

## INSTALLATION OF R-450 FRONT HYDRAULIC BRAKE KIT ALL VEHICLES/RAILGEAR UNITS

### 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.
- 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 hydraulic brake system, as it will damage the hydraulic brake pump and the brake cylinders.

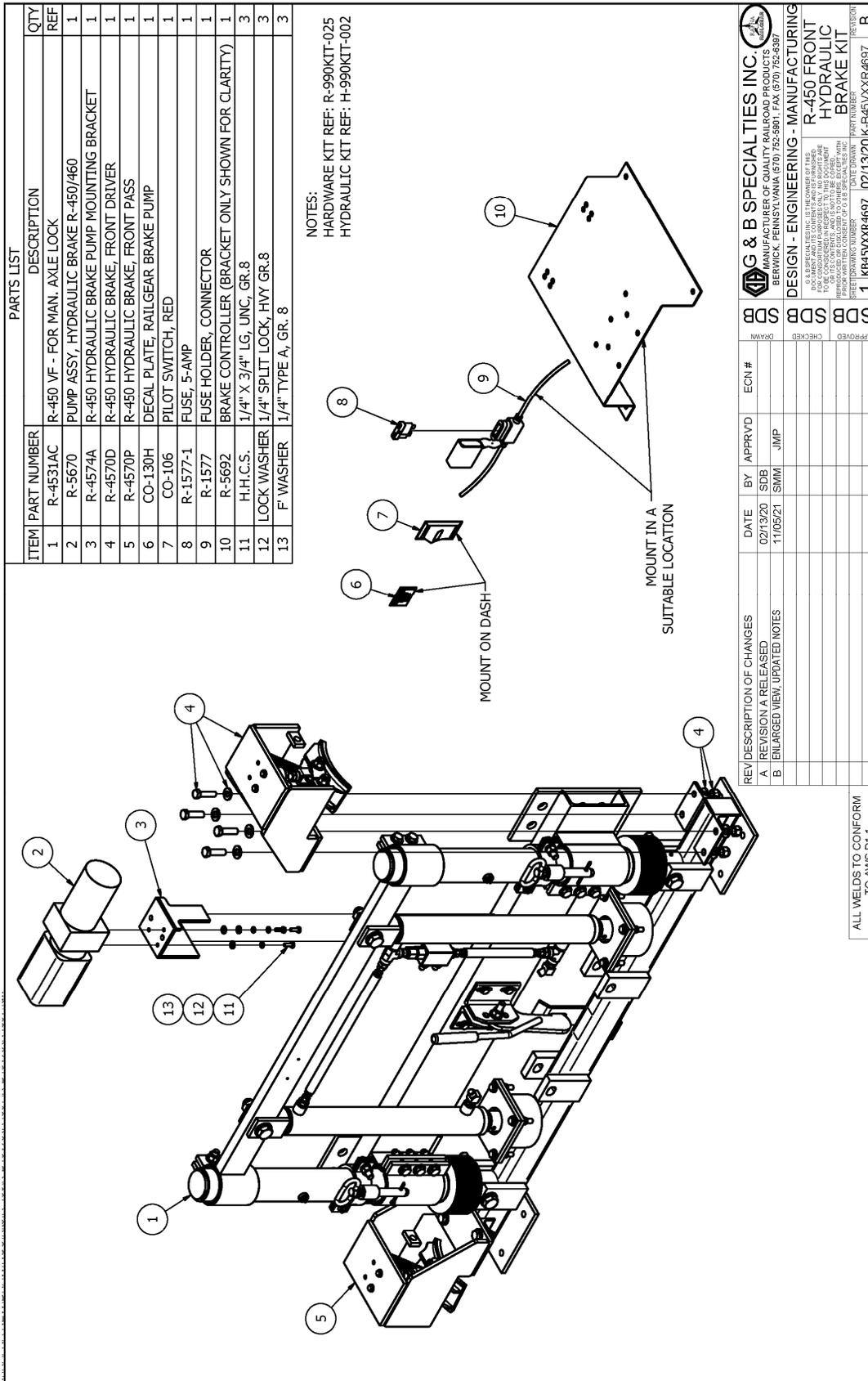
**INSTALLATION OF FRONT HYDRAULIC BRAKE KIT**
**Table 1: Front Hydraulic Brake Parts List**

Part Number	Description	Quantity
R-4570D	Hydraulic Brake, Driver's Side	1
R-4570P	Hydraulic Brake Passenger's Side	1
CO-106	Dash Switch	1
R-1577	5A In-Line Fuse	1
R-1577-1	5A In-Line Fuse	1
R-5670	Hydraulic Brake Pump	1
R-4574A	Hydraulic Brake Pump Bracket	1
R-5692	Electric Brake Control	1
CO-130H	"Railgear Brake Pump" Decal	1
H-990KIT-002	1/4" Male JIC to 1/4" Male JIC Tee	1
	Hose 24" Long	1
	Hose 38" Long	1
	Hose 51" Long	1
R-990KIT-025	1/4"UNC Gr. 8 Bolt x 3/4" Long	3
	1/4" SAE Washer	3
	1/4" Lock Washer	3
MISC.	4 & 14 Gauge Wire, Terminals, Wire Loom, etc.	As Req'd

1. Ensure that the rail wheels have been installed on the front railgear prior to installation of the Front Hydraulic Brake Kit.
2. Align the hydraulic brakes with the ends of the front railgear axle so that the 1/2" mounting holes in the brake housings align with the mounting holes in the axle as shown. Ensure that the brake housings are on the correct sides of the railgear axle. The brake shoe linkage of each brake housing should be toward the front of the vehicle.
3. Fasten each brake housing to the front railgear axle using four 1/2" x 1 3/4" bolts, eight 1/2" washers and four 1/2" nuts as shown (hardware included with brake assemblies). Torque the 1/2" fasteners to 100 ft-lbs dry. Do not over torque.
4. Remove the solenoid from the hydraulic brake pump by removing the strap that holds the solenoid to the motor housing. Re-install the solenoid in a convenient location under the hood close to the vehicle battery. Ensure that the solenoid body is properly grounded.
5. Fasten the hydraulic brake pump to the hydraulic brake pump bracket using three 1/4" x 3/4" long bolts, three 1/4" lock washers and three 1/4" washers. Torque the 1/4" fasteners to 12 ft-lbs dry. Do not over torque.
6. Align the hydraulic brake pump and bracket on the left-hand side of the railgear cross channel or in another suitable location. Ensure that the hydraulic hoses will be long enough to reach the pump. Clean and remove any paint from the area. Weld the hydraulic brake pump bracket to the railgear cross channel using a 1/4" fillet weld, both sides.

7. 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.
8. Choose a suitable location on the vehicle dash and install the dash switch.
9. Affix the "Railgear Brake Pump" decal in a suitable location adjacent to the dash switch.
10. 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 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.
11. 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. The railgear may not be properly grounded due to paint on the mounting plates and tar on the frame.
12. Connect the 51" long hydraulic hose to the 90° hydraulic fitting on the pump.
13. Connect the 1/4" Male JIC to 1/4" Male JIC tee fitting to the loose end of the 51" long hose.
14. Connect the 24" long hydraulic hose to the left-hand side of the tee fitting using the 1/4" female JIC coupler on the hose.

15. Connect the 38" long hydraulic hose to the right-hand side of the tee fitting using the 1/4" female JIC coupler on the hose.
16. Connect the loose end of the 24" long hydraulic hose to the left-hand side brake actuator.
17. Connect the loose end of the 38" long hydraulic hose to the right-hand side brake actuator.
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.
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 "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 Manual.



G & B SPECIALTIES INC. 535 WEST 3RD STREET, BERWICK, PENNSYLVANIA 15701-7521 TEL: (570) 752-5901 FAX: (570) 752-6397		DESIGN - ENGINEERING - MANUFACTURING		
R-450 FRONT HYDRAULIC BRAKE KIT		R-450 FRONT HYDRAULIC BRAKE KIT		
STREET/DRAWING NUMBER: 02/13/20 K-B45VXXR4697		PART NUMBER: B		
REV/DESCRIPTION OF CHANGES	DATE	BY	APPRVD	ECN #
A. REVISION A RELEASED	02/13/20	SDB	JMP	
B. ENLARGED VIEW, UPDATED NOTES	11/05/21	SMM		
ALL WELDS TO CONFORM TO AWS D1.1				



## OPERATION OF R-450 FRONT HYDRAULIC BRAKE KIT ALL VEHICLES/RAILGEAR UNITS

### OPERATION SAFETY PRECAUTIONS

If any operation 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 operation of the equipment.
- 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.
- 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 hydraulic brake system, as it will damage the hydraulic brake pump and the brake cylinders.

**OPERATION OF HYDRAULIC BRAKE KIT**

With the brake kit installed on this vehicle, it may be operated as normal. It should be noted, even when using the brake kit, stopping distances will be longer than on road. The hydraulic brake pump must be turned "Off" during road travel and "On" during rail travel. The 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.

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.

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 traveling 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 HYDRAULIC BRAKE KIT**

The brake 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.

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 2 provides all other Standard Fastener Torque Values.

**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
7/16" UNC Gr. 8 Fasteners	65
3/8" UNC Gr. 8 Fasteners	40
1/4" UNC Gr. 8 Fasteners	12

**BRAKE SHOE TO RAIL WHEEL CLEARANCE ADJUSTMENT**

**Caution:**

*The clearance between the brake shoe and the rail wheel must be correctly adjusted to prevent brake drag and to ensure proper braking ability. Check and adjust the brake shoe to rail wheel clearance as follows:*

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.

<b>Acceptable Brake Shoe To Rail Wheel Clearance</b>
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<b>1/8" - 1/4"</b>
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2. If the brake shoe to rail wheel clearance is not within specifications, adjust as follows:
  - a. Loosen the jam nut above the clevis on the clevis push rod.
  - b. Turn the clevis push rod to adjust the clevis up to increase the clearance or down to decrease the clearance.
  - c. 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.
  - d. 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.

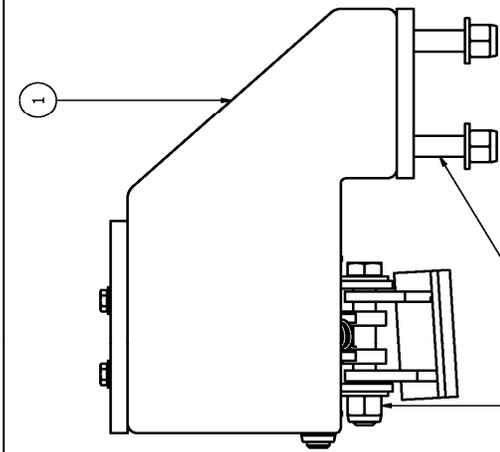
## HYDRAULIC BRAKE RELIEF VALVE SETTING

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.

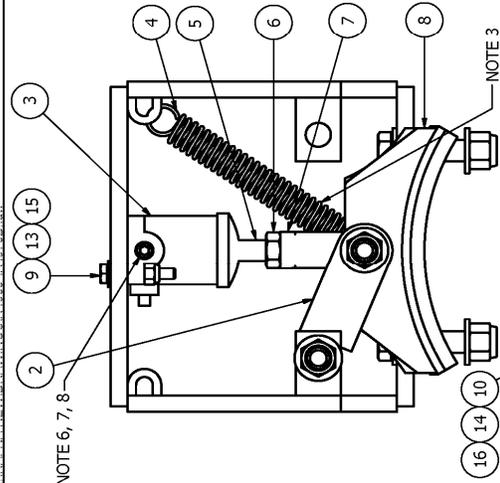
1. Disconnect the hydraulic hose from the pump.
2. Install a hydraulic pressure gauge (up to 3000 PSI) between the disconnected hydraulic hose and the pump port. The pressure gauge will indicate the relief valve setting when the pump is loaded.
3. Turn the "Railgear Brake Pump" dash switch to the "On" 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.

**PARTS OF HYDRAULIC BRAKE KIT**

PARTS LIST			
ITEM	PART NUMBER	DESCRIPTION	QTY
1	R-4561	BRAKE HOUSING, R-450, FRONT	1
2	R-4557	BRAKE SHOE LINKAGE	1
3	R-5603	HYDRAULIC BRAKE CYLINDER	1
4	R-5604	SPRING, EXTENSION	1
5	R-5602	HYDRAULIC BRAKE PUSH ROD	1
6	JAM NUT	1/2" UNF, GR.8 JAM HEX	1
7	R-5601	CLEVIS ASSY	1
8	R-4554	BRAKE SHOE ASSY, 10" WHEEL	1
9	H.H.C.S.	1/4" X 1 1/2" LG, UNC, GR.8	2
10	H.H.C.S.	1/2" X 4 1/2" LG, UNC, GR.8	1
11	H.H.C.S.	1/2" X 3 1/2" LG, UNC, GR.8	1
12	H.H.C.S.	1/2" X 1 3/4" LG, UNC, GR.8	4
13	F WASHER	1/4" TYPE A, GR. 8	2
14	F WASHER	1/2" TYPE A, GR. 8	12
15	NYLOCK NUT	1/4" UNC, GR.8 STD NYLOCK	2
16	NYLOCK NUT	1/2" UNC, GR.8 STD NYLOCK	6



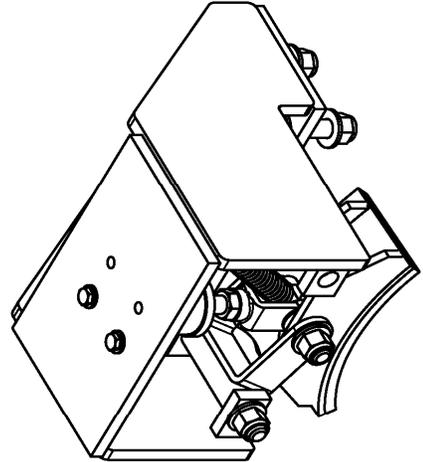
NOTE 4



NOTE 6, 7, 8

NOTE 3

NOTE 5



- NOTES:**
- HARDWARE KIT REF: R-990KIT-026
  - APPROX. WEIGHT: 23.3 LBS
  - SPRING SHOULD BE IN CENTER OF CLEVIS
  - DO NOT TORQUE BRAKE SHOE HARDWARE, BRAKE SHOE MUST REMAIN LOOSE
  - IF NECESSARY, ADD WASHERS TO SHIM BREAK SHOE TO ALIGN WITH WHEEL CYLINDER COMES WITH A PLUG, BUT IT MAY NEED TO BE MOVED DURING INSTALLATION
  - PLUG BRAKE CYLINDER ON SIDE AWAY FROM VEHICLE
  - CONNECT HOSE TO BRAKE CYLINDER ON SIDE TOWARDS VEHICLE

REV/DESCRIPTION OF CHANGES	DATE	BY	APPRVD	ECN #
A. REVISION A RELEASED	07/21/94	M.P.		
B. ADD ITEM 14 MOD DWG BOM	10/12/96	S.A.		
C. CHANGE PIN AND DWG CH	06/07/99	R.H.		
D. GENERAL UPDATE	03/27/01	V.Z.		
E. CHANGED POSITION OF ITEM 5 ADDED SHOP NOTE B560701	03/27/01	V.Z.		
F. REMOVED ITEM 12	02/13/03	MER		
G. MODIFY ITEMS 1 & 5. GENERAL REVISION	02/18/03	V.Z.		
H. UPDATE ADD ITEM 16	09/04/03	R.H.		
J. REDREW IN INVENTOR	02/13/20	SDB	SDB	ECN-20-070

DESIGNED	BY	DATE	APPROVED
CHECKED	BY	DATE	APPROVED
DRAWN	BY	DATE	APPROVED

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

**DESIGN - ENGINEERING - MANUFACTURING**  
R-450 HYDRAULIC BRAKE, DRIVER, FRONT

ALL WELDS TO CONFORM TO AWS D1.1



PARTS LIST			
ITEM	PART NUMBER	DESCRIPTION	QTY
1	S-309600	MOTOR	1
2	S-309601	SOLENOID	1
3	S-309682	BODY VALVE BLOCK	1
4	S-309642	PUMP	1
5	S-309606	RELIEF	1
6	S-309683	CHECK VALVE (INTERNAL)	1
7	S-309643	2 WAY, 2 POSITION VALVE	1
8	S-309632	COIL	1
9	S-309608	TANK	1
10	S-309644	COUPLING	1
11	S-309645	SUCTION OIL PIPE	1
12	S-309646	FILTER	1
13	S-309612	MAGNET	1
14	S-309613	O-RING	1
15	S-309615	HEX FLANGE SCREW	4
16	S-309661	RESPIRATOR ASSEMBLY	1
17	S-309617	OIL RETURN PIPE	1
18	S-309647	HEX SOCKET BOLT ASSEMBLY	2
19	S-309620	IRON PLUG	1
20	S-309623	CABLE	1
21	S-309624	INSULATION COVER (RED)	2
22	S-309625	HOOP	1
23	S-309626	WHITE CABLE ASSEMBLY	1
24	S-309684	GROUND BOLT	1
25	S-309648	NUT	1

REV	DESCRIPTION OF CHANGES	DATE	BY	APPRVD	ECN #
A	REVISION A RELEASED	03/19/20	SDB	SMM	
B	UPDATED PART NUMBERS	07/14/20	SMM	SMM	

NOTES:  
1. SEE SHEET 2 FOR HYDRAULIC SCHEMATIC  
2. TO BE USED WITH BAILEY PUMPS ONLY

ALL WELDS TO CONFORM TO ANS D1.1

<b>G &amp; B SPECIALTIES INC.</b>	<b>MANUFACTURER OF QUALITY RAILROAD PRODUCTS</b>	<b>BERWICK, PENNSYLVANIA (570) 752-5901 FAX (570) 752-6397</b>	<b>DESIGN - ENGINEERING - MANUFACTURING</b>	<b>BAILEY R-5670</b>	<b>HYDRAULIC PUMP</b>
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SDB	SDB	SDB	SDB	SDB	SDB
SDB	SDB	SDB	SDB	SDB	SDB
SDB	SDB	SDB	SDB	SDB	SDB
SDB	SDB	SDB	SDB	SDB	SDB
SDB	SDB	SDB	SDB	SDB	SDB
SDB	SDB	SDB	SDB		

