODUCT NUMBER | PF7000-001 and PF7000-002 |
| DOCUMENTATION KIT NUMBER | 36954 |

**DIAGRAM** **PAGE**

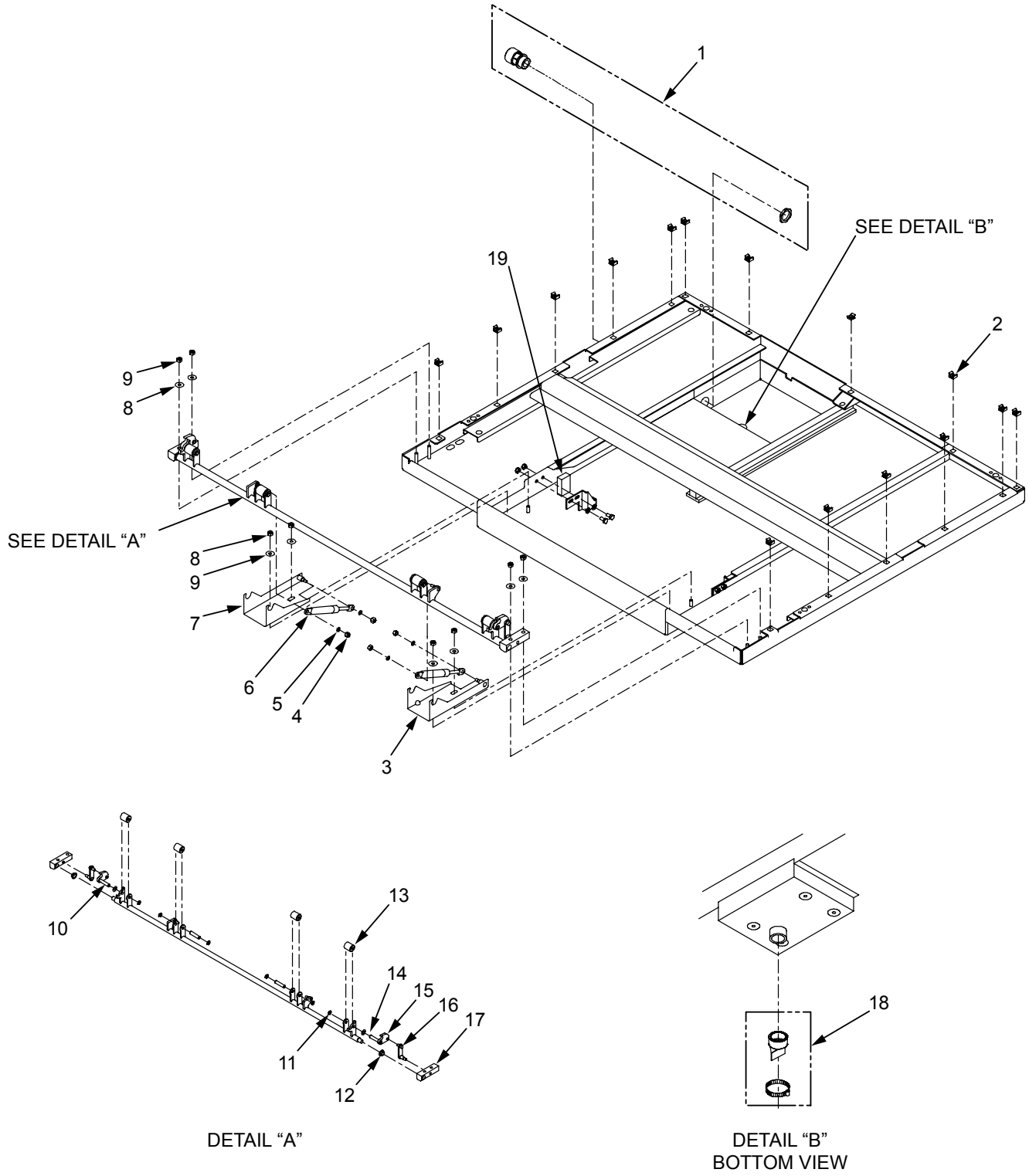



**FIGURE 5-1: PF7000 SERIES RAMP ENCLOSURE ASSEMBLY**

**FIGURE 5-1: PF7000 SERIES RAMP ENCLOSURE ASSEMBLY**
**MODEL NOs. 001 and 002**

| REF | DESCRIPTION | QTY | PART NO |
|---|---|---|---|
| 1 | KIT, CONDUIT CONN. AND NUT | 1 | 21814 |
| 2 | NUT, CAGE (BAG OF 10) | 1 | 21815 |
| 3 | BRACKET, SUPPORT, RH LIFTING MECHANISM | 1 | 38155 |
| 4 | NUT, ESN, MS-8 SST (BAG OF 10) | 1 | 21821 |
| 5 | WASHER, FLAT, M5 X 10MM (BAG OF 10) | 1 | 21820 |
| 6 | SPRING, PNEUMATIC | 2 | 38172 |
| 7 | BRACKET, SUPPORT, LH LIFTING MECHANISM | 1 | 38156 |
| 8 | WASHER, FLT, M6 X 18MM (BAG OF 10) | 1 | 21818 |
| 9 | NUT, ESN, M6-1.0 SST (BAG OF 10) | 1 | 21823 |
| 10 | FLOOR SUPPORT WLDT, LH | 1 | 38198 |
| 11 | RETAINING RING, E TYPE, 5/16 SHAFT SST | 1 | 21826 |
| 12 | BEARING, DU FLG, 3/8 ID X 1/4L | 2 | 253845 |
| 13 | ROLLER, LIFTING MECHANISM (BAG OF 10) | 1 | 21825 |
| 14 | SPACER, .312 X .62 X .062 (BAG OF 10) | 1 | 21824 |
| 15 | FLOOR SUPPORT WLDT, RH | 1 | 38199 |
| 16 | LINK WLDT, LIFTING MECHANISM | 2 | 38196 |
| 17 | BLOCK, BASE, LIFTING MECHANISM | 2 | 21399 |
| 18 | KIT, FLUTTER VALVE | 1 | 39023 |
| 19 | BUMPER STOP | 2 | 21780 |

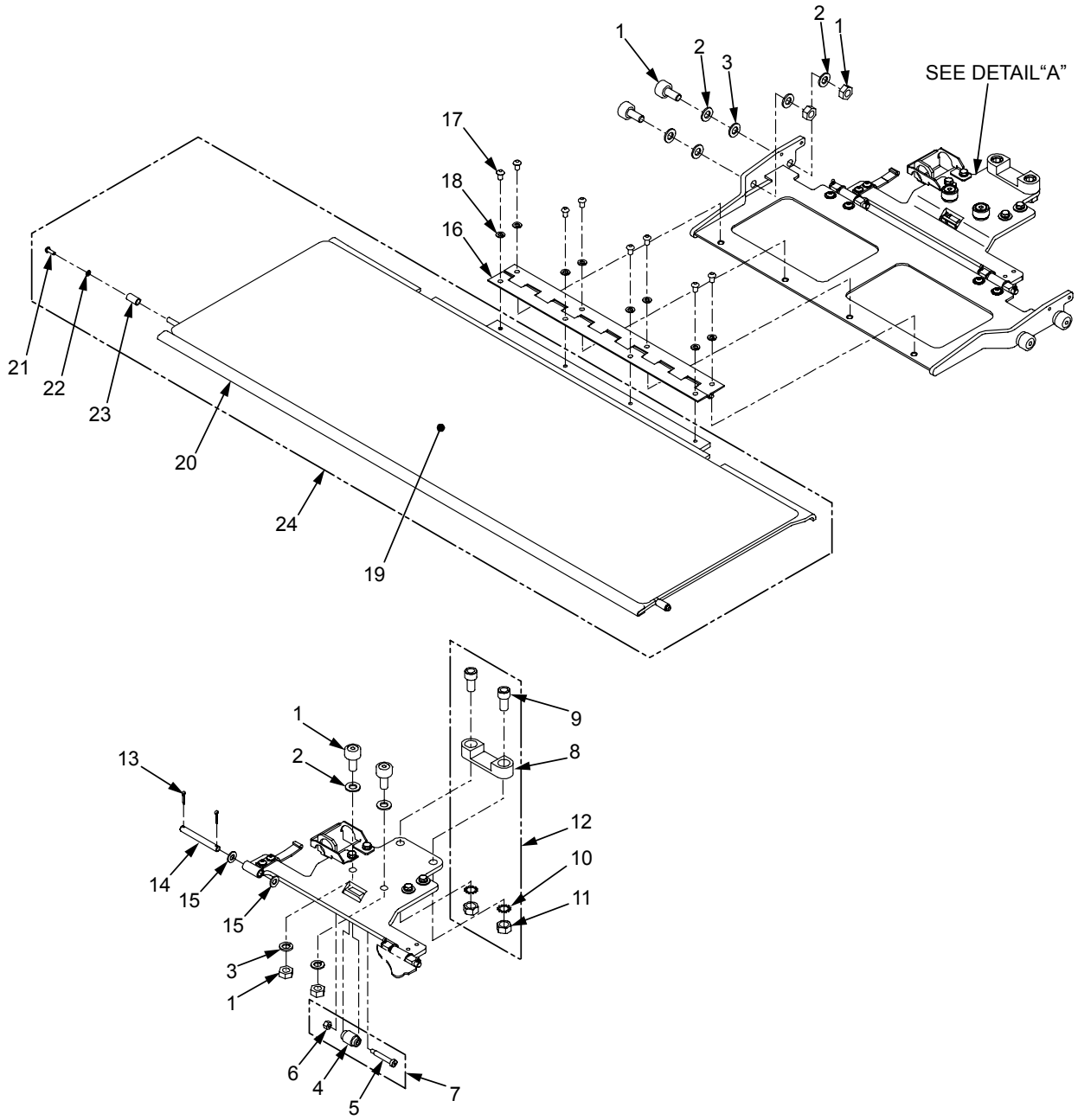



**FIGURE 5-2: PF7000 SERIES RAMP TRAVELING FRAME ASSEMBLY**

**FIGURE 5-2: PF7000 SERIES RAMP TRAVELING FRAME ASSEMBLY**
**MODEL NOs. 001 and 002**

| REF | DESCRIPTION | QTY | PART NO |
|---|---|---|---|
| 1 | CAM FOLLOWER, M10- X 1.25X13MM, SEALED, SST | 6 | 21370 |
| 2 | WASHER, FLT, M10 (BAG OF 10) | 1 | 36975 |
| 3 | WASHER, SPL, M10 X 18.1MM ODX2.2MM THK, SST (BAG OF 10) | 1 | 20923 |
| 4 | ROLLER, ALIGNMENT PLATE | 1 | 12055 |
| 5 | SCREW, SSH, M6 X 35MM, SST (BAG OF 10) | 1 | 36977 |
| 6 | NUT, ESN, M5-.8, SST (BAG OF 10) | 1 | 20567 |
| 7 | BLOCK, RAIL, CARRIAGE | 1 | 22523 |
| 8 | BLOCK, RAIL, CARRIAGE | 1 | 22523 |
| 9 | SCREW, SHC, 7/16-14 X 7/8, SST | 2 | 25967 |
| 10 | WASHER, ESL, 7/16 SST | 2 | 282915 |
| 11 | NUT, HEX, 7/16-14, SST | 2 | 22516 |
| 12 | KIT, BLOCK, RAIL, CARRIAGE | 1 | 36969 |
| 13 | PIN, COTTER, 3/32 X 0.50 (BAG OF 10) | 1 | 15930 |
| 14 | PIN, CARRIAGE, .310 X 2.75 | 2 | 11298 |
| 15 | SPACER, .312 X .62 X .062 (BAG OF 10) | 1 | 36979 |
| 16 | HINGE, CARRIAGE/RAMP PLATE | 1 | 38165 |
| 17 | SCREW, BHS, M6-1.0 X 12MM, SST (BAG OF 10) | 1 | 20579 |
| 18 | WASHER, SPL M6 X 11.8MM OD X 1.6MM THK, SST (BAG OF 10) | 1 | 20921 |
| 19 | SAFETREAD, 35.75 X 11.8, OCEAN GRAY | 1 | 38168 |
| 20 | PLATE WLDT, RAMP | 1 | 37536 |
| 21 | SCREW, PHP, M4-.7 X 12MM, SST (BAG OF 10 | 1 | 20575 |
| 22 | WASHER, SPLT, M4 X 7.6MM OD X .9MM THK (BAG OF 10) | 1 | 36980 |
| 23 | TUBE, RBD, SST, 3/8 X .058 X .709L | 1 | 38195 |
| 24 | KIT, RETROFIT, RAMP PLATE ASSY | 1 | 36976 |

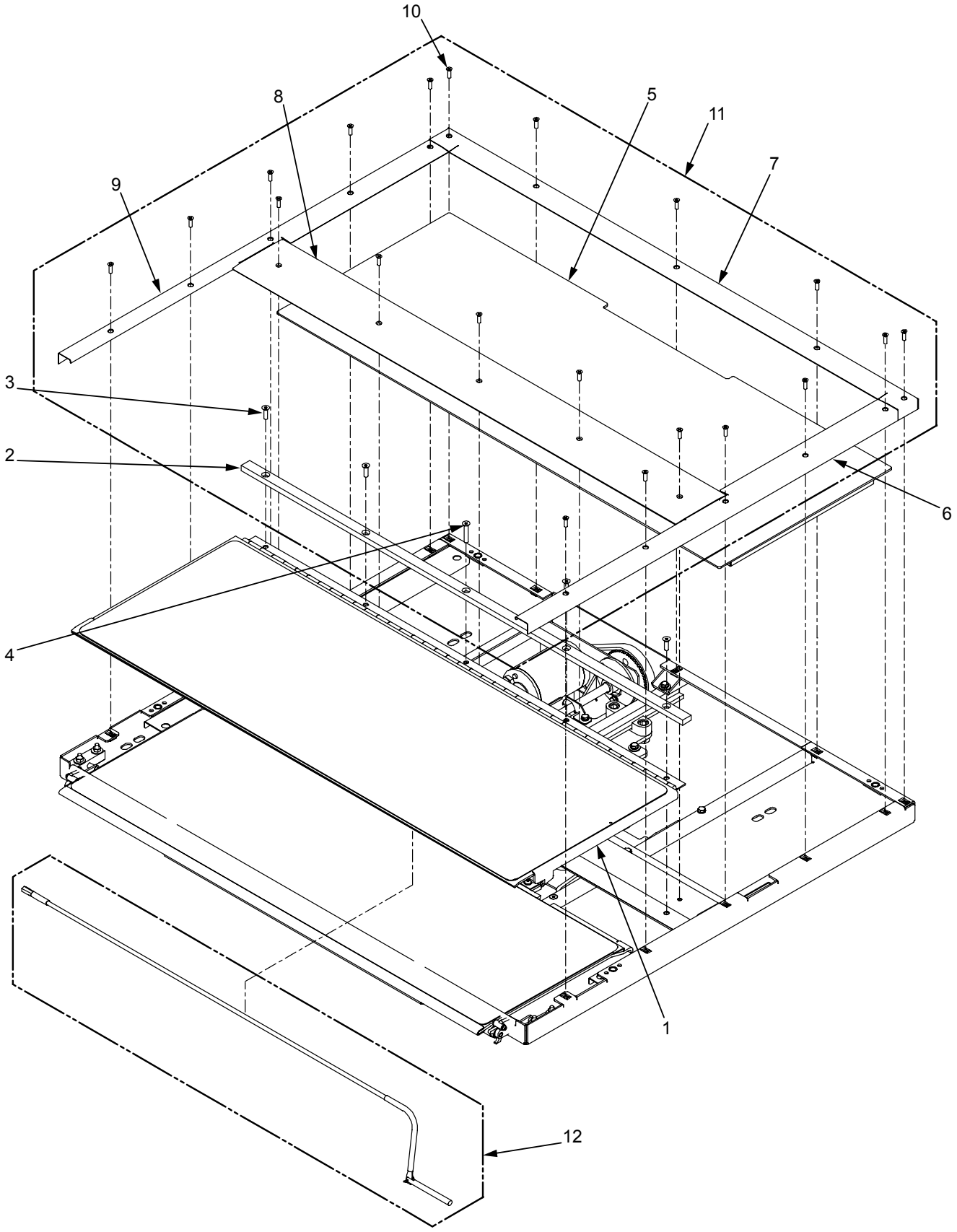



**FIGURE 5-3: PF7000 SERIES TOP COVER ASSEMBLY**

**FIGURE 5-3: PF7000 SERIES TOP COVER ASSEMBLY**
**MODEL NOs. 001 and 002**

| REF | DESCRIPTION | QTY | PART NO |
|---|---|---|---|
| 1 | HINGED FLOOR ASSY | 1 | 39013 |
| 2 | BAR, FLOOR SUPPORT | 1 | 38161 |
| 3 | SCREW, FHH, M6-1.0 X 20MM, SST (BAG OF 10) | 1 | 20589 |
| 4 | SCREW, FHH, M6-1.0 X 35MM, SST | 1 | 39006 |
| 5 | PANEL WLDT, SUB FLOOR | 1 | 37531 |
| 6 | COVER STRIP, LEFT, MAIN ENCLOSURE | 1 | 37544 |
| 7 | COVER STRIP, RIGHT, MAIN ENCLOSURE | 1 | 37545 |
| 8 | COVER STRIP, MIDDLE, MAIN ENCLOSURE | 1 | 37546 |
| 9 | COVER STRIP, REAR, MAIN ENCLOSURE | 1 | 37539 |
| 10 | SCREW, FHP, M5 X 16MM, SST (BAG OF 10) | 2 | 36978 |
| 11 | KIT, RETROFIT, COVER STRIPS | 1 | 36981 |
| 12 | KIT, MANUAL OPERATION TOOL | 1 | 36983 |

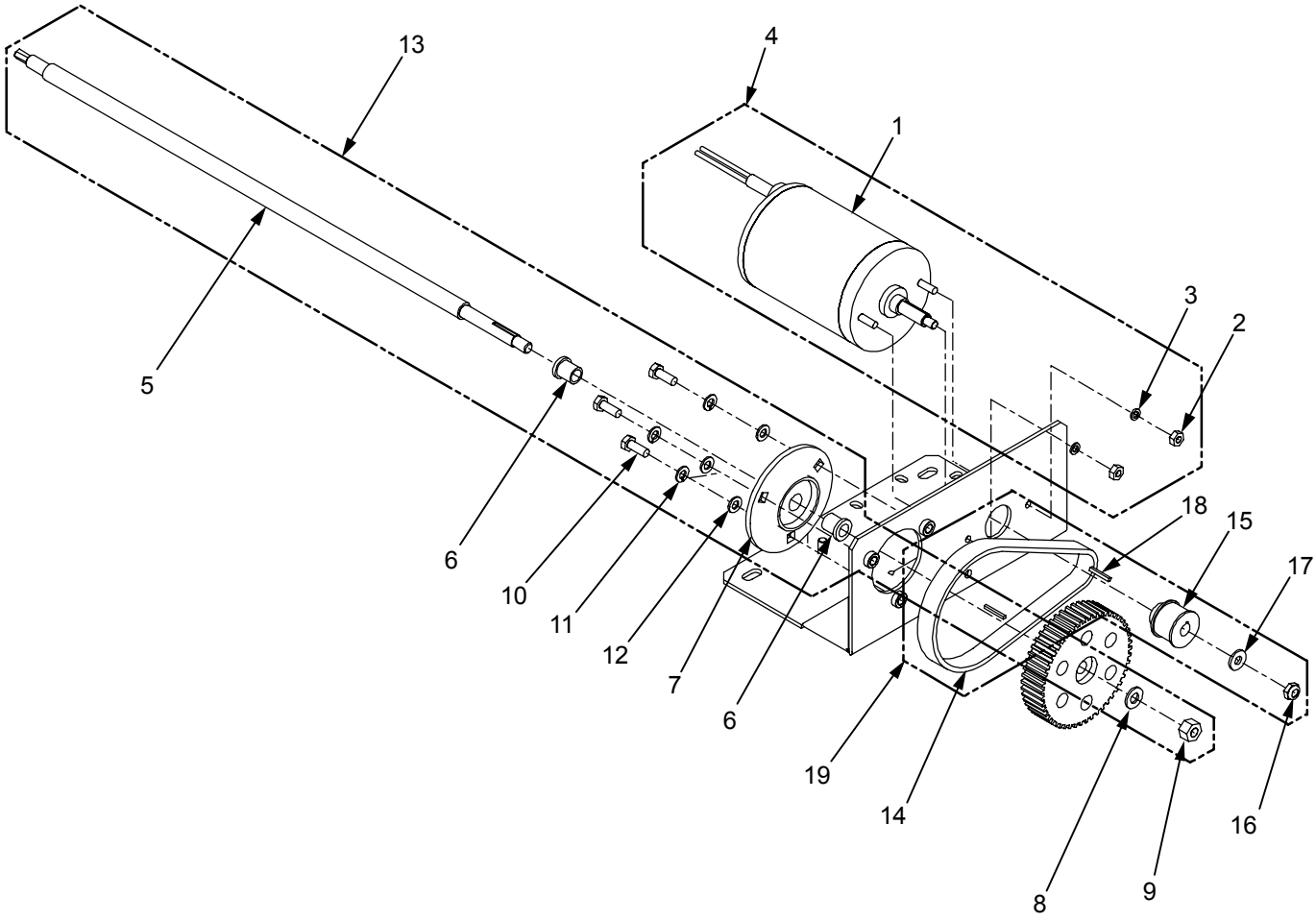



**FIGURE 5-4: PF7000 SERIES DRIVE SYSTEM ASSEMBLY**

**FIGURE 5-4: PF7000 SERIES RAMP DRIVE SYSTEM ASSEMBLY**
**MODEL NOs. 001 and 002**

| REF | DESCRIPTION | QTY | PART NO |
|---|---|---|---|
| 1 | MOTOR DRIVE ASSY, IP67 | 1 | 39027 |
| 2 | NUT, HEX, 10-32 SST | 2 | 283061 |
| 3 | WASHER, SPL, #10 SST (BAG OF 10) | 1 | 14432 |
| 4 | KIT, RETROFIT, MOTOR ASSY | 1 | 36972 |
| 5 | BALL SCREW/NUT ASSY | 1 | 37538 |
| 6 | BUSHING, FLNGD, .38 X .9 X .5 | 2 | 25297 |
| 7 | BEARING, BALL-3 HOLE | 1 | PF4-0121 |
| 8 | WASHER, FLT, M8 X 16MM OD X 1.6MM THK, SST (BAG OF 10) | 1 | 20916 |
| 9 | NUT, JAM, 5/16-24, SST | 1 | 11782 |
| 10 | SCREW, HEX, M6-1.0 X 16MM, SST | 3 | 37542 |
| 11 | WASHER, SPL, M6 X 11.8MM OD X 1.6MM THK, SST | 3 | 15267 |
| 12 | WASHER, FLT, M6 X 12MM OD X 1.6MM THK, SST | 3 | 15266 |
| 13 | KIT, RETROFIT, BALL SCREW/NUT ASSY | 1 | 36982 |
| 14 | BELT, HTD-0.591W X 14.764P.LG, 75 TEETH | 1 | 25128 |
| 15 | PULLEY, MOTOR DRIVE, MODIFIED | 1 | PF4-0137 |
| 16 | NUT, ESN, ¼-20 THIN, SST | 1 | 283096 |
| 17 | WASHER, FLT, .281 X .625 X .065, SST | 1 | 282735 |
| 18 | KEY, 3/32 X .75 | 2 | PF4-0017 |
| 19 | KIT, RETROFIT, PULLEY, MOTORDRIVE | 1 | 36971 |

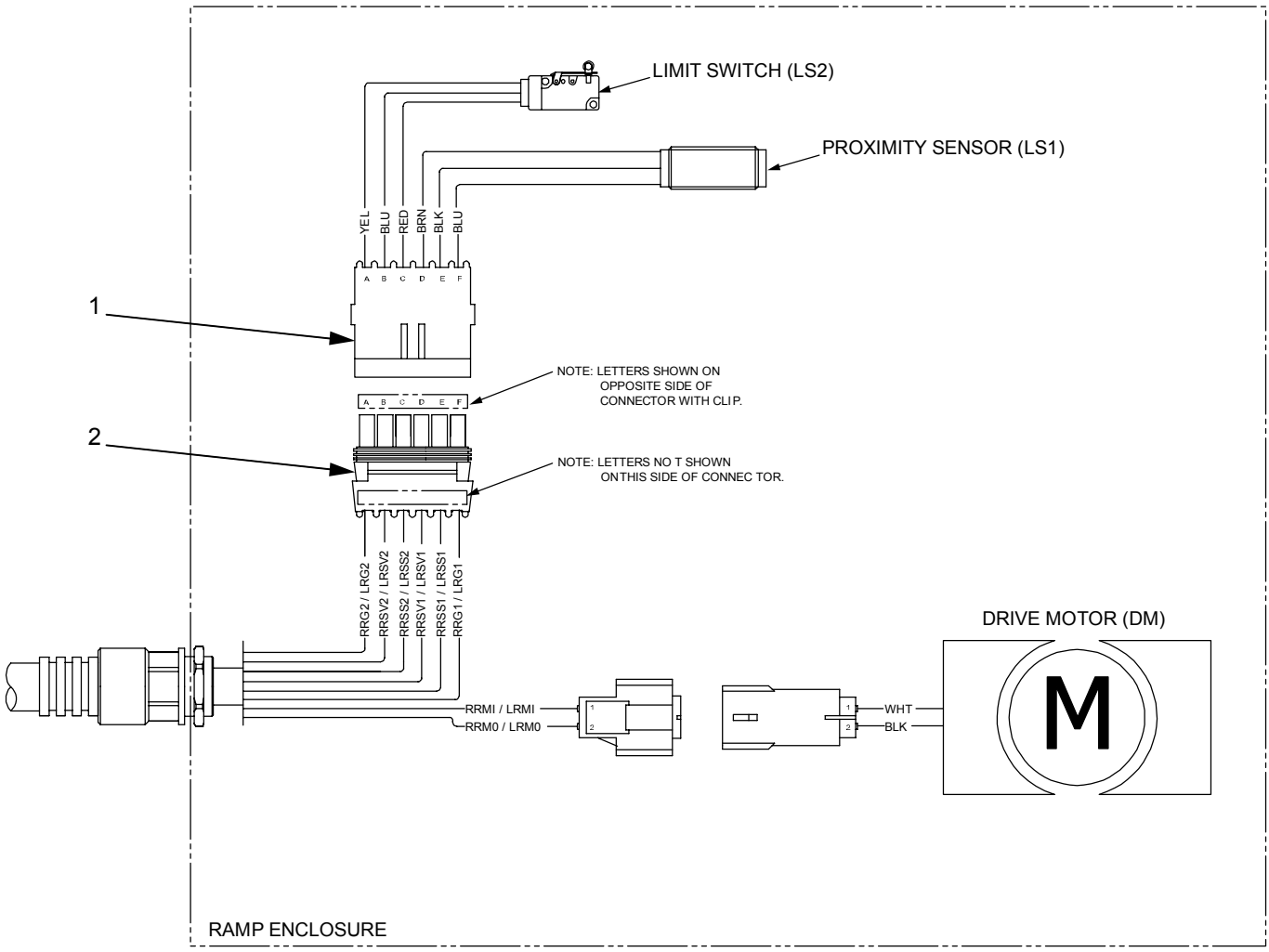



**FIGURE 5-5: PF7000 SERIES CONTROLLER INTERFACE HARNESSES**

**FIGURE 5-5: PF7000 SERIES CONTROLLER INTERFACES AND HARNESSES**
**MODEL NOs. 001 and 002**

| REF | DESCRIPTION | QTY | PART NO |
|---|---|---|---|
| 1 | HARNESS, STOW SENSOR/LIMIT SWITCH | 1 | 39017 |
| 2 | KIT, ELECTRICAL INSTALL | 1 | 39022 |

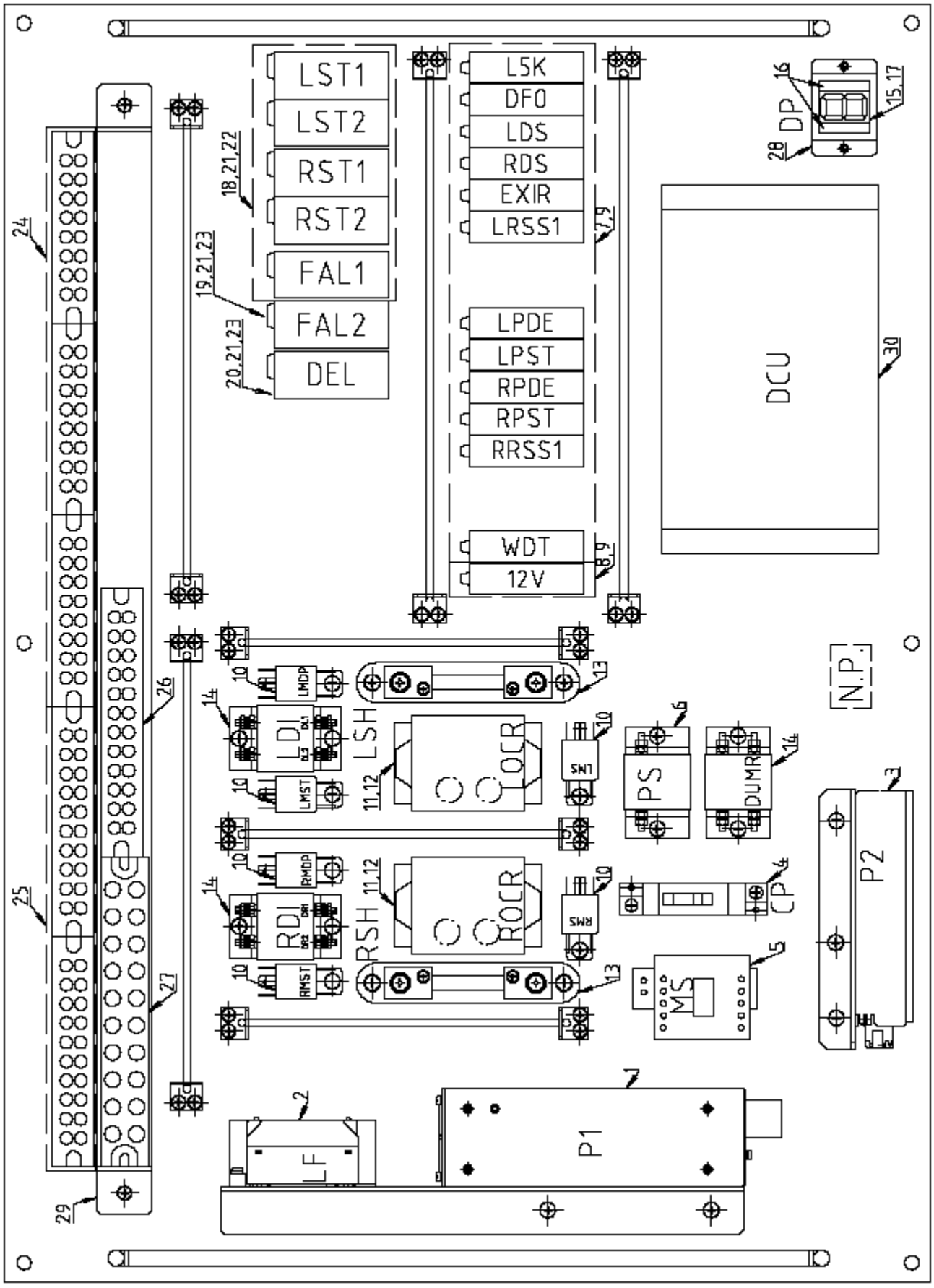



**Figure 5-6: PF7000 SERIES CONTOLLER P/N 38150 (SHEET 1 OF 2)**

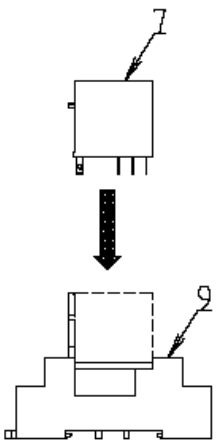



FIGURE 5-6.1

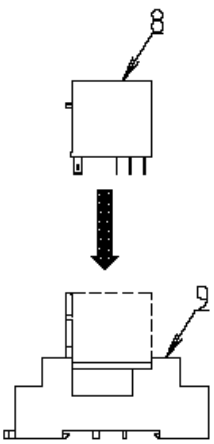



FIGURE 5-6.2

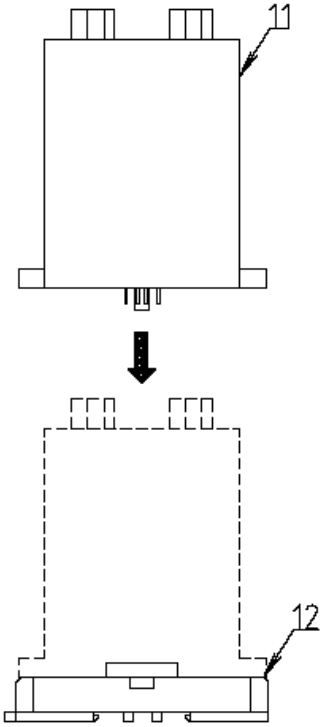



FIGURE 5-6.3

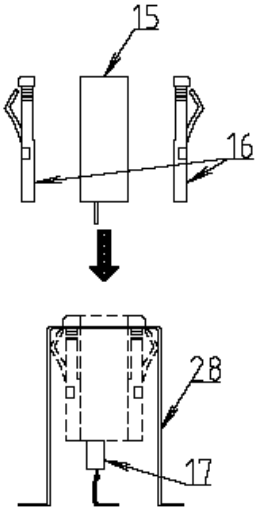



FIGURE 5-6.4

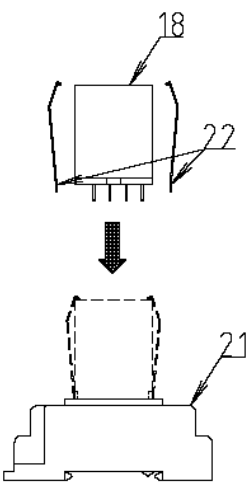



FIGURE 5-6.5

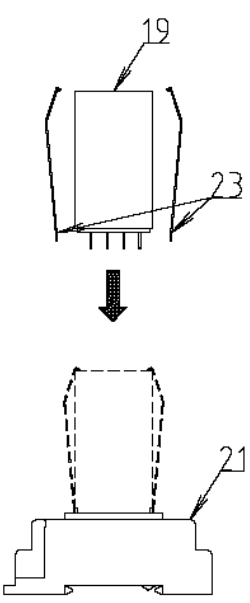



FIGURE 5-6.6

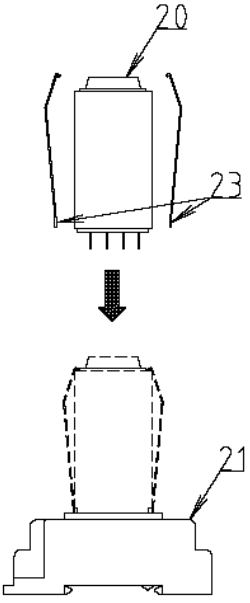



FIGURE 5-6.7

**FIGURE 5-6: PF7000 SERIES CONTROLLER P/N 38150 (SHEET 2 OF 2)**

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**FIGURE 5-6: PF7000 SERIES CONROLLER P/N 38150**
**MODEL NOs. 001 and 002**

| REF | DESCRIPTION | QTY | PART NO |
|---|---|---|---|
| 1 | REGULATED DC POWER SUPPLY 12V | 1 | 42000 |
| 2 | REGULATED DC POWER SUPPLY 24V | 1 | 42001 |
| 3 | LINE FILTER | 1 | 42002 |
| 4 | CIRCUIT BREAKER | 1 | 42003 |
| 5 | MAGNETIC CONTACTOR | 1 | 42004 |
| 6 | POLY SWITCH | 1 | 42005 |
| 7 | MINI POWER RELAY(24 VDC) (REFER TO FIGURE 5-7.1) | 12 | 42006 |
| 8 | MINI POWER RELAY(12 VDC) (REFER TO FIGURE 5-7.2) | 1 | 42007 |
| 9 | RELAY SOCKET (SOCKET FOR REF# 7 & 8) | 13 | 42008 |
| 10 | CB RELAY | 6 | 42009 |
| 11 | VOLTAGE SENSOR (24 VDC) (REFER TO FIGURE 5-7.3) | 2 | 42010 |
| 12 | SOCKET (SOCKET FOR REF# 11) | 2 | 42011 |
| 13 | SHUNT RESISTOR | 2 | 42012 |
| 14 | DIODE | 3 | 42013 |
| 15 | DIGITAL DISPLAY (REFER TO FIGURE 5-7.4) | 1 | 42014 |
| 16 | SPACER (SOCKET FOR REF# 15) | 2 | 42015 |
| 17 | SOLDERED TERMINAL (TERMINAL FOR REF# 15) | 2 | 42016 |
| 18 | POWER RELAY(24 VDC) (REFER TO FIGURE 5-7.5) | 5 | 42017 |
| 19 | POWER RELAY(220 VAC) (REFER TO FIGURE 5-7.6) | 1 | 42018 |
| 20 | TIMER RELAY(220 VAC) (REFER TO FIGURE 5-7.7) | 1 | 42019 |
| 21 | RELAY SOCKET (SOCKET FOR REF#18,19,20) | 1 | 42020 |
| 22 | HOLD-DOWN CLIPS (CLIP FOR REF#18) | 10 | 42021 |
| 23 | HOLD-DOWN CLIPS (CLIP FOR REF19 & 20) | 4 | 42022 |
| 24 | TERMINAL BLOCK 8 POLES 600V 20A | 3 | 42023 |
| 25 | TERMINAL BLOCK 10 POLES 600V 20A | 2 | 42024 |
| 26 | TERMINAL BLOCK 12 POLES 600V 20A | 1 | 42025 |
| 27 | TERMINAL BLOCK 10 POLES 600V 30A | 1 | 42026 |
| 28 | DIGITAL DISPLAY BASEPLATE | 1 | 42027 |
| 29 | TERMINAL BLOCK BASEPLATE | 1 | 42028 |
| 30 | DCU | 1 | 42029 |

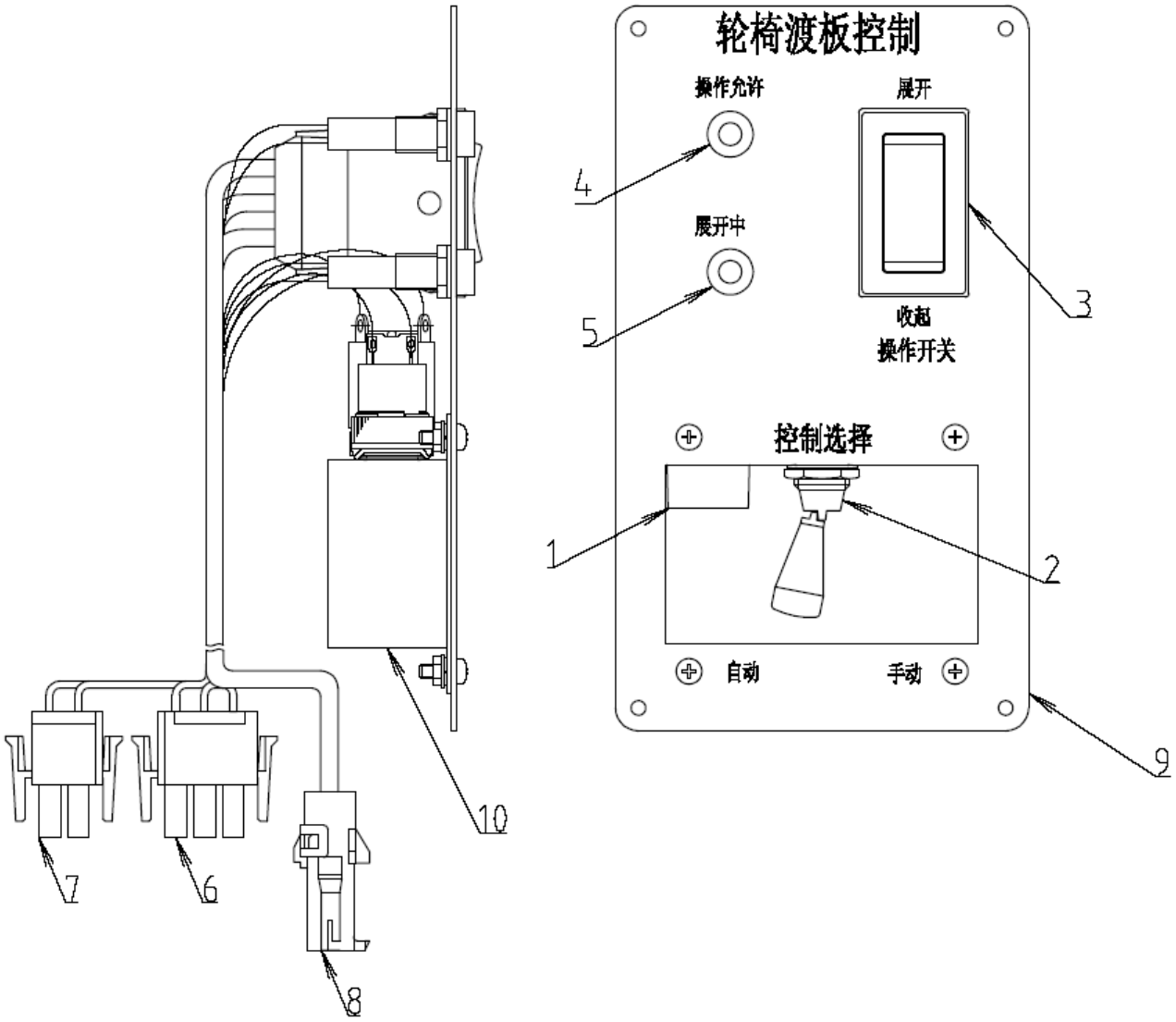



**FIGURE 5-7: PF7000 SERIES CONTROL PANEL P/N 38152**

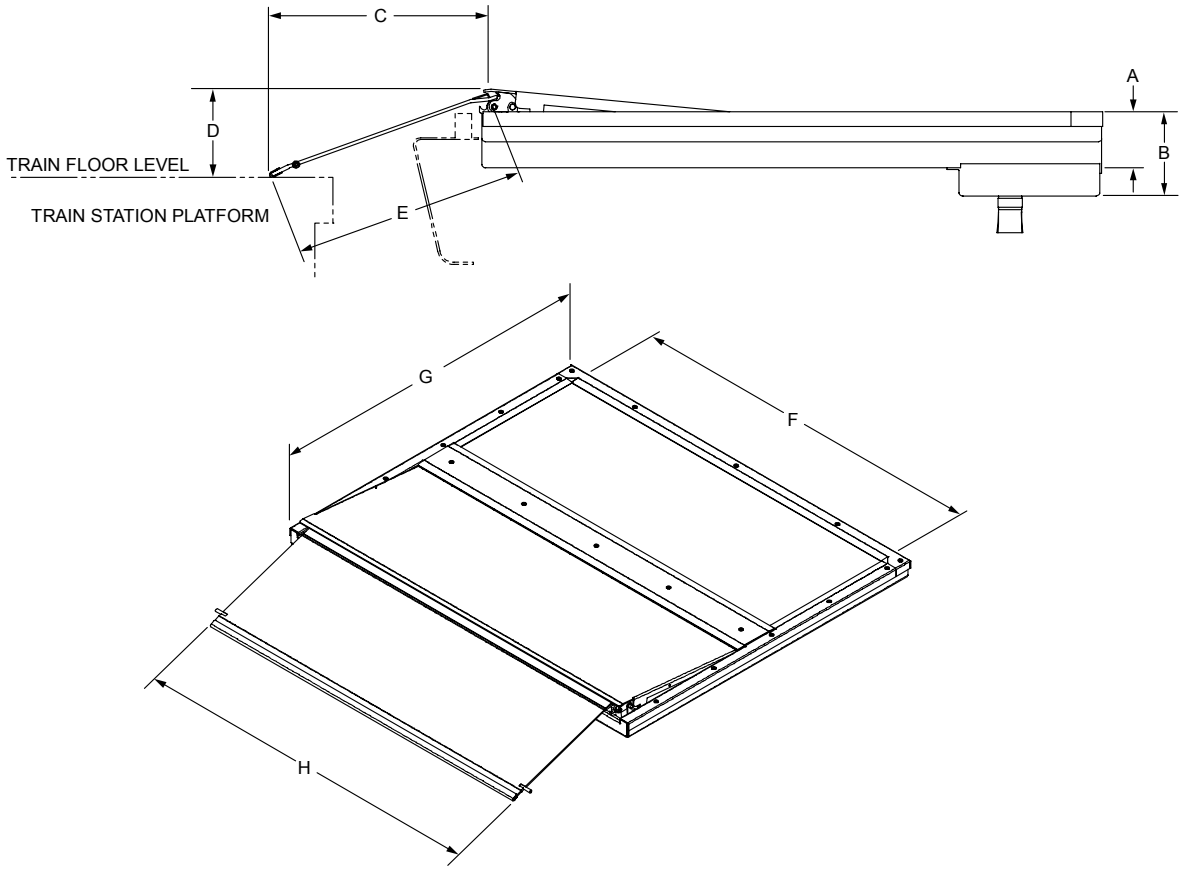
**FIGURE 5-7: PF7000 SERIES CONTROL PANEL P/N 38152**
**MODEL NOs. 001 and 002**

| REF | DESCRIPTION | QTY | PART NO |
|---|---|---|---|
| 1 | BUZZER | 1 | 36984 |
| 2 | TOGGLE SWITCH | 1 | 36985 |
| 2 | LOCKER SWITCH | 1 | 36986 |
| 4 | GREEN LED | 1 | 36987 |
| 5 | ORANGE LED | 1 | 36988 |
| 6 | PLUG 6 POLE, PIN | 1 | 36989 |
| 7 | PLUG 3 POLE, PIN | 1 | 36990 |
| 8 | PLUG HOUSING 2 POLE/ MALE TERMINAL | 1 | 36991 |
| 9 | PANEL | 1 | 36992 |
| 10 | TOGGLE SWITCH BOX | 1 | 36993 |

# APPENDIX 1
# RAMP SPECIFICATIONS

## PF7000 SERIES EXPRESS RAMP

| | |
|---|---|
| **Power ..... electric-motor** | **Rated load capacity ..... 363kgs** |
| **Power requirements ..... AC220V 50/60 Hz** | **Ramp weight..... approx. 103kgs** |




**DIMENSIONS**

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| **MODEL** | Stowed Height | Motor Depth | Usable Ramp Length | Floor-to-Ground Travel | Max Deploy Length | Stowed Width | Stowed Length | Usable Ramp Width |
| PF7-001 | 3.02 (77) | 4.55 (116) | 11.78 (299) | 3.54 (90) | 12.90 (328) | 36 (914) | 33.65 (855) | 36 (914) |
| PF7-002 | 3.02 (77) | 4.55 (116) | 11.78 (299) | 3.54 (90) | 12.90 (328) | 36 (914) | 33.65 (855) | 36 (914) |

NOTE: Dimensions in inches, millimeters in parentheses.