

INSTALLATION, OPERATIONS, & SERVICE MANUAL R-1110/R-1150

Safety Precautions

If any installation problems are encountered, please call G&B Specialties 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.
- Always disconnect the vehicle's battery when welding on the vehicle or railgear to protect the vehicle's electrical system.

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1.0 GENERAL INFORMATION

WORK AREA

The work area in which the railgear is to be installed should meet these minimum requirements to facilitate the installation and conditions that allow the work to be completed in a safe, accurate and timely manner.

- Floor - The floor should be level to provide good measurements required to check alignment of the railgear. The floor should also be sufficiently hard to prevent damage by the railgear wheels.
- Lighting - The work area should be adequately lighted.
- Space - There should be enough space to maneuver the railgear components into position and to safely work around other equipment.

TRUCK CONDITION

Before installation, the truck should be checked in some important areas.

- Tires - The tire pressure should be checked for the manufacturer's recommended inflation and checked for consistent pressure readings from all tires. This will ensure correct traction of the tires on the rails. In addition, the condition of the rear tires must be determined. If they are worn, they should be replaced.
- Alignment - Rear truck axle should be square with the truck frame. G&B Specialties recommends that a reputable alignment shop should check this. 0- degree thrust angle (which can be different than the manufacturer's specification) is required for proper railgear operation.
- Frame and Suspension - On a new truck these should be in good condition. On a used truck, the frame should be inspected for damage. The suspension components should also be checked for damage or wear. If any problems in these areas are not corrected, it will cause difficulty aligning and operating the railgear.
- Transverse Torque Rods - On vehicles that will regularly experience high center of gravity loads on rails, it is advised to install rear tandem control rods to limit transverse axle displacement. This is also necessary on long wheelbase vehicles to limit front tandem walking off in tight radius curves.

PRELIMINARY INSTALLATION

Roll the rear railgear up on the rear installation rails under the truck frame in the back. The railgear is usually installed with the safety pin offs on the rear. However, truck bodywork may dictate locating pin offs in the front.

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2.0 HYDRAULIC SYSTEM CONNECTION

NEW HYDRAULIC SYSTEM

If G&B Specialties' railgear is to be the only hydraulic components and there is not an existing hydraulic system, equip the truck with a 5 to 7 GPM, 2500-PSI pump, Suction Filter and a 5-gallon reservoir. The tank should have a minimum of one suction port (3/4" NPT), one return port (1/2" NPT) and a tank filler-breather. Fill the tank with UNAX Oil Rx 46 or equivalent hydraulic oil.

Route a pressure line (SAE 100r2-8 and -8JIC swivels at each end) from the pump to the center of the front bumper. The in port of the hydraulic control valve is connected to the pressure line. The outlet port of the front hydraulic control valve is routed to the inlet port of the rear hydraulic control valve. The outlet port of the rear hydraulic control valve is connected to the return port in the hydraulic reservoir. See **Figure 2-1**. The remaining ports on the front valve are connected to the front cylinders. The bottoms of the both cylinders connect, with a tee at the valve, to the same valve port. Check that proper hose clearance is obtained to avoid chafing and shield hoses if necessary.

WARNING

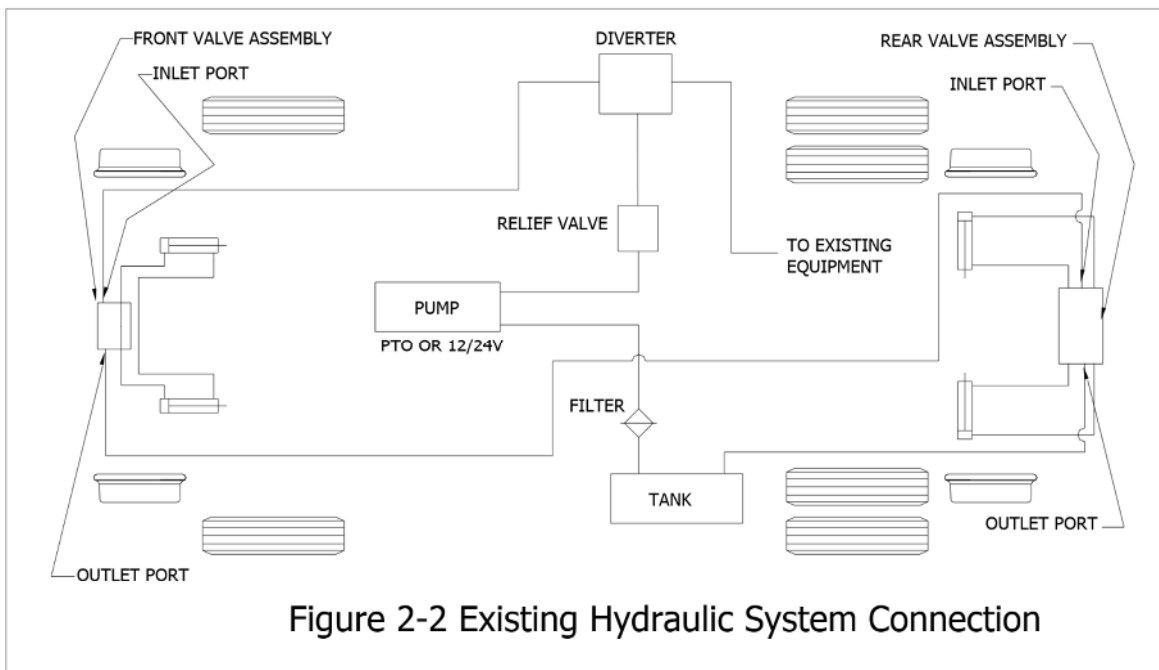
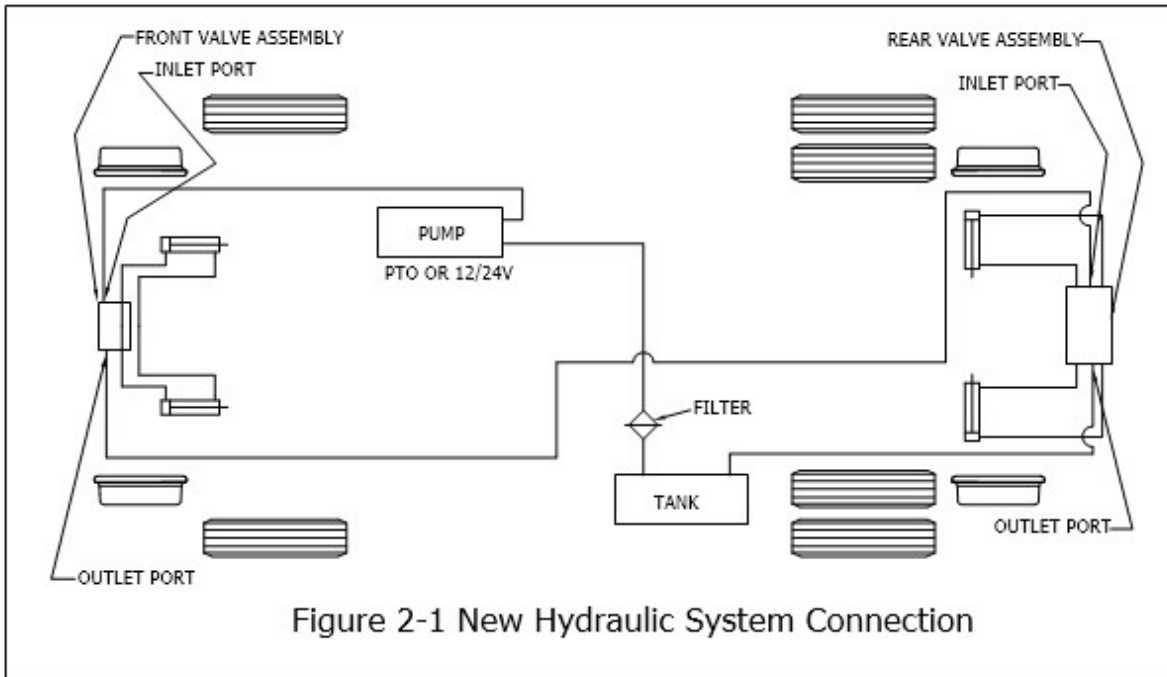
Be certain that front and rear valves are plumbed correctly. Each valve port is marked "INLET" or "OUTLET". Plumbing valve backwards will result in an unsafe condition, possible injury and/or damage.

EXISTING HYDRAULIC SYSTEM

If the truck has an existing hydraulic system, install an appropriately sized diverter valve in the pressure line after the pump and before any existing equipment valves. One-outlet routes to the existing valves and the other to the center of the front bumper. The in port of the hydraulic control valve is connected to the pressure line. The outlet port of the front hydraulic system valve is routed to the inlet port of the rear hydraulic control valve. The outlet port of the rear hydraulic control valve is connected to the return port in the hydraulic reservoir. See **Figure 2-2**. The remaining ports on the front valve are connected to the front cylinders. The bottoms of both cylinders connect, with a tee at the valve, to the same valve port. Check that proper hose clearance is obtained to avoid chafing and shield hoses if necessary. Directly after the pump, it is good practice to install a relief valve, set for the system pressure to provide overpressure protection for the pump.

NOTE

Railgear valves have built in pressure reliefs and the hydraulic working pressure of the system is 2000 PSI. The front valve is pre-set to 1500 PSI at the relief and the rear valve is pre-set to 2000 PSI. All other components supplied by G&B Specialties are rated 2500 PSI. Care must be exercised that the relief pressures at the valves don't exceed this. To ensure proper system pressure, check with a gauge



3.0 FRONT RAILGEAR INSTALLATION

NOTE

If the vehicle has been supplied with an integral extended front frame, then frame extensions will most likely not be required. The front valve plate can be welded directly to the extended front frame.

PRELIMINARY INSTALLATION

1. Remove front truck bumper.
2. Bolt/weld a frame extension to the truck frame as required. Make sure that tilt cabs or hoods will clear the frame extensions when opened. Trim the brackets and gusset as necessary. All truck frame extensions with bolt-on brackets must use 5/8"-11 bolts minimum, hardened steel washers, and grade-8 prevailing torque locknuts. All the grade-8 hardware should be tightened to the hardware manufacturer's specifications. Check that the frame extensions are level, and square with the truck frame.
3. In normal applications, mount the front valve plate assembly between the front frame extensions (with the hydraulic valve underside and the handle facing forward) and weld valve plate in place. In case this is not possible, mount the valve plate in the most appropriate, and easily accessible location.
4. Check to make sure that there is a minimum of 65" between the tires for the railgear to operate.
5. Before installation make sure that you have the correct link arms for your vehicle. The correct arms will allow the railgear to fully engage the rails and not interfere with the truck itself throughout its range of motion.

INSTALLATION RAILS

When installing Railgear it is necessary to get proper tire traction on the rail. This is accomplished by employing standard gauge rails, or surrogate "installation rails" (which can be fabricated from 3" square steel tubing per Figure 3-1) during installation of your railgear, to properly set the mounting height of the system. Make sure you have something ready to use as surrogate installation rails but do not position your vehicle on them at this time. These "rails" can be simple 2x4's or steel "C" channel, as long as they are level, will not crush under the weight of the vehicle, cannot move or tip over, and are tall enough that the wheel edge does not hit the ground.

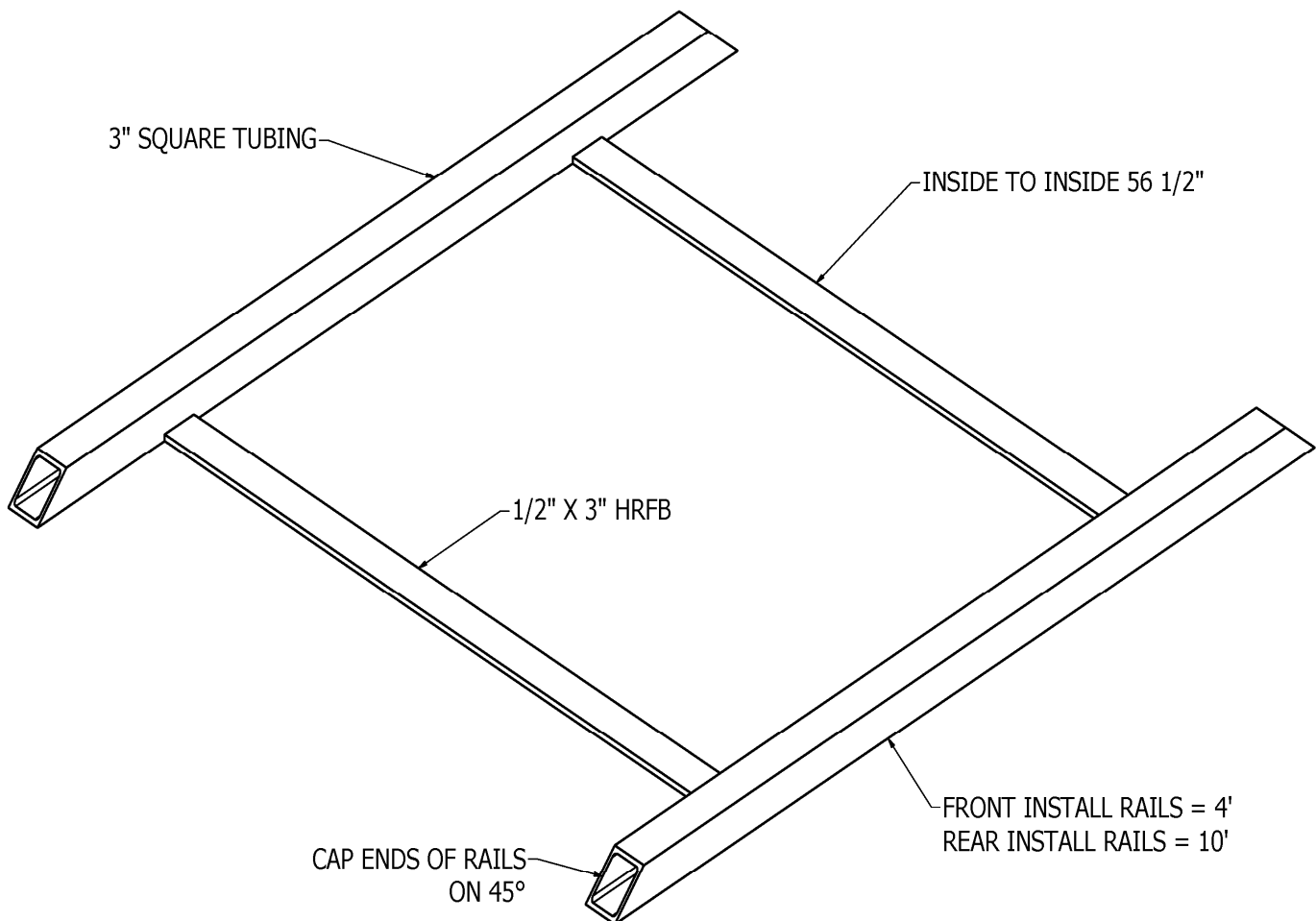


Figure 3-1 Front and Rear Installation Rails

FRONT RAILGEAR INSTALLATION

Figures of Key Features

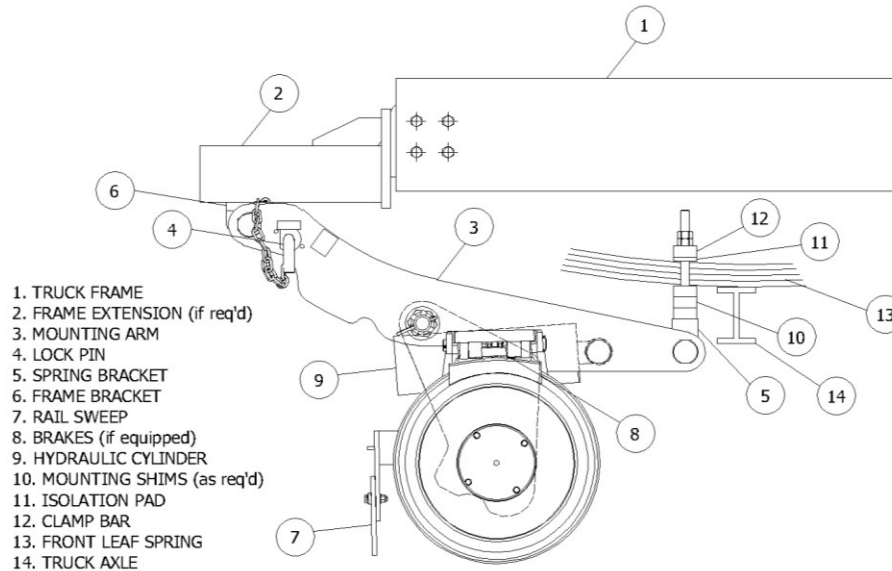


Figure 3-2 Front Railgear Components

WARNING

Before rotating front gear, ensure the axle is positioned correctly or damage to the cylinders could occur. (Figure 3-2)

Bridge Kit Information

In some configurations, the frame rails are wider than normal to accommodate vehicle components. In this case, the frame rails are too wide, and the cross tube falls in-between the frame rails, requiring a bridge kit. Heavy walled square tubing should be used for the bridge. The bridge kit can be installed in one of two ways, below the frame rails (Figure 3-3), and between the frame rails (Figure 3-4). If the correct mounting pin heights cannot be achieved with the bridge tube below the frame rails, it can be installed between the frame rails re-enforcing it with gussets.

NOTE

When purchasing a Bridge Kit from Rafna, it is a universal bridge kit and modification may need to be made for proper fitment and installation to the vehicle.

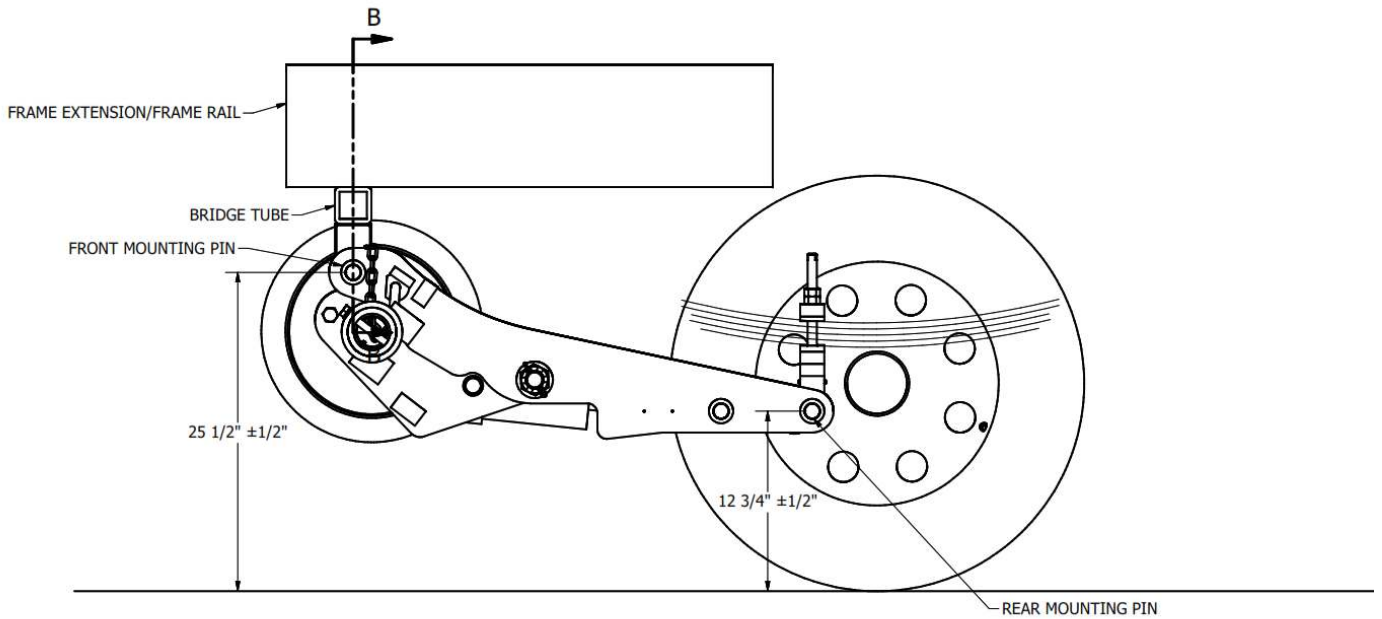
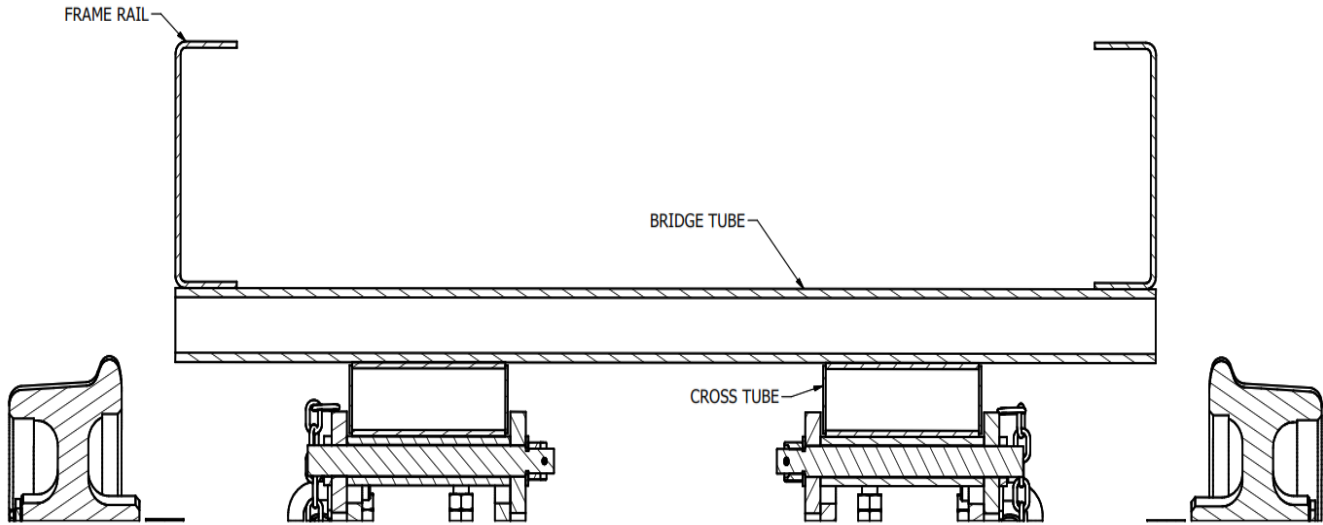


Figure 3-3 Below Frame Rail Bridge Kit

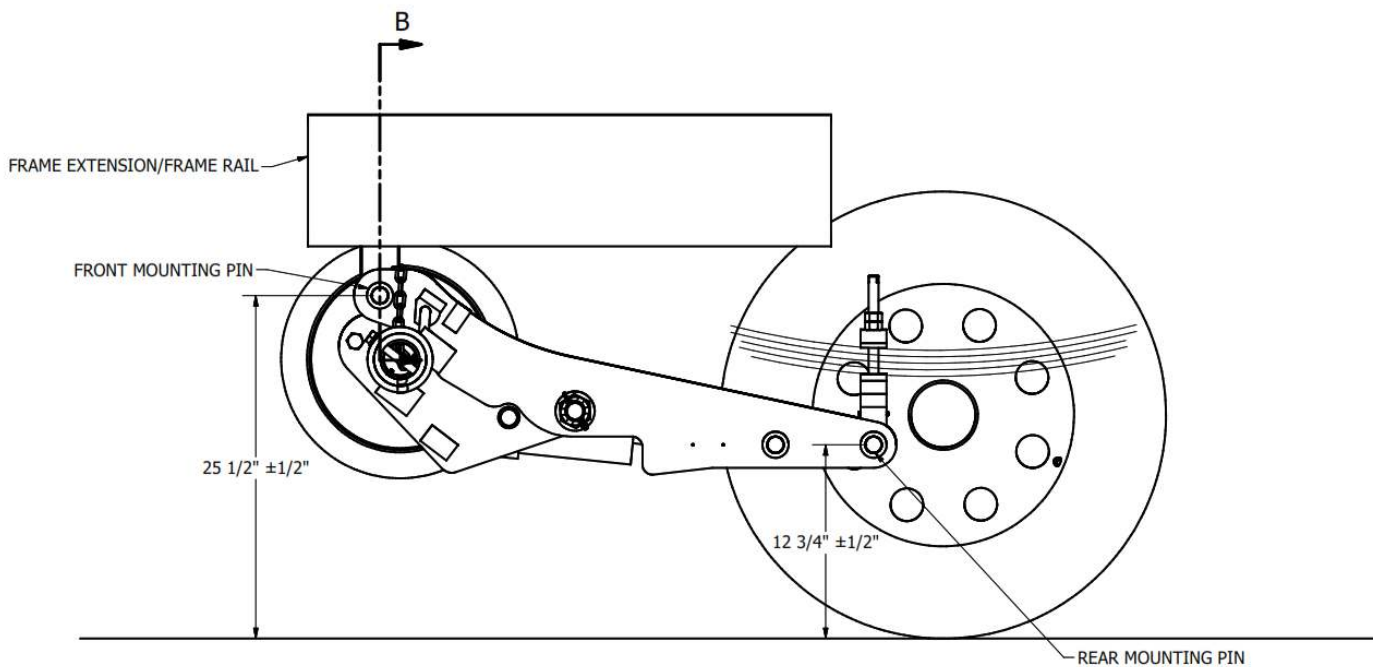
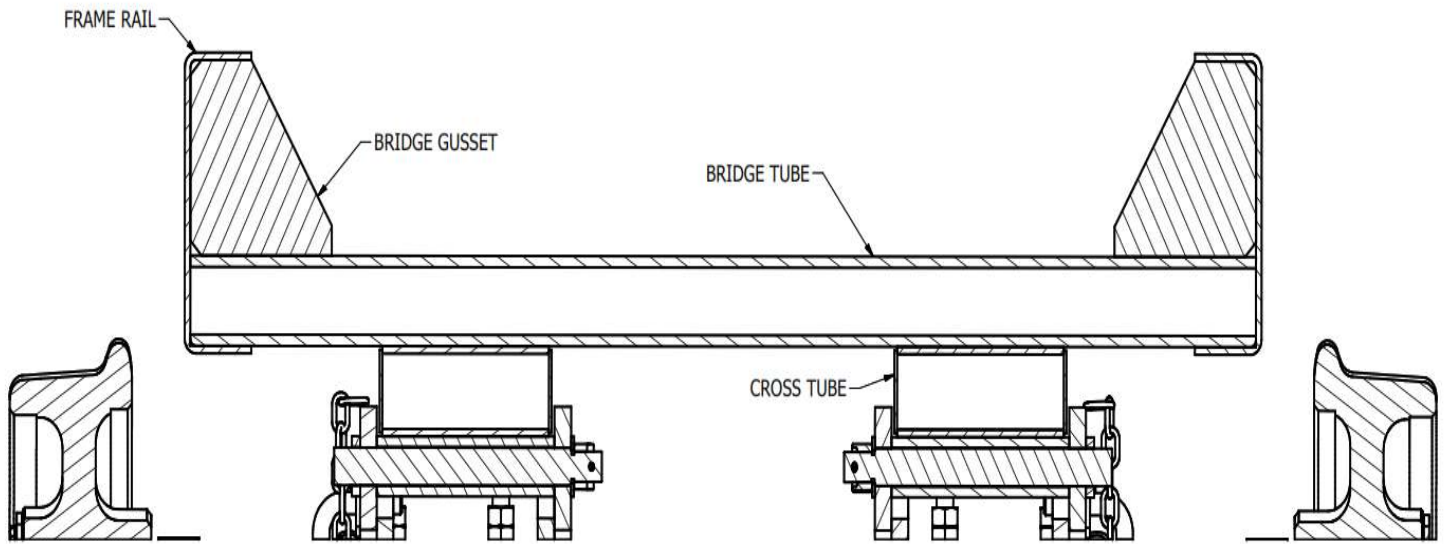


Figure 3-4 Between Frame Rail Bridge Kit

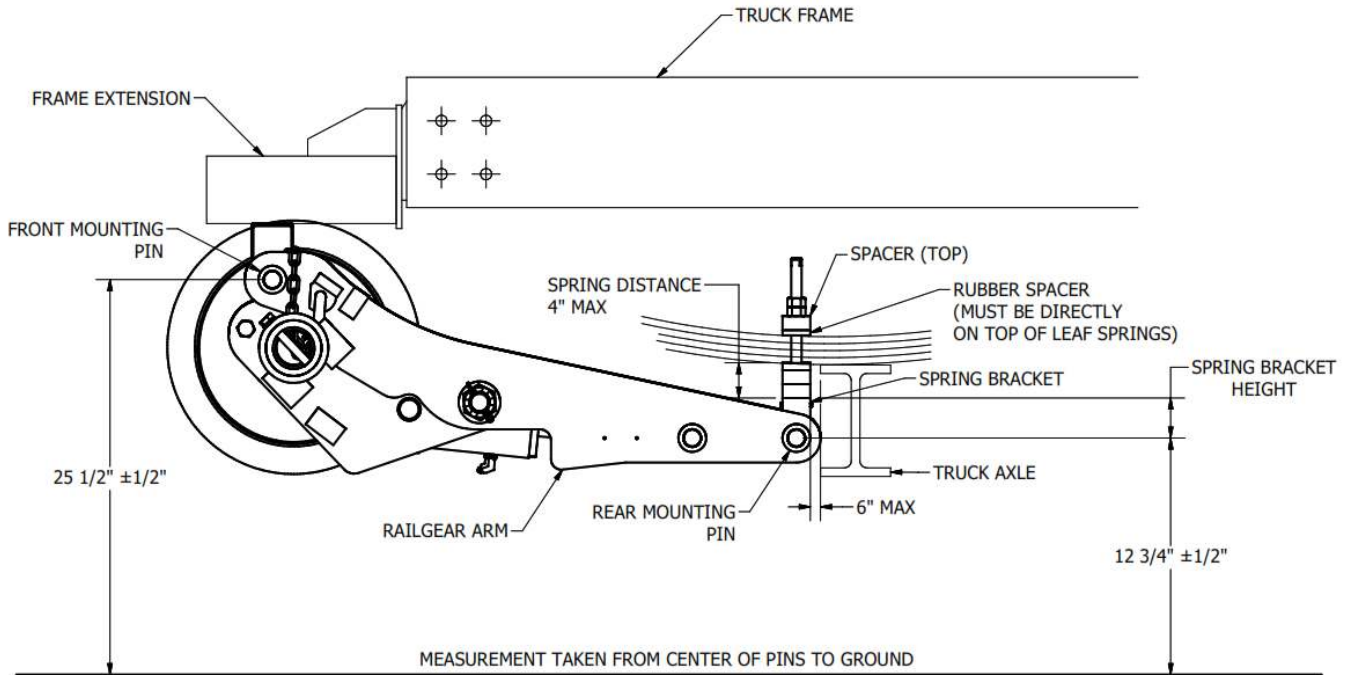


Figure 3-5 Critical Height Measurements

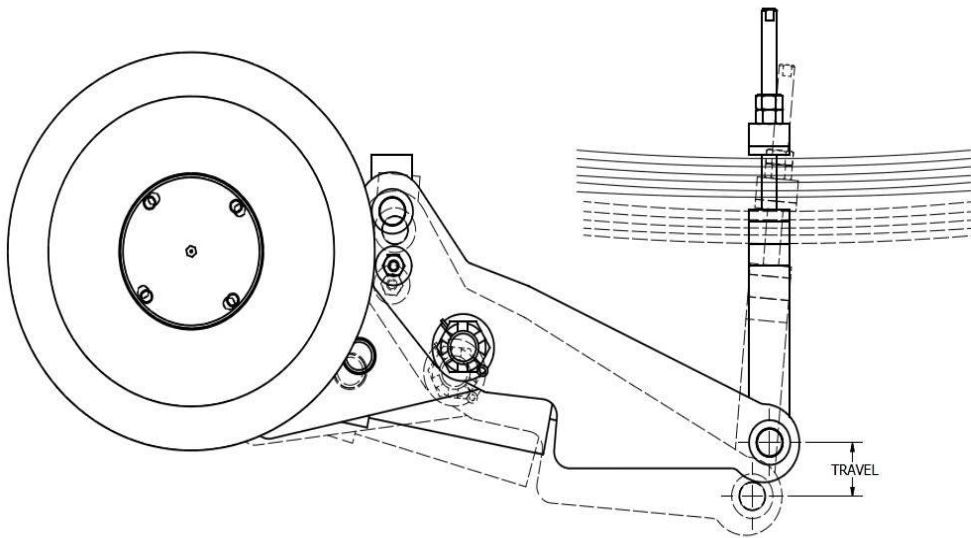


Figure 3-6 Interference Range

Clearance Note

Proper clearance will allow the railgear to move up and down with the truck's front suspension. As the truck tire bumps on the road, the truck spring allows the front axle to move upward. Since the railgear is attached to the spring just forward of the front axle, sufficient clearance must be allowed to prevent interference with other truck parts. The front mounting pin does not move in relation with the truck frame because it is fastened to the frame extension or the truck frame. As the front mounting pin does not move and the rear-mounting pin does, the railgear effectively rotates around the front mounting pin. Therefore, the part of the railgear near the rear mounting pin moves more than the part near the front mounting pin and attention needs to be paid to possible clearance problems that this movement may cause.

NOTE

If the vehicle has been supplied with an integral extended front frame, then frame extensions should not be necessary. The frame-mounting bracket can be brought up to the extended frame. Follow all instructions for finding the proper ground clearance with frame extensions. Solid or load bearing spacers may be required to obtain the proper ground clearance to the front mounting pin.

MOUNT SPRING BRACKET

- Slide the Railgear under the truck frame, positioning the spring bracket hangers as close to the front truck axle as possible. Have a minimum of half of the spacer sitting on the spring. The hanger can be moved a max of 6" from the truck axle.
- Once in position use floor jacks under the outboard and inboard long arm on the driver's side. Use jack to raise spring hanger toward trucks spring leaves. Raise until the rear mounting pin is 12.75" from the ground.
- Once at the correct height attach the spring bracket to the truck spring using a rubber spacer directly on top of the leaf springs. Then use flat bar to secure the spring hangers.
- Tighten until the rubber spacer just begins deforming.
- Repeat on passenger's side.

Spacers will need to be added to ensure spring bracket is 12.75" from the ground.

The spacers are to be placed between the spring bracket, and the underside of the truck spring. After lifting the Link Arms into place, attach the spring brackets to the truck spring, using two 3/4"-10 hex nuts per stud. Push the spring brackets against the axle beam and tighten the hex nuts onto the top spacer to cage the springs. The front railgear can now be actuated with the hydraulic system, which will easily position the front of the Link Arms to the level of the frame extensions for securement. The frame needs to be raised just enough to touch the frame extensions or truck frame.

To check the spring bracket location, check:

- That the spring bracket to truck axle is the same on both sides.

MOUNTING CROSS TUBE

- Ensure that both spring brackets are installed correctly before installing the mounting cross tubes.
- Remove the front pins off and make sure the steering tires are pointed forward. Actuate the hydraulic cylinders which will allow for the long arms to be raised toward the frame. The cross tubes must be elevated until touching the frame or extension.
- The center of the front mounting pin must be 25.5" from the ground. If required, up to 3" of load bearing shims may be used to achieve the correct height. If more than 3" is needed, a mounting block may be required.
- The hydraulic cylinders should be properly positioned to hold shims in place until alignment can be completed.
- Check the truck frame and make sure that there is no interference with the railgear.

TIRE CLEARANCE

NOTE

When the railgear is completely lowered the front of the truck tires should be approximately 2 inches from the top of the installation rails. If the test is being done off-rail, the wheel flange will add an extra inch and a quarter of height, so the wheel should be about 3.25" off the ground (Use a smooth hard surface for this! If the vehicle sinks into the ground, getting accurate measurements will be impossible). The front and rear mounting pins may be lowered to allow for tire clearance. Minimum height for the mounting pin is 23" on front and 10" on rear. This allows the railgear to have a minimum of 8" ground clearance when in the road position.

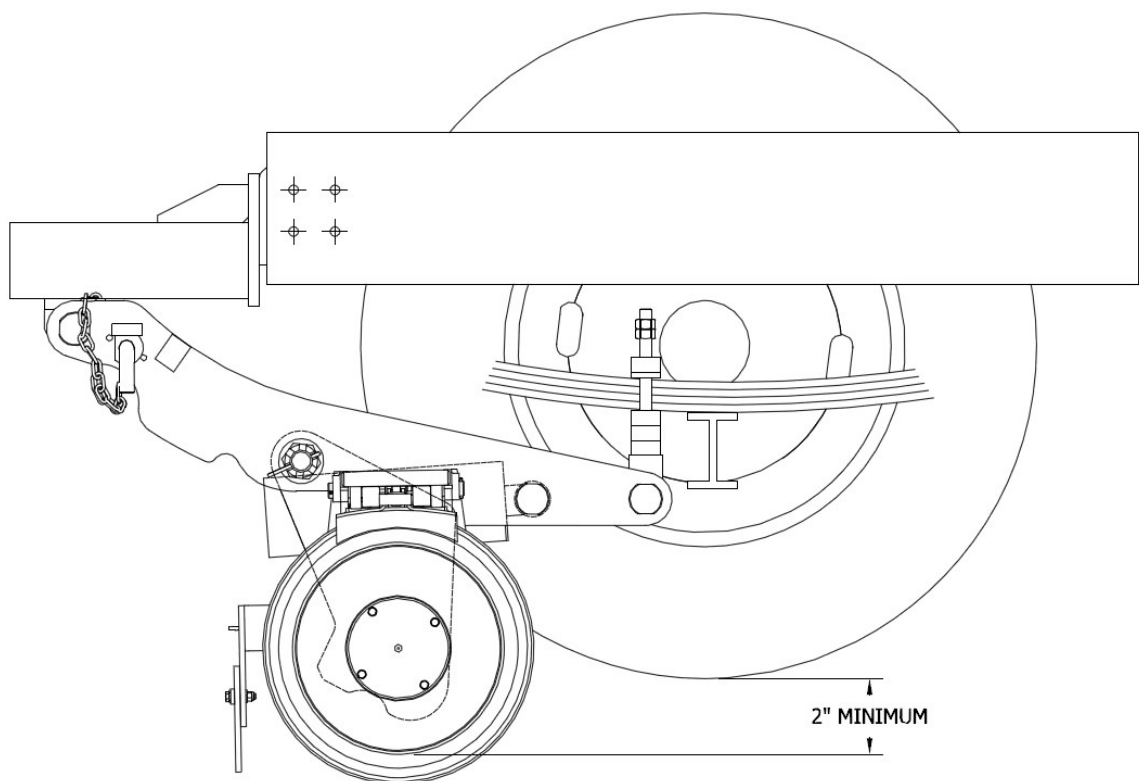


Figure 3-7 Front Tire Clearance

NOTE

Because the angle of the cobra brakes needs to be set before welding the front railgear axle, you should now begin brake installation.

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4.0 FRONT COBRA BRAKE/RAILSWEEP INSTALLATION

COBRA BRAKE GENERAL INFORMATION

First an air toggle valve will need to be installed in the instrument panel of the vehicle. This valve disconnects the railgear brake system when not in use.

On the front valve plate assembly, and rear frame bracket, a relay valve will be located. The control line feeding this relay valve comes from the control valve described above. The supply line to this relay valve comes from the check valve screwed into the air reservoir. There is a ball valve and a pressure regulator inline between the check valve and relay valve. The ball valve will disconnect the railgear brake system from the vehicle air system regardless of the position of the air toggle valve. The pressure regulator will allow adjustment of the front to rear bias, so that both axles will brake evenly and not allow one axle to lock, which would cause the wheels to slide.

The railgear Cobra Brake Assembly brake actuators are connected to the delivery ports on the railgear air relay valve.

KIT COMPONENTS

Table 4-1 Air Brake Kit

K-R1150BXVX001 AIR BRAKE KIT, FRONT (R1110/50)		
Part #	Description	Qty
R-11076A	Operating Valve Assembly	1
R-19035	Air Brake Hose	1
R-19039	Air Brake Hose	1
R-19033	90 Degree Elbow, Male Flare X 3/8" NPT	2
R-32030D	Brake Assembly, Drivers Side	1
R-4920	Bracket, Brake Valve	1
R-19043	Valve, Pressure Protection	1
R-32030P	Brake Assembly, Passengers Side	1
R-990KIT-446	Brake Valve Bracket Hardware Kit	1
K-R11BXVX002B	Air Brake Control Kit	1
K-R1150RSFR001 RAIL SWEEP KIT, FRONT (R1110/50)		
Part #	Description	Qty
R-16589D	Rail Sweep Assembly, Drivers Side	1
R-16589P	Rail Sweep Assembly, Passengers Side	1
R-990KIT-436	Hardware Kit, Rail Sweep/Air Brake	1

INSTALLATION

Install airlines and valves as shown in Air Brake Schematic, Figure 4-2. Make certain that the front air brake pressure regulator is set to 75 PSI.

It is the responsibility of the installer to supply the required air to the in-cab control valve, and from the in-cab control valve to the relay valve. The hoses, fittings etc., required for this connection are not included in this kit.

NOTE

The brakes should not be tested until the front railgear unit has been fully welded on the vehicle.

1. The brakes/sweeps bolt to the collars on the axle. Welding the collar is unnecessary.
2. Fasten the brakes with the provided hardware, as shown in Figure 4-1, through the railsweep bracket (use longer provided bolts on the side with the railsweep) towards the front of the vehicle.
3. Repeat step 2 for other side of axle.
4. Proceed to plumb brakes as shown in Figure 4-2.

NOTE

The sweeps should only be adjusted with the front railgear unit in the fully lowered rail position, and with the axle and brake/sweep mounting bracket angled 5° down toward to the running surface of the rail, as is required for the brake assembly.

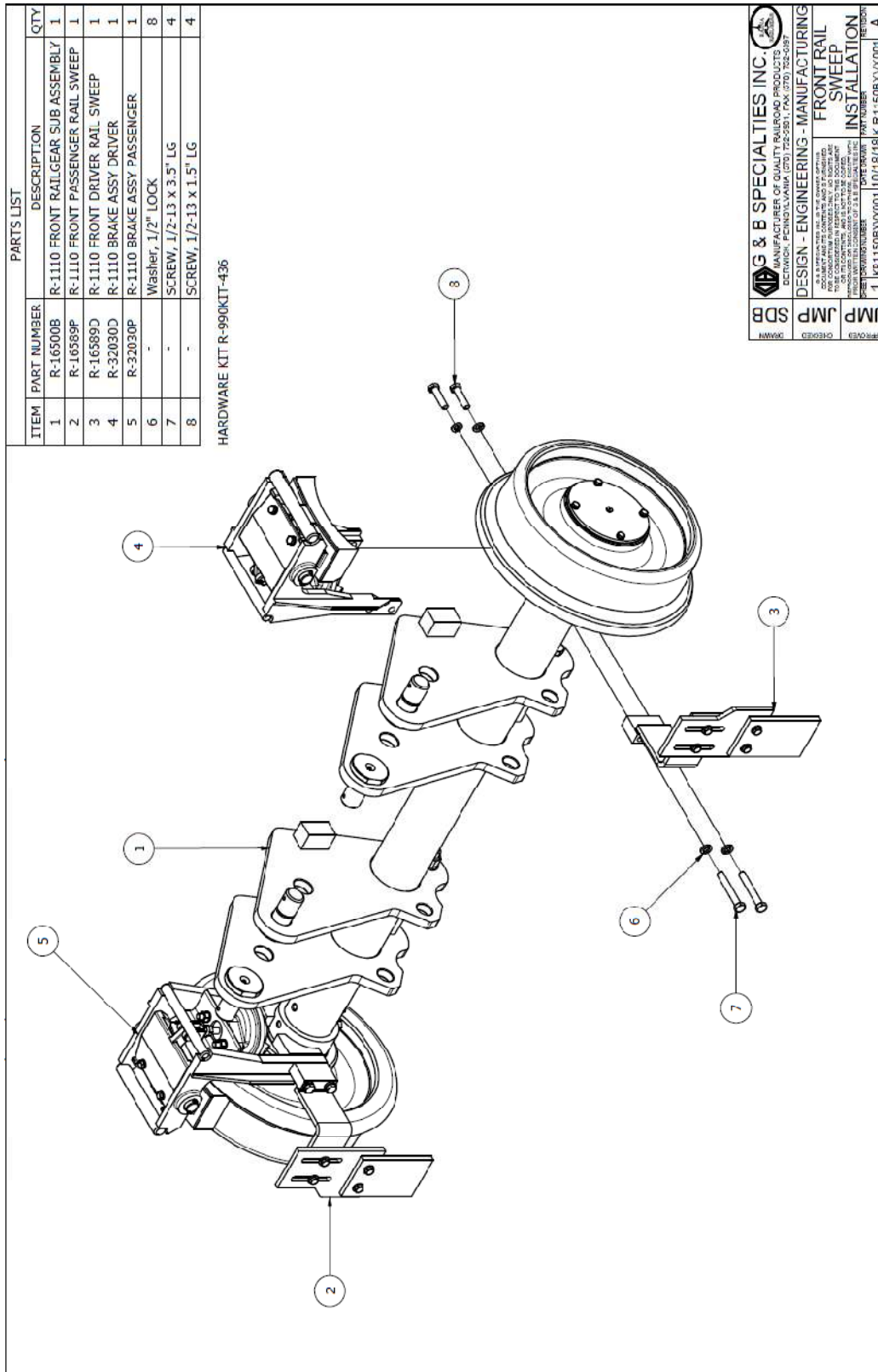


Figure 4-1 Rail Sweep Installation with Cobra Brakes

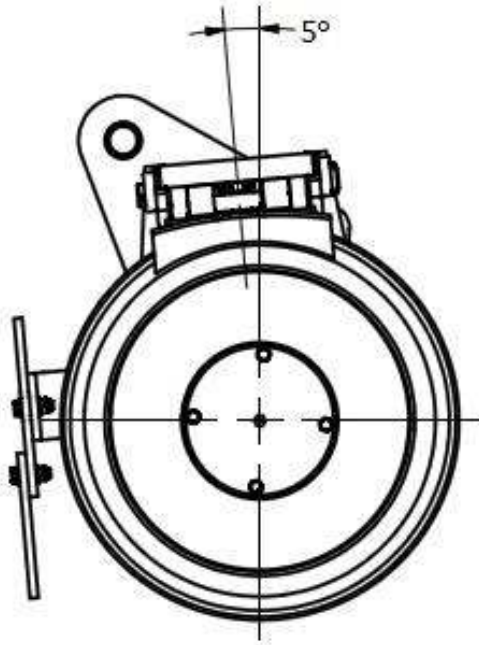


Figure 4-3 Brake alignment

BRAKE ADJUSTMENT/TESTING

1. Proceed to the next section and weld the front railgear axle before testing brakes!
2. There is a jam nut and clevis located on the threaded rod attached to the air brake chamber. This is used to adjust the gap between the wheel and brake shoe.
3. Operate the vehicle on a test track. With the air toggle valve in the “on” position and the ball valves open, check that:
 - When the vehicle brake pedal is depressed, the railgear brake clamps the rail wheel enough to slow its rotation but not enough to stop its rotation. The rail wheels should not be allowed to lock up.
 - That the brakes release properly when the pedal is released.

If the brakes do not function properly, contact a service representative at G&B Specialties.

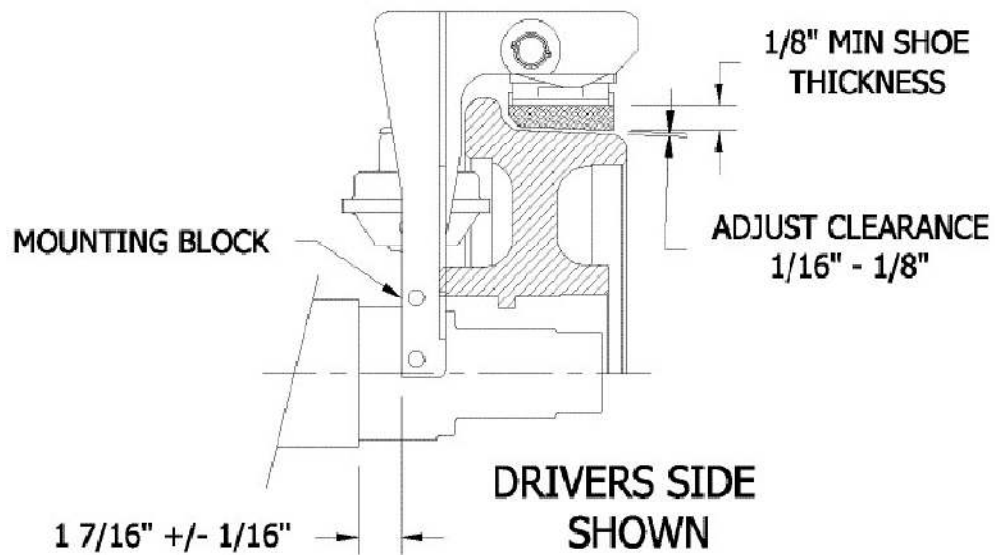


Figure 4-4 Brake Dimensions.

FRONT RAILGEAR ALIGNMENT

Now that the brakes are attached, the front railgear is now ready to be aligned and squared. Three measurements need to be taken to ensure that everything is properly aligned. Before welding, ensure brakes have 5 Degrees of offset, as shown in Figure 4-3.

To align to link arms, check:

- That they are parallel with each other and the truck frame.

The distance between the Link Arms should be the same at the front mounting pin as it is at the rear-mounting pin. This prevents the railgear from binding during up and down movements. In addition, the distance from the truck frame to the Link Arms should be uniform on both sides of the railgear.

- That they are the same distance forward.

Measure the distance from the front mounting pin to the common point on the truck frame. If the measurements are off, square the railgear by loosening the nuts on spring hanger and move the appropriate distance, then re-tighten.

Measure the distance from each spring hanger back to the truck axle. Since the forward position of the Link Arms has been verified in step (2), an off measurement here probably means that the truck axle is miss-aligned and needs to be corrected.

After these alignment checks, and after ensuring that there is sufficient clearance, the frame mounting brackets can be tack welded to the frame extensions, as shown in Figure 4-6.

NOTE

Do not attach welding ground clamp to the railgear wheels. This will cause arcing across the bearings and lead to premature bearing failure.

Raise the front rail wheels just above the floor, making sure there is enough room to slide the surrogate installation rails under the railgear wheels.

Because the railgear axle assembly is not fixed to the pivot arms, the rail wheels will need to be centered. To center the wheels, measure the distance from the inside of the rail wheels to the truck frame. If the measurements are not identical, slide the axle assembly in the appropriate direction and re-check rail wheel to truck frame distances. With the axle tube now centered, tack weld the axle tube to the outer pivot arms.

The front railgear is now ready to be lowered onto the installation rails. When the railgear is completely lowered, the front truck tires should be about 2" off the top of the installation rails. If the railgear will not lift the truck, check that the cylinders are not cross plumbed. If they are not, and the railgear still will not lift, you may need to adjust the hydraulic pressure. Check that the system pressure relief valve, and the front hydraulic control valve are both set high enough for your application.

NOTE

Hydraulic pressure is set at the factory, and is sufficient for most typical installations, so always check for other operational issues before increasing pressure. All hydraulic adjustments must be done by a qualified technician who is familiar with hydraulic operation and should be performed in small increments.

As a final review, recheck the center alignment of the railgear wheels to the truck frame. If it is off, break the tacks between the outer pivot arms and the axle tube, move the axle tube to the correct position and re-tack.

FINAL FRONT INSTALLATION

Ensure that the hex nuts on the spring hangers are tight and secured with Loctite Red or equivalent thread compound. Remove the excess stud length from both spring hangers. Leave approximately 1" of threads above the hex nuts. If these studs are not trimmed, they may cause a clearance problem with other parts of the truck.

After the studs are trimmed, you may hard-weld tacked components as shown in Figure 4-6. Weld as follows:

- Weld inboard side of outside pivot arms to axle tube all the way around.
- Fully weld, on all sides, front mounting blocks / cross tubes to truck frame.
- If shims were required, fully weld shims into place on all sides for each shim location.

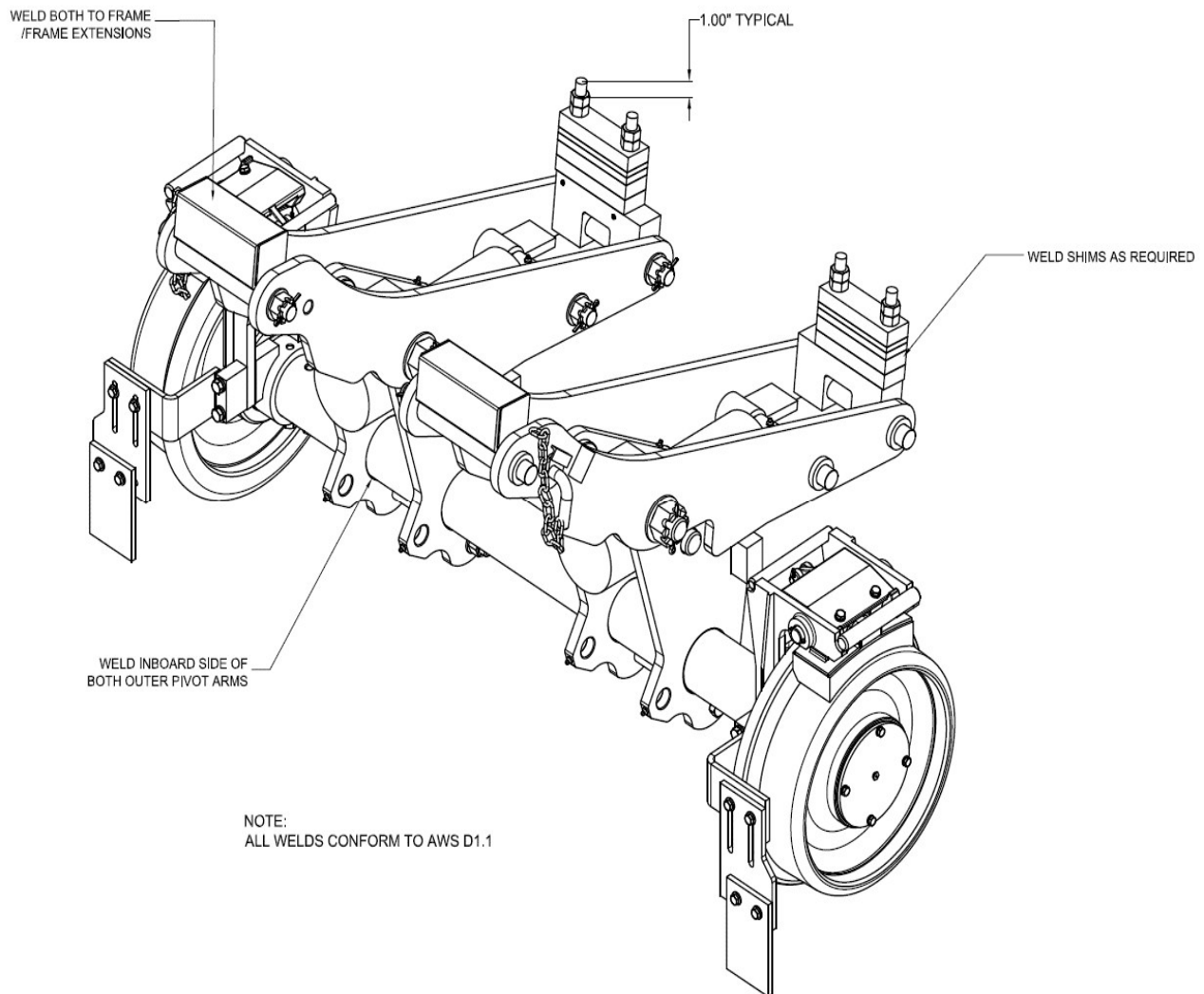


Figure 4-6 Welding Diagram

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5.0 REAR RAILGEAR INSTALLATION

NOTE

It is important to check truck tire pressure (especially the rear tires) to be sure that it is at the manufacturer's recommended level.

With the truck on the rear installation rails, position the rear railgear as close to the rear tires as practical (allowing clearance for mud flaps). The following table gives standard location and clearance guidelines for the rear railgear. Generally, it is advisable to leave a minimum of 2" clearance to any tire, spring or suspension component.

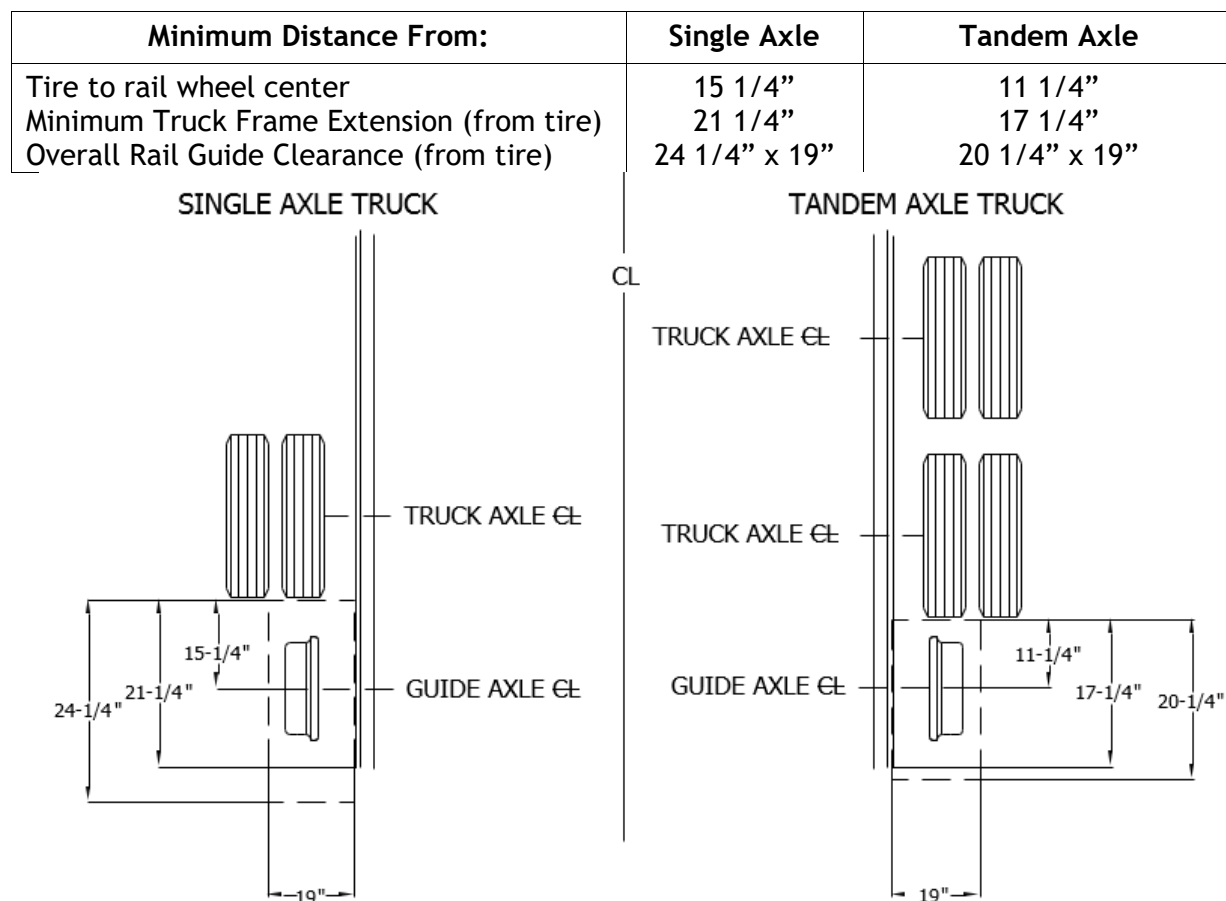


Figure 5-1

If the truck frame does not extend a minimum of 21 1/4" for a single axle or 17 1/4" for a tandem axle trucks, beyond the rear tire/mud flap, it should be extended to provide the necessary clearance for mounting the railgear.

In addition, while the railgear typically drops straight down, it can also articulate from side to side, to allow alignment of the vehicle with the rail. As such a clear space must extend out from the frame outward on either side for at least 19".

REAR SPACER INSTALLATION

Before proceeding, place a temporary 6" x 6" x 3/8" wall steel tube spacer between the truck frame and railgear mounting plate. Actuate both rear cylinders to raise the rear railgear mounting plate to the truck frame.

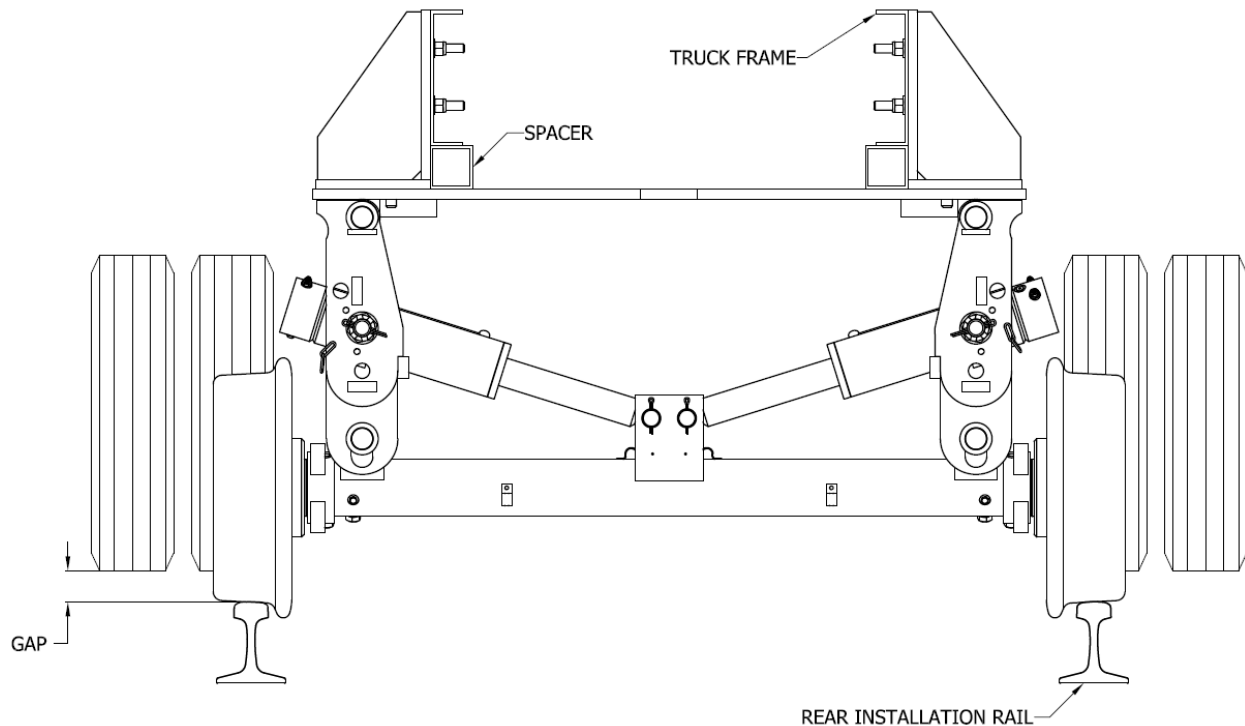


Figure 5-2

NOTE

Temporarily secure the rear railgear in place to prevent any movement during the remaining installation.

Raise the rear mounting plate and the truck frame to lift the truck wheels off the rear installation rails. Measure the gap between the truck tires and the rear installation rails. In general, the truck spring deflection equals 6" minus this gap. To calculate the required spacer thickness, multiply the spring and tire deflection by 60%. The formula is:

$$\text{Calculated Spacer Thickness} = (6.0'' - \text{Gap}) \times .6$$

The following table shows the calculated spacer thickness for several common gaps. Use the table below as a quick reference. Please note, the actual measurements may vary slightly, and should be calculated before fabricating a spacer out of solid steel pieces. This spacer will bear the full force of the vehicle rear axle and should not be hollow.

Table 5-1

If Gap =	Spring and Tire Deflection (6.0" -Gap)	Calculated Spacer Thickness (6.0 -Gap) x .6
5"	1"	3/4"
4"	2"	1 1/4"
3"	3"	1 3/4"
2"	4"	1 3/8"
1"	5"	3"

Release the clamps holding the rear railgear mounting plate to the truck frame. Collapse the railgear to its folded position (which will lower the truck tires down to the installation rails). Replace the temporary 6" spacers with the permanent, calculated spacers, and tack in place onto the rear railgear mounting plate.

Extend the rear railgear to the rail position (which will raise the truck frame). The truck inner duals should be flat to slightly cupping the installation rails. Too much weight on these tires (truck frame too low) will cause rapid tire wear. Not enough weight (truck frame too high) will cause spin and poor braking.

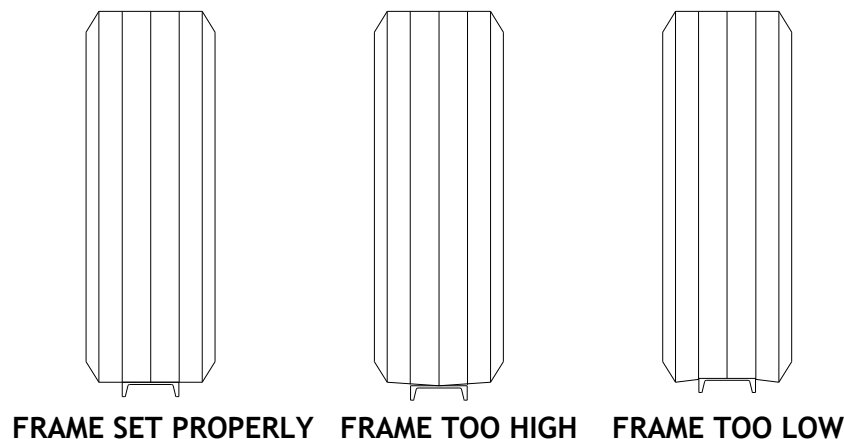


Figure 5-3

If necessary, adjust the spacer thickness to achieve proper tire cup on the installation rails.

SQUARE REAR RAILGEAR WITH TRUCK AXLE

Once the proper spacer height, and the railgear has been spaced away from the rear truck tires, the rear railgear needs to be made square with the rear truck axle. Four measurements must be taken to ensure this requirement.

- The distance from the truck axle to the Rear Railgear at both ends. Distance “A” must be equal to “B” (within 1/16”).
- The diagonal distance from the truck axle to the opposite side of the Rear Railgear.

Distance “C” must equal “D” (within 1/8”)

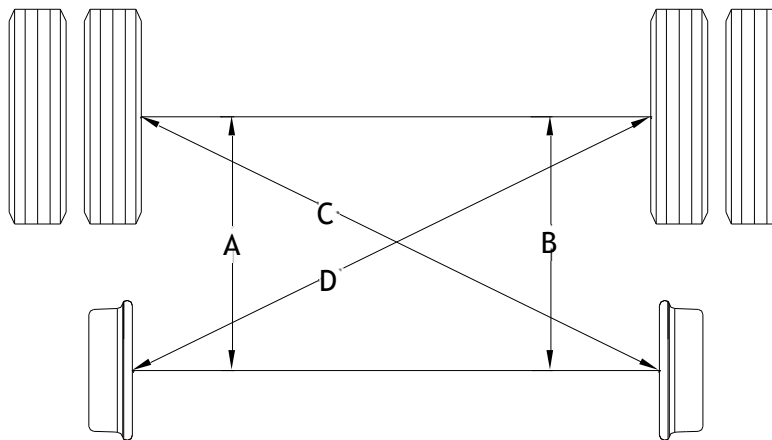


Figure 5-4

NOTE

Although the previous mounting conditions and alignment may be met, be certain that enough room exists between the rear railgear and other equipment. As previously stated, this should include a 2” clearance around the Railgear (more if equipped with remote pin offs). Also, ensure that there is clearance to remove the pin offs from their holes.

FINAL REAR INSTALLATION

Using the mounting plate as a template, drill four 21/32" dia. holes through the truck frame. Locate the mounting plate to allow for maximum adjustment of the rear railgear mounting plate. Bolt the mounting plate on the rear railgear mounting plate and truck frame with 5/8"-11 grade 5 bolts and Nylock nuts. Tack weld the mounting plate to the rear railgear mounting plate. If readjustments are needed later, the welds can be ground off and the rear railgear mounting plate can be slid up or down by loosening the bolts in the slots.

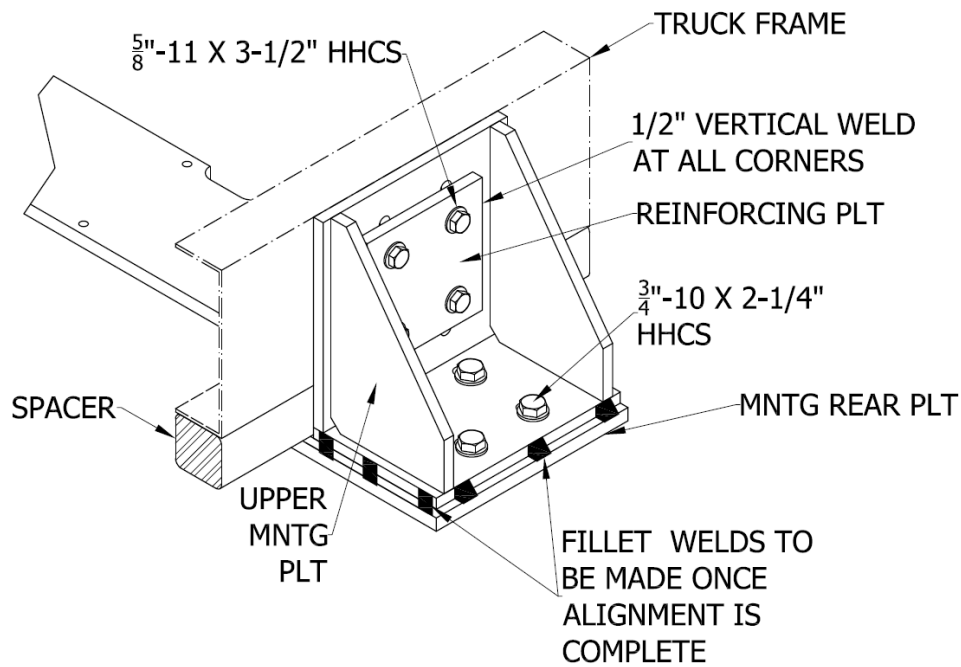


Figure 5-5

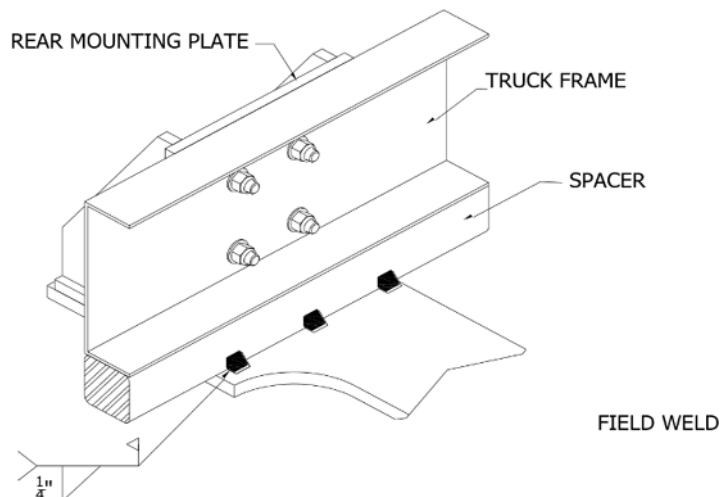


Figure 5-6 Welding of Spacer

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6.0 OPTIONAL EQUIPMENT

RAIL SWEEPS

Units with Brakes

On units equipped with brakes, front and/or rear, the rail sweeps are assembled on the railgear prior to shipment.

Units without Brakes

On units without brakes, rail sweeps are assembled to the railgear prior to shipment.

Rail Sweep Adjustment

Adjust the rubber sweeps so that they are slightly touching the rail head.

Rear Railsweep Installation (without brakes)

The rear railsweep assemblies are shipped assembled and should be parallel with the rail as shown. See pgs. 98, 99, and 100, for assemblies and parts.

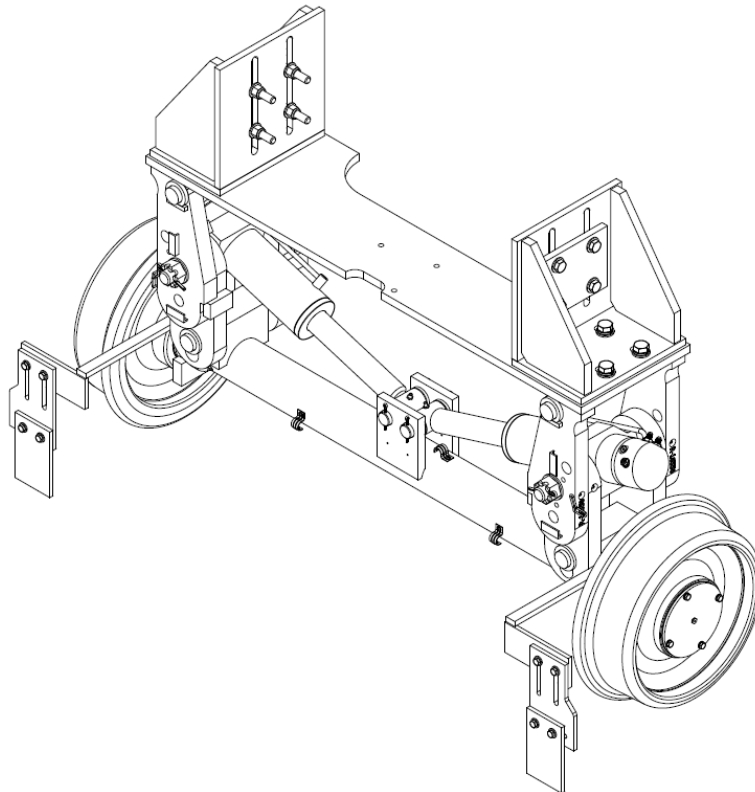


Figure 6-1

Rear Railsweep Installation (with brakes)

The rear brake assemblies are shipped assembled along with the railsweeps. Unlike the front sweeps, they should be parallel with the rail.

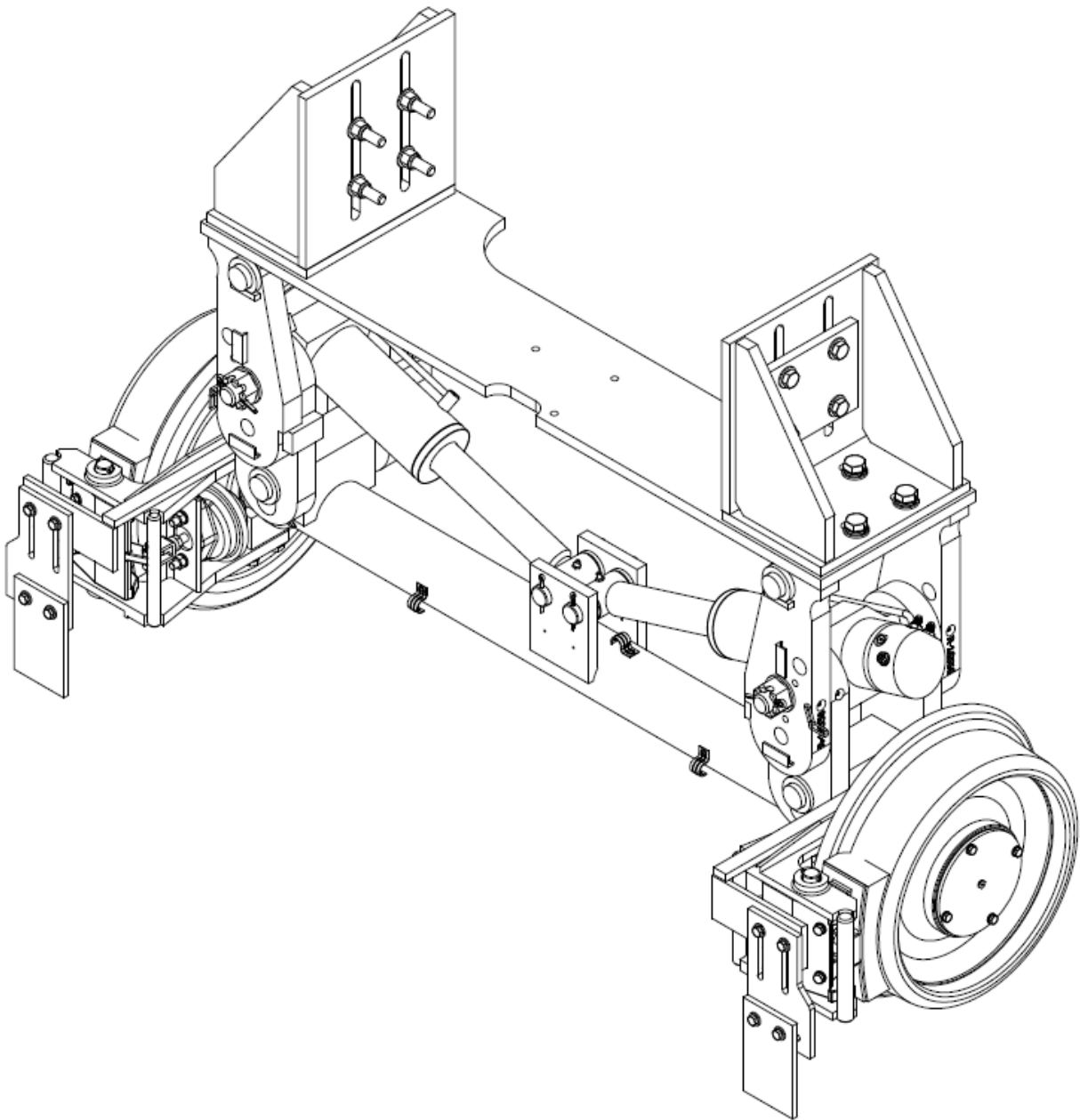


Figure 6-2

BRAKES

Plumbing Installation

An air toggle valve will need to be installed in the instrument panel of the vehicle. This valve disconnects the railgear brake system when not in use.

On the front valve plate assembly and rear frame bracket, a relay valve will be located. The control line feeding this relay valve comes from the control valve described above. The supply line to this relay valve comes from the check valve screwed into the air reservoir. There is a ball valve and a pressure regulator inline between the check valve and relay valve. The ball valve will disconnect the railgear brake system from the vehicle air system regardless of the position of the air toggle valve. The pressure regulator will allow adjustment of the front to rear bias, so that both axles will brake evenly and not allow one axle to lock and slide.

The railgear Cobra Brake Assembly brake chambers are connected to the delivery ports on the railgear air relay valve.

Install airlines and valves as shown in the **Air Brake Schematic**. Make certain that the front air brake pressure regulator is set to 75 PSI and the rear air brake pressure regulator is set to 30 PSI.

Testing

Operate the vehicle on a test track. With the air toggle valve in the “on” position and the ball valves open, check that:

- (1) When the vehicle brake pedal is depressed, the railgear brake clamps the rail wheel enough to slow its rotation but not enough to stop its rotation. The rail wheels should not be allowed to lock up.
- (2) That the brakes release properly when the pedal is released.

If the brakes do not function properly, contact a service representative at G&B Specialties.

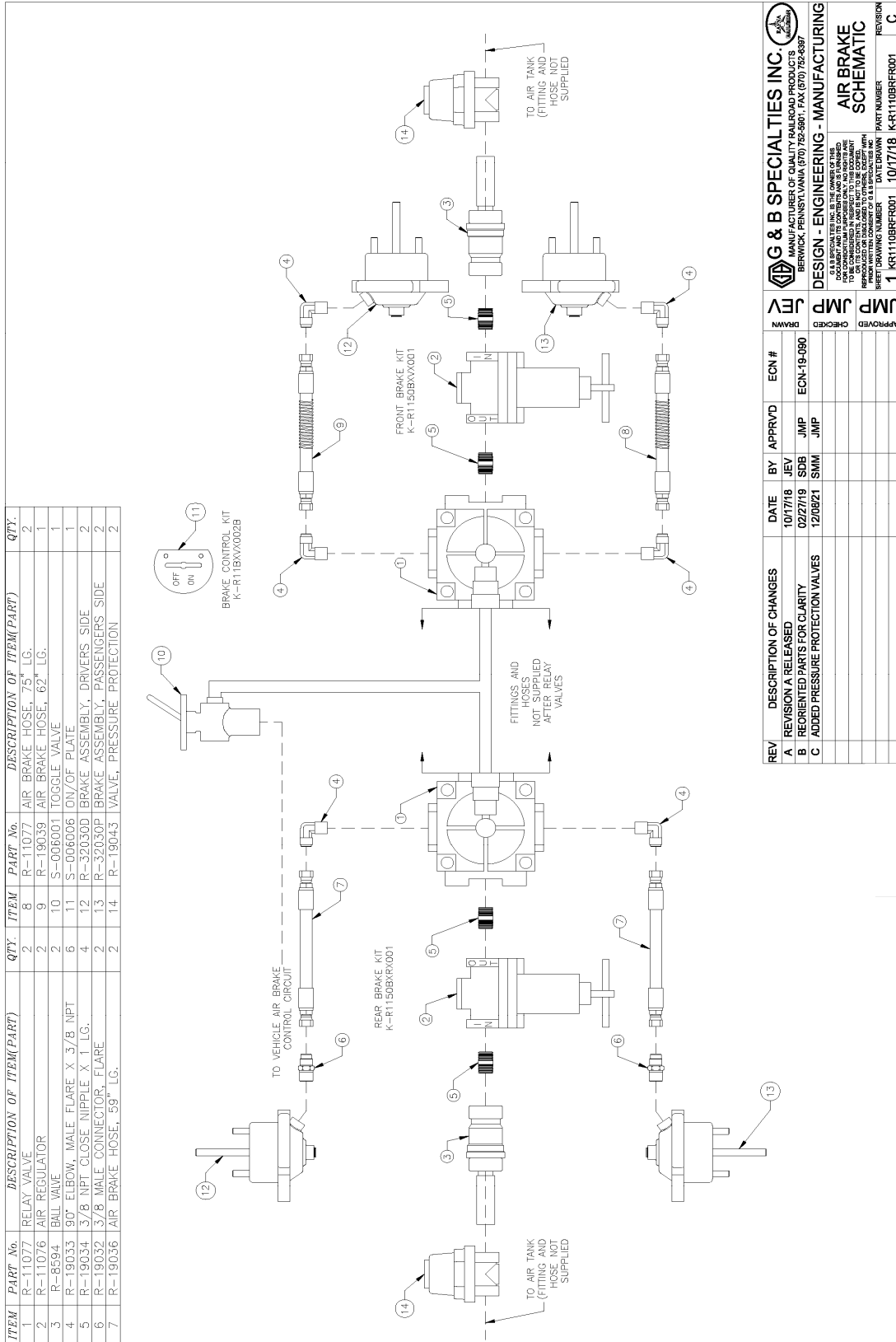


Figure 6-3

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DATE: 12/08/21
BY: SMM

ECN # ECN-19-090

REVISION A RELEASED
REVISION B REORIENTED PARTS FOR CLARITY
REVISION C ADDED PRESSURE PROTECTION VALVES

SHEET DRAWING NUMBER 10/17/18
PART NUMBER K-R1110BRFR001
REVISION C

Brake Installation
Table 6-1 Kit Components

Rafna Industries Ltd.				17-Jul-19
				Rev. E
HR K-R1150BXR001 AIR BRAKE KIT, REAR (R1150)				
Part Number	Description	# Req.	Remarks	Check
R-11076A	Operating Valve Assembly	1		
R-19039	Air Brake Hose, 62"	2		
R-19032	3/8 Male Connector, Flare	2		
R-32030D	Brake Assembly, Drivers Side	1		
R-32030P	Brake Assembly, Passengers Side	1		
R-16593D	Rail Sweep Assembly, Rear Driver's	1		
R-16593P	Rail Sweep Assembly, Rear Passenger's	1		
R-4920	Brake Valve Bracket	1		
R-990KIT-446	Screw, 5/16" x 1 1/4" Gr. 8 Z/Y	2	BRAKE VALVE BRACKET HARDWARE KIT	
	Washer, 5/16" Type-A Z/Y	4		
	Nut, 5/16" Nylock, gr.8 Z/Y	2		
R-990KIT-433	Washer, 1/2" Lock Z/Y	8	BRAKE/RAIL SWEEP HARDWARE KIT	
	Screw, 1/2" x 1 3/4" Gr. 8 Z/Y	4		
	Screw, 1/2" x 1-1/4" Gr. 8 Z/Y	4		

On the Front Valve plate assembly, and rear frame bracket, relay valves will be located. The control line feeding these relay valves comes from the air toggle valve described above. The supply lines to the relay valves comes from a check valve screwed into the air reservoir. There is a ball valve and a pressure regulator inline between the check valves and each relay valve. The ball valve will disconnect the railgear brake system from the vehicle air system regardless of the position of the air toggle valve. The pressure regulator will allow adjustment of the front to rear bias, so that both axles will brake evenly and not allow one axle to lock and slide.

The railgear Cobra Brake Assembly brake chambers are connected to the delivery ports on the railgear air relay valves.

Install airlines and valves as shown in the above Air Brake Schematic. Make certain that the front air brake pressure regulator is set to 75 PSI.

It is the responsibility of the installer to supply the required air to the in-cab control valve and from the in-cab control valve to the relay valve. The hoses, fittings etc. required for this connection are not included in this kit.

See pages 79, 80, and 101, for Assembly and Parts.

1. Place brake assemblies on stub axle and bolt them fast.
2. Install railsweeps, using the longer hardware on the side of the horizontal brake assembly.
3. Proceed to plumb the brakes.
4. Adjust and test brakes as outlined.
5. Loosen the sweep plate hardware, and lower or raise the rubber sweep as required so the bottom of the sweep is just above the top of the rail head.
6. Adjust and test brakes as outlined on pg. 37.

AIR LOCK OPTION

The following procedure details the Installation of the Front Air Lock Kit.

Table 6-2 K-R1150FXVX001 Kit Components

PART NUMBER	DESCRIPTION	QTY
R-16441	Pneumatic Cylinder Mounting Bracket	2
R-16440	Locking Pin	2
R-26023	Pneumatic Cylinder	2
R-11230	Female Union Tee, 1/4" Tube OD	2
R-11231	90° Elbow, 1/8" MPT x 1/4" Tube OD	7
R-11232	Dash Mount Air Valve	1
R-11233	1/4" Polyurethane Tubing (100')	1
R-990KIT-480	Hex Nut, 5/16" -24 UNF Jam Z/Y	2

1. If ordered with the Front Air Lockup Kit, the railgear will come with the outside lockup pins, holding collars, and latch tabs removed. If the railgear is being converted to the Air Lockup Kit, these items will need to be removed before installing.
2. Depending on the frame width of the vehicle and the position of the arms when installed, this kit can be mounted on the outside or inside arms of the railgear to ensure proper clearance and function. (Instructions and Figures are detailed with mounting of the kit on the outside arms. The same procedure applies to mounting on the inside arms.)
3. Lower the railgear until out of the way or until the flange hits the ground.
4. Place the locking pin (R-16440) inside and through the hole of the pneumatic cylinder mounting bracket (R-16441). (This will be the non-counter-bore end)
5. Place the pin through the lockup hole on the railgear arm and the mounting bracket against the arm. (This is aligning the pin and bracket with the arm to ensure the pin will always have proper movement and not bind.)
6. Adjust the mounting bracket that it does not interfere with any other parts of the railgear and tack in place ensuring the mounting bracket is tight against the arm and sitting flat.
7. Remove the locking pin and rotate the gear to the road position. Place the pin back in the mounting bracket and through the lockup hole in the railgear arm and ensure it goes through and has proper clearance with the lockup hole on the pivot arm. If this is not the case, remove tack welds and re-position and test again.
8. Once location is confirmed, it would be a good time to test fit the air cylinder in the mounting bracket if the railgear has front brakes to ensure proper clearance and no interference through its full rotation.

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9. Once everything has been tested, weld the mounting bracket to the railgear arm using 1/4" fillet welds and welding at least 2 sides of the mounting bracket.
10. Once welded, install the lockup pin through the mounting bracket and into the arm. Remove the jam nut from the lockup cylinder and install in the mounting bracket. Re-install the jam nut on the lockup cylinder once through the mounting bracket to secure. Thread the 5/16"-24 jam nut onto the threaded rod of the lockup cylinder. Screw the lockup pin onto the threaded rod of the lockup cylinder.
11. At this point, the cylinder should be able to be actuated by hand. Retract the cylinder so that it pulls the pin back out of the lockup hole and ensure it is not sticking out of the inside of the arm that it will interfere with the pivot arm when rotated. If the pin is sticking out, it needs to be threaded more onto the rod of the lockup cylinder.
12. Once adjusted, tighten the jam nut against the locking pin to keep it in place.
13. Rotate the gear to the road position and actuate the cylinder manually to ensure the locking pin passes through the hole on the pivot arm locking the gear in place with proper engagement. Adjust locking pin if needed.
14. Repeat the same installation procedure for the opposite side.
15. With both lockups installed, plumb the air cylinders using the correct fittings and valves.
16. Cover any part of the air hoses that contact sharp edges on the vehicle with wire loom.
17. Run the railgear up and down, making sure the lockup pins engage the pivot arms correctly when in the road position and do not interfere with anything on the vehicle/railgear in its full range of motion/rail position.

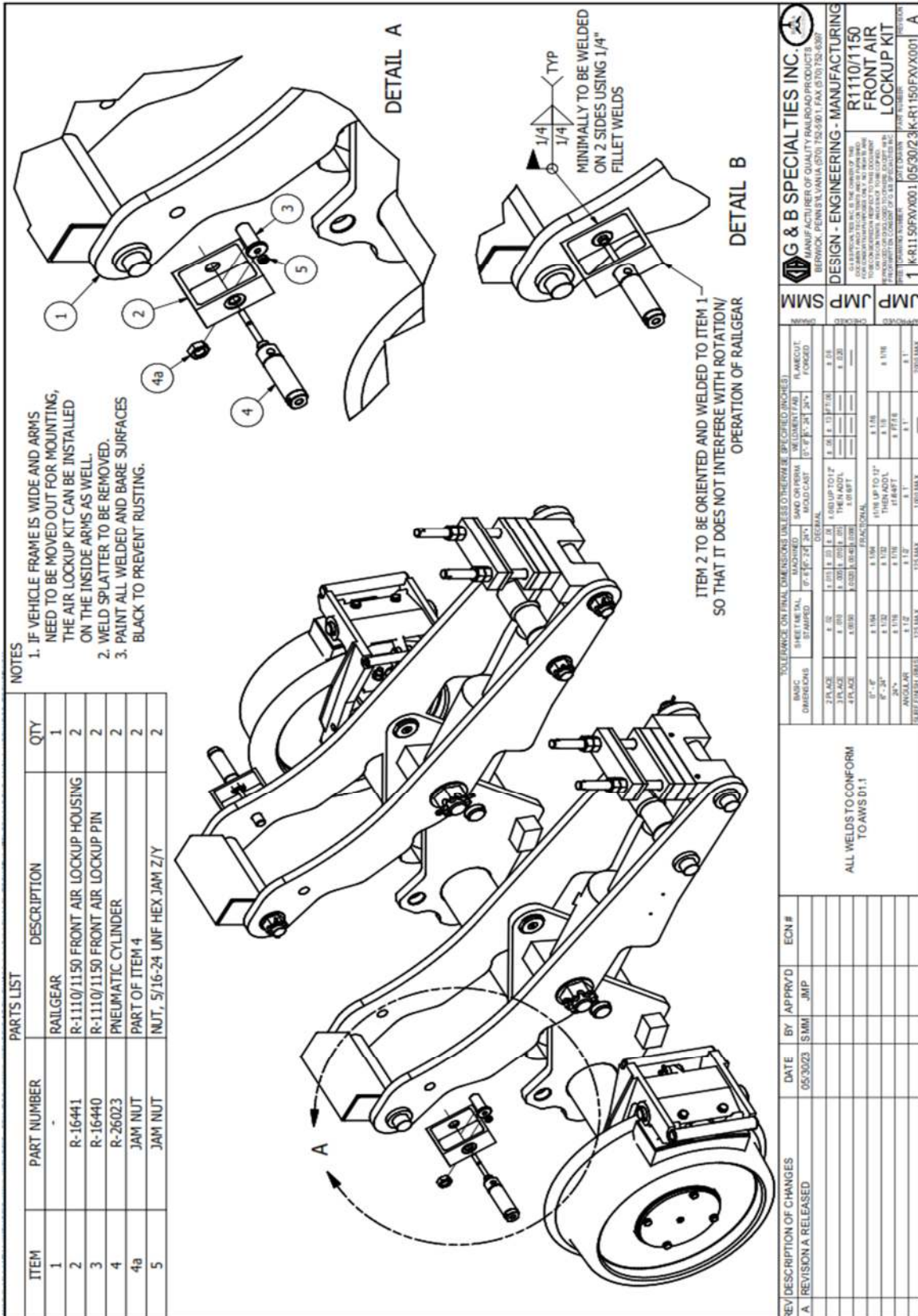


Fig 6-4

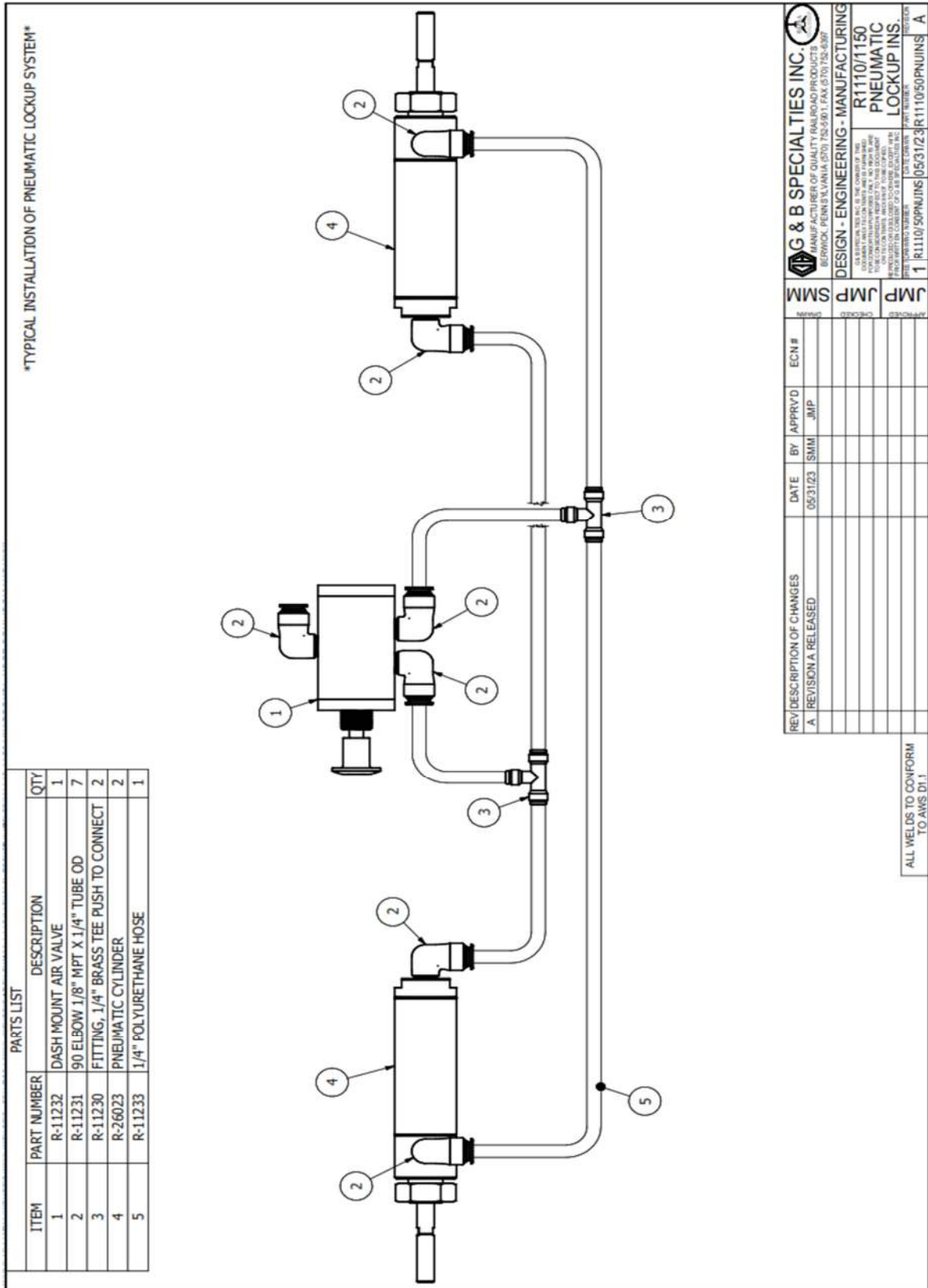


Fig 6-5 Typical Installation for Front and Rear Pneumatic Lockup

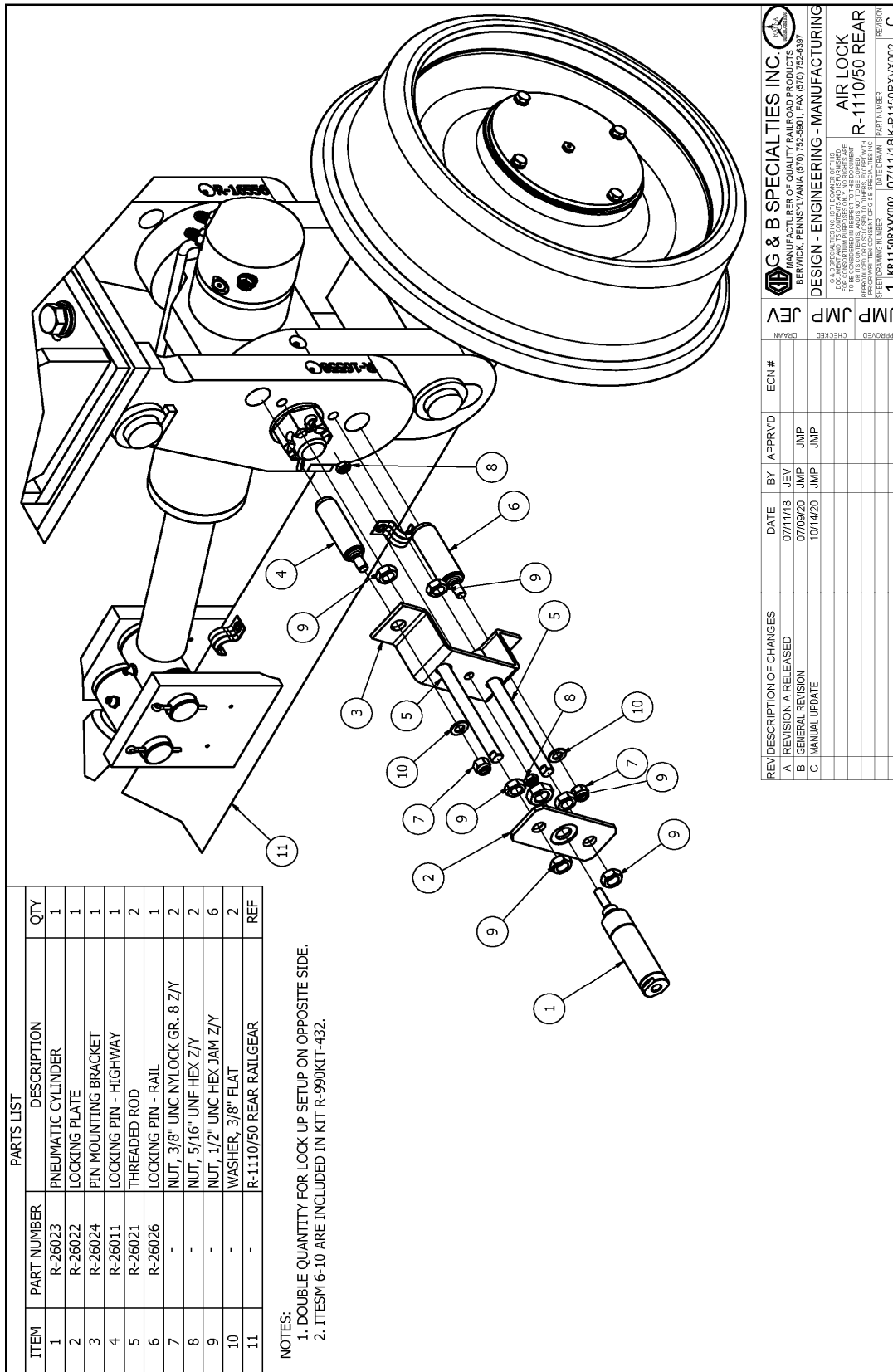
The following procedure details the Installation of the Rear Air lock Kit.

Table 6-3 K-R1150RXVX002 Kit Components

PART NUMBER	DESCRIPTION	QTY
R-26022	Pneumatic Locking Plate	2
R-26024	Pin Mounting Bracket	2
R-26023	Pneumatic Cylinder	2
R-26021	Threaded Rod	4
R-26011	Locking Pin - Highway Position	2
R-26026	Locking Pin - Rail Position	2
R-11230	Female Union Tee, 1/4" Tube OD	2
R-11231	90° Elbow, 1/8" MPT x 1/4" Tube OD	7
R-11232	Dash Mount Air Valve	1
R-11233	1/4" Polyurethane Tubing (100')	1
R-990KIT-432	Washer, 3/8" Flat	4
	Nut, 3/8" Gr.8 Nylock Nut Z/Y	4
	Hex Nut, 1/2" Jam Z/Y	12
	Hex Nut, 5/16"	4

1. Fasten the two locking pins (Item 4 & 6, Fig 6-6) to the pin mounting bracket (Item 3, Fig 6-6) using two 3/8" flat washers and two 3/8" nylock nuts (Items 7 & 10, Fig 6-6) as shown in Figure 6-4.
2. Thread the threaded rods (Item 5, Fig 6-6) into one 1/2" jam nut (Item 9, Fig.6-6) until there is 3/4" of thread sticking out. Thread the guide rods into the drilled holes, making sure only 3/4" of thread is in the holes, as shown in Figure 6-6.
3. Fasten the Pneumatic Locking plate (Item 2, Fig 6-6) to the Pneumatic cylinder (Item 1, Fig 6-6) as shown in Figure 6-6.
4. Fully extend the Pneumatic cylinder and fasten the rod end of the cylinder to the pin mounting bracket using two 5/16" jam nuts (Items 8, Fig 6-6) as shown in Figure 6-6.
5. Place the pin mounting bracket onto the threaded rods and thread two 1/2" jam nuts (Item 9, Fig 6-6) onto the threaded rods as shown in Figure 6-6.
6. Push the assembly down the guide rods until the pin plate hits the lower link arm spacers and fasten the tie plate with the two remaining jam nuts and tighten the 1/2" jam nuts.
7. Make sure that the cylinder rod end does not contact the arm when assembled. Adjust the pin plate on the cylinder rod end if there is contact.

8. Repeat same procedure for the opposite side.
9. Plumb the air cylinders using the correct fittings and valves.
10. Cover any part of the air hoses that contact sharp edges on the vehicle with wire loom.
11. Run the railgear up and down, making sure the pin plate contacts the link arm flush when the lockup is engaged in the lock position.



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CHECKED	JMP	10/4/20	BY	JMP	DATE	10/4/20	REVISION	B	GENERAL REVISION
DRAWN	JMP		BY	JMP	DATE		REVISION	C	MANUAL UPDATE

ECN #

REV/DESCRIPTION OF CHANGES

1 KR1150RXX002-07/11/18 K-RT1150RXX002 C

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AIR LOCK R-1110/50 REAR

Fig 6-6

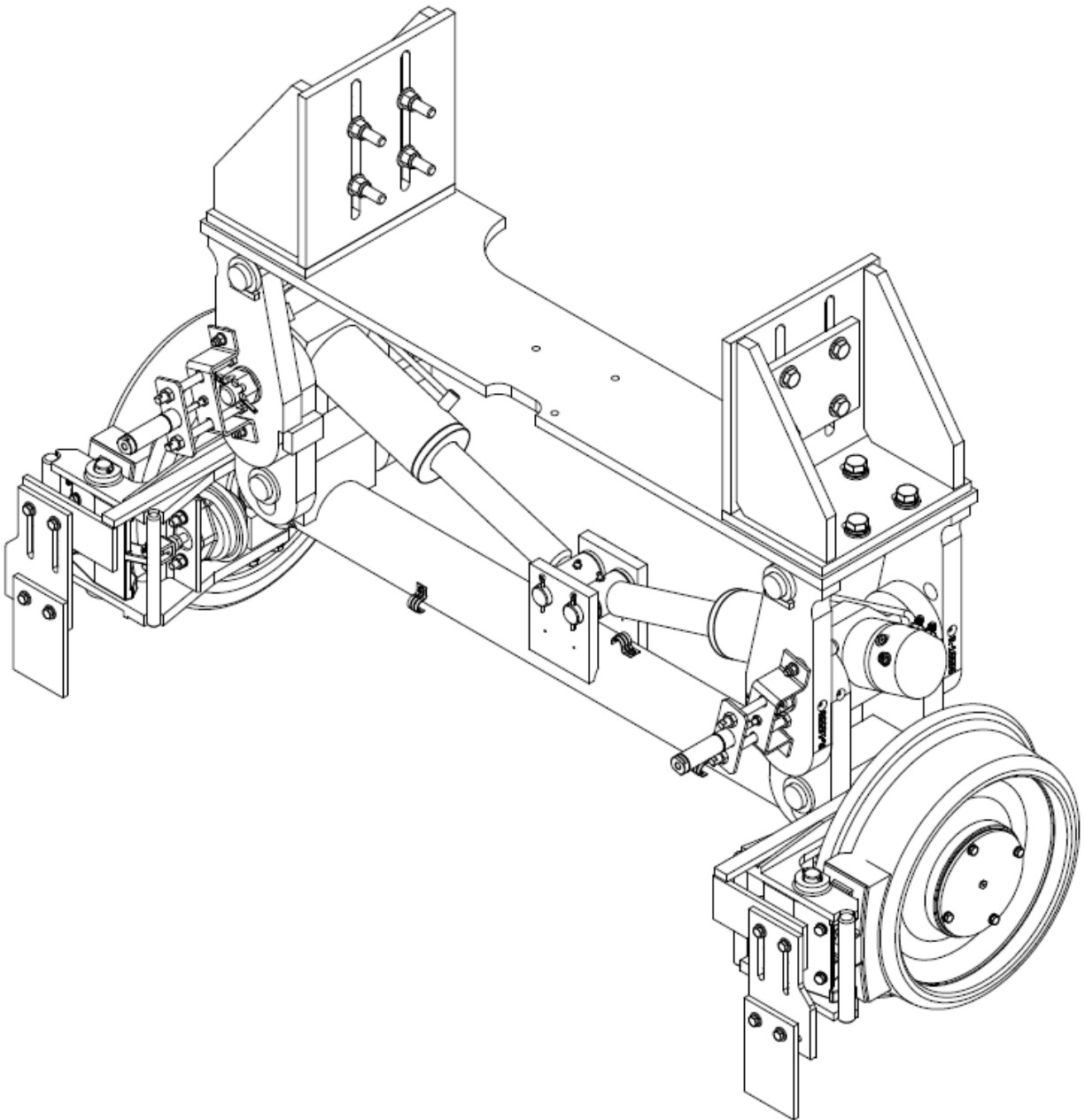


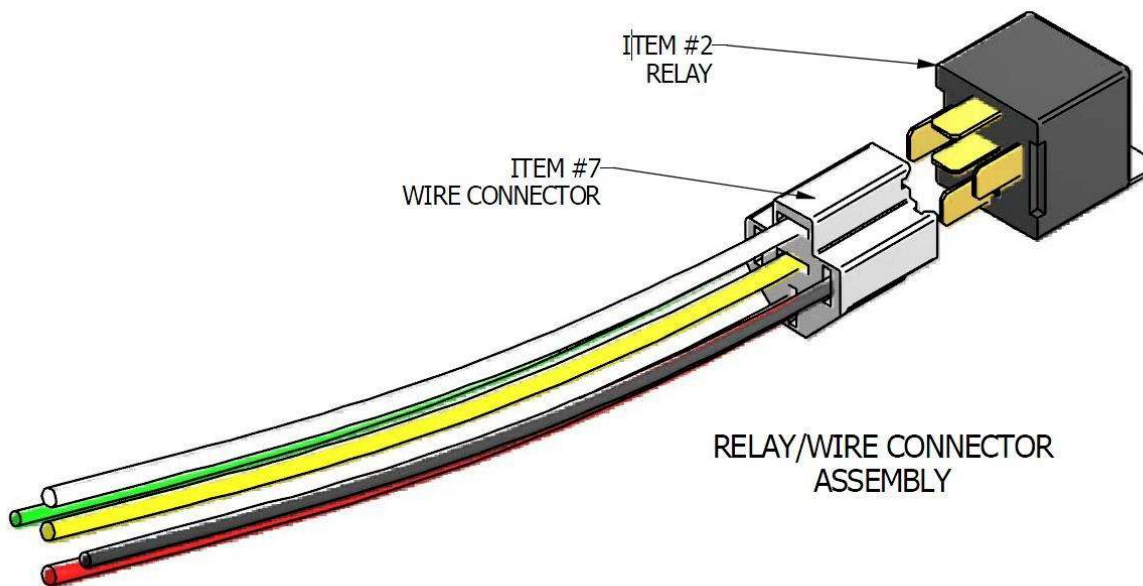
Fig 6-7

DUAL AXLE SHUNT

When using a dual axle shunt kit, it should be applied to both the front and rear axle. This shunt kit will provide continuity between the right and left rail wheels on each axle. It should be noted; the kit will not create continuity between the front and rear rail gear axles.

Table 6-4 Dual Axle Shunt Components

Part Number	Description	Qty
CO-106	Pilot Switch Red	1
CO-124	Relay, 30 Amp Dual 87 Terminal	2
CO-071	Circuit Breaker, 10 Amp	1
R-10422	Wire Connector for Relay	2
R-16320	Insulator, Axle Bolt	4
R-16319	Washer, 1/4" Insulation	4
R-16316	Ring Terminal, 1/4" 16 Ga	4
990722-100-22	Screw, 1/4" X 1" (Use On R-1110)	4
990722-125-22	Screw, 1/4" X 1 1/4" (Used On R-1150)	4
R-16321	Dash Shunt Sticker	1
R-16317	Quick Disconnect Term., Ins. 1/4"	12
R-16318	Black Wire, 16 Ga 100 Ft.	4



Shunt Installation

1. Find an ignition activated power supply on your vehicle, and install the provided fuse holder, fuse, and pilot lighted switch.
2. Mount the provided relays in a suitable location.
3. Connect the power wire from the red pilot switch, to both relays at terminal #85, via the black wires on the provided connector assemblies, and solder and heat shrink.
4. Secure the green wires coming from the #86 terminals to a suitable ground. The front and rear relays do not need to be connected to the same spot on the vehicle, but there should be continuity between grounding points.
5. Using a 12-gauge THHN stranded jumper wire, connect the Shunt/Sweep Assembly, from the #10 stud welded on shunt/sweep assembly, to the rail axle as per the WRP Shunt Connection Wiring Diagram, (K-R1115SHUNT001), provided in this manual. Be sure to connect both axles.
6. Run the white wire, coming from terminal #87 of the front relay, to the front passenger's side ring terminal, as per the drawing provided. Solder and heat shrink all connections.
7. Run the red wire, coming from terminal #30 of the front relay, to the driver's side axle ring terminal, as per the drawing provided. Solder and heat shrink all connections.
8. Do not use the yellow wire, coming from terminal #87 on the front relay (not shown in drawing). Instead wire nut or heat shrink the end of the wire to prevent it from making contact with the vehicle or railgear. The Yellow wire WILL be used on the rear relay, while the rear white wire (also not shown) will be masked off.
9. Run the yellow wire, coming from terminal #87 of the rear relay, to the driver's side rear axle ring terminal as per the drawing provided. Solder and heat shrink all connections.
10. Run the red wire, coming from terminal #30 of the rear relay, to the rear passenger's side axle ring terminal as per the drawing provided. Solder and heat shrink all connections.
11. This completes the installation of the dual axle shunt kit. When the interior switch is turned on it will pull in the relays and provide continuity between the front axle wheels and the rear axle wheels. It will not provide continuity between the front and rear rail wheels.

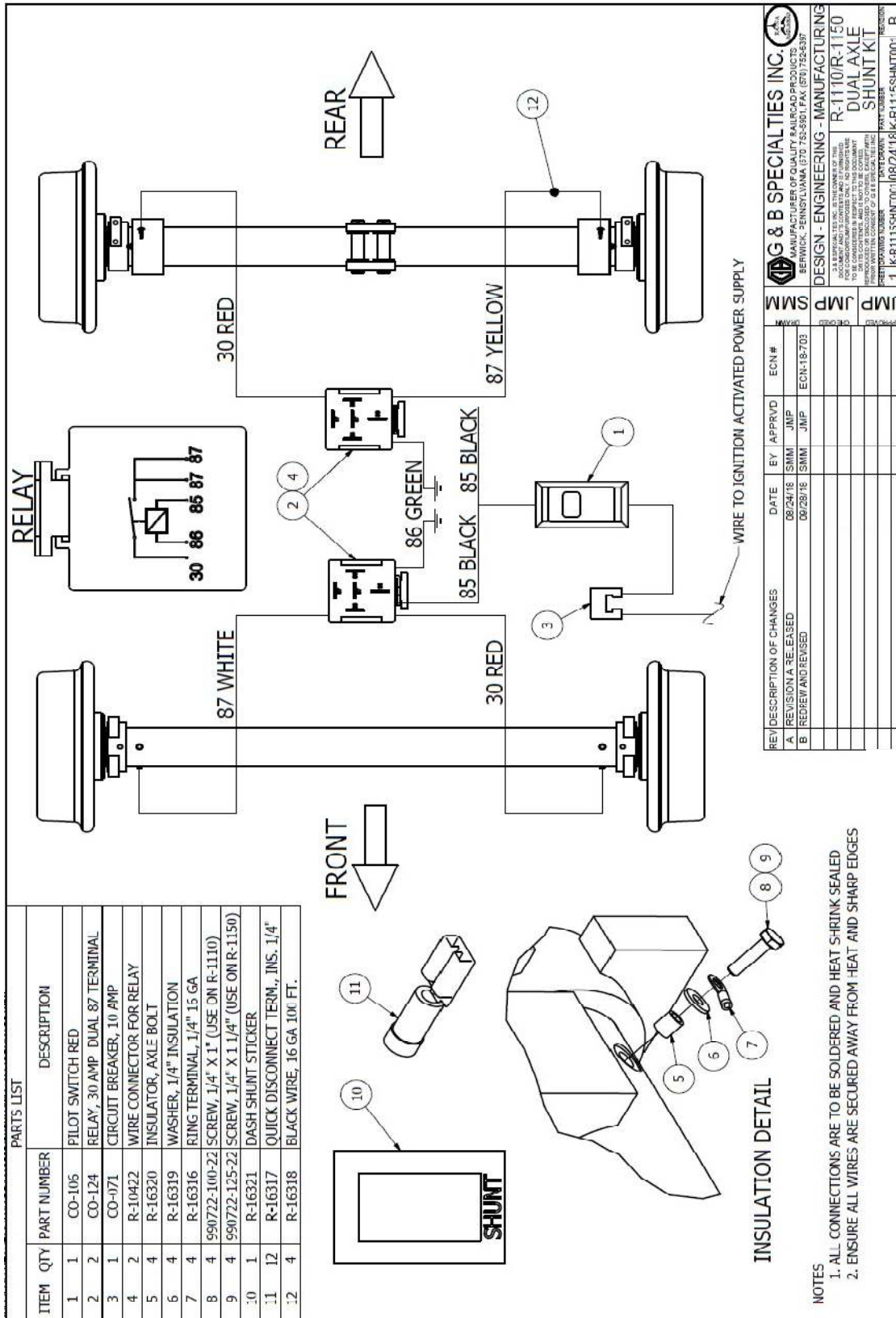


Figure 6-8 Dual Axle Shunt

7.0 FRONT TO REAR ALIGNMENT

FINAL ALIGNMENT

These final adjustments are necessary to align the front railgear to the rear railgear (which has already been aligned with the rear truck axle). The alignment of the railgear to the truck will affect the way the vehicle tracks down the rail. If the vehicle is not properly aligned the railgear may pull to one side, have excessive wheel flange wear and be prone to derailment. Four measurements need to be taken to do this final alignment and should be taken with the railgear fully deployed in the rail position

- (1) The distance from the Front Rail Wheel to the Rear Rail Wheel on each side in figure 7-1, distance “E” must equal to “F” (within $\frac{1}{8}$ ”).
- (2) The diagonals from the Front Rail Wheel to the Rear Rail Wheel on the opposite side.

In figure 7-1, distance “G” must be equal to “H” (within $\frac{1}{4}$ ”)

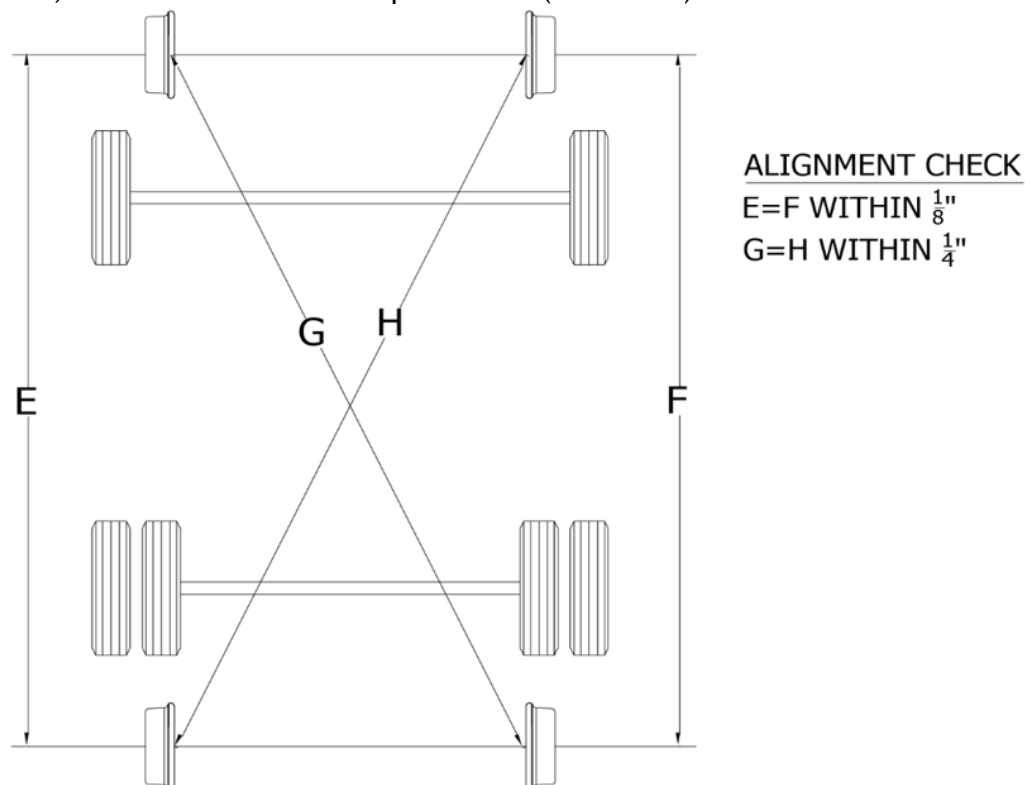


FIGURE 7-1

After the front and rear railgear have been properly aligned, complete structural welds may be applied at the locations that were previously only tacked:

- On the front railgear, between the frame mounting brackets and frame (or frame extensions, if required).
- On the front railgear between the axle tube and the lower portion of the clamp assembly.

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8.0 FINAL CHECKLIST

- Rail test the vehicle to check for good traction and braking. An industrial siding, or some authorized track time will be required. Check that the rail wheels do not lock up and slide.
- Adjust the railgear for proper height as required.
- Cross check the rear railgear to the vehicle rear axle again.
- Weld the mounting plate to the rear frame mounting plate with two 2” welds per side.
- Welding the plates must be done, do not forget it.
- Double-check that all welds, nuts, cotter pins and fasteners are in place and installed properly.
- Route and secure all hoses and wires, making sure that there will be sufficient clearance from pinch points and exhaust.
- Check the Hydraulic reservoir for proper fill level.
- Raise the railgear to the road position and install locking pins.
- Apply the decal kit as shown on page 110, 111, and 112.

INSTALLATION CHECK LIST

Check tire pressures

Front Alignment

- Front mounting Pin height: **25 1/2”**
- Rear mounting Pin height: **12 3/4”**

Rear Alignment

	<u>Single Axle</u>	<u>Tandem Axle</u>
• Tire rail Wheel Center	15 1/4”	11 1/4”
• Minimum truck frame extension	22 1/4”	17 1/4”
• Calculate Spacer thickness (with 6” spacer) =	(6.0” -GAP) x .6	

Check overall measurements

- Rear truck axle to rear railgear (straight) A=B (within 1/16”)
- Rear truck axle to rear railgear (diagonal) C=B (within 1/8”)
- Front Rail Gear to rear railgear (straight) E=F (within 1/8”)
- Front Rail Gear to rear railgear (diagonal) G=H (within 1/4”)

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9.0 INSTALLATION SUMMARY

Initial Instructions

- Provide adequate work area (floor, lighting, and space)
- Inspect truck condition: tire pressure and condition, frame and suspension bushings on truck, alignment, and transverse torque rods
- Fabricate front and rear installation rails
- Drive truck onto installation rails

Hydraulic System Connection

- For new hydraulic system: Install pump, PTO, tank & main hydraulic lines to Front and Rear Valves.

- For existing hydraulic systems: Install diverter valve, main relief valve and main hydraulic lines to Front and Rear valves.

Rear Railgear Installation

- Location of Rear Railgear
- Recheck tire pressure
- Measure for location with single axle truck and tandem axle truck

Spacer installation with Front Railgear on rails in track position

- Place 6” spacer between frame and mounting bracket then lower rail guide to track position ▪ Calculate Spacer thickness (using formula)
- Raise railgear to road position and remove temporary spacer
- Install permanent spacer and tack in position
- Lower railgear to track position and check tire cup

Square Railgear with Truck Frame

- Primary: Measure Rear railgear to truck axle (both sides)
- Secondary: Measure diagonal from rail wheel axle to truck axle
- Check Rail Guide clearance including lock pins 2” clearance minimum

Final Rear Installation

- Drill holes for mounting plate, install and tighten bolts
- Tack weld mounting plate and spacers to rear mounting plate

Front to Rear Alignment

- Measure Front to Rear Rail Wheels: E=F (within 1/8”)
- Measure Front to Back diagonal: G=H (within 1/4”)
 - If necessary, add shims to Front railgear and tack in place
 - Upon completion of alignment, weld:
- Frame mounting brackets to frame (or frame extensions)

Rail Sweeps

- Rail Sweep components
- Rail Sweep installation

Brakes

- Brake Components
- Plumbing Installation
- Testing

Air-Lock

- Air-Lock Components
- Air-Lock Installation

Final Checklist

- Rail test truck for traction and braking
- Re-adjust railgear height as required
- Cross check rear rail wheel to truck rear axle
- Weld mounting plate to mounting bracket
- Check welds, fasteners, and cotter pins. Secure hoses and wires.
- Top off hydraulic fluid
- Touch-up Paint
- Raise Front & Rear railgear and install locking pins
- Apply Decal Kit

10.0 STEERING WHEEL LOCK

All Vehicles must be using a steering wheel lock while on the rail.

Telescoping Steering Wheel

If steering wheel is telescoping, make sure that the steering wheel is in the minimum position or in a position such that the steering wheel lock can be easily applied.

INSTALLATION

Table 10.1 Steering Wheel Lock Kit Components

Part Number	Description	Qty
S-001050	Steering Wheel Lock	1
S-001040	Steering Wheel Lock Decal	1
R-21167	Speed Decal	1

1. Ensure the front wheels are pointing straight ahead and the steering wheel is centered before installation.
2. The steering wheel lock consists of one steering wheel lock patch with Rafna logo and three adhesive back strips.
3. Without removing the protective backing, position one adhesive back strip on top of the steering column cover and another on the steering wheel. The strips should be close enough together so that the patch will cover both when the steering wheel lock is engaged. Ensure that the adhesive back strips do not interfere with any devices, such as the hazard light button on the steering column cover or the air bag cover on the steering wheel. Modify the adhesive back strips as required to clear any obstructions. Mark their locations on the steering column cover and the steering wheel.
4. Without removing the protective backing, position the third adhesive back strip in a convenient location on the dash (so that it does not interfere with the view and/or operation of the vehicle). This adhesive back strip will serve as a holder when the steering wheel lock is disengaged. Mark the location.
5. Scuff the three areas previously marked with medium / fine sandpaper. The areas should be free of dust, dirt, and any oily residue. Thoroughly clean the areas with denatured alcohol or a similar non-oil-based degreaser that will not react with the plastic. Let the degreaser dry.
6. Take care when placing the adhesive back strips; once they are applied, they should not be removed. Do not touch the adhesive with your fingers. Removing the adhesive back strips once installed or touching the adhesive may cause poor adhesion.

7. Peel off the protective backing from the adhesive back strips. Firmly press them into place as previously located. Do not disturb the adhesive back strips for 24 to 30 hours to allow the adhesive to fully cure.
8. Store the steering wheel lock patch on the adhesive back strip located on the dash.
9. Stick the steering wheel lock decal in a highly visible spot on the dashboard.
10. Stick the maximum speed decal in a highly visible spot, within clear sight of the operator, on the dashboard.

**R-21167 THIS VEHICLE IS EQUIPPED WITH
A RAIL CONVERSION UNIT
RAFNA MODEL
R-1110/1130/1150
30 MPH / 48 KM/H
RECOMMENDED MAXIMUM SPEED ON RAIL
Railway company rules governing rail travel must be observed at all times.**

OPERATION

The following procedure details the steering wheel lock operation.

1. Placing the Vehicle on The Track:

- a) Engage the steering wheel lock after both the front and rear railgear are fully deployed and prior to rail travel.
- b) Turn the steering wheel until the front tires point straight ahead.
- c) Position the patch portion of the steering wheel lock onto the adhesive back strips affixed to the steering wheel and steering column cover. Press firmly into place. When installed on the adhesive back strips the patch should restrict the steering wheel from turning.

2. Traveling on Rail:

- a) The steering wheel lock must always be engaged while on rail.

3. Removing the Vehicle from The Track:

- a) Disengage the steering wheel lock after both the front and rear Railgear are fully retracted in the road position and prior to road travel.
- b) Firmly grasp the steering wheel lock patch's d-ring and peel it off the adhesive back strips.
- c) Store the patch on the adhesive back strip which serves as the holder located on the dash.

SERVICE OF STEERING WHEEL LOCK

Take care when removing the Patch. Due to certain plasticizers in the steering wheel steering column cover and dash, along with the vehicle's operating environment, the adhesive back strips may peel off and be removed. If the adhesive back strips do peel off, replace the strips with new ones at the earliest convenience.

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11.0 RAILGEAR OPERATION AND MAINTENANCE

RAILGEAR OPERATION

Check to be sure that the railgear is in good operating condition. Inspections should include:

- All air and hydraulic fittings
- All air and hydraulic hoses
- Brake operation
- Railgear parts for damage
- Rail wheel wear
- Hydraulic fluid level

Engage Front Railgear

1. Drive truck into position to line up front Railgear with the rail.
2. Engage truck's parking brake to prevent the truck from rolling.
3. Engage PTO or electric pump.
4. Remove locking pins.
5. Engage front Railgear.
6. Stow the pins in locking hole.

Engage Rear Railgear

1. If the Railgear has air brakes, turn the valve on.
2. Engage the PTO or electric pump.
3. Remove the locking pins.
4. Engage the Railgear.
5. When the Railgear is fully extended, replace the locking pins.

On Track

- Do not exceed **30 MPH** while on track. All railroad rules should be observed
- Be aware that some railgear is designed so that it does not operate crossing circuits
- Reduce speed at crossings, curves, branch lines, switches, and frogs
- Traction is reduced on track; tire damage may result if the wheels are allowed to spin
- Braking distance is increased while on track. Do not slide the truck tires or wheels on rail
- Do not exceed rated load of equipment

Removing Railgear from Track

1. Be sure that the PTO is engaged
2. Engage the truck parking brake
3. Leave the truck running and in neutral
4. Remove Locking Pins
5. Lift both sets of railgear
6. Both sets of railgear must have the locking pins reinstalled
7. Disengage the switch that controls the railgear Air Brakes
8. Disengage the truck PTO before moving truck

RAILGEAR MAINTENANCE

If your hi-rail vehicle is heavily used or operated under extreme conditions, the inspections listed below may need to be performed more frequently than stated.

Daily

- Visually inspect for hydraulic fluid leaks
- Visually inspect all hoses for wear or damage
- Visually inspect railgear units for damaged or worn parts
- Check and make sure that all threaded fasteners are secured
- Inspect wheel flanges for excessive wear
- Ensure that the railgear unit hydraulic system and brakes (if equipped) are in good operating condition

Weekly

Perform standard daily inspection points as listed above, and then check the following:

- Grease and lubricate all grease fittings on front and rear railgear and guide wheels
- Check level of hydraulic oil and all other fluids.
- Check air pressure in tires and inflate to proper inflation pressure (if required).

Bi-annually

Perform standard daily and weekly inspection points as listed above, and then check the following:

- Remove the hubcaps from the rail wheels and inspect for deterioration or loss of wheel bearing grease
- Clean the strainer / filter in the hydraulic power unit tank
- Rail test for proper traction and adjust as needed
- Rail test for proper braking and adjust as needed
- Check Railgear alignment

LUBRICATION

Grease fittings are provided at all railgear lubrication points. The recommended lubricant for all lubrication points on this railgear is **MYSTIK JT-6 LOW TEMP GREASE** or equivalent. In cold weather, -20F or colder, Shell Darina XL102 or equivalent may be used.

WHEEL WEAR STANDARDS AND RECOMMENDATIONS

At the present time, G&B produces 8”, 10”, 12”, 14”, and 16” steel wheels. Each size has a different flange and tread thickness, which dictates the allowable wear. Although the following numbers are recommended limits, risk of failure is increased when not followed. Rail gauge can be supplied by G&B Specialties for 8”, 10”, 12”, 14”, and 16” rail wheels. They are used as go/no go gauges. When placed on rail wheels they will indicate how much wear is still permissible or if the rail wheels need to be replaced.

The gauge for the R-1110/1150 model railgear can be ordered using the following part number; R-14030WG

- Rail wheel failure can result in equipment damage or failure, personal injury or death.

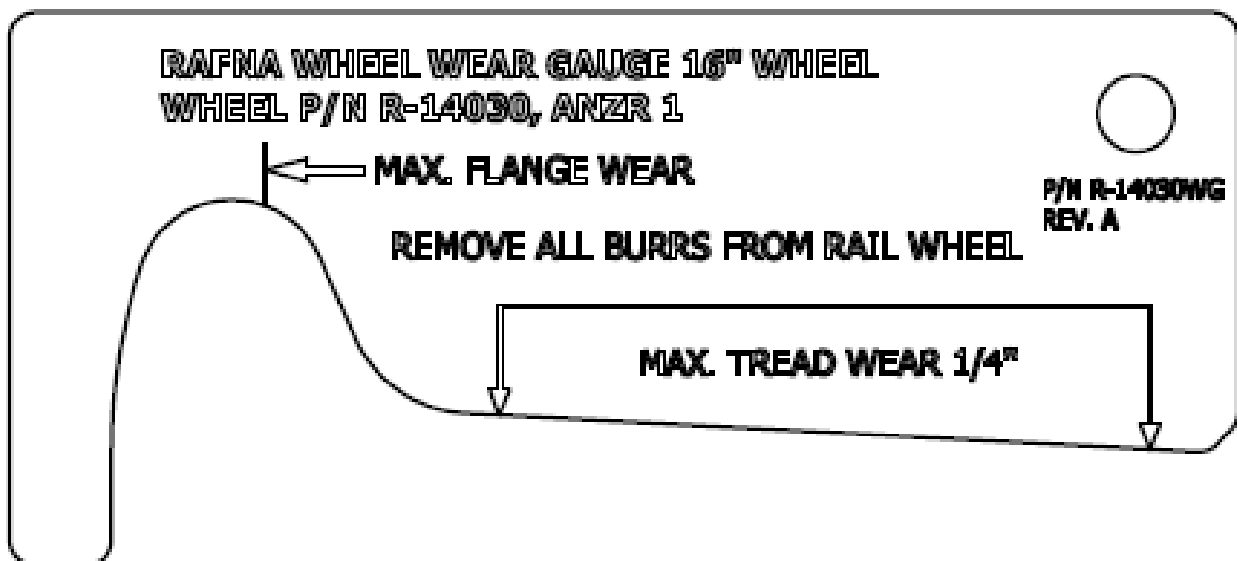
Flange Wear Limits:

The maximum flange wear is indicated on the rail wheel gauge. When the gauge is placed on the rail wheel, if a gap is seen between the gauge and the maximum flange wear line, the rail wheel needs to be replaced.

Tread Wear Limits:

For tread wear, use the following chart in conjunction with the appropriate rail wheel gauge.

NOMINAL RAIL WHEEL DIAMETER (INCHES)	MIN. ALLOWABLE WHEEL DIAMETER (INCHES)
16	15 3/4

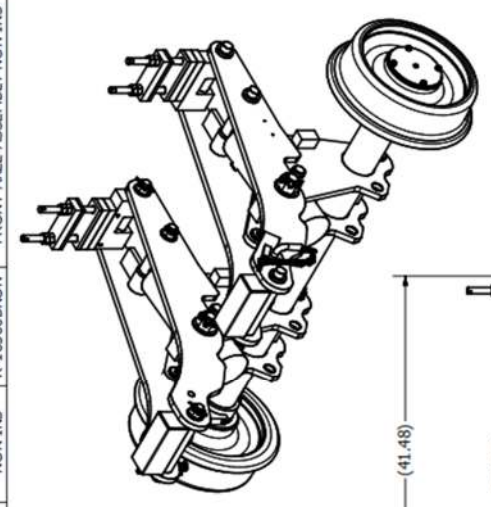


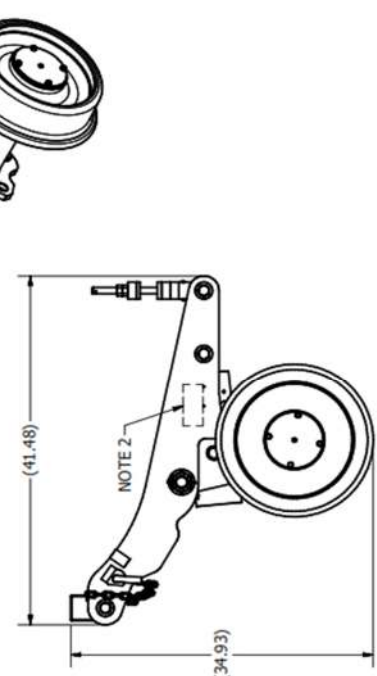
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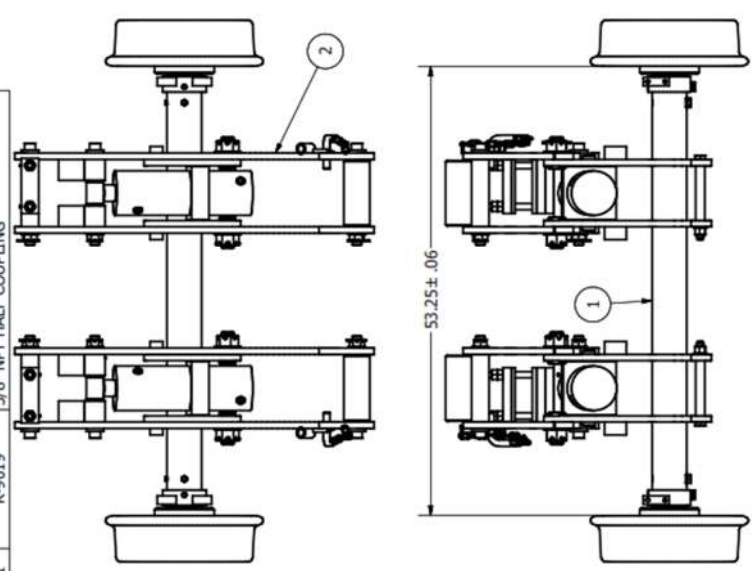
12.0 PARTS

ASSEMBLY NUMBER		INSULATION		PART NUMBER		PART DESCRIPTION	
R-16315		INS		R-16500B		FRONT AXLE ASSEMBLY INS	
R-16315NON		NON INS		R-16500BNON		FRONT AXLE ASSEMBLY NON INS	

PARTS LIST		DESCRIPTION	
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	SEE TAB	SEE TAB
2	1	K-R1150RFAJ002	STANDARD FRONT UPPER RAILGEAR ASSY
3	1	R-9019	3/8" NPT HALF COUPLING





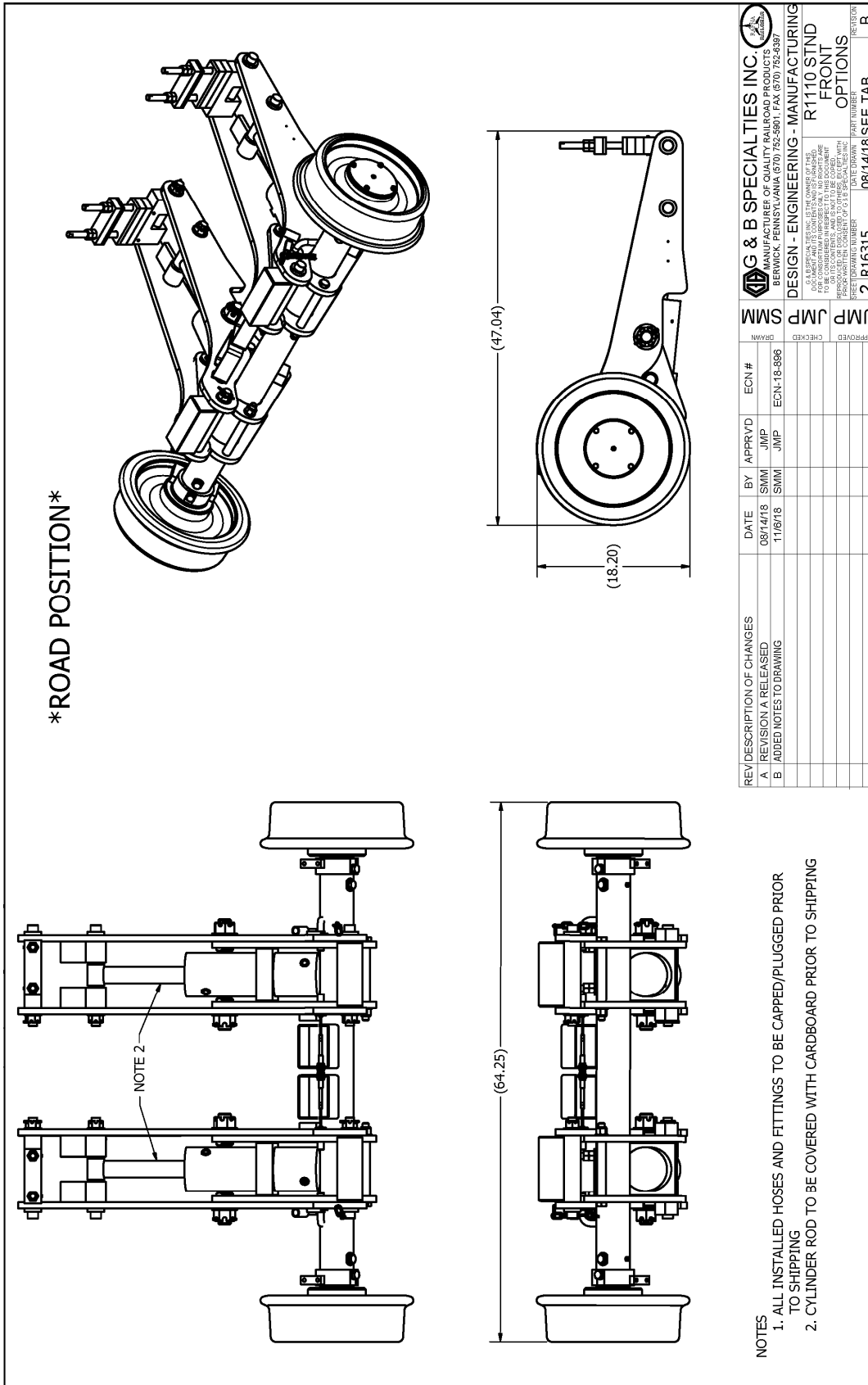


NOTES

- SEE SHEET 2 FOR ROAD POSITION
- DRILL TWO 1/8" HOLES SPACED AT 2.5/16" APART FOR SERIAL TAG
- ALL INSTALLED HOSES AND FITTINGS TO BE CAPPED/PLUGGED PRIOR TO SHIPPING
- CYLINDER ROD TO BE COVERED WITH CARDBOARD PRIOR TO SHIPPING

REV DESCRIPTION OF CHANGES		DATE	BY	APPRVD	ECN #
A	REVISION A RELEASED	11/09/18	JVP	JMP	ECN-18-898
B	ADDED NOTES TO DRAWING	11/06/18	SAIM	JMP	ECN-18-898

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PART NUMBER		PART NUMBER	
1 R16315		11/09/18/SEE TAB	
REV		REV	
B		B	



NOTES

1. ALL INSTALLED HOSES AND FITTINGS TO BE CAPPED/PLUGGED PRIOR TO SHIPPING
2. CYLINDER ROD TO BE COVERED WITH CARDBOARD PRIOR TO SHIPPING

REV	DESCRIPTION OF CHANGES	DATE	BY	APPRVD	ECN #	APPROVED
A	REVISION 1 RELEASED	08/14/18	SMM	JMP	ECN-18-886	
B	ADDED NOTES TO DRAWING	11/06/18	SMM	JMP		

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 JUMP SMM DRAWN
 JUMP SMM CHECKED
 JUMP SMM APPROVED
 R1110 STND FRONT OPTIONS
 2 R16315 08/14/18 SEE TAB B

PARTS LIST			
ITEM	PART NUMBER	DESCRIPTION	QTY
1	R-16200	CROSS TUBE ASSEMBLY, FRONT	2
2	R-16204	HANGER, SPRING	2
3	R-16506P	HYDRAULIC CYLINDER, PASS SIDE	1
4	R-16506D	HYDRAULIC CYLINDER, DRIVER SIDE	1
5	R-16512	PIN, FRONT MOUNTING	6
6	990600-100-002	WASHER, 1" FLAT NARROW	6
7	990312-100-02	NUT, 1" HEX SLOTTED	6
8	R-16207P	STANDARD ARM, PS OUTER ASSY	1
9	R-16206P	STANDARD ARM, PS INNER ASSY	1
10	R-16206D	STANDARD ARM, DS INNER ASSY	1
11	R-16207D	STANDARD ARM, DS OUTER ASSY	1
12	990509-200-02	COTTER PIN, 3/16" X 2" ZY	6
13	990312-150-12	NUT, 1 1/2" HEX SLOTTED	4
14	R-16515	STUD, THREADED	4
15	R-16514	SET SCREW, 1/4"	4
16	R-32015	SPACER, 1"	6
17	R-32016	SPACER, 1/2"	2
18	R-32017	PAD, RUBBER	2
19	990311-075-02	NUT, 3/4" Hvy HEX GR 8 ZY	8
20	990600-150-002	WASHER, 1 1/2" FLAT NARROW	4
21	990511-250-02	COTTER PIN, 1/4" X 2 1/2" ZY	4

NOTES
1. THIS DRAWING IS FOR REFERENCE, AND TO BE USED WHILE ASSEMBLING THE R-16315

REV	DESCRIPTION OF CHANGES	DATE	BY	APPRVD	ECN #
A	REVISION A RELEASED	08/14/18	SMM	JMP	

APPROVED	CHECKED	DESIGN
JMP	JMP	SMM

SHEET/DRAWING NUMBER	DATE DRAWN	PART NUMBER	REVISION
1	08/14/18	K-R1150RFUA002	A

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R1110
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UPPER ASSY

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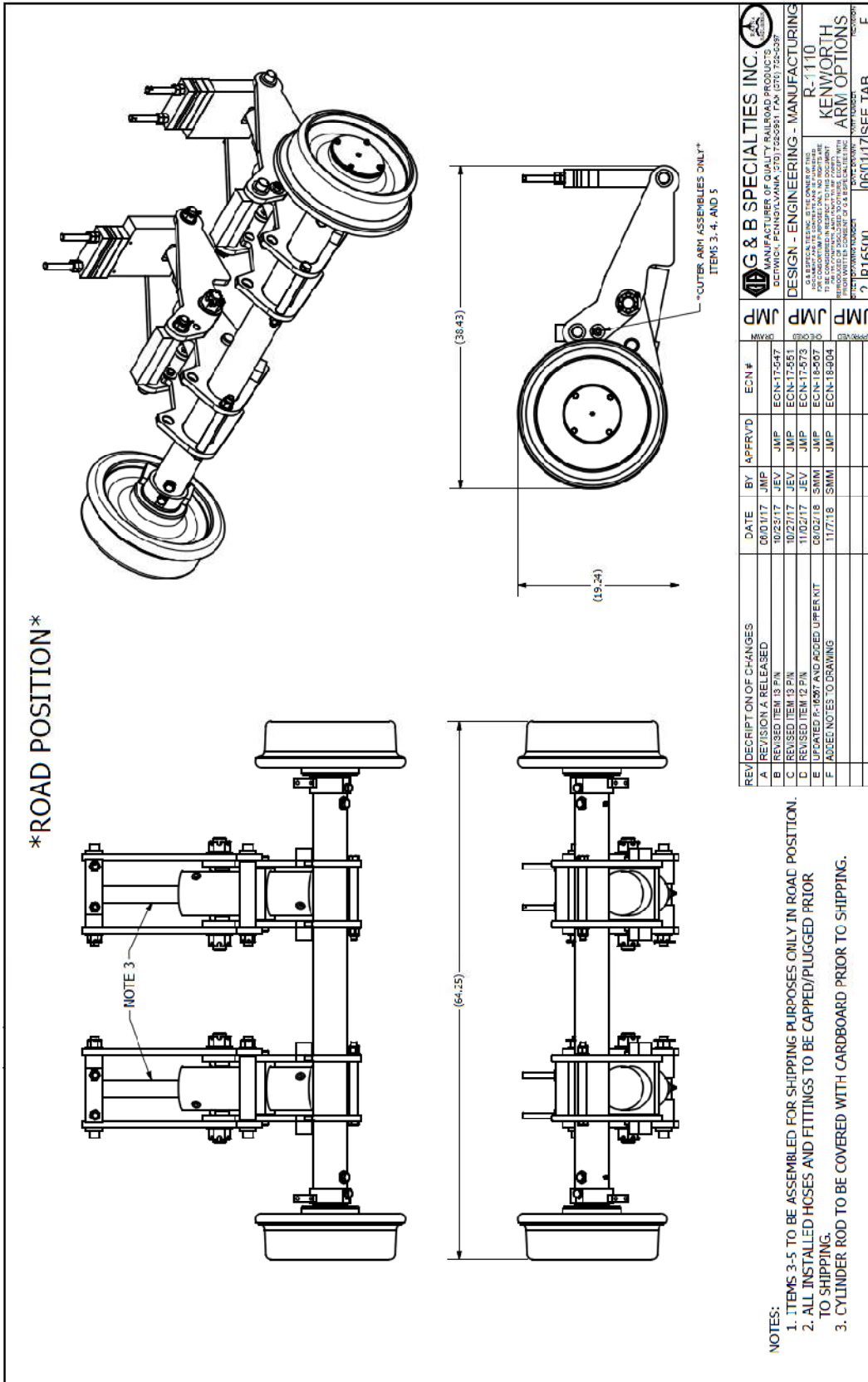
ITEM QTY		PART NUMBER		DESCRIPTION	
1	1	SEE TAB	SEE TAB	SEE TAB	DESCRIPTION
2	1	K R115067A001	SEE TAB	SEE TAB	DESCRIPTION
3	2	990027-250-02	SCREW, 1/2" X 1.3" X 2-1/2" HHC Z/Y GR 2		
4	4	990601-050-002	WASHER, 1/2" FLAT WIDE		
5	2	990031-050-02	NUT, 1/2" X 1.125" LCK Z/Y		

ASSEMBLY NUMBER		INSTRUCTION		R-11500 OPTIONS	
R-165000	R-16500	INS	INS	R-16557	FRONT AXLE SUB ASSEMBLY
R-165000N	R-16500N	NON INS	NON INS	R-16567N01	FRONT AXLE SUB ASSEMBLY NON INS

REVISION DESCRIPTION OF CHANGES		DATE	BY	APPROVD	ECN #
A	REVISION 4 RELEASED	03/07/17	JMP	JMP	ECN-17-547
B	REVISED ITEM 13 PIN	1/23/17	JEV	JMP	ECN-17-901
C	REVISED ITEM 12 PIN	1/22/17	JEV	JMP	ECN-17-901
D	REVISED ITEM 11 PIN	03/07/18	SNM	JMP	ECN-17-974
E	UPDATED R-16500 AND ADDED UPPER KIT	11/7/18	SNM	JMP	ECN-18-800
F	ADDED NOTES TO DRAWING				

NOTES:

- SEE SHEET 2 FOR ROAD POSITION AND ASSEMBLY OF ITEMS 3-5.
- DRILL TWO 1/8" HOLES SPACED AT 2-5/16" APART FOR SERIAL TAG.
- ALL INSTALLED HOSES AND FITTINGS TO BE CAPPED/PLUGGED PRIOR TO SHIPPING.
- CYLINDER ROD TO BE COVERED WITH CARDBOARD PRIOR TO SHIPPING.



NOTES:

- ITEMS 3-5 TO BE ASSEMBLED FOR SHIPPING PURPOSES ONLY IN ROAD POSITION.
- ALL INSTALLED HOSES AND FITTINGS TO BE CAPPED/PLUGGED PRIOR TO SHIPPING.
- CYLINDER ROD TO BE COVERED WITH CARDBOARD PRIOR TO SHIPPING.

REVISION	DESCRIPTION OF CHANGES	DATE	BY	APPR/VD	ECN #	JMP	MW
A	REVISION 1 RELEASED	06/01/17	JMP	JMP	ECN-17-547	JMP	
B	REVISED ITEM 13 P/N	10/25/17	JEV	JMP	ECN-17-551	JMP	
C	REVISED ITEM 13 P/N	10/27/17	JEV	JMP	ECN-17-573	JMP	
D	REVISED ITEM 12 P/N	11/02/17	JEV	JMP	ECN-17-573	JMP	
E	UPDATED P-1097 AND ADDED UPPER KIT	08/02/18	SMM	JMP	ECN-18-907	JMP	
F	ADDED NOTES TO DRAWING	11/7/18	SMM	JMP	ECN-18-904	JMP	

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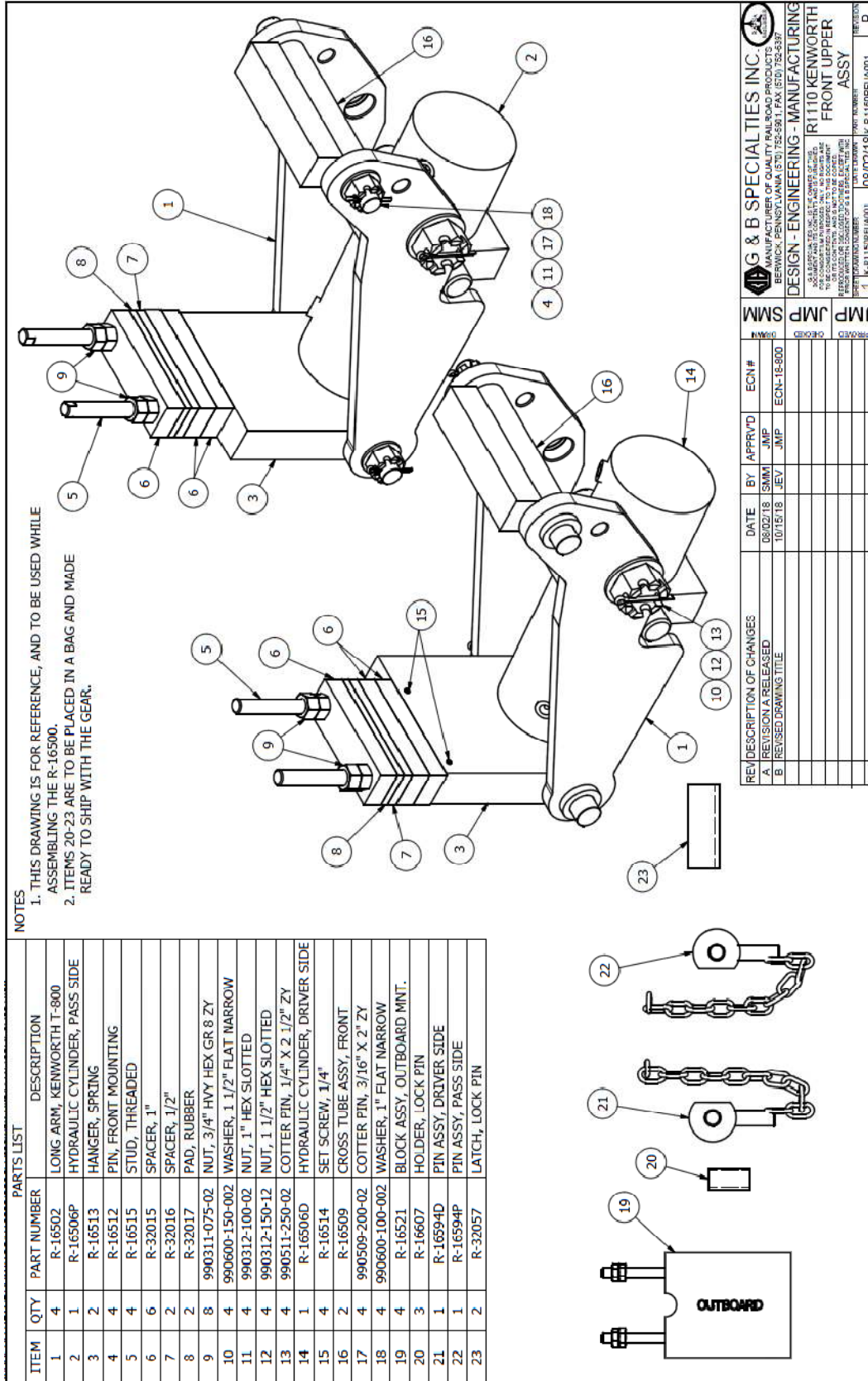
DESIGN - ENGINEERING - MANUFACTURING

R-1110

KENWORTH

ARM OPTIONS

2 | R116500 | 06/01/17 | SEE TAB | F



NOTES
1. THIS DRAWING IS FOR REFERENCE, AND TO BE USED WHILE ASSEMBLING THE R-16500.
2. ITEMS 20-23 ARE TO BE PLACED IN A BAG AND MADE READY TO SHIP WITH THE GEAR.

REVISION	DESCRIPTION OF CHANGES	DATE	BY	APPRVD	ECN#
A	REVISION A RELEASED	08/02/18	SMM	JMP	ECN-18-800
B	REVISED DRAWING TITLE	10/15/18	JEV	JMP	

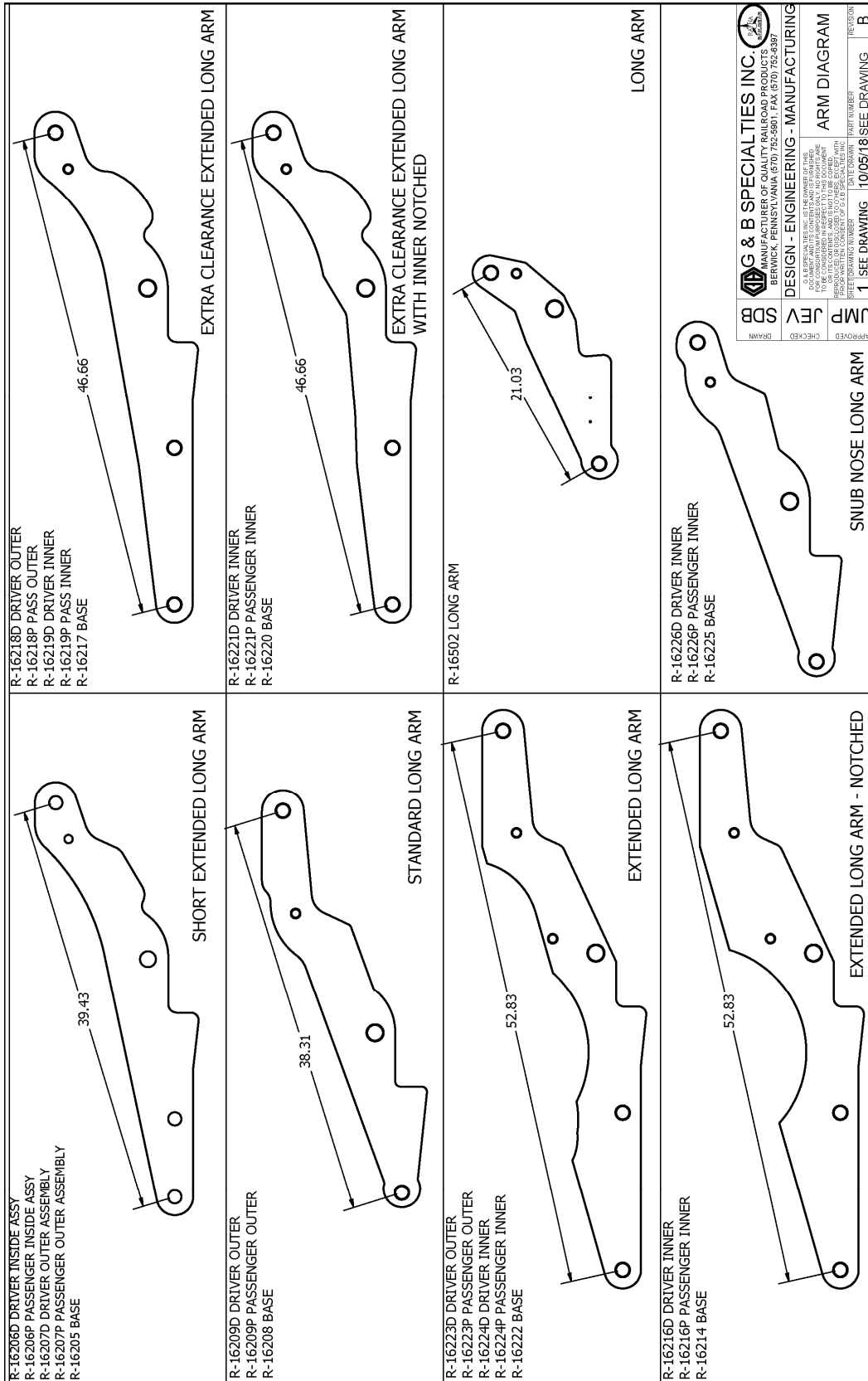
APPROVED	CHECKED	DATE	BY	APPRVD	ECN#
JMP	JMP				
SMM	SMM				

REVISED DRAWING NUMBER	REVISED DATE	REVISED BY	REVISED FOR
K-1110RUP-0401	08/02/18	K-1110RUP-0401	REVISION B

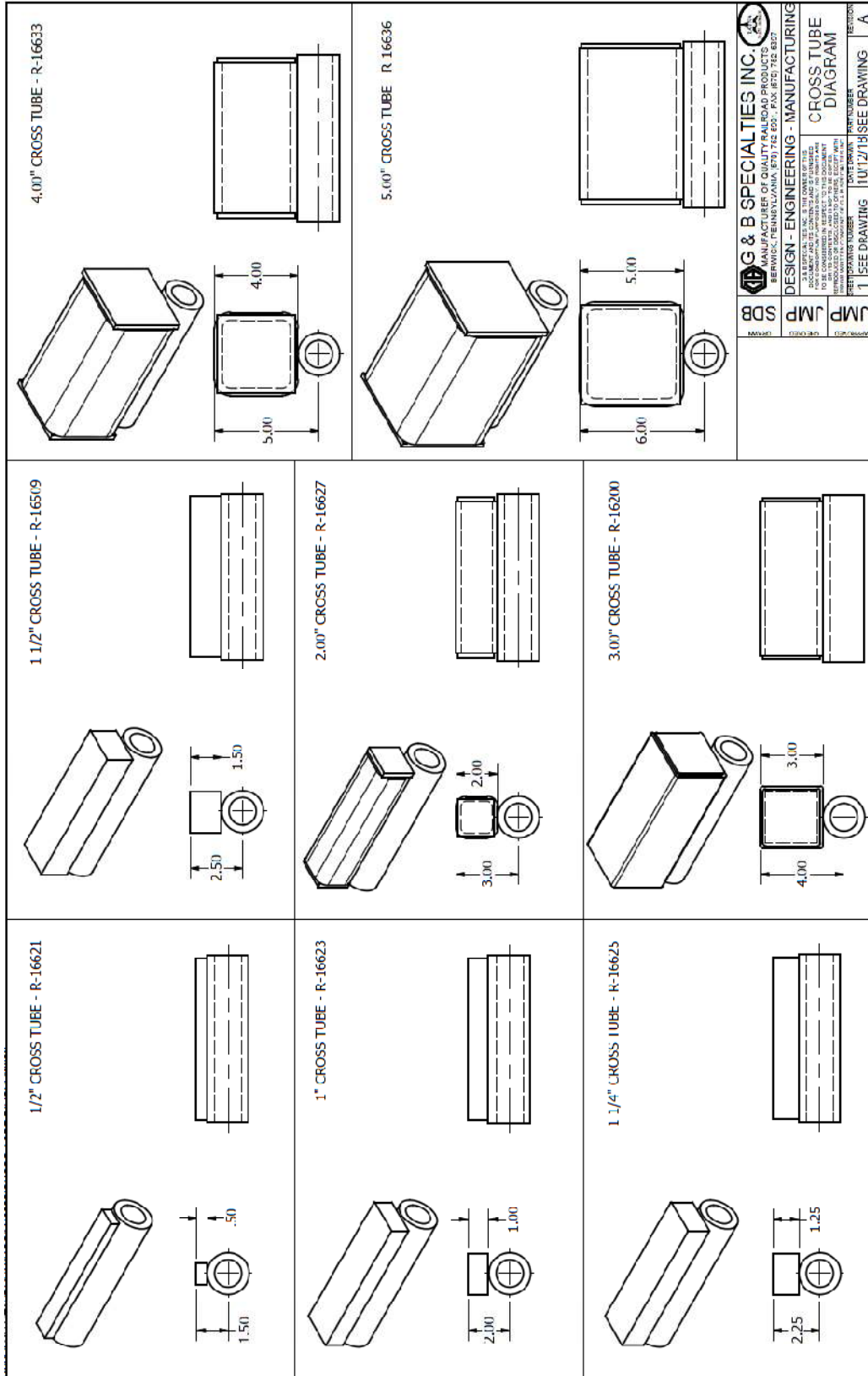
MANUFACTURER	DESIGN	MANUFACTURING
G & B SPECIALTIES INC.	ENGINEERING	MANUFACTURING

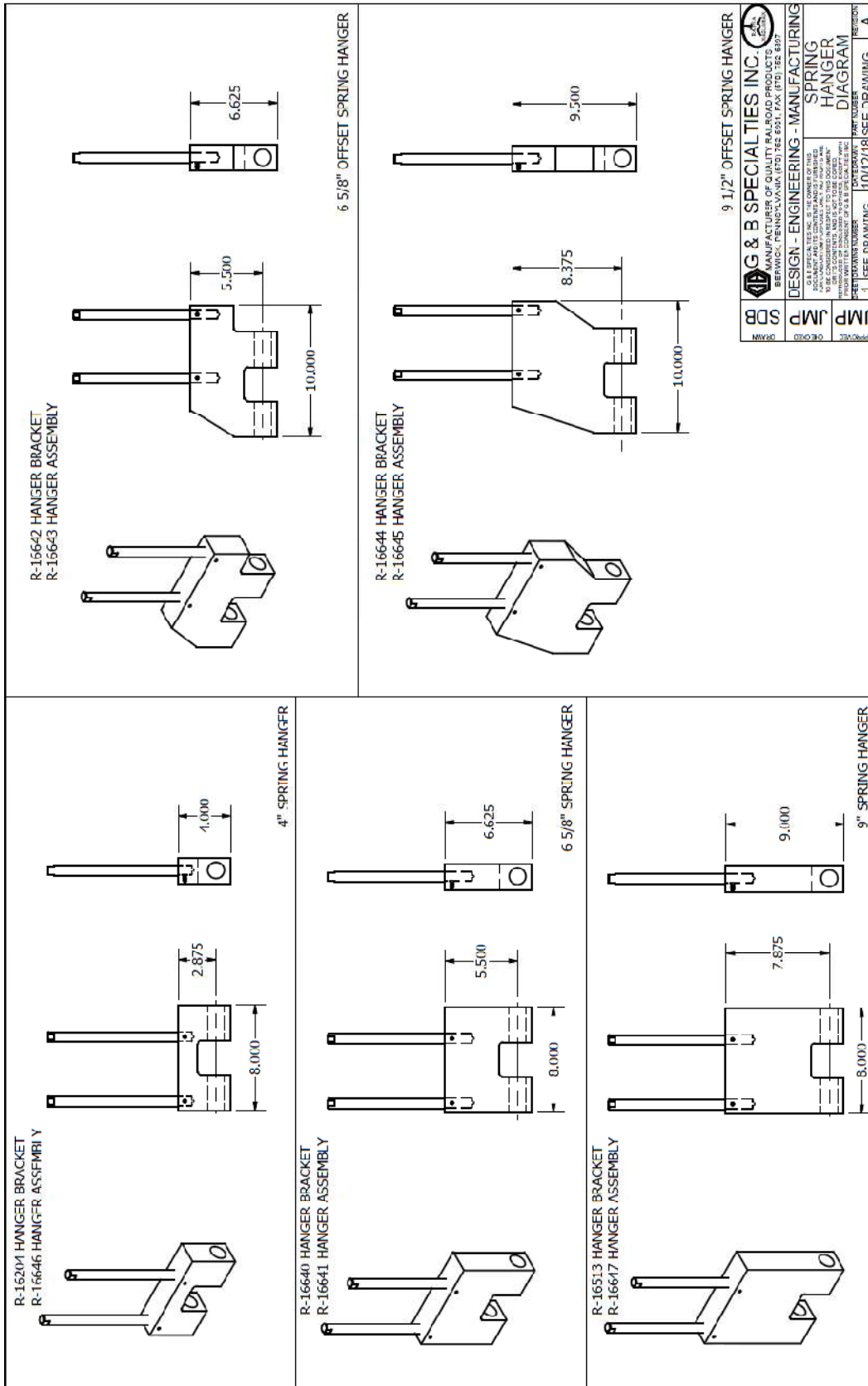
MANUFACTURER	DESIGN	MANUFACTURING
G & B SPECIALTIES INC.	ENGINEERING	MANUFACTURING

REVISED DRAWING NUMBER	REVISED DATE	REVISED BY	REVISED FOR
K-1110RUP-0401	08/02/18	K-1110RUP-0401	REVISION B



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<p>DESIGN - ENGINEERING - MANUFACTURING</p>	
<p>ARM DIAGRAM</p>	
<p>APPROVED</p>	<p>DATE DRAWN</p>
<p>MP JEV</p>	<p>1 SEE DRAWING 10/05/18 SEE DRAWING</p>
<p>DRY</p>	<p>REVISION</p>
<p>DRY</p>	<p>B</p>





R-1650WB OPTIONS			
ASSEMBLY NUMBER	INSULATION	PART NUMBER	PART DESCRIPTION
R-1650UB	INS	R-16574	SCREW, 1/4"-20 X 1" NYLON
R-1650UBNON	NON INS	990722-100-12	SCREW, 1/4" X 1" GR.5 HEX CAP Z/Y

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	R-16507	FRONT AXLE TUBE
2	2	SEE TAB	SEE TAB
3	2	R-16518	BRAKE SADDLE
4	2	990729-400-22	SCREW, 5/8" X 4" GR 8 HEX CAP Z/Y
5	2	990729-500-22	SCREW, 5/8" X 5" GR 8 HEX CAP Z/Y
6	2	990731-950-22	SCREW, 3/4" X 9 1/2" HEX CAP Z/Y
7	4	990403-062-02	5/8" XDUTY LOCK WASHER Z/Y
8	2	990600-075-002	3/4" NARROW FLAT WASHER
9	2	990335-075-002	NUT, 3/4" HVT HEX NYLON GR 8
10	2	R-16568	SHUB AXLE ASSEMBLY
11	4	990900-009	FITTING, 1/8" NPT GREASE ZERK
12	2	R-16508	TUBE, SPACER
13	2	R-16313P	PASS. FRONT PIVOT ARM
14	2	R-16313D	DRIVER FRONT PIVOT ARM
15	2	Z-STICKER009	STICKER, R-1150 WELDING

NOTE 3
ITEM 15

NO WELDING ON AXLE TUBE
OUTBOARD OF SHUNT BOLT

NYLON BOLT FACES REAR OF VEHICLE

NOTES

1. INSTALL ALL INSULATORS ON STUB AXLE BEFORE PRESSING INTO AXLE TUBE
2. CHECK FOR ZERO CONTINUITY AFTER ASSEMBLY
3. PLACE 1 STICKER (ITEM 15) ON THE INSIDE OF THE ARMS WHERE NOTED

REV	DESCRIPTION OF CHANGES	DATE	BY	APPRVD	ECN#
A	REVISION A RELEASED	09/17/18	SMM	JMP	ECN-18-94
B	UPDATED PIVOT ARMS	12/10/18	JEV	JMP	ECN-18-945
C	REMOVED NOTE ABOUT SILICONE	12/22/18	SDB	JMP	ECN-18-945

REV	DESCRIPTION	DATE	BY	APPRVD	ECN#
1	R-1110 FRONT SUB ASSEMBLY	08/07/18	SEE TAB	SEE TAB	SEE TAB

REV	DESCRIPTION	DATE	BY	APPRVD	ECN#
1	R-1650UB	08/07/18	SEE TAB	SEE TAB	SEE TAB

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PARTS LIST		R-16567 OPTIONS		
ITEM	QTY	PART NUMBER	DESCRIPTION	PART DESCRIPTION
1	1	R-16507	FRONT AXLE TUBE	
2	2	SEE TAB	SEE TAB	
3	2	R-16518	BRAKE SADDLE	
4	2	990729-400-22	SCREW, 5/8" X 4" GR 8 HEX CAP Z/Y	R-16574 SCREW, 1/4" X 1" NYLON
5	2	990779-500-77	SCREW, 5/8" X 5" GR 8 HEX CAP Z/Y	
6	4	990403-062-02	WASHER, 5/8" XDUTY LOCK Z/Y	
7	2	R-16568	STUB AXLE ASSY	
8	2	R-16504L	LEFT FRONT PIVOT ARM	
9	2	R-16504R	RIGHT FRONT PIVOT ARM	
10	4	990910-019	FITTING, 1/8 NPT GREASE ZERK	
11	2	R-16508	TUBE, SPACER	
12	2	990600-075-002	3/4" NARROW FLAT WASHER	
13	2	990335-075-02	NUT, 3/4" Hvy HEX NYLOCK GR 8	
14	2	990731-950-22	SCREW, 3/4" X 9 1/2" HEX CAP Z/Y	
15	2	Z-STICKER019	STICKER, R-1150 WELDING	

NOTES:

1. INSTALL ALL INSULATORS ON STUB AXLE BEFORE PRESSING INTO AXLE TUBE
2. CHECK FOR ZERO CONTINUITY AFTER ASSEMBLY
3. PLACE 1 STICKER (ITEM 15) ON THE INSIDE OF THE ARMS WHERE NOTED

REV/DESCRIPTION OF CHANGED	DATE	BY	APPROVD	ECN #
A REVISION A RELEASED	08/02/17	JEV	JMP	ECN-18-588
B ADDED R-1658 AND HARDWARE	08/02/18	SMM	JMP	ECN-18-588
C REMOVED NOTE ABOUT SILICONE	10/22/18	SD8	JMP	ECN-18-588-G

DESIGN - ENGINEERING - MANUFACTURING	DESIGN - ENGINEERING - MANUFACTURING
R-1110 KENWORTH FRONT SUB AXLE ASSY	R-1110 KENWORTH FRONT SUB AXLE ASSY
1 R-16567	06/02/17/SEE TAB

PARTS LIST			
ITEM	PART NUMBER	DESCRIPTION	QTY
1	R-32031	BRKT ASSY	1
2	R-32029	BRAKE ACTUATOR ASSY	1
3	HEX NUT	1/2" UNF (INCLUDED W/ ITEM #2)	1
4	HEX NUT	7/16" UNC (INCLUDED W/ ITEM #2)	2
5	L WASHER	7/16" (INCLUDED W/ ITEM # 2)	2
6	R-32040	ACTUATOR ARM	1
7	R-5601	CLEVIS ASSY	1
8	R-20143	CLEVIS PIN (INCLUDED WITH ITEM #7)	1
9	COTTER PIN	1/8" X 1" Z/Y (INCLUDED WITH ITEM #7)	1
10	R-32027	PIVOT SHAFT	2
11	R-32034	PIVOT SHAFT	1
12	R-32035	RETAINER CLIP	1
13	R-32033	RETAINER BLOCK	2
14	R-55998	BRAKE SHOE - COBRA V-265	1
15	L WASHER	3/8" GR.8	2
16	H.I.C.S	3/8" UNC GR.8 X 1"	2
17	ROLL PIN	3/16" X 1 3/8"	4

NOTE 1

NOTE 2

NOTE 4

NOTES:

- FOR BRAKES MOUNTED ON FRONT RAIL GEAR, ORIENT PORT OF BRAKE ACTUATOR APPROX. 45° OFF CENTERLINE
- FOR BRAKES MOUNTED ON REAR RAIL GEAR, ORIENT PORT OF BRAKE ACTUATOR APPROX. 7-15° OFF CENTERLINE
- REFERENCE HARDWARE KIT R-990KIT-383
- COAT THREADS WITH RUST PREVENTATIVE.

REVISION	DATE	BY	APPRVD	ECN #	CHECKED	DESCRIPTION OF CHANGES
A	07/24/14	AML	JMP	ECN-18-529	JMP	REVISION A RELEASED
B	07/24/18	JEV	JMP	ECN-19-087	JMP	REVISED BORDER AND BOM
C	02/27/19	SDB	JMP	ECN-20-480	JMP	MADE CLEVIS/ACTUATOR ASSYS. ADDED NOTES
D	07/09/20	JMP	JMP	ECN-21-387	JMP	ADDED RUST PREVENTATIVE NOTE
E	06/18/21	SNM	JMP		JMP	CORRECTED ACTUATOR ORIENTATION

SHEET/DRAWING NUMBER	DATE DRAWN	PART NUMBER	REVISION
1 IR32030D	07/25/18R-32030D		E

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BRAKE ASSY
DRIVERS SIDE

PARTS LIST			
ITEM	PART NUMBER	DESCRIPTION	QTY
1	R-32031	BRKT ASSY	1
2	R-32029	BRAKE ACTUATOR ASSY	1
3	HEX NUT	1/2" UNF (INCLUDED W/ITEM #2)	1
4	HEX NUT	7/16" UNC (INCLUDED W/ITEM #2)	2
5	L' WASHER	7/16" (INCLUDED W/ITEM # 2)	2
6	R-32040	ACTUATOR ARM	1
7	R-5601	CLEVIS ASSY	1
8	R-20143	CLEVIS PIN (INCLUDED WITH ITEM 7)	1
9	COTTER PIN	1/8" X 1" Z/Y (INCLUDED WITH ITEM 7)	1
10	R-32027	PIVOT SHAFT	2
11	R-32034	PIVOT SHAFT	1
12	R-32035	RETAINER CLIP	1
13	R-32033	RETAINER BLOCK	2
14	R-55998	BRAKE SHOE - COBRA V-265	1
15	L' WASHER	3/8" GR.8	2
16	H-I.C.S	3/8" UNC GR.8 X 1"	2
17	ROLL PIN	3/16" X 1 3/8"	4

NOTE 1: [Arrow pointing to the front rail gear area]

NOTE 2: [Arrow pointing to the rear rail gear area]

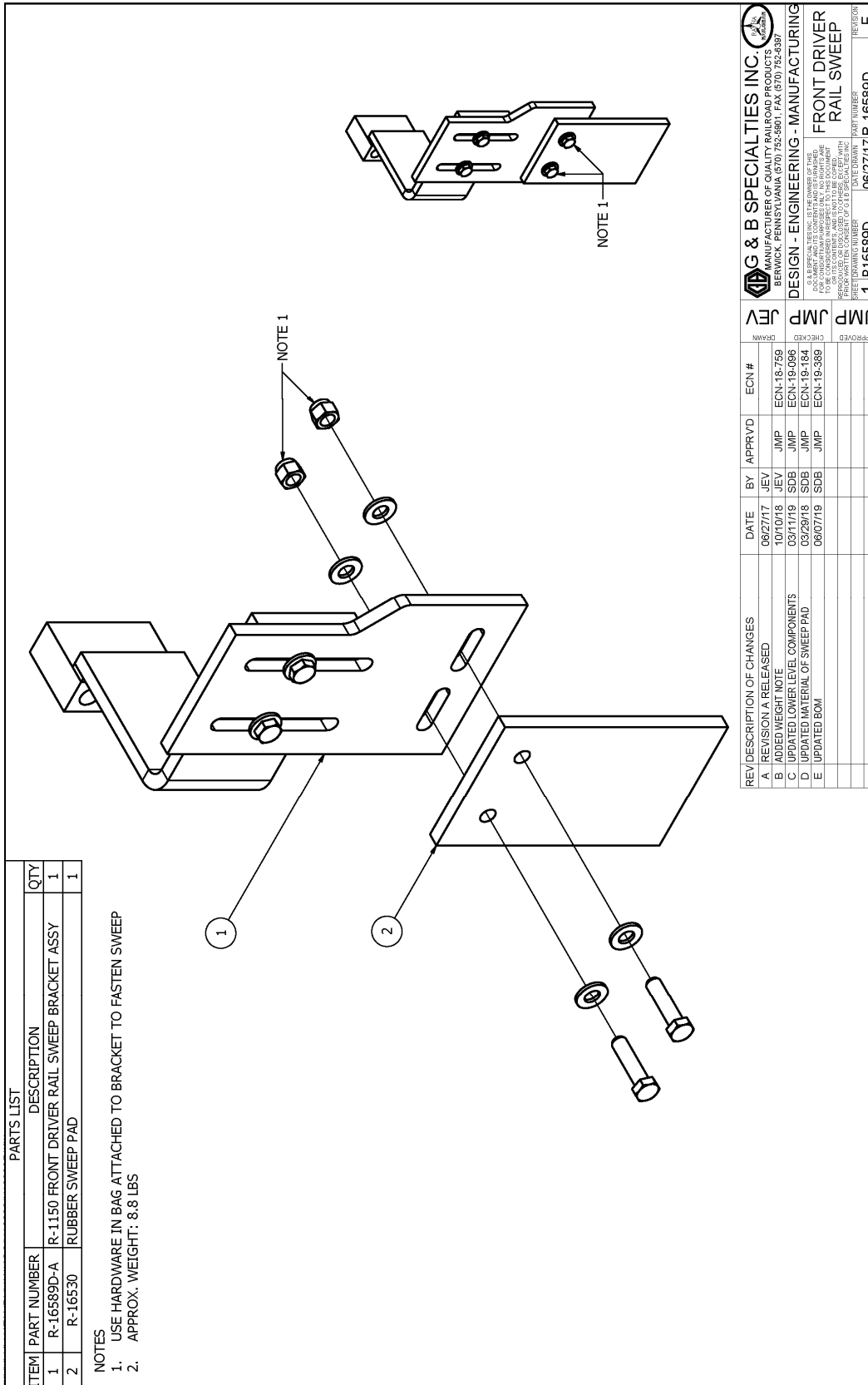
NOTE 4: [Arrow pointing to the pivot shaft area]

REV	DESCRIPTION OF CHANGES	DATE	BY	APPRVD	ECN #	CHK'D BY
A	REVISION A RELEASED	07/24/14	AVL	JMP	ECN-18-530	AVL
B	REVISED BORDER AND BOM	07/24/18	JEV	JMP	ECN-19-088	JEV
C	MADE CLEVIS/ACTUATOR ASSY, ADDED NOTES	02/27/19	SDB	JMP	ECN-20-461	SDB
D	ADDED RUST PREVENTATIVE NOTE	07/06/20	JMP	JMP	ECN-21-398	JMP
E	CORRECTED ACTUATOR ORIENTATION	06/16/21	SWM	JMP		JMP

NOTES:

- FOR BRAKES MOUNTED ON FRONT RAILGEAR, ORIENT PORT OF BRAKE ACTUATOR APPROX. 45° OFF CENTERLINE
- FOR BRAKES MOUNTED ON REAR RAILGEAR, ORIENT PORT OF BRAKE ACTUATOR APPROX. 7-15° OFF CENTERLINE
- REFERENCE HARDWARE KIT R-990KIT-383
- COAT THREADS WITH RUST PREVENTATIVE.

G & B SPECIALTIES INC.
MANUFACTURER OF QUALITY RAILROAD PRODUCTS
BERWICK, PENNSYLVANIA (717) 752-5901, FAX (717) 752-6397
DESIGN - ENGINEERING - MANUFACTURING
BRAKE ASSY
PASSENGERS
SIDE
1 | R32030P | 07/25/18 | R-32030P | E



PARTS LIST			
ITEM	PART NUMBER	DESCRIPTION	QTY
1	R-16589D-A	R-1150 FRONT DRIVER RAIL SWEEP BRACKET ASSY	1
2	R-16530	RUBBER SWEEP PAD	1

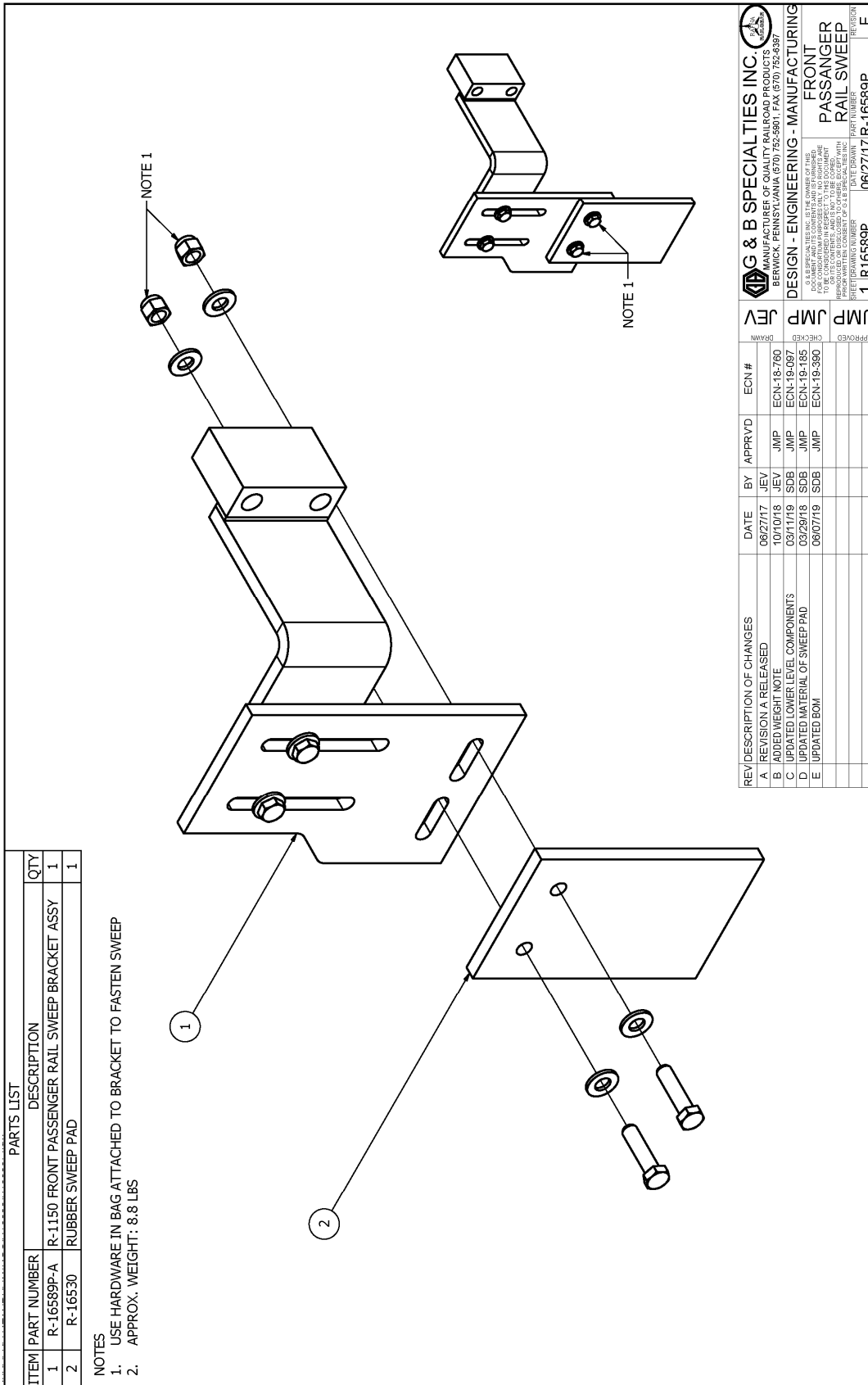
- NOTES
1. USE HARDWARE IN BAG ATTACHED TO BRACKET TO FASTEN SWEEP
 2. APPROX. WEIGHT: 8.8 LBS

REV	DESCRIPTION OF CHANGES	DATE	BY	APPRVD	ECN #	DESIGN	FUNCTION
A	REVISION A RELEASED	06/27/17	JEV	JEV	ECN-18-759	JEV	FRONT DRIVER RAIL SWEEP
B	ADDED WEIGHT NOTE	10/10/18	JEV	JMP	ECN-19-096	JMP	FRONT DRIVER RAIL SWEEP
C	UPDATED LOWER LEVEL COMPONENTS	03/11/19	SOB	JMP	ECN-19-104	JMP	FRONT DRIVER RAIL SWEEP
D	UPDATED MATERIAL OF SWEEP PAD	03/29/18	SOB	JMP	ECN-19-388	JMP	FRONT DRIVER RAIL SWEEP
E	UPDATED BOM	06/07/19	SOB	JMP		JMP	FRONT DRIVER RAIL SWEEP

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

THIS IS A SPECIALTY ITEM. IT IS THE OWNER'S RESPONSIBILITY TO OBTAIN THE NECESSARY PERMITS AND APPROVALS FOR THE USE OF THIS PRODUCT. THE USER SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS. THIS PRODUCT IS NOT TO BE USED IN ANY MANNER NOT INTENDED BY THE MANUFACTURER.

1 | R16589D | 06/27/17 | R-16589D | E



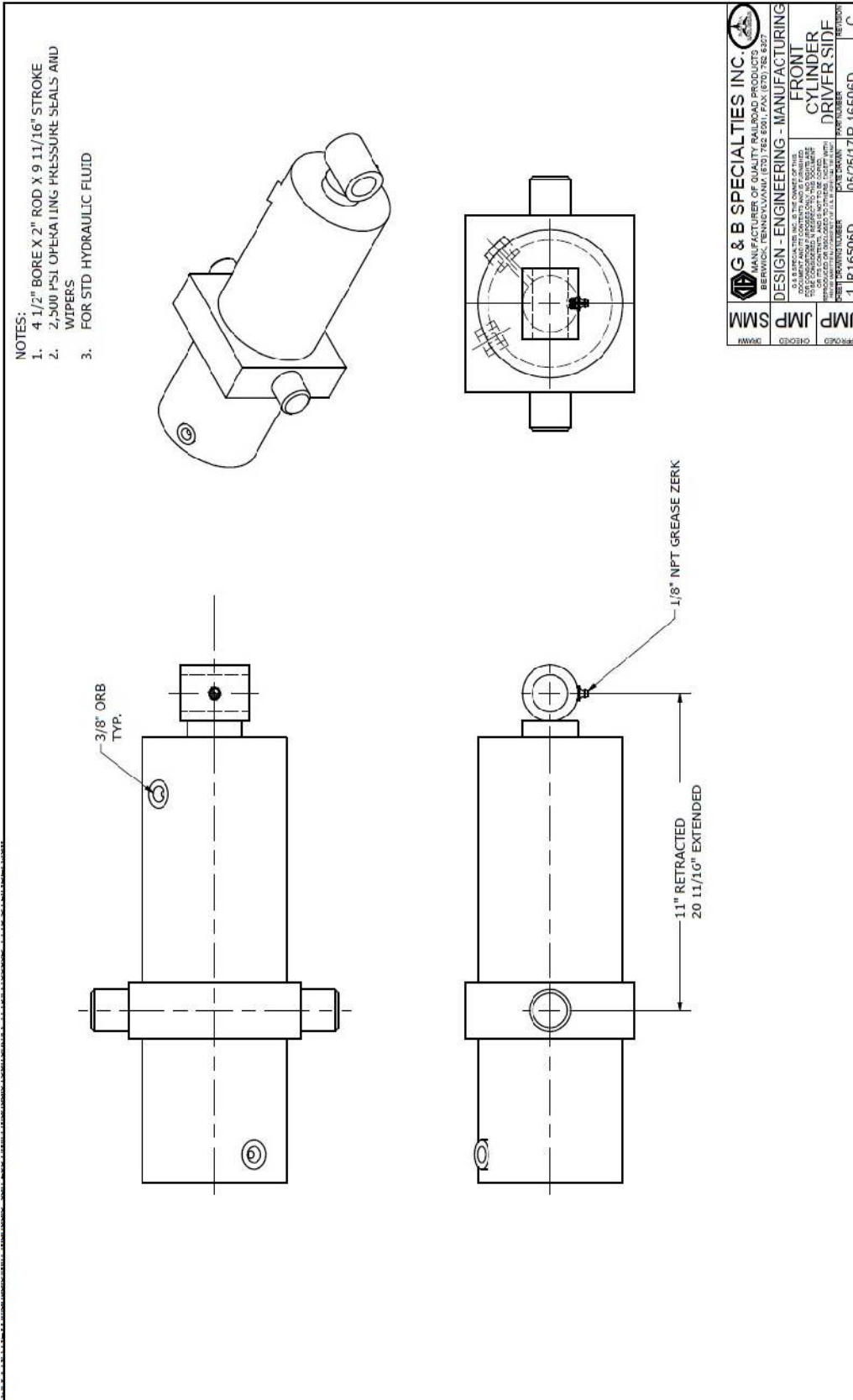
PARTS LIST			
ITEM	PART NUMBER	DESCRIPTION	QTY
1	R-16589P-A	R-1150 FRONT PASSENGER RAIL SWEEP BRACKET ASSY	1
2	R-16530	RUBBER SWEEP PAD	1

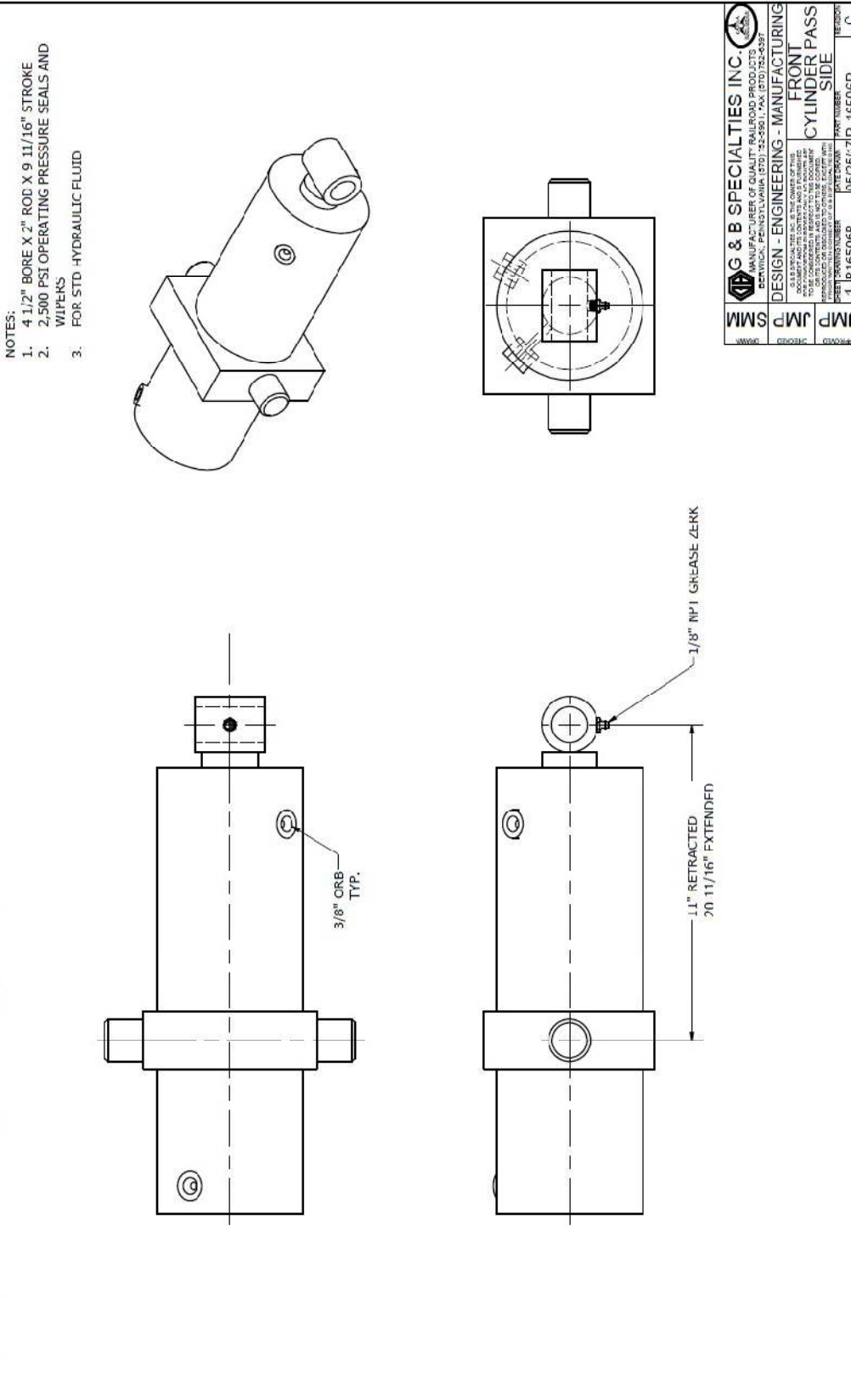
NOTES
 1. USE HARDWARE IN BAG ATTACHED TO BRACKET TO FASTEN SWEEP
 2. APPROX. WEIGHT: 8.8 LBS

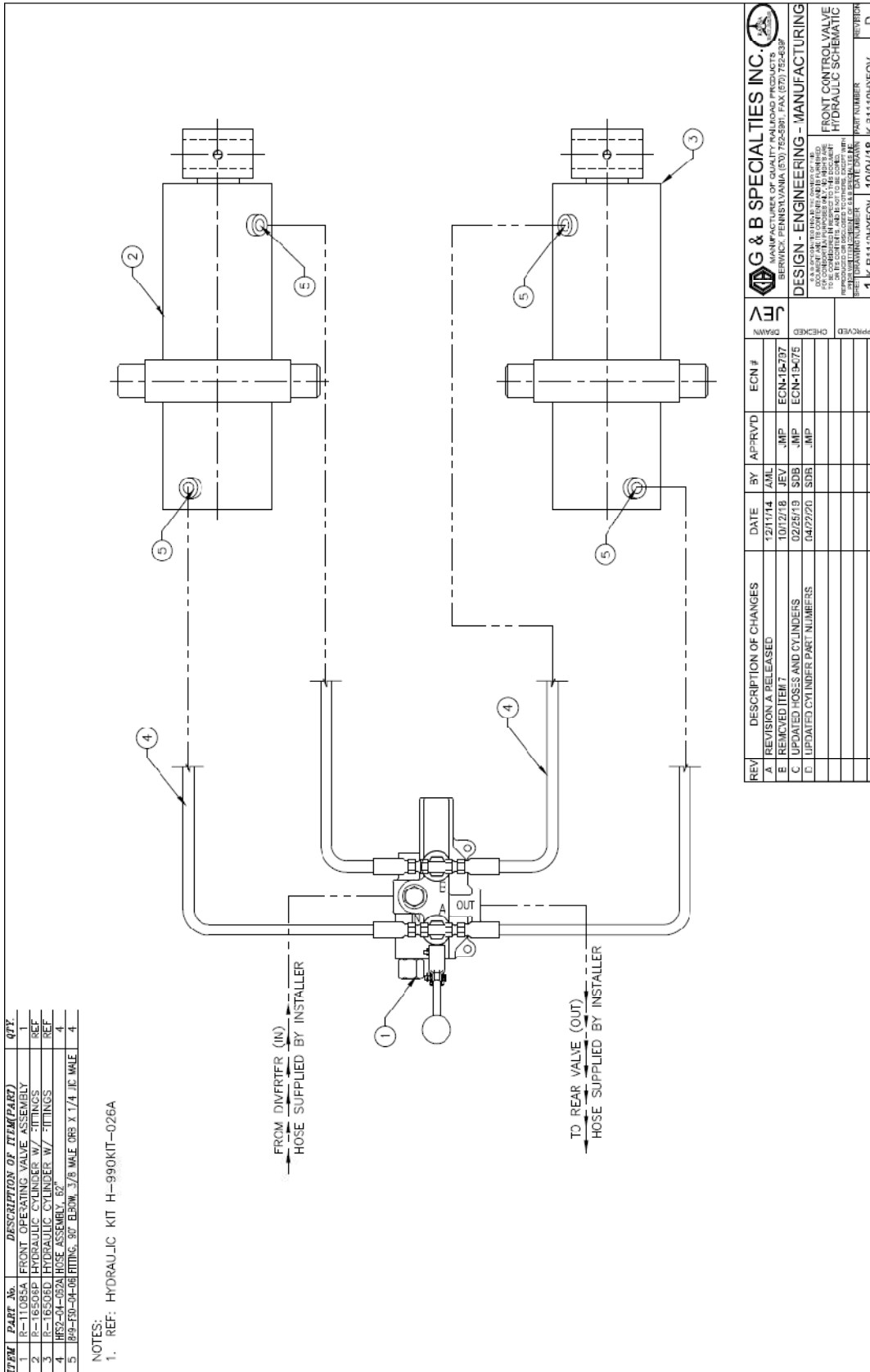
REV/DESCRIPTION OF CHANGES	DATE	BY	APPRVD	ECN #	CHECKED	DRAWN
A. REVISION A RELEASED	06/27/17	JEV	JMP	ECN-18-780	JMP	JEV
B. ADDED WEIGHT NOTE	10/10/18	JEV	JMP	ECN-18-087	JMP	JEV
C. UPDATED LOWER LEVEL COMPONENTS	03/11/19	SDB	JMP	ECN-19-087	JMP	JEV
D. UPDATED MATERIAL OF SWEEP PAD	03/29/18	SDB	JMP	ECN-19-185	JMP	JEV
E. UPDATED BOM	06/07/19	SDB	JMP	ECN-19-390	JMP	JEV

APPROVED	DATE DRAWN	PART NUMBER	REVISION
JMP	06/27/17	R-16589P	E


G & B SPECIALTIES INC.	
MANUFACTURER OF QUALITY RAILROAD PRODUCTS	
BERWICK, PENNSYLVANIA (570) 752-5901, FAX (570) 752-6397	
DESIGN - ENGINEERING - MANUFACTURING	
FRONT PASSENGER RAIL SWEEP	







REV	DESCRIPTION OF CHANGES	DATE	BY	AP-PRVD	ECN #
A	REVISION A RELEASED	12/11/14	ANL		
B	REMOVED ITEM 7	10/27/18	JEV	MP	ECN-18-787
C	UPDATED HOSES AND CYLINDERS	02/26/19	SDB	MP	ECN-19-475
D	UPDATED CYLINDER PART NUMBERS	04/22/20	SDB	MP	


G & B SPECIALTIES INC.
 1000 W. MARKET ST. #100
 BERWICK, PENNSYLVANIA (570) 752-5901 FAX (570) 752-6397

DESIGN - ENGINEERING - MANUFACTURING
 DOCUMENT IS TO REMAIN UNCHANGED UNLESS SPECIFICALLY NOTED OTHERWISE.
 TO BE CONSIDERED IN EFFECT, THIS DOCUMENT MUST BE APPROVED BY THE DESIGN, ENGINEERING, MANUFACTURING, AND QUALITY DEPARTMENTS.
 SHEET NUMBER: 1 DATE DRAWN: 10/04/18 POINT NUMBER: D

ITEM	PART No.	DESCRIPTION OF ITEM(PART)	QTY.
1	R-11085	OPERATING VALVE, FRONT	1
2	R-11220	REDUCIN BUSHING, 1/2 MPT x 1/4, FPT	2
3	R-11221	MALE BRANCH TEE, 1/4 JIC x 1/4 JIC x 1/4 MPI	2
4	R-11222	90° ELBOW, 1/2 JIC x 3/4 MPI	2
5	R-11225	VINYL CAP, 1/4 JIC	4
6	R-11226	VINYL CAP, 1/2 JIC	2

NOTES:
1. ASSEMBLY FITTINGS WITH LOCTITE THREAD SEALANT

REV	DATE	BY	APP
1	9/22/08	1	1

G & B SPECIALTIES INC.
MANUFACTURER OF QUALITY RAILROAD PRODUCTS
BERWICK, PENNSYLVANIA 17004 (USA) TEL: (570) 752-5901 FAX: (570) 752-6397

DESIGN - ENGINEERING - MANUFACTURING

OPERATING VALVE FRONT ASSEMBLY
MIO-R1110-50
REV J

DATE: 9/22/08
DRAWN: [Name]
CHECKED: [Name]
DATE: 9/22/08
PART NUMBER: R-11085A

Rear Railgear

PARTS LIST			R-1110-35 OPTIONS		
ITEM	PART NUMBER	DESCRIPTION	LOCK-UP	PART NUMBER	PART DESCRIPTION
1	R-16308	R-1110 REAR AXLE ASSEMBLY INSULATED	MANUAL PINS	R-1110R-UPPER	R-1110 REAR UPPER ASSY
2	SEE TAB	SEE TAB	AIR LOCK	R-1110R-UPAIR	R-1110 REAR UPPER ASSY - AIR

NOTES:

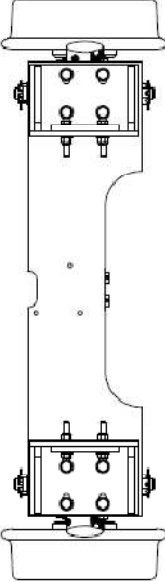
1. MANUAL PINS ARE DEPICTED.
2. HOSES NOT SHOWN FOR CLARITY.
3. ALL INSTALLED HOSES AND FITTINGS TO BE CAPPED/PLUGGED PRIOR TO SHIPPING.

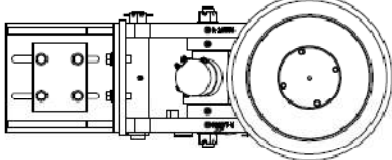
REV	DESCRIPTION OF CHANGES	DATE	BY	APPROVD	ECN #	APPROVED
A	REVISION A RELEASED	07/09/20	JMP	JMP		JMP
B	MANUAL UPDATES	10/14/20	JMP	JMP		JMP

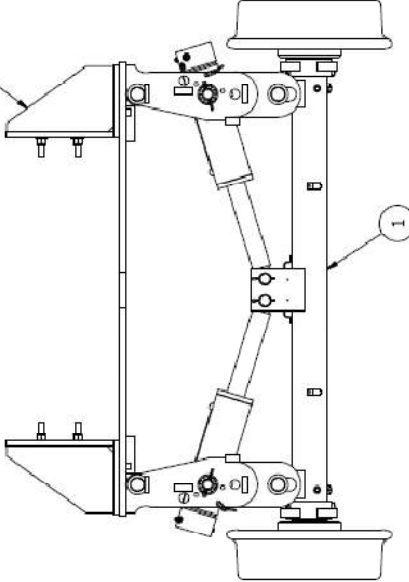
G & B SPECIALTIES INC.	
<small>BERWICK, PENNSYLVANIA (570) 752-5901 FAX (570) 752-6397</small>	
DESIGN - ENGINEERING - MANUFACTURING	R-1110 REAR
ASSEMBLY INS	OPTIONS
REV: 07/09/20	PART NUMBER: 1 R111030
DATE: 07/09/20	REV: 07/09/20
BY: JMP	REV: 07/09/20
BY: JMP	REV: 07/09/20
BY: JMP	REV: 07/09/20
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BY: JMP	REV: 07/09/20

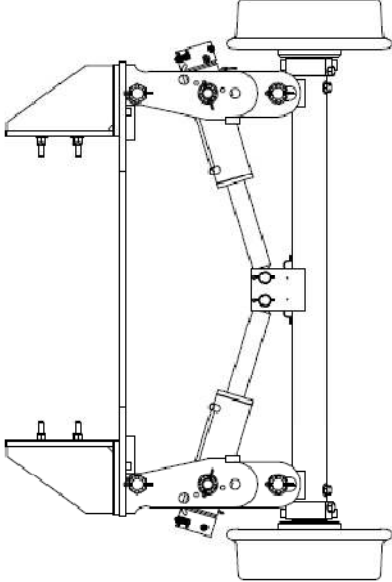
PARTS LIST		R-1110-35 OPTIONS		
ITEM	PART NUMBER	DESCRIPTION	LOCK-UP	PART DESCRIPTION
1	R-16308NON	R-1110 REAR AXLE ASSEMBLY NON-INSULATED	MANUAL PINS	R-1110 REAR UPPER ASSY
2	SEE TAB	SEE TAB	AIR LOCK	R-1110 REAR UPPER ASSY - AIR

REV	DESCRIPTION OF CHANGES	DATE	BY	APPROVD	ECN #	APPROVED
A	REVISION A RELEASED	07/09/20	JMP	JMP		BAW
B	MANUAL UPDATES	10/14/20	JMP	JMP		CRS







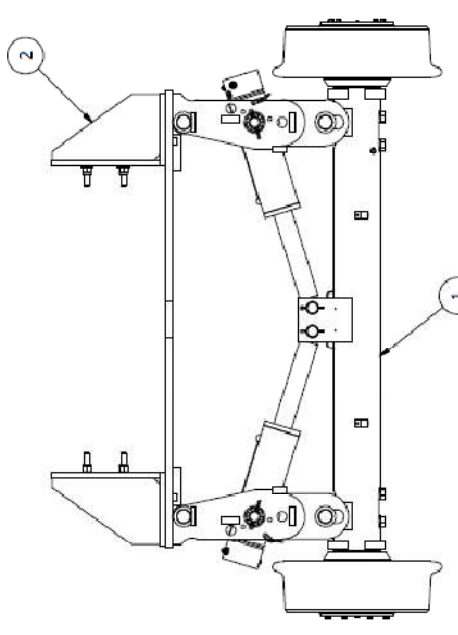


NOTES:

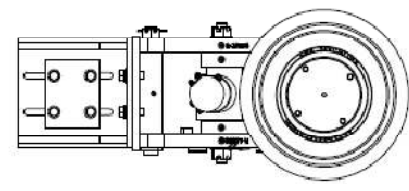
1. MANUAL PINS ARE DEPICTED.
2. HOSES NOT SHOWN FOR CLARITY.
3. ALL INSTALLED HOSES AND FITTINGS TO BE CAPPED/PLUGGED PRIOR TO SHIPPING.


G & B SPECIALTIES INC.	
<p>MANUFACTURER OF QUALITY RAILROAD PRODUCTS BERWICK, PENNSYLVANIA 15010-2521 FAX (570) 752-6397</p> <p>DESIGN - ENGINEERING - MANUFACTURING</p> <p>U.S. & CANADA ONLY. ALL DIMENSIONS IN INCHES. FOR CONSTRUCTION PURPOSES ONLY. ALL DIMENSIONS SHOWN SHALL TAKE PRECEDENCE OVER ANY DIMENSIONS SHOWN ON ANY OTHER DRAWING. INTERNATIONAL CUSTOMERS: SEE WABTEC WEBSITE FOR DIMENSIONAL CONVERSIONS.</p>	<p>R-1110 REAR ASSEMBLY NON INS OPTIONS</p> <p>1 R111035 07/09/20 SEE TAB</p>

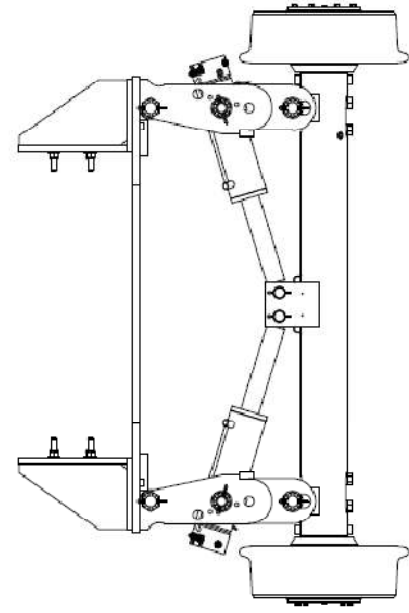
PARTS LIST		R-1110-50 OPTIONS			
ITEM	PART NUMBER	DESCRIPTION	LOCK-UP	PART NUMBER	PART DESCRIPTION
1	R-16586	R-1150 REAR AXLE ASSEMBLY INSULATED	MANUAL PINS	R-1110R-UPPER	R-1150 REAR UPPER ASSY
2	SEE TAB	SEE TAB	AIR LOCK	R-1110R-UPAIR	R-1150 REAR UPPER ASSY - AIR



1: Manual pins location
2: Hose location








REV/DESCRIPTION OF CHANGES	DATE	BY	APPRVD	ECN#	APPROVED	CHECKED	DATE
A. REVISION A RELEASED	07/06/20	JMP	JMP				
B. MANUAL UPDATES	10/14/20	JMP	JMP				

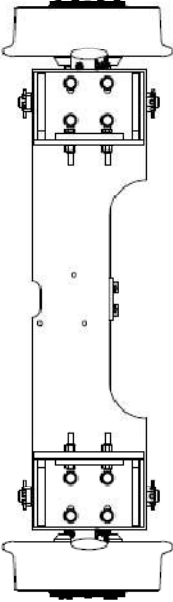
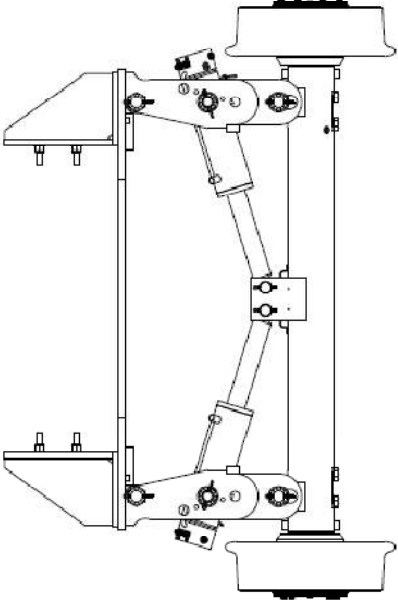
NOTES:

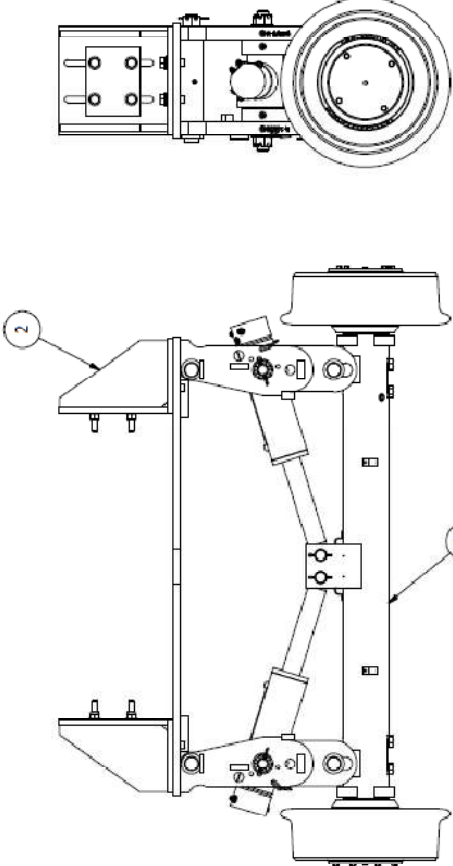
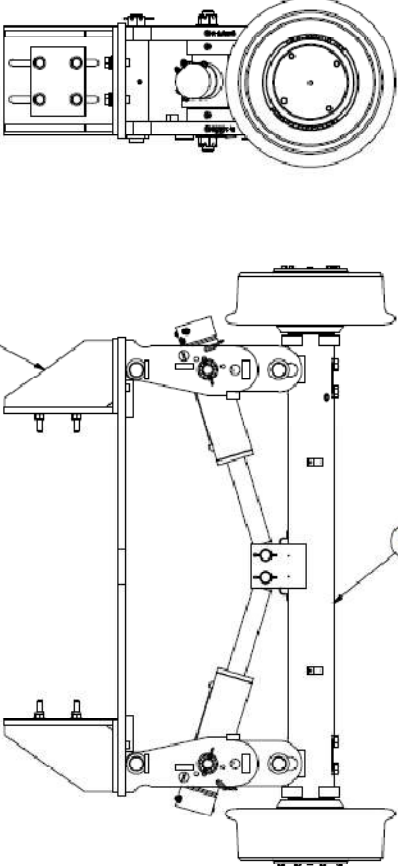
- MANUAL PINS ARE DEPICTED.
- HOSES NOT SHOWN FOR CLARITY.
- ALL INSTALLED HOSES AND FITTINGS TO BE CAPPED/PLUGGED PRIOR TO SHIPPING.

	G & B SPECIALTIES INC. MANUFACTURER OF QUALITY RAILROAD PRODUCTS BERWICK, PENNSYLVANIA 17011-7529, FAX: (570) 752-6397	DESIGN - ENGINEERING - MANUFACTURING	R-1150 REAR ASSEMBLY INS OPTIONS
SHEET NO. 1 OF 1 PART NUMBER: R111050	DATE: 07/06/20 BY: JMP APPROVED: JMP	ECN#:	REVISION: B

PARTS LIST		R-1110-55 OPTIONS	
ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	R-16586NON	R-1150 REAR AXLE ASSEMBLY NON-INSULATED	1
2	SEE TAB	SEE TAB	1

ASSEMBLY NUMBER	LOCK-UP	PART NUMBER	PART DESCRIPTION
R-1110-55	MANUAL PINS	R-1110R-UPPER	R-1150 REAR UPPER ASSY
R-1110-55AIR	AIR LOCK	R-1110R-UPAIR	R-1150 REAR UPPER ASSY - AIR

NOTES:

1. MANUAL PINS ARE DEPICTED.
2. HOSES NOT SHOWN FOR CLARITY.
3. ALL INSTALLED HOSES AND FITTINGS TO BE CAPPED/PLUGGED PRIOR TO SHIPPING.

REV/DESCRIPTION OF CHANGES	DATE	BY	APPR'D	ECN #	APPROV'D
A. REVISION A RELEASED	07/09/20	JMP	JMP		
B. MANUAL UPDATES	10/14/20	JMP	JMP		

REV	DATE	BY	APPR'D	ECN #	APPROV'D
JMP					
JMP					
JMP					
JMP					
JMP					
JMP					
JMP					
JMP					
JMP					
JMP					

<p>G & B SPECIALTIES INC. MANUFACTURER OF QUALITY RAILROAD PRODUCTS BERWICK, PENNSYLVANIA ESTD. 1932-2001, PA. 15701-7532-8327</p> <p>DESIGN - ENGINEERING - MANUFACTURING</p> <p>1616 BERWICK RD. BERWICK, PA. 15701 FOR CONTACT PLEASE CONTACT: SALES DEPARTMENT 1616 BERWICK RD. BERWICK, PA. 15701 PROFESSORIAL OFFICE OF G & B SPECIALTIES INC.</p>	<p>R-1150 REAR ASSEMBLY NON-INS OPTIONS</p> <p>DATE REVISION: 07/09/20 (SEE TAB)</p> <p>REV NUMBER: 1 R111055</p>
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PARTS LIST				PARTS LIST			
ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
1	R-16533	PIN ASSEMBLY	2	13	990600-062-002	5/8" FLAT WASHER TYPE A, NARROW	16
2	R-16558	UPPER REAR BACK PASS LINK	1	14	990316-062-12	5/8" UNC NUT, GR.5 STD NYLOCK	8
3	R-16556	UPPER REAR FRONT PASS LINK	1	15	R-11198	SUPPORT PLATE	2
4	R-16559	UPPER REAR BACK DRIVER LINK	1	16	990511-250-02	COTTER PIN, 1/4" X 2-1/2" Z/Y	8
5	R-16555	UPPER REAR FRONT DRIVER LINK	1	17	990312-125-02	NUT, HEX, SLOTTED, 1 1/4-7 UNC	8
6	R-16534	LINK, LOWER (SLOTTED)	4	18	990603-125-002	WASHER, 1-1/4" FLAT WASHER NARROW TYPE B.	4
7	R-16550	PIN ASSEMBLY	2	19	990900-009	1/8 NPT ST ZERK	12
8	R-16587D	HYDRAULIC CYLINDER ASSEMBLY, DRIVER SIDE	1	20	R-16549	PIVOT WASHER	2
9	R-16587P	HYDRAULIC CYLINDER ASSEMBLY, PASSENGER SIDE	1	21	H-990KIT-027	HYDRAULIC HOSE KIT	1
10	R-16588	UPPER REAR PLATE ASSY	1	22	990600-075-002	3/4" FLAT WASHER TYPE-A	8
11	R-16582	UPPER MOUNTING BRKT REAR UNIT	2	23	990408-075-02	WASHER, 3/4" LOCK X-DUTY	8
12	990729-350-12	5/8" X 3 1/2" LG, HEX SCREW, UNC, GR.5	8	24	990731-225-22	3/4" X 2-1/4" HEX SCREW, UNC, GR. 8	8

DRAWING CONFIGURED WITH STANDARD SLOTTED LINKS AND 12 1/2" UPPER MOUNTING BRACKET (ITEM #11), PART NUMBERS AVAILABLE FOR OTHER VARIATIONS

REVISIONS:

REVISION	DESCRIPTION OF CHANGES	DATE	BY	APPROVD	ECN #
A	REVISION A RELEASED	08/24/18	JEV	JMP	ECN-18-863
B	REMOVED CYLINDER PIN AND COTTER	09/18/18	SMI	JMP	ECN-18-866
C	UPDATED MOUNTING HARDWARE	11/01/18	SMI	JMP	ECN-18-866
D	UPDATED CYLINDER PART NUMBER AND BOM	04/22/20	SDB	JMP	ECN-20-271
E	REVISED VIEWS FROM UPDATED LOWER LEVELS	07/17/20	SMI	JMP	ECN-20-474
F	REVISED 1/4" HARDWARE	10/14/20	JMP	JMP	ECN-20-837

NOTES:
1. HOSES NOT SHOWN FOR CLARITY ASSEMBLE HOSES TO FITTINGS AND ZIP TIE TO HYDRAULIC RETURN PRIOR TO ASSY. OF RAILGEAR

DESIGN - ENGINEERING - MANUFACTURING
R-1110/150
UPPER REAR ASSEMBLY

MANUFACTURER OF QUALITY RAILROAD PRODUCTS
BERWICK, PENNSYLVANIA EST. 1925-5901, FAX (570) 752-6397

SETUP WORK NUMBER: 08/24/18R-1110R-UPP ER
JOB NUMBER: F

PARTS LIST				PARTS LIST			
ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
1	R-16533	PIN ASSEMBLY	2	13	990600-075-002	3/4" TYPE A FLAT WASHER, NARROW, GR. 8	8
2	R-16608	UPPER REAR BACK PASS LINK	1	14	R-11198	SUPPORT PLATE	2
3	R-16556	UPPER REAR FRONT PASS LINK	1	15	990603-125-002	WASHER, 1-1/4" FLAT WASHER NARROW TYPE. B	4
4	R-16609	UPPER REAR BACK DRIVER LINK	1	16	990312-125-02	NUT, HEX, SLOTTED, 1 1/4"-7 UNC	8
5	R-16555	UPPER REAR FRONT DRIVER LINK	1	17	990511-250-02	COTTER PIN, 1/4" X 2-1/2" Z/Y	8
6	R-16534	LINK, LOWER (SLOTTED)	4	18	R-16549	PIVOT WASHER	2
7	R-16550	PIN ASSEMBLY	2	19	990900-009	1/8 NPT ST ZERK	10
8	R-16588	UPPER REAR PLATE ASSY	1	20	H-990KIT-027	HYDRAULIC HOSE KIT	1
9	R-16582	UPPER MOUNTING BRKT REAR UNIT	2	21	R-16587P	HYDRAULIC CYLINDER ASSEMBLY, PASSENGER SIDE	1
10	990729-350-12	5/8" X 3 1/2" LG HEX SCREW, UNC, GR.5	8	22	R-16587D	HYDRAULIC CYLINDER ASSEMBLY, DRIVER SIDE	1
11	990600-062-002	5/8" TYPE A FLAT WASHER, NARROW	16	23	990403-075-02	WASHER, 3/4" X-DUTY LOCK	8
12	990316-062-12	5/8" UNC NUT, GR.5 STD NYLOCK	8	24	990731-225-22	3/4" X 2-1/4" HEX SCREW, UNC, GR 8	8

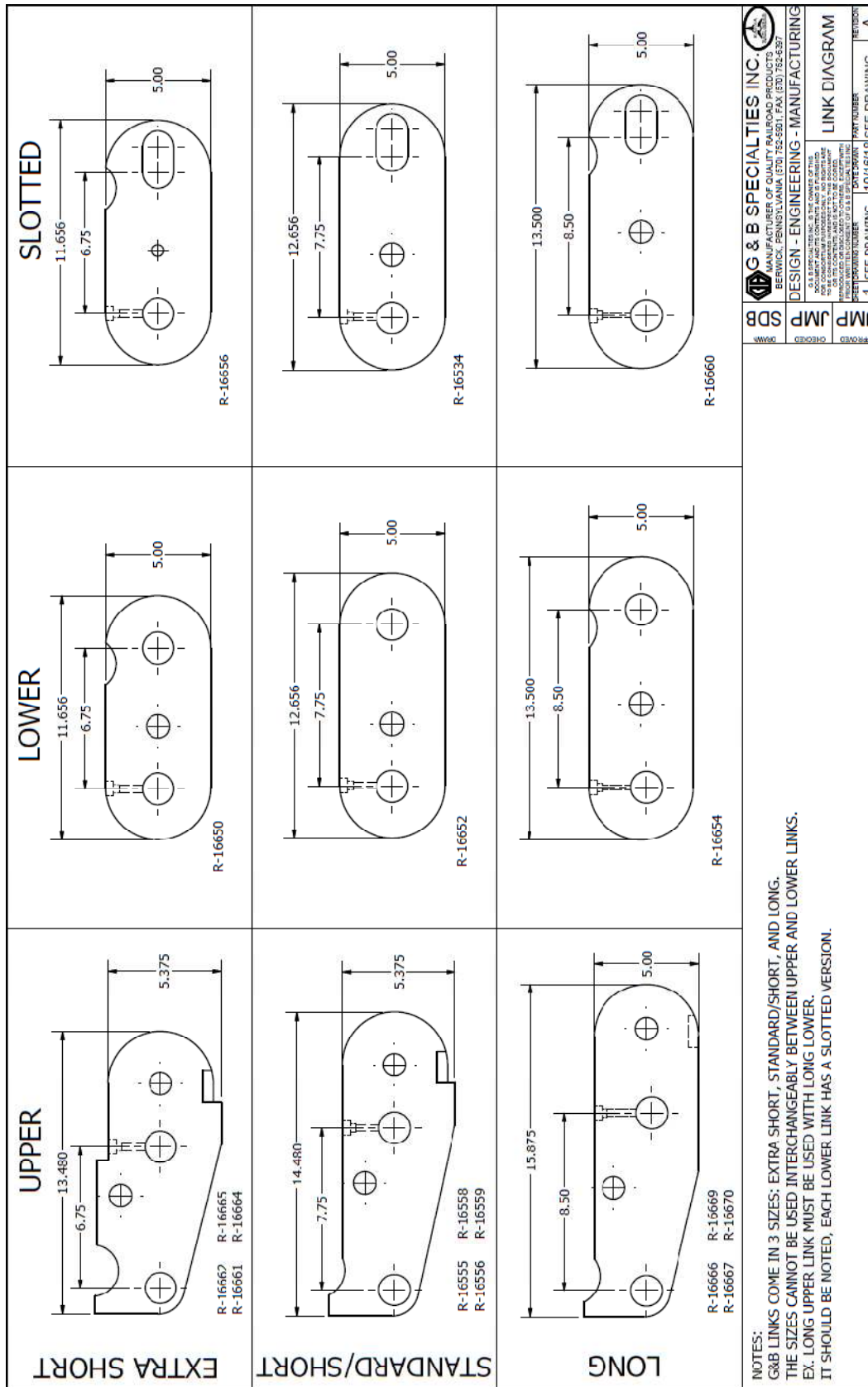
DRAWING CONFIGURED WITH STANDARD SLOTTED LINKS AND 12 1/2" UPPER MOUNTING BRACKET (ITEM #9). PART NUMBERS AVAILABLE FOR OTHER VARIATIONS

REV/DESCRIPTION OF CHANGES

REV	DESCRIPTION	DATE	BY	APPROVD	ECN #
A	REVISION A RELEASED	08/24/18	JEV		
B	REMOVED CYLINDER PIN AND COTTER	09/18/18	SMW	JMP	ECN-184664
C	UPDATED MOUNTING HARDWARE	11/01/18	SMW	JMP	ECN-184665
D	UPDATED CHANGES PART NUMBERS AND BOM	04/22/20	SOB	JMP	ECN-203272
E	REVISED VIEWS FROM UPDATED LOWER LEVELS	07/16/20	SMW	JMP	ECN-204170
F	REVISED 3M HARDWARE	10/14/20	JMP	JMP	ECN-204338

NOTES:
1. HOSES NOT SHOWN FOR CLARITY
2. ASSEMBLE HOSES TO FITTINGS AND ZIP TIE TO HYDRAULIC RETURN PRIOR TO ASSY. OF RAILGEAR

G & B SPECIALTIES INC.
BERWICK, PENNSYLVANIA (570) 752-5901 FAX: (570) 752-6397
DESIGN - ENGINEERING - MANUFACTURING
R-1110/1150
UPPER AIR
ASSY



NOTES:
G&B LINKS COME IN 3 SIZES: EXTRA SHORT, STANDARD/SHORT, AND LONG.
THE SIZES CANNOT BE USED INTERCHANGEABLY BETWEEN UPPER AND LOWER LINKS.
EX. LONG UPPER LINK MUST BE USED WITH LONG LOWER.
IT SHOULD BE NOTED, EACH LOWER LINK HAS A SLOTTED VERSION.

AWR/OWNED JMP/MP/SDB
DESIGNED JMP/MP/SDB
CHECKED JMP/MP/SDB
DATE 10/16/18
REV 1
SEE DRAWING 10/16/18
SEE DRAWING 10/16/18

G & B SPECIALTIES INC.
MANUFACTURER OF QUALITY RAILROAD PRODUCTS
BERWICK, PENNSYLVANIA (570) 752-5901, FAX (570) 752-6397
DESIGN - ENGINEERING - MANUFACTURING
LINK DIAGRAM
PART NUMBER

PARTS LIST		R-16586 OPTIONS	
ITEM	PART NUMBER	DESCRIPTION	QTY
1	R-16547	WELDMENT, AXLE	1
2	R-16591	STUB AXLE ASSY. REAR	2
3	SFF TAR	SFF TAR	7
4	991731-500-22	SCREW, 0.750 X 5.000 GR. 8 HEX Z/Y	4
5	991403-075-12	WASHER, 0.750 X-DUTY LOCK Z/Y	4
6	990900-007	FITTING, 0.125 45 DEG PTF	2
7	R-16551	PIN, CYLINDER	2
8	991509-200-12	COTTER PIN, 3/16" X 2" Z/Y	4

ASSEMBLY NUMBER	INSULATION	PART NUMBER	PART DESCRIPTION
R-16586	INS	R-16578	HHCS 1/4-20 X 1 1/4" NYLON
R-16586NON	NON INS	990722-125-12	HHCS 3/4-20 X 1 1/4"

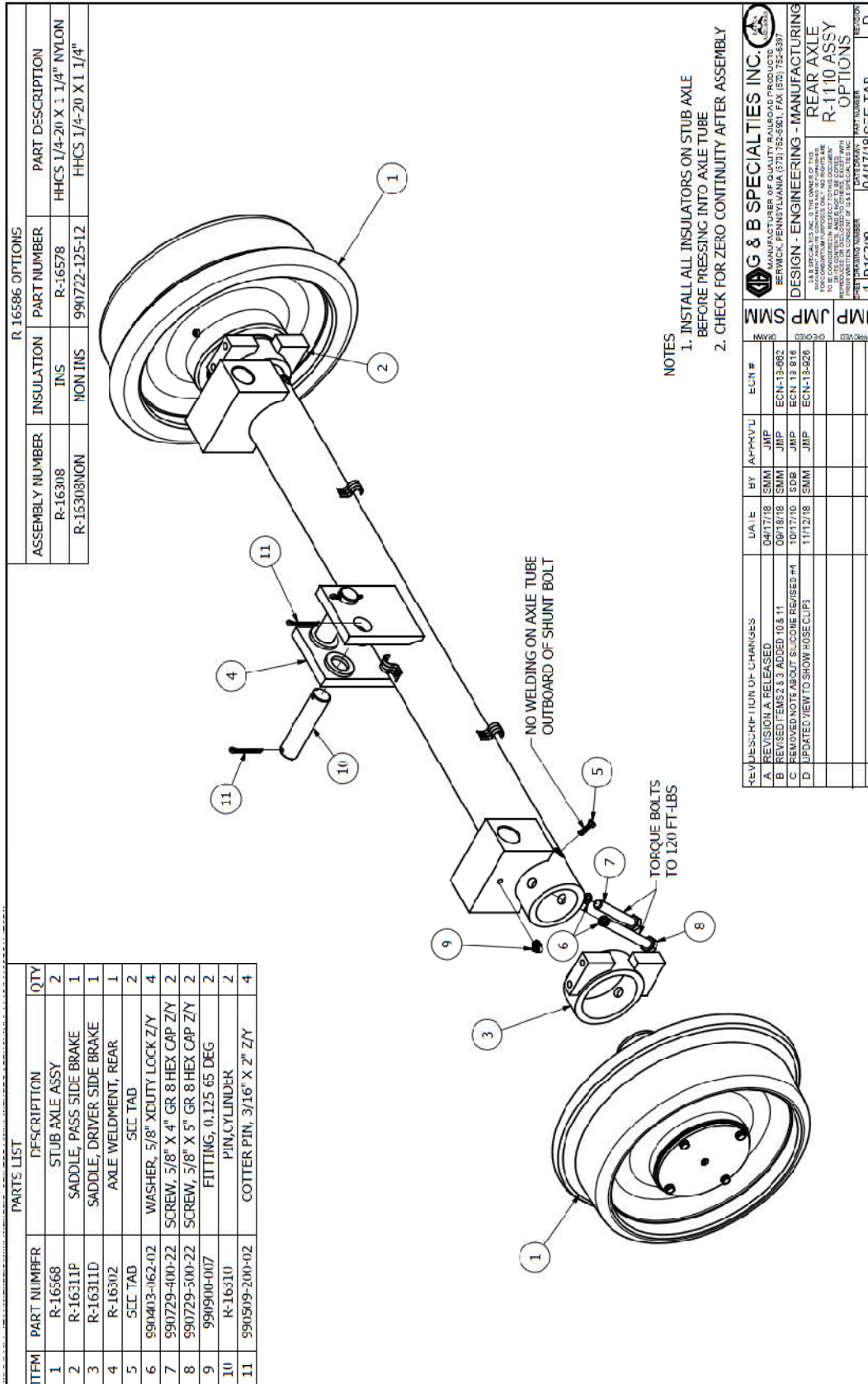
NO WELDING ON AXLE TUBE
OUTBOARD OF SHUNT BOLT

TORQUE BOLTS TO 200 FT-LBS

NOTES:
1. INSTALL ALL INSULATORS ON STUB AXLE BEFORE PRESSING INTO AXLE TUBE
2. CHECK FOR ZERO CONTINUITY AFTER ASSEMBLY

REV	DESCRIPTION OF CHANGES	DATE	BY	APPRVD	ECN #
A	REVISION 1 RELEASED	06/18/17	SMM		ECN-17-584
B	REVISED BILL OF MATERIAL	10/31/17	JEV	.MP	ECN-18-951
C	CHANGED BORDER	06/07/18	JEV	.MP	ECN-18-988
D	ADDED CYLINDER PIN AND COTTER	06/19/18	SMM	.MP	ECN-18-988
E	REMOVED NOTE ABOUT SILICONE REUSED #1	10/17/18	SDB	.MP	ECN-18-814
F	UPDATED VIEW TO SHOW HOSE CLIPS	11/12/18	SMM	.MP	ECN-18-932

MANUFACTURER OF QUALITY RAILROAD PRODUCTS BERWICK, PENNSYLVANIA EST. 1925-2001, FAX (570) 752-6387	G & B SPECIALTIES INC.
DESIGN - ENGINEERING - MANUFACTURING	REAR AXLE
REAR AXLE	R-1110 ASSY
OPTIONS	
06/18/17	06/18/17
IR16586	IR16586
06/18/17	06/18/17
SEE TAB	SEE TAB
F	F



R-16586 OPTIONS

ASSEMBLY NUMBER	INSULATION	PART NUMBER	PART DESCRIPTION
R-16308	INS	R-16578	HHCS 1/4-20 X 1 1/4" NYLON
R-15308NON	NON INS	990722-125-12	HHCS 1/4-20 X 1 1/4"

NOTES
1. INSTALL ALL INSULATORS ON STUB AXLE BEFORE PRESSING INTO AXLE TUBE
2. CHECK FOR ZERO CONTINUITY AFTER ASSEMBLY

REV	DESCRIPTION OF CHANGES	DATE	BY	APPROV	ECN #
A	REVISION A RELEASED	04/17/18	SMM	JMP	ECN-13-062
B	REVISED ITEMS 2 & 3 ADDED 10 & 11	09/18/18	SMM	JMP	ECN-13-818
C	REMOVED NOTE ABOUT SILICONE RE/USED #1	10/17/10	SDB	JMP	ECN-13-818
D	UPDATED VIEW TO SHOW HOSECLIPS	11/12/18	SMM	JMP	ECN-13-028

REV	DESCRIPTION OF CHANGES	DATE	BY	APPROV	ECN #
JMP					
SMM					

G & B SPECIALTIES INC.
MANUFACTURER OF QUALITY RAILROAD PRODUCTS
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DATE OF DRAWING: 04/17/18
DRAWING NUMBER: 1 R16308
PART NUMBER: R-1110 ASSY
OPTIONS: SEE TAB
REVISION: D

NOTES:

- ALL BEARINGS MUST BE PACKED WITH GREASE ENSURING COMPLETE COVERAGE
- INSTALL BEARING INTO FLANGE (INBOARD) SIDE OF WHEEL
- PACK WHEEL WITH GREASE; COMPLETELY COATING BACK SIDE OF BEARING
- INSTALL GREASE SEAL BY TAPPING GENTLY WITH HAMMER, UNTIL FLUSH WITH HUB (DO NOT RELEASE GREASE SEALS)
- INSTALL WHEEL ONTO AXLE
- PACK BEARING CAVITY WITH GREASE UNTIL FLUSH WITH OUTBOARD RACE
- INSERT BEARING INTO OUTBOARD SIDE OF WHEEL
- INSTALL FIRST AXLE NUT
- SET END PLAY BY DOING THE FOLLOWING:
 - TIGHTEN AXLE NUT TO 200 FT-LBS WHILE ROTATING WHEEL
 - LOOSEN AXLE NUT ONE FULL TURN
 - RETIGHTEN AXLE NUT TO 50 FT-LBS WHILE ROTATING WHEEL
 - LOOSEN AXLE NUT BY 30° (HALF A WRENCH FLAT)
- INSTALL TABBED LOCK WASHER (DO NOT REUSE LOCK WASHERS)
- INSTALL SECOND AXLE NUT, TORQUE TO 100 FT-LBS
- VERIFY END PLAY OF WHEEL IS WITHIN .001" - .005"
- BEND THREE TABS OF LOCK WASHER UPWARD TO PREVENT NUT ROTATION
- FILL OUTBOARD CAVITY WITH GREASE
- APPLY SILICONE TO HUBCAP MOUNTING SURFACE
- INSTALL HUBCAP AND SECURE WITH PROVIDED HARDWARE

ITEM	PAK#	NUMBER	DESCRIPTION	QTY
1	R-16569		REAR SPINDLE	1
2	R-16572		INSULATION, TUBE	1
3	R-16571		INSULATION, RING	1
4	R-16570		INSULATION, BOLT	2
5	R-16573		16" 1150 REAR WHEEL	1
6	R-16575		SEAL, WHEEL	1
7	R-16576		NUT, AXLE	2
8	R-16577		AXLE TAB WASHER	1
9	R-11028A		HUB CAP ASSEMBLY	1
10	R-16592		BEARING ASSEMBLY	2
11	990723-075-22		SCREW, 5/16-18 X 3/4" HEX Z/Y	4
12	990401-031-02		WASHER, 5/16" REG LOCK Z/Y	4
13	R-11055A		GASKET 16" WHEEL	1

REVISIONS:

REV	DESCRIPTION OF CHANGES	DATE	BY	APPRVD	EON#
A	REVISION A RELEASED	06/19/17	SMM	JMP	ECN-15-202
B	ADDED ITEM 13, REVISED NOTES	03/20/18	JEV	JMP	ECN-15-852
C	CHANGED BORDER	06/10/18	JEV	JMP	ECN-15-852
D	RE-CREATED DRAWING NOTES	04/26/19	SDB	SMM	ECN-15-289

PARTS LIST

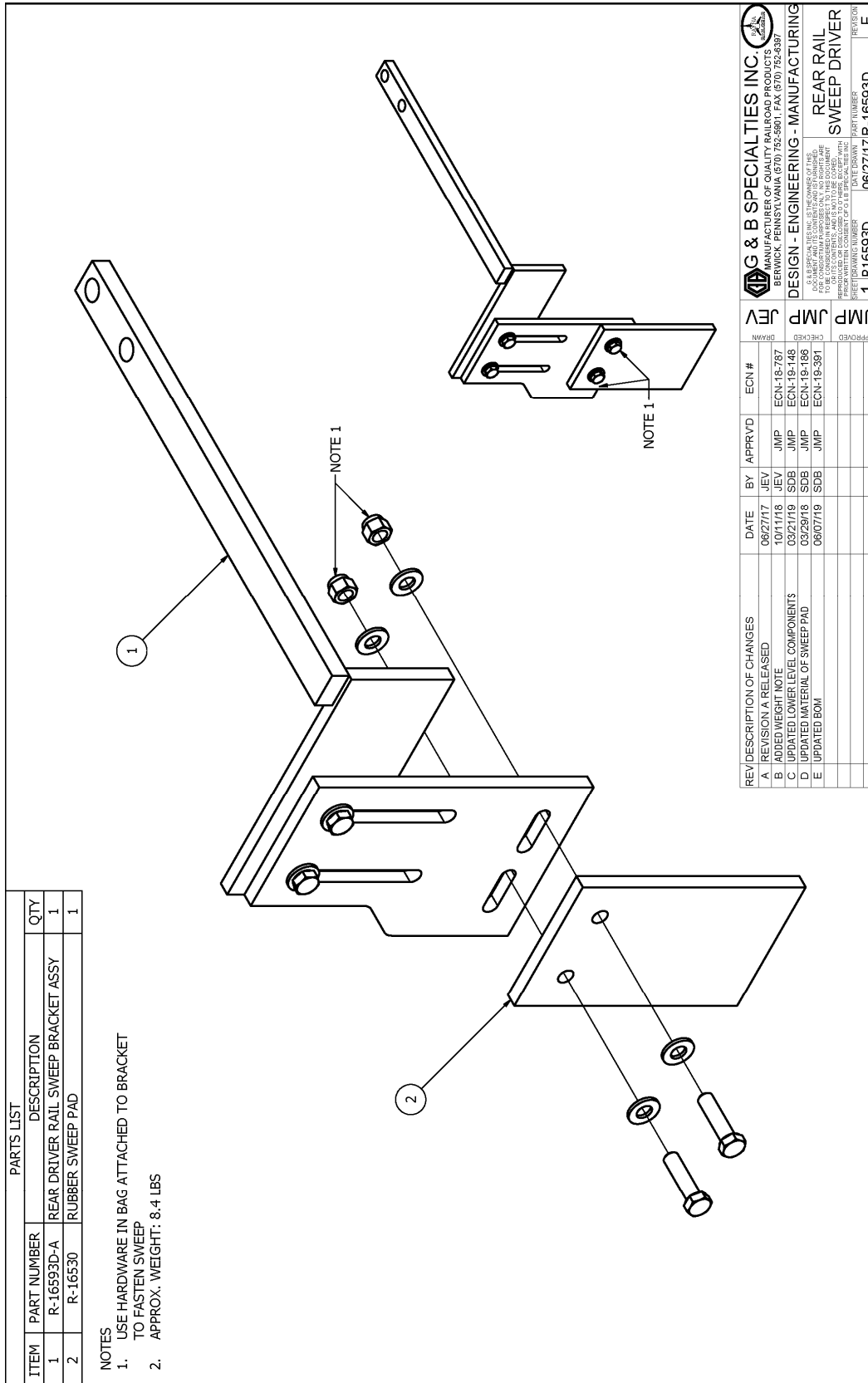
ITEM#	PAK#	NUMBER	DESCRIPTION	QTY
1	R-16569		REAR SPINDLE	1
2	R-16572		INSULATION, TUBE	1
3	R-16571		INSULATION, RING	1
4	R-16570		INSULATION, BOLT	2
5	R-16573		16" 1150 REAR WHEEL	1
6	R-16575		SEAL, WHEEL	1
7	R-16576		NUT, AXLE	2
8	R-16577		AXLE TAB WASHER	1
9	R-11028A		HUB CAP ASSEMBLY	1
10	R-16592		BEARING ASSEMBLY	2
11	990723-075-22		SCREW, 5/16-18 X 3/4" HEX Z/Y	4
12	990401-031-02		WASHER, 5/16" REG LOCK Z/Y	4
13	R-11055A		GASKET 16" WHEEL	1

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

1150 REAR STUB AXLE ASSEMBLY

DATE: 06/19/17
REV: 1
REVISED BY: SMM
REVISED DATE: 03/20/18
REVISED BY: JEV
REVISED DATE: 06/10/18
REVISED BY: JEV
REVISED DATE: 04/26/19
REVISED BY: SDB

DATE: 06/19/17
REV: 1
REVISED BY: SMM
REVISED DATE: 03/20/18
REVISED BY: JEV
REVISED DATE: 06/10/18
REVISED BY: JEV
REVISED DATE: 04/26/19
REVISED BY: SDB



REV	DESCRIPTION OF CHANGES	DATE	BY	APPRVD	ECN #	APPROVED	DATE	REVISION
A	REVISION A RELEASED	06/27/17	JEV		ECN-18-787			
B	ADDED WEIGHT NOTE	10/11/18	JEV		ECN-19-148			
C	UPDATED LOWER LEVEL COMPONENTS	03/21/19	ISDB		ECN-19-186			
D	UPDATED MATERIAL OF SWEEP PAD	03/29/18	ISDB		ECN-19-391			
E	UPDATED BOM	06/07/19	ISDB					

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 INFORMATION STORAGE AND RETRIEVAL SYSTEMS, WITHOUT THE
 WRITTEN CONSENT OF G & B SPECIALTIES, INC.

DRAWN: JEV
 CHECKED: JEV
 APPROVED: JEV

1 | R16593D | 06/27/17 | R-16593D | E

REAR RAIL SWEEP DRIVER

PARTS LIST			
ITEM	PART NUMBER	DESCRIPTION	QTY
1	R-16593P-A	REAR PASSENGER RAIL SWEEP BRACKET ASSY	1
2	R-16530	RUBBER SWEEP PAD	1

NOTES
 1. USE HARDWARE IN BAG ATTACHED TO BRACKET TO FASTEN SWEEP
 2. APPROX. WEIGHT: 8.4 LBS

REV	DESCRIPTION OF CHANGES	DATE	BY	APPRVD	ECN #	APPROVED	DATE DRAWN	PART NUMBER	REVISION
A	REVISION A RELEASED	06/27/17	JEV	JMP	ECN-18-768				
B	ADDED WEIGHT NOTE	10/11/18	JEV	JMP	ECN-19-149				
C	UPDATED LOWER LEVEL COMPONENTS	09/21/19	SDB	JMP	ECN-19-187				
D	UPDATED MATERIAL OF SWEEP PAD	09/29/18	SDB	JMP	ECN-19-392				
E	UPDATED BOM	06/07/19	SDB	JMP	ECN-19-692				
F	REVERSED LOWER BRACKET ORIENTATION	10/02/19	SDB	SDB					

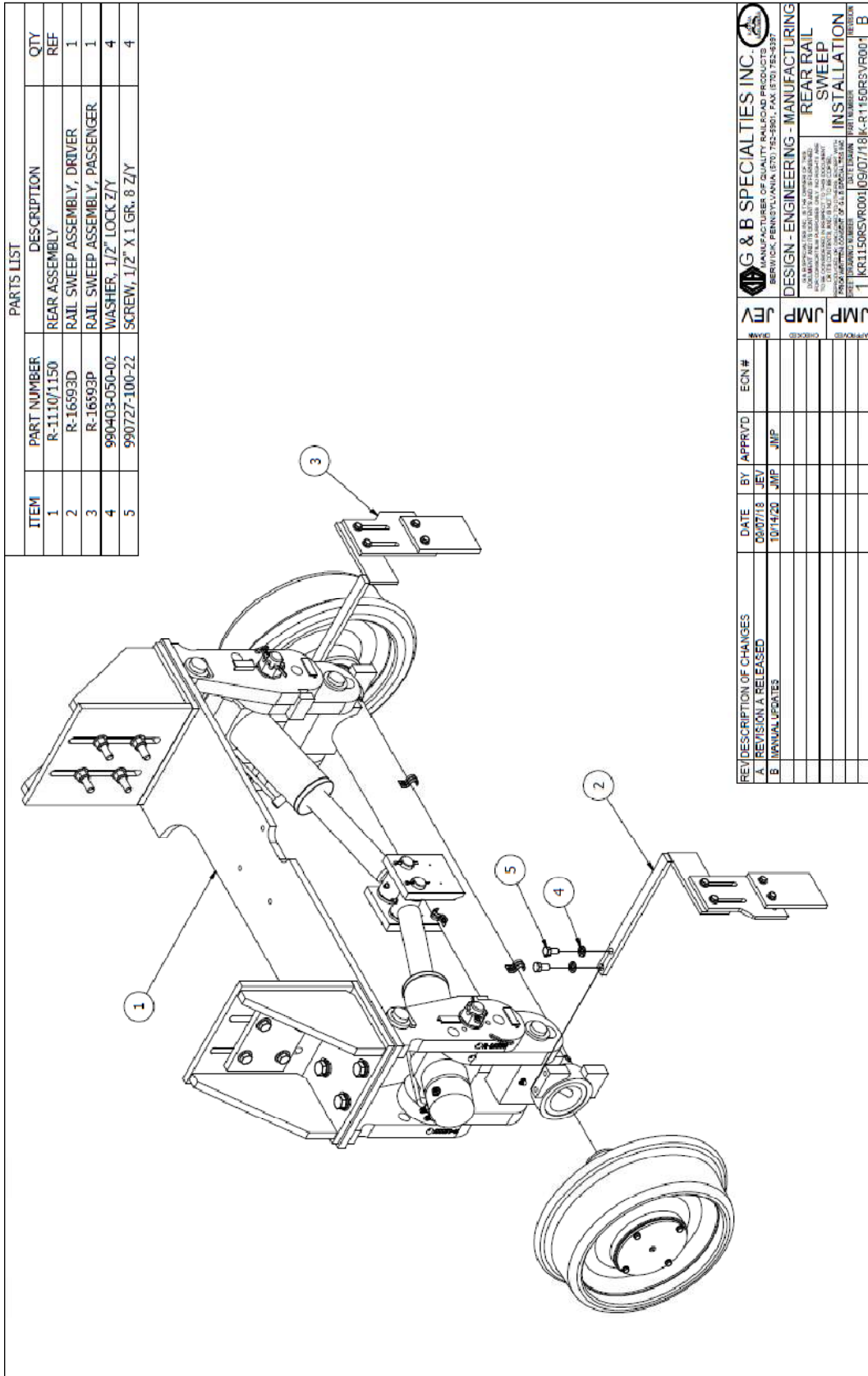
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JEV
 JMP
 JMP
 JMP

DRAWN
 CHECKED
 APPROVED

1 R16593P 06/27/17 R-16593P F

REAR RAIL
 SWEEP PASS



PARTS LIST				
ITEM	PART NUMBER	DESCRIPTION	QTY	REF
1	R-1110/1150	REAR ASSEMBLY	1	
2	R-16693D	RAIL SWEEP ASSEMBLY, DRIVER	1	
3	R-16693P	RAIL SWEEP ASSEMBLY, PASSENGER	1	
4	990403-050-02	WASHER, 1/2" LOCK Z/Y	4	
5	990727-100-22	SCREW, 1/2" X 1 GR. 8 Z/Y	4	

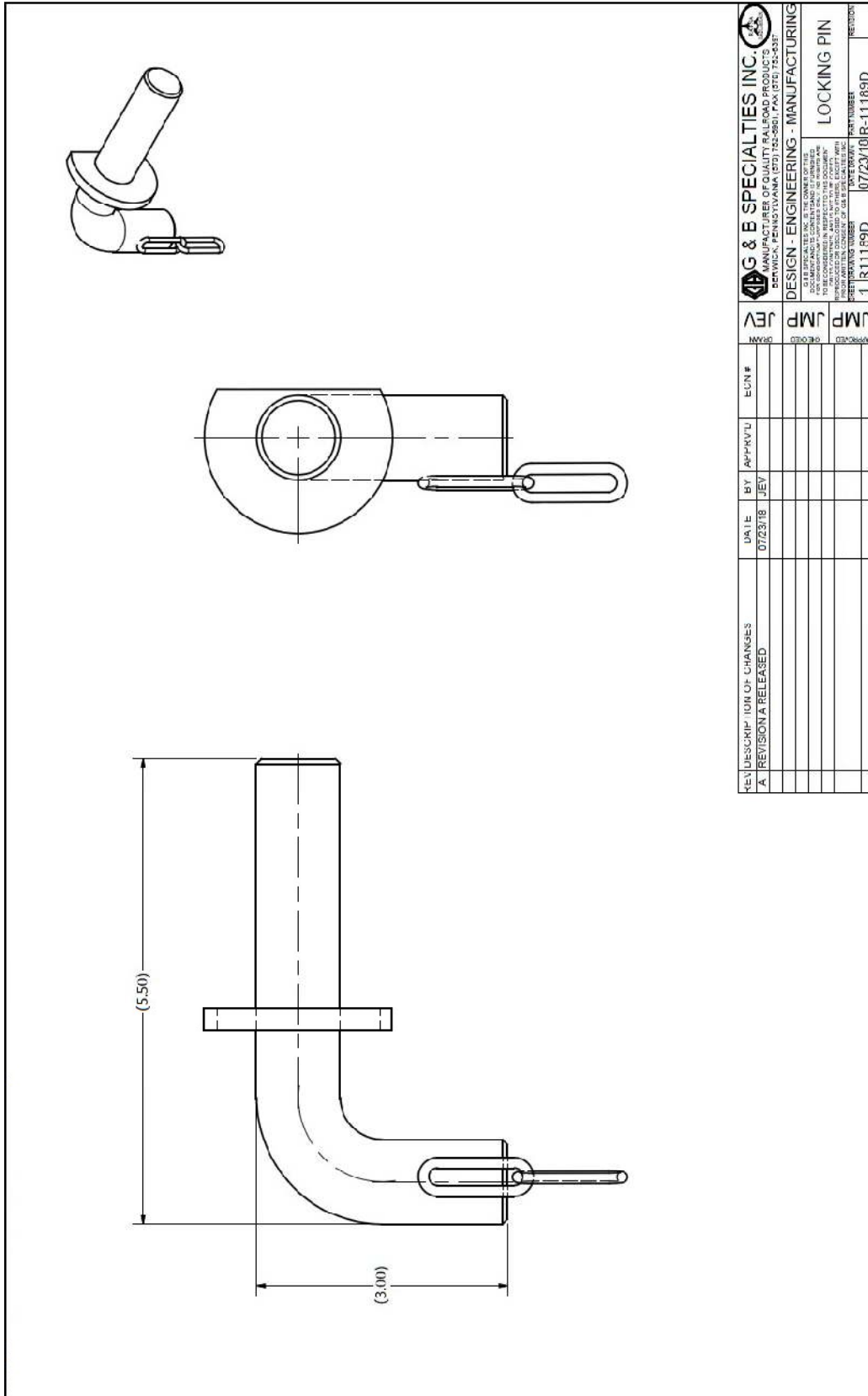
G & B SPECIALTIES INC. MANUFACTURER OF QUALITY RAILROAD PRODUCTS BERWICK, PENNSYLVANIA (570) 752-5901, FAX (570) 752-6397		REAR RAIL SWEEP INSTALLATION <small>FOR USE WITH THE MIO-R1110-50 REAR RAIL SWEEP ASSEMBLY. THIS DRAWING IS THE PROPERTY OF G&B SPECIALTIES INC. AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM. WITHOUT PERMISSION IN WRITING FROM THE MANUFACTURER.</small>
REVISIONS OF CHANGES A. REVISION A RELEASED B. MANUAL UPDATES	DATE 06/07/18 10/14/20	BY JEV JMP
APPROVED _____ _____ _____	CHECKED _____ _____ _____	ECN # _____ _____ _____
DRAWN JEV JMP JMP		
1 KCL150RSVR001 091071718 K-R1150RSVR001 B		

PARTS LIST			
ITEM	PART NUMBER	DESCRIPTION	QTY REF
1	R-1110/1150	REAR ASSEMBLY	1
2	R-32030D	BRAKE ASSEMBLY, DRIVER'S	1
3	R-32030P	BRAKE ASSEMBLY, PASSENGER'S	1
4	R-16593D	REAR SWEEP ASSEMBLY, DRIVER'S	1
5	R-16593P	REAR SWEEP ASSEMBLY, PASSENGER'S	1
6	-	WASHER, 1/2" LOCK Z/Y	8
7	-	SCREW, 1/2" X 1-3/4" GR. 8 Z/Y	4
8	-	SCREW, 1/2" X 1-1/4" GR. 8 Z/Y	4

HARDWARE KIT: R-990KIT-433

REVISION DESCRIPTION	DATE	BY	APPROVD	ECN #
A REVISION A RELEASED	06/24/18	JEV	JEV	
B GENERAL REVISION	07/08/20	JMP	JMP	
C MANUAL UPDATE	10/14/20	JMP	JMP	

G & B SPECIALTIES INC. MANUFACTURER OF QUALITY RAILROAD PRODUCTS BERWICK, PENNSYLVANIA 15701-752-5901, FAX (570) 752-6397	G & B		
DESIGN - ENGINEERING - MANUFACTURING			
REAR ASSEMBLY SWEEP W/ BRAKES			
DATE REVISION NUMBER 11/01/2018 0001	DATE DRAWN 08/25/18	PART NUMBER R-R 1150BKRX001	REVISION C



G & B SPECIALTIES INC. 1000 W. 10TH STREET, SUITE 100 BERWICK, PENNSYLVANIA 17004-2580, USA TEL: (570) 752-5901 FAX: (570) 752-6397		DESIGN - ENGINEERING - MANUFACTURING		LOCKING PIN	
APPROVED JPM		DATE DRAWN 07/23/10		PART NUMBER R-11189D	
CHECKED JPM		DATE CHECKED 07/23/10		DRAWING NUMBER 1 R11189D	
DRAWN JEV		DATE 07/23/10		EUN #	
REVISIONS A. REVISION A. RELEASED		BY JEV		APPROVAL	

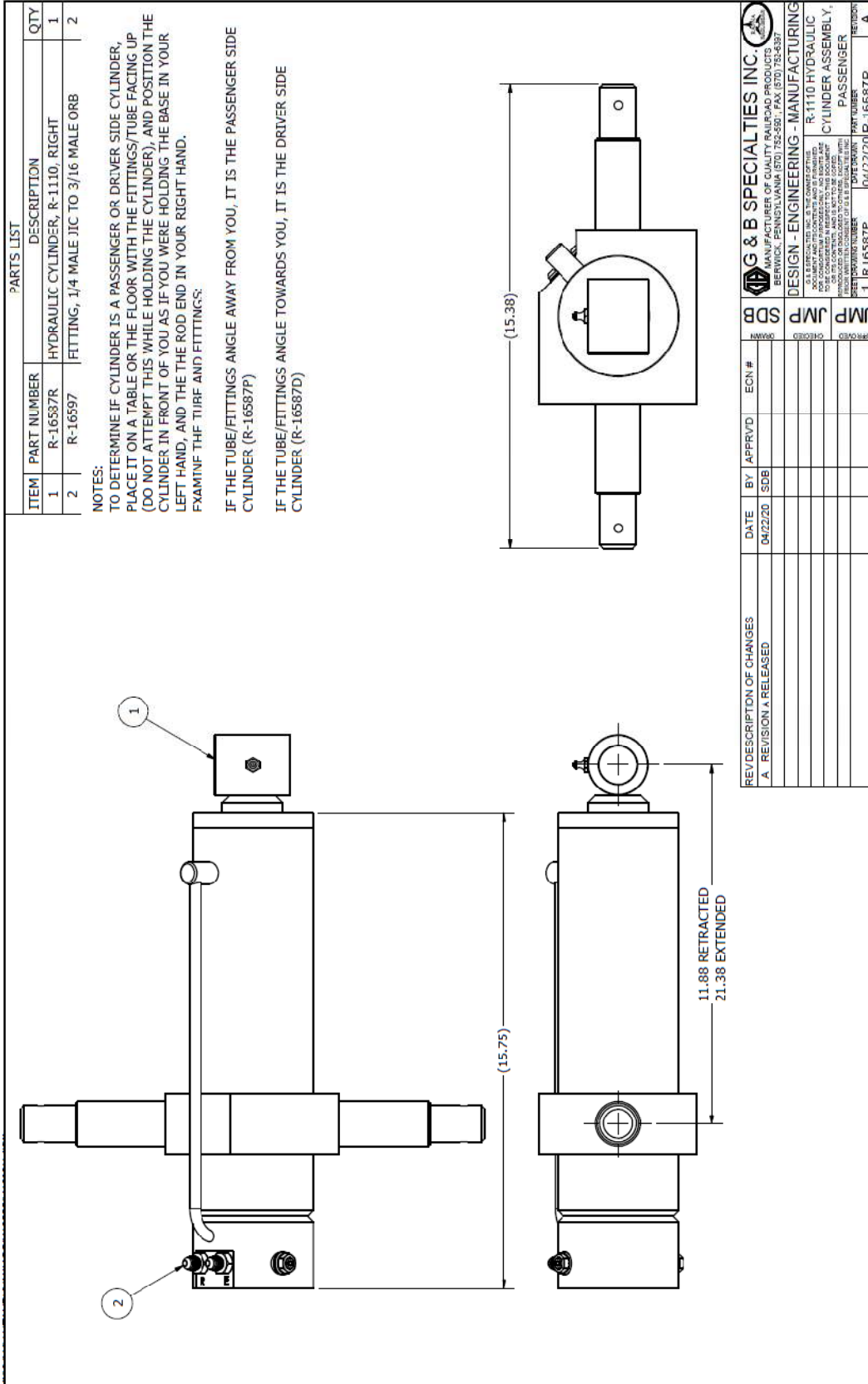
PARTS LIST			
ITEM	PART NUMBER	DESCRIPTION	QTY
1	R-16587L	HYDRAULIC CYLINDER R-1110, LEFT	1
2	R-16597	FITTING, 1/4 MALE JIC TO 3/16 MALE ORB	2

NOTES:
TO DETERMINE IF CYLINDER IS A PASSENGER OR DRIVER SIDE CYLINDER, PLACE IT ON A TABLE OR THE FLOOR WITH THE FITTINGS/TUBE FACING UP (DO NOT ATTEMPT THIS WHILE HOLDING THE CYLINDER), AND POSITION THE CYLINDER IN FRONT OF YOU AS IF YOU WERE HOLDING THE BASE IN YOUR LEFT HAND, AND THE THE ROD END IN YOUR RIGHT HAND. EXAMINE THE TUBE AND FITTINGS:
IF THE TUBE/FITTINGS ANGLE AWAY FROM YOU, IT IS THE PASSENGER SIDE CYLINDER (R-16587P)
IF THE TUBE/FITTINGS ANGLE TOWARDS YOU, IT IS THE DRIVER SIDE CYLINDER (R-16587D)

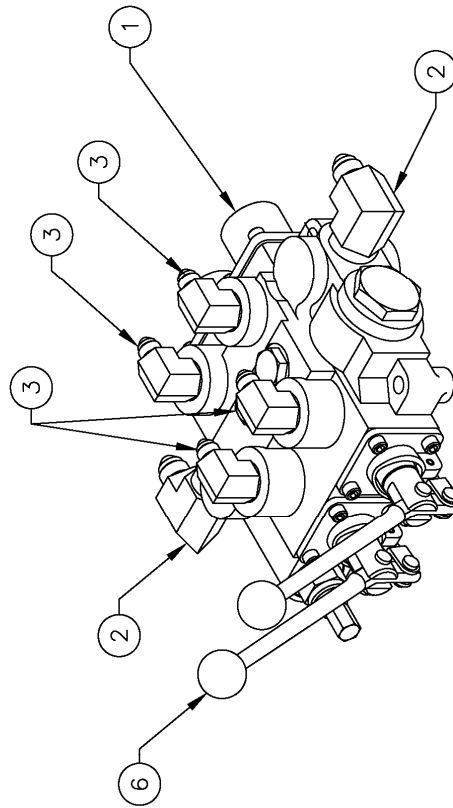
REV	DESCRIPTION OF CHANGES	DATE	BY	APPRVD	ECN #	DESIGN	MANUFACT
A	REVISION A RELEASED	04/22/20	SDB				

REV	DESCRIPTION	DATE	BY	APPRVD	ECN #
1	R-16587D	04/22/20	R-16587D		

G & B SPECIALTIES INC.
MANUFACTURER OF QUALITY RAILROAD PRODUCTS
BERWICK, PENNSYLVANIA (570) 752-5901, FAX (570) 752-6397
DESIGN - ENGINEERING - MANUFACTURING
R-1110 HYDRAULIC
CYLINDER ASSEMBLY,
DRIVER



ITEM	PART No.	DESCRIPTION OF ITEM(PART)	QTY.
1	R-11084	OPERATING VALVE, REAR	1
2	R-11222	90° ELBOW, 1/2 JIC x 3/4 MPT	2
3	R-11223	90° ELBOW, 1/4 JIC x 1/2 MPT	4
4	R-11225	VINYL CAP, 1/4 JIC	4
5	R-11226	VINYL CAP, 1/2 JIC	2
6	R-11084B	OPERATING VALVE HANDLE	2



REV	DESCRIPTION OF CHANGES	DATE	BY	APPRVD	ECN #	APPROVED	CHECKED	DRAWN
A	REVISION A RELEASED	12/13/21	SMM					

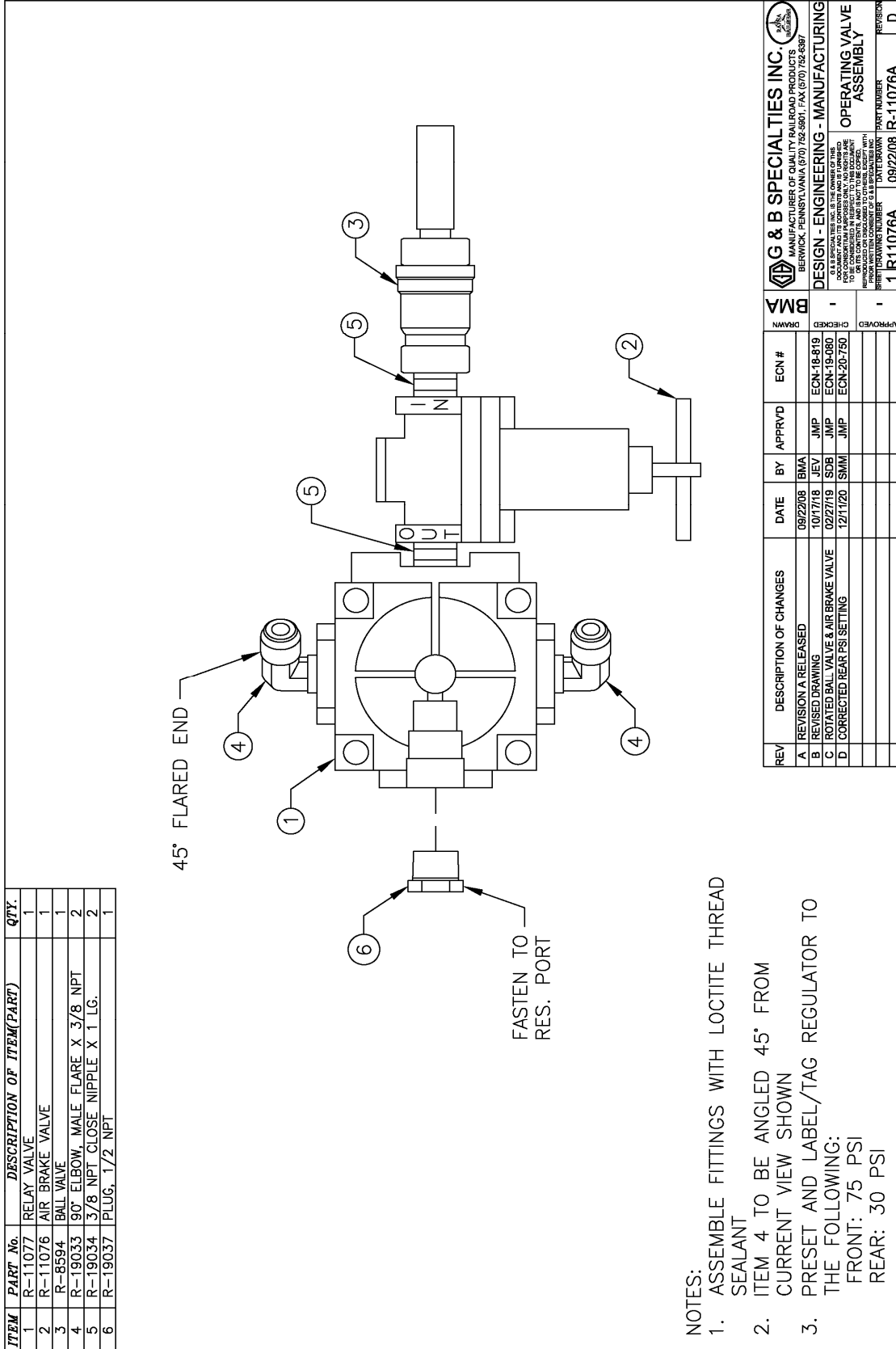
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DATE DRAWN: 12/13/21
PART NUMBER: R-11084A
REVISION: A

NOTES:
1. ASSEMBLE FITTINGS WITH
LOCTITE THREAD SEALANT



ITEM	PART No.	DESCRIPTION OF ITEM(PART)	QTY.
1	R-11077	RELAY VALVE	1
2	R-11076	AIR BRAKE VALVE	1
3	R-8594	BALL VALVE	1
4	R-19033	90° ELBOW, MALE FLARE X 3/8 NPT	2
5	R-19034	3/8 NPT CLOSE NIPPLE X 1 LG.	2
6	R-19037	PLUG, 1/2 NPT	1

- NOTES:
- ASSEMBLE FITTINGS WITH LOCTITE THREAD SEALANT
 - ITEM 4 TO BE ANGLED 45° FROM CURRENT VIEW SHOWN
 - PRESET AND LABEL/TAG REGULATOR TO THE FOLLOWING:
FRONT: 75 PSI
REAR: 30 PSI

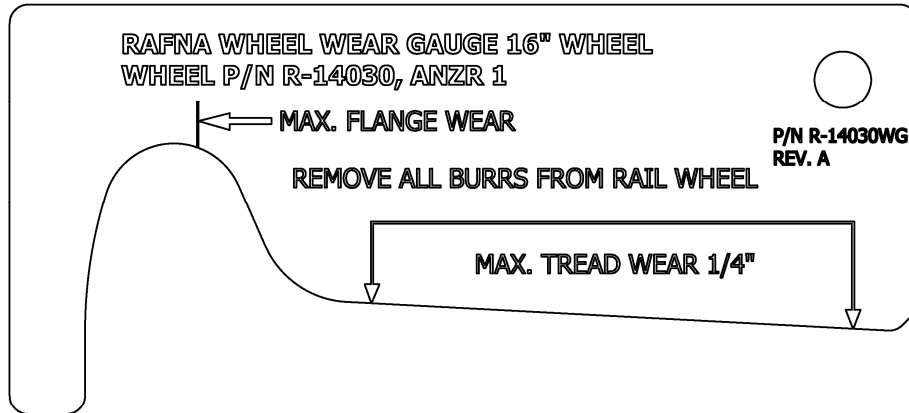
REV	DESCRIPTION OF CHANGES	DATE	BY	APPRVD	ECN #	CHECKED	DRAWN
A	REVISION A RELEASED	09/22/08	BMA	JMP	ECN-18-819		
B	REVISED DRAWING	10/17/18	JEV	JMP	ECN-18-980		
C	ROTATED BALL VALVE & AIR BRAKE VALVE	02/27/19	SDB	JMP	ECN-18-980		
D	CORRECTED REAR PSI SETTING	12/11/20	SMMI	JMP	ECN-20-750		

G & B SPECIALTIES INC.
WABTEC COMPANY, A DIVISION OF
 BERWICK, PENNSYLVANIA 16017-7520 PA (717) 752-6397

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OPERATING VALVE ASSEMBLY

REVISED BY: **1** R11076A 09/22/08 R-11076A D



GAUGE NOT SHOWN TO SCALE



OPERATION OF RAFNA GUIDE WHEEL UNIT



TO PLACE VEHICLE ON RAIL:

1. Drive vehicle on crossing, centering it over tracks.
2. Once centered over tracks, remove front and rear safety pins.
3. Lower rear wheels first:
 - A. If rear is not completely centered (within 4"), rear rail wheels will center truck on rail
 - B. With the rear wheels fully extended and properly seated on rail, install safety pin into lower hole on both sides.
4. Center front rail wheels over rail:
 - A. If front is not completely centered over rail, maneuver truck so that it is.
 - B. Front vehicle wheels must be straight ahead.
 - C. Lower front rail wheels until cylinders are fully retracted. Front rail unit incorporates an over-center design.
 - D. Install front safety pins in rail position.
5. Check all rail wheel flanges to assure they are seated properly on rail.
6. Ensure that the rear safety pins are installed properly.
7. Engage vehicle steering wheel lock.

TO REMOVE VEHICLE FROM RAIL:

1. Drive vehicle on to crossing.
2. Either front or rear unit may be activated first.
3. Front Unit:
 - A. Remove safety pins.
 - B. Retract front rail wheels completely.
 - C. Re-install safety pins.
4. Rear Unit:
 - A. Remove safety pins.
 - B. Retract rear rail wheels completely.
 - C. Re-install safety pins.
5. Check to ensure that all safety pins are in their proper location.
6. Disengage steering wheel lock.

SAFE OPERATING SPEEDS ON RAIL WILL BE GOVERNED BY TRACK CONDITIONS AND EXISTING RAILROAD RULES AND REGULATIONS. UNDER NO CIRCUMSTANCES SHOULD THIS VEHICLE BE OPERATED OVER 30MPH WHILE ON TRACK.

RAFNA RAILGEAR, G&B SPECIALTIES

(570) 752-5901

BERWICK, PA

R-11210-1



OPERATION INSTRUCTIONS:

1. REMOVE SAFETY PINS.
2. ACTIVATE VALVE:
- A. PUSH - RAIL POSITION
- B. PULL - ROAD POSITION
3. REPLACE SAFETY PINS IN PROPER LOCATION.

R-11210-2



OPERATION INSTRUCTIONS:

1. REMOVE SAFETY PINS.
2. ACTIVATE VALVE:
- A. PUSH - RAIL POSITION
- B. PULL - ROAD POSITION
3. REPLACE SAFETY PINS IN PROPER LOCATION.

R-11210-2

LOCKING PINS

PULL TO OPEN



PUSH TO CLOSE

REAR RAILGEAR
R-11210-4

R-11210 REV C

INSPECTION AND MAINTENANCE OF RAFNA GUIDE WHEEL UNIT

DAILY:

1. Visually inspect railgear unit for hydraulic leaks, loose fasteners, and excessive wear.
2. Spin all four rail wheels and note any bearing noise or resistance.
3. Check hydraulic fluid level.
4. Check rail wheel flanges for irregular wear.

Weekly:

1. Grease all fittings on front and rear railgear units:
 - A. Twentyfour (24) on front unit
 - B. Fifteen (15) on rear unit
2. Inspect bearing grease every 2,000 miles or 6 months (whichever comes first)
3. Inspect bearings and grease cavity by removing hubcaps. Unless bearing problem is suspected, the bearings do not need to be removed or repacked.
4. Install new hubcap gasket. If necessary replace hubcaps.

R-11210-5

THINK FIRST R-11210-6
DRIVE WITH CARE!

R-11210-A REV C

 **CAUTION** 

RELIEF VALVE SETTINGS:
FRONT: 2000 PSI, 2500 PSI MAX.
REAR: 1500 PSI, 2000 PSI MAX.
DO NOT BOTTOM-OUT RELIEFS, IF ADJUSTED.
R-11210-7

 **CAUTION** 

RELIEF VALVE SETTINGS:
FRONT: 2000 PSI, 2500 PSI MAX.
REAR: 1500 PSI, 2000 PSI MAX.
DO NOT BOTTOM-OUT RELIEFS, IF ADJUSTED.
R-11210-7

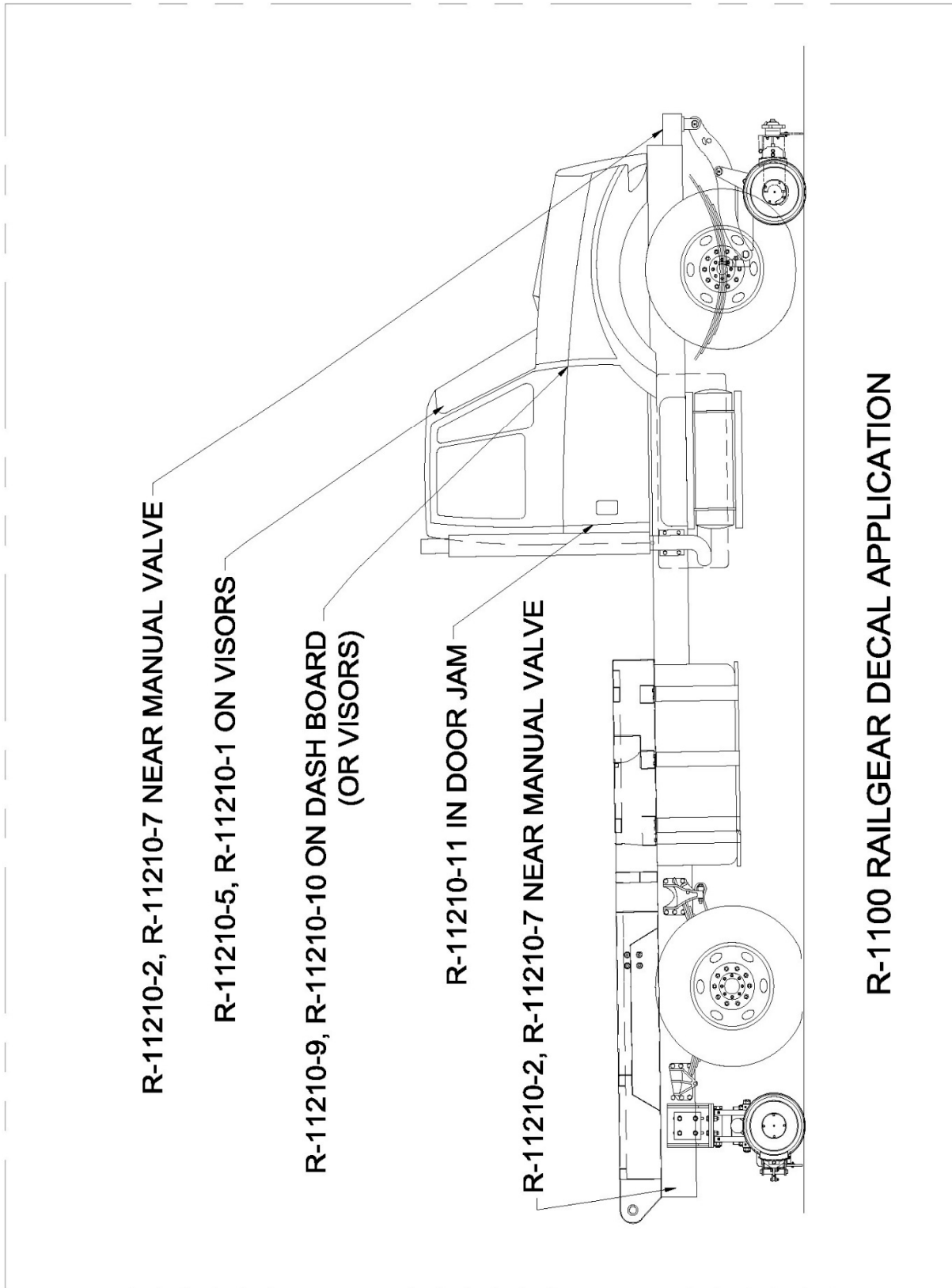


LOCK STEERING WHEEL ONLY WHEN FRONT WHEELS ARE PARALLEL TO RAIL
R-11210-10

RAILGEAR VEHICLE COMPLETED BY: _____
WITH RAILGEAR INSTALLED AND FINISHED BODY, THIS VEHICLE HAS _____ LBS OF AVAILABLE PAYLOAD
DATE OF COMPLETION OF RAILGEAR INSTALLATION: _____ mo _____ yr

CAUTION:
THIS VEHICLE HAS SPECIAL DESIGN AND EQUIPMENT FEATURES FOR OFF-HIGHWAY USE. IT HANDLES DIFFERENTLY FROM ORDINARY PASSENGER VEHICLES IN DRIVING CONDITIONS WHICH MAY OCCUR ON AND OFF HIGHWAY.

WEIGHT AND LOCATION OF PAYLOAD MAY ALSO AFFECT THE HANDLING OF THIS VEHICLE.
PRIOR TO OPERATION, PLEASE READ THIS VEHICLES OWNERS MANUAL, THE RAIL GEAR OPERATIONS, AND SERVICE MANUAL.
R-11210-11



VEHICLE MAKE: _____ VEHICLE MODEL: _____

VEHICLE YEAR: _____ VEHICLE VIN #: _____

VEHICLE UNIT #: _____

FRONT RAILGEAR SERIAL #: _____

REAR RAILGEAR SERIAL #: _____

ALIGN REAR RAILGEAR

A1 & A2 MUST BE EQUAL WITHIN 1/16"

A1 = _____

A2 = _____

B1 & B2 MUST BE EQUAL WITHIN 1/8"

B1 = _____

B2 = _____

ALIGN FRONT RAILGEAR TO REAR

C1 & C2 MUST BE EQUAL WITHIN 1/8"

C1 = _____

C2 = _____

D1 & D2 MUST BE EQUAL WITHIN 1/4"

D1 = _____

D2 = _____

RAIL WHEEL FLANGE TO GROUND CLEARANCE

LEFT FRONT _____

RIGHT FRONT _____

LEFT REAR _____

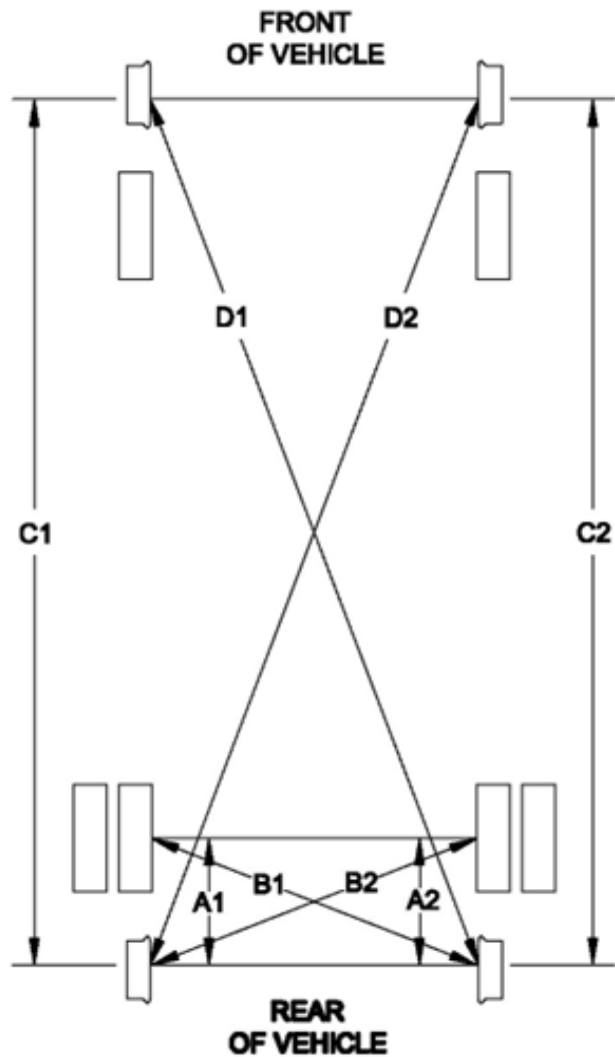
RIGHT REAR _____



VEHICLE WHEEL



RAIL WHEEL



INSTALLER/INSPECTOR SIGNATURE: _____