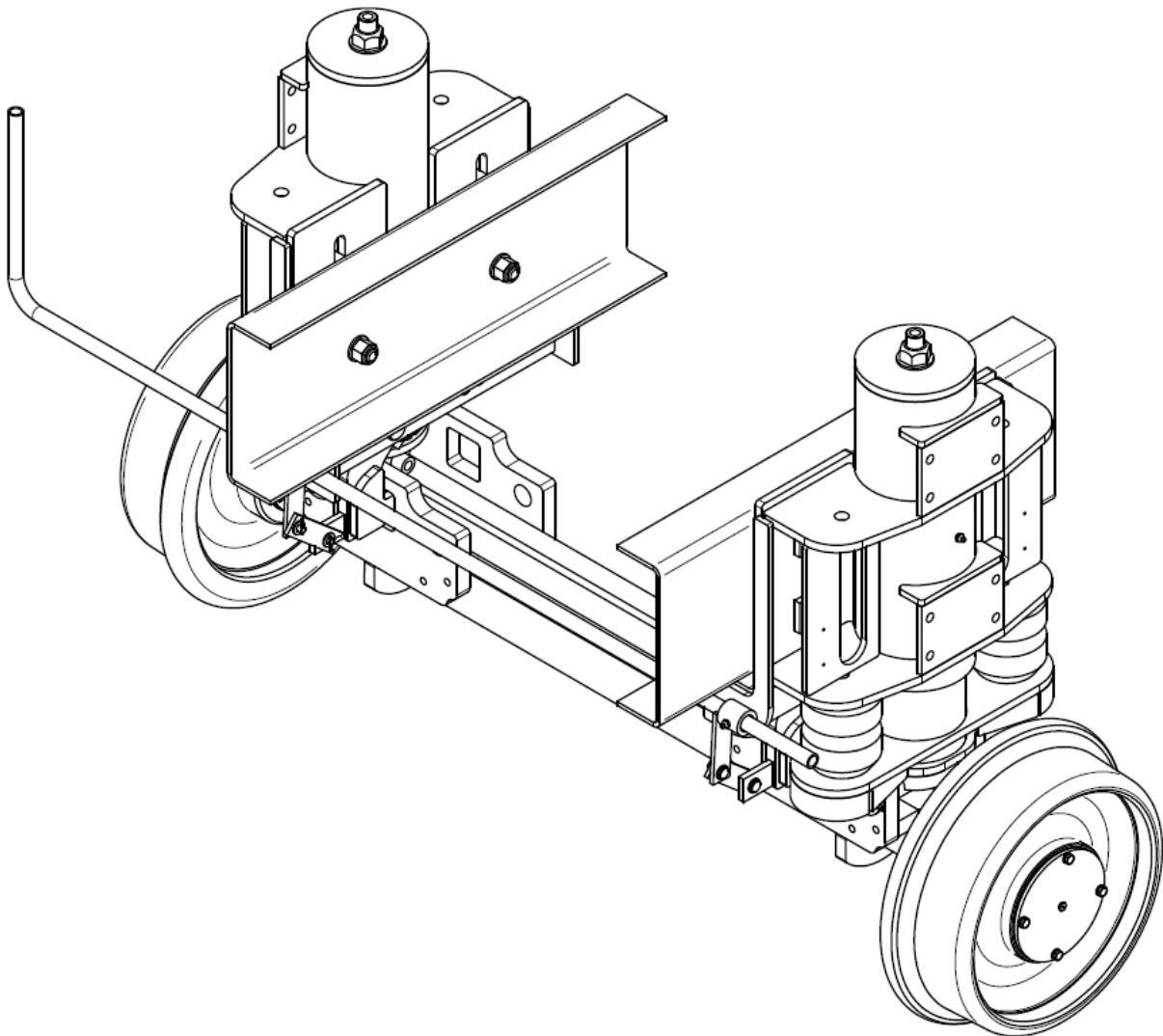


**R-890 VERTICAL FRONT BEHIND CAB RAILGEAR KIT W/ 16" WHEELS
MBTA WHEEL PROFILE**



INSTALLATION, OPERATIONS, SERVICE AND PARTS MANUAL

INSTALLATION SAFETY PRECAUTIONS

If any installation problems are encountered, please call G&B Specialties, Inc. for technical assistance before continuing with the installation process.



CAUTION
WARNING

- 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 G&B Specialties railgear equipment. Applicable railway company procedures and policies must be adhered to.
- Before performing any work under the vehicle or railgear, ensure that 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.
- Always disconnect the vehicle's battery when welding on the vehicle or railgear to protect the vehicle's electrical system.

INSTALLATION OF R-890 VERTICAL FRONT BEHIND CAB RAILGEAR KIT

The following procedure details the installation of the vertical front railgear kit. The hardware and parts required for this installation are listed in Table 1.

Table 1		
Part Number	Description	Qty
R-8906	R-890 Behind Cab Front Railgear w/ 16" Wheels MBTA Profile	1
R-8912	Angled Shim	2
R-8961	Handle (Included w/R-8906)	1
R-8998	Washer Plate (Included w/ R-8906)	8
	$\frac{3}{4}$ " UNC Gr. 8 Bolt x 3.5" Long (Included w/ R-8906)	8
	$\frac{3}{4}$ " Gr. 8 Washer (Included w/ R-8906)	16
	$\frac{3}{4}$ " UNC Gr. 8 Nylock Nut (Included w/ R-8906)	8

1. Prior to installing the railgear, the vehicle's rear axle(s) should be aligned to zero tolerance by a qualified alignment professional. The rear axles should be parallel to each other, and perpendicular to and centered on the vehicle frame.
2. The rear railgear should have already been installed and aligned with the rear axle(s) of the vehicle.
3. The railgear is supplied with the necessary installation fasteners, which are packaged separately, and integral "L" shaped mounting brackets. The railgear should be mounted behind the cab, but as close to the cab as possible, without interfering with other components of the vehicle. Ensure that there is a minimum of 18.5" of clear frame space to mount the railgear. Ensure that there will be sufficient clearance above the railgear cylinders for the hydraulics and for railgear suspension movement, considering future adjustments of the railgear. It may be necessary to relocate some components.
4. The railgear is symmetrical and has no "front" or "back" and can therefore be mounted in either direction. If desired/appropriate, the rail sweeps can be removed and re-installed on the opposite side of the railgear. Similarly, the vertical lock system can be installed on the opposite side of the railgear at any time by re-installing the lock hook, return spring and lock handle on the opposite side. If this is done, replace with any cotter pins that are removed with new cotter pins. Torque the $\frac{1}{4}$ " fasteners to 12 ft-lbs dry. Do not over torque.
5. Position and support the railgear on the outside of the frame with the angled shims between the horizontal part of the railgear mounting brackets and the bottom of the frame. Use the angled shims with the thickest part forward so that the railgear will be as vertical as possible when the vehicle is on rail. Use appropriate shims between the bottom of the frame and the angled shims to achieve the correct mounting height of 28" from the mounting bracket to the ground (see Figure 4). Tack weld all shims together and to the railgear so that they cannot fall out. Using multiple thin shims in place of one thick shim will make future adjustments much easier.

6. Use appropriate shims between the outside face of the web of the frame and the railgear mounting brackets to achieve a bracket-to-bracket mounting distance of 35" and to center the railgear on the frame (see figure 4). Tack weld all shims together and to the railgear so that they cannot fall out. Using multiple thin shims in place of one thick shim will make future adjustments much easier.
7. Align the railgear as per the Railgear Operation, Service and Parts section of this manual.
8. Using the slots in the mounting brackets as guides, drill four 3/4" holes a minimum of 5" apart in each side of the frame extension. Ensure that all vehicle manufacturer frame-drilling guidelines are followed. Ensure that enough room is left in the slots for future height adjustments.
9. Fasten the railgear to the frame using the supplied 3/4" mounting fasteners including the washer plates, which should be centered over the slots in the mounting brackets. Torque all 3/4" fasteners to 175 ft-lbs dry. Do not over torque.
10. Insert the vertical lock handle through the bushings provided on the railgear above the lock hooks. The handle can be angled, cut and/or modified as desired to fit properly. Ensure that there will be sufficient room for the handle to rotate, considering if railgear brakes will be installed later. Ensure that the handle will be positioned close to the vertical front railgear hydraulics operating valve. Align the links that are attached to the vertical lock-up hook onto the handle. The links should be on the inside of the bushings. Weld the links to the handle using a 1/4" fillet weld around the outside surface of the links. Ensure that the weld will not interfere with the motion of the handle and links. Ensure that the hooks can be fully engaged and disengaged from the axle.
11. Re-install/mount any accessories that were removed to accommodate the railgear.
12. Torque all fasteners as per the Railgear Kit Operation, Service and Parts section of this manual.
13. Grease the railgear at all lubrication points as described in the Railgear Kit Operation, Service and Parts section of this manual.

Following the installation of the railgear Hydraulic Kit and the vehicle Front Axle Lock-Up Kit, the railgear will need to be adjusted:

14. Perform the Railgear Alignment procedure as described in the Railgear Kit Operation, Service and Parts section of this manual.
15. Perform the Vehicle Front Tire Clearance adjustment procedure as described in the Railgear Kit Operation, Service and Parts section of this manual. Ensure that the washer plates are welded in position.
16. Adjust the rail sweeps as described in the Railgear Kit Operation, Service and Parts section of this manual.

OPERATION, SERVICE AND PARTS OF R-890 VERTICAL FRONT BEHIND CAB RAILGEAR KIT W/ 16" WHEELS

SAFETY PRECAUTIONS

If any operating, services 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.
- Ensure that the position and function of all railgear controls are known before attempting operation.
- Ensure the railgear is locked in road position before starting road travel.
- Ensure all body parts and loose clothing is clear of any moving parts of the equipment.
- If misalignment of the railgear equipment is indicated, promptly perform the alignment procedure.
- Before performing any work under the vehicle or railgear, ensure the engine is turned off and the parking brake is set.
- 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.
- Always disconnect the vehicle's battery when welding on the vehicle or railgear to protect the vehicle's electrical system.

OPERATION OF VERTICAL FRONT BEHIND CAB RAILGEAR KIT

With the railgear kit installed on this vehicle, it may be operated as normal. The vehicle, however, has decreased ground clearance and angles of approach and departure due to the railgear. Caution must be used when operating the vehicle.

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 Hydraulic Kit Operation, Service, and Parts manual for information on the location and operation of the railgear hydraulic system controls.

Placing the Vehicle on Rail - To Lower the Railgear:

1. Engage the vehicle front axle lock as per the Front Axle Lock Operation, Service and Parts manual.
2. Disengage the railgear's vertical lock hooks by rotating the lock handle appropriately. If the hooks cannot be disengaged, raise the railgear slightly.
3. Hold the lock handle in the disengaged position.
4. Lower the railgear. Release the lock handle once the railgear axle has lowered sufficiently that the lock hooks will not engage the axle.
5. As the railgear reaches the rails, it will begin taking some of the vehicle's load. The railgear's rubber suspension springs should be observed compressing under this load. (If this is not the case, **DO NOT use the railgear**. Inspect the railgear for lubrication and damage.)
6. Continue lowering the railgear until the hydraulic cylinders are fully extended. The vehicle front tires should be approximately 3" above the rail.
7. Ensure that the railgear is fully deployed.

Removing the Vehicle from Rail - To Raise the Railgear:

1. Raise the railgear fully. The railgear's vertical lock hooks should automatically engage the axle in the locked position.
2. Ensure that the vertical lock hooks are engaged and that the railgear is locked in the road position.
3. Disengage the vehicle front axle lock as per the Front Axle Lock Operation, Service and Parts manual.

SERVICE OF VERTICAL FRONT BEHIND CAB RAILGEAR KIT

The railgear kit must be serviced regularly to avoid damage to the equipment. Table 2 below provides the Recommended Service Schedule and the detailed service procedures follow.

Table 3 provides the Standard Fastener Torque Values.

Grease fittings are provided at all railgear lubrication points as shown in Figure 1. The recommended lubricant for all lubrication points on this railgear is MYSTIK JT-6 LOW TEMP grease or equivalent. In cold weather areas/seasons, SHELL DARINA XL102 or equivalent may be used.

Service Required	Daily	Weekly	Monthly	3 Months	6 Months
Ensure that the vehicle is in good operating condition	✓	✓	✓	✓	✓
Check for loose rail wheels and fasteners (re-torque if required)	✓	✓	✓	✓	✓
Ensure railgear vertical lock is functioning correctly	✓	✓	✓	✓	✓
Visually inspect the railgear for damaged or worn parts	✓	✓	✓	✓	✓
Inspect the rail wheel flanges for wear (use Rafna wear gauge)		✓	✓	✓	✓
Inspect all hydraulic components for leaks or wear		✓	✓	✓	✓
Check and adjust rail sweeps		✓	✓	✓	✓
Check and adjust rail wheel bearing end-play			✓	✓	✓
Grease railgear outer guide tubes			✓	✓	✓
Grease railgear inner tubes			✓	✓	✓
Grease lower cylinder pivot points			✓	✓	✓
Grease railgear lock guide handle bushings			✓	✓	✓
Grease rail wheel bearings (every 3000 rail kms or 1900 rail miles)				✓	✓
Check and adjust railgear alignment					✓
Check and repack rail wheel bearings					✓
Check and adjust vehicle front tire clearance					✓

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

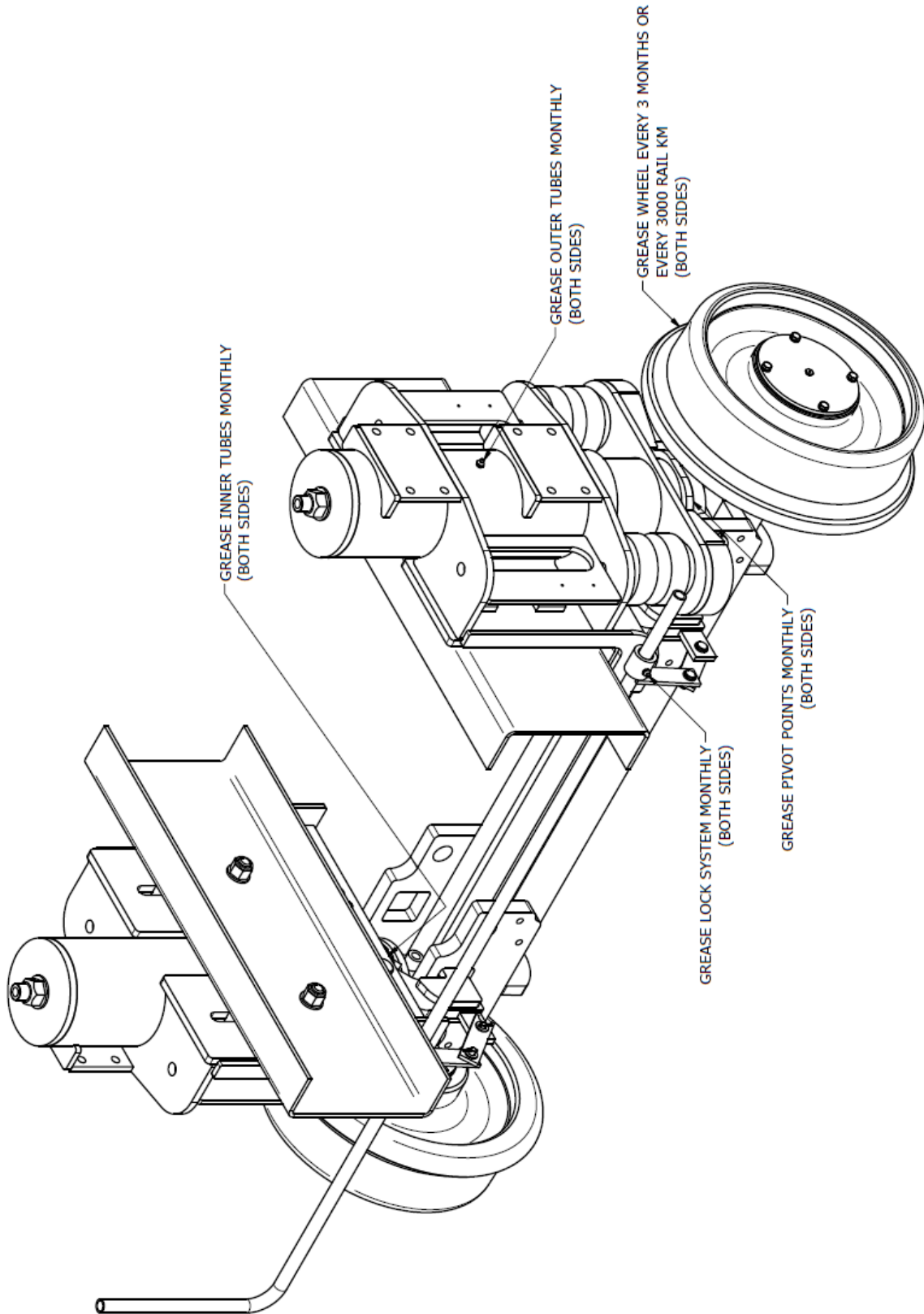


Figure 1 Railgear Lubrication Points

RAIL SWEEP ADJUSTMENT

The distance between the rail sweep rubber and the rail is adjustable and should be maintained at approximately $\frac{1}{8}$ ". To adjust the rail sweep rubber, with the railgear in the rail position, loosen the two $\frac{1}{4}$ " fasteners that secure the rail sweep rubber to the rail sweep bracket. Slide the rail sweep rubber up or down for the correct clearance. Tighten and torque the $\frac{1}{4}$ " fasteners to 12 ft-lbs dry. Do not over torque.

RAIL WHEEL BEARING ADJUSTMENT

The rail wheel bearings require periodic adjustment to keep the endplay within specification. If the rail wheel bearings are not correctly adjusted, failure may occur and will not be covered under the railgear warranty. Check and adjust the bearing endplay with the railgear in the road position and with the rail wheels free to turn.

Use a magnetic base dial gauge to measure the endplay of each rail wheel bearing. The bearing endplay must be between 0.001" and 0.005". If this is not the case, adjust as follows:

1. Remove the rail wheel hubcap and gasket by removing the four 5/16" bolts and 5/16" lock washers.
2. Ensure that the wheel bearing cavity is full of grease.
3. Remove the outer axle nut, axle tab washer, and axle lock washer and loosen the inner axle nut.
4. Perform the following:
 - a. Tighten inner axle nut to 200 ft-lbs while rotating wheel
 - b. Loosen inner axle nut one full turn
 - c. Re-tighten inner axle nut to 50 ft-lbs while rotating wheel
 - d. Loosen inner axle nut by 30° (Half a wrench flat)
5. Install lock washer ensuring that pin in axle nut is aligned with a hole in the lock washer.
6. Install tabbed lock washer (Do not re-use tabs).
7. Install outer axle nut, torque to 100 ft-lbs.
8. Verify end play of wheel, if wheel is within .001"-.005", proceed. If end play is more, repeat process.
9. Bend three tabs of lock washer upward to prevent nut rotation.
10. Fill outboard cavity with grease.
11. Replace hub cap gasket and install hub cap on wheel. Torque 5/16" bolts to 13 ft-lbs.

VEHICLE FRONT TIRE CLEARANCE ADJUSTMENT

The vehicle front tires must remain at a minimum height above the rail to ensure sufficient clearance when travelling on rail. Both the setting of the front axle lock and the mounting height of the railgear affect the clearance height. If the front tires are less than 3" from the rails when the railgear is in the rail position OR the front rail wheels are less than 8" from the ground when the railgear is in the road position, the front tire clearance must be adjusted as follows:

1. Ensure that the vehicle front axle lock is correctly adjusted as per the Front Axle Lock Operation, Service and Parts manual.
2. Determine how much the railgear must be adjusted up or down to obtain the correct road and rail clearance.
3. With the railgear in the road position, support the railgear and grind off the welds from the washer plates. Loosen the eight $\frac{3}{4}$ " mounting bolts.
4. Add or remove shims as necessary between the bottom of the flange of the vehicle frame and the top surface of the mounting brackets.
5. Tack weld the shims to each other and to the railgear, so they will not fall out.
6. Torque the $\frac{3}{4}$ " fasteners to 175 ft-lbs dry. Do not over torque.
7. Ensure that the railgear will not contact any vehicle components throughout the full range of railgear motion and railgear suspension movement. Ensure that the railgear lock handle will not contact the vehicle's driveshaft and that the tops of the railgear's hydraulic cylinders and their hydraulic fittings will not contact the vehicle during railgear suspension travel.
8. Re-check the road and rail clearances and re-adjust if necessary.
9. If the minimum clearances cannot be met after adjusting the railgear and vehicle front axle lock, then the cylinder stopper can be removed from inside the hydraulic cylinders to provide 1" more cylinder travel.
10. Re-weld the washer plates using a $\frac{3}{8}$ " fillet weld all around.

RAILGEAR ALIGNMENT

The railgear must be correctly aligned to perform properly and safely, and to avoid excessive wear and derailment. The railgear rail wheels must be aligned to point in the same direction as and be centered on the vehicle rear tires. The railgear is supplied with fixed non-adjustable rail wheels. For the rail wheels to be aligned with the vehicle rear wheels, the entire railgear must be moved on the vehicle frame.

Prior to performing the railgear alignment, the vehicle should have a rear axle alignment done to within zero tolerance by a qualified alignment professional and the tires should be properly inflated.

The railgear alignment is checked with the vehicle on a straight, level section of rail with the railgear in the rail position. Refer to Figure 2 for railgear alignment measurements and specifications.

To move the railgear on the vehicle frame, raise the railgear until it is just off the rails, support the railgear and then loosen the eight $\frac{3}{4}$ " mounting fasteners. To center the railgear on the vehicle rear tires (lateral alignment), adjust the shim thicknesses between the railgear mounting brackets and the web of the vehicle frame. Ensure that the railgear guide tubes remain parallel to each other and that the railgear mounting brackets remain at 35" apart. To align the rail wheels to point in the same direction as the vehicle tires (directional alignment), move the railgear mounting brackets forwards or backwards with respect to each other along the vehicle frame. This will change the directional angle of the railgear axle and wheels. It may be necessary to weld closed the $\frac{3}{4}$ " mounting holes in the vehicle frame and drill new holes.

When the railgear is correctly aligned, the $\frac{3}{4}$ " mounting fasteners should be torqued to 175 ft-lbs dry. Do not over torque. Ensure that the washer plates are welded to the railgear mounting brackets with a $\frac{3}{8}$ " fillet weld all around.

Note

Check the railgear clearance to all vehicle components throughout the full range of railgear motion and railgear suspension movement.

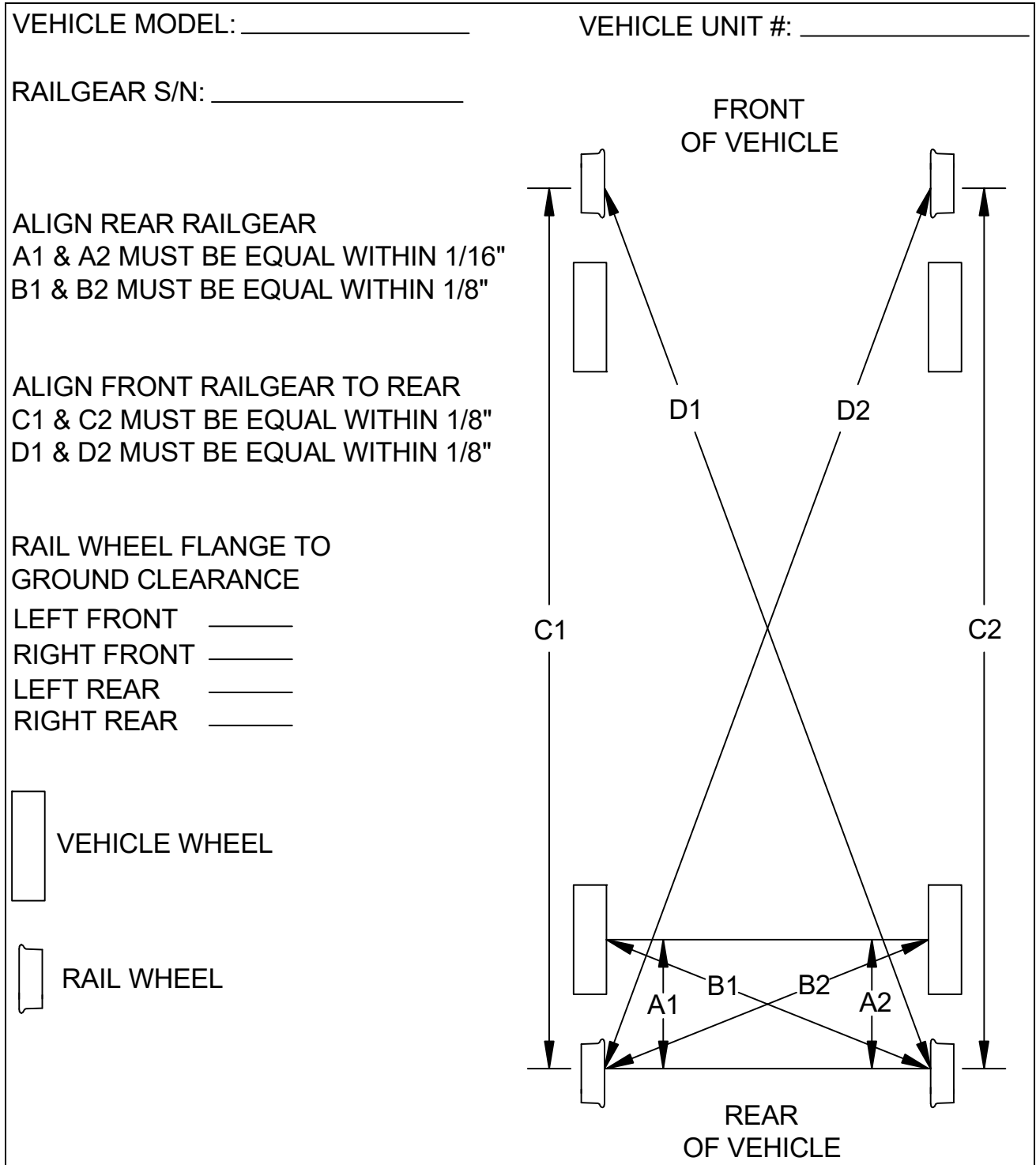


Figure 2 Railgear Alignment

PARTS OF VERTICAL FRONT BEHIND CAB RAILGEAR KIT

PARTS LIST		QTY
ITEM	PART NUMBER	DESCRIPTION
1	R-8997	TOP PLATE
2	R-8928	OUTER GUIDE TUBE ASSEMBLY
3	R-8939	INNER GUIDE TUBE ASSEMBLY
4	R-5683	TIMBEREN 540/75 SPRING
5	R-9116A-CV	3.5" BORE X 16" STROKE HYDRAULIC CYLINDER ASSEMBLY
6	R-8961	HANDLE
7	R-8966	LINK
8	R-8960	HOOK ASSEMBLY
9	R-8910ETG	R-890 W/ 16" WHEELS AXLE ASSY GREENLINE
10	R-5604	SPRING, EXTENSION
11	S-005001	3/8" OD X 3/4" LONG PIN
12	R-8964	3/4" OD X 1.7/8" LONG PIN
13	R-8991	1.1/4" OD X 8" LONG PIN
14	R-8998	WASHER PLATE
15	COTTER PIN	3/32" X 3/4"
16	COTTER PIN	1/4" X 2"
17	H.H.C.S	1/4" X 2.1/4" LG, UNC GR.8
18	H.H.C.S	3/4" X 3 1/2" LG, UNC GR.8
19	NYLOCK NUT	1/4", UNC, GR.8
20	NYLOCK NUT	3/4", UNC, GR.8
21	STOVER NUT	1" UNC STOVER NUT, GR.8
22	F WASHER	1/4" TYPE-A, GR.8
23	F WASHER	3/8" TYPE-A, GR.8
24	F WASHER	3/4" TYPE-A, GR.8
25	F WASHER	1" TYPE-A, GR.8
26	F WASHER	1.1/4" TYPE-A, GR.8
27	REF	VEHICLE FRAME

HARDWARE KIT: R-990KIT-444

NOTES:
 1. ITEMS 14, 18, AND 20, ALONG WITH QT. 16 OF ITEM 26 ARE TO BE PACKAGED TOGETHER FOR SHIPPING
 2. ITEM 6 IS TO BE SHIPPED LOOSE
 3. APPROX. WEIGHT: 1270 LBS.

REVISION	DATE	BY	APPRVD	ECN #
A	11/23/20	SMI	JMP	

DESIGN - ENGINEERING - MANUFACTURING	DATE DRAWN	PART NUMBER
JMP		R-890 WITH 16" WHEELS AXLE ASSY GREEN LINE

APPROVED	DATE DRAWN	PART NUMBER
JMP	11/23/20	R-8906

REVISION	DATE	BY	APPRVD	ECN #
A	11/23/20	SMI	JMP	

REV/DESCRIPTION OF CHANGES

A REVISION A RELEASED

Figure 3

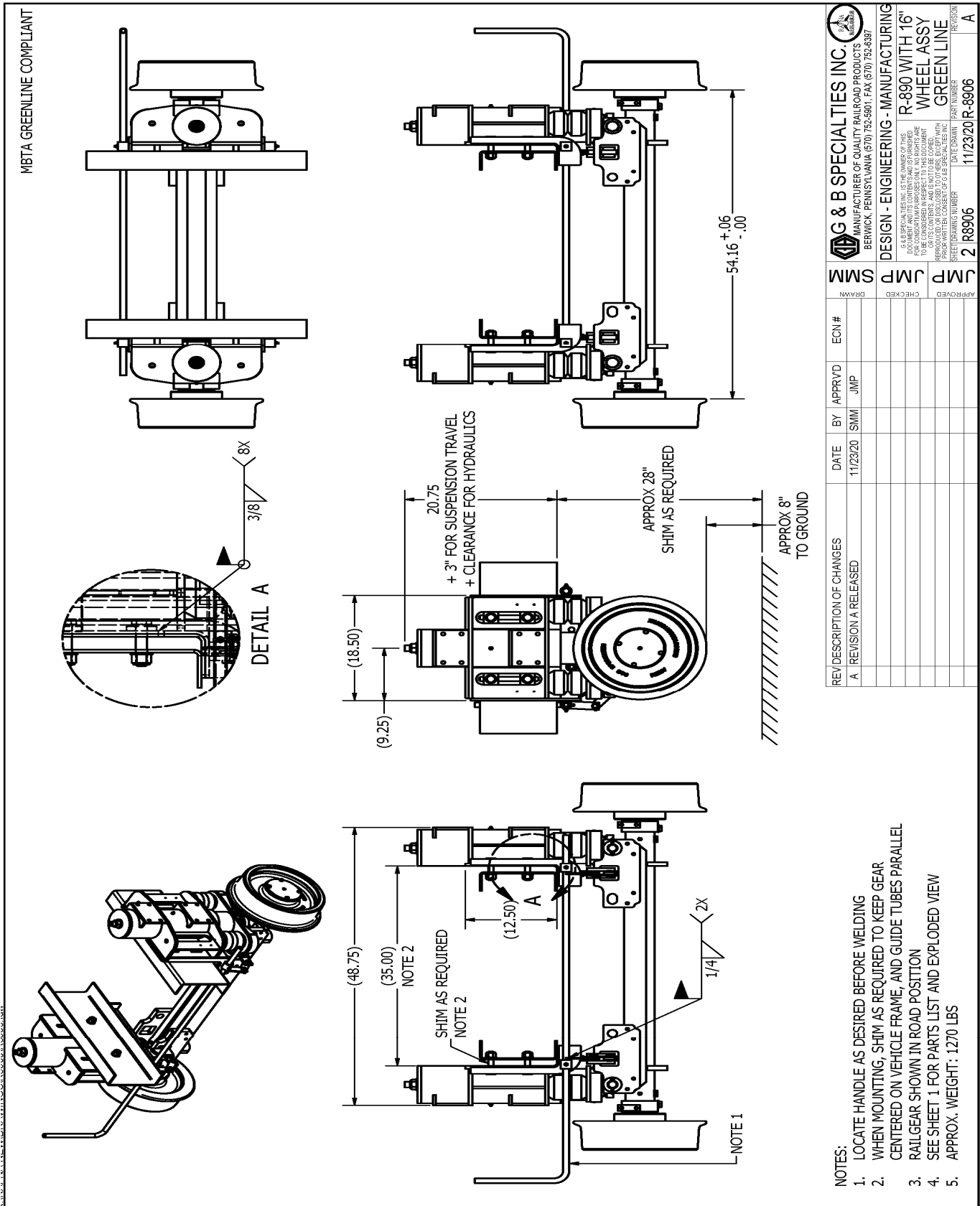


Figure 4

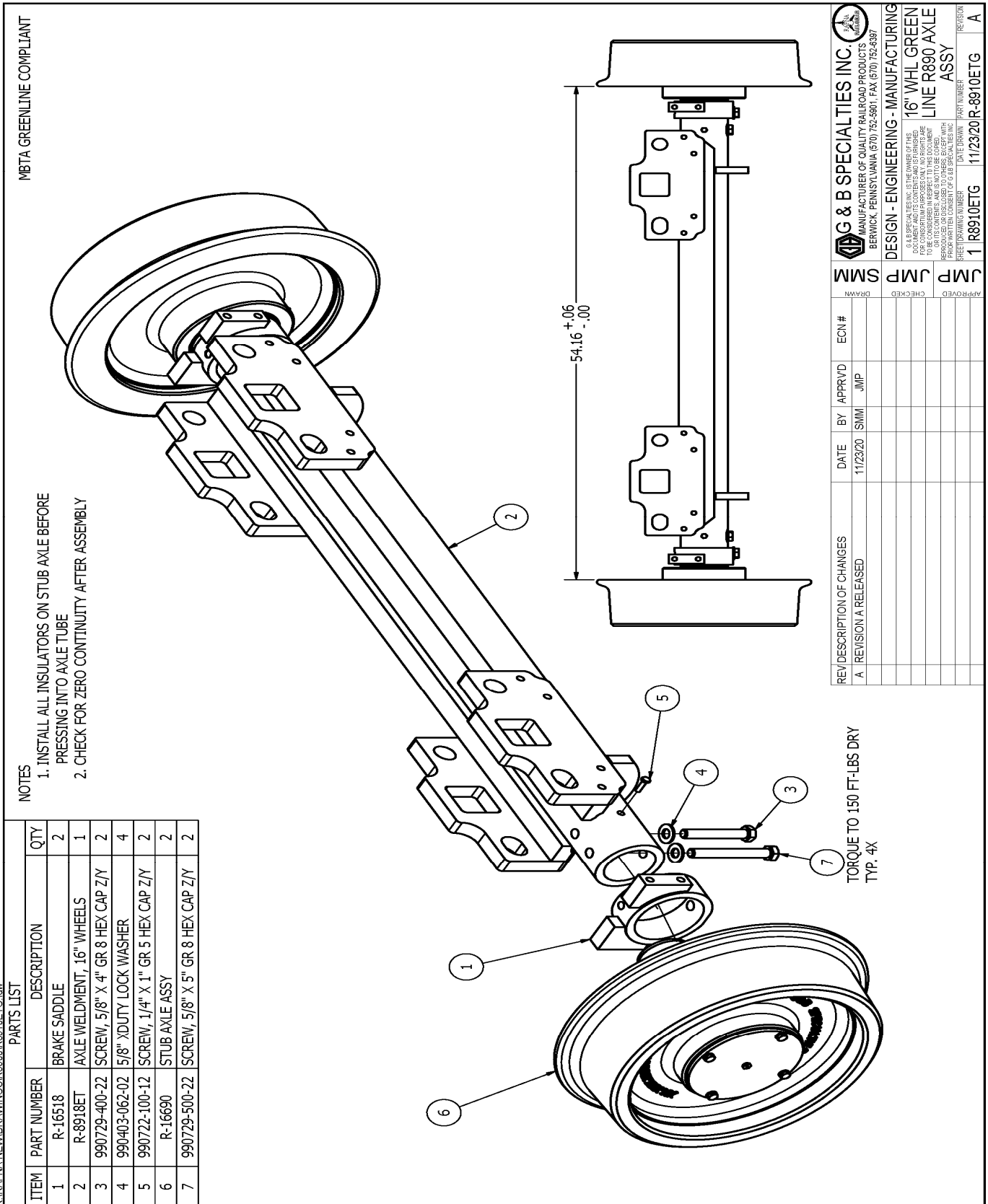


Figure 5

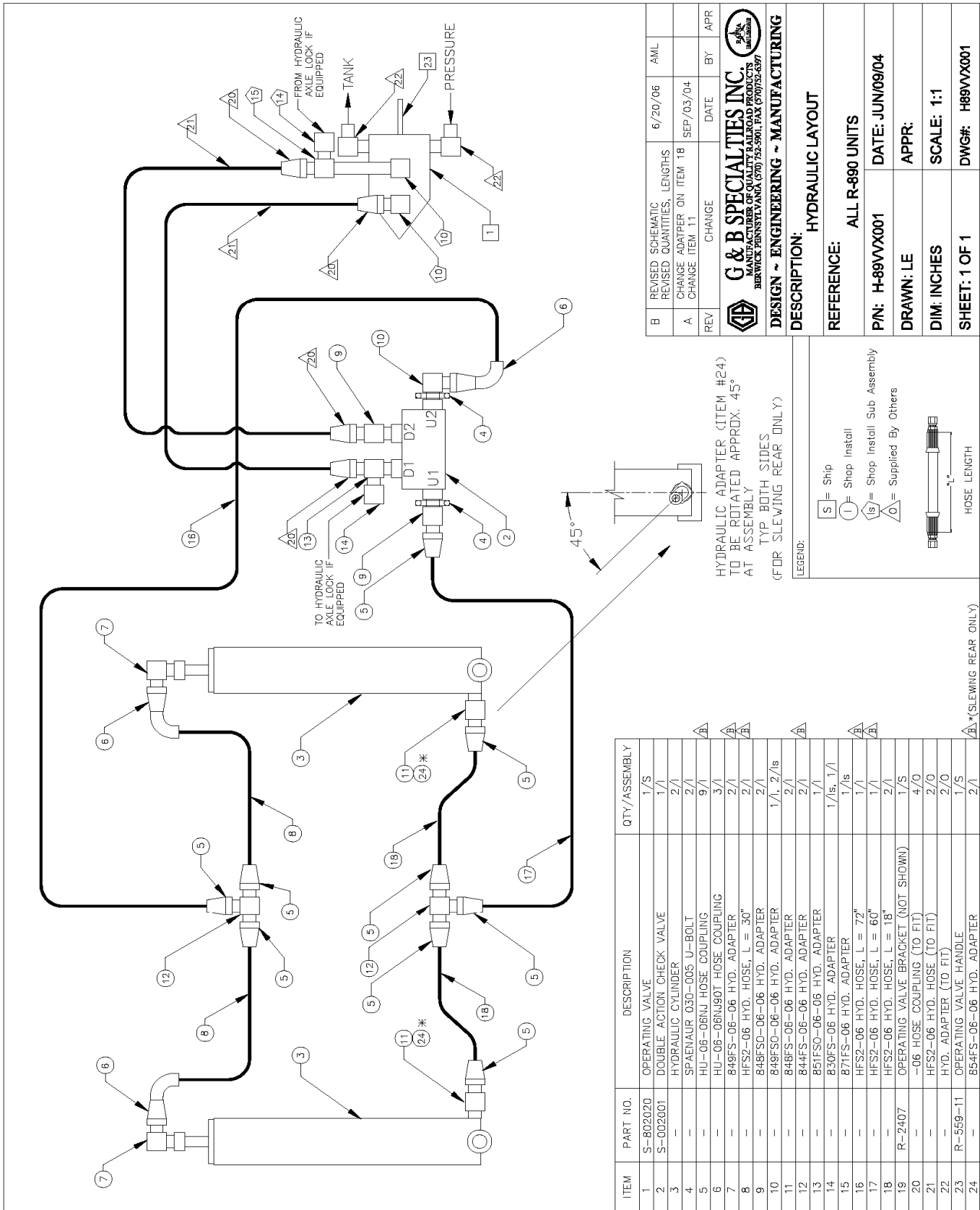
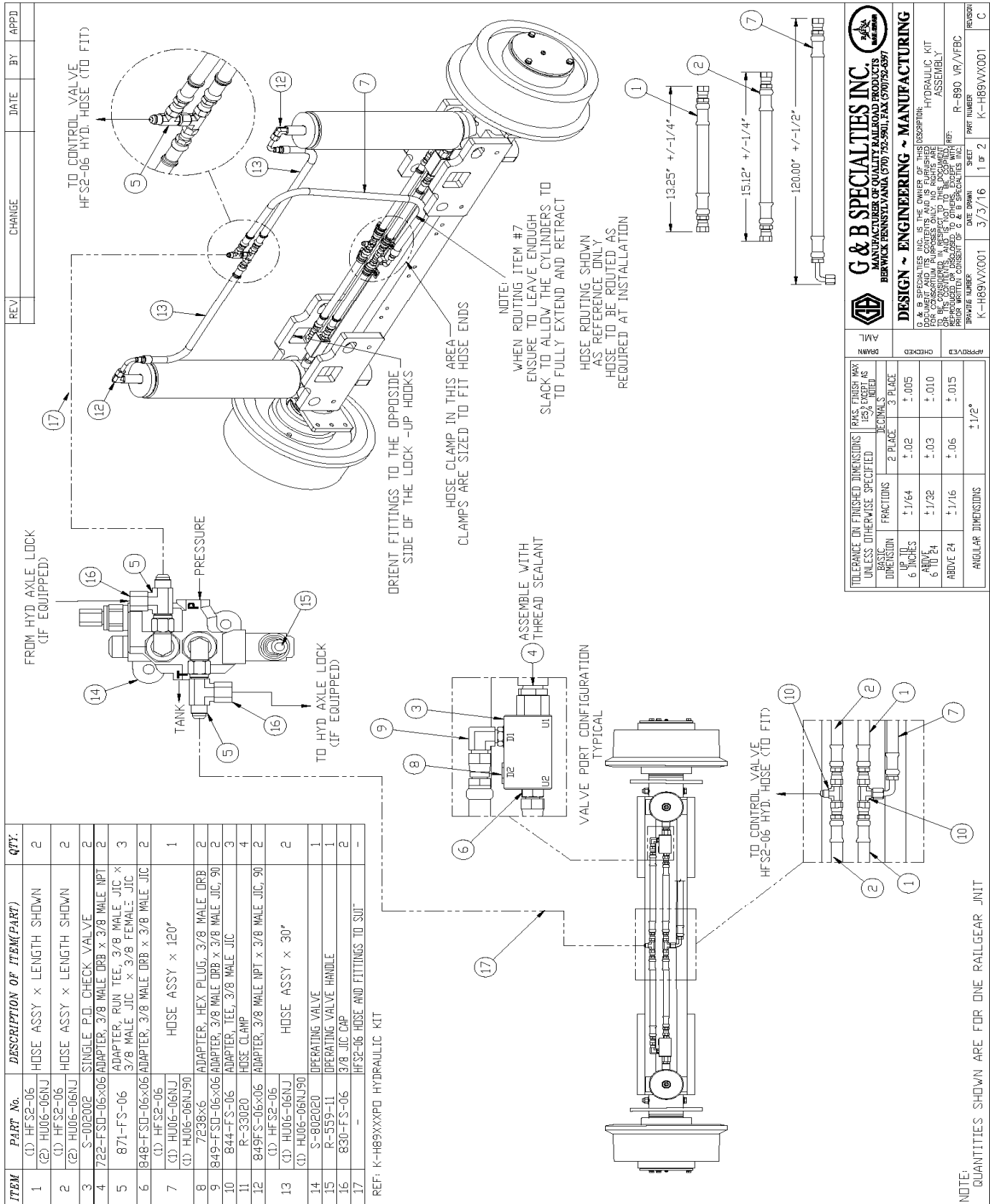


Figure 7 REF: EXTERNAL MOUNTED P.O. CHECK VALVE



ITEM	PART No.	DESCRIPTION OF ITEM(PART)	QTY.
1	(1) HF52-06 (2) HU06-06NJ	HOSE ASSY x LENGTH SHOWN	2
2	(1) HF52-06	HOSE ASSY x LENGTH SHOWN	2
3	S-002002	SINGLE P.O. CHECK VALVE	2
4	722-FSD-06x06	ADAPTER, 3/8 MALE DRB x 3/8 MALE NPT	2
5	871-FS-06	ADAPTER, RUN TEE, 3/8 MALE JIC x 3/8 MALE JIC x 3/8 FEMALE JIC	3
6	848-FSD-06x06	ADAPTER, 3/8 MALE DRB x 3/8 MALE JIC	2
7	(1) HF52-06 (1) HU06-06NJ (1) HU06-06NJ90	HOSE ASSY x 120"	1
8	7238x6	ADAPTER, HEX PLUG, 3/8 MALE DRB	2
9	849-FSD-06x06	ADAPTER, 3/8 MALE DRB x 3/8 MALE JIC, 90	2
10	844-FS-06	ADAPTER, TEE, 3/8 MALE JIC	3
11	R-33020	HOSE CLAMP	4
12	849FS-06x06	ADAPTER, 3/8 MALE NPT x 3/8 MALE JIC, 90	2
13	(1) HF52-06 (1) HU06-06NJ (1) HU06-06NJ90	HOSE ASSY x 30"	2
14	S-802020	OPERATING VALVE	1
15	R-559-11	OPERATING VALVE HANDLE	1
16	830-FS-06	3/8 JIC GAP	2
17	-	HF52-06 HOSE AND FITTINGS TO SUIT	-

REF: K-H89XXXPD HYDRAULIC KIT

NOTE:
QUANTITIES SHOWN ARE FOR ONE RAILGEAR JUNIT

TOLERANCE ON FINISHED DIMENSIONS UNLESS OTHERWISE SPECIFIED	FRACTIONS	DECIMALS	3 PLACE
BASIC DIMENSION	UP TO 6 INCHES	±.005	±.010
	6 TO 24	±.010	±.015
ANGULAR DIMENSIONS		±1/2°	

APPROVED	CHECKED	DATE DRAWN	SHEET	REV
		3/3/16	1 of 2	C

DATE	BY	APPD

REV	CHANGE

G & B SPECIALTIES INC.
BERWICK PENNSYLVANIA (717) 752-5901 FAX (717) 752-6397

DESIGN ~ ENGINEERING ~ MANUFACTURING

DESCRIPTION: HYDRAULIC KIT ASSEMBLY

DATE DRAWN: 3/3/16

SHEET: 1 of 2

REV: C

APPROVED	CHECKED	DATE DRAWN	SHEET	REV
		3/3/16	1 of 2	C

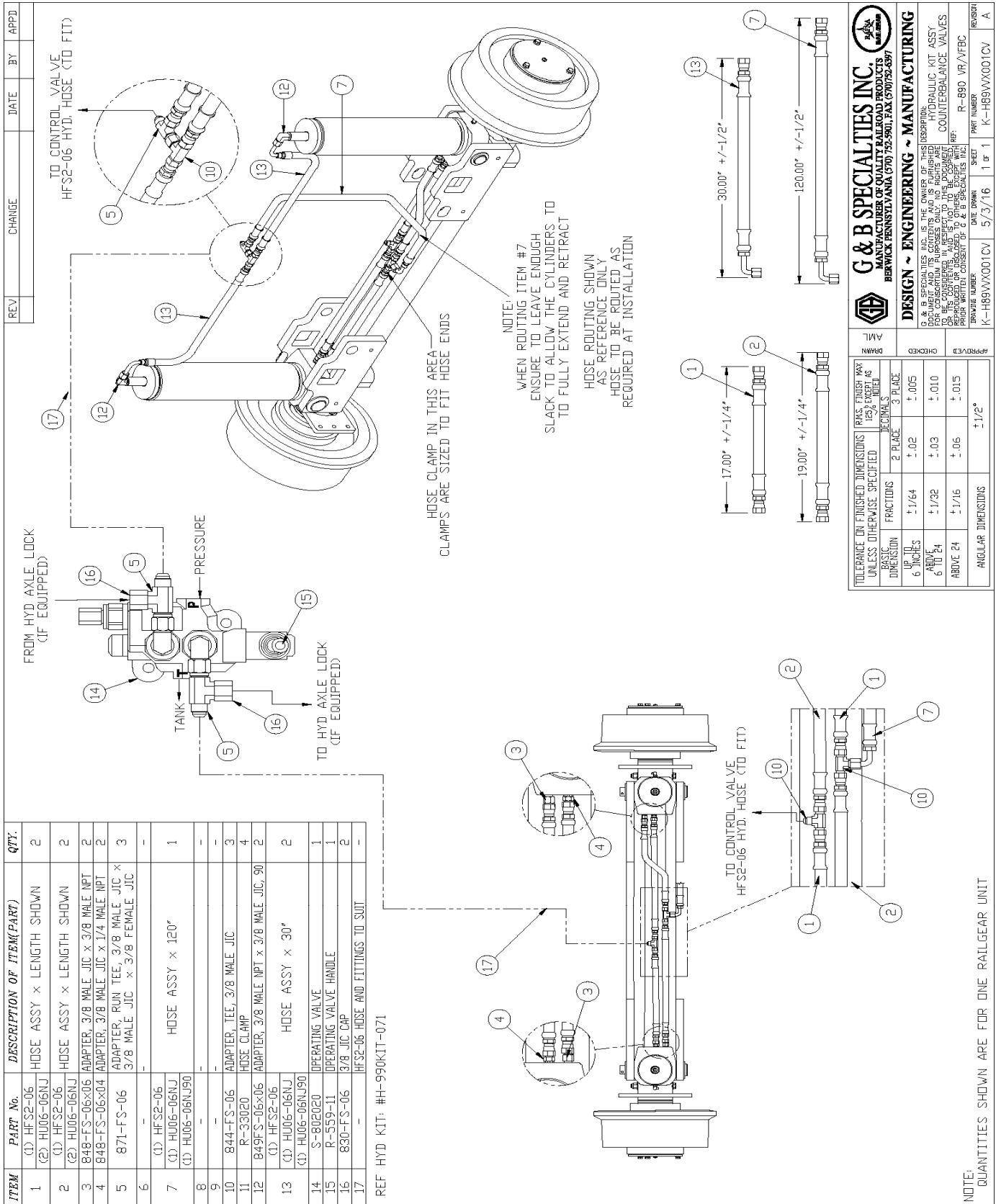


Figure 9 REF: INTERNAL CHECK VALVE