III. FOLDOVER RAMP MAINTENANCE

The maintenance information in this chapter applies to the Ricon FoldOver Stainless Steel 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!

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.

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 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 ramp and other system components require periodic maintenance. Ricon recommends a thorough vehicle inspection by an authorized 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	• 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, actuator drive arms and trim pockets are free of debris.
Ramp non-slip surfaces	• 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 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 dealer or qualified service technician. 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 dealer or qualified service technician 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 with Texaco 01554 Aircraft Hydraulic Oil or equivalent U.S. mil spec H5606G fluid.
Setscrews	Check for loose or missing setscrews at these locations: • Driveshaft couplers (2 x 4 ea) • Sensor target (1 ea) • Pillow blocks (2 x 2 ea) Tighten, or replace, as necessary.
Drive arm T-nuts	Check for looseness; tighten as necessary; apply thread locker (Loc-tite blue), as necessary. Refer to **Figure 3-4** for drive arm hardware configuration.
Ramp interior (for debris)	Check area below floor plate, and remove any accumulated dirt or debris.

TABLE 3-2: MAINTENANCE SCHEDULE	
INSPECTION POINT	**ACTION**
Non-slip surface	Visually check for damage to surface, and for loose or missing non-slip material.
Decals	Visually check for illegibility or damage, replace as necessary.
– 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 –	
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 uses electrical power from the host vehicle to deploy and stow 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.

1. HYDRAULIC PUMP

The ramp employs an electro-hydraulic pump (contained within the ramp enclosure) 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 II for a flow control valve adjustment procedure.

3. 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 **Figure 3-1** for 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 fuse location at top, right corner. Refer to **Table 3-3** for functions and ratings of fuses located inside controller. Access to the controller is gained by removing 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 of each connector pin.

Refer to **Section 4** for a description of sensor light activity during ramp movement.

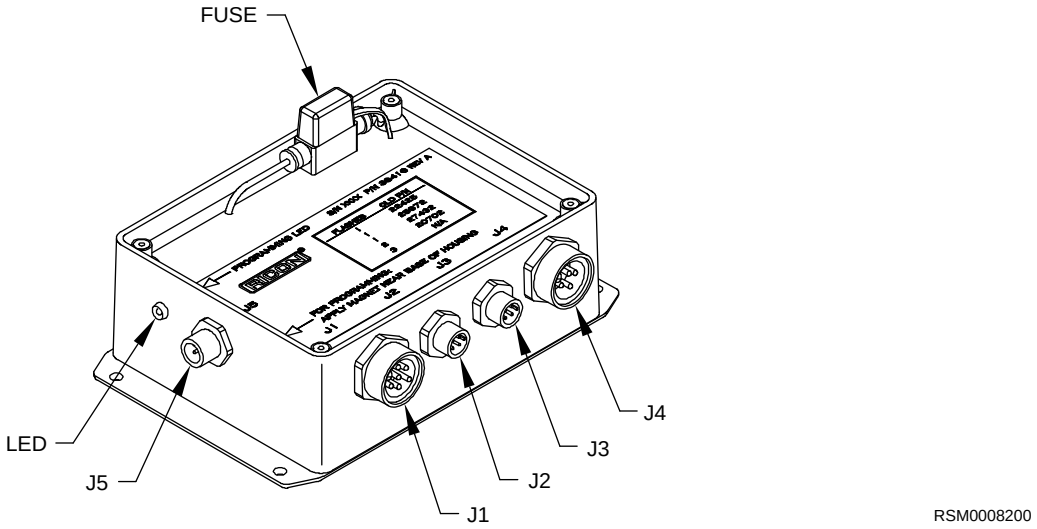

FIGURE 3-1: CONTROLLER

TABLE 3-3: CONTROLLER FUSES		
FUSE	**RATING**	**CIRCUIT**
F2	7.5 AMP	Main Power (Programmable Controller, Solenoid Valves, Sensors)
END OF TABLE		

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					

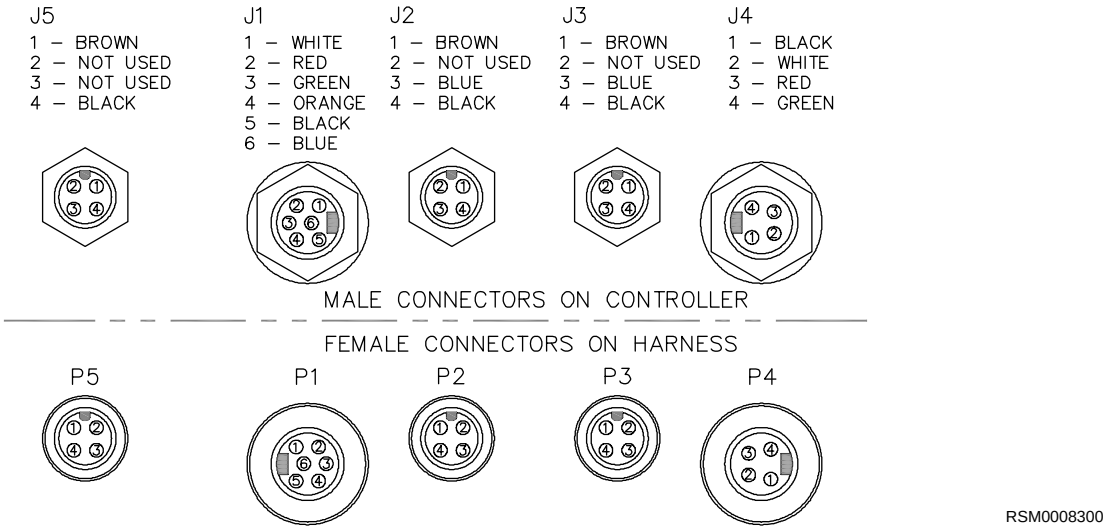

FIGURE 3-3: CONTROLLER CONNECTOR-PIN NUMBERING

NOTE: Some applications require 12 VDC system power. Voltage levels are 12 volts in these applications.

4. SENSOR LIGHT ACTIVITY DURING RAMP MOVEMENT

The latest FoldOver ramps have a third ramp position that is monitored by the controller. This position is very near the to the fully stowed position. The ramp must be within this area before the electrical interlock output signal will turn on (12VDC). This is done to reduce the possibility of a passenger tripping on the front edge of the ramp when it is not stowed competely. Failure to stow completely could be caused by accumulated debris beneath the ramp (within the frame). The following information will provide an aide to troubleshoot ramp problems using the indicator lights on each sensor.

Refer to **Figure 3-4.** This illustration shows the location of the target (installed on a driveshaft), the stow and deploy sensors, and the sensor lights.

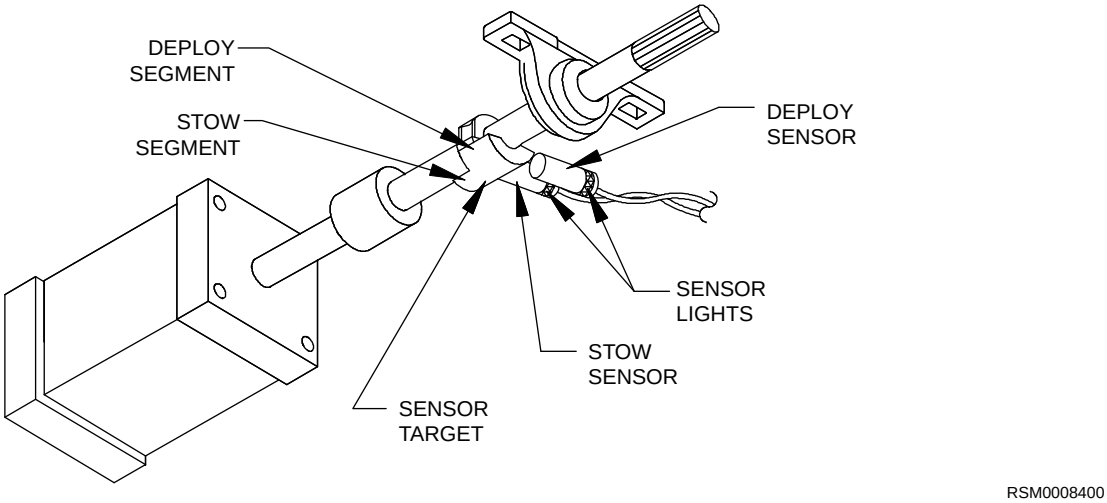

FIGURE 3-4: TARGET AND SENSOR LOCATIONS

Refer to **Figure 3-5.** This illustration shows the four ramp positions detected by the controller. The controller determines the ramp angles shown by using the signals from the two sensors. The “A” ramp angle shown in the figure is greater than actual for clarity; the actual height of the front edge of the ramp above the floor is about one inch. This angle can be adjusted by turning the sensor target very slightly.

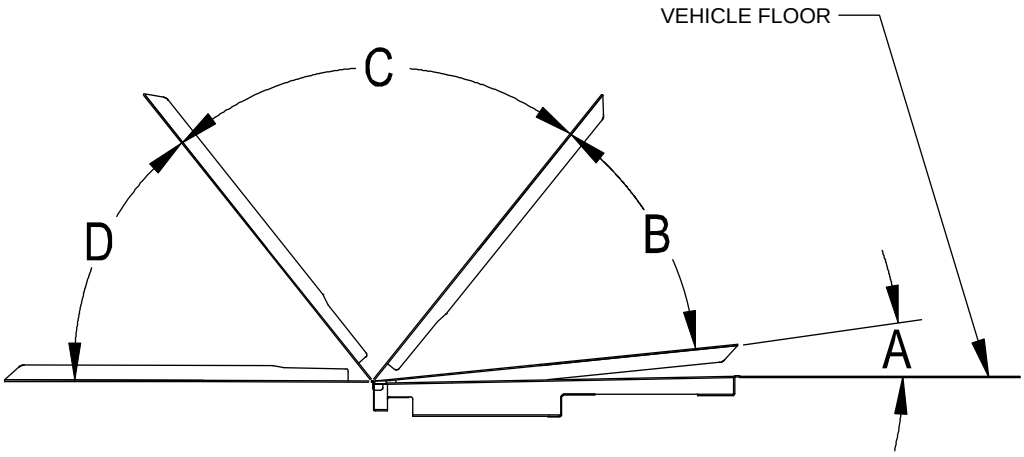

FIGURE 3-5: RAMP POSITIONS

Refer to **Table 3-5**. The status of the sensor lights (on or off) and the interlock output (0VDC or 12VDC) occur over the entire range of each angle shown. Note that the interlock output has both a normal and an inverted output. This table applies to the normal output.

TABLE 3-5: SENSOR LIGHT AND INTERLOCK OUTPUT STATUS

ANGLE	DEPLOY LIGHT	STOW LIGHT	INTERLOCK OUTPUT
A	OFF	OFF	24VDC
B	ON	OFF	0VDC
C	ON	ON	0VDC
D	OFF	ON	0VDC
End of Table			

5. CIRCUIT BREAKERS AND FUSES

The bus builder installs a 50-amp circuit breaker for 24V applications or a 90-amp circuit breaker for 12V applications 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 dealer or qualified 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 3-6** for the correct configuration of the arms and their hardware. Use a spanner wrench (Ricon p/n 36250) 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.

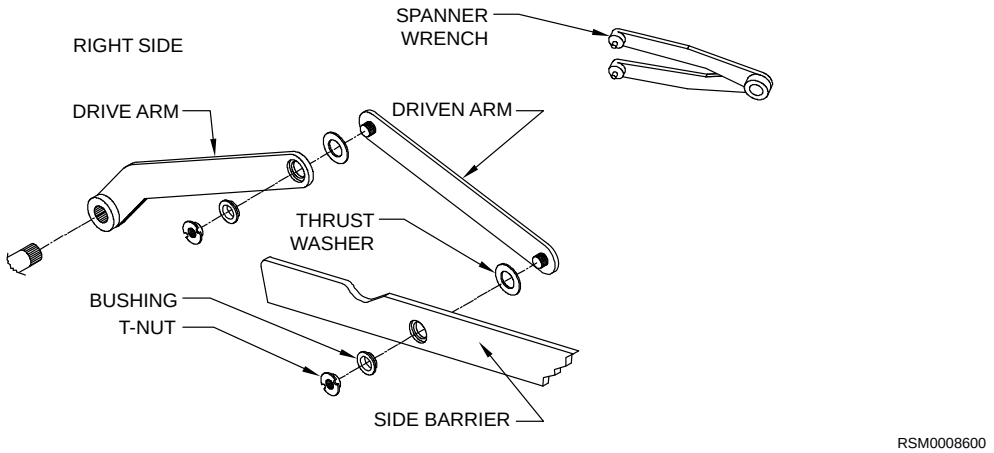

FIGURE 3-6: HARDWARE CONFIGURATION FOR RIGHT SIDE RAMP ARM

E. ELECTRICAL AND HYDRAULIC DIAGRAMS

Refer to **Table 3-6** for wire color codes used on schematic. Refer to **Figure 3-7** for a description of plug and receptacle designations used on schematic. Refer to **Figure 3-8** for a list of symbols used on schematic. Refer to **Table 3-7** for an explanation of labels used on schematic. Refer to **Figures 3-9, 3-10**, and **3-11** 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 3-12** 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 3-6: 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		

END OF TABLE

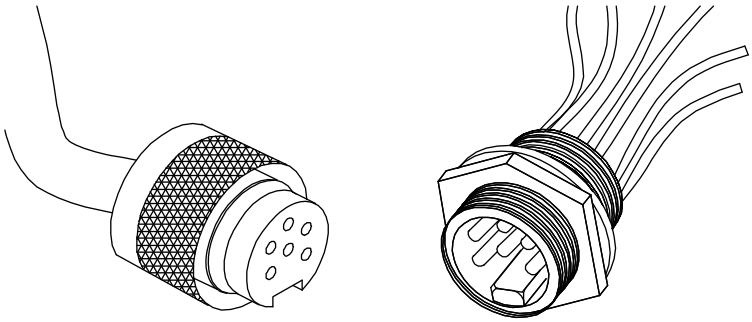

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FIGURE 3-7: CONNECTOR CONFIGURATION

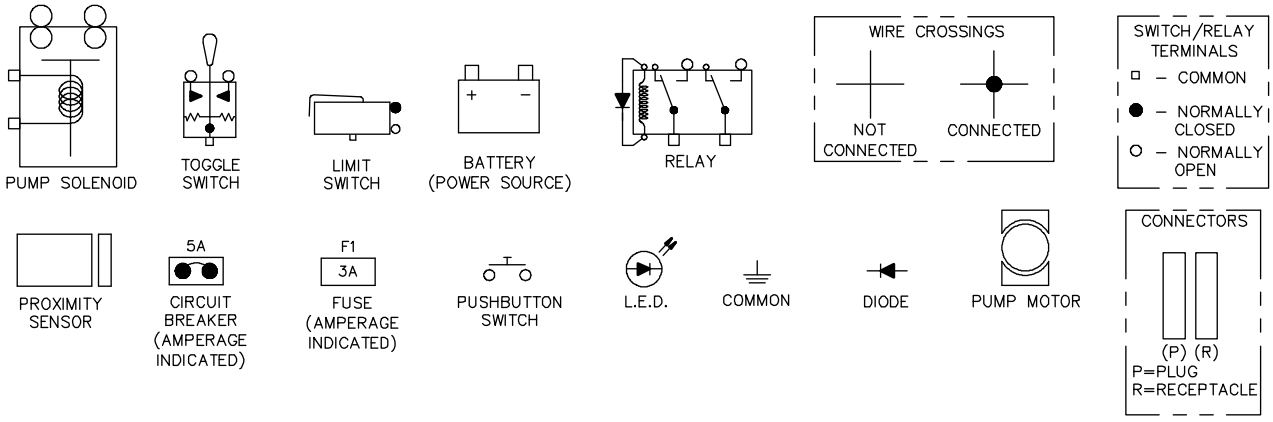

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FIGURE 3-8: SCHEMATIC SYMBOLS

TABLE 3-7: WIRING DIAGRAM LABELS	
LABEL	**DESCRIPTION**
+24 VDC	System power for interlocks, hydraulic valves, controller, and sensors. **NOTE:** Some applications require +12 VDC system power.
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.
COM, COMMON	System electrical common.
HEATER MAT	Power to ramp heater mat. **NOTE:** This feature is optional and may not be connected.
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.
END OF TABLE	

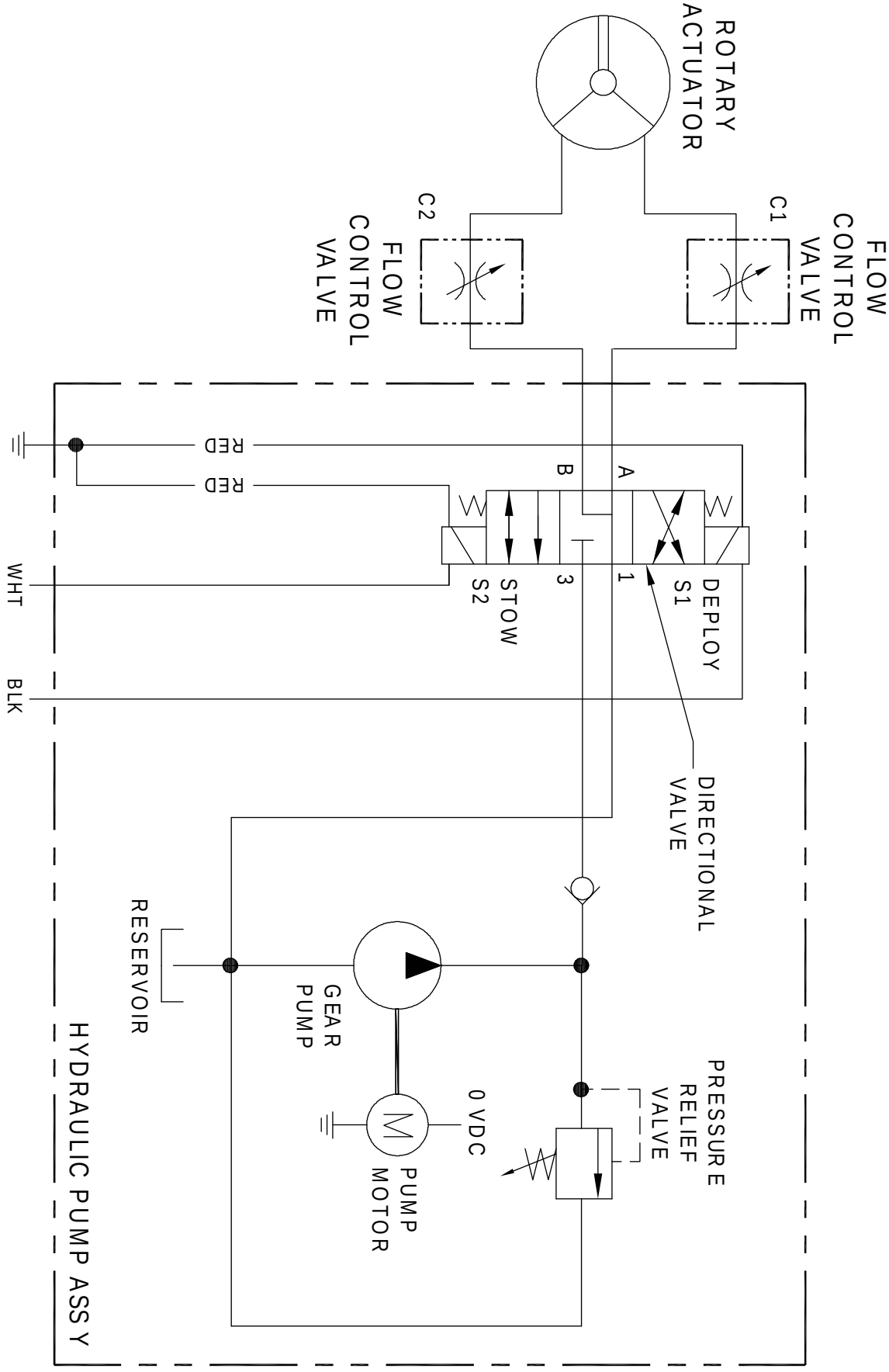

FIGURE 3-9: NO HYDRAULIC FLOW AT REST

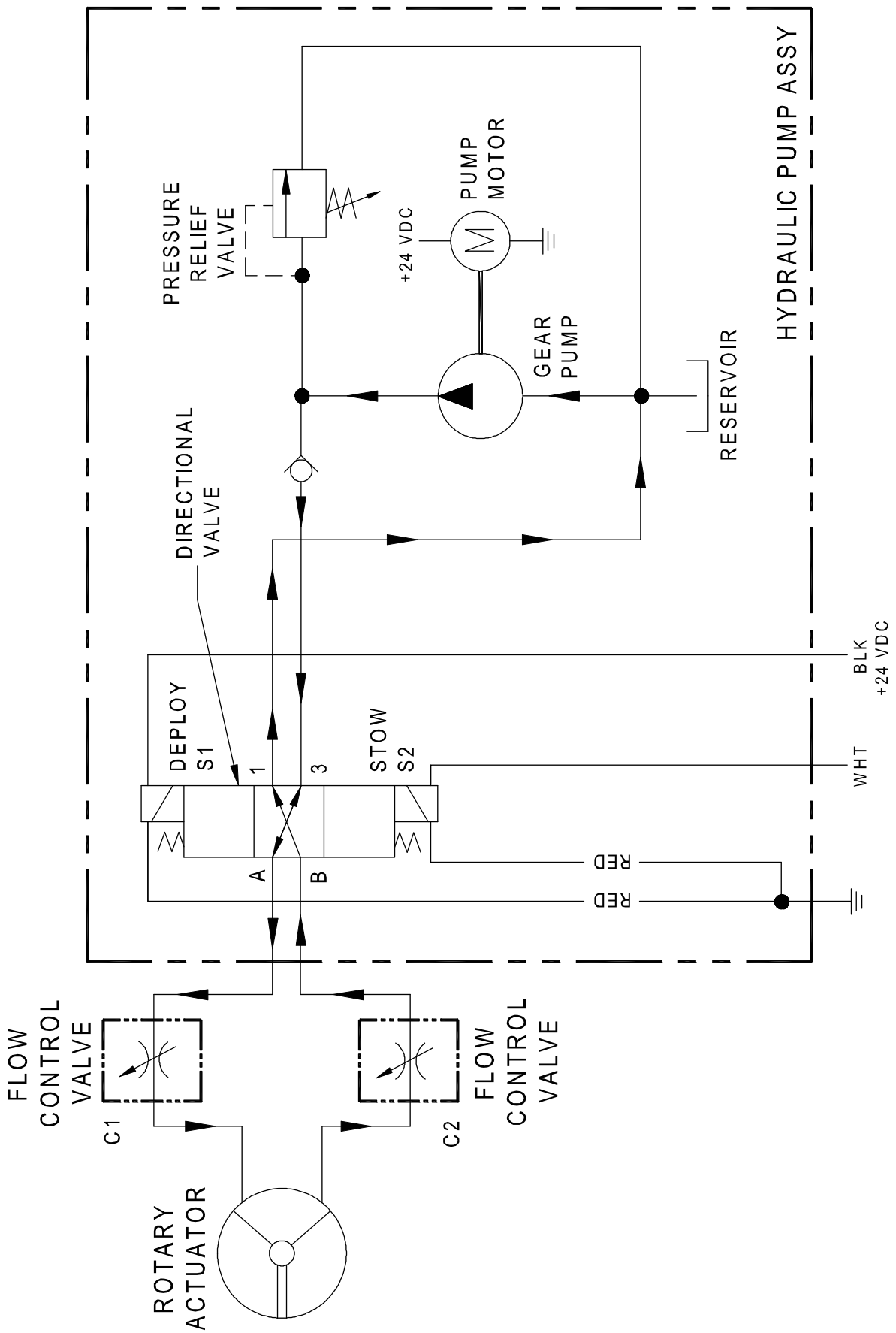

FIGURE 3-10: HYDRAULIC FLUID FLOW DURING DEPLOY MOTION

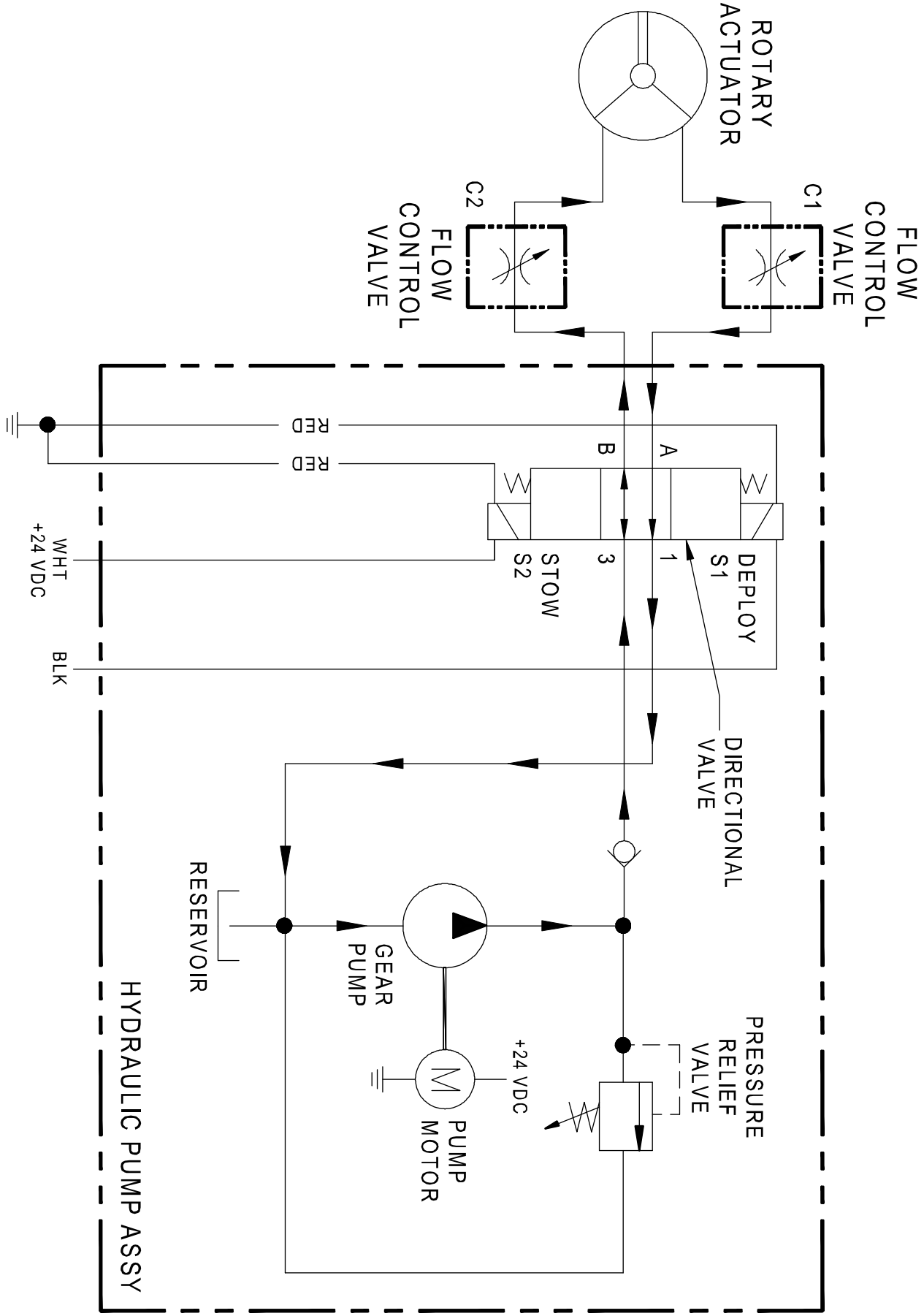

FIGURE 3-11: HYDRAULIC FLUID FLOW DURING STOW MOTION

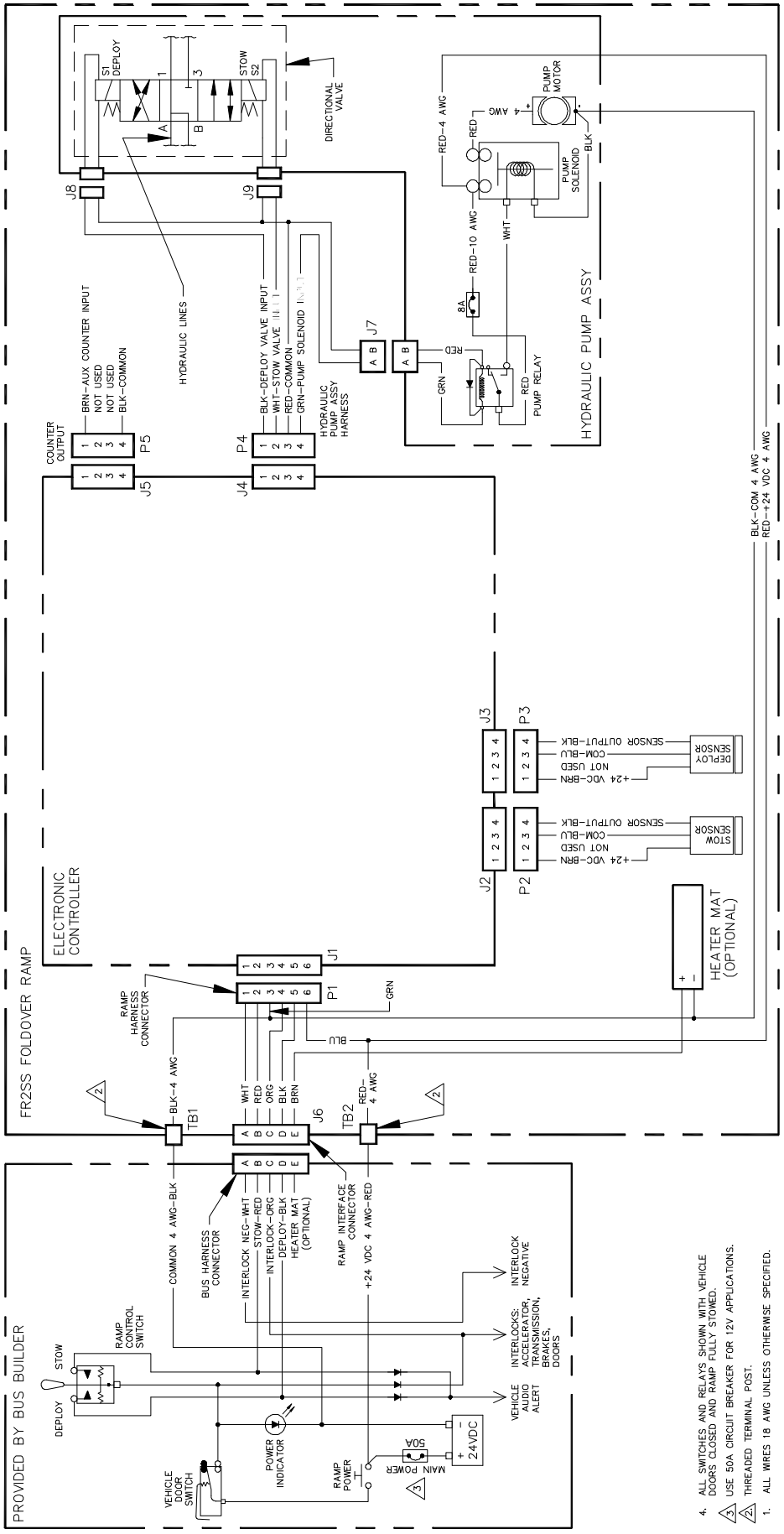

FIGURE 3-12: FR2SS-SERIES RAMP ELECTRICAL DIAGRAM

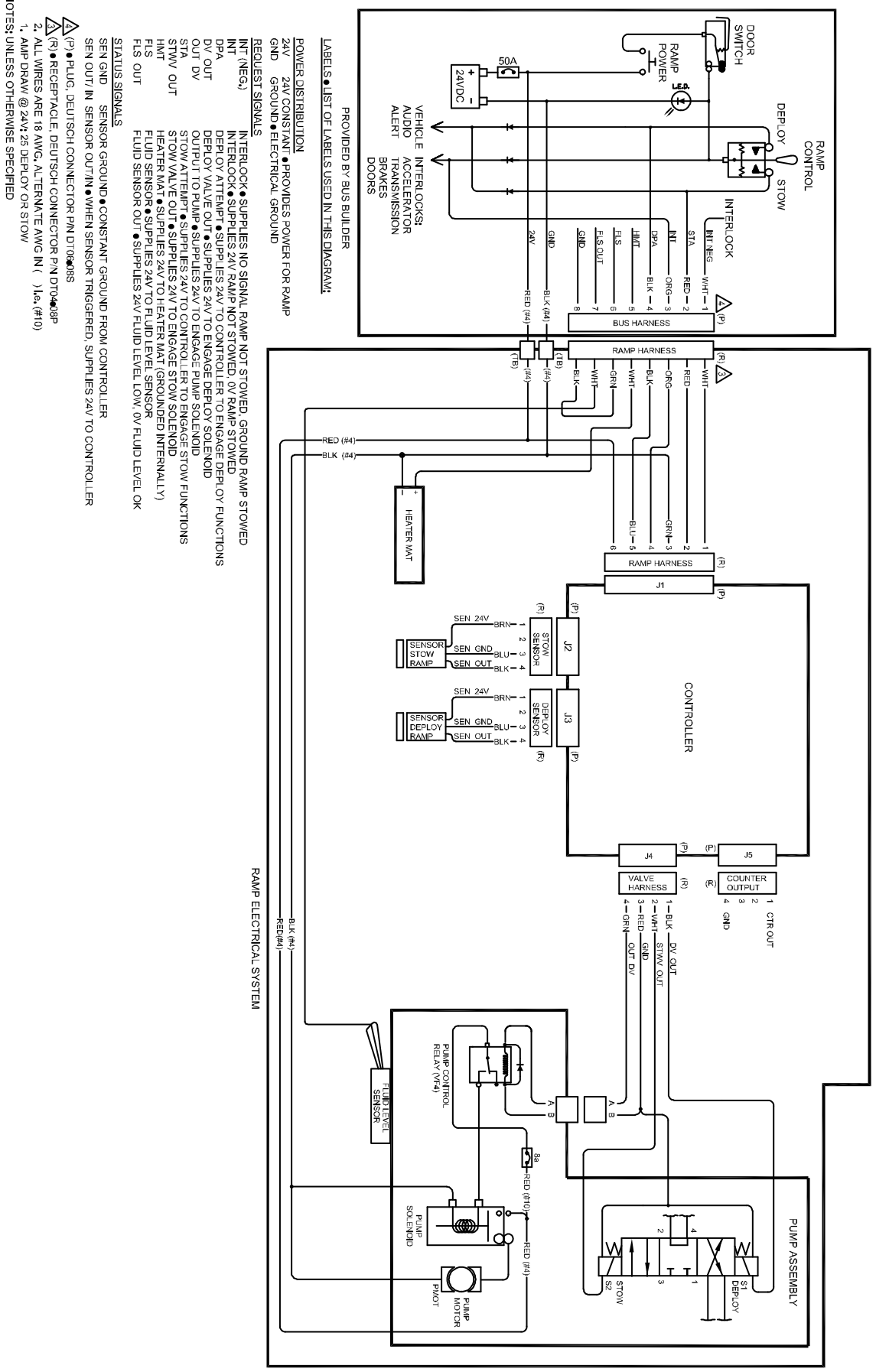

FIGURE 3-13: FR2N-SERIES RAMP ELECTRICAL DIAGRAM

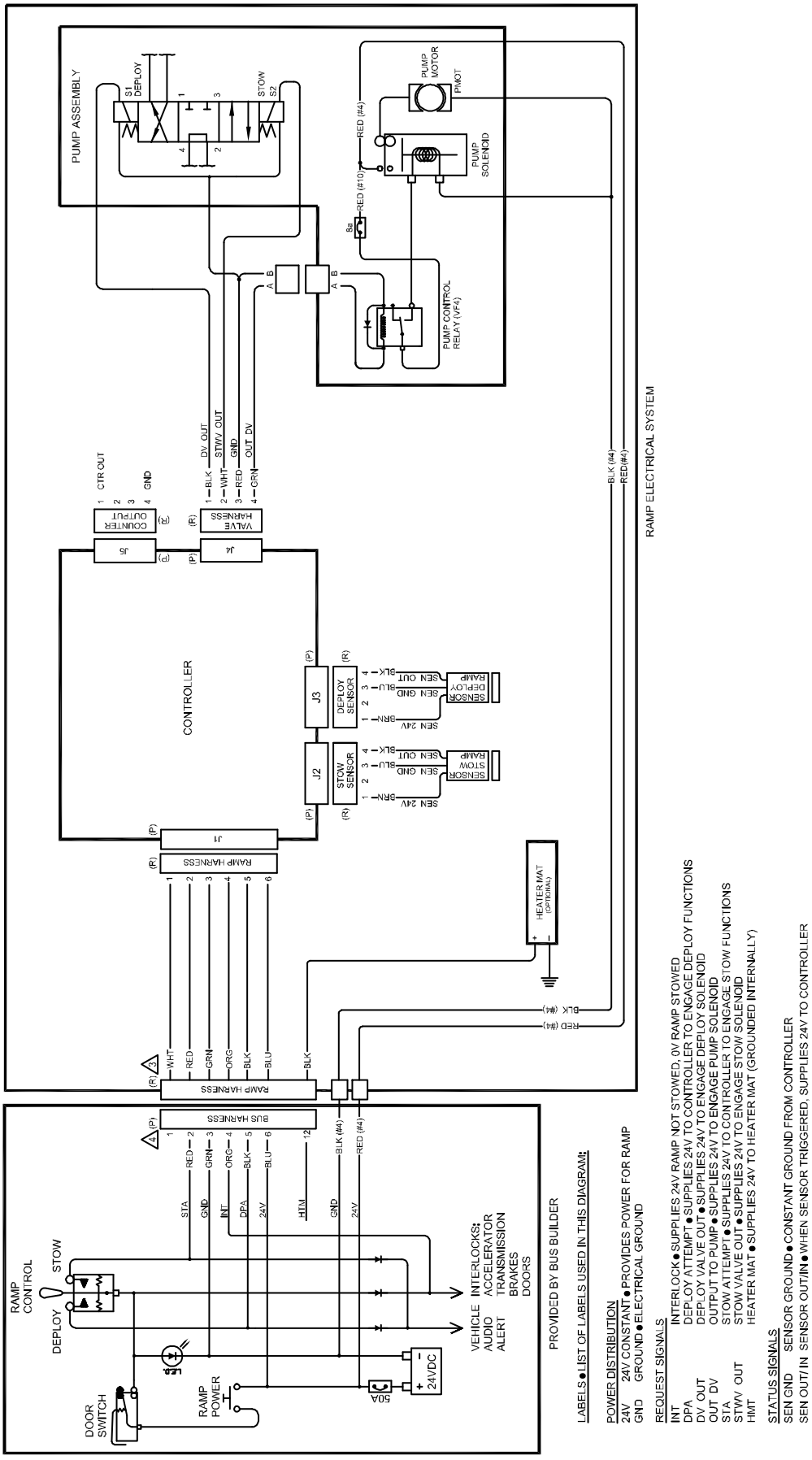

FIGURE 3-14: FR2G-SERIES RAMP ELECTRICAL DIAGRAM

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