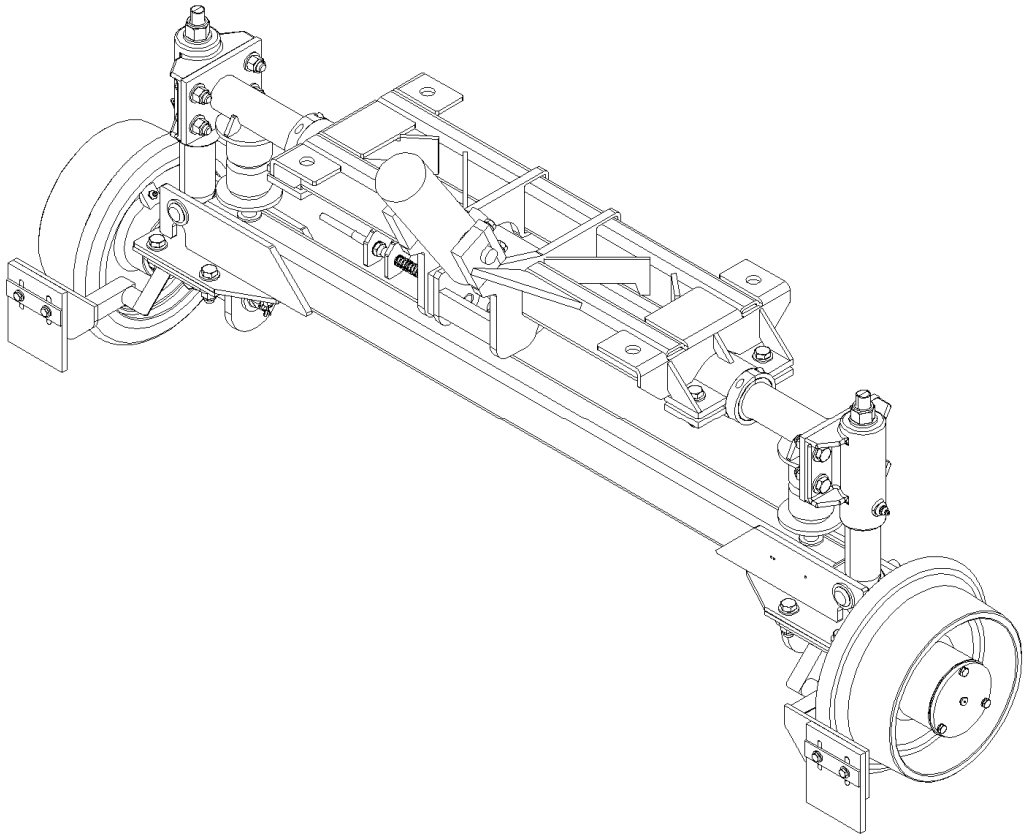
RAFNA R-290 RAILGEAR REAR
STANDARD / IN-CAB / FULL IN-CAB CONTROLS
2011 GM HD SHORT BED



SAFETY PRECAUTIONS

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

- **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.**

1.0 INSTALLATION OF RAILGEAR KIT

The following procedure details the installation of the railgear kit. The procedure is identical for both front and rear applications. The hardware required for one front or rear installation is listed in table 1.

Table 1: Railgear Kit Installation Parts

Part Number	Description	Qty
R-21172	Railgear Assembly (Standard/In-Cab)	1
R-21173	Railgear Assembly (Full In-Cab)	
R-1600	Rail Wheel Assembly	2
R-21102D	Rail Sweep	1
R-21102P	Rail Sweep	1
R-990KIT-203 (2 per)	½" UNC Gr. 8 Bolt x 2" Long	8 (4)
	½" Gr. 8 Washer	16 (8)
	½" UNC Gr. 8 Nylon Insert Lock Nut	8 (4)

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.

3. Standard/In-Cab Controls Only:

   Depending on the Hydraulic Kit ordered, lock cam converters may have been supplied to prevent the lock pins from engaging in the rail position. If this is the case, manually rotate the railgear until the rail position lock cam is accessible. Position the lock cam converter on the rail position lock cam and weld it in place. Grind the cam smooth so that the lock pin slides smoothly past the weld. The lock cam converter should prevent the lock pin from engaging in the rail position.

4. Measure from the railgear mounting surface, the bottom of the mounting brackets, to the ground. Determine what combination of railgear mounting shims are required in order to set the railgear mounting surface at approximately 16.5 - 17" from the ground. Railgear mounting shims are supplied with the vehicle mounting kit. 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.

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

6. 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. If there are multiple slot sets in the mounting plates, try to use the slots that will position the railgear closest to the vehicle wheels. Ensure that the railgear does not contact any vehicle components. Fasten the railgear and shims to the mounting plates using four suitably long ¾" bolts, eight ¾" washers, and four ¾" nuts.

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

8. 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 below 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.

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

10. Re-install the vehicle bumper and other components as required .

11. 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 and or exhaust. 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. 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.

12. <u>Standard/In-Cab Controls Only:</u>
    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" placard is on the cable end.

13. 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.

14. Standard/In-Cab Controls Only:
    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.

15. Standard/In-Cab Controls Only:
    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.

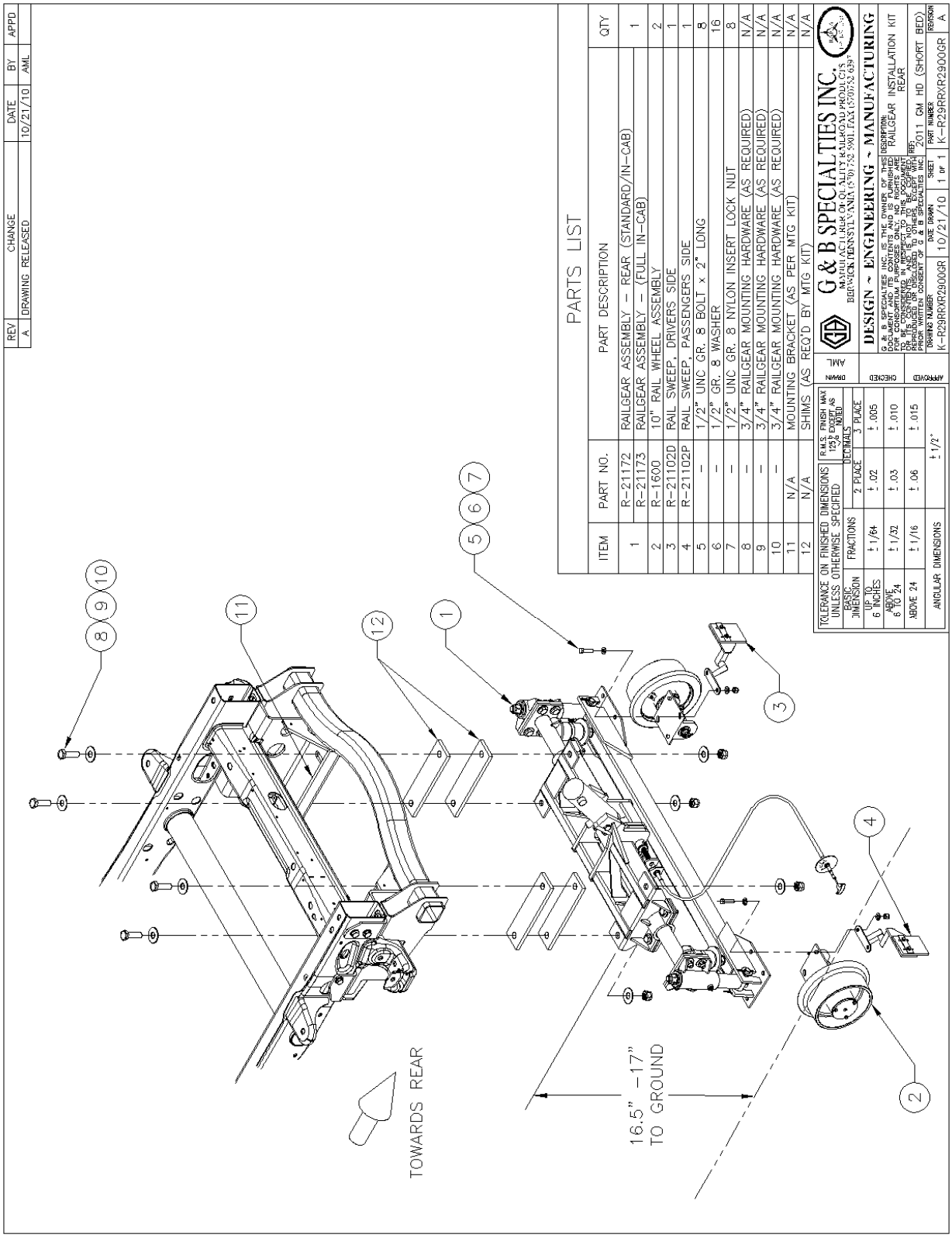
16. Follow the Rail Wheel Load Adjustment procedure detailed in the Railgear Kit Operation, Service and Parts manual.

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

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

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

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


REV | CHANGE | DATE | BY | APPD
A | DRAWING RELEASED | 10/21/10 | AML
PARTS LIST
ITEM | PART NO. | PART DESCRIPTION | QTY
1 | R-21172 | RAILGEAR ASSEMBLY – REAR (STANDARD/IN-CAB) | 1
R-21173 | RAILGEAR ASSEMBLY – (FULL IN-CAB)
2 | R-1600 | 10" RAIL WHEEL ASSEMBLY | 2
3 | R-21102D | RAIL SWEEP, DRIVERS SIDE | 1
4 | R-21102P | RAIL SWEEP, PASSENGERS SIDE | 1
5 | – | 1/2" UNC GR. 8 BOLT x 2" LONG | 8
6 | – | 1/2" GR. 8 WASHER | 16
7 | – | 1/2" UNC GR. 8 NYLON INSERT LOCK NUT | 8
8 | – | 3/4" RAILGEAR MOUNTING HARDWARE (AS REQUIRED) | N/A
9 | – | 3/4" RAILGEAR MOUNTING HARDWARE (AS REQUIRED) | N/A
10 | – | 3/4" RAILGEAR MOUNTING HARDWARE (AS REQUIRED) | N/A
11 | N/A | MOUNTING BRACKET (AS PER MTG KIT) | N/A
12 | N/A | SHIMS (AS REQ'D BY MTG KIT) | N/A
TOLERANCE ON FINISHED DIMENSIONS UNLESS OTHERWISE SPECIFIED
DECIMALS: 2 PLACE ± .02, 3 PLACE ± .005
FRACTIONS: UP TO 6 INCHES ± 1/64, ABOVE 6 TO 24 ± 1/32, ABOVE 24 ± 1/16
R.M.S. FINISH MAX 125 EXCEPT AS NOTED
ANGULAR DIMENSIONS ± 1/2°
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
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DESCRIPTION: RAILGEAR INSTALLATION KIT REAR
REF: 2011 GM HD (SHORT BED)
DRAWING NUMBER: K-R29RRXR2900GR
DATE DRAWN: 10/21/10
SHEET: 1 of 1
PART NUMBER: K-R29RRXR2900GR
REVISION: A
TOWARDS REAR
16.5" -17" TO GROUND

SAFETY PRECAUTIONS

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

- **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.**

2.0 OPERATION OF RAILGEAR KIT (STANDARD/IN-CAB CONTROLS)

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.

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

Placing The Vehicle On Rail – To Lower The Railgear:

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

2. Hold the locking cable handle in the disengaged position.

3. Lower the railgear and release the locking cable 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 2° over-center before proceeding.

Removing The Vehicle From Rail – To Raise The Railgear:

1. Disengage the lock pin by pulling on the locking cable handle. Do not force the locking cable. 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 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.

OPERATION OF RAILGEAR KIT (FULL IN-CAB CONTROLS)

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.

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

Placing The Vehicle On Rail – To Lower The Railgear:

7. Prior to approaching the rail crossing, remove the manual safety lock pins from the front and rear railgear. It may be necessary to raise the railgear off the lock pins. Store the lock pins in secure place in the vehicle.

8. Lower the railgear.

9. 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.)

10. Continue lowering the railgear until the hydraulic cylinder is fully extended.

11. Ensure that the railgear is fully deployed and about 2° over-center before proceeding.

Removing The Vehicle From Rail – To Raise The Railgear:

4. Raise the railgear.

5. Continue raising the railgear until the hydraulic cylinder is completely retracted.

6. Once the vehicle is clear of the rails, insert the manual safety lock pin through the lock guides.

3.0 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 ESSO LONAX EP2 grease or equivalent. In cold weather areas/seasons, SHELL DARINA XL102 or equivalent may be used.

Service Required	Daily	6 Months	Yearly
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 end-play			✓
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

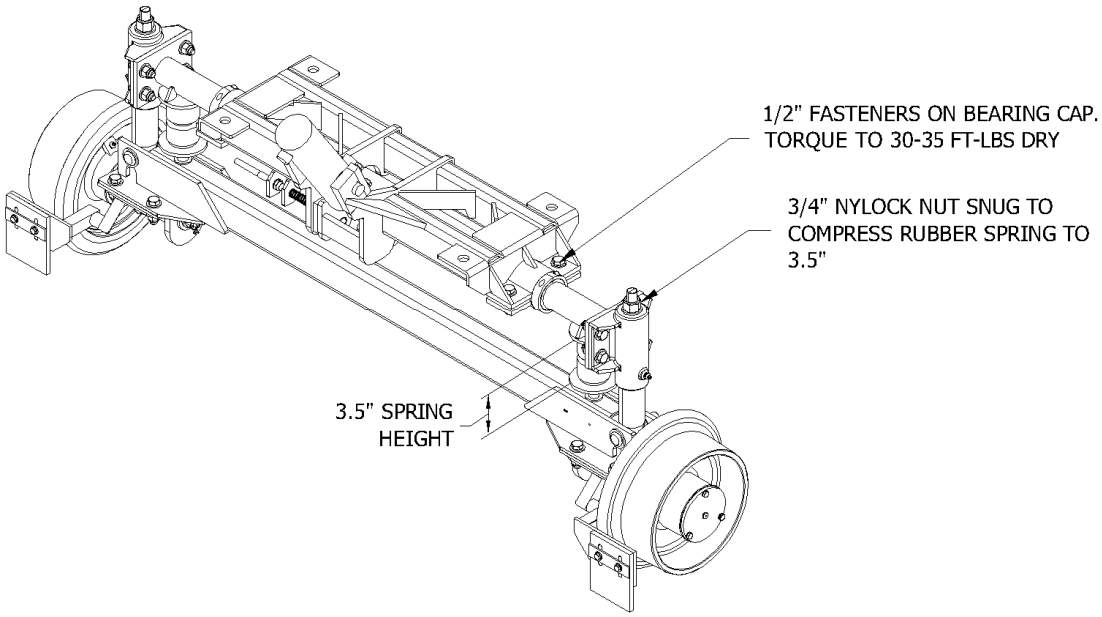


FIGURE 1: NON-STANDARD FASTENER TORQUE VALUES

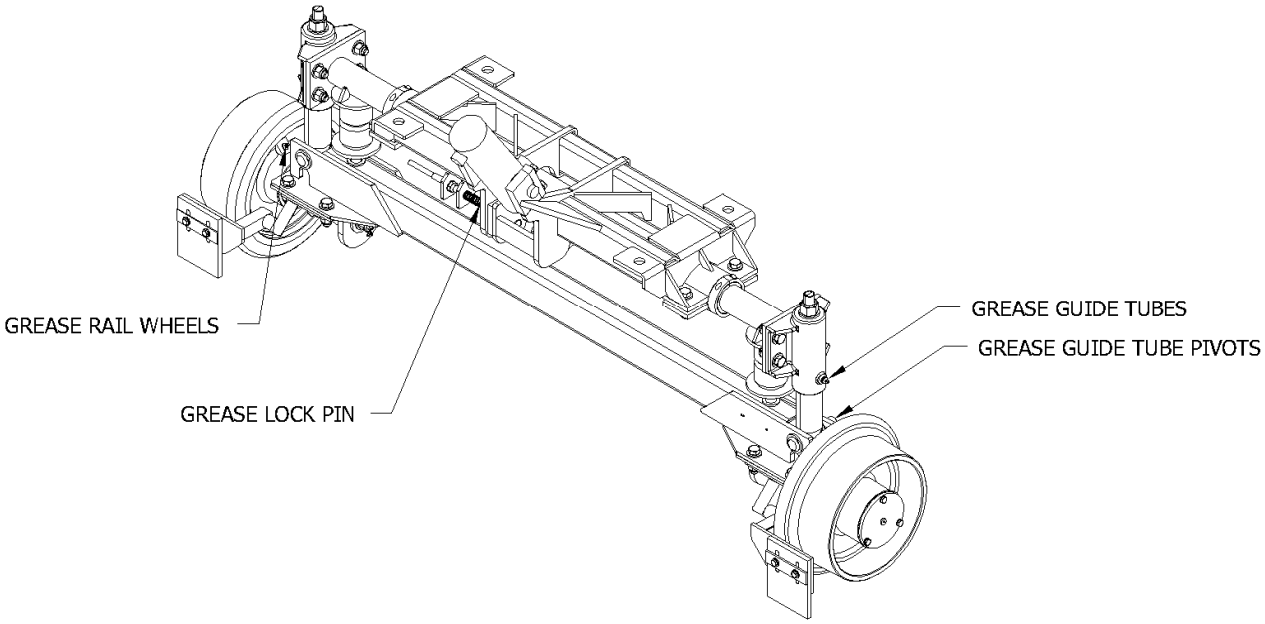


FIGURE 2: LUBRICATION POINTS

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 2-3° 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.

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 450 lbs and a maximum of 750 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 s 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 of 2000 lbs per wheel 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, if necessary convert the pressure reading to a load reading using the supplied table

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
300	180	210	240	270	300	330	370	410	450
310	190	210	240	270	310	340	380	420	460
320	190	220	250	280	320	350	390	430	480
330	200	230	260	290	330	370	400	450	490
340	200	230	270	300	340	380	420	460	500
350	210	240	270	310	350	390	430	470	520
360	220	250	280	320	360	400	440	490	530
370	220	260	290	330	370	410	450	500	550
380	230	260	300	340	380	420	470	510	560
390	230	270	310	350	390	430	480	530	580
400	240	280	310	350	400	440	490	540	590
410	250	280	320	360	410	450	500	550	610
420	250	290	330	370	420	470	520	570	620
430	260	300	340	380	430	480	530	580	640
440	260	300	350	390	440	490	540	600	650
450	270	310	350	400	450	500	550	610	670
460	280	320	360	410	460	510	560	620	680
470	280	320	370	420	470	520	580	640	700
480	290	330	380	430	480	530	590	650	710
490	290	340	380	430	490	540	600	660	730
500	300	350	390	440	500	550	610	680	740
510	310	350	400	450	510	560	630	690	760
520	310	360	410	460	520	580	640	700	770
530	320	370	420	470	530	590	650	720	790
540	320	370	420	480	540	600	660	730	800
550	330	380	430	490	550	610	670	740	820
560	340	390	440	500	560	620	690	760	830
570	340	390	450	510	570	630	700	770	850
580	350	400	460	510	580	640	710	780	860
590	350	410	460	520	590	650	720	800	880
600	360	410	470	530	600	660	740	810	890
610	370	420	480	540	610	680	750	830	910
620	370	430	490	550	620	690	760	840	920
630	380	430	490	560	630	700	770	850	940
640	380	440	500	570	640	710	790	870	950
650	390	450	510	580	650	720	800	880	970
660	400	460	520	590	660	730	810	890	980
670	400	460	530	590	670	740	820	910	990
680	410	470	530	600	680	750	830	920	1010
690	410	480	540	610	690	760	850	930	1020
700	420	480	550	620	700	780	860	950	1040
710	430	490	560	630	710	790	870	960	1050
720	430	500	570	640	720	800	880	970	1070
730	440	500	570	650	730	810	900	990	1080
740	440	510	580	660	740	820	910	1000	1100
750	450	520	590	660	750	830	920	1010	1110
760	460	520	600	670	760	840	930	1030	1130
770	460	530	600	680	770	850	940	1040	1140
780	470	540	610	690	780	860	960	1060	1160
790	480	550	620	700	790	870	970	1070	1170
800	480	550	630	710	800	890	980	1080	1190
810	490	560	640	720	810	900	990	1100	1200
820	490	570	640	730	820	910	1010	1110	1220
830	500	570	650	740	830	920	1020	1120	1230
840	510	580	660	740	830	930	1030	1140	1250
850	510	590	670	750	840	940	1040	1150	1260
860	520	590	680	760	850	950	1060	1160	1280
870	520	600	680	770	860	960	1070	1180	1290
880	530	610	690	780	870	970	1080	1190	1310
890	540	610	700	790	880	990	1090	1200	1320
900	540	620	710	800	890	1000	1100	1220	1340

Rail Wheel Load (lbs)

ADJUST EACH RAIL WHEEL LOAD AS FOLLOWS:

There are two rubber springs on the railgear located between the railgear lower cross frame and each adjustment rod. The adjustment rods are threaded into the railgear axle. The rubber springs support the load between the lower cross frame and the axle while a ¾" nylock nut on top of each guide tube prevents the axle from separating from the lower cross frame. The load on the rail wheels is adjusted by threading the adjustment rod into or out of the axle (effectively making the railgear shorter or taller) and moving the ¾" nylock nut in order to keep the rubber springs compressed at 3.5" while in the road position. There must be at least two threads passing through the ¾" nylock nut on top of the guide tubes. Both adjustment rods on the same railgear should be set at the same distance from the railgear axle.

1. Raise the railgear until the rail wheels are off the rails.

2. Loosen the ¾" jam nuts that secure the adjustment rods to the railgear axle and loosen the ¾" nylock nuts on top of the outer guide tubes.

3. Screw the adjustment rods into the axle to decrease the rail wheel loads or out of the axle to increase the rail wheel loads.

4. Lower the railgear to the rail position and re-check the rail wheel loads. Re-adjust the rail wheel loads if necessary.

5. The distance between the top of the axle and the bottom of the adjustment rod plates once adjusted should not exceed 2.5". If the correct rail wheel load cannot be achieved within this maximum distance, then railgear mounting shims will have to be added between the railgear and the railgear mounting brackets. Likewise, if the adjustment rods are threaded completely into the axle and the rail wheel load is still too high, then railgear mounting shims will have be removed from between the railgear and the railgear mounting brackets. The railgear alignment will have to be checked if shims are added or removed.

6. Raise the railgear until the rail wheels are off the rails. Tighten the ¾" jam nuts on the adjustment rods against the axle. Tighten the ¾" nylock nuts on top of the guide tubes so that the rubber springs are compressed to 3.5".

7. Lower the railgear to the rail position. Check that the ¾" nylock nuts are about ¾"-1" above the top of the guide tubes. This is the amount the rubber springs are able to extend.

8. 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. 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.

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. G&B Specialties can also supply a special alignment tool kit (order part number R-066K) with which separate instructions are supplied.

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.

Figure 3: Railgear Alignment

VEHICLE MODEL: _____ VEHICLE UNIT #: _____

RAILGEAR S/N: _____

TURNING RADIUS (INCH) AFTER WHEEL KIT INSTALLATION:

RAD/DIA _____

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"

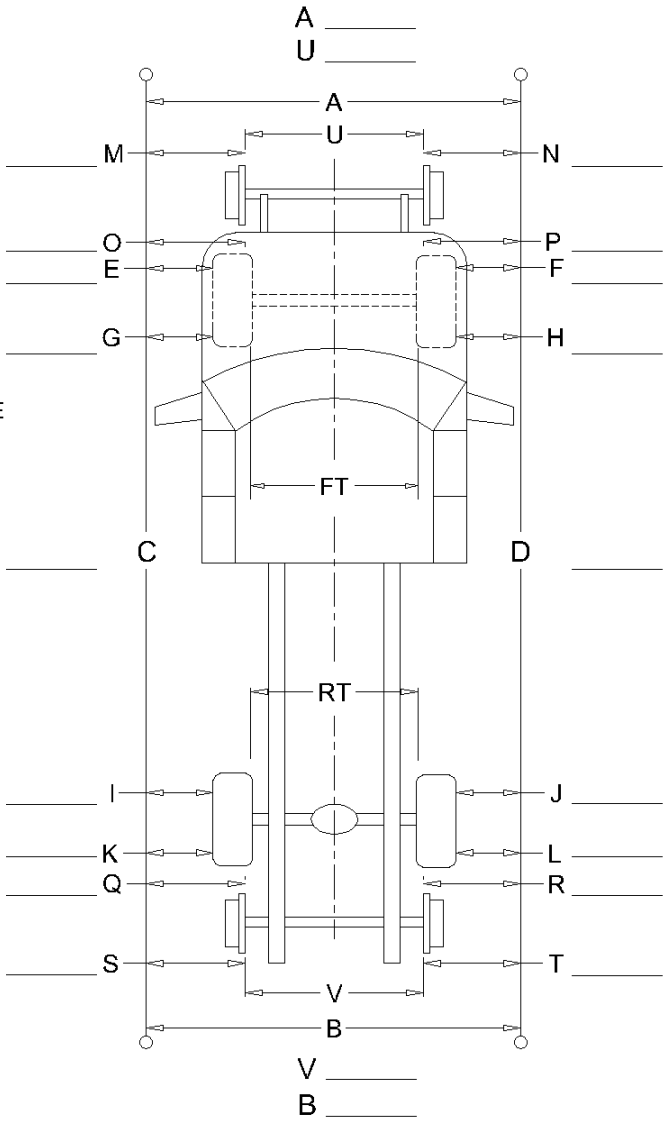
ENSURE THAT U & V ARE BETWEEN
53 - 7/16" AND 53 - 9/16"

OVER-CENTER ANGLE (DEG):

FRONT _____
REAR _____

TREAD TO TREAD, NOT SIDEWALL:

FRONT (FT) _____
REAR (RT) _____



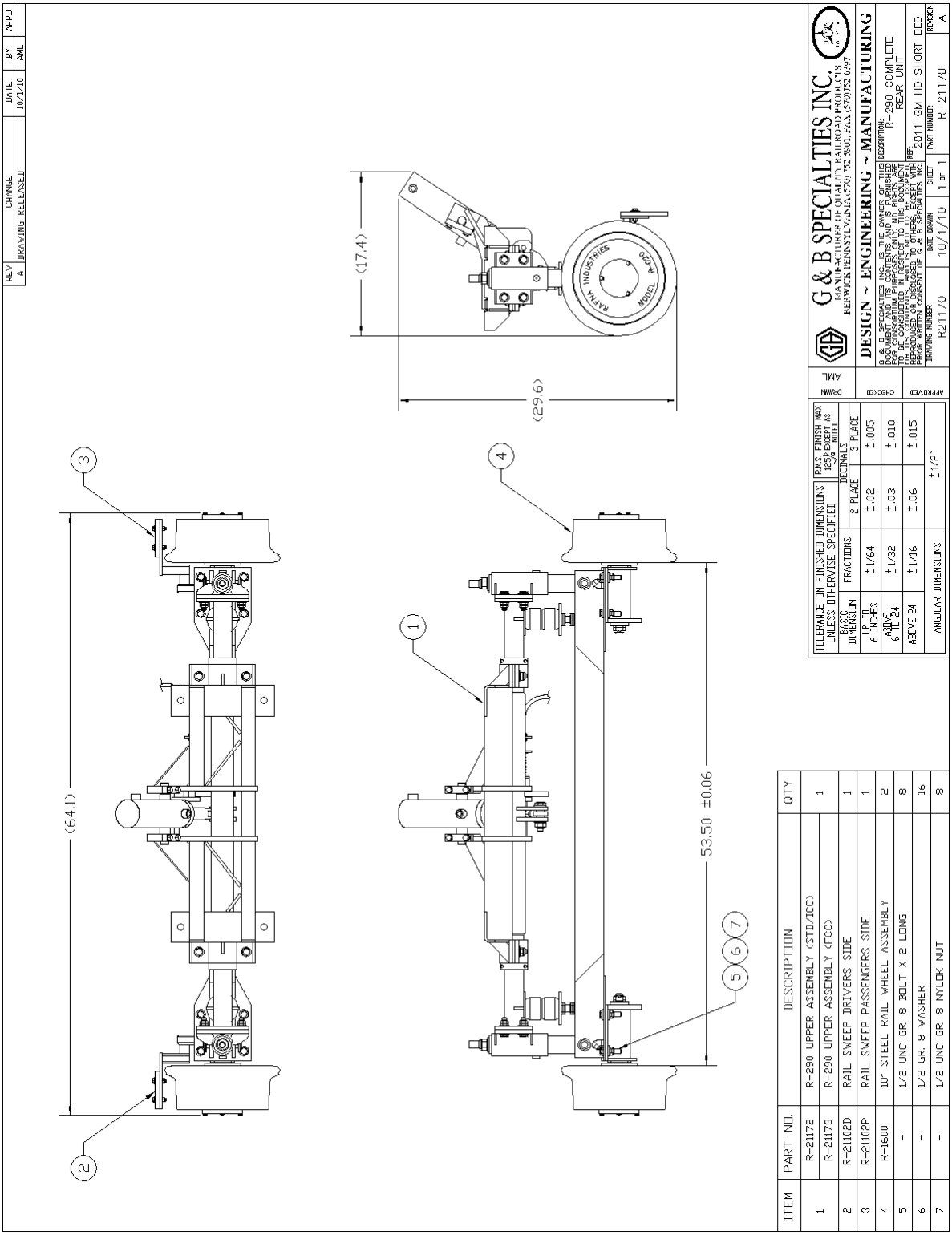
RAIL WHEEL LOAD (LBS):

LEFT FRONT _____
RIGHT FRONT _____
LEFT REAR _____
RIGHT REAR _____

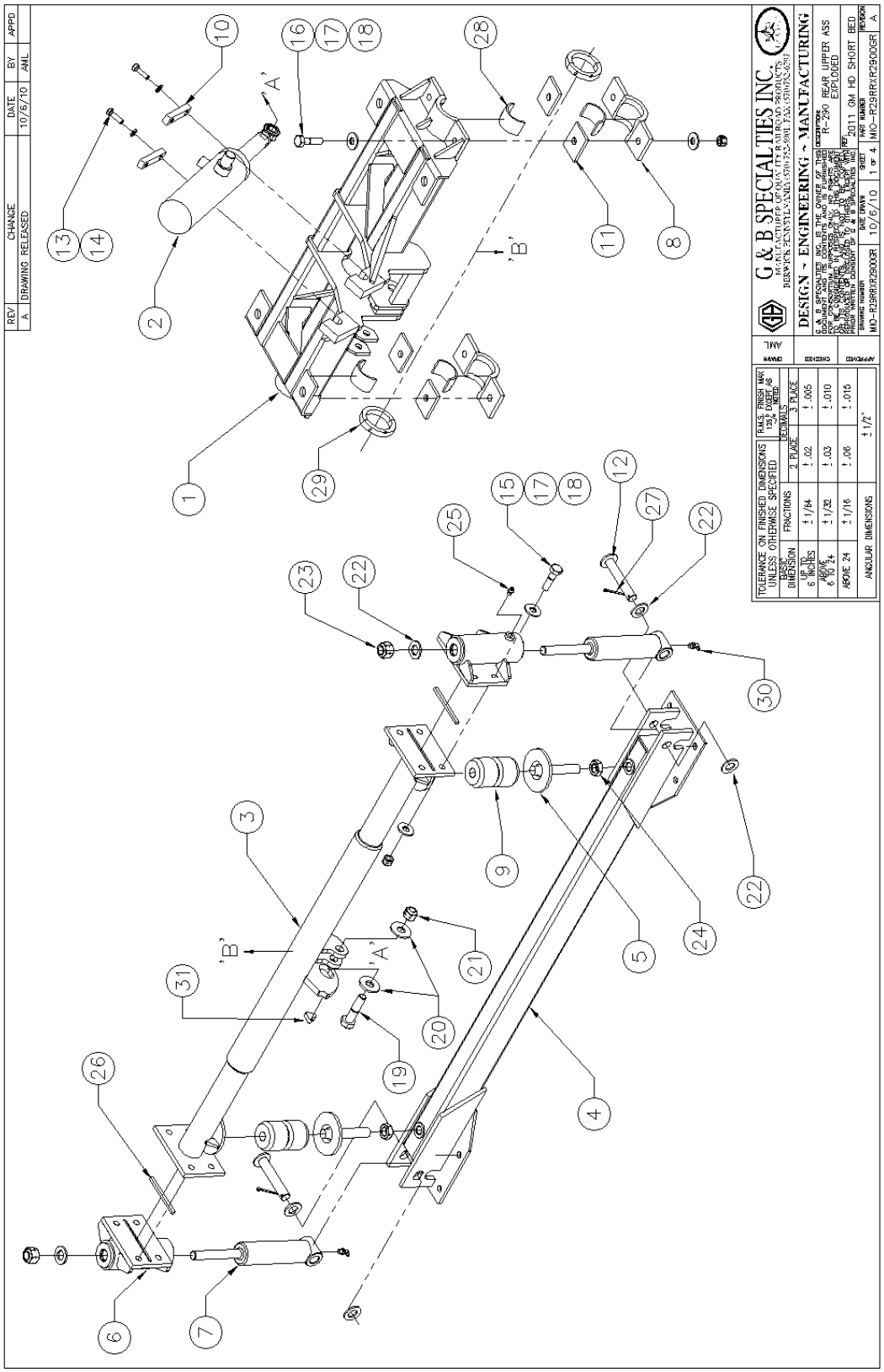
RAIL WHEEL FLANGE TO GROUND CLEARANCE:

LEFT FRONT _____
RIGHT FRONT _____
LEFT REAR _____
RIGHT REAR _____

4.0 PARTS OF RAILGEAR KIT



ITEM	PART NO.	DESCRIPTION	QTY
1	R-21172	R-290 UPPER ASSEMBLY (STD/ICC)	1
	R-21173	R-290 UPPER ASSEMBLY (FCC)	
2	R-21102D	RAIL SWEEP DRIVERS SIDE	1
3	R-21102P	RAIL SWEEP PASSENGERS SIDE	1
4	R-1600	10" STEEL RAIL WHEEL ASSEMBLY	2
5	-	1/2 UNC GR. 8 BOLT X 2 LONG	8
6	-	1/2 GR. 8 WASHER	16
7	-	1/2 UNC GR. 8 NYLOK NUT	8


G & B SPECIALTIES INC.
DESIGN ~ ENGINEERING ~ MANUFACTURING
REAR UPPER ASS
EXPLODED
2011 GM HD SHORT BED
MIO-R29RRXR2900GR
'A'
'B'

REV	CHANGE	DATE	BY	APPD
A	DRAWING RELEASED	10/6/10	AML	

ITEM	PART NO.	PART DESCRIPTION	QTY
1	R-21172	UPPER CROSS FRAME (STD. & IN-CAB CONTROLS)	1
	R-21173	UPPER CROSS FRAME (FULL IN-CAB CONTROLS)	
2	R-21174	HYDRAULIC CYLINDER	1
3	R-2920	LOWER CROSS FRAME	1
4	R-2930	AXLE	1
5	R-2948	ADJUSTMENT ROD	2
6	R-2941	OUTER GUIDE TUBE ASSEMBLY	2
7	R-2944	INNER GUIDE TUBE ASSEMBLY	2
8	R-3602B	BEARING END CAP	2
9	R-130	RUBBER SPRING	2
10	R-2950	TRUNION CAP	2
11	R-3602A	SHIM	4
12	R-2949	GUIDE TUBE PIN	2
13	–	3/8" UNC GR.8 x 1-1/4" LONG BOLT	4
14	–	3/8" SPLIT LOCK WASHER	4
15	–	1/2" UNC GR. 8 x 1-3/4" LONG BOLT	8
16	–	1/2" UNC GR. 8 x 2" LONG BOLT	12
17	–	1/2" GR. 8 WASHER	40
18	–	1/2" UNC GR. 8 NYLON INSERT LOCK NUT	20
19	–	5/8" UNC GR. 8 x 2-3/4" LONG BOLT	1
20	–	5/8" GR. 8 WASHER	2
21	–	5/8" UNC GR. 8 NYLON INSERT LOCK NUT	1
22	–	3/4" GR. 8 WASHER	6
23	–	3/4" UNC GR. 8 NYLON INSERT LOCK NUT	2
24	–	3/4" UNC JAM NUT	2
25	–	1/8" NPT GREASE ZERK	2
26	–	1/4" x 1/4" KEYSTOCK 4" LONG	2
27	–	5/32" COTTER PIN x 2" LONG	2
28	R-3618	SPLIT BEARING	2
29	R-2589	SPLIT COLLAR	2
30	–	1/8" NPT 90° GREASE ZERK	2
31	R-2961	LOCK CAM CONVERTER (FOR IN CAB CONTROLS ONLY)	1
32	R-1505	BELLOWS (NOT SHOWN)	2
33	R-601	BELLOWS CLAMP (NOT SHOWN)	2

TOLERANCE ON FINISHED DIMENSIONS UNLESS OTHERWISE SPECIFIED		R.M.S. FINISH MAX 125 EXCEPT AS NOTED	
BASIC DIMENSION	FRACTIONS	DECIMALS 2 PLACE	DECIMALS 3 PLACE
UP TO 6 INCHES	± 1/64	± .02	± .005
ABOVE 6 TO 24	± 1/32	± .03	± .010
ABOVE 24	± 1/16	± .06	± .015
ANGULAR DIMENSIONS		± 1/2°	

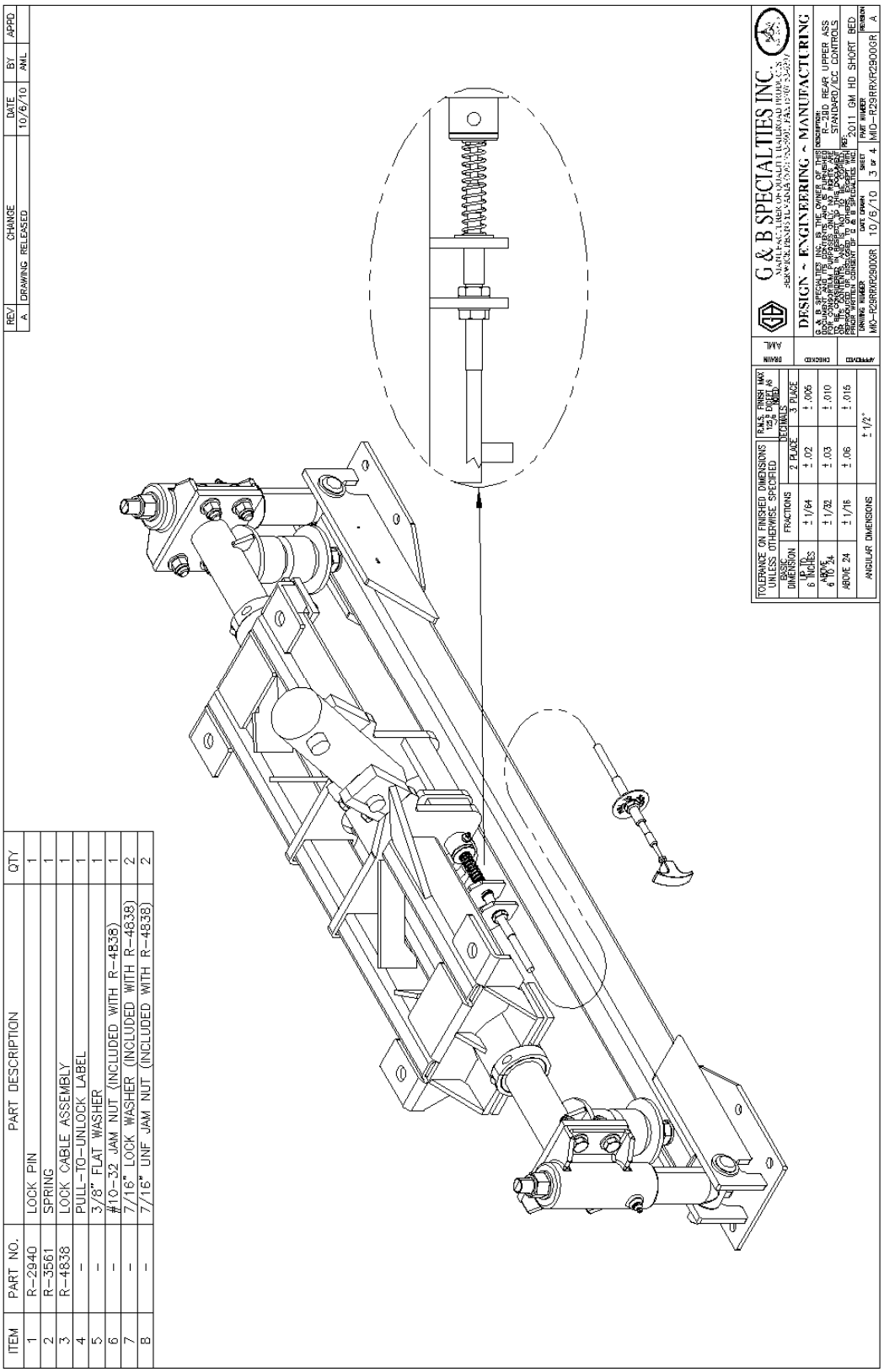
DRAWN: AML
CHECKED:
APPROVED:

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

DESIGN ~ ENGINEERING ~ MANUFACTURING

DESCRIPTION: R-290 REAR UPPER ASS EXPLODED
REF: 2011 GM HD SHORT BED

DRAWING NUMBER	DATE DRAWN	SHEET	PART NUMBER	REVISION
MIO-R29RRXR2900GR	10/6/10	2 or 4	MIO-R29RRXR2900GR	A



ITEM	PART NO.	PART DESCRIPTION	QTY
1	R-2940	LOCK PIN	1
2	R-3561	SPRING	1
3	R-4838	LOCK CABLE ASSEMBLY	1
4	–	PULL-TO-UNLOCK LABEL	1
5	–	3/8" FLAT WASHER	1
6	–	#10-32 JAM NUT (INCLUDED WITH R-4838)	1
7	–	7/16" LOCK WASHER (INCLUDED WITH R-4838)	2
8	–	7/16" UNF JAM NUT (INCLUDED WITH R-4838)	2

REV	CHANGE	DATE	BY	APPD
A	DRAWING RELEASED	10/6/10	AML	

G & B SPECIALTIES INC.

DESIGN ~ ENGINEERING ~ MANUFACTURING

DESCRIPTION: R-29D REAR UPPER ASS STANDARD/ICC CONTROLS

2011 GM HD SHORT BED

PART NUMBER: MIO-R29RRXR2900GR

REVISION: A

DRAWN: AML

CHECKED:

APPROVED:

DRAWING NUMBER: MIO-R29RRXR2900GR

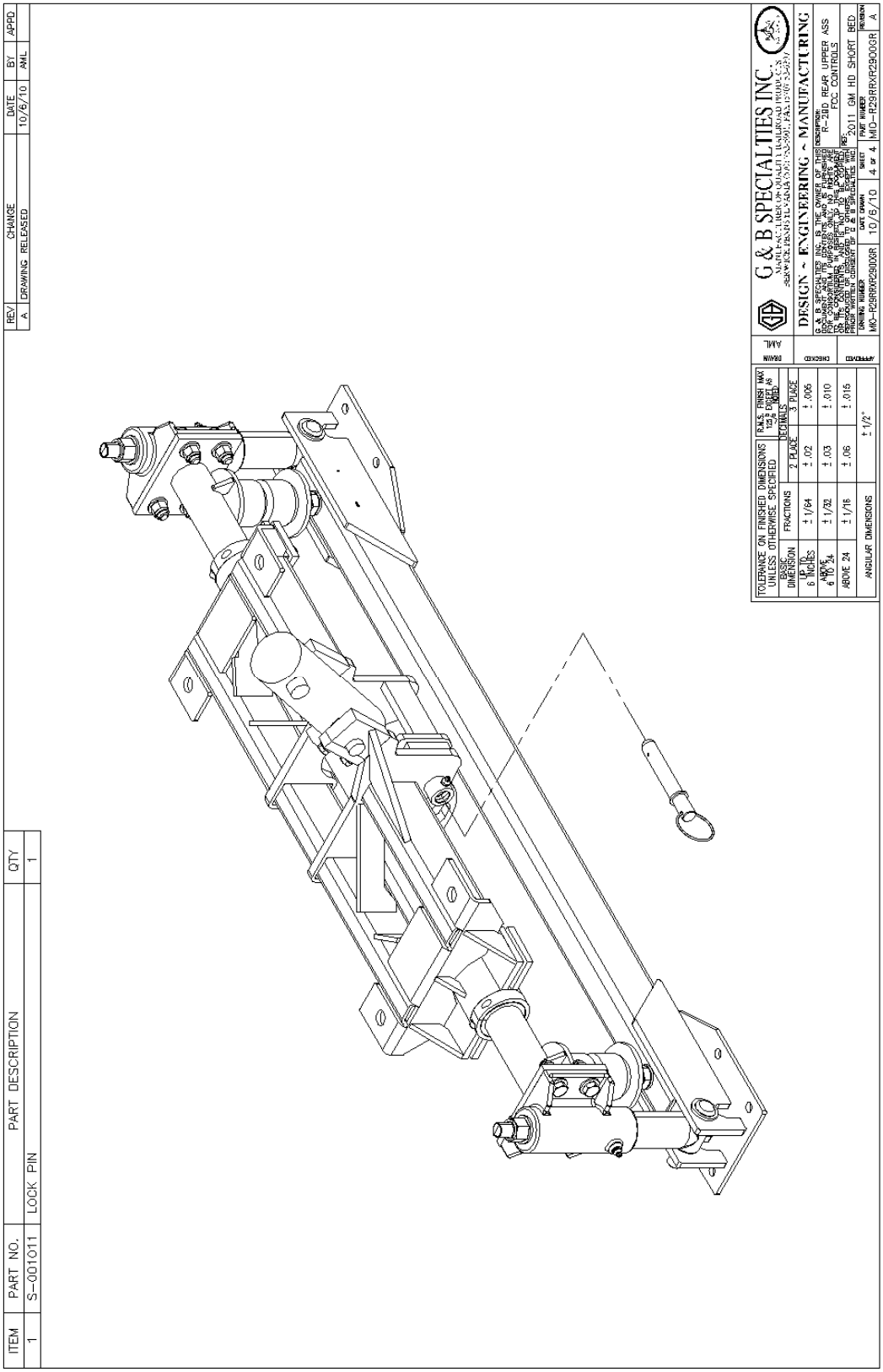
DATE DRAWN: 10/6/10

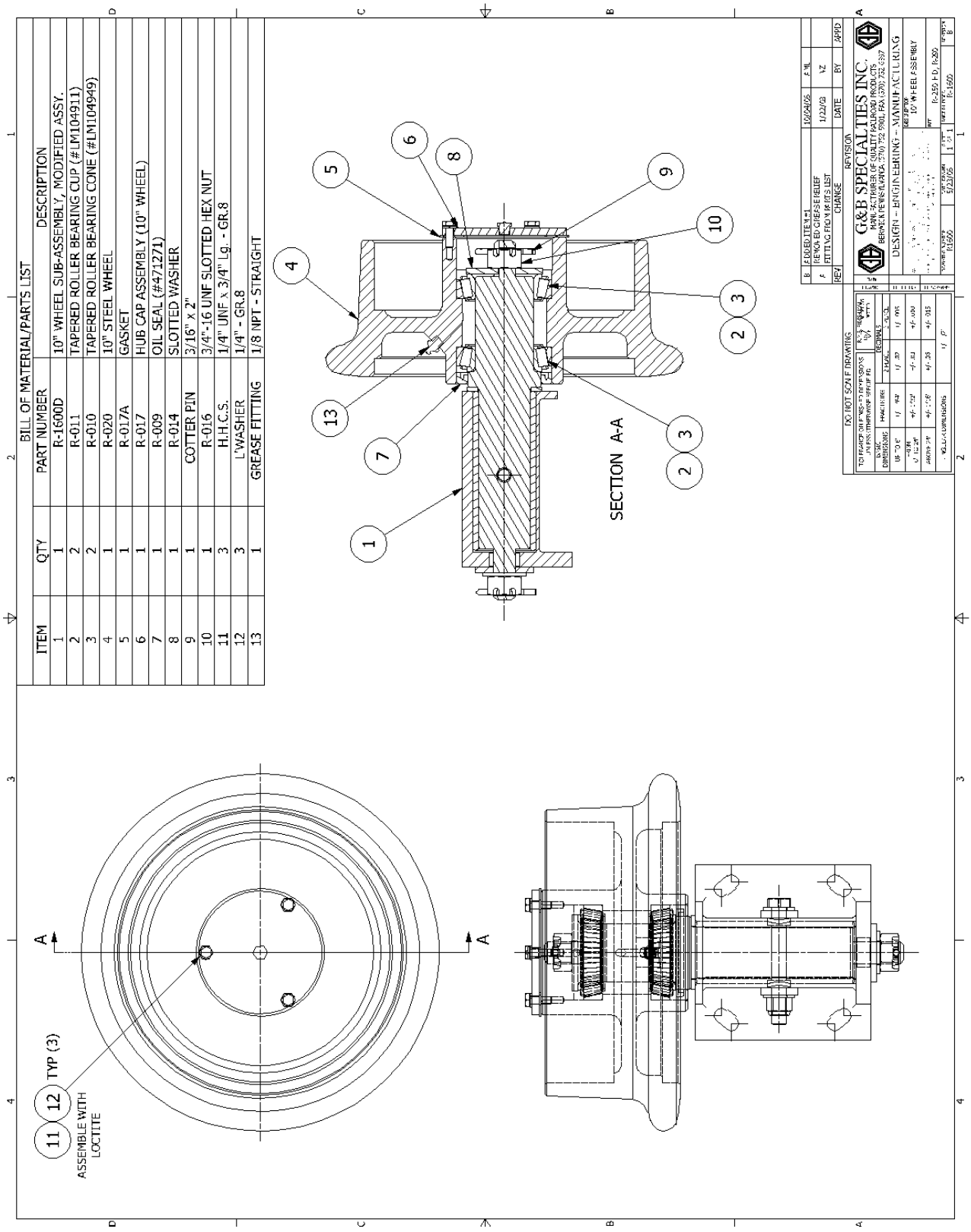
SHEET: 3 of 4

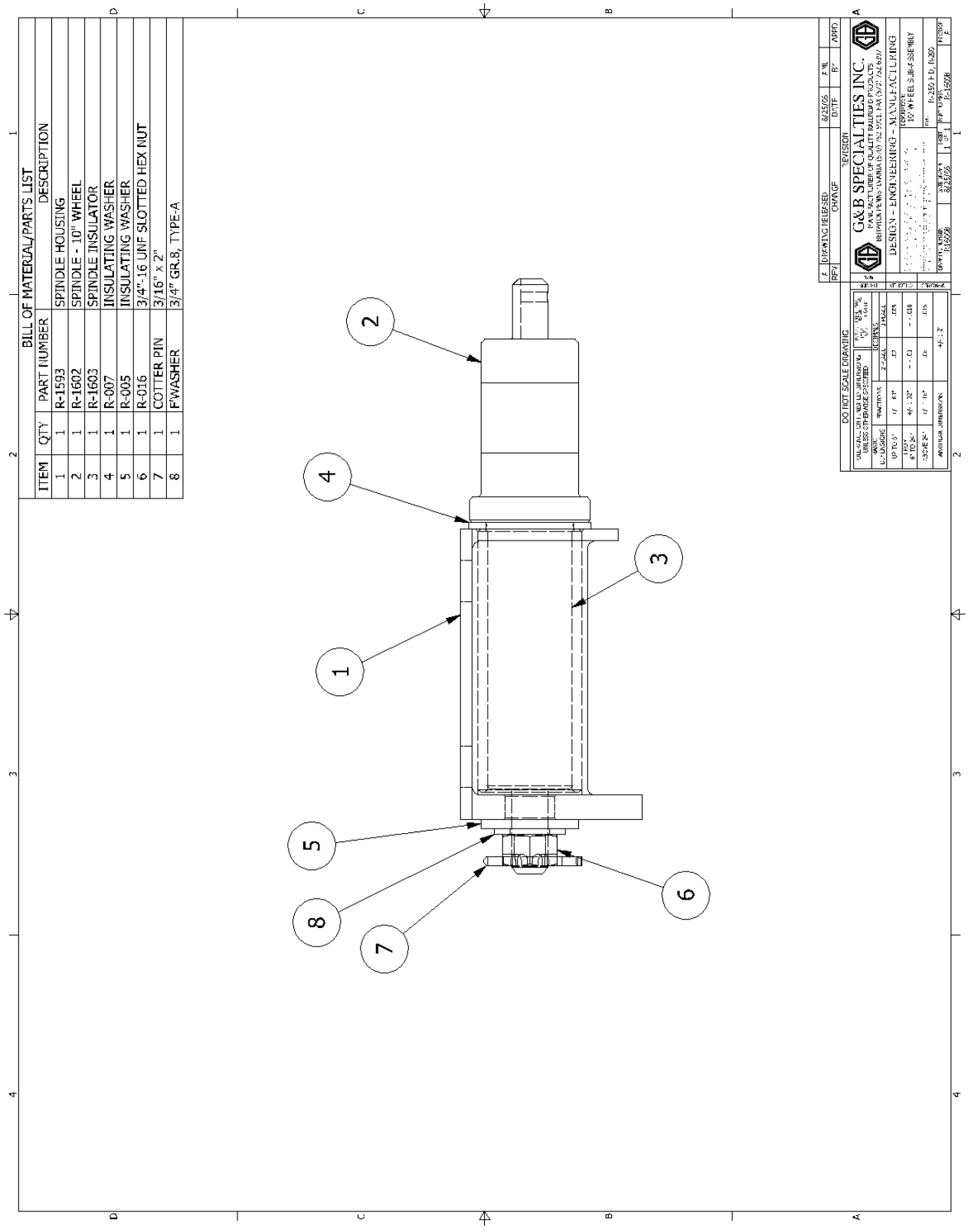
TOLERANCE ON FINISHED DIMENSIONS UNLESS OTHERWISE SPECIFIED

BASIC DIMENSION	FRACTIONS	DECIMALS 2 PLACE	DECIMALS 3 PLACE
UP TO 6 INCHES	± 1/64	± .02	± .005
ABOVE 6 TO 24	± 1/32	± .03	± .010
ABOVE 24	± 1/16	± .06	± .015
ANGULAR DIMENSIONS		± 1/2°	

FINISH MAX 125 EXCEPT AS NOTED


REV
A
CHANGE
DRAWING RELEASED
DATE
10/6/10
BY
AML
APPD
ITEM
1
PART NO.
S-001011
PART DESCRIPTION
LOCK PIN
QTY
1
G & B SPECIALTIES INC.
DESIGN ~ ENGINEERING ~ MANUFACTURING
DRAWN
AML
CHECKED
APPROVED
TOLERANCE ON FINISHED DIMENSIONS UNLESS OTHERWISE SPECIFIED
BASIC DIMENSION
FRACTIONS
2 PLACE DECIMALS
3 PLACE
UP TO 6 INCHES
± 1/64
± .02
± .005
6 TO 24
± 1/32
± .03
± .010
ABOVE 24
± 1/16
± .06
± .015
ANGULAR DIMENSIONS
± 1/2°
R.M.S. FINISH MAY 125 & BREAK AS
DESCRIPTION:
R-29D REAR UPPER ASS
FCC CONTROLS
REF:
2011 GM HD SHORT BED
DRAWING NUMBER
MIO-R29RRXR2900GR
DATE DRAWN
10/6/10
SHEET
4 of 4
PART NUMBER
MIO-R29RRXR2900GR
REVISION
A


BILL OF MATERIAL/PARTS LIST
ITEM | QTY | PART NUMBER | DESCRIPTION
1 | 1 | R-1600D | 10" WHEEL SUB-ASSEMBLY, MODIFIED ASSY.
2 | 2 | R-011 | TAPERED ROLLER BEARING CUP (#LM104911)
3 | 2 | R-010 | TAPERED ROLLER BEARING CONE (#LM104949)
4 | 1 | R-020 | 10" STEEL WHEEL
5 | 1 | R-017A | GASKET
6 | 1 | R-017 | HUB CAP ASSEMBLY (10" WHEEL)
7 | 1 | R-009 | OIL SEAL (#471271)
8 | 1 | R-014 | SLOTTED WASHER
9 | 1 | COTTER PIN | 3/16" x 2"
10 | 1 | R-016 | 3/4"-16 UNF SLOTTED HEX NUT
11 | 3 | H.H.C.S. | 1/4" UNF x 3/4" Lg. - GR.8
12 | 3 | L'WASHER | 1/4" - GR.8
13 | 1 | GREASE FITTING | 1/8 NPT - STRAIGHT
SECTION A-A
ASSEMBLE WITH LOCTITE
TYP (3)
G&B SPECIALTIES INC.
DESIGN - BENDIX BEARING - MANUFACTURING
10" WHEEL ASSEMBLY
R-1600
DO NOT SCALE DRAWING



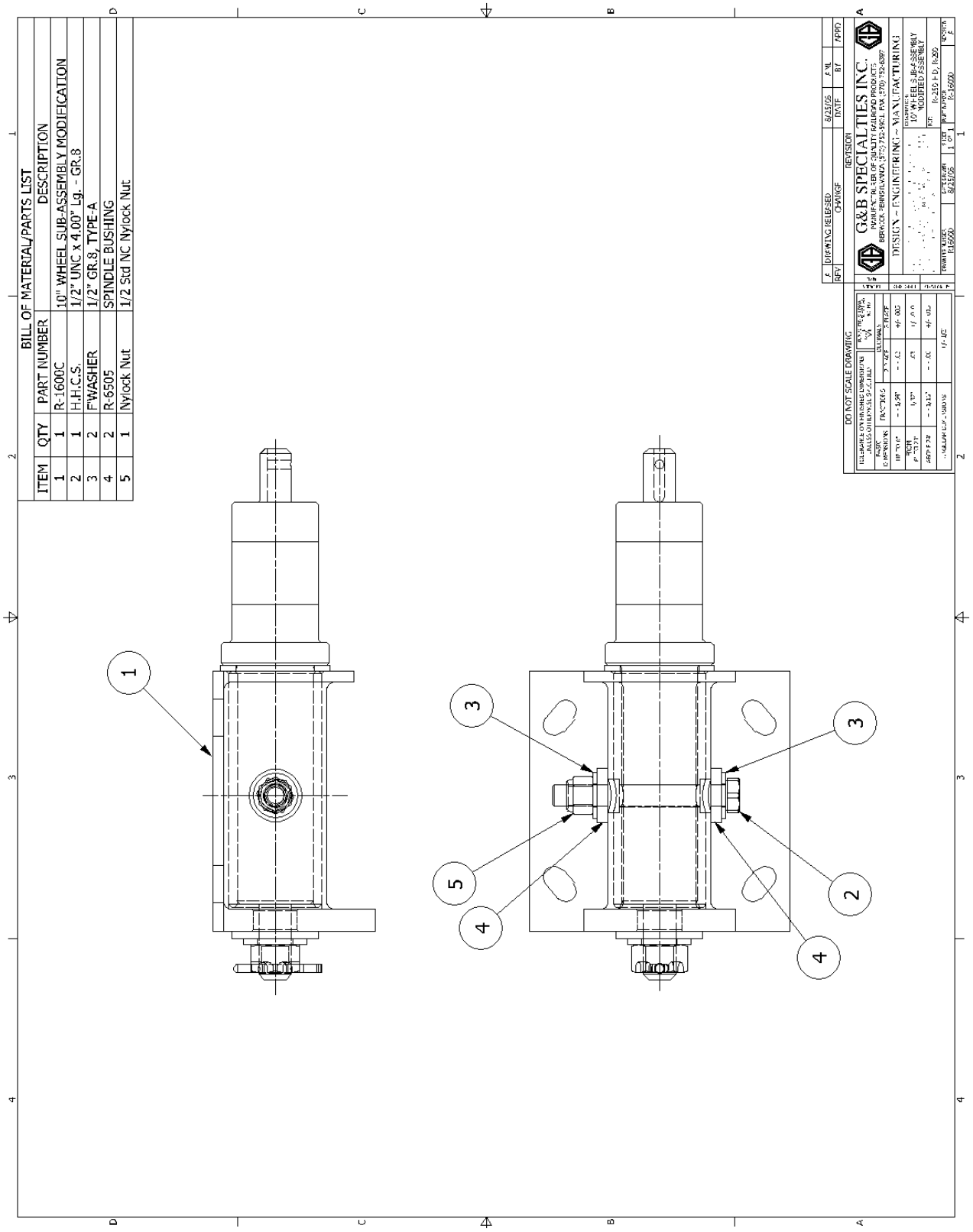
BILL OF MATERIAL/PARTS LIST

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	R-1593	SPINDLE HOUSING
2	1	R-1602	SPINDLE - 10" WHEEL
3	1	R-1603	SPINDLE INSULATOR
4	1	R-007	INSULATING WASHER
5	1	R-005	INSULATING WASHER
6	1	R-016	3/4"-16 UNF SLOTTED HEX NUT
7	1	COTTER PIN	3/16" x 2"
8	1	FWASHER	3/4" GR.8, TYPE-A

DO NOT SCALE DRAWING

G&B SPECIALTIES INC.

DESIGN – ENGINEERING – MANUFACTURING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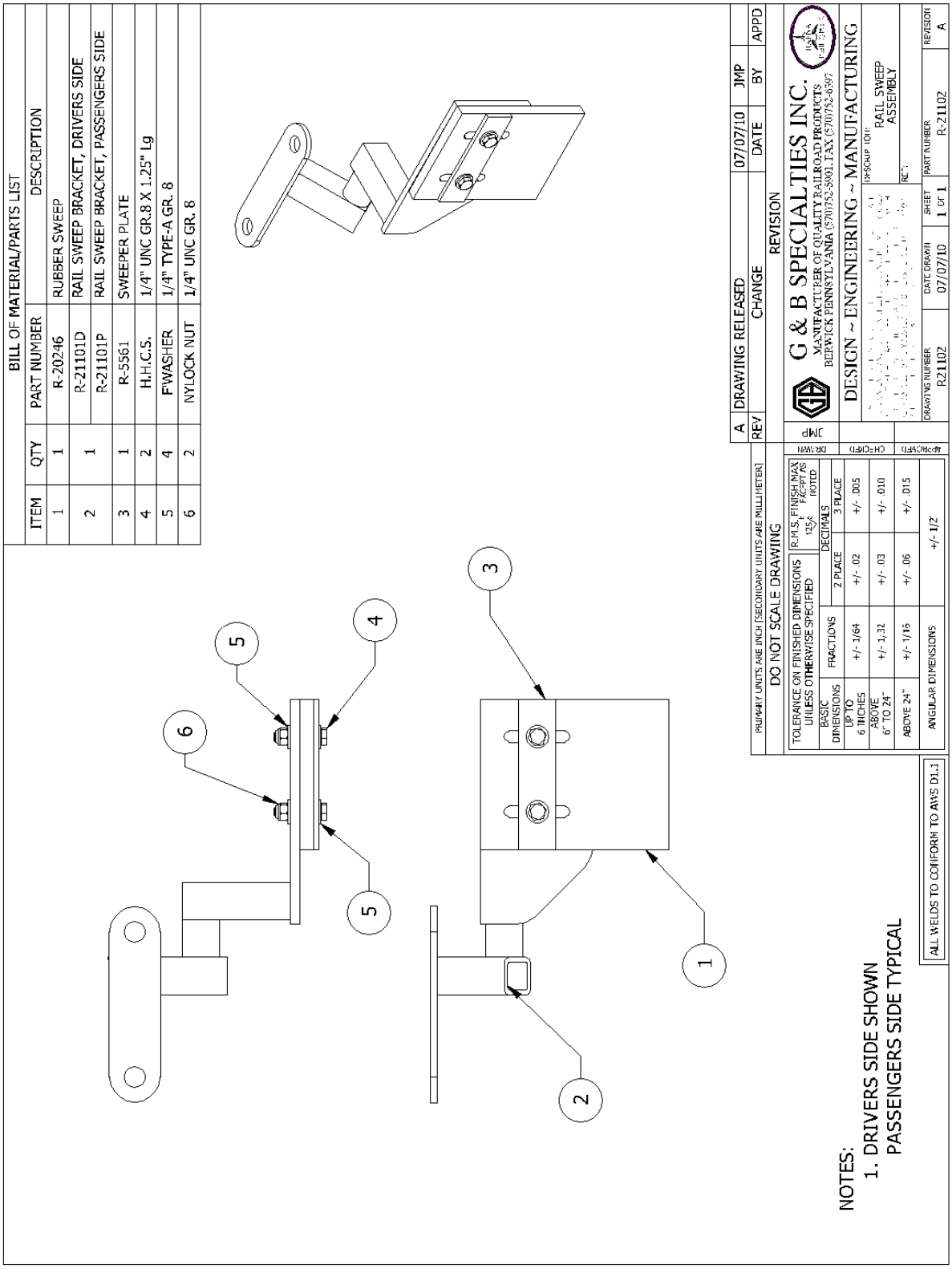
ITEM QTY PART NUMBER DESCRIPTION
1 1 R-1600C 10" WHEEL SUB-ASSEMBLY MODIFICATION
2 1 H.H.C.S. 1/2" UNC x 4.00" Lg. - GR.8
3 2 F'WASHER 1/2" GR.8, TYPE-A
4 2 R-6505 SPINDLE BUSHING
5 1 Nylock Nut 1/2 Std NC Nylock Nut
DO NOT SCALE DRAWING
G&B SPECIALTIES INC.
DESIGN ~ ENGINEERING ~ MANUFACTURING
1
2
3
4
5


BILL OF MATERIAL/PARTS LIST
ITEM | QTY | PART NUMBER | DESCRIPTION
1 | 1 | R-20246 | RUBBER SWEEP
2 | 1 | R-21101D | RAIL SWEEP BRACKET, DRIVERS SIDE
2 | 1 | R-21101P | RAIL SWEEP BRACKET, PASSENGERS SIDE
3 | 1 | R-5561 | SWEEPER PLATE
4 | 2 | H.H.C.S. | 1/4" UNC GR.8 X 1.25" Lg
5 | 4 | FWASHER | 1/4" TYPE-A GR. 8
6 | 2 | NYLOCK NUT | 1/4" UNC GR. 8
A | DRAWING RELEASED | 07/07/10 | JMP
REV | CHANGE | DATE | BY | APPD
REVISION
G & B SPECIALTIES INC.
MANUFACTURER OF QUALITY RAILROAD PRODUCTS
BERWICK PENNSYLVANIA (570)752-5901, FAX (570)752-6397
DESIGN ~ ENGINEERING ~ MANUFACTURING
RAIL SWEEP ASSEMBLY
DRAWING NUMBER R21102
DATE DRAWN 07/07/10
SHEET 1 OF 1
PART NUMBER R-21102
REVISION A
PRIMARY UNITS ARE INCH [SECONDARY UNITS ARE MILLIMETER]
DO NOT SCALE DRAWING
TOLERANCE ON FINISHED DIMENSIONS UNLESS OTHERWISE SPECIFIED
R.M.S. FINISH MAX
BASIC DIMENSIONS
FRACTIONS
DECIMALS
2 PLACE
3 PLACE
UP TO 6 INCHES
ABOVE 6" TO 24"
ABOVE 24"
ANGULAR DIMENSIONS
ALL WELDS TO CONFORM TO AWS D1.1
NOTES:
1. DRIVERS SIDE SHOWN
PASSENGERS SIDE TYPICAL