

INSTALLATION OF R-290 HYDRAULIC KIT W/ MANUAL OPERATING VALVES STD CONTROLS W/ FRONT OR REAR PUMP LOCATION WITH DETENT FORD F-250/350, GM 2500HD/3500 HD, & RAM 2500/3500

INSTALLATION SAFETY PRECAUTIONS

If any installation problems are encountered, please call G&B Specialties 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 or operation of the equipment.
- Installation/Operation instructions provided below only address the Rafna 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.
- 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.
- Railway company rules governing rail travel must always be observed.
- Ensure all body parts and loose clothing are clear of any moving parts of the railgear. Be aware of all pinch points.
- 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.

INSTALLATION OF HYDRAULIC KIT

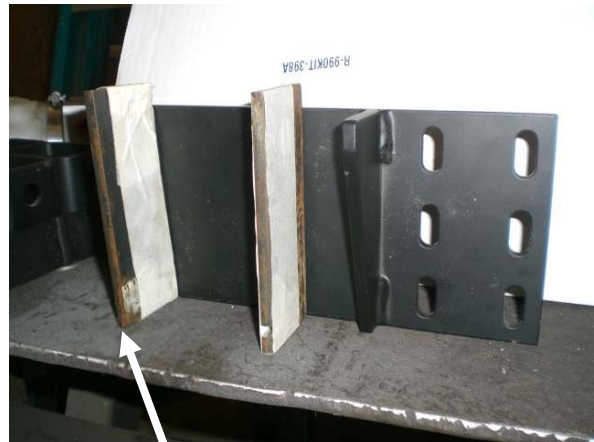
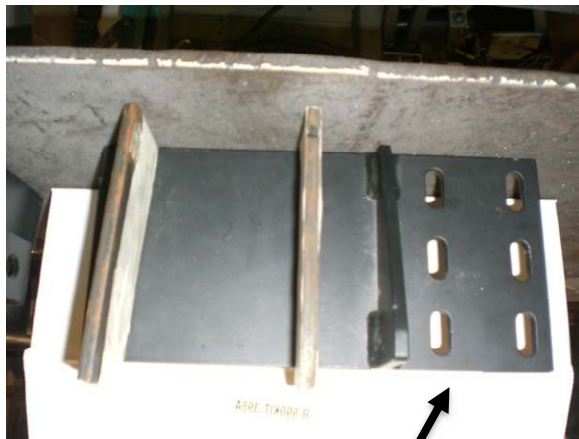
The following procedure details the installation of the hydraulic kit. The hardware required for this installation is listed in Table 1.

Table 1: Hydraulic Kit Installation Parts

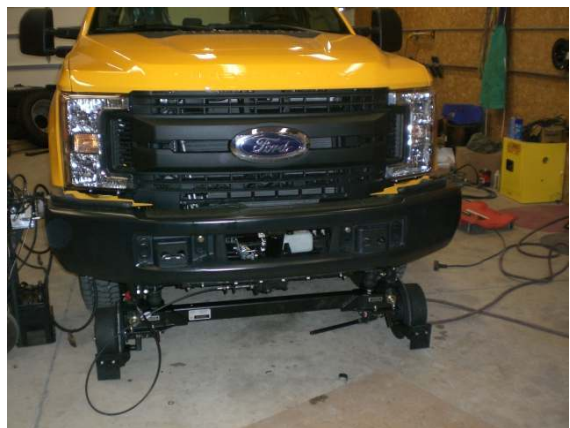
Part Number	Description	Qty
R-2965	Pump Mounting Bracket	1
R-2965B	Front Pump Mounting Spacer	2
R-2965D	Pump Shim Plate	1
S-003041	Hydraulic Pump	1
R-31592	Manual Control Valve	2
R-31590	Toggle Switch	2
R-31591	Boot, Toggle Switch	2
CO-106	Dash Switch	1
R-1577	In-Line Fuse Connector	1
R-1577-1	In-Line Fuse 5 Amp	1
CO-130G	"Railgear Pump" Decal	3
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
R-2868	Locking Cable Holding Collar	1
R-32180	Railgear Operation Decal	2
R-32145	Single P.O. Check Valve Assy	2
H-990KIT-057	Hydraulic Adapter	1
	Hydraulic Adapter	3
	Hydraulic Adapter	4
	Hydraulic Adapter	4
	Hydraulic Adapter	4
	Hydraulic Adapter	8
	Hose 23" Long	4
	Hose 33" Long (for std pump location)	1
	Hose 80" Long (for under hood pump install)	1
	Hose 360" Long	2
R-990KIT-402	1/4" UNC Gr. 8 Bolt x 1.25" Long	4
	1/4" SAE Washer	8
	1/4" Nylock Nut	4
	5/16" UNC Gr. 8 Bolt x 1" Long	4
	5/16" SAE Washer	4
	5/16" Lock Washer	4
Not Supplied	2 & 14 Gauge Wire, Terminals, Loom, Etc.	As Req'd

FRONT MOUNTING OF HYDRAULIC PUMP

MOUNT PUMP USING SUPPLIED BRACKETS OR FABRICATE YOUR OWN. BRACKETS WILL NEED TO BE WELDED TO RAILGEAR AT LOCATIONS CHOSEN BY INSTALLER. CHOOSE A LOCATION ON FRONT OF VEHICLE WHICH WILL ACCOMMODATE YOUR END USERS REQUIREMENTS. PHOTOS ARE ATTACHED FOR REFERENCE USE ONLY.

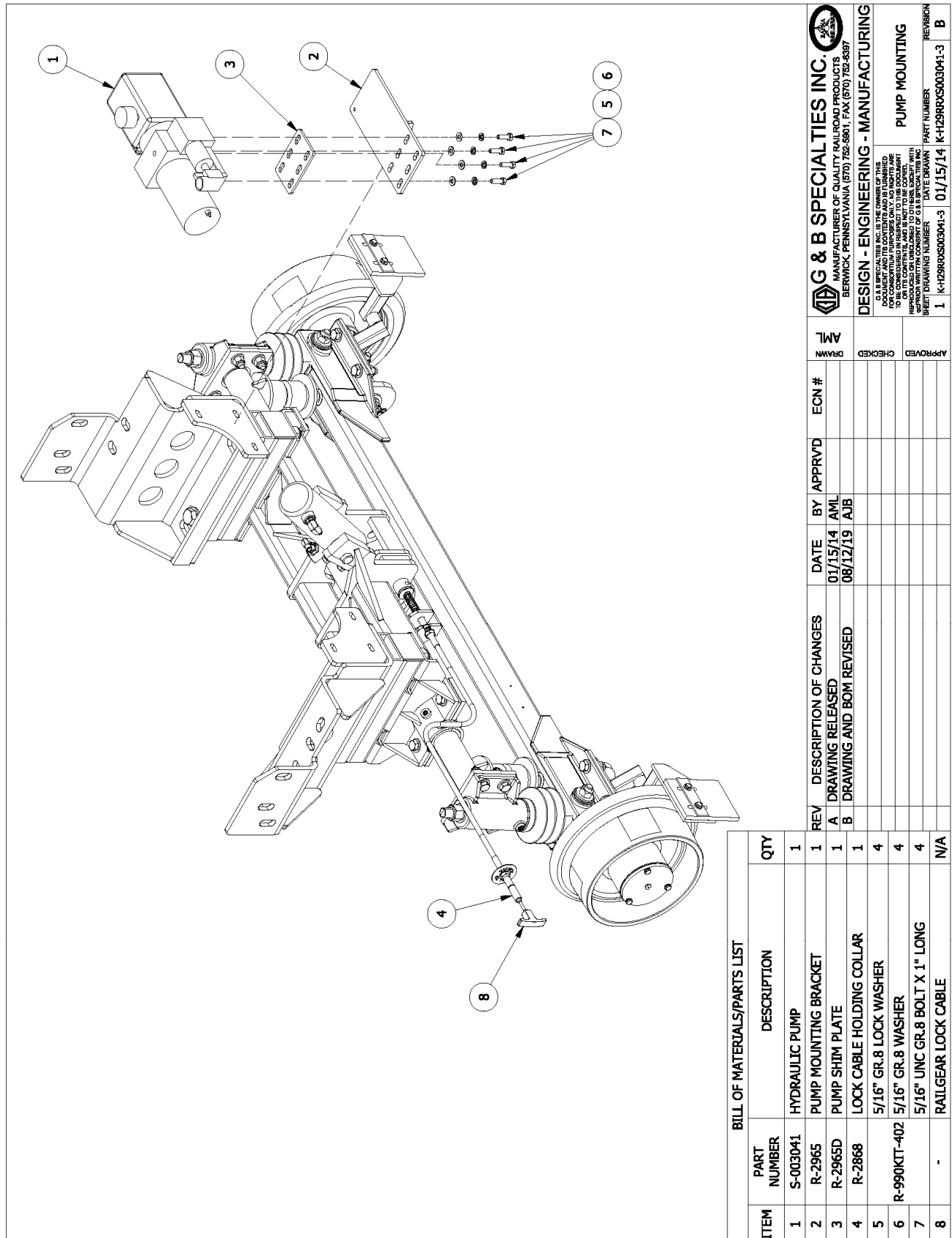


SUPPLIED PARTS, R-2965, AND R-2965B



REAR MOUNTING OF HYDRAULIC PUMP

1. Position the pump mounting bracket against the right side rear mounting bracket as shown. Clamp it in place. Position the pump and spacer on top of the pump mounting bracket as shown with the tank towards the right side of the vehicle. Ensure the pump and spacer will not interfere with any part of the vehicle or railgear components. The hand pump handle receiver can be turned to point downwards to ease hand pump handle use.
2. Once the pump mounting bracket position is verified, remove the pump and weld the pump mounting bracket to the right side rear mounting bracket all around.
3. Reposition and fasten the pump on top of the rear pump mounting bracket with four 5/16" x 0.75" long bolts, four 5/16" lock washers and four 5/16" washers.



INSTALLATION INSTRUCTIONS FRONT OR REAR LOCATION

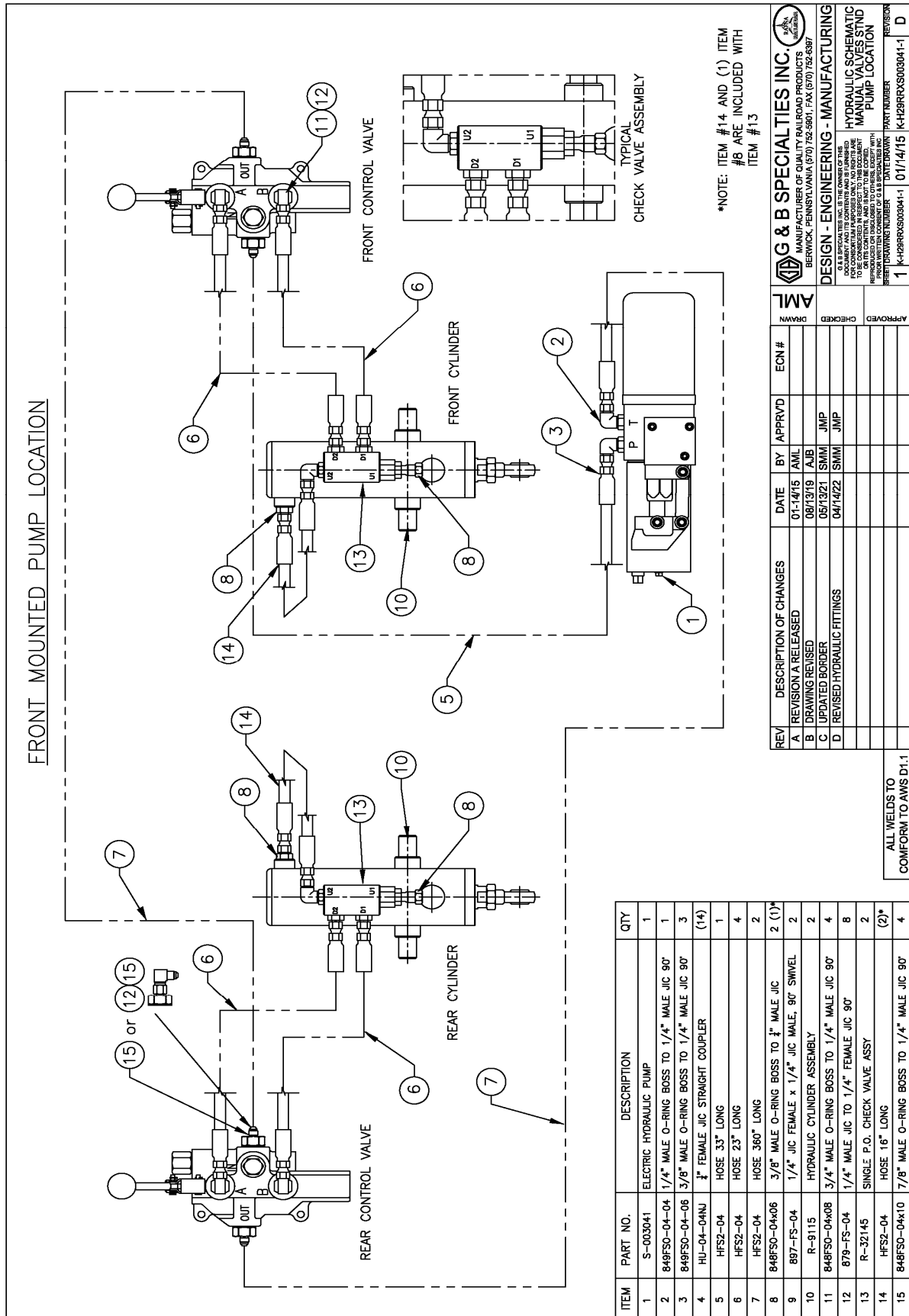
The pump is shipped with a hand pump handle, a solenoid, and a rubber terminal boot.

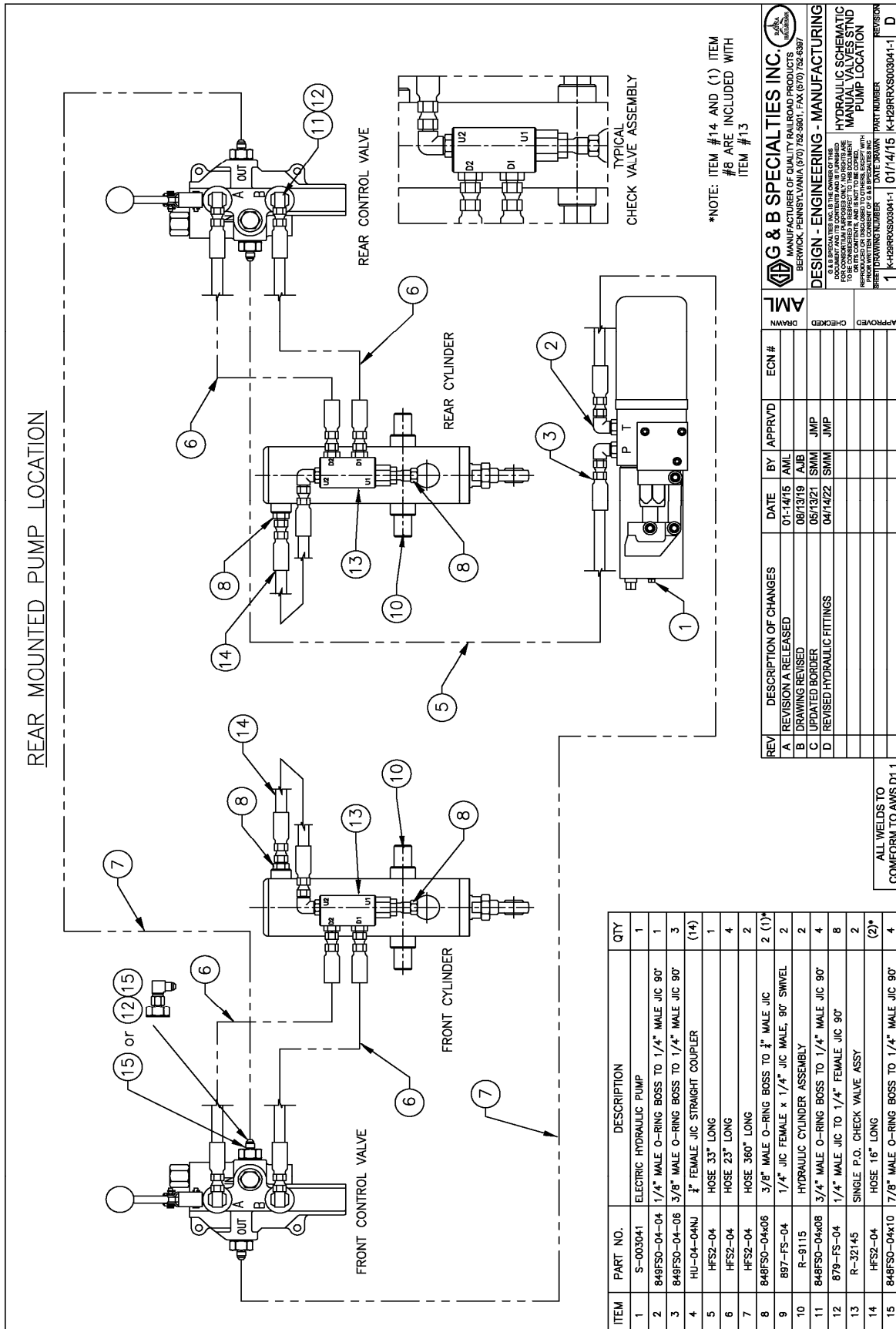
1. Locate and install the solenoid in a convenient location under the hood near the vehicle's battery. Ensure that the solenoid's body is electrically grounded.
2. Install all hydraulic fittings and adapters as shown on hydraulic schematic.
3. Route all required hose as shown on the hydraulic schematic.
4. 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.
5. Install the dash switch and "Railgear Pump" decal in a convenient location on the dash.
6. Using suitable 14 gauge wire, cable loom, connectors, solder and heat shrink tubing:
 - a. Route and install all electrical components as shown on the electrical schematic.
7. Using suitable 2 gauge wire, cable loom, connectors, solder and heat shrink tubing:
 - a. Connect one wire from the vehicle's battery to the power terminal on the circuit breaker or fuse.
 - b. Connect another wire from the load terminal on the circuit breaker to the power terminal on the solenoid.
 - c. 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.
 - d. 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.
8. Mount the front and rear control valves as required. It may be necessary to fabricate a bracket to mount the valve in a suitable location. Ensure the control valve is within reach of the railgear locking cable handle and the toggle switch for activating the railgear pump.
9. Ensure that the control valves are mounted so that the controls do not fill with water and freeze. They should also be mounted in a location protected from road spray etc.
10. Affix the supplied railgear operation decals in a suitable location adjacent to the front and rear control valves.
11. Ensure all wires and terminals are soldered, heat shrink sealed, enclosed in protective cable loom and secured with tie-wraps.
12. Ensure all holes in the firewall are sealed and protected with a grommet.

13. Fill the hydraulic system and bleed the air out:
 - a. Fill the pump tank with **DEXRON III** (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.
 - 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.
14. Follow the Hydraulic System Relief Valve Setting procedure detailed in the Hydraulic Kit Service section of this manual.
15. 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.
16. Test the operation of the controls and emergency pump operation. Refer to the operation procedure in the Railgear Kit manual and Hydraulic Kit Operation section of this manual.
17. Locate and store the hand pump handle and the locking cable holding collar in a secure location in the vehicle cab.

Ensure that the thermal overload wires are properly spliced/connected as shown

It is recommended that a 200 amp fuse or a 200 amp circuit breaker be installed to isolate the hydraulic pump from the vehicle electrical system as shown



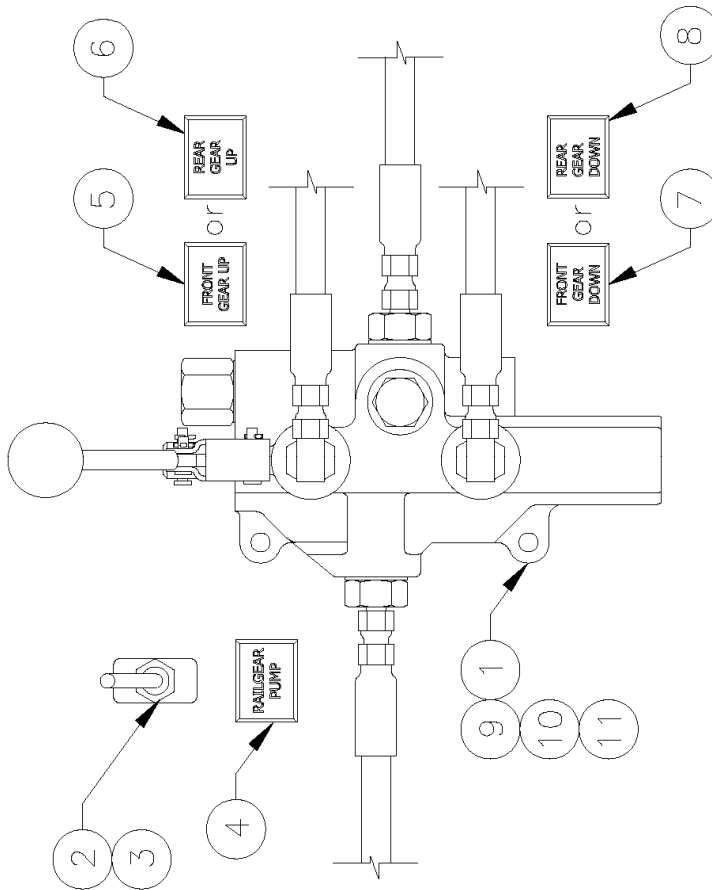


G & B SPECIALTIES INC.
MANUFACTURER OF QUALITY RAILROAD PRODUCTS
BERWICK, PENNSYLVANIA (570) 752-5901 FAX (570) 752-6397

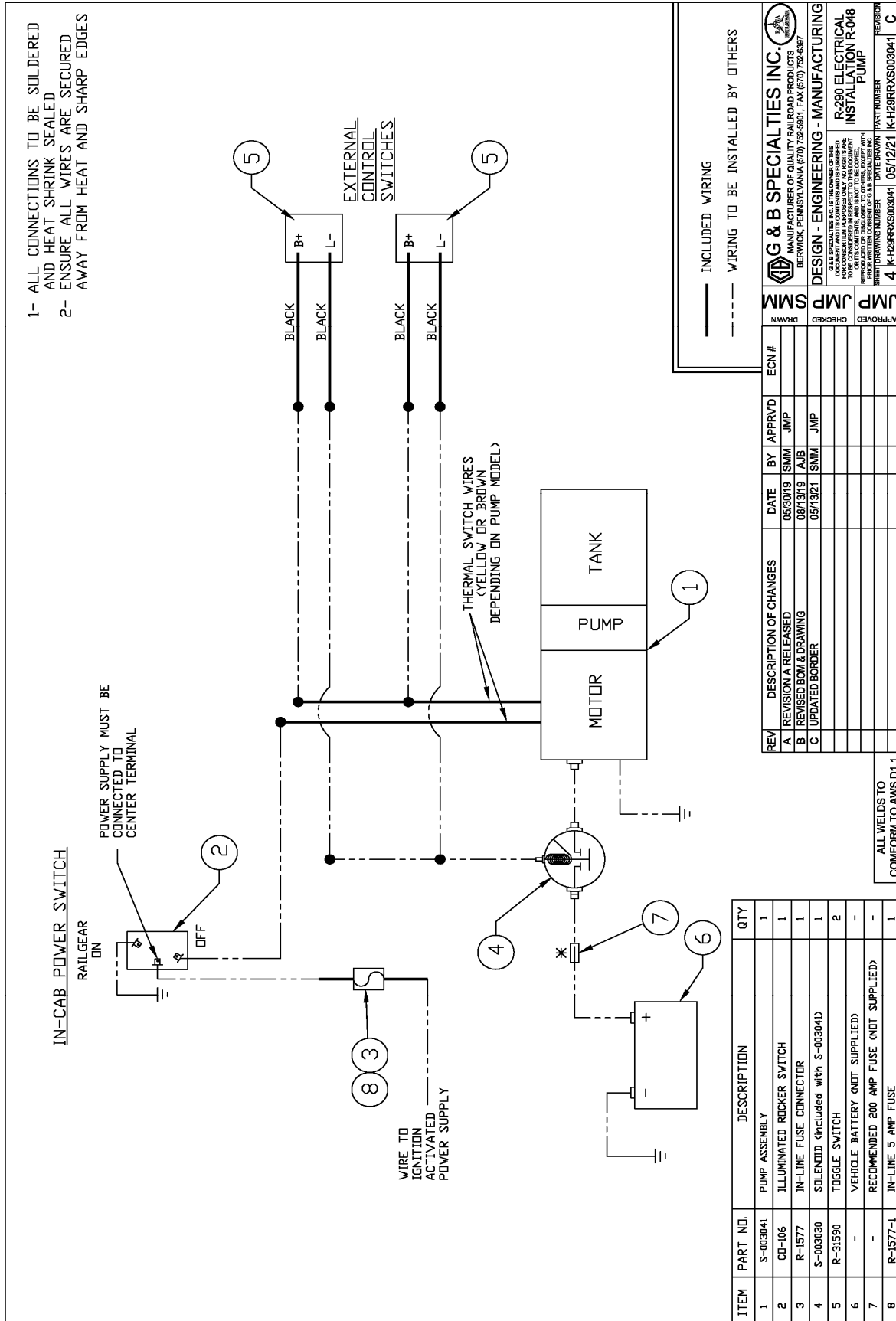
DESIGN - ENGINEERING - MANUFACTURING

HYDRAULIC SCHEMATIC
MANUAL VALVES STAND
PUMP LOCATION

SHEET DRAWING NUMBER 1 K-H29RRXS003041-1
DATE DRAWN 01/14/15
PART NUMBER K-H29RRXS003041-1
REVISION D



ITEM	PART NO.	DESCRIPTION	QTY
1	R-31592	MANUAL CONTROL VALVE	2
2	R-31590	TOGGLE SWITCH	2
3	R-31591	TOGGLE SWITCH BOOT	2
4	CO-130G	"RAILGEAR PUMP" DECAL	2
5	CO-130N	"FRONT GEAR UP" DECAL	1
6	CO-130O	"REAR GEAR UP" DECAL	1
7	CO-130P	"FRONT GEAR DOWN" DECAL	1
8	CO-130Q	"REAR GEAR DOWN" DECAL	1
9	H.H.C.S.	1/4" UNC x 2.25"	4
10	F'WASHER	1/4" SAE	8
11	NYLOCK NUT	1/4" UNC	4



OPERATION AND SERVICE OF R-290 HYDRAULIC KIT W/ MANUAL OPERATING VALVES

STD CONTROLS W/ FRONT OR REAR PUMP LOCATION WITH DETENT FORD F-250/350, GM 2500HD/3500 HD, & RAM 2500/3500

OPERATION AND SERVICE SAFETY PRECAUTIONS

If any operating, service or parts problems are encountered, please call G&B Specialties, Inc. for technical assistance.



- 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 operation of the railgear equipped vehicle.
- Operating instructions provided below only address the Rafna 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.
- 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.
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- 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.

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 STD RAILGEAR HYDRAULIC SYSTEM CONTROLS

The railgear hydraulic system consists of a hydraulic pump and a front and rear control valve.

1. The railgear hydraulic pump must be energized prior to use by turning on the respective dash switch. 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 valve is activated.
2. The direction of the front or rear railgear movement is selected by selecting the “Up” or “Down” position on the respective control valve located near the railgear. Then activating the pump control switch located near the control valve. At this point the pump should start and the railgear should move in the selected direction.
3. To stop the movement of the railgear, release the pump control switch. Return the valve handle to the middle position.
4. 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 in-active.

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. The railgear control valves have an integrated detent. This will allow the valve to be lock in the position for up or down motion of the railgear. Select the direction you want the railgear to move by pressing the handle on the valve in that direction. The handle should stay in that position.
3. 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.

4. Pump the emergency hand pump handle to move the railgear. It will require 50 to 100 full strokes to fully raise or lower each railgear.
5. Return the control valve handle to the middle position.
6. Remove and store the locking cable holding collar and the hand pump handle.
7. 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.

The recommended oil for the railgear hydraulic system is **DEXRON III** or equivalent. In extremely cold weather areas/seasons, Tellus S4 VX32 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				✓

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 front 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.

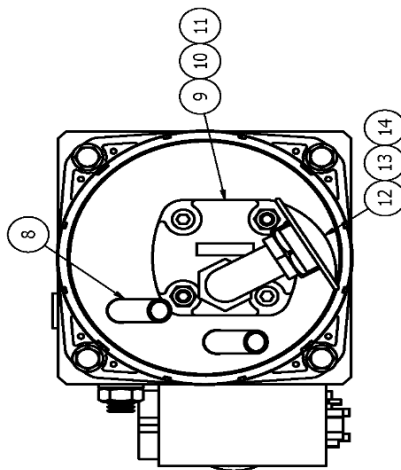
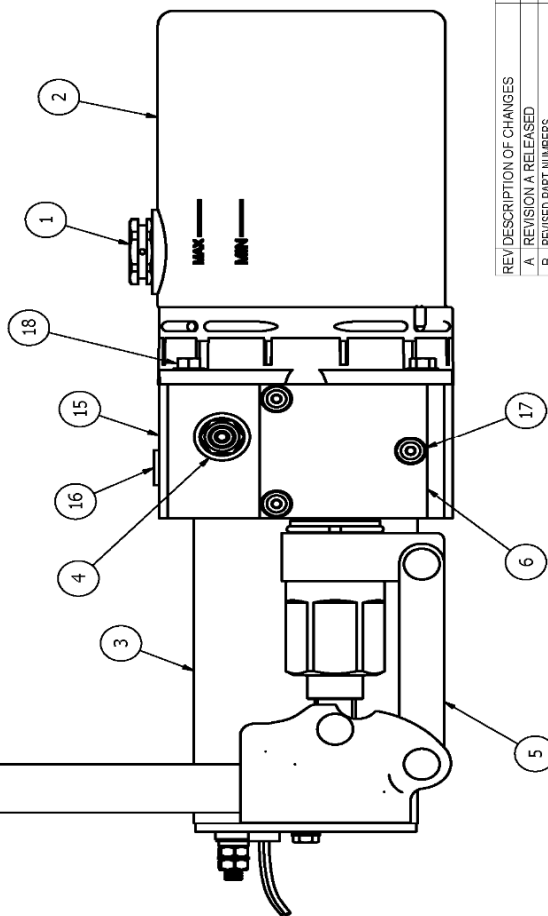
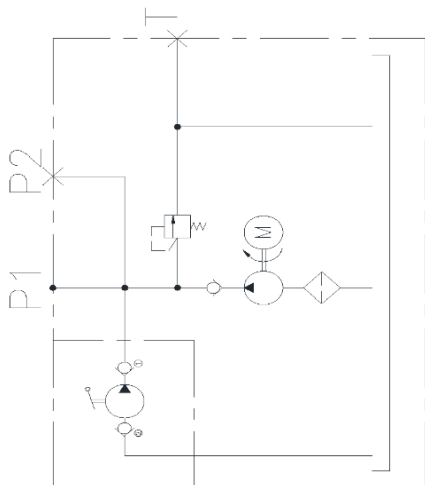
Should the railgear pump fail to operate, first check the fuse or the circuit breaker and all wiring for shorts. Then the following test can be performed to verify the integrity of the pump motor and pump solenoid.

1. Pump motor test:
 - a) Connect one end of a 2 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 NUMBER	DESCRIPTION	QTY	
1	S-309616	BREATHER	1	
2	S-309608	RESERVOIR/TANK	1	
3	S-309600	MOTOR	1	
4	S-309607	CHECK VALVE	1	
5	S-309605	HAND PUMP ASSEMBLY	1	
6	S-309603	HAND PUMP BLOCK	1	
7	S-309627	PUMP HANDLE	1	
8	S-309617	OIL RETURN PIPE	2	
9	S-309604	PUMP	1	
10	S-309609	COUPLING	1	
11	S-309618	HEX SOCKET BOLT	2	
12	S-309610	SUCTION OIL PIPE	1	
13	S-309611	FILTER	1	
14	S-309612	MAGNET	1	
15	S-309602	BODY VALVE BLOCK	1	
16	S-309620	IRON PLUG	1	
17	S-309619	HEX SOCKET BOLT	3	
18	S-309615	HEX FLANGED SCREW	4	



NOTES

1. TO BE USED WITH PUMPS HAVING SERIAL NUMBERS OF THE KS SERIES

REV/DESCRIPTION OF CHANGES	DATE	BY	APPRVD	ECN #	QTY	UNIT	DESCRIPTION
A REVISION A RELEASED	10/16/19	SMW	JMP				
B REVISION A RELEASED	07/14/20	SMW	JMP				

REVISION A

REVISION B

REVISION C

REVISION D

REVISION E

REVISION F

REVISION G

REVISION H

REVISION I

REVISION J

REVISION K

REVISION L

REVISION M

REVISION N

REVISION O

REVISION P

REVISION Q

REVISION R

REVISION S

REVISION T

REVISION U

REVISION V

REVISION W

REVISION X

REVISION Y

REVISION Z

REVISION AA

REVISION AB

REVISION AC

REVISION AD

REVISION AE

REVISION AF

REVISION AG

REVISION AH

REVISION AI

REVISION AJ

REVISION AK

REVISION AL

REVISION AM

REVISION AN

REVISION AO

REVISION AP

REVISION AQ

REVISION AR

REVISION AS

REVISION AT

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REVISION AV

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REVISION BZ

REVISION CA

REVISION CB

REVISION CC

REVISION CD

REVISION CE

REVISION CF

REVISION CG

REVISION CH

REVISION CI

REVISION CJ

REVISION CK

REVISION CL

REVISION CM

REVISION CN

REVISION CO

REVISION CP

REVISION CQ

REVISION CR

REVISION CS

REVISION CT

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REVISION EL

REVISION EM

REVISION EN

REVISION EO

REVISION EP

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BILL OF MATERIAL/PARTS LIST			
ITEM	PART NUMBER	DESCRIPTION	QTY
1	C5216x4x6	SWIVEL ADAPTER #6 SAE MALE x #4 SAE FEMALE	1
2	S-002002	SINGLE P.O. CHECK VALVE	1
3	848FSO-04x06	Jic(-4) to Male O-ring (-6), Straight	3
4	849FSO-04x06	Jic(-4) to Male O-ring (-6), 90 degrees	1
5	HFS2-04	HOSE ASSEMBLY, 16" LONG	1
-	HU-04-04NJ	1/4" FEMALE JIC STRAIGHT HOSE COUPLER*	(2)

*PART OF ITEM #5

ALL WELDS TO CONFORM TO AWS D1.1

REV/DESCRIPTION OF CHANGES	DATE	BY	APPRVD	EON #	DESIGN	CHECKED	APPROVED
A REVISION A RELEASED	09/24/13	JL					

G & B SPECIALTIES INC.
MANUFACTURER OF QUALITY RAILROAD PRODUCTS
BERWICK, PENNSYLVANIA (570) 752-5901 FAX (570) 752-6397

DESIGN - ENGINEERING - MANUFACTURING

SINGLE P.O. CHECK VALVE ASSEMBLY

DRAWING NUMBER: 1 R31245 DATE DRAWN: 09/24/13 PART NUMBER: 09/24/13R-32145 REVISION: A