Scorpion II® Truck Mounted Attenuator Assembly Manual and Mounting Instruction Guide

For Model:

Scorpion II® C-90 MASH TL-3 Vertical TMA

PLEASE READ ALL INSTRUCTIONS CAREFULLY BEFORE PROCEEDING WITH THE INSTALLATION

Version 3.9

September 2026

TMA Intended Use Disclaimer – MUST READ

Intended use: Truck-Mounted Attenuators (TMAs) are designed and certified under NCHRP-350 & MASH for crash attenuation only. They are not approved for any purpose other than crash attenuation.

Operational limit: TMAs must only be deployed at speeds up to 50 km/h. Use above 50 km/h or in any unauthorised configuration is prohibited.

Restrictions: Do not modify, alter, relocate, or combine with non-approved equipment. Only personnel trained or authorised by TrafFix Devices Inc (OEM) shall install, inspect, maintain, or remove TMAs.

Warranty & liability: Any use outside these conditions voids all warranties. RTL (distributor) and TrafFix Devices Inc disclaim liability for damages resulting from prohibited use; remedies where permitted are limited to repair or replacement.

Contact: For written authorisation, training, or technical support contact RTL.

TMA Maintenance, Annual Inspections and Pivot Pin Replacement:

Note: TMAs require regular maintenance. RTL recommends daily checks, monthly greasing, annual TMA inspections, and pivot pin replacement every two years.

Note: High-Use C-90 TMAs must follow the Accelerated Maintenance Schedule and also have pivot pins replaced every 18 months.

For more information, visit www.rtl.co.nz, contact our Service Team or call 0800 785 744.

Scorpion II C-90 Height Verification – Please Complete

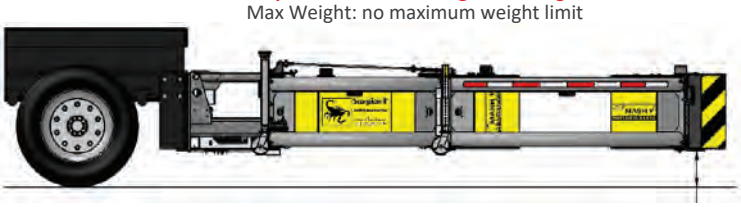
Attention Installer, please fill in the check boxes & information in this document with the actual measurements of the Scorpion II C-90 after installation. Once completed, please email the form to services@rtl.co.nz

Installer:	Add Installer Name	**Customer:**	Add the Customer Name
Truck VIN Number:	Add Truck VIN Number	**Truck Registration Number:**	Add the Truck Rego Number
TMA (Serial) Number:	Add TMA Serial Number	**Installer Signature:**	
Date:	Add Date		

Truck Tare Weight:	Record Weight **kg**	**Installer Job Number** (Internal)**:**	Internal Job Reference Number

Required Minimum Weight: 6804 kg
Max Weight: no maximum weight limit

Recommended Ride Height: 304mm



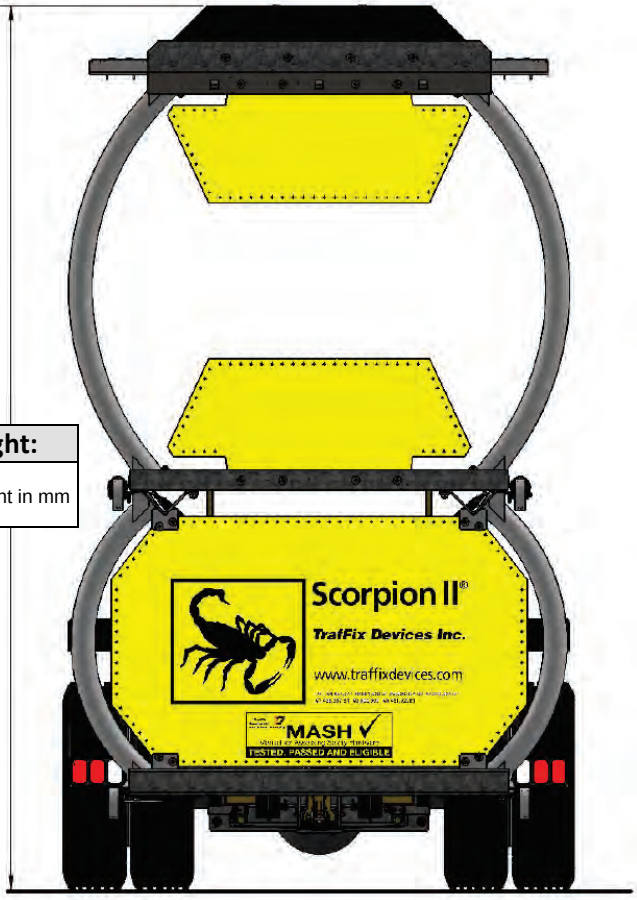


Height to Underside (Left Side):	Height to Underside (Right Side):
Add height to underside (mm)	Add height to underside (mm)

TMA Serial Number is located here.
TMA No. MXXXXX



Height:
Add Height in mm



Bottom of Mounting Plate to Ground:
Add measurement here (mm)

This completed form must be sent to RTL for the product to be covered under warranty.

Truck Tare Weights: The Scorpion TMA is rated for ALL truck tare weights over 6804 kg with no upper weight limit.

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Engineered Products for Safer Highways

RTL

TMA MAINTENANCE CHECKLIST

TMAs require regular maintenance. RTL recommends daily checks, monthly greasing, annual TMA inspections, and pivot pin replacement every two years. For more information, visit www.rtl.co.nz

TASK	BEFORE USE	WEEKLY	MONTHLY	ANNUALLY	EVERY TWO YEARS
Annual TMA Inspection to be completed with RTL — **Book Online at: www.rtl.co.nz/book-a-service**				✓	
Replace Pivot Pins with RTL every two years — **Book Online at: www.rtl.co.nz/book-a-service**					✓
Wash off road salt and grime ***AFTER*** each use	✓	✓	✓	✓	
Verify TMA raises and lowers properly	✓	✓	✓	✓	
Verify function of all lighting (Tail Lights, Side Marker Lights, etc.)	✓	✓	✓	✓	
Verify that reflective sheeting is present and in good condition	✓	✓	✓	✓	
Check TMA for hydraulic fluid leaks	✓	✓	✓	✓	
Verify that jack crank handles fold up tightly and do not hang down	✓	✓	✓	✓	
Verify that energy absorbing modules and tubes are secure and in good condition	✓	✓	✓	✓	
Check ride height, adjust if it does not meet 305mm ± 25mm specification [1]		✓	✓	✓	
Check for loose or missing fasteners and hardware		✓	✓	✓	
Check energy absorbing tube assemblies for cracks and gouges		✓	✓	✓	
Check energy absorbing tube assemblies for broken welds		✓	✓	✓	
Check energy absorbing modules for large dents, punctures, or missing rivets		✓	✓	✓	
Verify TMA Strut tensioning straps are intact		✓	✓	✓	
Grease pivot points and lockout arm			✓	✓	
Grease jack casters			✓	✓	
Check TMA hydraulic components, valves, and pivot pins of dirt and debris			✓	✓	
Verify overall dimensions are still within specification				✓	
Clean all electrical connections on pump power and controller circuits				✓	
Verify structural integrity of all steel attenuator components				✓	
Verify structure integrity of truck side mounting components				✓	
Verify integrity of all welds				✓	
Clean/remove rust and repaint as needed				✓	
Drain TMA hydraulic system and replace fluid				✓	

Name: ____ **Date:** ____ **Truck Rego:** ____ **TMA Serial Number:** ____

TMA Checks, Servicing & Maintenance

NOTE: TMAs require regular maintenance. RTL recommends daily checks, monthly greasing, annual TMA inspections, and pivot pin replacement every two years. For more information, visit www.rtl.co.nz or contact our Service Team. Please call us today on 0800 785 744.

TMA Intended Use - MUST READ

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Contact: services@rtl.co.nz or 0800 785 744

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ACCELERATED MAINTENANCE SCHEDULE

FOR SEVERE DUTY
C-90 TMA

SEPT 2026

C-90 TMAs require regular maintenance including daily checks, monthly greasing, annual TMA inspections, and pivot pin replacement every 18 months on high-use TMAs. For more information, visit www.rtl.co.nz or email services@rtl.co.nz

TASK	TASK PERFORMED ON C-90 TMA								
	BEFORE USE		WEEKLY		MONTHLY		EVERY 6 MONTHS	ANNUALLY	EVERY 18 MONTHS
Annual TMA Inspection to be completed with RTL **Book Online at: www.rtl.co.nz/book-a-service**								✓	
Replace Pivot Pins with RTL every 18 months **Book Online at: www.rtl.co.nz/book-a-service**									✓
Wash/clean road grime ***AFTER*** each use	✓		✓		✓		✓		
Verify TMA raises and lowers properly	✓		✓		✓		✓		
Verify function of all lighting (Tail Lights, Side Marker Lights, etc.)	✓		✓		✓		✓		
Verify that reflective sheeting is present and in good condition	✓		✓		✓		✓		
Check TMA for hydraulic fluid leaks	✓		✓		✓		✓		
Verify that jack crank handles fold up tightly and do not hang down	✓		✓		✓		✓		
Verify that energy absorbing modules and tubes are secure and in good condition	✓		✓		✓		✓		
Check ride height, adjust if it does not meet 305mm ± 25mm specification [1]	✓		✓		✓		✓		
Check for loose or missing fasteners and hardware	✓		✓		✓		✓		
Check energy absorbing tube assemblies for cracks and gouges			✓		✓		✓		
Check ATF/hydraulic fill level [2]			✓		✓		✓		
Check energy absorbing tube assemblies for broken welds [3]			✓		✓		✓		
Check energy absorbing modules for large dents, punctures			✓		✓		✓		
Verify tensioning cables are tight			✓		✓		✓		
Grease pivot points [4]			✓		✓		✓		
Check TMA hydraulic components, valves, and pivot pins for dirt and debris			✓		✓		✓		
Verify overall dimensions are still within specification [5]			✓		✓		✓		
Clean all electrical connections on pump power and controller circuits			✓		✓		✓		
Verify structural integrity of all steel attenuator components							✓		
Verify structure integrity of truck side mounting components							✓		
Verify integrity of all welds							✓		
Drain TMA hydraulic system and replace fluid							✓		

1. Reference TDI Drawing 1000-200 for Ride Height Measurement and Adjustment
2. Utilize Appropriate Automatic Transmission Fluid (ATF) to Proper Fill Level
3. Reference TDI Drawing 1000-236 for Tube Measurement and Inspection
4. Utilize Extreme Pressure (EP) Moly Grease for All Grease Points
5. Reference TDI Drawing 1000-197 for Overall Dimensions

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Scorpion II C-90 TMA Driver Instruction Sheet

TMAs require regular maintenance. RTL recommends daily checks, monthly greasing, annual TMA inspections, and pivot pin replacement every two years.

Book Online at: www.rtl.co.nz/book-a-service For more information, visit www.rtl.co.nz or contact our Service Team

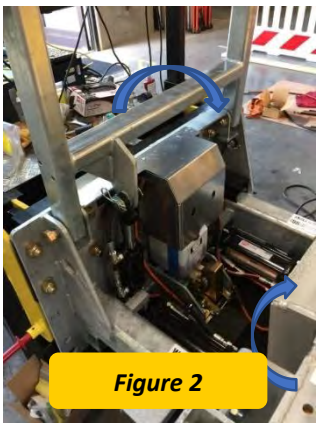
Note: High-Use C-90 TMAs must follow the Accelerated Maintenance Schedule and have pivot pins replaced every 18 months.

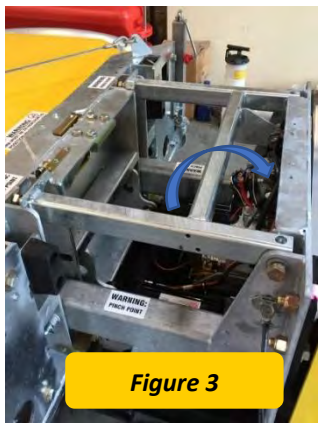
Lowering the C-90 Attenuator (Deploying) – Must be at 50 km/h or less:

1. Press and hold the DOWN button until the GREEN LED light is illuminated *(Figure 1)*.
2. The illuminated GREEN LED light indicates that the TMA is fully deployed, the Locking Arms will move to the Horizontal Position *(Figure 2 and 3).*



Figure 1


Figure 2


Figure 3

Raising the C-90 Attenuator (Storing)

1. Press and hold the UP button, the GREEN LED light will turn off *(Figure 4).*
2. When raising the TMA, the Locking Arms will move to the stored position **before** *(Figure 5 - A)* the TMA moves to the stored position *(Figure 5 - B).*
3. The Locking Arms and TMA in the Final stored Position (Figure 6). The TMA must be fully locked in the vertical position.



Figure 4

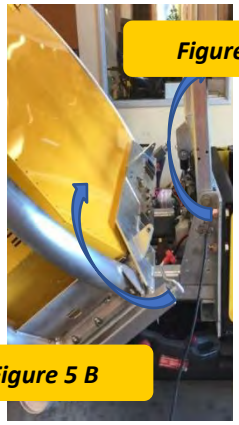

Figure 5 A

Figure 5 B

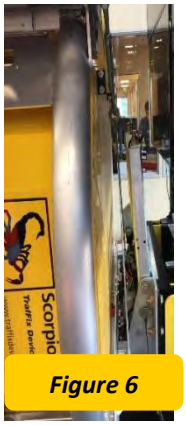


Figure 6

For any service issues and repairs, please book online: http://www.rtl.co.nz/rtl-service-booking-form

TMA Intended Use – MUST READ

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Auckland
Wellington
Christchurch
Invercargill

RTL Auckland
31 Maurice Road, Penrose,
Auckland 1061, New Zealand
P O Box 1411, Panmure, Auckland

P +64 9 259 2600
E sales@rtl.co.nz

V2.3 September 2026

0800 785 744 **rtl.co.nz**

Scorpion II C-90 MASH TL-3 Vertical Attenuator:
GREASE POINTS – LOCATIONS:

The Truck-Side frame: Critical – Monthly Greasing

- Has two grease points as per **Fig.1 & 2**
- It can only be accessed when the TMA is in the stored position.
- **Fig.3,** The TMA in the stored position. The circles indicates where the grease points are.



Fig.1 LHS centre grease point



Fig.2 RHS centre grease point



Fig.3 Access the grease points.

TMA Maintenance, Annual Inspections and Pivot Pin Replacement:

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Note: High-Use C-90 TMAs must follow the Accelerated Maintenance Schedule and have pivot pins replaced every 18 months.

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The Back-up frame: Critical – Monthly Greasing

- Has four grease points as per **Fig.4 & 5**
- It can only be accessed with the TMA deployed.

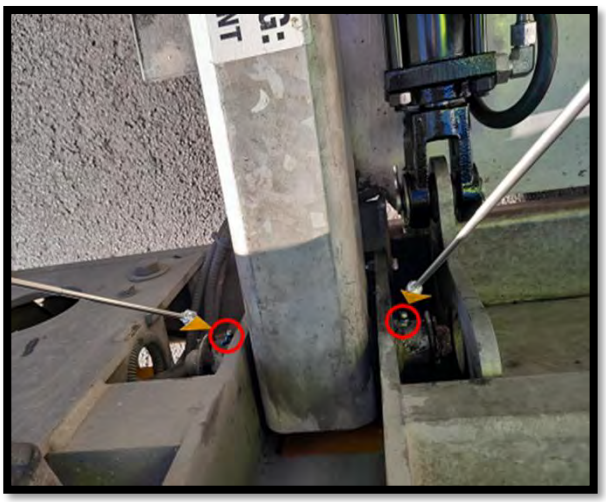


Fig.4 LHS grease points



Fig.5 RHS grease points

Lock-out arms: Not critical - Condition based assessment and treatment

- Has two grease points as per **Fig.6**
- It can only be accessed when the TMA is in the fully deployed position.

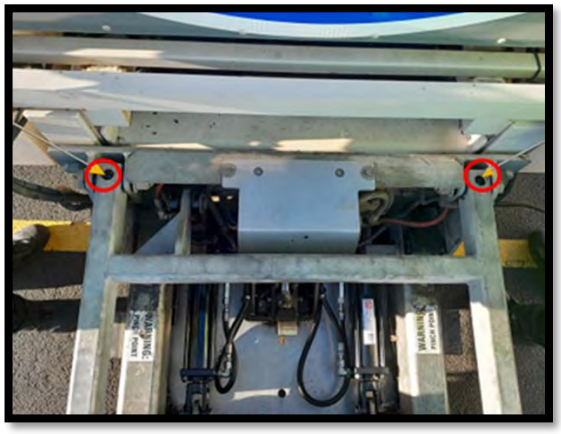


Fig.6. Lockout arms

Locking Mechanism: Monthly greasing

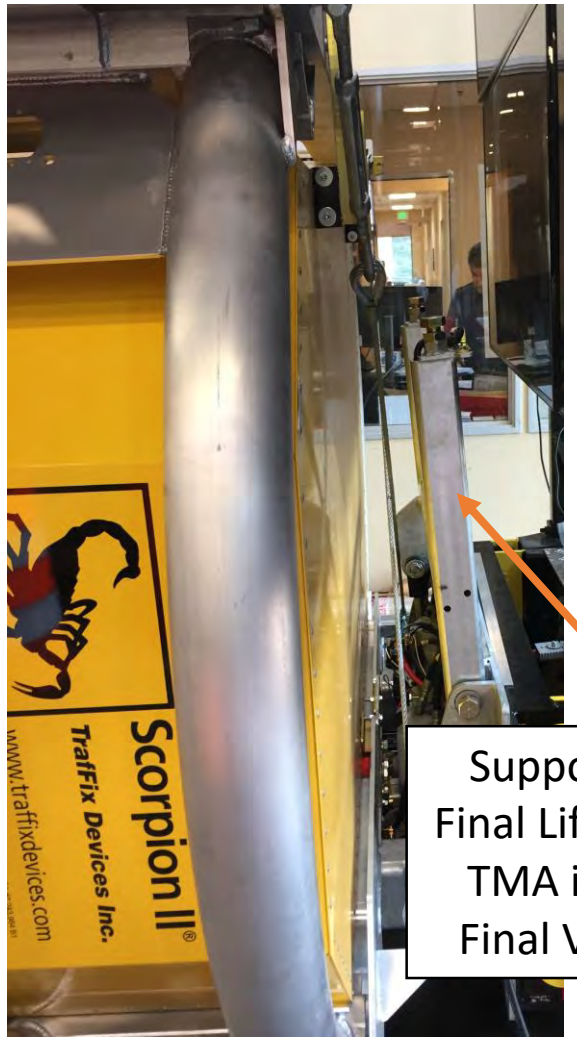
- Has one grease point as per **Fig.7**
- It can only be accessed when the TMA is deployed.



Fig.7 Locking mechanism



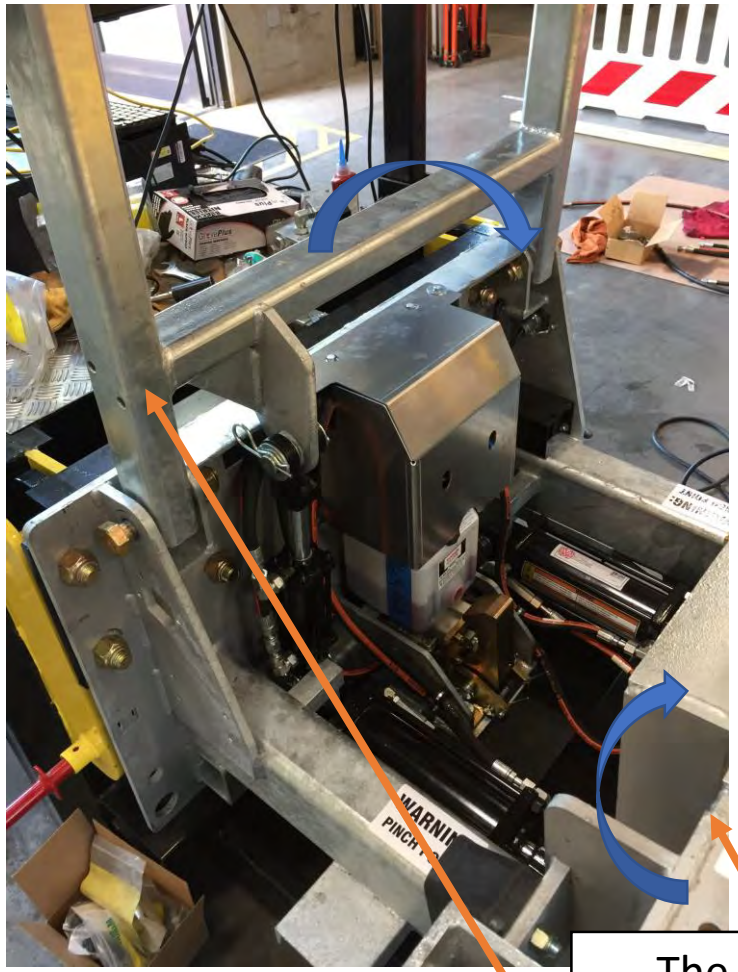
The TMA Support Structure Rotates to Lifted Position Before the TMA will Lift to the Vertical Stored Position The TMA is Designed to Remain in the Horizontal Position Until the Support Structure in the Lifted Position

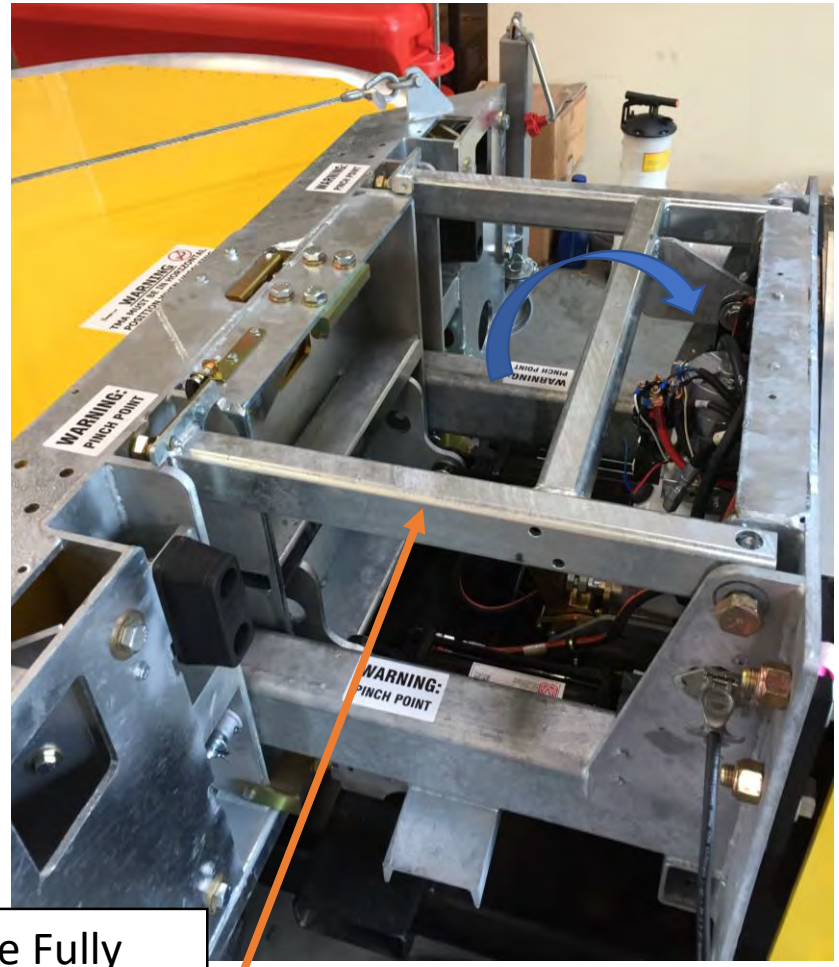


Support Structure in Final Lifted Position and TMA is Shown in the Final Vertical Position

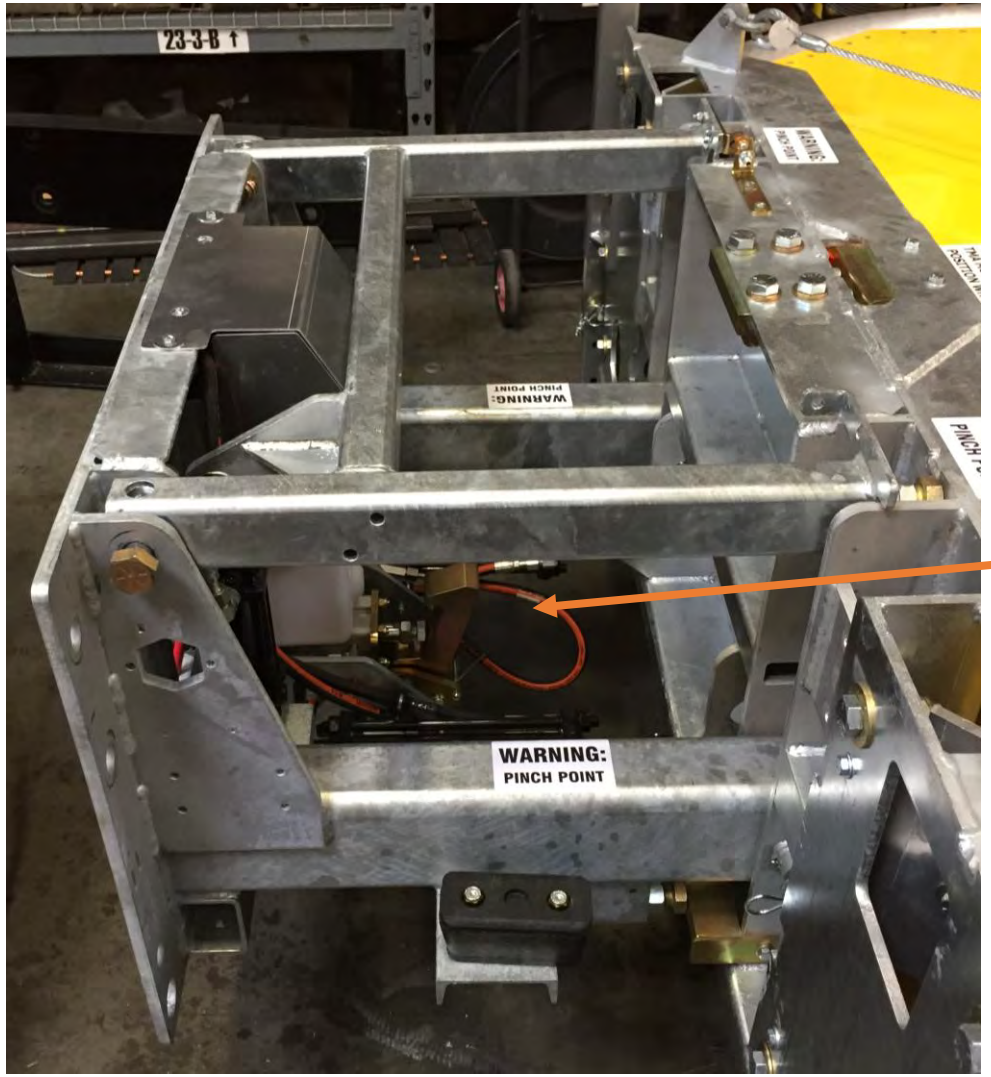
Rotation of the TMA and Support Structure is Hydraulically Sequenced and is Activated when the Up or Down Button is Pressed The TMA Hydraulic System Sequences the Movement of the TMA, Latch, and the Support Structure

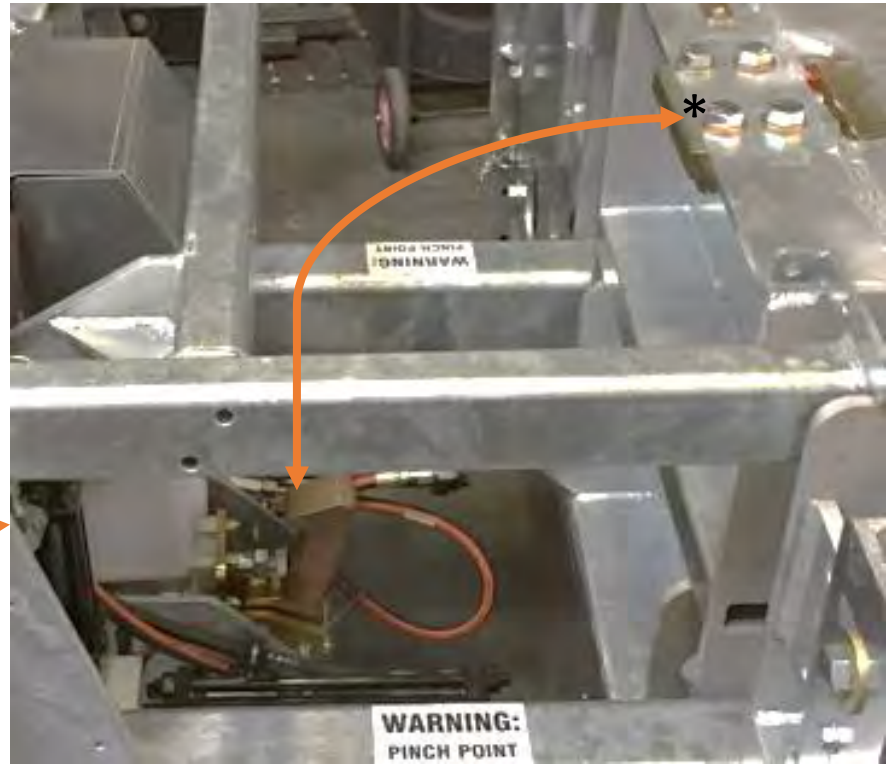
Rotation of the TMA and Support Structure are Hydraulically Sequenced and is activated when the Up or Down Button is Pressed





The TMA Must be Fully Deployed into the Horizontal Position Before the Support Structure Begins to Rotate to the Horizontal Position





The Gold Latch Secures the TMA in the Stored Position Minimizing TMA Movement. The Latch Design is Based on a Car Hood Latch. When the TMA is Rotated into the Stored Position the Latch Engages the TMA Frame*. When the TMA is Deployed the Latch Disengages the Frame by means of a Sequenced Hydraulic Cylinder that Disengages the Latch Thereby Allowing the TMA to Rotate to the Horizontal Stored Position.

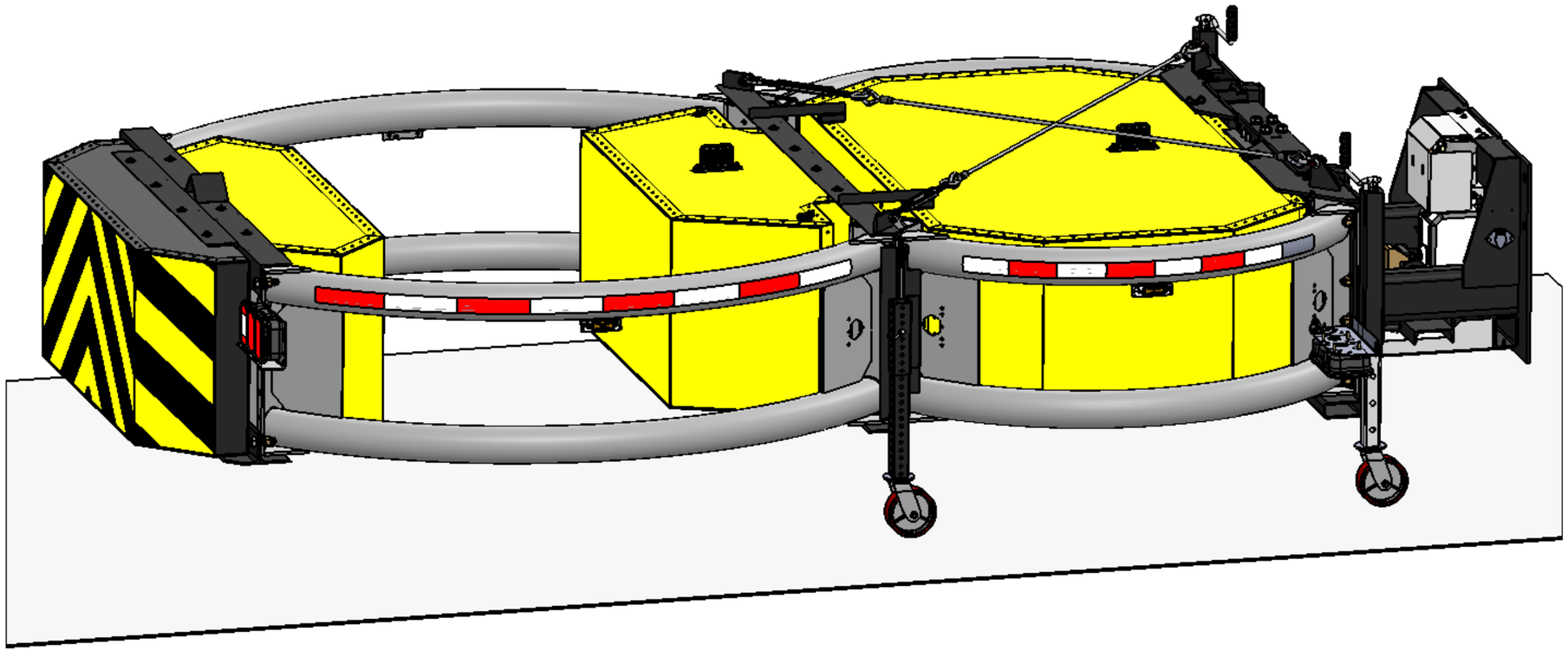
Assembly Instructions: Scorpion C-90 TMA

Recommended Tools and Equipment:

- Forklift with 2,500 lb minimum lifting capacity
- Lifting rings, straps, chain, high strength rope, etc.
- Wheel chocks
- Air compressor
- Impact gun, 1/2" drive
- Impact sockets: 1-1/16", 1-1/8", 3/4"
- Wrenches: 7/16", 9/16", 3/4", 1-1/16", 1-1/8"
- Ratchet, 3/8" drive
- Sockets: 7/16", 9/16", 3/16" Allen
- Pry Bars
- Wire cutters
- Tin snips

Recommended Safety Equipment:

- Safety glasses
- Gloves
- Hearing protection
- Steel toe boots
- Hard hat



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FAX (949) 361-9205
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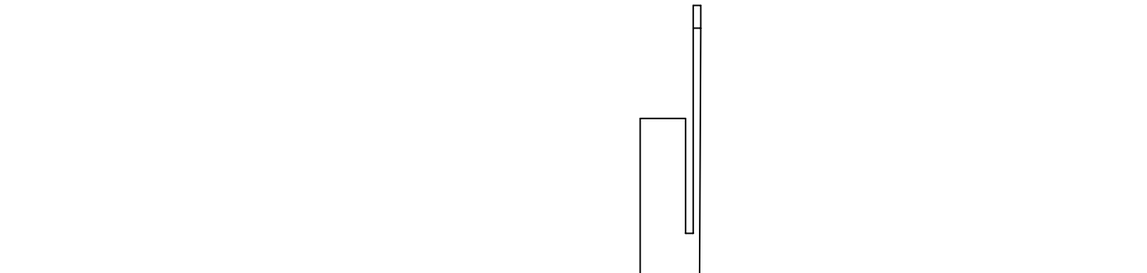
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Scorpion C-90 TMA

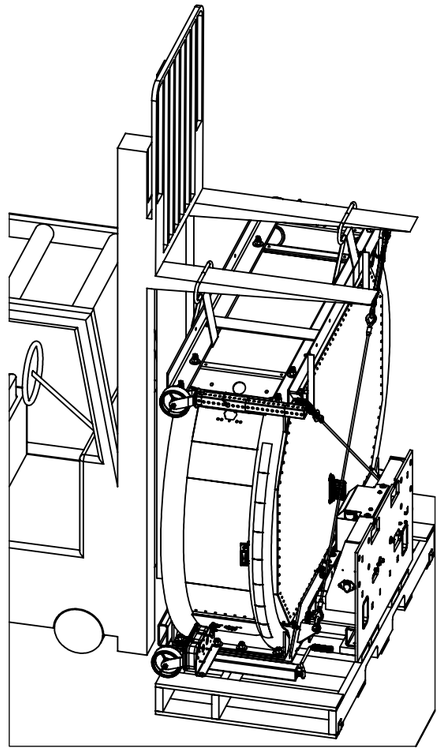
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Ryan Selvius	10/3/16	GM	10/13/16	

Step 1. Removing the Strut From its Pallet

Attach a suitable set of lifting rings/straps to the upper steel diaphragm of the Strut assembly. All rigging should have a minimum lifting capacity of 4,000 lbs (1,800 kg) and be in good condition. Each lifting strap assembly should be the same length. Attach one lifting strap to each angle of the diaphragm. Position a forklift (minimum capacity of 2,500 lbs, [1,150 kg]) with the forks above the Strut and carefully slide the lifting straps over each fork. Slowly raise the forks until there is tension in the straps and check that the straps are fully taught.







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160 Avenida La Pata
San Clemente, CA 92673
(949) 361-5663
FAX (949) 361-9205
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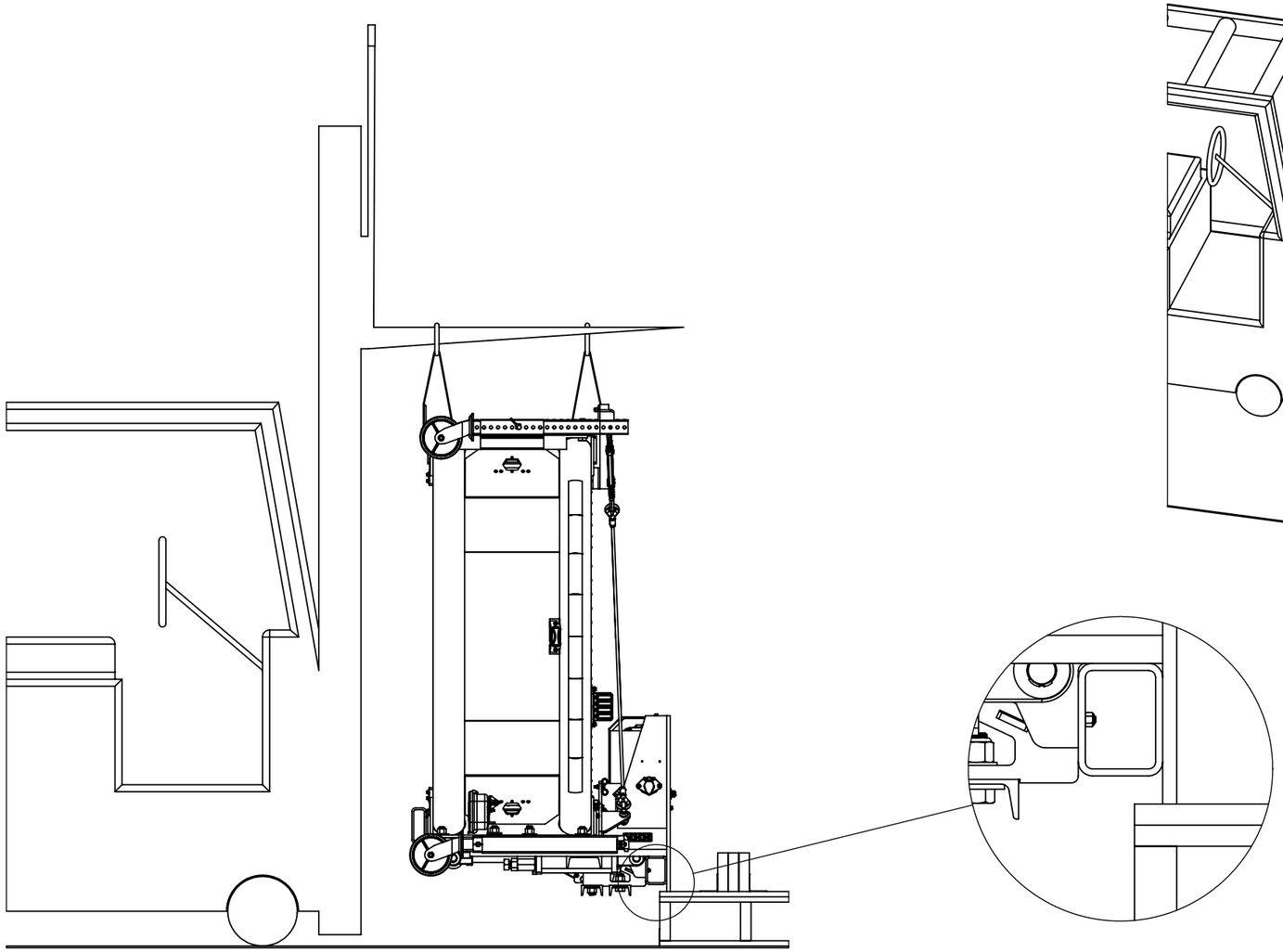
Assembly Instructions Scorpion C-90 TMA

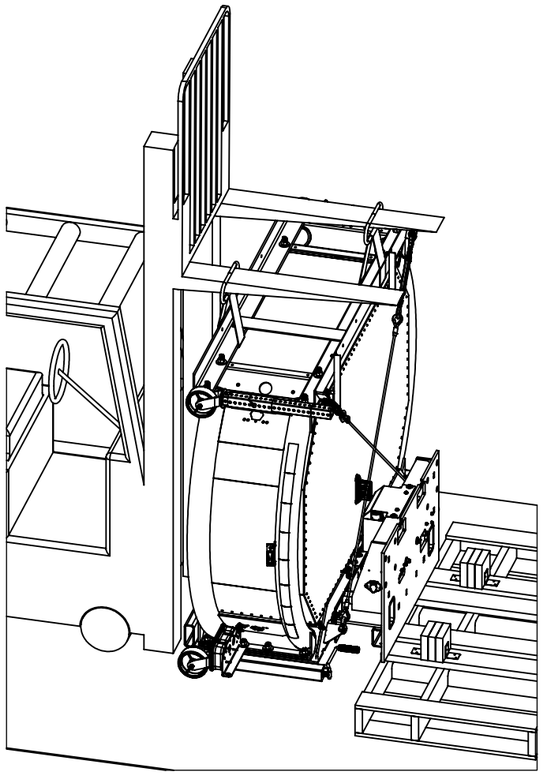
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Ryan Selvius	10/3/16	GM	10/13/16	SHEET 2 OF 15

Step 2. Removing the Strut From its Pallet

Raise the Strut off of the pallet and then set it down with the mounting plate on the edge of the pallet.







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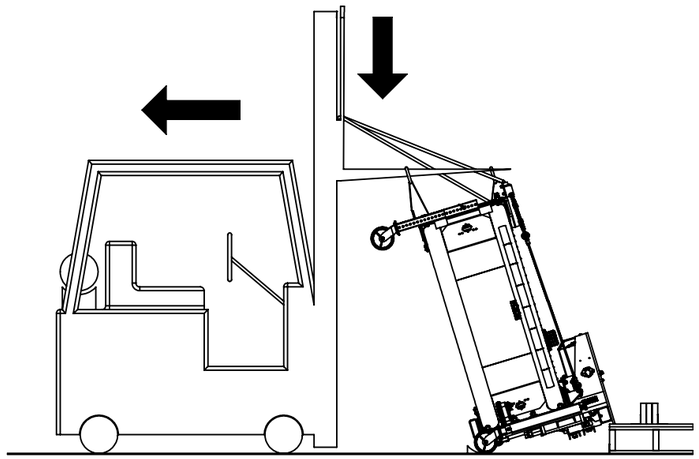
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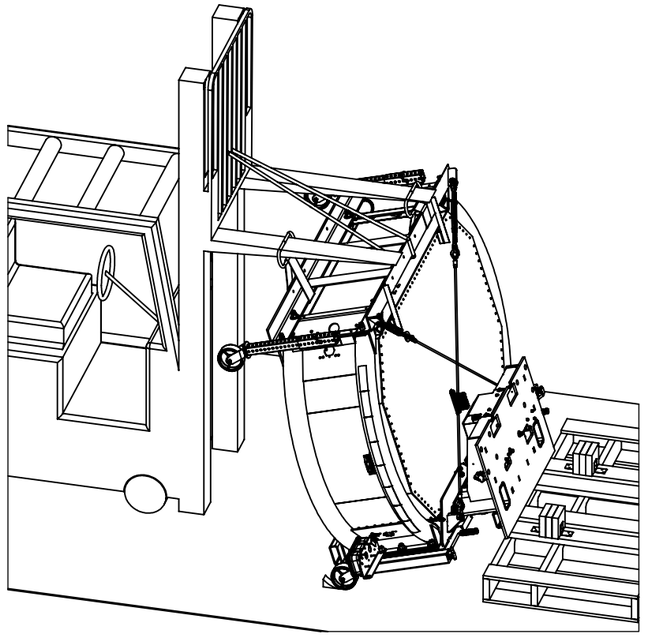
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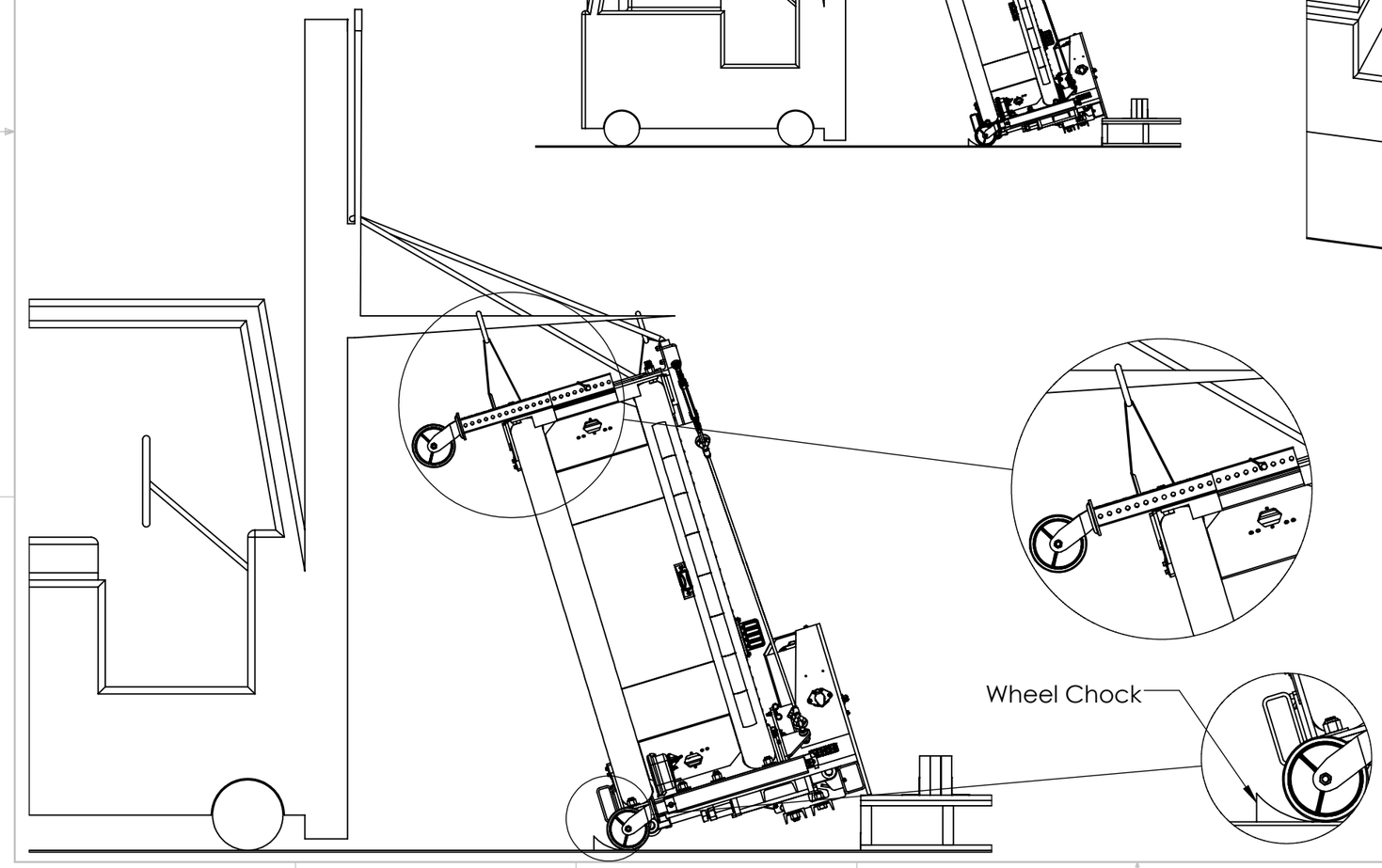
Step 3. Removing the Strut From its Pallet

Continue lowering the Strut section until the jack wheels contact the ground. Insert a pair of wheel chocks (or similar object) to prevent the wheels from rolling. Lower the drop jacks until the yellow stripe is no longer visible. Lastly, attach a rope or cable to the upper angle of the diaphragm and fasten it to the backstop of the forklift. The length of the tied off rope should be about 8-12" (200-300 mm) longer than the fork length.

Carefully lower the forks while slowly reversing the forklift. This will bring the rear of the strut down to the ground. Continue lowering the Strut rear until the drop jacks come in contact with the ground.









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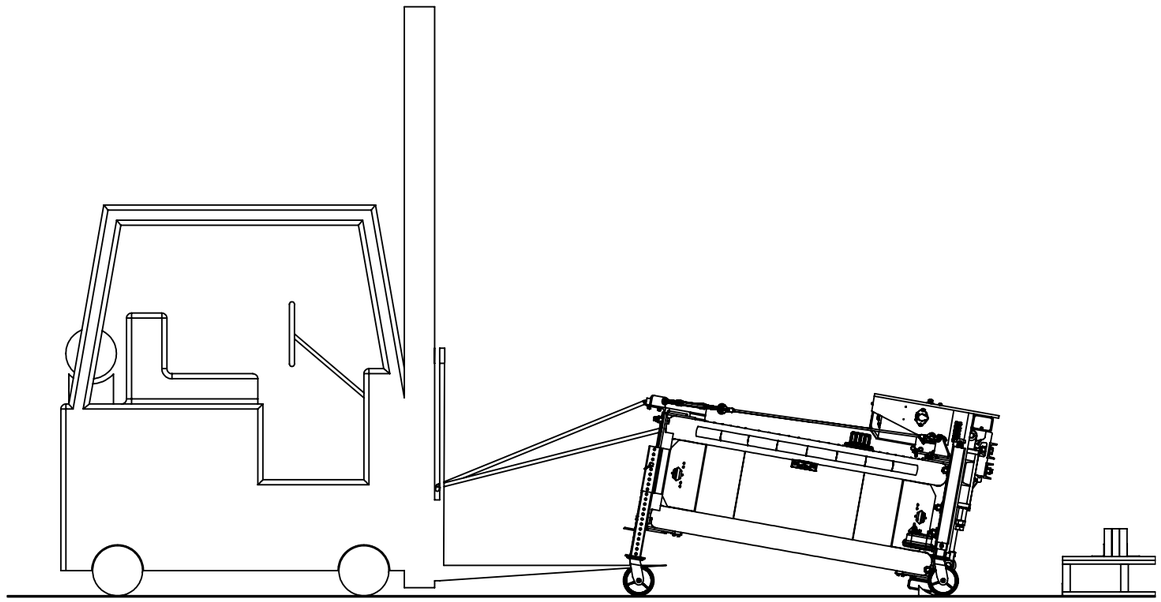
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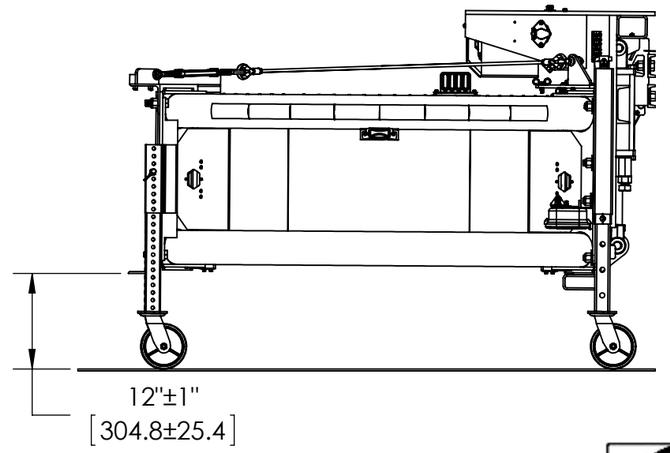
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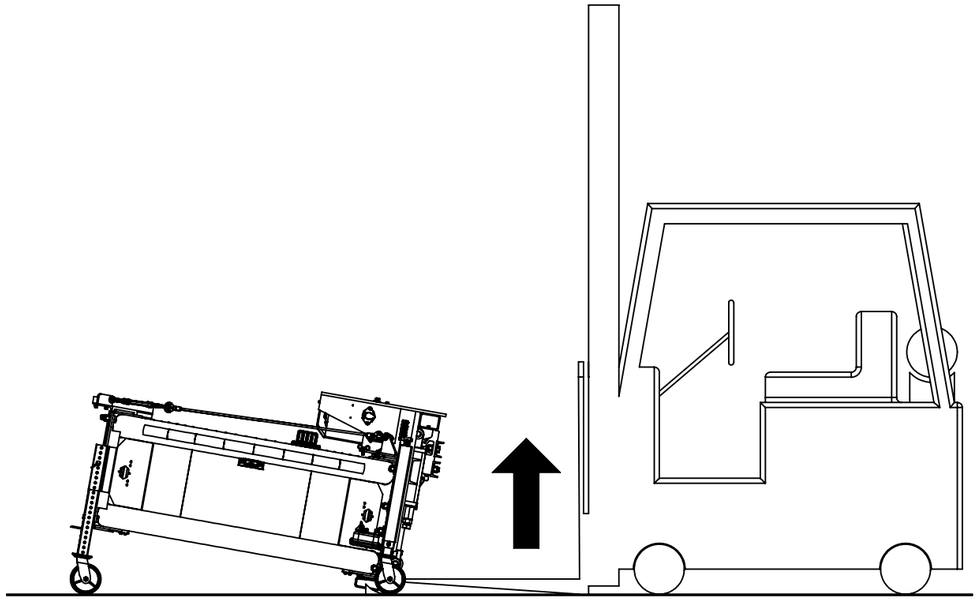
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Ryan Selvius	10/3/16	GM	10/13/16	SHEET 4 OF 15

Step 4. Leveling Strut

Once the Strut section is down on all 4 wheels, the lifting straps and rope can be removed. Move the forklift to the front end of the Strut and lift from the lower tube so the jacks can be lowered. Level the Strut so that it is 12" +/- 1" (304.8 +/- 25.4 mm) above the ground.









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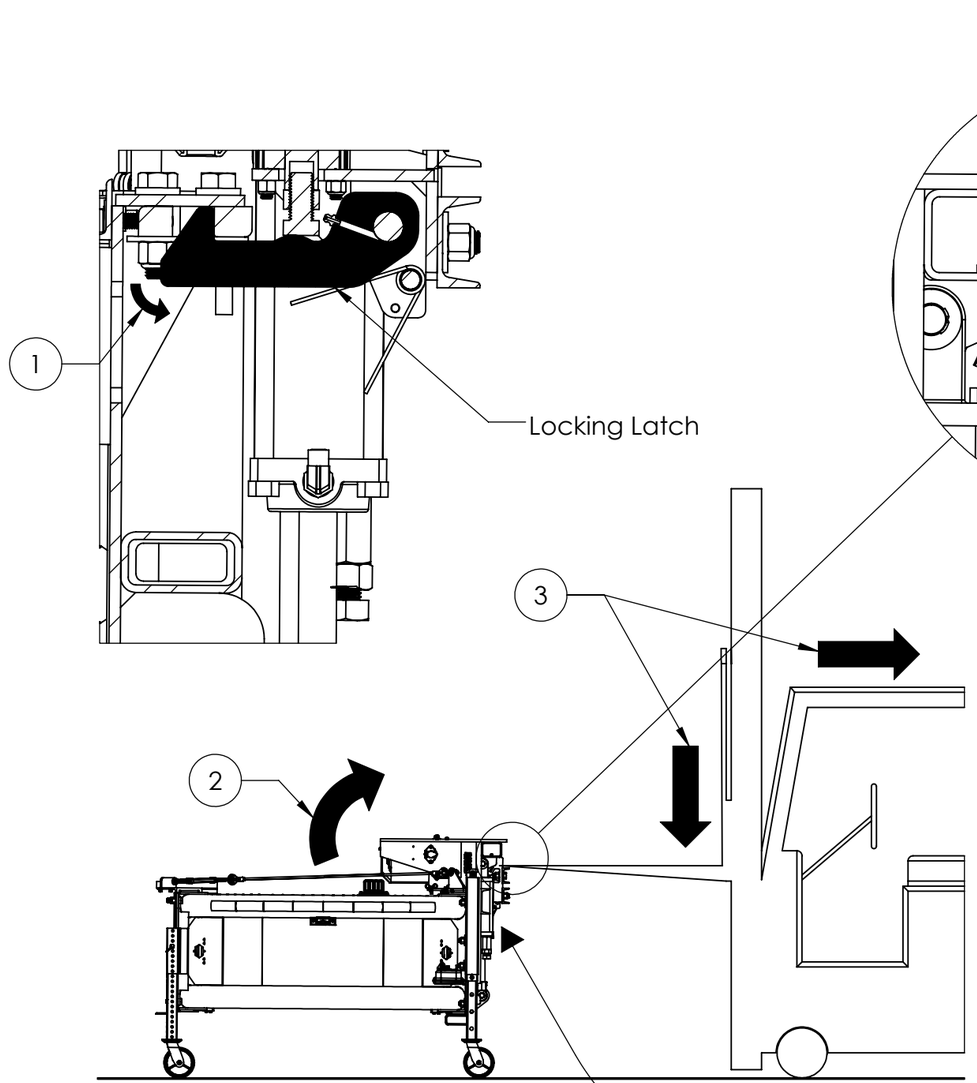
Assembly Instructions Scorpion C-90 TMA

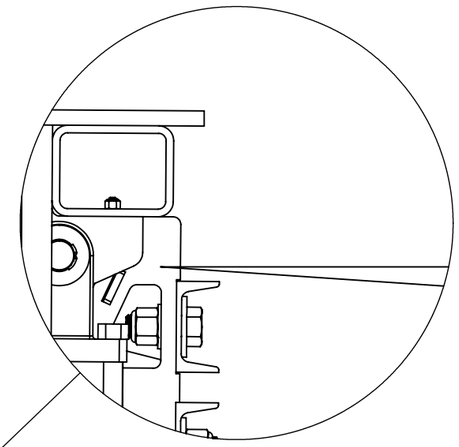
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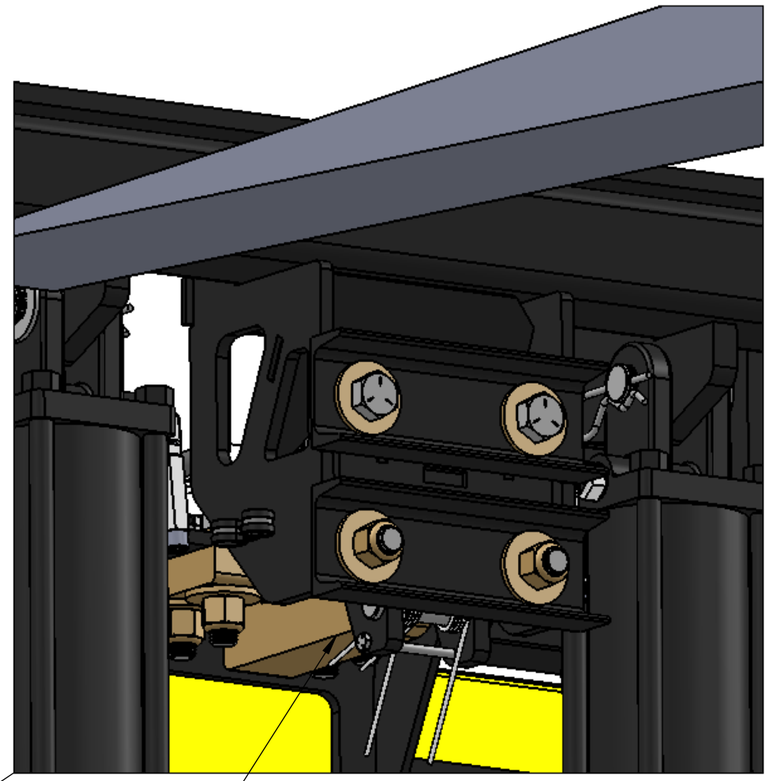
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Step 5. Unfolding C-90 Frame

Position forklift forks a few inches below the mounting plate. (1) Carefully pull the locking latch down to release it from the latch plate. (2) After the latch has been released, the frame can be rotated down onto the forks. (3) Slowly lower the forks and reverse the forklift to lower the frame to the horizontal position.













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B	1000-165	A

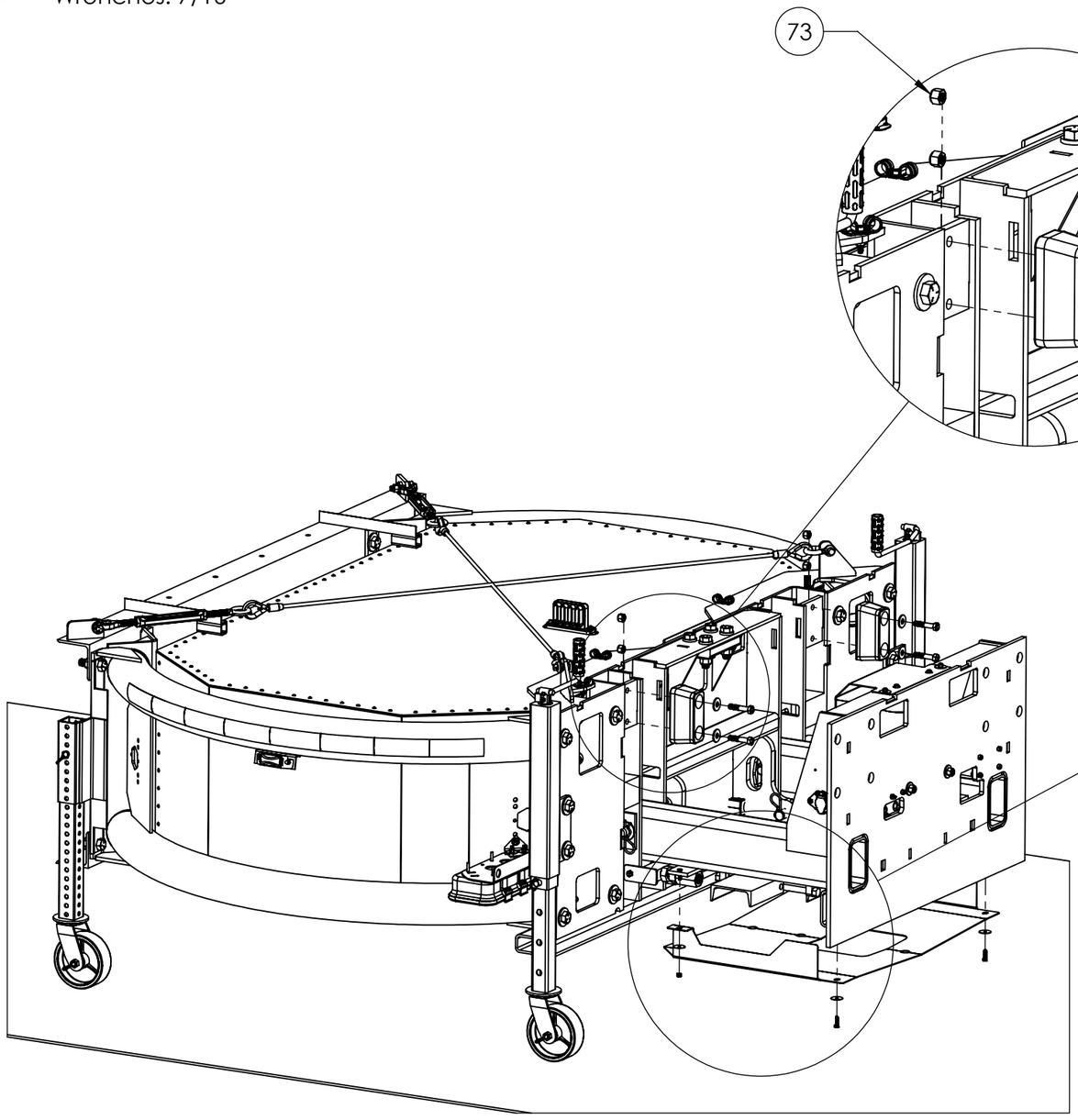
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Ryan Selvius	10/3/16	GM	10/13/16	SHEET 6 OF 15

Step 6. Install Skid Plate and Bumpers

Install the bumpers and skid plate with the supplied hardware as shown below. Tighten the 1/2"-13 bolts for the bumpers until there is approximately 1/2" (13 mm) of thread exposed past the end of the nut.

Recommended Tools:

- Ratch, 3/8" drive
- Sockets: 7/16", 3/16" Allen
- Wrenches: 7/16"



Item No.	Part No.	Description	Qty.
38	11610	Bumper	2
69	12004	Bolt, 1/2"-13 x 2-1/2", Zn Plated, Gr. 5	4
71	12075	Washer, 3/4" USS, Zn-Y Plated	4
73	12024	Locknut, Nylon Insert, 1/2"-13, Gr. 8	4
30	11570	Skid Plate	1
81	12029	Bolt, 1/4"-20 x 1", Zn Plated, Gr. 5	3
78	12032A	Bolt, SHCS, 1/4"-20 x 1-1/4", Zn Plated Alloy Steel	1
83	12005	Fender Washer, 1/4", Zn Plated Steel	4
84	12014	Locknut, Nylond Insert, 1/4"-20	4

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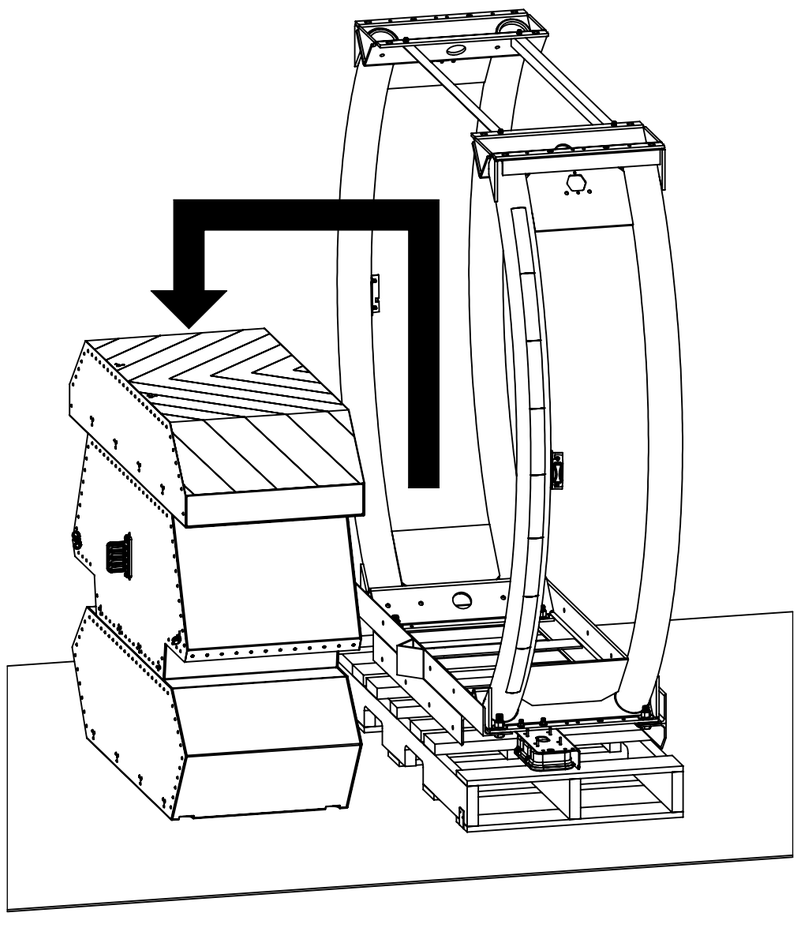
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Scorpion C-90 TMA

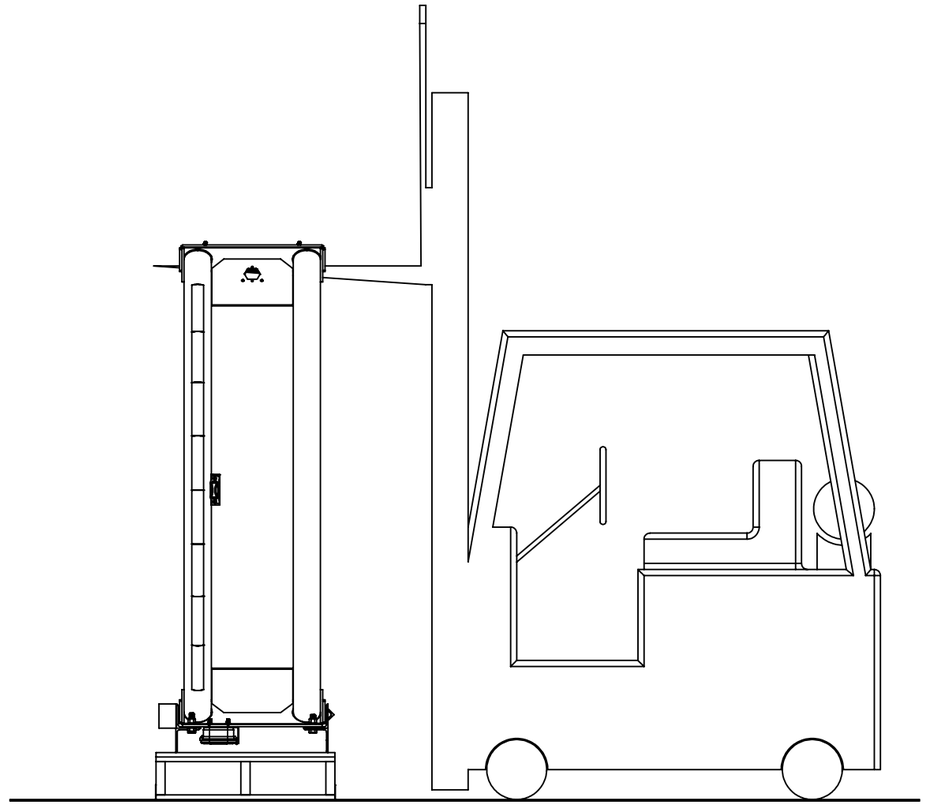
SIZE	DWG. NO.	REV
B	1000-165	A

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Ryan Selvius	10/3/16	GM	10/13/16	

Step 7. Remove Cartridge Modules

Cut the banding that restrains the modules inside the Cartridge and carefully remove the modules. Don't cut the banding that holds the Cartridge to the pallet. Be sure to lift the modules one at a time and use 2 people to perform this task. Bring the forklift into position as shown below with the forks positioned 6-12" (150-300 mm) below the angle braces.







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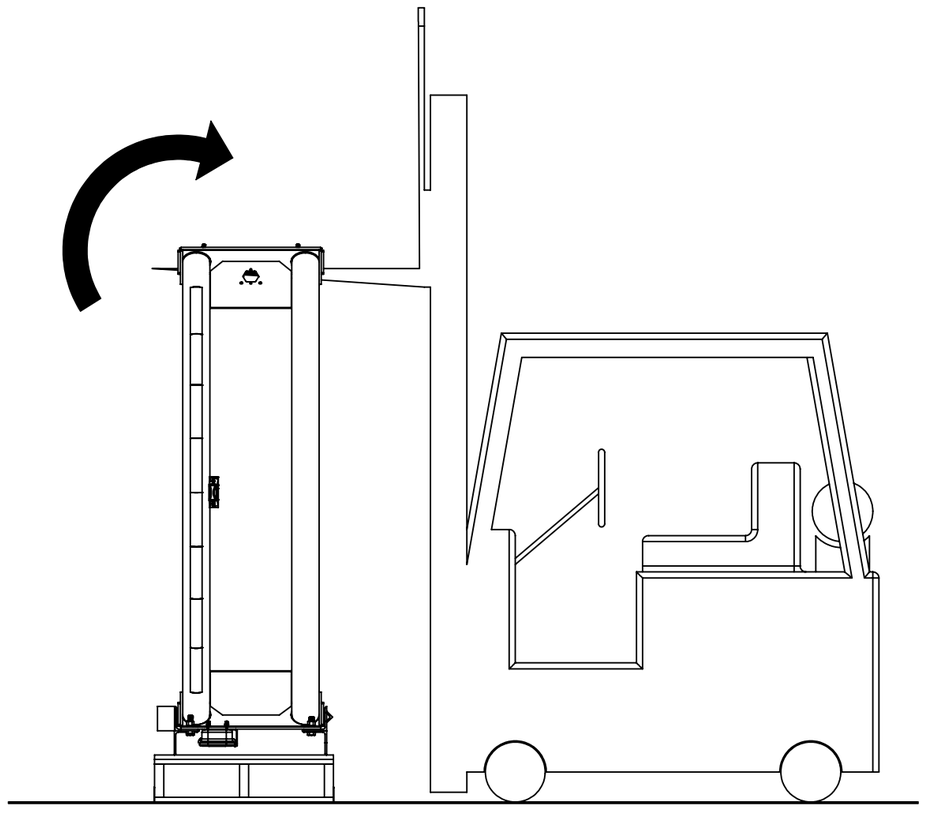
Assembly Instructions Scorpion C-90 TMA

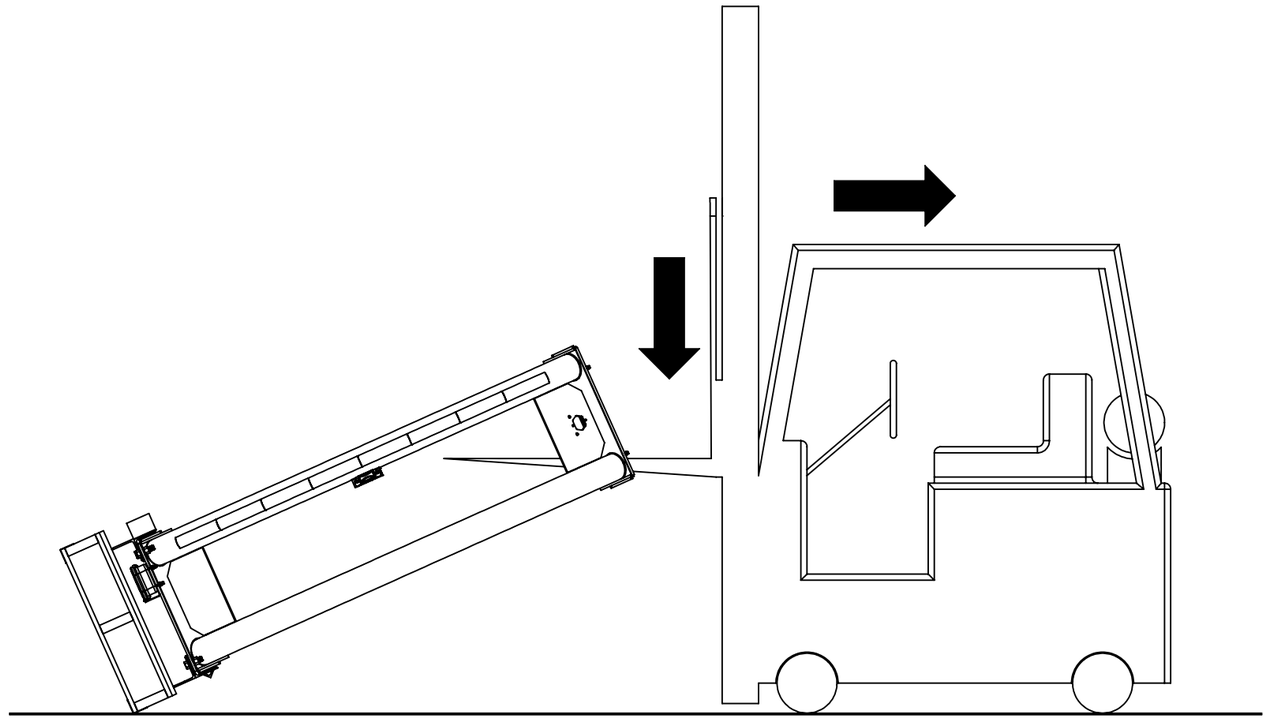
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B	1000-165	A

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Step 8. Lower Cartridge to Horizontal Position

Rock Cartridge back until the angle braces contact the forks and the Cartridge will stay in place. Slowly lower the forks and reverse the forklift simultaneously to lower the front of the Catrtridge to the ground.







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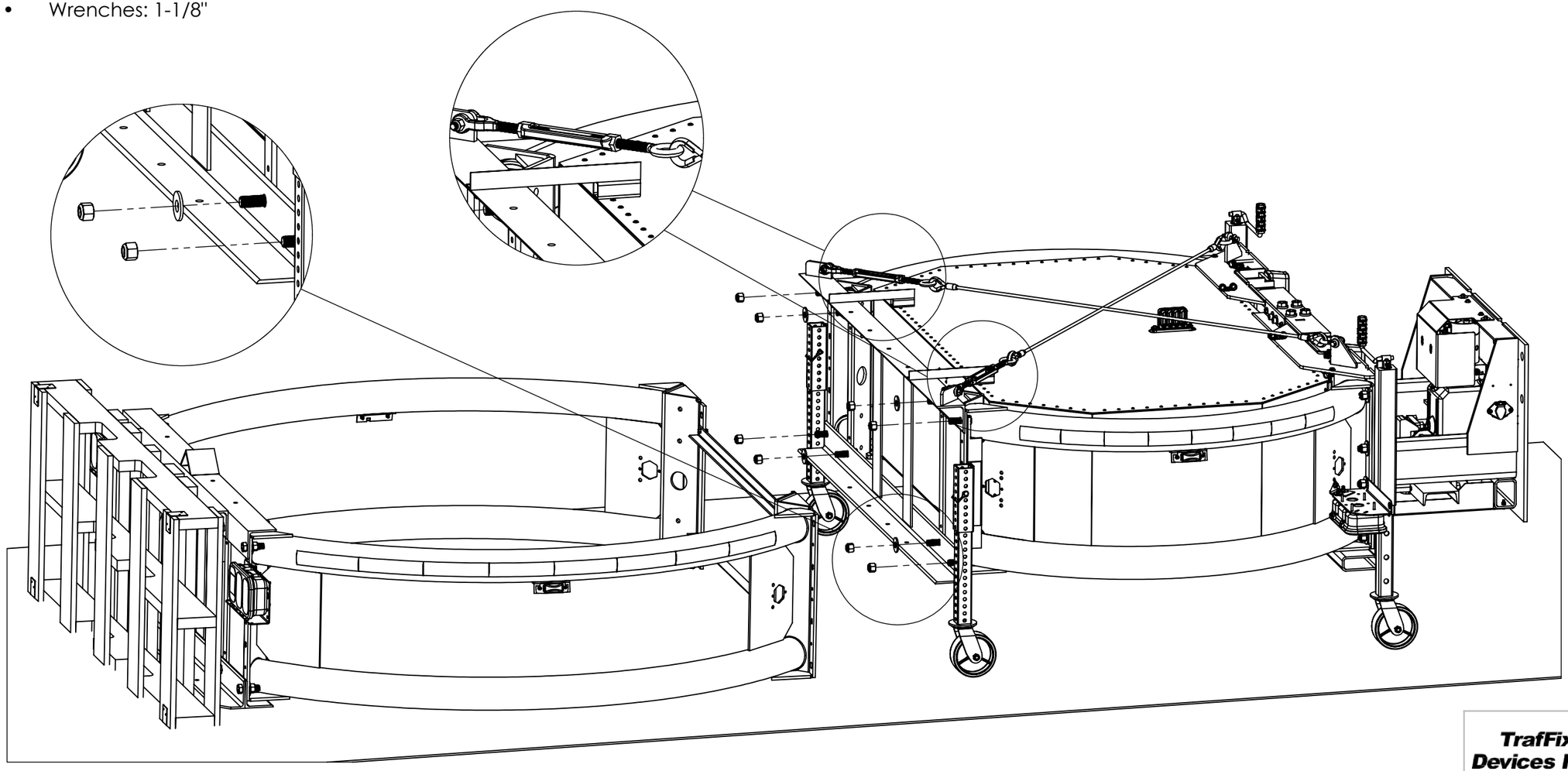
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Ryan Selvius	10/3/16	GM	10/13/16	SHEET 9 OF 15

Step 9. Joining the Strut and Cartridge

First, loosen the turnbuckles until there is no longer tension in the steel cables that cross the top of the strut. Next, remove the eight (8) 3/4" nuts and washers from the bolts that attach the middle diaphragm to the strut tubes.

Recommended Tools:

- Impact gun, 1/2" drive
- Impact Sockets: 1-1/16"
- Wrenches: 1-1/8"









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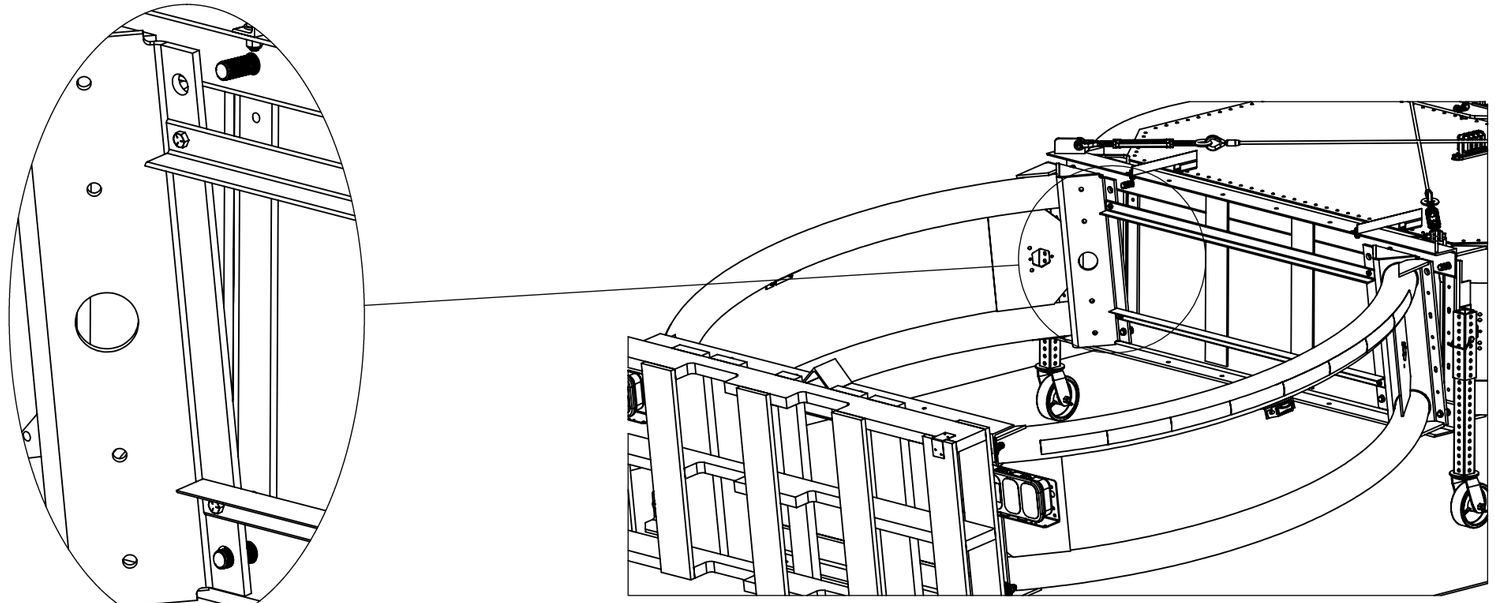
Assembly Instructions Scorpion C-90 TMA

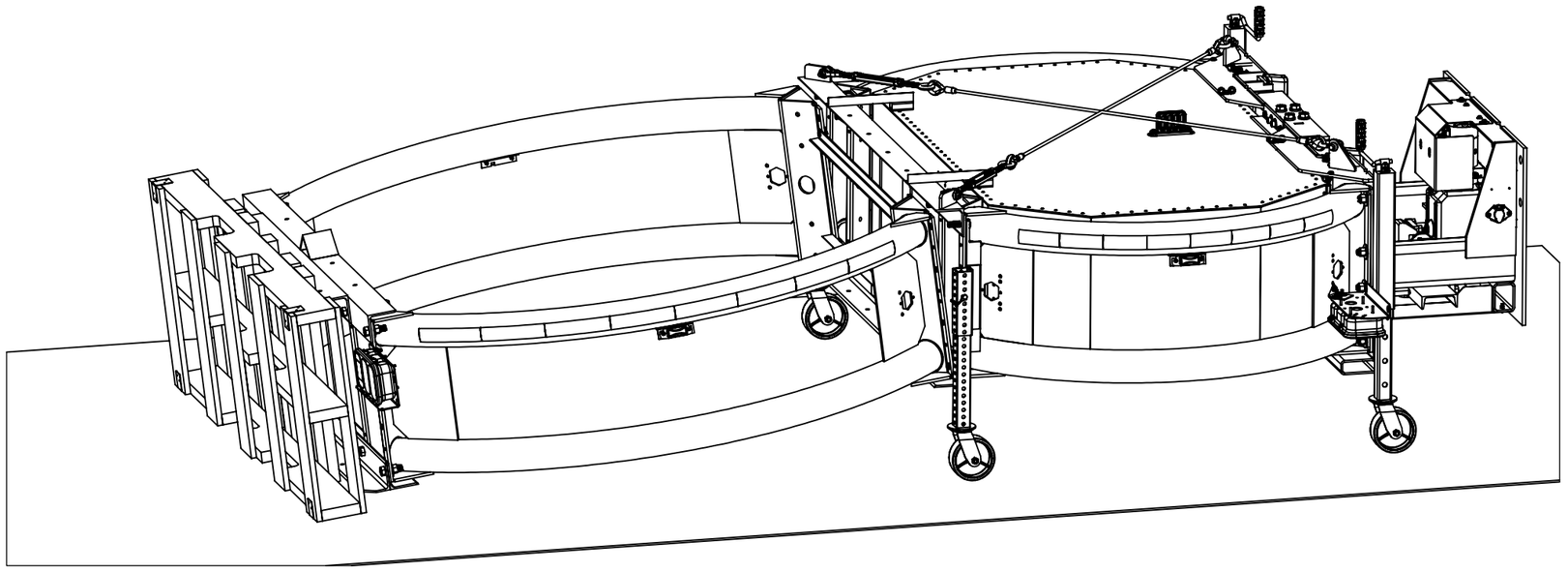
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B	1000-165	A

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Step 10. Joining the Strut and Cartridge

Lift the front end of the Cartridge and set thetube end plates on the bottom edge of the middle diaphragm. Align the bottom holes of the end plates with the corresponding 3/4" bolts.







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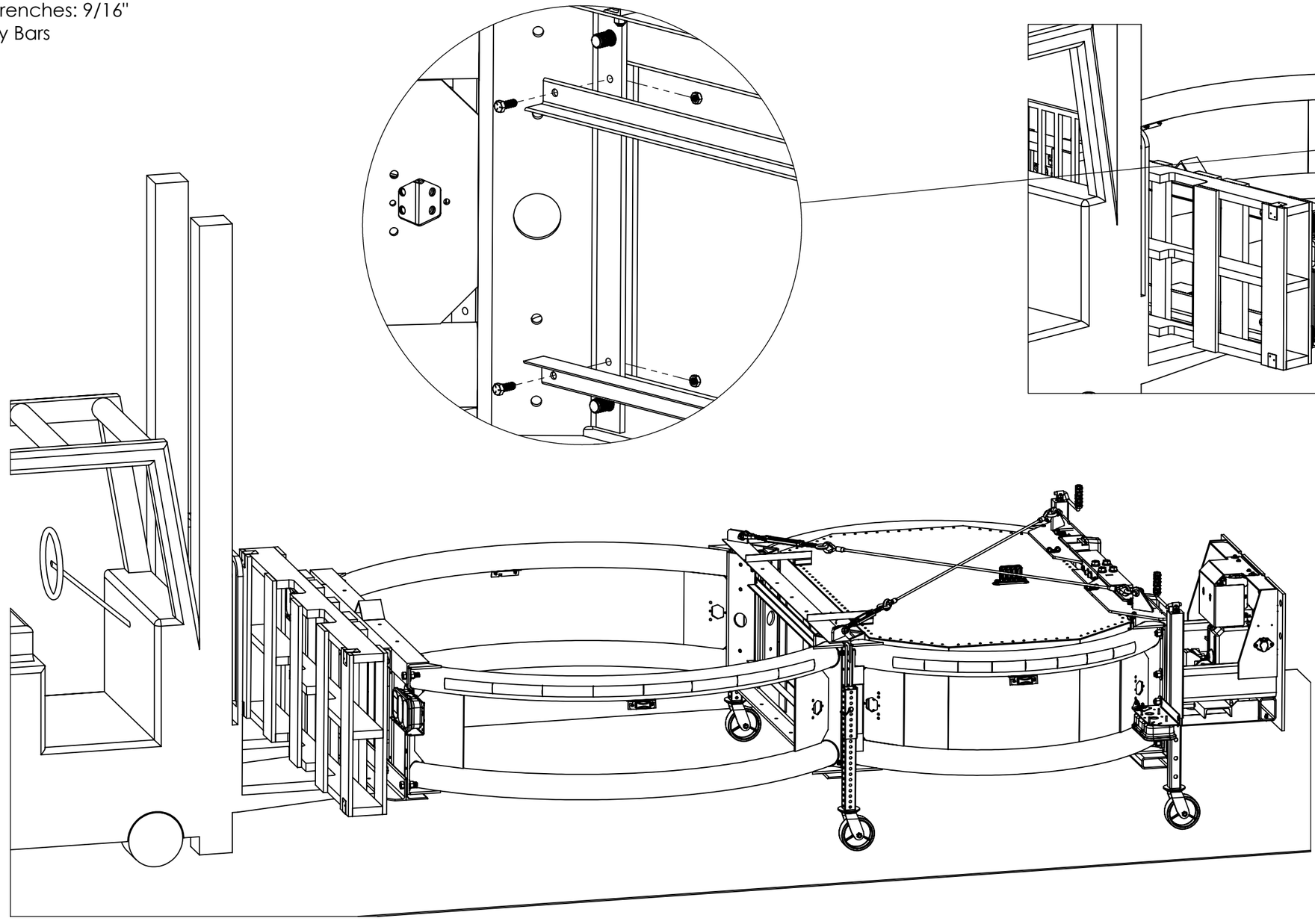
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Ryan Selvius	10/3/16	GM	10/13/16	SHEET 11 OF 15

Step 11. Joining the Strut and Cartridge

Use the forklift to lift the rear of the Cartridige so that the top holes of the tube end plate can be aligned with the upper 3/4" bolts. Once all the bolts have been aligned with the cartridge tube endplate, the angle braces can be removed by loosening the 3/8" bolts that attach them.

Recommended Tools:

- Ratchet, 3/8" drive
- Sockets: 9/16"
- Wrenches: 9/16"
- Pry Bars





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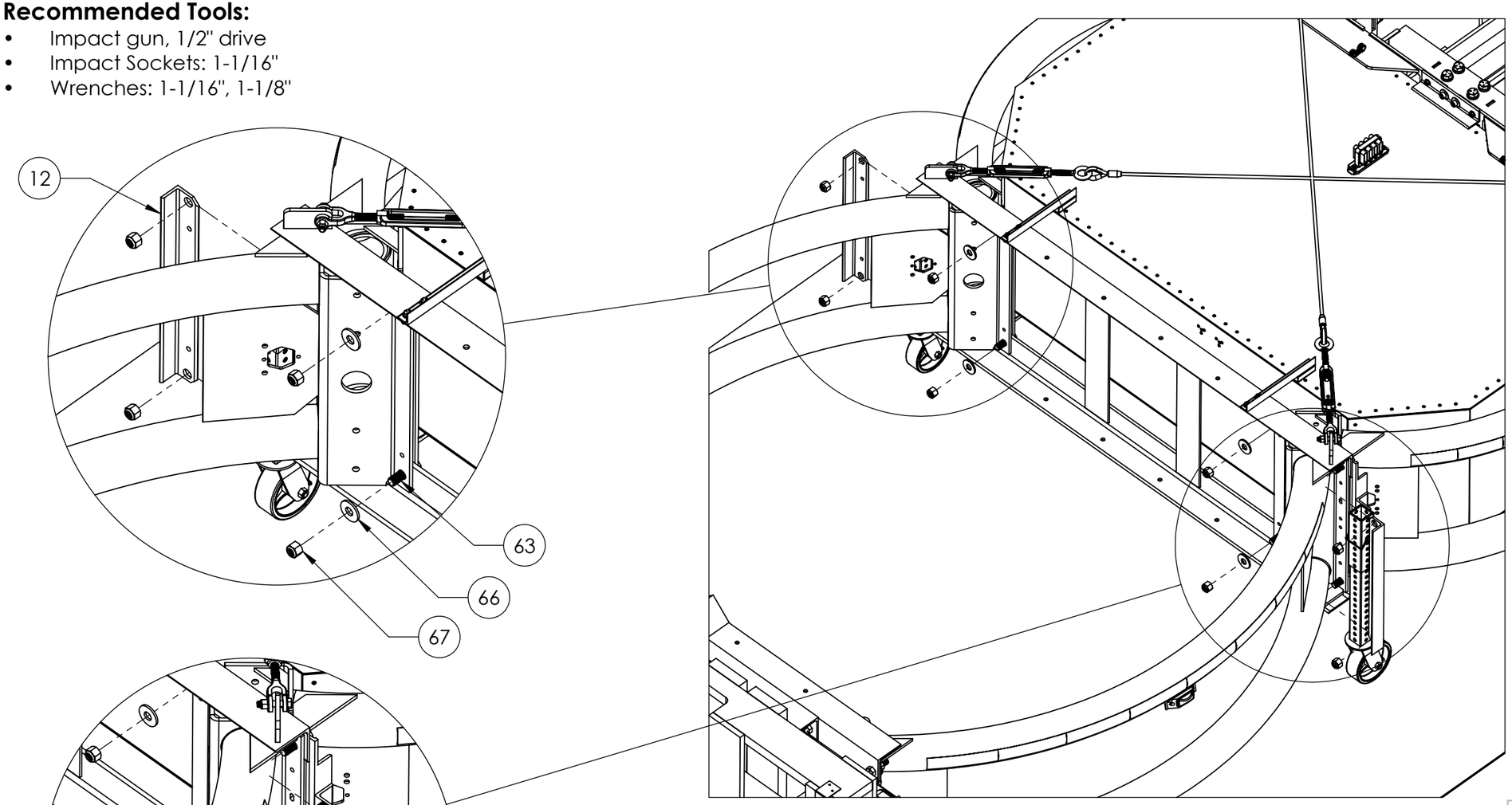
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Ryan Selvius	10/3/16	GM	10/13/16	SHEET 12 OF 15

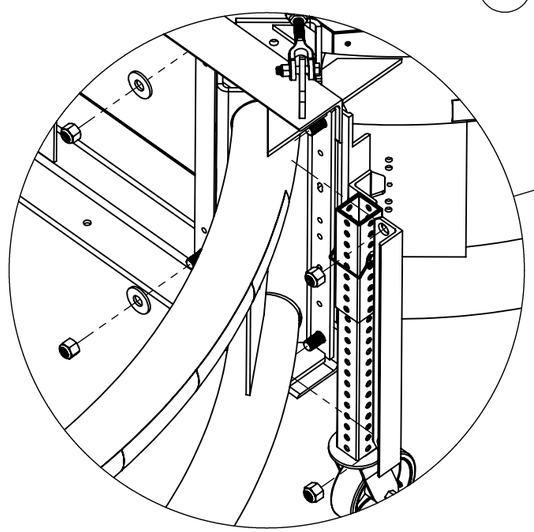
Step 12. Joining the Strut and Cartridge

Reinstall the 3/4" nuts and washers that were removed in step 9. Be sure to install the 10122 Vertical Support Angles in the outside positions. After all of the bolts/nuts have been tightened, retighten the turnbuckles until each cable deflects no more than 1/4" (6.5 mm) when pushing the cable in the center with the palm of your hand. Cut the banding that attaches the pallet to the cartridge diaphragm and remove the pallet.

Recommended Tools:

- Impact gun, 1/2" drive
- Impact Sockets: 1-1/16"
- Wrenches: 1-1/16", 1-1/8"





Item No.	Part No.	Description	Qty.
12	10122	Vertical Support Angle, Powder Coated Black	2
63	12007	Bolt, 3/4"-10 x 2-1/2", Zn Plated, Gr. 5	8
66	12060	Washer, 3/4" USS, Zn-Y Plated	8
67	12008	Locknut, Nylon Insert, 3/4"-10, Gr. 8	8



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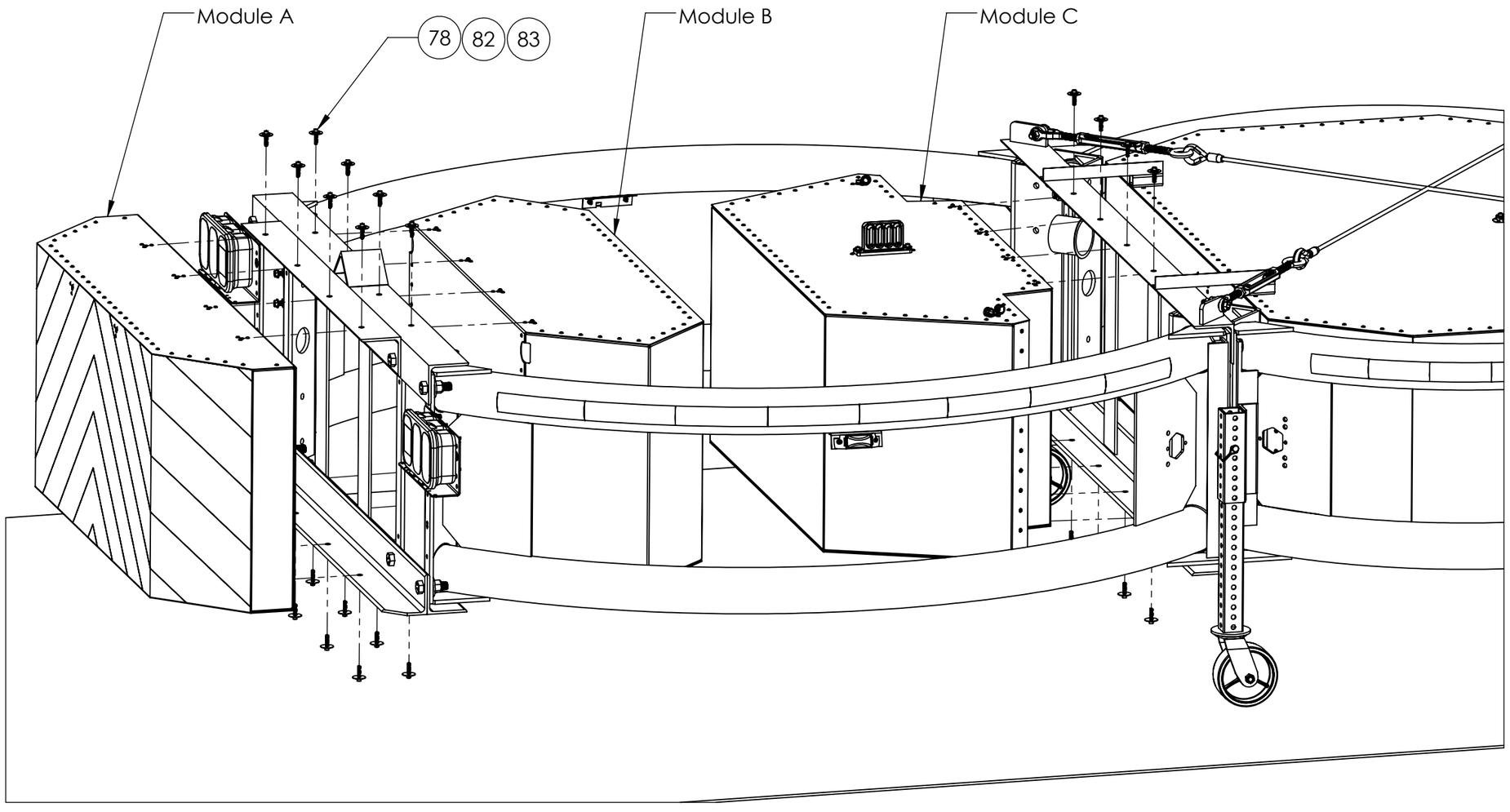
DRAWN BY:	DATE:	APPROVED BY:	DATE:	SHEET 13 OF 15
Ryan Selvius	10/3/16	GM	10/13/16	

Step 13. Installing the Modules

Position each of the modules in place as shown below. Fasten them to the TMA using the supplied hardware consisting of eight (8) 1/4"-20 socket head screws, eight (8) 1/4" USS washers, and eight (8) 1/4" fender washers for each module. Be sure to apply a drop or two of the provided red thread locking adhesive to the threads of each screw.

Recommended Tools:

- Ratchet, 3/8" drive
- Sockets: 3/16" Allen



Item No.	Part No.	Description	Qty.
78	12032A	Screw, SHCS, 1/4"-20 x 1-1/4", Zn Plated Alloy Steel	24
82	12042	Washer, 1/4" USS, Zn-Y Plated, Gr. 8	24
83	12005	Fender Washer, 1/4", Zn Plated	24
*	14511	Threadlocker, Red Vibra-Tite, 2 mL	1

*Not Shown





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Step 14. Connecting the Lighting Cables

Route the lighting cables as shown in the photos below and secure with cable ties. Utilize the loop clamps installed on module C to secure the cables. Be sure to test all light functions after the connections have been made.

This concludes the assembly of the Scorpion C-90 TMA. Proceed to the installation portion of the manual for attachment to the host truck.







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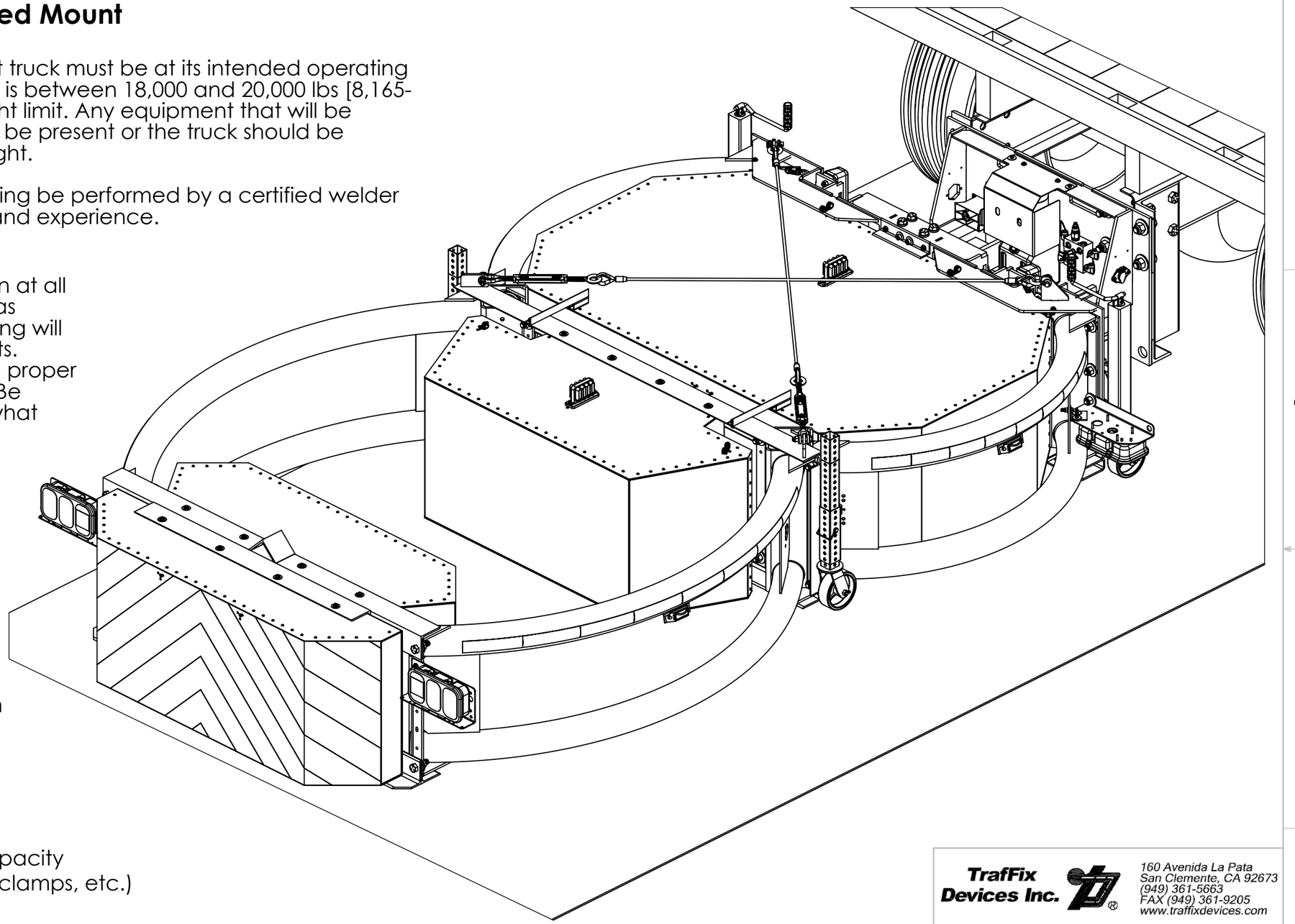
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Ryan Selvius	10/3/16	GM	10/13/16	SHEET 15 OF 15

Scorpion C-90 Installation: Flat Bed Mount

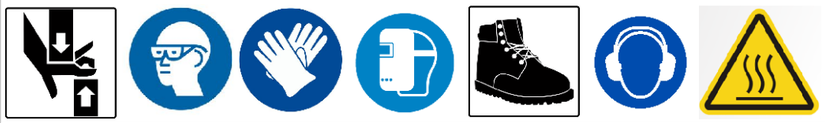
Prior to beginning the installation, the host truck must be at its intended operating weight. The recommended weight range is between 18,000 and 20,000 lbs [8,165-9,070 kg] however there is no upper weight limit. Any equipment that will be permenantly installed on the truck should be present or the truck should be ballasted to represent the additional weight.

TrafFix Devices recommends that all welding be performed by a certified welder or someone with equivalent knowledge and experience.

Safety Precaution!
Proper safety precautions should be taken at all times. Metal fabrication operations such as welding, flame cutting, grinding, and drilling will be performed on heavy steel components. Appropriate clothing should be worn and proper safety equipment and procedures used. Be aware of what you are doing as well as what fellow workers are doing at all times.



Recommended Tools:
- MIG Welder
- Plasma Cutter or Oxy-Acetylene Torch
- Magnetic Drill
- Angle Grinder
- Impact Gun: 1/2" or 3/4" Drive
- Impact Sockets: 1-7/16", 1-1/2"
- Wrenches: 1-7/16", 1-1/2"
- Torque Wrench, 250 ft-lb [340 N-m] capacity
- Clamps (C-clamps, Vise Grip welding clamps, etc.)
- Carpenter Square
- Level, at least 36" [900mm] in length
- Tape Measure



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TITLE:
Scorpion C-90 TMA Installation
Flat Bed Mount

SIZE	DWG. NO.	REV
B	1000-172	A

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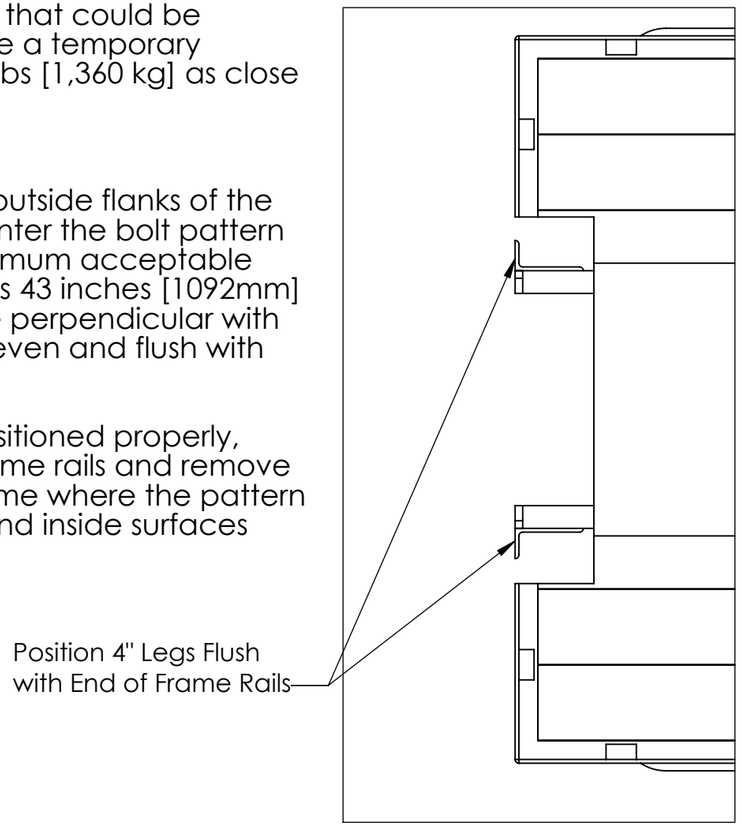
Scorpion C-90 Installation: Flat Bed Mount

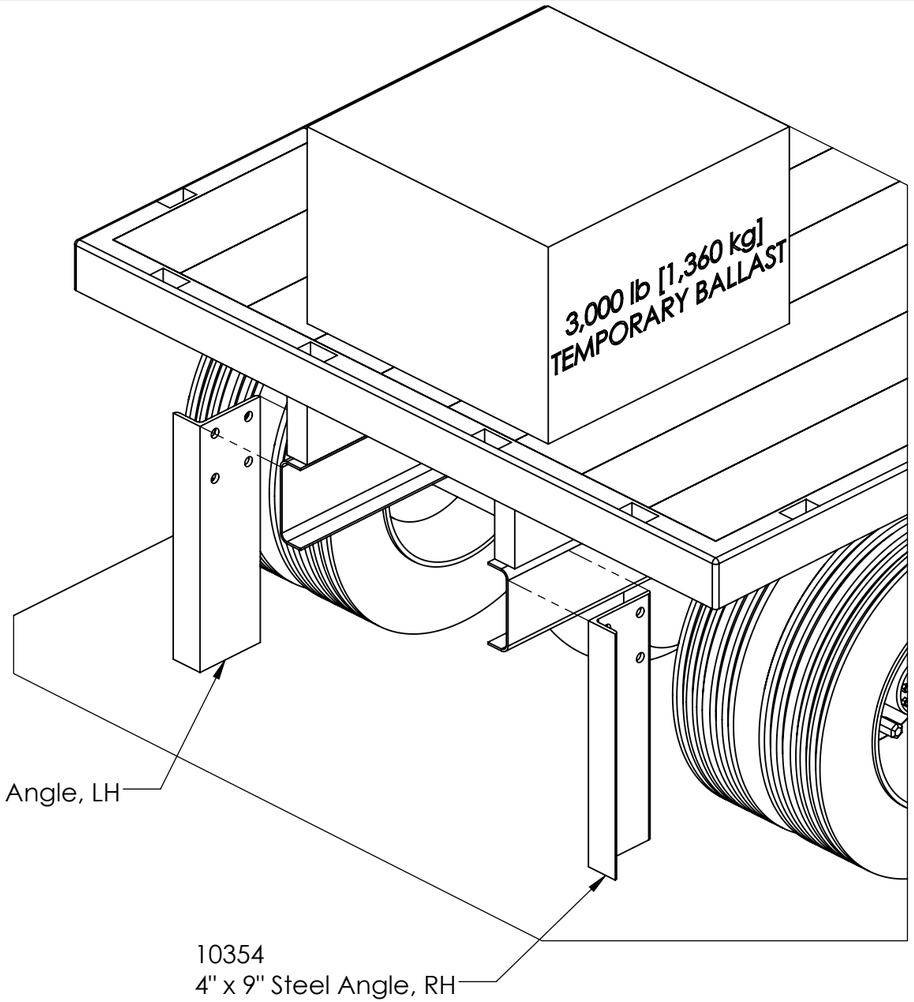
Before beginning the installation, position the truck on solid level ground. The frame rail ends should be clean and square. Remove any electrical cables that could be damaged during the installation. Place a temporary ballast weighing approximately 3,000 lbs [1,360 kg] as close to the rear of the bed as possible.

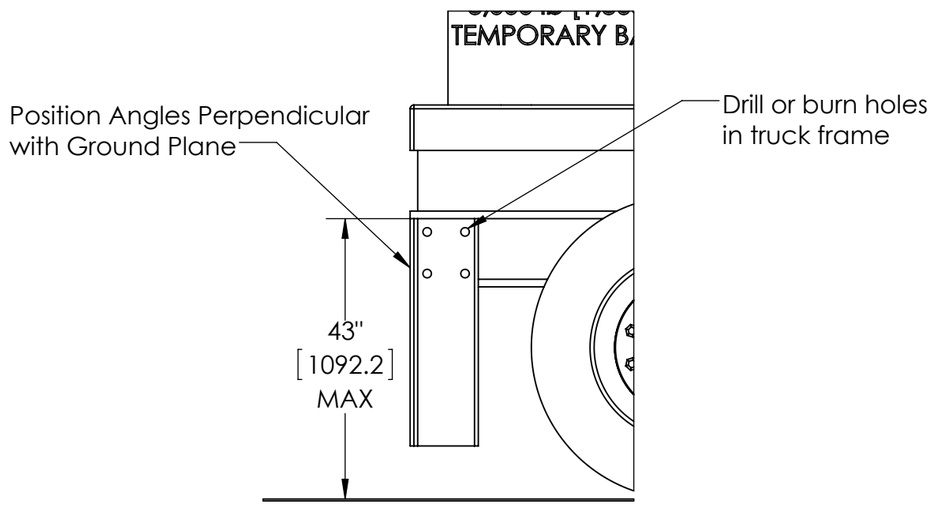
Step 1: Position 4" x 9" Angles

Position the 4" x 9" steel angles on the outside flanks of the truck frame rails as depicted. Try to center the bolt pattern on the channel of the frame. The maximum acceptable height for the top of the 4" x 9" angles is 43 inches [1092mm] from the ground. The angles should be perpendicular with the ground and the 4" legs should be even and flush with the end of the frame rails.

Once the 4" x 9" angles have been positioned properly, mark the 4 hole bolt pattern on the frame rails and remove the angles. Drill or burn holes in the frame where the pattern has been marked. Grind the outside and inside surfaces smooth afterward.







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SIZE	DWG. NO.	REV
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Ryan Selvius	11/1/16	GM	11/7/16	SHEET 2 OF 8

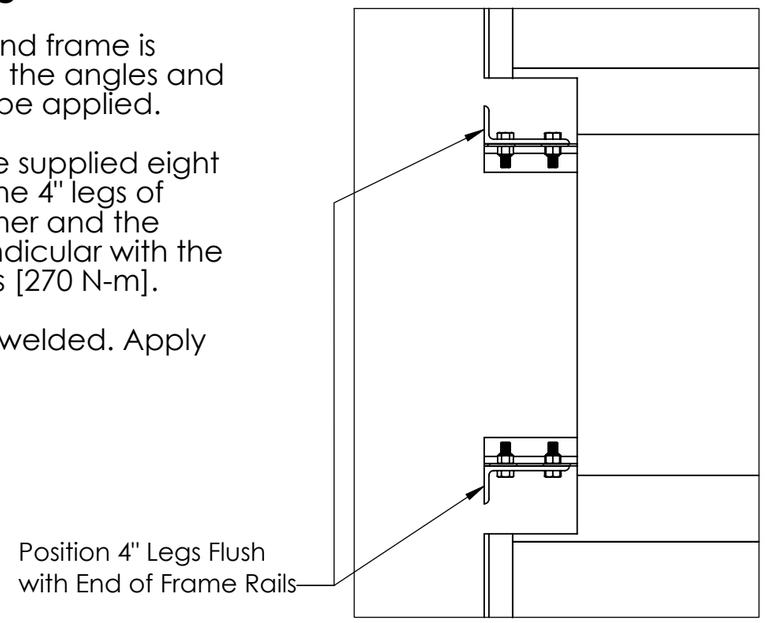
Scorpion C-90 Installation: Flat Bed Mount

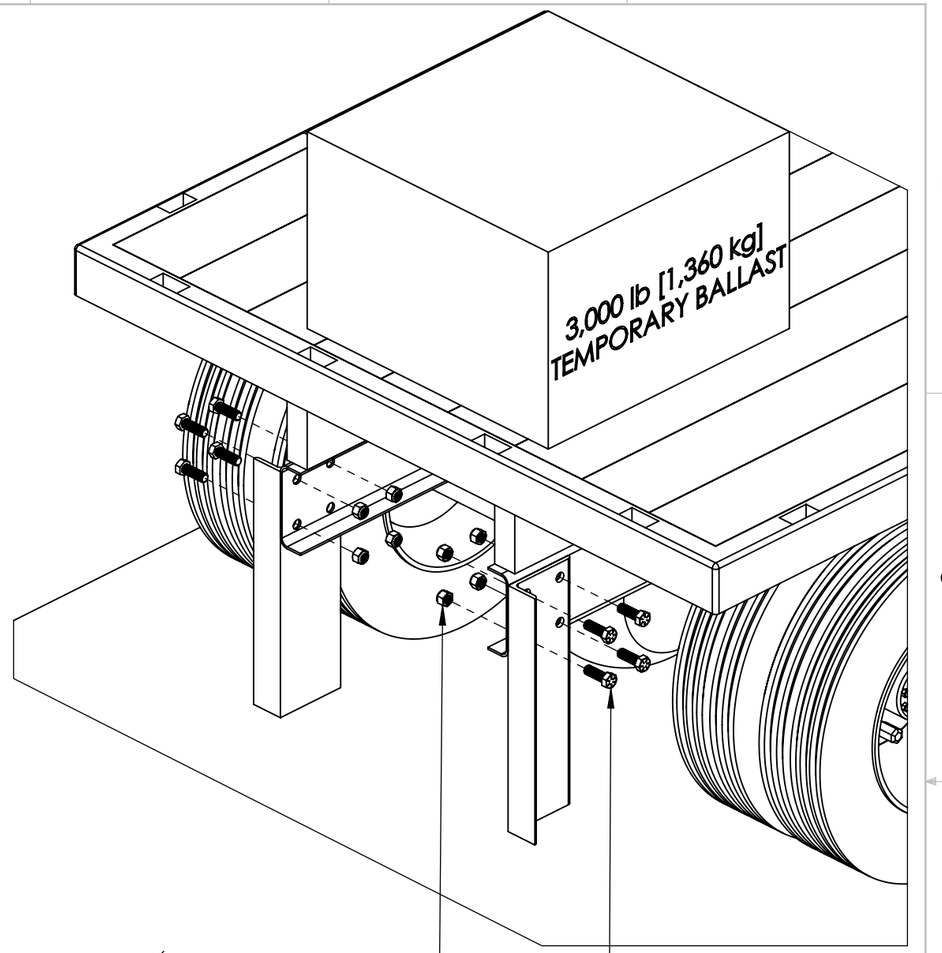
Step 2: Install Bolts and Weld 4" x 9" Angles

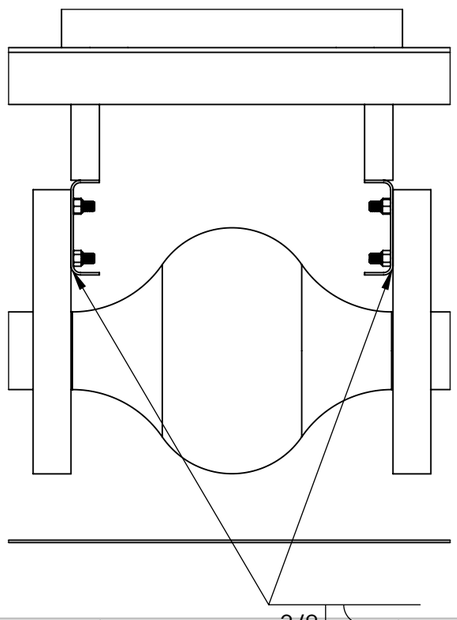
Take note of where welding on the angles and frame is required. Grind off the powder coating from the angles and frame as needed so that a clean weld can be applied.

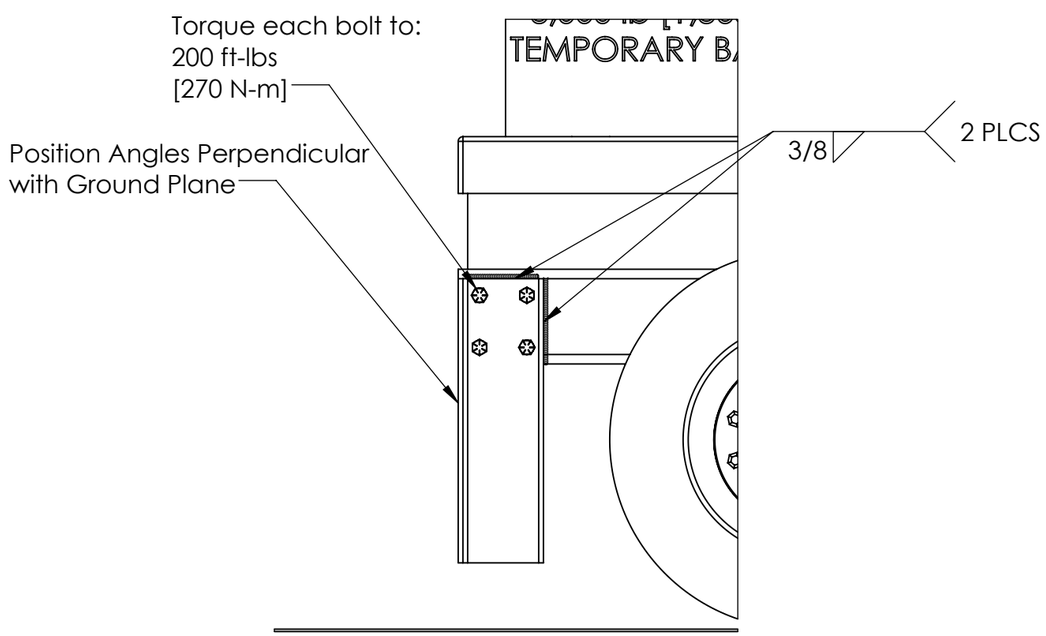
Attach the 4" x 9" angles to the truck with the supplied eight (8) 1"-8 x 3" bolts and locknuts. Be sure that the 4" legs of each angle are even and flush with eachother and the truck frame. The angles must also be perpendicular with the ground. Tighten all eight (8) bolts to 200 ft-lbs [270 N-m].

Once the bolts are tight, the angles can be welded. Apply 3/8" weld beads as indicated below.









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Flat Bed Mount

SIZE	DWG. NO.	REV
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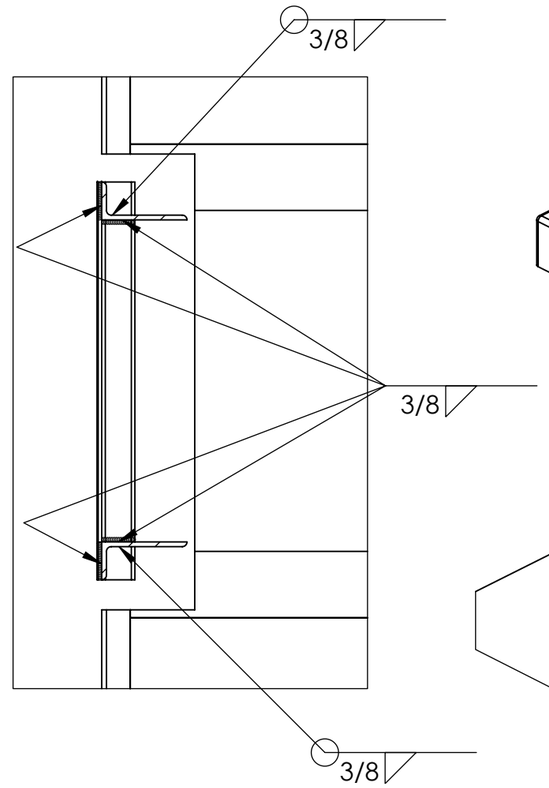
Scorpion C-90 Installation: Flat Bed Mount

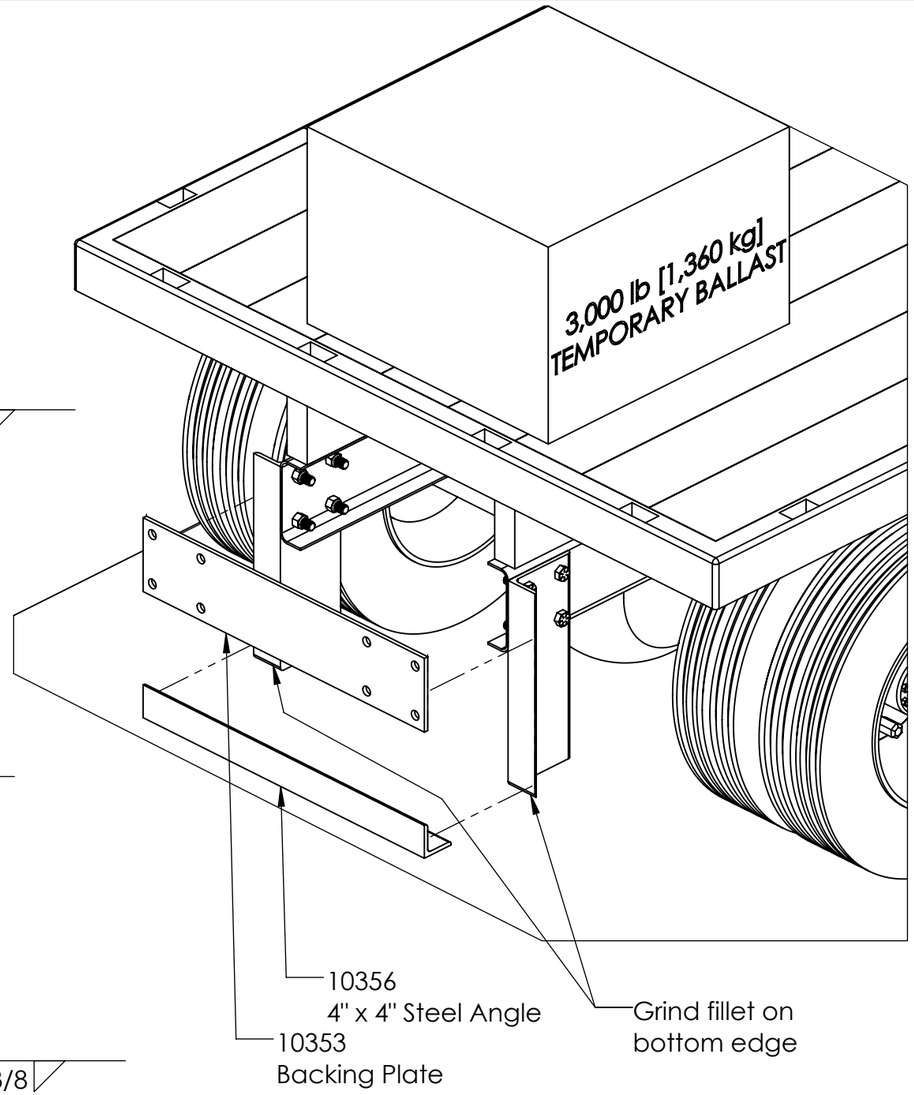
Step 3: Position Backing Plate and Trim 4" x 9" Angles

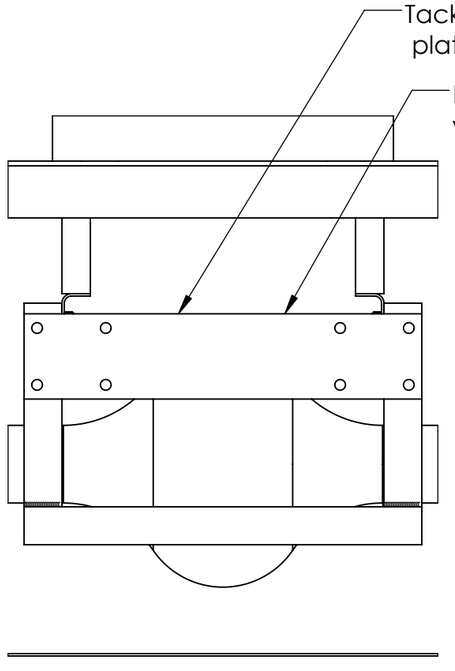
Measure approximately 12" [25mm] up from the ground and mark a cut line at the bottom of the 4" x 9" angles. Cut off the portion of the angles that extend below the line.

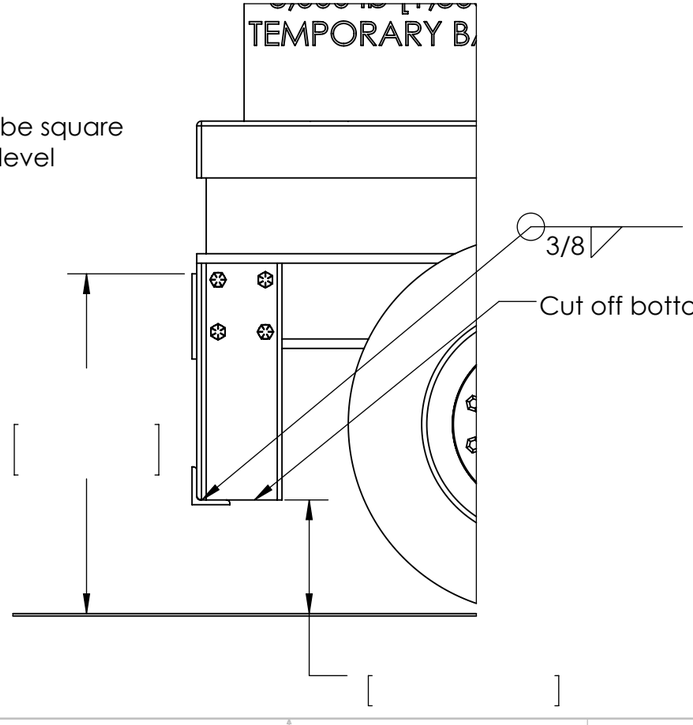
Position the backing plate and 4" x 4" angle as depicted below. The top edge of the backing plate should measure 36" from the ground. The backing plate should be square with the truck frame and it should be level. Any angularity of the backing plate can prevent the TMA from being installed correctly. Grind off the powder coating in the areas where welding will be performed. Once the backing plate has been positioned, tack weld it in place. Apply a generous number of tack welds with adequate penetration.

Position the 4" x 4" angle as shown. Be sure that both legs sit flush with the 4" x 9" angles. The bottom edge of the 4" x 9" angles will need to have a fillet ground in them. Once the angle is positioned properly, grind off the powder coating and fully weld it in place.









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FAX (949) 361-9205
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TITLE:
Scorpion C-90 TMA Installation
Flat Bed Mount

SIZE	DWG. NO.	REV
B	1000-172	A

DRAWN BY:	DATE:	APPROVED BY:	DATE:	SHEET 4 OF 8
Ryan Selvius	11/1/16	GM	11/7/16	

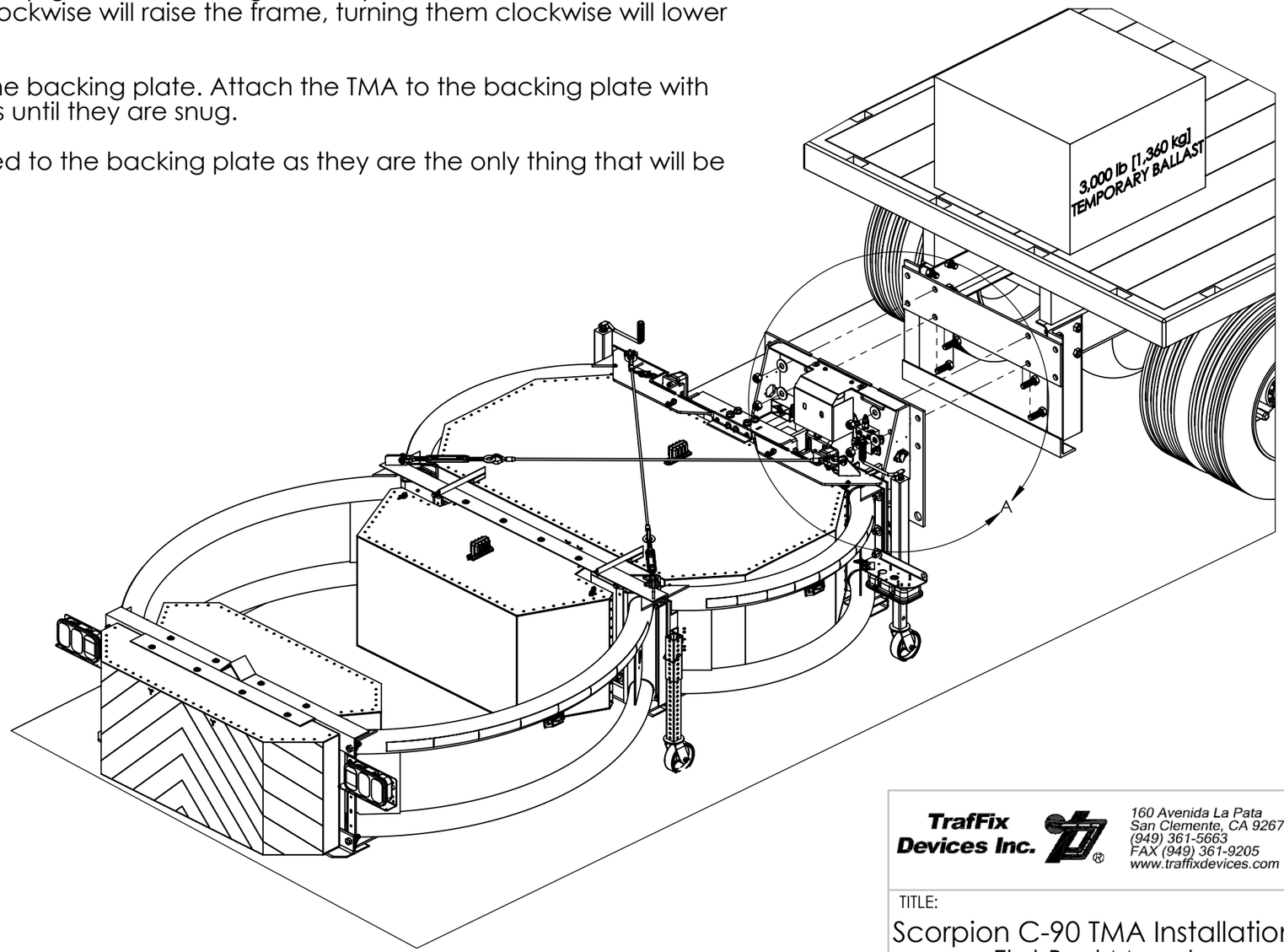
Scorpion C-90 Installation: Flat Bed Mount

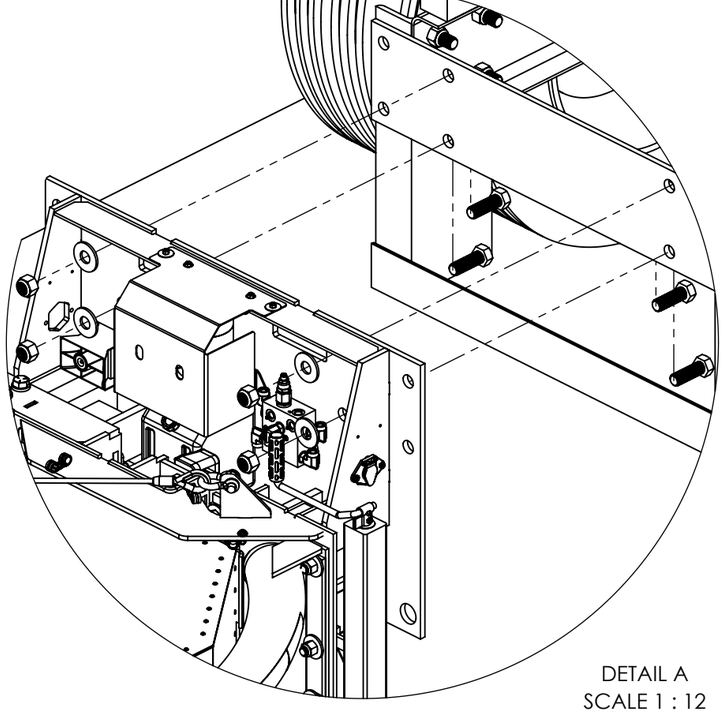
Step 4: Attach TMA to Check Ride Height

Check that the assembled Scorpion C-90 TMA is level and is at the proper 12 inches [25mm] off the ground (see drawing 1000-169 for reference on measuring ride height). The C-90 truck side frame should also be level with the TMA. If it is not, make adjustments to the stop bolts to bring it level (again, see drawing 100-169). To do this, raise the C-90 truck side frame using a forklift; turning the bolts counter clockwise will raise the frame, turning them clockwise will lower the frame.

Roll the TMA up to the back of the truck and align it with the backing plate. Attach the TMA to the backing plate with four (4) 1"-8 x 3" bolts using the inner holes. Tighten the bolts until they are snug.

Note: it is important that adequate tack welds were applied to the backing plate as they are the only thing that will be holding the weight of the TMA.





DETAIL A
SCALE 1 : 12

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San Clemente, CA 92673
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TITLE:
Scorpion C-90 TMA Installation
Flat Bed Mount

SIZE	DWG. NO.	REV
B	1000-172	A

DRAWN BY:	DATE:	APPROVED BY:	DATE:	
Ryan Selvius	11/1/16	GM	11/7/16	SHEET 5 OF 8

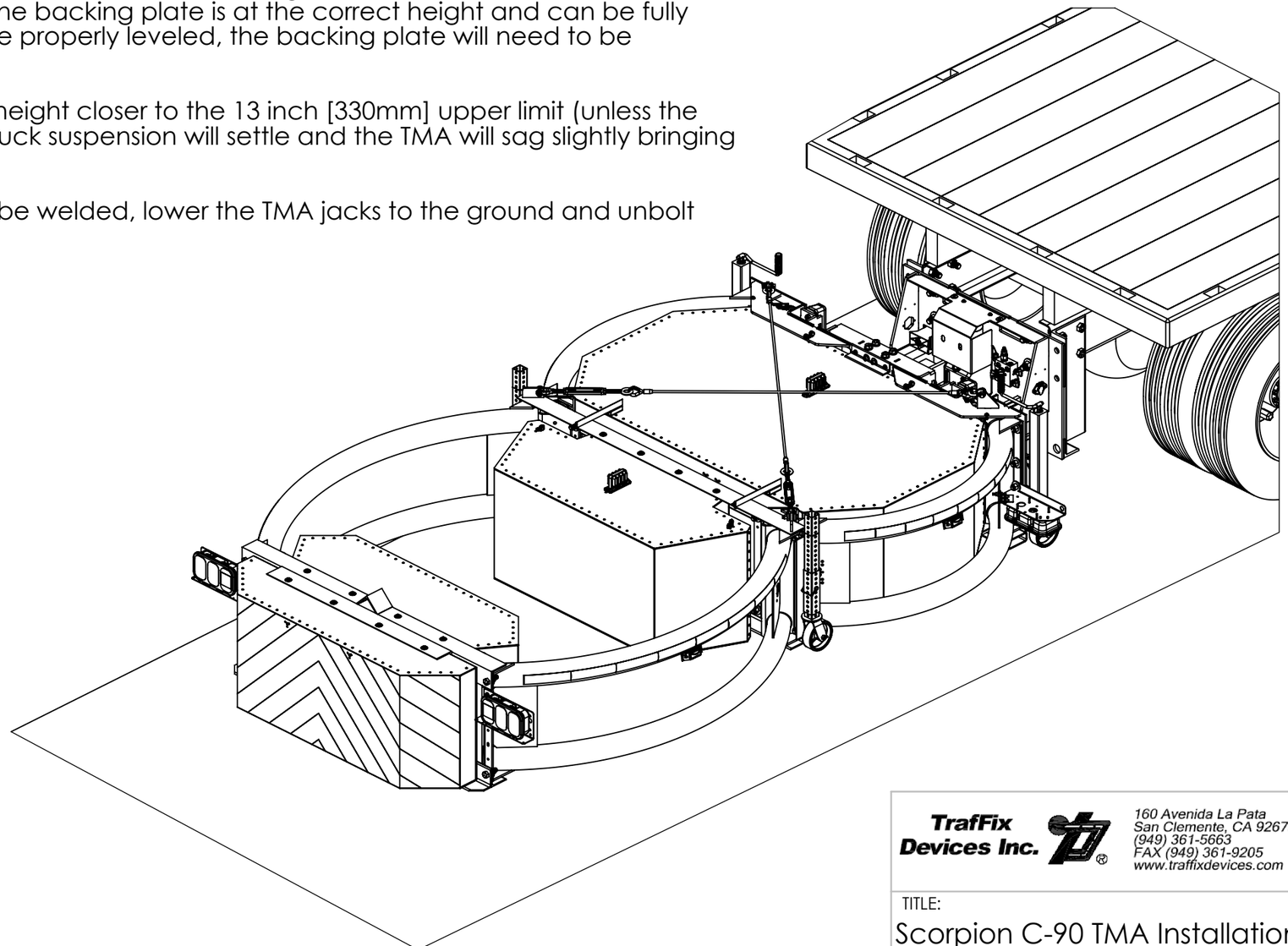
Scorpion C-90 Installation: Flat Bed Mount

Step 5: Check Ride Height of TMA

Once the TMA is securely bolted to the truck, remove the temorary ballast on the truck bed. Raise all 4 of the jacks until the truck is carrying the weight of the TMA. Inspect the TMA to verify that it is reasonably level with the truck. Proceed to take ride height measurements as outlined in drawing 1000-169. If the TMA ride height is within specification or is close enough that it can be adjusted using the stop bolts, then the backing plate is at the correct height and can be fully welded. If the TMA is excessively high or low and cannot be properly leveled, the backing plate will need to be removed and repositioned.

Note: it is best practice for the TMA to start out with a ride height closer to the 13 inch [330mm] upper limit (unless the truck is equipped with air ride suspension). Over time the truck suspension will settle and the TMA will sag slightly bringing the ride height close to the desired 12 inches [305mm].

Once it has been determined that the backing plate can be welded, lower the TMA jacks to the ground and unbolt the TMA from the truck.



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Flat Bed Mount

SIZE	DWG. NO.	REV
B	1000-172	A

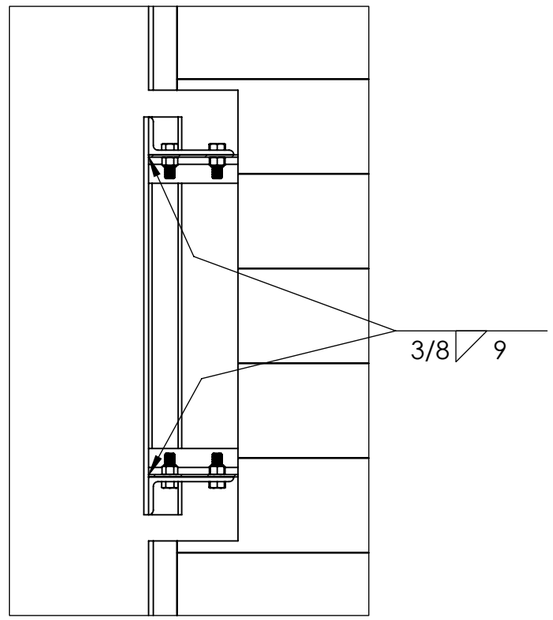
DRAWN BY:	DATE:	APPROVED BY:	DATE:	
Ryan Selvius	11/1/16	GM	11/7/16	SHEET 6 OF 8

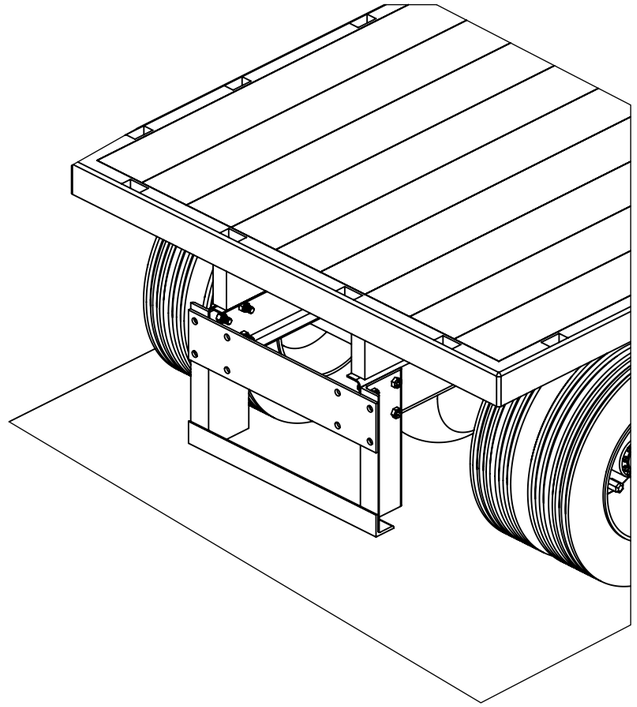
Scorpion C-90 Installation: Flat Bed Mount

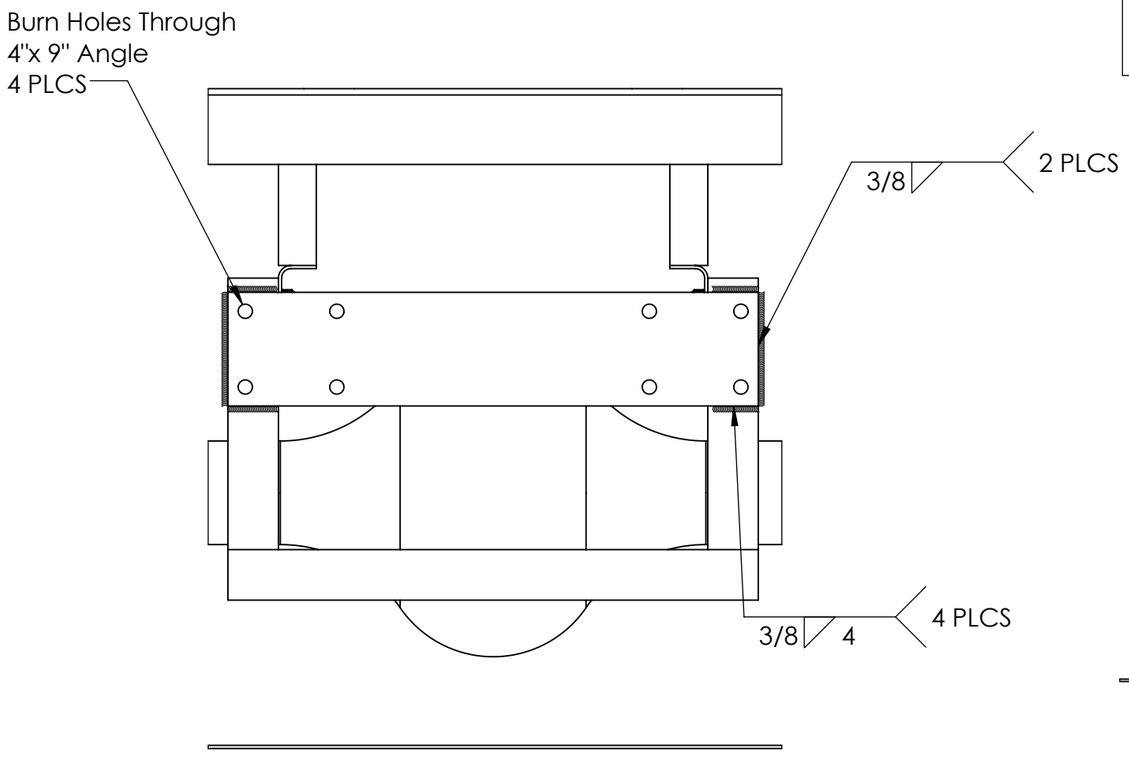
Step 6: Welding the Backing Plate

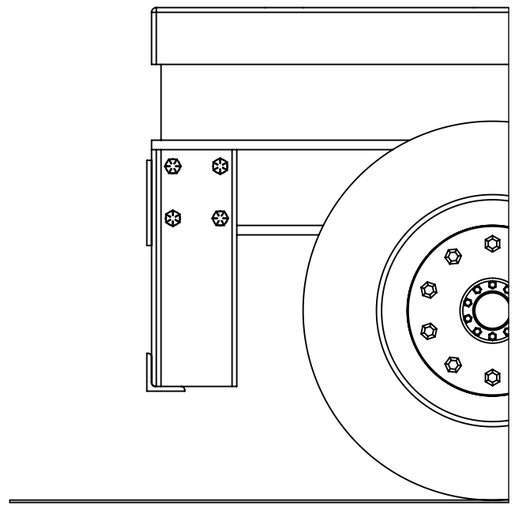
Burn holes through the 4" leg of the 4" x 9" angles in line with the backing plate holes. Fully weld the backing plate in place. Grind off all slag and weld spatter adjacent to the holes.

Sand off any bubbled powder coating near the welds. Primer all surfaces that are unfinished and apply at least two coats of paint.









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Flat Bed Mount

SIZE	DWG. NO.	REV
B	1000-172	A

DRAWN BY:	DATE:	APPROVED BY:	DATE:	SHEET 7 OF 8
Ryan Selvius	11/1/16	GM	11/7/16	

TrafFix Devices Inc.

21 October, 2019

TrafFix Devices Inc is the manufacturer of the Scorpion Truck Mounted Attenuator Model C-90 (TMA).
TrafFix Devices Inc reviewed the installation of the C-90 Scorpion TMA for use in New Zealand and we have designed a mounting plate (reference drawing 11174 Rev B) to be suitable for mounting the C-90 to a host truck with an installation height of between 250 and 265mm above the ground.

When installed correctly, the mounting plate (11174 Rev B) will provide proper mounting, and meet the requirements of MASH for the Scorpion Truck Mounted Attenuator model C-90.

Sincerely,



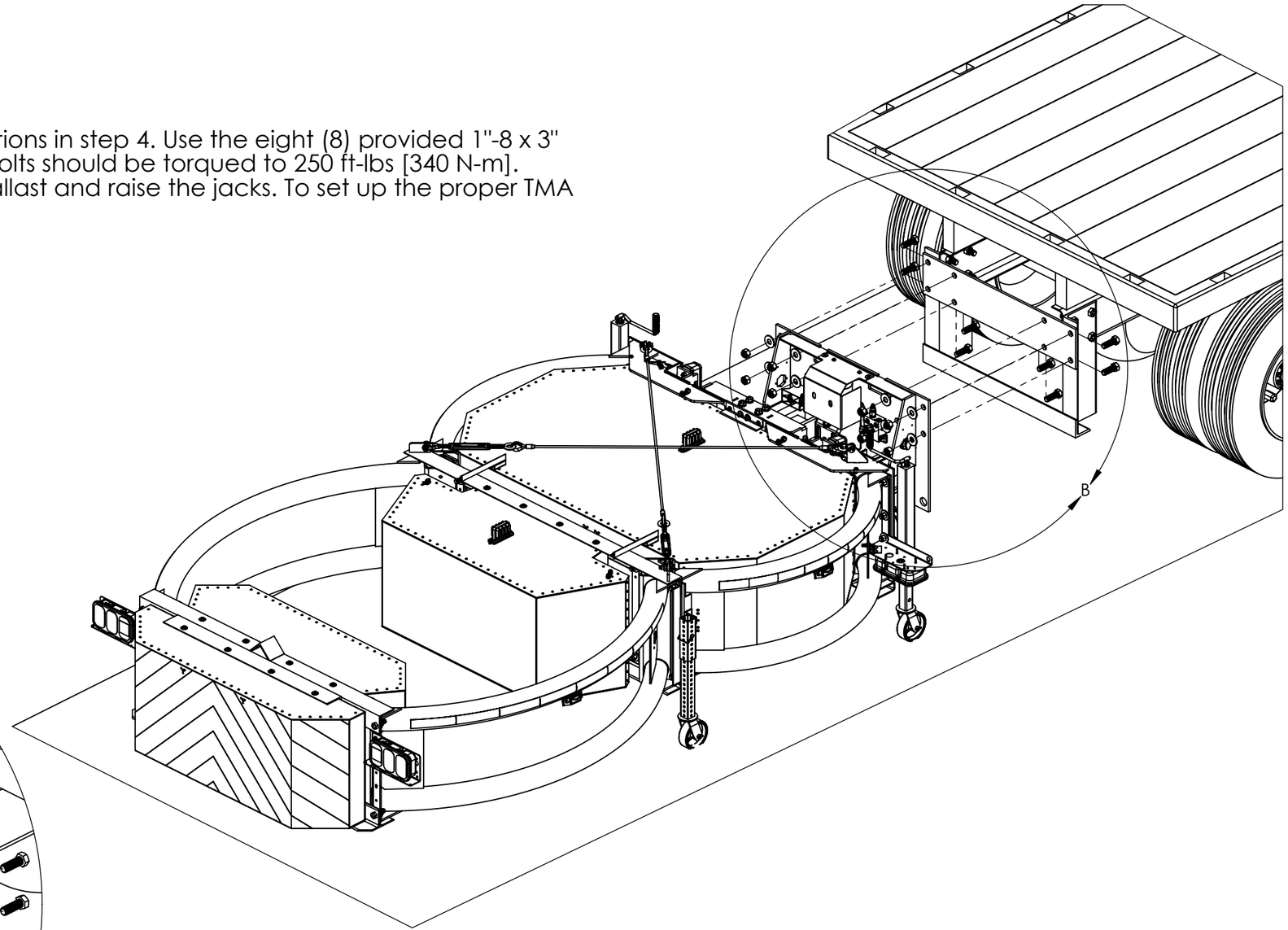
Geoff Maus
Vice President of Engineering
TrafFix Devices Inc.

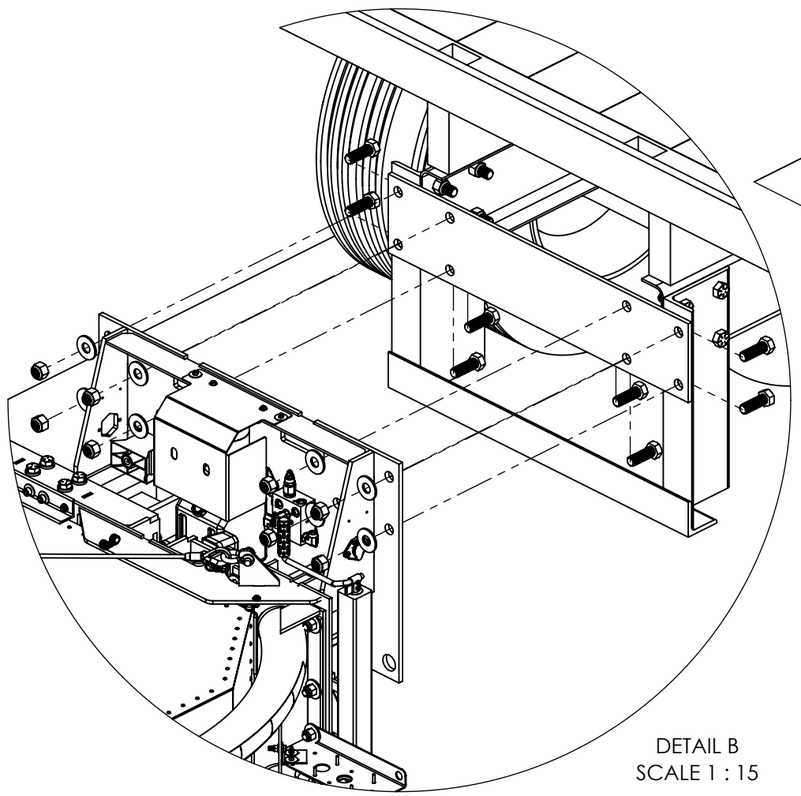
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San Clemente, California 92673
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FAX (949) 361-9205
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Scorpion C-90 Installation: Flat Bed Mount

Step 7: Attaching and Leveling the TMA

Attach the TMA to the truck following the same directions in step 4. Use the eight (8) provided 1"-8 x 3" bolts, locknuts, and washers to attach the TMA. The bolts should be torqued to 250 ft-lbs [340 N-m]. Once the TMA is attached, remove the temporary ballast and raise the jacks. To set up the proper TMA ride height, consult drawing 1000-169.





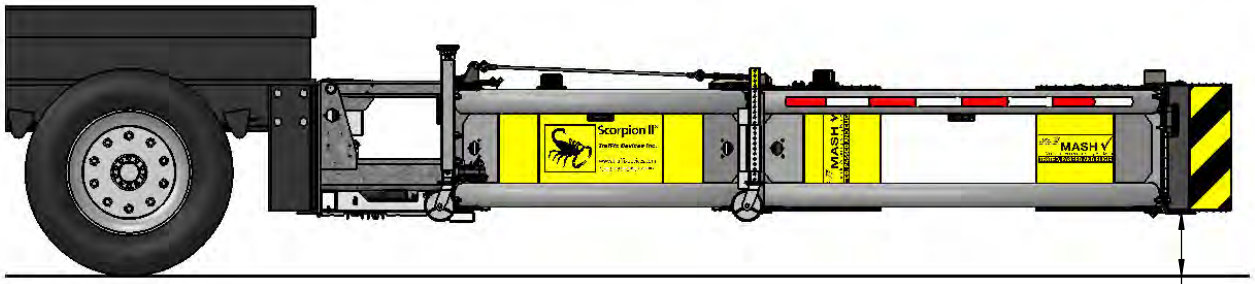
DETAIL B
SCALE 1 : 15

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TITLE:
Scorpion C-90 TMA Installation
Flat Bed Mount

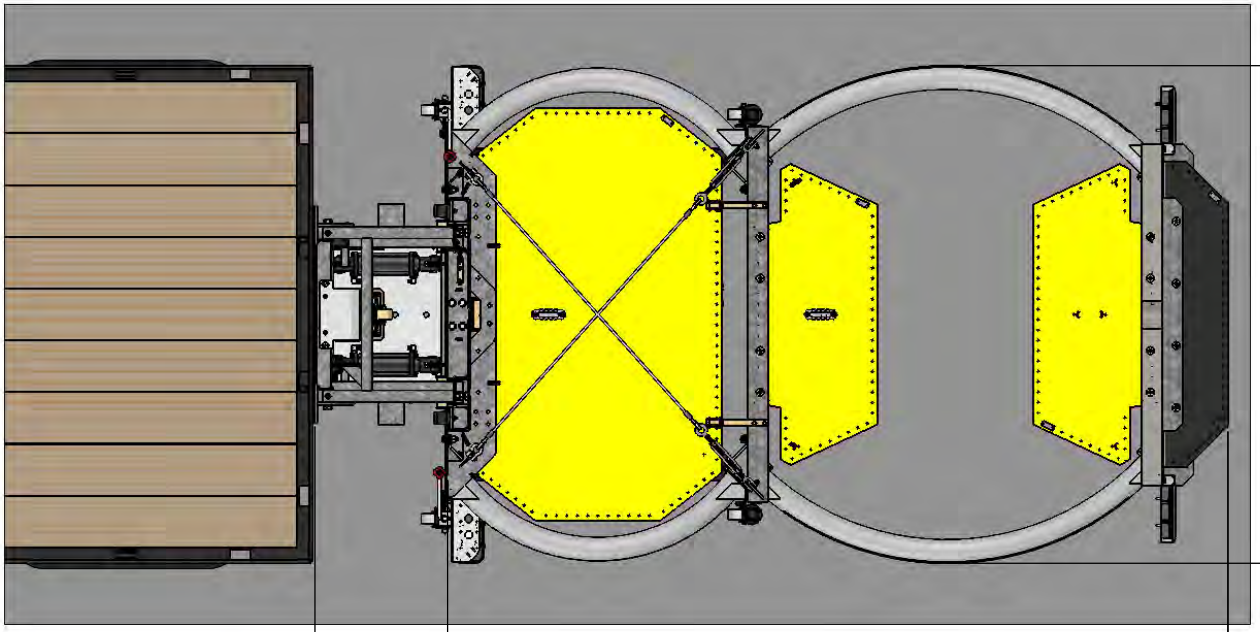
SIZE	DWG. NO.	REV
B	1000-172	A

DRAWN BY:	DATE:	APPROVED BY:	DATE:	
Ryan Selvius	11/1/16	GM	11/7/16	SHEET 8 OF 8





304.8±25.4mm



96"
[2438.4]

150.74
[3828.9]

176.38
[4480]

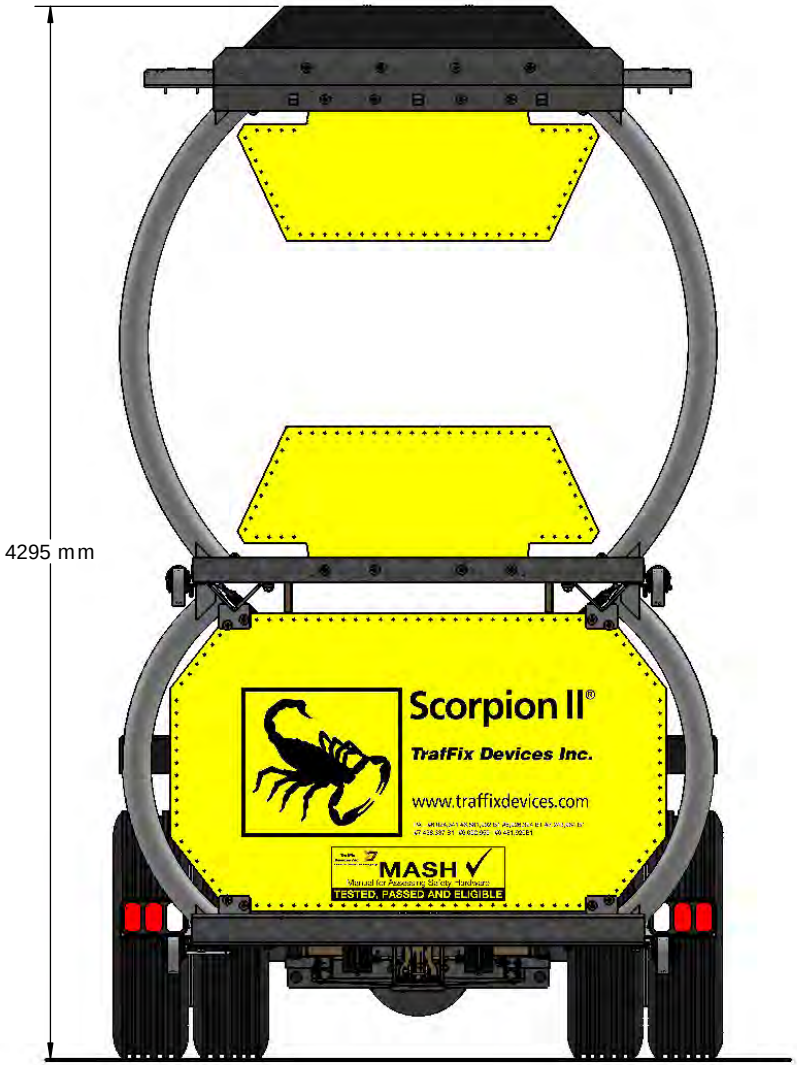
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TITLE:
Scorpion II TL-3 C-90, Overall Dimensions, Flatbed Truck

SIZE	DWG. NO.	REV
B	1000-197NZ	A

DRAWN BY:	DATE:	SHEET
Ryan Selvius	06/07/19	SHEET 1 OF 2





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TITLE:
Scorpion II TL-3 C-90, Overall Dimensions, Flatbed Truck

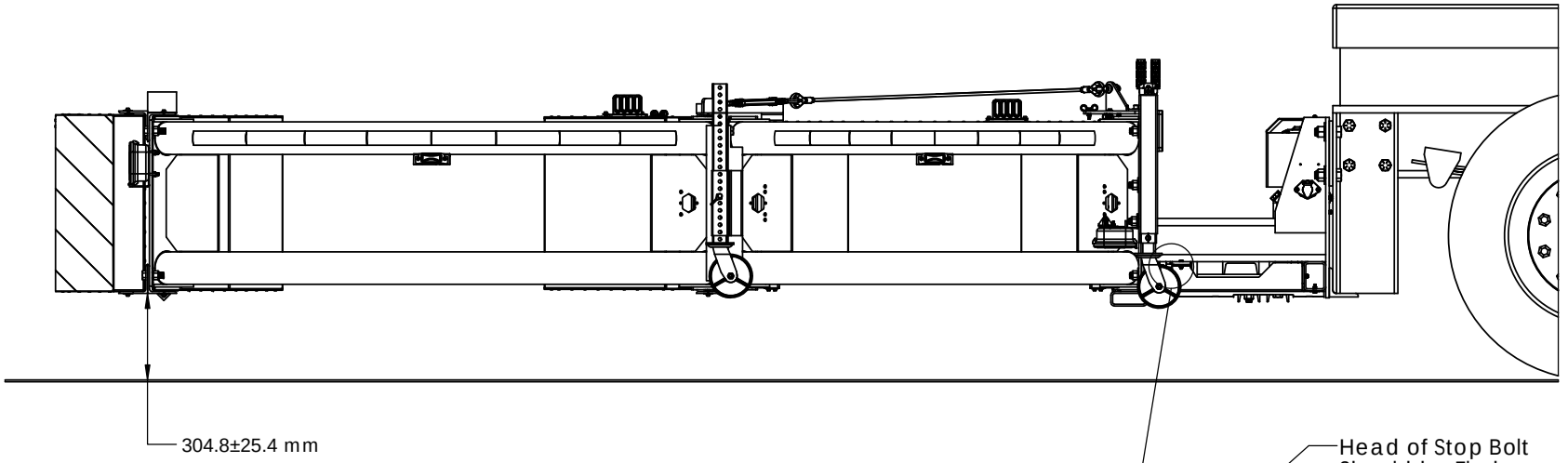
SIZE	DWG. NO.	REV
B	1000-197NZ	A

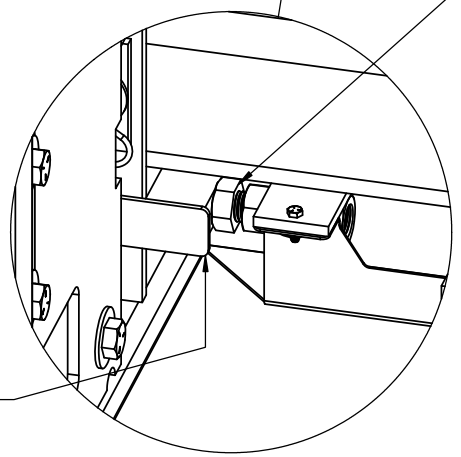
DRAWN BY:	DATE:	SHEET 2 OF 2
Ryan Selvius	06/07/19	

Ride Height Adjustment: Scorpion C-90

Step 1.

Position the TMA truck on solid level ground and lower the TMA to the fully deployed position. Measure the ride height at the rear diaphragm on both sides of the TMA. Both measurements must be 304.8mm +/- 25.4mm for the TMA to perform as designed. If the height measurement falls within specification, verify that both stop bars (PN 11509) are contacting the heads of the stop bolts (PN 12129). An easy way to tell is by inserting a piece of paper between the stop bar and bolt head as they come together. If the paper is tightly pinched on both sides, the bolts are adjusted correctly. If any one of these items is not correctly adjusted, please proceed to step 2.





Recommended Tools:

- Torque Wrench
- 1-1/2" Crowfoot Wrench
- Ratchet: 1/2" drive
- Breaker Bar: 1/2" drive
- Sockets: 1-1/2"
- Tape Measure



Follow proper lock out/tag out procedures at all times when performing any repair, maintenance, or adjustments to the Scorpion C-90 TMA.

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FAX (949) 361-9205
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TITLE: Ride Height Adjustment Scorpion C-90 TMA

SIZE	DWG. NO.	REV
B	1000-169NZ	A

DRAWN BY:	DATE:	APPROVED BY:	DATE:	SHEET 1 OF 2
Ryan Selvius	06/07/19	GM	06/07/19	

Ride Height Adjustment: Scorpion C-90

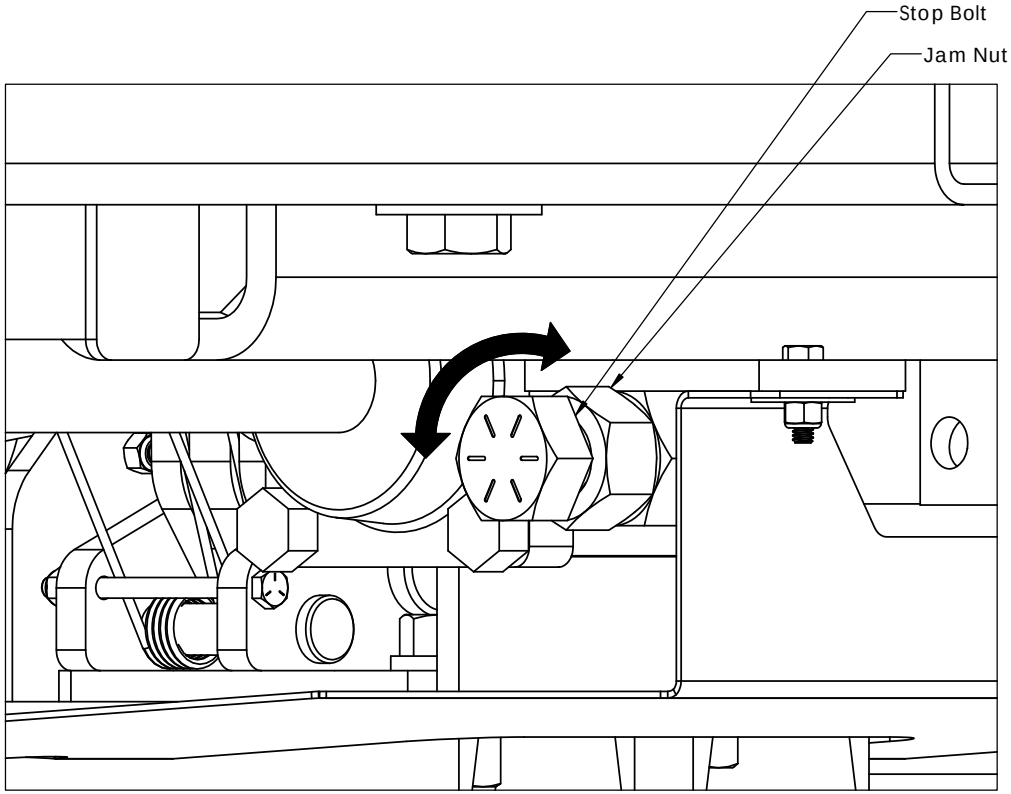
Step 2.

Raise the TMA to the fully stored position and verify that the locking latch has engaged. It is very important that the locking latch be engaged so as to prevent any unexpected movement of the TMA that could cause injury to workers. Loosen both jam nuts so the stop bolts may be adjusted. If the measurements taken in step 1 showed that the ride height was too high, turn the stop bolts clockwise which will lower the TMA. If the ride height was too low, turn the stop bolts counter clockwise which will raise the TMA.

Each 1/3 turn of the stop bolts will result in approximately 1" [25mm] of height change at the rear of the TMA.

After each adjustment, lower the TMA and check the height measurements outlined in step 1. Once the required ride height has been attained at all 4 locations, adjust the stop bolts until the heads are in contact with both stop bars. Verify that the heads are making proper contact by performing the paper pinch check. Once the bolts have been properly adjusted, raise the TMA to the fully stored position so the jam nuts can be tightened. Apply at least 400 ft-lbs [540 N-m] of torque to ensure the jam nuts do not loosen.

If proper ride height cannot be accomplished, please contact TrafFix Engineering for assistance.



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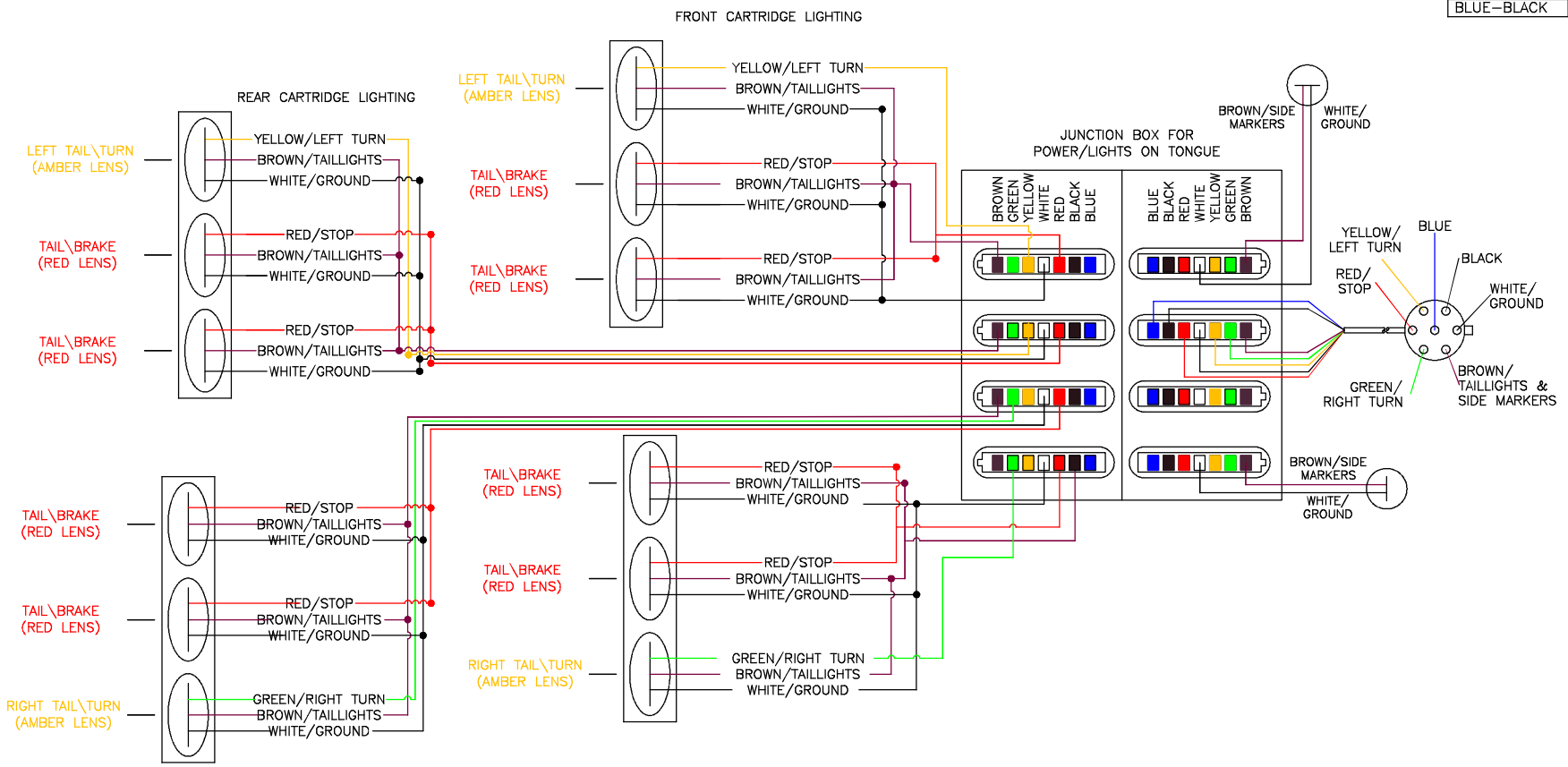
TITLE: Ride Height Adjustment Scorpion C-90 TMA

SIZE	DWG. NO.	REV
B	1000-169NZ	A

DRAWN BY:	DATE:	APPROVED BY:	DATE:	SHEET 2 OF 2
Ryan Selvius	06/07/19	GM	06/07/19	

7 WAY PLUG WIRING	
WHITE	GROUND
BLACK	--
YELLOW	LEFT TURN
RED	STOP
GREEN	RIGHT TURN
BROWN	TAILLIGHTS
BLUE-BLACK	--

LIGHT WIRING DIAGRAM FOR NEW ZEALAND



NOTES: UNLESS OTHERWISE SPECIFIED.

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE IN INCHES.

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NEW ZEALAND TMA
DETAILED 24V WIRING DIAGRAM

DRAWN BY:	DATE:
Mary Dralle	04-09-12
CHECKED BY:	DATE:
APPROVED BY:	DATE:

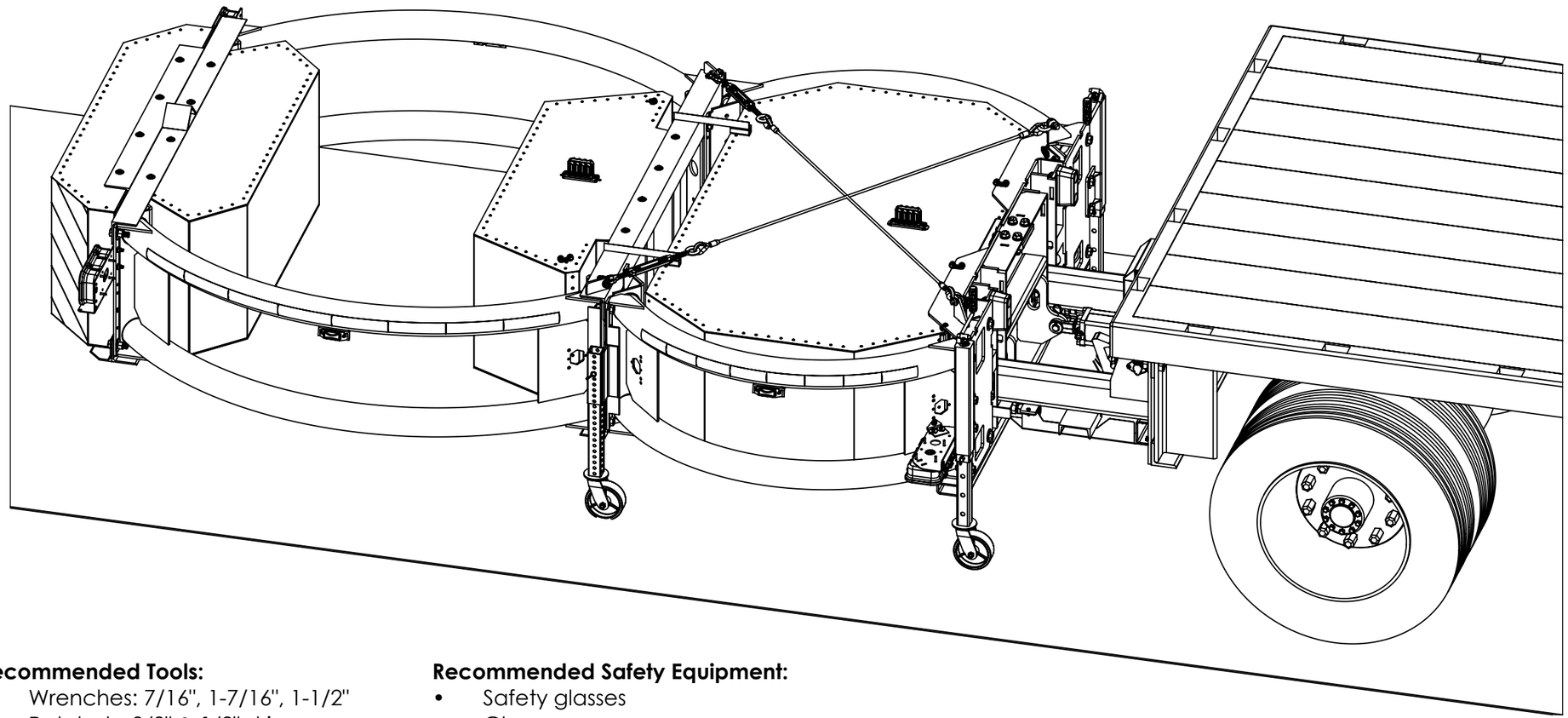
SIZE	DWG NO.	REV
B	1000-115	A

SCALE 1/1 SHEET 1 OF 1

Bearing Replacement: Scorpion C-90 Frame

Step 1.

Position the TMA truck on solid level ground and lower TMA to the fully deployed position. Lower the drop jacks until they hit the ground, then slightly raise the TMA until the next highest pin hole on the drop jack will align and reinstall the lock pin. Lower the TMA slightly until the drop jacks are carrying weight. Lower the drop legs on the front jacks to the lowest possible position and then begin cranking the handle until the wheels contact the ground. Crank the jacks until the weight has been taken off of the pivot pins (PN 10939). This will be apparent when the pivot pins can be rotated by hand.



Recommended Tools:

- Wrenches: 7/16", 1-7/16", 1-1/2"
- Ratchets: 3/8" & 1/2" drive
- Sockets: 3/16" Allen, 1-1/2"
- Hammer and punches
- Cylindrical wire brush
- Heavy Duty Wheel Bearing Grease

Recommended Safety Equipment:

- Safety glasses
- Gloves
- Steel toe boots



Follow proper lock out/tag out procedures at all times when performing any repair, maintenance, or adjustments to the Scorpion C-90 TMA.

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160 Avenida La Pata
San Clemente, CA 92673
(949) 361-5663
FAX (949) 361-9205
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TITLE: Bearing Replacement Scorpion C-90 TMA

SIZE	DWG. NO.	REV
B	1000-168	A

DRAWN BY:	DATE:	APPROVED BY:	DATE:	
Ryan Selvius	10/24/16	GM	10/31/16	SHEET 1 OF 5

Step 2: Disconnect Strut Power Cable

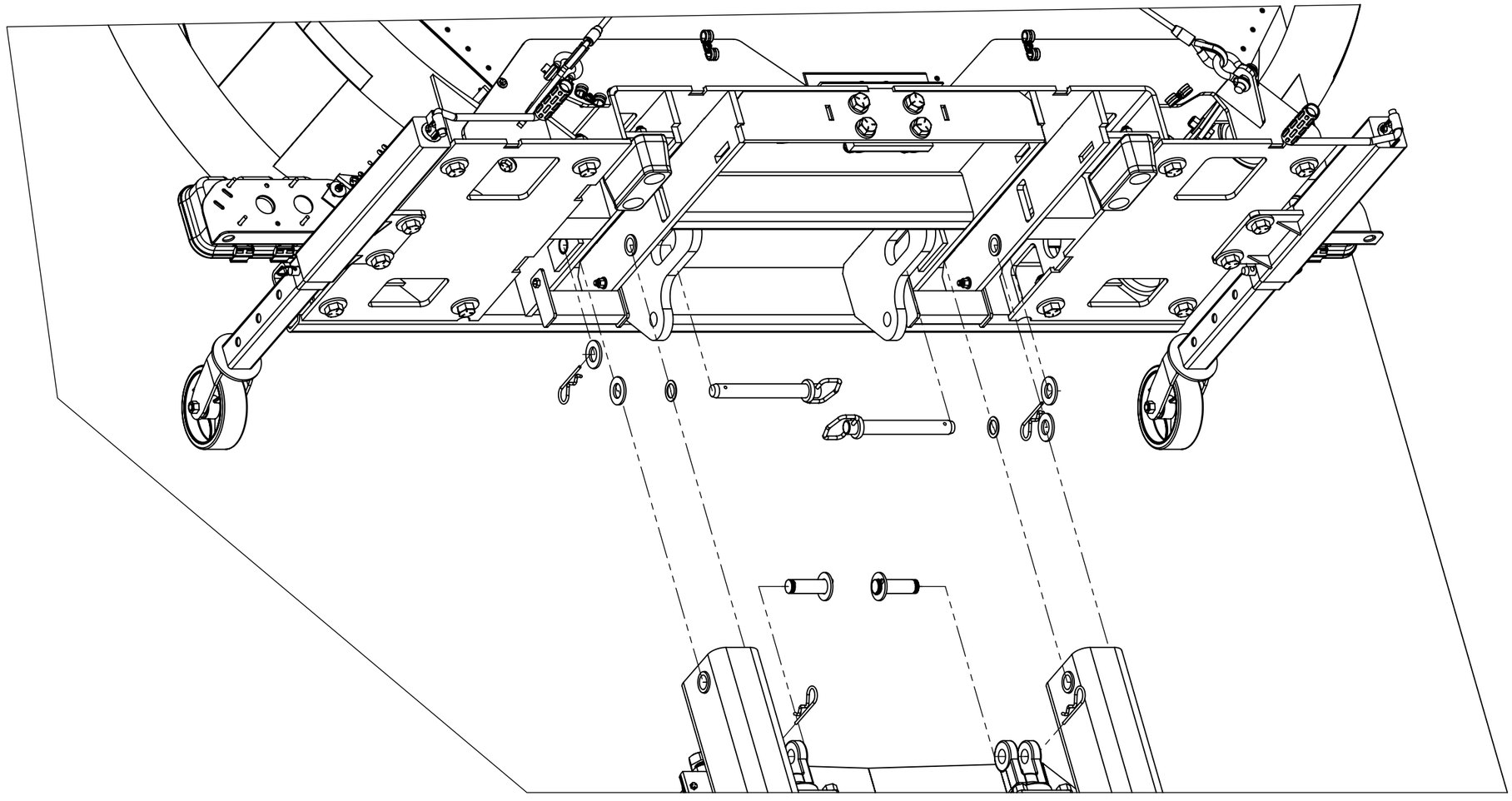
Before the TMA can be seperated from the C-90 frame, the lighting power cable needs to be disconnected. Remove the screws and loop clamps identified in the photo below. Disconnect the the large power cable that connects to the truck and feed it back through until it is seperated from the C-90 backup frame (PN 11502-01).



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TITLE: Bearing Replacement Scorpion C-90 TMA		
SIZE B	DWG. NO. 1000-168	REV A
DRAWN BY: Ryan Selvius	DATE: 10/24/16	APPROVED BY: GM / DATE: 10/31/16
SHEET 2 OF 5		

Step 3: Seperating the C-90 Frame

Once the strut power cable is clear and the weight of the TMA is being carried by the jacks instead of the pivot pins, the C-90 frame can be seperated. Remove the keeper pins from the pivot pins (PN 10939) and the cylinder clevis pins (PN 12015-3.375). Remove the pivot pins and clevis pins as shown below. Block the casters on the TMA so it can't roll away and then pull the truck forward far enough to provide room to work.



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TITLE:
Bearing Replacement
Scorpion C-90 TMA

SIZE	DWG. NO.	REV
B	1000-168	A

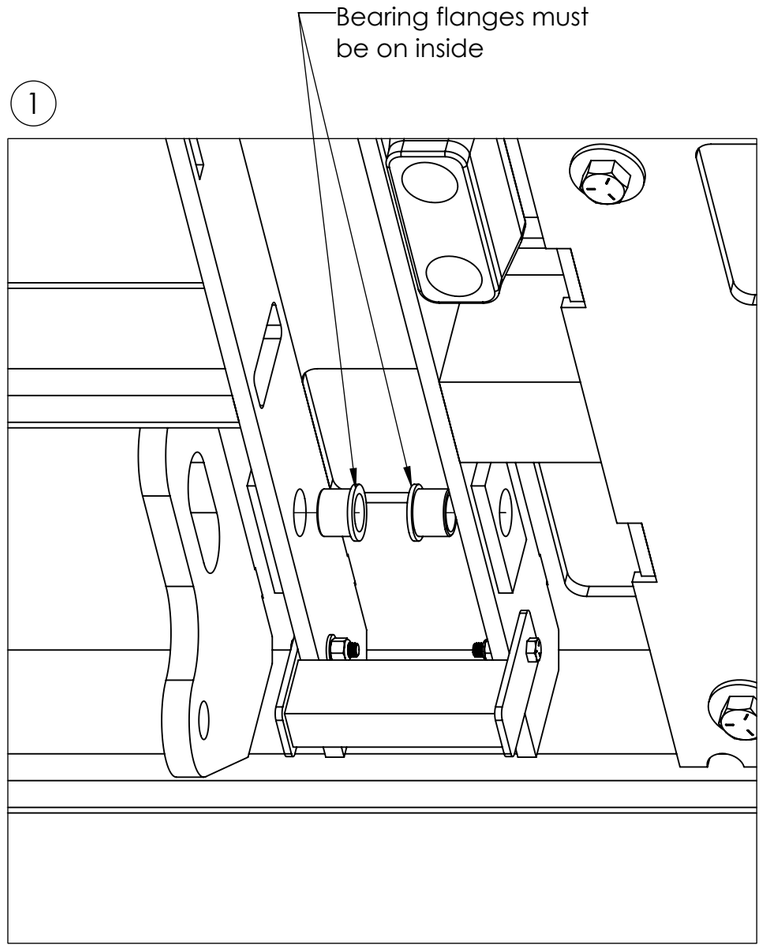
DRAWN BY:	DATE:	APPROVED BY:	DATE:	
Ryan Selvius	10/24/16	GM	10/31/16	SHEET 3 OF 5

Step 4: Replace Worn Bearings

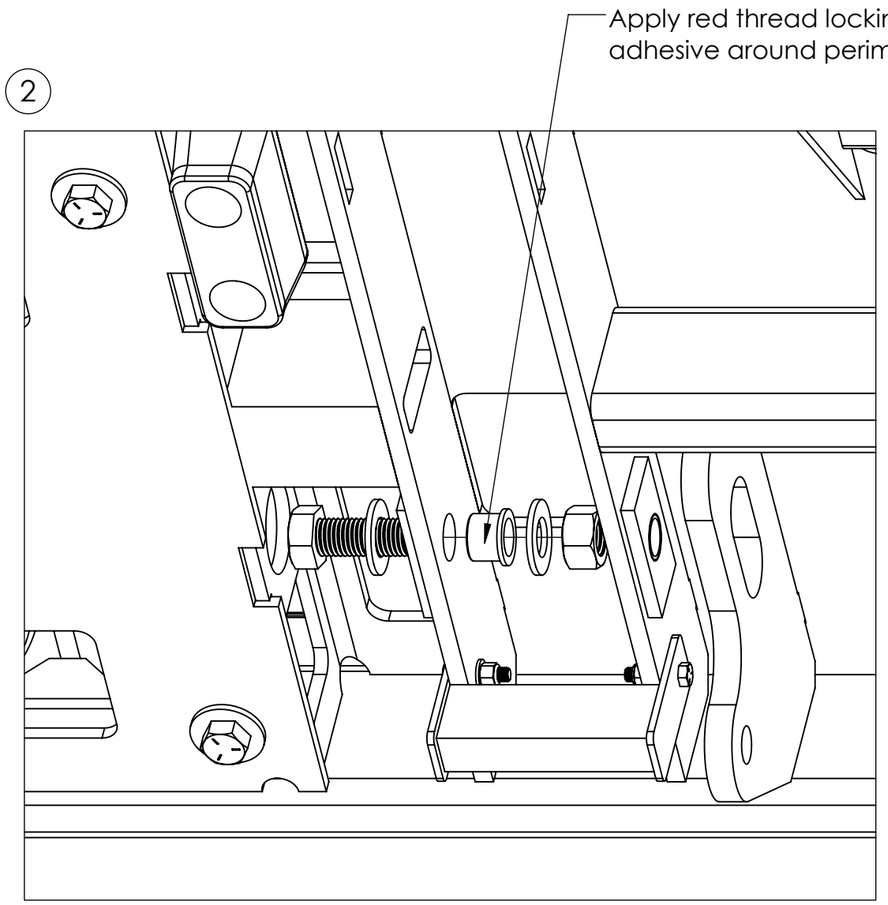
(1) Remove the worn bearings (four total) from the vertical pivot plates on the backup. Use a wire brush to clean the bearing holes until all debris, dirt, grease, and residues have been removed and the surface of the steel is shiny. Inspect the condition of the bearing holes for any deformation, elongation, or wear. If there is any damage or wear present on the holes, please consult with the TrafFix Engineering department for assistance before proceeding with bearing replacement.

(2) Use a 1"-8 x 3" bolt, nut, and a couple washers (or an M24 x 70 bolt, nut and washers) to install the new bearings. Apply a bead of red thread locking adhesive to the perimeter of the bearing OD. Insert the bearing with the flange on the inside and insert the bolt into the bearing and tighten the nut. Continue tightening the nut until it is snug; this will drive the bearing into the hole in the plate and fully seat it in place. Repeat for all 4 bearings.

1



2



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TITLE:

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SIZE	DWG. NO.	REV
B	1000-168	A

DRAWN BY:	DATE:	APPROVED BY:	DATE:	
Ryan Selvius	10/24/16	GM	10/31/16	SHEET 4 OF 5

Step 5: Reconnecting the C-90 Frame

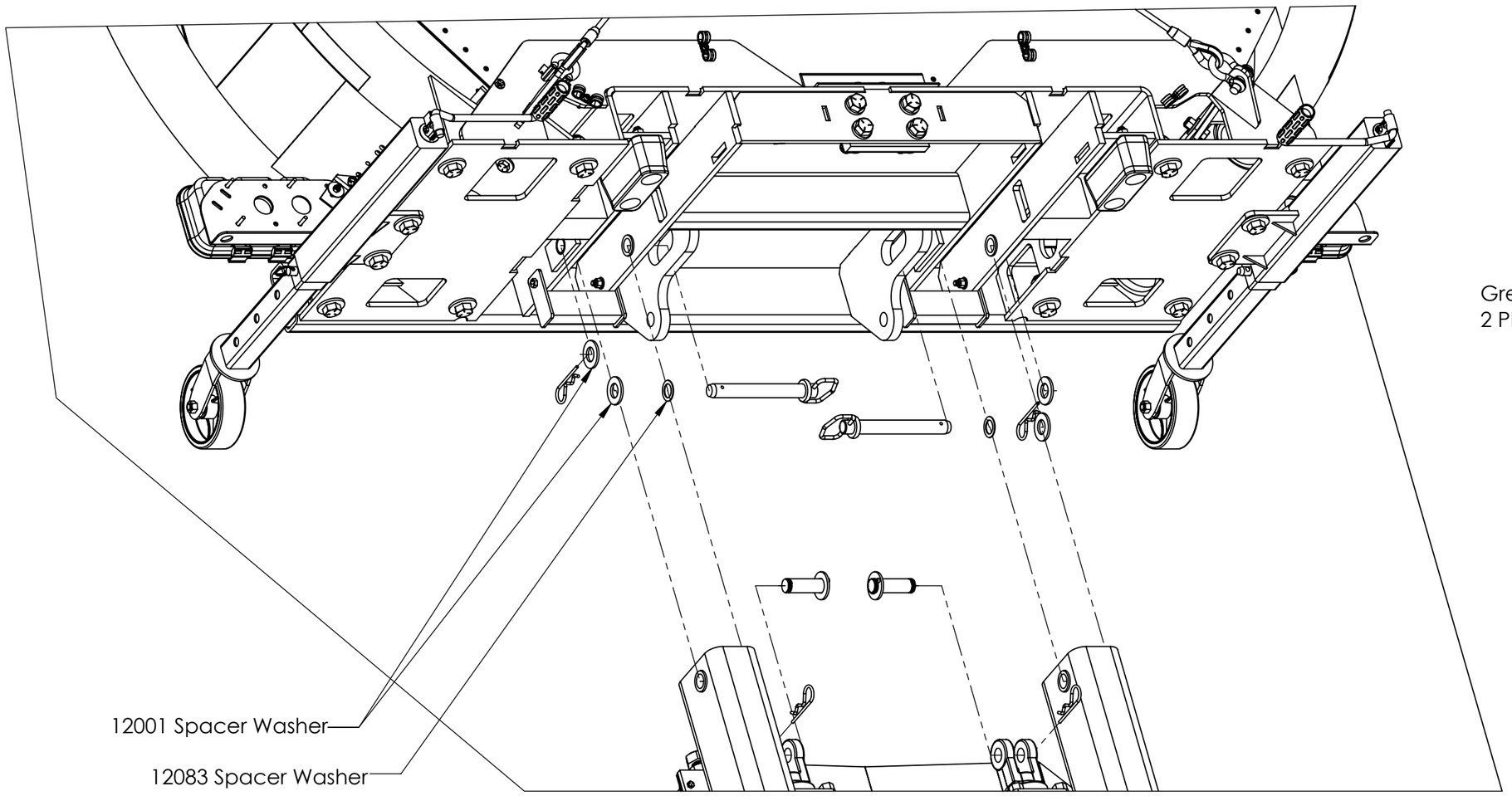
Once the new bearings have been installed, back the truck up to the TMA and re-align the pivot axis. When reinstalling the pivot pins, be sure to also install the provided spacer washers (PN's 12001 and 12083). These are important as they occupy the extra space and prevent the bearings from walking out. Please note, the spacer washers may need to be installed differently than depicted, their orientation is dependent on the size and locations of the gaps.

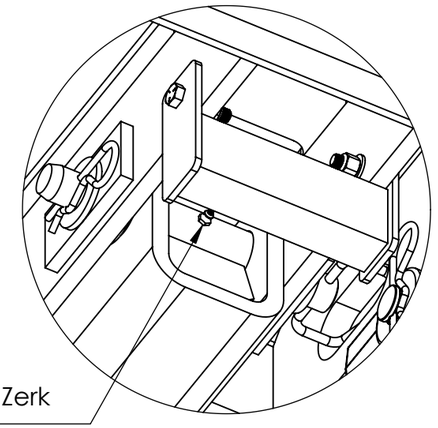
Next, reinstall the clevis pins for the hydraulic cylinders.

After the pivot pins and cylinder clevis pins have been reinstalled and secured with keeper pins, crank up the front jacks and raise the drop legs. Power the TMA and rotate it to the stored position. Locate the two grease zerks for the pivot and apply heavy duty wheel bearing grease with a grease gun. Insert grease until it just begins to exit the ends of each tube.

Lower the TMA and verify that the stop bolts are adjusted properly. When the TMA is fully deployed, the stop bars should be in contact with both bolt heads and the rear of the TMA should be 12" +/- 1" [305mm +/- 25.5mm] from the ground (see drawing 1000-169).

Reinstall the strut power cable by following the sequence in step 2 in reverse order.





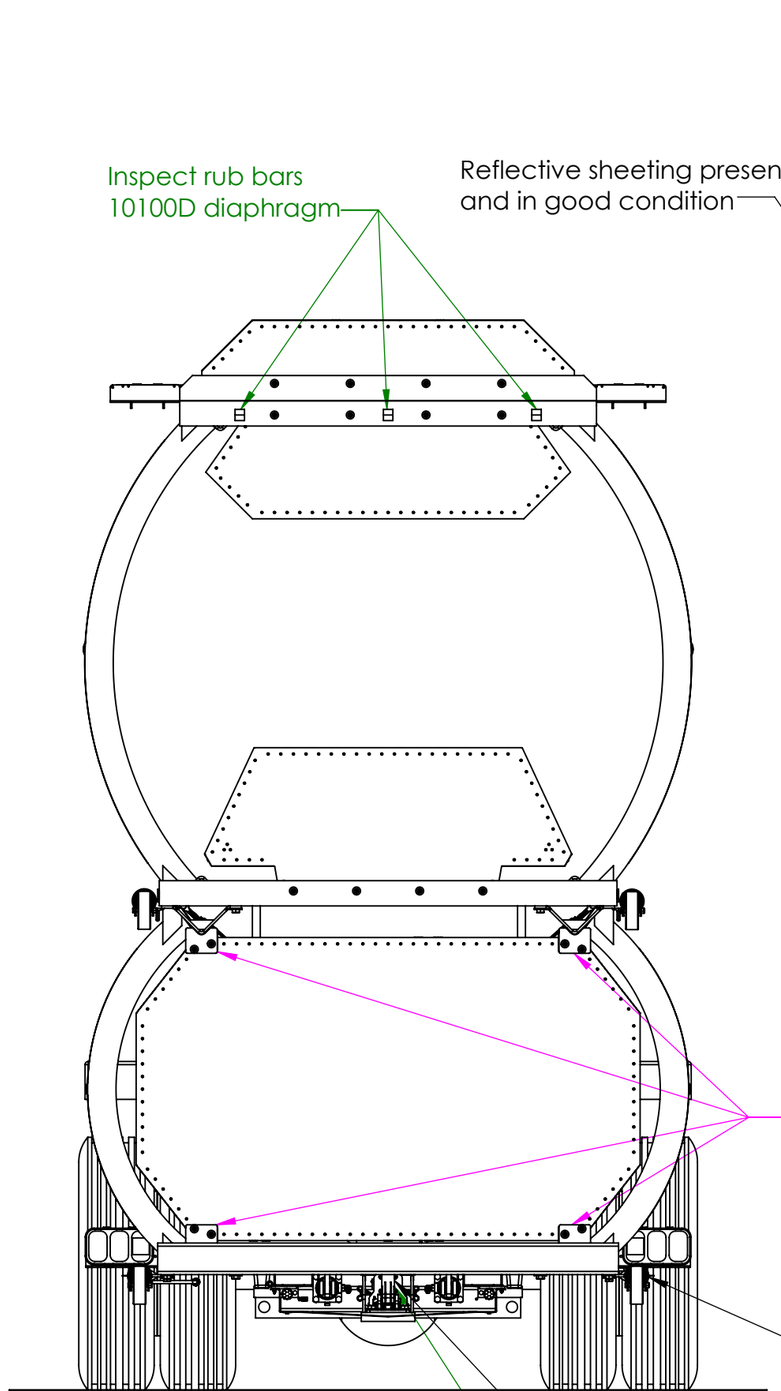
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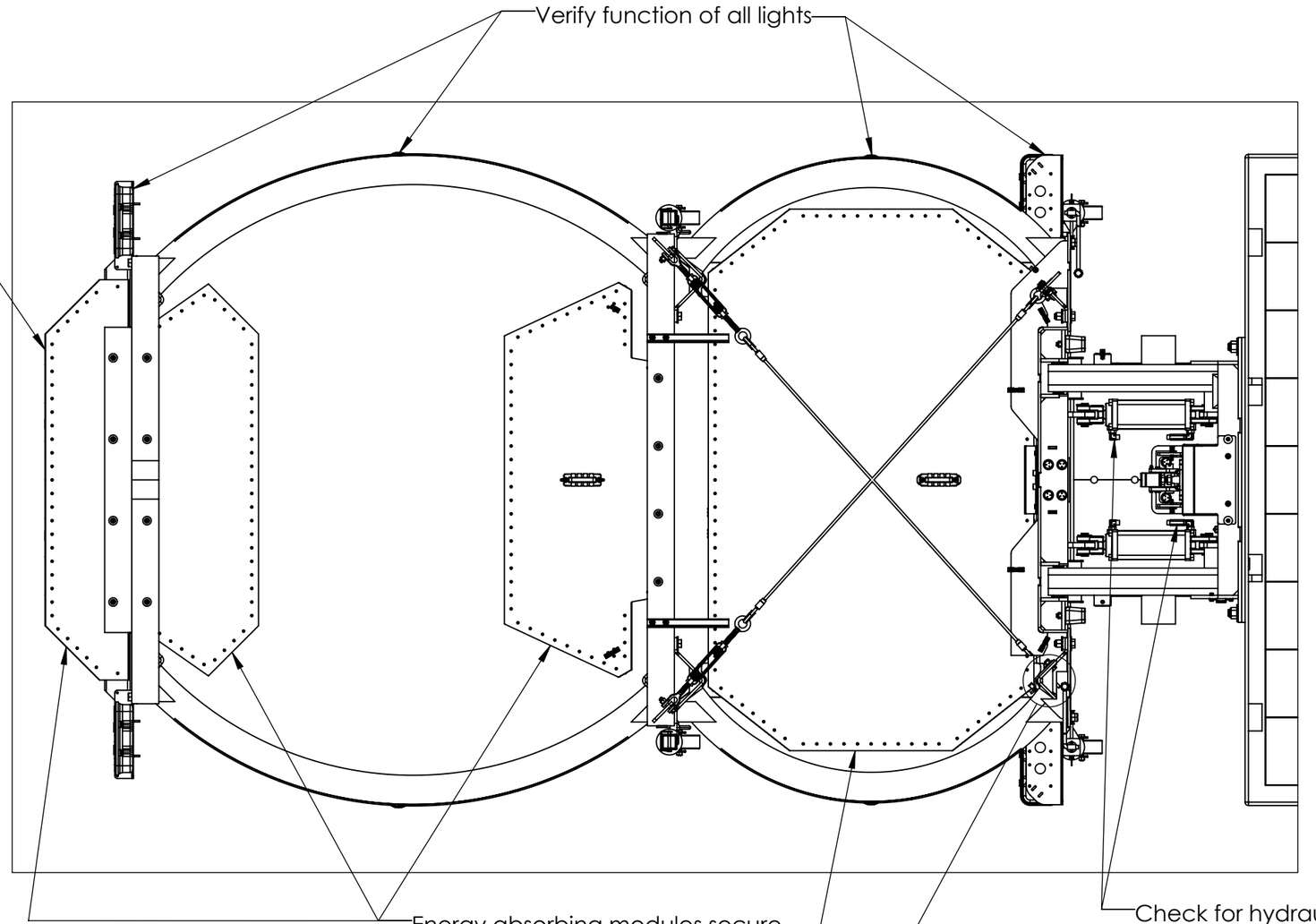
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Bearing Replacement
Scorpion C-90 TMA

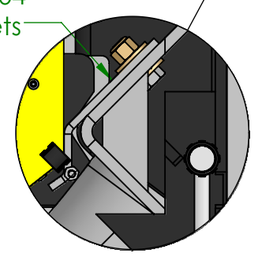
SIZE	DWG. NO.	REV
B	1000-168	A

DRAWN BY:	DATE:	APPROVED BY:	DATE:	SHEET 5 OF 5
Ryan Selvius	10/24/16	GM	10/13/16	

Inspection and Maintenance Overview: Scorpion C-90 TMA







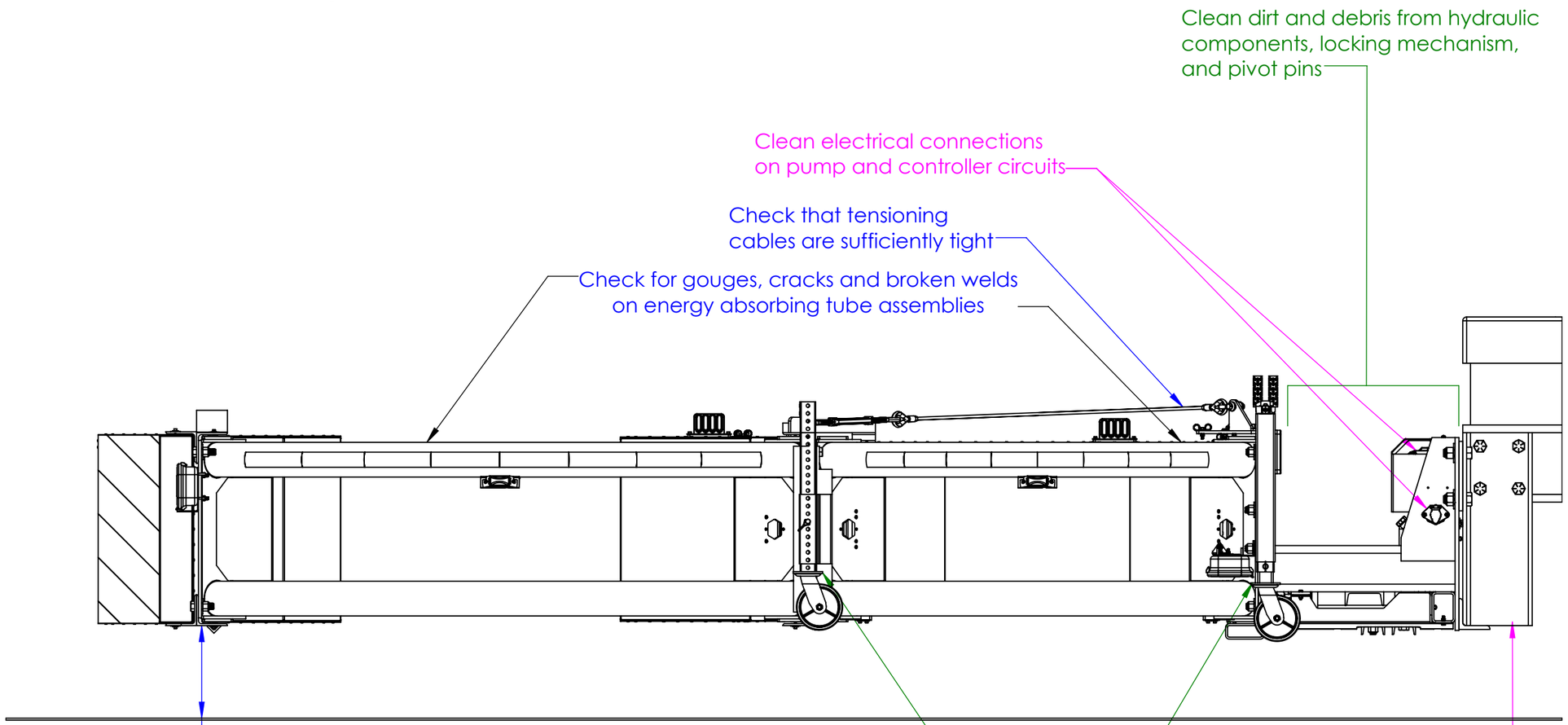
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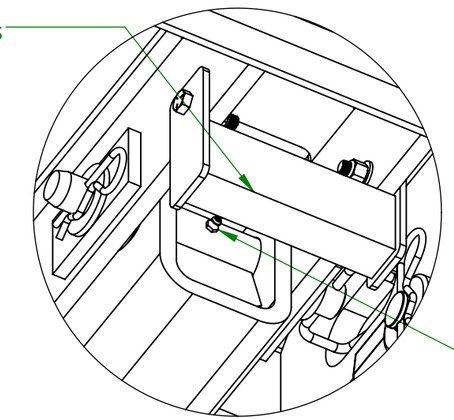
TITLE:
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Scorpion C-90 TMA

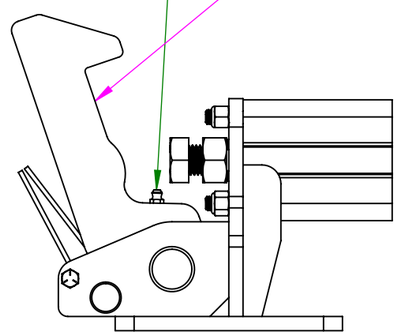
SIZE	DWG. NO.	REV
B	1000-171	A

DRAWN BY:	DATE:	APPROVED BY:	DATE:	
Ryan Selvius	10/28/16	GM	11/1/16	SHEET 1 OF 3

Inspection and Maintenance Overview: Scorpion C-90 TMA







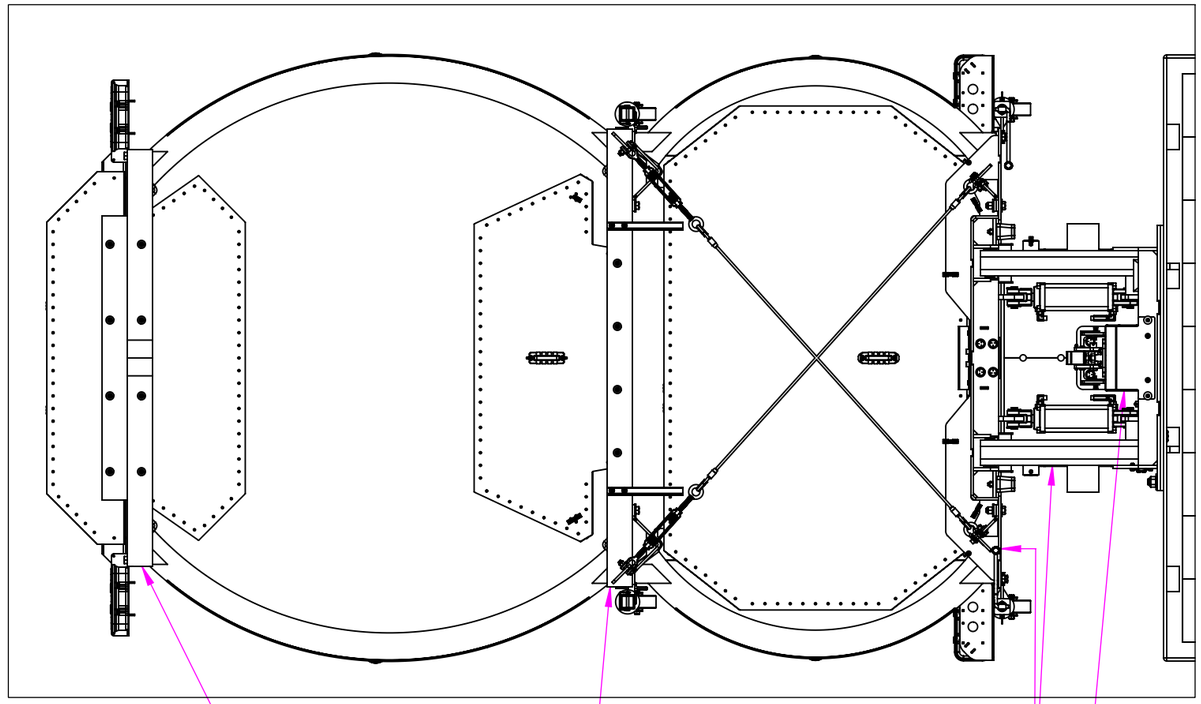
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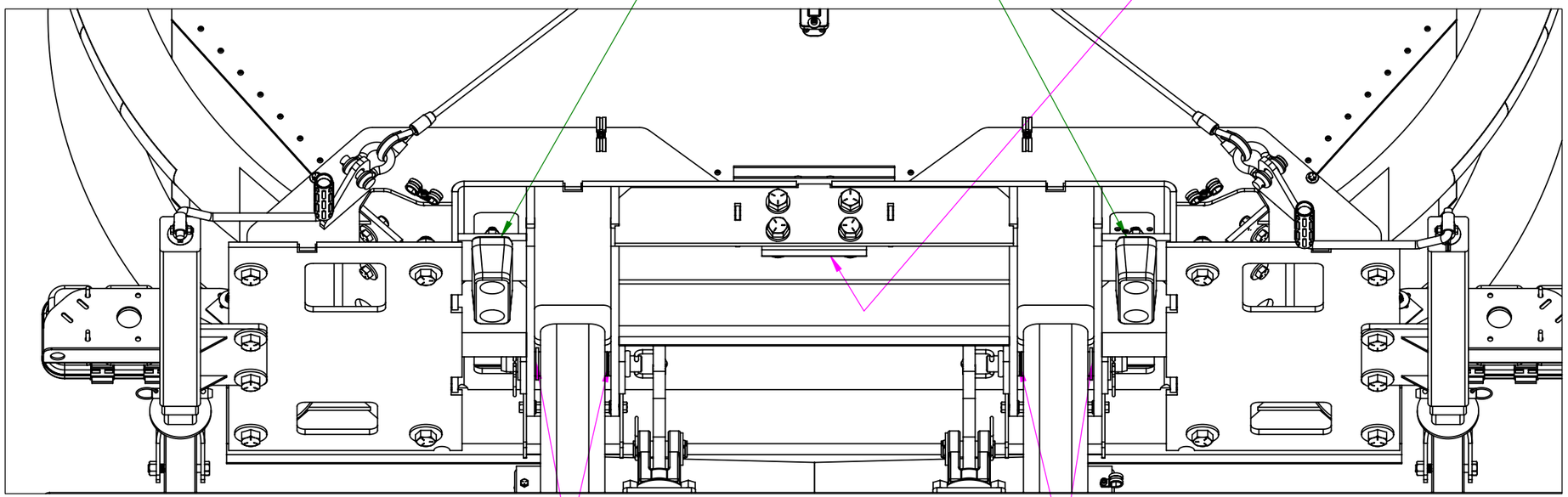
TITLE:
Inspection & Maintenance Overview
Scorpion C-90 TMA

SIZE	DWG. NO.	REV
B	1000-171	A

DRAWN BY:	DATE:	APPROVED BY:	DATE:	
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Inspection and Maintenance Overview: Scorpion C-90 TMA





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San Clemente, CA 92673
(949) 361-5663
FAX (949) 361-9205
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Inspection & Maintenance Overview
Scorpion C-90 TMA

SIZE	DWG. NO.	REV
B	1000-171	A

DRAWN BY:	DATE:	APPROVED BY:	DATE:	
Ryan Selvius	10/28/16	GM	11/1/16	SHEET 3 OF 3

Scorpion C-90 TMA Inspection & Maintenance Schedule

Task	Before Each Use	Weekly	Monthly	Annual	Post Impact
Verify TMA raises and lowers properly	X	X	X	X	X
Verify that locking latch engages in stored position	X	X	X	X	X
Verify function of all lighting	X	X	X	X	X
Verify that reflective sheeting is present and in good condition	X	X	X	X	X
Inspect for hydraulic fluid leaks	X	X	X	X	X
Verify jack crank handles folded up tightly and do not hang down	X				
Verify that energy absorbing modules are secure and in good condition	X	X	X	X	X
Check ride height, adjust if it does not meet specification		X	X	X	X
Inspect for for loose or missing fasteners and hardware		X	X	X	X
Inspect energy aborbing tube assemblies for cracks and gouges		X	X	X	X
Inspect energy absorbing tube assemblies for broken welds		X	X	X	X
Inspect energy absorbing modules for large dents, punctures, broken rivets		X	X	X	X
Verify strut tensioning cables are tight		X	X	X	X
Grease pivot point, locking latch, and jack casters			X	X	X
Inspect condition of rub bars on bottom of 10100D diaphragm, repair if necessary			X	X	
Inspect 11509 stop bars for damage or excessive wear, replace if necessary			X	X	X
Check alignment of 10204 energy absorber bracket, adjust if necessary			X	X	X
Clean hydraulic components, locking mechanism, and pivot pins of dirt and debris			X	X	
Inspect locking latch for correct setup, adjust if necessary			X	X	X
Inspect 11610 bumpers for wear and cracks, replace as needed			X	X	X
Replace pivot bearings				X	
Clean all electrical connections on pump power and controller circuits				X	
Inspect structural integrity of all steel atenuator components				X	X
Inspect structural integrity of truck side mounting components				X	X
Inspect integrity of all welds				X	X
Clean/remove rust and repaint as needed				X	
Replace 10215-RUBBER module D mounting pads				X	
Drain hydraulic system and replace fluid				X	
Inspect locking latch and latch plate for wear and damage, replace if necessary				X	

Task	Before Each Use	Weekly	Monthly	Annual	Post Impact
Verify measurements of strut and cartridge tube assemblies					X
Inspect strut and cartridge tube assemblies for broken welds and damaged gussets					X
Inspect atenuator steel components for deformation and broken welds					X
Check operation of C-90 frame; verify C-90 backup pivots freely without binding					X
Inspect truck side mounting steel for deformation and broken welds					X
Inspect lighting and cable components for damage					X
Inspect reflective sheeting					X
Install all replacement components with new hardware					X