



INSTALLATION & OPERATIONS OF HYDRAULIC KIT

SAFETY PRECAUTIONS

If any installation problems are encountered, please call G&B Specialties, Inc. for technical assistance before continuing with the installation process.



- Failure to heed to any of the following warnings could result in severe bodily injury and/or equipment damage.
- Read and understand this manual completely before attempting installation and operation of the equipment.
- Installation instructions provided below only address the Rafna Industries railgear equipment. Applicable railway company procedures and policies must be adhered to.
- Before performing any work under the vehicle or railgear, ensure the engine is turned off and the parking brake is set.
- Always disconnect the vehicle's battery when welding on the vehicle or railgear in order to protect the vehicle's electrical system.
- Beware of all pinch points on the railgear and keep all parts of the body clear.
- When routing hydraulic hoses, ensure that the hoses do not contact any sharp edges or hot surfaces.
- When routing electrical wires, ensure that the wires do not contact any sharp edges or hot surfaces.
- All wire connections are to be soldered and heat shrink sealed to prevent future corrosion related problems.
- All wires must be covered with protective cable loom.



- **Operating instructions provided below only address the Rafna Industries railgear equipment. Applicable railway company procedures and policies must be adhered to.**
- **Railway company rules governing rail travel must be observed at all times.**
- **Before performing any work under the vehicle or railgear, ensure the engine is turned off and the parking brake is set.**
- **Ensure all body parts and loose clothing are clear of any moving parts of the railgear. Be aware of all pinch points.**
- **The In-Cab Controls can only be used for removing the vehicle from rail. DO NOT use the In-Cab Controls to place the vehicle on rail as this may cause damage to the railgear.**
- **Note that if the railgear is part way retracted or extended, opening the manifold directional valve manual over-rides may cause the railgear to drop suddenly causing personal injury. Ensure all body parts are clear of the railgear if it should suddenly drop.**
- **When operating the railgear using the emergency hand pump, ensure that the correct manual valve over-ride is open for the desired railgear (front or rear) and desired direction of operation (raise or lower).**
- **Do not use the emergency hand pump to raise and lower the railgear on a routine basis. If the hydraulic pump or manifold should fail, have it repaired as soon as possible.**
- **If the emergency hand pump has been used to raise or lower the railgear, ensure the manifold directional valve manual over-rides are in the closed and locked position before starting road or rail travel.**
- **Ensure the hydraulic pump has been de-energized before starting road or rail travel.**
- **Never operate the vehicle if the Gross Vehicle Weight Rating (GVWR), Gross Axle Weight Rating Front or Rear (GAWR), or the wheel or tire load ratings are exceeded.**



INSTALLATION OF HYDRAULIC KIT

The following procedure details the installation of the hydraulic kit. The hardware required for this installation is listed in table 1.

Table 1: Hydraulic Kit Installation Parts

Part Number	Description	Qty
R-048	Hydraulic Pump And Manifold	1
R-2965	Rear Pump Mounting Bracket	1
R-700	In-Cab Control Panel	1
R-18113	Pump Spacer	1
CO-071	10 Amp Circuit Breaker	1
CO-130N	“Front Gear Up” Decal	1
CO-130O	“Rear Gear Up” Decal	1
CO-130P	“Front Gear Down” Decal	1
CO-130Q	“Rear Gear Down” Decal	1
S-002002	Single Pilot Operated Check Valve	2
R-2868	Locking Cable Holding Collar	1
R-2961	In-Cab Control Lock Cam Converter	2
R-1565	Flow Reducer	2
S-001031	Railgear Operation Decal	2
849FSO-04-04	1/4” Male O-Ring Boss to 1/4” Male JIC 90°	7
849FSO-04-06	3/8” Male O-Ring Boss to 1/4” Male JIC 90°	3
25UA-06	3/8” Male NPT to 3/8” Male NPT 90°	2
848FSO-04-06	3/8” Male O-Ring Boss to 1/4” Male JIC Straight	4
849FS-04-06	3/8” Male NPT to 1/4” Male JIC 90°	2
720FSO-06-06	3/8” Male O-Ring Boss to 3/8” Female NPT Straight	2
HFS2-04	Hose 16” Long	2
HFS2-04	Hose 23” Long	2
HFS2-04	Hose 40” Long	2
HFS2-04	Hose 360” Long	2
HU04-04NJ	1/4” Female JIC Straight Coupler (On Hoses)	16
	1/4” UNC Gr. 8 Bolt x 0.75” Long	4
	1/4” SAE Washer	4
	1/4” Lock Washer	4
	5/16” UNC Gr. 8 Bolt x 2.75” Long	4
	5/16” SAE Washer	4
	5/16” Lock Washer	4
Not Supplied	2 & 14 Gauge Wire, Terminals, Loom, Etc.	As Req'd



1. If not already done, install the lock cam converters. Manually rotate both the front and rear railgear until the rail position lock cams are accessible. Position the lock cam converters on the rail position lock cams and weld them in place. Grind the cams smooth. The lock cam converters should prevent the front and rear lock pins from engaging in the rail position.
2. The pump is shipped with a manifold, a hand pump handle, a solenoid, and a rubber terminal boot.
3. Locate and install the solenoid in a convenient location under the hood near the vehicle's battery using installer supplied hardware. Ensure that the solenoid's body is electrically grounded.
4. Install a 1/4" male O-Ring Boss to 1/4" male JIC 90° fitting into each P, T, C1, C2, C3 and C4 ports of the manifold and into the T port of the pump.
5. Install a 3/8" male O-Ring Boss to 1/4" male JIC 90° fitting into the P port of the pump. Ensure that the check valve components remain in the port cavity.
6. Position the pump on top of the right front bumper extension as shown with the tank towards the center of the vehicle, so that the holes in the front bumper extension align with the threaded holes in the pump. Fasten the pump to the right front bumper extension using four 5/16" x 2.75" long bolts, four 5/16" washers, and four 5/16" lock washers.
7. Position the manifold on top of the left front bumper extension as shown so that no ports are on the rear side of the manifold. Fasten the manifold to the left front bumper extension using four 1/4" x 0.75" long bolts, four 1/4" washers, and four 1/4" lock washers.
8. Insert a flow reducer into the NPT end of two 3/8" male NPT to 1/4" male JIC 90° fittings. Install one of these fittings into the rod end port of each railgear cylinder. Use Teflon sealant on all NPT fittings.
9. Install a 3/8" male NPT to 3/8" male NPT 90° fitting and a 3/8" male ORB to 3/8" female NPT straight fitting between the U1 port of each check valve and the blind end port of each railgear cylinder. Use Teflon sealant on all NPT fittings. The check valves may have to be rotated away from the axis of the cylinders in order to avoid contact with the railgear in the road position.
10. Install a 3/8" male ORB to 1/4" male JIC 90° fitting into the U2 port of each check valve and a 3/8" male ORB to 1/4" male JIC straight fitting into the D1 and D2 ports of each check valve.



11. Connect one 16” long hydraulic hose between the U2 port on the front railgear cylinder check valve and the rod end port on the rear railgear cylinder.
12. Connect one 16” long hydraulic hose between the U2 port on the rear railgear cylinder check valve and the rod end port on the front railgear cylinder.
13. Connect one 23” long hydraulic hose (straight and 90° ends) between the C1 port on the manifold and the D1 port on the rear railgear cylinder check valve. The 90° hose end should be at the check valve.
14. Connect one 23” long hydraulic hose (straight and 90° ends) between the C2 port on the manifold and the D2 port on the rear railgear cylinder check valve. The 90° hose end should be at the check valve.
15. Connect one 33” long hydraulic hose between the P port on the manifold and the P port on the pump.
16. Connect one 33” long hydraulic hose between the T port on the manifold and the T port on the pump.
17. Connect one 360” long hydraulic hose to the C3 port on the manifold and mark the other end of this hose as “D1”.
18. Connect one 360” long hydraulic hose to the C4 port on the manifold and mark the other end of this hose as “D2”.
19. Route the two 360” long hydraulic hoses to the front of the vehicle along the left side of the frame and secure in place with tie-wraps. Where necessary, fasten the hose to the frame with installer supplied hose clips and hardware.
20. Connect the end of the 360” long hydraulic hose marked “D1” to the D1 port on the front railgear cylinder check valve.
21. Connect the end of the 360” long hydraulic hose marked “D2” to the D2 port on the front railgear cylinder check valve.
22. Ensure that none of the hoses contact any sharp edges or hot surfaces. Tie-wrap all hoses securely leaving enough slack for the railgear to function.
23. Install the In-Cab Control panel in the cab in a convenient location under the dash.
24. Install the circuit breaker under the hood near the previously installed railgear pump solenoid.



25. The pump manifold has three wire harnesses and two wires connected to it:
- One 3' wire harness for the rear railgear with a control box on the end.
 - One 35' wire harness for the front railgear with a control box on the end.
 - One 20' wire harness for the in-cab controls with terminated wires on the end.
 - One white and one black wire each with ring terminals on the ends.
26. Using suitable 14 gauge wire, cable loom, connectors, solder and heat shrink tubing:
- Lengthen the white wire if required, and connect it from the manifold to the switching terminal on the railgear pump solenoid previously mounted under the hood.
 - Lengthen the black wire if required, and connect from the manifold through the firewall to the load terminal on the railgear switch on the In-Cab Control panel.
 - Connect another length of black wire from the power terminal on the railgear switch through the firewall to the "Aux" terminal on the circuit breaker.
 - Connect another black wire from the "Bat" terminal on the circuit breaker to the power terminal on the solenoid.
 - Connect another wire from the ground terminal on the railgear switch to a suitable ground location on the vehicle.
 - Ensure the manifold is properly grounded to the vehicle chassis by connecting a wire from the manifold to a suitable ground location on the vehicle. The railgear may not be properly grounded due to paint on the mounting plates and tar on the frame.
 - Lengthen the 20' wire harness if require and route it from the manifold through the firewall to the In-Cab Control panel. Connect the wires to the In-Cab Control switches as shown.
27. Using suitable 2 gauge wire, cable loom, connectors, solder and heat shrink tubing:
- Connect one wire from the vehicle's battery to the power terminal on the railgear pump solenoid.
 - Connect another wire from the load terminal on the solenoid to the power terminal on the pump motor. Use the supplied rubber boot to protect the pump power terminal from shorting out.
 - Ensure the pump motor base is properly grounded to the vehicle chassis by connecting a wire from the pump motor base to a suitable ground location on the vehicle. The railgear may not be properly grounded due to paint on the mounting plates or tar on the frame.
28. Route the 35' wire harness from the pump along the frame to the front of the vehicle and secure in place with tie-wraps. If necessary, the control box can be removed from and reinstalled on the wire harness to facilitate routing. Fabricate a bracket and mount the front railgear control box with installer-supplied hardware in a protected vertical position in a suitable location. Ensure the control box is within reach of the railgear locking cable handle.



29. Route the 3' wire harness from the pump to the rear of the vehicle and secure in place with tie-wraps. If necessary, the control box can be removed from and reinstalled on the wire harness to facilitate routing. Fabricate a bracket and mount the rear railgear control box with installer-supplied hardware in a protected vertical position in a suitable location. Ensure the control box is within reach of the railgear locking cable handle.
30. Ensure that the control boxes are mounted vertically so that the controls do not fill with water and freeze. They should also be mounted in a location protected from road spray etc.
31. Affix the supplied railgear operation decals in a suitable location adjacent to the front and rear control boxes.
32. Ensure all wires and terminals are soldered, heat shrink sealed, enclosed in protective cable loom and secured with tie-wraps.
33. Ensure all holes in the firewall are sealed and protected with a grommet.
34. Fill the hydraulic system and bleed the air out:
 - a) Fill the pump tank with **ESSO Univis Extra** (or equivalent) hydraulic fluid.
 - b) Operate the front railgear up and down briefly to circulate the fluid and bleed the system of air (refer to the Railgear Kit and Hydraulic Kit Operation, Service, and Parts manuals for operation instructions).
 - c) Refill the pump tank and repeat the above step until all air is removed from the front hydraulic system.
 - d) Operate the rear railgear up and down briefly to circulate the fluid and bleed the system of air (refer to the Railgear Kit and Hydraulic Kit Operation, Service, and Parts manuals for operation instructions).
 - e) Refill the pump tank and repeat the above step until all air is removed from the rear hydraulic system.
 - f) With both front and rear railgear locked in the road position, fill the pump tank to the full line.
35. Follow the Hydraulic System Relief Valve Setting procedure detailed in the Hydraulic Kit Operating, Service and Parts Manual.
36. Test the fit of the locking cable holding collar on both the front and rear locking cables. Ensure that the locking cable holding collar keeps the railgear locking pin fully disengaged. Grind the locking cable holding collar or adjust the locking cable handle on the cable to fit if necessary.



37. Test the operation of the controls and directional valve manual over-rides. Refer to the operation procedure in the Railgear Kit and Hydraulic Kit Operation, Service, and Parts manuals.
38. Lower both front and rear railgear to rail position and ensure the lock cam converters previously installed prevent the lock pins from engaging the lock cams.
39. Locate and store the hand pump handle and the locking cable holding collar in a secure location in the vehicle cab.



OPERATION OF HYDRAULIC KIT

With the hydraulic kit installed on this vehicle, it may be operated as normal.

Never operate the vehicle if the Gross Vehicle Weight Rating (GVWR), Gross Axle Weight Rating Front or Rear (GAWR), or the wheel or tire load ratings are exceeded.

Refer to the Railgear Kit Operation, Service and Parts manual for information on the mechanical operation, service and parts of the railgear.

Location And Operation Of The Railgear Hydraulic System Controls:

The railgear hydraulic system consists of a hydraulic pump and manifold, a front control box, a rear control box, and an in-cab control panel.

1. The railgear hydraulic pump must be energized prior to use by turning on the respective dash switch on the control panel in the vehicle cab. At this point the dash switch light should come on but the pump should not run and the railgear should not move until a control button is depressed.
2. The direction of the front or rear railgear movement is selected by pushing the “Up” or “Down” button on the respective control box located near the railgear. At this point the pump should start and the railgear should move in the selected direction.
3. The direction of the front or rear railgear movement can also be selected by pushing the “Up” or “Down” button on the respective in-cab control panel switch. At this point the pump should start and the railgear should move in the selected direction. Note that the in-cab controls can only be used to raise the railgear from rail to road position.
4. To stop the movement of the railgear, release the depressed button.
5. The pump must be de-energized after use by turning off the respective dash switch. At this point the pump should not be able to run and the control buttons should be inactive.

Location And Operation Of The Hydraulic Pump Emergency Hand Pump:

If the railgear hydraulic system should fail such that the railgear does not respond to depressing the buttons on the front and / or rear control boxes, then the emergency hand pump system may be used to place the vehicle on rail or remove the vehicle from rail. Follow the standard operation procedure (as detailed in the Railgear Kit Operation, Service and Parts Manual) except substitute the following steps when the procedure requires raising or lowering of the railgear.



1. Remove the hand pump handle from storage and insert the handle into the hand pump located on the body of the hydraulic pump.
2. There are four manifold directional valves, one for each railgear function: “Front Gear Up”, “Front Gear Down”, “Rear Gear Up”, and “Rear Gear Down”. The manual over-rides for these valves are located on the manifold under rubber boots. Only open one manifold directional valve over-ride at a time. To manually open a manifold directional valve over-ride, remove the rubber boot, push in and twist the knob allowing the knob to extend. To manually close a manifold directional valve over-ride, push the knob in, twist the knob to lock it in place and replace the rubber boot.
3. Select and open the manual over-ride for the respective railgear and desired direction of movement.
4. Remove the locking cable holding collar from storage. It can be slipped in between the locking cable handle and the locking cable bulkhead fitting to hold the locking cable in the disengaged position.
5. Pump the emergency hand pump handle to move the railgear. It will require 30 to 50 full strokes to fully raise or lower each railgear.
6. Close the manual over-ride. Ensure all manifold directional valve manual over-rides are closed and locked in position. Replace all the rubber boots.
7. Remove and store the locking cable holding collar and the hand pump handle.
8. Ensure the railgear lock pins are fully engaged as required by the procedure.



SERVICE OF HYDRAULIC KIT

The hydraulic kit must be serviced regularly to avoid damage to the equipment. Table 1 below provides the Recommended Service Schedule and Table 2 provides Standard Fastener Torque Values.

The recommended oil for the railgear hydraulic system is ESSO Unavis Extra or equivalent. In extremely cold weather areas/seasons, ESSO Unavis J13 or equivalent may be used.

Table 1: Recommended Service Schedule

Service Required	Initial 100 km (62 Miles) of road and/or rail use	Daily	Weekly	Monthly
Inspect hydraulic kit fasteners (re-torque if required)		✓	✓	✓
Inspect all hydraulic fittings and hoses for leaks and wear.		✓	✓	✓
Check oil in hydraulic reservoir. (fill with railgear raised if req'd)				✓
Check emergency hand pump and manifold over-ride operation				✓

Table 2: Standard Fastener Torque Values

Fastener Size	Fastener Torque Value (ft-lbs) Dry
1" UNC Gr. 8 Fasteners	250
3/4" UNC Gr. 8 Fasteners	175
5/8" UNC Gr. 8 Fasteners	150
1/2" UNC Gr. 8 Fasteners	100
3/8" UNC Gr. 8 Fasteners	40
1/4" UNC Gr. 8 Fasteners	12



HYDRAULIC SYSTEM RELIEF VALVE SETTING

This system is equipped with one relief valve located on the railgear pump body next to the emergency hand pump. This relief valve protects the entire hydraulic system from over pressurization. The relief valve will require adjustment at installation and if ever there appears to be inadequate hydraulic pressure to operate the railgear.

1. Disconnect the hydraulic hose from the “P” port of the pump.
2. Install a hydraulic pressure gauge (up to 3000 PSI) between the disconnected hydraulic hose and the pump port. The pressure gauge will indicate the relief valve setting when the pump is loaded.
3. Following the procedure in the Railgear Kit Operation, Service and Parts manual, raise the rear railgear completely and continue to raise the railgear so that the hydraulic cylinder creates a load on the pump by trying to “dead-head”. The pressure reading on the pressure gauge should climb to 1800 PSI.
4. If the pressure is not correct, release the railgear controls and adjust the relief valve on the pump accordingly. Loosen the lock nut and turn the setscrew in to increase the pressure or out to decrease the pressure. Re-check the pressure.
5. Once the correct pressure on the pump relief valve is obtained, ensure the lock nut on the relief valve is tightened. Release the pressure in the system and remove the pressure gauge. Re-connect all hydraulic hoses.
6. Ensure the railgear is properly raised as per the Railgear Kit Operation, Service and Parts manual.



ELECTRICAL SYSTEM TROUBLESHOOTING

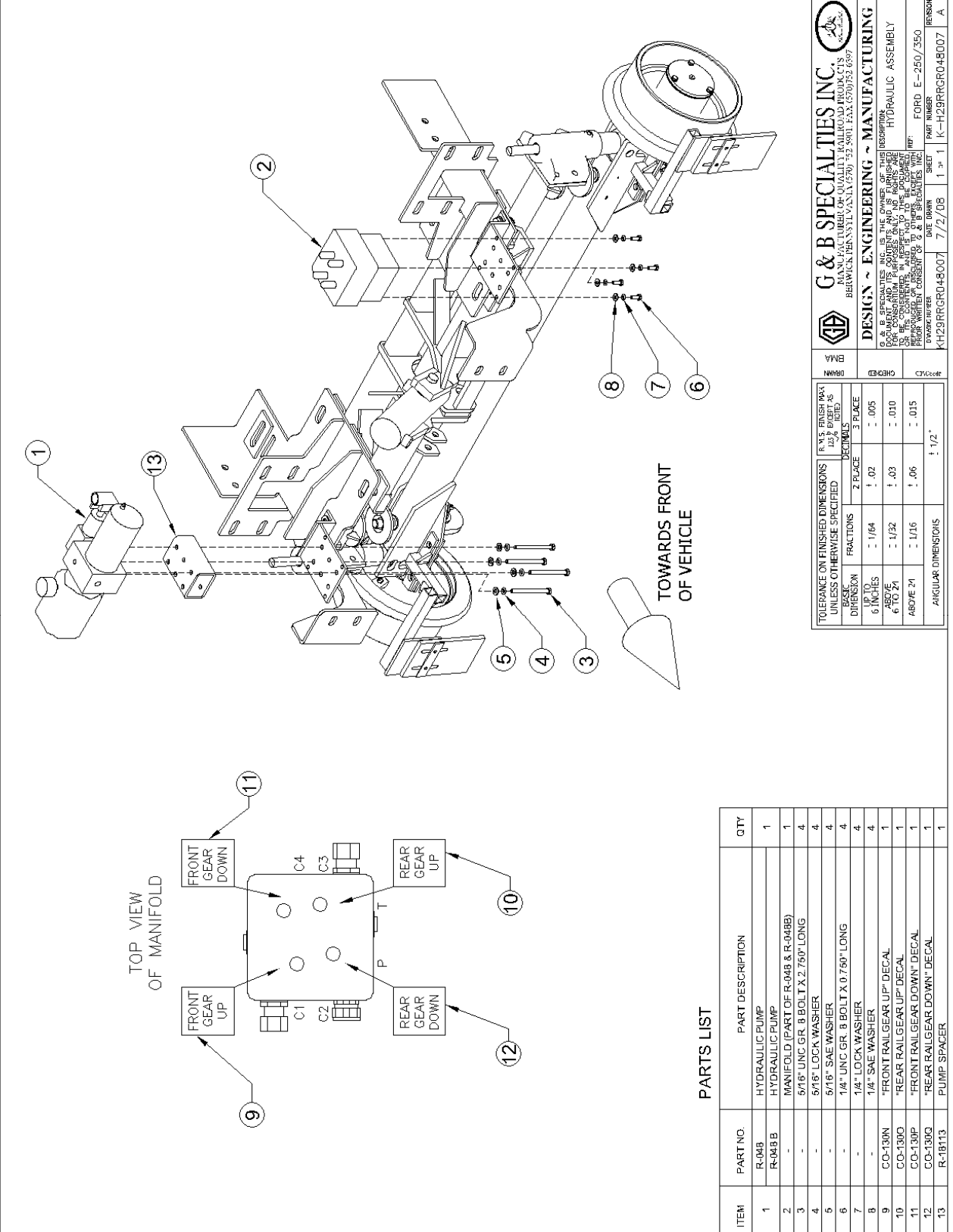
The following basic test can be performed to check the integrity of the railgear electrical system.

Should the railgear pump fail to operate, first check the fuse or the circuit breaker and all wiring for shorts. Then the following test can be performed to verify the integrity of the pump motor and pump solenoid.

1. Pump motor test:
 - a) Connect one end of a 4 gauge shunt wire to the pump motor power terminal and touch the other end to the battery positive terminal.
 - b) The pump motor should run upon touching the shunt wire.
 - c) If the pump does not run, the pump is not properly grounded or the pump motor is defective.
 - d) If the pump motor runs, test for a defective solenoid.
2. Solenoid test:
 - a) Connect one end of a 14 gauge shunt wire to the switching terminal on the solenoid and touch the other end to the battery positive terminal. If the pump does not operate the solenoid is not properly grounded or it is defective. If the pump operates, the problem lies with the fuse/circuit breaker, wiring and/or switches.

Should the pump start running immediately following turning on the respective dash switch, the following tests can be performed to help locate the problem.

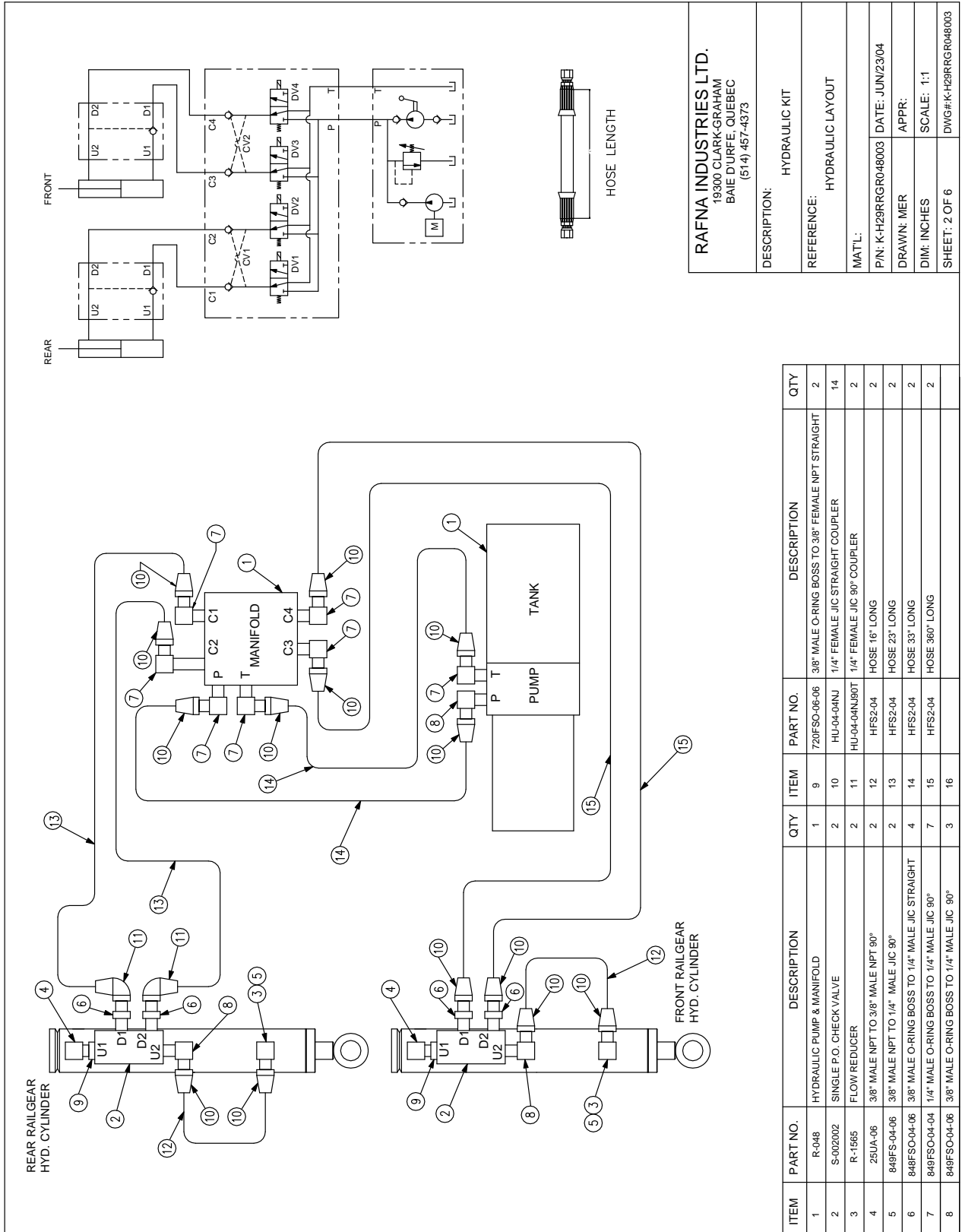
1. Disconnect the wire from the switching terminal on the solenoid. If the pump continues to run, then the solenoid is defective.
2. Check all wiring and switches for shorts and / or loose terminals.



PARTS LIST

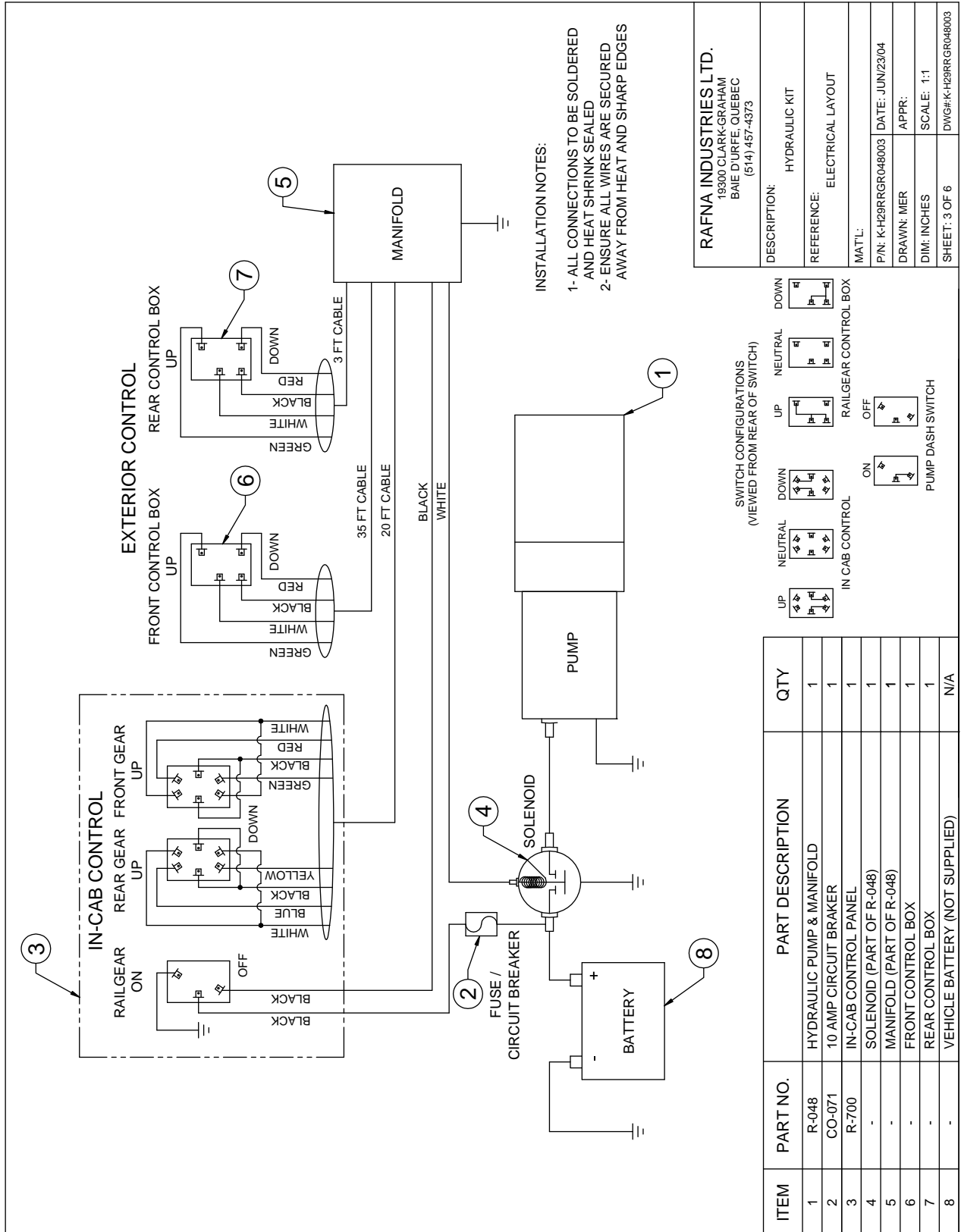
ITEM	PART NO.	PART DESCRIPTION	QTY
1	R-04B	HYDRAULIC PUMP	1
2	R-04BB	HYDRAULIC PUMP	1
3	-	MANIFOLD (PART OF R-04B & R-04BB)	4
4	-	5/16" UNC GR. 8 BOLT X 2.750" LONG	4
5	-	5/16" LOCK WASHER	4
6	-	5/16" SAE WASHER	4
7	-	1/4" UNC GR. 8 BOLT X 0.750" LONG	4
8	-	1/4" SAE WASHER	4
9	CO-130N	"FRONT RAIL GEAR UP" DECAL	1
10	CO-130O	"REAR RAIL GEAR UP" DECAL	1
11	CO-130P	"FRONT RAIL GEAR DOWN" DECAL	1
12	CO-130Q	"REAR RAIL GEAR DOWN" DECAL	1
13	R-18113	PUMP SPACER	1

		G & B SPECIALTIES INC. 1000 W. 10TH ST. SUITE 100 BERWICK, PENNSYLVANIA 17701-7521 FAX: (570) 752-6397	
		DESIGN ~ ENGINEERING ~ MANUFACTURING	
BMA DRWN CHCKD APPR'D		G & B SPECIALTIES INC. IS THE OWNER OF THIS DESCRIPTION. FOR CONSTRUCTION PURPOSES ONLY AND NOT BE USED FOR ANY OTHER PURPOSES. ALL DIMENSIONS ARE TO UNLESS OTHERWISE SPECIFIED. PRIOR WRITTEN CONSENT OF G & B SPECIALTIES, INC.	
TOLERANCE ON FINISHED DIMENSIONS UNLESS OTHERWISE SPECIFIED		R. U.S. FINISH MARK UNLESS OTHERWISE SPECIFIED	
BACK DIMENSION	FRACTIONS	DECIMALS	DESCRIPTION
UP TO 1/8"	- 1/64	- .005	HYDRAULIC ASSEMBLY
1/8" TO 1/2"	- 1/32	- .010	
1/2" TO 1"	- 1/16	- .015	
ABOVE 1"	- 1/8	- .020	
ANGULAR DIMENSIONS	± 1/2°		
DRAWING NUMBER	DATE DRAWN	SHEET	REVISION
KH29RRGR048007	7/2/08	1 of 1	K-H29RRGR048007 A



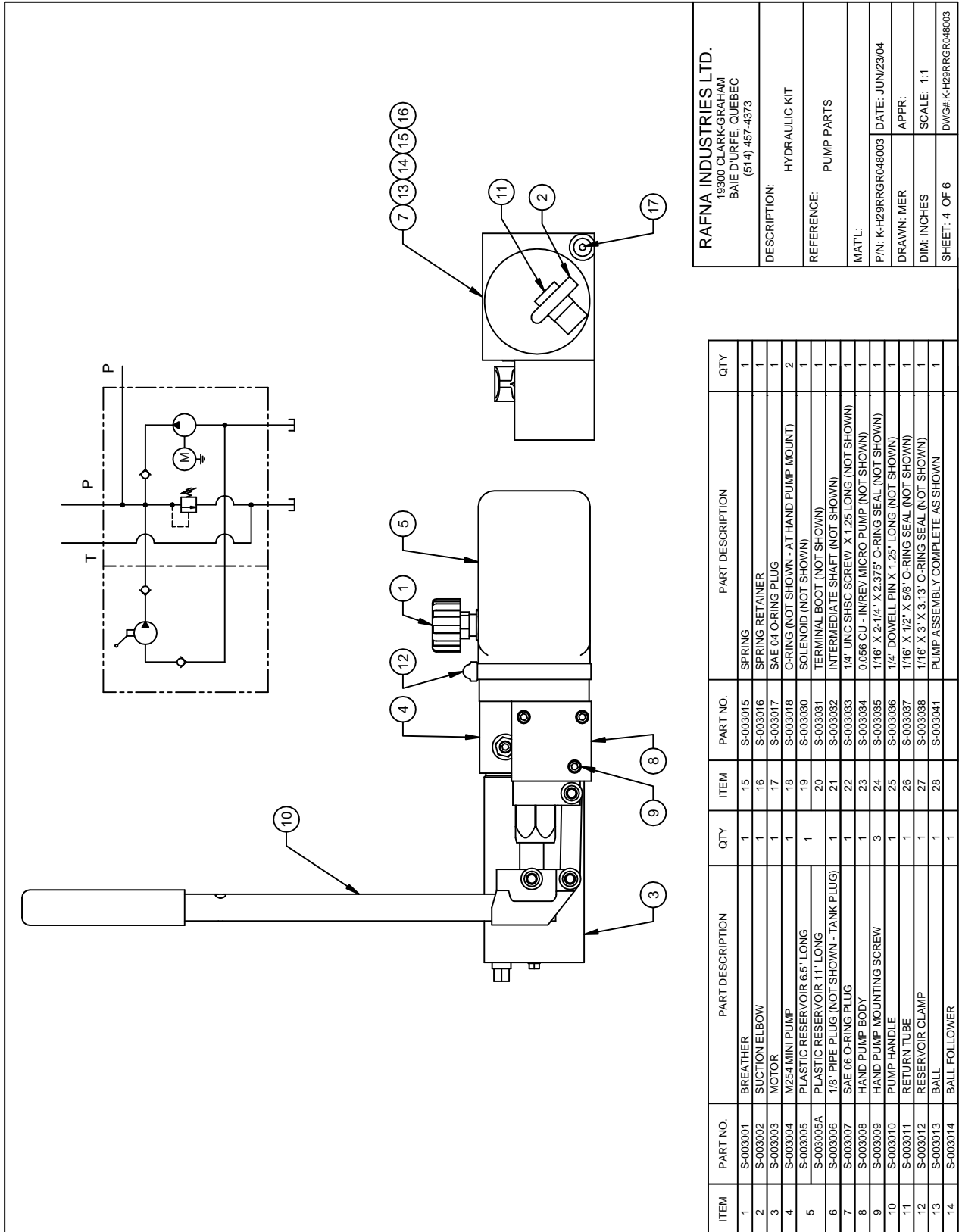
RAFNA INDUSTRIES LTD.
19300 CLARK-GRAHAM
BAIE D'URFE, QUEBEC
(514) 457-4373

DESCRIPTION: HYDRAULIC KIT
REFERENCE: HYDRAULIC LAYOUT
MATERIAL:
P/N: K-H29RRGR048003 DATE: JUN/23/04
DRAWN: MER APPR:
DIM: INCHES SCALE: 1:1
SHEET: 2 OF 6 DWG#K-H29RRGR048003



RAFNA INDUSTRIES LTD. 19300 CLARK-GRAHAM BAIE D'URFE, QUEBEC (514) 457-4373	
DESCRIPTION:	HYDRAULIC KIT
REFERENCE:	ELECTRICAL LAYOUT
MAT'L:	
P/N: K-H29RRGR048003	DATE: JUN/23/04
DRAWN: MER	APPR:
DIM: INCHES	SCALE: 1:1
SHEET: 3 OF 6	DWG#: K-H29RRGR048003

ITEM	PART NO.	PART DESCRIPTION	QTY
1	R-048	HYDRAULIC PUMP & MANIFOLD	1
2	CO-071	10 AMP CIRCUIT BRAKER	1
3	R-700	IN-CAB CONTROL PANEL	1
4	-	SOLENOID (PART OF R-048)	1
5	-	MANIFOLD (PART OF R-048)	1
6	-	FRONT CONTROL BOX	1
7	-	REAR CONTROL BOX	1
8	-	VEHICLE BATTERY (NOT SUPPLIED)	N/A



RAFNA INDUSTRIES LTD.
19300 CLARK-GRAHAM
BAIE D'URFE, QUEBEC
(514) 457-4373

DESCRIPTION: HYDRAULIC KIT

REFERENCE: PUMP PARTS

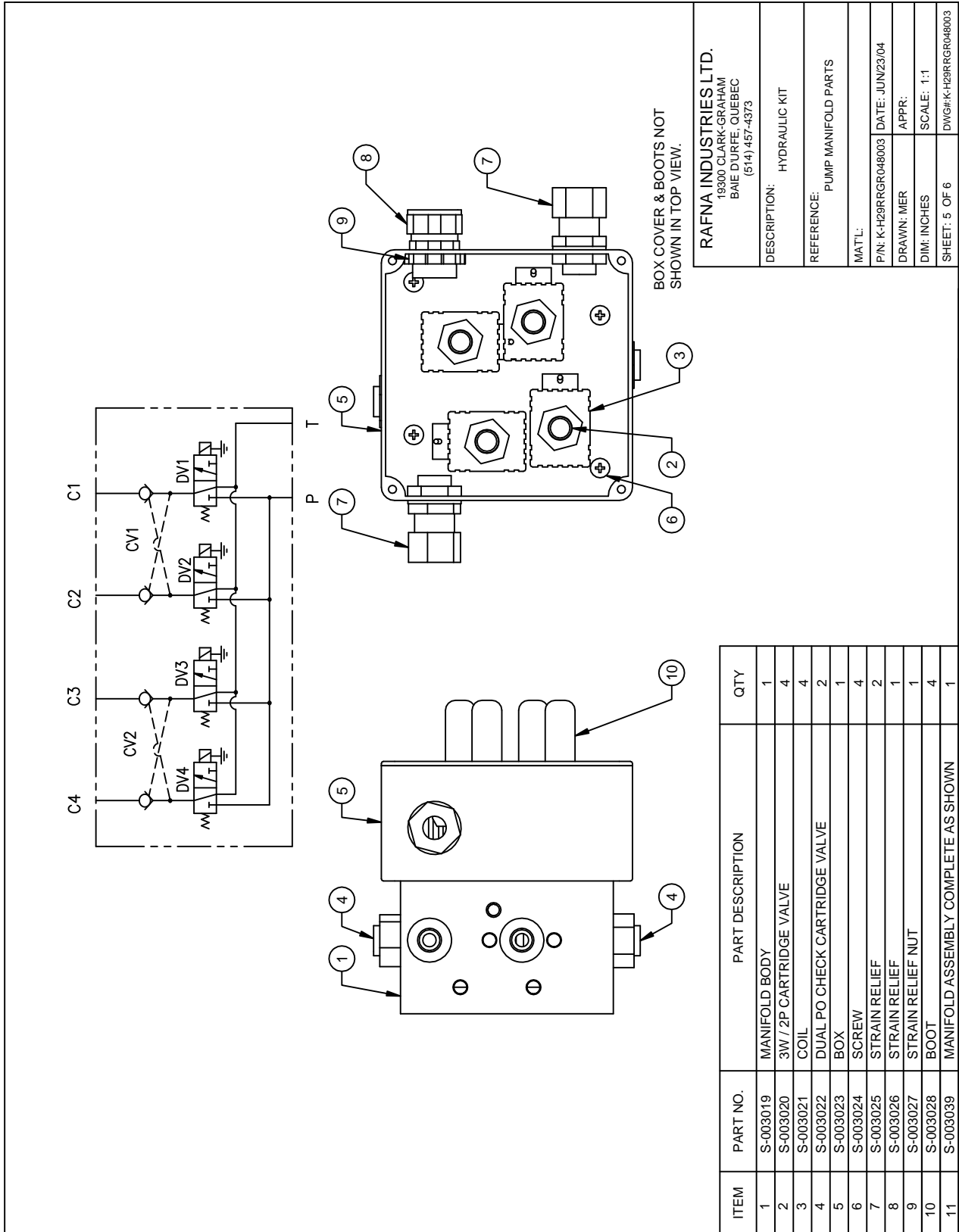
MAT'L:

P/N: K-H29RRGR048003 | DATE: JUN/23/04

DRAWN: MER | APPR:

DIM: INCHES | SCALE: 1:1

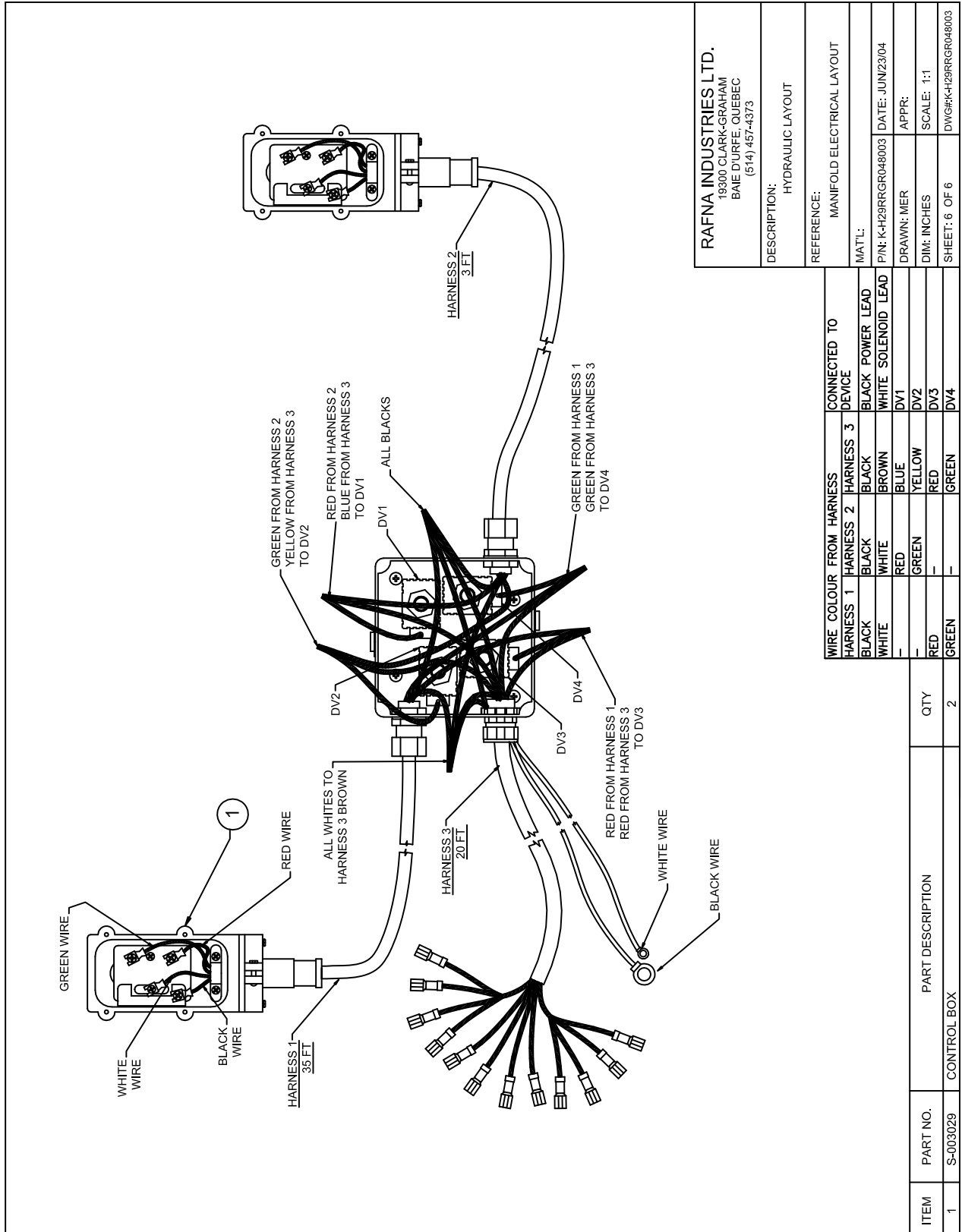
SHEET: 4 OF 6 | DWG#K-H29RRGR048003



BOX COVER & BOOTS NOT SHOWN IN TOP VIEW.

RAFNA INDUSTRIES LTD. 19500 CLARK-GRAHAM BAIE D'URFE, QUEBEC (514) 457-4373	
DESCRIPTION:	HYDRAULIC KIT
REFERENCE:	PUMP MANIFOLD PARTS
MAT'L:	
P/N: K-H29RRGR048003	DATE: JUN/23/04
DRAWN: MER	APPR:
DIM: INCHES	SCALE: 1:1
SHEET: 5 OF 6	DWG#: K-H29RRGR048003

ITEM	PART NO.	PART DESCRIPTION	QTY
1	S-003019	MANIFOLD BODY	1
2	S-003020	3W / 2P CARTRIDGE VALVE	4
3	S-003021	COIL	4
4	S-003022	DUAL PO CHECK CARTRIDGE VALVE	2
5	S-003023	BOX	1
6	S-003024	SCREW	4
7	S-003025	STRAIN RELIEF	2
8	S-003026	STRAIN RELIEF	1
9	S-003027	STRAIN RELIEF NUT	1
10	S-003028	BOOT	4
11	S-003039	MANIFOLD ASSEMBLY COMPLETE AS SHOWN	1



RAFNA INDUSTRIES LTD. 19300 CLARK-GRAHAM BAIE D'URFE, QUEBEC (514) 457-4373	
DESCRIPTION:	HYDRAULIC LAYOUT
REFERENCE:	MANIFOLD ELECTRICAL LAYOUT
MAT'L:	
P/N: K-H29RRGR048003	DATE: JUN/23/04
DRAWN: MER	APPR:
DIM: INCHES	SCALE: 1:1
SHEET: 6 OF 6	DWG#K-H29RRGR048003

WIRE COLOUR FROM HARNESS	HARNESS 1	HARNESS 2	HARNESS 3	CONNECTED TO DEVICE
BLACK	BLACK	BLACK	BLACK	BLACK POWER LEAD
WHITE	WHITE	BROWN	WHITE	WHITE SOLENOID LEAD
RED	RED	BLUE	BLUE	DV1
GREEN	GREEN	YELLOW	YELLOW	DV2
RED	RED	RED	RED	DV3
GREEN	GREEN	GREEN	GREEN	DV4

ITEM	PART NO.	PART DESCRIPTION	QTY
1	S-003029	CONTROL BOX	2