

**INSTALLATION OF HYDRAULIC KIT FOR PUMP APPLICATIONS
R-460 ROTARY FRONT RAILGEAR / R-290HD ROTARY REAR RAILGEAR
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-H2946XXF060 - Hydraulic Kit Installation Parts

Part Number	Description	Qty
R-060	Railgear Hydraulic Pump	1
R-060-2	Pump Bracket	1
R-20162	Pump Mounting Blocks	2
CO-106	Dash Switch	1
R-1577	5 Amp In-Line Fuse	1
S-001030	Railgear Operation Decal	1
CO-130G	"Railgear Pump" Decal	1
H-990KIT-044	Adapter, 1/4 Male JIC x 3/8 Male ORB	4
	TEE, 1/4 Male JIC	2
	Adapter, 1/4 Male JIC x 3/8 Male ORB, 90°	5
	Coupler, Straight, 1/4 JIC Female (installed on hoses)	12
	Coupler, Straight, 1/4 JIC Female, 90° (installed on hoses)	4
	Hydraulic Hose 13" Long	2
	Hydraulic Hose 18" Long	2
	Hydraulic Hose 36" Long	2
R-990KIT-268	Hydraulic Hose 360" Long	2
	1/4" UNC Gr. 5 Bolt x 7" Long	2
	1/4" SAE Washer	4
	1/4" Lock Washer	2
	3/8" TYPE-A Flat Washer	6
	3/8" UNC Gr. 8 Bolt x 1 1/4" Long	6
	3/8" Lock Washer	6

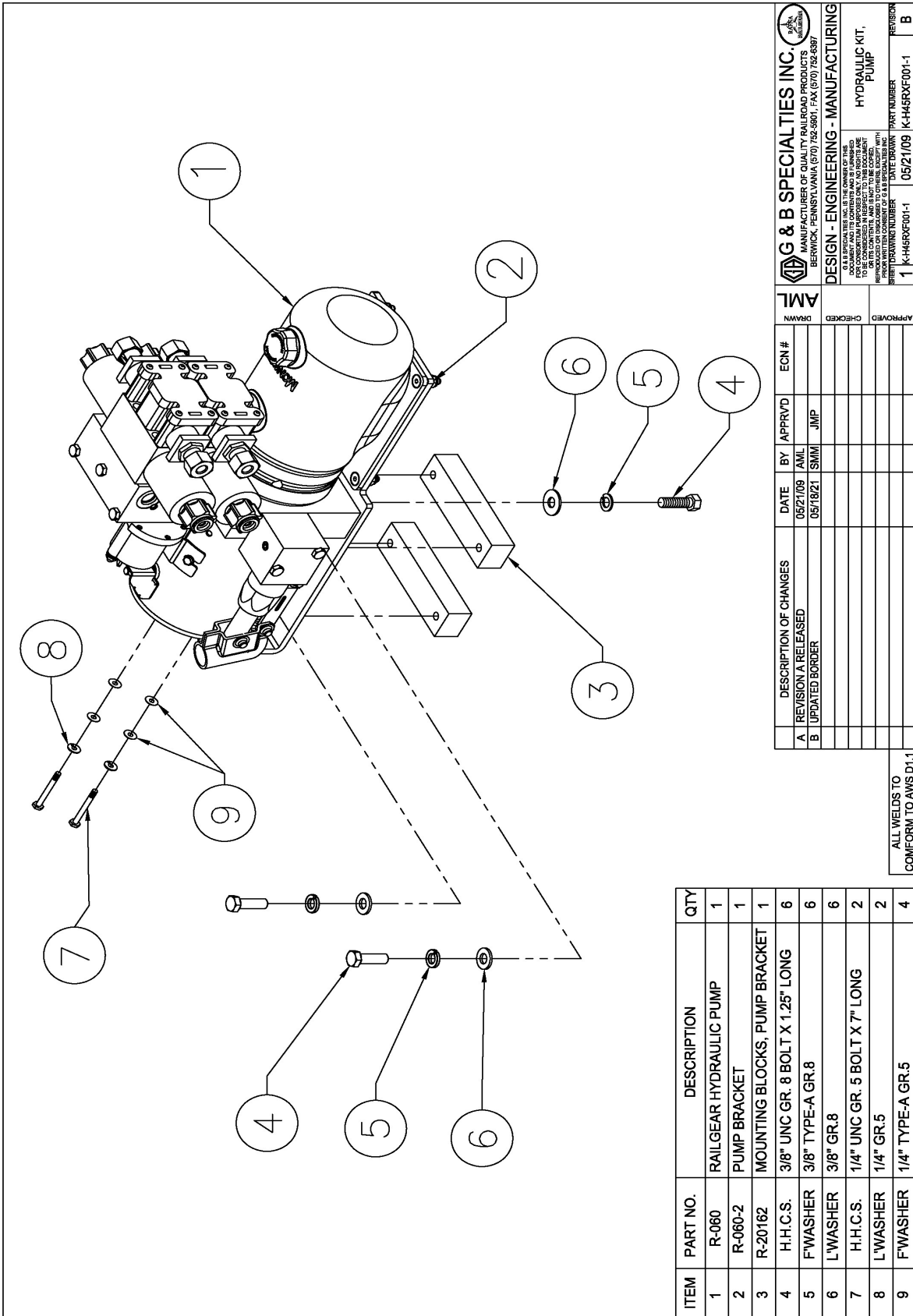
- Assemble the pump mounting blocks to the pump bracket as shown using the supplied 3/8" fasteners. Torque the 3/8" fasteners to 40 ft-lbs dry.
- Assemble the pump to the pump bracket as shown using the 1/4" fasteners at the motor end of the pump and the 3/8" fasteners on the bottom of the pump. Torque the 3/8" fasteners to 30 ft-lbs dry. Do not over torque.
- Choose a suitable location for the pump assembly, either forward mounted or rear mounted. The pump mounting blocks are designed for the purpose of welding the blocks to an installer supplied mounting plate. The mounting blocks can be removed or modified at the installer's discretion.
- Install all appropriate fittings and install/fabricate all appropriate hoses as show on the included hydraulic schematic.
- 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 wire harnesses and two wires connected to it:
 - a) Two 36’ wire harnesses with a control box on the end.
 - b) One white and one black wire each with ring terminals on the ends.
 - c) Depending on the location of the pump, it may be necessary to shorten and or lengthen the control box wiring harness.
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 previously mounted under the hood.
 - b) Lengthen the black wire if required and connect it from the pump to the load terminal on the dash switch.
 - c) Connect another length of black wire from the power terminal on the dash switch 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. Route the 36’ wire harnesses from the pump along the frame to the railgear unit 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.
12. 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.

13. Ensure all wires and terminals are soldered, heat shrink sealed, enclosed in protective cable loom and secured with tie-wraps.
14. 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.
15. Follow the Hydraulic System Relief Valve Setting procedure located in the Hydraulic Kit Service section of this manual.
16. Test the operation of the controls. Refer to the operation procedure in the Railgear Kit Manual and Hydraulic Kit Operation section of this manual.



ITEM	PART NO.	DESCRIPTION	QTY
1	R-060	RAILGEAR HYDRAULIC PUMP	1
2	R-060-2	PUMP BRACKET	1
3	R-20162	MOUNTING BLOCKS; PUMP BRACKET	1
4	H.H.C.S.	3/8" UNC GR. 8 BOLT X 1.25" LONG	6
5	F'WASHER	3/8" TYPE-A GR.8	6
6	L'WASHER	3/8" GR.8	6
7	H.H.C.S.	1/4" UNC GR. 5 BOLT X 7" LONG	2
8	L'WASHER	1/4" GR.5	2
9	F'WASHER	1/4" TYPE-A GR.5	4

DESCRIPTION OF CHANGES	DATE	BY	APPRVD	AML	ECN #
A REVISION A RELEASED	05/21/09	JMP	JMP	AML	
B UPDATED BORDER	05/18/21	SMM	JMP	AML	

ALL WELDS TO CONFORM TO AWS D1.1.

DATE	BY	APPRVD	AML	ECN #
05/21/09	JMP	JMP	AML	
05/18/21	SMM	JMP	AML	

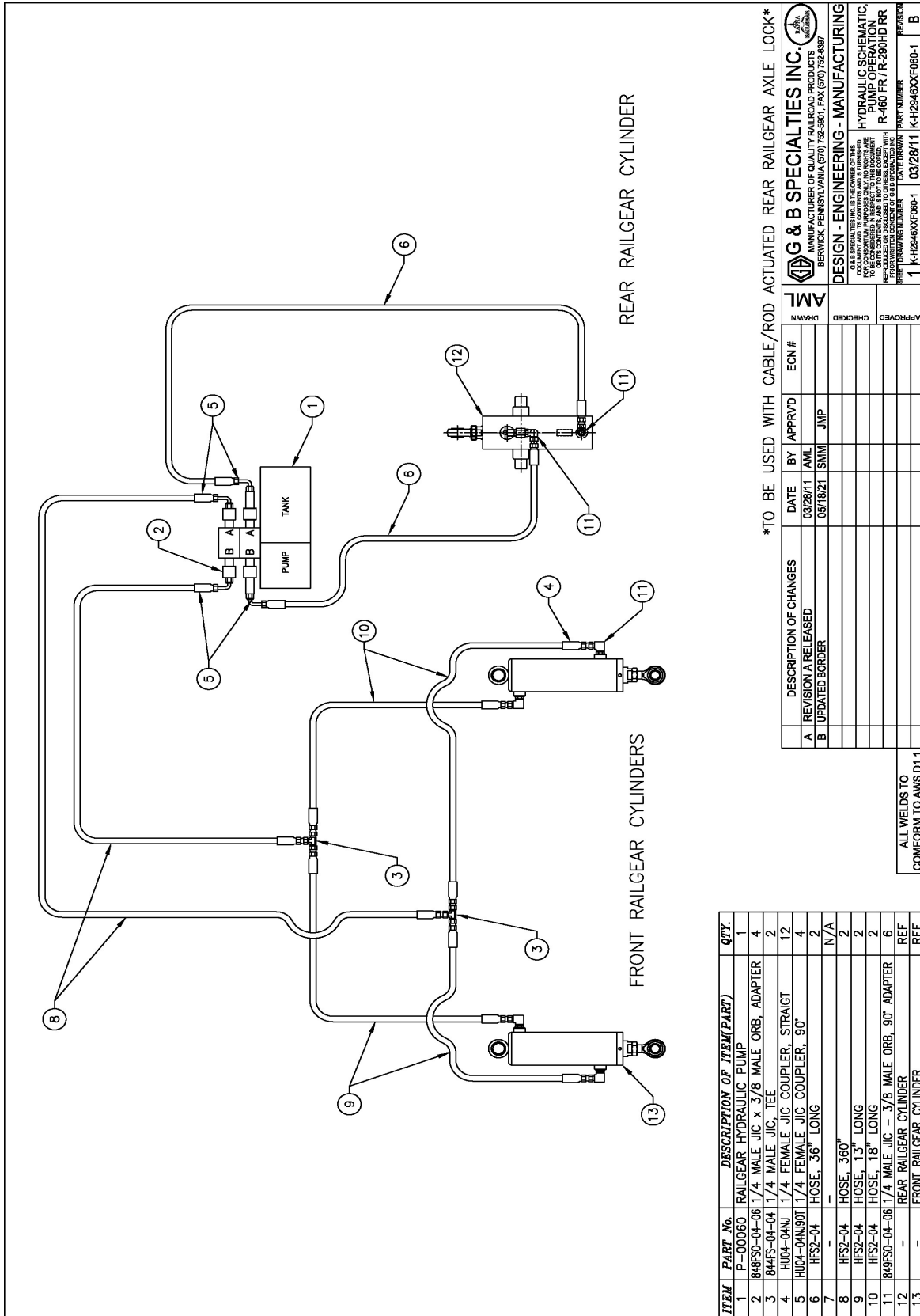
G & B SPECIALTIES INC.
MANUFACTURER OF QUALITY RAILROAD PRODUCTS
BERWICK, PENNSYLVANIA (717) 752-5901, FAX (717) 752-6397

DESIGN - ENGINEERING - MANUFACTURING

ALL DIMENSIONS ARE IN THE DECIMAL SYSTEM UNLESS OTHERWISE SPECIFIED.
DIMENSIONS IN PARENTHESES AND IN SQUARES ARE FOR INFORMATION ONLY AND ARE NOT TO BE CONSIDERED IN RESPECT TO THIS DOCUMENT.
REPRODUCTION OR DISSEMINATION TO OTHERS, WITHOUT THE WRITTEN PERMISSION OF G&B SPECIALTIES INC., IS PROHIBITED.

HYDRAULIC KIT, PUMP

DATE DRAWN: 05/21/09
PART NUMBER: K-H46RXF001-1
REVISION: B



Hydraulic 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

TO BE USED WITH CABLE/ROD ACTUATED REAR RAILGEAR AXLE LOCK

AM	DRW	AM	AM
DATE	BY	APPRVD	EON #
03/28/11	JMM	JMP	
09/19/21	SMM		

DESCRIPTION OF CHANGES	DATE	BY	APPRVD	EON #
A REVISION A RELEASED	03/28/11	JMM	JMP	
B UPDATED BORDER	09/19/21	SMM		

ALL WELDS TO CONFORM TO AWS D1.1			
SHEET DRAWING NUMBER	DATE DRAWN	PART NUMBER	REVISION
1 K-H2946XXF060-1	03/28/11	K-H2946XXF060-1	B

ITEM	PART No.	DESCRIPTION OF ITEM(PART)	QTY.
1	P-00060	RAILGEAR HYDRAULIC PUMP	1
2	84850-04-06	1/4 MALE JIC x 3/8 MALE ORB. ADAPTER	4
3	844FS-04-04	1/4 MALE JIC, TEE	2
4	HU04-04N1	1/4 FEMALE JIC COUPLER, STRAIGHT	12
5	HU04-04N90T	1/4 FEMALE JIC COUPLER, 90°	4
6	HFS2-04	HOSE, .36" LONG	2
7	-	N/A	N/A
8	HFS2-04	HOSE, .360"	2
9	HFS2-04	HOSE, 13" LONG	2
10	HFS2-04	HOSE, 18" LONG	2
11	84950-04-06	1/4 MALE JIC - 3/8 MALE ORB. 90° ADAPTER	6
12	-	REAR RAILGEAR CYLINDER	REF
13	-	FRONT RAILGEAR CYLINDER	REF

**OPERATION, SERVICE, AND PARTS
OF HYDRAULIC KIT FOR PUMP APPLICATIONS
R-460 ROTARY FRONT RAILGEAR / R-290HD ROTARY REAR RAILGEAR
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 box and a rear control box.

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 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. To stop the movement of the railgear, release the depressed button.
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.

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 Univis 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-309690	MOTOR	1
2	S-309691	BODY VALVE BLOCK	1
3	S-309692	HAND PUMP BLOCK	1
4	S-309693	CONTROL BLOCK	1
5	S-309605	HAND PUMP ASSEMBLY	1
6	S-309652	CHECK VALVE (INTERNAL)	1
7	S-309606	RELIEF	1
8	S-309653	4 WAY 3 POSITION SOLENOID VALVE	2
9	S-309654	SOLENOID	1
10	S-309655	GEAR PUMP	1
11	S-309694	COUPLING (INTERNAL)	1
12	S-309680	TANK	1
13	S-309657	HEX BOLT	3
14	S-309658	HEX BOLT WITH SPRING WASHER	4
15	S-309659	HEX BOLT WITH SPRING WASHER	2
16	S-309615	LONG BOLT	2
17	S-309660	BOLT	2
18	S-309623	CABLE	1
19	S-309624	CABLE COVER	2
20	S-309614	O-RING	4
21	S-309613	O-RING	1
22	S-309661	RESPIRATOR ASSEMBLY	1
23	S-309621	IRON PLUG	4
24	S-309662	PLASTIC PLUG (FOR SHIPPING ONLY)	4
25	S-309663	OIL PIPE	1
26	S-309664	FILTER	1
27	S-309617	OIL RETURN PIPE	1
28	S-309665	SUCTION OIL PIPE	1
29	S-309612	MAGNET	1
30	S-309634	CONTROL BOX ASSEMBLY (SHEET 2)	2
31	S-309667	CABLE, BLACK (18", SHEET 2)	1
32	S-309668	CABLE, WHITE (18", SHEET 2)	1
33	S-309669	CONNECTING CABLE (12", SHEET 2)	1
34	S-309627	HAND PUMP OPERATING ROD	1
35	S-309628	ROD COVER	1
36	S-309638	CABLE GLAND (SHEET 2)	2

DATE	BY	APPRVD	ECN #
03/18/20	SDB		
07/15/20	SNMI	SNMI	
08/19/20	SNMI	SNMI	

REV	DESCRIPTION OF CHANGES
A	REVISION A RELEASED
B	UPDATED PART NUMBERS
C	UPDATED PUSH BUTTON PART NUMBER

NOTES:

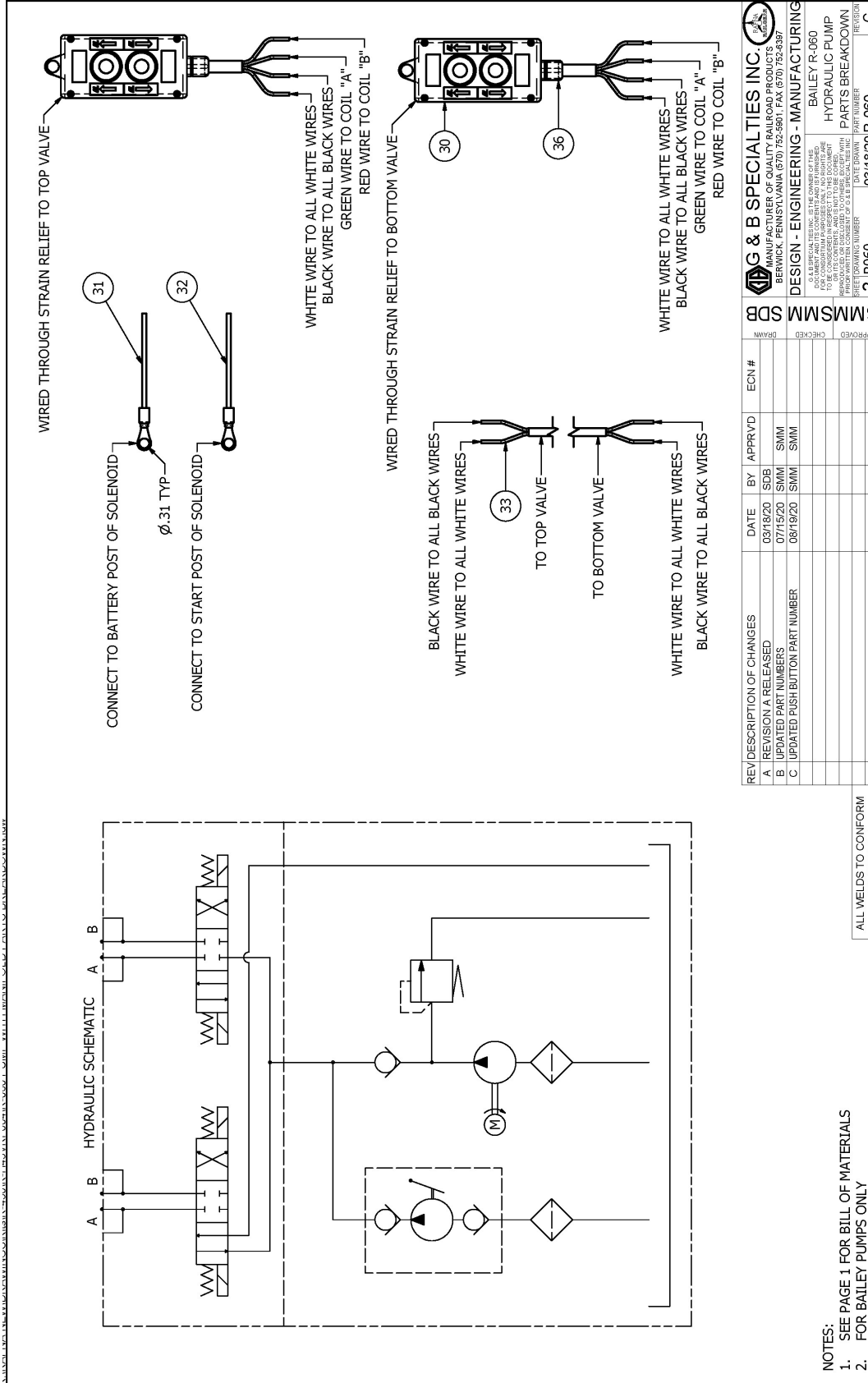
- SEE SHEET 2 FOR HYDRAULIC SCHEMATIC AND ELECTRICAL CONNECTION INSTRUCTIONS
- TO BE USED WITH BAILEY PUMPS ONLY

ALL WELDS TO CONFORM TO AWS D1.1

DESIGN - ENGINEERING - MANUFACTURING

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 535 WEST 3RD STREET, BERWICK, PA, USA
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 TEL: (570) 752-5901 FAX: (570) 752-6397

BAILEY R-060
 HYDRAULIC PUMP
 PARTS BREAKDOWN
 PART NUMBER: 03/18/20/R-060
 REVISION: C



REV/DESCRIPTION OF CHANGES	DATE	BY	APPR/VD	ECN #	DRWN
A REVISION A RELEASED	03/18/20	SDB			
B UPDATED PART NUMBERS	07/15/20	SMM	SMM		
C UPDATED PUSH BUTTON PART NUMBER	08/19/20	SMM	SMM		

REV/DESCRIPTION OF CHANGES	DATE	BY	APPR/VD	ECN #	DRWN
A REVISION A RELEASED	03/18/20	SDB			
B UPDATED PART NUMBERS	07/15/20	SMM	SMM		
C UPDATED PUSH BUTTON PART NUMBER	08/19/20	SMM	SMM		

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NOTES:

- SEE PAGE 1 FOR BILL OF MATERIALS
- FOR BAILEY PUMPS ONLY

G & B SPECIALTIES INC. MANUFACTURER OF QUALITY RAILROAD PRODUCTS BERWICK, PENNSYLVANIA (670) 752-5901 FAX (670) 752-6397 DESIGN - ENGINEERING - MANUFACTURING BAILEY R-060 HYDRAULIC PUMP PARTS BREAKDOWN SHEET/DRAWING NUMBER DATE DRAWN PART NUMBER REVISION 2 R060 03/18/20R-060 C