

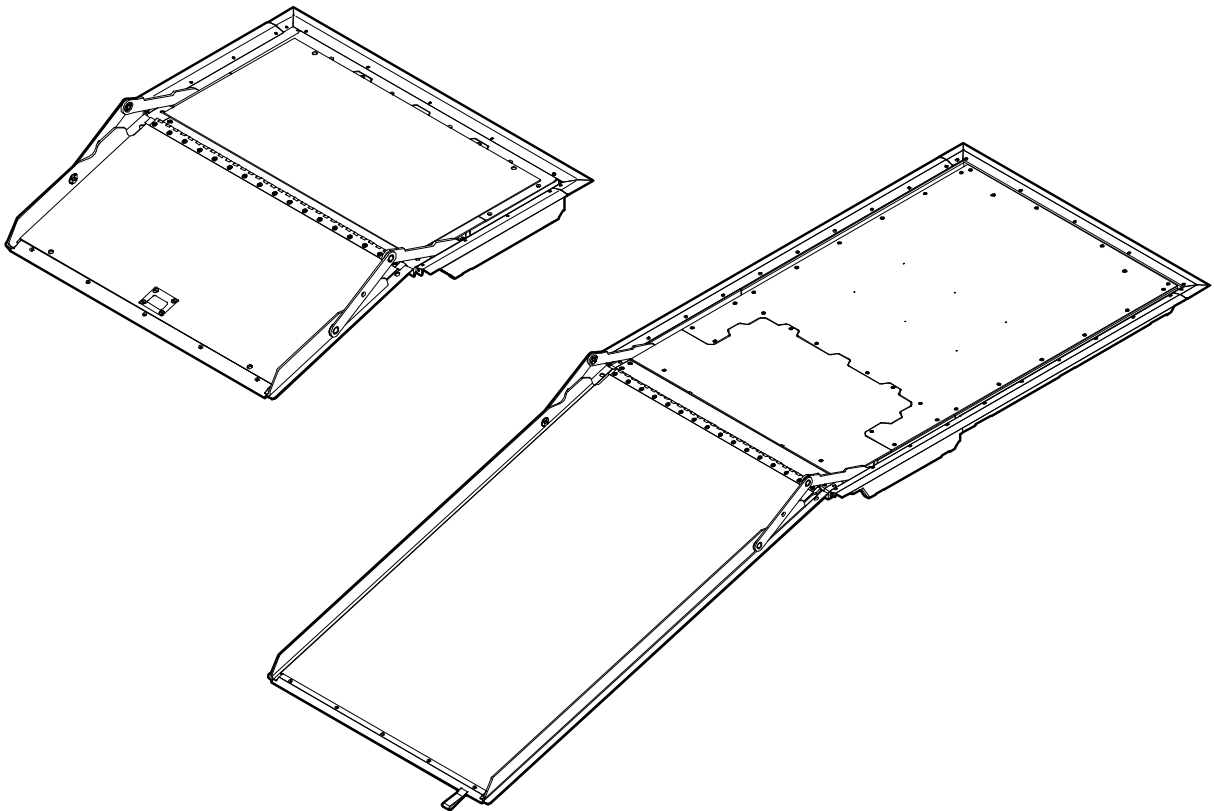


Ricon[®]

A Wabtec subsidiary

FoldOver[®]

**Electric FR2E-Series
Low-Floor Vehicle Access Ramp
for Transit Buses**



Service Manual

This Ricon service manual is only for use by Ricon dealers or qualified service technicians, and is not intended for use by non-professionals. The manual provides essential instructions and reference information, which supports qualified technicians in the correct installation and maintenance of Ricon products.

Ricon dealers or qualified service technicians have the training and knowledge to perform maintenance work properly and safely. For the location of a Ricon dealer or qualified service technician in your area, call Ricon Product Support at 1-800-322-2884 or visit our website at <http://ricondealer.wabtec.com>.

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

REVISION RECORD

REV	PAGES	DESCRIPTION OF CHANGE	ECO
32DFRE02. B	4-1	Update to Figure 4-1.	8523
	4-4	Update to Figure 4-2.1.	

Chapter

Page

I. FOLDOVER ELECTRIC FR2E-SERIES RAMP INTRODUCTION..... 1-1

A. RAMP FEATURES1-1

1. INTERLOCK SUPPORT 1-1

2. AUDIBLE ALERT 1-1

3. RAMP CONTROL PANEL 1-1

B. RICON PRODUCT SUPPORT 1-2

C. RICON TWO-YEAR LIMITED WARRANTY 1-3

D. SHIPPING INFORMATION 1-4

E. CUSTOMER ORIENTATION..... 1-5

II. FOLDOVER ELECTRIC FR2E-SERIES RAMP INSTALLATION 2-1

A. INSTALLATION GUIDELINE2-1

1. LOCATING MOUNTING BRACKETS ON BUS FRAME 2-1

2. INSTALLING RAMP IN FLOOR..... 2-1

3. INSTALLING VEHICLE WIRING HARNESS 2-3

B. FOLDOVER RAMP ADJUSTMENTS2-3

1. CHAIN ASSEMBLY REPLACEMENT..... 2-3

2. FINAL INPSECTION 2-4

III. FOLDOVER ELECTRIC FR2E-SERIES RAMP MAINTENANCE..... 3-1

A. GENERAL SAFETY PRECAUTIONS3-1

B. DAILY INSPECTION3-2

C. MAINTENANCE SCHEDULE..... 3-2

D. RAMP COMPONENT INFORMATION..... 3-3

1. MOTOR DRIVE SYSTEM 3-3

2. TRAY POSITION SWITCHES ASSEMBLY 3-3

3. ELECTRONIC CONTROLLER 3-3

4. INTERLOCK OUTPUT STATUS..... 3-4

5. CIRCUIT BREAKERS AND FUSES 3-4

6. ELECTRICAL DIAGRAMS..... 3-4

E. ELECTRICAL DIAGRAMS..... 3-7

IV. FOLDOVER ELECTRIC FR2E-SERIES RAMP SPARE PARTS..... 4-1

Appendix: Ramp Specifications 4-16

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I. FOLDOVER® ELECTRIC FR2E-SERIES RAMP INTRODUCTION

This manual applies to the Ricon FoldOver® Electric FR2E-Series Low-Floor Vehicle Access Ramp when installed in transit vehicles. The chapters in this service manual contain product description, maintenance instructions, and a spare parts list. The descriptions in this chapter apply to the Ricon FoldOver® Electric FR2E-Series Low-Floor Vehicle Access Ramp when installed in transit vehicles utilizing 12VDC or 24VDC applications. The FoldOver electric ramp is installed in low-floor transit vehicles to accommodate persons with disabilities using mobility-aid equipment or who cannot easily climb steps. The electro-mechanically powered ramp folds into the vehicle vestibule flooring when not in use.

All Electric FR2E-Series ramps have a 1,000 lbs. (453 kg) load limit. Passengers must use the ramp one at a time; **do not overload ramp**. Be certain that persons with mobility-aid equipment fit between the left- and right-side ramp barriers without any interference before allowing use of ramp.

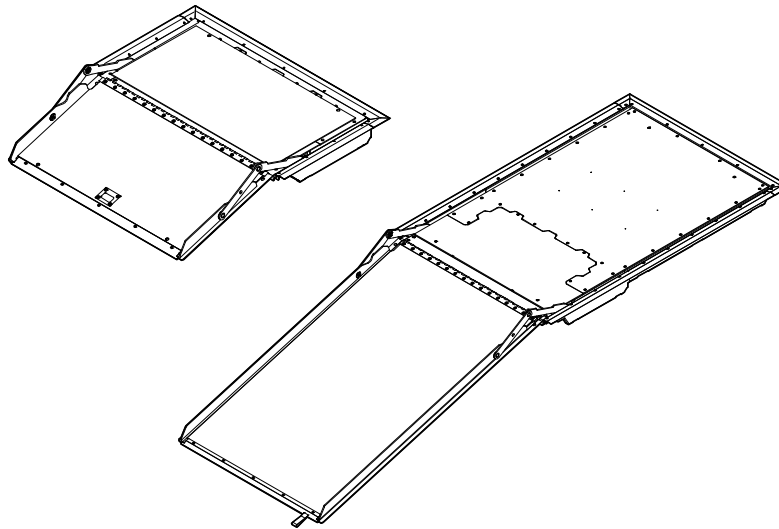


FIGURE 1-1: RICON FOLDOVER FR2E ELECTRIC LONG AND SHORT RAMP

A. RAMP FEATURES

1. INTERLOCK SUPPORT

The ramp electronics can interface with the vehicle interlock circuitry to prevent vehicle departure when ramp is deployed. The electric ramp interlock circuitry senses the position of the ramp (stowed or deployed) and makes this information available by the controller and through the 55-pin amp harness connector. A vehicle interlock circuit typically requires that the following conditions be met before operating power is supplied to electric ramp:

- Park vehicle and set parking brake.
- Place transmission in neutral.
- Open vehicle door adjacent to electric ramp.

2. AUDIBLE ALERT

NOTE: This feature is optional and may not have been connected during ramp installation.

The ramp supports an audible alert device that sounds while the ramp is in motion.

3. RAMP CONTROL PANEL

Refer to **Figure 1-2**. Ricon typically does not provide a control panel. However, the ramp can be operated with one similar to that shown (the actual panel appearance will vary between transit authorities and vehicles). The control panel is normally installed in the driver area. It should have a power ON/OFF switch, a power on indicator light, and a spring-loaded, three-position ramp control switch (center-off). The electric ramp receives power from the vehicle when the interlock conditions are met and the power on/off switch is ON. The control panel can then be used to transmit deploy or stow signals to the electric ramp.

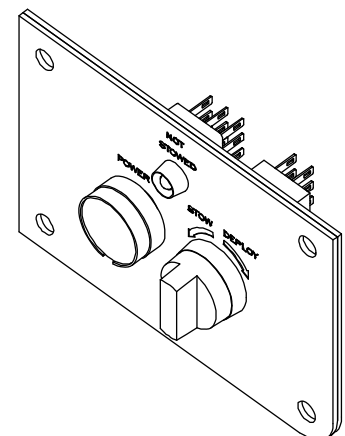


FIGURE 1-2: TYPICAL CONTROL PANEL

B. RICON PRODUCT SUPPORT

If you have questions about this manual, or you need additional copies, please contact Ricon Product Support at the locations listed. Also, refer to the Ricon website at: <http://ricondealer.wabtec.com>

Ricon Corporation

1135 Aviation Place

San Fernando, CA 91340

Telephone: (818) 267-3000
..... (800) 322-2884
(in US but outside 818 area code)

John Condon Email: jcondon@wabtec.com

National Sales Manager

Telephone: 209-603-5189

Mike O'NeillEmail: moneill@wabtec.com**Eastern Area Sales Manager**

Telephone: 847-224-5087

Justin MillikinEmail: jmillikan@wabtec.com**Central Area Sales Manager**

Telephone: 916-206-7456

Vapor Ricon Europe Ltd.

Meadow Lane

Loughborough, Leicestershire

LE 1HS, United Kingdom

Telephone: (+044) 1509 635 920

C. RICON TWO-YEAR LIMITED WARRANTY

The following warranty provides two years of limited coverage for the Ricon FoldOver® Electric FR2E-Series Low-Floor Vehicle Access Ramp when installed in Transit Vehicles.



RICON FOLDOVER® ELECTRIC FR2E-SERIES LOW FLOOR VEHICLE ACCESS RAMP FOR TRANSIT BUSES TWO-YEAR LIMITED WARRANTY

Ricon Corporation (Ricon) warrants to the original purchaser of this product that Ricon will repair or replace, at its option, any parts that fail because of defective material or workmanship as follows:

- Repair or replace parts for a period of two years starting from the date ramp is put into service. Obtain a complete list of parts covered by this warranty from Ricon Product Support.
- Labor costs for specified parts replaced under this warranty for a period of two years from the date put into service. A Ricon rate schedule determines parts covered and labor allowed.

This Warranty Does Not Cover:

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

NOTE: Ricon recommends this product be inspected by a Ricon dealer or qualified service technician at least once every six months, or sooner if necessary. Perform required maintenance at this time.

 **WARNING!**

THIS PRODUCT HAS BEEN DESIGNED AND MANUFACTURED TO EXACT SPECIFICATIONS. ANY MODIFICATION OF THIS PRODUCT CAN BE HAZARDOUS.

This Warranty is Void If:

- * The product is not installed and maintained by a Ricon dealer or qualified service technician.
- * The product is modified, in any respect from its original design, without written authorization from Ricon.

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

Ricon obligation under this warranty is exclusively limited to the repair or exchange of parts that fail within the applicable warranty period.

Ricon assumes no responsibility for expenses or damages, including incidental or consequential damages. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply.

Important: The warranty registration card must be completed and returned to Ricon within 20 days after product installation to validate this warranty. The warranty is not transferable.

The warranty gives specific legal rights. There may be other rights that vary in each state.

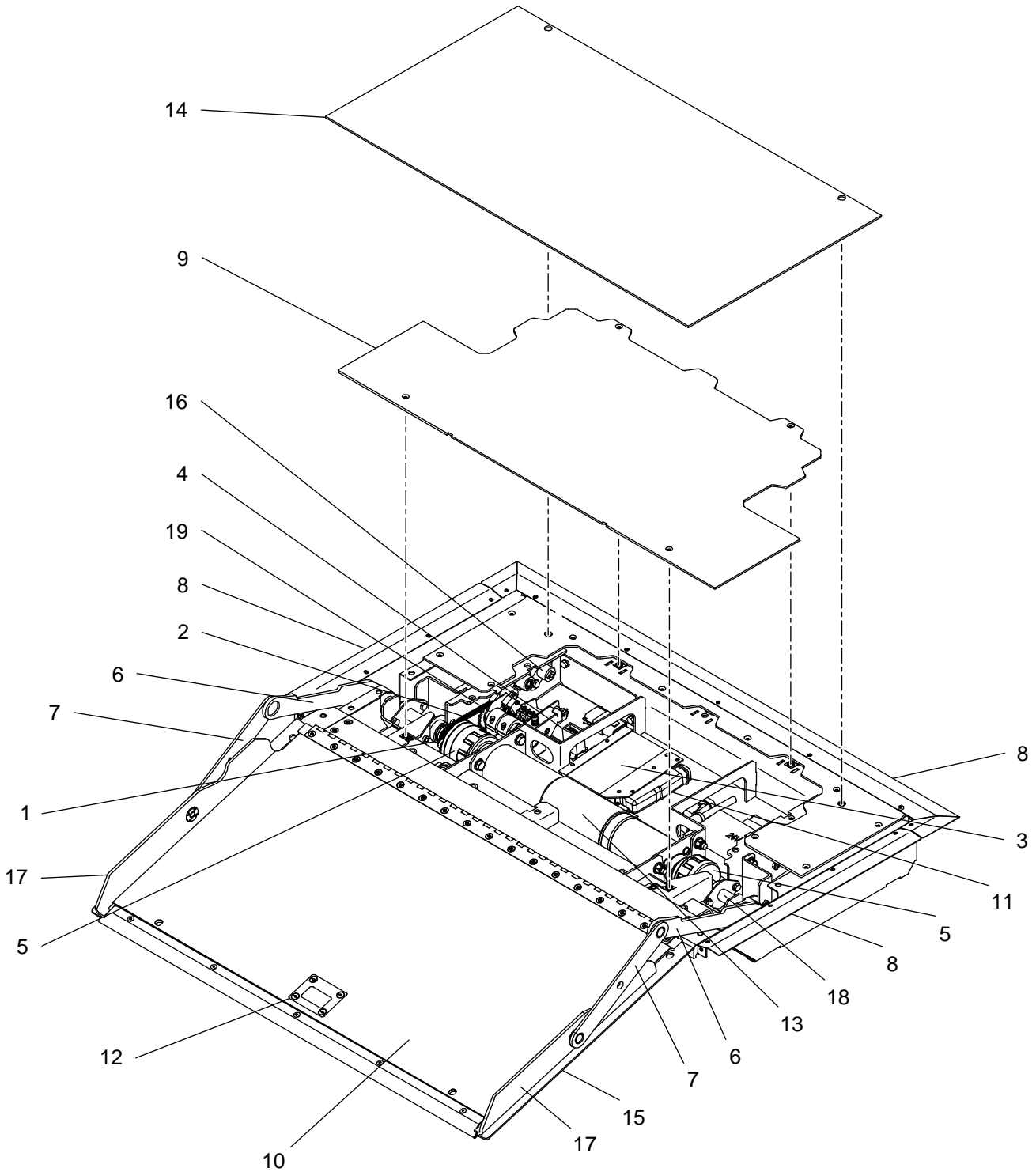
D. SHIPPING INFORMATION

- 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 ramp assembly contains all items listed on the included bill of material. Please report any missing items immediately to Ricon Product Support. Save bill of material for later reference. Return the completed warranty and owner registration cards to Ricon within 20 days to validate warranty.

NOTE: The Sales or Service personnel must review the Warranty and this Operator Manual with the user to be certain that they understand how to safely operate the product. Instruct the user to follow the operating instructions without exception.

E. CUSTOMER ORIENTATION

- 1. **Figure 1-3** shows major components of the Ricon FoldOver® Electric FR2E-Series ramp. A description of each component is provided in **Table 1-1**. Refer to Chapter IV "Parts Diagrams and Lists" for more details.



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FIGURE 1-3: ELECTRIC FR2E-SERIES RAMP MAJOR COMPONENTS

TABLE 1-1: FOLDOVER® ELECTRIC FR2E-SERIES RAMP MAJOR COMPONENTS

ITEM	DESCRIPTION
Item	Description
Front, Rear, Left and Right	Reference point from outside the vehicle looking inward.
1	Adjustable Coupler - Use for adjustment and alignment of chain sprocket.
2	Chain – Transfers the motion from the drive shaft to the CAM shaft which actuates the micro-switches that identify the position of the ramp tray.
3	Controller – Translates electrical commands from bus control panel into signals that control ramp electro-mechanical components. Monitors ramp position and drives counter.
4	Counter – Counts each cycle.
5	Couplings – (Left & Right) Transmits rotary motion and attaches the drive motor shaft assemblies to the dual gearboxes.
6	Drive Arms – Ramp linkage arms attach to outboard end of driveshafts.
7	Driven Arms – Ramp linkage arms attach to ramp.
8	Flange Kit – Perimeter trim pieces that are installed after the ramp has been installed in vehicle.
9	Floor Plate (Access Cover) – Portion of ramp that passenger traverses over to enter and exit vehicle which also provides access to electro-mechanical ramp components.
10	Front Cover – Front edge of ramp that opens and closes when platform is deployed or stowed.
11	Harness – Integrates conduits, relays, etc.
12	Hatch Handle – Use to assist in manual deploy or stow ramp.
13	Motor Drive System – Electro-mechanical motor-gearbox combination used to operate the ramp.
14	Non-Slip Surface – Flooring over which passengers traverse.
15	Platform Assembly – Area where passengers traverse over to enter and exit vehicle.
16	Positive Connection Block – Connection through which the ramp receives power from vehicle.
17 *	Ramp Tray Barrier – Left and Right side barrier of platform.
18	Spider Coupling Drive Shaft – Transmits motor torque to drive arms.
19	Tray Position Switches Assy – Contains CAMs and micro-switches which identify the position of the ramp tray by the position of the CAMs

* Note: Short ramp tray shown.

II. FOLDOVER® ELECTRIC FR2E-SERIES RAMP INSTALLATION

A. INSTALLATION GUIDELINES

Careful installation of the Ricon FoldOver® Electric FR2E-Series Low-Floor Vehicle Access Ramp contributes to proper and safe operation. Use the electrical wiring diagram in Chapter III, Figure 3-4 to supplement this section.

1. LOCATING MOUNTING BRACKETS ON BUS FRAME

Use a rigid fixture that substitutes for the ramp assembly when positioning ramp mounting brackets on the bus frame. If the ramp assembly is used to position the mounting brackets, verify that it is correctly located relative to the vehicle floor, etc. Accurate positioning of the brackets prevents twisting or warping of ramp frame when installing and tightening the mounting hardware. A warped frame may cause the ramp motion to be erratic. Set the height of the ramp flooring surface flush to the surrounding floor structure to prevent a tripping hazard.

2. INSTALLING ELECTRIC FR2E-SERIES LOW-FLOOR VEHICLE ACCESS RAMP IN FLOOR

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

- a. Trim away floor material to allow ramp assembly to drop into floor opening.

NOTE: Do Not install ramp trim (flange kit) until ramp is installed in bus. The ramp trim overlaps the perimeter gap between the sides of the enclosure and bus structure. The typical gap between the sides of the enclosure and the bus structure is 1/8 inch. Use shims to fill gap.

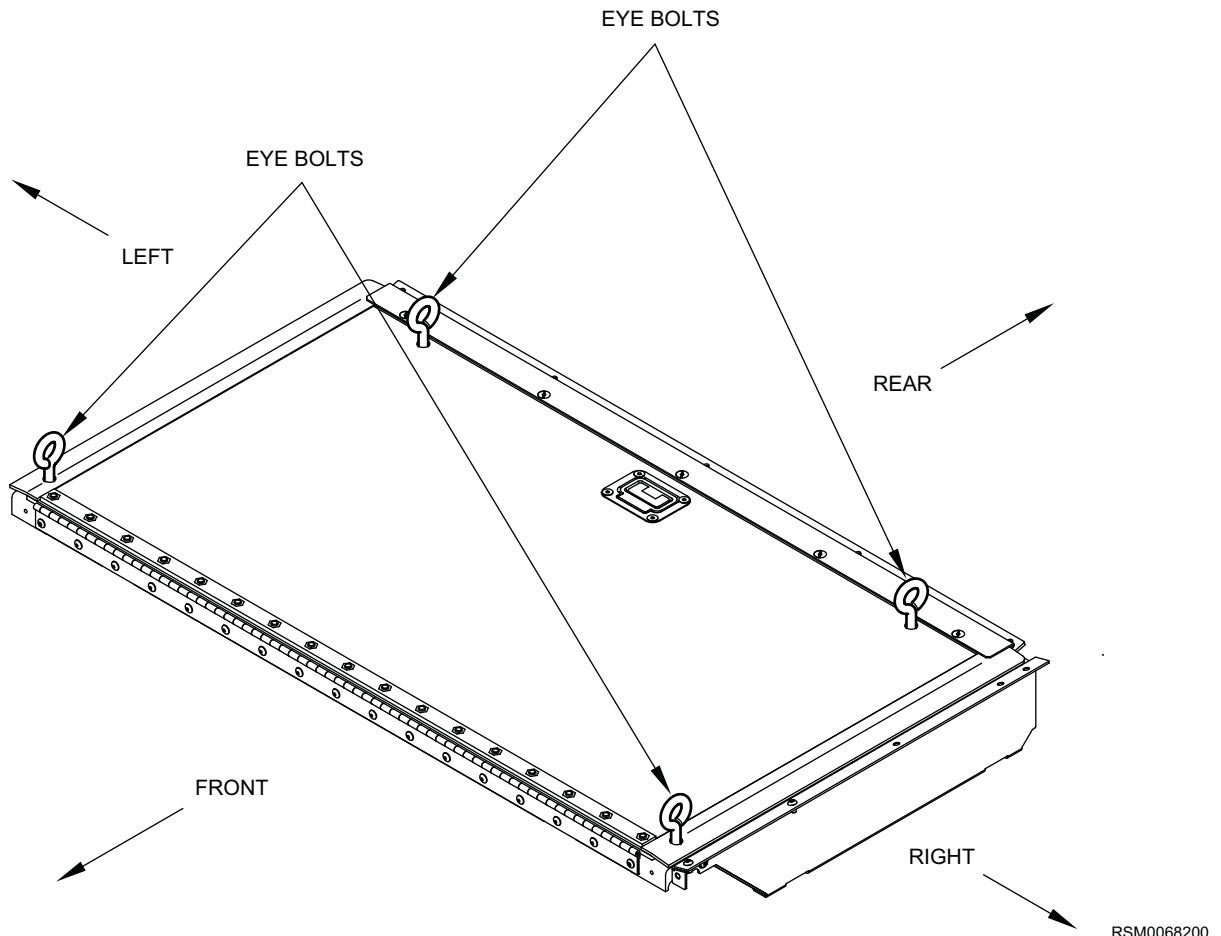


FIGURE 2-1: RAMP LIFTING EYE BOLTS

! WARNING!

TAKE EXTREME CARE WHEN POSITIONING RAMP INTO BUS. BE SURE TO FOLLOW PROPER OPERATION AND SAFETY INSTRUCTIONS WHEN USING LIFTING DEVICE.

- b. Refer to **Figure 2-1**. Attach lifting device hooks to pre-installed eye bolts.

- c. Use lifting device to place ramp into bus.
- d. Refer to **Figure 2-2**. Lower ramp onto bus floor. Ensure that rear ramp flange rests on bus floor.

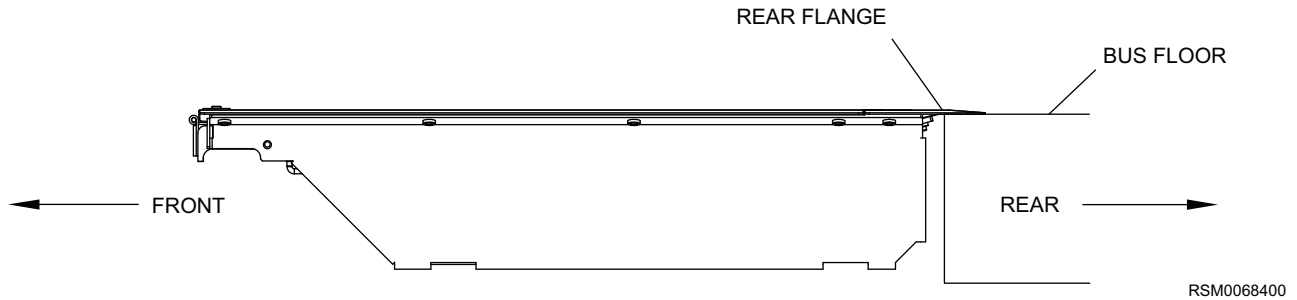


FIGURE 2-2: RAMP INSTALLATION (SHORT RAMP SHOWN)

NOTE: Ramp should sit securely and level on bus structure. If ramp does not sit level on bus structure, install appropriate shim spacers accordingly.

⚠ CAUTION!

FOLLOW SEQUENCE FOR SECURING RAMP ONTO BUS STRUCTURE. DEVIATION FROM THE INSTALLATION SEQUENCE CAN CAUSE RAMP WARPAGE.

- e. Install and tighten hardware to secure ramp enclosure within bus structure.

NOTE: Installation of ramp into bus may vary by manufacturer and configuration of ramp.

- f. Refer to **Figure 2-3**. Install left and right trim pieces with attaching hardware provided.
- g. Install rear trim piece with attaching hardware provided.

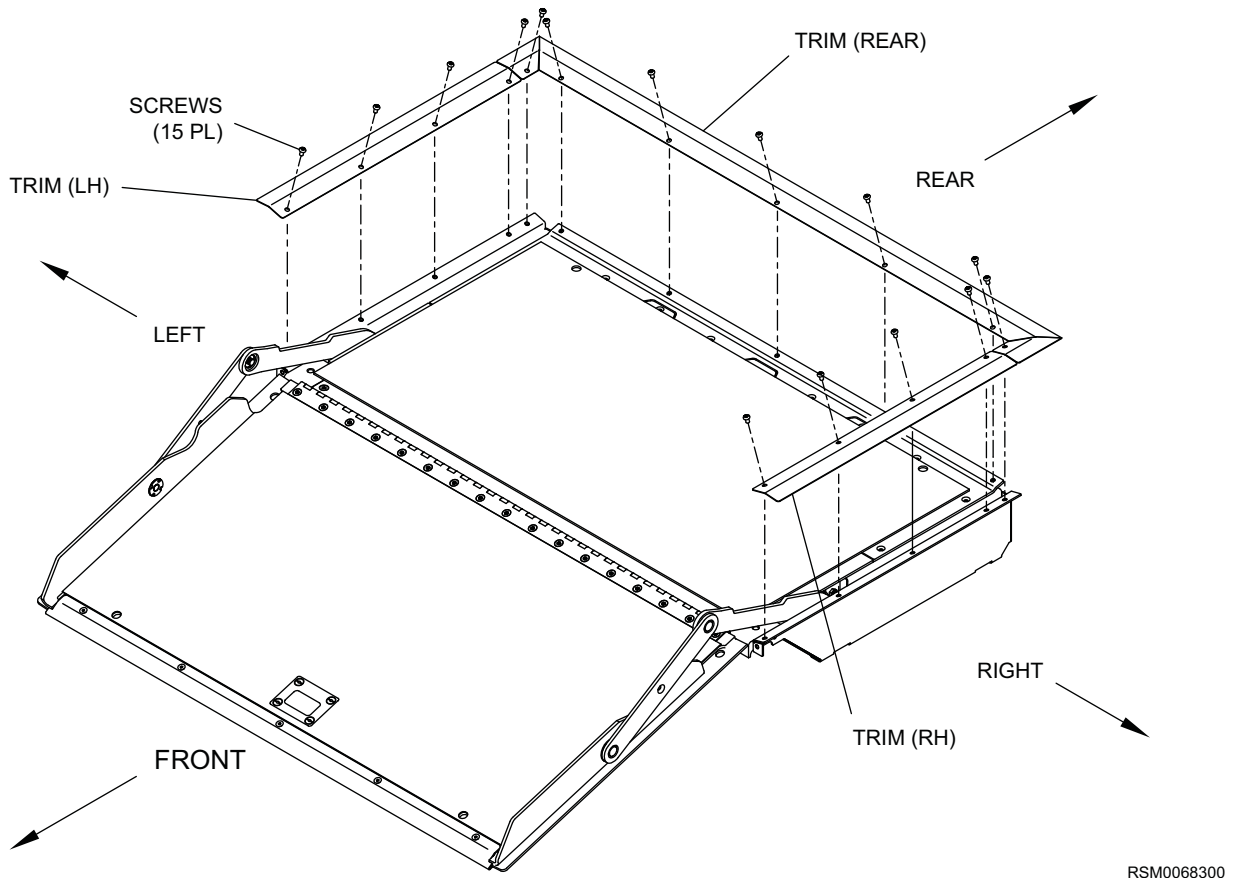


FIGURE 2-3: RAMP TRIM INSTALLATION

3. INSTALLING VEHICLE WIRING HARNESS

Route wiring harness from vehicle ramp controls to rear of ramp. Use the supplied electrical installation kit to connect vehicle control wiring to the ramp interface connector (Ricon P/N 51034). See **Table 2-1** for 12-pin Deutsch connector pin and signal descriptions.

- a. Disconnect vehicle battery.

 CAUTION
Be sure that harness does not interfere with any moving parts, or binds against any parts, or is pinched in any way.

- b. Install Main Circuit Breaker Kit (P/N 36267). Avoid installing near a heat source.
- c. Refer to Chapter III Electrical Diagram, Figure 3-4. Route and install black ground cable (P/N 43929) to ground connection and red power cable (P/N 43928) to positive connection block.
- d. Route and install ramp interface harness (supplied by bus manufacturer) to ramp interface connection.
- e. Cycle ramp a few times to ensure ramp is working properly.

Table 2-1: CONNECTOR SIGNAL DESCRIPTION			
5 Pin	12 Pin	Wire	Description
A	1	White	Interlock (Output) – No signal when ramp not stowed, Ground when ramp stowed.
B	2	Red	Stow Attempt (Input) – 12V/24V to controller to engage stow functions.
C	3	Orange	Interlock (Output) – 12V/24V when ramp not stowed. 0V when ramp stowed.
D	4	Black	Deploy Attempt (Input) – 12V/24V to controller to engage deploy functions.
E	5	Brown	Heater Mat (Optional) – 12V/24V to heater mat (Grounded internally).

B. FOLDOVER FR2E ELECTRIC RAMP COMPONENT REPLACEMENT AND ADJUSTMENTS

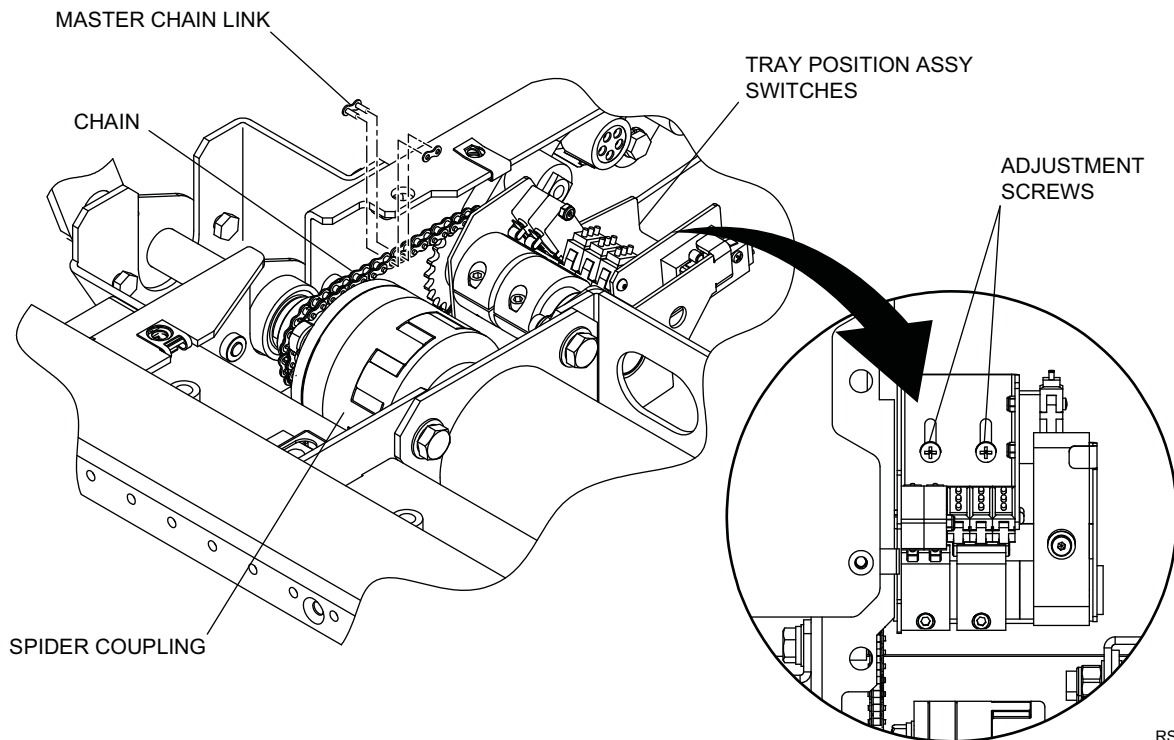
Removal of ramp assembly from vehicle and onto a workbench or work stand is necessary for access to enclosure components. Moving the ramp assembly to a workbench or work stand may require two people.

Follow all safety requirements before proceeding with any of the following procedures.

1. CHAIN ASSEMBLY REPLACEMENT

In the event that the chain assembly may require replacement, follow the removal and installation procedures. The chain assembly is located on the inside of the enclosure. The ramp tray will not require removal to access the chain assembly.

- a. Deploy wheelchair ramp to ground level.
- b. Remove Floor Cover to access enclosure components.
- c. Refer to Figure 2-4. Loosen adjustment screws of Tray Position Switch Assembly.
- d. Mark the position of the chain relative to the timing sprocket of the left had crank shaft.



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FIGURE 2-4: CHAIN REMOVAL

- e. Refer to **Figure 2-4**. Remove and retain master chain link.
- f. Replace and install new chain then install master chain link.
- g. Adjust tension of chain by adjusting position of Tray Position Switch Assembly.
- h. Tighten two screws to secure Tray Position Switch Assembly.
- i. Test the chain assembly by deploying and stowing ramp 2-3 cycles.

2. FINAL INSPECTION

- a. Visually inspect ramp for loose or missing hardware and fittings, and confirm that pockets are free of debris.
- b. Verify that slanted plated cover is secure and closed on ramp.
- c. Verify that non-skid flooring is clean, functional, and securely fastened.
- d. Verify that manual operation strap is undamaged.

III. FOLDOVER® ELECTRIC FR2E-SERIES RAMP MAINTENANCE

The maintenance information in this chapter applies to the Ricon FoldOver® Electric FR2E-Series Low-Floor Vehicle Access Ramp when installed in transit vehicles. The information consists of safety precautions, a maintenance schedule, component information, and diagrams for the electrical system. This chapter is intended to supplement related sections of the vehicle manufacturer Owner Manual and Quick-Start Guide.

A. GENERAL SAFETY PRECAUTIONS



WARNING!

THIS ELECTRIC RAMP IS DRIVEN WITH AN ELECTRIC MOTOR DRIVE SYSTEM. USE EXTREME CAUTION WHEN DOING MAINTENANCE AND REPAIRS. DO NOT DISCONNECT ELECTRICAL CABLES OR FITTINGS WHEN RAMP IS IN MOTION OR WHEN POWER IS APPLIED TO THE ELECTRIC RAMP.

Follow these safety precautions during service of the Ricon FoldOver Electric ramp:

- Under no circumstances is maintenance, repair, or adjustment of the FoldOver electric ramp to be performed without the presence of an individual capable of giving aid.
- Give immediate attention to all injuries, and administer first-aid or seek medical attention as necessary.
- Protective eye shields and clothing should be worn during maintenance, repair, and adjustment of the FoldOver electric ramp.
- The user must be cautious when operating the ramp. Be certain that hands, feet, legs, and clothing are not in the path of ramp movement.
- Batteries contain acid that can burn. Wear protective clothing and eye protection at all times. If acid comes in contact with skin, immediately flush affected area with water and wash with soap. Do not place anything electrically conductive on top of battery. Do not smoke or use an open flame near battery.
- Work in a properly ventilated area.
- Read and understand all instructions before attempting to operate the FoldOver electric ramp.
- Inspect the ramp before use for unsafe conditions, unusual noises, or erratic movements. Do not use ramp if any of these are present, and arrange to have a Ricon dealer or qualified service technician inspect ramp.
- Keep others clear of the ramp while it is operating.
- Ricon strongly recommends that the vehicle be parked on level ground when using ramp. Using the ramp when vehicle is sloped may result in a ramp angle that is too steep for safe use. In addition, the sloped vehicle may not allow the ramp to make complete contact with the ground.
- The FoldOver electric ramp and other system components require periodic maintenance. Ricon recommends a thorough vehicle inspection by a Ricon dealer or qualified service technician at least once every six months. To maximize safety, the ramp and related components should be maintained at their highest level of performance.
- Read and comply with warning labels attached to ramp.

B. DAILY INSPECTION

Check ramp daily, following the Daily Inspection outlined in **Table 3-1**. Meet all inspection criteria before allowing passengers on ramp.

TABLE 3-1: DAILY INSPECTION	
INSPECTION POINT	CHECK
Ramp controller	<ul style="list-style-type: none"> • Power ON/OFF switch operates correctly. • Power On indicator illuminates when Power ON/OFF switch is ON. • DEPLOY and STOW switches operate correctly. • No unusual noises or erratic movements when ramp is deploying or stowing.
Ramp and surrounding area	Vestibule area is free of loose objects and trim pockets are free of debris.
Ramp non-slip surfaces	<ul style="list-style-type: none"> • Surface is clean and free of slippery or sticky substances that could compromise user safety. • Surface is intact and secure, and loose edges, if present, cannot create a stumbling hazard.
END OF TABLE	

C. MAINTENANCE SCHEDULE

Regular maintenance and inspection of the Ricon FoldOver® Electric FR2E-Series Low-Floor Vehicle Access Ramp provides optimum performance and reduces the need for repairs. Maintain the ramp as directed in **Table 3-2**. Perform ramp maintenance more frequently during heavy use (more than 20 cycles per day).

⚠ CAUTION!
~ This Ricon Product Is Complex ~
Required warranty period maintenance and repairs must be done at a Ricon dealer or qualified service facility. Improper maintenance, use of non-Ricon replacement parts, or product modification will void warranty and can result in unsafe operating conditions. We recommend that a Ricon dealer or qualified service facility continue maintenance inspections when warranty ends.

TABLE 3-2: MAINTENANCE SCHEDULE	
INSPECTION POINT	ACTION
– 6,000 MILE INSPECTION –	
Electrical System	Check all electrical cables and fittings; tighten or replace as necessary.
Cover Fasteners	Check all threaded fasteners for looseness, and retighten as necessary.
Non-slip surface	Visually check for damage to surface, and for loose or missing non-slip material.
Ramp Interior	Visually check ramp interior area and remove accumulated dirt and debris.
Setscrews	Check for loose or missing setscrews at these locations: <ul style="list-style-type: none"> • Driveshaft couplers (2 x 4 ea) • Sensor target (1 ea) • Pillow blocks (2 x 2 ea) Tighten, or replace, as necessary.
Decals	Visually check for illegibility or damage, replace as necessary.

TABLE 3-2: MAINTENANCE SCHEDULE

INSPECTION POINT	ACTION
– 12,000 MILE INSPECTION –	
Wiring harnesses	Check wiring insulation for heavy abrasions, and connectors for looseness. Replace as necessary.
Fasteners	Check all threaded fasteners for tightness and retighten as necessary.
Non-slip surfaces	Check non-slip surface for excessive wear or damage (rips, tears, peeling, etc.), and replace as necessary.
– 24,000 MILE INSPECTION –	
Self Aligning Assembly	Grease or oil to lubricate parts is NOT recommended. Keep components clean and free of debris. Refer to installation section for self aligning assembly replacement.
END OF TABLE	

D. RAMP COMPONENT INFORMATION

Ricon FoldOver® Electric FR2E-Series Low-Floor Vehicle Access Ramp uses electrical power from the host vehicle to deploy and stow the ramp. Vehicle electrical power is converted to mechanical force, which is used to move the ramp. Electrical components are described below. Please refer to **Figures 3-4** for electrical diagram.

1. ELECTRIC MOTOR DRIVE SYSTEM

The ramp employs an electro-mechanical motor drive system (contained within the ramp enclosure). Settings are programmed in the motor drive system and is preset at Ricon.

The motor drive system converts electrical power into mechanical force through the crank shafts when either the DEPLOY or STOW micro-switches are activated and controlled by an electronic controller. Ricon recommends operating the ramp while the vehicle engine is running in order to minimize current drain on the vehicle battery.

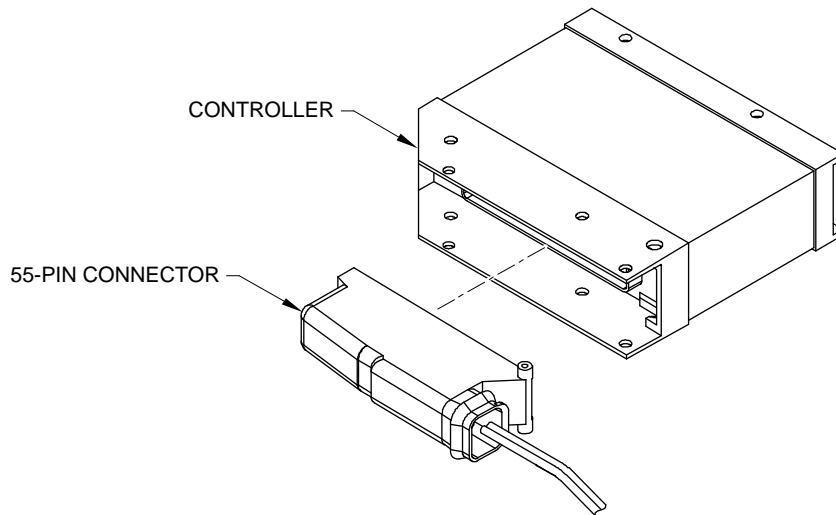
2. TRAY POSITION SWITCH ASSEMBLY

A factory adjusted tray position switch assembly identifies the DEPLOY or STOW position of the ramp tray as the electro-mechanical drive system transfers motion from the crank shaft, through the chain, onto the CAM shaft. The CAMs attached on the rotating CAM shaft activate the micro-switches which relay signals to the electronic controller that controls the functions of the ramp.

3. ELECTRONIC CONTROLLER

The electronic controller interprets input/output signals from the micro-switches and controls ramp functions by relaying signals to/from the control box. It contains integrated circuits (ICs), relays, fuses, and associated parts. The ICs cannot be accessed externally. The 55-pin ramp connector receives 12V/24V to power the controller and sends 12V/24V through the control box that controls power to the motor drive system.

Refer to **Figure 3-1** for connector and controller connection. Controller only requires one 55-pin connector connection.



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FIGURE 3-1: CONTROLLER

NOTE: Voltage levels are 24 to 28 VDC in this application.

4. INTERLOCK OUTPUT STATUS

The FoldOver Electric ramps has two ramp positions that are monitored by the controller. This position is fully stowed to deployed position. The ramp must be in the fully stowed area before the electrical interlock output signal will turn on (24VDC). This is done to reduce the possibility of a passenger tripping on the front edge of the ramp when it is not stowed completely as well as preventing the bus from operating or moving when ramp is deployed. Refer to **Table 3-3**. The status of the interlock output (GND or 12VDC/24VDC) occur when the ramp is either STOWED or DEPLOYED. Note that the interlock output has both a normal and an inverted output. This table applies to the normal output.

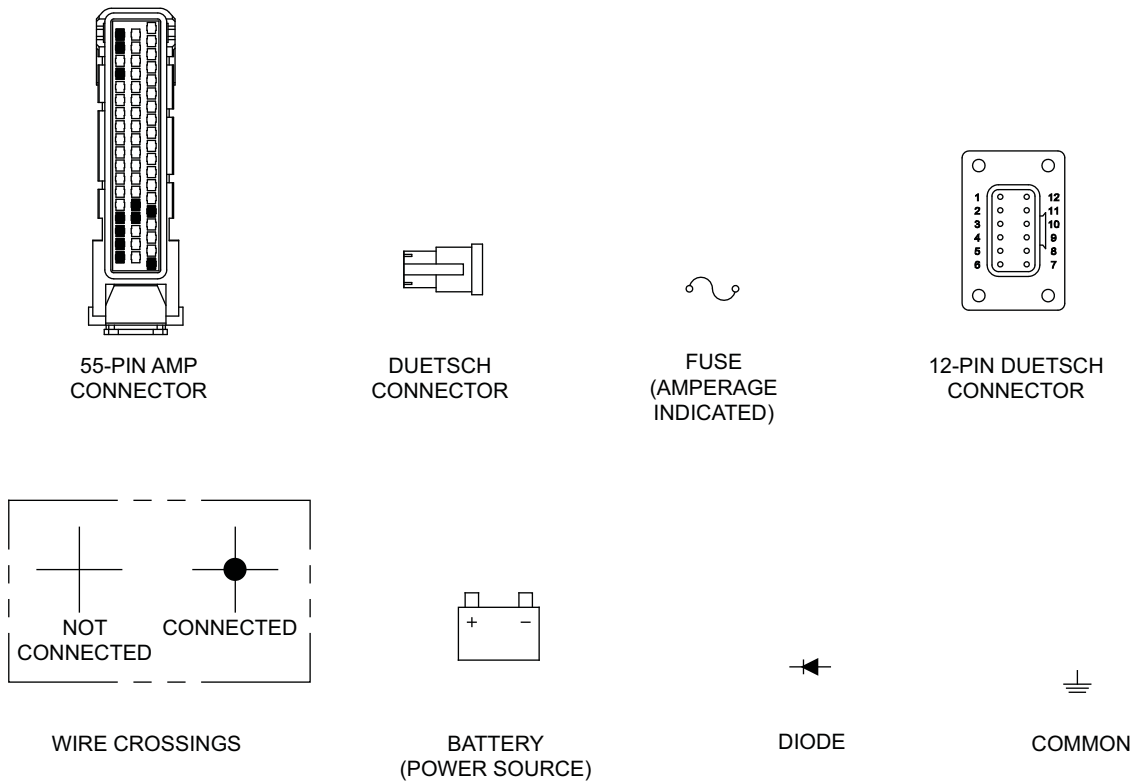
TABLE 3-3: INTERLOCK OUTPUT STATUS	
POSITION	INTERLOCK OUTPUT
STOWED	GND
DEPLOYED	12VDC/24VDC
End of Table	

5. CIRCUIT BREAKERS AND FUSES

The bus builder installs a 50-amp circuit breaker for 12V or 24V applications to protect ramp control circuits. Refer to **Table 3-4** for harness fuses.

6. ELECTRICAL DIAGRAMS

Refer to **Figure 3-2** for a description of plug and receptacle designations used on schematic.

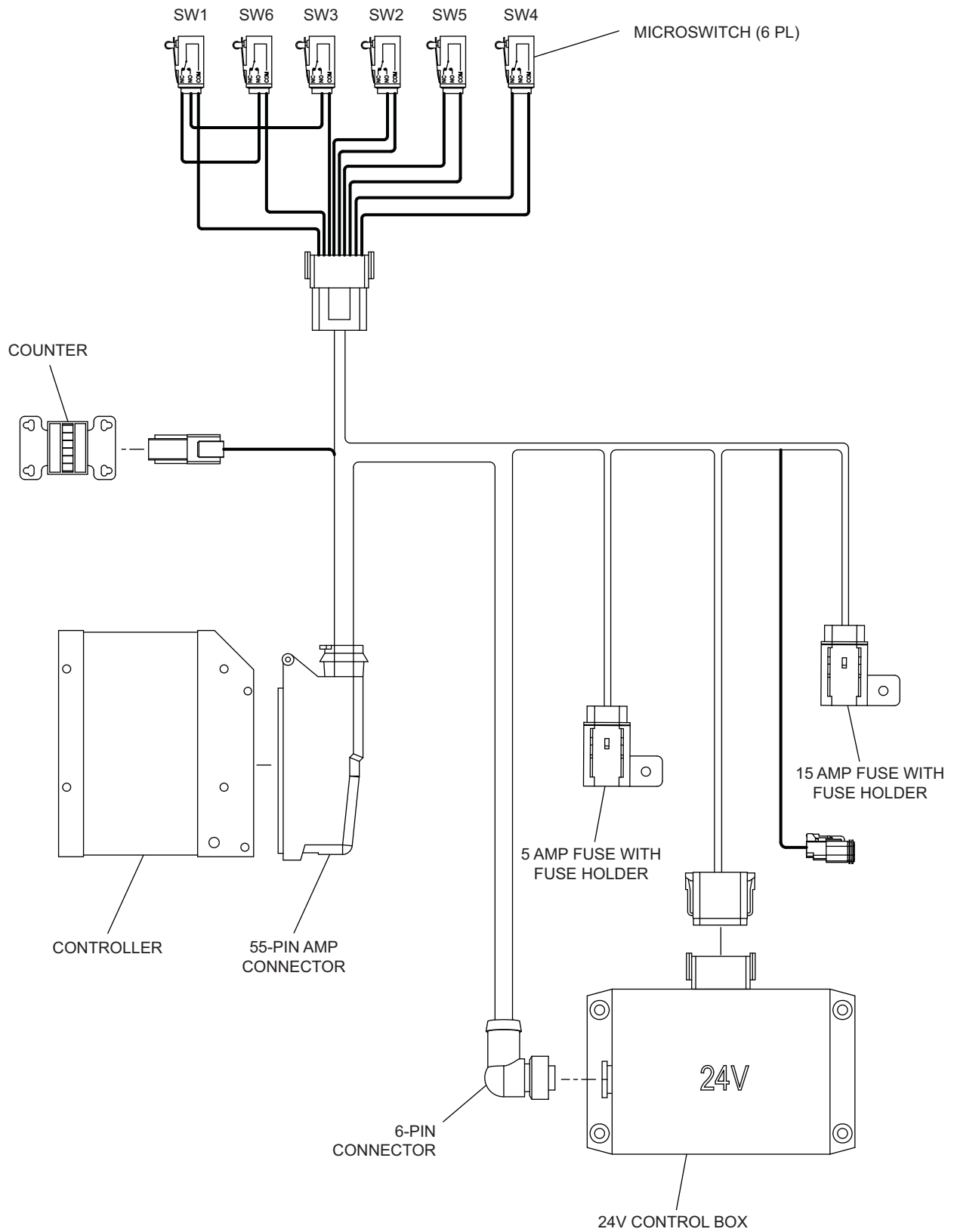


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FIGURE 3-2: SCHEMATIC SYMBOLS

TABLE 3-4: HARNESS FUSES		
FUSE	RATING	CIRCUIT
F1	5 AMP	Lift Enable (Ramp Switch)
F2	15 AMP	12V/24V High Voltage (Motor Power)
END OF TABLE		

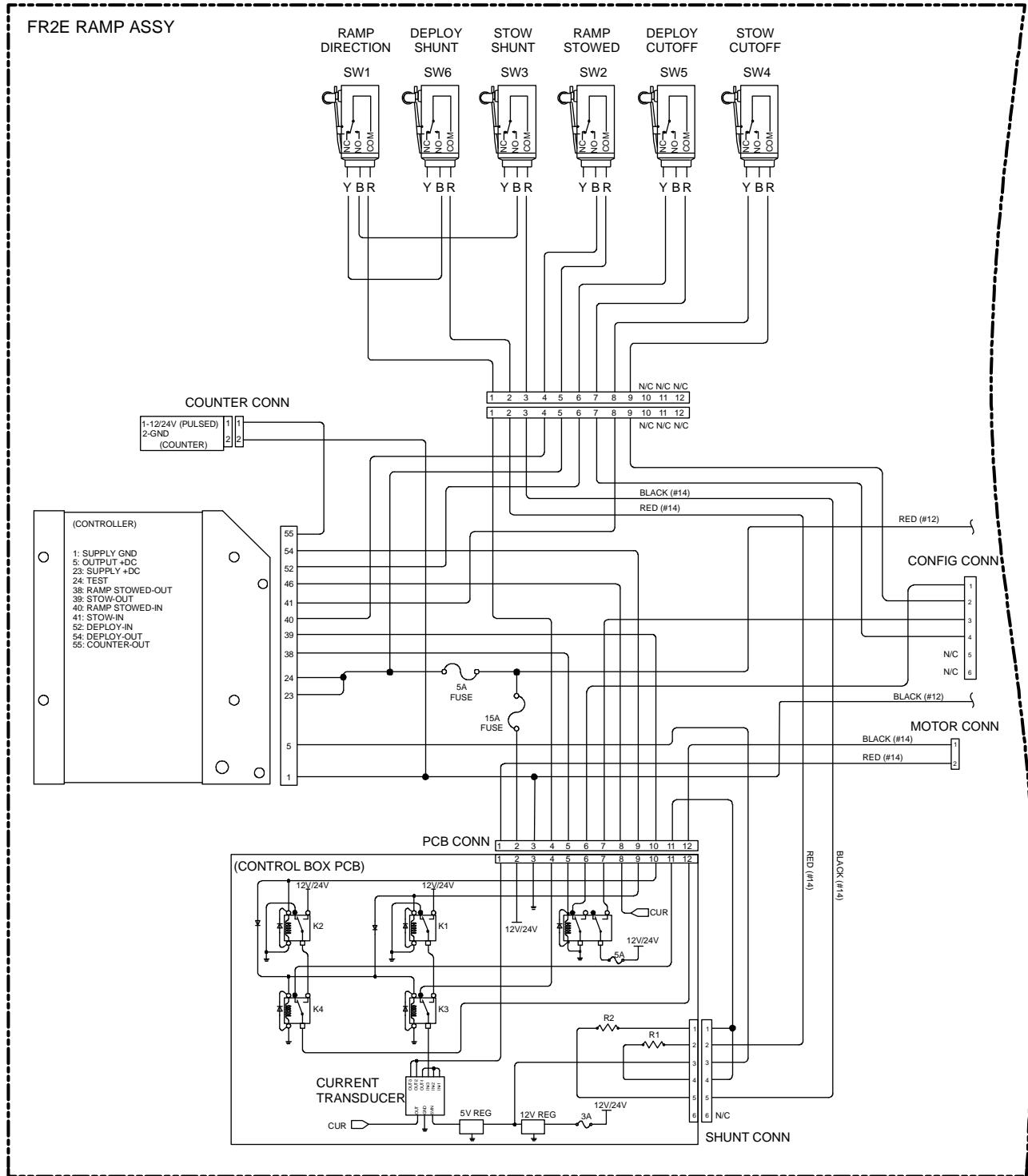
Refer to **Figure 3-3** for an overall wiring diagram of the ramp system. The wiring diagram is located at the end of this chapter.



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FIGURE 3-3: CONNECTOR CONFIGURATION

E. WIRING DIAGRAM



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FIGURE 3-4.1: FR2E-SERIES ELECTRIC RAMP HARNESS DIAGRAM (SHEET 1 OF 2)

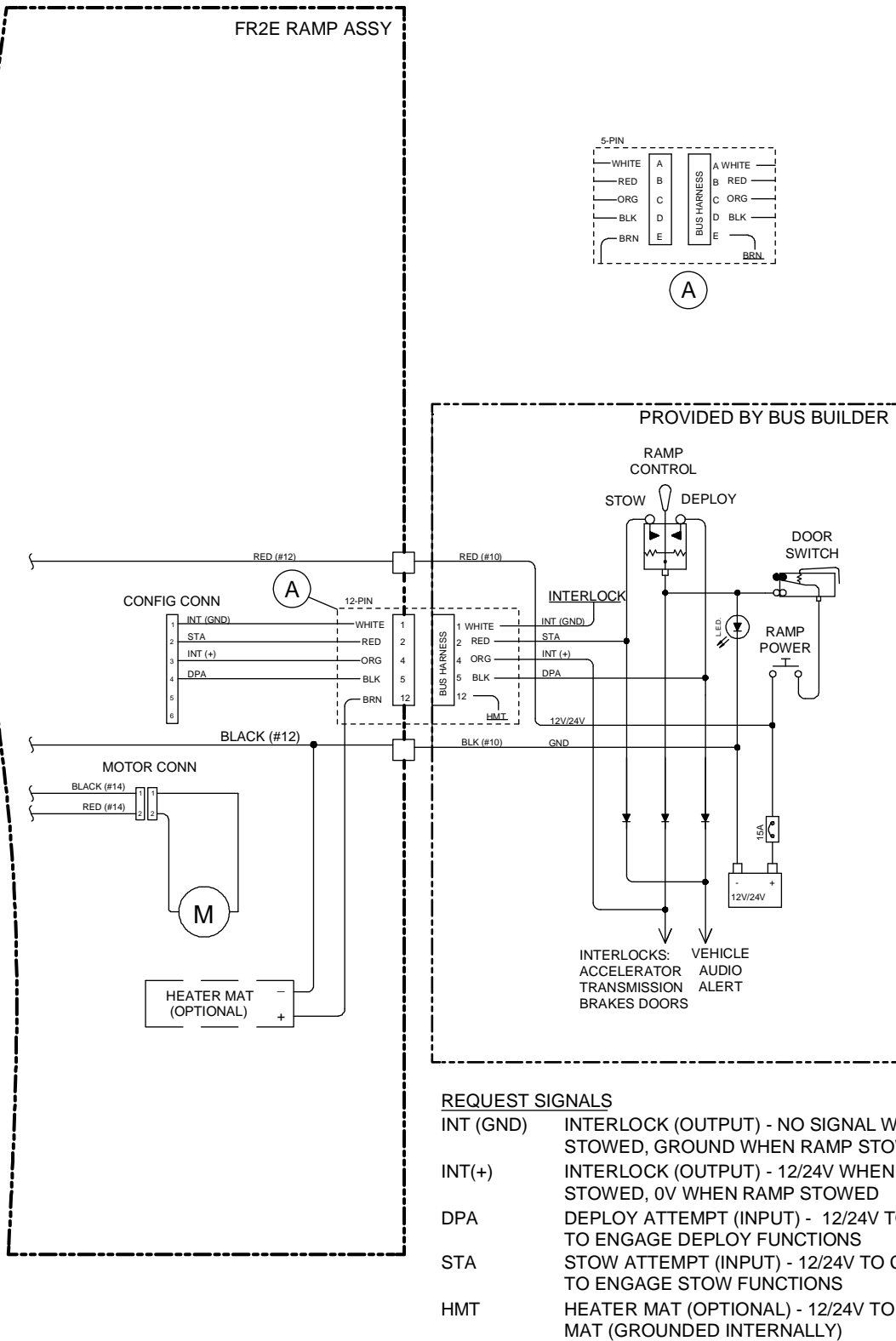


FIGURE 3-4.2: FR2E-SERIES ELECTRIC RAMP HARNESS DIAGRAM (SHEET 2 OF 2)

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IV. FOLDOVER® ELECTRIC FR2E-SERIES SHORT AND LONG RAMP SPARE PARTS

The parts layouts and lists in this chapter apply to the Ricon FoldOver® Electric FR2E-Series Low-Floor Vehicle Access Short and Long Ramp when installed in a transit vehicle. Replaceable ramp parts are illustrated in exploded views of major lift assemblies, which show smaller assemblies and components with reference numbers. Each associated parts list contains reference numbers, parts descriptions, and Ricon part numbers.

Each accompanying parts list contains figure item numbers, part descriptions, quantities used, configurations and the Ricon part number. To order parts, locate part on an appropriate diagram and note the figure item number. Find the figure item number on the accompanying parts list and use the part number in the far right column. Note that parts identified with (REF) in the QTY column of the spare parts list are for reference purposes only and are not sold for spare parts.

NOTE:

- Most items that are described as “kits” contain a single part (plus hardware). Therefore, you may need to order more than one kit if the part is used more than once on the assembly shown.
- Small, inexpensive hardware items are supplied in a minimum quantity of ten, and are packaged in a bag. A single bag may provide more parts than you need, or you may need multiple bags when working on a large assembly. The QTY column indicates how many individual parts are used on the assembly shown; you will need to determine the number of bags required for your task.
- The reference numbers for some parts have more than one part number listed. This occurs when variations of a part are used on different ramp models. These parts are followed by a model designation (FR2E00, etc).

PRODUCT MODEL AND KIT NUMBERS	
PRODUCT NUMBER	FR2E
DOCUMENTATION KIT NUMBER	55470
SPARE PARTS BOM	44220

PARTS DIAGRAMS

PAGE

FIGURE 4-1: FR2E-SERIES DECAL PART NUMBERS AND LOCATIONS4-2

FIGURE 4-2: FR2E-SERIES RAMP ASSEMBLY4-4

FIGURE 4-3: FR2E-SERIES MOTOR DRIVE ASSEMBLY4-10

FIGURE 4-4: FR2E-SERIES ELECTRICAL HARNESSSES AND COMPONENTS.....4-12

LIFT SPECIFICATIONS4-15

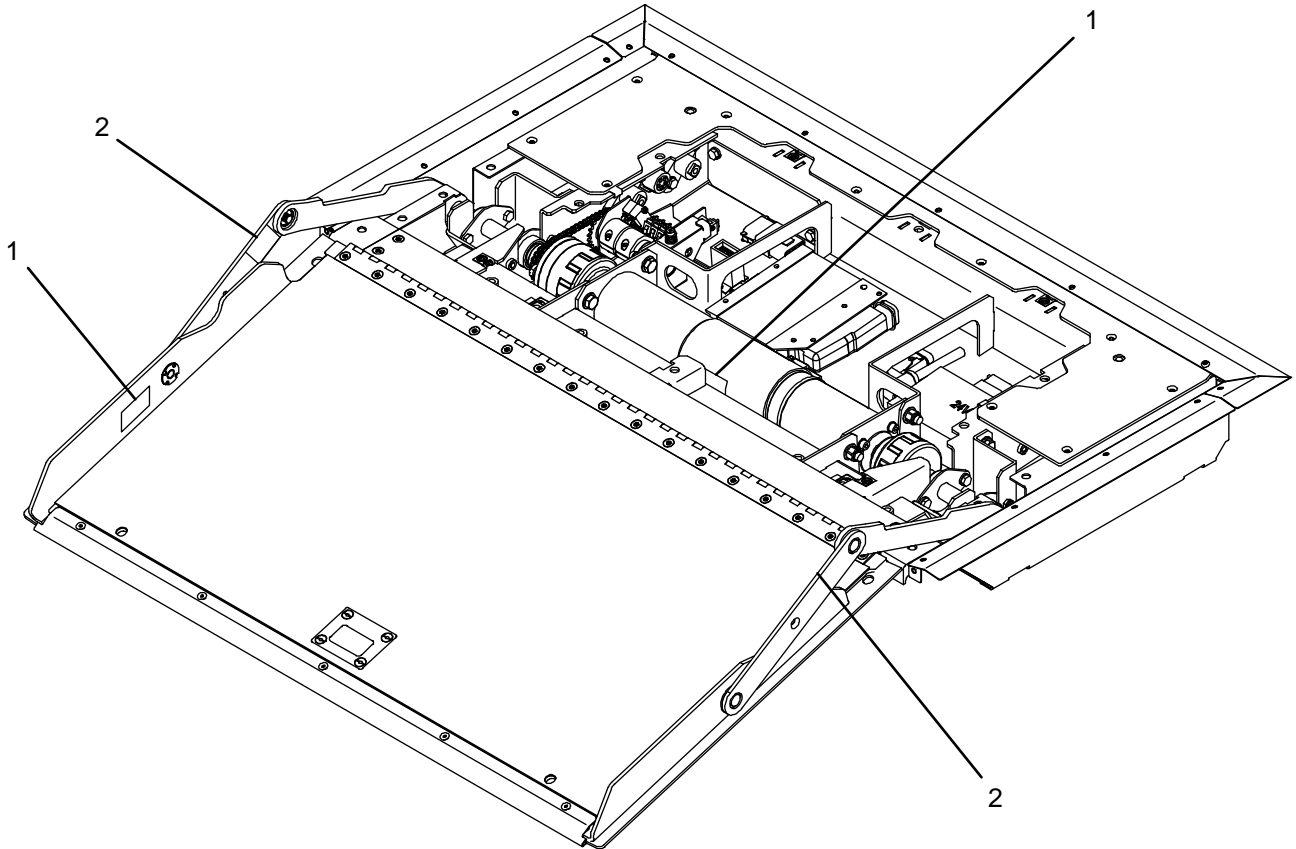


FIGURE 4-1: FR2E DECAL LOCATIONS

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FIGURE 4-2: FR2E-SERIES RAMP ASSEMBLY

FIG. ITEM	DESCRIPTION	QTY	CONFIG.	PART NO.
1	DECAL, SERIAL#, "CE" UNIVERSAL	2		32-10-166
2	DECAL, CAUTION, PINCH POINT, F/OVER RAMP	2		18618

NOTE: (REF) in QTY column is for Referenced Parts Only and are not sold as spare parts.

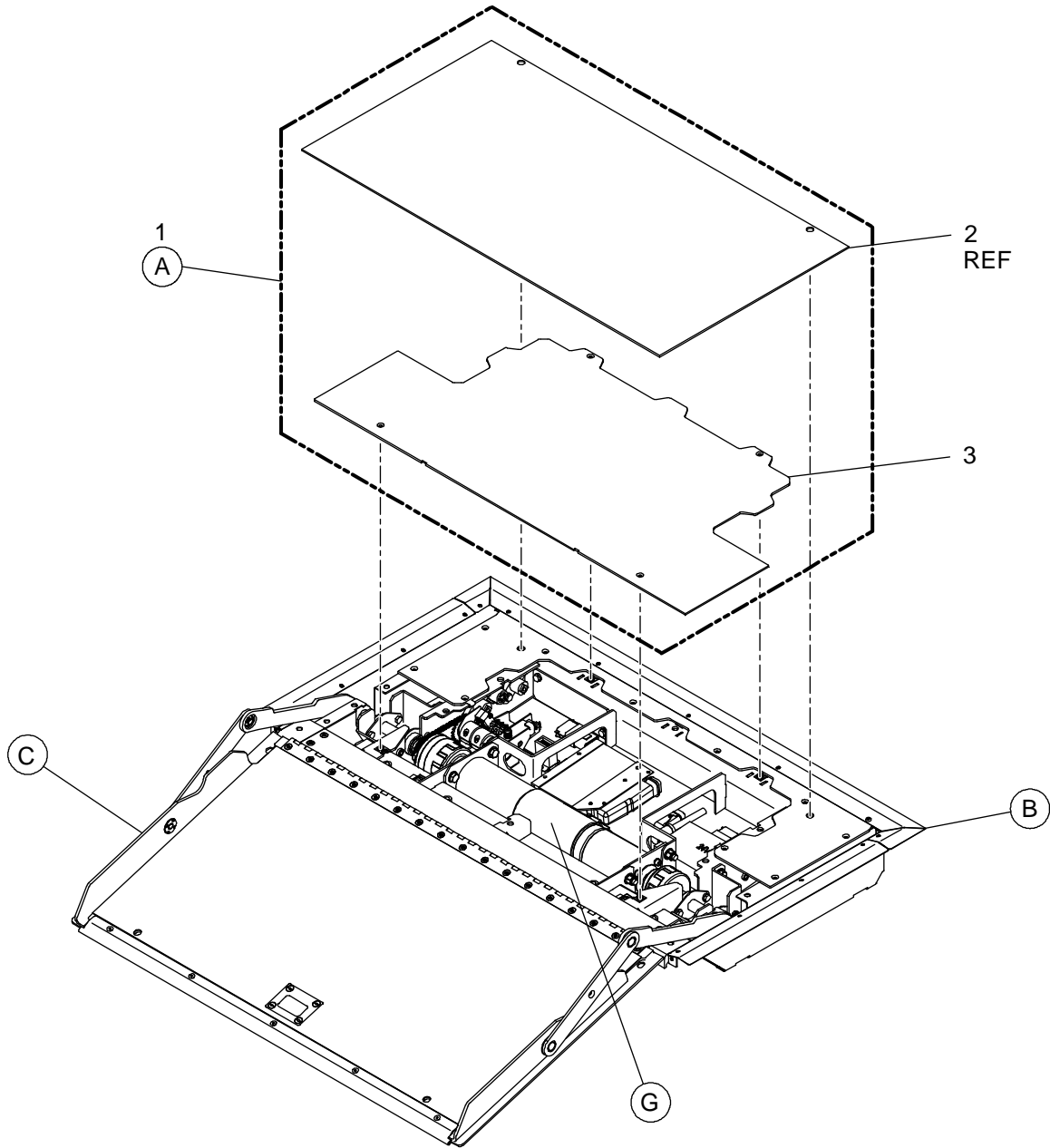


FIGURE 4-2.1: FR2E-SERIES RAMP ASSEMBLY (SHEET 1 OF 5)

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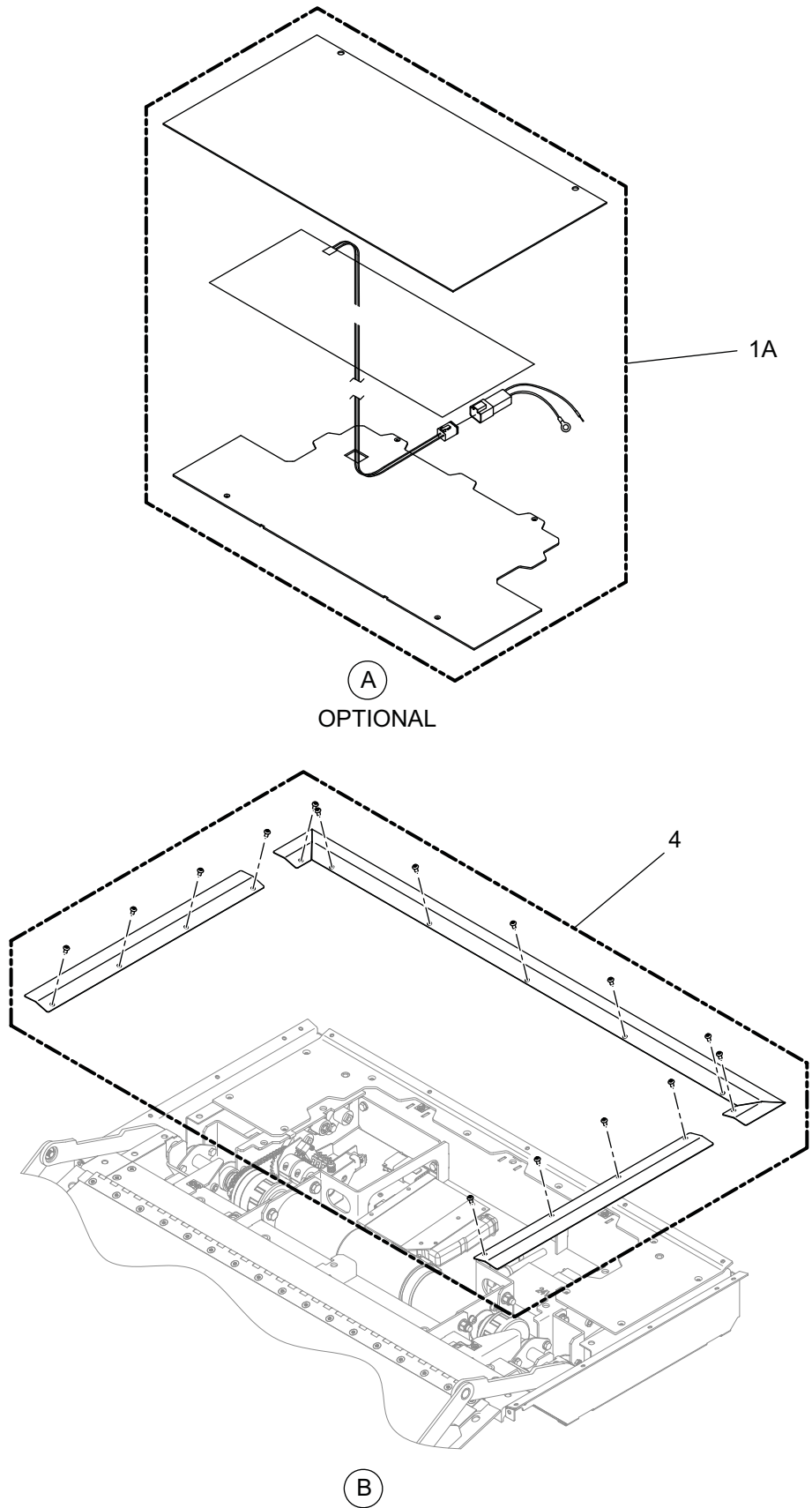
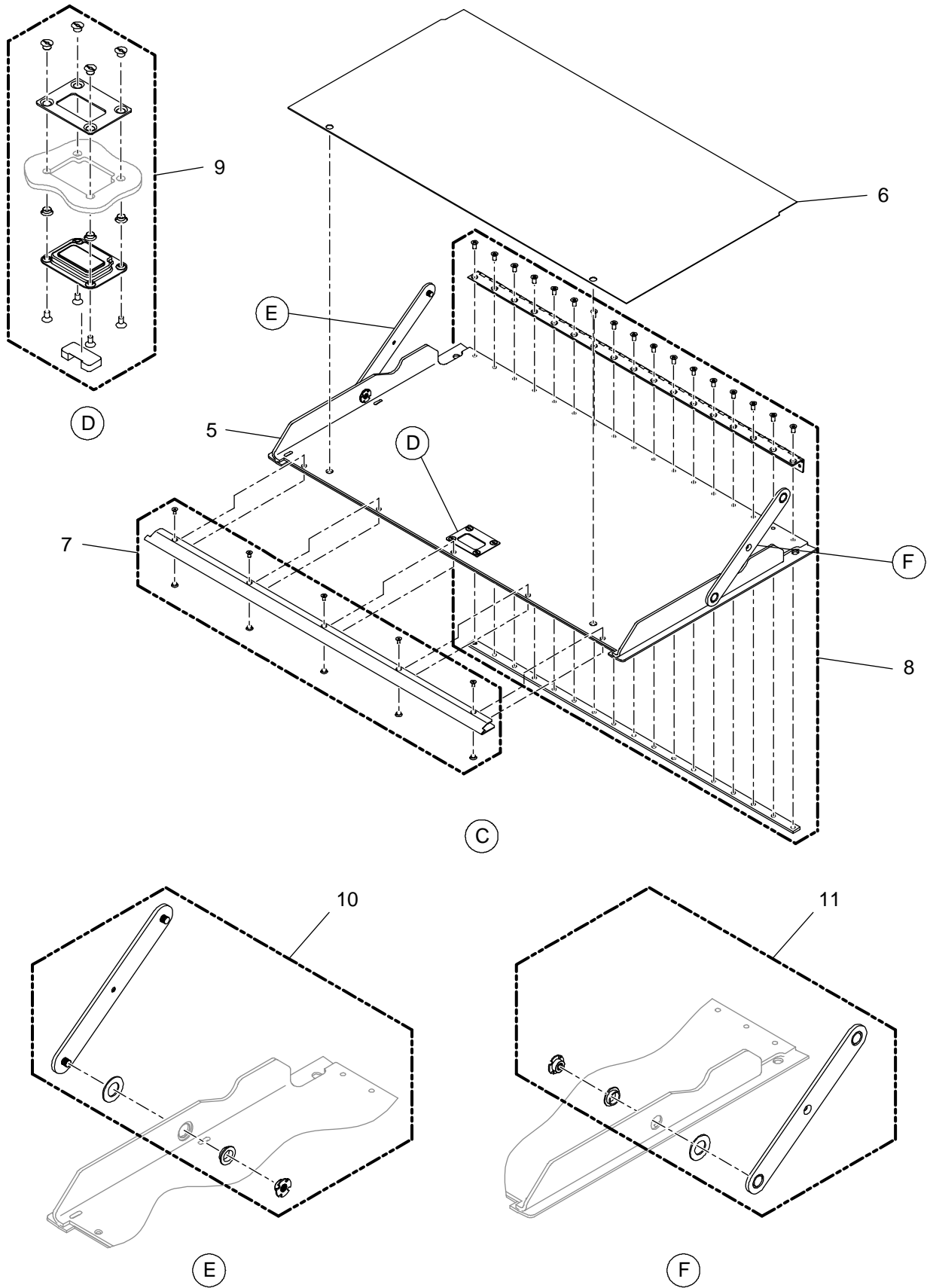


FIGURE 4-2.2: FR2E-SERIES RAMP ASSEMBLY (SHEET 2 OF 5)

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FIGURE 4-2.3: FR2E-SERIES RAMP ASSEMBLY (SHEET 3 OF 5)

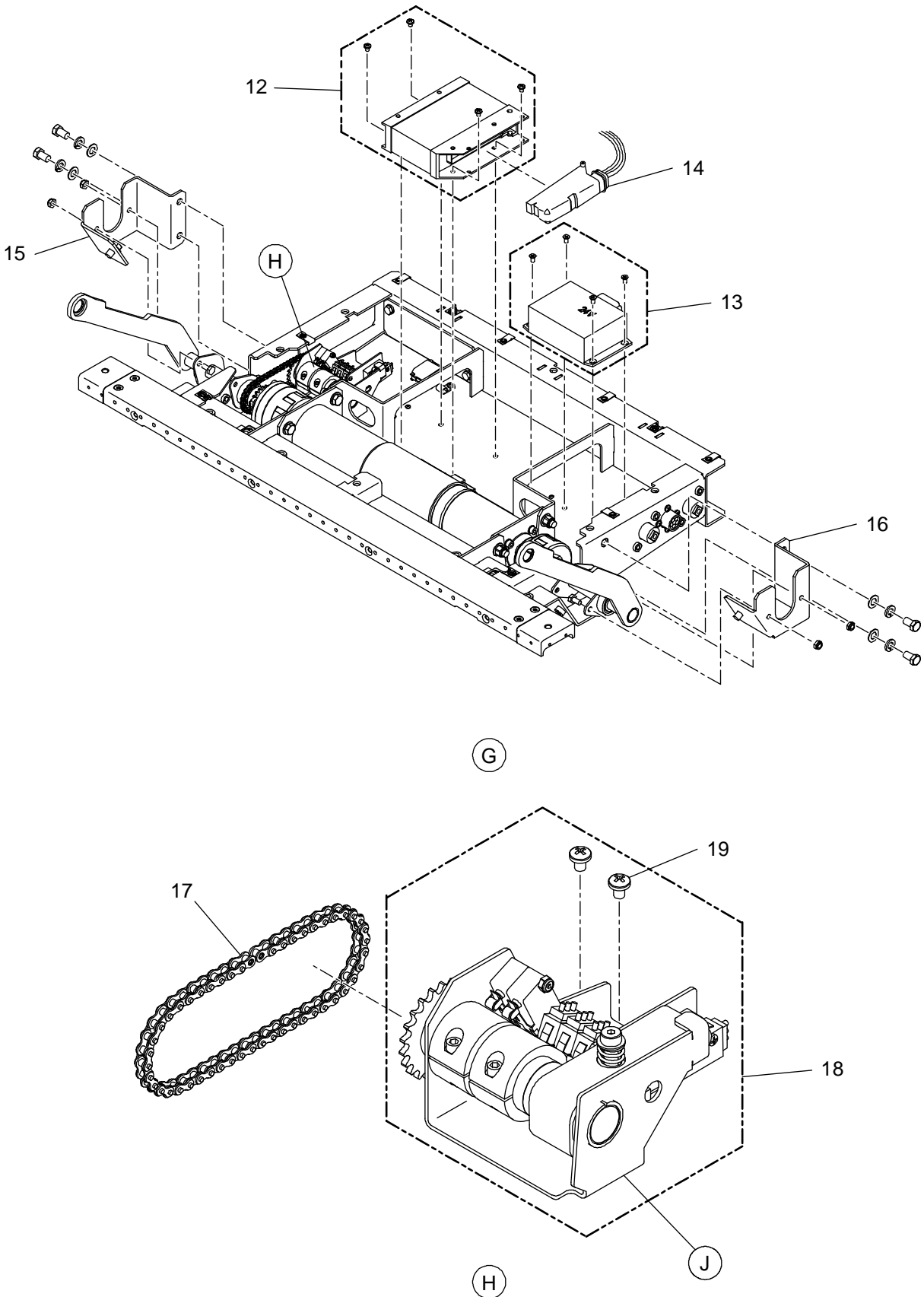


FIGURE 4-2.4: FR2E-SERIES RAMP ASSEMBLY (SHEET 4 OF 5)

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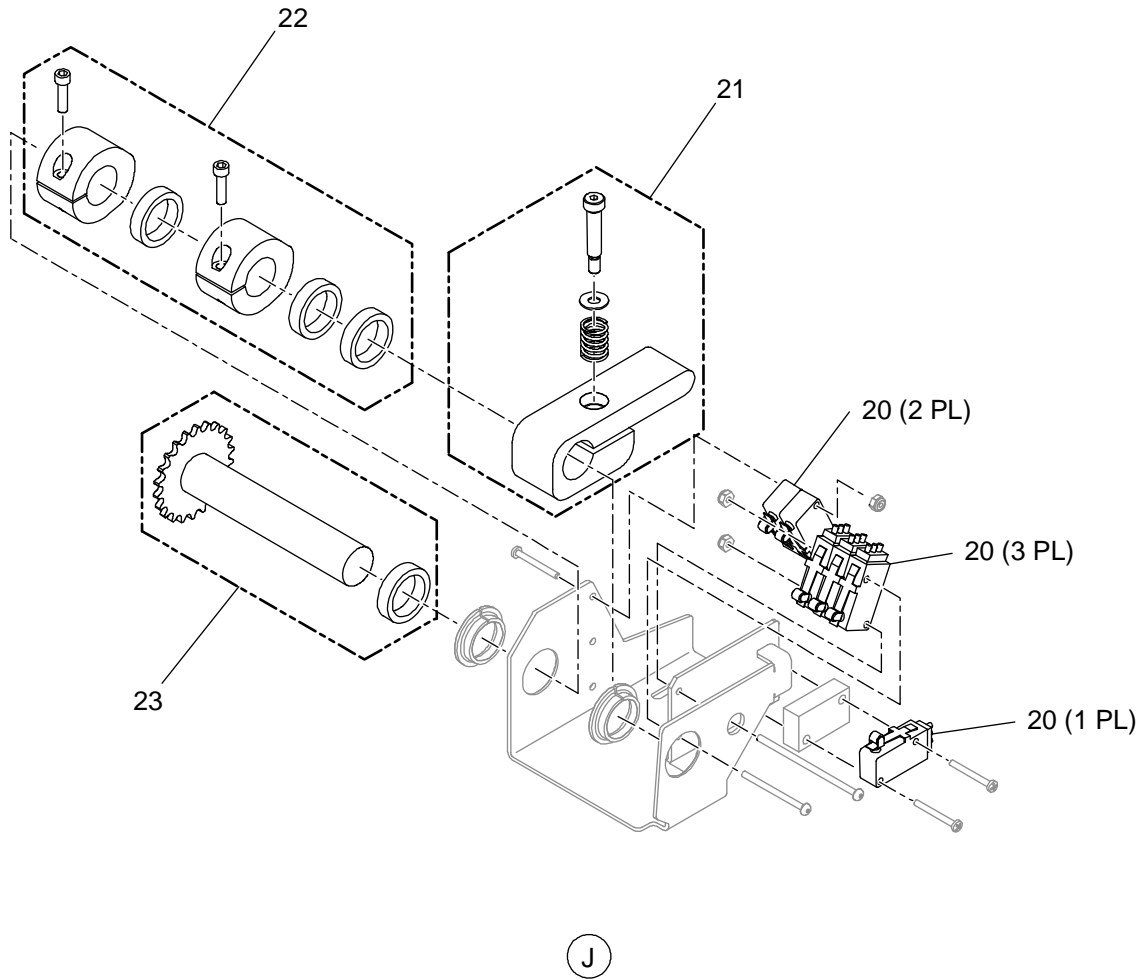


FIGURE 4-2.5: FR2E-SERIES RAMP ASSEMBLY (SHEET 5 OF 5)

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FIGURE 4-2: FR2E-SERIES RAMP ASSEMBLY

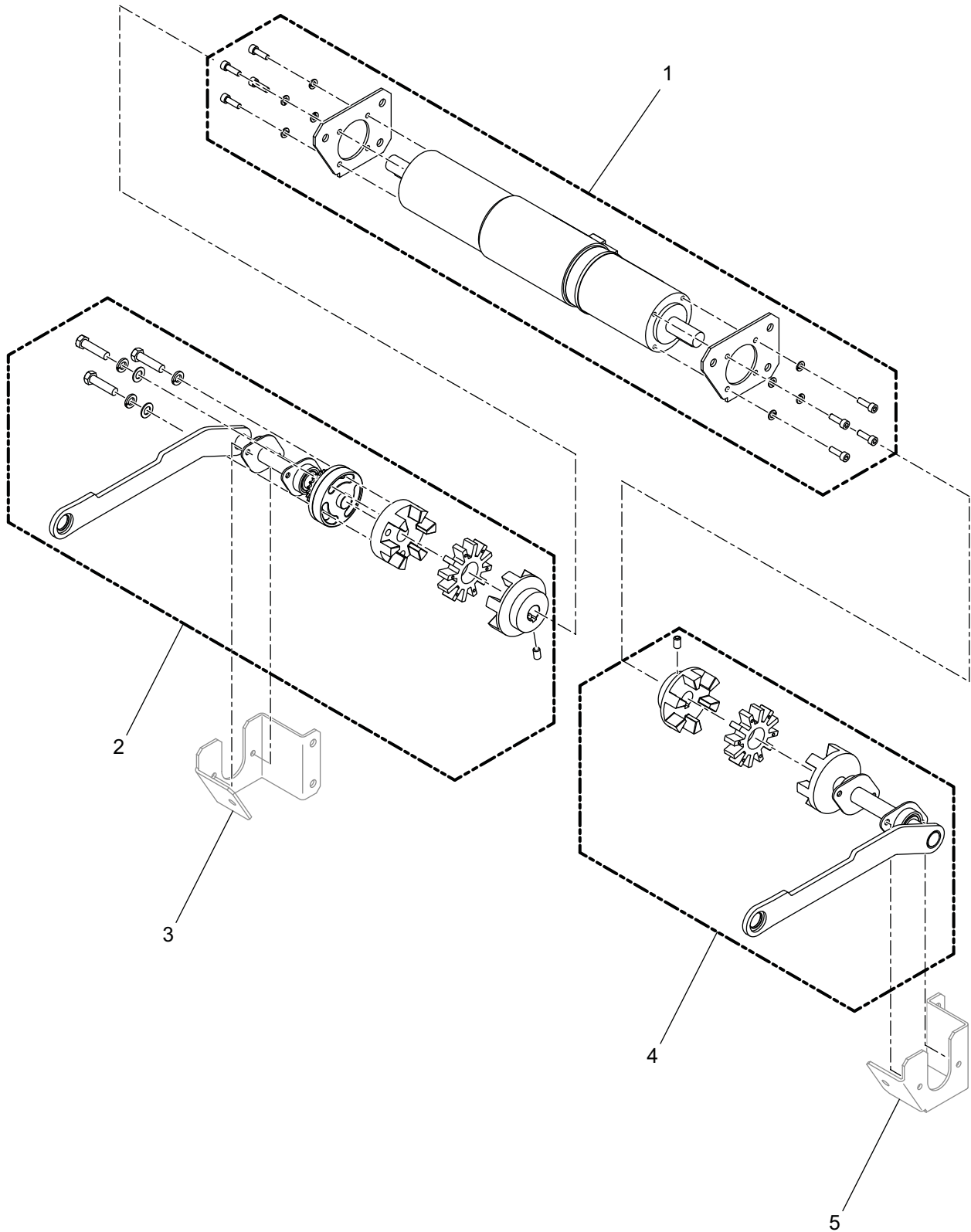
FIG. ITEM	DESCRIPTION	QTY	CONFIG.	PART NO.
1	KIT, FLOOR COVER	1		55497
1A	KIT, FLOOR COVER WITH HEATING MAT	1		55498
2	** FLOORING, ALTRO, META 27903 (STORM) (Short Ramp)	REF	FR2E12-MX7903C001000	57698
2	** FLOORING, ALTRO, META 27903 (STORM) (Short Ramp)	REF	FR2E12-MX7903C001010	57698
2	** FLOORING, ALTRO, META 27903 (STORM) (Short Ramp)	REF	FR2E12-MX7903C001020	57698
2A	** FLOORING, 3M, GRAY #370 (LongRamp)	REF	FR2E13-SA0000C011000	58180
2A	** FLOORING, 3M, GRAY #370 (LongRamp)	REF	FR2E13-SB0000C011000	58180
3	PLATE, FLOOR COVER	REF		48540
3A	PLATE, FLOOR COVER	REF		58337
4	KIT, FLANGE TRIM 34.4"x20" L (Short Ramp)	1	FR2E12-MX7903C001000	57684
4	KIT, FLANGE TRIM 34.4"x20" L (Short Ramp)	1	FR2E12-MX7903C001010	57684
4	KIT, FLANGE TRIM 34.4"x20" L (Short Ramp)	1	FR2E12-MX7903C001020	57684
4A	KIT,FLANGE,RAMP 32"x54" L (LongRamp)	1	FR2E13-SA0000C011000	58158
4A	KIT,FLANGE,RAMP 32"x54" L (LongRamp)	1	FR2E13-SB0000C011000	58158
5	** ASSY, RAMP TRAY, 34.4" W x 20" L, 24V, LH, ELECTRIC	REF	FR2E12-MX7903C001000	57661
5A	** ASSY, RAMP TRAY, 34.4" W x 20" L, 24V, RH, ELECTRIC	REF	FR2E12-MX7903C001010	57661
5B	** ASSY, RAMP TRAY, 34.4" W x 20" L, 24V, LH, ELECTRIC	REF	FR2E12-MX7903C001020	57661
5C	** ASSY, RAMP TRAY, 32" W x 54" L, 24V, REAR ELECTRIC	REF	FR2E13-SA0000C011000	57685
5D	** ASSY, RAMP TRAY, 32" W x 54" L, 24V, REAR ELECTRIC	REF	FR2E13-SB0000C011000	57685
6	*** SAFETREAD, 4FT x 60FT, BLK, 3M #310	REF		17792
7	KIT, PLATE, SKID	1		55499
8	KIT, RAMP HINGE	1		58500
9	KIT, HATCH HANDLE	1		58501
10	KIT, DRIVE ARM, LH	1		58502
11	KIT, DRIVE ARM, RH	1		58503
12	KIT, 24V IFM ELECTRIC CONTROLLER	1		58504
13	KIT, 24V ELECTRIC CONTROL BOX	1		58505
14	HARNESS ASSY, ELECTRIC (SEE FIG.4-4)	1		51034
15	KIT, BEARING SUPPORT BRACKET, LH	1		58506
16	KIT, BEARING SUPPORT BRACKET, RH	1		58507
17	KIT, CHAIN, #25, SST, 11.75" LONG	1		58508
18	KIT, TRAY POSITION ASSY SWITCHES	1		58509
19	SCREW, PHP, 10-24 x 1/4 SST (BAG OF 10)	1		25633
20	KIT, SWITCH, LIMIT ROLLER, SPDT, 15A MAX	6		264104
21	KIT, DIRECTION SWITCH WITH HARDWARE	1		58510
22	KIT, CAM SWITCHES WITH HARDWARE	1		58511
23	KIT, CRANK-SLOTTED DISC ASSY, LH	1		58512

NOTE: (REF) in QTY column is for Referenced Parts Only and are not sold as spare parts.

NOTE: * Item or configuration not shown.

NOTE: ** Some applications require alternate flange trim for alternate applications. Refer to Config. Column for alternate applications.

NOTE: *** Platform Assembly for reference only. Flooring and extruded parts are assembled in the factory. Contact Product Support.



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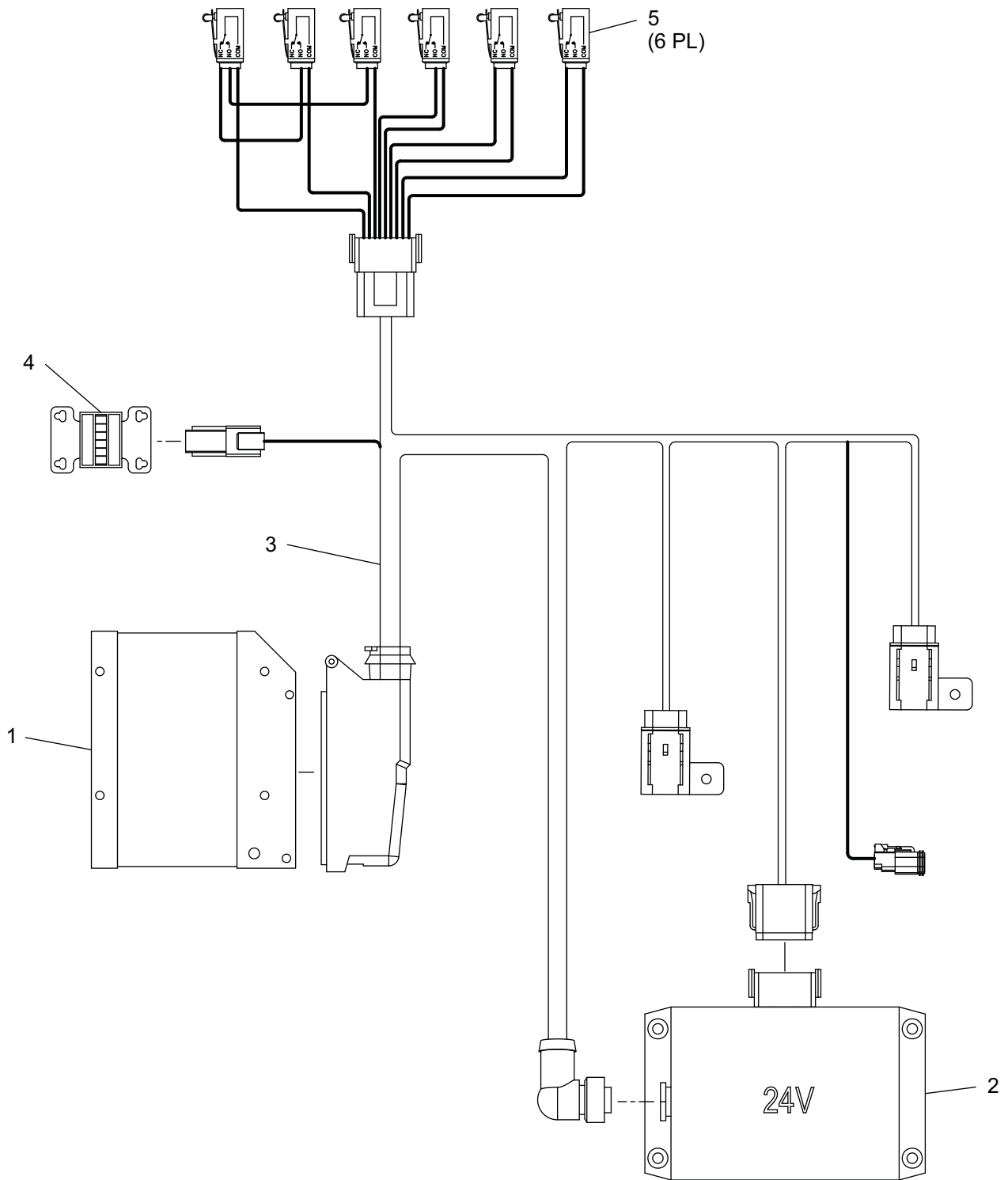
FIGURE 4-3: FR2E-SERIES MOTOR DRIVE ASSEMBLY

FIGURE 4-3: FR2E-SERIES MOTOR DRIVE ASSEMBLY

FIG. ITEM	DESCRIPTION	QTY	CONFIG.	PART NO.
1	KIT, 24V DRIVE ASSY	1		58513
1A	KIT, 12V DRIVE ASSY	1		58516
2	KIT, SLOTTED DISC CRACK WITH SPIDER COUPLING, LH	1		58514
3	BEARING SUPPORT BRACKET, LH (SEE FIG.2)	1		58506
4	KIT, SPIDER COUPLING AND SHAFT, RH	1		58515
5	BEARING SUPPORT BRACKET, RH (SEE FIG.2)	1		58507

NOTE: (REF) in QTY column is for Referenced Parts Only and are not sold as spare parts.

NOTE: * Item or configuration not shown.



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FIGURE 4-4: FR2E-SERIES ELECTRICAL HARNESSES AND COMPONENTS

FIGURE 4-4: FR2E-SERIES ELECTRICAL HARNESSES AND COMPONENTS

FIG. ITEM	DESCRIPTION	QTY	CONFIG.	PART NO.
1	24V ELECTRIC CONTROLLER (SEE FIG 4-2)	REF		55923
2	24V ELECTRIC CONTROL BOX (SEE FIG 4-2)	REF		55919
3	KIT, HARNESS ASSY	1		51034
4	KIT, COUNTER & CONNECTOR ASSY, WITH HARDWARE	1		44219
5	KIT, SWITCH, LIMIT ROLLER, SPDT, 15A MAX	6		264104
6 *	KIT, BLOCK, POSITIVE CONNECTION	1		46514

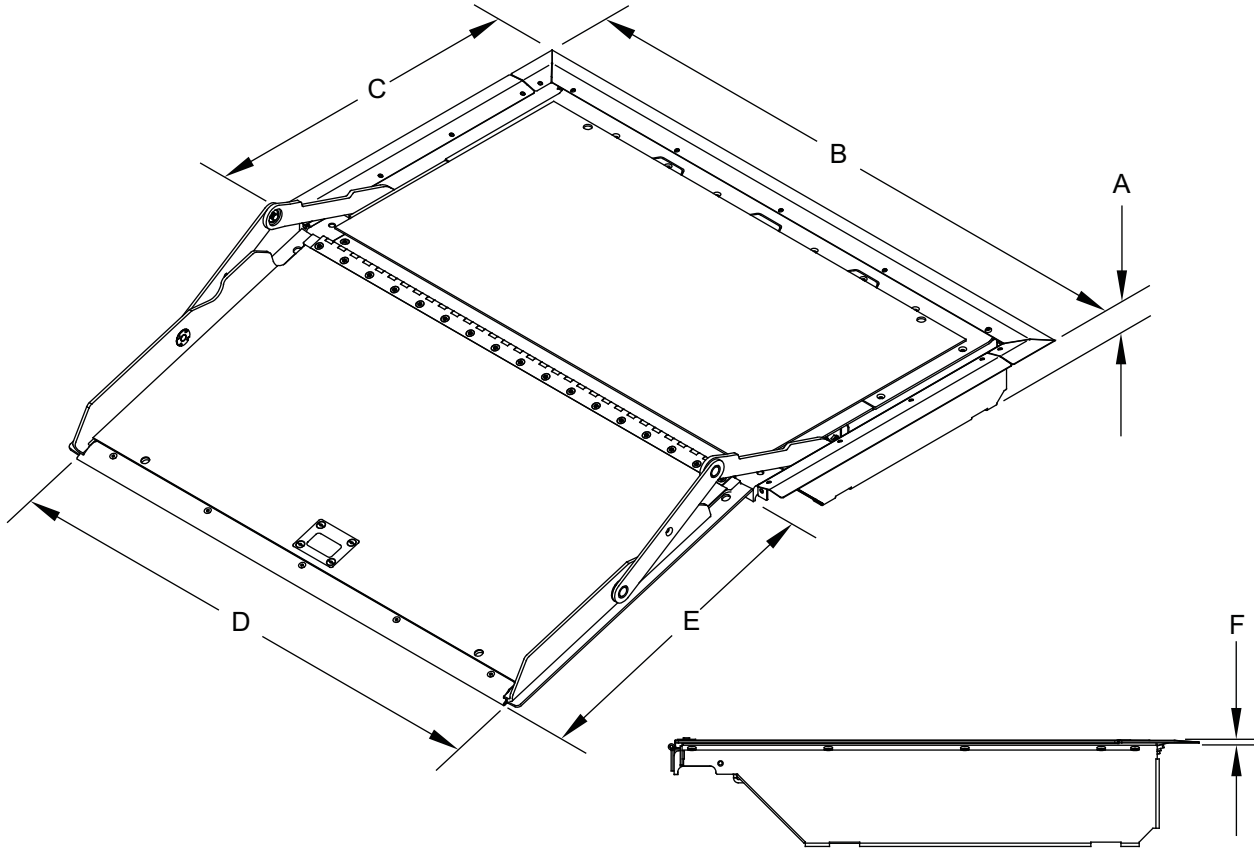
NOTE: (REF) in QTY column is for Referenced Parts Only and are not sold as spare parts.

NOTE: * Item or configuration not shown.

APPENDIX 1

TABLE 2-4: ELECTRIC LOW-FLOOR-VEHICLE ACCESS SHORT RAMP SPECIFICATIONS

Power System	Electro-mechanical motor drive system
Power Requirements:	
Electric	24 VDC
Continuous Current	1.5 amps
Operating Current	5 amps
Rated Load Capacity.....	1000 lbs. (453kg)
Ramp Weight.....	210 lbs. (95kg)



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DIMENSIONS – Inches (MM)

	A	B	C	D	E*	F**
MODEL	Ramp Frame Height	Ramp Trim Width	Ramp Trim Length	Useable Platform Width	Sloped Surface Length	Stowed Height Above Floor
FR2E12	4.3 (109)	40.0 (1016)	21.9 (556)	34.4 (874)	20.0 (508)	0.10 (2.5)

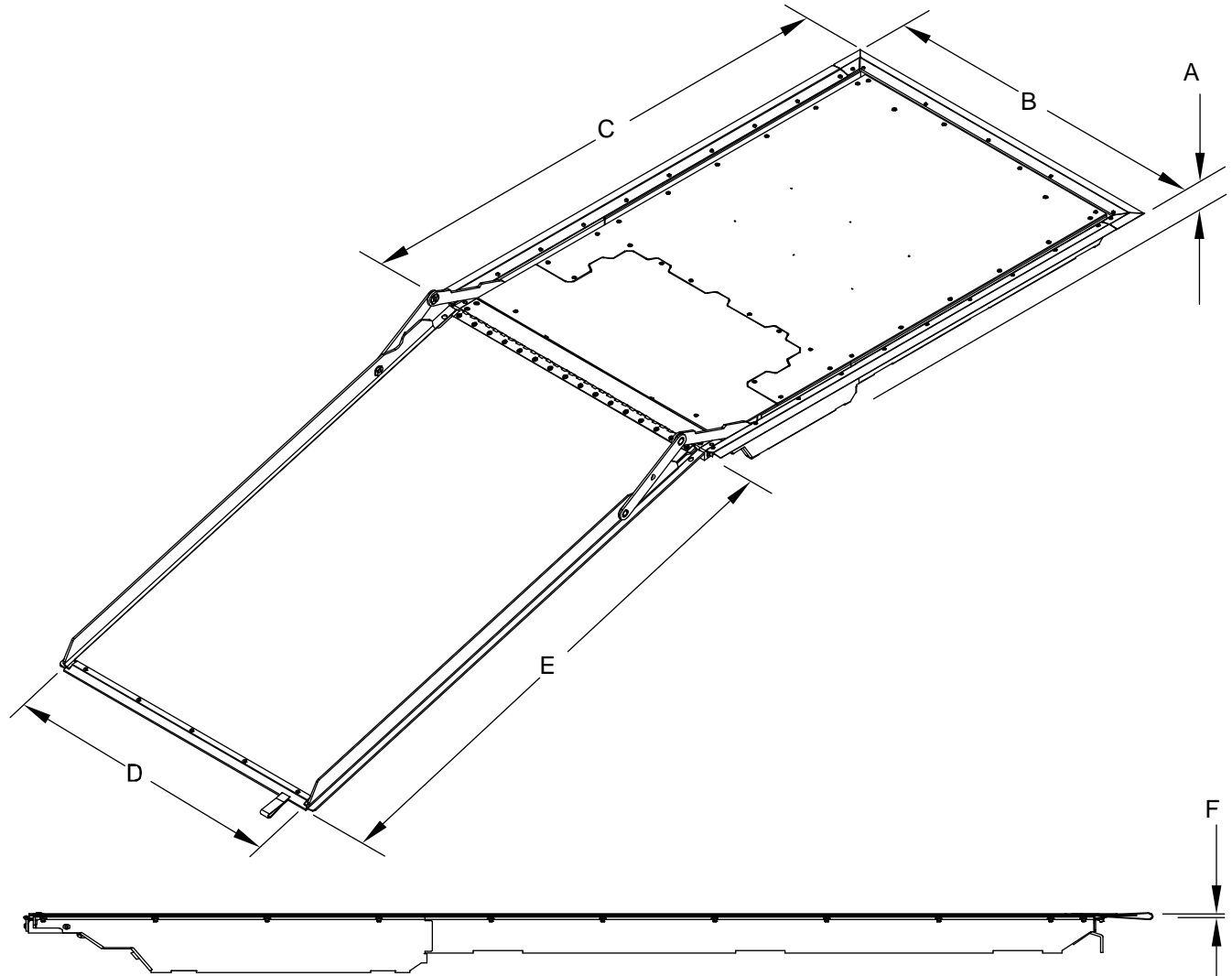
END OF TABLE

NOTE: Ramp may be configured to meet specific requirements.

NOTE: * The effective ramp length takes into account the allowable vertical transitions. Actual length will be slightly shorter.

TABLE 2-5: ELECTRIC LOW-FLOOR-VEHICLE ACCESS LONG RAMP SPECIFICATIONS

Power System	Electro-mechanical motor drive system
Power Requirements:	
Electric	24 VDC
Continuous Current	1.5 amps
Operating Current	5 amps
Rated Load Capacity	1000 lbs. (453kg)
Ramp Weight	210 lbs. (95kg)



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DIMENSIONS – Inches (MM)

	A	B	C	D	E*	F**
MODEL	Ramp Frame Height	Ramp Trim Width	Ramp Trim Length	Useable Platform Width	Sloped Surface Length	Stowed Height Above Floor
FR2E13	4.5 (114)	35.2 (894)	48.2 (1224)	30.0 (765)	48.0 (1219)	0.10 (2.5)

END OF TABLE

NOTE: Ramp may be configured to meet specific requirements.

NOTE: * The effective ramp length takes into account the allowable vertical transitions. Actual length will be slightly shorter.