

INSTALLATION OF R-450 REAR 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 REAR HYDRAULIC BRAKE KIT

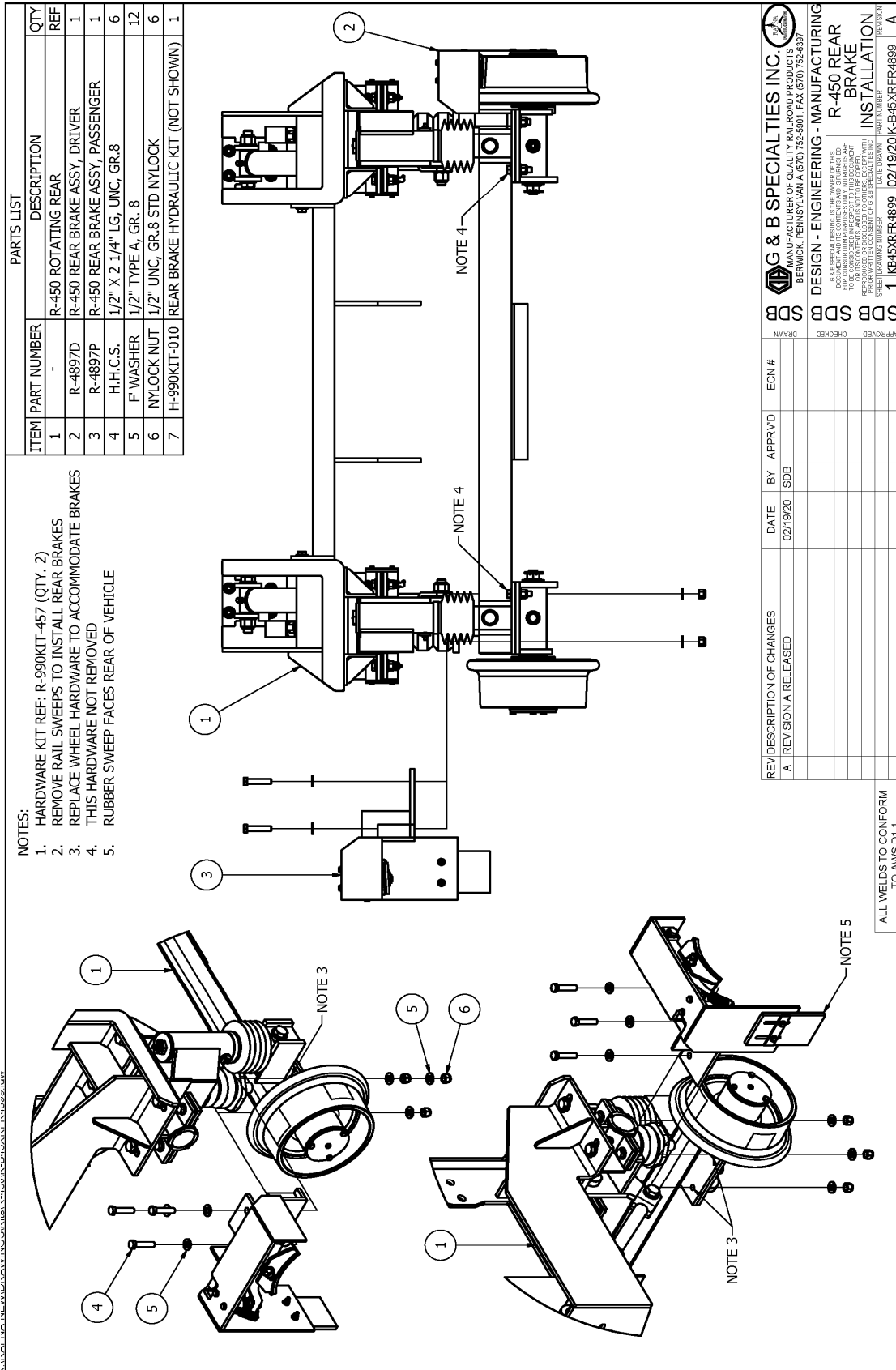
The following procedure details the installation of the Rear Hydraulic Brake Kit. The hardware required for this installation is listed in Table 1.

Table 1: Part breakdown for K-B45XRFR4899

Part Number	Description	Quantity
R-4897D	Hydraulic Brake Assembly, Drivers Side	1
R-4897P	Hydraulic Brake Assembly, Passengers Side	1
H-990KIT-010	Reducer, 3/8 Male ORB x 1/4 Female ORB	1
	TEE, 1/4 Male JIC x 1/4 Male ORB	1
	TEE, 1/4" Male JIC to 1/4" Male JIC	1
	Hose 33" Long	1
	Hose 85" Long	1
	Hose 360" Long	1
R-990KIT-457 (2X)	1/2" UNC Gr. 8 Bolt x 2.25" Long	6
	1/2" Gr. 8 Washer	12
	1/2" UNC Gr. 8 Nylock Nut	6

1. Install the rear brake assemblies as shown in Figure 1. You must remove the standard rail sweep assemblies, and most of the standard wheel attachment hardware; they will not be reused, and new hardware is provided with this kit. Do not reuse Nylon Locking Nuts.
2. You must properly align the wheels after the brakes are installed (see appropriate R-450 Rotating Rear Installation, Operation, and Service manual, for your railgear order.)
3. Ensure that the brake pump has been installed per the front brake installation manual (MIO-B45VXXR4697).
4. Remove the 90° fitting installed on the hydraulic brake pump and replace it with the 3/8 Male ORB x 1/4 Female ORB adapter onto the pump.
5. Install the 1/4 Male JIC x 1/4 Male ORB onto the adapter.
6. Connect the loose end of the 32" hose for the front brakes to one side of the TEE.
7. Connect the loose end of the 360" hose for the rear brakes to the other side of the TEE.
8. Route the 360" hose to the rear railgear as required and connect the 1/4" Male JIC TEE fitting to the loose end of the 360" long hose.
9. For the driver side, connect one end of the 33" long hydraulic hose to the driver side brake cylinder and the other end the TEE attached to the loose end of 360" hose.
10. For the passenger side, connect one end of the 85" long hydraulic hose to the passenger side brake cylinder and the other end the TEE attached to the loose end of 360" hose.
11. Ensure that none of the hoses contact any sharp edges or hot surfaces. Secure all hoses leaving enough slack for the railgear to function.

12. 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.
13. Follow the Hydraulic Brake Relief Valve Setting procedure detailed in the "Operation, Service and Parts" section of this manual.
14. Follow the Brake Shoe to Rail Wheel Clearance Adjustment procedure detailed in the "Operation, Service and Parts" section of this manual.
15. Test the operation of the hydraulic brakes as per the "Operation, Service and Parts" section of this manual.



- NOTES:
 1. HARDWARE KIT REF: R-990KIT-457 (QTY. 2)
 2. REMOVE RAIL SWEEPS TO INSTALL REAR BRAKES
 3. REPLACE WHEEL HARDWARE TO ACCOMMODATE BRAKES
 4. THIS HARDWARE NOT REMOVED
 5. RUBBER SWEEP FACES REAR OF VEHICLE

ITEM	PART NUMBER	DESCRIPTION	QTY
1	-	R-450 ROTATING REAR	REF
2	R-4897D	R-450 REAR BRAKE ASSY, DRIVER	1
3	R-4897P	R-450 REAR BRAKE ASSY, PASSENGER	1
4	H.H.C.S.	1/2" X 2.1/4" LG, UNC, GR.8	6
5	F WASHER	1/2" TYPE A, GR. 8	12
6	NYLOCK NUT	1/2" UNC, GR.8 STD NYLOCK	6
7	H-990KIT-010	REAR BRAKE HYDRAULIC KIT (NOT SHOWN)	1

REVISION	DESCRIPTION OF CHANGES	DATE	BY	APPRVD	ECN #
A	REVISION A RELEASED	02/19/20	SDB		

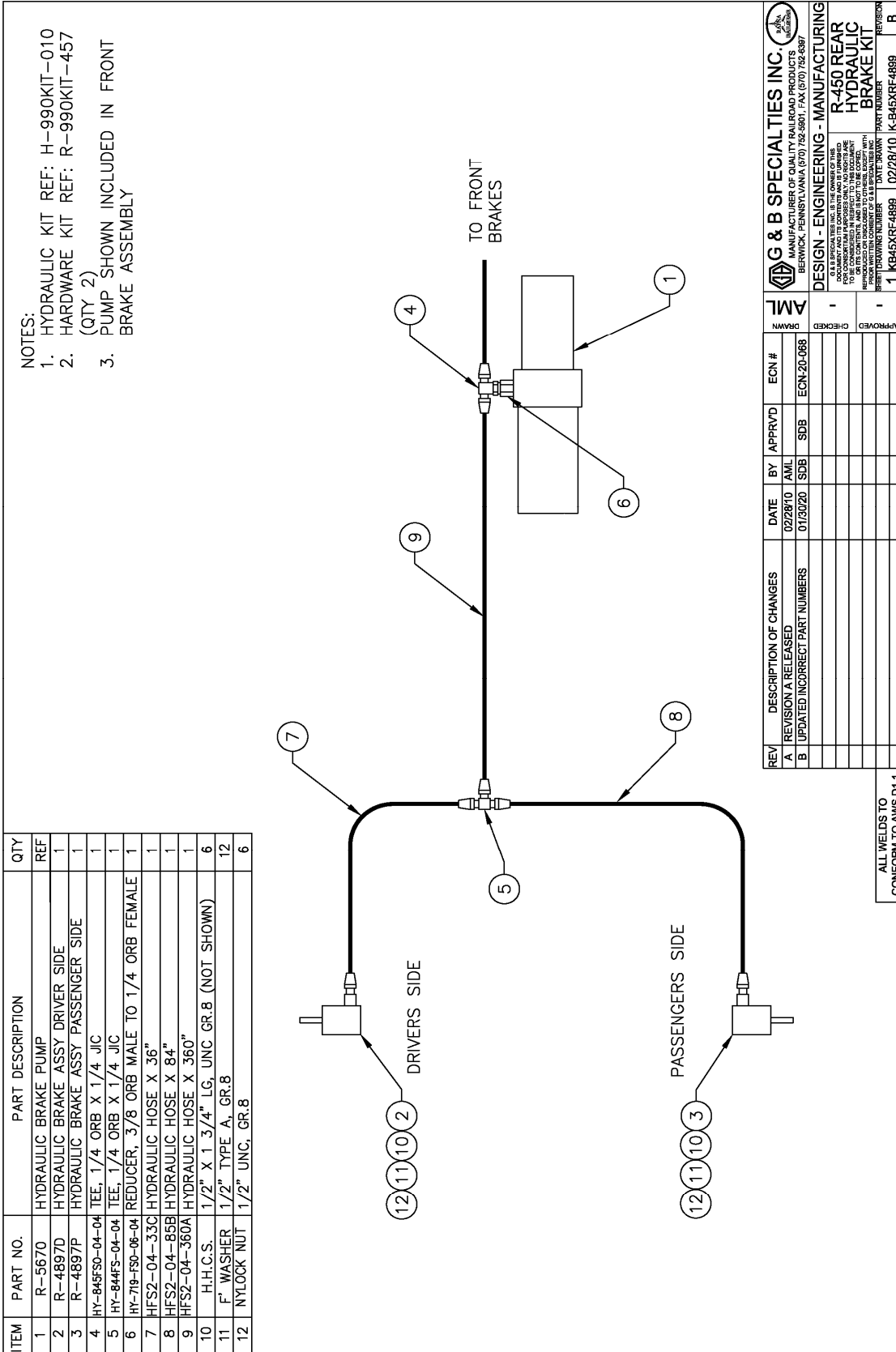
ALL WELDS TO CONFORM TO AWS-D1.1

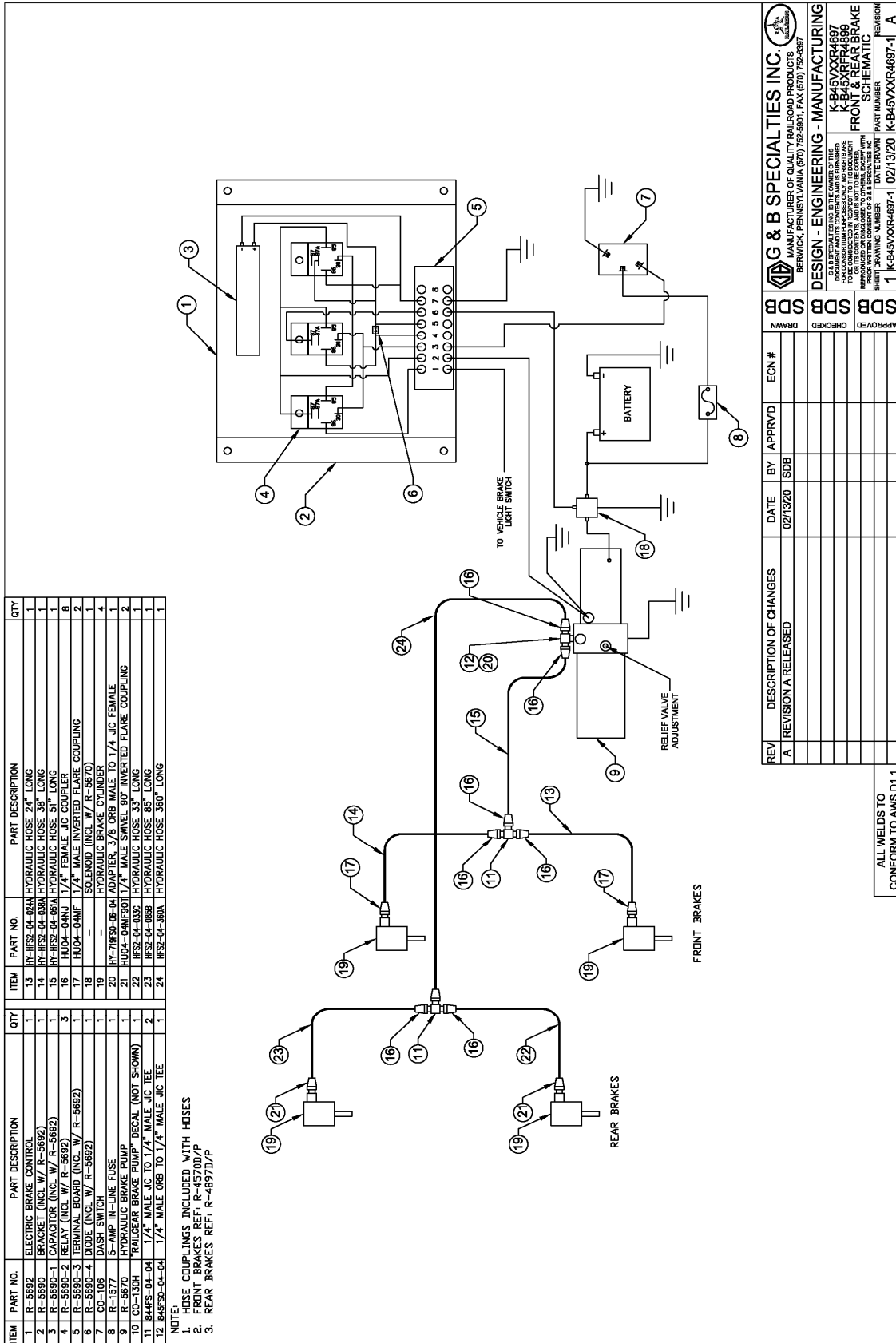
APPROVED: [Signature] DATE: 02/19/20

DESIGN - ENGINEERING - MANUFACTURING

R-450 REAR BRAKE INSTALLATION

1 KB45XRFR4899 02/19/20 K-B45XRFR4899 A





ITEM	PART NO.	PART DESCRIPTION	QTY	ITEM	PART NO.	PART DESCRIPTION	QTY
1	R-5692	ELECTRIC BRAKE CONTROL BRACKET (INCL. W/ R-5692)	1	13	HY-FHS2-04-0244	HYDRAULIC HOSE 24" LONG	1
2	R-5690	CAPACITOR (INCL. W/ R-5692)	1	14	HY-FHS2-04-0384	HYDRAULIC HOSE 38" LONG	1
3	R-5690-1	RELAY (INCL. W/ R-5692)	1	15	HY-FHS2-04-0314	HYDRAULIC HOSE 51" LONG	1
4	R-5690-2	RELAY (INCL. W/ R-5692)	3	16	HU04-04N1	1/4" FEMALE JIC COUPLER	8
5	R-5690-3	TERMINAL BOARD (INCL. W/ R-5692)	1	17	HU04-04MF	1/4" MALE INVERTED FLARE COUPLING	2
6	R-5690-4	DIODE (INCL. W/ R-5692)	1	18	---	SOLENOID (INCL. W/ R-5670)	4
7	CO-106	DASH SWITCH	1	19	---	HYDRAULIC BRAKE CYLINDER	4
8	R-1577	5-AMP IN-LINE FUSE	1	20	HY-71650-06-04	ADAPTER, 3/8 ORB MALE TO 1/4" JIC FEMALE	1
9	R-5670	HYDRAULIC BRAKE PUMP	1	21	HU04-04MF30T	1/4" MALE SWIVEL 90° INVERTED FLARE COUPLING	2
10	CO-130H	RATGEAR BRAKE PUMP DECAL (NOT SHOWN)	1	22	FS2-04-0336	HYDRAULIC HOSE 33" LONG	1
11	R44FS-04-04	1/4" MALE JIC TO 1/4" MALE JIC TEE	2	23	FS2-04-0658	HYDRAULIC HOSE 65" LONG	1
12	R48FS2-04-04	1/4" MALE ORB TO 1/4" MALE JIC TEE	1	24	FS2-04-3604	HYDRAULIC HOSE 360" LONG	1

NOTE:
1. HOSE COUPLINGS INCLUDED WITH HOSES
2. FRONT BRAKES REF. R-4897D/P
3. REAR BRAKES REF. R-4897D/P

REV	DESCRIPTION OF CHANGES	DATE	BY	APPRVD	ECN #	APPROVED	BY	DATE	DESCRIPTION OF CHANGES
A	REVISION A RELEASED	02/13/20	SDB						

REV	DESCRIPTION OF CHANGES	DATE	BY	APPRVD	ECN #	APPROVED	BY	DATE	DESCRIPTION OF CHANGES
1	REVISION A	02/13/20	SDB						

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

DESIGN - ENGINEERING - MANUFACTURING

G & B SPECIALTIES INC. IS THE OWNER OF THIS SCHEMATIC. IT IS TO BE USED ONLY FOR CONSTRUCTION PURPOSES ONLY, AND NOT FOR REPRODUCTION OR DISTRIBUTION WITHOUT THE WRITTEN CONSENT OF G & B SPECIALTIES INC.

SHEET DRAWING NUMBER: 1021320
PART NUMBER: K-B45VXR4697-1
DATE DRAWN: 02/13/20
REVISION: A

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

OPERATION 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 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.

Acceptable Brake Shoe To Rail Wheel Clearance
--

1/8" - 1/4"

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-4895D	BRAKE HOUSING, DRIVER SIDE	1
2	R-4896	BRAKE LEVER	1
3	R-4554	BRAKE SHOE ASSY, 10" WHEEL	1
4	R-5603	HYDRAULIC BRAKE CYLINDER	1
5	R-5602	HYDRAULIC BRAKE PUSH ROD	1
6	R-5604A	EXTENSION SPRING (R-5604 CUT IN HALF)	2
7	R-2411	RUBBER SWEEP	1
8	R-5561	SWEEPER PLATE	1
9	R-5590-6	1" CHAIN LINK BENT UP AT 30°	2
10	H.H.C.S.	1/4" X 1 1/2" LG, UNC, GR.8	4
11	H.H.C.S.	1/2" X 3 1/4" LG, UNC, GR.8	2
12	F' WASHER	1/4" TYPE A, GR. 8	6
13	F' WASHER	1/2" TYPE A, GR. 8	10
14	JAM NUT	1/2" UNF, GR.8 JAM HEX	2
15	NYLOCK NUT	1/4" UNC, GR.8 STD NYLOCK	4
16	NYLOCK NUT	1/2" UNC, GR.8 STD NYLOCK	2

NOTES:

- CYLINDER MUST BE PLUGGED AS DEPICTED
- PLUG COMES INSTALLED IN CYLINDER, BUT MAY NEED TO BE MOVED FROM IT'S ORIGINAL LOCATION
- LINK MUST BE BENT AS DEPICTED BELOW BEFORE INSTALLING UNDER BOLT HEAD
- 6 WASHERS MUST BE USED TO SPACE INSIDE OF BRAKE SHOE ON 1/2" BOLT
- APPROX. WEIGHT: 32.2 LBS
- HARDWARE KIT REF: R-990KIT-060

HOSE CUTOUT

R-5590-6 WITH BEND

NOTE 3

NOTE 4

DATE: 08/07/01 BY: V.Z.
 DATE: 10/18/02 BY: V.Z.
 DATE: 01/20/03 BY: V.Z.
 DATE: 11/13/03 BY: L.M.E.
 DATE: 09/21/05 BY: J.M.P.
 DATE: 04/13/06 BY: A.M.L.
 DATE: 09/04/18 BY: S.W.M.
 DATE: 01/28/20 BY: S.D.B.
 DATE: 04/16/21 BY: S.W.M.

REV/DESCRIPTION OF CHANGES

A	REVISION A RELEASED	08/07/01	V.Z.
C	ADD ITEMS #15 & #16, MODIFY #6	10/18/02	V.Z.
D	MODIFY ITEM #16	01/20/03	V.Z.
E	UPDATE BRAKE SHOE, HYDRAULIC CYLINDER	11/13/03	L.M.E.
F	NOTE REMOVED	09/21/05	J.M.P.
G	REVISED/REDESIGN ITEM #1	04/13/06	A.M.L.
H	ADDED HOLE FOR HOSE	09/04/18	S.W.M.
J	REDEW IN INVENTOR	01/28/20	S.D.B.
K	UPDATED TO SHOW HOSE CUTOUT	04/16/21	S.W.M.

ALL WELDS TO CONFORM TO AWS D1.1

DATE DRAWN: 08/07/01
 PART NUMBER: 1 R48997D
 DATE REVISION: 08/07/01
 REVISION: K

G & B SPECIALTIES INC.
 MANUFACTURER OF QUALITY RAILROAD PRODUCTS
 BERWICK, PENNSYLVANIA (570) 752-5901 FAX (570) 752-6397
 DESIGN - ENGINEERING - MANUFACTURING
 HYDRAULIC BRAKE PACKAGE DRIVER SIDE

G & B SPECIALTIES INC. IS THE OWNER OF THIS DOCUMENT. ANY REPRODUCTION OR DISTRIBUTION OF THIS DOCUMENT WITHOUT THE WRITTEN CONSENT OF G & B SPECIALTIES INC. IS PROHIBITED. ANY REPRODUCTION OR DISTRIBUTION OF THIS DOCUMENT WITHOUT THE WRITTEN CONSENT OF G & B SPECIALTIES INC. IS PROHIBITED.

PARTS LIST		PARTS LIST			
ITEM PART NUMBER	DESCRIPTION	QTY	ITEM PART NUMBER	DESCRIPTION	QTY
1	R-4895P	1	9	R-5590-6	1" CHAIN LINK BENT UP AT 30°
2	R-4896	1	10	H.H.C.S.	1/4" X 1 1/2" LG, UNC, GR.8
3	R-4554	1	11	H.H.C.S.	1/2" X 3 1/4" LG, UNC, GR.8
4	R-5603	1	12	F WASHER	1/4" TYPE A, GR. 8
5	R-5602	1	13	F WASHER	1/2" TYPE A, GR. 8
6	R-5604A	2	14	JAM NUT	1/2" UNF, GR.8 JAM HEX
7	R-2411	1	15	NYLOCK NUT	1/4" UNC, GR.8 STD NYLOCK
8	R-5561	1	16	NYLOCK NUT	1/2" UNC, GR.8 STD NYLOCK

NOTES:

- CYLINDER MUST BE PLUGGED AS DEPICTED
- PLUG COMES INSTALLED IN CYLINDER, BUT MAY NEED TO BE MOVED FROM IT'S ORIGINAL LOCATION
- LINK MUST BE BENT AS DEPICTED BELOW BEFORE INSTALLING UNDER BOLT HEAD
- 6 WASHERS MUST BE USED TO SPACE INSIDE OF BRAKE SHOE ON 1/2" BOLT
- APPROX. WEIGHT: 32.2 LBS
- HARDWARE KIT REF: R-990KIT-060

R-5590-6 WITH BEND
NOTE 3
.28
30°

NOTE 4
HOSE CUTOUT

REV	DESCRIPTION OF CHANGES	DATE	BY	APPRVD	ECN #
A	REVISION A RELEASED	09/21/05	JMP		
B	ADD BOLT #16 & #16, MODIFY #5	10/18/02	V.Z		
C	MODIFY #11 & #16	01/23/03	V.Z		
D	UPDATE BRAKE SHOE-HYDRAULIC CYLINDER	07/13/03	LME		
E	REVISION B RELEASED	09/21/05	JMP		
F	REVISION C RELEASED	04/13/05	AVIL		
G	REVISION D RELEASED	09/04/05	ISMMI		
H	ADDED HOLE FOR HOSE	01/28/20	SDB		ECN-20-050
J	REDREW IN INVENTOR	04/16/21	ISMMI		ECN-21-228
K	UPDATED TO SHOW HOSE CUTOUT		JMP		

ALL WELDS TO CONFORM TO AWS D1.1

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

DESIGN - ENGINEERING - MANUFACTURING PACKAGE

HYDRAULIC BRAKE
PASSENGER SIDE

APPROVED BY: JMP
DATE: 09/21/05
ECN: R-4897P

