INSTALLATION OF RAILGEAR KIT R-290HD REAR

SAFETY PRECAUTIONS

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

- Failure to heed to any of the following warnings could result in severe bodily injury and/or equipment damage.
- Read and understand this manual completely before attempting installation of the equipment.
- Installation instructions provided below only address the RAFNA railgear equipment. Applicable railway company procedures and policies must be adhered to.
- Before performing any work under the vehicle or railgear, ensure the engine is turned off and the parking brake is set.
- Beware of all pinch points on the railgear and keep all parts of the body clear.
- Always disconnect the vehicle's battery when welding on the vehicle or railgear in order to protect the vehicle's electrical system.

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INSTALLATION OF RAILGEAR KIT

Railgear Kit Installation Parts

Part Number	Description	Qty
R-21200	HD Railgear Assembly, Cable	1
R-21200-LR	HD Railgear Assembly, Lever	
R-001	Rail Wheel Assembly	2
R-21201D	Rail Sweep	1
R-21201P	Rail Sweep	1
(WHEEL MTG)	½" UNC Gr. 8 Bolt x 2" Long	4
	½" UNC Gr. 8 Bolt x 1.75" Long	4
	½" Gr. 8 Washer	16
	½" UNC Gr. 8 Nylon Insert Lock Nut	8
(RAILGEAR MTG)	¾" UNC Gr. 8 Bolt x 2.5" Long	4
	¾" UNC Gr. 8 Bolt x 3.5" Long	4
	¾" UNC Gr. 8 Bolt x 4.5" Long	4
	¾" UNC Gr. 8 Bolt x 5.5" Long	4
	¾" Gr. 8 Washer	8
	¾" UNC Gr. 8 Nylon Insert Lock Nut	4
K-R29ARRXR290RHD	Rod Lock Kit (if required)	(1)
K-R290HDCAM001	Cam Lock Kit, STD	1

1. Ensure that the respective (front or rear) mounting kit has been installed on the vehicle prior to installing the railgear kit.

2. In order to install the railgear at the correct height, ensure that the road wheels and tires kit has been installed on the vehicle and that the vehicle is resting on its four properly inflated tires. (Wheel kit may not be necessary depending on vehicle application)

3. Install Lock Cam Kit (pg. 6)

4. Install Pull Rod as shown in manual AIO-R29ARRXR290RHD (if applicable)

5. Measure from the railgear mounting surface (bottom) of the respective mounting plates to the ground. Determine what combination of railgear mounting shims are required in order to set the railgear mounting surface at approximately 17.5-18" from the ground. Railgear mounting shims are supplied with the respective mounting kit and minimum shim usage as noted in the mounting kit installation instructions must be followed. If this height cannot be achieved with the supplied shims, the vehicle suspension will need to be modified. This modification is not included with the Rafna railgear.

6. Position the railgear beneath the mounting plates on the vehicle. When installed on the rear of the vehicle, the hydraulic cylinder should be on the rear side of the railgear.

7. Raise the railgear to the mounting plates using the railgear mounting shims as required between the mounting plates and the railgear. Align the holes in the railgear and shims with the slots in the mounting plates. Center the railgear on the mounting plate slots.

8. It is recommended that the gear be installed in the forward most mounting slots (slots closest to front of vehicle). This will help to ensure the greatest amount of clearance for the railgear to the the tow hitch. Ensure that the railgear does not contact any vehicle components (the vehicle exhaust system and bumpers can be modified as noted later in this procedure). Fasten the railgear and shims to the mounting plates using four suitably long ¾" bolts, eight ¾" washers, and four ¾" nuts.

9. Tighten but do not torque the ¾" fasteners as they will be torqued following the railgear alignment procedure.

10. Manually rotate the railgear to mid travel in order to ease installation of the rail wheels and rail sweeps.

11. Place the rail wheels below the mounting tables on the railgear axle. Place the rail sweeps in front of (for front railgear applications) or to the rear of (for rear railgear applications) the rail wheels and on top of the mounting tables. Fasten the rail wheels and rail sweeps to the mounting tables with eight ½" x 2" long bolts, sixteen ½" washers, and eight ½" nuts.

12. Tighten but do not torque the ½" fasteners as they will be torqued following the railgear alignment procedure.

13. Re-install the vehicle bumper and other components as required by the respective Mounting Kit Installation manual.

14. Manually rotate the railgear up to the road position. Take note of if and where the railgear, rail wheels, and/or rail sweeps contact the vehicle bumper. Trim and reinforce the bumper as required. Ensure there is enough clearance to accommodate side-to-side adjustment and rail wheel load adjustment of the railgear. Take note of if and where the railgear, rail wheels, and rail sweeps contact the vehicle exhaust system. The exhaust system can be bent to fit around the railgear. Ensure any exhaust system modifications conform to applicable laws and regulations.

Proceed to install the railgear hydraulic system as per the Hydraulic Kit Installation manual before continuing with the following steps.

15. Depending on the Hydraulic Kit ordered, a bracket may have been supplied to hold the railgear locking cable handle near to the railgear control box. If not, a bracket will have to be fabricated by the installer. The locking cable is supplied with a bulkhead fitting to ease installation. Ensure that the "Pull To Unlock" decal is on the cable end.

16. Follow the Railgear Over-Center Adjustment procedure detailed in the Railgear Kit Operation, Service and Parts manual. Ensure the cylinder rod-end lock nut is re-tightened following this adjustment.

17. With the railgear fully raised to the road position, ensure that the railgear lock pin properly engages the lock cam. It may be necessary to grind the lock cam slightly to ensure proper fit.

18. Follow the Rail Wheel Load Adjustment procedure detailed in the Railgear Kit Operation, Service and Parts manual.

19. Follow the Railgear Alignment procedure detailed in the Railgear Kit Operation, Service and Parts manual.

20. Follow the Rail Sweep Adjustment procedure detailed in the Railgear Kit Operation, Service and Parts manual.

21. Torque all fasteners as detailed in the Railgear Kit Operation, Service and Parts manual.

22. Grease the railgear at all lubrication points as detailed in the Railgear Kit Operation, Service and Parts manual.

RAILGEAR LOCK SYSTEM INSTALLATION

The railgear lock system provides an automatic mechanical pin lock for the road and rail position plus an additional over-center lock in the rail position.

The lock cam should not be installed until the railgear unit is installed on the vehicle and the over center adjustment has been made.

Installation (Rod Lock)

1. The railgear unit is shipped with the rod actuated lock system partially installed.

2. Install the tie plate to the lower pull rod as show, weld in place once properly adjusted.

3. Install the upper pull rod to the tie plate as shown, cut to length or modify as required.

4. The pull rod will need a support plate attached to the body and/or bumper to support the knob end of the pull rod. A support plate is shipped with the kit. If this support plate is not suited for the particular application, one will need to supplied by the installer.

5. Assemble pull knob to upper pull rod as shown. Once the pull rod assembly is properly assembled, installed and adjusted, the upper pull rod will need to be welded to the tie plate.

6. Raise/Lower the railgear to either the fully locked rail or road position.

7. Place the lock cam against the cam base as shown, with the cam ID mark facing down towards the railgear axle.

8. Loosely attach the lock cam to the cam base with the supplied 10mm hardware.

Adjustment

1. The lock cam base is slotted to allow for easier adjustment of the lock pin/lock cam engagement.

2. With the railgear in the fully locked rail or road position, and the lock pin engaged, adjust the cam towards the lock pin. The cam should not be touching the lock pin. There should be approximately 1/16"-1/8" clearance between the lock pin and the lock cam.

3. Tighten but do not torque the 10mm fasteners.

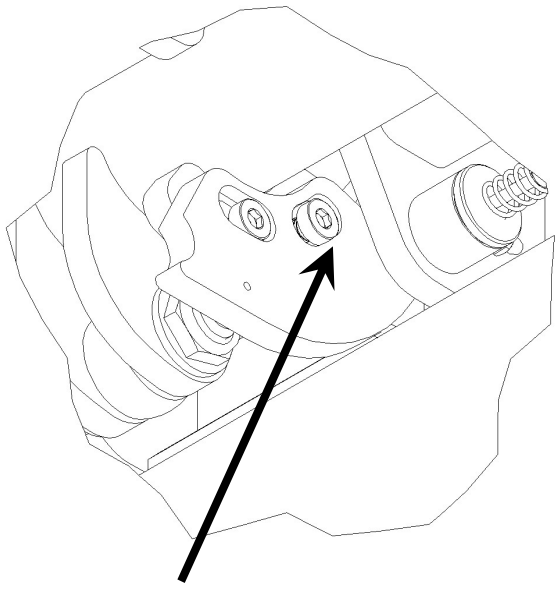
4. Disengage the railgear mechanical locking pin by pulling on the locking cable handle or pull rod.

5. Proceed to rotate the railgear to the fully locked rail or road position. One the gear is past the locked position, release the locking pin handle. The lock pin should ride against the side of the cam.

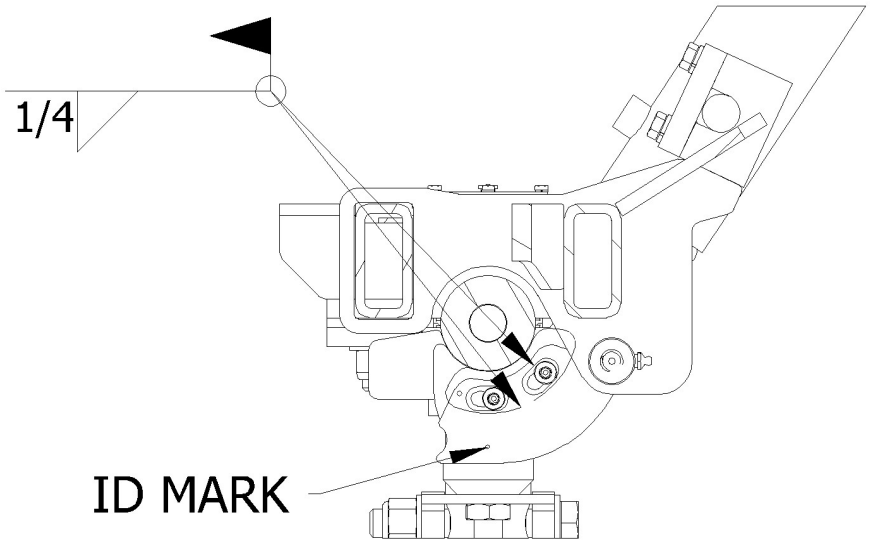
6. Once the gear reaches the full locked position, the pin should automatically engage the cam.

7. If the lock pin does not engage automatically, adjust the cam as necessary to allow for automatic engagement in both the road and rail position. It may be necessary to grind the cam slightly to allow for proper engagement of the lock pin.

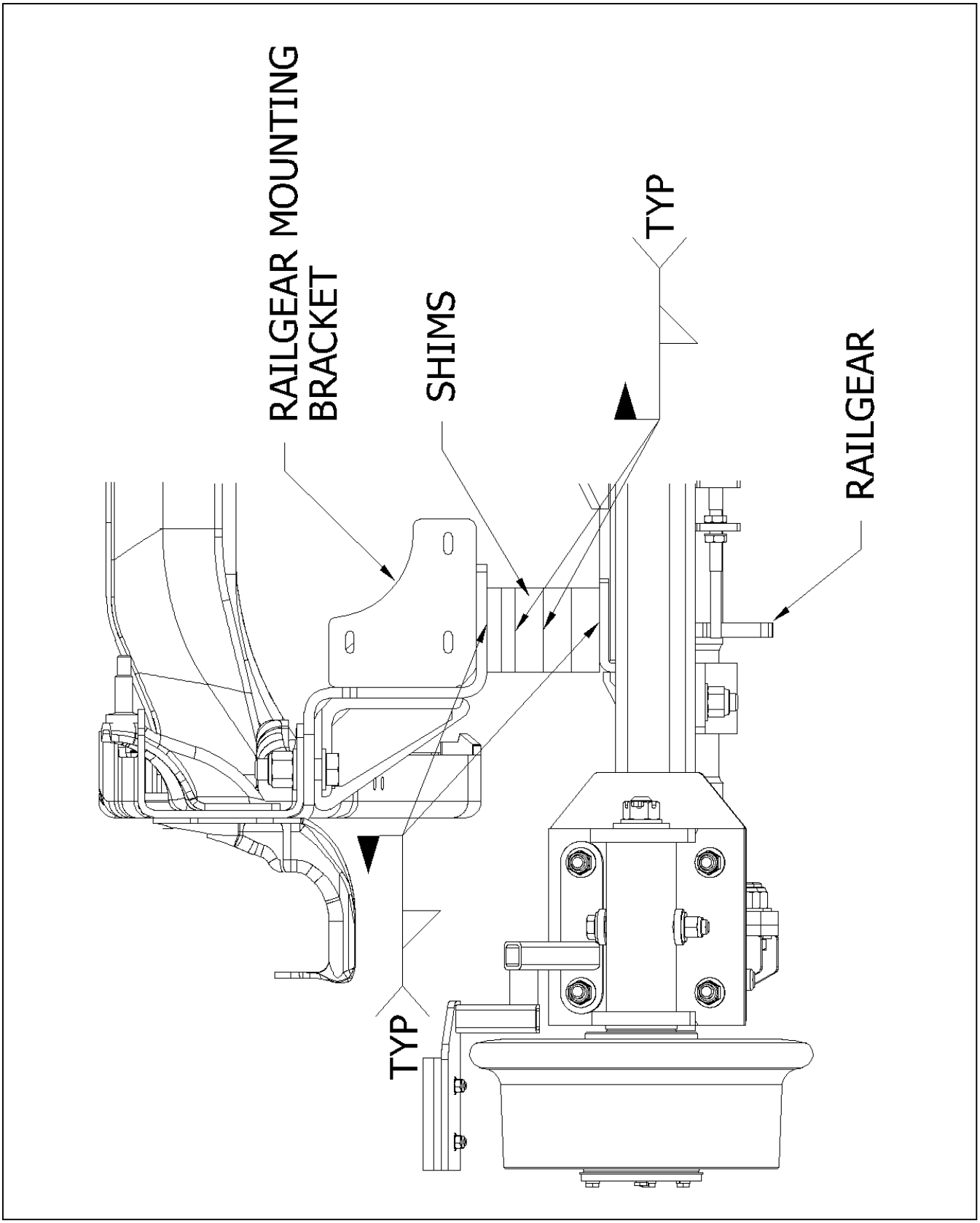
8. Once the proper adjustment has been made, torque the 10mm fasteners to 40 ft-lbs dry then weld the cam to the cam base as shown.



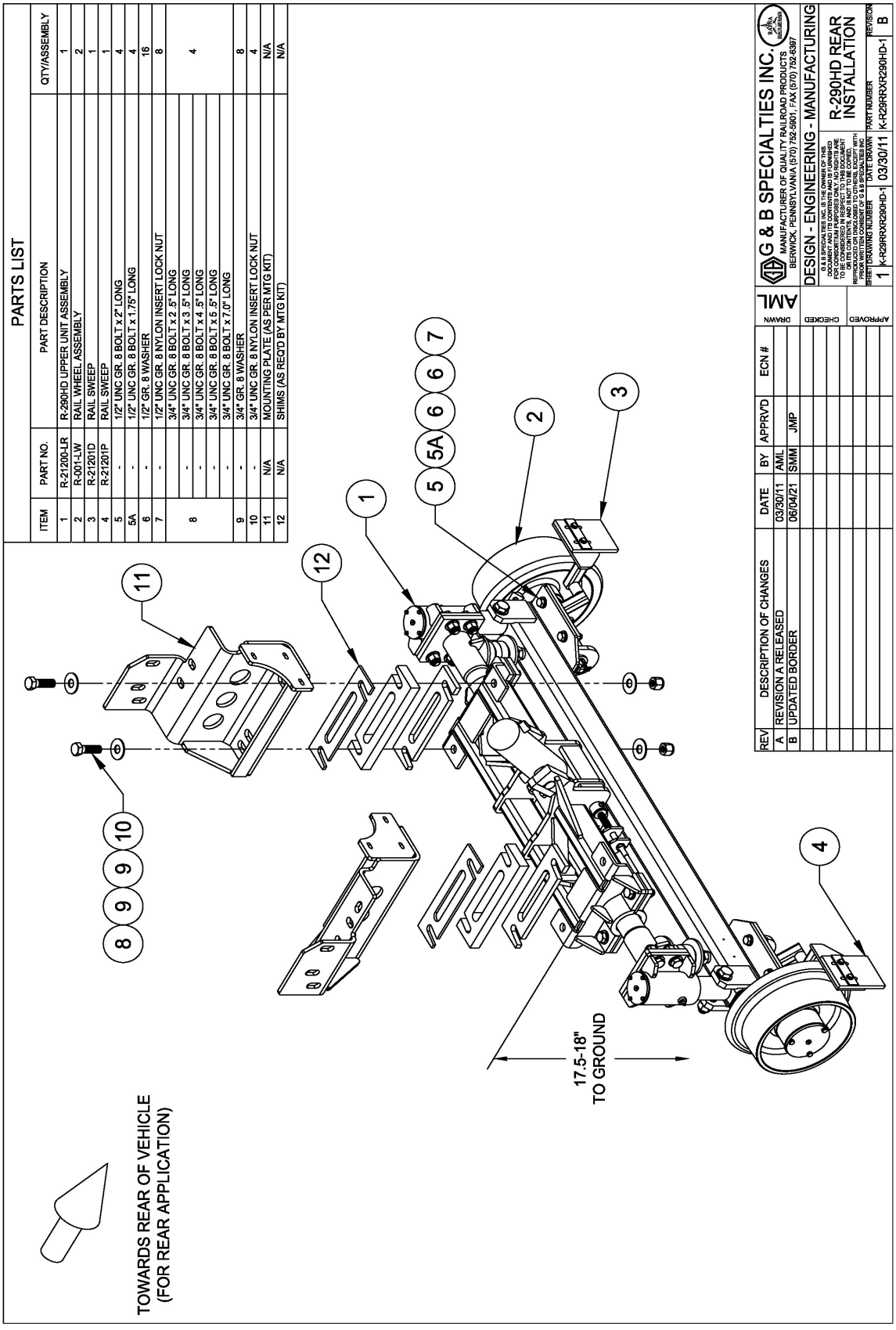
Torque Cam Bolts to 40FT-LBS dry



Weld cam to cam base as shown, weld after installation and adjustment.


RAILGEAR MOUNTING BRACKET
SHIMS
TYP
RAILGEAR
TYP

MIO-R29RRXR290HD Rev D



OPERATION, SERVICE AND PARTS OF RAILGEAR KIT

SAFETY PRECAUTIONS

If any operating, services or parts problems are encountered, please call G&B Specialties, Inc. for technical assistance.

- Failure to heed to any of the following warnings could result in severe bodily injury and/or equipment damage.
- Read and understand this manual completely before attempting operation of the railgear equipped vehicle.
- Operating instructions provided below only address the RAFNA railgear equipment. Applicable railway company procedures and policies must be adhered to.
- Railway company rules governing rail travel must be observed at all times.
- Ensure that the position and function of all railgear controls are known before attempting operation.
- Ensure the railgear is locked in road or rail position before starting road or rail travel respectively.
- Ensure all body parts and loose clothing are clear of any moving parts of the equipment.
- If misalignment of the railgear equipment is indicated, promptly perform the alignment procedure.
- Before performing any work under the vehicle or railgear, ensure the engine is turned off and the parking brake is set.
- Never operate the vehicle if the Gross Vehicle Weight Rating (GVWR), Gross Axle Weight Rating Front or Rear (GAWR), or the wheel or tire load ratings are exceeded.

OPERATION OF RAILGEAR KIT

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

Never operate the vehicle if the Gross Vehicle Weight Rating (GVWR), Gross Axle Weight Rating Front or Rear (GAWR), or the wheel or tire load ratings are exceeded.

Placing The Vehicle On Rail – To Lower The Railgear

(On vehicles equipped with this unit on the rear and an RAFNA R-460 on the front, be sure to lower and engage the rear railgear unit first)

1. Disengage the lock pin by pulling on the locking cable/lock rod handle. Do not force, if the lock pin cannot be disengaged, raise the railgear slightly.

2. Hold the locking cable/lock rod handle in the disengaged position.

3. Lower the railgear and release the locking cable/lock rod handle once the railgear has rotated past the road locked position.

4. As the railgear is being deployed, it will start taking some of the vehicle's load. The railgear's spring suspension should be observed compressing at least 1" under this load. (If this is not the case, **DO NOT use the railgear**. Inspect the railgear for lubrication and damage.)

5. Continue lowering the railgear until the hydraulic cylinder is fully extended and the lock pin re-engages in the rail position. Some railgear models have a lock cam converter installed to prevent the lock pin from engaging in the rail position; they have a hydraulic lock instead.

6. Ensure that the railgear is fully deployed and about 3°-5° over-center before proceeding.

Removing The Vehicle From Rail – To Raise The Railgear

1. Disengage the lock pin by pulling on the locking cable/lock rod handle. Do not force, if the lock pin cannot be disengaged, lower the railgear slightly. Some railgear models have a lock cam converter installed to prevent the lock pin from engaging in the rail position in which case the lock pin does not need to be disengaged.

2. Raise the railgear and release the locking cable/lock rod handle once the railgear has rotated past the rail locked position.

3. Continue raising the railgear until the lock pin clicks into the road locked position. The hydraulic cylinder should be completely retracted.

SERVICE OF RAILGEAR KIT

The railgear kit must be serviced regularly to avoid damage to the equipment. Table 1 below provides the Recommended Service Schedule and the detailed service procedures follow.

Non-standard fastener torque values relative to this railgear are shown in Figure 1. Table 2 provides all other Standard Fastener Torque Values.

Grease fittings are provided at all railgear lubrication points as shown in Figure 2. The recommended lubricant for all lubrication points on this railgear is Dexron III grease or equivalent. In cold weather areas/seasons, SHELL DARINA XL102 or equivalent may be used.

Table 1: Recommended Service Schedule

Service Required	Daily	Weekly	Monthly	3 Months	6 Months	12 Months
Visually inspect the railgear for damaged or worn parts	✓					
Check for loose rail wheels and fasteners (re-torque if required)		✓				
Ensure railgear lock pin is functioning correctly	✓					
Ensure the vehicle is in good operating condition	✓					
Inspect the rail wheel flanges for wear (use Rafna wear gauge)			✓			
Inspect all hydraulic components for leaks or wear		✓				
Check and adjust rail sweeps			✓			
Grease railgear inner and outer guide tubes					✓	
Grease railgear inner tube lower pivot point					✓	
Grease railgear locking pin					✓	
Check and adjust rail wheel bearing endplay						✓
Grease rail wheel bearings (every 3000 rail kms or 1900 rail miles)				✓		
Check and adjust rail wheel load						✓
Check and adjust rail wheel alignment						✓
Check and repack rail wheel bearings						✓

Table 2: Standard Fastener Torque Values

Fastener Size	Fastener Torque Value (ft-lbs) Dry
1" UNC Gr. 8 Fasteners	250
¾" UNC Gr. 8 Fasteners	175
$^{5}/_{8}$" UNC Gr. 8 Fasteners	150
½" UNC Gr. 8 Fasteners	100
$^{3}/_{8}$" UNC Gr. 8 Fasteners	40
¼" UNC Gr. 8 Fasteners	12

RAILGEAR OVER-CENTER ADJUSTMENT

The railgear is designed to rotate slightly past vertical into the rail position in order to provide a secondary safety feature in the event of a hydraulic and / or lock pin failure. With this additional rotation, the railgear would have to lift the vehicle before it could rotate out of the rail position. This additional rotation past vertical is called the over-center angle and is adjustable via a threaded rod end on the end of the hydraulic cylinder. The location of the railgear in the road position is also a function of the over-center adjustment, however, DO NOT use the over-center adjustment to adjust the road position of the railgear. This will have adverse effects on the over-center safety feature.

The over-center angle is defined as the angle between the vertical edge of the outer guide tubes and the vertical. It can be measured with the vehicle on a level section of rail with the railgear in the rail position using an angle meter. The over-center angle must be 3-5° past vertical. If this is not the case, adjust as follows:

1. Unload the railgear hydraulic cylinder by raising the railgear just off rail.

2. Loosen the ¾" jam nut on the hydraulic cylinder rod end and adjust the rod end out to increase the over-center angle or in to decrease the over-center angle. Note that the cylinder rod can be turned instead of turning the rod end.

3. Re-deploy the railgear to the rail position and re-check the over-center angle. Re-adjust as necessary.

4. Tighten the jam nut on the hydraulic cylinder rod end.

5. Following the over-center angle adjustment, the railgear may contact the vehicle if not enough clearance was left during installation. Check the railgear clearance to all vehicle components throughout the full range of railgear and railgear suspension movement. If there is interference with the vehicle bumper, it can be trimmed and reinforced as required. If there is interference with the vehicle exhaust system, it can be bent to fit, ensuring any exhaust system modifications conform to applicable laws and regulations. If there is interference with any other vehicle components, please call G&B Specialties, Inc. for technical assistance.

6. With the railgear fully raised to the road position, ensure that the railgear lock pin properly engages the lock cam. It may be necessary to grind the lock cam slightly to ensure proper fit.

7. Note that some hydraulic kit installations provide a lock cam converter to prevent the railgear lock pin from engaging in the rail position. If such a lock cam converter was installed, skip this step. Otherwise, with the railgear fully lowered to the rail position, ensure that the railgear lock pin properly engages the lock cam. It may be necessary to grind the lock cam slightly to ensure proper fit.

RAIL WHEEL BEARING ADJUSTMENT

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

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

1. Remove the rail wheel hubcap and gasket by removing the three ¼" bolts and ¼" lock washers. Remove and discard the cotter pin from the ¾" slotted spindle nut.

2. Ensure the wheel bearing cavity is full of grease.

3. While rotating the rail wheel forward, torque the spindle nut to 20 ft-lbs. Then loosen the spindle nut and re-torque it to 6 ft-lbs. Re-Check and re-adjust the bearing end-play if required. If no torque wrench is available, tighten the spindle nut until the rail wheel is difficult to turn by hand. Then loosen the spindle nut and retighten it just until no loose can be felt in the bearings. Re-adjust the bearing end-play with a torque wrench as soon as possible.

4. Install a new $^{3}/_{16}$" x 2" long cotter pin through the spindle nut. Tighten the spindle nut slightly if needed to insert the cotter pin.

5. Re-install the hubcap and gasket using the ¼" bolts and new ¼" split lock washers. Blue Loctite can be used on the bolts as an added safety measure. Tighten and torque the ¼" fasteners to 12 ft-lbs dry. Do not over torque.

RAIL SWEEP ADJUSTMENT

The distance between the rail sweep rubber and the rail is adjustable and should be maintained at approximately $^{1}/_{8}$". To adjust the rail sweep rubber, with the railgear in the rail position, loosen the two ¼" fasteners which secure the rail sweep rubber to the rail sweep bracket. Slide the rail sweep rubber up or down for the correct clearance. Tighten and torque the ¼" fasteners to 12 ft-lbs dry. Do not over torque.

RAIL WHEEL LOAD ADJUSTMENT

During rail travel, the railgear removes a predetermined portion of the vehicle's load from the vehicle's wheels and carries it on the rail wheels. A minimum amount of load must be maintained on the rail wheels in order to avoid derailment. Likewise, a minimum amount of load must be maintained on the vehicle wheels in order to provide traction for acceleration and braking, this load at installation must be a minimum of 700 lbs and a maximum of 1200 lbs and is checked as described below using a bottle jack equipped with a gauge.

The rail wheel load should be adjusted following the installation of the railgear and once the vehicle has had all of its permanent load (service body, crane, welders, etc) installed. The rail wheel load requires periodic checks; however, it should only require re-adjustment if the railgear is moved, the permanent vehicle equipment is changed, or the vehicle suspension settles or is changed. The rail wheel load should be checked at regular intervals that coincide with regular maintenance schedule for the vehicle or minimally once a year during vehicle annual FRA inspection. As non-permanent load is added to and/or removed from the vehicle, the rail wheel load will change also. This is acceptable as long as the weight ratings of the vehicle, axles, wheels, tires and railgear are not exceeded and as long as the minimum rail wheel load is maintained, and the maximum wheel load is not exceeded.

Check each rail wheel load as follows:

1. Place the vehicle on a straight and level section of rail with the railgear lowered to the rail position. Ensure the railgear is taking load through the tread of the rail wheel and not on the flange of the rail wheel. The vehicle should only be carrying the permanently attached load (service body, crane, etc) and any always carried non-attached load (welders, etc) during this procedure. Do not include the operator or passengers. Ensure the vehicle tires have been inflated to the manufacturer's recommended air pressure and that they are not in contact with any obstructions except the rails.

2. Place the hydraulic bottle jack on a solid surface beneath the rail wheel spindle housing and jack the rail wheel off the rail.

3. Insert a piece of paper between the rail and the rail wheel. Lower the jack until the rail wheel squeezes the paper so that it cannot be pulled out.

4. Slowly jack up the rail wheel while pulling on the paper and observe the jack gauge. When the paper can be pulled out, stop jacking.

5. Record the load or pressure reading on the jack gauge.

Table 3: Rail Wheel Load vs Jack Pressure and Bore

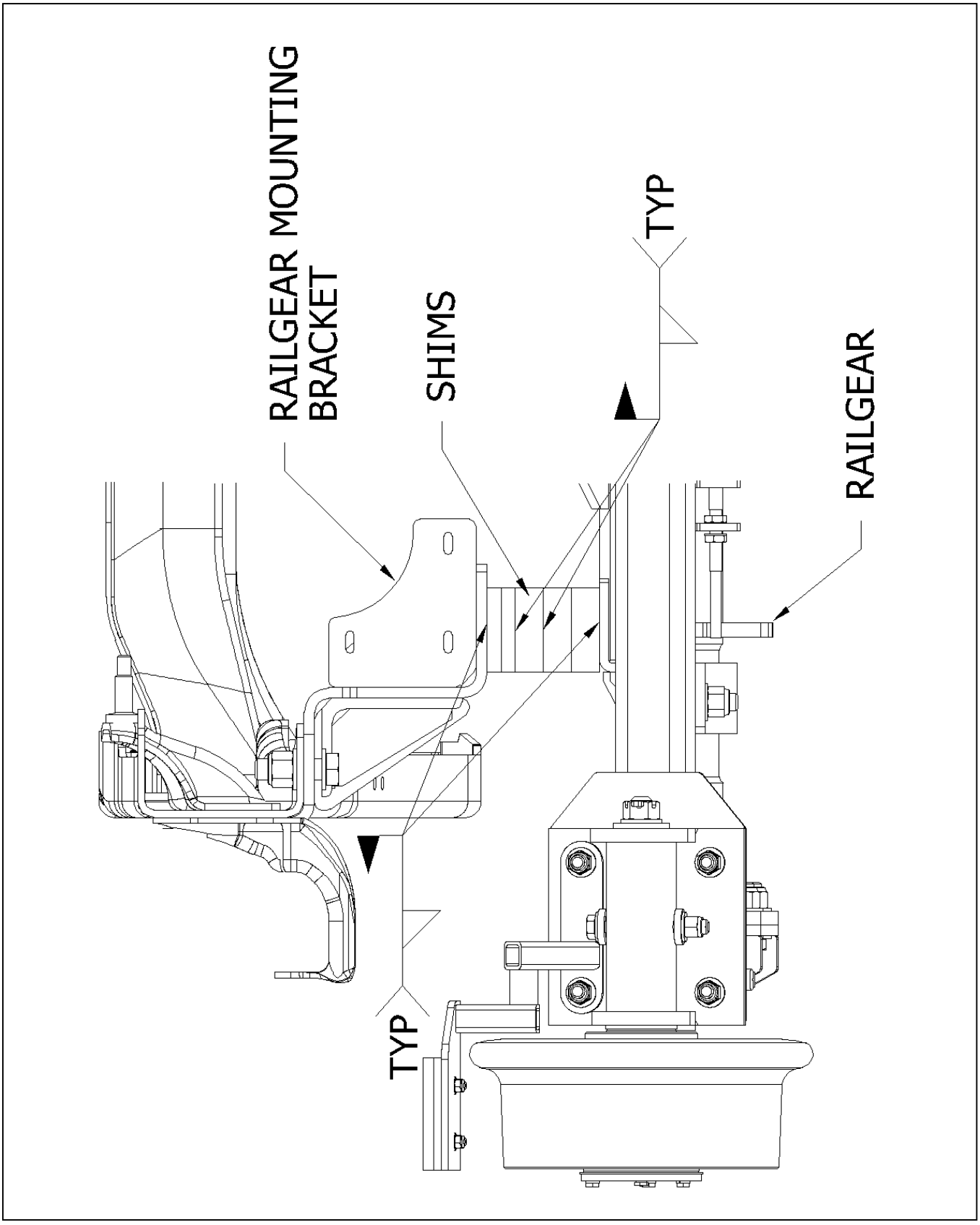
Jack Pressure (PSI)	Jack Cylinder Bore Diameter (inches)								
	7/8	15/16	1	1 1/16	1 1/8	1 3/16	1 1/4	1 5/16	1 3/8
540	320	370	420	480	540	600	660	730	800
560	340	390	440	500	560	620	690	760	830
580	350	400	460	510	580	640	710	780	860
600	360	410	470	530	600	660	740	810	890
620	370	430	490	550	620	690	760	840	920
640	380	440	500	570	640	710	790	870	950
660	400	460	520	590	660	730	810	890	980
680	410	470	530	600	680	750	830	920	1010
700	420	480	550	620	700	780	860	950	1040
720	430	500	570	640	720	800	880	970	1070
740	440	510	580	660	740	820	910	1000	1100
760	460	520	600	670	760	840	930	1030	1130
780	470	540	610	690	780	860	960	1060	1160
800	480	550	630	710	800	890	980	1080	1190
820	490	570	640	730	820	910	1010	1110	1220
840	510	580	660	740	830	930	1030	1140	1250
860	520	590	680	760	850	950	1060	1160	1280
880	530	610	690	780	870	970	1080	1190	1310
900	540	620	710	800	890	1000	1100	1220	1340
920	550	640	720	820	910	1020	1130	1240	1370
940	570	650	740	830	930	1040	1150	1270	1400
960	580	660	750	850	950	1060	1180	1300	1430
980	590	680	770	870	970	1090	1200	1330	1460
1000	600	690	790	890	990	1110	1230	1350	1480
1020	610	700	800	900	1010	1130	1250	1380	1510
1040	630	720	820	920	1030	1150	1280	1410	1540
1060	640	730	830	940	1050	1170	1300	1430	1570
1080	650	750	850	960	1070	1200	1330	1460	1600
1100	660	760	860	980	1090	1220	1350	1490	1630
1120	670	770	880	990	1110	1240	1370	1520	1660
1140	690	790	900	1010	1130	1260	1400	1540	1690
1160	700	800	910	1030	1150	1280	1420	1570	1720
1180	710	810	930	1050	1170	1310	1450	1600	1750
1200	720	830	940	1060	1190	1330	1470	1620	1780
1220	730	840	960	1080	1210	1350	1500	1650	1810
1240	750	860	970	1100	1230	1370	1520	1680	1840
1260	760	870	990	1120	1250	1400	1550	1700	1870
1280	770	880	1010	1130	1270	1420	1570	1730	1900
1300	780	900	1020	1150	1290	1440	1600	1760	1930
1320	790	910	1040	1170	1310	1460	1620	1790	1960
1340	810	920	1050	1190	1330	1480	1640	1810	1990
1360	820	940	1070	1210	1350	1510	1670	1840	2020
1380	830	950	1080	1220	1370	1530	1690	1870	2050
1400	840	970	1100	1240	1390	1550	1720	1890	2080
1420	850	980	1120	1260	1410	1570	1740	1920	2110
1440	870	990	1130	1280	1430	1590	1770	1950	2140
1460	880	1010	1150	1290	1450	1620	1790	1980	2170
1480	890	1020	1160	1310	1470	1640	1820	2000	2200
1500	900	1040	1180	1330	1490	1660	1840	2030	2230
1520	910	1050	1190	1350	1510	1680	1870	2060	2260
1540	930	1060	1210	1370	1530	1710	1890	2080	2290
1560	940	1080	1230	1380	1550	1730	1910	2110	2320
1580	950	1090	1240	1400	1570	1750	1940	2140	2350
1600	960	1100	1260	1420	1590	1770	1960	2160	2380
1620	970	1120	1270	1440	1610	1790	1990	2190	2410
1640	990	1130	1290	1450	1630	1820	2010	2220	2440
1660	1000	1150	1300	1470	1650	1840	2040	2250	2460
1680	1010	1160	1320	1490	1670	1860	2060	2270	2490
1700	1020	1170	1340	1510	1690	1880	2090	2300	2520
1720	1030	1190	1350	1530	1710	1900	2110	2330	2550
1740	1050	1200	1370	1540	1730	1930	2140	2350	2580

Rail Wheel Load (lbs)

ADJUST EACH RAIL WHEEL LOAD AS FOLLOWS:

The load on the rail wheels is adjusted by adding or removing railgear shims as necessary in order to attain the proper rail wheel load. The same number of shims should be used on both sides of the railgear. The threaded adjustment rods can be used to fine tune the rail wheel load ***but should not be used for the primary rail wheel load adjustment***.

1. Ensure that the front railgear is lowered and engaged in the rail position.
2. Raise the railgear until the rail wheels are off the rails.
3. Support the railgear unit with a floor jack.
4. Loosen the 3/4" fasteners securing the railgear to the railgear mounting brackets. Let the railgear drop far enough to enable shims to be added or removed.
5. **Ensure that the railgear shims are staggered as shown.**
6. Tighten the 3/4" railgear mounting bolts.
7. Lower the railgear to the road position and check the rail wheel load. The railgear suspension spring should be compressed approximately 1" under the recommended rail wheel load of 700 lbs minimum and 1200 lbs maximum.
8. Repeat steps 1 thru 5 until the proper rail wheel load is achieved.
9. Following the rail wheel load adjustment, the railgear may contact the vehicle if not enough clearance was left during installation. Check the railgear clearance to all vehicle components throughout the full range of railgear and railgear suspension movement. If there is interference with the vehicle bumper, it can be trimmed and reinforced as required.
10. Once the railgear wheel loads are adjusted and the railgear alignment is complete, the railgear shims will need to be welded as shown.


RAILGEAR MOUNTING BRACKET
SHIMS
TYP
RAILGEAR
TYP

RAILGEAR ALIGNMENT

The railgear must be correctly aligned in order to perform properly, safely, and avoid excessive wear and derailment. The rail wheels can be independently aligned for toe-in/toe-out and the railgear can be adjusted side to side (laterally) on the vehicle. A parallel line system and the following procedure should be used to perform the railgear alignment.

The rail wheel loads should be checked and adjusted, the vehicle should have had a four-wheel alignment (with the complete railgear package installed on the vehicle and any suspension modifications done) and the tires should be properly inflated prior to performing the railgear alignment.

The railgear alignment is done with the vehicle on a straight and level section of rail with the railgear in the rail position and the vehicle wheels pointing straight ahead. The individual rail wheel alignment should be done first, followed by the lateral alignment of the railgear.

Each rail wheel is aligned by loosening the four ½" fasteners which secure it to the railgear axle. The rail wheel is then turned into alignment. The four ½" fasteners should then be tightened and torqued to 100 ft-lbs dry. Do not over torque.

The railgear is aligned laterally by loosening the four ¾" fasteners which secure it to the mounting plates. The railgear is then moved sideways into alignment. It may be necessary to raise the railgear off the rails to move the railgear side to side. Do not use any force against the railgear guide tubes as this may damage them and restrict suspension movement. The four ¾" fasteners should then be tightened and torqued to 175 ft-lbs dry. Do not over torque.

Refer to Figure 3 for alignment measurement and specifications. Use an 18" magnetic straight edge on the back of each rail wheel to measure from.

Following the railgear alignment, the railgear may contact the vehicle if not enough clearance was left during installation. Check the railgear clearance to all vehicle components throughout the full range of railgear and railgear suspension movement. If there is interference with the vehicle bumper, it can be trimmed and reinforced as required. If there is interference with the vehicle exhaust system, it can be bent to fit, ensuring any exhaust system modifications conform to applicable laws and regulations. If there is interference with any other vehicle components, please call G&B Specialties, Inc for technical assistance.

RAFNA RAILGEAR ALIGNMENT RACK DATA

GAS OR DIESEL VIN#_____

VEHICLE MAKE:_____ VEHICLE MODEL:_____ VEHICLE YEAR:_____
DOOR STICKER GVWR:_____ DOOR STICKER GAWR FRT:_____ DOOR STICKER GAWR RR_____
RAILGEAR S/N: FRT_____ RR_____ VEHICLE UNIT #,S/N:_____
RAILGEAR TYPE:_____ INSTALLER: _____ DATE: _____

SET UP PARALLEL STRING LINES
A & B MUST BE EQUAL WITHIN 1/32"
C & D MUST BE EQUAL WITHIN 1/32"

ADJUST STRING LINES AROUND VEHICLE
E, F, G, & H MUST BE EQUAL WITHIN 1/16"
I, J, K, & L MUST BE EQUAL WITHIN 1/16"
(E, F, G, & H MAY NOT EQUAL I, J, K, & L)

ADJUST RAIL WHEEL ALIGNMENT
M & O MUST BE EQUAL WITHIN 1/16"
N & P MUST BE EQUAL WITHIN 1/16"
Q & S MUST BE EQUAL WITHIN 1/16"
R & T MUST BE EQUAL WITHIN 1/16"

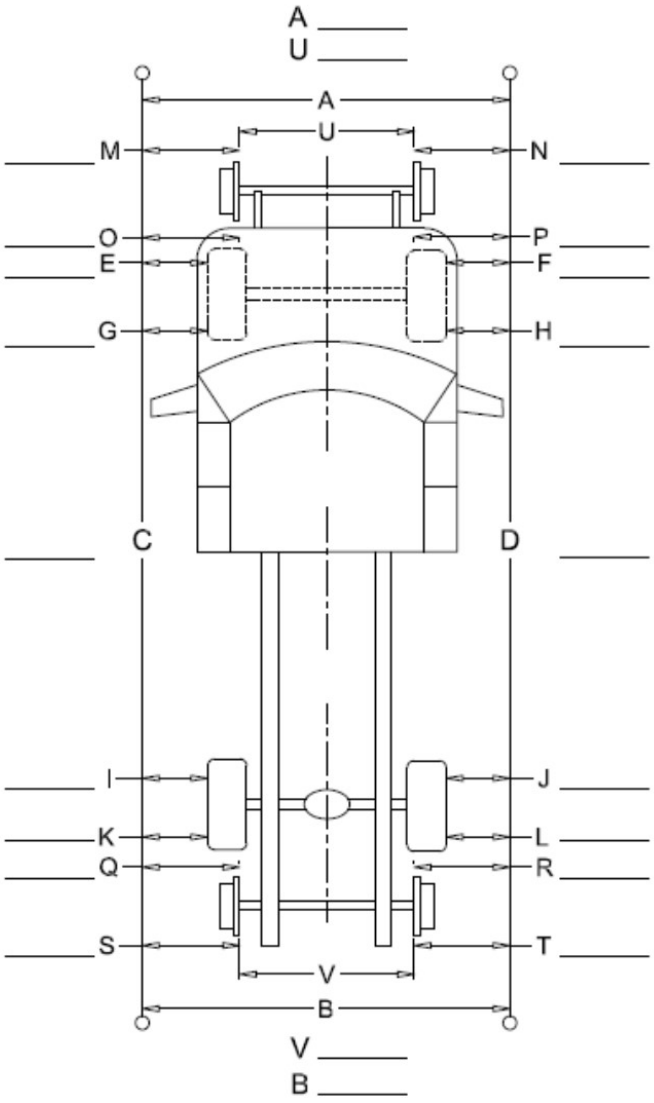
ADJUST RAILGEAR LATERAL ALIGNMENT
M & O MUST EQUAL N & P WITHIN 1/8"
Q & S MUST EQUAL R & T WITHIN 1/8"

ENSURE THAT U & V ARE BETWEEN
53– 7/16" AND 53—9/16"

OVER-CENTER ANGLE (DEGREE)
FRONT_____
REAR _____

RAIL WHEEL LOADS (LBS)
LEFT FRONT _____RIGHT FRONT_____
LEFT REAR _____ RIGHT REAR _____

RAIL WHEEL FLANGE TO GROUND CLEARANCE
LEFT FRONT _____RIGHT FRONT_____
LEFT REAR _____ RIGHT REAR _____



MOUNTING HEIGHT FRONT: _____ MOUNTING HEIGHT REAR: _____

STOCK TURNING DIAMETER: _____ **MODIFIED** TURNING DIAMETER: _____

OEM: VEHICLE WEIGHT: _____ FRONT GAWR: _____ REAR GAWR: _____

MODIFIED: VEHICLE WEIGHT: _____FRONT GAWR: _____REAR GAWR:_____

FAX COMPLETED FORM TO JAKE SANUTE AT FAX # 570-802-0491

MAY 31, 2018 REV "D"

RAFNA RAILGEAR PORTABLE ALIGNMENT DATA

GAS OR DIESEL VIN#_____

VEHICLE MAKE:_____ VEHICLE MODEL:_____ VEHICLE YEAR:_____
DOOR STICKER GVWR:_____ DOOR STICKER GAWR FRT:_____ DOOR STICKER GAWR RR_____
RAILGEAR S/N: FRT_____ RR_____ VEHICLE UNIT #,S/N:_____
RAILGEAR TYPE:_____ INSTALLER: _____ DATE: _____

ADJUST RAILGEAR LATERAL ALIGNMENT
A MUST EQUAL B WITHIN 1/8"
C MUST EQUAL D WITHIN 1/8"

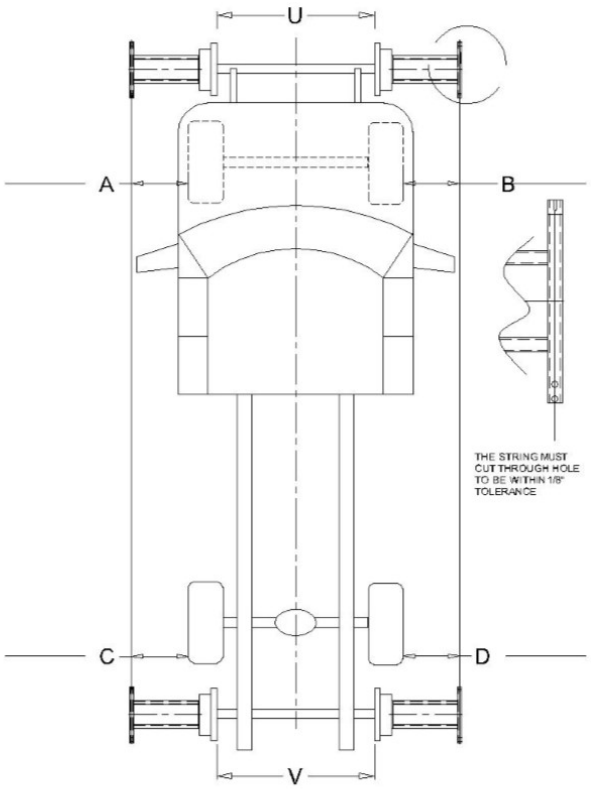
ENSURE THAT U & V ARE BETWEEN
53– 7/16" AND 53—9/16"

OVER-CENTER ANGLE (DEGREE)
FRONT_____
REAR _____

RAIL WHEEL LOADS (LBS)
LEFT FRONT _____RIGHT FRONT_____
LEFT REAR _____ RIGHT REAR _____

RAIL WHEEL FLANGE TO GROUND CLEARANCE
LEFT FRONT _____RIGHT FRONT_____
LEFT REAR _____ RIGHT REAR _____

U _____



V _____

MOUNTING HEIGHT FRONT: _____ MOUNTING HEIGHT REAR: _____

STOCK TURNING DIAMETER: _____ **MODIFIED** TURNING DIAMETER: _____

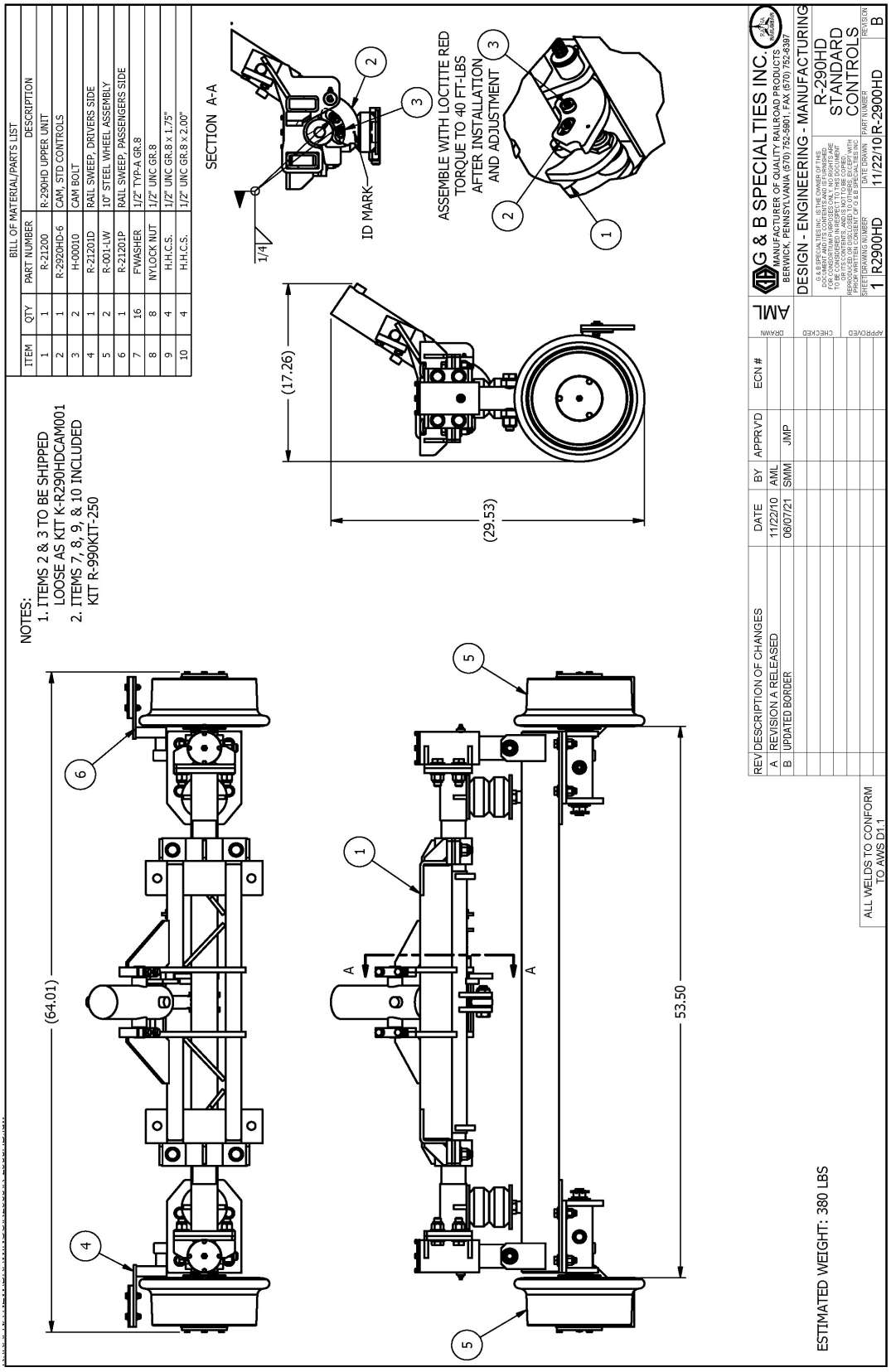
OEM: VEHICLE WEIGHT: _____ FRONT GAWR: _____ REAR GAWR: _____

MODIFIED: VEHICLE WEIGHT: _____FRONT GAWR: _____REAR GAWR:_____

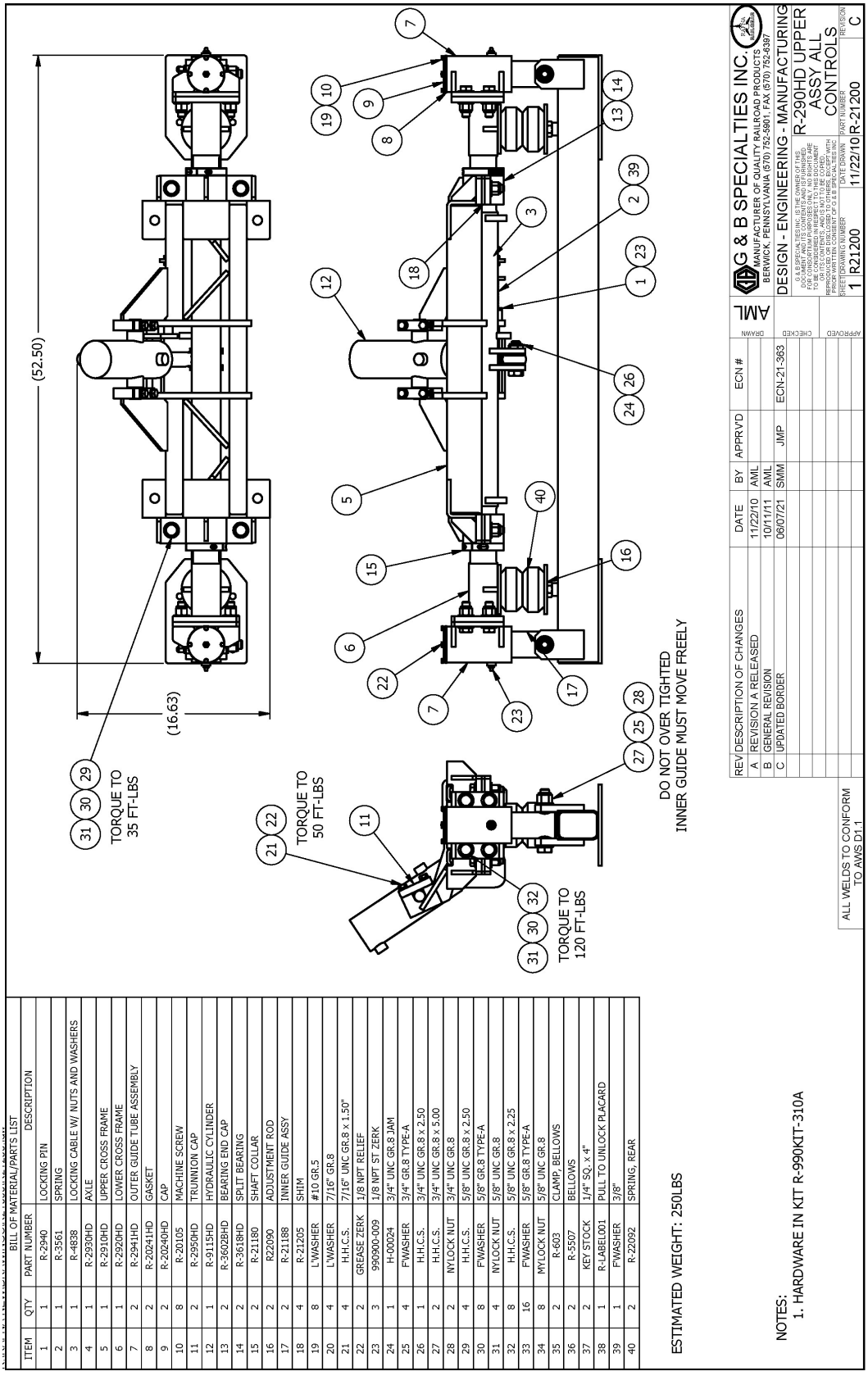
FAX COMPLETED FORM TO JAKE SANUTE AT FAX # 570-802-0491

MAY 31, 2018 REV B

PARTS OF RAILGEAR KIT



MIO-R29RRXR290HD Rev D

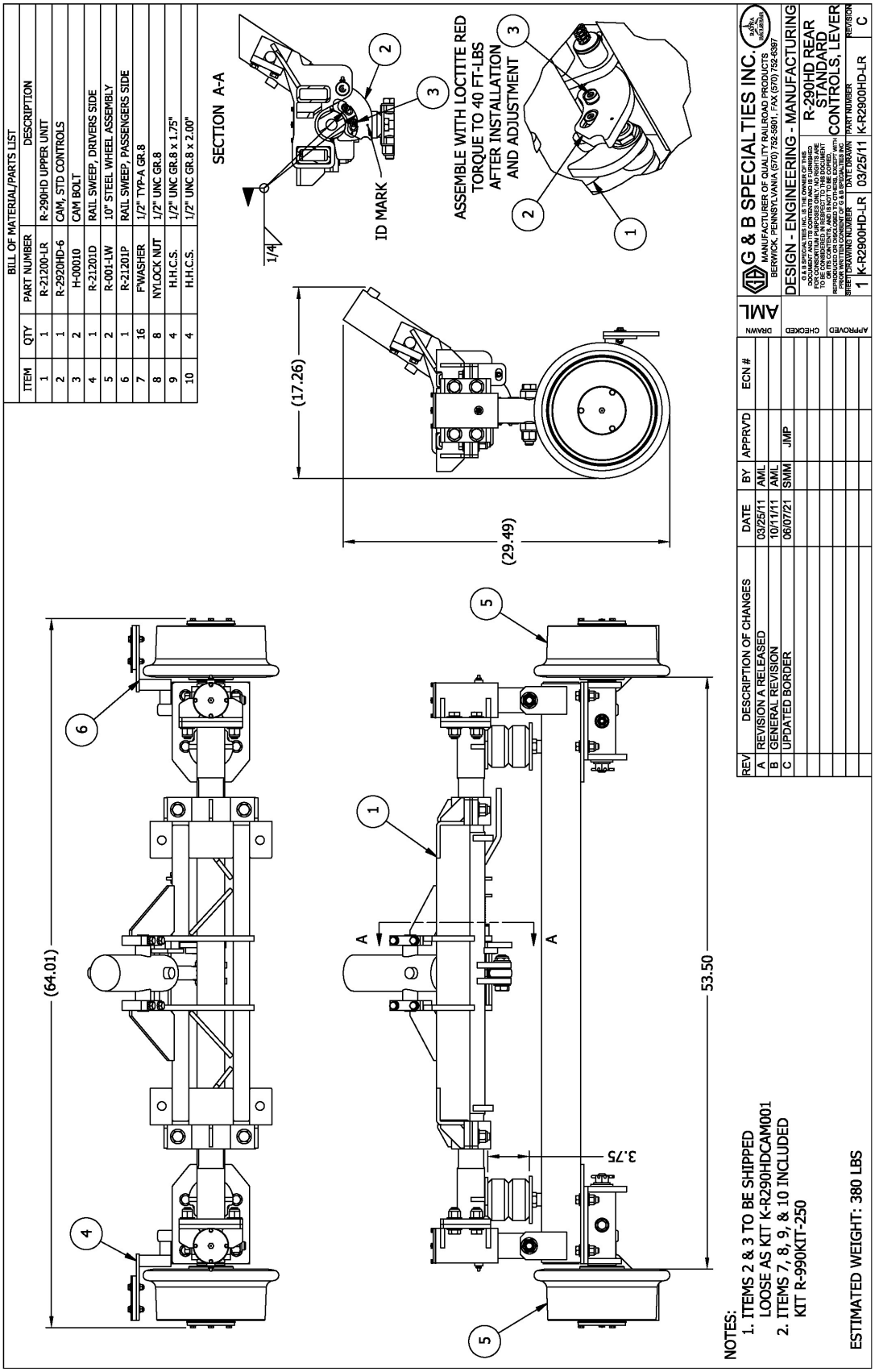


BILL OF MATERIAL/PARTS LIST

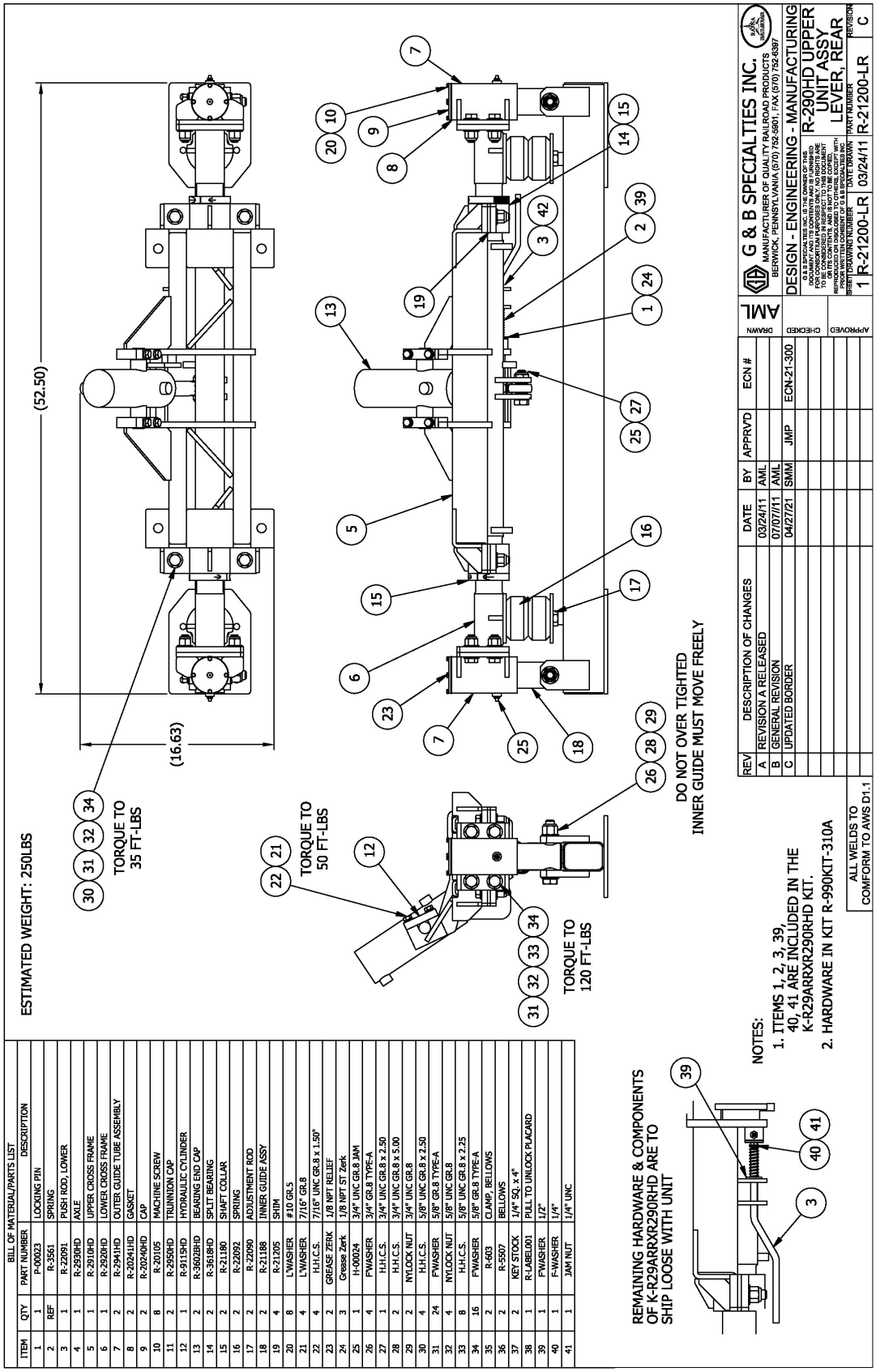
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	R-2940	LOCKING PIN
2	1	R-3561	SPRING
3	1	R-4838	LOCKING CABLE W/ NUTS AND WASHERS
4	1	R-2930HD	AXLE
5	1	R-2910HD	UPPER CROSS FRAME
6	1	R-2920HD	LOWER CROSS FRAME
7	2	R-2941HD	OUTER GUIDE TUBE ASSEMBLY
8	2	R-20241HD	GASKET
9	2	R-20240HD	CAP
10	8	R-20105	MACHINE SCREW
11	2	R-2950HD	TRUNNION CAP
12	1	R-9115HD	HYDRAULIC CYLINDER
13	2	R-36028HD	BEARING END CAP
14	2	R-3618HD	SPLIT BEARING
15	2	R-21180	SHAFT COLLAR
16	2	R22090	ADJUSTMENT ROD
17	2	R-21188	INNER GUIDE ASSY
18	4	R-21205	SHIM
19	8	L'WASHER	#10 GR.5
20	4	L'WASHER	7/16" GR.8
21	4	H.H.C.S.	7/16" UNC GR.8 x 1.50"
22	2	GREASE ZERK	1/8 NPT RELIEF
23	3	990900-009	1/8 NPT ST. ZERK
24	1	H-00024	3/4" UNC GR.8 JAM
25	4	F'WASHER	3/4" GR.8 TYPE-A
26	1	H.H.C.S.	3/4" UNC GR.8 x 2.50
27	2	H.H.C.S.	3/4" UNC GR.8 x 5.00
28	2	NYLOCK NUT	3/4" UNC GR.8
29	4	H.H.C.S.	5/8" UNC GR.8 x 2.50
30	8	F'WASHER	5/8" GR.8 TYPE-A
31	4	NYLOCK NUT	5/8" UNC GR.8
32	8	H.H.C.S.	5/8" UNC GR.8 x 2.25
33	16	F'WASHER	5/8" GR.8 TYPE-A
34	8	MYLOCK NUT	5/8" UNC GR.8
35	2	R-603	CLAMP, BELLOWS
36	2	R-5507	BELLOWS
37	2	KEY STOCK	1/4" SQ. x 4"
38	1	R-LABEL001	PULL TO UNLOCK PLACARD
39	1	F'WASHER	3/8"
40	2	R-22092	SPRING, REAR

ESTIMATED WEIGHT: 250LBS

NOTES:
1. HARDWARE IN KIT R-990KIT-310A


BILL OF MATERIAL/PARTS LIST
ITEM | QTY | PART NUMBER | DESCRIPTION
1 | 1 | R-21200-LR | R-290HD UPPER UNIT
2 | 1 | R-2920HD-6 | CAM, STD CONTROLS
3 | 2 | H-00010 | CAM BOLT
4 | 1 | R-21201D | RAIL SWEEP, DRIVERS SIDE
5 | 2 | R-001-LW | 10" STEEL WHEEL ASSEMBLY
6 | 1 | R-21201P | RAIL SWEEP, PASSENGERS SIDE
7 | 16 | FWASHER | 1/2" TYP-A GR.8
8 | 8 | NYLOCK NUT | 1/2" UNC GR.8
9 | 4 | H.H.C.S. | 1/2" UNC GR.8 x 1.75"
10 | 4 | H.H.C.S. | 1/2" UNC GR.8 x 2.00"
SECTION A-A
1/4
ID MARK
ASSEMBLE WITH LOCTITE RED
TORQUE TO 40 FT-LBS
AFTER INSTALLATION
AND ADJUSTMENT
(17.26)
(29.49)
(64.01)
53.50
3.75
A
A
NOTES:
1. ITEMS 2 & 3 TO BE SHIPPED LOOSE AS KIT K-R290HDCAM001
2. ITEMS 7, 8, 9, & 10 INCLUDED KIT R-990KIT-250
ESTIMATED WEIGHT: 380 LBS
REV | DESCRIPTION OF CHANGES | DATE | BY | APPRVD | ECN #
A | REVISION A RELEASED | 03/25/11 | AML
B | GENERAL REVISION | 10/11/11 | AML
C | UPDATED BORDER | 06/07/21 | SMM | JMP
DRAWN AML
CHECKED
APPROVED
G & B SPECIALTIES INC.
MANUFACTURER OF QUALITY RAILROAD PRODUCTS
BERWICK, PENNSYLVANIA (570) 752-5901 ; FAX (570) 752-6397
DESIGN - ENGINEERING - MANUFACTURING
R-290HD REAR STANDARD CONTROLS, LEVER
SHEET 1 | DRAWING NUMBER K-R2900HD-LR | DATE DRAWN 03/25/11 | PART NUMBER K-R2900HD-LR | REVISION C

MIO-R29RRXR290HD Rev D



REV	DESCRIPTION OF CHANGES	DATE	BY	APPRVD	ECN #
A	REVISION A RELEASED	03/24/11	AML		
B	GENERAL REVISION	07/07/11	AML		
C	UPDATED BORDER	04/27/21	SMM	JMP	ECN-21-300

BILL OF MATERIAL/PARTS LIST

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	P-00023	LOCKING PIN
2	REF	R-3561	SPRING
3	1	R-22091	PUSH ROD, LOWER
4	1	R-2930HD	AXLE
5	1	R-2910HD	UPPER CROSS FRAME
6	1	R-2920HD	LOWER CROSS FRAME
7	2	R-2941HD	OUTER GUIDE TUBE ASSEMBLY
8	2	R-20241HD	GASKET
9	2	R-20240HD	CAP
10	8	R-20105	MACHINE SCREW
11	2	R-2950HD	TRUNNION CAP
12	1	R-9115HD	HYDRAULIC CYLINDER
13	2	R-3602BHD	BEARING END CAP
14	2	R-3618HD	SPLIT BEARING
15	2	R-21180	SHAFT COLLAR
16	2	R-22092	SPRING
17	2	R-22090	ADJUSTMENT ROD
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23	2	GREASE ZERK	1/8 NPT RELIEF
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35	2	R-603	CLAMP, BELLOWS
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37	2	KEY STOCK	1/4" SQ. x 4"
38	1	R-LABEL001	PULL TO UNLOCK PLACARD
39	1	F'WASHER	1/2"
40	1	F-WASHER	1/4"
41	1	JAM NUT	1/4" UNC

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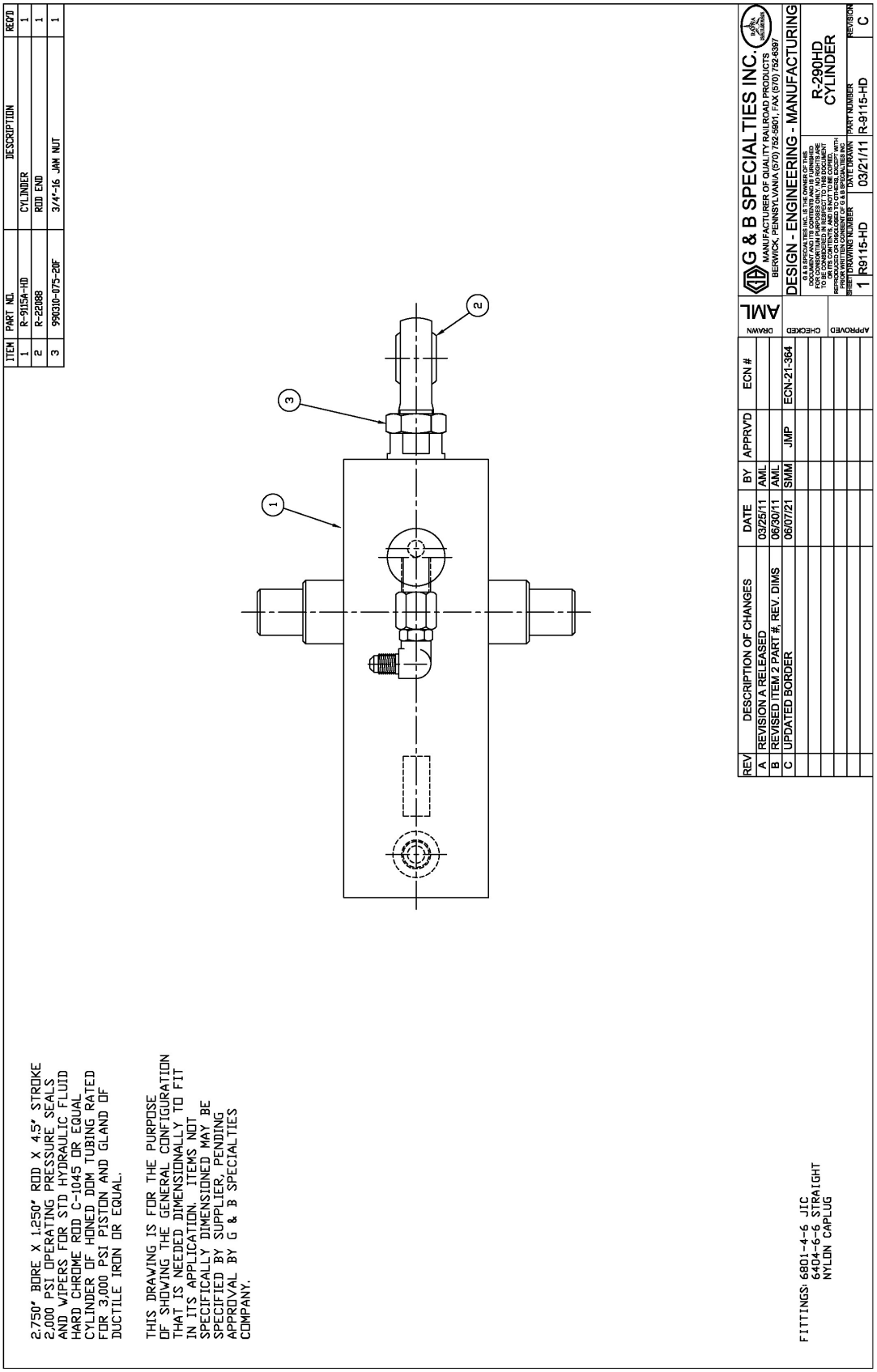

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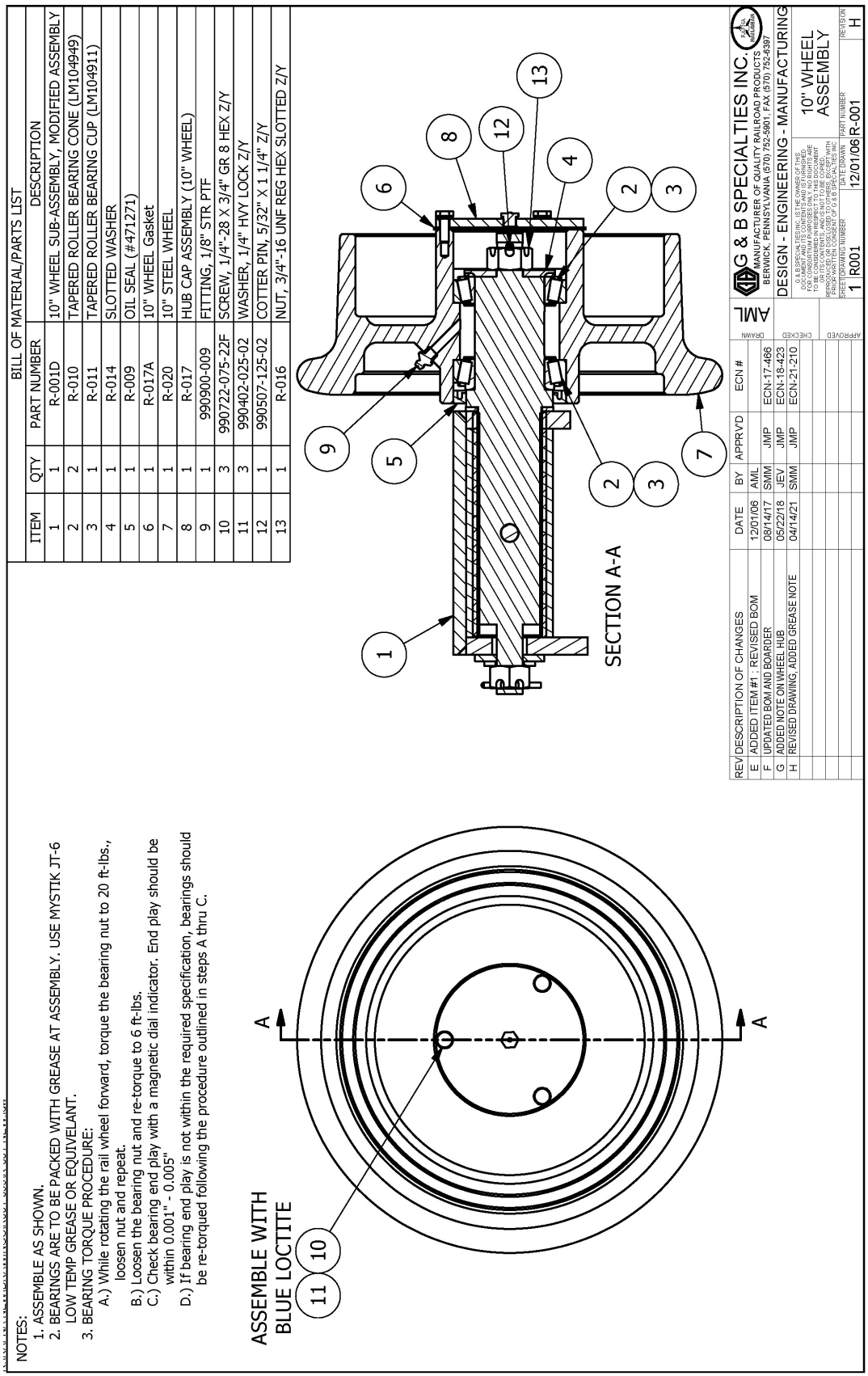

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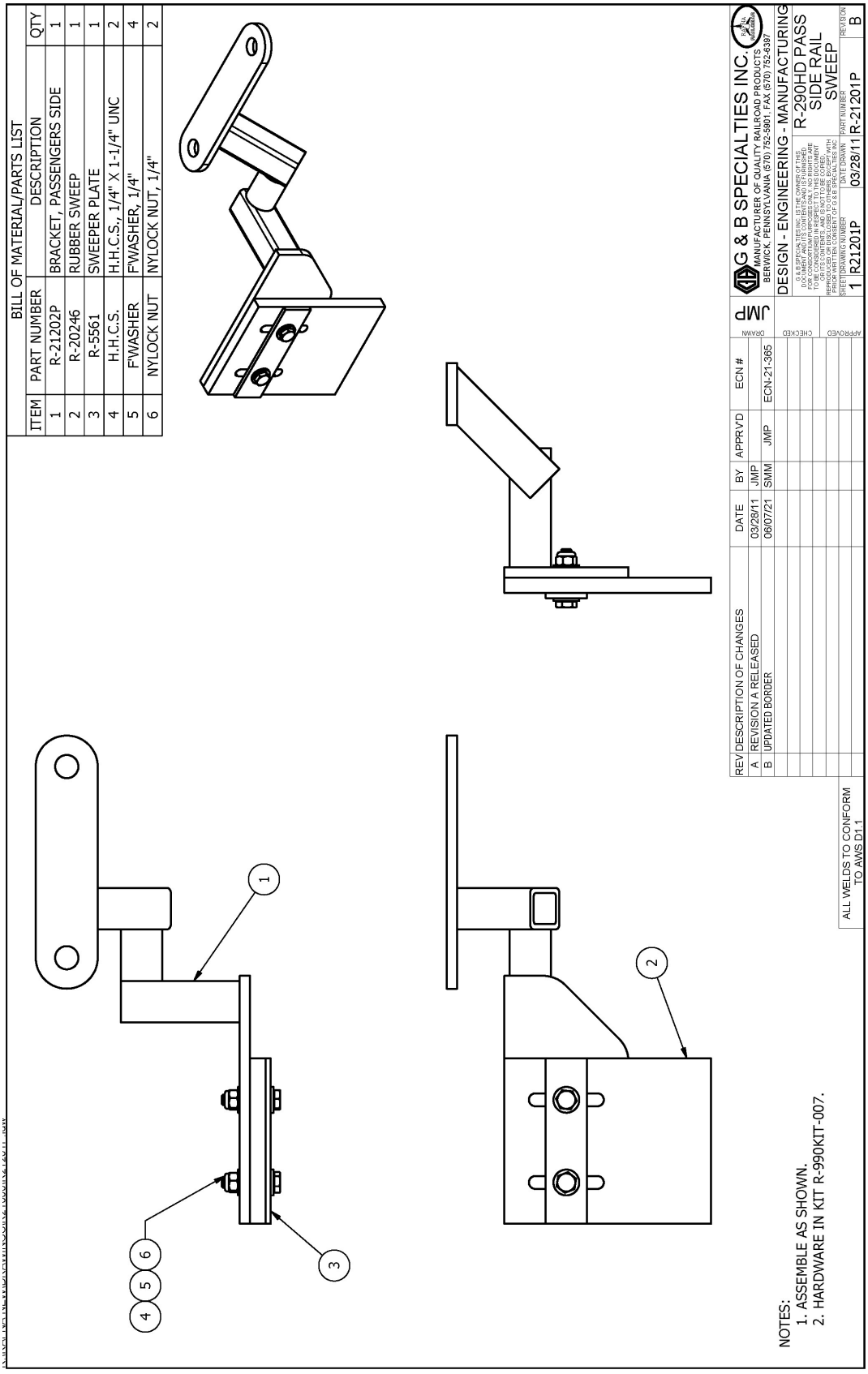

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