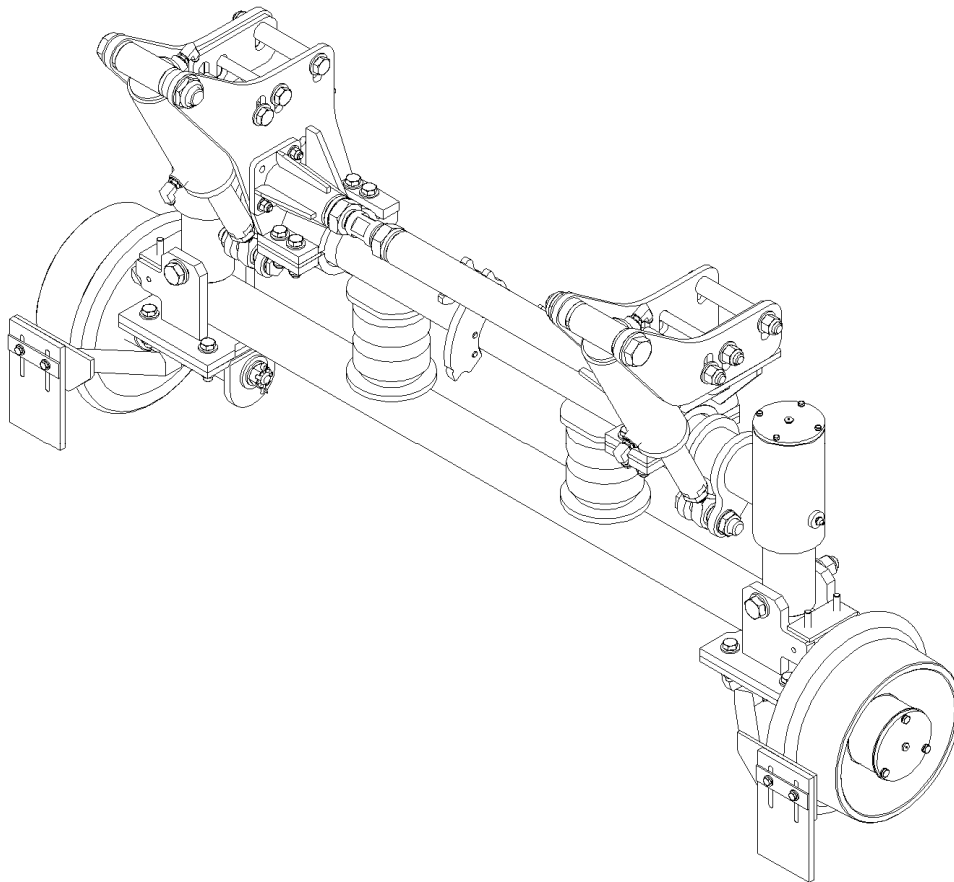


**RAFNA R-460 RAILGEAR ROTARY FRONT
2008-2011 FORD F-450/550 4x2/4x4**



INSTALLATION / OPERATIONS / SERVICE MANUAL

INSTALLATION 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 that the engine is turned off and the parking brake is set.
- Beware of all pinch points on the railgear and keep all parts of the body clear.
- Always disconnect the vehicle's battery when welding on the vehicle or railgear in order to protect the vehicle's electrical system.
- Ensure all removed components are given to the vehicle owner after the installation of the railgear. These components must be re-installed if the railgear is removed from the vehicle.
- Railway Company rules governing rail travel must be observed at all times.
- Never operate the vehicle if the Gross Vehicle Weight Rating (GVWR), Gross Axle Weight Rating (GAWR), or the wheel or tire load ratings are exceeded.

INSTALLATION OF RAILGEAR KIT**FRAME MODIFICATION**

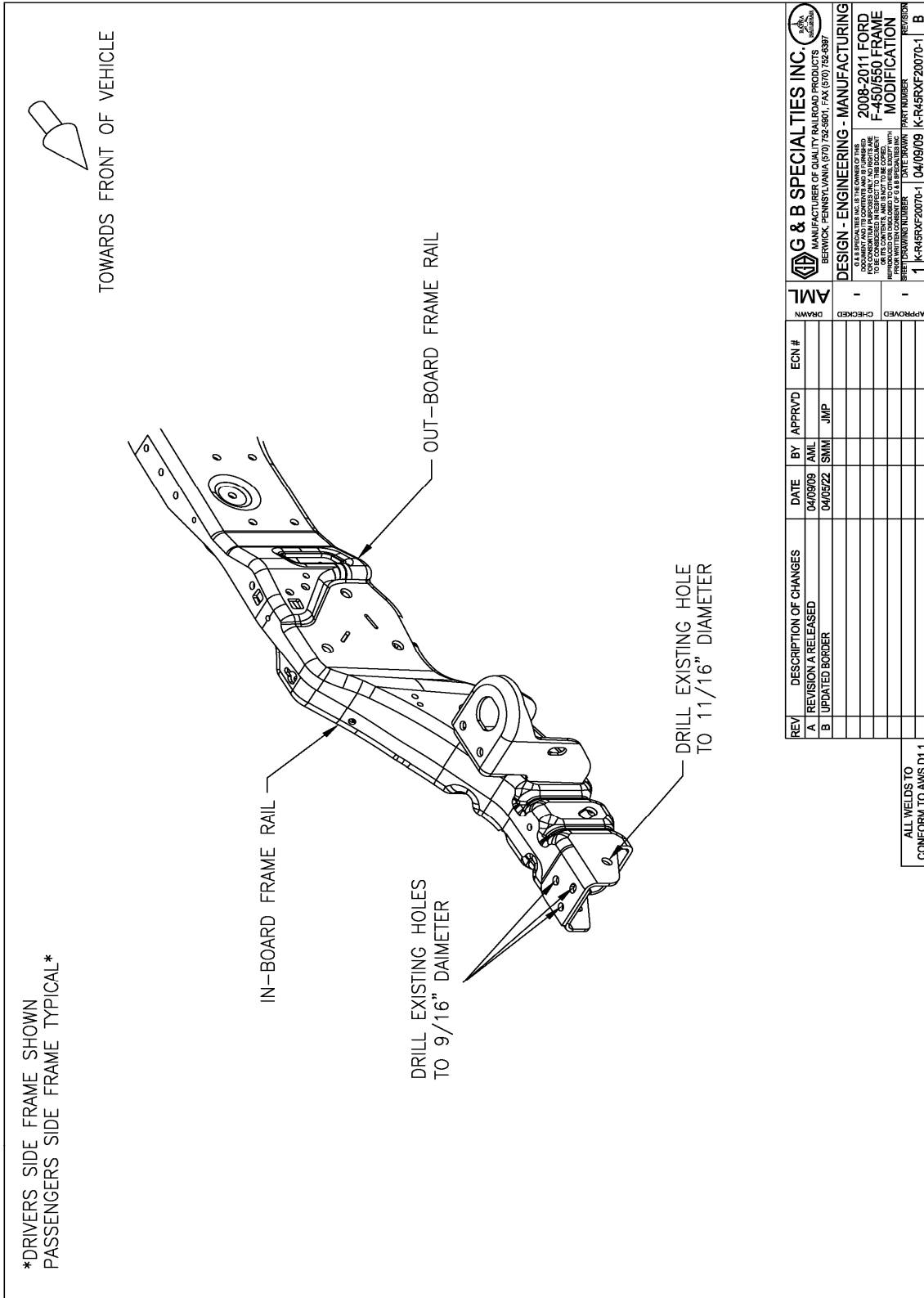
The following procedure details the frame modification required prior to installation of the Rotating Front Railgear. The hardware required for this modification is listed in Table 1.

Table 1: Front Railgear Kit Installation Parts

| Part Number | Description | Qty |
|-------------|--------------------------------|-----|
| R-14529D-A | Hole Template, Drivers Side | 1 |
| R-14529P-A | Hole Template, Passengers Side | 1 |
| R-11113 | Tow Hook Spacer, 1" | 2 |

1. Remove the front bumper and front tow hooks if so equipped. Remove the coolant line retaining clips from the inside passenger frame rail. The coolant line retaining clip will need to be relocated in an appropriate place by the installer.
2. Remove the front air radiator. (Diesel Only)
3. Retain the front bumper and tow hooks for re-installation.
4. Drill the (3) existing holes in the top of each frame rail to 9/16" diameter.
5. On the out-board side of the driver's side frame rail, drill out the first existing hole to 11/16" diameter.
6. On the out-board side of the passenger's side frame rail, drill out the first existing hole to 11/16" diameter.
7. On the in-board side of the driver's side frame rail, drill out the first two existing holes to 11/16" diameter. Repeat for the in-board side of the passenger's side frame rail.
8. Attach the drivers side hole template to the out-board side of the driver's side frame rail and attach as shown with the supplied hardware.
9. Mark the frame as shown using the hole template as a guide. Remove the hole template from the frame. At the first marked point, drill an 11/16" diameter hole thru the outboard frame rail. At the second marked point, drill an 11/16" diameter thru both frame rails.
10. Attach the passengers side hole template to the out-board side of the passenger's side frame rail and attach as shown with the supplied hardware.

11. Mark the frame as shown using the hole template as a guide. Remove the hole template from the frame. At the first marked point, drill an 11/16" diameter hole thru the outboard frame rail. At the second marked point, drill an 11/16" diameter thru both frame rails.
12. Modify tow hook/bumper bracket by removing the tow hook loop from the bracket assembly as shown.
13. Drill the (3) existing holes to 9/16" diameter.
14. Re-install modified tow hook/bumper bracket using the supplied spacer and 1/2" hardware (included in the R-990KIT-277) as shown. Torque 1/2" bolts to 100 ft-lbs dry.



| | | |
|--|------------|--|
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| 2008-2011 FORD F-450/550 FRAME MODIFICATION | DATE DRAWN | PART NUMBER |
| 1 | 04/09/09 | K-R46RXF20070-1 |
| | | K-R45RXF20070-1 |
| | | B |

*DRIVERS SIDE SHOWN
PASSENGERS SIDE TYPICAL*

| ITEM | PART No. | DESCRIPTION OF ITEM(PART) | QTY. | REF. |
|------|------------|----------------------------------|------|------|
| 1 | - | VEHICLE FRAME | | |
| 2 | R-11113 | TOW HOOK SPACER | 2 | |
| 3 | H.H.C.S. | 1/2" UNC GR.8 x 3.50" | 6 | |
| 4 | F.WASHER | 1/2" TYPE-A GR.8 | 12 | |
| 5 | NYLOCK NUT | 1/2" UNC GR.8 | 6 | |
| 6 | - | MODIFIED TOW HOOK/BUMPER BRACKET | | REF. |

| REV | DESCRIPTION OF CHANGES | DATE | BY | APPRVD | ECN # | APPROVED |
|-----|------------------------|----------|-----|--------|-------|----------|
| A | REVISION A RELEASED | 04/09/09 | AML | JMP | | APPROVED |
| B | UPDATED BORDER | 04/05/22 | SMI | JMP | | CHECKED |
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DESIGN - ENGINEERING - MANUFACTURING

2008-2011 FORD
F-450/550 R-460
ROTARY FRONT
INSTALLATION

SHEET DRAWING NUMBER: 1 DATE DRAWN: 04/09/09 PART NUMBER: K-R46RXF20070-8 REVISION: B

FRONT RAILGEAR INSTALLATION

The following procedure details the installation of the railgear kit. The procedure is identical for both cable and rod lockup applications.

Table 2: Front Railgear Kit Installation Parts (Cable Lock)

| Part Number | Description | Qty |
|----------------|-----------------------------------|-----|
| R-20070B | R-460 Rotary Front Upper Assembly | 1 |
| R-001 | 10" Steel Wheel Assembly | 2 |
| R-20120D | Rail Sweep, Drivers Side | 1 |
| R-20120P | Rail Sweep, Passengers Side | 1 |
| K-R45RXFCAM001 | Lock Cam Kit, Standard | 1 |
| R-990KIT-204C | Wheel Mounting Hardware | 2 |
| R-11109 | Frame Spacer | 4 |
| R-20235 | Bumper Spacer | 4 |
| R-990KIT-277 | Bumper Install Hardware Kit | 1 |

Table 3: Front Railgear Kit Installation Parts (Rod Lock)

| Part Number | Description | Qty |
|----------------|-----------------------------------|-----|
| R-20070D | R-460 Rotary Front Upper Assembly | 1 |
| R-001 | 10" Steel Wheel Assembly | 2 |
| R-20120D | Rail Sweep, Drivers Side | 1 |
| R-20120P | Rail Sweep, Passengers Side | 1 |
| K-R45RXFCAM001 | Lock Cam Kit, Standard | 1 |
| R-990KIT-204C | Wheel Mounting Hardware | 2 |
| R-11109 | Frame Spacer | 4 |
| R-20235 | Bumper Spacer | 4 |
| R-990KIT-277 | Bumper Install Hardware Kit | 1 |
| K-R45ARRXR450R | Pull Rod Kit | 1 |

Table 4: Rod Lock Kit Installation Parts

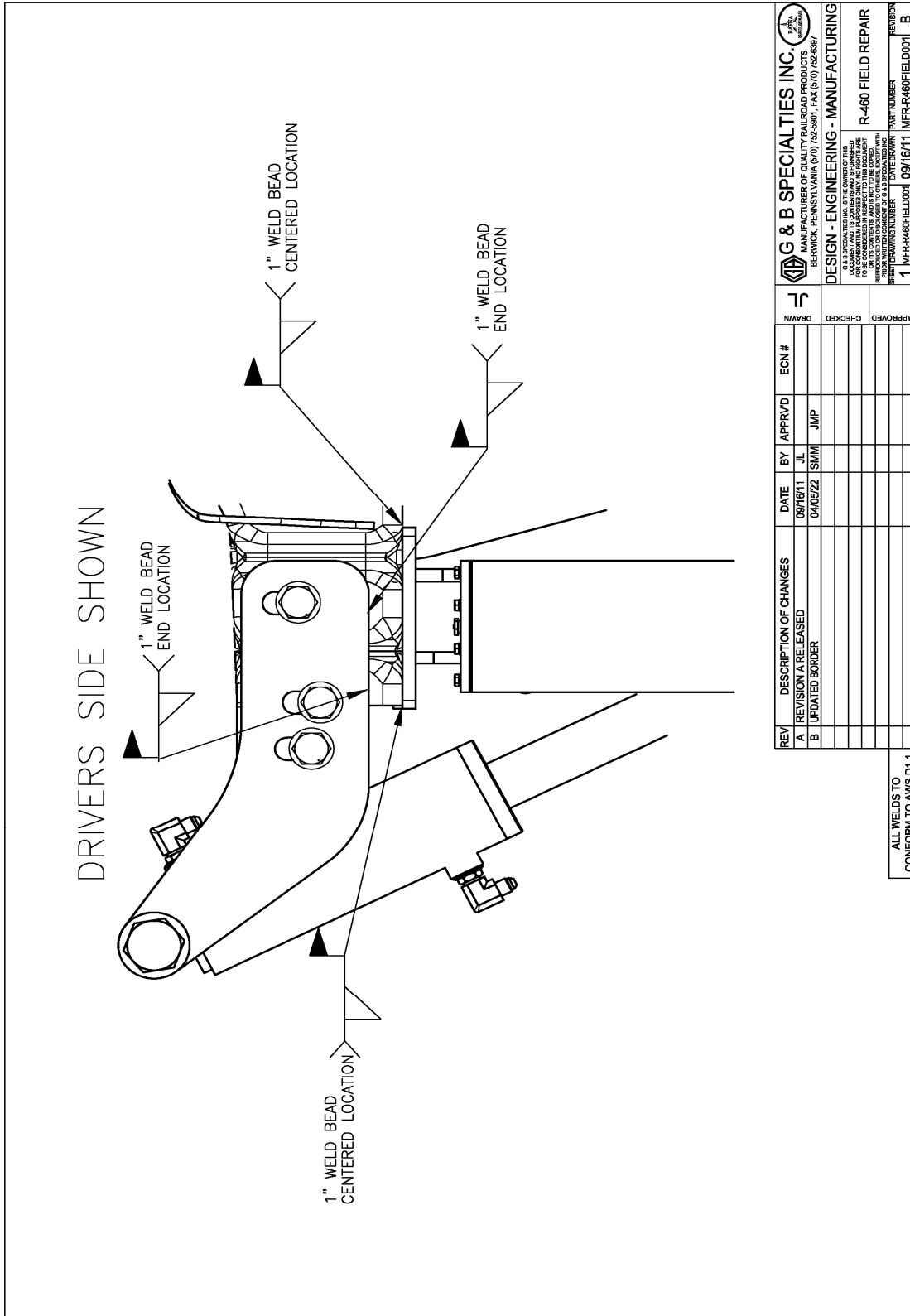
| Part Number | Description | Qty |
|--------------|-------------------------------|-----|
| P-00032 | Pull Rod | 1 |
| P-00034 | Support Plate | 1 |
| P-00024A | Tie Plate | 1 |
| R-5652A | Pull Knob | 1 |
| R-990KIT-296 | Installation Hardware Kit | 1 |
| | Jam Nut, 1/4" UNC Gr.5 | 1 |
| | Flat Washer, 1/4" Gr.5 | 1 |
| | Flat Washer, 3/8" Gr.5 | 1 |
| | Flat Washer, 1/2" Gr.5 | 1 |
| | Jam Nut, 3/8" UNC Gr.5 | 1 |
| | Nylock Jam Nut, 3/8" UNC Gr.5 | 1 |

1. Be sure to modify the vehicle frame as outlined in the Frame Modification section of this manual before attempting to install the railgear unit.
2. Remove the Lock Cam from the upper cross frame assembly by removing the (3) 3/8" bolts securing the lock cam to the cam base.
3. Loosen, but do not remove the (6) 3/8" bolts securing the front support beam assembly. Loosen the jam nuts and turn the adjusting rod to shorten the support beam until there is approximately 1/8"-1/4" gap between the support beam mounting plates and each railgear mounting bracket.
4. Loosen, but do not remove, the (8) 1/2" bolts securing the railgear bearing caps to the upper cross frame assembly.
5. Remove the (6) shipping spacers securing the outer support plates to the railgear mounting brackets. Retain the 5/8" hardware securing the shipping spacers, these will be used to mount the front railgear unit. **Use caution as the outer support plates will swing downward and free once the shipping spacers are removed.**
6. Slide the railgear under the front frame horns and raise the unit into place. The railgear mounting brackets should sit flush with the bottom of the vehicle frame and flush to the inside of the vehicle frame.
7. The slots in the railgear mounting brackets should line up with the holes drilled in the frame during the frame modification.
8. Swing the outer support plates up into place and align the slots with the holes in the frame.
9. Ensure that the top surface of the outer support plate is level with the top surface of the railgear mounting bracket. These surfaces may protrude above the top surface of the frame and may not be level with the top surface of the frame.
10. Secure the mounting brackets to the vehicle frame with the included 5/8" hardware and frame spacers. Torque to 200 ft-lbs dry.
11. Prep area for welding.
12. Field weld the railgear mounting brackets, both driver's side and passenger's side, to the vehicle frame per drawing, MFR-R460FIELD001
13. Undercoat welded areas.
14. Center the upper cross frame assembly to the railgear mounting brackets and tighten the (8) 1/2" bolts securing the railgear bearing caps to the upper cross frame assembly, do not torque at this time.

15. Turn the adjusting rod to lengthen the support beam until there is no gap between the support beam mounting plates and both railgear mounting brackets. Adjust until just tight. Do not over tighten as this will force the front frame rails to spread apart. Tighten jam nuts.
16. Tighten 3/8" support beam fasteners to 40 ft-lbs dry.

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

17. Follow the Railgear Lock System Installation and adjustment Procedure detailed in the Installation section of this manual.
18. Follow the Railgear Alignment procedure detailed in the Service section of this manual.
19. Follow the Vehicle Axle Lockup Kit installation procedure detailed in the Axle Lockup Kit Installation and Operation manual.
20. Follow the Rail Sweep Adjustment procedure detailed in the Service section of this manual.
21. Torque all fasteners as detailed in the Service section of this manual.
22. Grease the railgear at all lubrication points as detailed in the Service section of this manual.
23. Modify front bumper as required. Re-install front bumper as shown.



| REV | DESCRIPTION OF CHANGES | DATE | BY | APPRVD | ECN # | DRAWN | CHECKED | APPROVED |
|-----|------------------------|----------|-----|--------|-------|-------|---------|----------|
| A | REVISION A RELEASED | 09/16/11 | JL | JMP | | | | |
| B | UPDATED BORDER | 04/05/22 | SMM | JMP | | | | |
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DATE DRAWN: 09/16/11
PART NUMBER: R-460
FIELD REPAIR: R-460
REVISION: B

*DRIVERS SIDE SHOWN
PASSENGERS SIDE TYPICAL*

| ITEM | PART No. | DESCRIPTION OF ITEM (PART) | QTY. |
|------|-------------|----------------------------|------|
| 1 | R-20070 | ROTARY FRONT RAILGEAR | REF |
| 2 | | VEHICLE FRAME3 | REF |
| 3 | H.H.C.S. | 5/8" UNC GR.8 x 6.50" | 6 |
| 4 | F WASHER | 5/8" TYPE-A GR.8 | 12 |
| 5 | INTLOCK NUT | 5/8" UNC GR.8 | 6 |
| 6 | R-11109 | FRAME SPACER | 4 |

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| REV | DESCRIPTION OF CHANGES | DATE | BY | APPRVD | ECN # |
|-----|------------------------|----------|-----|--------|-------|
| A | REVISION A RELEASED | 12/14/09 | AML | | |
| B | UPDATED BORDER | 04/05/22 | SMM | JMP | |

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| DRAWN | CHECKED | APPROVED | REVISION |
| AML | | | B |

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SHEET DRAWING NUMBER: 1 DATE DRAWN: 12/14/09 PART NUMBER: K-R46RXF20070-6 REVISION: B

NOTES:

- ITEMS 4, 5, 7 & 8 INCLUDED IN KIT K-R45AVXFX04A
- ITEM 6 INCLUDED WITH FRONT RAILGEAR UNIT

ITEM PART No. DESCRIPTION OF ITEM(PART) QTY. REF. REF.

| | | | | |
|----|---|---|--|--------------|
| 1 | VEHICLE FRAME | 1 | | |
| 2 | VEHICLE FRONT BUMPER | 1 | | |
| 3 | BUMPER SPACER | 4 | | |
| 4 | R-20235 BUMPER BRKT. - PULL CABLE, DRIVERS SIDE | 1 | | |
| 5 | P-000180 MITG BRKT. - PULL CABLE, PASSENGERS SIDE | 1 | | |
| 6 | PULL CABLE, RAILGEAR AXLE LOCK | 1 | | |
| 7 | PULL CABLE, VEHICLE AXLE LOCK | 1 | | |
| 8 | "PULL TO UNLOCK" PLACARD | 2 | | |
| 9 | H.H.G.S. 1/2" UNC GR.8 x 3.50" | 2 | | |
| 10 | H.H.G.S. 1/2" UNC GR.8 x 3.25" | 2 | | |
| 11 | F.WASHER 1/2" TYPE-A GR.8 | 8 | | R-990KIT-277 |
| 12 | NYLOCK NUT 1/2" UNC GR.8 | 4 | | |

TYPICAL ASSEMBLY FOR CABLE OPERATED RAILGEAR LOCK AND CABLE OPERATED VEHICLE AXLE LOCK

***DRIVERS SIDE SHOWN
PASSENGERS SIDE TYPICAL.***

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DESIGN - ENGINEERING - MANUFACTURING

2008-2011 FORD
F-450/550 R460
ROTARY FRONT
LOCK ASSEMBLY
PART NUMBER
1 K-R46RXF20070-9 12/15/09 K-R46RXF20070-9 B

APPROVED: _____
CHECKED: _____
DRAWN: _____

DATE: 12/15/09
BY: AMI JHP
APPRVD: _____
DATE: 04/05/22
BY: SMH

REV A REVISION A RELEASED
REV B UPDATED BORDER

DESCRIPTION OF CHANGES

ECN #

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NOTES:

- ITEMS 4, 5, 7 & 8 INCLUDED IN KIT K-R45AVXF04A
- ITEM 6 INCLUDED WITH FRONT RAILGEAR UNIT

| ITEM | PART No. | DESCRIPTION OF ITEM(PART) | QTY. |
|------|----------|--------------------------------------|------|
| 1 | - | VEHICLE FRAME | REF |
| 2 | - | VEHICLE FRONT BUMPER | REF |
| 3 | R-20235 | BUMPER SPACER | 4 |
| 4 | P-00018D | WIG BOLT, FULL CABLE DRIVERS SIDE | 1 |
| 5 | P-00018P | WIG BOLT, FULL CABLE PASSENGERS SIDE | 1 |
| 6 | - | FULL CABLE, RAILGEAR AXLE LOCK | REF |
| 7 | - | "PULL TO UNLOCK" PLACARD | REF |
| 8 | H.C.S. | 1 1/2" UNC GR.B x 3.50" | 2 |
| 9 | H.C.S. | 1 1/2" UNC GR.B x 3.25" | 2 |
| 10 | F.WASHER | 1 1/2" TYPE-A GR.B | 8 |
| 11 | NUT | 1 1/2" UNC GR.B | 8 |
| 12 | NUT | 1 1/2" UNC GR.B | 4 |

TYPICAL ASSEMBLY FOR CABLE OPERATED RAILGEAR LOCK AND ROD OPERATED VEHICLE AXLE LOCK

| REV | DESCRIPTION | DATE | BY | CHKD | APP'D |
|-----|---------------------|----------|-----|------|-------|
| A | REVISION A RELEASED | 12/15/09 | AML | JMP | |
| B | UPDATED BORDER | 04/05/22 | SMM | | |
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*DRIVERS SIDE SHOWN
PASSENGERS SIDE TYPICAL*

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DESIGN - ENGINEERING - MANUFACTURING
 2008-2011 FORD
 2008-2010 FORD
 ROTARY FRONT
 INSTALLATION

DATE DRAWN: 12/15/09
 PART NUMBER: K-R46RXF20070-9A
 REVISION: B

NOTES:

- ITEMS 4, 5, 7 & 8 INCLUDED IN KIT K-R45AVXF04A
- ITEM 6 INCLUDED WITH FRONT RAILGEAR UNIT

ITEM PART No. DESCRIPTION OF ITEM(PART) QTY.

| ITEM | PART No. | DESCRIPTION OF ITEM(PART) | QTY. |
|------|------------------|---------------------------|------|
| 1 | - | VEHICLE FRAME | REF |
| 2 | - | VEHICLE FRONT BUMPER | REF |
| 3 | R-20235 | BUMPER SPACER | 4 |
| 4 | - | - | - |
| 5 | - | - | - |
| 6 | - | - | - |
| 7 | - | - | - |
| 8 | - | - | - |
| 9 | HHCS 1/2" | UNC GR.8 x 3.50" | 2 |
| 10 | HHCS 1/2" | UNC GR.8 x 3.25" | 2 |
| 11 | F WASHER 1/2" | TYPE-A GR.8 | 6 |
| 12 | INTLOCK NUT 1/2" | UNC GR.8 | 4 |

R-990KIT-277

TYPICAL ASSEMBLY FOR ROD OPERATED RAILGEAR LOCK AND ROD OPERATED VEHICLE AXLE LOCK

AMERICAN MANUFACTURING

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DESIGN - ENGINEERING - MANUFACTURING

2008-2011 FORD
F-450/550 R-460
ROTARY FRONT
INSTALLATION

DATE: 12/15/09
PART NUMBER: K-R46RXF20700-9B
REVISION: B

***DRIVERS SIDE SHOWN
PASSENGERS SIDE TYPICAL***

| REV | DESCRIPTION | DATE | AML | AMM | JMP | APPROVED | CHECKED | DATE | REVISION |
|-----|---------------------|----------|-----|-----|-----|----------|---------|------|----------|
| A | REVISION A RELEASED | 12/15/09 | AMM | JMP | | | | | |
| B | UPDATED BORDER | 04/05/22 | AMM | JMP | | | | | |

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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 hydraulic lock in the rail position.

NOTE: 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 (CABLE LOCK)

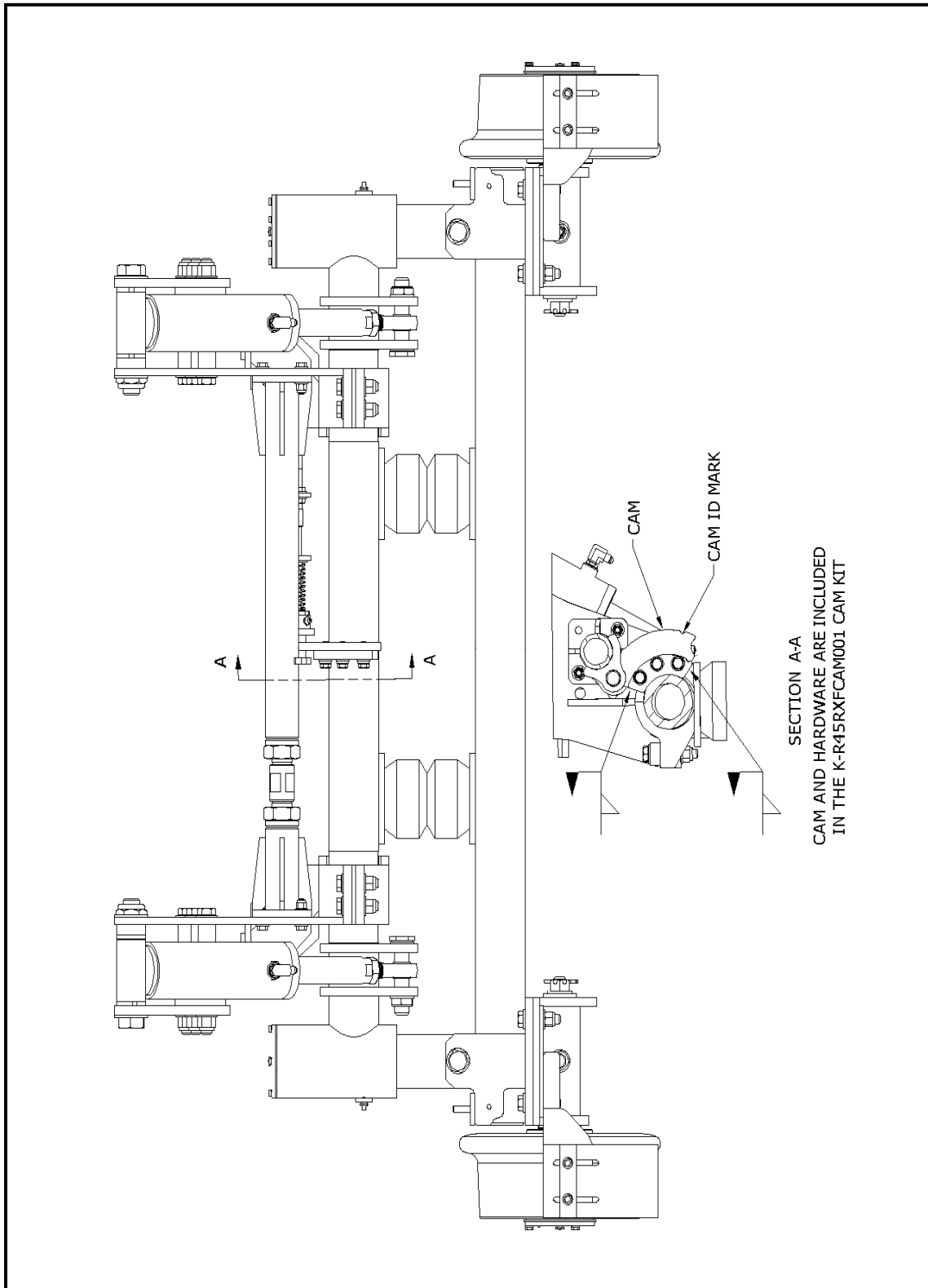
1. The front railgear unit is shipped with the cable actuated lock system and lock cable installed.
2. Raise/Lower the railgear to either the fully locked rail or road position.
3. Place the lock cam against the cam base as shown, with the cam ID mark facing down towards the railgear axle.
4. Loosely attach the lock cam to the cam base with the supplied 3/8" hardware.

INSTALLATION (ROD LOCK)

1. The front railgear unit is shipped with the rod actuated lock system partially installed.
2. Install the tie plate to lower pull rod as show using the supplied 3/8" hardware.
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 3/8" 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 1/8" clearance between the lock pin and the lock cam.
3. Tighten but do not torque the 3/8" 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. Once 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 3/8" fasteners to 40 ft-lbs dry then weld the cam to the cam base as shown.



Lock Cam Installation/Adjustment

G&B Specialties Inc. 535 West 3rd Street, Berwick, PA, USA Tel: (570) 752-5901 Fax: (570) 752-6397 US Field Service: 570-441-6988; CAN Field Service 570-854-0482; www.rafna.com

R-460 ROTARY FRONT RAILGEAR KIT OPERATION 2008-2011 FORD F-450/550 4x2/4x4

OPERATION SAFETY PRECAUTIONS

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



CAUTION
WARNING

- Failure to heed to any of the following warnings could result in severe bodily injury and/or equipment damage.
- Read and understand this manual completely before attempting operation of the railgear equipped vehicle.
- Operating instructions provided below only address the RAFNA railgear equipment. Applicable railway company procedures and policies must be adhered to.
- Railway company rules governing rail travel must be observed at all times.
- Ensure that the position and function of all railgear controls are known before attempting operation.
- Ensure the railgear is locked in road position before starting road travel.
- Ensure all body parts and loose clothing 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.
- Always disconnect the vehicle's battery when welding on the vehicle or railgear in order to protect the vehicle's electrical system.

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.

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

Placing The Vehicle on Rail - To Lower the Railgear:

1. Engage the vehicle front axle lock. Follow the Axle Lockup Kit Operation procedure detailed in the Axle Lockup Kit Installation and Operation and Service manual.
2. Disengage the railgear mechanical locking pin by pulling on the locking cable handle. Do not force the locking cable. If the lock pins cannot be disengaged, raise or lower the railgear slightly.
3. Hold the locking cable handle in the disengaged position.
4. Lower the railgear and release the locking cable handle once the railgear has rotated past the road locked position.
5. 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 under this load.
6. Continue lowering the railgear until the hydraulic cylinders are fully extended. In this position, the railgear should be about 2°-3° over center and the vehicle front tires should be approximately 2"-3" above the rail.
7. Ensure that the vehicle front axle lock is fully engaged.

Removing the Vehicle from Rail - To Raise the Railgear:

1. Disengage the railgear mechanical locking pin by pulling on the locking cable handle. Do not force the locking cable. If the lock pins cannot be disengaged, raise or lower the railgear slightly.
2. Hold the locking cable handle in the disengaged position.
3. Raise the railgear and release the locking cable handle once the railgear has rotated past the rail locked position.
4. Raise the railgear fully. The railgear lock pin should engage automatically.
5. Disengage the vehicle front axle lock as per the Axle Lockup Kit Operation procedure detailed in the Axle Lockup Kit Installation and Operation and Service manual.

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.

Figure 1 provides the Non-Standard Fastener Torque Values. Table 2 provides Standard Fastener Torque Values for all other fasteners.

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 MYSTIK JT-6 LOW TEMP 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 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 |
| ⅝" UNC Gr. 8 Fasteners | 150 |
| ½" UNC Gr. 8 Fasteners | 100 |
| ⅜" UNC Gr. 8 Fasteners | 40 |
| ¼" UNC Gr. 8 Fasteners | 12 |

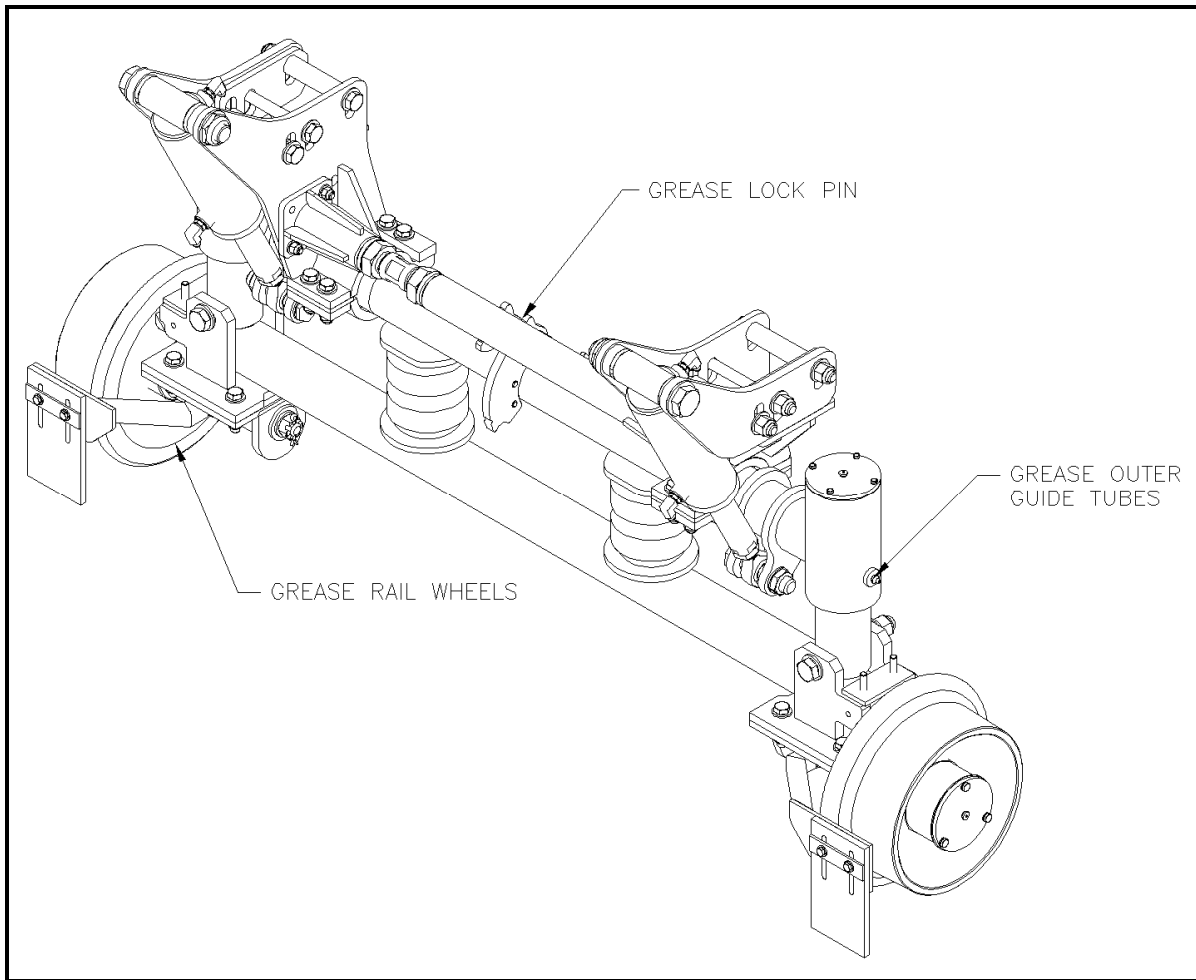


Figure 2: Railgear Lubrication Points

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. 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 between 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 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. Repeat process for other cylinder.
6. Both cylinders should be adjusted so that both cylinders have the same amount of stroke over center. This will help to eliminate any binding or twisting of the railgear when deployed to the rail position.
7. 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.
8. 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 adjust and/or 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 endplay within specification. If the rail wheel bearings are not correctly adjusted, failure may occur and will not be covered under the railgear warranty. Check and adjust the bearing endplay with the railgear in the road position and with the rail wheels free to turn.

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

1. Remove the rail wheel hubcap and gasket by removing the three 1/4" bolts and 1/4" lock washers. Remove and discard the cotter pin from the 3/4" 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 endplay 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 endplay 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 1/4" bolts and new 1/4" split lock washers. Blue Loctite can be used on the bolts as an added safety measure. Tighten and torque the 1/4" 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 1/4" fasteners that secure the rail sweep rubber to the rail sweep bracket. Slide the rail sweep rubber up or down for the correct clearance. Tighten and torque the 1/4" fasteners to 12 ft-lbs dry. Do not over torque.

RAILGEAR ALIGNMENT

The railgear must be correctly aligned 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 1/2" fasteners that secure it to the railgear axle. The rail wheel is then turned into alignment. The four 1/2" fasteners should then be tightened and torqued to 100 ft-lbs dry. Do not over torque.

Lateral alignment is achieved by sliding the lower half of the railgear unit in the pivot bearings. It may be necessary to loosen the bearing caps slightly to ease the adjustment process. Once the railgear is in alignment, tighten the bearing caps to 40 ft-lbs dry. Do not over torque.

Ensure that the railgear over-center adjustment has been made before continuing

Once the alignment is complete, it will be necessary to install the rotation stops. The rotation stops also act as a type of shaft collar to keep the railgear from losing lateral alignment. Rotate the railgear down to the rail position, place the rotation stops on the upper axle as shown and weld in place.

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 modified 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"

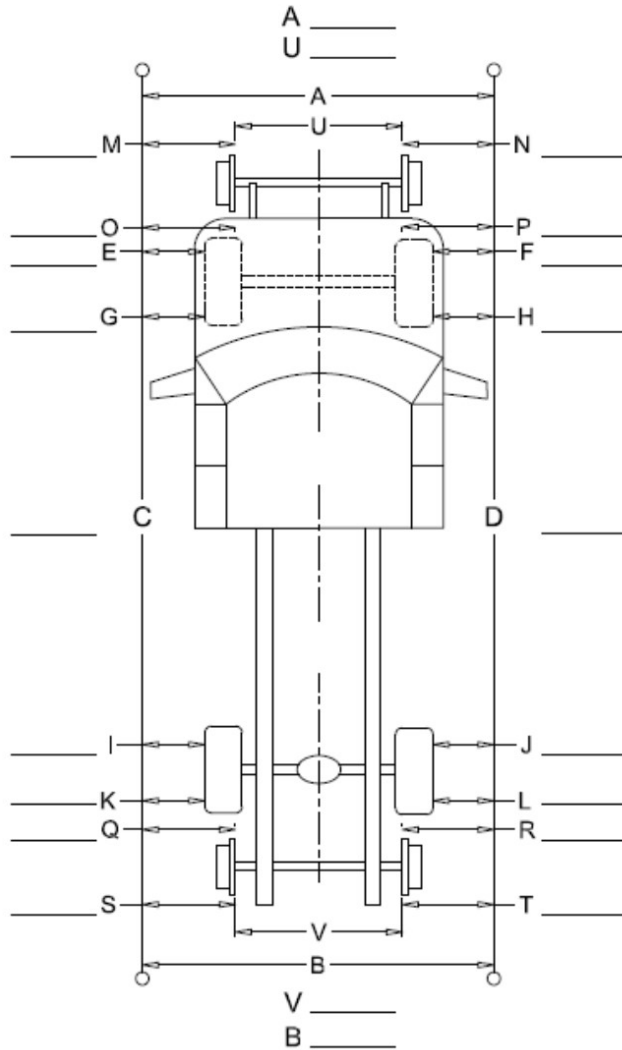
ADJUST RAILGEAR LATERAL ALIGNMENT
 M & O MUST EQUAL N & P WITHIN 1/8"
 Q & S MUST EQUAL R & T WITHIN 1/8"

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: _____

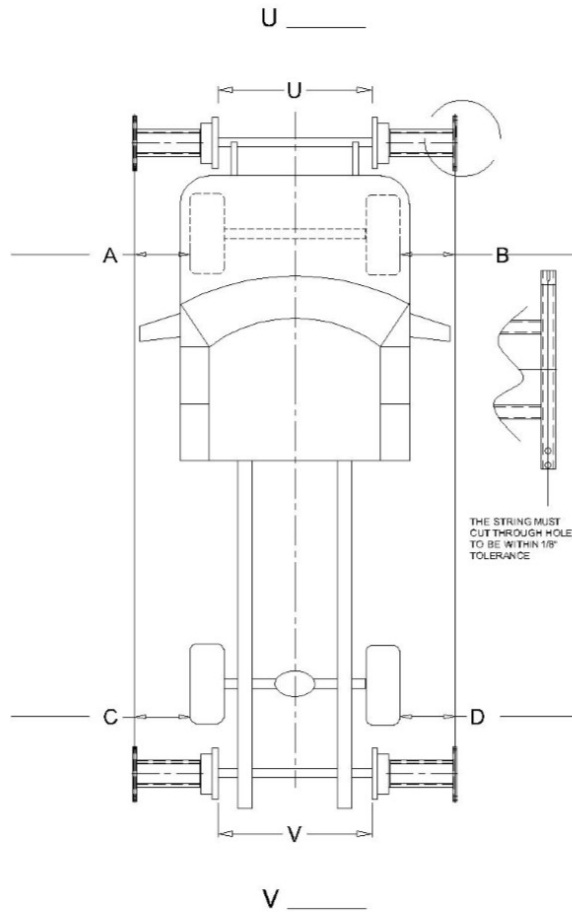
ADJUST RAILGEAR LATERAL ALIGNMENT
A MUST EQUAL B WITHIN 1/8"
C MUST EQUAL D WITHIN 1/8"

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 CLEAR-
ANCE
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 B

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-460 model railgear can be ordered using the following part number; S-001200

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

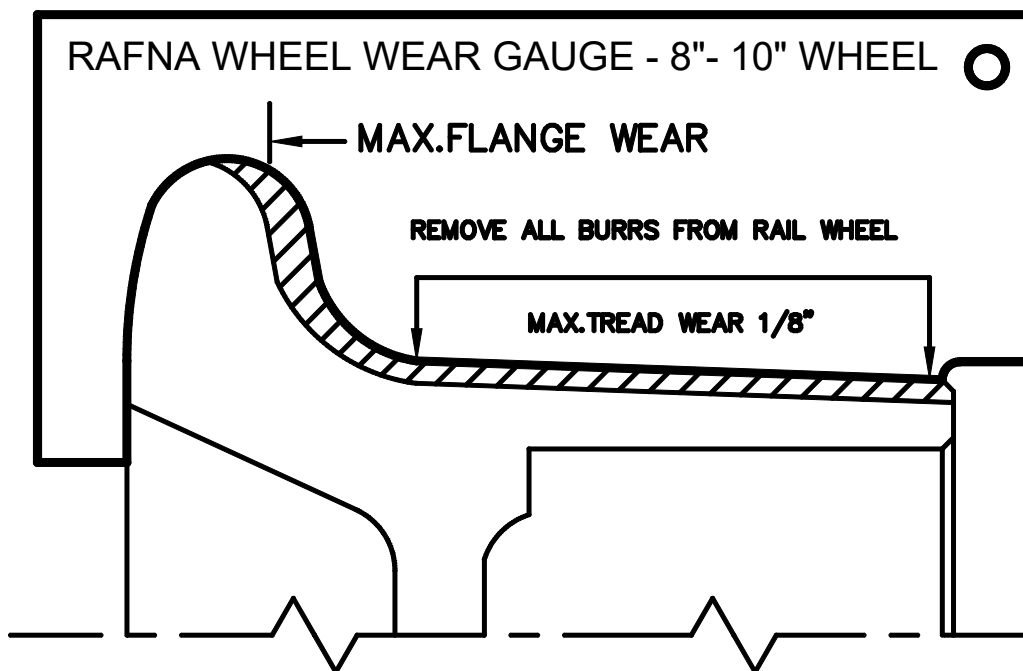
Flange Wear Limits:

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.

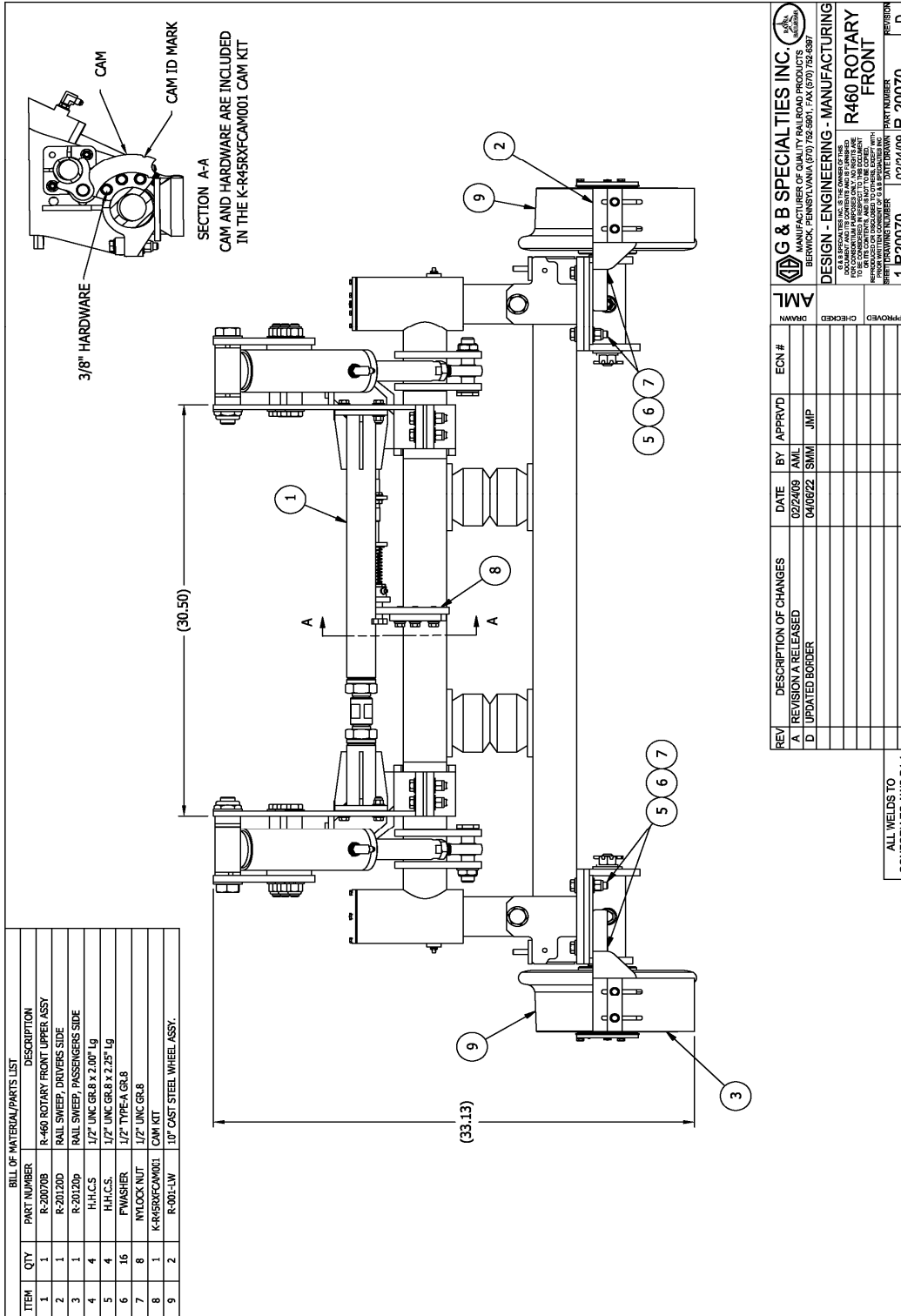
Tread Wear Limits:

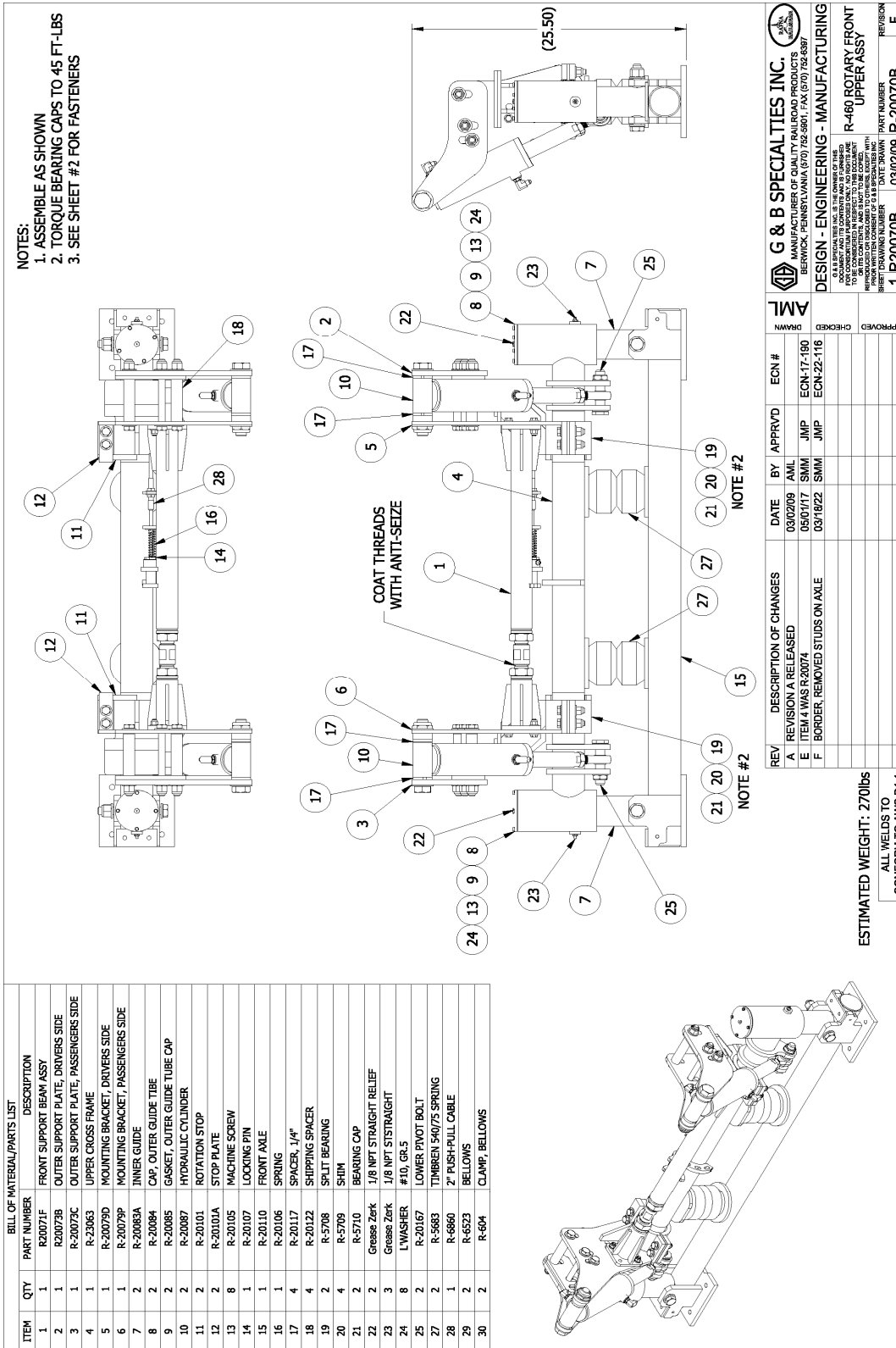
For tread wear, use the following chart in conjunction with the appropriate rail wheel gauge.

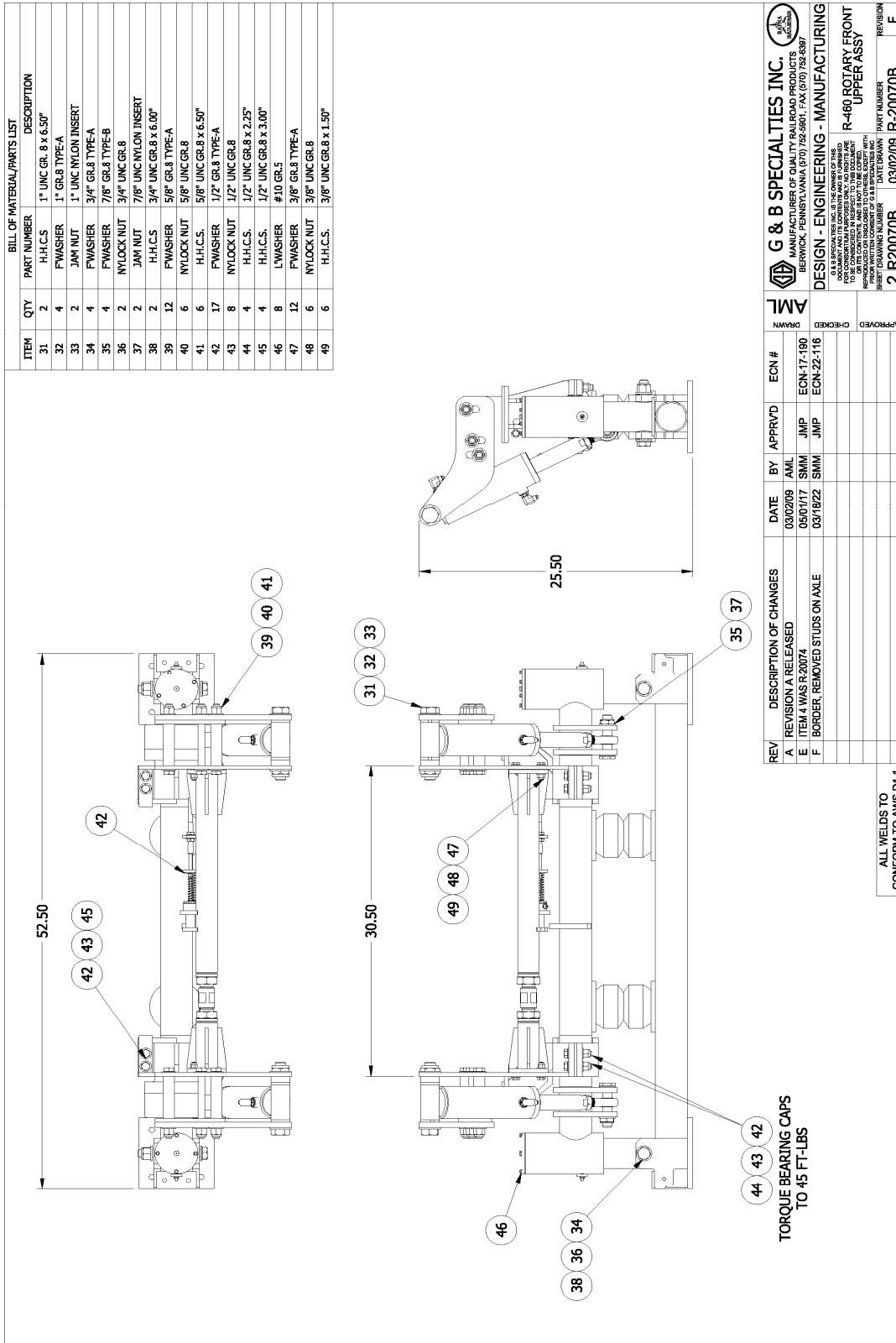
| NOMINAL RAIL WHEEL DIAMETER (INCHES) | MIN. ALLOWABLE WHEEL DIAMETER (INCHES) |
|--------------------------------------|--|
| 10 | 9 3/4 |

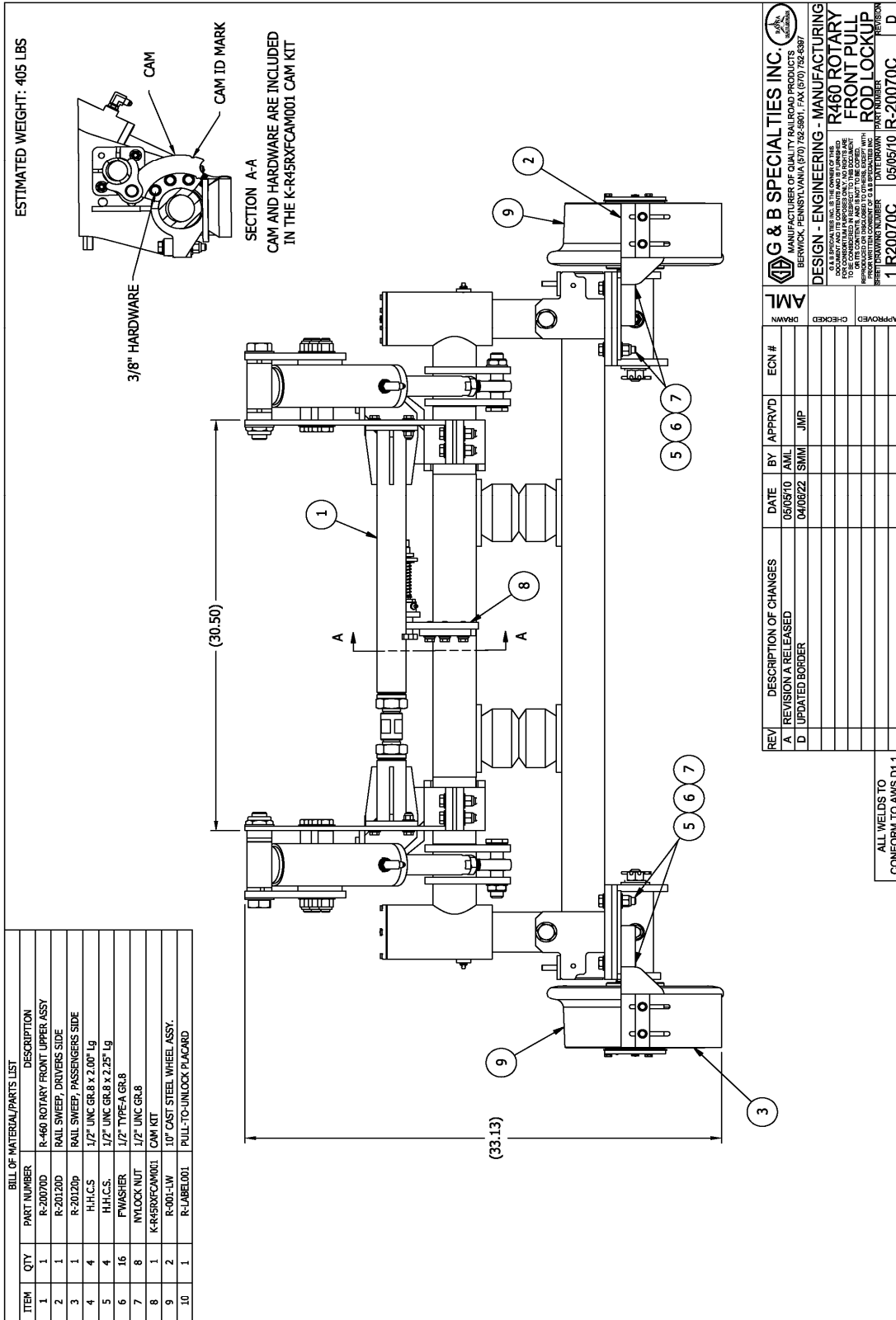


PARTS OF RAILGEAR KIT









NOTES:

- ASSEMBLE AS SHOWN
- TORQUE BEARING CAPS TO 45 FT-LBS
- SEE SHEET #2 FOR FASTENERS
- ITEM 50 & 51 ARE PART OF KIT #R-990KIT-296

| ITEM | QTY | PART NUMBER | DESCRIPTION |
|------|-----|-------------|--------------------------------------|
| 1 | 1 | R-20071G | FRONT SUPPORT BEAM ASSY |
| 2 | 1 | R-20073B | OUTER SUPPORT PLATE, DRIVERS SIDE |
| 3 | 1 | R-20073C | OUTER SUPPORT PLATE, PASSENGERS SIDE |
| 4 | 1 | R-23063 | UPPER CROSS FRAME |
| 5 | 1 | R-20079D | MOUNTING BRACKET, DRIVERS SIDE |
| 6 | 1 | R-20079P | MOUNTING BRACKET, PASSENGERS SIDE |
| 7 | 2 | R-20083A | INNER GUIDE |
| 8 | 2 | R-20084 | CAP, OUTER GUIDE TUBE |
| 9 | 2 | R-20087 | GASKET, OUTER GUIDE TUBE CAP |
| 10 | 2 | R-20087 | HYDRAULIC CYLINDER |
| 11 | 2 | R-20101 | ROTATION STOP |
| 12 | 2 | R-20101A | STOP PLATE |
| 13 | 8 | R-20105 | MACHINE SCREW |
| 14 | 1 | R-20107A | LOCKING PIN |
| 15 | 1 | R-20110 | FRONT AXLE |
| 16 | 1 | R-20106 | SPRING |
| 17 | 4 | R-20117 | SPACER, 1/4" |
| 18 | 4 | R-20122 | SHIPPING SPACER |
| 19 | 2 | R-5708 | SPLIT BEARING |
| 20 | 4 | R-5709 | SHIM |
| 21 | 2 | R-5710 | BEARING CAP |
| 22 | 2 | Grease Zerk | 1/8 NPT STRAIGHT RELIEF |
| 23 | 3 | Grease Zerk | 1/8 NPT STRAIGHT |
| 24 | 8 | LWASHER | #10, GR.5 |
| 25 | 2 | R-20167 | LOWER PIVOT BOLT |
| 27 | 2 | R-5683 | TIMBERN 540/75 SPRING |
| 28 | 1 | R-20168 | LOWER PUSH ROD |
| 29 | 2 | R-6523 | BELLOWS |
| 30 | 2 | R-604 | CLAMP, BELLOWS |

| REV | DESCRIPTION OF CHANGES | DATE | BY | APPRVD | ECN # |
|-----|-------------------------------|----------|------|--------|------------|
| A | REVISION A RELEASED | 05/05/10 | AML | JMP | ECN-17-189 |
| D | ITEM 4 WAS R-20074 | 05/01/17 | SMMI | JMP | ECN-22-117 |
| E | BORDER, REMOVED STUDS ON AXLE | 03/18/22 | SMMI | JMP | ECN-22-117 |

ESTIMATED WEIGHT: 270lbs

ALL WELDS TO CONFORM TO AWS D1.1

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

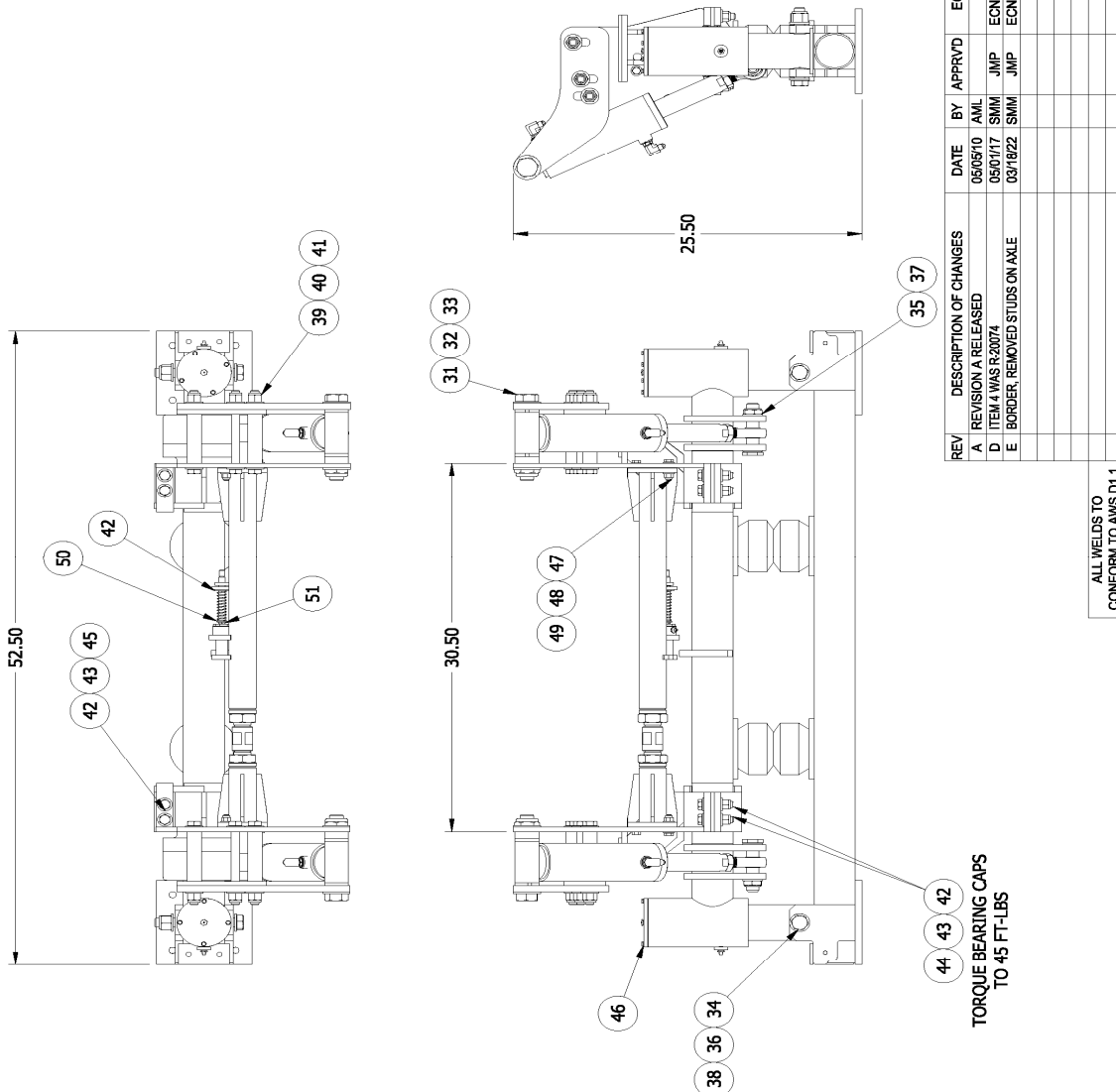
DESIGN - ENGINEERING - MANUFACTURING

R-460 ROTARY FRONT UPPER ASSY

1 R20070D 05/05/10 R-20070D

| BILL OF MATERIAL/PARTS LIST | | |
|-----------------------------|-----|--------------------------------|
| ITEM | QTY | PART NUMBER DESCRIPTION |
| 31 | 2 | H.H.C.S 1" UNC GR. 8 x 6.50" |
| 32 | 4 | FWASHER 1" GR.8 TYPE-A |
| 33 | 2 | JAM NUT 1" UNC NYLON INSERT |
| 34 | 4 | FWASHER 3/4" GR.8 TYPE-A |
| 35 | 4 | FWASHER 7/8" GR.8 TYPE-B |
| 36 | 2 | NYLOCK NUT 3/4" UNC GR.8 |
| 37 | 2 | JAM NUT 7/8" UNC NYLON INSERT |
| 38 | 2 | H.H.C.S 3/4" UNC GR.8 x 6.50" |
| 39 | 12 | FWASHER 5/8" GR.8 TYPE-A |
| 40 | 6 | NYLOCK NUT 5/8" UNC GR.8 |
| 41 | 6 | H.H.C.S. 5/8" UNC GR.8 x 6.50" |
| 42 | 17 | FWASHER 1/2" GR.8 TYPE-A |
| 43 | 8 | NYLOCK NUT 1/2" UNC GR.8 |
| 44 | 4 | H.H.C.S. 1/2" UNC GR.8 x 2.25" |
| 45 | 4 | H.H.C.S. 1/2" UNC GR.8 x 3.00" |
| 46 | 8 | LWASHER #10 GR.5 |
| 47 | 8 | FWASHER 3/8" GR.8 TYPE-A |
| 48 | 6 | NYLOCK NUT 3/8" UNC GR.8 |
| 49 | 6 | H.H.C.S. 3/8" UNC GR.8 x 1.50" |
| 50 | 1 | FWASHER 1/4" GR.8 WIDE |
| 51 | 1 | JAM NUT 1/4" UNC GR.8 |

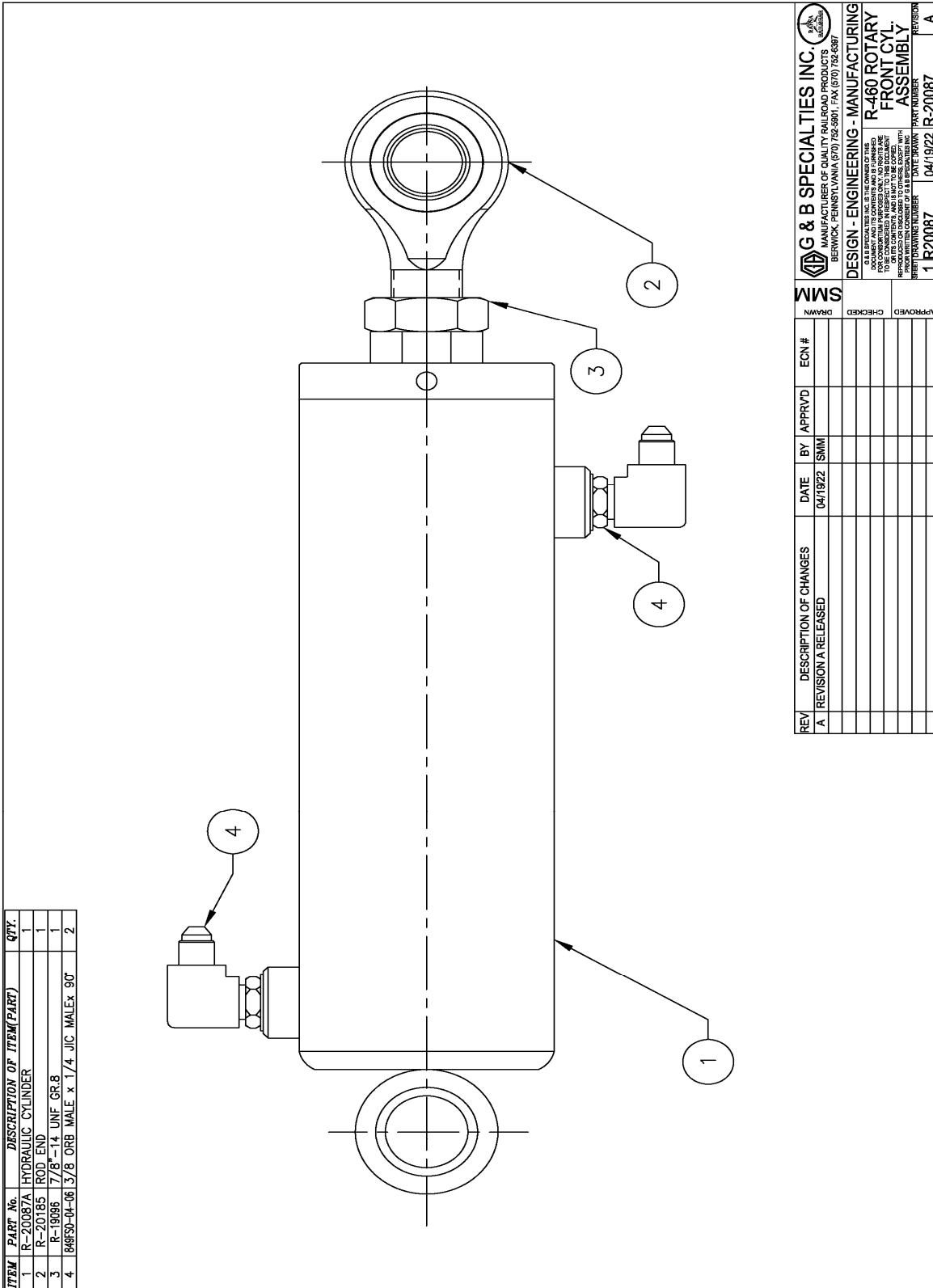
NOTES:
1. ASSEMBLE AS SHOWN
2. TORQUE BEARING CAPS TO 45 FT-LBS
3. ITEM 50 & 51 ARE PART OF KIT #R-990KIT-296



| | | | | | |
|-----|-------------------------------|----------|------|--------|------------|
| REV | DESCRIPTION OF CHANGES | DATE | BY | APPRVD | ECN # |
| A | REVISION A RELEASED | 05/05/10 | AML | JHP | ECN-17-088 |
| D | ITEM 4 WAS R-20074 | 05/01/17 | SMMI | JMP | ECN-22-117 |
| E | BORDER, REMOVED STUDS ON AXLE | 03/16/22 | SMMI | JMP | ECN-22-117 |

| | | | | |
|-----|----------|------------|-------------|----------|
| AMT | APPROVED | DATE DRAWN | PART NUMBER | REVISION |
| AMT | APPROVED | 05/05/10 | R-20070D | E |

ALL WELDS TO CONFORM TO AWS D1.1

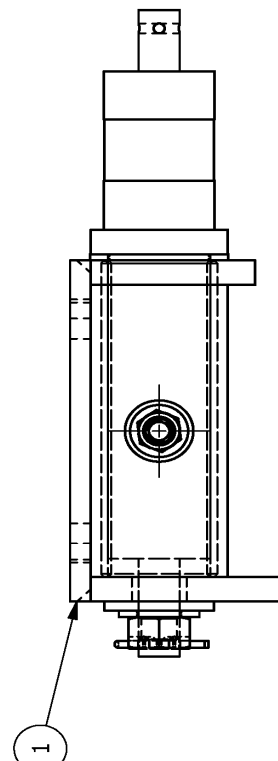
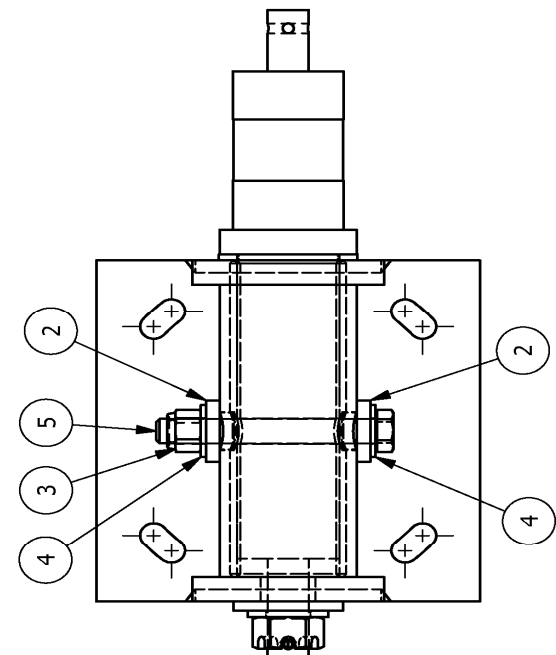


| REV | DESCRIPTION OF CHANGES | DATE | BY | APPRVD | ECN # |
|-----|------------------------|----------|------|--------|-------|
| A | REVISION A RELEASED | 04/19/22 | SMMI | | |
| | | | | | |
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|----------|---------|-------|
| APPROVED | CHECKED | DRAWN |
| | | |

| | |
|--|---|
| G & B SPECIALTIES INC. MANUFACTURER OF QUALITY RAILROAD PRODUCTS BERWICK, PENNSYLVANIA (717) 752-5901, FAX (717) 752-6397 | DESIGN - ENGINEERING - MANUFACTURING |
| G & B SPECIALTIES INC. IS THE OWNER OF THE INTELLECTUAL PROPERTY RIGHTS IN ALL INFORMATION CONTAINED HEREIN. NO PARTS ARE TO BE REPRODUCED OR COPIED IN ANY MANNER WITHOUT THE WRITTEN CONSENT OF G & B SPECIALTIES INC. | R-460 ROTARY FRONT CYL. ASSEMBLY |
| SHEET DRAWING NUMBER | DATE DRAWN |
| 1 R20087 | 04/19/22 |
| PART NUMBER | REVISION |
| R-20087 | A |

| BILL OF MATERIAL/PARTS LIST | | | |
|-----------------------------|-------------|-------------------------------------|-----|
| ITEM | PART NUMBER | DESCRIPTION | QTY |
| 1 | R-001C | 10" WHEEL SUN-ASSEMBLY MODIFICATION | 1 |
| 2 | R-6505 | SPINDLE BUSHING | 2 |
| 3 | NULOCK NUT | 1/2"-13, GR.8 | 1 |
| 4 | F'WASHER | 1/2" TYPE-A, GR. 8 | 3 |
| 5 | H.H.C.S. | 1/2" UNC GR.8 x 4.00" Lg. | 1 |

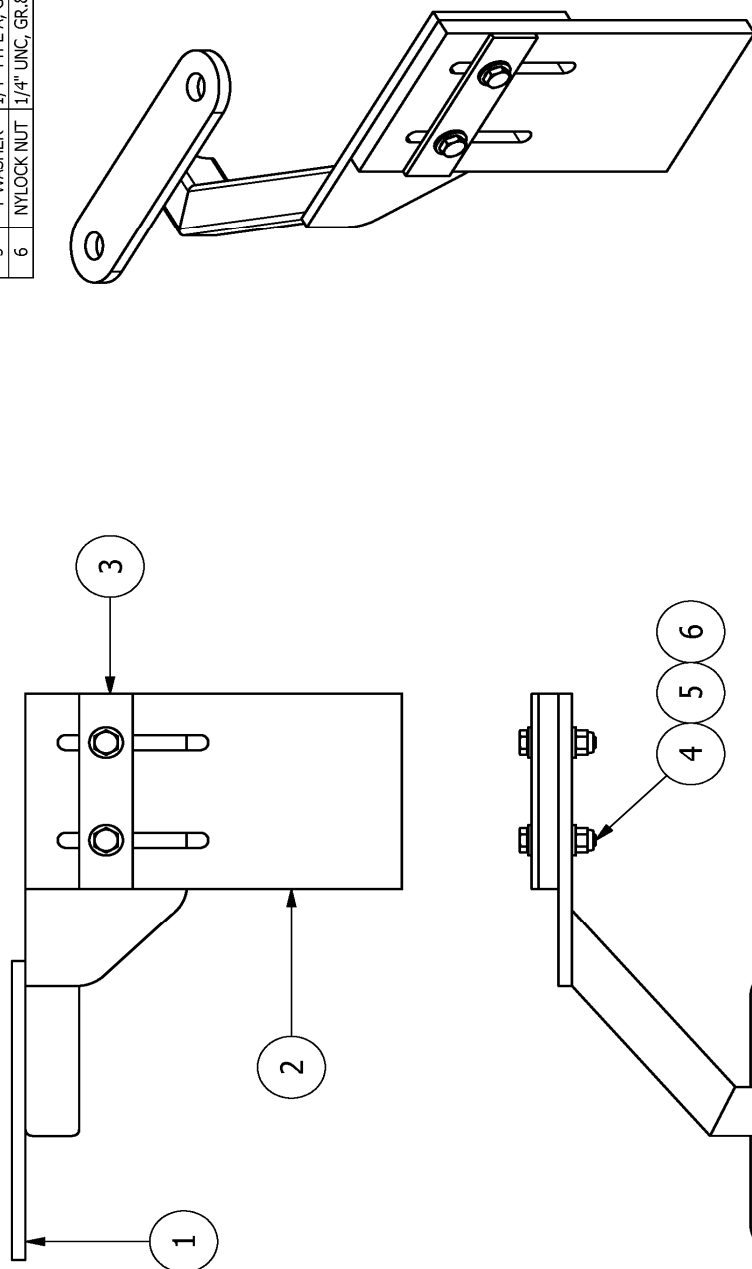
| | | | | | | |
|----------------------------|----------|-----|--------|------------|------|---|
| REV/DESCRIPTION OF CHANGES | DATE | BY | APPRVD | ECN # | AM L | G & B SPECIALTIES INC. |
| A REVISION A RELEASED | 12/01/06 | AML | JMP | ECN-21-456 | AM L | MANUFACTURER OF QUALITY RAILROAD PRODUCTS BERWICK, PENNSYLVANIA (570) 752-5901, FAX (570) 752-6397 |
| B UPDATED BORDER | 07/16/21 | SMM | | | | DESIGN - ENGINEERING - MANUFACTURING |
| | | | | | | 10" WHEEL SUB ASSY, MODIFIED |
| | | | | | | 1 R001D 12/01/06 R-001D B |

ALL WELDS TO CONFORM TO AWS D1.1

| BILL OF MATERIAL/PARTS LIST | | | |
|-----------------------------|-------------|--------------------------------|-----|
| ITEM | PART NUMBER | DESCRIPTION | QTY |
| 1 | R-20121D-A | MOUNTING BRACKET, DRIVERS SIDE | 1 |
| 2 | R-2411 | RUBBER SWEEP | 1 |
| 3 | R-5561 | SWEEPER PLATE | 1 |
| 4 | H.H.C.S. | 1/4" X 1 1/4" LG. UNC, GR.8 | 2 |
| 5 | FWASHER | 1/4" TYPE A, GR. 8 | 4 |
| 6 | NYLOCK NUT | 1/4" UNC, GR.8 STD NYLOCK | 2 |

NOTES:

- ASSEMBLE AS SHOWN
- HARDWARE KIT REF: R-990KIT-007
- APPROX. WEIGHT: 3.0 LBS



| REV/DESCRIPTION OF CHANGES | DATE | BY | APPRVD | ECN # | DRAWN | CHECKED | APPROVED |
|----------------------------|----------|------|--------|------------|-------|---------|----------|
| A REVISION A RELEASED | 02/19/09 | JUL | | ECN-09-528 | | | |
| B REVISION B RELEASED | 12/10/09 | AMIL | | ECN-20-135 | | | |
| C GENERAL UPDATE | 03/11/20 | SDB | SDB | | | | |

| | |
|---|---|
| G & B SPECIALTIES INC. MANUFACTURER OF QUALITY RAILROAD PRODUCTS BERWICK, PENNSYLVANIA 670752-5901, FAX 670752-6397 | DRIVE SIDE RAIL SWEEP ASSEMBLY |
| DESIGN - ENGINEERING - MANUFACTURING | |
| <small>G&B SPECIALTIES, INC. IS THE OWNER OF THIS DOCUMENT. IT IS TO BE USED ONLY FOR CONSULTATION PURPOSES ONLY. NO PARTS OR SERVICES SHALL BE ORDERED OR PURCHASED WITHOUT THE WRITTEN CONSENT OF G&B SPECIALTIES, INC.</small> | DATE DRAWN: 02/19/09 PART NUMBER: R-460 FRONT REVISION: C |

ALL WELDS TO CONFORM TO AWS D1.1

| BILL OF MATERIAL/PARTS LIST | | | |
|-----------------------------|-------------|-----------------------------------|-----|
| ITEM | PART NUMBER | DESCRIPTION | QTY |
| 1 | R-20121P-A | MOUNTING BRACKET, PASSENGERS SIDE | 1 |
| 2 | R-2411 | RUBBER SWEEP | 1 |
| 3 | R-5561 | SWEEPER PLATE | 1 |
| 4 | H.H.C.S. | 1/4" X 1 1/4" LG, UNC, GR.8 | 2 |
| 5 | FWASHER | 1/4" TYPE A, GR. 8 | 4 |
| 6 | NYLOCK NUT | 1/4" UNC, GR.8 STD NYLOCK | 2 |

NOTES:

ASSEMBLE AS SHOWN

HARDWARE KIT REF: R-990KIT-007

APPROX. WEIGHT: 3.0 LBS

| | | | | | |
|---|--|------------------------|----------------------|-----------------------------------|------------------------------|
| REV DESCRIPTION OF CHANGES A REVISION A RELEASED B REVISED ITEM # C GENERAL UPDATE | DATE 02/19/09 12/10/09 03/11/20 | BY JL AML SDB | APPRVD SDB SDB | ECN # ECN-09-525 ECN-20-134 | APPROVED CHECKED DRAWN |
|---|--|------------------------|----------------------|-----------------------------------|------------------------------|

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|--|---|
| G & B SPECIALTIES INC. MANUFACTURER OF QUALITY RAILROAD PRODUCTS BERWICK, PENNSYLVANIA (570) 752-5901, FAX (570) 752-6397 | DESIGN - ENGINEERING - MANUFACTURING PASS SIDE RAIL SWEEP ASSEMBLY R-460 FRONT PART NUMBER: 02/19/09R-20120P REVISION: C |
|--|---|

ALL WELDS TO CONFORM TO AWS D1.1