

INSTALLATION OF FRONT HYDRAULIC BRAKE KIT ROTARY R-490 RAILGEAR

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.
- All wire connections should 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.
- Do not use regular brake fluid in the front hydraulic brake system, as it will damage the hydraulic brake pump and the brake cylinders.

INSTALLATION OF FRONT HYDRAULIC BRAKE KIT
K-B49RXF20103 (PTO KIT)

Part Number	Description	Quantity
R-20103D	Hydraulic Brake, Driver Side	1
R-20103P	Hydraulic Brake, Passengers Side	1
CO-106	Dash Switch	1
R-1577	5A In-Line Fuse	1
R-1577-1	Fuse, 5 Amp	1
R-5670	Hydraulic Brake Pump	1
R-5692	Electric Brake Control	1
R-20450	Pump Support Plate	2
R-20451	Pump Plate	1
R-20453	Brake Support	1
R-20454	Spacer	4
R-20484	Box Assy, Pump Protection	1
R-4574B	Brake Pump Mounting Spacer	1
CO-130H	"Railgear Brake Pump" Decal	1
844FS-04-04	1/4" Male JIC to 1/4" Male JIC Tee	1
HFS2-04	Hose 32" Long	1
HFS2-04	Hose 24" Long	1
HU04-04NJ	1/4" Female Hose Straight Coupling (Installed on hoses)	2
HU04-04MF45T	1/4" Male Swivel Inverted Coupling, 45° Swivel	2
R-990KIT-464	3/8" UNC Gr.8 Bolt x 1 1/4" Long	4
	3/8" Type-A Gr.8 Flat Washer	6
	3/8" Gr. 8 Washer, Split Lock	2
	3/8" Gr. 8 Nylock Nut	2
	1/2" UNC Gr. 8 Bolt x 2 1/2" Long	4
	1/2" Type-A Gr.8 Flat Washer	8
	1/2" Gr. 8 Nylock Nut	4
R-990KIT-394	3/8" UNC Gr.8 Bolt x 1" Long	6
	3/8" UNC Gr.8 Bolt x 1.25" Long	2
	3/8" Gr.8 Washer, Flat	8
	3/8" Gr.8 Washer, Lock	8

K-B49RXF20107 (PUMP KIT)

Part Number	Description	Quantity
R-20103D	Hydraulic Brake, Driver Side	1
R-20103P	Hydraulic Brake, Passengers Side	1
CO-106	Dash Switch	1
R-1577	5A In-Line Fuse	1
R-1577-1	Fuse, 5 Amp	1
R-5670	Hydraulic Brake Pump	1
R-5692	Electric Brake Control	1
R-20453	Brake Support	1
R-4574B	Brake Pump Mounting Spacer	1
CO-130H	"Railgear Brake Pump" Decal	1
844FS-04-04	1/4" Male JIC to 1/4" Male JIC Tee	1
HFS2-04	Hose 32" Long	1
HFS2-04	Hose 24" Long	1
HU04-04NJ	1/4" Female Hose Straight Coupling (Installed on hoses)	2
HU04-04MF45T	1/4" Male Swivel Inverted Coupling, 45° Swivel	2
R-990KIT-465	3/8" UNC Gr.8 Bolt x 1 1/4" Long	4
	3/8" Type-A Gr.8 Flat Washer	6
	3/8" Gr. 8 Washer, Split Lock	2
	3/8" Gr. 8 Nylock Nut	2
R-990KIT-394	3/8" UNC Gr.8 Bolt x 1" Long	6
	3/8" UNC Gr.8 Bolt x 1.25" Long	2
	3/8" Gr.8 Washer, Flat	8
	3/8" Gr.8 Washer, Lock	8

1. Ensure that the rail wheels have been installed on the front railgear prior to installation of the Front Hydraulic Brake Kit.
2. Place the hydraulic brakes on the ends of the front railgear axle so that the 3/8" threaded holes align with the slots in the top and side mounting surfaces of the brake housing. The brake shoe linkage of each brake housing should be toward the front of the vehicle. (Figure 1)
3. Fasten each brake housing to the front railgear axle using the supplied 3/8" hardware shown in Figure 1. Torque the 3/8" fasteners to 45 ft-lbs dry. Do not over torque.

NOTE: If Hydraulics on Vehicle are Operated by Pump, Skip to Step 9

4. Working at the rear step on the Driver's Side, locate the two 12mm bolts and remove. We will be re-using these bolts. (Figure 2) (Photo 1)

5. Install the Pump Plate Supports (R-20550) using the bolts that were just removed. Bolts do not have to be torqued at this time as we must mark and drill the mating holes for the lower portion of the supports. (Figure 3)
6. Ensure the Pump Plate Supports are parallel with the step's mounting bracket and mark holes to drill. (Figure 3)
7. Use a 17/32" drill bit or adequate to allow for a 1/2" bolt to pass through and drill marked holes on the step's mounting bracket.
8. Place Spacers (R-20454) under the Pump Plate Supports and lay the Pump Plate (R-20451) on top of the Support Brackets. Used supplied 1/2" x 2 1/2" bolts and associated hardware to fasten the Pump Plate to the Support Brackets and Step Bracket. (Figure 4)
9. Install the Brake Pump Support (R-20453) Bracket using the supplied 3/8" x 1 1/4" bolts and associated hardware. (Figure 5)
10. Install Hydraulic Brake Pump (R-5670) and Spacer (R-4574B) on Pump Plate by using the supplied 3/8" x 1 1/4" bolts, flat washers, and lock washers to fasten. (Figure 6)
11. Position the electric brake control under the hood on or close to the vehicle firewall. Fasten the electric brake control to the vehicle using installer-supplied self-tapping screws. The brake controller can be mounted inside the cab of the vehicle at the installer's discretion.
12. Choose a suitable location on the vehicle dash and install the dash switch.
13. Affix the "Railgear Brake Pump" decal in a suitable location adjacent to the dash switch.
14. Using suitable 14 gauge wire, cable loom, connectors, solder and heat shrink tubing: (Figure 7)
 - a) Lengthen as required, terminate and connect one of the red wires from the brake pump valve to reach to terminal 2 on the electric brake control.
 - b) Lengthen as required, terminate and connect the other red wire from the brake pump valve to a suitable ground location.
 - c) Terminate and connect a black wire from the power terminal on the brake pump solenoid to one end of the in-line fuse.
 - d) Terminate and connect another length of black wire from the other end of the in-line fuse through the firewall to the power terminal on the dash switch.
 - e) Terminate and connect a wire from the dash switch ground terminal to a suitable ground location on the vehicle.
 - f) Terminate and connect a wire from the load terminal on the dash switch to terminal 3 on the electric brake control.
 - g) Terminate and connect a wire from the switching terminal on the brake pump solenoid to terminal 6 on the electric brake control.
 - h) Terminate and connect a wire from terminal 7 on the electric brake control to a suitable ground location.
 - i) Terminate and connect a wire to terminal 1 on the electric brake control and splice it into the load wire from the vehicle service brake light switch behind the brake pedal.

15. Optional Upfitter Switch Installation: (Figure 8)

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

- a) Lengthen as required, terminate and connect one of the red wires from the brake pump valve to reach to terminal 2 on the electric brake control.
- b) Lengthen as required, terminate and connect the other red wire from the brake pump valve to a suitable ground location.
- c) Terminate and connect a black wire from terminal 3 on the electric brake control to one end of the in-line fuse.
- d) Terminate and connect another length of black wire from the other end of the in-line fuse to the violet/green striped wire for the AUX 3 upfitter switch.
- e) Terminate and connect a wire from the switching terminal on the brake pump solenoid to terminal 6 on the electric brake control.
- f) Terminate and connect a wire from terminal 7 on the electric brake control to a suitable ground location.

Terminate and connect a wire to terminal 1 on the electric brake control and splice it into the load wire from the vehicle service brake light switch behind the brake pedal

16. Using suitable 4 gauge wire, cable loom, connectors, solder and heat shrink tubing:

- a) Terminate and connect one wire from the vehicle's battery to the power terminal on the brake pump solenoid.
- b) Terminate and connect another wire from the load terminal on the brake pump solenoid to the power terminal on the brake pump motor.
- c) Apply a small amount of silicon sealant to the pump motor and solenoid terminals to protect them from shorting out or rusting.
- d) Ensure the brake pump motor base is properly grounded to the vehicle chassis by connecting a wire from the brake pump motor base to a suitable ground location on the vehicle.

17. Install/Fabricate the hydraulic hoses/fittings/adapters as shown on the hydraulic schematic. (Figure 7/8)

18. Ensure that none of the hoses contact any sharp edges or hot surfaces. Secure all hoses leaving enough slack for the railgear to function.

19. Ensure that all wires and terminals are soldered, heat shrink sealed, enclosed in protective cable loom and secured with tie-wraps.

20. Ensure that any holes in the firewall are sealed and protected with a grommet.

21. Fill the hydraulic brake system and bleed the air out:

- a) Fill the hydraulic brake pump tank with **DEXRON III** (or equivalent) hydraulic fluid.
- b) Turn on the dash switch. Depress and hold the vehicle brake pedal. The hydraulic brake pump should start.
- c) Open the air bleed valve on each brake cylinder to allow air to escape.
- d) Close the air bleed valve on each brake cylinder.
- e) Release the brake pedal.
- f) Re-fill the hydraulic brake pump tank with hydraulic fluid.
- g) Repeat the above steps until only oil and no more air comes out of the air bleed valve.
- h) Fill the hydraulic brake pump tank to the fill line.

22. Paint any parts that were welded.
23. Follow the Front Hydraulic Brake Relief Valve Setting procedure detailed in the Operation, Service and Parts section of this manual.
24. Follow the Brake Shoe To Rail Wheel Clearance Adjustment procedure detailed in the Operation, Service and Parts section of this manual.
25. Test the operation of the hydraulic brakes as per the Operation, Service and Parts section of this manual.
26. Once Brakes are fully tested, Install the Pump Protection Box (R-20484) using remaining 3/8" hardware. (Figure 9)

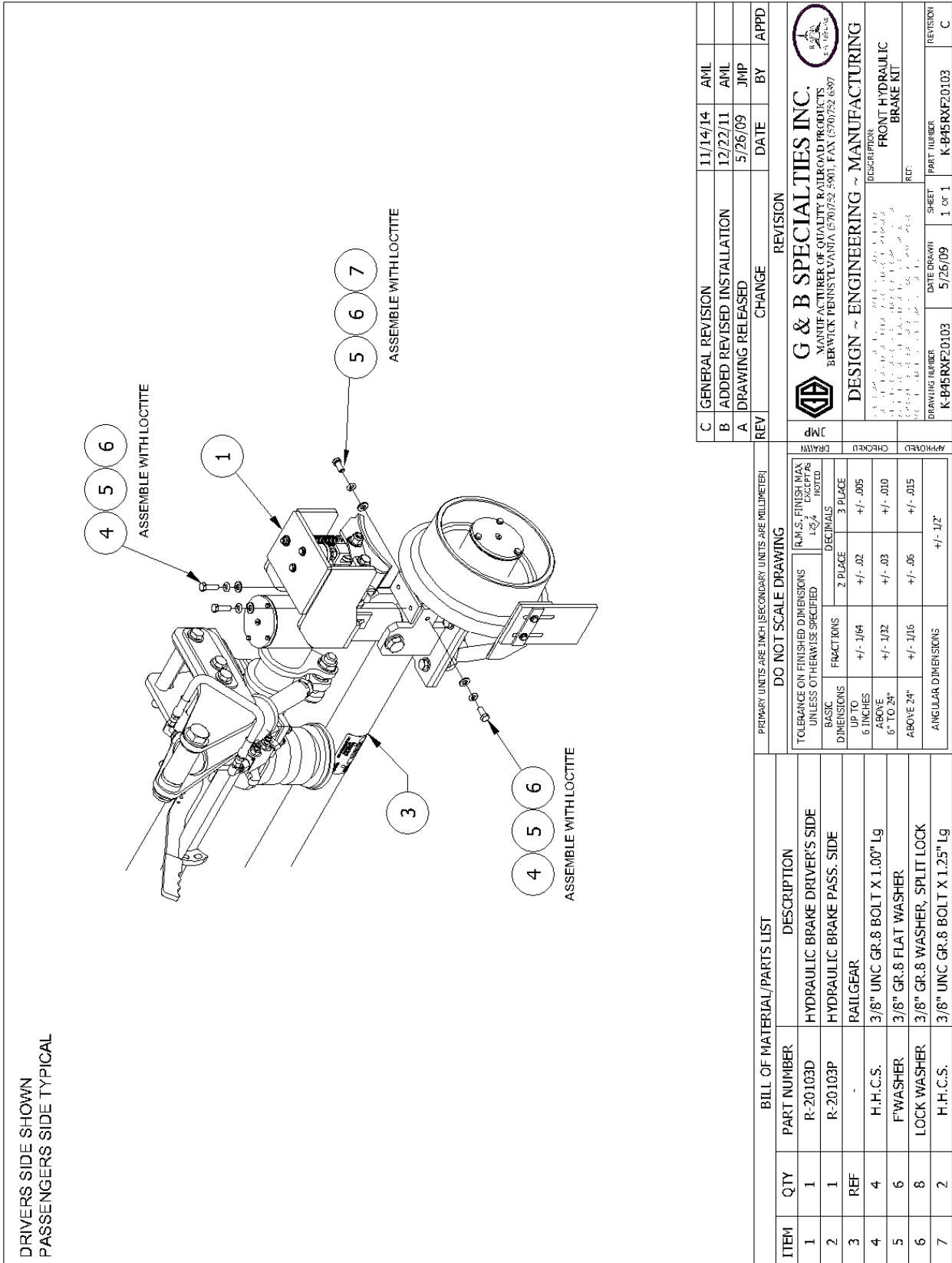


Figure 1: Brake Mounting Installation

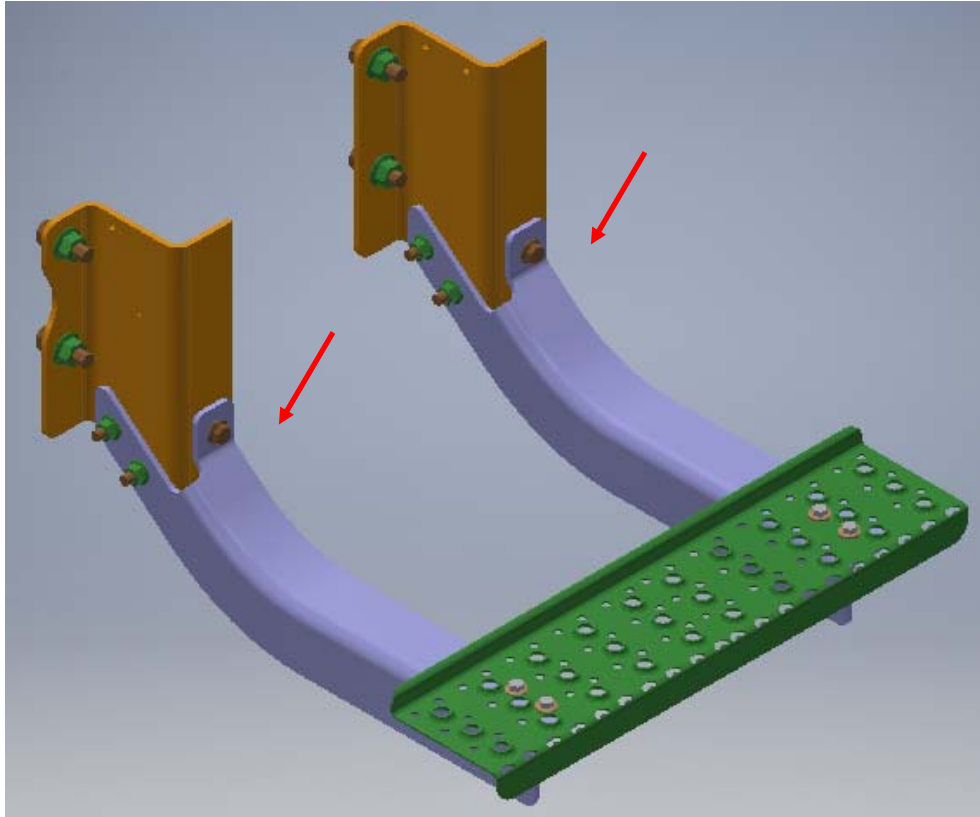


Figure 2: Step Bolts To Be Removed/Re-Used

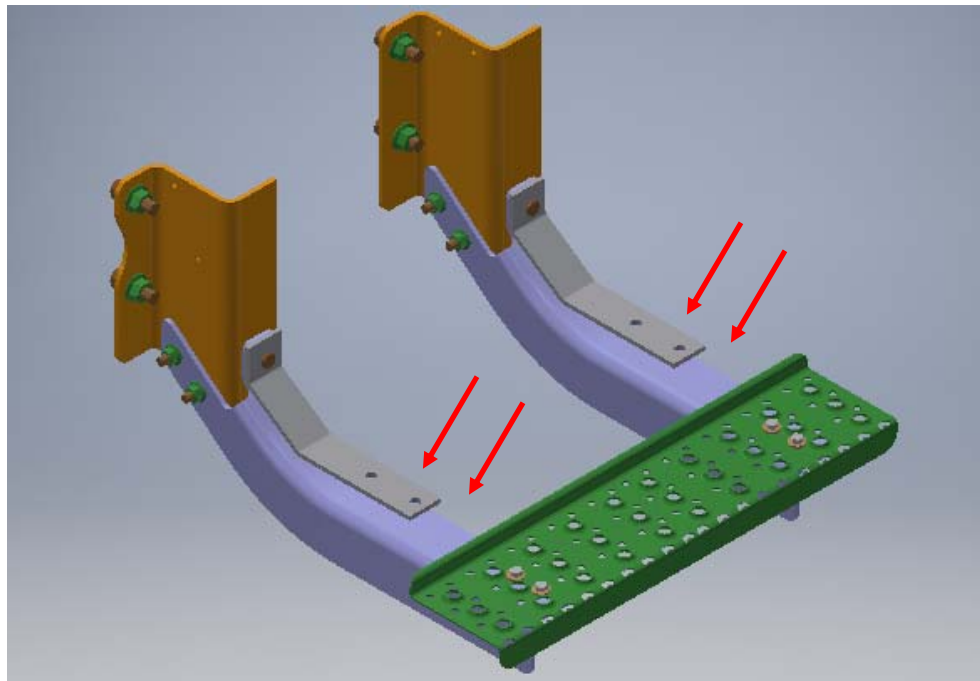


Figure 3: Pump Plate Supports Location

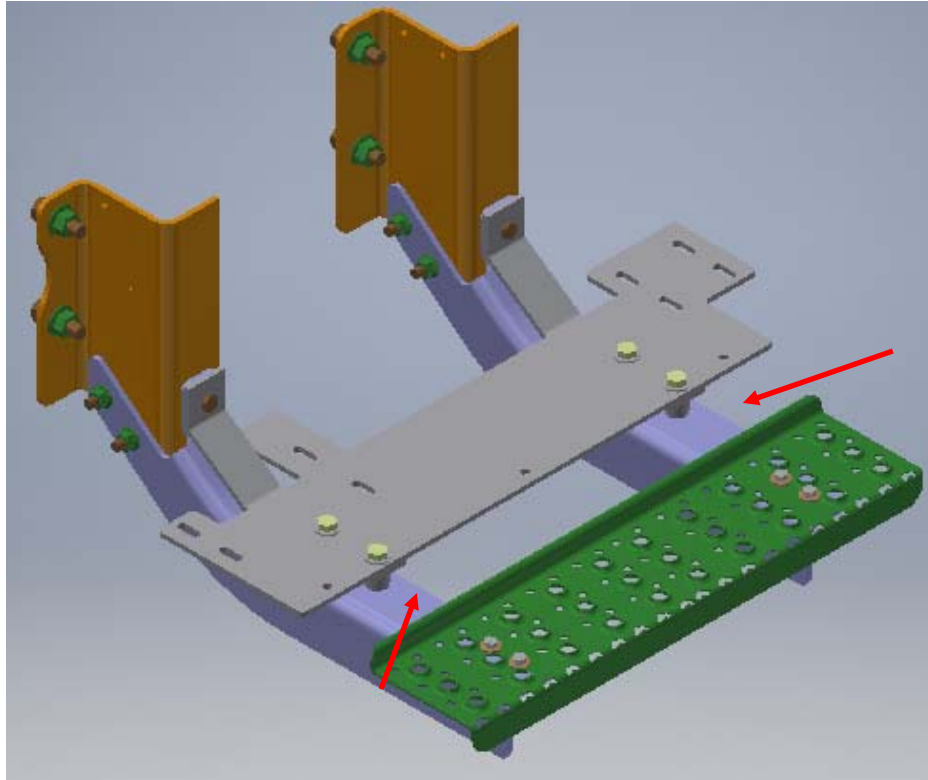


Figure 4: Spacer Location

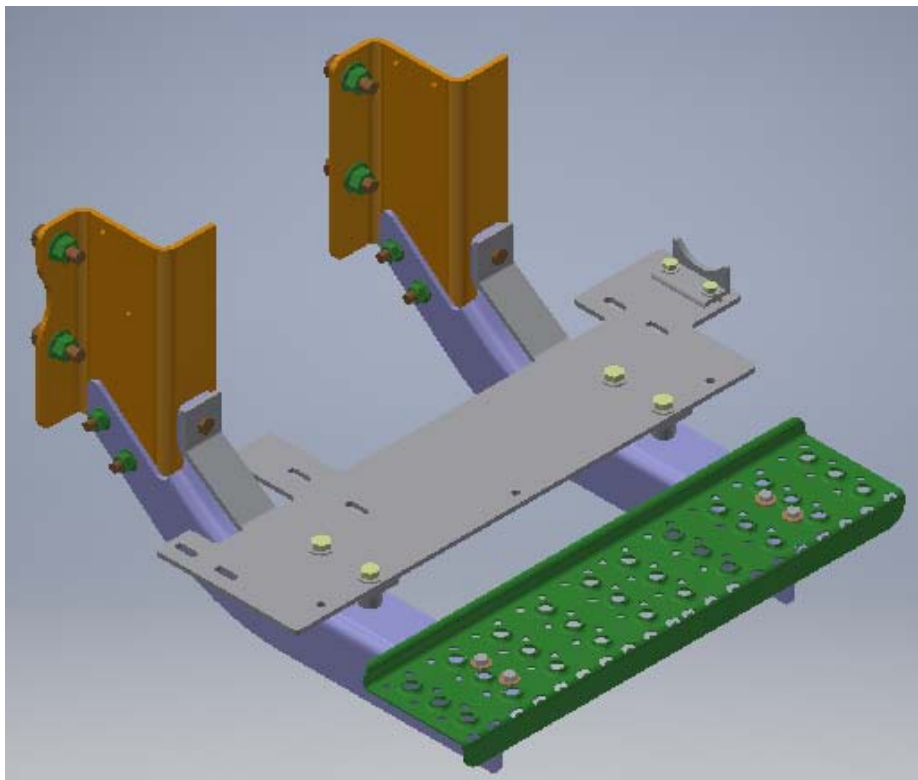


Figure 5: Brake Support Bracket

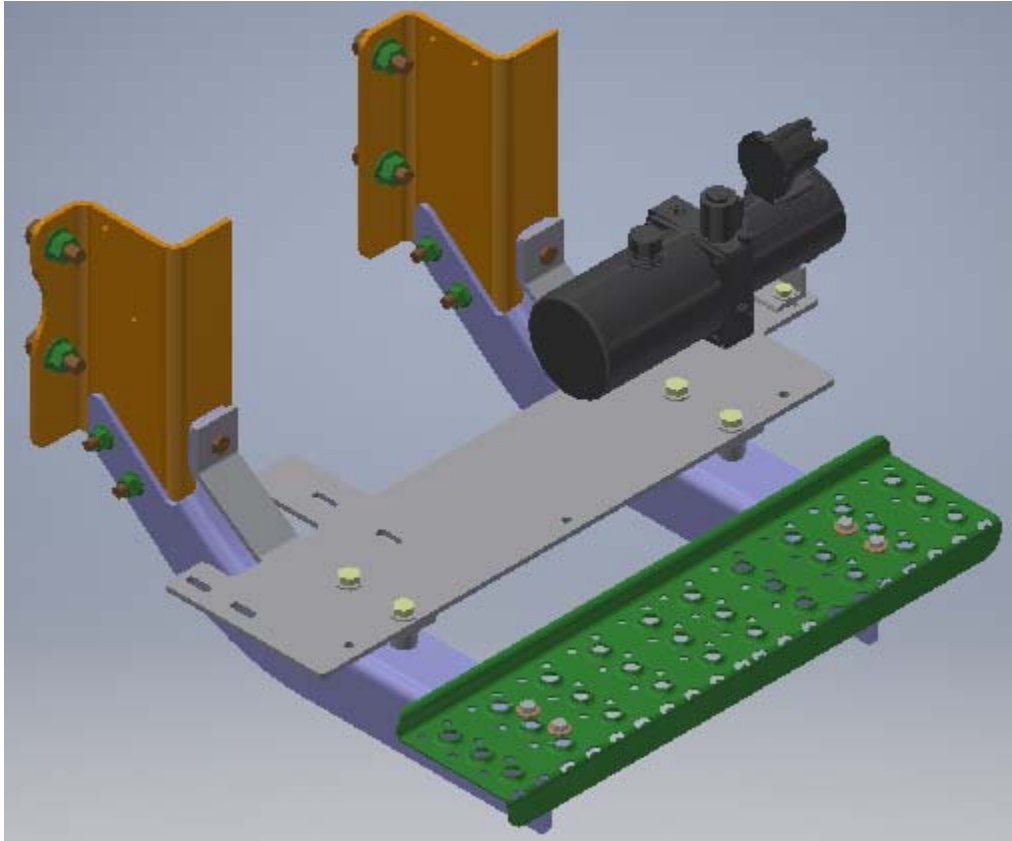


Figure 6: Brake Pump Installation

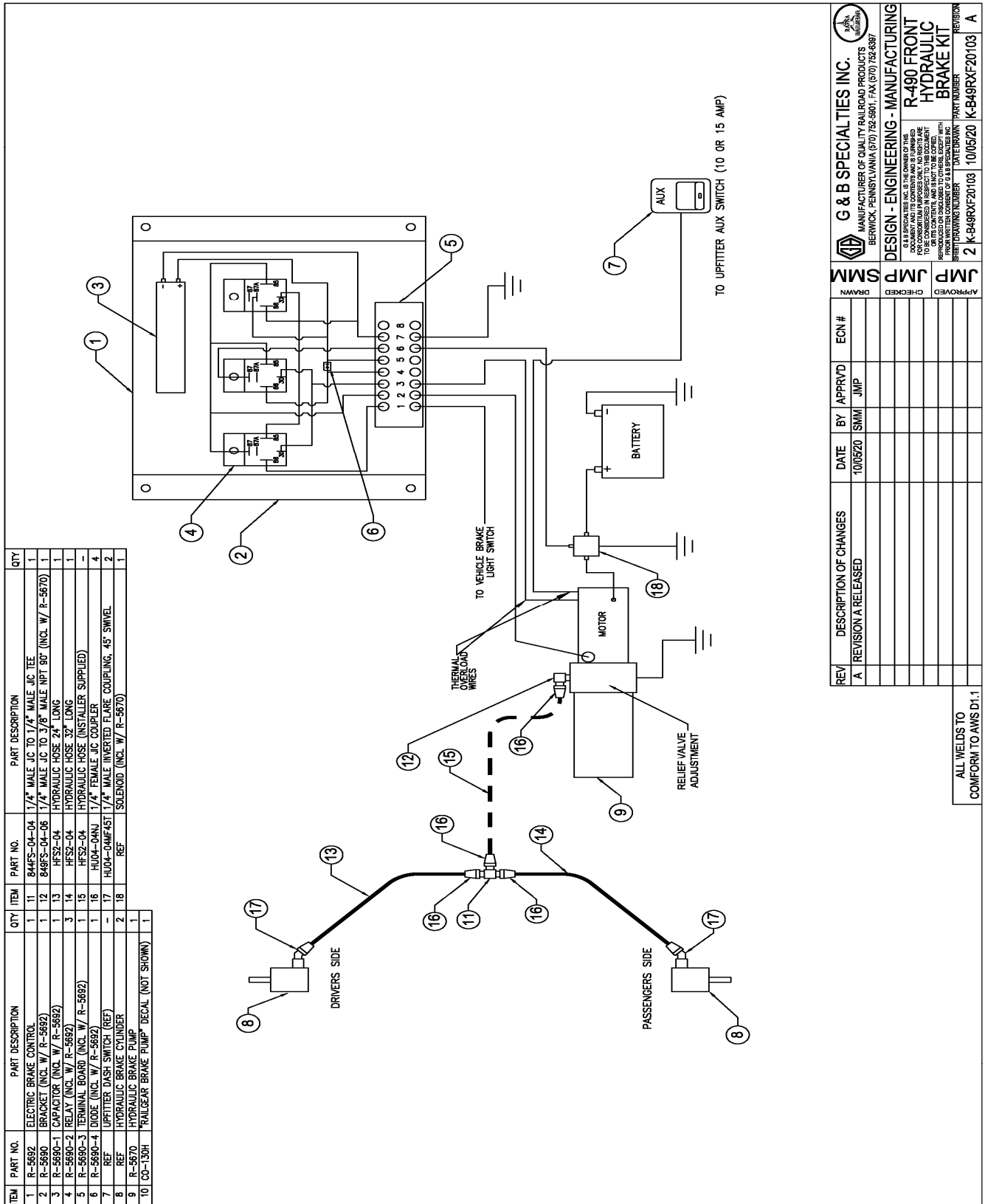


Figure 8: Brake Pump Hydraulic/Wiring Schematic (Upfitter Switch)

 G & B SPECIALTIES INC. MANUFACTURER OF QUALITY RAILROAD PRODUCTS BERWICK, PENNSYLVANIA (570) 752-5901 FAX (570) 752-6397	
DESIGN - ENGINEERING - MANUFACTURING R-490 FRONT HYDRAULIC BRAKE KIT	
APPROVED JMP	REVISION A
CHECKED JMD	PART NUMBER K-B49RXF20103
DRAWN SMM	DATE 10/05/20
ECN #	BY SMM
DESCRIPTION OF CHANGES A REVISION A RELEASED	APPROVD JMP

ALL WELDS TO CONFORM TO AWS D1.1



Photo 1: Hydraulic Pump and Brake Pump Installed

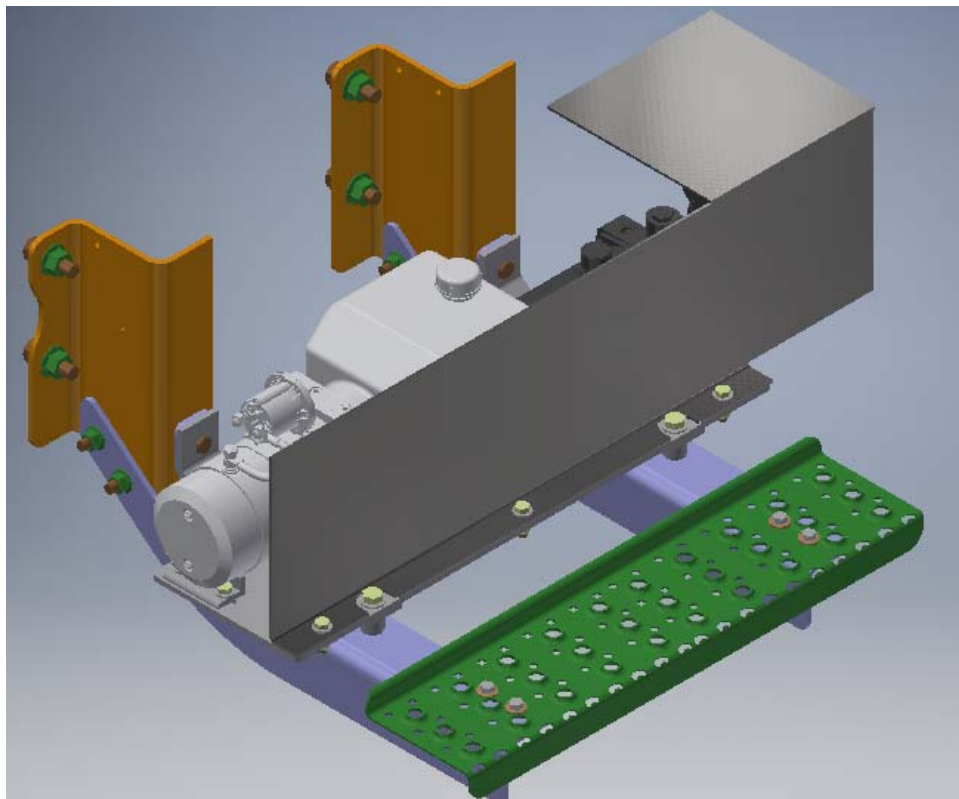


Figure 9: Pump Protection Box Installed

OPERATION & SERVICE OF R-490 FRONT HYDRAULIC BRAKE KIT

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 always be observed.
- 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.
- Despite the added braking power provided by the railgear air brakes, braking distance while on rail is greater than when on road.
- 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.
- Do not use regular brake fluid in the front hydraulic brake system, as it will damage the hydraulic brake pump and the brake cylinders.

OPERATION OF FRONT HYDRAULIC BRAKE KIT

With the front hydraulic brake kit installed on this vehicle, it may be operated as normal, however the hydraulic brake pump must be turned "Off" during road travel and "On" during rail travel. The front hydraulic brake kit provides additional braking power when on rail. Braking distance on rail is much greater than when on road and will be adversely affected by inclement weather.

A dash switch is provided to turn off the power to the hydraulic brake pump, which prevents the railgear brakes from functioning during road travel. When travelling on rail, with the dash switch in the "On" position, the railgear hydraulic brakes act together with the vehicle's brakes to provide added braking power through the rail wheels.

To Operate The Vehicle On Rail:

1. Turn the "Railgear Brake Pump" dash switch to the "On" position.
2. Proceed with rail travel. The railgear hydraulic brakes will function with the vehicle brakes when the vehicle brake pedal is depressed.

To Operate The Vehicle On Road:

1. Turn the "Railgear Brake Pump" dash switch to the "Off" position.
2. Proceed with road travel. The railgear hydraulic brakes will remain in-active.

SERVICE OF FRONT HYDRAULIC BRAKE KIT

The Recommended Service Schedule and the detailed service procedures follow.

Do not torque the 1/2" fasteners that pass through the brake shoe linkage. These fasteners must remain slightly loose to allow the hydraulic brakes to function freely.

Table 1: Recommended Service Schedule

Service Required	Initial 100 km (62 Miles) of road and/or rail use	Monthly	6 Months	Yearly
Inspect hydraulic brake kit fasteners (re-torque if required)	✓		✓	✓
Inspect all hydraulic fittings and hoses for leaks and wear	✓		✓	✓
Check oil in hydraulic reservoir (fill if required)	✓	✓		✓
Check / adjust brake shoe to rail wheel clearance (see procedure)	✓		✓	✓

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

BRAKE SHOE TO RAIL WHEEL CLEARANCE ADJUSTMENT

The clearance between the brake shoe and the rail wheel must be correctly adjusted to prevent brake drag and to ensure proper braking ability.

1. With the hydraulic brake dash switch turned "Off" and the railgear hydraulic brakes in the retracted position, visually inspect the railgear hydraulic brake components for excessive damage and/or wear and measure the brake shoe to rail wheel clearance.

Acceptable Brake Shoe To Rail Wheel Clearance	1/8" - 1/4"
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2. If the brake shoe to rail wheel clearance is not within specifications, adjust as follows:
 - Loosen the jam nut above the clevis on the clevis push rod.
 - Turn the clevis push rod to adjust the clevis up to increase the clearance or down to decrease the clearance.
 - When moving the clevis down on the clevis push rod, do not move the clevis down beyond the point at which the inside bottom face of the clevis is flush with the end of the push rod. Replace the brake shoe and re-adjust.
 - Tighten the jam nut above the clevis on the clevis push rod.
3. Re-check the brake shoe to rail wheel clearance and re-adjust as necessary.

HYDRAULIC BRAKE RELIEF VALVE SETTING

The hydraulic brake pump is equipped with one relief valve located on the hydraulic pump body. This relief valve protects the entire hydraulic brake 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 hydraulic brakes or if the rail wheels are found to skid when the brakes are applied.

1. Disconnect the hydraulic hose from 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. Turn the "Railgear Brake Pump" dash switch to the "On" position and depress the vehicle brake pedal so that activating the brakes creates a load on the pump. The pressure reading on the pressure gauge should climb to 700 PSI.
4. If the pressure is not correct, release the brake pedal 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 that the lock nut on the relief valve is tightened. Release the pressure in the system and remove the pressure gauge. Re-connect the hydraulic hose.
6. Ensure that the hydraulic hoses are connected properly and that the hydraulic brakes are functioning properly.

BRAKE REPLACEMENT PARTS

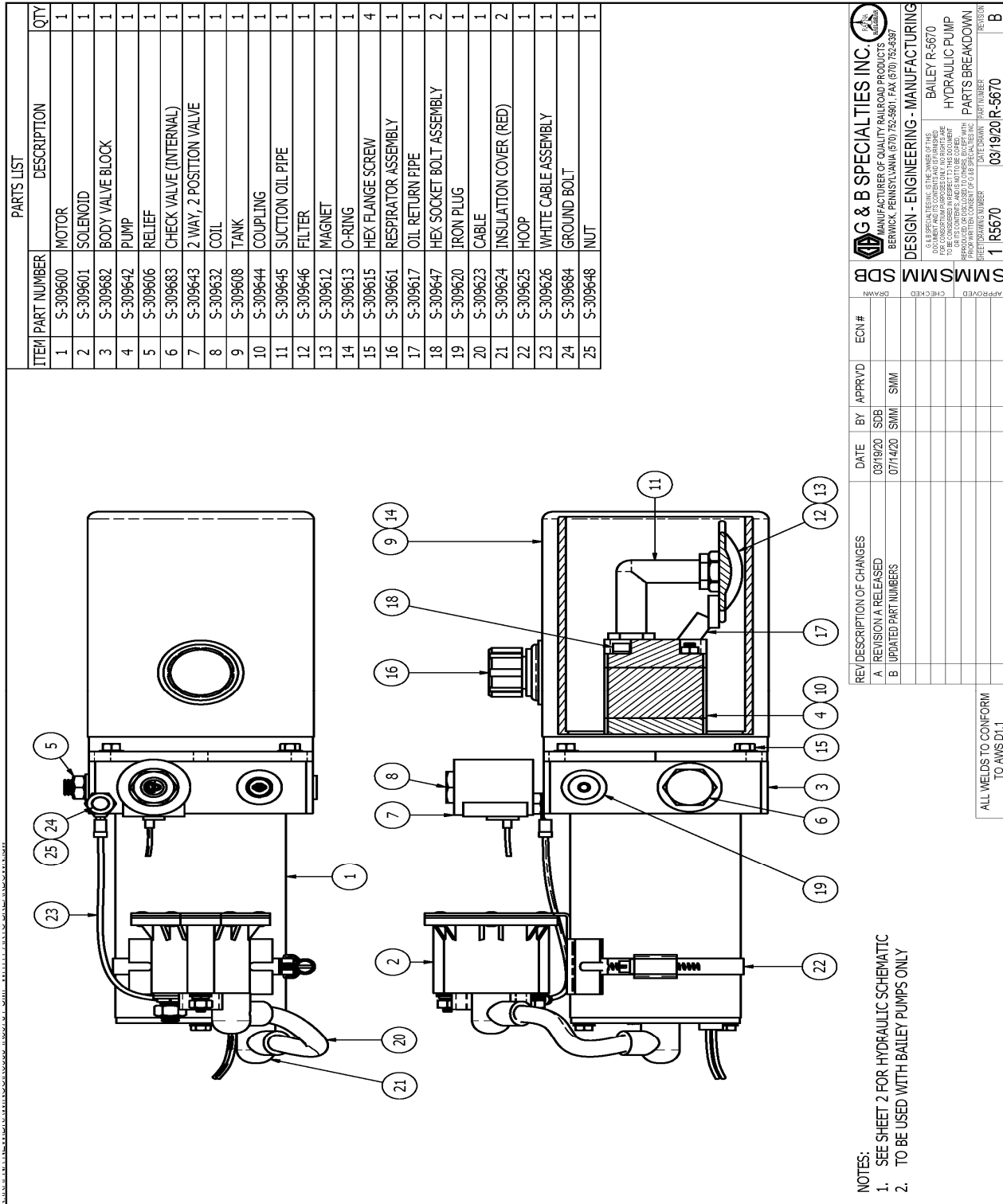


Figure 11: R-5670 Brake Pump

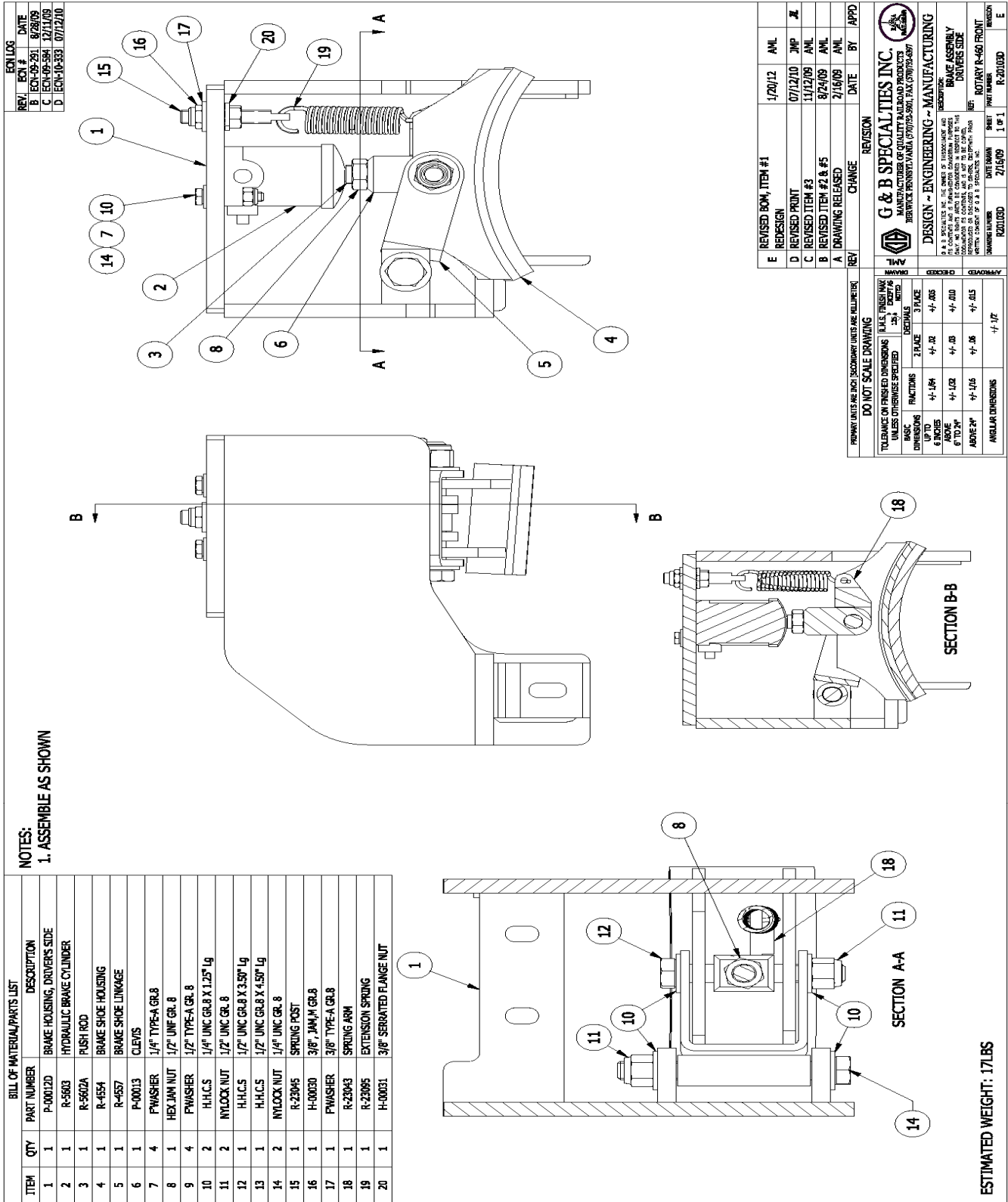
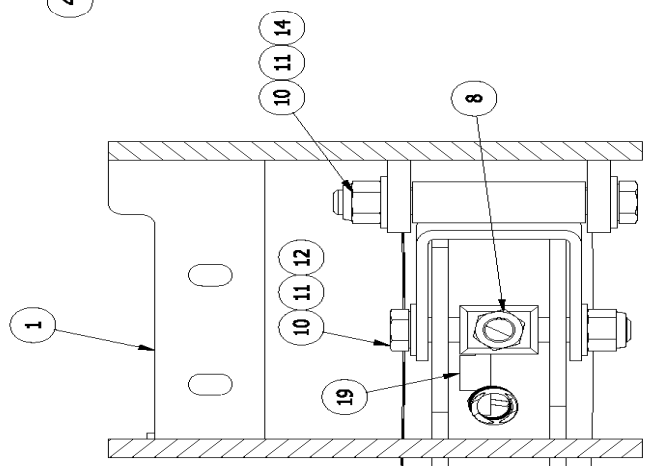
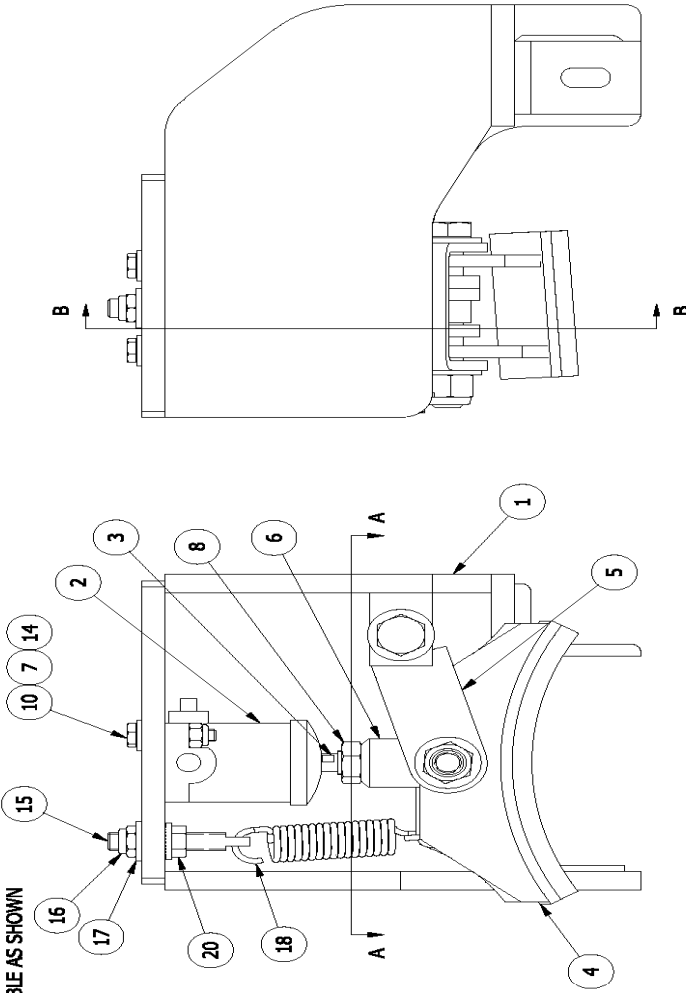


Figure 12: R-20103D

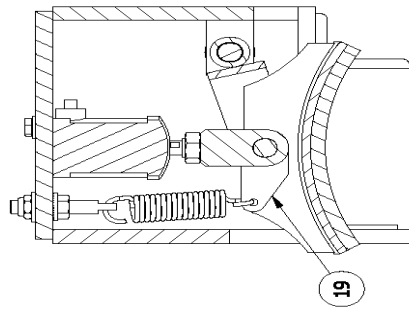
ESTIMATED WEIGHT: 17LBS

NOTES:
1. ASSEMBLE AS SHOWN

BILL OF MATERIAL/PARTS LIST		
ITEM	QTY	DESCRIPTION
1	1	BRAKE HOUSING, PASSENGERS SIDE
2	1	HYDRAULIC BRAKE CYLINDER
3	1	COLLAR ROD
4	1	BRAKE SHOE HOUSING
5	1	BRAKE SHOE LINING
6	1	CLEVIS
7	4	1/4" TYPE-A, GR.B
8	1	HEX.WM NUT 1/2" UNF, GR.B
9	4	1/2" TYPE-A, GR.B
10	2	H.H.C.S. 1/4" UNC X 1.25", GR.B
11	2	INLOCK NUT 1/2" UNC, GR.B
12	1	H.H.C.S. 1/2" UNC X 3.50", GR.B
13	1	H.H.C.S. 1/2" UNC X 4.50", GR.B
14	2	INLOCK NUT 1/4" UNC, GR.B
15	1	R-23045 SPRING POST
16	1	H-00030 3/8" JAW, GR.B
17	1	PWASHER 3/8" TYPE-A, GR.B
18	1	EXTENSION SPRING
19	1	R-23043 SPRING ARM
20	1	3/8" SERRATED FLANGE NUT



SECTION A-A



SECTION B-B

REV	CHANGE	DATE	BY	APPD
A	DRAWING RELEASED	1/20/12	AML	

REVISION	
1	DESIGN - ENGINEERING - MANUFACTURING

<p>G & B SPECIALTIES INC. MANUFACTURER OF QUALITY RAILROAD PRODUCTS 1000 W. WASHINGTON ST. WILKES BARRE, PA 18250 TEL: (570) 838-2200 FAX: (570) 838-2297</p>	<p>DESIGN - ENGINEERING - MANUFACTURING</p> <p>FOR PARTS AND REPAIRS CONTACT THE CUSTOMER SERVICE DEPARTMENT AT (570) 838-2200. FOR TECHNICAL INFORMATION CONTACT THE TECHNICAL SUPPORT DEPARTMENT AT (570) 838-2297.</p>
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<p>TELEVISION DIMENSIONS UNLESS OTHERWISE SPECIFIED</p> <p>FRACTIONS 2 PLACE</p> <p>DECIMALS 3 PLACE</p> <p>UP TO 1/4" ±.005</p> <p>1/2" TO 1" ±.010</p> <p>1" TO 2" ±.015</p> <p>2" TO 4" ±.020</p> <p>4" TO 6" ±.025</p> <p>6" TO 12" ±.030</p> <p>12" TO 24" ±.035</p> <p>24" TO 48" ±.040</p> <p>48" TO 96" ±.045</p> <p>96" TO 192" ±.050</p>	<p>ANGULAR DIMENSIONS ±.1°</p>
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<p>DATE DRAWN: 1/20/12</p>	<p>SHEET: 1 OF 1</p>
<p>DRAWING NUMBER: R-20103P</p>	<p>PART NUMBER: R-20103P</p>

Figure 13: R-20103P