

**INSTALLATION OF HYDRAULIC KIT FOR PUMP APPLICATIONS
R-450 VERTICAL FRONT RAILGEAR / R-290HD ROTARY REAR RAILGEAR
2017-PRESENT FORD F-450 DRW PICKUP 4X2/4X4**

INSTALLATION 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 of the equipment.
- Installation 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.
- 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.
- Always disconnect the vehicle's battery when welding on the vehicle or railgear in order to protect the vehicle's electrical system.

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1.0 INSTALLATION OF HYDRAULIC KIT W/ PUMP
K-H4529XXF060 - Hydraulic Kit Installation Parts

Part Number	Description	Qty
R-20477	Railgear Hydraulic Pump	1
R-31592	Manual Control Valve	2
R-31590	Toggle Switch	2
R-31591	Boot	2
CO-106	Dash Switch	1
R-1577	5 Amp In-Line Fuse	1
R-1557-1	5 Amp Fuse	1
S-001030	Railgear Operation Decal	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-056	Emergency Hand Pump	1
R-23200	Fitting, 4 Way 1/4" JIC	4
R-23204	Plug, 1/4" Double Shutoff Dripless	4
R-23202	Coupler, 1/4" Double Shutoff Dripless	2
R-23206	Dust Cap, 1/4"	4
R-23208	Dust Plug, 1/4"	4
H-990KIT-081	Adapter, 1/4" Male JIC x 3/4" Male ORB	8
	Adapter, 1/4" Male ORB x 1/4" Male JIC	2
	Adapter, 3/8" Male ORB x 1/4" Male JIC	6
	Adapter, 1/4" JIC Female x 1/4" JIC Male	8
	Hydraulic Hose 23" Long	2
	Hydraulic Hose 36" Long	2
	Hydraulic Hose 80" Long	2
	Hydraulic Hose 360" Long	2
R-990KIT-462	Screw, 1/4" x 2 1/4" Lg. UNC Gr. 8 Z/Y	4
	Washer, 1/4" Flat Z/Y	8
	Nut, 1/4" Nylock Gr. 8 Z/Y	4
	Washer, 3/8" Flat Z/Y	2
	Screw, 3/8" x 1 1/4" Lg. UNC Gr. 8 Z/Y	2
	Washer, 3/8" Reg. Lock Z/Y	2

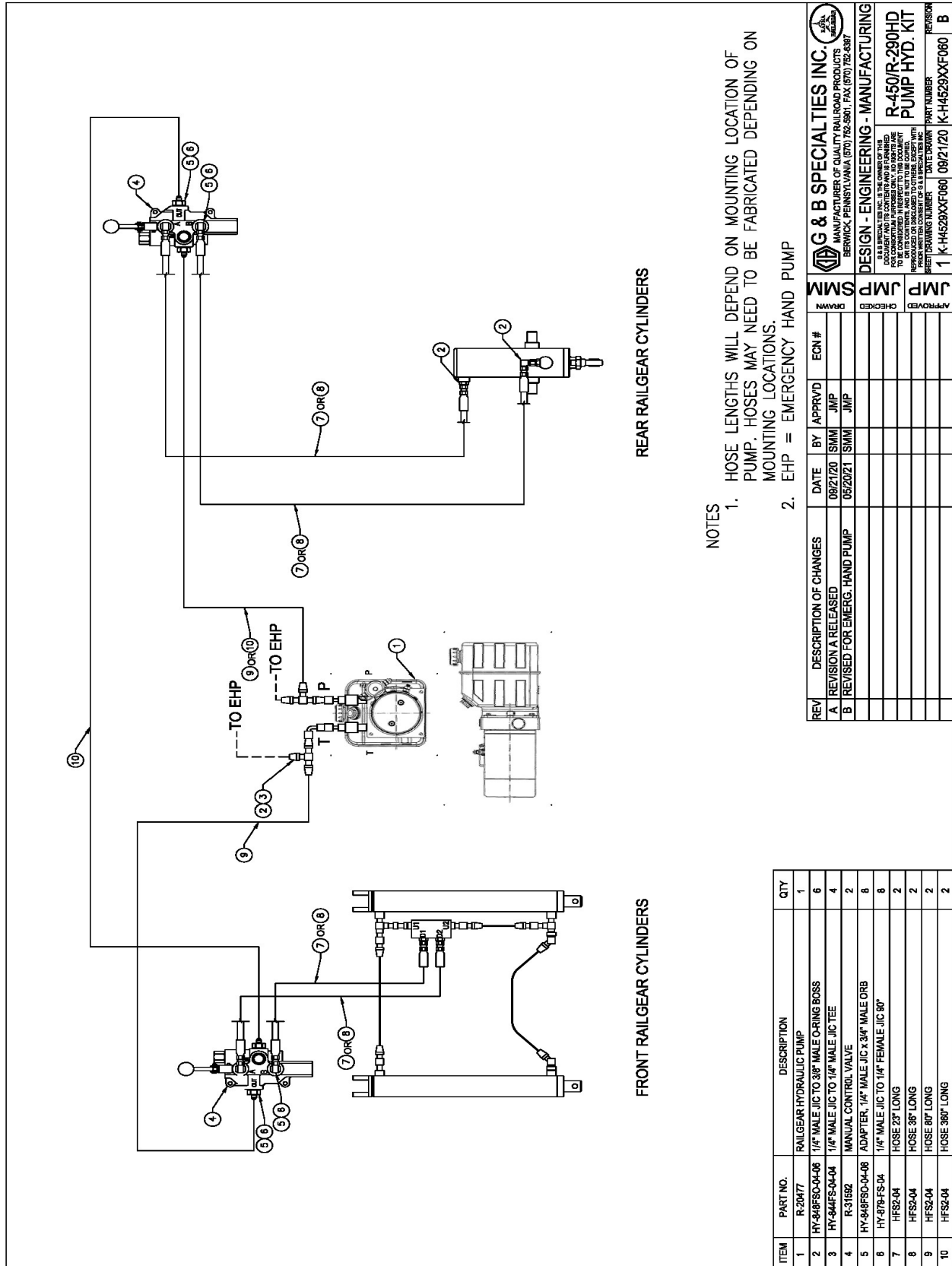
1. Choose a suitable location for the pump assembly, either forward mounted or rear mounted. A mounting plate will need to be fabricated at the installer's discretion. Pump mounting hardware has been supplied in this kit, being the 3/8" hardware.
2. Mount the front and rear control valves as required. It will be necessary to fabricate mounting brackets for the control valves. Valve mounting hardware has been supplied in this kit, being the 1/4" hardware. When mounted, ensure the control valve is within reach of the toggle switch for activating the railgear pump. **NOTE:** Ensure the control valves are mounted so that the controls do not fill with water and freeze.
3. Affix the supplied railgear operation decals in a suitable location adjacent to the front and rear control valves.
4. Install all appropriate fittings and install/fabricate all appropriate hoses as show on the included hydraulic schematic.
5. Ensure that none of the hoses contact any sharp edges or hot surfaces. Secure these hoses in place with tie-wraps. Ensure that there is enough slack in the hoses for the railgear to function.
6. Install the dash switch and "Railgear Pump" decal in a convenient location on the dash.
7. The pump has two wires connected to it:
 - a) One white and one black wire each with ring terminals on the ends.
8. Using suitable 14-gauge wire, cable loom, connectors, solder and heat shrink tubing:
 - a) Lengthen the white wire if required and connect it from the pump to the switching terminal on the railgear pump solenoid.
 - b) Lengthen the black wire if required and connect it from the pump through the firewall to the load terminal on the dash switch.
 - c) Connect another length of black wire from the power terminal on the dash switch through the firewall to the in-line fuse.
 - d) Connect another length of black wire from the in-line fuse to the power terminal on the solenoid.
 - e) Connect another wire from the ground terminal on the dash switch to a suitable ground location on the vehicle.
9. **Optional Upfitter Switch Installation:**

Using suitable 14-gauge wire, cable loom, connectors, solder and heat shrink tubing:

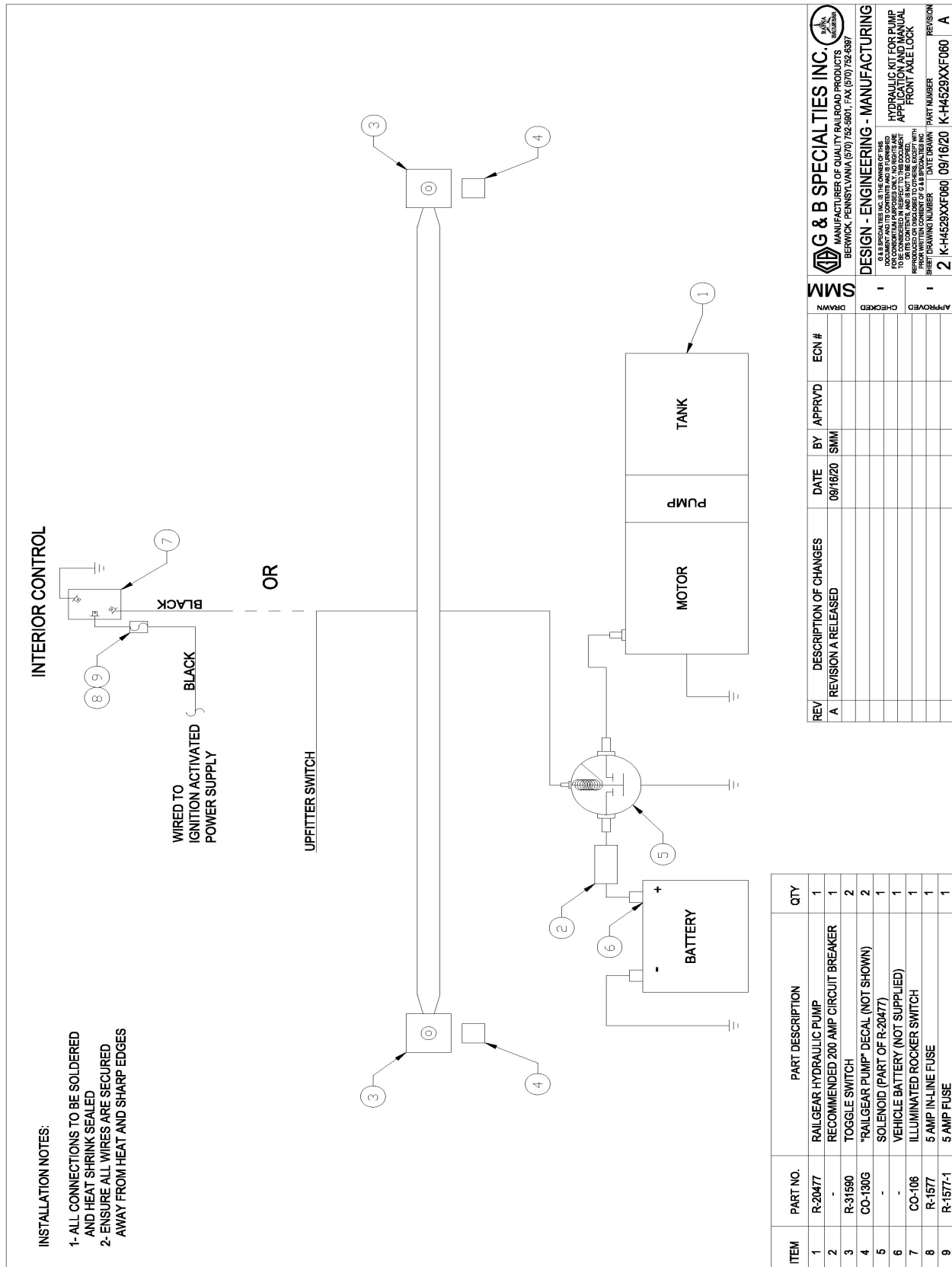
- a) Lengthen the white wire if required and connect it from the pump to the switching terminal on the railgear pump solenoid.
- b) Lengthen the black wire if required and connect it from the pump to one end of the in-line fuse.
- c) Connect another length of black wire from the other end of the in-line fuse to the brown wire for the AUX 4 upfitter switch.

10. Using suitable 4-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 railgear pump solenoid.
 - b) Connect another wire from the load terminal on the solenoid to the power terminal on the pump motor. Use silicone to protect the pump power terminal from shorting out.
 - c) 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.
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 section of this manual 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 section of this manual 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.
14. Follow the Hydraulic System Relief Valve Setting procedure located in the Hydraulic Kit Service section of this manual.
15. Test the operation of the controls. Refer to the operation procedure in the Railgear Kit Manual and Hydraulic Kit Operation section of this manual.
16. Once pump is fully tested and functioning, install the Emergency Hand Pump (R-056).
17. Test function of Emergency Hand Pump By rotating the gear to the rail position and use the hand pump to retract the gear to the road position. Test both front and rear.

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

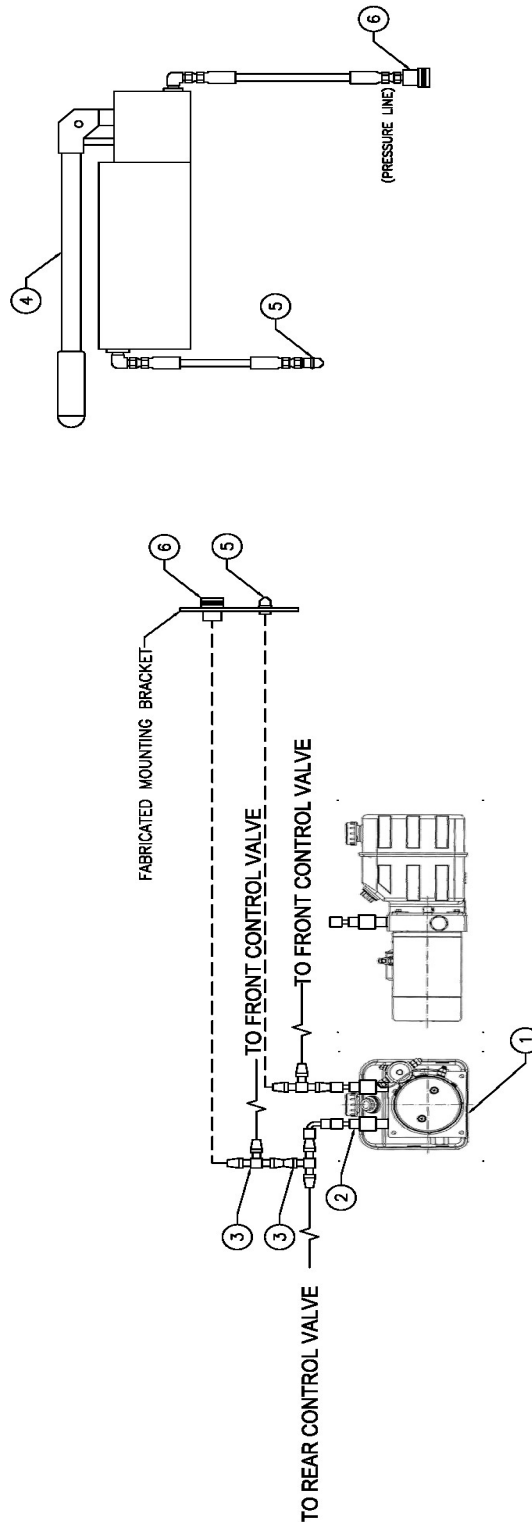


Hydraulic Schematic



Electrical Schematic

G&B Specialties Inc. 535 West 3rd Street, Berwick, PA, USA Tel: (570) 752-5901 Fax: (570) 752-6397
US Field Service: 570-441-6988; CAN Field Service 570-854-0482; www.rafna.com



NOTES

1.-----SHOSE SUPPLIED/FABRICATED BY INSTALLER

[illegible]

Emergency Hand Pump

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**OPERATION, SERVICE, AND PARTS
OF HYDRAULIC KIT FOR PUMP APPLICATIONS
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2017-PRESENT FORD F-450 DRW PICKUP 4X2/4X4**

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 is clear of any moving parts of the railgear. Be aware of all pinch points.
- 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.

2.0 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, a front control lever and a rear control lever.

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 the toggle switch near the respected valve is activated and control lever is depressed.
2. The direction of the front or rear railgear movement is selected by pushing the lever or pulling the lever on the respective valve located near the railgear while engaging the toggle switch which calls for the pump to energize. At this point the pump should start and the railgear should move in the selected direction.
3. To stop the movement of the railgear, move the lever back to the neutral position or leave go of the toggle switch killing power to the pump.
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 levers should be in-active.



3.0 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 **DEXRON III** or equivalent. In extremely cold weather areas/seasons, **ESSO Unis 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)				✓

Table 2: Standard Fastener Torque Values

Fastener Size	Fastener Torque Value (ft-lbs) Dry
1" UNC Gr. 8 Fasteners	250
¾" UNC Gr. 8 Fasteners	175
⅝" UNC Gr. 8 Fasteners	150
½" UNC Gr. 8 Fasteners	100
⅜" UNC Gr. 8 Fasteners	40
¼" UNC Gr. 8 Fasteners	12

HYDRAULIC SYSTEM RELIEF VALVE SETTING

This system is equipped with one relief valve located on the railgear pump body. 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 upper “B” port on 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.

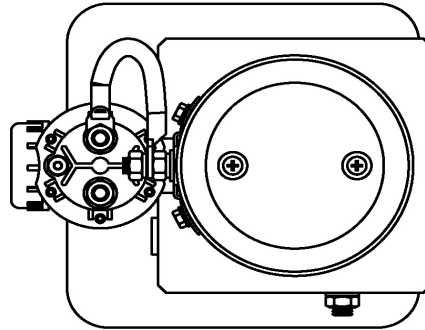
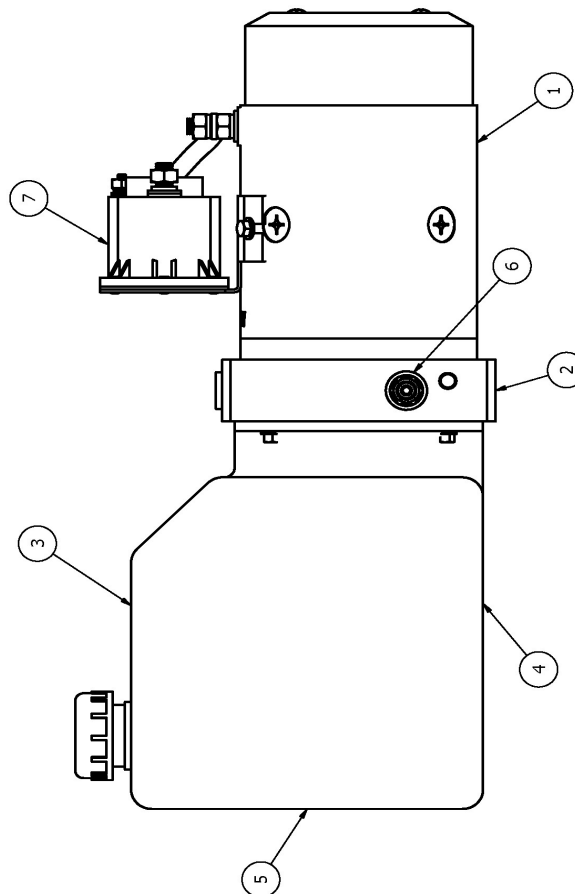
1. Pump motor test:
 - a) Connect one end of a 14-gauge shunt wire to the pump motor power terminal and touch the other end to the battery positive terminal.
 - b) The pump motor should run upon touching the shunt wire.
 - c) If the pump does not run, the pump is not properly grounded, or the pump motor 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.

4.0 Parts

PARTS LIST			
ITEM	PART NUMBER	DESCRIPTION	QTY
1	S-309195	12V/DC MOTOR	1
2	S-309109	MANIFOLD	1
3	S-253208	RESERVOIR TANK (1 GAL.)	1
4	S-309118	PUMP GEAR	1
5	S-309153	SUCTION FILTER	1
6	S-309139	RELIEF VALVE	1
7	S-309601	SOLENOID	1



ALL WELDS TO CONFORM TO AWS D1.1	REVISION	DATE	BY	APPROVED	ECN #	 G & B SPECIALTIES INC. MANUFACTURER OF QUALITY RAILROAD PRODUCTS BERWICK, PENNSYLVANIA (717) 752-5901, FAX (717) 752-4387 DESIGN - ENGINEERING - MANUFACTURING G & B SPECIALTIES, INC. IS THE OWNER OF THIS DRAWING. IT IS THE RESPONSIBILITY OF THE USER FOR CONFORMANCE PURPOSES ONLY. NO PORTION OF THIS DRAWING IS TO BE REPRODUCED OR COPIED IN ANY MANNER WITHOUT THE WRITTEN PERMISSION OF G & B SPECIALTIES, INC. REVISION NUMBER DATE NUMBER 1 R20477 10/05/20 R-20477 A
	A	10/05/20	SMI	JMP		
	DESCRIPTION OF CHANGES					
	A REVISION A RELEASED					R490 HYDRAULIC PUMP
						JUMP CHECKED JUMP APPROVED

ALL WELDS TO CONFORM
TO AWS D1.1