PN 626198

Revision B March 2020

SS180®M

Product Description Assembly Manual

INGAL CIVIL PRODUCTS
A valmont COMPANY

TRINITY HIGHWAY
Ahead of the Curve®

SS180® M

The SS180® M Truck Mounted Attenuator ("TMA") has been tested pursuant to American Association of State Highway and Transportation Officials ("AASHTO") Manual for Assessing Safety Hardware ("MASH") specifications.

Product Description
Assembly Manual

2525 N. Stemmons Freeway
Dallas, Texas 75207

Warning: The local distributors, owners, contractors, lessors, and lessees are RESPONSIBLE for the assembly, maintenance, and repair of the SS180® M. Failure to fulfill these RESPONSIBILITIES with respect to the assembly, maintenance, and repair of the SS180® M could result in serious injury or death.

Important: These instructions are for standard assembly specified by the appropriate highway authority. In the event the specified system assembly, maintenance, or repair would require a deviation from standard assembly parameters, contact a Trinity Highway representative.

This manual must be available to the worker overseeing and/or assembling the product at all times. For additional copies, contact Ingal Civil Products directly at 1800-803-795 or visit www.ingalcivil.com.au.

The instructions contained in this manual supersede all previous information and manuals. All information, illustrations, and specifications in this manual are based on the latest SS180® M information available to Trinity Highway at the time of printing. We reserve the right to make changes at any time. Please contact Ingal Civil Products to confirm that you are referring to the most current instructions.

Part No. 626198

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Customer Service Contacts

Trinity Highway is committed to the highest level of customer service. Feedback regarding the SS180® M system, its assembly procedures, supporting documentation, and performance is always welcome. Additional information can be obtained from the contact information below:

Trinity Highway:

Telephone:	(888) 323-6374 (USA) +1 (214) 589-8140 (International)
Contact:	TrinityHighway.com/Contact
Website	trinityhighway.com

Important Introductory Notes

Proper assembly, deployment and future maintenance of the SS180® M are critical to achieve tested performance under accepted MASH criteria. Take the time to review this manual thoroughly before performing all necessary work. These instructions should be read in their entirety and understood before assembling the TMA. These instructions are to be used only in conjunction with the assembly of the SS180® M system and are for standard assemblies only as specified by the applicable highway authority.

In the event your system assembly requires or involves deviation from standard parameters or, during the assembly process a question arises, please contact Trinity Highway customer service. These instructions are intended for an individual who is qualified to both read and accurately interpret them as written. They are intended for the individual who is experienced and skilled in the assembly of highway products which are specified and selected by the highway authority.

If additional information is required, please contact Trinity Highway Customer Service. If there are deviations, alterations, or departures from the assembly protocol specified in this manual, the SS180® M many not perform as tested.

Important: It is the responsibility of the installer to maintain a safe work area including the use of standard work zone safety equipment & PPE: gloves, safety-toe shoes, and eye / ear protection.

Important: DO NOT use any component part that has not been specifically crash tested and/or approved for this system during assembly or repair.

System Overview

The SS180® M system has shown to reduce the risk of injury to passengers of an errant vehicle and to the driver of the truck to which the system is attached when the system is impacted within the applicable MASH criteria. The system mounts on the rear of a truck and may be used in stationary applications (e.g. as a truck block in a work zone) and mobile operations (e.g. striping, sweeping, plowing, etc.).

Safety Symbols

This section describes safety symbols that may appear in the SS180® M manual. Read this manual for complete safety, assembly, operating, maintenance, repair, and service information.

Symbol	Meaning
	**Safety Alert Symbol:** Indicates Danger, Warning, or Caution. Failure to read and follow the Danger, Warning, Caution, or Important statements could result in serious injury or death to workers and bystanders.
	**Warning:** Read safety instructions thoroughly and follow the assembly directions and suggested safe practices before assembling, maintaining, or repairing the SS180® M. Failure to follow this warning can result in serious injury or death to the worker and/or bystanders.
	**Important:** Please keep up-to-date instructions for later use and reference by anyone involved with this product.

Safety Rules for Assembly

*** Important Safety Instructions ***

This manual must be kept in a location where it is readily available to persons who assemble, maintain, or repair the SS180® M. Additional copies of this manual are available from Trinity Highway by calling (888) 323-6374 or contact us using TrinityHighway.com/Contact. Please contact Trinity Highway if you have any questions concerning the information in this manual.

	**Important:** It is the responsibility of the installer to use proper safety precautions when operating power equipment, mixing chemicals, and when moving heavy equipment or SS180® M components. The installer is responsible for proper use of hand, eye, foot, and back protection.
	**Warning:** Safety measures incorporating appropriate traffic control devices specified by the highway authority must be used to protect all personnel while the TMA is in use. The traffic control plan established by the highway authority must always be observed when utilizing this product.

Limitations and Warnings

Trinity Highway, in compliance with MASH "Recommended Procedures for the Safety Performance of Highway Safety Features", contracts with FHWA approved testing facilities to perform crash tests, evaluation of tests, and submittal of results to the FHWA for review.

The SS180® M was tested to meet the impact criteria, requirements, and guidelines of MASH. These tests, specifically set forth by the FHWA, evaluate product performance by simulating those impacts outlined by MASH involving a typical range of vehicles on our roadways, from lightweight cars (approx. 2420 lb. [1100kg]) to full size pickup trucks (approx. 5000 lb. [2270 kg]) as specified by the FHWA. A product can be certified for multiple Test Levels. The SS180® M is certified to the Test Level as shown below:

Test Level 3: 62 mph [100 km/h]

These FHWA directed tests are not intended to represent the performance of systems when impacted by every vehicle type or every impact condition existing on the roadway. This system is tested only to the test matrix criteria of MASH as approved by the FHWA.

Trinity Highway expressly disclaims any warranty or liability for injury or damage to persons or property resulting from any impact, collision or harmful contact with products, other vehicles, or nearby hazards or objects by any vehicle, object or person, whether or not the products were assembled in consultation with Trinity Highway or by third parties.

The SS180® M is intended to be assembled, delineated, and maintained within specific state and federal guidelines. It is important for the highway authority specifying the use of a highway product to select the most appropriate product configuration for its site specifications. The customer should be careful to properly select, assemble, and maintain the product. Careful evaluation of the site lay out, vehicle population type; speed, traffic direction, and visibility are some of the elements that require evaluation in the selection of a highway product.

After an impact occurs, the debris from the impact should be removed from the area immediately and the product should be evaluated and restored to its original specified condition or replaced as soon as possible. All components and assemblies should be inspected and any parts that are damaged should be replaced with original Trinity Highway replacement parts. Contact the Customer Service Department prior to repair if you have any questions (p. 3).

Warning: It is the responsibility of the installer to ensure that the SS180® M and delineation used meet all federal, state, specifying agency, and local specifications.

Warning: It is the responsibility of the installer to ensure that your assembly meets all appropriate Manual on Uniform Traffic Control Devices (MUTCD) and local standards.

Host Vehicle Tare Weights should be between 6150kg and 11,000kg.

Warning: Roll-ahead distance is 6.4m. Plan your TMA deployment accordingly.

Know Your SS180® M System

For the safety of the operator, the operator shall stand at the rear of the truck, on the curb side, (Figure 2). When tilting the TMA, care shall be taken to stay clear of all moving parts.

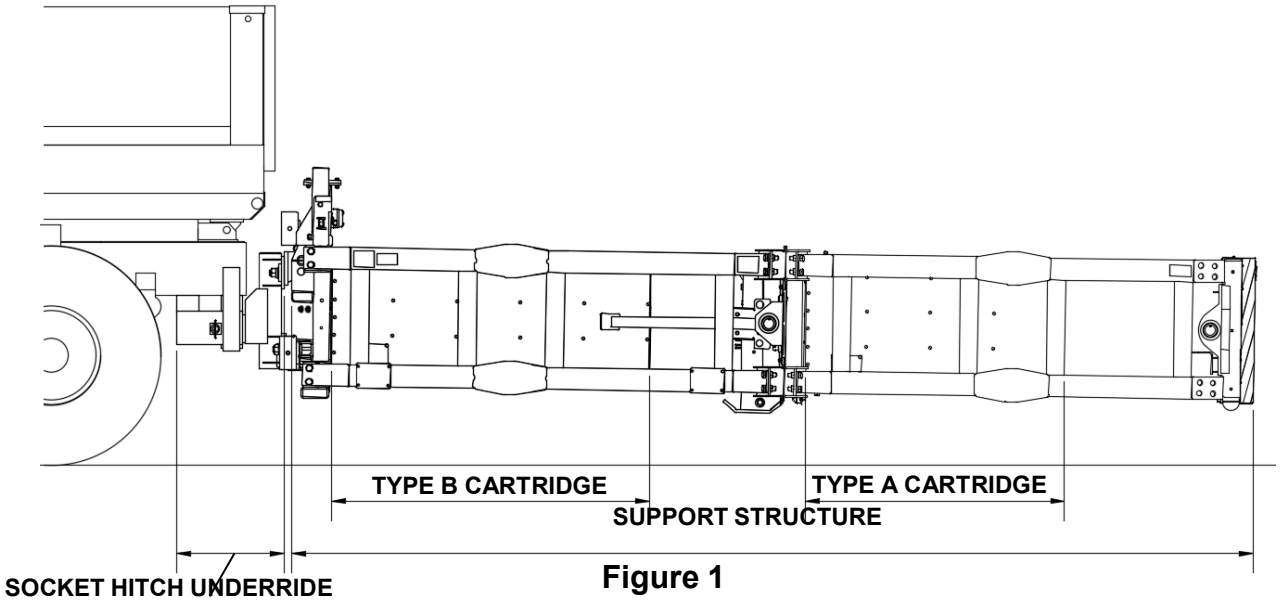


Figure 1

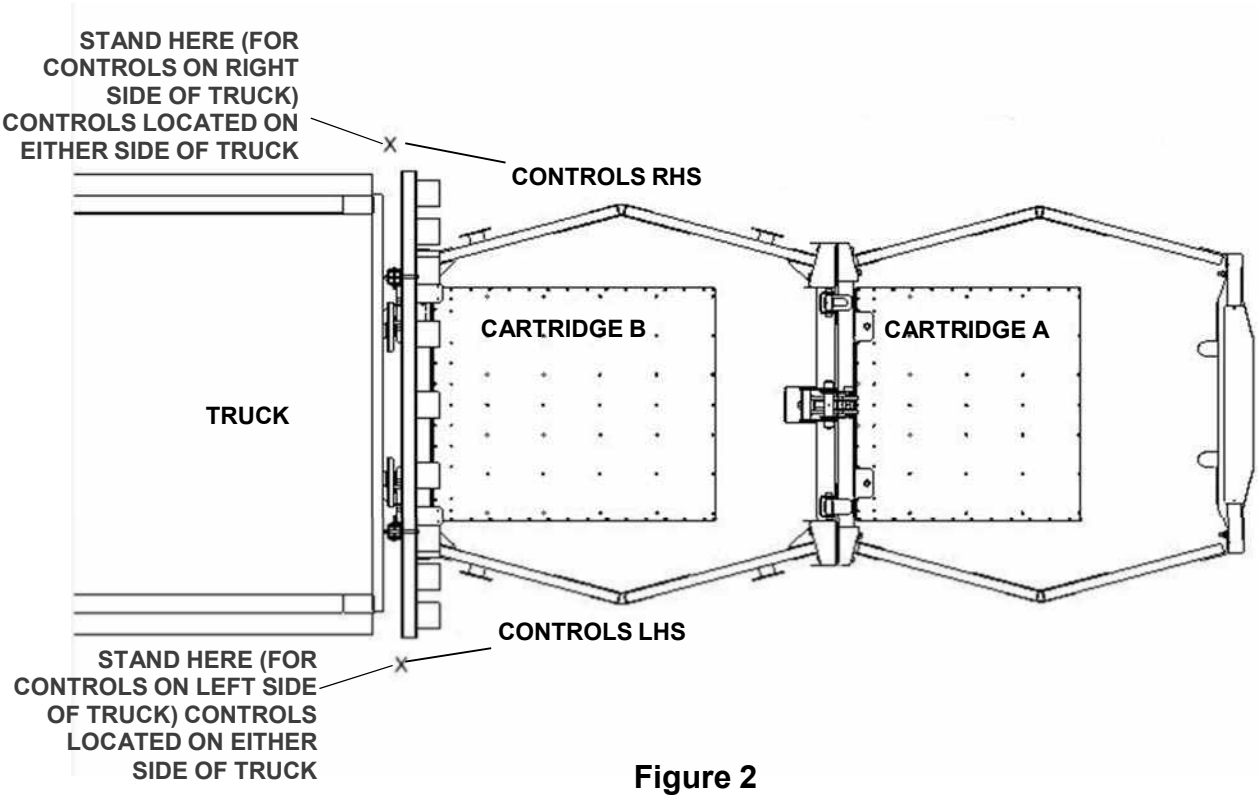


Figure 2

1. The SS180® M shall be rigidly fastened to the truck. In the horizontal position, the bottom of the TMA shall be 11" to 13" [280 to 330 mm] from the ground to the bottom of the Rear Impact Face (Figure 3).

Warning: The SS180® M can only absorb the energy of an impacting vehicle when in the unfolded position.

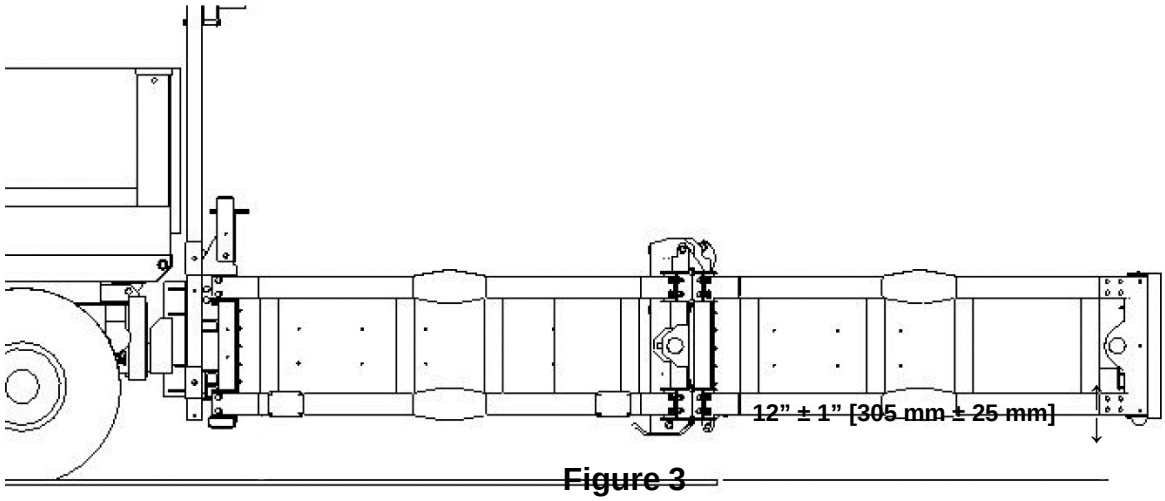


Figure 3

2. Jacks shall be used to support the SS180® M when it is detached from the truck. The Jacks must be stored while the TMA is attached to the truck.

Important: The SS180® M must be deployed in the unfolded position at **all times** while operating as either a **Barrier Vehicle** or **Shadow Vehicle.**

The SS180® M can be in the **"unfolded"** position when traveling short distances at low speed (not greater than 40 km/h).

The SS180® M must be in the **"folded"** position when traveling long distances at a high speed (greater than 40 km/h).

3. The SS180® M is intended to support its own weight and dissipate the kinetic energy of errant vehicles per MASH criteria. Do not drag the TMA or place anything on its top or damage will result. Do not sit, stand, or lean on any part of the TMA (Figures 4 & 5).

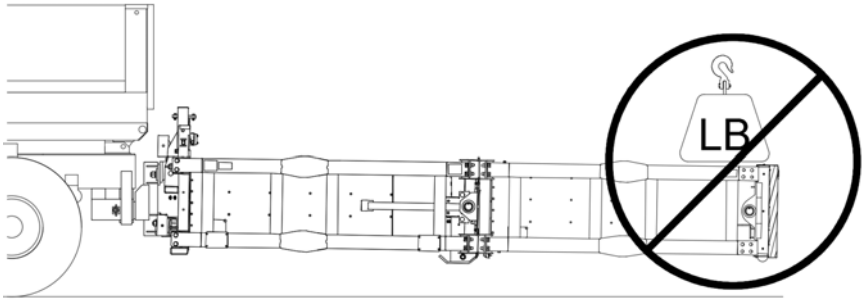


Figure 4

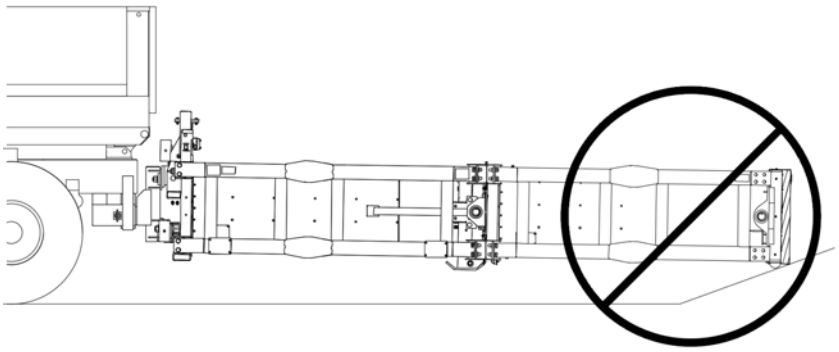


Figure 5

4. Before raising or lowering the TMA, the operator shall be fully trained in its proper operation. All operators are required to fully understand the contents of this manual prior to operating the system. The operator should never stand under the TMA while it is being raised or lowered.
5. Folding the TMA provides the best maneuverability and driving characteristics. The TMA shall be in its folded transport position while travelling between deployment locations. Refer to local agency policies as required for additional guidance. Unfold the system before entering a job site or beginning shadow vehicle operations. The support vehicle must be fully stopped before TMA folding and unfolding.
6. All persons shall stand clear before folding or unfolding the TMA. The system must be stopped in full folded position before allowing anyone directly behind the folded system.

7. Ballast and other heavy objects **MUST BE ADEQUATELY ANCHORED** to the truck to prevent shifting during an impact (Figure 6). The force exerted on the tie-down straps could be 20 times the weight of the ballast.

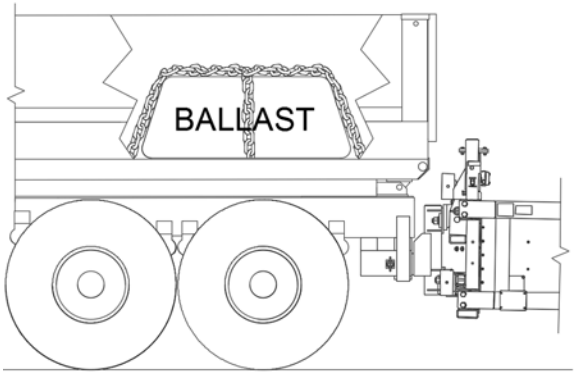


Figure 6

8. The agency responsible for the truck shall inspect it for adequate operator safety equipment (e.g., seat belts, head rests, etc.)
9. The SS180® M can only be mounted to trucks weighing between 6,120 -11,340 kg.
10. Make sure that the performance and safety of the TMA is not impaired by damage or corrosion.

Warning: This TMA is intended to be used as an impact attenuator on the rear of trucks weighing between 6,120 - 11,340 kg. The TMA shall not be used for any other purpose.

11. Regular maintenance of the TMA is critical for proper operation. Refer to the maintenance section of this manual for additional information.
    a. Regular inspection of frame members, cartridges, and fasteners is necessary to ensure proper system performance.
    b. Regular inspection of hydraulic hoses is critical. A broken or damaged hose will cause the system to operate uncontrollably.
    c. Keep electrical connections at the Pump Motor/Solenoid clean. Clean any hydraulic spills or leakage to prevent bodily injury, fire, etc.
12. The driver shall be cautious while making turns with the TMA in the unfolded position. The TMA extends beyond the end of the truck and will swing wide while turning.
13. This system is an impact attenuator and is therefore used in high risk areas. Stay clear of traffic whenever possible.

14. The Hydraulic Assembly was designed to fold and unfold the TMA. Any other use may be hazardous to people or equipment.
    a. Do not use the system to push a load.
    b. Do not use the raised end of the system to support any load.
    c. Do not use any part of the TMA for towing or hauling a load. This could cause the lift mechanism to malfunction and permanently damage the system.
    d. Do not use the TMA as a ladder.

Warning: Do not leave the TMA raised, even slightly, when deployed.

BARRIER VEHICLE - A truck on which a TMA is mounted, while positioned upstream (towards the direction that traffic is approaching) of a work zone.

SHADOW VEHICLE - A truck on which a TMA is mounted, which is following behind a moving operation such as striping, spraying, etc.

THE USE OF A TMA ON THE BACK OF A TRUCK, WHEN IMPACTED WITHIN THE APPLICABLE MASH CRITERIA, HAS BEEN SHOWN TO:

Reduce the severity of the impact

Help protect the occupants of the impacting vehicle

Help protect the barrier or shadow vehicle occupants

Help reduce damage to the barrier or shadow vehicle

HAS NOT BEEN SHOWN TO:

Affect the skid (roll ahead) distance of an impacted truck

CONTROLLING SKID DISTANCE (ROLL AHEAD):

- Skid distance is significantly increased and is less predictable for lightweight shadow vehicles.
- Skid distance is reduced and is more consistent when heavier shadow vehicles are used.
- Required Truck + TMA weight: 7,030 kg] up to 12,250 kg.

Assembly

Read and understand all instructions before beginning assembly.

The weight of the vehicle shall be between 6,120 kg and 11,340 kg for tested performance.

Refer to the Australian Design rules – Vehicle Standards Bulletin 6 (VSB6) for the Australian regulations regarding chassis modifications and attachments. The system may be attached to the truck by attaching parts to the vehicle frame, using specified hardware in the VSB6. Do not weld any TMA components to the truck frame. It is recommended the use of side fishplate to mount the unit to the chassis (as per page 13, figure 8). The addition of the side fishplates allows for the removal and replacement of the mounting system, if the unit was to be damaged in a TMA impact. Use certified or professional welders to ensure durable attachment of the TMA system. Disconnect the truck battery before any welding on truck or TMA.

The truck frame must be suitable and accessible for mounting a TMA. If there are any questions regarding the suitability, contact the Customer Service Department for input as to your specific application.

Shipping list

Check the shipping list against the actual parts.

Recommended Tools

- Welding equipment
- Cutting torch
- Hammer
- Drift pin or alignment pin (300mm long)
- Tape measure
- 1/2” drive socket wrench w/150mm extension
- 1/2” drive sockets (9/16”, 1-1/8”, 1-1/2”, 9/16” deep well)
- Open end wrenches –(9/16”, 1-1/8”, 1-1/2”)
- 300mm crescent wrenches – (2)
- Marking implement (pencil, soap stone)
- Drill for 13/16" diameter bit
- 13/16" diameter bit and pilot drill bit for same
- Center punch
- Torque wrench - 120 N-m
- Hydraulic fluid (Dexron™ III fluid only) - Shipped with system
- Floor jack or Forklift
- Work gloves and other personal protection equipment as required
- Bubble level

Important: The above list of tools is a general recommendation. Depending on specific site conditions and the complexity of the assembly specified by the appropriate highway authority, additional or fewer tools may be required. Decisions as to what tools are needed to perform the job are entirely the responsibility of the specifying highway authority and the authority’s selected contractor performing the assembly of the system at the authority’s specified assembly site.

Preparation

1A) Assembly Must Be Performed On Level Surface

The system's framework is very heavy.

1B) Truck Ballast

Use a bubble level to verify that the truck is parked on a level surface. The truck shall be as close to the final driving weight as possible. If ballast must be added to achieve the minimum weight, add it at this time. Ballast must be properly anchored to the truck to keep it in place during an impact. Ideally, an adequately sized truck, that requires no ballast, should be used. Because the 910 kg weight of the rearward protruding TMA is supported by the back of the shadow vehicle, care must be taken not to exceed the manufacturer's published maximum axle loads. To ensure that the driving characteristics of the vehicle are maintained, the manufacturer's recommended center-of-gravity zone shall be followed completely.

2) Interference Check

Before attempting to assemble the Underride, check for interference concerns.

The TMA folds so the Impact Face is very close to the mounting location (p. 24, Figure 25). If you are not using a standard Socket Receiver Hitch Underride skip to Step 8.

Temporarily position the Underride Socket Receiver under truck frame as shown (p. 13, Figure 8) and check for interference concerns. Interference concerns with tail lights, springs, dump bodies (in the folded or unfolded positions), etc., shall be corrected before proceeding.

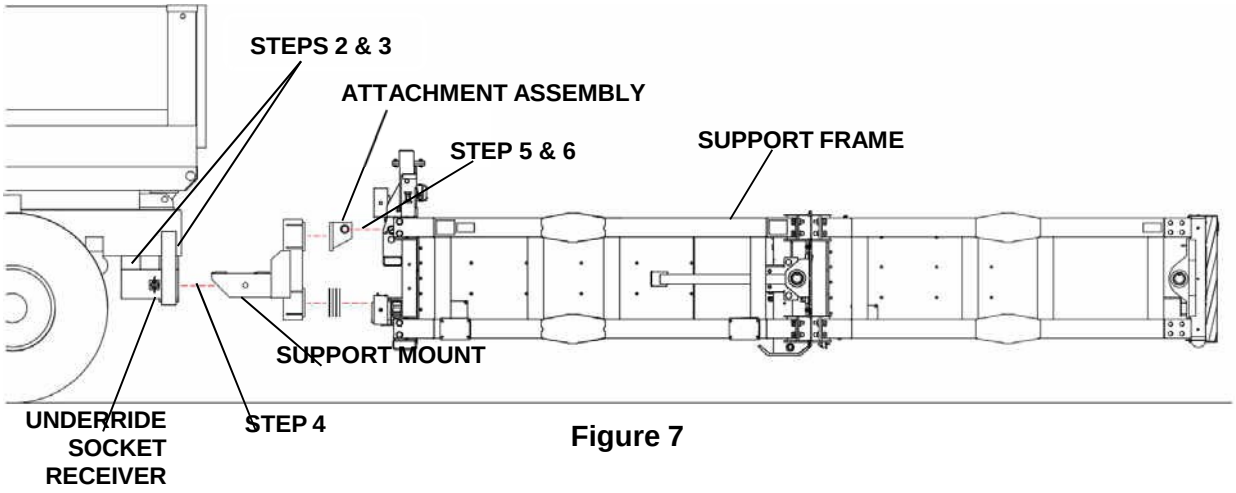


Figure 7

3) Underride Assembly

With the truck at its actual driving weight and parked on a level surface, measure the distance from the ground to the bottom of the truck frame. A distance of 711mm ± 25 mm is required. Spacer Tubes may be added to the bottom of the frame to achieve this height (p. 14, Figure 10).

> ***Note: The truck's springs may settle with the weight of the TMA, sometimes as much as 50 mm. Adjust the height to compensate for anticipated settling.***

Measure distance from the back end of the frame forward to the rear-most leaf spring hanger. Look for any obstruction on the bottom of the frame that may interfere with the Socket Receiver. A minimum of 305 mm is required (Underride Assembly drawing on p. 60).

It is important to check for obstructions before mounting the socket receivers. Position the Socket Receiver at the rear end of the frame so that the 76 x 387 mm flat bar is along the outside of the frame member and the Socket Receiver Assembly is flush with the end of frame. If spacers are required, weld them to the Socket Receiver and lap the Spacer Splices (pieces of 10 x 51 x 103 mm flat bar) across the Socket Receiver and Spacer at the rear most location (p. 47). The top of the Socket Receiver shall be 711mm ± 25 mm from the level ground for proper system height (p. 14, Figure 10).

Important: Welding must be performed by professional or certified welder.

All welds must be then primed and painted.

Australian chassis modification regulations may differ to that explained in this manual. It is always recommend that you follow your local design rules when modifying the vehicle's chassis and installing any TMA. Ensure that the vehicle and any modifications carried out meet the compliance requirements for your region.

To provide addition strength to the rear of the chassis, it is recommend that the Underride Socket Receivers have the flat mounting bar removed, then weld the Underride Socket Receivers to a large 16mm thick steel fishplate (similar as shown below in figure 8). Remember to position holes in the fishplates for the pins to pass through the socket receiver. Then bolt the fishplates to the chassis and if possible, also the tray sub frames. Once bolted on, install an extra cross-brace on the inside between each Underride Socket Receiver. This will provide a rigid rear mount assembly (without welding to the chassis), while allowing the removal and replacement of the receivers if damaged in a TMA impact.

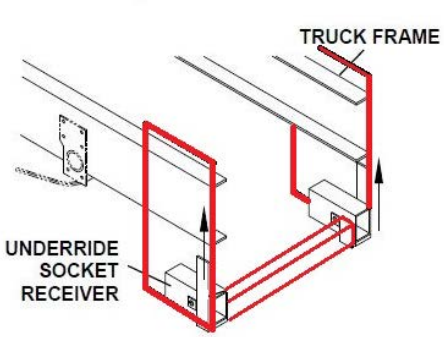


Figure 8

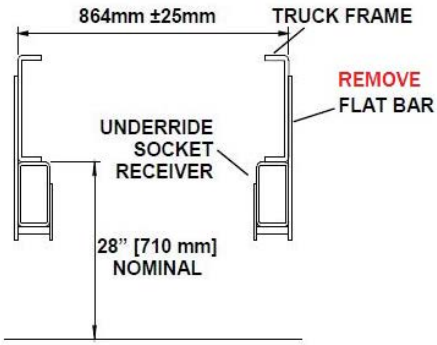
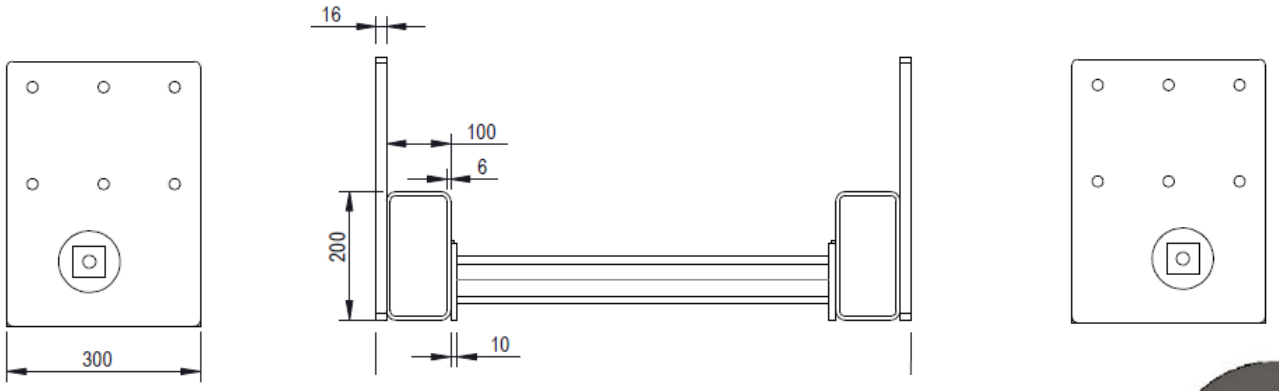
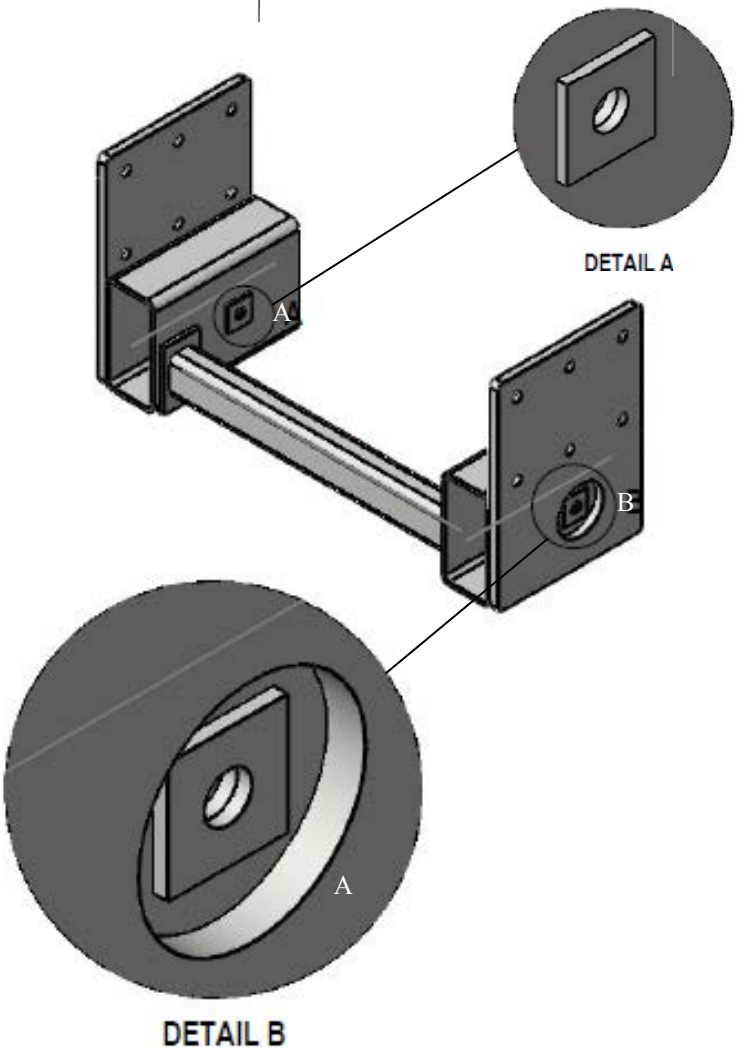


Figure 9

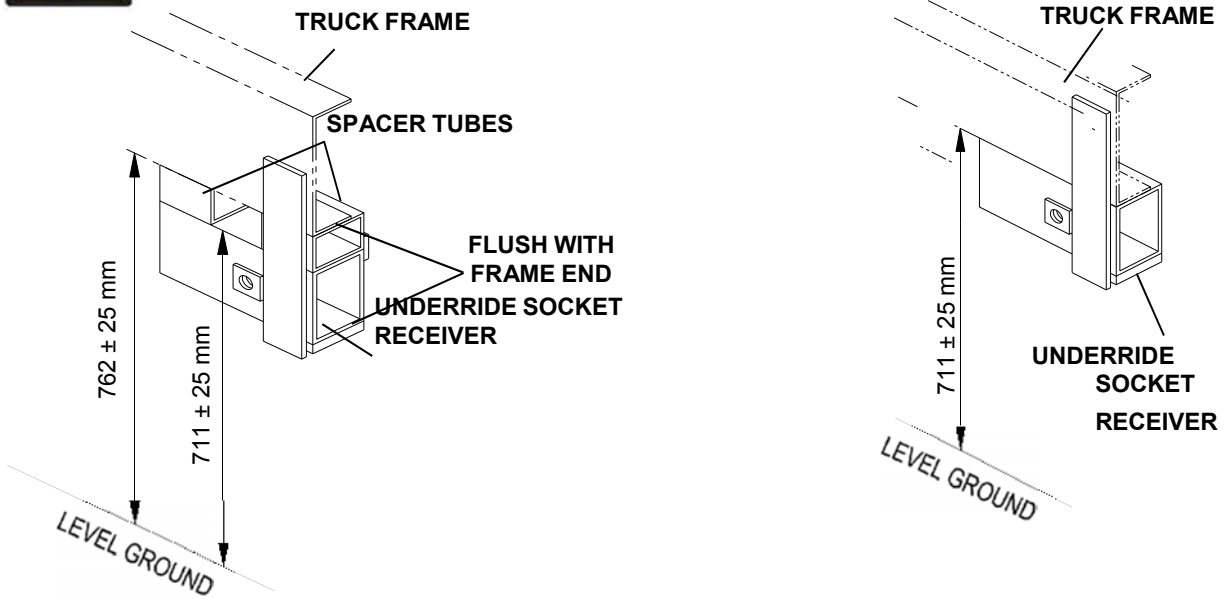
An example of modified Underride Socket Receiver mounts are shown below. They are a suggested guide on how to install the Underride Socket Receivers without welding to the vehicle chassis.

Installation of the Underride Socket Receivers <u>may</u> vary on each vehicle due to chassis, suspension and body variations. You should allow seek the direction of a engineer as to the best installation for your selected vehilce, prior to beginning installation.





Important: Left and right Underride Socket Receivers must be parallel and level with each other.



WITH SPACERS **WITHOUT SPACERS**

Figure 10 – Socket Hitch
Left Side Shown

4) - Socket Hitch Assembly

Insert the Socket Hitches and pin them into place using the 1” x 6 3/4” Hitch Pins and Retainer Pins shipped with the system.

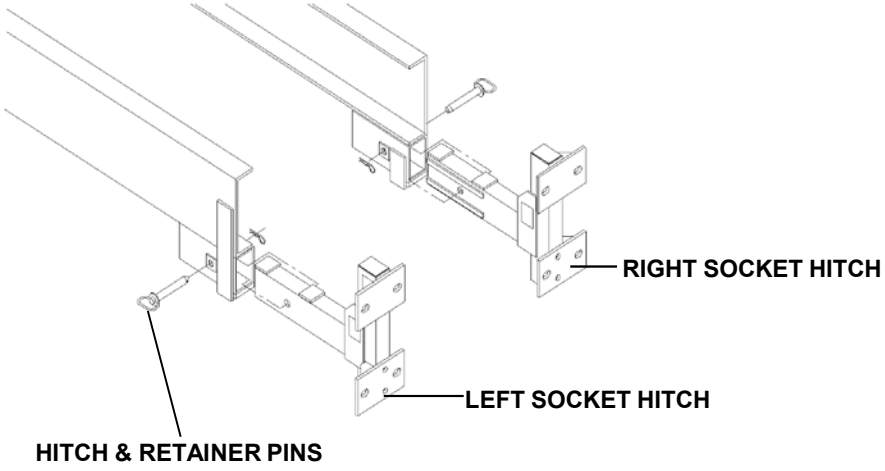


Figure 11

5) Mount the Support Brackets to Socket Receivers

Mount the Support Brackets to the Socket Hitches as shown in Figure 12. Shims are used to level the system. It is recommended that two (2) 1/4" Shims per side be used initially. This may be adjusted once the system is assembled.

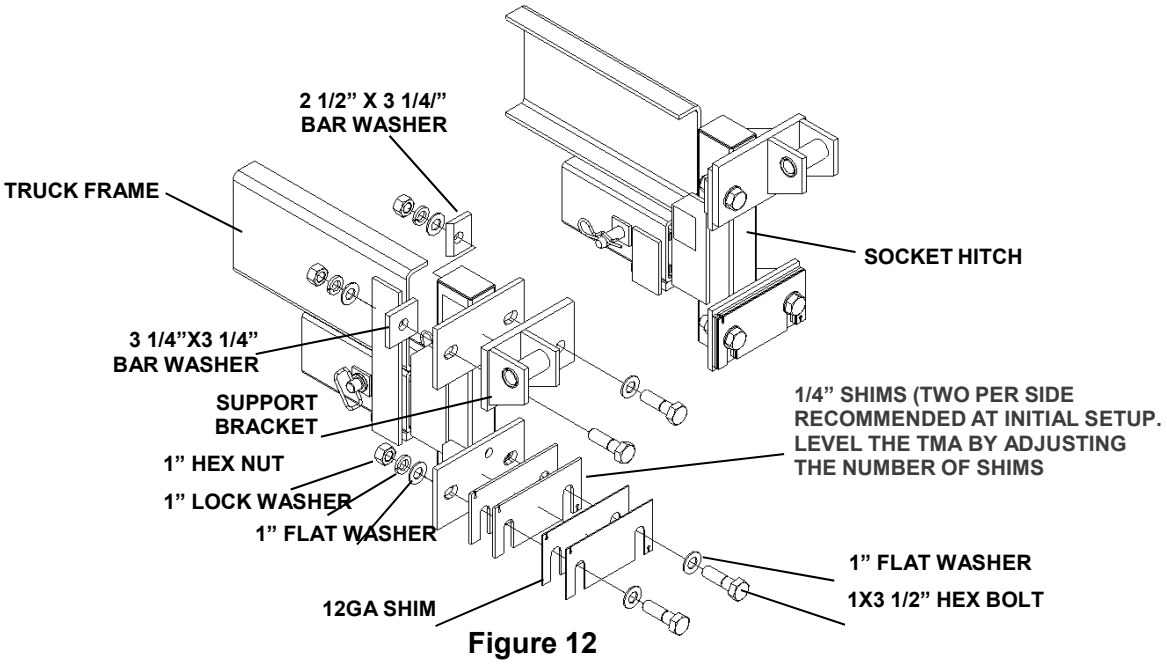


Figure 12

6) Attach the Support Frame / Backup to the Attachment Assembly

Move the system to the truck and pin the Support Frame/Backup Assembly to the Support Brackets (Figure 13). The system is to be assembled as a whole unit. Use forklift slings to support the system. Use the upper set of mounting holes for the attachment.

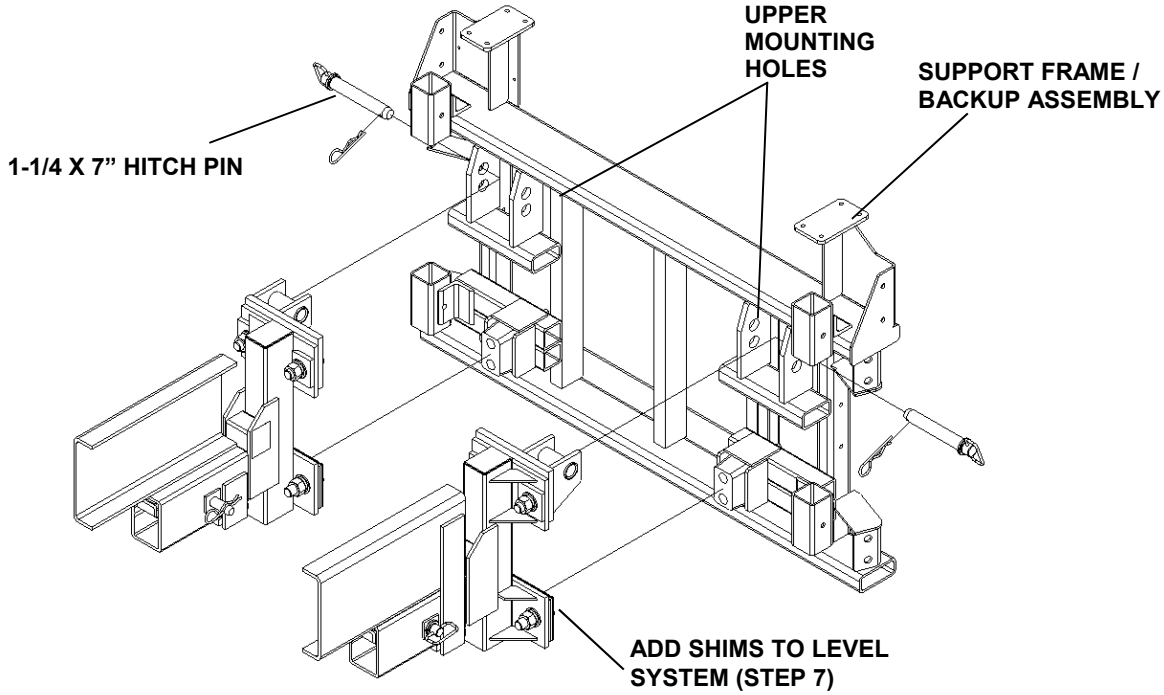


Figure 13

7) Adjust the Height of the System Frame

Verify that the system frame is 305mm ± 25 mm from the ground at the rear of the system. It may be necessary to add shims to the Socket Hitch in order to level the Frame (Figures 3 & 12).

8) Connect the Lights and Controls

Locate the female TMA Socket Connector in a convenient location on the truck so that lifting or lowering the TMA will not damage the electrical cable. Make sure that the electrical cord on the TMA can reach this location.

For support vehicles with combined tail and clearance lights, connect a jumper between pins 2 and 6 on the backside of the male TMA plug connector (VIEW A-A and Figure 14). Connect the 7-pin plug to the socket on the truck.

The truck battery must be of the proper voltage. The SS180® M is available in 12 and 24 volt versions. Be sure the system and truck are compatible. Use standard safety practices when attaching the battery cables. Attach positive terminal first when connecting and remove the negative cable first when disconnecting the battery. Do not run the battery cables around sharp corners, metal work, or in other areas that could pinch or cut the cables. Connect the battery cable to the pump motor. Consult the Hydraulic Assembly drawing package.

Caution: For over-current protection, the positive cable lead coming off the truck battery should be protected with a 70 amp fuse or circuit breaker within 450mm of the truck battery.

The controls at the rear of the truck are mounted to both sides of the Support Frame. Securely fasten cable ties to secure any loose wiring to the SS180® M frame. Mount the cab switch box inside the cab within easy reach of the driver and plug in the cab switch box at the mating connector of the TMA.

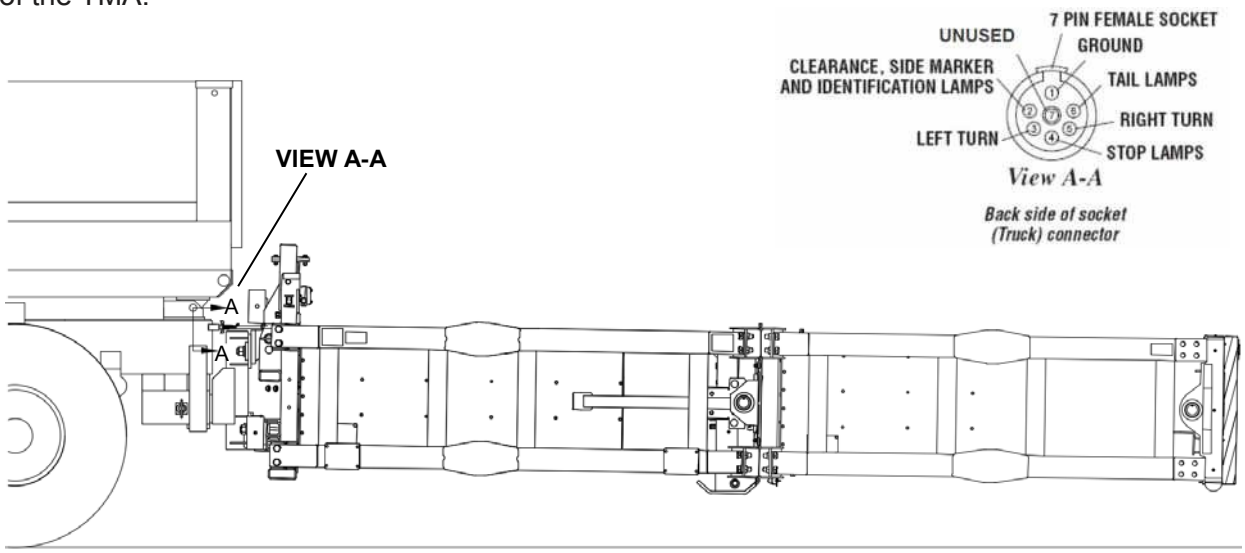


Figure 14

9) Check the Hydraulic System

The Hydraulic Assembly is pre-assembled and tested for operation and leaks before shipping. The pump is wired as shown on the Hydraulic Assembly drawing (pp. 53-56). Before operating the system, check to see if the reservoir has adequate fluid. The fluid level of a folded system should be approximately half full. Add only Dexron™ III ATF fluid. Do not overfill or fluid may leak out when un-folded. Replace the cap in the fill port.

Read Operation Instructions (p. 19; Folding and Unfolding the System). To ensure all electrical and hydraulic lines will not be damaged, use the switch at the rear of the truck to fold and unfold the system twice. Cycling the SS180® M will purge excess air from hydraulic lines and confirm its operational status.

Important: Cycle the system using the cab switches to test controller operation.

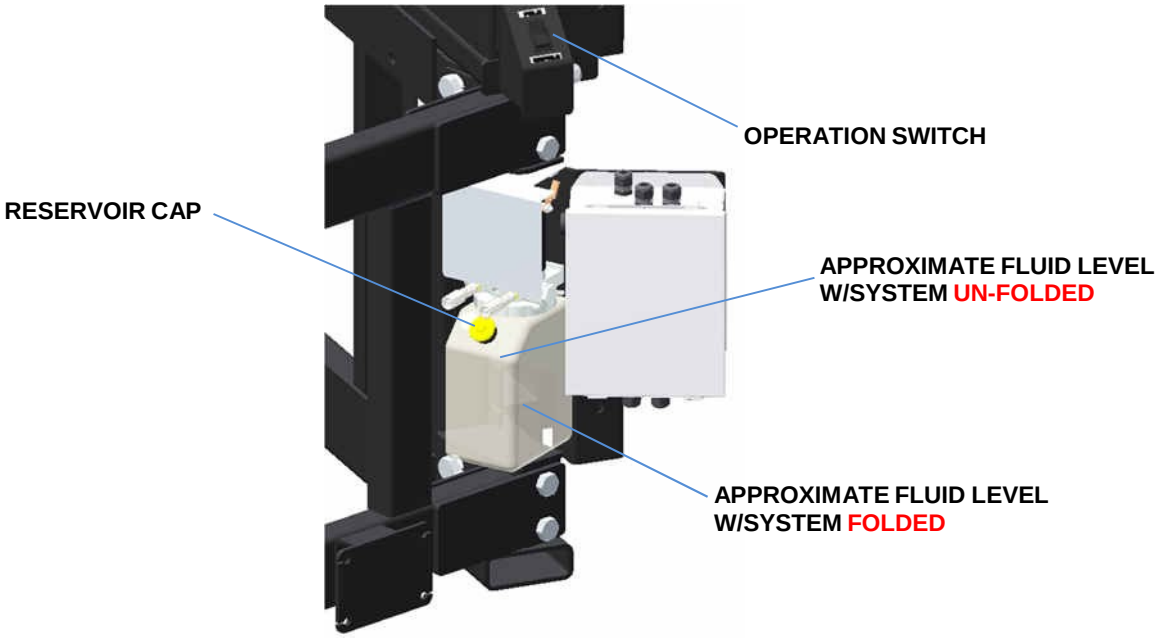


Figure 15

Note: Continuous operation may run down truck battery and/or damage pump.

Important: Ensure both positive and ground cables are connected directly from pump to battery. **DO NOT** rely on chassis or frame for proper grounding.

10) Store the Jacks

The Jacks are provided to facilitate the attachment and removal of a folded SS180® M from the truck. Retrieve Jacks set aside earlier and place them in a storage location (Figure 16).

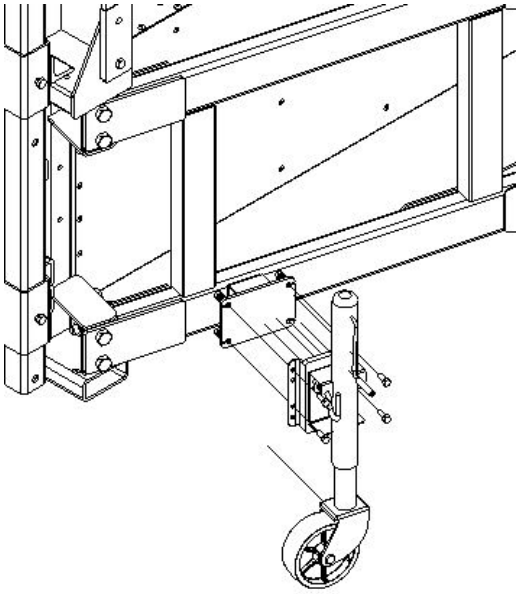


Figure 16

Important: Unbolt, remove, and store Jacks when the TMA is in service.

11) Verify the Position of the Hydraulic/Electrical Lines

Check the location of all the hydraulic and electrical lines to be sure they will not be damaged while folding and unfolding the system.

12) Final Check of System

Double check the height and levelness of the system.

13) Ready to Use

The SS180® M system is now ready for use. To ensure proper and safe operation, all SS180® M users shall be given operating and safety training from this manual and as specified by the owner and local regulations.

Operation Instructions

Before operating the SS180® M, thoroughly read and understand all Operation Instructions and safety sections of this manual. Verify that the system is properly assembled and in working order. For proper impact performance, the TMA must be equipped with one SS180® M Type A Cartridge and one SS180® M Type B Cartridge, in their proper positions as shown below.

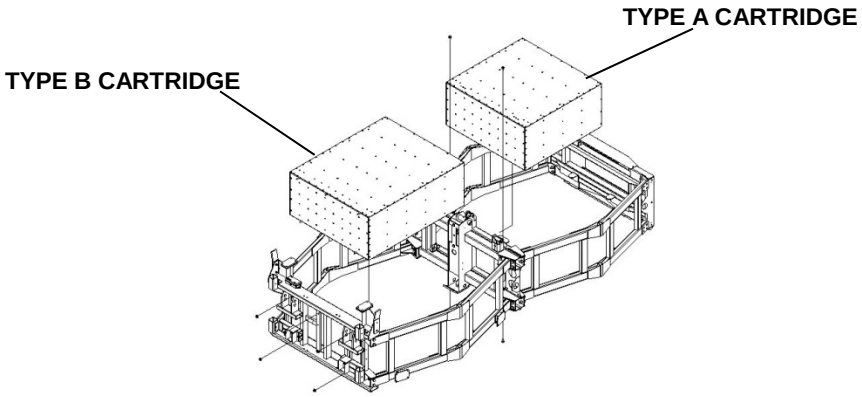


Figure 17

The SS180® M has been equipped with a Hydraulic Pump to fold / unfold the unit. The controls are located on both sides of the Support Frame. A set of controls may also be located in the truck cab.

While folding or unfolding the SS180® M from outside the cab, the operator must stand on the non-traffic side of the truck. Always stay clear of moving parts. Never stand underneath the TMA.

Folding and Unfolding the System

Caution: Make sure the area above and behind the system is clear of all objects before proceeding. **Under no circumstances shall anyone be allowed behind the system when it is being folded or unfolded.** When operating from the cab, always be aware of objects behind and above the SS180® M.

Folding and unfolding the system: The Rocker Switch operates by pushing and holding the switch down on the end towards the desired position.

The system will not serve its intended purpose when folded. The SS180® M must be unfolded during shadow or barrier vehicle operations. The truck with a folded SS180® M offers better driving performance. Driving with the system in the folded position is recommended during restricted city driving, driving to and from the work site, and when there is a period of extended high-speed travel between work sites. Be sure to unfold the system before entering a site. The support vehicle must be stopped each time the SS180® M is folded or unfolded.

Important: The SS180® M hydraulic system is only to be operated while the truck is stopped. Jarring or severe bumping of the system while folding or unfolding will cause damage to the system and possible injury to the operator.

The pump is not intended for continuous operation. The folding and unfolding operation has an automatic stop feature. Hold the rocker switch down until the pump motor stops at the fully folded or unfolded position.

Maintenance

Before performing any maintenance on the SS180® M, thoroughly read and understand the Maintenance Section and the Safety Section of this manual.

Routine Maintenance

Description	Interval
1. Height - The height of the system is important to its impact performance. Check regularly and adjust as necessary (Figure 18).	**As Required**

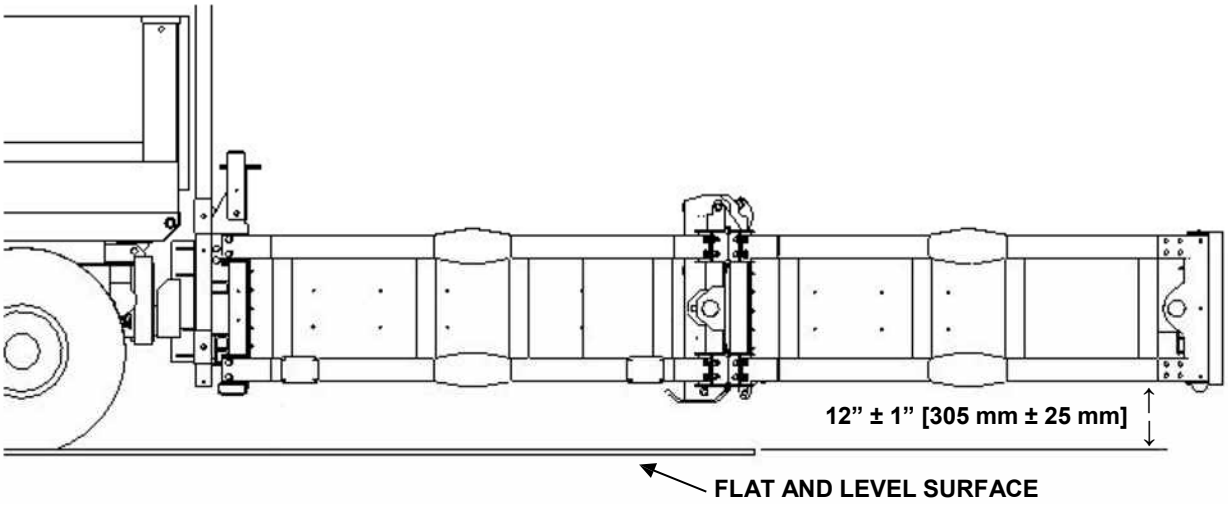


Figure 18

2. Fasteners - Check the tightness of the fasteners. Refer to the Drawing Package for all fastener locations. Check all bolts attaching the Cartridges to the support structure.	**Monthly**
3. Lights - Replace non-working lights.	**As Required**
4. Lubrication - Lubricate as described in the Lubrication Section (Maintenance Section - III).	**Varies – p. 23**
5. Hydraulic Pump – Clean the outside of the Hydraulic Pump as required. Check fluid level and electrical connections. Remove all residue or debris on or around the pump.	**Monthly**
6. Hydraulic Ram – Clean the Hydraulic Ram. Remove all residue or debris on or around the ram.	**Monthly**
7. Hydraulic Hoses – Check all Hydraulic Hoses for damage, leaks or cracks. Replace damaged or leaky hoses.	**Each use**
8. Clean System - Clean the system frame, Cartridges and Impact Face from dirt and salt. Always check lubrication after cleaning.	**Monthly & each use when salt &/or snow are present**

Detaching and Attaching the System

1) Detaching the System from the Truck

Ensure the TMA and the truck are on level ground

A. System is in the folded position

B. Attach Jacks as shown in Figures 19 & 20

C. Crank the Jacks until the weight of the system is supported

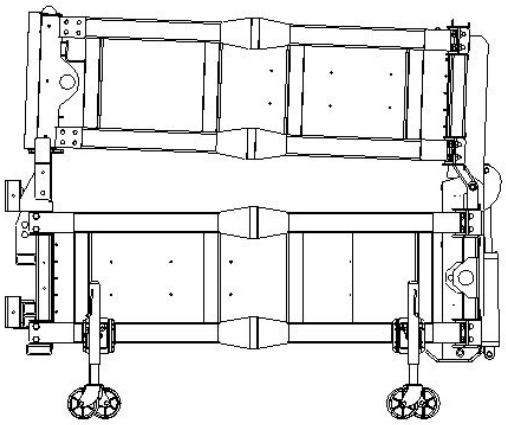


Figure 19

D. Unplug the light harness and disconnect the positive and negative cables from the pump. Unplug the Cab Switch Box at the mating connector on the TMA.

E. Remove the Socket Hitches from the Underride Socket Receivers by removing both 1 x 6 3/4" hitch pins and retainer pins (Figure 21). (If the alignment is off, making removal difficult, it may be necessary to adjust Jacks or temporarily disengage the TMA from the Socket Hitches. This can be done by removing the two (2) 1 1/4 x 7" Hitch Pins and Retainer Pins as shown in Figure 22.) Loosen the hardware to ease interference and then retighten.

F. Roll the TMA away from the truck.

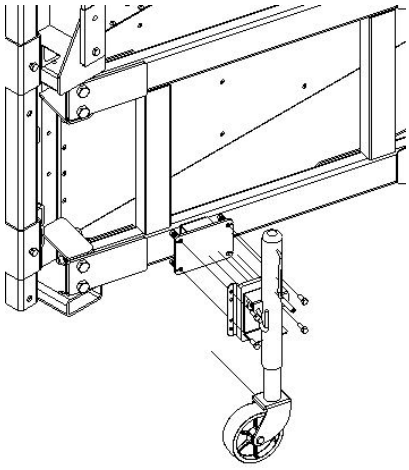


Figure 20

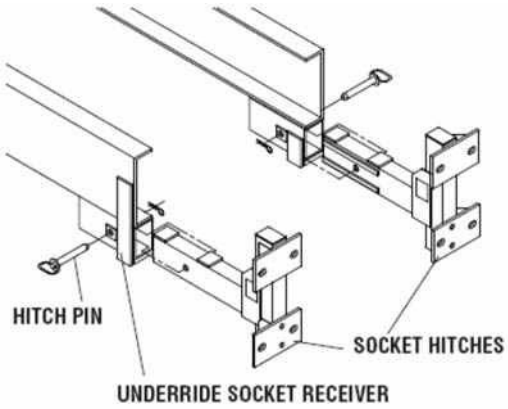


Figure 21

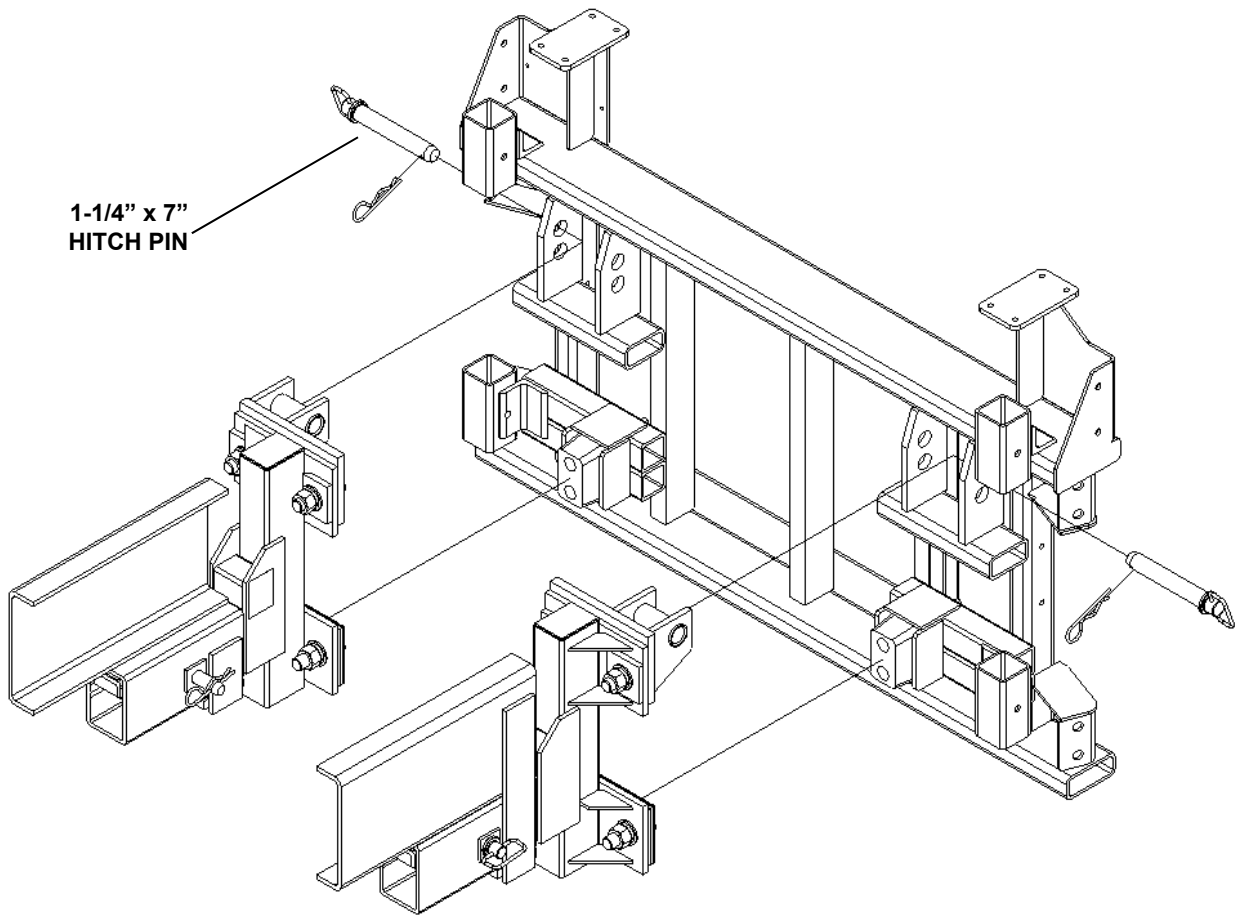


Figure 22

2) Attaching the System to the Truck

A. Roll the TMA to the truck.

B. Insert the Socket Hitches into the Underride Socket Receivers and pin them into place using 1 x 6-3/4” pin and retainer pin (Figure 21). If alignment is off, making the assembly difficult, it may be necessary to adjust Jacks or temporarily uncouple the Socket Hitches from the TMA. Ensure the retainer pins are inserted correctly and cannot fall out.

C. Plug in the light harness and connect the positive and negative cables to the pump. Plug in the Cab Switch Box to the mating connector on the TMA.

D. Retract the Jacks completely and remove them from the TMA.

E. Store Jacks for future maintenance or repair.

E. Check hydraulic/electrical system for proper operation.

F. Verify system is 280-330 mm above level ground at Rear Impact Face.

Lubrication

When handling hydraulic fluid, use appropriate measures to prevent spillage. Clean any spillage immediately.

1) Add Hydraulic Fluid

Add hydraulic fluid as required and check the fluid level monthly. The reservoir is full when the fluid level is filled to the location indicated below when the system is unfolded. Use only Dexron™ III ATF Hydraulic fluid.

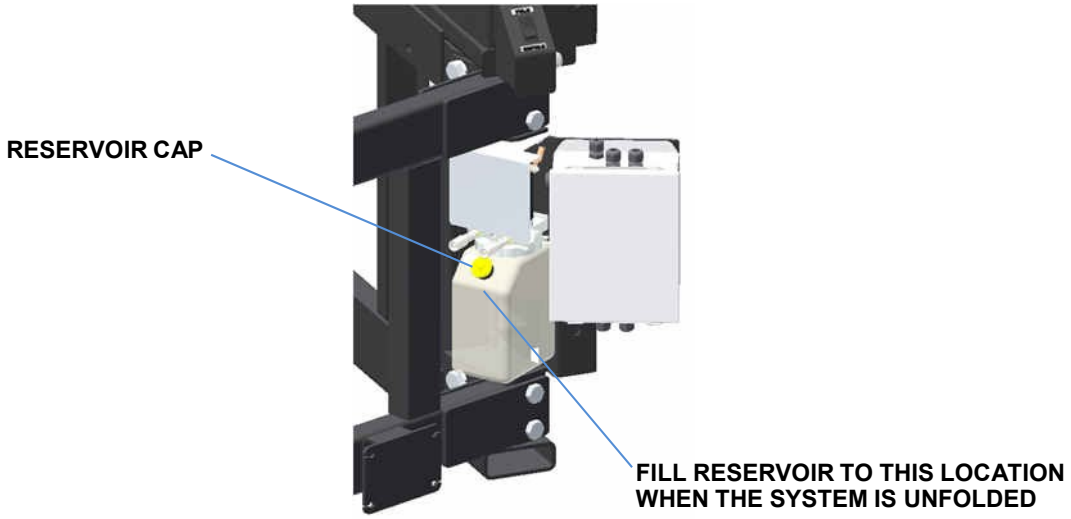


Figure 23

2) Grease Pivot Points

Figure 24 shows three (3) pivot locations equipped with grease fittings that require periodic lubrication. To prevent excessive noise and/or wear grease the locations shown below as required.

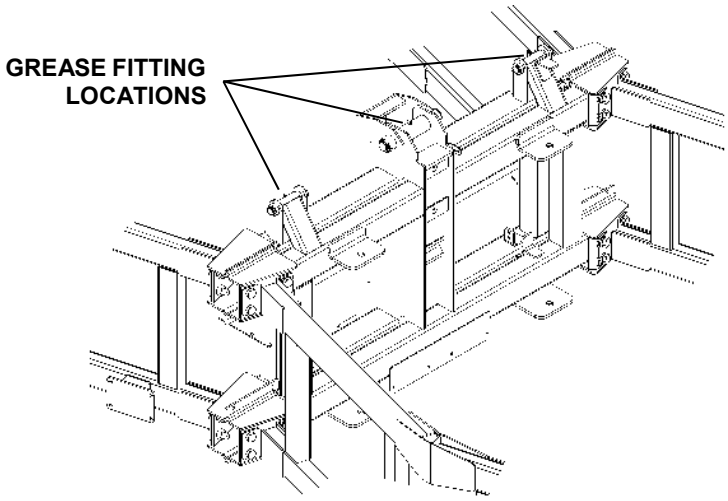


Figure 24

Technical Specifications

1) Weight	kg
Type A Cartridge	59
Type B Cartridge	89
Frame Components	742
Jacks	32
Total	922

2) Dimensions

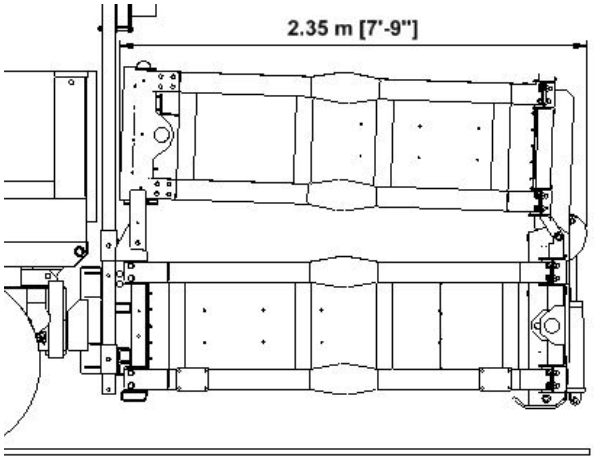


Figure 25

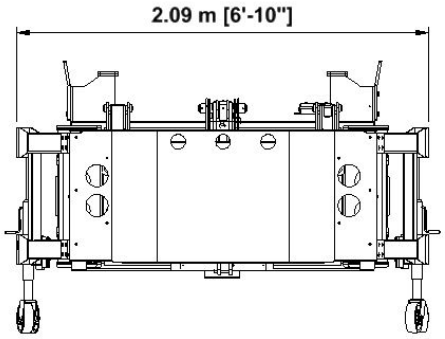


Figure 26

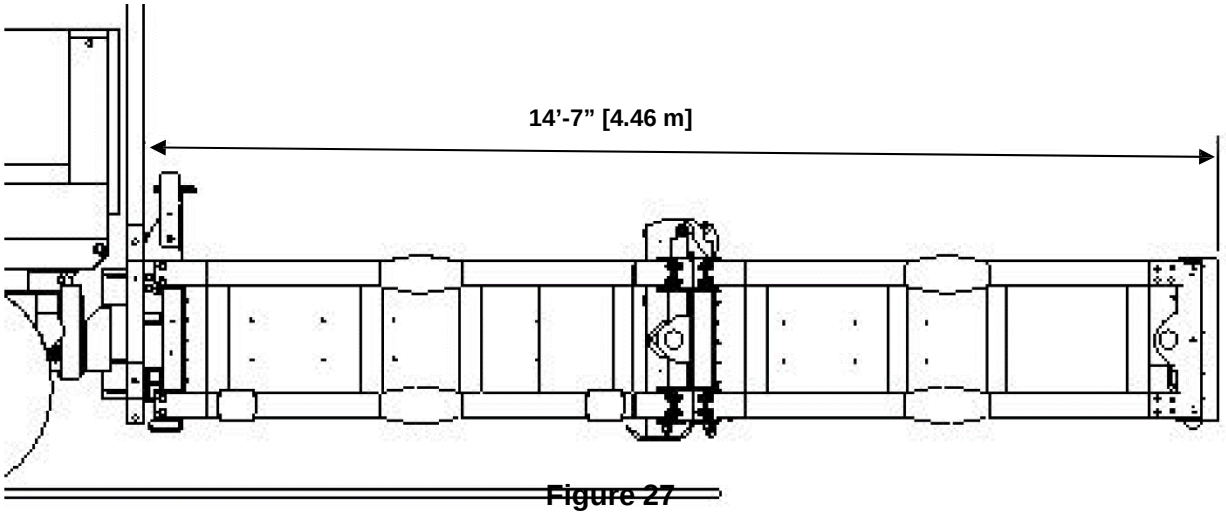


Figure 27

3) Replacement Parts

Refer to the drawing package for replacement part numbers and descriptions. Contact customer service for replacement parts (p. 3).

4) Operating Rates

The system **folds and unfolds** in approximately 35 to 40 seconds on a fully charged battery.

Repair Instructions

Post Impact

Important: Only the correct parts manufactured specifically for this product by Trinity Highway may be used to repair a damaged system. Failure to comply may result in damage to the system and/or an untested effect on the impacting vehicle, to and including injury or death.

1) Inspect the Frame for bent parts

Replace all frame members that have been damaged. Do not attempt to weld or straighten parts. Replace the arms in pairs. Refer to the system drawings for the part numbers and descriptions of the parts.

2) Replace Frame Arm Mounting Bolts

Replace all Frame Arm Mounting bolts. Refer to the system drawings for the part numbers and descriptions of the parts. All frame attaching bolts are 3/4"-10 G5, Zinc plated cap screws with 3/4"-10 G5, Zinc plated nuts. Split lock washers are placed under the head of the cap screws on all fasteners interior to the arm attachment of the FWD section and attachment of the mid-frame in the REAR section. All outer fasteners are tightened to 120-130 ft-lbs. [163-176 Nm]. The interior fasteners are torqued to 55-60 ft-lbs. [75-81 Nm]. All fasteners must have thread locker (Red Loctite® 262 recommended) applied to the threads prior to assembly (pp. 41-43).

3) Remove Cartridges

Remove the crushed Cartridges.

Warning: Do not attempt to repair damaged Cartridges. For full impact capacity, the cartridges will need to be replaced even if only crushed slightly.

4) Assemble Cartridges (p. 19, Figure 17)

Using a forklift and sling, place the Type B Cartridge in position and secure it using the flat washers, lock washers and nuts provided. Torque the nuts to 90 ± 5 ft-lb [120±7 N-m]. Insert the Type A Cartridge between the mid-frame flanges and anchor it to the assembly with 1/2-13 G5 hex cap screws and 1/2" flat washers. Use medium threadlocker on the bolt threads (Blue Loctite® 242 recommended). Torque bolts to 65 ± 5 ft-lb [88±7 N-m] (pp 44-45).

5) Adjust the Height and Levelness of the System Frame

Verify that the System Frame is 305mm ± 25 mm from the ground at the front and rear of the system. It may be necessary to add shims to the Socket Hitches in order to adjust the levelness of the Cartridge (Figure 28).

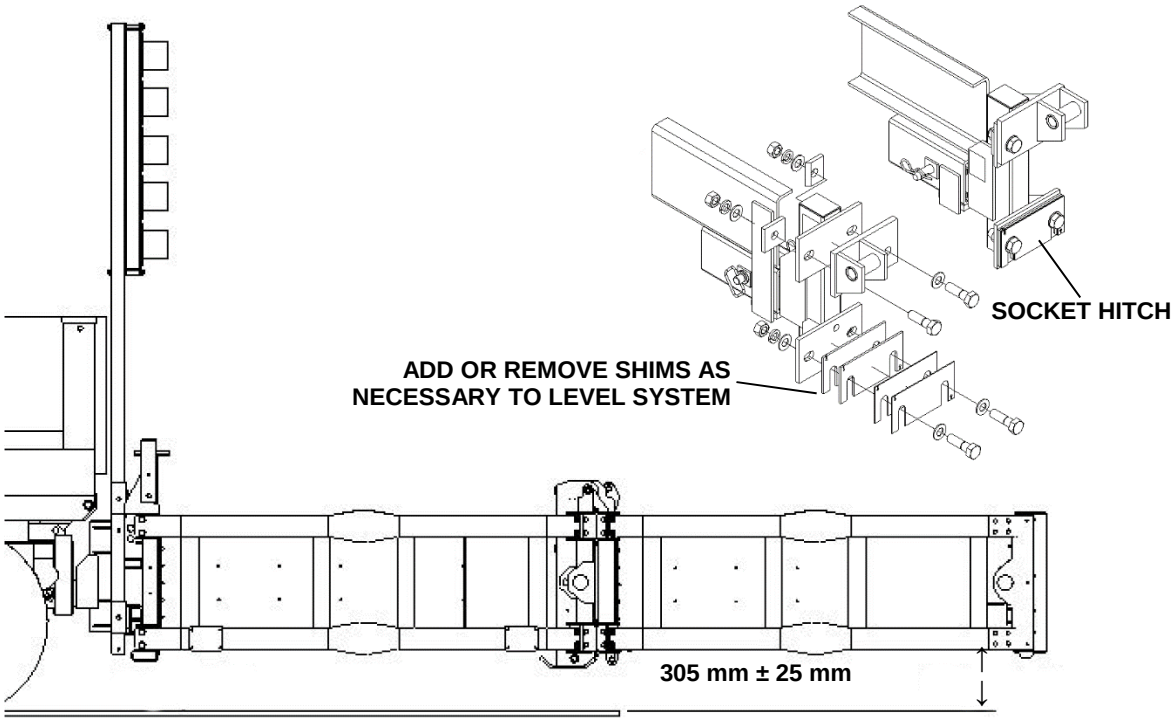


Figure 28

6) Verify Position of Hydraulic / Electrical Lines

Check the location of all the hydraulic and electrical lines to make sure they will not be damaged during the folding and unfolding of the system.

7) Check System Lights for Proper Operation

Verify that all the turn / stop / tail / lights are working properly and replace all non-working light assemblies.

There are two light circuits on the TMA. Verify both circuits are operational.

Raise the system to folded position and verify secondary lights are working.

With the system unfolded, lights on the Impact Face and Mid Frame will be on.

With the system folded, the lights on the Mid Frame will be on and the lights on the Impact Face will be off.

8) Final check

Each fastener is in place and properly tightened.

9) Ready to Use

The system is now ready for service.

Troubleshooting Guide

Safety Notes – See Troubleshooting Decision Trees on page 37.

1) Always wear eye protection when working on or around machinery or power tools, and while working with hydraulics.

2) Do not attempt to control a hydraulic leak with your hand. High-pressure hydraulic fluid can puncture the skin and cause severe injury or death. Use extreme caution when working on hydraulic systems.

In general, consult Trinity Highway Customer Service if problems with operating or repairing the TMA arise (p. 3). This guide is meant to be an aid for performing minor repairs, not a detailed repair manual.

Note: For any problems not listed here, contact Trinity Highway Customer Service.

Test Equipment

The following is a recommended list of the test equipment required to troubleshoot DC powered hydraulic systems.

1. Gage

A 34.5 MPa pressure gage, preferably glycerin filled, is a valuable and relatively inexpensive tool for checking fluid pressure in the various sections of the circuit.

2. DC Test Light

A test light is a light bulb with one lead wired to an alligator clip and the other lead connected to a metal probe. It is used to check for the presence of a voltage in the electrical circuit. With the alligator clip grounded, the light glows when the probe comes into contact with a hot electrical component.

3. Continuity Light

A continuity light is like a test light but contains its own battery. It is used for testing electrical circuits when the components are not connected to a power source.

4. Volt Meter

A DC voltmeter can be used to troubleshoot voltage problems. Two common uses are: 1) Ground one probe while using the other to probe hot leads in search of the available voltage at the point where the second probe is connected. 2) Measure a voltage drop in a wire or component by connecting one probe to one end and the remaining probe to the other end of the item in question.

5. Ohmmeter

Note: All tests conducted with an ohmmeter must be done with the power source disconnected from the system.

An ohm meter is used to measure resistance and is useful when working with solenoid coils. On some coils the wire resistance is large enough that a DC test light might not illuminate, falsely indicating an open circuit (infinite resistance). A successful coil test, however, shall always show some non-infinite value of resistance.

6. Assorted Hoses, Pressure Fittings

These can be used to connect and/or isolate certain parts of a hydraulic circuit for diagnosing hydraulic problems.

If you suspect problems, do not operate the system. Diagnose and repair, or contact Trinity Highway Customer Service Department for input as to your specific application.

Hydraulic Fluid

1. Purpose

The main purpose of hydraulic fluid is to transfer power from the pump to the actuators. Secondary tasks include reducing metal on metal friction and preventing the formation of rust and sludge. These traits are achieved when the oil has a good lubricity (slipperiness), and with additives that inhibit oxidation and the entrainment of air and water in the oil, respectively. The viscosity (thickness) of the oil must be appropriate for the operating temperature to minimize unwanted leakage and to lubricate the close fitting parts in the system.

Additionally, the oil must be compatible with the seals used in the system. Finally, the oil must be able to pour or flow at the lowest expected operating temperature so that it can enter the reservoir and pump for use. For all of these reasons, automatic transmission fluid (ATF, Dexron ™ III) has been found to be the best readily available fluid for the job in most climate conditions.

2. Selecting Fluids for Applications Outside ATF'S Temperature Range

When looking for fluids that can be used in place of ATF or for applications where the operating temperature is outside the range of ATF, the following specs should be discussed with your local oil distributor:

A. Fluid must be compatible with Buna-N sealing compounds.

B. The pour point of fluid used must be below the lowest anticipated temperature.

C. Fluid should contain Rust or Oxidation inhibitors as well as other detergent type inhibitors.

D. Fluid viscosity (SUS) must have an operating range between 80 and 375, with the ideal viscosity near 200 SUS.

E. The viscosity index should be as high as possible. As an example, ATF has the following specs listed for most oil manufacturers:

[1] Viscosity	(SUS)
37 º C	185 to 205
99 º C	45 to 55
Pour Point	-47 º F [-44º C] to
	-35 º F [-37º C]
Viscosity Index	145 to 165

Hydraulic System Check

Finding & Solving Problems

Caution: Contact Trinity Highway Customer Service Department for advice on repair or replacement of TMA parts. All replacement components must be approved for use or provided by Trinity Highway.

Hydraulic system failures can occur in several ways: A gradual or sudden loss of pressure or flow, a loss of power at the pump, or other difficulties. Any of the system's components could be the cause. Start with the appropriate checklist below.

Important: Avoid the use of Teflon™ tape on hydraulic fittings as it can easily jam valves and cause failures in the hydraulic system.

1. Motor Does Not Start

Improper ground. Check ground conditions.

Improper or low voltage supply. Check voltage supply from truck battery and at pump.

Electrical system inoperative: Verify that cable from battery is correctly attached.

Failed motor solenoid: Replace, taking note of correct wire locations for reassembly.

2. Rough or Erratic Performance

Insufficient or no oil in system, pump losing prime: Fill system, check for leaks.

Ground fault: Check for loose wire leads, verify that pump is securely mounted to TMA frame and that the truck lighting plug is correctly attached. Ensure ground wire from pump is directly routed to the truck battery.

Wrong oil in system (should be ATF Dexron™ III): Change Oil.

Clogged or dirty cylinder check valve: Remove load on the cylinder, disassemble cylinder check valve and clean (See section on Cylinder Check Valves).

Oil line is restricted, dirty, or collapsed: Clean or replace oil line.

Dirty pump: Clean exterior and check for contaminated oil. If necessary, drain, flush, and refill system with ATF Dexron™ III.

Worn components (valves, cylinder, etc.): Check for cause of wear. Replace worn parts with correct components.

Leakage: Check all components, verify tightness of fittings, and inspect hoses for wear while system is idle. Replace damaged hoses or fittings.

Excessive loading (especially any features not originally installed by Trinity Highway): Remove excessive load.

3. Operates Slowly or With Cavitation

Low voltage: Verify voltages with DC voltmeter and check truck charging system.

Oil viscosity too high or cold oil: Allow oil to warm up before operating or replace with lower viscosity oil as necessary.

Air in system: Check for leaks and tighten as necessary. Cycle the system several times to relieve air from system.

Oil leaks: Tighten fittings, replace seals or damaged lines.

Worn components (valves, cylinder, etc.): Check for cause of wear. Replace worn parts with correct components.

Restriction in lines or cylinder check valves: Remove load on the cylinder, clean lines or valves, and replace hoses if necessary.

4. Operates Too Fast

Internal fixed flow controls reversed: Contact Trinity Highway

5. Pump Overheats

Low voltage at pump: Check battery and wiring

Incorrect, low volume, or dirty oil: Add or change oil as necessary

Excessive internal leakage (pump): Replace the pump (contact Trinity Highway).

Restriction in lines or cylinder check valves: Remove load on the cylinder, clean lines or valves, and replace hoses if necessary.

Insufficient heat radiation: Clean dirt and mud from reservoir and components.

6. Noisy Pump

Low oil level, incorrect or foamy oil: Replace or add oil as necessary.

Suction line or inlet screen plugged: Consult Trinity Highway.

Worn or damaged pump: Replace the pump (contact Trinity Highway).

7. Load Drops When Locked

Leaking cylinder seals or fittings: Remove load on the cylinder, inspect for damaged hoses or fittings, tighten fittings or replace hoses if necessary.

Faulty counterbalance valve: Remove load on the cylinder. Clean or replace the appropriate counterbalance valve components.

8. Leaky Cylinder

Seals worn or damaged: Replace the cylinder.

Rod damaged: Replace the cylinder.

Pressure Relief Valve

1. Purpose

A. Limit the maximum pressure in the hydraulic system to a safe level.

B. Keep the motor amperage (and battery drain) at a minimum when the cylinder dead heads (reaches full stroke).

2. Adjusting Relief Valve (pump)

Note: In general, do not adjust the relief valve. It is set to the correct operating pressure at the factory.

A. Symptoms of incorrect pressure relief adjustment.

1) Relief pressure too high

a. Battery current draw is excessive

b. Motor RPM is slow

2) Relief pressure too low.

a. Motor RPM is fast

b. System will not fold (cylinder will not extend).

c. Excessive turbulence in reservoir.

Important: Contact the Trinity Highway Customer Service Department for all replacement parts or components.

Warning: Do not exceed pressure rating for hydraulic system components. The system pressure of the SS180® M is factory set to 2400 psi [MPa 16.5].

Counterbalance Valve

1. Purpose

The counterbalance valve allows free flow of hydraulic oil into and out of the cylinder but blocks the flow when there is no pump pressure. The counterbalance valve locks the system when the pump is not running.

Caution: When the system is stopped at an intermediate angle, there will be pressure on the oil in the hoses between the counterbalance valve and cylinder. This pressure is supporting the load of the folding bay. **ALWAYS** make sure the TMA is completely folded or unfolded before loosening a hose fitting or servicing any check valve. This will minimize the chance of injury from an uncontrolled falling load or spray of high-pressure oil. Never stand underneath the TMA when performing any service or component check.

2. Repairing Counterbalance Valve

A. Symptoms

If the TMA exhibits a slow drifting of the folding bay when the pump is not running, one of the following may be true:

1) The counterbalance valve has become blocked by foreign debris in the oil (hydraulic) line.
2) The piston ring seal inside the cylinder has been compromised.

B. Repair procedure

1) Blocked Cartridge
   a. Ensure the system is completely folded or unfolded.
   b. Remove the Cartridge from the valve body, being cautious of oil spray from residual pressure in the system.
   c. Clean the Cartridge using compressed air, making sure to direct the air away from anyone's face. Avoid breathing the oil mist that this process may create.
   d. Reinsert the Cartridge as they were before disassembly.
2) Piston ring seal
   a. Refer to the following section on the Hydraulic Cylinder.

Important: If the counterbalance valve has failed in some other way, do not attempt to repair it. Replace it with a new valve by contacting Trinity Highway Customer Service Department (p. 3).

Hydraulic Cylinder

Warning: Never allow anyone underneath the moving portion of the SS180® M. Block out all loads and disconnect electrical contact prior to performing any service on hydraulic equipment.

1. Troubleshooting

If you suspect problems with the hydraulic cylinder on the TMA, you may need to remove the cylinder from the TMA for repair or replacement. The cylinder can only be removed when the TMA is completely folded. Double check all electrical contacts between the TMA and support vehicle have been disconnected prior to performing any work on the hydraulic system.

A cracked, bent, or leaky cylinder may need repair but will almost always be replaced to ensure reliable performance.

2. Cylinder Replacement

A. Completely fold the TMA.

B. Unplug all electrical connections between the TMA and the support vehicle.

C. See Hydraulic Cylinder Assembly drawing on page 51. Loosen (but do not disconnect) the “Follower Link Pivot” and the “Push Link Pivot” where they are bolted to the “Weldment, Front Intermediate Frame” and the “Weldment, Rear Intermediate Frame”, respectively.

D. At the top end of the cylinder rod, loosen the set screw and push out the short 1” diameter pin, making note of the alignment and location of all linkage components for later reassembly.

E. Disconnect the hoses leading into the cylinder at two convenient locations and place temporary caps on hoses and cylinder ports to prevent spillage or contamination.

F. At the bottom end of the Cylinder body, remove the Cotter Pin from the Clevis Pin and push out the long 1” diameter pin, making note of the alignment and location of all components for later reassembly.

G. The cylinder should now be free. Reinstall a new cylinder in the reverse order of these removal steps, making sure to properly align and (where necessary) tighten all components. Use blue thread locker (medium strength) on all fasteners.

Note: See the section on Hydraulic System Priming (p. 34). You will likely need to prime the system if you are installing a new or “dry” cylinder.

3. Repairing Cylinder

Replace any faulty or damaged cylinder with a new cylinder.

Hydraulic System Priming

SS180® M hydraulic systems come direct from the factory primed and ready to operate. Priming should only be necessary after changing the oil or if you have recently repaired a leak.

1. Priming Process

Systems that have been disassembled for repair require priming for proper performance. The hydraulic system is said to be primed when all hoses and the cylinder are full of oil and the air has been expelled. The reservoir will be full of oil (oil just visible at the filler port) when the TMA is FOLDED. Prime the pump as follows:

A. Detach the long hoses where they connect to the cylinder. Note which hoses connect to the top and bottom of the cylinder.

B. Jog and pump by briefly depressing the “UNFOLD” button until clean oil flows from two of the hoses.

C. Repeat this process for the other two hoses by briefly depressing the “FOLD” button.

D. Replace and retighten all four hoses.

Caution: Do not completely fold or unfold the TMA until it has been jogged a few times to work out any air in the system. Add oil at the filler port any time that the pump begins to cavitate.

E. Jog the system a few times by depressing “FOLD” or “UNFOLD” depending on the current position of the TMA.

2. Check for These Problems When a System Fails to Prime

Correct pump mounting, with the motor on top and reservoir at the bottom. Every SS180® M has vertically mounted pumps. Mounting the pump in some other orientation will prevent the suction line from picking up oil and cause cavitation.

Note: Vertical mount pumps have a label stating such designation.

A solid plug in the reservoir filler port instead of a vent plug (See Reservoir section).

Reservoir

Important: Do not use a solid plug or fill cap without a filter/breather element, or damage will be caused to the pump and/or reservoir.

1 Use Recommended Fluid:

Fill reservoir with Dexron™ III only (See Hydraulic Fluid section).

2 Proper Filling:

A. With the TMA FOLDED (cylinder fully retracted), fill the reservoir so that oil can just be seen in the filler port.

B. Operate the unit several times starting with short cylinder strokes (in the folded position only), increasing the length of each successive stroke.

C. Recheck oil level often and add as necessary to keep the pump from picking up air.

D. Reinstall the filter/breather plug provided.

3 Reservoir Problems

A. Clear oil flowing out of the filler port usually means the reservoir was completely filled before the cylinder was fully collapsed (TMA unfolded).

B. Foamy oil flowing out of the filler port points to one of the following:

1) Air present in the system; the response is usually spongy or the cylinder may move with a jerking motion.

C. Water in the oil:

Water can enter the reservoir through the filler port if the unit is left outdoors or washed with a high-pressure washer. Protect the unit, whenever possible, and change the oil if you suspect contamination. In cold weather the water could freeze, preventing the pump from working until the ice melts.

Warning: Remove all rings, watches, jewelry, etc. prior to doing any electrical work!

Electrical Problems

1 Low Voltage

Operating DC (direct current) power units efficiently requires proper voltage.

Caution: Any attempt to operate below the minimum required voltage could cause system failure.

A. Signs that point to low voltage are:

1) Motor won't run because solenoid won't shift.

2) Motor running at reduced speed.

B. Minimum voltage requirements:

1) Between the motor stud and ground: 9.0 volts at maximum load.

C. Causes for low voltages are:

1) Improper ground. Check grounds.

2) Battery capacity too small.

3) Cable ends not electrically secure to battery cable.

4) Battery cable size too small for load and length of run. Copper #4 automotive is the recommended minimum size battery cable. Larger copper battery cable (#2, #1, #0, or #00) may be required for cable lengths over 25 feet to keep performance from deteriorating.

5) The pump ground is established through the battery ground cable. Clean any dirt or rust from cable to achieve proper ground.

6) Burnt contacts on motor solenoid.

D. Check for low voltage as follows (requires a voltmeter):

1) On alternator equipped vehicles, verify that the battery voltage is approximately 13.5 volts with no electrical accessories operating and the engine running.

2) Operate the TMA while an assistant uses the voltmeter to probe each connection, cable end, and cable from the battery all the way back to the motor stud. Note the voltage losses. Make necessary repairs. Increase the voltage above the minimum as required.

Important: Check ground connections and remove any paint, rust, or dirt that may be acting as insulators.

2 DC Motors

Before concluding that the hydraulic pump is malfunctioning:

1) Verify that all connections are secure and that the problem does not lie somewhere else.
2) Check ground.
3) Check brushes for wear, and replace if necessary.

Important: A motor that does not turn in freezing weather may indicate frozen water in hydraulic system.

If it has been verified that the pump is defective; contact Trinity Highway Customer Service Department for input as to your specific application (p. 3).

3 Electrical Switches

A. If you suspect that the switch is defective, use one of these three methods to test the operation of the switch:
   1) First check grounds.
   2) Use continuity light to test the switch (p.37).
   3) Use a circuit test light to test the switch (p.37).

B. Motor solenoid switches:

   The solenoid switches found on the hydraulic pump are four post style solenoid. They shall be constructed and wired such that:
   1) The large posts with the connecting bar must be attached to the cable from the battery.
   2) The same post is the shared hot lead and provides power to the control circuit.
   3) The remaining large posts attach to the motor wires.
   4) The small post on each solenoid connects to the control circuit on the side and the other small post connects to the ground. This circuit activates both the solenoid and the pump when energized.

4 Electrical Polarity

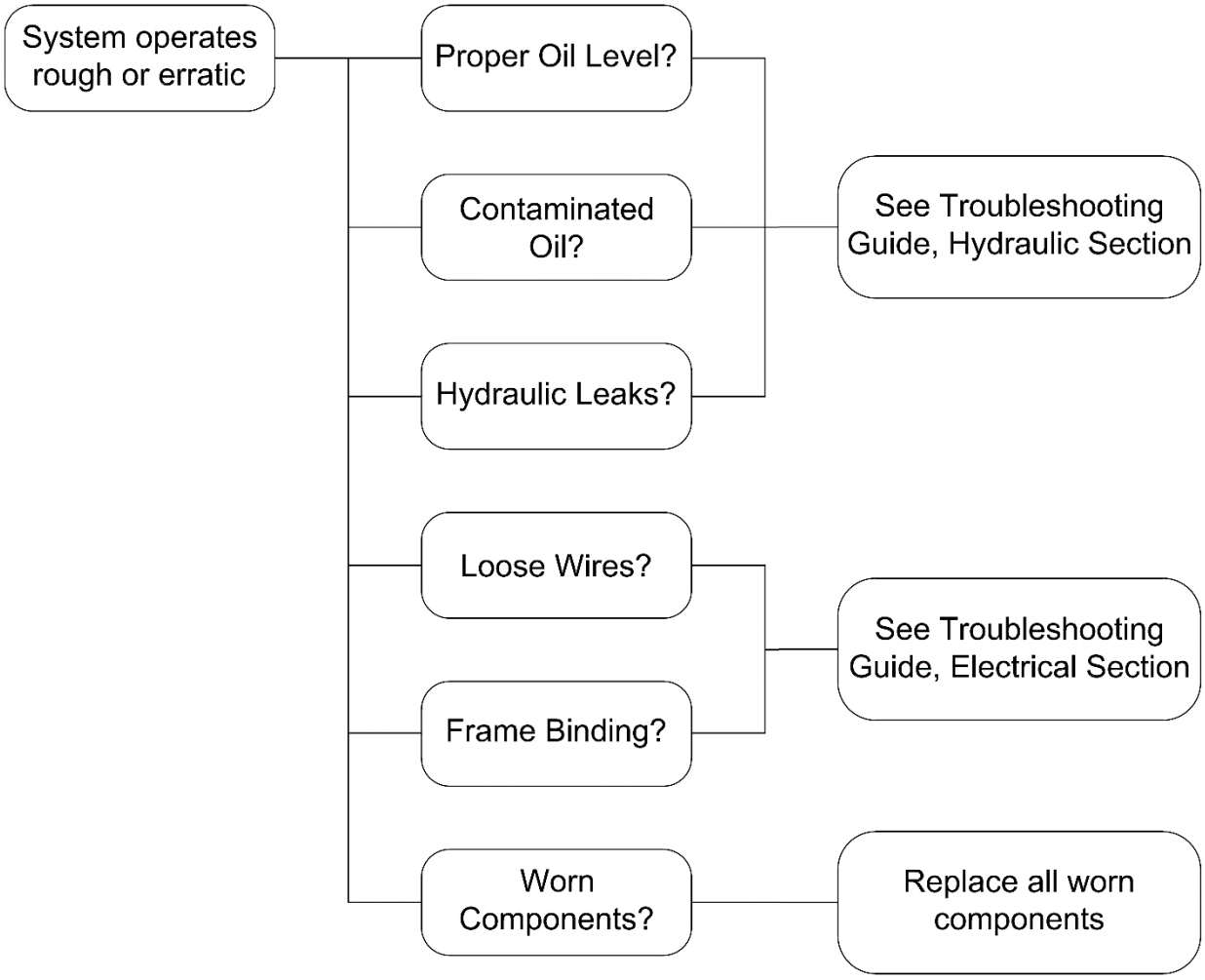
The pump motor and all controls have a negative ground.

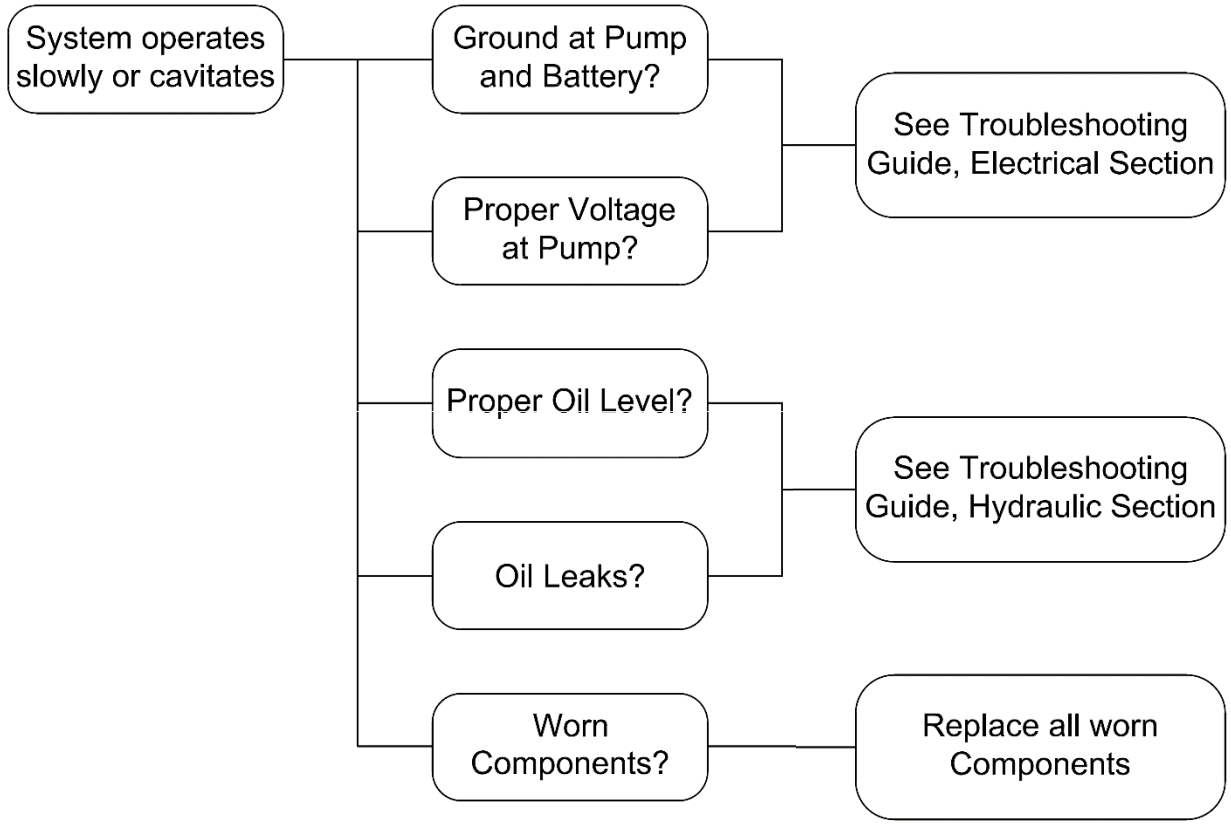
5 Electrical Shorts or Open Circuits

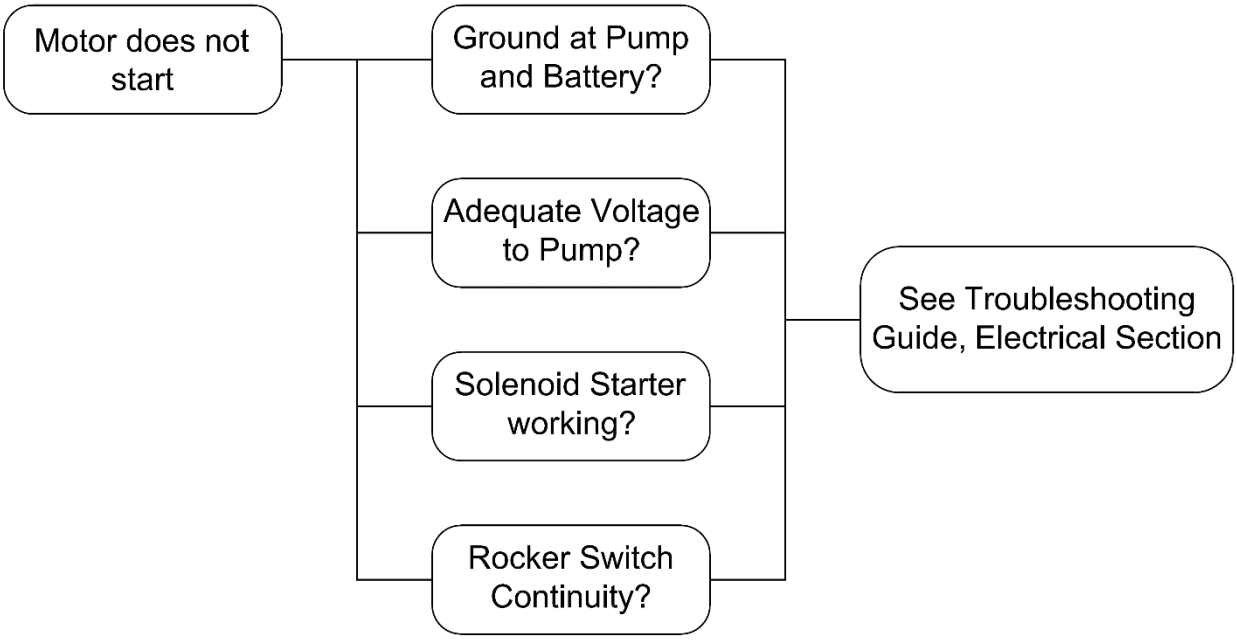
A. Shorts occur when wires with power come in contact with a ground. A short will cause a fuse to blow or a wire to burn. Look for pinched or cut wires.

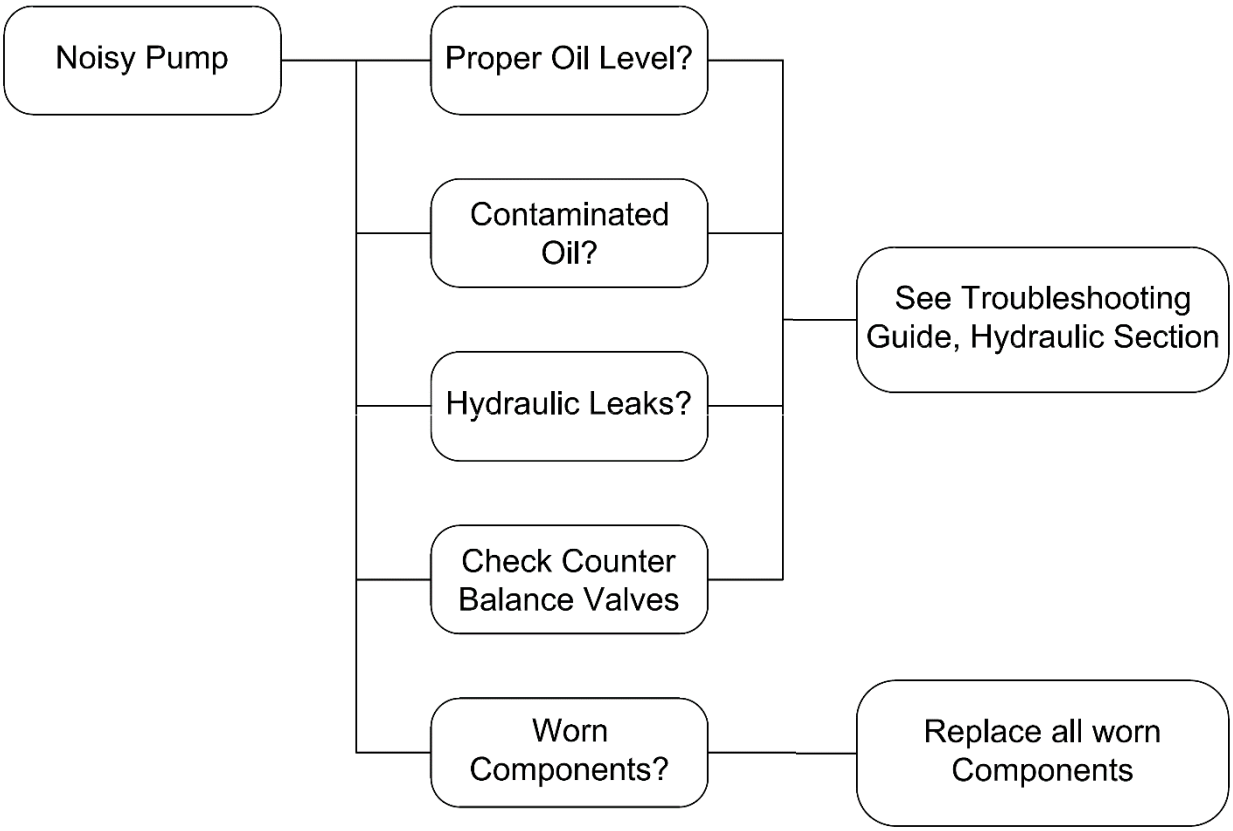
B. An open circuit is simply a break which prohibits current flow. Look for pinched or cut wires.

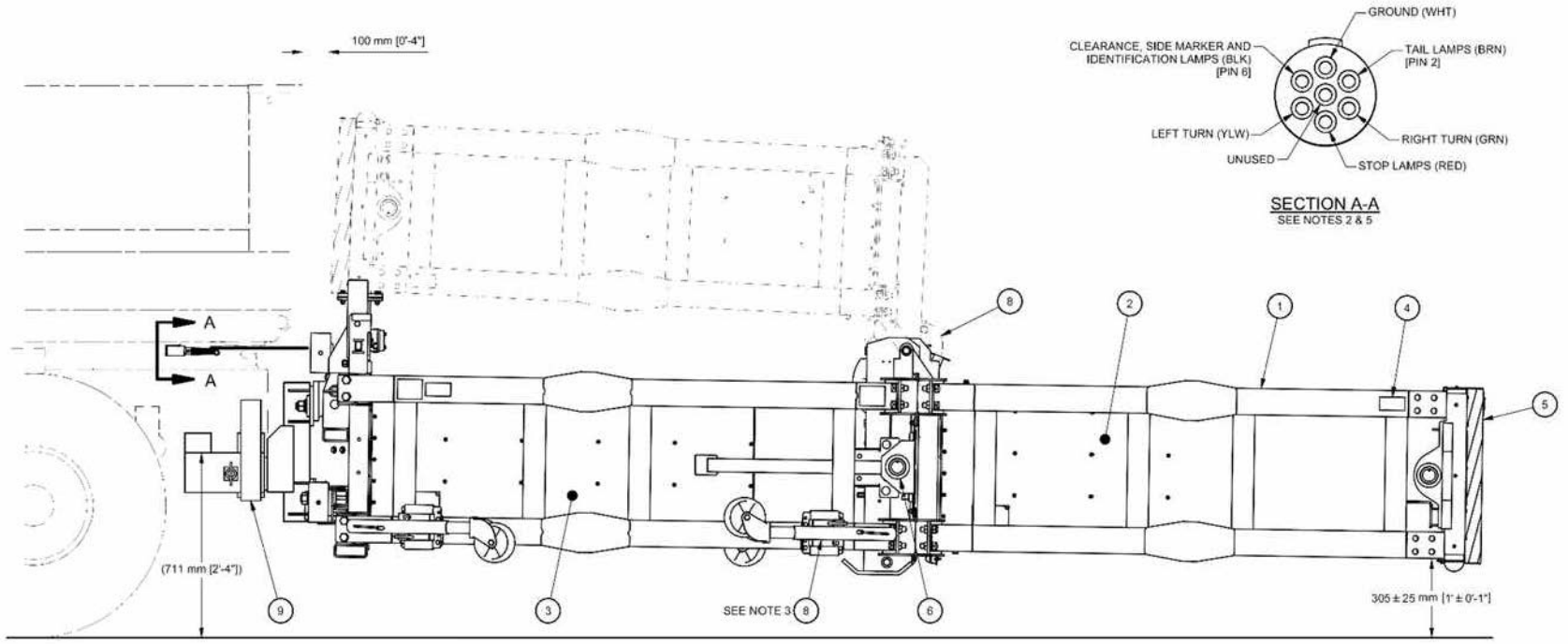
Troubleshooting Decision Trees and System Drawings




System operates slowly or cavitates
Ground at Pump and Battery?
Proper Voltage at Pump?
See Troubleshooting Guide, Electrical Section
Proper Oil Level?
Oil Leaks?
See Troubleshooting Guide, Hydraulic Section
Worn Components?
Replace all worn Components


Motor does not start
Ground at Pump and Battery?
Adequate Voltage to Pump?
Solenoid Starter working?
Rocker Switch Continuity?
See Troubleshooting Guide, Electrical Section


Noisy Pump
Proper Oil Level?
Contaminated Oil?
Hydraulic Leaks?
Check Counter Balance Valves
Worn Components?
See Troubleshooting Guide, Hydraulic Section
Replace all worn Components



NOTES:
1. IT IS RECOMMENDED THAT THE SS180M TMA BE MOUNTED TO TRUCKS RATED BETWEEN 6100 kg [13,500 LBS] AND 11,300 kg [25,000 LBS].
2. LOCATE FEMALE CONNECTOR IN A CONVENIENT LOCATION ON THE TRUCK SO THAT LIFTING OR LOWERING THE TMA WILL NOT DAMAGE THE ELECTRICAL CABLE.
3. JACKS MUST BE REMOVED WHENEVER THE TMA IS OPERATIONAL.
4. SEE THE SAFE-STOP TMA MANUAL FOR DESIGN LIMITATIONS & INSTALLATION INSTRUCTIONS BEFORE ASSEMBLING AND INSTALLING A SYSTEM.
5. FOR SUPPORT VEHICLES WITH COMBINED TAIL AND CLEARANCE LIGHTS, CONNECT A JUMPER BETWEEN PINS 2 AND 6 ON THE BACK SIDE OF THE TMA PLUG CONNECTOR.

KEY			
①	FRAME	⑦	HYDRAULICS
②	CARTRIDGE A	⑧	MISC PARTS
③	CARTRIDGE B	⑨	UNDERRIDE ASSY
④	DECALS	⑩	
⑤	IMPACT COVER	⑪	
⑥	LIGHTING	⑫	

REFERENCES	
SERIAL NO.	N/A
SALES ORDER	
EH PROJECT	
DESIGN SPEED	N/A
NOSE TYPE	N/A
NO. OF UNITS	

FRAME ASSY	626592
CARTRIDGE A ASSY	626605
CARTRIDGE B ASSY	626611
LIGHTING ASSY	625143
MISC PART ASSY	626628
HYDRAULICS ASSY	626612
DECAL ASSY	626596
IMPACT COVER ASSY	626614
ARROWBOARD ASSY	626597
ATTACHMENT ASSY	604382
UNDERRIDE ASSY	616797

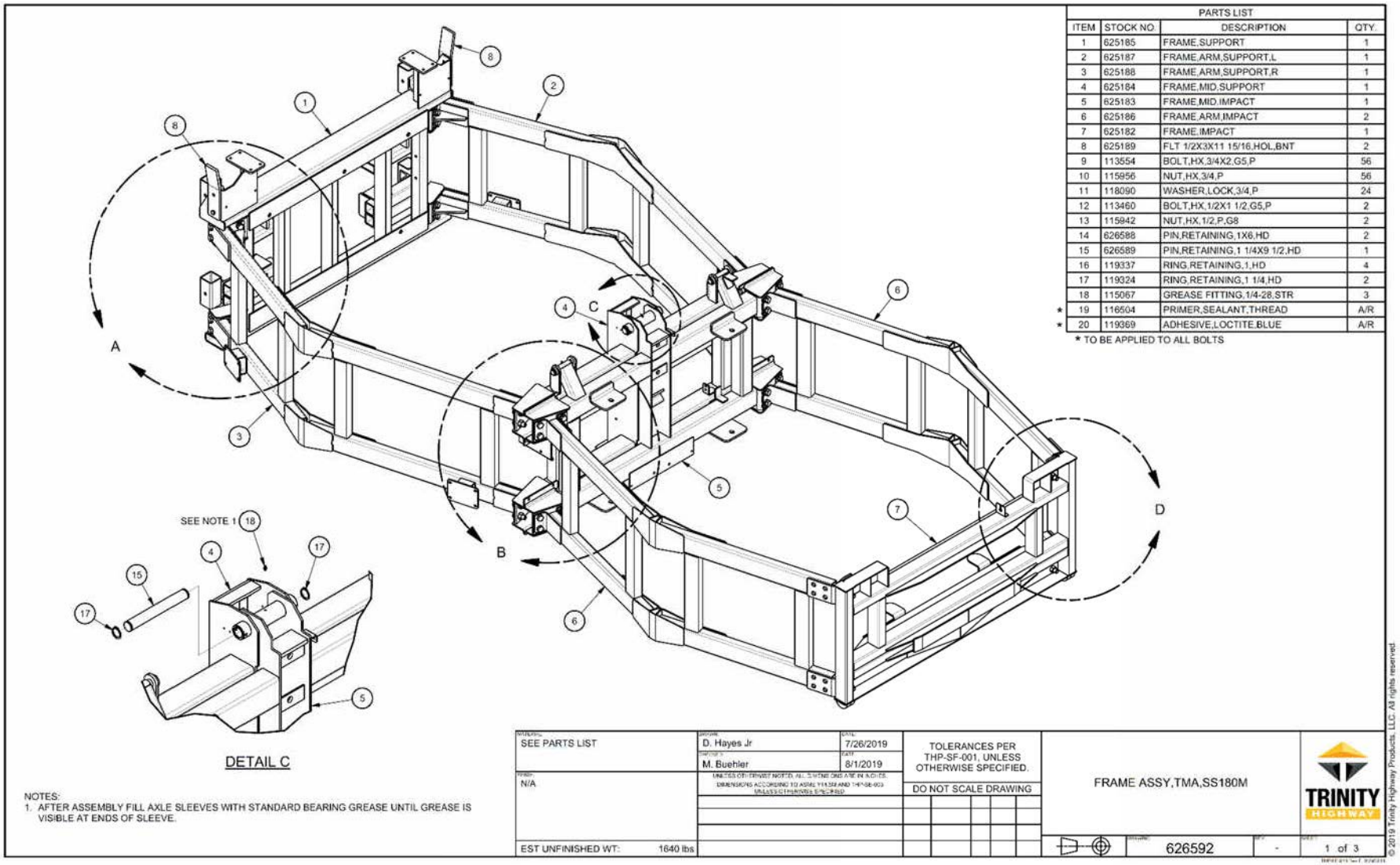
DRAWN	D. Hayes Jr	DATE	7/26/2019	MODEL NO.	SS180M	
CHECKED	M. Buehler	DATE	8/1/2019	FILE	SS180M.idw	
UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN MILLIMETERS [INCH]. DIMENSIONS ACCORDING TO ASME Y14.5M-1994 AND THP SE-003 UNLESS OTHERWISE SPECIFIED.				DO NOT SCALE DRAWING		
Revision		ECO	Date	Rev	By	Chk
INITIAL RELEASE		6625	-	-	-	-

SAFE-STOP TMA® SS180®M

DRAWING SS180M | REV - | SHEET 1 of 1

TRINITY HIGHWAY

SS180® M



PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	625185	FRAME,SUPPORT	1
2	625187	FRAME,ARM,SUPPORT,L	1
3	625188	FRAME,ARM,SUPPORT,R	1
4	625184	FRAME,MID,SUPPORT	1
5	625183	FRAME,MID,IMPACT	1
6	625186	FRAME,ARM,IMPACT	2
7	625182	FRAME,IMPACT	1
8	625189	FLT 1/2X3X11 15/16,HOL,BNT	2
9	113554	BOLT,HX,3/4X2,G5,P	56
10	115956	NUT,HX,3/4,P	56
11	118090	WASHER,LOCK,3/4,P	24
12	113460	BOLT,HX,1/2X1 1/2,G5,P	2
13	115942	NUT,HX,1/2,P,G8	2
14	626588	PIN,RETAINING,1X6,HD	2
15	626589	PIN,RETAINING,1 1/4X9 1/2,HD	1
16	119337	RING,RETAINING,1,HD	4
17	119324	RING,RETAINING,1 1/4,HD	2
18	115067	GREASE FITTING,1/4-28,STR	3
* 19	116504	PRIMER,SEALANT,THREAD	A/R
* 20	119369	ADHESIVE,LOCTITE,BLUE	A/R

* TO BE APPLIED TO ALL BOLTS

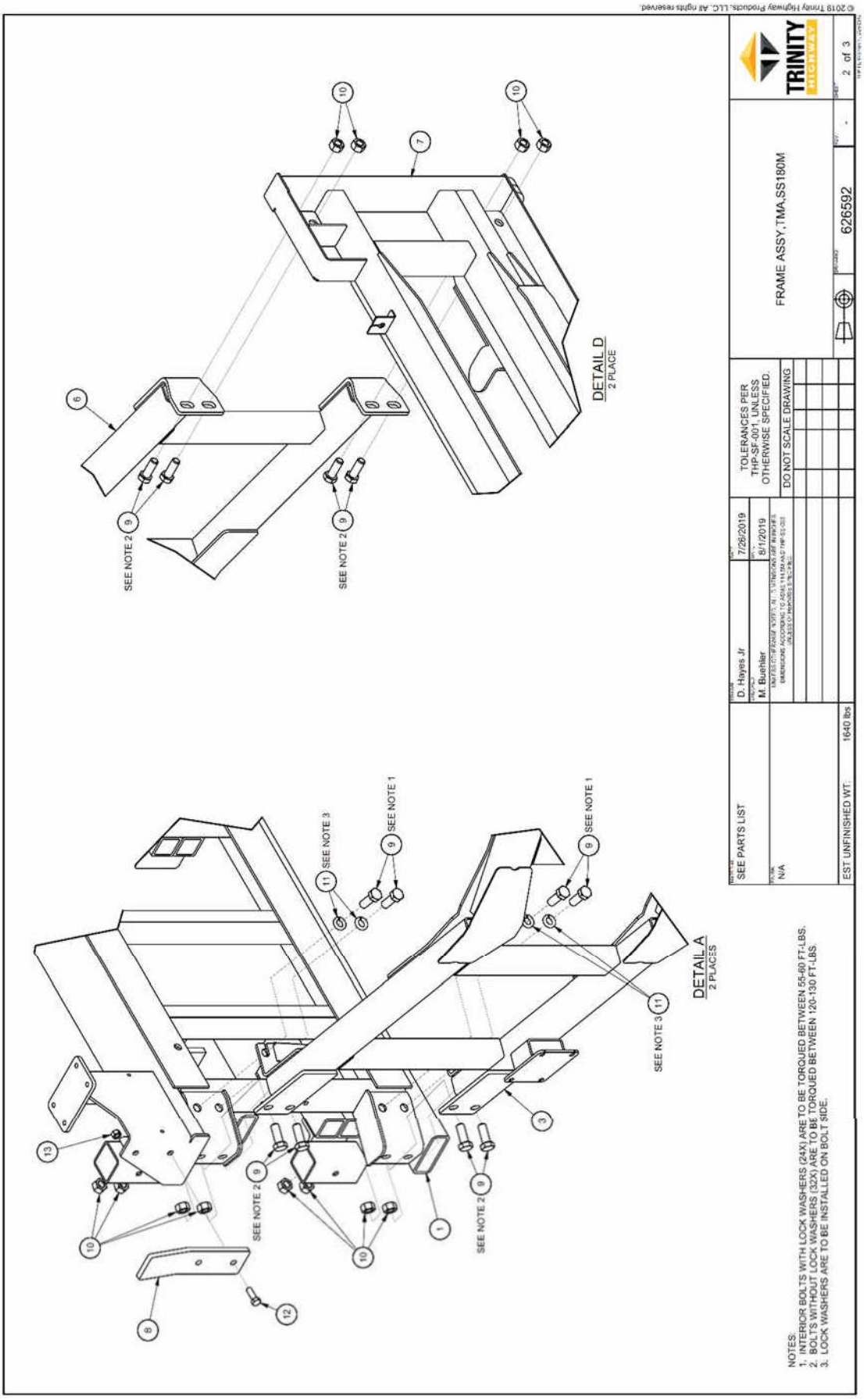
NOTES:
1. AFTER ASSEMBLY FILL AXLE SLEEVES WITH STANDARD BEARING GREASE UNTIL GREASE IS VISIBLE AT ENDS OF SLEEVE.

SEE PARTS LIST	D. Hayes Jr	7/26/2019	TOLERANCES PER THP-SF-001, UNLESS OTHERWISE SPECIFIED.	FRAME ASSY,TMA,SS180M
	M. Buehler	8/1/2019	DO NOT SCALE DRAWING	
N/A				
EST UNFINISHED WT: 1640 lbs				626592 - 1 of 3

TRINITY HIGHWAY

Support Frame Assembly

626592 - 2 of 3


DETAIL D
2 PLACE
SEE NOTE 2
SEE NOTE 2
DETAIL A
2 PLACES
SEE NOTE 1
SEE NOTE 1
SEE NOTE 3
SEE NOTE 3
SEE NOTE 2
SEE NOTE 2
NOTES:
1. INTERIOR BOLTS WITH LOCK WASHERS (24X) ARE TO BE TORQUED BETWEEN 55-60 FT-LBS.
2. BOLTS WITHOUT LOCK WASHERS (32X) ARE TO BE TORQUED BETWEEN 120-130 FT-LBS.
3. LOCK WASHERS ARE TO BE INSTALLED ON BOLT SIDE.
SEE PARTS LIST
N/A
D. Hayes Jr
M. Buehler
7/26/2019
5/1/2019
TOLERANCES PER THP-SF-001, UNLESS OTHERWISE SPECIFIED.
DO NOT SCALE DRAWING
FRAME ASSY,TMA,SS180M
626592
EST UNFINISHED WT.
1640 lbs
2 of 3
TRINITY HIGHWAY
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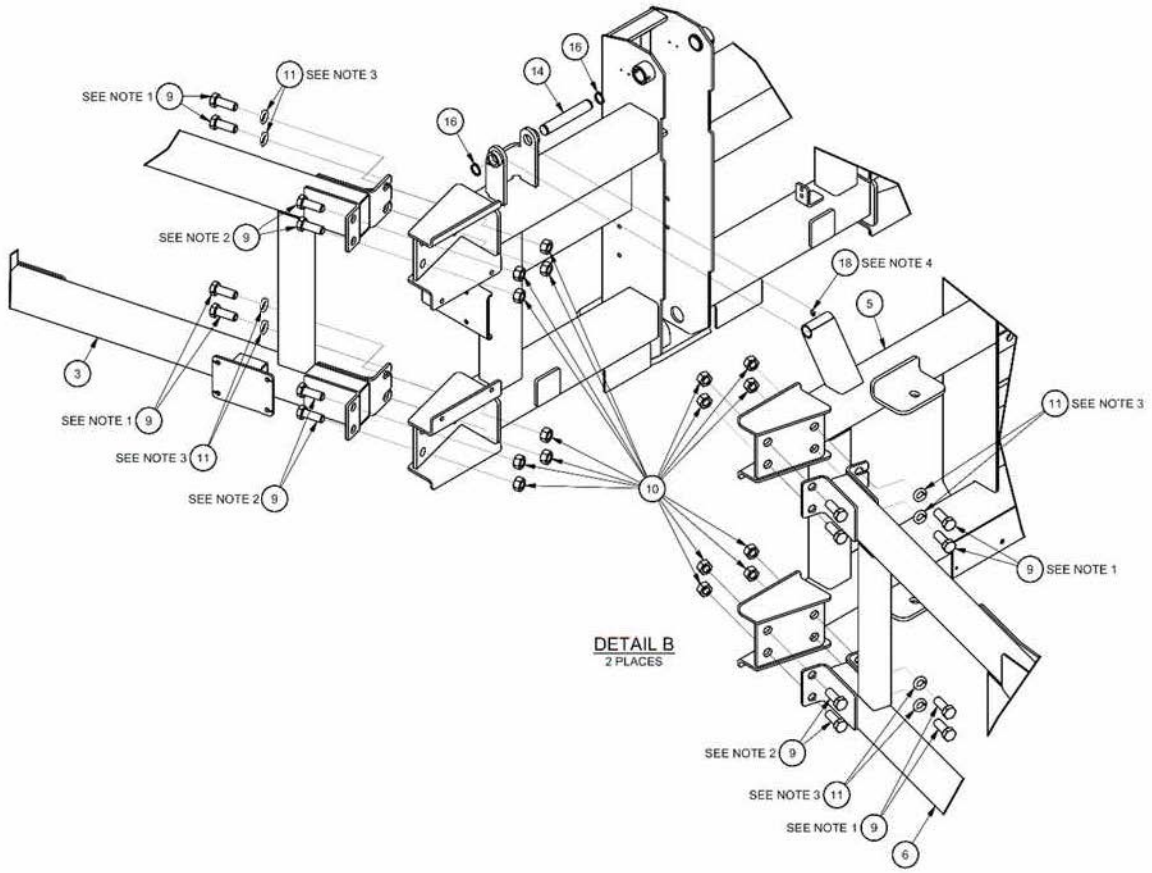
626592 - 3 of 3

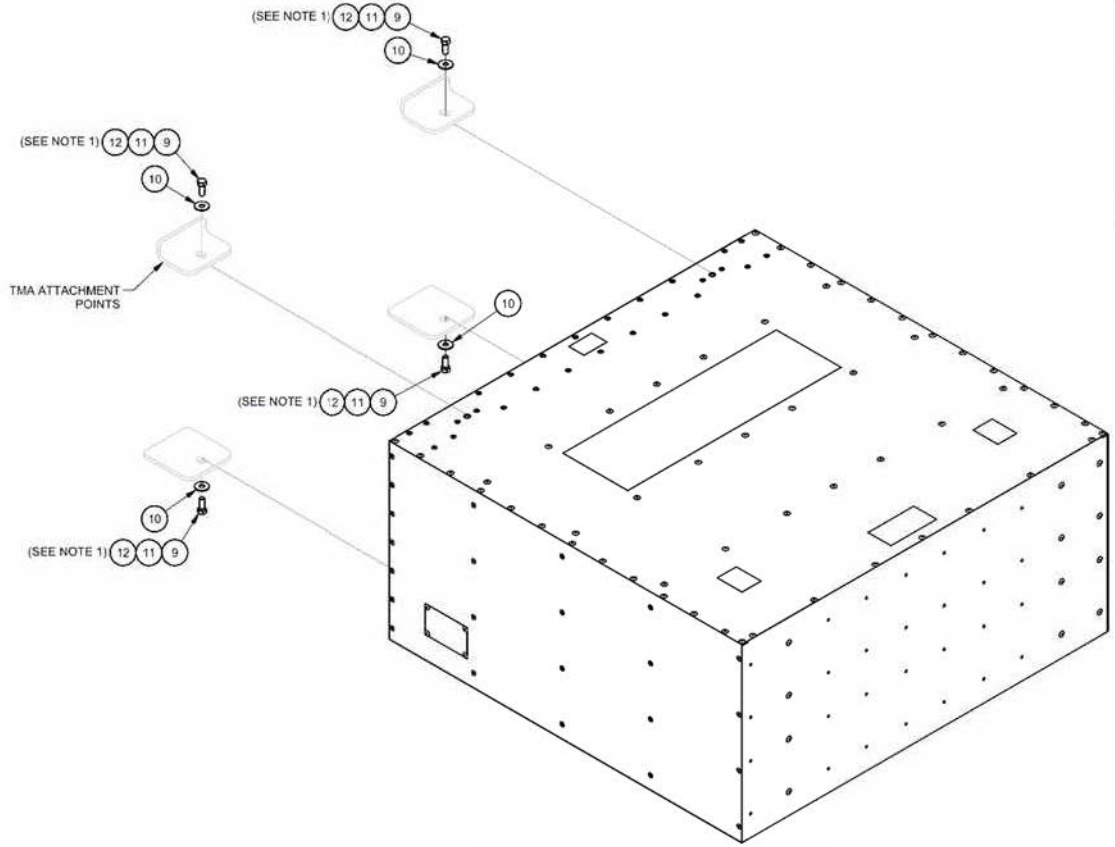


NOTES:
1. INTERIOR BOLTS WITH LOCK WASHERS (24X) ARE TO BE TORQUED BETWEEN 55-60 FT-LBS.
2. BOLTS WITHOUT LOCK WASHERS (32X) ARE TO BE TORQUED BETWEEN 120-130 FT-LBS.
3. LOCK WASHERS ARE TO BE INSTALLED ON BOLT SIDE.
4. AFTER ASSEMBLY FILL AXLE SLEEVES WITH STANDARD BEARING GREASE UNTIL GREASE IS VISIBLE AT ENDS OF SLEEVE.

MATERIAL: SEE PARTS LIST	DRAWN: D. Hayes Jr	DATE: 7/26/2019	TOLERANCES PER THP-SF-001, UNLESS OTHERWISE SPECIFIED.	FRAME ASSY,TMA,SS180M
	CHECKED: M. Buehler	DATE: 8/1/2019		
FINISH: N/A	UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES DIMENSIONS ACCORDING TO ASME Y14.5M AND THP SE-001 UNLESS OTHERWISE SPECIFIED		DO NOT SCALE DRAWING	
EST UNFINISHED WT: 1640 lbs				DRAWING: 626592 REV: - SHEET: 3 of 3

TRINITY HIGHWAY

626605



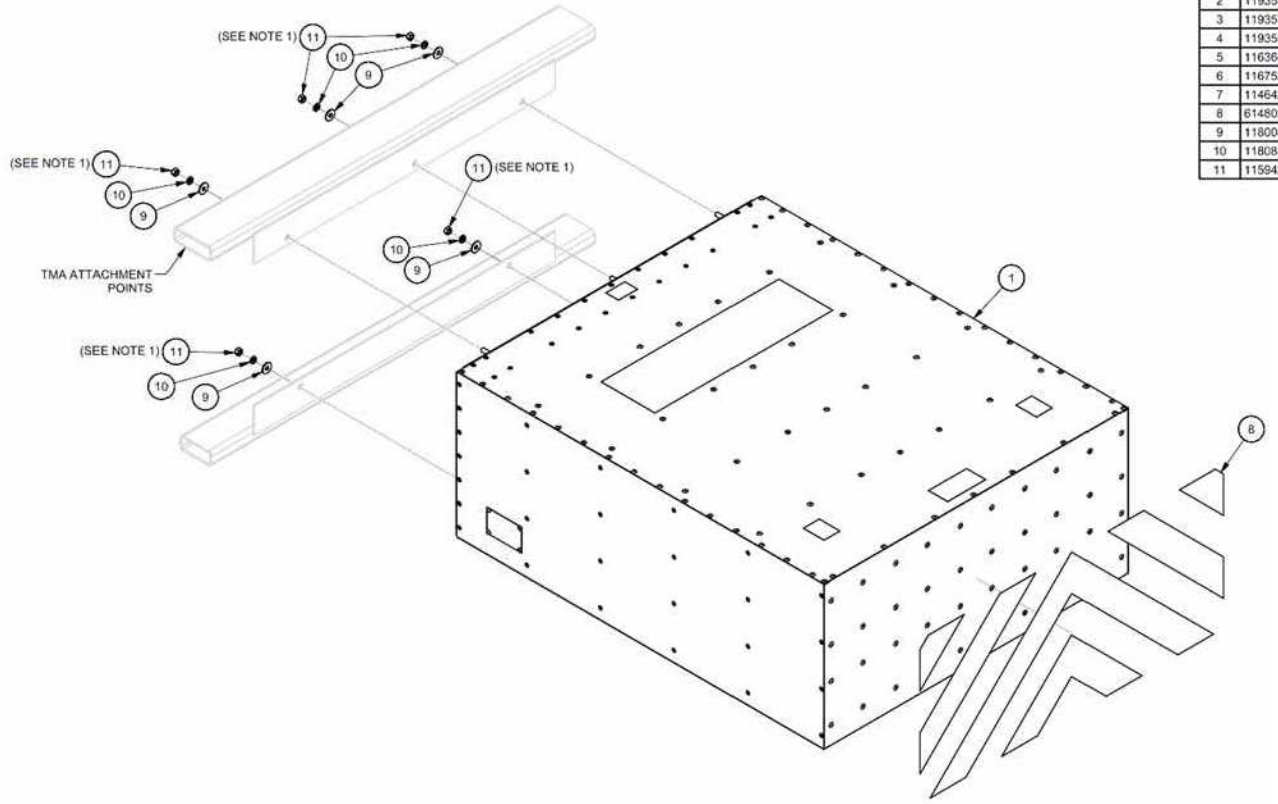
PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	626604	CARTRIDGE,.050X4 BAY	1
2	119353	DECAL,TRINITY LOGO	1
3	119354	DECAL,CARTRIDGE A,MASH	1
4	119357	DECAL,TRINITY REPLACEMENT PARTS	2
5	116364	PLATE,ID,PN,SN,DATE	1
6	114459	DECAL,CAUTION,STAY CLEAR	1
7	116752	RIVET,ALUM,3/16X1/4,LF	4
8	119356	DECAL,TORQUE BOLTS,65FT-LBS	1
9	113463	BOLT,HX,1/2X1 1/4,G5,P	4
10	118008	WASHER,FLAT,1/2ID X 1 3/8OD,P	4
11	118840	PRIMER,LOCTITE,QKSTX 7088	A/R
12	119369	ADHESIVE,LOCTITE,BLUE	A/R

NOTES:
1. TORQUE BOLTS TO 65 FT-LBS ± 5 FT-LBS.

SEE PARTS LIST	D. Hayes Jr 7/26/2019	TOLERANCES PER THP-SF-001, UNLESS OTHERWISE SPECIFIED.	CARTRIDGE,A,MASH
N/A	M. Buehler 8/1/2019	DO NOT SCALE DRAWING	
EST UNFINISHED WT: 128 lbs			626605 - 1 of 2

Cartridge A

626611

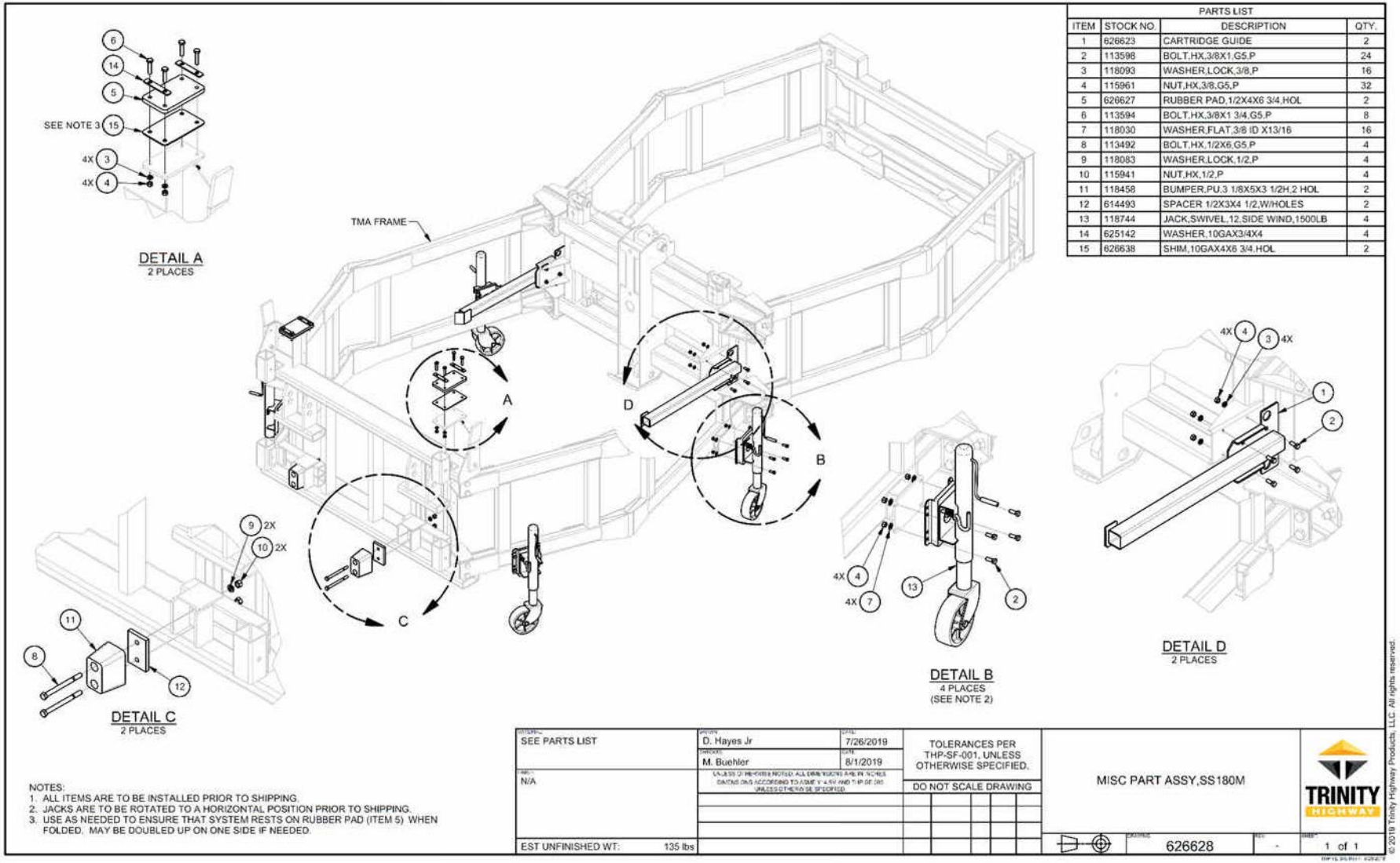


PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	626610	CARTRIDGE,B,MASH,PRE	1
2	119353	DECAL,TRINITY LOGO	1
3	119357	DECAL,TRINITY REPLACEMENT PARTS	2
4	119355	DECAL,CARTRIDGE B,MASH	1
5	116364	PLATE,ID,PN,SN,DATE	1
6	116752	RIVET,ALUM,3/16X1/4,LF	4
7	114642	DECAL,TORQUE 90 FT/LBS	1
8	614802	STRIPING ASSY,CART-B,TMA 9180	1
9	118008	WASHER,FLAT,1/2ID X 1 3/8OD,P	5
10	118083	WASHER,LOCK,1/2,P	5
11	115942	NUT,HX,1/2,P,G8	5

NOTES:
1. TORQUE NUTS TO 90 FT-LBS ± 5 FT-LBS.

SEE PARTS LIST	D. Hayes Jr	7/26/2019	TOLERANCES PER THP-SF-001, UNLESS OTHERWISE SPECIFIED.	CARTRIDGE,B,MASH
	M. Buehler	8/1/2019		
N/A	UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES. DIMENSIONS ACCORDING TO ASME Y14.5M AND THP-SD-001 UNLESS OTHERWISE SPECIFIED.		DO NOT SCALE DRAWING	
EST UNFINISHED WT: 190 lbs				626611 - 1 of 2

626628



PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	626623	CARTRIDGE GUIDE	2
2	113596	BOLT,HX,3/8X1,G5,P	24
3	118093	WASHER,LOCK,3/8,P	16
4	115961	NUT,HX,3/8,G5,P	32
5	626627	RUBBER PAD,1/2X4X6 3/4,HOL	2
6	113594	BOLT,HX,3/8X1 3/4,G5,P	8
7	118030	WASHER,FLAT,3/8 ID X13/16	16
8	113492	BOLT,HX,1/2X6,G5,P	4
9	118083	WASHER,LOCK,1/2,P	4
10	115941	NUT,HX,1/2,P	4
11	118458	BUMPER,PU,3 1/8X5X3 1/2H,2 HOL	2
12	614493	SPACER 1/2X3X4 1/2,W/HOLES	2
13	118744	JACK,SWIVEL,12,SIDE WIND,1500LB	4
14	625142	WASHER,10GAX3/4X4	4
15	626638	SHIM,10GAX4X6 3/4,HOL	2

NOTES:
1. ALL ITEMS ARE TO BE INSTALLED PRIOR TO SHIPPING.
2. JACKS ARE TO BE ROTATED TO A HORIZONTAL POSITION PRIOR TO SHIPPING.
3. USE AS NEEDED TO ENSURE THAT SYSTEM RESTS ON RUBBER PAD (ITEM 5) WHEN FOLDED. MAY BE DOUBLED UP ON ONE SIDE IF NEEDED.

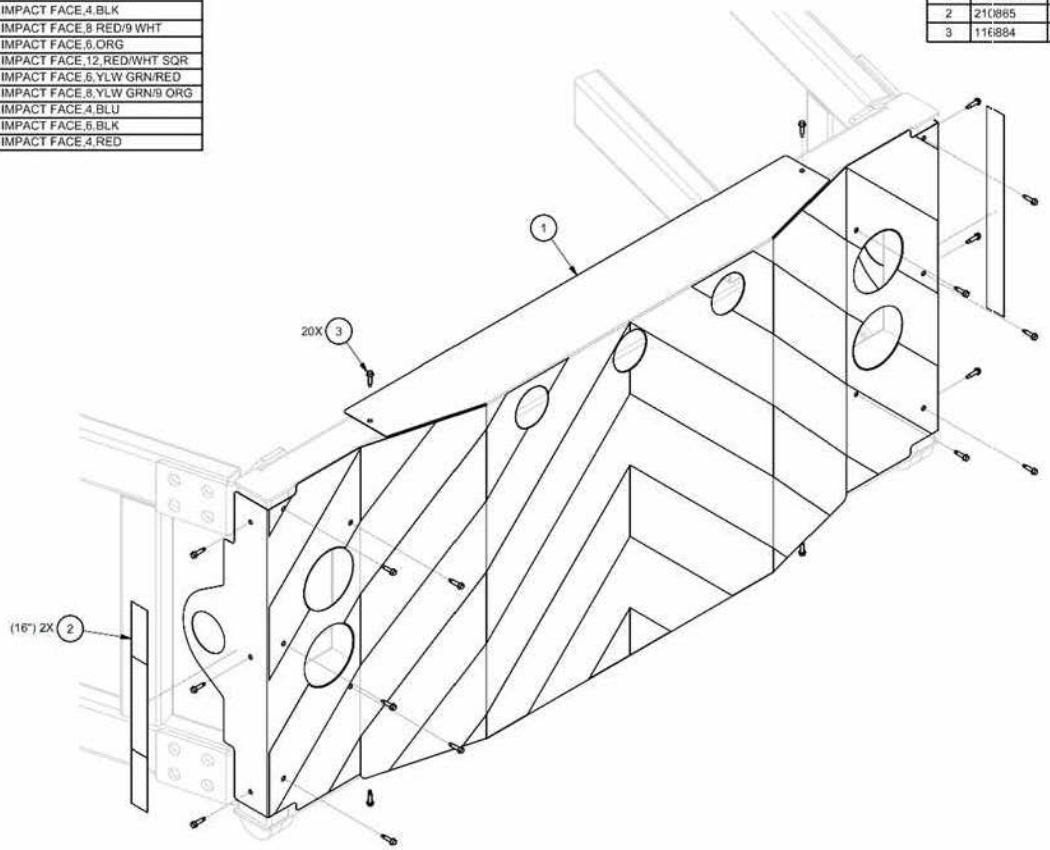
MATERIAL: SEE PARTS LIST	DRAWN: D. Hayes Jr	DATE: 7/26/2019	TOLERANCES PER THP-SF-001, UNLESS OTHERWISE SPECIFIED.	MISC PART ASSY,SS180M
FINISH: N/A	CHECKED: M. Buehler	DATE: 8/1/2019	DO NOT SCALE DRAWING	
EST UNFINISHED WT: 135 lbs	UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES DIMENSIONS ARE ACCORDING TO ASME Y14.5M AND THP-SF-001 UNLESS OTHERWISE SPECIFIED.			DRAWING: 626628 REV: - SHEET: 1 of 1

Miscellaneous Part Assembly

626614

STRIPING ASSEMBLY TABLE			
ASSY NO.	ASSY DESCRIPTION	ITEM 1	DESCRIPTION
626614	IMPACT FACE ASSY,4,YLW,MASH	626615	IMPACT FACE,4,YLW
626617	IMPACT FACE ASSY,4,BLK,MASH	626616	IMPACT FACE,4,BLK
626704	IMPACT FACE ASSY,8 RED/9 WHT,MASH	626697	IMPACT FACE,8 RED/9 WHT
626705	IMPACT FACE ASSY,6,ORG,MASH	626698	IMPACT FACE,6,ORG
626706	IMPACT FACE ASSY,12,RED/WHT SQR,MASH	626699	IMPACT FACE,12,RED/WHT SQR
626707	IMPACT FACE ASSY,6,YLW GRN/RED,MASH	626700	IMPACT FACE,6,YLW GRN/RED
626708	IMPACT FACE ASSY,8,YLW GRN/ORG,MASH	626701	IMPACT FACE,8,YLW GRN/9 ORG
626709	IMPACT FACE ASSY,4,BLU,MASH	626702	IMPACT FACE,4,BLU
626710	IMPACT FACE ASSY,6,BLK,MASH	626703	IMPACT FACE,6,BLK
626712	IMPACT FACE ASSY,4,RED,MASH	626711	IMPACT FACE,4,RED

PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	SEE TABLE	IMPACT FACE (SEE TABLE)	1
2	210865	TAPE,REFLECTIVE,1 1/2 RED/WHITE	2.67
3	116884	SCREW,HWH,#12X1,SELF TAPPING,P	20



NOTES:
1. STRIPING PATTERN SHOWN IS GENERIC. SEE STRIPING ASSEMBLY TABLE ITEM 1 DRAWING FOR SPECIFIC STRIPING PATTERN DETAILS.

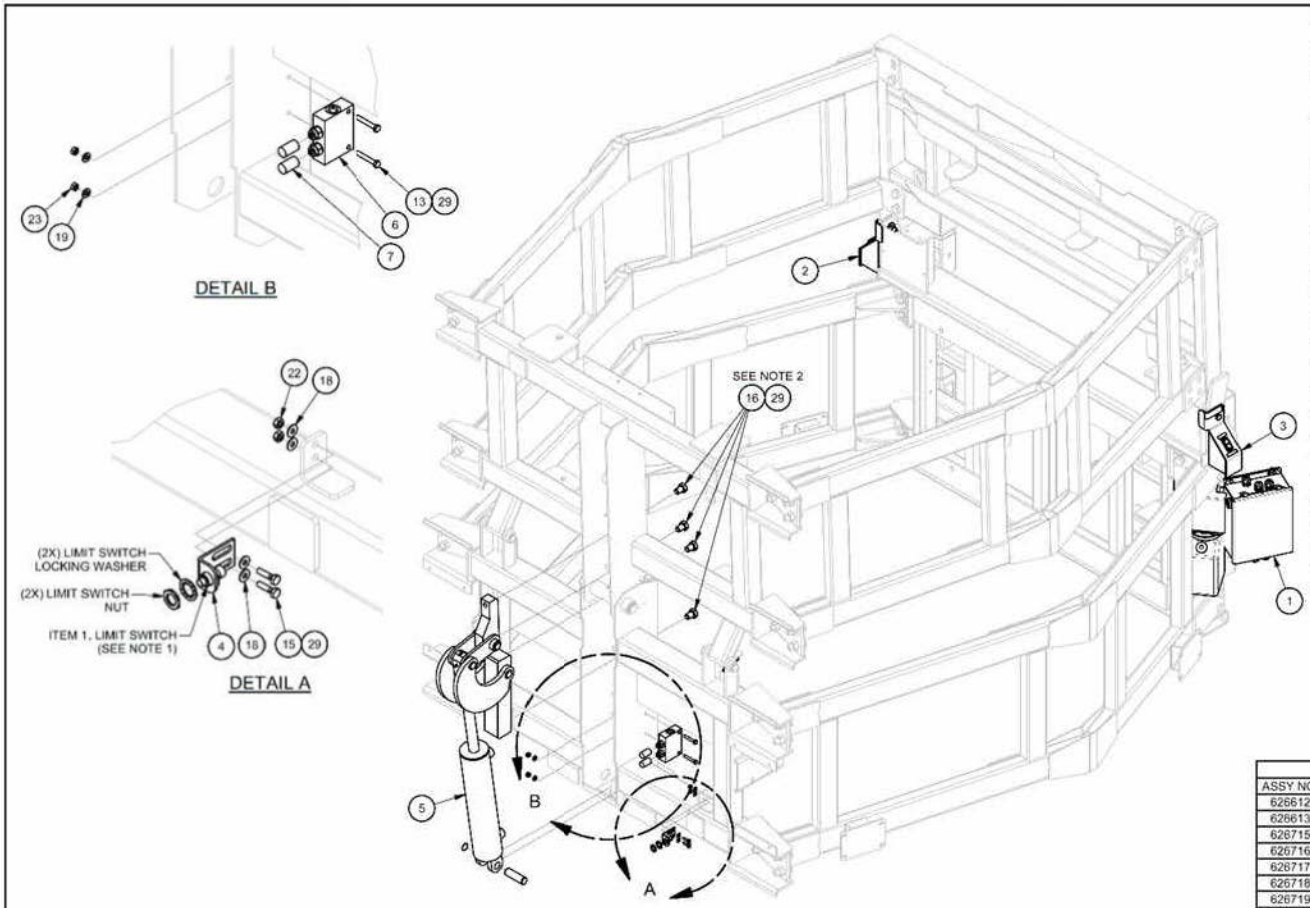
MATERIAL: SEE PARTS LIST	DRAWN: D. Hayes Jr	DATE: 7/26/2019	TOLERANCES PER THP-SF-001, UNLESS OTHERWISE SPECIFIED.
FINISH: N/A	CHECKED: S. Thompson	DATE: 8/1/2019	DO NOT SCALE DRAWING
EST UNFINISHED WT: 8.95 lbs	UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES. DIMENSIONS AND TOLERANCING PER ASME Y14.5M AND TYP SCALE UNLESS OTHERWISE SPECIFIED.		

IMPACT FACE ASSY,MASH

TRINITY HIGHWAY

DRAWING: 626614 | REV: - | SHEET: 1 of 1

Impact Face Assembly



PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	SEE TABLE	PUMP ASSY,*	1
2	625161	BRACKET,SIDE CONTROL,L,W/DECAL	1
3	625162	BRACKET,SIDE CONTROL,R,W/DECAL	1
4	605593	BRACKET,SWITCH	2
5	625152	HYDRAULIC CYLINDER ASSY,SS180M	1
6	117927	VALVE,HYDRAULIC,COUNTER BALANCE	1
7	114018	CAP,HYDRAULIC,COUNTER BALANCE VALVE	2
8	114780	ELBOW,#4 M-JICX#6 M-ORB,P	2
9	114346	COUPLING,#4 MORB X #4 MJIC,P	4
10	119329	COUPLING,#6 MORB X #4 MJIC	2
11	119331	HOSE ASSY,HYDRAULIC,#4 F ENDS,20	2
12	119330	HOSE ASSY,HYDRAULIC,#4 F ENDS,130	2
13	119322	BOLT,HX,5/16X2,G5	2
14	005744	BOLT,HX,1/2X2,G5,P	2
15	113509	BOLT,HX,1/4X1,G5,P	4
16	119323	BOLT,HX,3/4X1,G5	4
17	113622	BOLT,HX,3/8X3,G5,P	2
18	118018	WASHER,FLAT,1/4X5/8,P	8
19	118045	WASHER,FLAT,5/16 X 11/16,P	2
20	118037	WASHER,FLAT,3/8X1,P	2
21	118008	WASHER,FLAT,1/2ID X 1 3/8OD,P	2
22	115947	NUT,HX,1/4,G5,P	4
23	115968	NUT,HX,5/16,P	2
24	115942	NUT,HX,1/2,P,G8	2
25	115961	NUT,HX,3/8,G5,P	2
26	SEE TABLE	REMOTE,WINCH,RAMSEY,*	1
27	625170	CABLE ASSY,BATTERY,4GA,25FT	1
28	119365	TIE,NYLON,3/16X18	3
29	119369	ADHESIVE,LOCTITE,BLUE	A/R

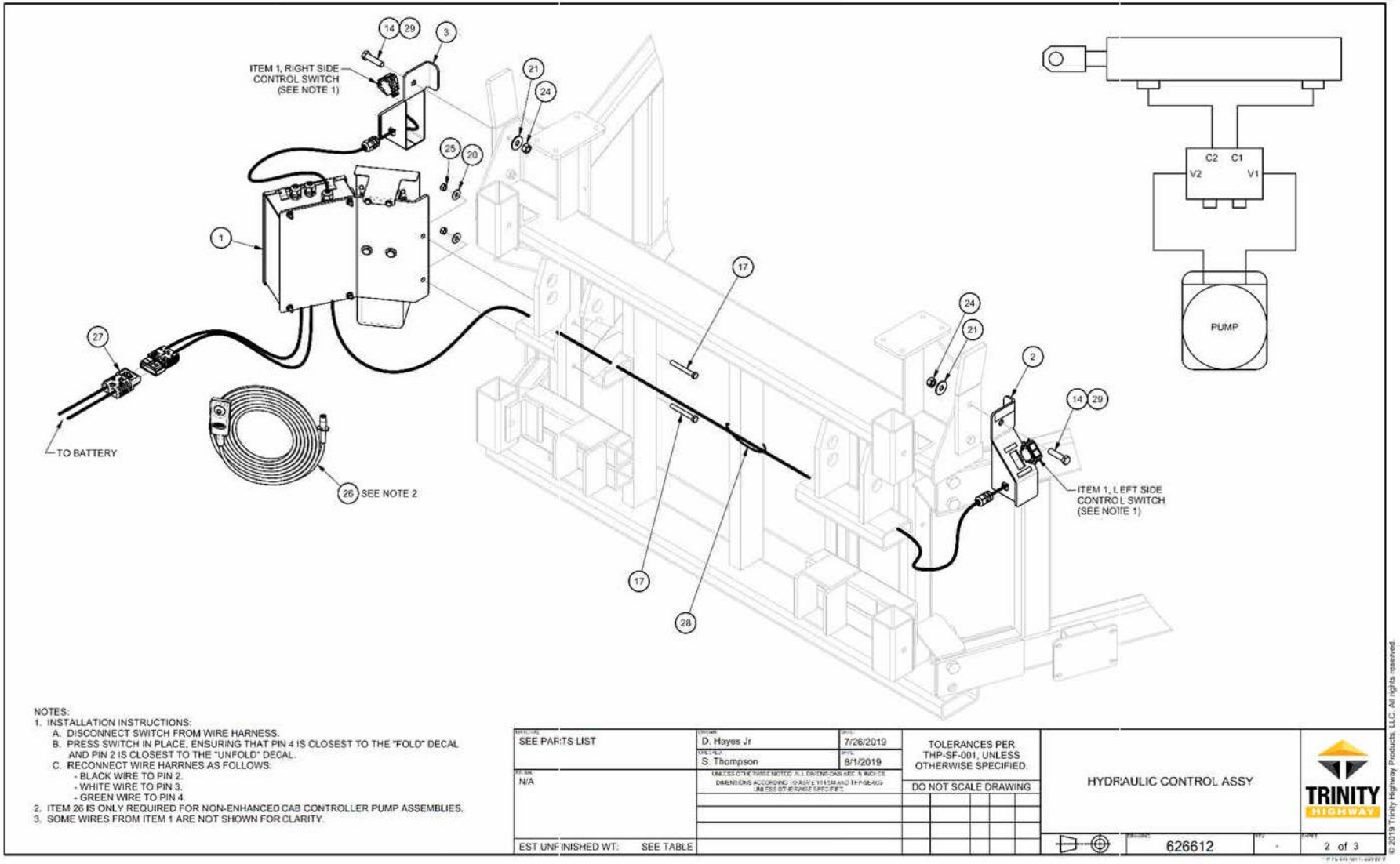
TABLE				
ASSY NO.	ASSY DESCRIPTION	EST WT	ITEM 1	ITEM 26
626612	HYD CONTROL ASSY,25FT,12V	173 lbs	626629	118706
626613	HYD CONTROL ASSY,25FT,24V	173 lbs	626630	118706
626715	HYD CONTROL ASSY,50FT,12V	175 lbs	626713	118795
626716	HYD CONTROL ASSY,50FT,24V	175 lbs	626714	118795
626717	HYD CTRL ASSY,ENH'D,25FT,12V	174 lbs	626631	N/A
626718	HYD CTRL ASSY,ENH'D,25FT,24V	174 lbs	626632	N/A
626719	HYD CTRL ASSY,ENH'D,50FT,12V	176 lbs	626633	N/A
626720	HYD CTRL ASSY,ENH'D,50FT,24V	176 lbs	626634	N/A

NOTES:
1. SEE MANUFACTURING PROCEDURE "INSTALL LIMIT SWITCHES" FOR INSTALLATION DETAILS AND CALIBRATION.
2. BOLTS ARE TO BE TORQUED BETWEEN 115-125 FT-LBS.

SEE PARTS LIST	D. Hayes Jr 7/26/2019	TOLERANCES PER THP-SF-001, UNLESS OTHERWISE SPECIFIED
	S. Thompson 8/1/2019	DO NOT SCALE DRAWING
N/A	UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES. DIMENSIONS ACCORDING TO ASME Y14.5M AND THP-SM-003 UNLESS OTHERWISE SPECIFIED.	HYDRAULIC CONTROL ASSY
EST UNFINISHED WT: SEE TABLE		DRAWING 626612 REV - SHEET 1 of 3

Hydraulic Control Assembly

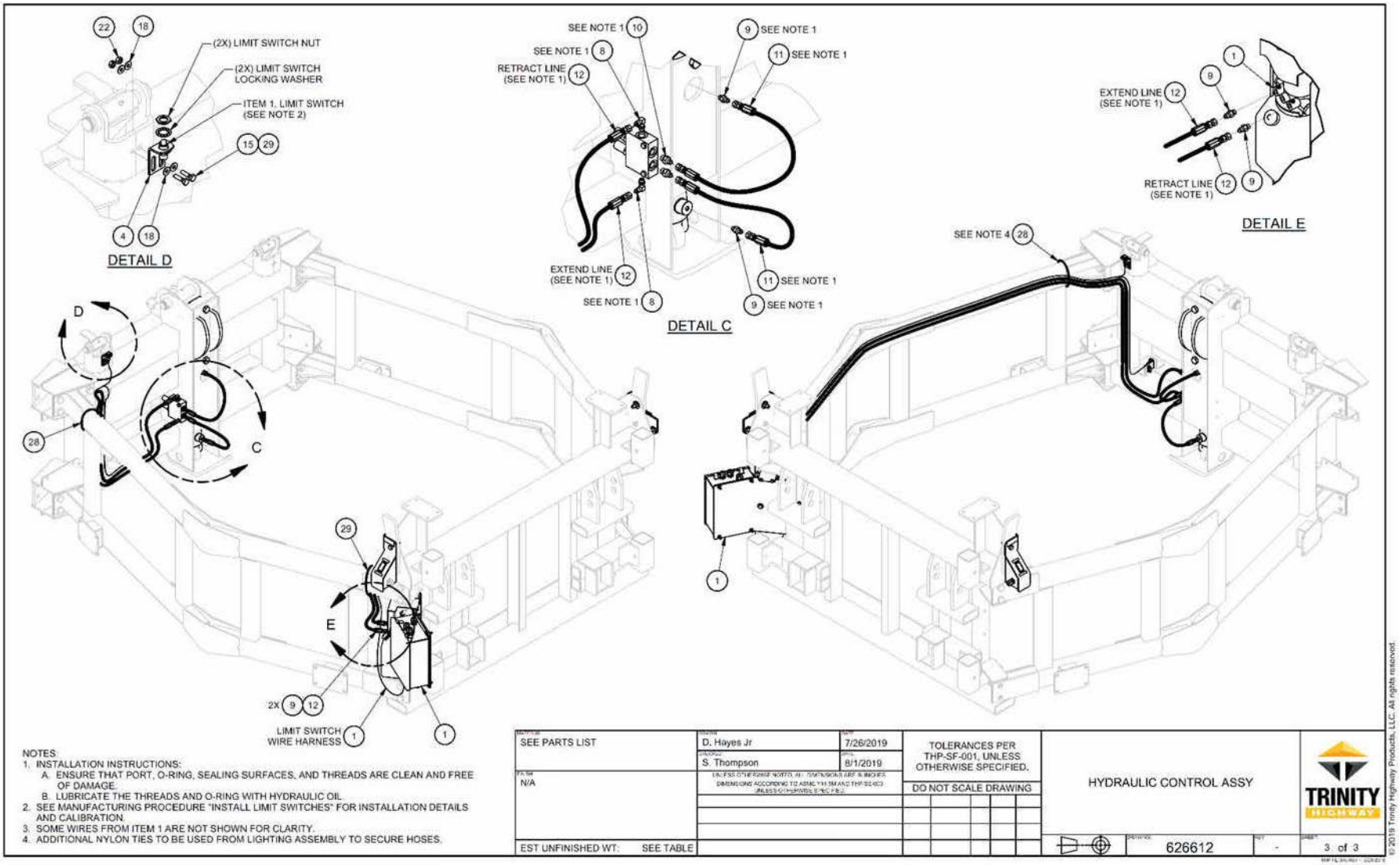
626612 - 2 of 3



NOTES:
1. INSTALLATION INSTRUCTIONS:
   A. DISCONNECT SWITCH FROM WIRE HARNESS.
   B. PRESS SWITCH IN PLACE, ENSURING THAT PIN 4 IS CLOSEST TO THE "FOLD" DECAL AND PIN 2 IS CLOSEST TO THE "UNFOLD" DECAL.
   C. RECONNECT WIRE HARRNES AS FOLLOWS:
      - BLACK WIRE TO PIN 2.
      - WHITE WIRE TO PIN 3.
      - GREEN WIRE TO PIN 4.
2. ITEM 26 IS ONLY REQUIRED FOR NON-ENHANCED CAB CONTROLLER PUMP ASSEMBLIES.
3. SOME WIRES FROM ITEM 1 ARE NOT SHOWN FOR CLARITY.

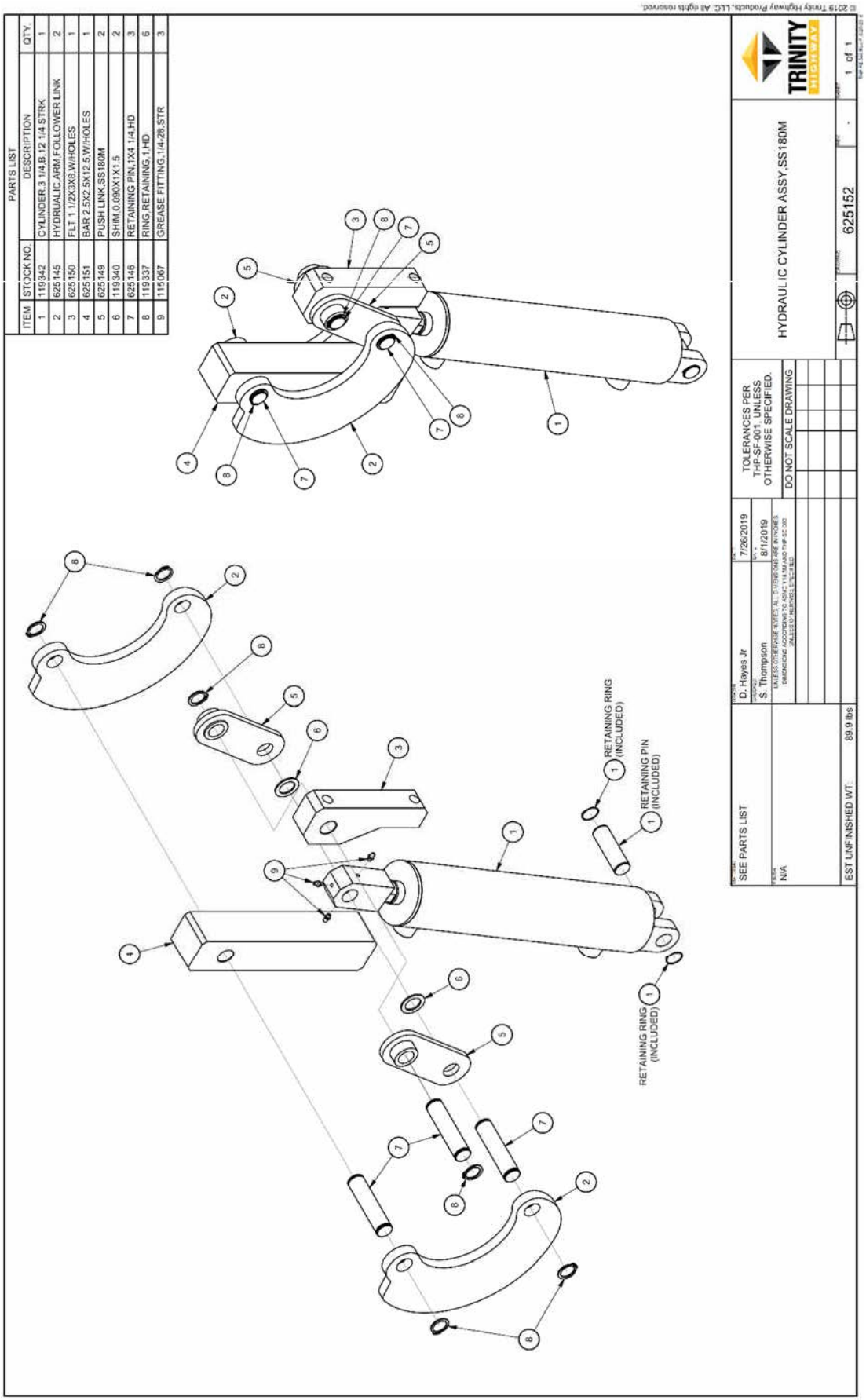
SEE PARTS LIST	D. Hayes Jr	7/26/2019	TOLERANCES PER THP-SF-001, UNLESS OTHERWISE SPECIFIED.	HYDRAULIC CONTROL ASSY
	S. Thompson	8/1/2019		
N/A	UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES. DIMENSIONS ACCORDING TO ASME Y14.5M AND THP-SM-002 UNLESS OTHERWISE SPECIFIED.		DO NOT SCALE DRAWING	
EST UNFINISHED WT: SEE TABLE				626612 - 2 of 3

626612 - 3 of 3



NOTES:
1. INSTALLATION INSTRUCTIONS:
   A. ENSURE THAT PORT, O-RING, SEALING SURFACES, AND THREADS ARE CLEAN AND FREE OF DAMAGE.
   B. LUBRICATE THE THREADS AND O-RING WITH HYDRAULIC OIL.
2. SEE MANUFACTURING PROCEDURE "INSTALL LIMIT SWITCHES" FOR INSTALLATION DETAILS AND CALIBRATION.
3. SOME WIRES FROM ITEM 1 ARE NOT SHOWN FOR CLARITY.
4. ADDITIONAL NYLON TIES TO BE USED FROM LIGHTING ASSEMBLY TO SECURE HOSES.

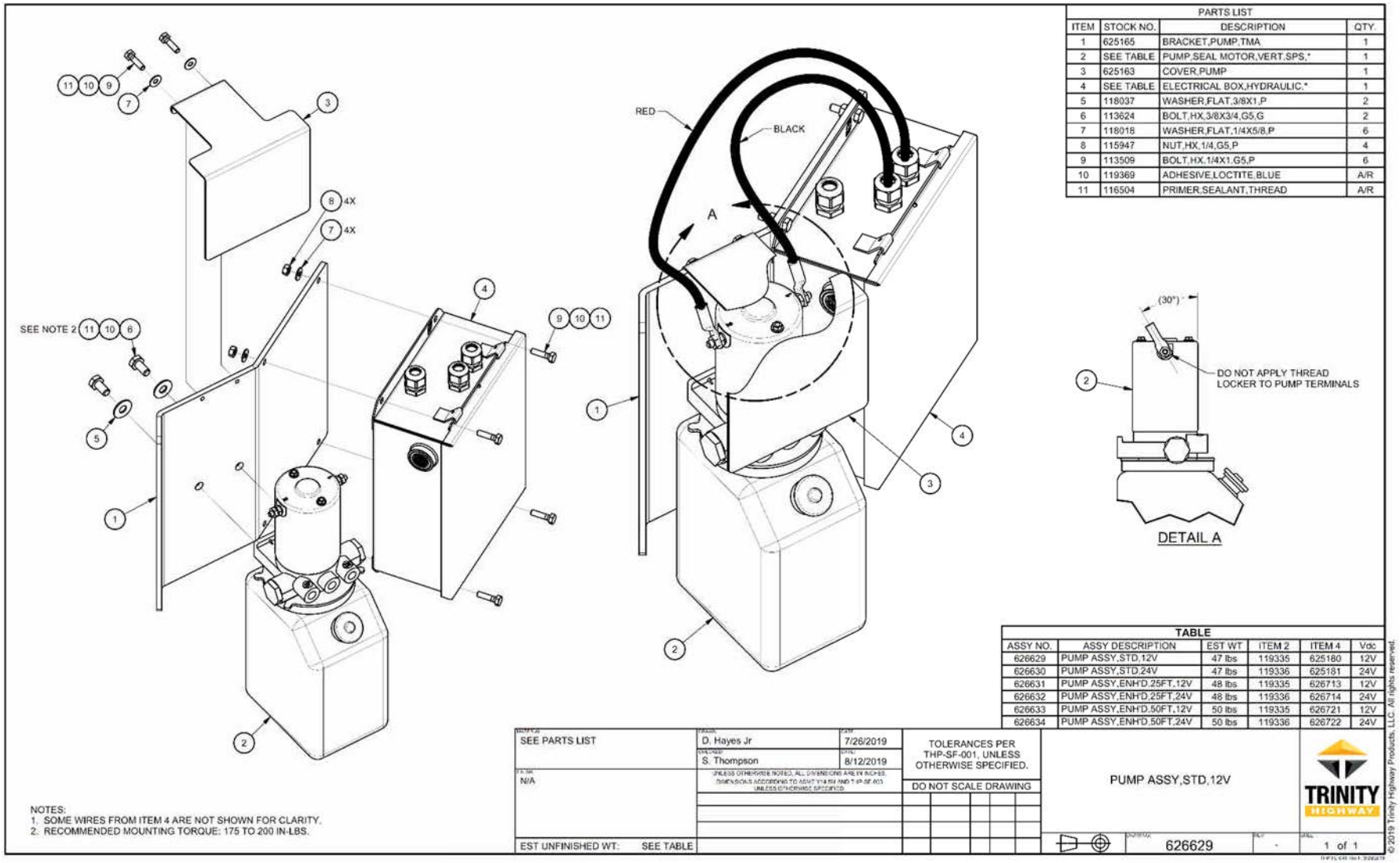
SEE PARTS LIST	D. Hayes Jr	7/26/2019	TOLERANCES PER THP-SF-001, UNLESS OTHERWISE SPECIFIED.	HYDRAULIC CONTROL ASSY
	S. Thompson	8/1/2019	DO NOT SCALE DRAWING	
N/A	UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES. DIMENSIONING ACCORDING TO ASME Y14.5M AND THP-SD-003 UNLESS OTHERWISE SPECIFIED.			
EST UNFINISHED WT: SEE TABLE			626612	- / 3 of 3



625152

Hydraulic Cylinder Assembly

626629



PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	625165	BRACKET,PUMP,TMA	1
2	SEE TABLE	PUMP,SEAL MOTOR,VERT,SPS,*	1
3	625163	COVER,PUMP	1
4	SEE TABLE	ELECTRICAL BOX,HYDRAULIC,*	1
5	118037	WASHER,FLAT,3/8X1,P	2
6	113624	BOLT,HX,3/8X3/4,G5,G	2
7	118018	WASHER,FLAT,1/4X5/8,P	6
8	115947	NUT,HX,1/4,G5,P	4
9	113509	BOLT,HX,1/4X1,G5,P	6
10	119369	ADHESIVE,LOCTITE,BLUE	A/R
11	116504	PRIMER,SEALANT,THREAD	A/R

TABLE					
ASSY NO.	ASSY DESCRIPTION	EST WT	ITEM 2	ITEM 4	Vdc
626629	PUMP ASSY,STD,12V	47 lbs	119335	625180	12V
626630	PUMP ASSY,STD,24V	47 lbs	119336	625181	24V
626631	PUMP ASSY,ENH'D,25FT,12V	48 lbs	119335	626713	12V
626632	PUMP ASSY,ENH'D,25FT,24V	48 lbs	119336	626714	24V
626633	PUMP ASSY,ENH'D,50FT,12V	50 lbs	119335	626721	12V
626634	PUMP ASSY,ENH'D,50FT,24V	50 lbs	119336	626722	24V

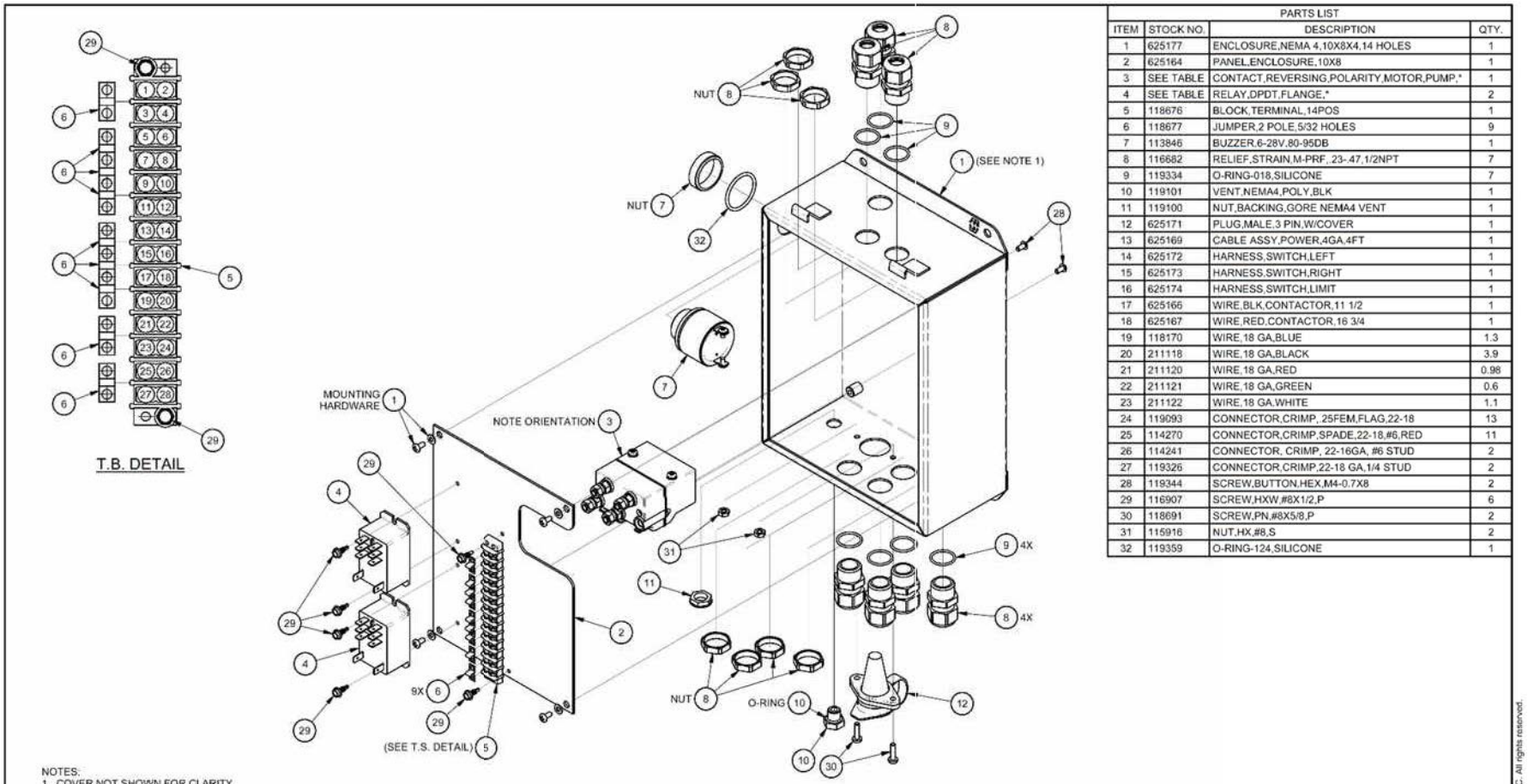
NOTES:
1. SOME WIRES FROM ITEM 4 ARE NOT SHOWN FOR CLARITY.
2. RECOMMENDED MOUNTING TORQUE: 175 TO 200 IN-LBS.

SEE PARTS LIST	D. Hayes Jr	7/26/2019	TOLERANCES PER THP-SF-001, UNLESS OTHERWISE SPECIFIED.
	S. Thompson	8/12/2019	DO NOT SCALE DRAWING
N/A	UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES. DIMENSIONS ACCORDING TO ASME Y14.5M AND Y14.5-SF-003 UNLESS OTHERWISE SPECIFIED.		
EST UNFINISHED WT: SEE TABLE			

PUMP ASSY,STD,12V

626629 | - | 1 of 1

Pump Assembly



NOTES:
1. COVER NOT SHOWN FOR CLARITY.

PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	625177	ENCLOSURE,NEMA 4,10X8X4,14 HOLES	1
2	625164	PANEL,ENCLOSURE,10X8	1
3	SEE TABLE	CONTACT,REVERSING,POLARITY,MOTOR,PUMP,*	1
4	SEE TABLE	RELAY,DPDT,FLANGE,*	2
5	118676	BLOCK,TERMINAL,14POS	1
6	118677	JUMPER,2 POLE,5/32 HOLES	9
7	113846	BUZZER,6-28V,80-95DB	1
8	116682	RELIEF,STRAIN,M-PRF,.23-.47,1/2NPT	7
9	119334	O-RING-018,SILICONE	7
10	119101	VENT,NEMA4,POLY,BLK	1
11	119100	NUT,BACKING,GORE NEMA4 VENT	1
12	625171	PLUG,MALE,3 PIN,W/COVER	1
13	625169	CABLE ASSY,POWER,4GA,4FT	1
14	625172	HARNESS,SWITCH,LEFT	1
15	625173	HARNESS,SWITCH,RIGHT	1
16	625174	HARNESS,SWITCH,LIMIT	1
17	625166	WIRE,BLK,CONTACTOR,11 1/2	1
18	625167	WIRE,RED,CONTACTOR,16 3/4	1
19	118170	WIRE,18 GA,BLUE	1.3
20	211118	WIRE,18 GA,BLACK	3.9
21	211120	WIRE,18 GA,RED	0.98
22	211121	WIRE,18 GA,GREEN	0.6
23	211122	WIRE,18 GA,WHITE	1.1
24	119093	CONNECTOR,CRIMP, 25FEM,FLAG,22-18	13
25	114270	CONNECTOR,CRIMP,SPADE,22-18,#6,RED	11
26	114241	CONNECTOR, CRIMP, 22-16GA, #6 STUD	2
27	119326	CONNECTOR,CRIMP,22-18 GA,1/4 STUD	2
28	119344	SCREW,BUTTON,HEX,M4-0.7X8	2
29	116907	SCREW,HXW,#8X1/2,P	6
30	118691	SCREW,PN,#8X5/8,P	2
31	115916	NUT,HX,#8,S	2
32	119359	O-RING-124,SILICONE	1

TABLE			
ASSEMBLY NO.	ASSEMBLY DESCRIPTION	ITEM 3	ITEM 4
625180	ELECTRICAL BOX,HYDRAULIC,12V	119327	116651
625181	ELECTRICAL BOX,HYDRAULIC,24V	119328	116652

SEE PARTS LIST	D. Hayes Jr	7/24/2019	TOLERANCES PER THP-SF-001, UNLESS OTHERWISE SPECIFIED.
	S. Thompson	8/1/2019	
N/A	UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES. DIMENSIONING ACCORDING TO ASME Y14.5M AND THP-SF-001. UNLESS OTHERWISE SPECIFIED.		DO NOT SCALE DRAWING
EST UNFINISHED WT: 24.4 lbs			

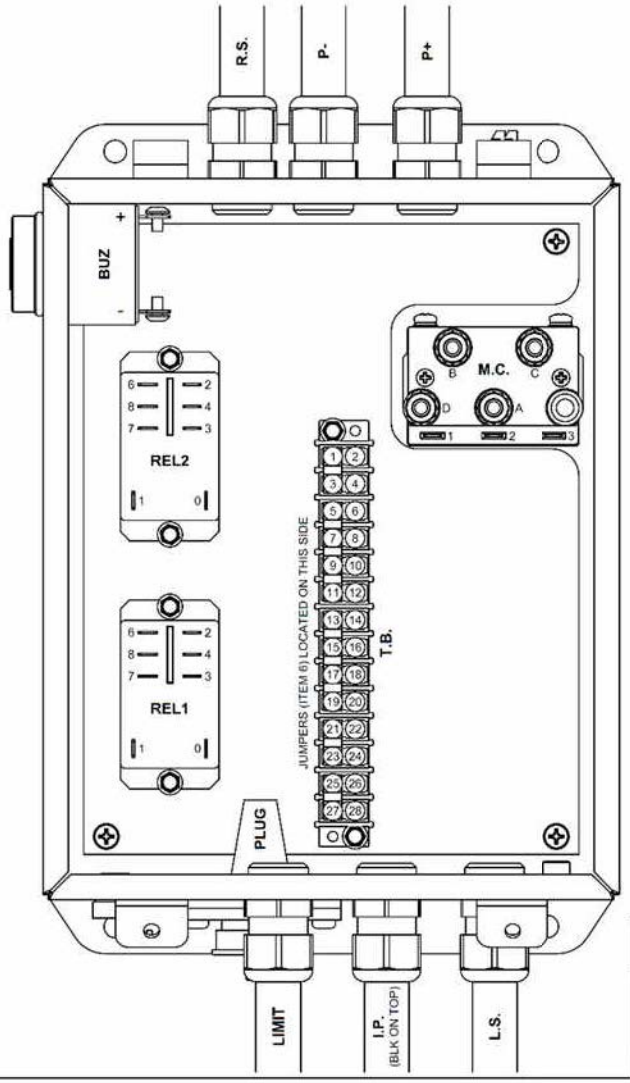
ELECTRICAL BOX,HYDRAULIC,*

625180 | - | 1 of 4

TRINITY HIGHWAY

Electrical Box, Hydraulic

625180 – 2 of 4



WIRE TABLE					
WIRE I.D.	STOCK NO.	COLOR	LENGTH	CONNECTOR (1)	CONNECTOR (2)
EE	118170	BLUE	(9 3/8)	114241	114270
FF	118170	BLUE	(8 1/4)	114241	114270
GG	118170	BLUE	(6 1/2)	119093	114270
HH	118170	BLUE	(7 3/4)	119093	119093
II	211122	WHITE	(12 3/4)	119093	119093
JJ	211118	BLACK	(11 1/2)	119093	114270
KK	211118	BLACK	(10 5/8)	119093	119093
LL	211118	BLACK	(5 1/8)	119093	114270
MM	211118	BLACK	(6)	119093	114270
NN	211118	BLACK	(9 1/2)	119326	114270
OO	211118	BLACK	(5 1/2)	119093	114270
PP	211120	RED	(8 3/4)	119326	114270
QQ	211120	RED	(3)	119093	114270
RR	211121	GREEN	(6 1/2)	119093	114270

NOTE: STRIP WIRE ENDS AS REQUIRED. ENSURE STRIPPED SECTION IS FULLY INSERTED INTO CONNECTOR BEFORE CRIMPING.

CONNECTION TABLE		
WIRE I.D.	COMPONENT (PIN)	COMPONENT (PIN)
EE	BUZ (+)	T.B. (4)
FF	BUZ (-)	T.B. (7)
GG	REL2 (2)	T.B. (3)
HH	REL2 (4)	REL1 (2)
II	REL2 (8)	M.C. (3)
JJ	REL2 (6)	T.B. (27)
KK	REL1 (8)	M.C. (1)
LL	REL2 (1)	T.B. (9)
MM	REL1 (1)	T.B. (11)
NN	M.C. (D)	T.B. (12)
OO	M.C. (2)	T.B. (10)
PP	M.C. (A)	T.B. (16)
QQ	REL1 (4)	T.B. (15)
RR	REL1 (6)	T.B. (21)
	PLUG (RED)	T.B. (19)
	PLUG (GRN)	T.B. (23)
	PLUG (YLW)	T.B. (25)
	L.S. (BLK) (2)	T.B. (28)
	L.S. (GRN) (4)	T.B. (24)
	L.S. (WHT) (3)	T.B. (20)
	R.S. (BLK) (2)	T.B. (26)
	R.S. (GRN) (4)	T.B. (22)
	R.S. (WHT) (3)	T.B. (18)
	LIMIT (BLK)	REL1 (0)
	LIMIT (GRN)	REL2 (0)
	LIMIT (WHT)	T.B. (17)
	P+ (RED)	M.C. (C)
	P- (BLK)	M.C. (B)
	I.P. (RED)	M.C. (A)
	I.P. (BLK)	M.C. (D)

LEGEND	
DESCRIPTION (LABEL)	ITEM NO.
BUZZER (BUZ)	7
RELAY 1 (REL1)	4
RELAY 2 (REL2)	4
TERMINAL BLOCK (T.B.)	5
MOTOR CONNTACTOR (M.C.)	3
CAB CONTROLLER (PLUG)	12
RIGHT SWITCH (R.S.)	15
LEFT SWITCH (L.S.)	14
LIMIT SWITCHS (LIMIT)	16
INCOMING POWER PLUG (I.P.)	13
MOTOR POWER,POSITIVE (P+)	18
MOTOR POWER,NEGATIVE (P-)	17

NOTES:
1. SEE SHEET 3 FOR WIRING DIAGRAM.
2. SEE SHEET 4 FOR WIRING SCHEMATIC.

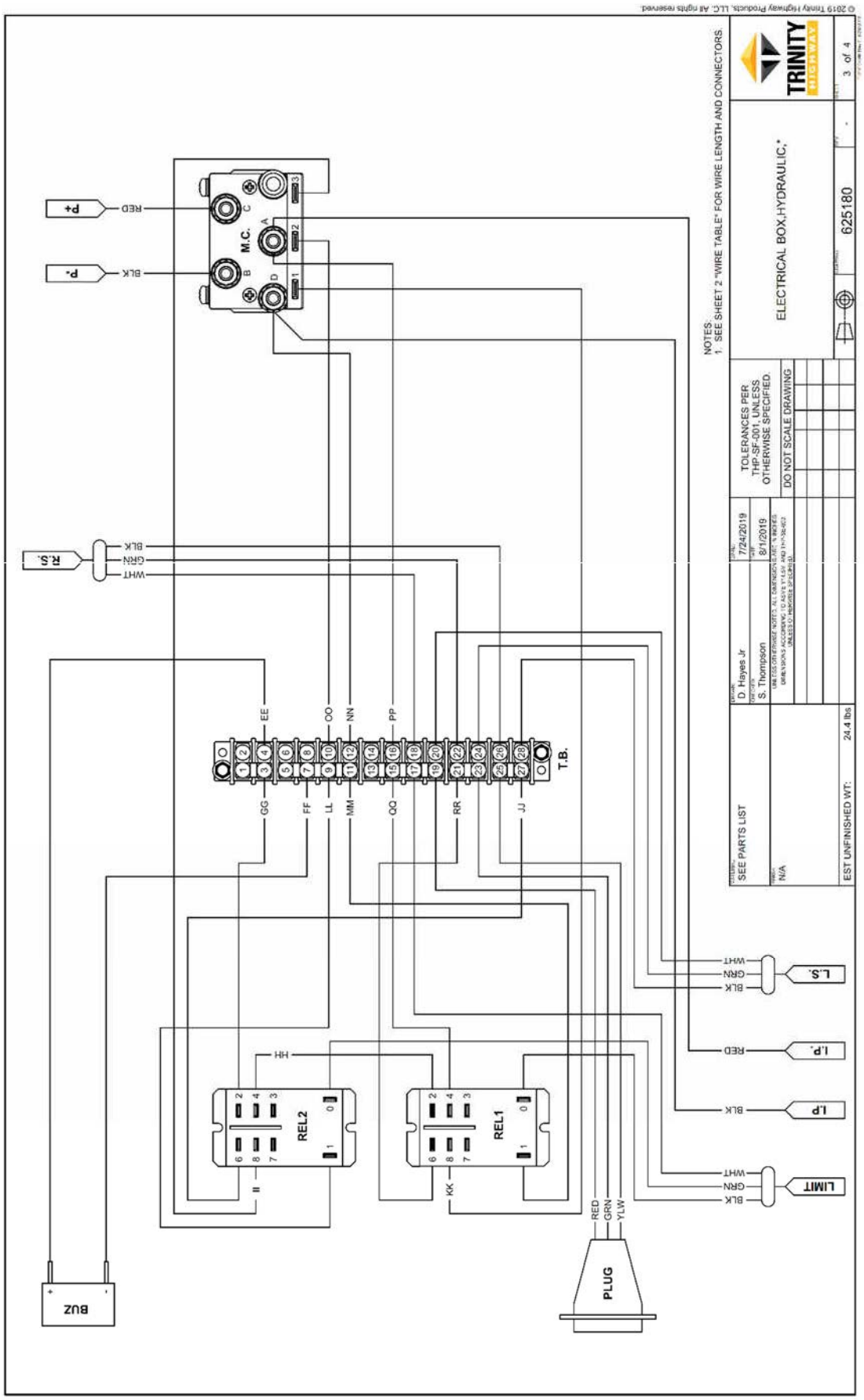
MATERIAL: SEE PARTS LIST	DESIGN: D. Hayes Jr	DATE: 7/24/2019	TOLERANCES PER THP-SF-001, UNLESS OTHERWISE SPECIFIED.
	CHECKED: S. Thompson	DATE: 8/1/2019	DO NOT SCALE DRAWING
FINISH: N/A	UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES. DIMENSIONS ADDITIONS TO ADHERE Y14.5M AND TP SE 003 UNLESS OTHERWISE SPECIFIED.		
EST UNFINISHED WT: 24.4 lbs			

ELECTRICAL BOX,HYDRAULIC,*

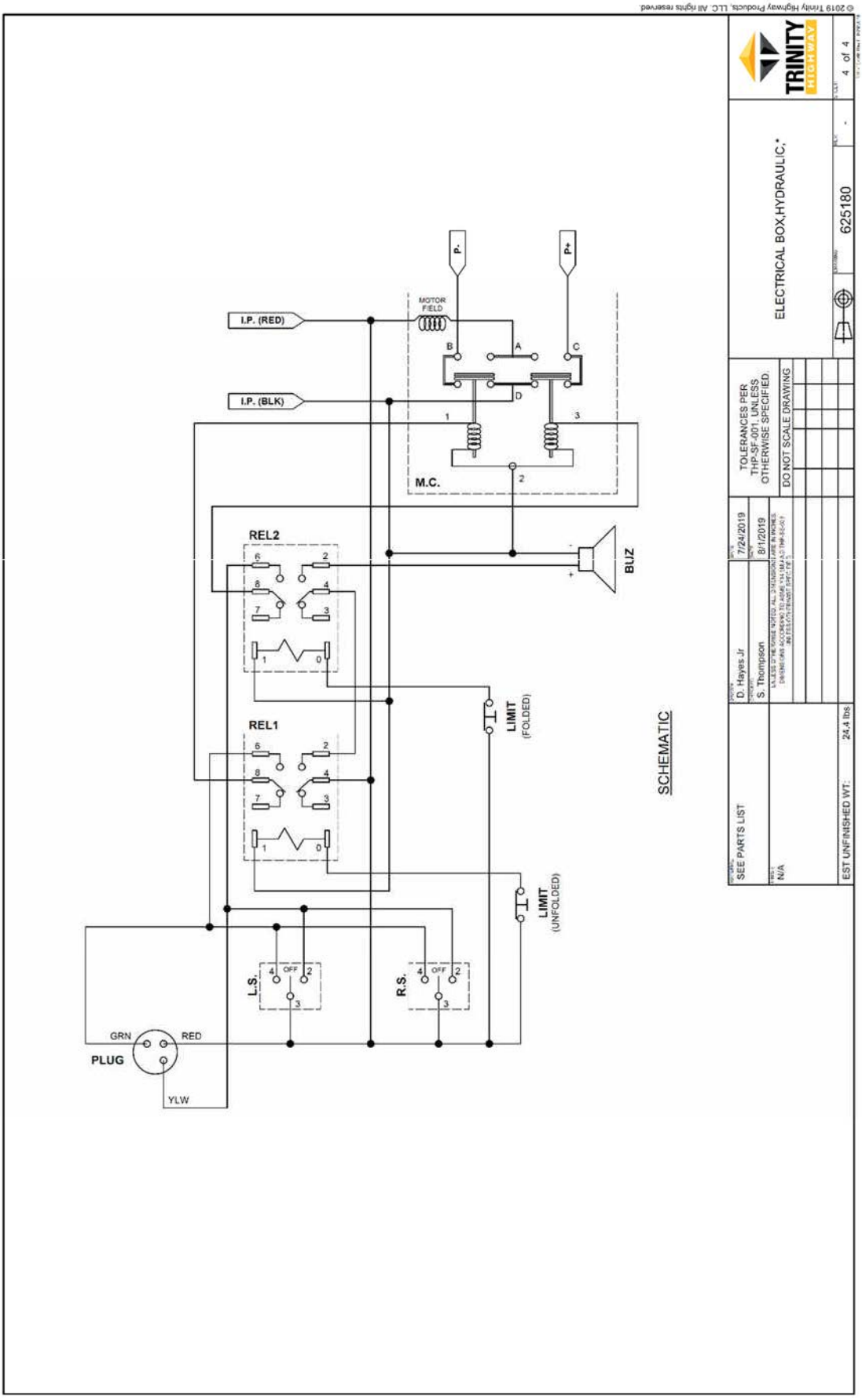
DRAWING: 625180 | REV: - | SHEET: 2 of 4

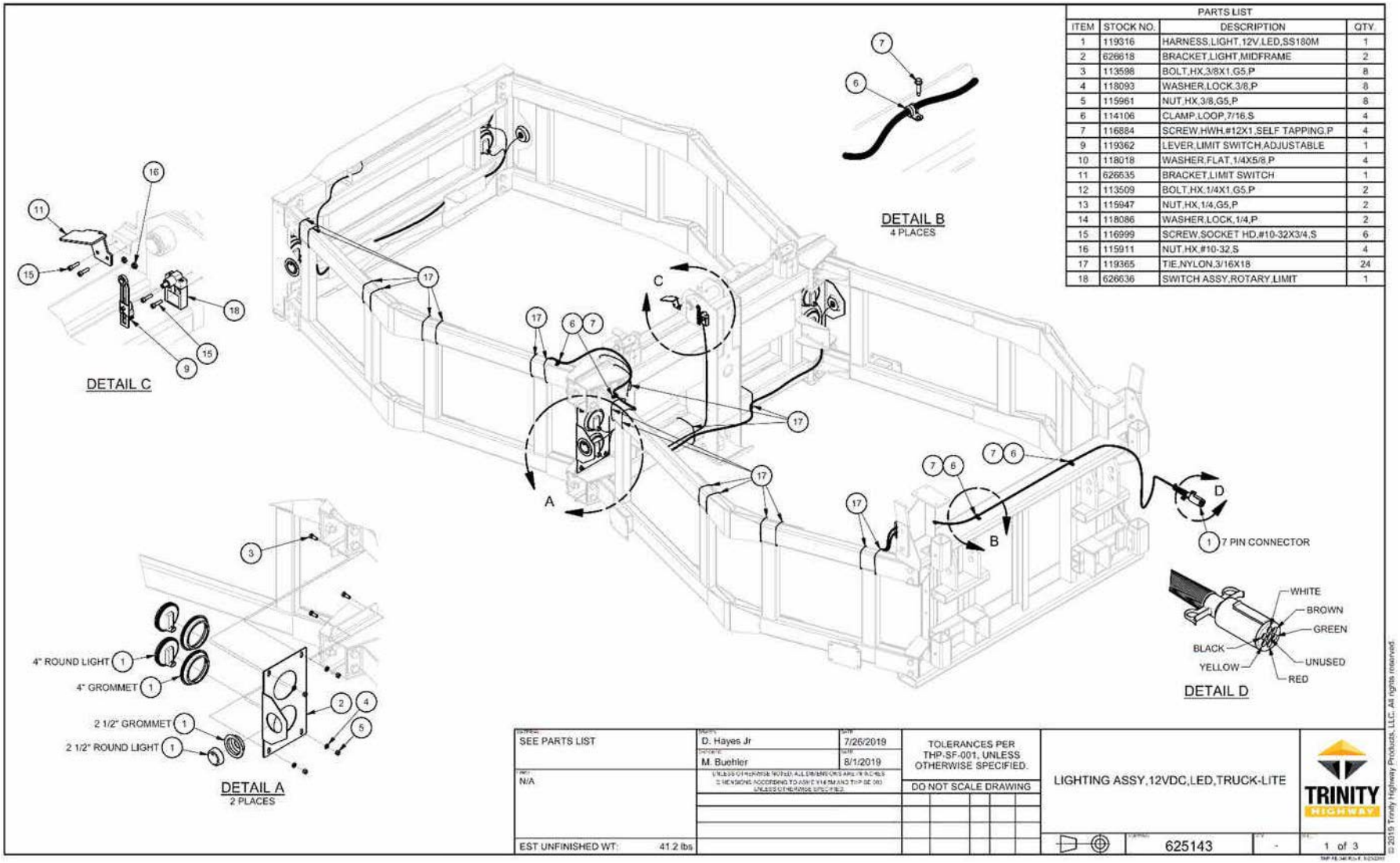
TRINITY HIGHWAY

625180 – 3 of 4


NOTES:
1. SEE SHEET 2 "WIRE TABLE" FOR WIRE LENGTH AND CONNECTORS.
ELECTRICAL BOX,HYDRAULIC,*
625180
3 of 4
TOLERANCES PER THP-SF-001, UNLESS OTHERWISE SPECIFIED.
DO NOT SCALE DRAWING
D. Hayes Jr
7/24/2019
S. Thompson
8/1/2019
SEE PARTS LIST
N/A
EST UNFINISHED WT:
24.4 lbs
M.C.
P+
P-
R.S.
T.B.
REL1
REL2
BUZ
PLUG
L.S.
L.P.
LIMIT
RED
GRN
BLK
WHT
YLW

625180 – 4 of 4

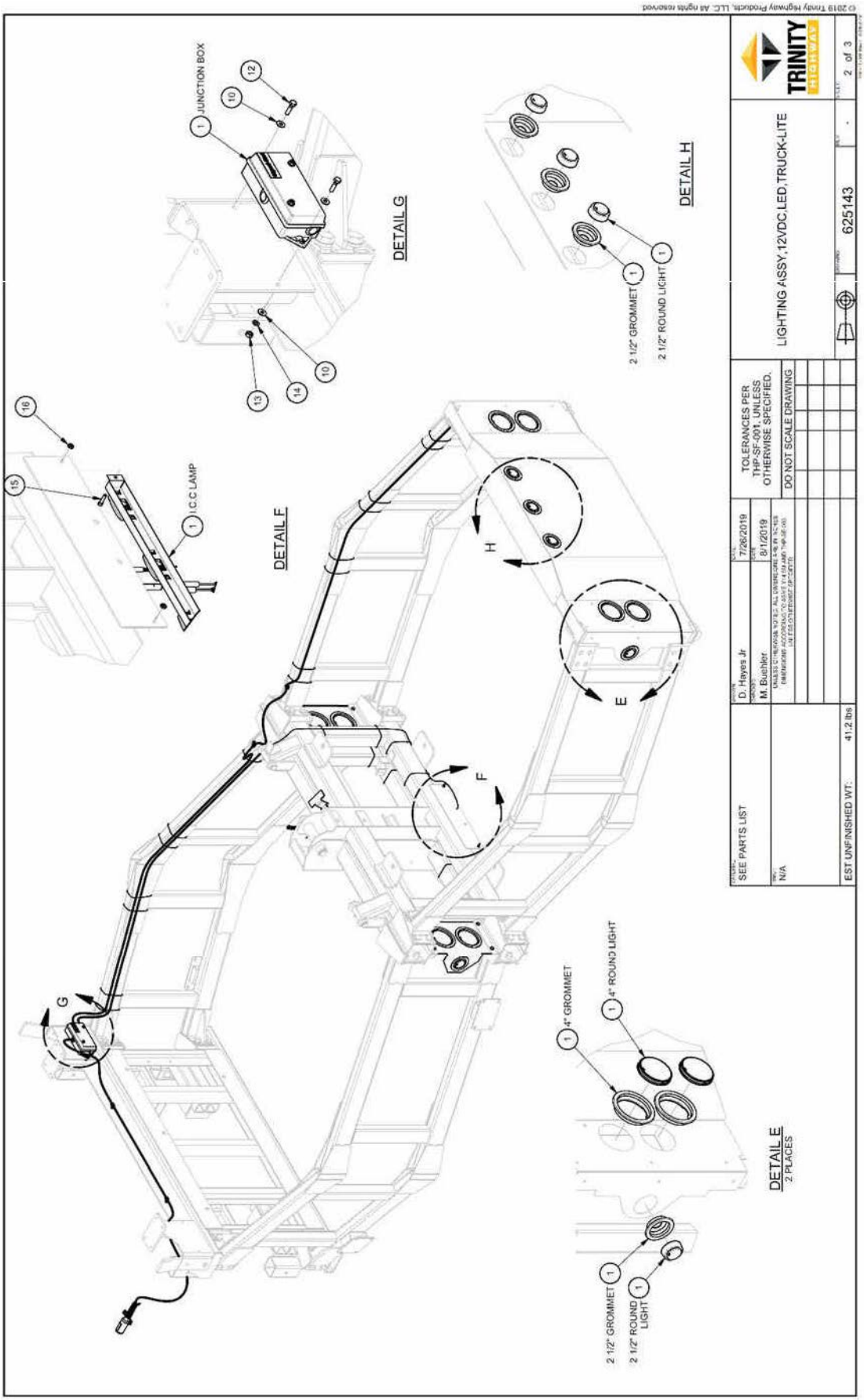


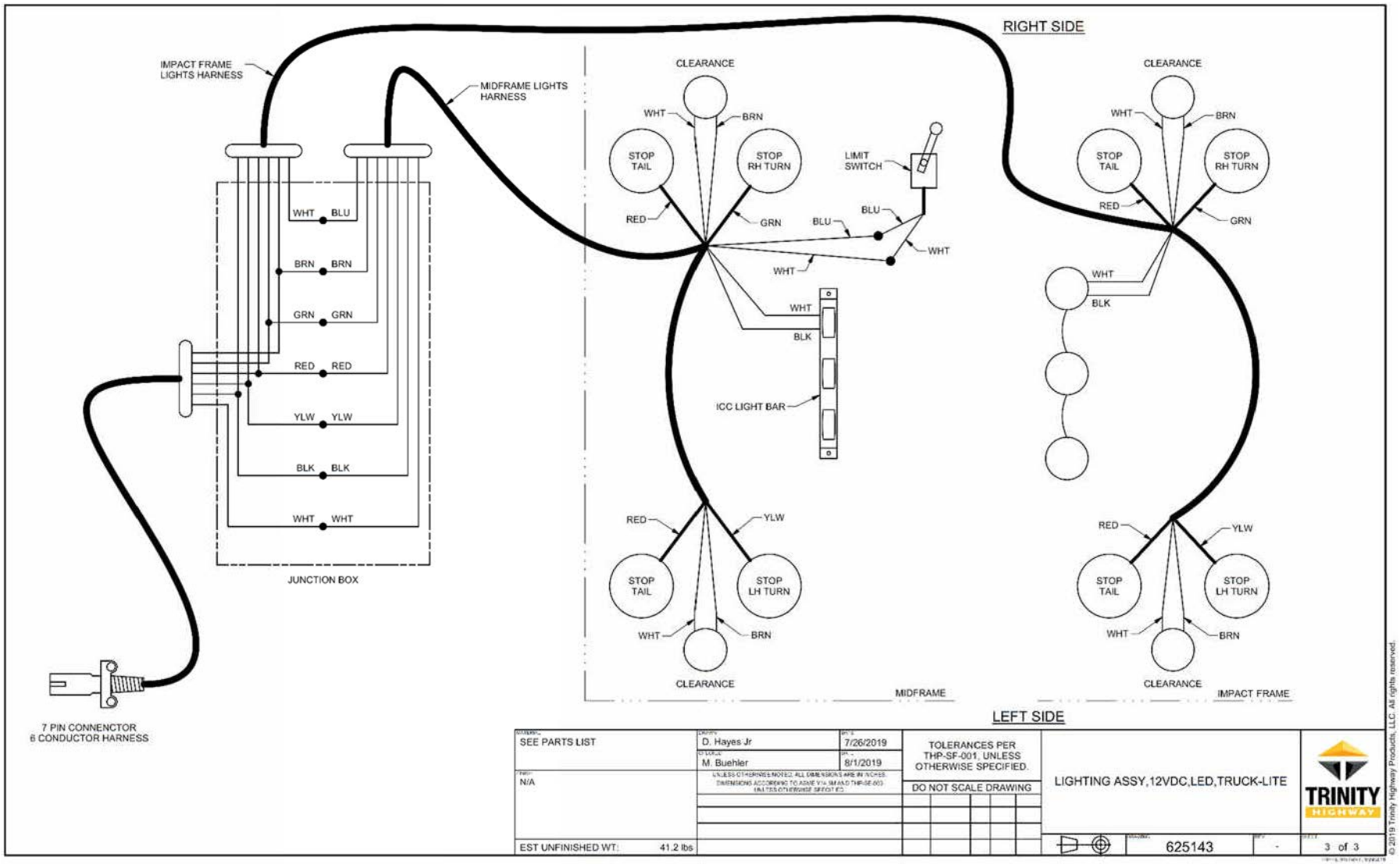


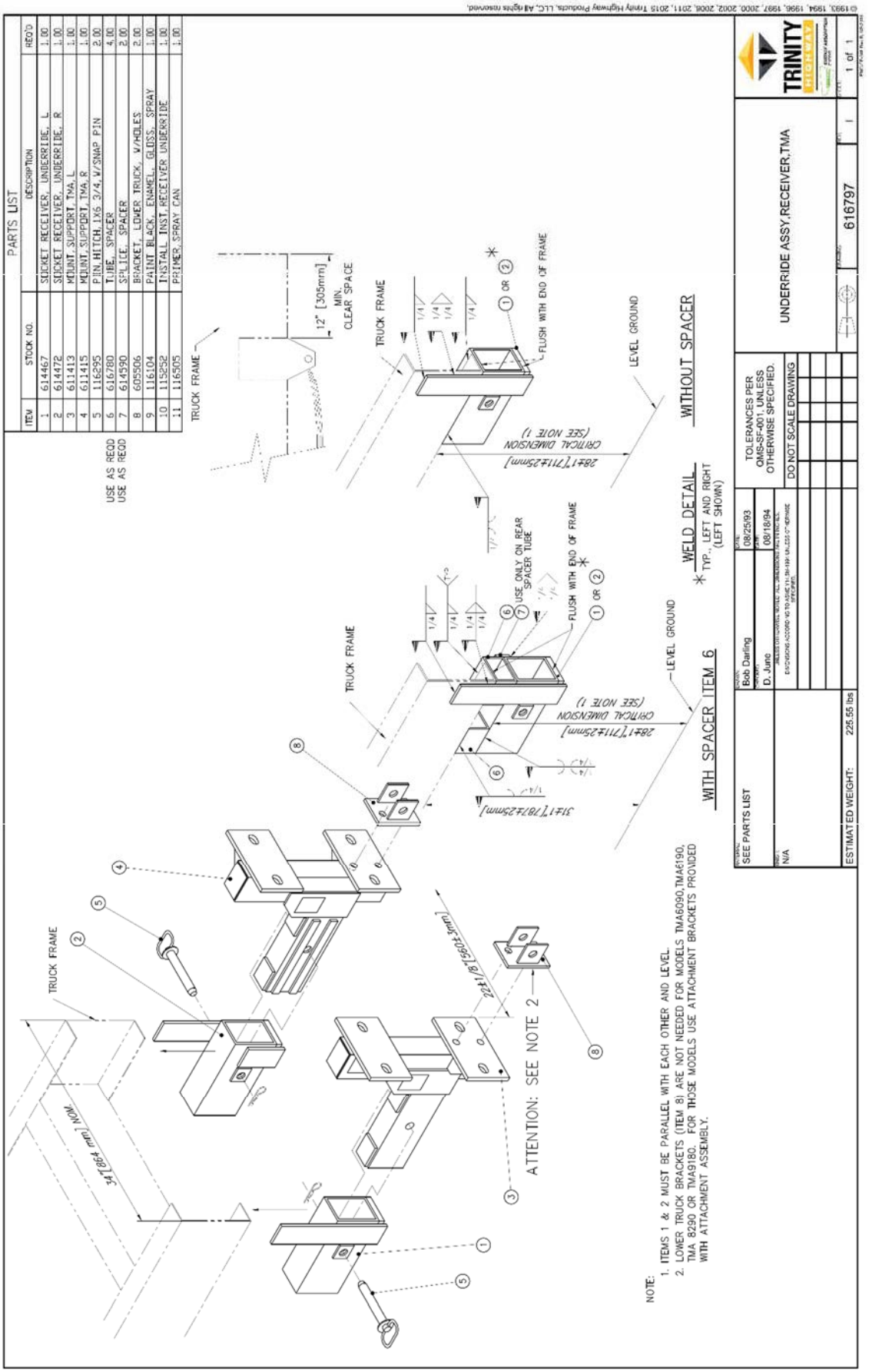
PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	119316	HARNESS,LIGHT,12V,LED,SS180M	1
2	626618	BRACKET,LIGHT,MIDFRAME	2
3	113598	BOLT,HX,3/8X1,G5,P	8
4	118093	WASHER,LOCK,3/8,P	8
5	115961	NUT,HX,3/8,G5,P	8
6	114106	CLAMP,LOOP,7/16,S	4
7	116884	SCREW,HWH,#12X1,SELF TAPPING,P	4
9	119362	LEVER,LIMIT SWITCH,ADJUSTABLE	1
10	118018	WASHER,FLAT,1/4X5/8,P	4
11	626635	BRACKET,LIMIT SWITCH	1
12	113509	BOLT,HX,1/4X1,G5,P	2
13	115947	NUT,HX,1/4,G5,P	2
14	118086	WASHER,LOCK,1/4,P	2
15	116999	SCREW,SOCKET HD,#10-32X3/4,S	6
16	115911	NUT,HX,#10-32,S	4
17	119365	TIE,NYLON,3/16X18	24
18	626636	SWITCH ASSY,ROTARY,LIMIT	1

LED Lighting Assembly

625143 – 2 of 3

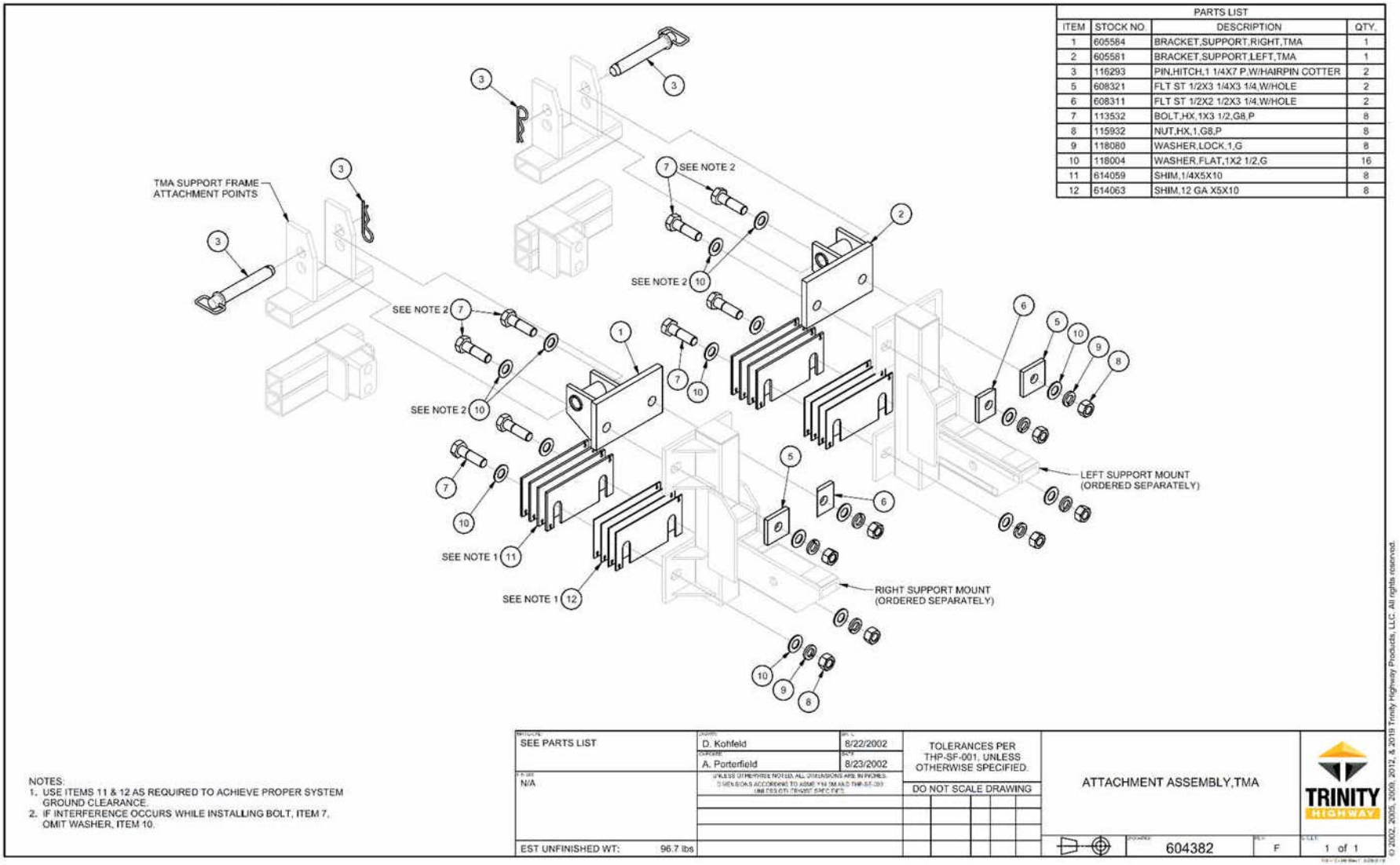

JUNCTION BOX
DETAIL G
DETAIL H
2 1/2" GROMMET
2 1/2" ROUND LIGHT
DETAIL F
I.C.C LAMP
DETAIL E
2 PLACES
4" GROMMET
4" ROUND LIGHT
2 1/2" GROMMET
2 1/2" ROUND LIGHT
SEE PARTS LIST
N/A
EST UNFINISHED WT:
41.2 lbs
D. Hayes Jr
7/26/2019
M. Buehler
8/1/2019
TOLERANCES PER THP-SF-001, UNLESS OTHERWISE SPECIFIED.
DO NOT SCALE DRAWING
LIGHTING ASSY,12VDC,LED,TRUCK-LITE
625143
2 of 3
TRINITY HIGHWAY





Underride Assembly

604382



PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	605584	BRACKET,SUPPORT,RIGHT,TMA	1
2	605581	BRACKET,SUPPORT,LEFT,TMA	1
3	116293	PIN,HITCH,1 1/4X7 P,W/HAIRPIN COTTER	2
5	608321	FLT ST 1/2X3 1/4X3 1/4,W/HOLE	2
6	608311	FLT ST 1/2X2 1/2X3 1/4,W/HOLE	2
7	113532	BOLT,HX,1X3 1/2,G8,P	8
8	115932	NUT,HX,1,G8,P	8
9	118080	WASHER,LOCK,1,G	8
10	118004	WASHER,FLAT,1X2 1/2,G	16
11	614059	SHIM,1/4X5X10	8
12	614063	SHIM,12 GA X5X10	8

NOTES:
1. USE ITEMS 11 & 12 AS REQUIRED TO ACHIEVE PROPER SYSTEM GROUND CLEARANCE.
2. IF INTERFERENCE OCCURS WHILE INSTALLING BOLT, ITEM 7, OMIT WASHER, ITEM 10.

SEE PARTS LIST	D. Kohfeld	8/22/2002	TOLERANCES PER THP-SF-001, UNLESS OTHERWISE SPECIFIED.	ATTACHMENT ASSEMBLY,TMA
	A. Porterfield	8/23/2002	DO NOT SCALE DRAWING	
N/A				604382 F 1 of 1
EST UNFINISHED WT: 96.7 lbs				

Attachment Assembly

Notes:

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HIGHWAY
Ahead of the Curve®

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