

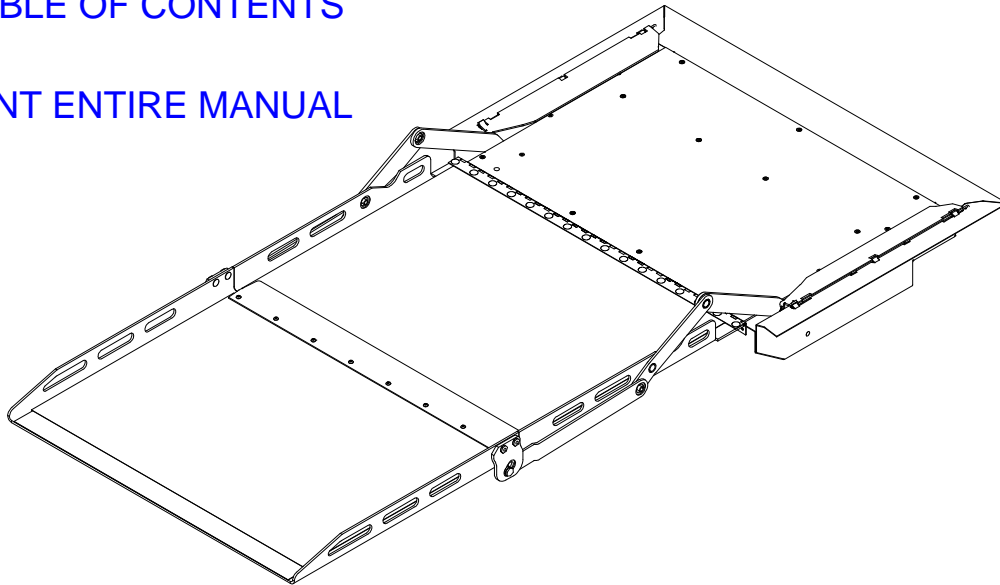


INNOVATION IN MOBILITY

FoldOver ^ä
BR2-3000 Series
Low-Floor Vehicle Access Ramp
for
Transit Buses

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SERVICE MANUAL

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 the training and knowledge to perform maintenance work properly and safely. For the location of a Ricon authorized service technician in your area, call Ricon Product Support at 1-800-322-2884.

Customer Name: _____

Installing Dealer: _____

Date Installed: _____

Serial Number: _____

Revision Record

REV	DATE	PAGES	DESCRIPTION OF CHANGE	ECR/ECO
32DFR112. A	08/22/03	All	New release.	4334/5133

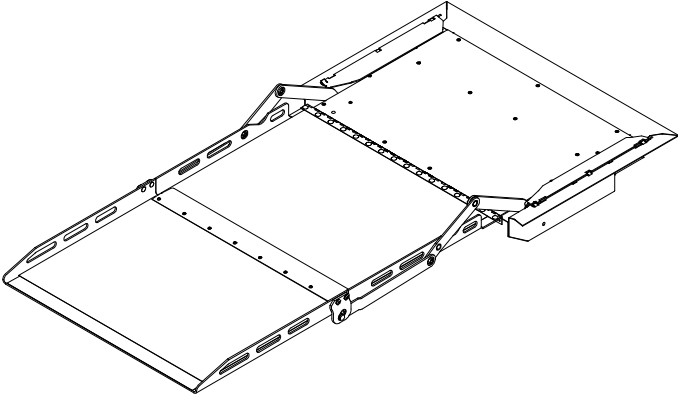
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I. FOLDOVER RAMP INTRODUCTION

This manual applies to the Ricon BR2-3000 Series FoldOver Low-Floor Vehicle Access ramp when installed in transit vehicles. The chapters in this service manual contain a product description, maintenance instructions, a troubleshooting guide, and a spare parts list.



A. 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: www.riconcorp.com

Ricon Corporation
7900 Nelson Road
Panorama City, CA 91402
Telephone: (818) 267-3000
..... (800) 322-2884
(in US but outside 818 area code)

Ricon U.K. Ltd.
Littlemoss Business Park,
Littlemoss Road
Droylsden, Manchester
United Kingdom, M43 7EF
Telephone: (+44) 161 301 6000

B. RICON TWO-YEAR LIMITED WARRANTY

The following warranty provides two years of limited coverage for the Ricon BR2-3000 Low-Floor Vehicle Access ramp.

RICON FOLDOVER RAMP 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 an authorized Ricon 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 an authorized Ricon 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.

The 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.

C. SHIPPING INFORMATION

Check the received product for freight damage. Make damage claims immediately to the freight carrier.

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.

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II. FOLDOVER RAMP DESCRIPTION

The descriptions in this chapter apply to the Ricon BR2-3000 Series FoldOver Low-Floor Vehicle Access ramp when installed in transit vehicles. The FoldOver ramp is installed in transit vehicles to accommodate handicapped passengers who cannot easily climb steps or are using mobility-aid equipment. The hydraulically powered ramp folds into the vehicle vestibule flooring when not in use.

All BR2-3000-series ramps have a 660-lb (300kg) load limit. Passengers must use the ramp one at a time; **do not overload ramp**. Be certain that passenger mobility-aid equipment fits between the left- and right-side ramp barriers without any interference before allowing use of ramp.

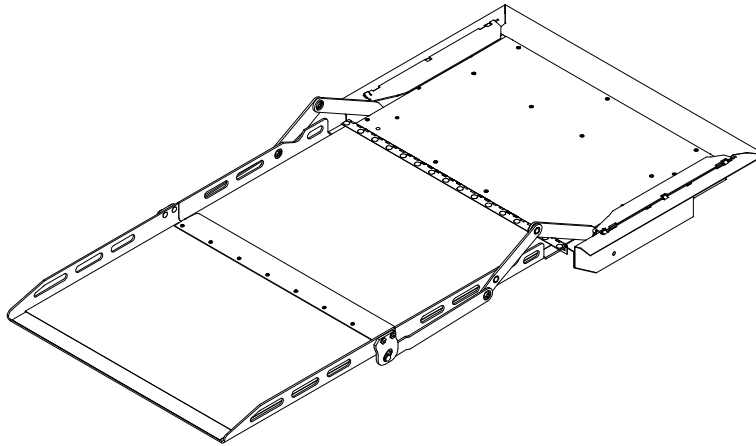


FIGURE 2-1: RICON FOLDOVER RAMP

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 ramp interlock circuitry senses the position of the ramp (stowed or deployed) and makes this information available at the J1 bus harness connector. A vehicle interlock circuit typically requires that the following conditions be met before operating power is supplied to ramp:

- Park vehicle and set parking brake.
- Place transmission in neutral.
- Open vehicle door adjacent to 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 2-2**. Ricon 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 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 ramp hydraulic system.

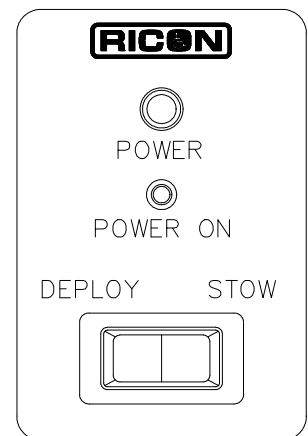


FIGURE 2-2: TYPICAL CONTROL PANEL

B. RAMP CAPACITY

Refer to **Table 2-1**. Passengers are required to use ramp one at a time; **do not overload ramp**. Be certain that passenger mobility-aid equipment fits easily between the left and right side barriers before allowing use of ramp.

TABLE 2-1: RAMP CAPACITY			
MODEL	LOAD LIMIT	USEABLE WIDTH	USEABLE LENGTH
BR2-30481100	660 lb. (300 kg)	30 in (76 cm)	48 in (122 cm)
BR2-32481100	660 lb. (300 kg)	32 in (81 cm)	48 in (122 cm)
END OF TABLE			

C. MAJOR RAMP COMPONENTS

Figure 2-3 shows major components of the FoldOver Ramp. A description of each component is provided in Table 2-2.

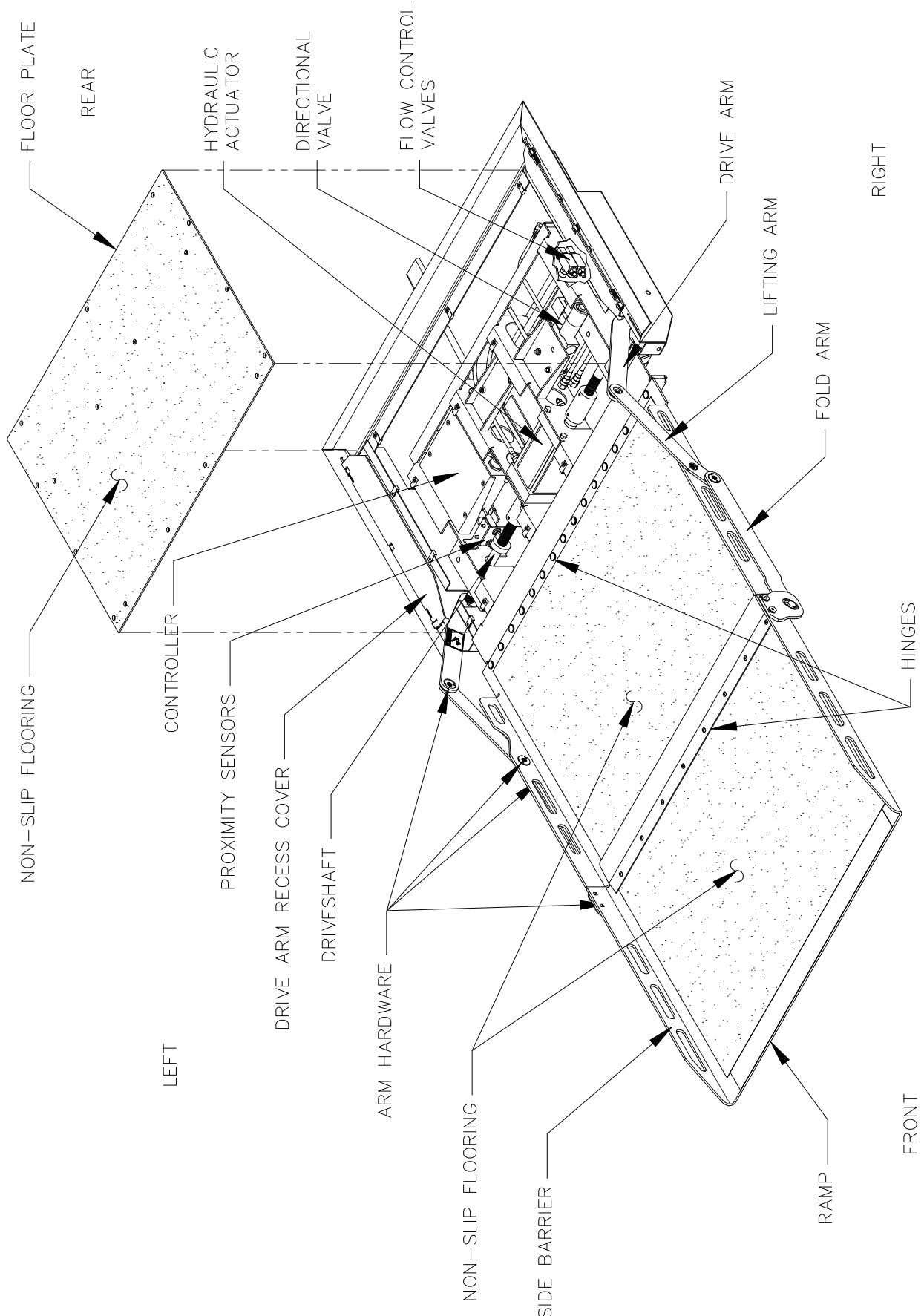


FIGURE 2-3: MAJOR RAMP COMPONENTS

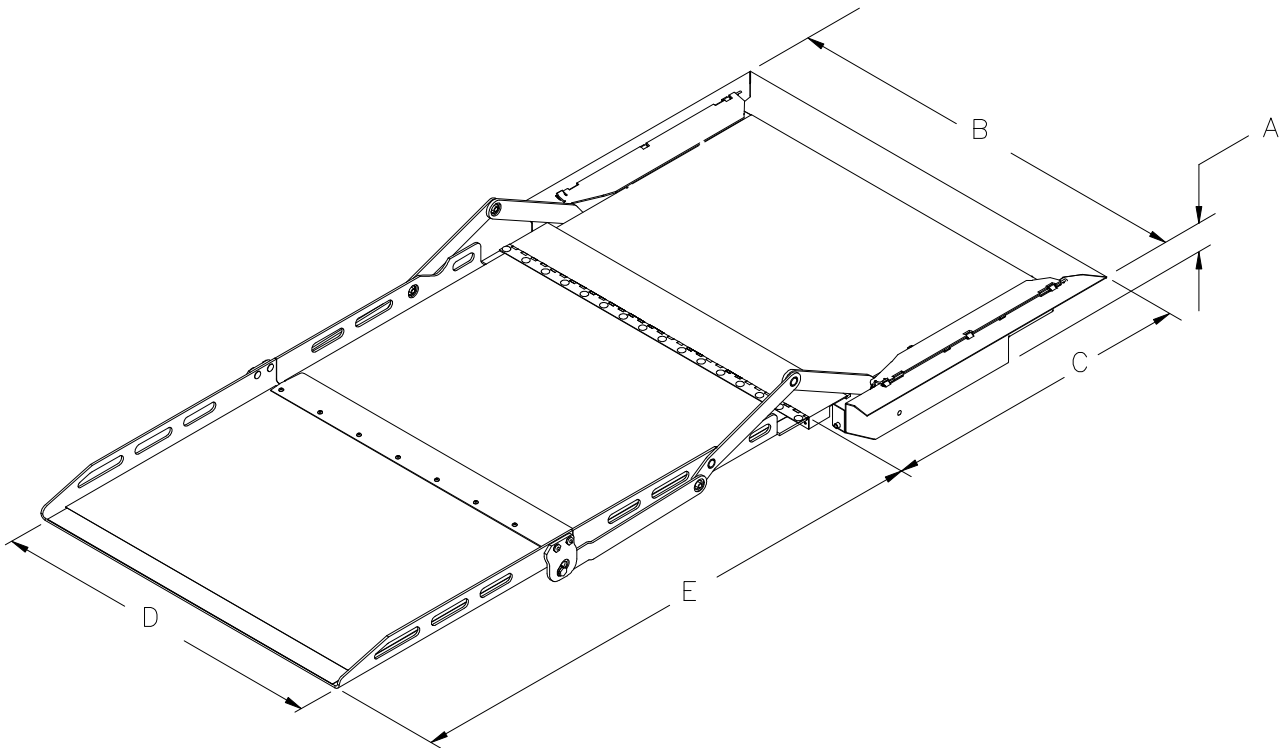
TABLE 2-2: MAJOR BR2-3000 FOLDOVER RAMP COMPONENTS

NAME	DESCRIPTION
Controller	Translates electrical commands from ramp control panel into signals that control ramp components.
Directional valve	Hydraulic component controls direction of ramp movement (deploy or stow).
Driveshafts (left & right)	Transmits torque from actuator to drive arms.
Drive arm recess covers (left & right)	Folding covers protect passengers from tripping hazard.
Drive arms (left & right)	Ramp linkage arms connected to driveshafts.
Lifting arms (left & right)	Ramp linkage arms connect drive arms to rear section of ramp; provide primary lifting force for entire ramp.
Fold arms (left & right)	Ramp linkage arms connect lifting arms to front section of ramp; provide folding action for front section.
Flow control valves	Control rate of ramp movement; manually adjusted.
Arm hardware (Shoulder screws, bushings, thrust washers)	Pivoting, load-bearing parts at ends of drive arms and lifting arms.
Hinges	Pivoting connections between ramp and vehicle, and between front and rear ramp sections.
Hydraulic actuator	Hydraulic powered component provides rotary force used to deploy and stow ramp.
Non-slip flooring	Bonded to ramp to reduce passenger slippage.
Proximity sensors	Electrical sensors detect ramp in stowed position; located adjacent to left driveshaft.
Ramp	Unfolds (deploys) to provide access for handicapped passengers; divided into front and rear sections; folds into vestibule floor.
Side barrier (left & right)	Vertical curbs help to confine wheelchair to ramp area.
END OF TABLE	

D. RAMP SPECIFICATIONS

TABLE 2-3: RICON LOW-FLOOR-VEHICLE ACCESS RAMP SPECIFICATIONS

Power System	Electro-hydraulic pump and rotary actuator
Power Requirements:	
Electric.....	+24 VDC
Maximum Current Draw.....	25 amps
Rated Load Capacity	660 lbs. (300kg)
Ramp Weight.....	approx. 300 lbs. (136kg)



DIMENSIONS – inches (cm)

	A	B	C	D	E	F
MODEL	Ramp Frame Height	Ramp Trim Width	Ramp Trim Length	Useable Platform Width	Usable Platform Length	Floor-to-Ground Travel, max
BR2-30481100	4.8 (12.2)	36.5 (92.7)	27.8 (70.6)	30 (76.2)	48 (122)	4.8 (12.2)
BR2-32481100	4.8 (12.2)	38.8 (98.6)	27.8 (70.6)	32 (81.3)	48 (122)	4.8 (12.2)

END OF TABLE

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III. FOLDOVER RAMP MAINTENANCE

The maintenance information in this chapter applies to the Ricon BR2-3000 Series FoldOver 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 hydraulic and electrical systems. This chapter is intended to supplement related sections of the vehicle manufacturer Owner and Service Manuals.

A. GENERAL SAFETY PRECAUTIONS

 WARNING!
<p>THIS RAMP IS DRIVEN WITH HYDRAULIC PRESSURE GENERATED BY A HYDRAULIC PUMP SYSTEM. THE FLUID IS HIGHLY PRESSURIZED AND POSSIBLY VERY HOT. USE EXTREME CAUTION WHEN DOING MAINTENANCE AND REPAIRS. DO NOT DISCONNECT HOSES OR FITTINGS WHEN RAMP IS IN MOTION.</p>

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

- Under no circumstances is maintenance, repair, or adjustment of the FoldOver 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 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 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 an authorized Ricon 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 ramp and other system components require periodic maintenance. Ricon recommends a thorough vehicle inspection by an authorized Ricon 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 operation	<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, ramp drive arms, and drive arm recesses are free of debris or loose objects.
Ramp non-slip flooring	<ul style="list-style-type: none"> • Flooring is clean and free of slippery or sticky substances that could compromise user safety. • Flooring 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 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 authorized 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 an authorized Ricon facility continue maintenance inspections when warranty ends.

TABLE 3-2: MAINTENANCE SCHEDULE	
INSPECTION POINT	ACTION
– 6,000 MILE INSPECTION –	
Hydraulic fluid leaks	Check all hoses and fittings; check fluid level. Tighten, fill, or replace as necessary
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.
Ramp arm hardware (drive, lifting and folding arms)	Check for looseness; tighten as necessary; apply thread locker (Loc-tite blue), as necessary. Refer to Figure 3-4 for arm hardware configuration.
Ramp interior (for debris)	Check area below floor plate, and remove any accumulated dirt or debris.
Non-slip flooring	Visually check for damage to flooring, and for loose or missing non-slip material.
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 flooring	Check non-slip flooring for excessive wear or damage (rips, tears, peeling, etc.), and replace as necessary.
– 24,000 MILE INSPECTION –	
Pillow blocks	Lightly grease pillow blocks. Pillow blocks are sealed; lubricate through grease fitting.
Bushing & thrust washer	Refer to Figure 3-4 . Check these hardware parts for excessive play, and replace if necessary.
END OF TABLE	

D. RAMP COMPONENT INFORMATION

The Ricon FoldOver Ramp converts electrical power from the host vehicle to hydraulic force, which is then used to move the ramp. Vehicle electrical power is converted to hydraulic force, which is used to move the ramp. Electrical and hydraulic components are described below. Please refer to **Figures 3-7, 3-8, and 3-9** for hydraulic schematics and flow diagrams. Refer to **Figure 3-10** for ramp electrical schematic.

1. HYDRAULIC PUMP

The ramp employs an electro-hydraulic pump to pressurize hydraulic fluid. Pressure is regulated in the pump body and is preset at Ricon.

The hydraulic pump provides pressure to the rotary hydraulic actuator when either the DEPLOY or STOW switch is activated. Ricon recommends operating the ramp while the vehicle engine is running in order to minimize current drain on the vehicle battery.

2. FLOW CONTROL VALVES

Two manually adjusted flow control valves (needle valves) control the volume of hydraulic fluid passing through the rotary actuator. Their adjustment determines the rate of ramp movement. There is one valve for ramp deployment and one for stowing. Turning the valves **counterclockwise** increases the rate of ramp movement, and **clockwise** decreases the rate of ramp movement. The typical adjustment range for each valve is between ½ to 1 turn open (CCW) from fully closed (fully CW).

Refer to Installation Notes in Chapter IV for a flow control valve adjustment procedure.

3. DIRECTIONAL VALVE

The directional valve controls the direction of fluid flow through the actuator.

When the controller sends a DEPLOY signal to the S1 valve solenoid, the shuttle valve then directs flow to the C1 flow control valve. From C1, fluid flows through the actuator (producing torque), then to the C2 flow control valve, back to the directional valve, and returns to the hydraulic pump reservoir.

When the controller sends a STOW signal to the S2 valve solenoid, the shuttle valve then directs flow to the C2 flow control valve. From C2, fluid passes through the actuator (producing torque), then to the C1 flow control valve, back to the directional valve and returns to the hydraulic pump reservoir.

4. ELECTRONIC CONTROLLER

The electronic controller interprets DEPLOY and STOW requests and controls ramp functions. It contains a programmable integrated circuit (IC), relays, two fuses, and associated parts. The programmable IC cannot be accessed externally. The ramp harness, which is connected to controller connector J1, supplies system power in addition to STOW and DEPLOY requests. Connector J1 also provides positive and negative interlock signals. Connectors J2 and J3 receive signal inputs from the RAMP STOWED and RAMP DEPLOYED sensors, respectively. Connector J4 provides directional control signals to the hydraulic pump. Connector J5 provides a timing signal to the auxiliary counter.

Refer to **Figures 3-1** and **3-2** for a side view and top view of controller, showing locations of J1, J2, J3, J4, and J5 connectors. The controller cover is sealed with silicone rubber and is not easily removed. Note the four mounting holes at the corners of enclosure. Note locations of fuses F1 (3A) and F2 (7.5A) at left center of **Figure 3-2**. Refer to **Table 3-3** for functions and ratings of fuses located inside controller. Access to the controller is gained by removing the bottom cover from ramp. Reseal the cover with silicone rubber before reinstalling.

Refer to **Figure 3-3** for connector pin numbering and wire colors. Refer to **Table 3-4** for a signal description at each connector pin.

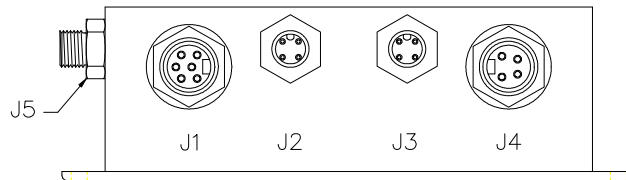


FIGURE 3-1: CONTROLLER SIDE VIEW

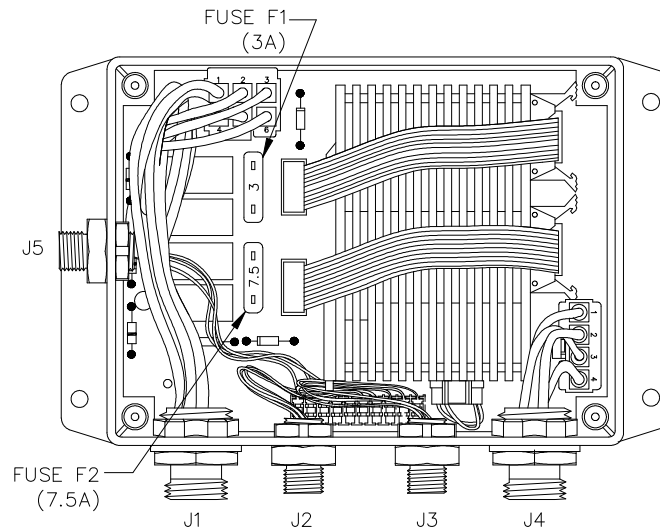


FIGURE 3-2: CONTROLLER TOP VIEW

TABLE 3-3: CONTROLLER FUSES		
FUSE	RATING	CIRCUIT
F1	3.0 AMP	Interlock Output (positive output on J-1 pin 4)
F2	7.5 AMP	Main Power (Programmable Controller, Solenoid Valves, Sensors)
END OF TABLE		

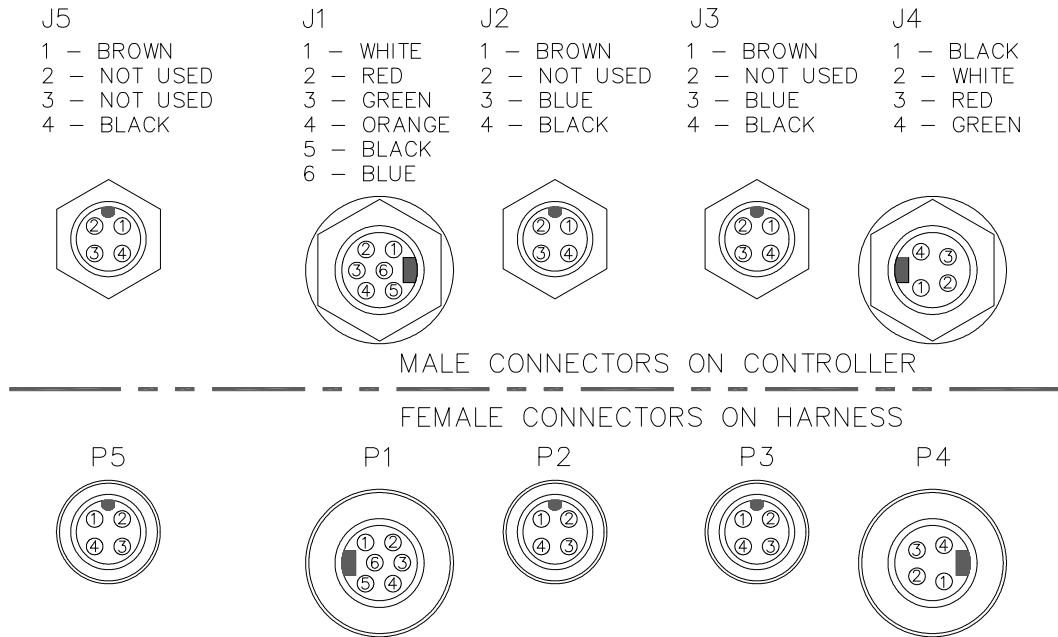


FIGURE 3-3: CONTROLLER CONNECTOR-PIN NUMBERING

TABLE 3-4: CONNECTOR-PIN DESCRIPTIONS FOR CONTROLLER					
PIN	COLOR	FUNCTION	AT REST	IN ACTION	
J1	1	White	Output signal to vehicle interlock	Ground; stowed	No signal; ramp not stowed
	2	Red	STOW request from control switch	0 volts	24 volts; STOW switch activated
	3	Green	Ground	Ground	Ground
	4	Orange	Output signal to vehicle interlock	Off; stowed	24 volts; ramp not stowed (deployed)
	5	Black	DEPLOY request from control switch	0 volts	24 volts; DEPLOY switch activated
	6	Blue	24 volts to controller (constant)	24 volts	24 volts
J2	1	Brown	Power to stowed sensor	24 volts	24 volts
	2	Not used			
	3	Blue	Ground	Ground	Ground
	4	Black	Stowed sensor controller input	0 volts; sensor off	24 volts when sensor is activated
J3	1	Brown	Power to deploy sensor	24 volts	24 volts
	2	Not used			
	3	Blue	Ground	Ground	Ground
	4	Black	Deployed sensor controller input	0 volts	24 volts when sensor is activated
J4	1	Black	DEPLOY output to hydraulic pump	0 volts	24 volts; DEPLOY function engaged
	2	White	STOW output to hydraulic pump	0 volts	24 volts; STOW function engaged
	3	Red	Ground	Ground	Ground
	4	Green	Output to hydraulic pump relay	0 volts	24 volts; STOW/DEPLOY function engaged
J5	1	Brown	Output signal to auxiliary counter	Off	24V pulse each stow cycle
	2	Not used			
	3	Not used			
	4	Black	Ground for auxiliary counter	Ground	Ground
END OF TABLE					

5. CIRCUIT BREAKERS AND FUSES

The bus builder installs a 25-amp circuit breaker to protect ramp control circuits.

Two fuses protect the controller, and are located inside its sealed enclosure. Please refer to **Figure 3-2** for their locations. The fuses must be replaced by a Ricon authorized service technician. The hydraulic pump assembly contains an 8-amp circuit breaker to protect components within the hydraulic pump assembly.

6. RAMP ARM ASSEMBLY

Please refer to **Figure 3-4** for the correct configuration of the ramp lifting and folding arms and their hardware. Use a spanner wrench (Ricon p/n 18756) to tighten the T-nuts that bolt the ramp arms and hardware together. Apply a small amount of threadlocker (Loctite blue) to T-nuts before assembling hardware.

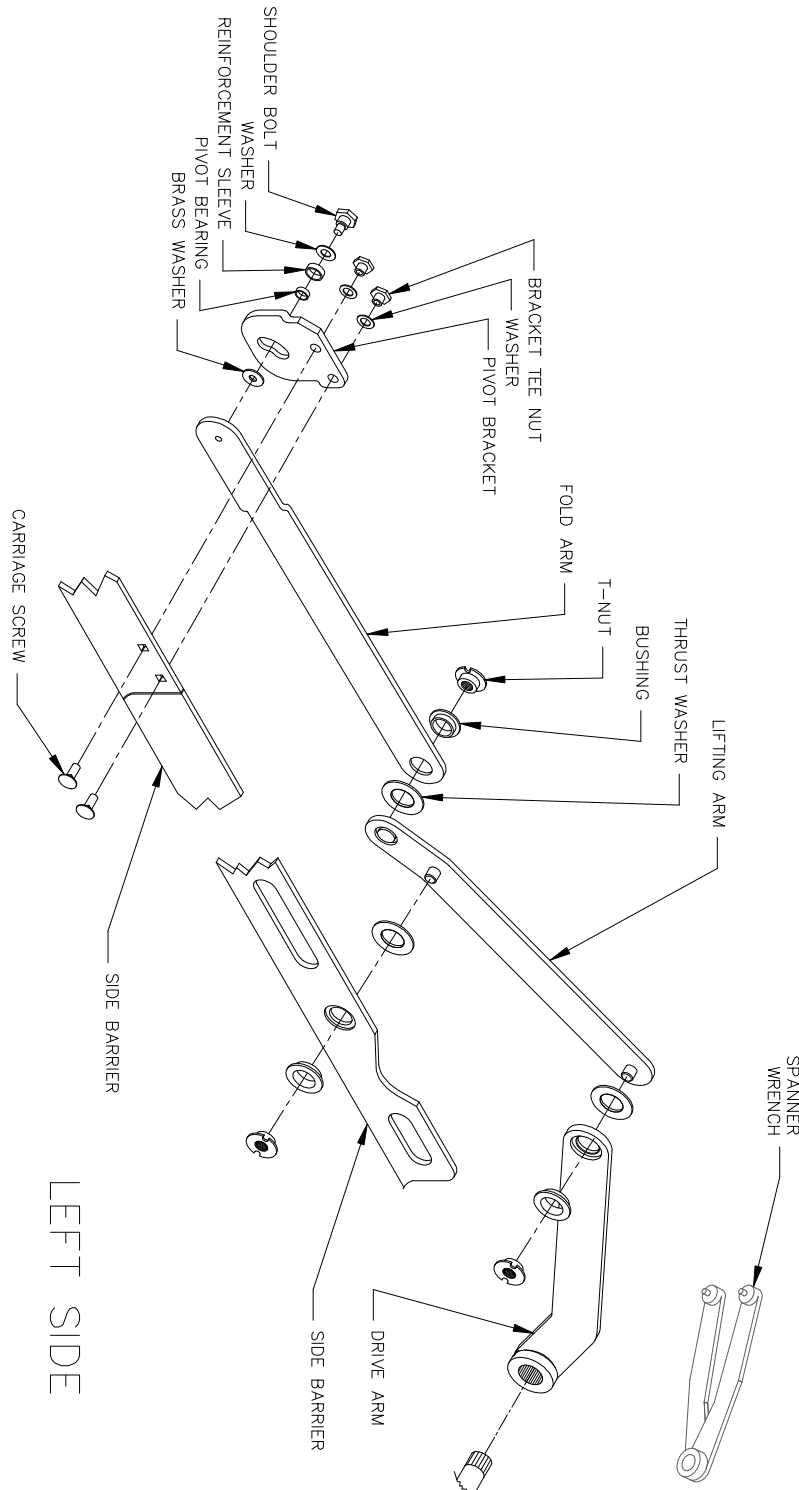


FIGURE 3-4: HARDWARE CONFIGURATION FOR LEFT SIDE RAMP ARM

E. ELECTRICAL AND HYDRAULIC DIAGRAMS

Refer to **Table 3-5** for wire color codes used on schematic. Refer to **Figure 3-5** for a description of plug and receptacle designations used on schematic. Refer to **Figure 3-6** for a list of symbols used on schematic. Refer to **Table 3-6** for an explanation of labels used on schematic. Refer to **Figures 3-7, 3-8, and 3-9** for diagrams of the ramp hydraulic system in its inactive, deploy, and stow modes. The diagrams show the direction and path of fluid flow, and valve positions. The diagrams are located on the following pages.

Refer to **Figure 3-10** for an overall electrical schematic of the ramp system, including that portion supplied by the bus builder. The electrical schematic is located at the end of this chapter.

TABLE 3-5: WIRE COLOR CODES			
CODE	COLOR	CODE	COLOR
BLK	BLACK	RED	RED
BLU	BLUE	TAN	TAN
BRN	BROWN	VIO	VIOLET
GRN	GREEN	WHT	WHITE
GRY	GRAY	YEL	YELLOW
ORG	ORANGE		
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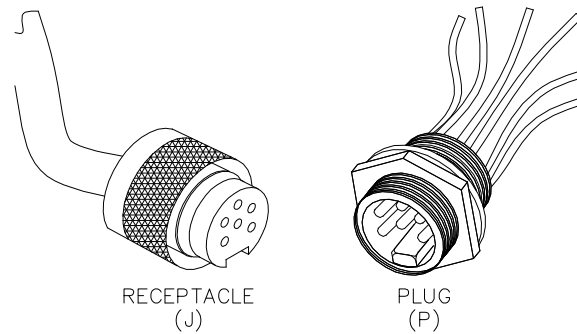


FIGURE 3-5: CONNECTOR CONFIGURATION

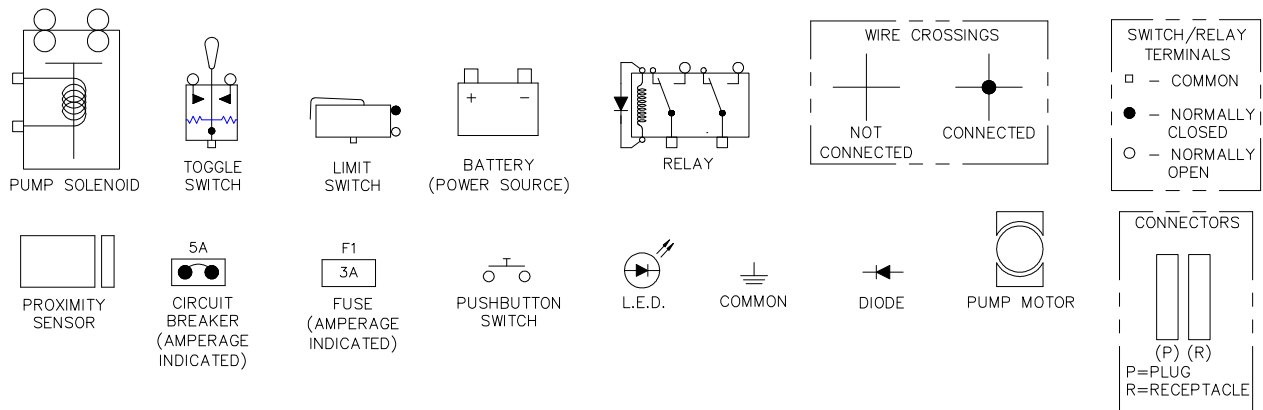


FIGURE 3-6: SCHEMATIC SYMBOLS

TABLE 3-6: WIRING DIAGRAM LABELS

LABEL	DESCRIPTION
+24 VDC	System power for interlocks, hydraulic valves, controller, and sensors.
COUNTER	Signal; pulse to auxiliary counter; generated by STOW function.
DEPLOY	Signal; to controller to request DEPLOY function.
DEPLOY VALVE INPUT	Signal; opens deploy valve.
GND, GROUND	System electrical common.
INTERLOCK	Signal; to vehicle interlock circuit when ramp is fully stowed; 24V when ramp is stowed; signal is generated by the electronic controller.
INTERLOCK NEG	Electrical ground (common) for vehicle interlock systems when ramp stowed; open when ramp is deployed.
PUMP SOLENOID INPUT	Signal; actuates pump solenoid.
SENSOR GROUND	Constant ground from controller.
STOW	Signal; to controller to request STOW function.
SENSOR OUTPUT	Signal; generated when either the STOWED or DEPLOYED sensor is triggered.
STOW VALVE INPUT	Signal; opens stow valve.
VEHICLE AUDIO ALERT	Signal to audible alarm. NOTE: This feature is optional and may not be connected.
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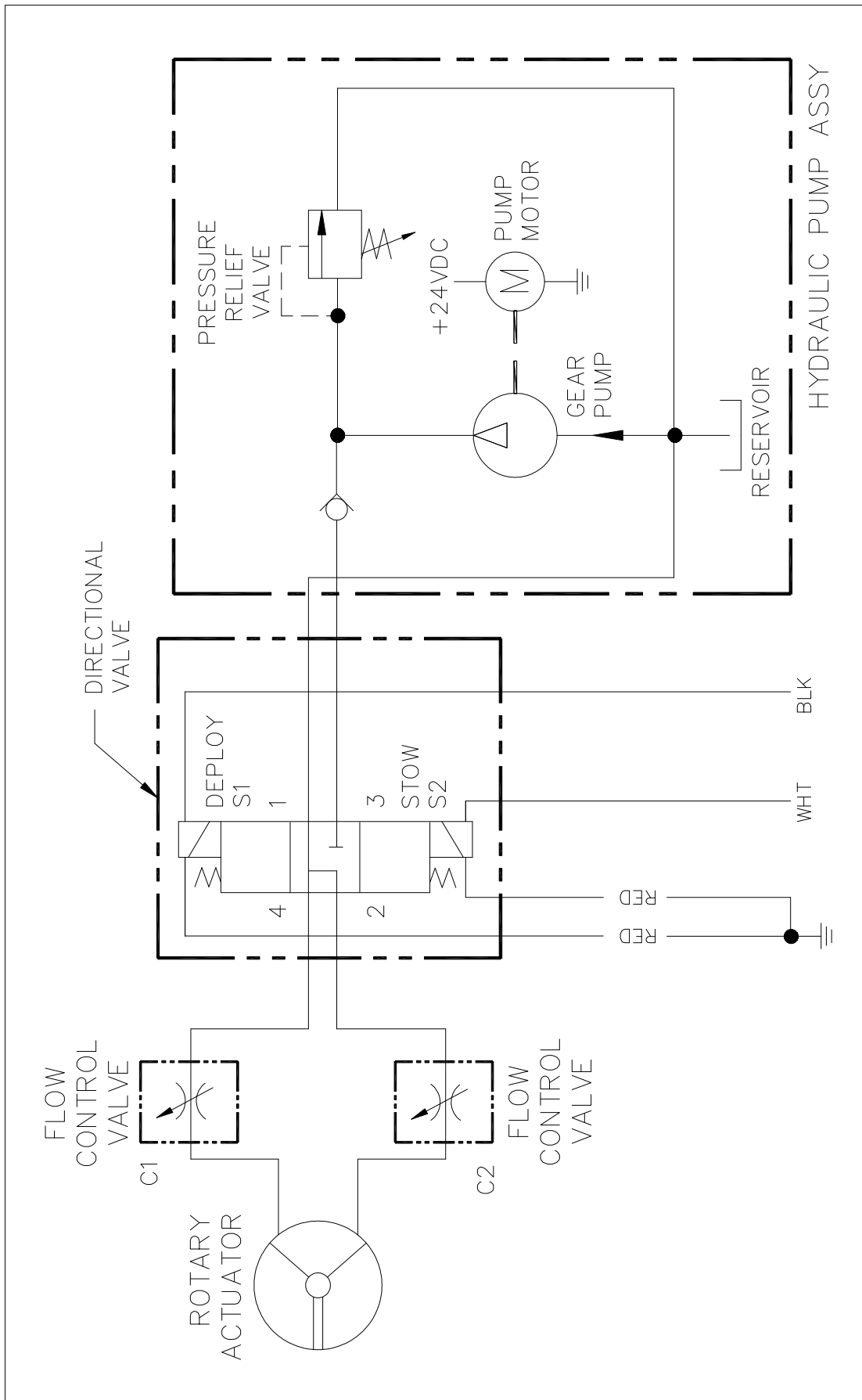


FIGURE 3-7: NO HYDRAULIC FLUID FLOW AT REST

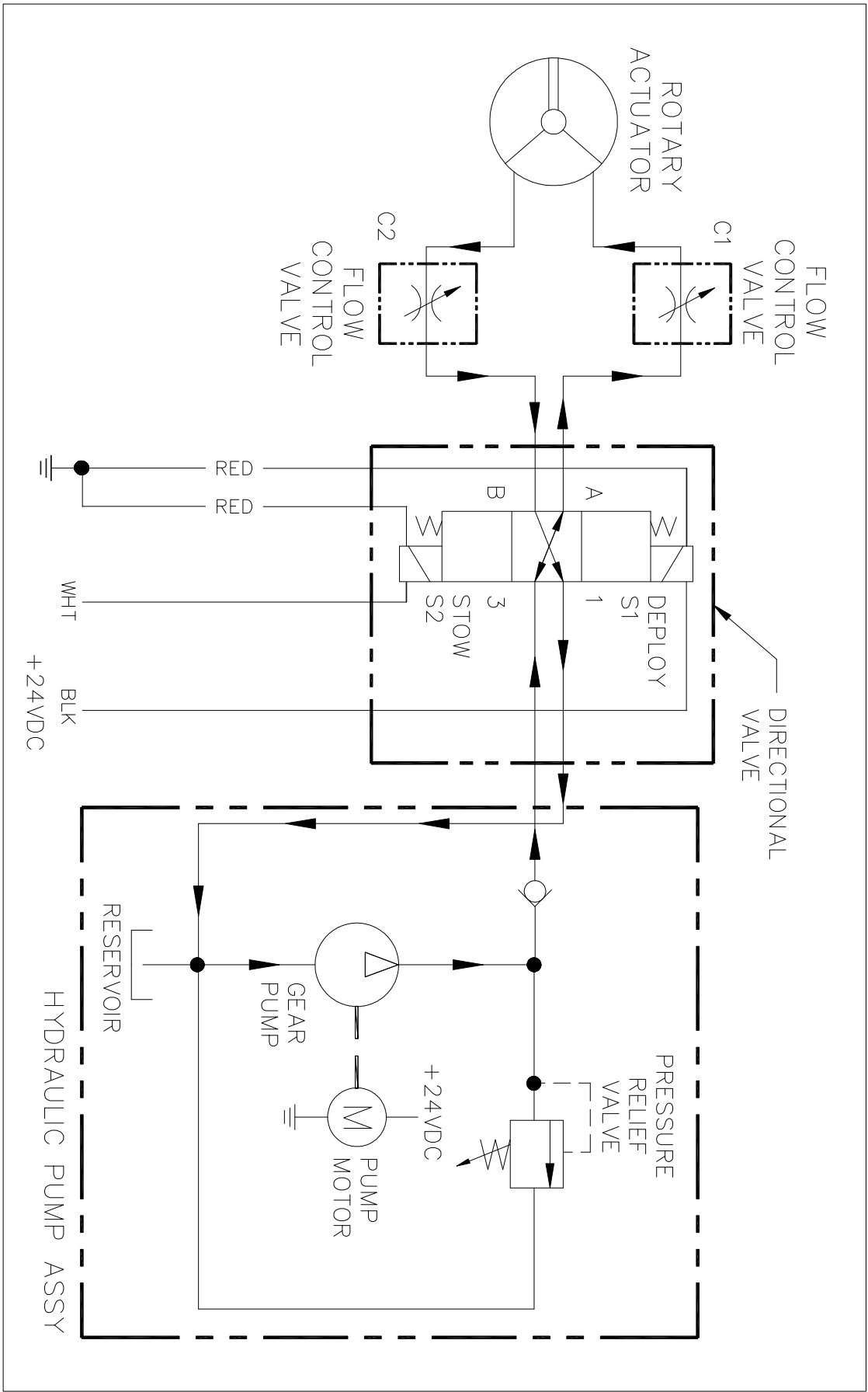


FIGURE 3-8: HYDRAULIC FLUID FLOW DURING DEPLOY MOTION

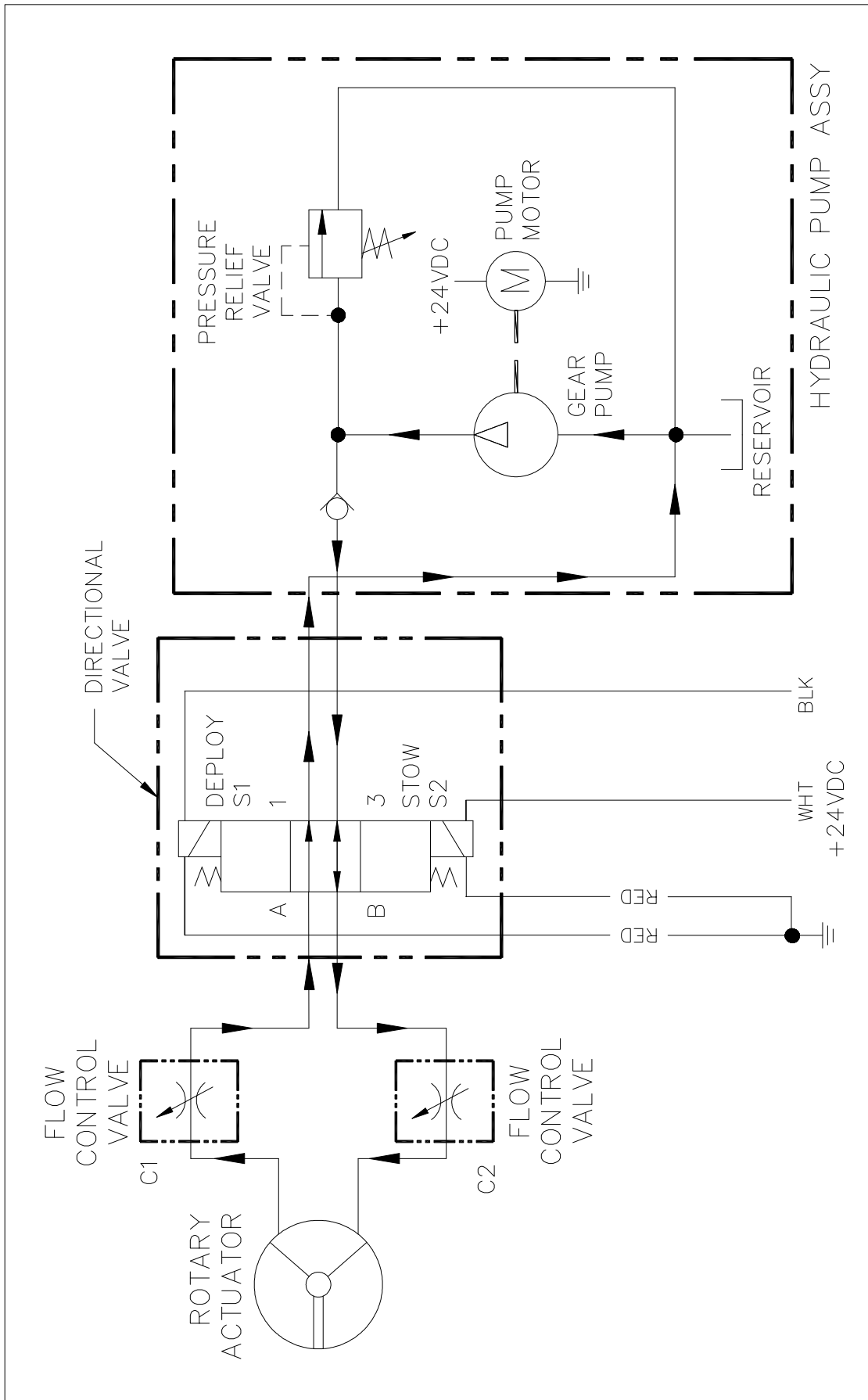


FIGURE 3-9: HYDRAULIC FLUID FLOW DURING STOW MOTION

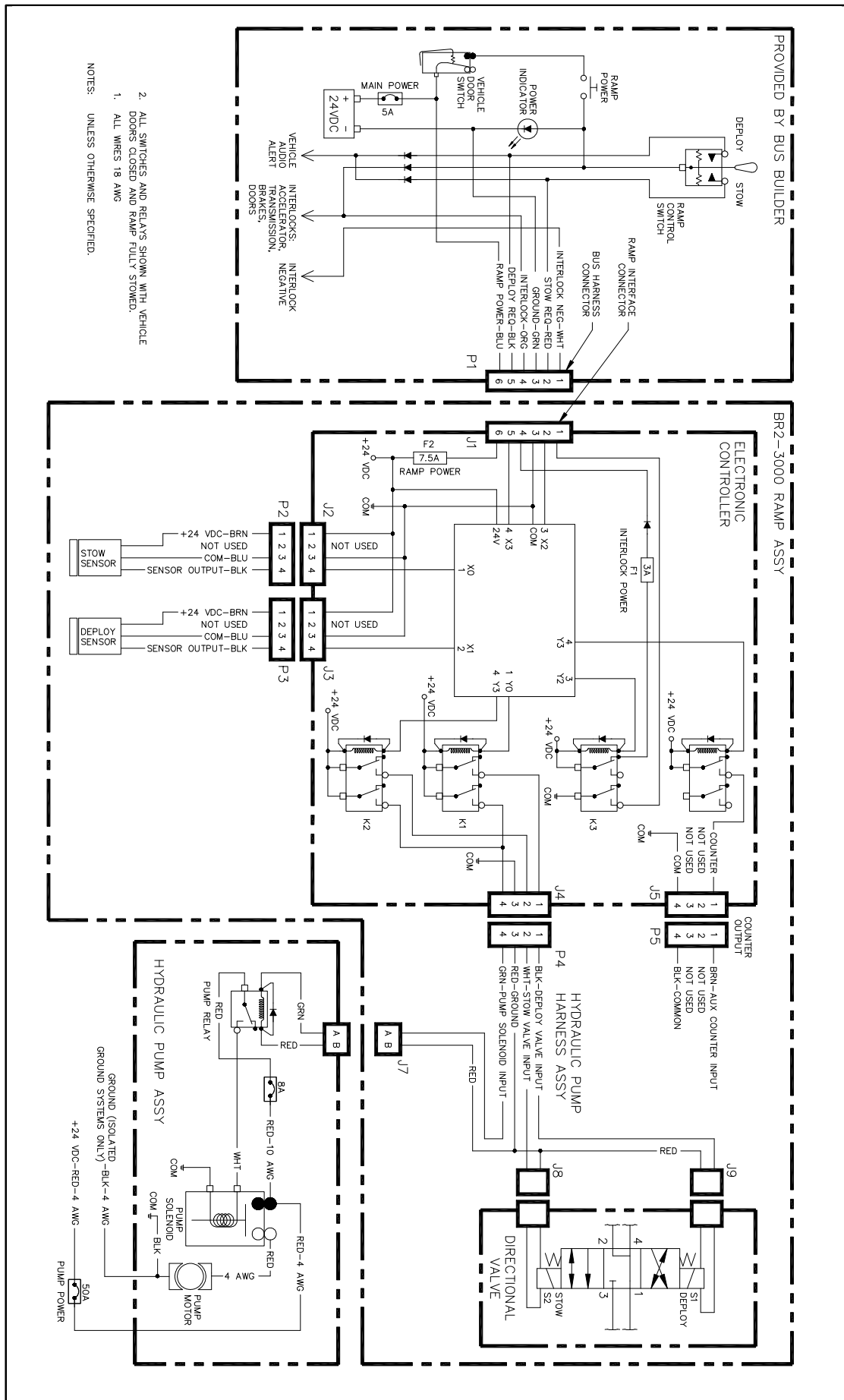


FIGURE 3-10: RAMP ELECTRICAL SYSTEM DIAGRAM

IV. FOLDOVER RAMP TROUBLESHOOTING

The troubleshooting information in this chapter applies to the Ricon BR2-3000 Series FoldOver Low-Floor Vehicle Access ramp when installed in transit vehicles. The troubleshooting guide covers several possible failure modes, including complete lack of response, erratic behavior, and inability to stow. Use the electrical wiring diagram in **Figure 3-10** and the hydraulic diagrams in **Figures 3-7, 3-8 and 3-9** of Chapter III to supplement this chapter.

A. TROUBLESHOOTING TABLE

TABLE 4-1: TROUBLESHOOTING GUIDE			
Function	Symptom	Possible Cause	Remedy
DEPLOY function inoperative or erratic	Hydraulic pump does not operate; pump solenoid does not operate	Main circuit breaker tripped	Reset circuit breaker.
		Hydraulic pump circuit breaker tripped	Reset circuit breaker.
		Vehicle battery charge too low	Check vehicle battery. If necessary, operate ramp with vehicle engine running.
		No power to ramp interface connector P1, pin 6 (blue lead)	Check for input power at ramp interface connector pin P1-6. Repair wiring, as required.
		No signal from switch to ramp interface connector P1, pin 5 (black lead)	Check for deploy signal at ramp interface connector pin P1-5. Repair wiring, as required.
		STOW/DEPLOY switch defective	Replace or repair STOW/DEPLOY switch.
		Door switch interlock circuit defective	Replace or repair door switch.
		Main ramp power switch defective	Replace or repair main ramp power switch.
		Pump solenoid defective	Replace pump solenoid.
		Pump relay defective	Replace pump relay.
		Electronic controller defective	Replace controller.
		Deploy sensor is defective or out of adjustment	Adjust ramp sensor target; set proper sensor-to-target distance; refer to section C.6 in this chapter. Replace sensor, if necessary.
		Hydraulic pump assy wiring harness defective	Check wiring harness to hydraulic pump assembly. Repair wiring, as required.
	Pump solenoid operates, but no ramp movement occurs	Flow control valves are closed	Adjust valves as shown in section C.5 in this chapter.
		Flow control valves are clogged	Clean the valves. Adjust valves as shown in section C.5 in this chapter.
Air in hydraulic system		Cycle ramp to bleed system. Refill hydraulic fluid reservoir as required.	

TABLE 4-1: TROUBLESHOOTING GUIDE

Function	Symptom	Possible Cause	Remedy
DEPLOY function inoperative or erratic (cont.)	Pump solenoid operates, but no ramp movement occurs (cont.)	Loose or faulty wiring at hydraulic pump	Check wiring harness on hydraulic pump; repair harness, as required.
		Pump motor defective	Replace pump assy.
		Hydraulic rotary actuator defective	Replace hydraulic actuator.
	Ramp deploys very slowly or stalls when DEPLOY switch is pressed	Sensor target requires adjustment	Adjust sensor target; refer to section C.6 in this chapter.
		Needle valve setting is too restrictive	Close both needle valves by turning them fully clockwise. Readjust valves as shown in section C.5 in this chapter.
		Hydraulic fluid level low	Check hydraulic fluid level; refill as required.
		Directional valve defective	Replace directional valve.
		Low hydraulic pressure	<ul style="list-style-type: none"> ▪ Check that hydraulic pump pressure output is 1400 PSI. Adjust pump relief valve as necessary. ▪ Check pump and hydraulic lines for leaks or obstructions; repair, as required. ▪ Replace hydraulic pump assy.
		Hydraulic rotary actuator defective (binding or jammed)	Repair or replace hydraulic rotary actuator.
		Ramp hinge or ramp drive arms defective (binding or jammed)	Repair or replace defective parts.
		Wiring harness leading to pump is defective	Check wiring harness leading to pump. Repair wiring, as required.
	Ramp deploys normally but stalls at halfway point	Deploy sensor or sensor target is out of adjustment.	Adjust target as shown in section C.6 of this chapter.
	Hydraulic pump does not shut off when ramp is fully deployed	Hydraulic pump solenoid defective	Replace solenoid.
		Hydraulic pump relay defective	Replace relay.
		Electronic controller defective	Replace controller.

TABLE 4-1: TROUBLESHOOTING GUIDE

Function	Symptom	Possible Cause	Remedy
STOW function inoperative or erratic	Hydraulic pump does not operate; pump solenoid does not operate	Main circuit breaker tripped	Reset main circuit breaker.
		Hydraulic pump circuit breaker tripped	Reset circuit breaker.
		Vehicle battery charge too low	Check vehicle battery. If necessary, operate ramp with vehicle engine running.
		No input power to bus harness connector P1, pin 6 blue lead)	Check for input power at bus harness connector pin P1-6. Repair wiring, as required.
		No signal from STOW/DEPLOY switch to ramp interface connector P1, pin 2 (red lead)	Check for stow signal at ramp interface connector pin P1-2. Repair wiring, as required.
		STOW/DEPLOY switch defective	Replace or repair STOW/DEPLOY switch.
		Main ramp power switch defective.	Replace or repair main ramp power switch.
		Pump solenoid defective	Replace pump solenoid.
		Pump relay defective	Replace pump relay.
		Electronic controller defective	Replace controller.
		Pump wiring harness defective	Check pump wiring harness. Repair wiring, as required.
	Pump solenoid operates, but no ramp movement occurs	Needle valves closed	Adjust valves as shown in section C.5 in this chapter.
		Needle valves clogged	Clean needle valves. Adjust valves as shown in section C.5 in this chapter.
		Hydraulic pump wiring harness defective	Check pump harness wiring. Repair wiring, as required.
		Directional valve defective	Replace directional valve.
		Electronic controller defective	Replace controller.
		Hydraulic rotary actuator defective	Replace hydraulic rotary actuator.
		Hydraulic pump defective	Replace hydraulic pump.

TABLE 4-1: TROUBLESHOOTING GUIDE

Function	Symptom	Possible Cause	Remedy
STOW function inoperative or erratic (cont.)	Ramp stows very slowly or stalls when STOW/DEPLOY switch is set to STOW	Sensor target requires adjustment	Adjust sensor target; refer to section C.6 in this chapter.
		Hydraulic fluid level low	Check hydraulic fluid level; refill as required.
		Needle valve setting is too restrictive	Close both needle valves by turning them fully clockwise. Readjust valves as shown in section C.5 in this chapter.
		Low hydraulic pressure	<ul style="list-style-type: none"> ▪ Check that hydraulic pump pressure output is 1400 PSI. Adjust pump relief valve as necessary. ▪ Check hydraulic lines for leaks or obstructions; Repair, as required. ▪ Replace hydraulic pump.
		Hydraulic pump wiring harness defective	Repair or replace harness from electronic controller to hydraulic pump.
		Pump directional valve defective	Replace hydraulic pump.
		Hydraulic rotary actuator defective (binding or jammed)	Replace hydraulic rotary actuator.
		Ramp hinge or ramp drive arms defective (binding or jammed)	Repair or replace binding parts.
		Hydraulic pump pressure regulator defective	Replace hydraulic pump.
	Hydraulic pump does not shut off when ramp is stowed	Hydraulic pump solenoid defective	Replace solenoid.
		Hydraulic pump relay defective	Replace relay.
		Electronic controller defective	Replace controller.

TABLE 4-1: TROUBLESHOOTING GUIDE

Function	Symptom	Possible Cause	Remedy
Reversed operation	Ramp stows when STOW/DEPLOY switch is set to DEPLOY; ramp deploys when STOW/DEPLOY switch is set to STOW; unit will only deploy about 10 inches and will only stow when past the vertical mark	Hydraulic lines are not connected correctly	Verify that hydraulic lines to hydraulic pump, directional valve, flow control valves and hydraulic actuator are connected correctly. Refer to Figure 3-7 in Chapter 3.
		Leads not connected properly on directional valve solenoids	Verify that connector J8 (the connector with the black and red wires) is connected to solenoid S1, and that connector J9 (the connector with the white and red wires) is connected to solenoid S2. Refer to Figure 3-10 in Chapter 3.
	Ramp will stow when DEPLOY switch is depressed/or deploy when STOW switch is depressed; ramp will operate normally otherwise	Bus harness to ramp interface connector is not wired correctly	Verify that red STOW lead on STOW/DEPLOY switch is connected to bus harness connector J1, pin 2, and the black DEPLOY lead is connected to bus harness connector J1, pin 5. Refer to Figure 3-10 in Chapter 3.
Ramp will function in one direction, but not the other	Ramp will stow, but not deploy	Deploy valve not operating properly	Check for DEPLOY signal at directional valve solenoid S1.
		Deploy sensor defective or out of adjustment	Verify that proximity sensor is energized (LED on sensor indicates operation) and adjusted for correct gap. Refer to section C.6 in this chapter.
		Hydraulic pump solenoid defective	Replace hydraulic pump.
Interlocks will not disengage	Constant interlock signal on ramp interface connector P1, pin 2 (orange wire)	Ramp not fully stowed	Remove possible obstructions and verify that ramp is fully stowed.
		Misadjusted sensor target or stow sensor	Adjust sensor target and/or stow sensor; refer to section C.6 in this chapter.
		Stow sensor defective	Replace stow sensor.
		Electronic controller defective	Replace controller.

B. INSTALLATION GUIDELINE

Careful installation of the Ricon FoldOver ramp contributes to proper and safe operation. Use the electrical wiring diagram in **Figure 3-10** and the hydraulic diagrams in **Figures 3-7, 3-8** and **3-9** of Chapter III 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 bus frame. If the ramp assembly is used to position mounting brackets, verify that it is correctly located relative to the vehicle floor, etc. Accurate positioning of brackets prevents twisting or warping of ramp frame when installing and tightening mounting hardware. A warped frame may cause the ramp motion to be erratic. Set height of ramp flooring surface flush to surrounding floor structure to prevent a tripping hazard.

2. INSTALLING RAMP IN FLOOR


Trim away floor material to allow ramp assembly to drop into floor opening. The ramp perimeter trim overlaps the floor surface, and is sealed to it with a bead of sealer or a gasket. The typical gap between the side mounting faces and the bus structure is 1/8 inch; use shims to fill gap. Mount ramp with six grade-5 screws (included in supplied hardware installation kit). Use flat washers and locking-type nuts. Cover ramp pockets to protect ramp until bus assembly is complete.

3. INSTALLING VEHICLE WIRING HARNESS

Route wiring harness from vehicle ramp controls to rear of ramp. Use the supplied electrical installation kit (Ricon p/n 23510) to connect vehicle control wiring to the ramp interface connector. See **Table 4-2** for pin layout and signal descriptions.

Table 4-2: J1 PIN LAYOUT AND DESCRIPTION			
Pin	Wire color	Description	Volts/amps
1	White	Interlock common	Ground for interlock circuits
2	Red	STOW request from ramp control switch	24 volts, 5mA max draw
3	Green	Ground	Ground for ramp circuits
4	Orange	Output signal to interlock circuit , ramp not stowed	24 volts, 5A max
5	Black	DEPLOY request from ramp control switch	24 volts, 5mA max draw
6	Blue	Main power to ramp	24 volts, 5A max

4. ADJUSTING PRESSURE IN RAMP HYDRAULIC SYSTEM

 WARNING!
THIS RAMP IS DRIVEN WITH HYDRAULIC PRESSURE GENERATED BY A HYDRAULIC PUMP SYSTEM. THE FLUID IS HIGHLY PRESSURIZED AND POSSIBLY VERY HOT. USE EXTREME CAUTION WHEN ADJUSTING HYDRAULIC PRESSURE. DO NOT DISCONNECT HOSES OR FITTINGS WHEN PUMP IS ACTIVE.

- a. Close both flow control valves (C1 and C2) by loosening the lock screws that secure their knobs, and then rotating both knobs fully CW.
- b. Disconnect hydraulic line at port A (DEPLOY port) of hydraulic pump.
- c. Connect pressure test gauge to port A of hydraulic pump.
- d. Locate pressure relief valve on hydraulic pump, and loosen its lock nut. Engage adjustment screw with a 1/4" hex key wrench.
- e. Hold ramp control switch in DEPLOY position (note that ramp does not move because flow control valve has been disconnected).
- f. Adjust pressure to 1400 PSI. Rotate adjustment screw CW to increase pressure or CCW to decrease pressure. Retighten pressure relief valve lock nut.
- g. Disconnect pressure gauge from hydraulic pump.
- h. Reconnect hydraulic line to port A of hydraulic pump.
- i. Reset both flow control valves with procedure in following paragraph.

5. FLOW CONTROL VALVE ADJUSTMENT

NOTE: It is important to adjust both flow control valves **identically** (C1 and C2) during this procedure.

- Loosen lock screws that secure the valve knobs.
- Turn both valves fully CW. This completely closes the valves, stopping ramp operation.
- Open both valves 1/2 turn CCW from fully closed. Verify that each valve is adjusted identically. Rotating valves CCW increases flow to the ramp actuator and increases speed/torque; rotating the valves CW decreases flow to the actuator and decreases speed/torque.
- Tighten lock screws.

6. ADJUSTING SENSOR TARGET FOR POSITION AND GAP

- Verify that the ramp is completely stowed. This establishes a reference position for ramp during target adjustment.
- Refer to **Figure 4-1** to verify that target is correctly installed on actuator driveshaft; the small stow segment points at the actuator and the larger deploy segment is adjacent to the pillow block. The target must be laterally positioned on driveshaft so that its STOW and DEPLOY segments are aligned with sensors; each target segment must be directly in front of a sensor. Adjust as necessary.

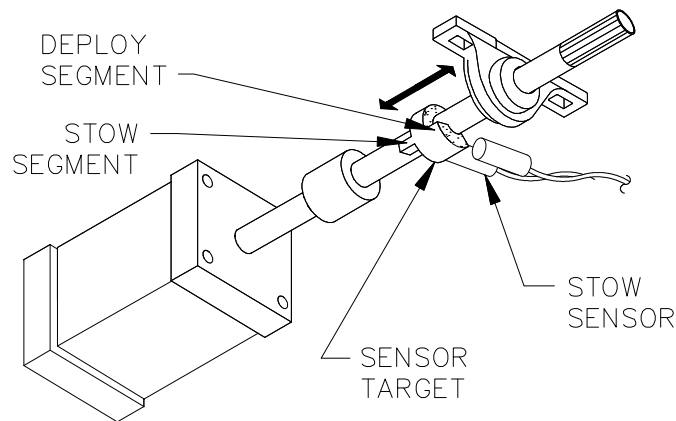
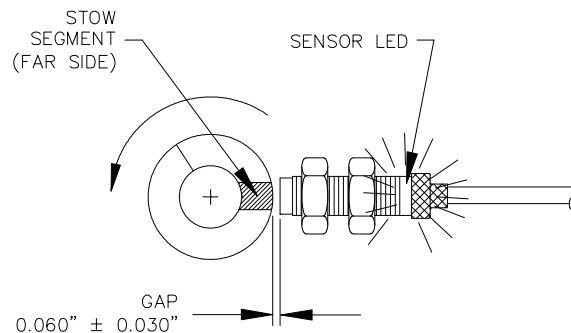


FIGURE 4-1: ORIENTATION OF SENSOR TARGET

- Refer to **Figure 4-2**. Loosen jam nuts on sensor body. Adjust position of both nuts to achieve a gap between nose of sensor and outside diameter of target that is $.060'' \pm .030''$ (gap can be set anywhere on outside diameter of target). Do not allow sensor to contact target. Tighten jam nuts and recheck gap. Repeat for other sensor.
- When front edge of ramp is approximately 10 inches above vehicle floor, the STOW sensor will be aligned with the stow segment on the target and the LED on the sensor body will illuminate. **Figure 4-2** shows the position of the STOW segment when the ramp has been fully stowed.



**FIGURE 4-2: SENSOR GAP ADJUSTMENT
(VIEW IS FROM LEFT SIDE)**

7. FINAL INSPECTION

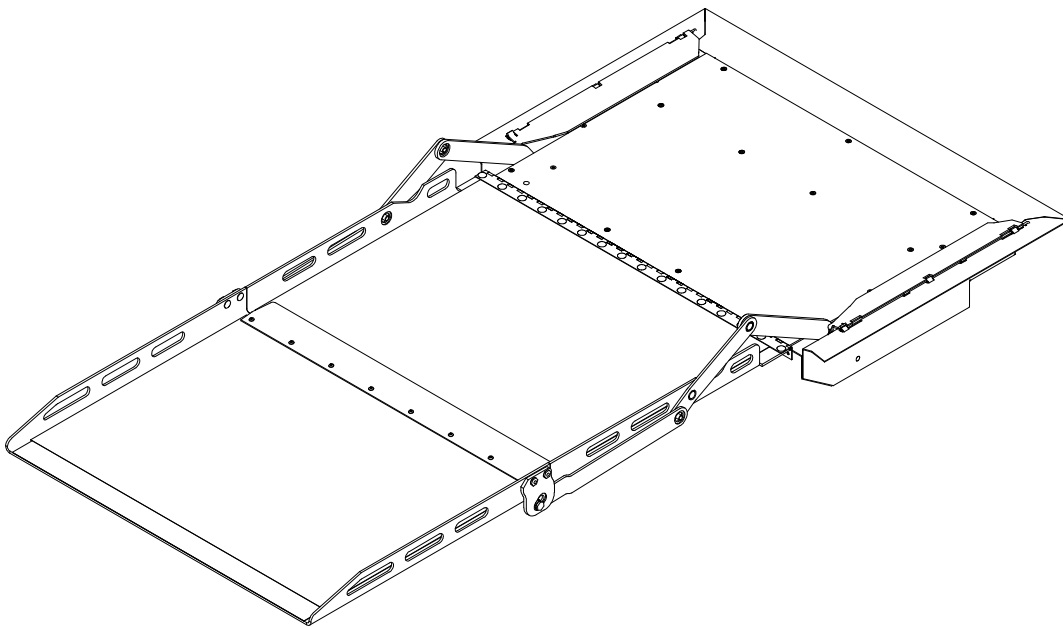
- a. Visually inspect ramp for loose or missing hardware and fittings, and confirm that pockets are free of debris.
- b. Verify that bottom cover is installed on ramp.
- c. Verify that non-skid flooring is clean, functional, and securely fastened.

V. FOLDOVER RAMP SPARE PARTS

The parts layouts and lists in this chapter apply to the Ricon FoldOver Low-Floor Vehicle Access ramps when installed in transit vehicles. Replaceable ramp parts are illustrated in exploded views of major lift assemblies, which show smaller assemblies and components with reference numbers. Each associated parts lists contains reference numbers, parts descriptions, and Ricon part numbers. To order, locate the part in an exploded view, note its reference number, find this number on the associated parts list, and order the part number in the far right column.

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 (e.g., BR2-30481100).



PARTS DIAGRAMS

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RAMP DECALS

Refer to **Figure 5-1**. Inspect decals at mileage interval listed in **Table 3-1** of Chapter III. Inspect for chipping, peeling, fading, and illegibility. Replace a decal by ordering part number shown in **Figure 5-1**, and applying it where shown.

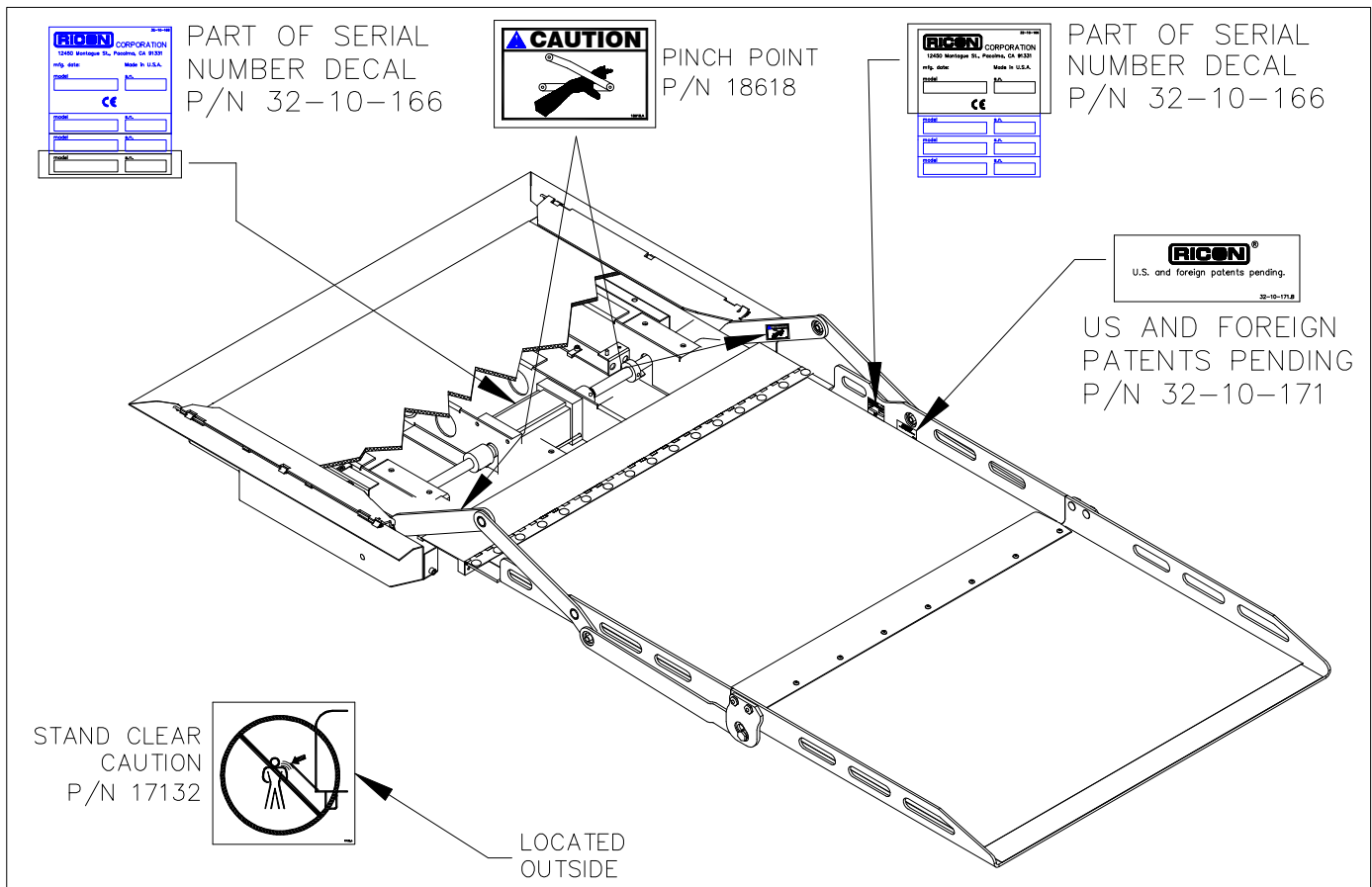


FIGURE 5-1: DECAL PART NUMBERS AND LOCATIONS

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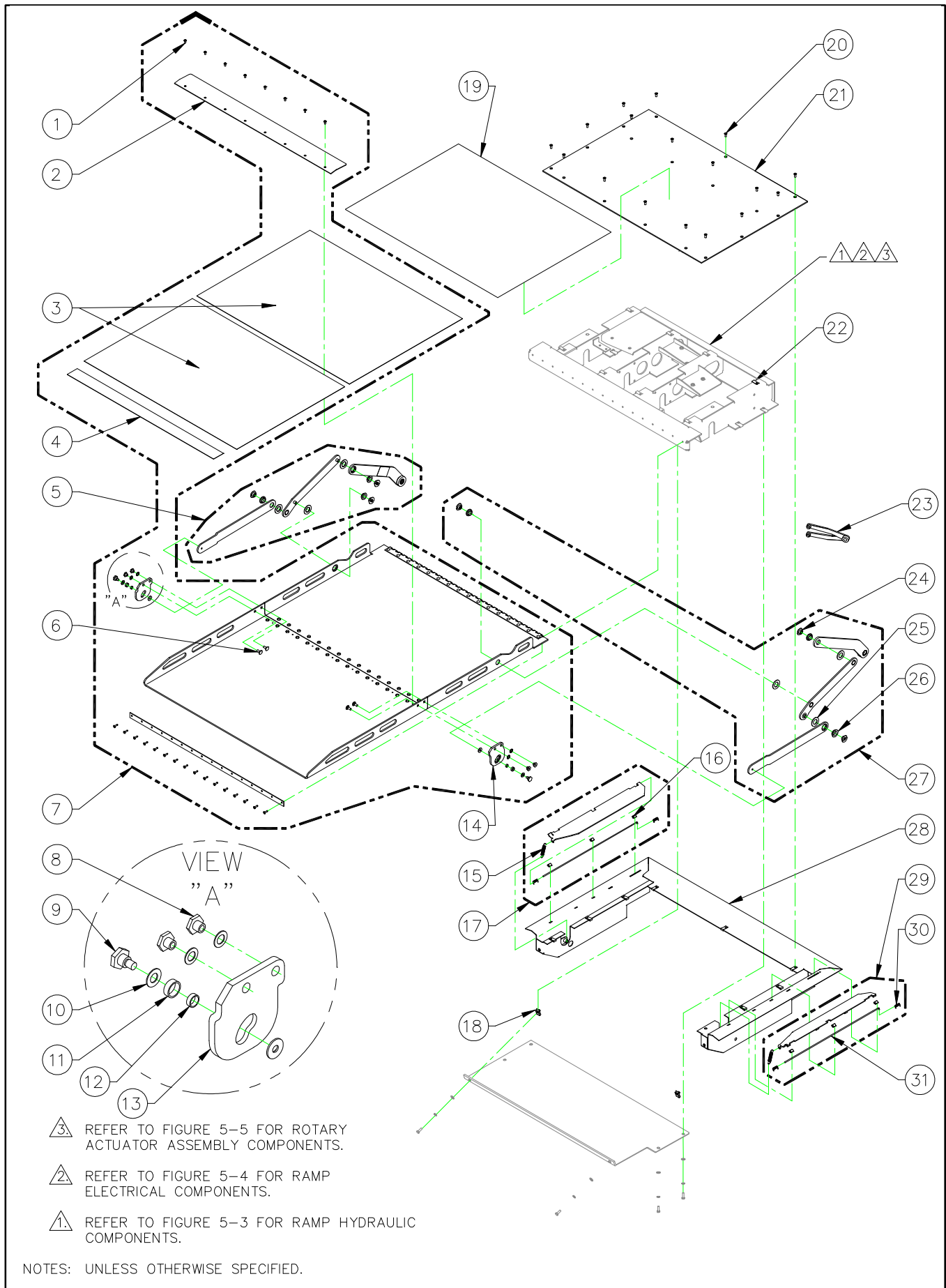


FIGURE 5-2: RAMP AND SUPPORT ASSEMBLY – TOP VIEW

FIGURE 5-2: RAMP AND SUPPORT ASSEMBLY – TOP VIEW

ITEM	DESCRIPTION	QTY	PART NO
1	SCREW, BHS, 10-24x3/8 SST, BAG OF 10	1	14425
2	PLATE, TRANSITION, PLATFORM, NARROW (BR2-30481100)	1	23138
	PLATE, TRANSITION, PLATFORM, NARROW (BR2-32481100)	1	21798
3	SAFETREAD, BLK, 34"X52"	1	29249
4	SAFETREAD, 2"X60FT, ROLL, YELLOW (BULK ITEM)	1	17250
5*	KIT, ARM ASSY, RAMP, LH, W/HRDWR	1	29277
6	SCREW, CAR, 1/4-20X5/8 SST, BAG OF 10	1	19707
7	RAMP AND HINGE ASSY, W/HRDWR (BR2-30481100)	1	29275
	RAMP AND HINGE ASSY, W/HRDWR (BR2-32481100)	1	29276
8	NUT, TEE, 1/4-20X1/4L NECK SST, BAG OF 10	1	14485
9	SHOULDER BOLT W/10-24 THREAD	2	23508
10	WASHER, FLAT, .375x.63x.032 NYLON, BAG OF 10	1	14435
11	SLEEVE, REINFORCEMENT, ARM MECHANISM	2	23509
12	BEARING, DU 3/8 IDx.465ODx3/16"LONG	2	23132
13	BRACKET, PIVOT, LH	1	21992
14	BRACKET, PIVOT, RH	1	21991
15	SPRING, FLAPPER ARM, SST, 2" LONG	2	23131
16	CLIP, FLAPPER MECHANISM	6	23512
17	KIT, COVER, DRIVE ARM RECESS, LH, W/HRDWR	1	29279
18	NUT, SPRING, 1/4-20 MULTI THD, BAG OF 10	1	15952
19	SAFETREAD, BLK, 34"X24"	1	17792
20	SCREW, FHH, M 5-.8X20MM, SST, BLK OXIDE, BAG OF 10	2	29246
21	PLATE, FLOOR (BR2-30481100)	1	23501
	PLATE, FLOOR (BR2-32481100)	1	23127
22	NUT, SPRING, M5-.8, MULTI-THD, BAG OF 10	1	19793
23	SPANNER WRENCH	1	18756
24*	T-NUT, 3/8-16	6	17269
25	WASHER, BRONZE THRUST, 1 3/8X3/4X1/16"	6	18212
26	BUSHING, FLANGE, OILITE BRONZE	6	18211
27*	KIT, ARM ASSY, RAMP, RH, W/HRDWR	1	29278
28	TRIM POCKETS ASSY, FOLDING RAMP, SHORT (BR2-30481100)	1	235007
	TRIM POCKETS ASSY, FOLDING RAMP, SHORT (BR2-32481100)	1	23112
29	KIT, COVER, DRIVE ARM RECESS, RH W/HRDWR	1	29280
30	SPRING, BARRIER HINGE	4	25433
31	ROD, AXLE, FLAPPER	2	23117

* Spanner wrench (item 21) is required for assembly of ramp arm hardware.

**Kit includes 3 each of items 22, 23 and 24. Refer to Ramp Arm Assembly section of Chapter 3 in the Foldover Ramp Service Manual.

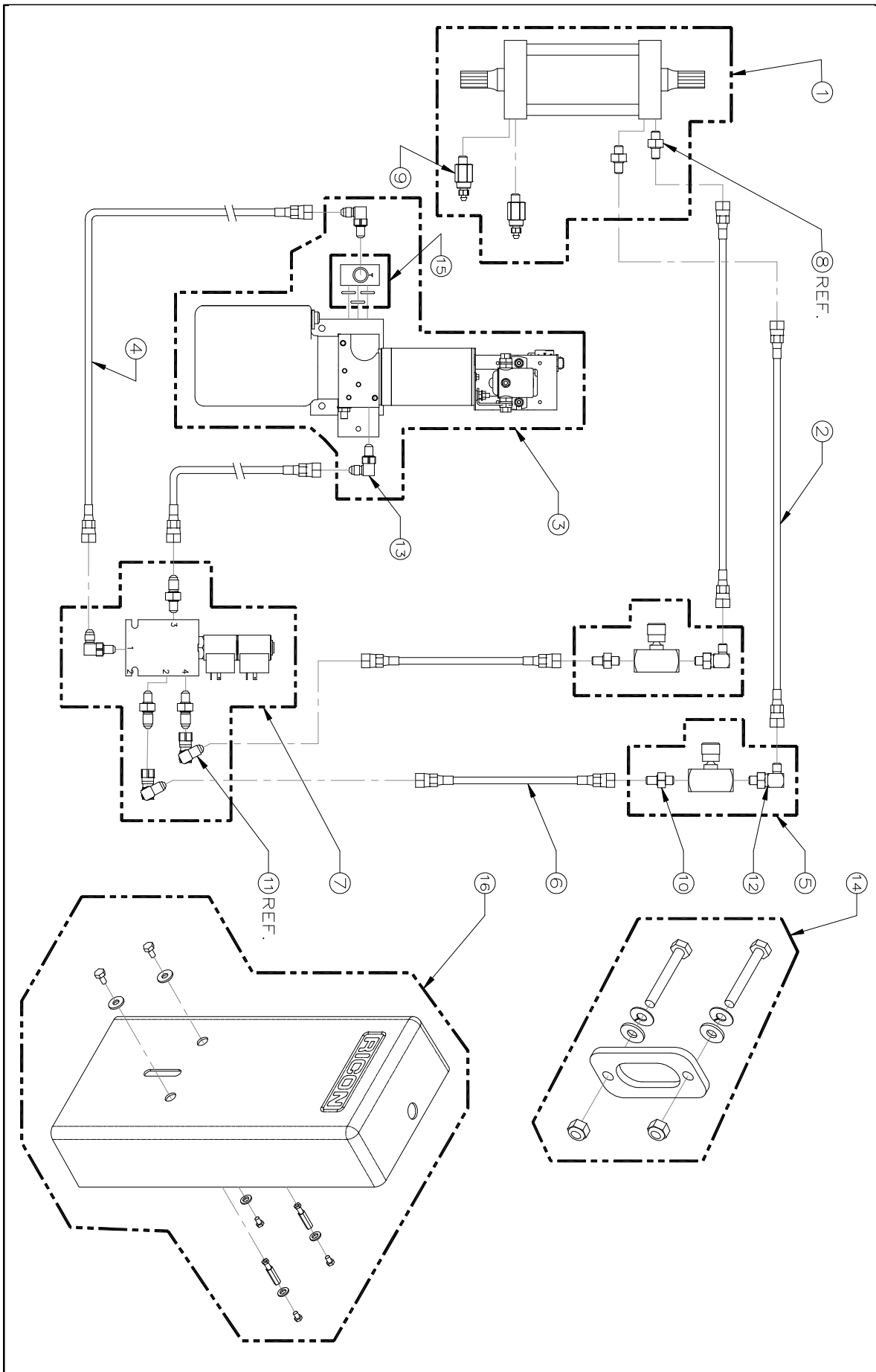


FIGURE 5-3: RAMP HYDRAULIC COMPONENTS

FIGURE 5-3: RAMP HYDRAULIC COMPONENTS

ITEM	DESCRIPTION	QTY	PART NO
1*	KIT, ACTUATOR, W/ADAPTERS AND FITTINGS	1	18619
2	HOSE, HYDRAULIC, 21.5"	2	V2-SH-008
3	PUMP ASSY, HYDRAULIC, 12V	1	PM212152111
4	HOSE, HYDRAULIC, 15'	2	F9-HH-15
5	VALVE ASSY, FLOW CONTROL, INCL. FITTINGS	2	17211
6	HOSE, HYDRAULIC, 9"	2	21642
7	VALVE ASSY, DIRECTIONAL, INCL. FITTINGS	1	21641
8	ADAPTER, ORB, 4XJIC, 4 STL	4	17208
9	FITTING, BLEEDER	2	25710
10	ADAPTER, ORB, 6XJIC, 4 STL	1	26591
11	FITTING, SNL, 1/4JX1/4J, STL	2	VS-SH-06
12	FITTING, STE, 1/4J/X9/16-18STL	2	V2-SH-14
13	FITTING, ELBOW, #4 STD THDX#4 JIC	3	18235
14	KIT, MOUNTING BRACKET, FLOW CTRL VALVE W/HRDWR	1	18624
15	KIT, BLOCK, HYDRAULIC TANK RETURN	1	30108
16	COVER ASSY, PUMP	1	23521

*Refer to **Figure 5-5** for a parts breakdown of the hydraulic rotary actuator assembly.

FIGURE 5-4: RAMP ELECTRICAL COMPONENTS

ITEM	DESCRIPTION	QTY	PART NO
1	CONTROLLER ASSY	1	22425
2	HARNESS ASSY, J4	1	23562
3	HARNESS ASSY, J1	1	17286
4	SENSOR ASSY W/MOLDED CABLE	2	98071
5	RELAY, 12V COIL 40A	1	28-36-405
6	SOLENOID, SGL POLE, SGL THROW, 12V	1	19066
7	CIRCUIT BREAKER, 8AMP	1	265108
8	JUMPER, 10 AWG, 3.75" RED	1	10551
9	HARNESS, PUMP MOTOR WIRING	1	22426
10	KIT, INSTALLATION, CONNECTOR WITH PINS	1	23510

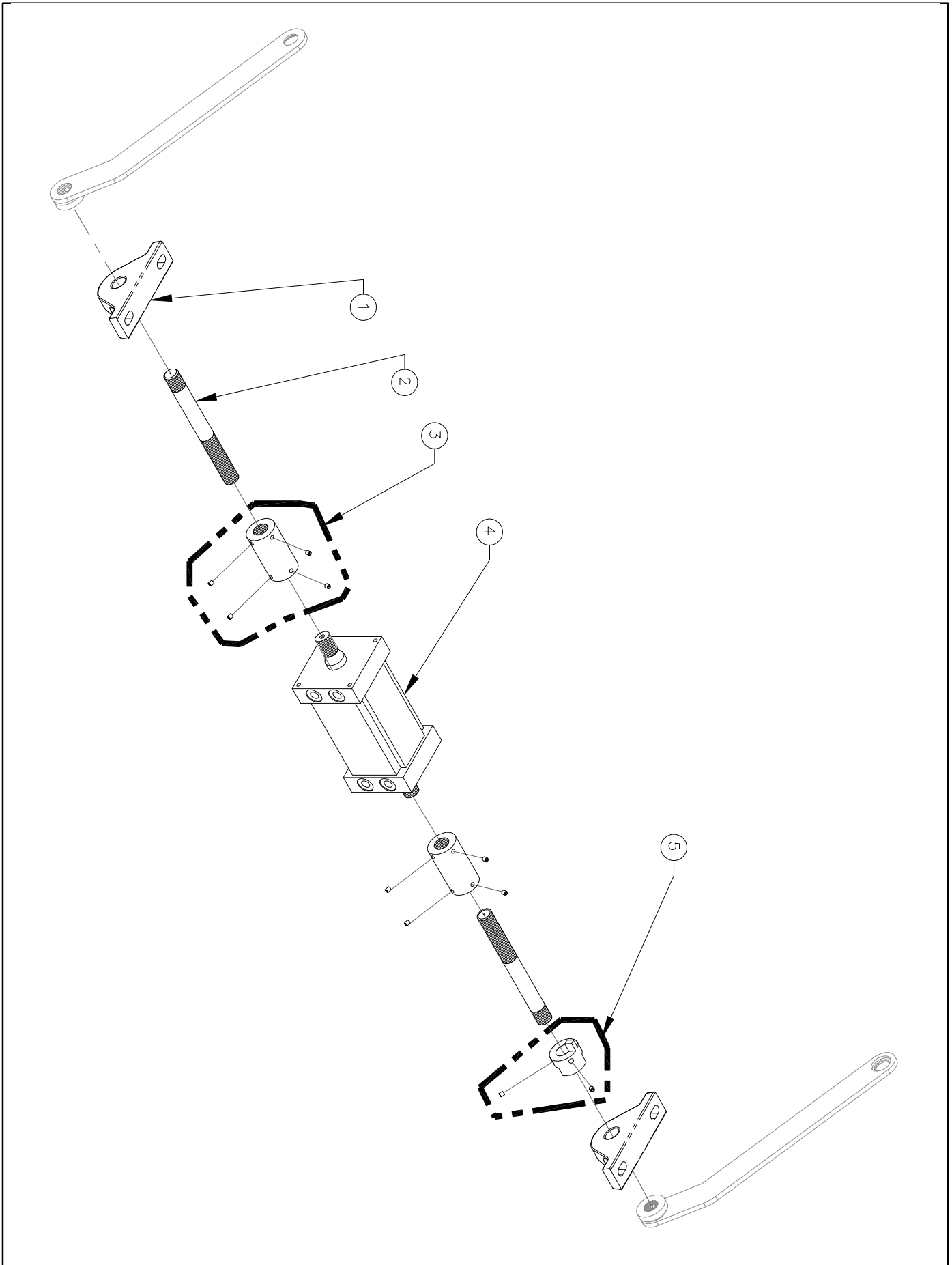


FIGURE 5-5: ROTARY ACTUATOR ASSEMBLY

FIGURE 5-5: ROTARY ACTUATOR ASSEMBLY

ITEM	DESCRIPTION	QTY	PART NO
1	PILLOW BLOCK W/ GREASE FITTING	2	98160
2	DRIVESHAFT, RAMP	2	18741
3	KIT, COUPLER W/ HARDWARE	2	18614
4	ACTUATOR, HYDRAULIC, ROTARY	1	98048
5	KIT, TARGET SENSOR W/ HARDWARE	1	18613

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