



SST[®] Trailer

TRAILER MOUNTED ATTENUATOR

PRODUCT DESCRIPTION ASSEMBLY MANUAL



PN 115313

REVISION K NOVEMBER 2022

SST[®] Trailer

The SST[®] Trailer (“SST[®]”) has been tested pursuant to National Cooperative Highway Research Program (“NCHRP”) Report 350 specifications. The SST[®] has been deemed eligible for federal-aid reimbursement on the National Highway System by the Federal Highway Administration (“FHWA”).

Product Description Assembly Manual



115601 Dallas Parkway
Suite 525
Addison, Texas 75001



Warning: The local highway authority, distributors, owners, contractors, lessors, and lessees are **RESPONSIBLE** for the assembly, maintenance, and repair of the SST[®]. Failure to fulfill these **RESPONSIBILITIES** with respect to the assembly, maintenance, and repair of the SST[®] 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 Valtir representative.

This manual must be available to the worker overseeing and/or assembling the product at all times. For additional copies, contact Valtir at (888) 323-6374 or visit Valtir.com.

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 SST[®] information available to Valtir at the time of printing. We reserve the right to make changes at any time. Please contact Valtir to confirm that you are referring to the most current instructions.

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Customer Service Contacts

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

Valtir

Telephone	(888) 323-6374 (USA) +1 312 467 6750 (International)
E-mail	Valtir.com/Contact
Website	Valtir.com

Important Introductory Notes

Proper assembly, deployment, and future maintenance of the SST® is critical to achieve performance of the system that has been evaluated and deemed eligible for reimbursement by the FHWA per NCHRP Report 350. These instructions should be read in their entirety and understood before assembling the SST®. These instructions are to be used only in conjunction with the assembly of the SST® and are for standard assemblies only as specified by the applicable highway authority. If you need additional information, or have questions about the SST® system, please contact the highway authority that has planned and specified this assembly and, if needed, contact Valtir's Customer Service Department. This product must be deployed in the location specified by the appropriate highway authority. If there are deviations, alterations, or departures from the assembly instructions specified in this manual, then the device may not perform as tested.



Important: DO NOT use any component part that has not been specifically specified herein for this system during assembly or repair.

This product has been specified for use by the appropriate highway authority and has been provided to that user who has unique knowledge of how this system is to be assembled. No person should be permitted to assemble, maintain, or repair this system that does not possess the unique knowledge described above. These instructions are intended for an individual qualified to both read and accurately interpret them as written. These instructions are intended only for an individual experienced and skilled in the assembly of highway products that are specified and selected by the highway authority.

A manufacturer's drawing package will be supplied by Valtir upon request. Details contained in the drawing package must be studied thoroughly by a qualified individual who is skilled in interpreting them before the start of any product assembly.

Safety Symbols

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

Symbol

Meaning



Safety Alert Symbol: Indicates Danger, Warning, Caution, or Important. Failure to read and follow the Danger, Warning, Caution, or Important indicators could result in serious injury or death to the workers and/or bystanders.



Warning: Read safety instructions thoroughly and follow the suggested safe practices before assembling, maintaining, or repairing the SST®. Failure to follow this warning can result in serious injury or death in the event of a vehicle impact with a system.



Important: Please keep up-to-date instructions for later use and reference by anyone involved in the assembly of the product.

Safety Rules for Assembly

*** Important Safety Instructions ***

This manual must be kept in a location where it is readily available to persons who are skilled and experienced in the assembly, maintenance, or repair of the SST®. Additional copies of this manual are immediately available from Valtir by calling (888) 323-6374 or by email at Valtir.com/Contact. Please contact Valtir if you have any questions concerning the information in this manual or about the SST®.



Important: It is the responsibility of the installer to use proper safety precautions when operating power equipment and when moving heavy equipment or SST® components. Hand, eye, foot, and back protection shall be used.



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 deploying this product.

Limitations and Warnings

Valtir contracts with FHWA approved testing facilities to perform crash tests, evaluation of tests, and submit of the results to the FHWA for review.

The SST® was tested to meet the impact criteria, requirements and guidelines of NCHRP Report 350. These tests are designed to evaluate product performance by simulating those impacts outlined by involving a typical range of vehicles on roadways, from lightweight cars (approx. 1800 lb. [820kg]) to full size pickup trucks (approx. 4400 lb. [2000 kg]).. The SST® is certified to the Test Level(s) shown below:

Test Level 3: 62 mph [100 kph]

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 to the test matrix criteria of NCHRP Report 350 as approved by FHWA.

Valtir 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 Valtir or by third parties.

The SST® 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. Site lay out, vehicle population type; speed, traffic direction, and visibility are important elements that require evaluation in the selection of a highway product.

After an impact occurs, the product must be repaired to its original condition as soon as possible. When a safety product is impacted, it is mandatory that the highway authority inspect all the components for damage and repair and/or replace components as necessary. If the system is not repairable, a complete system replacement is required.



Warning: Do not assemble, maintain, or repair the SST® until you have read this manual thoroughly and completely understand it. Ensure that all Danger, Warning, Caution, and Important statements within the manual are completely followed. Please call Valtir Customer Service if you do not understand these instructions (p. 3).

Trailer Description

The SST® has been 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 it is impacted within the applicable NCHRP Report 350 criteria. The system attaches to the rear of a truck and may be used in stationary applications, such as a truck blocking a work zone or mobile operations, such as striping, sweeping, plowing, etc.

The SST® consists of the following basic components: A collapsible frame assembly, two crushable cartridges, an impact face, cylinder hitch assembly, intermediate frame suspension, wheels and tires (Figures 1 and 2).

Definitions:

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

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

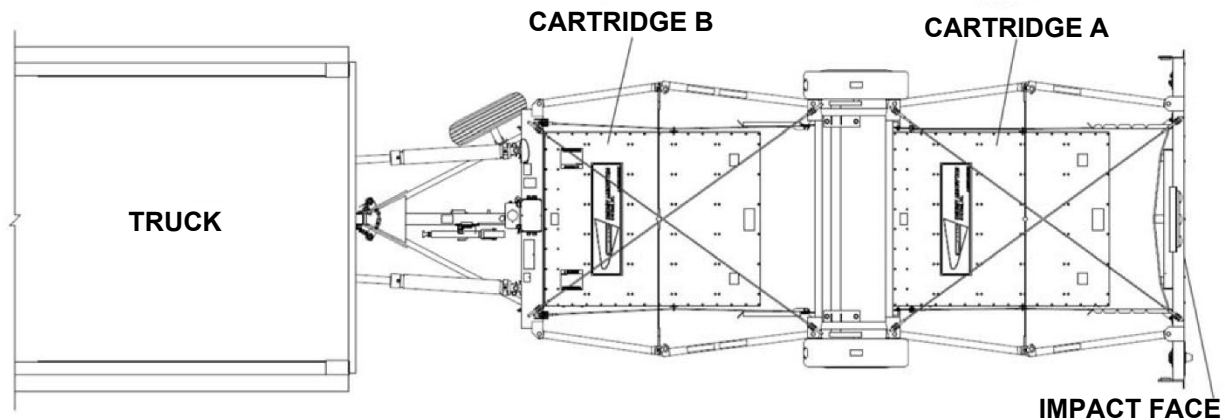


Figure 1

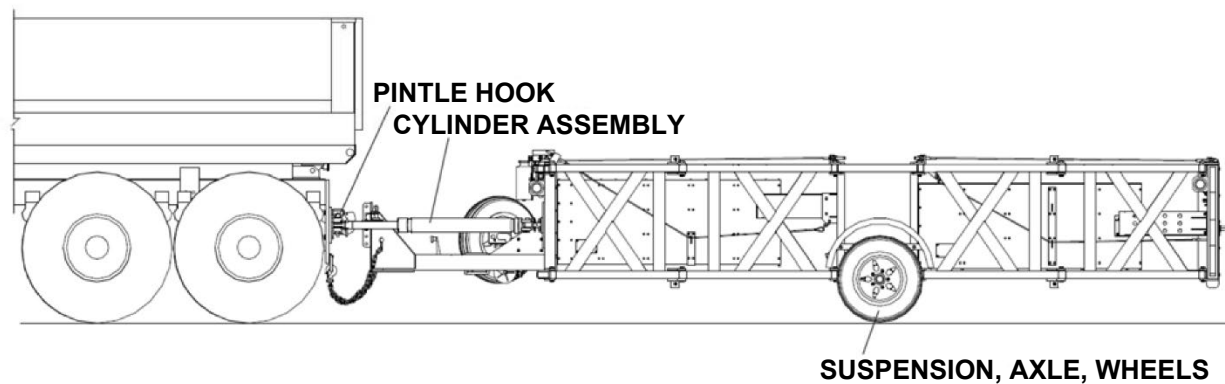


Figure 2



Warning: Ensure that no one is near or behind the SST[®] when in operation.



Warning: Do not operate the SST[®] while wearing loose fitting clothing which may become entangled during operation.



Warning: Deploy appropriate traffic-control devices while the SST[®] is in operation.

1. It is the operator's responsibility to ensure hydraulic cylinders are attached to the truck hydraulic brackets and locked in place with the hairpin cotter pins when the SST[®] is in the work zone or being used for protection (Figure 3).

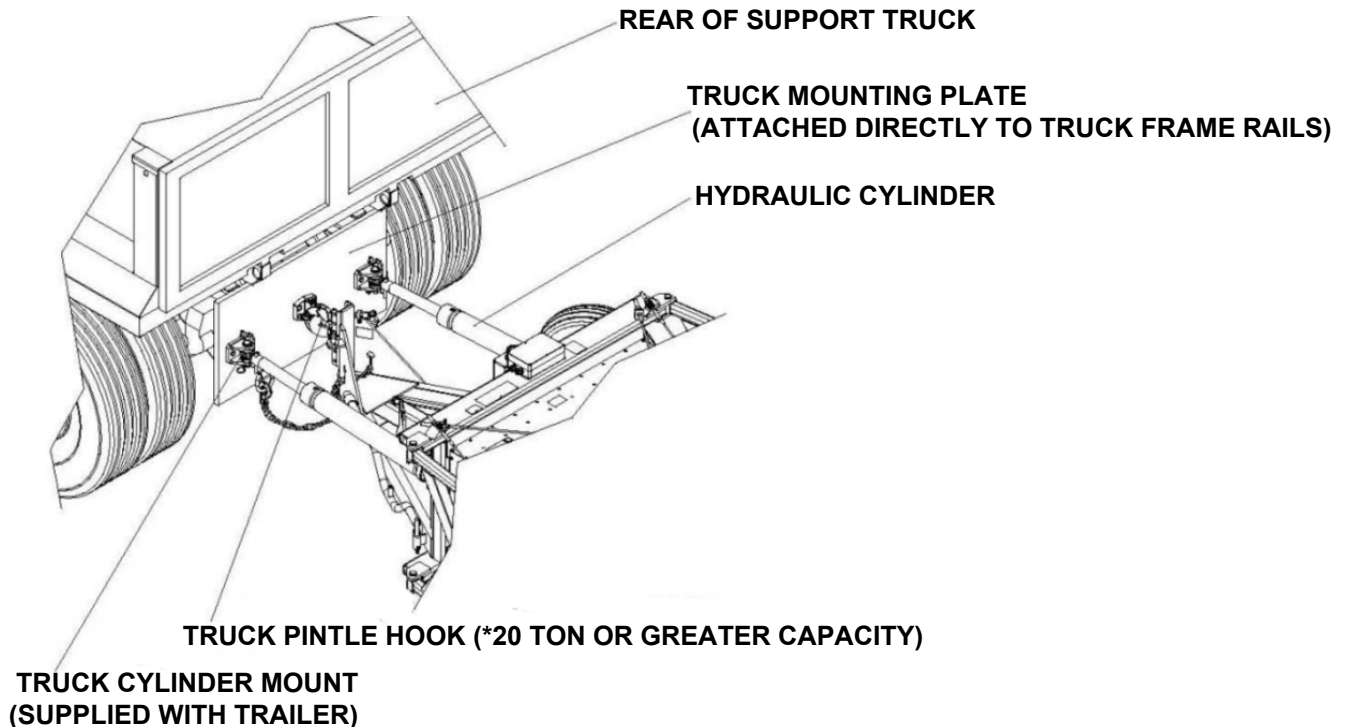


Figure 3

*Valtir recommends the use of a pintle hook with a rating of 20 tons (40,000 lbs.) or greater.



Important: Check for signs of wear at the Pintle Hook and Receiver as part of normal vehicle maintenance procedures.

- The TMA should be securely fastened to the truck. In the horizontal position on level ground, the bottom of the TMA should be 12" ± 2" [305 mm ± 50 mm] from the ground and level (Figure 4).

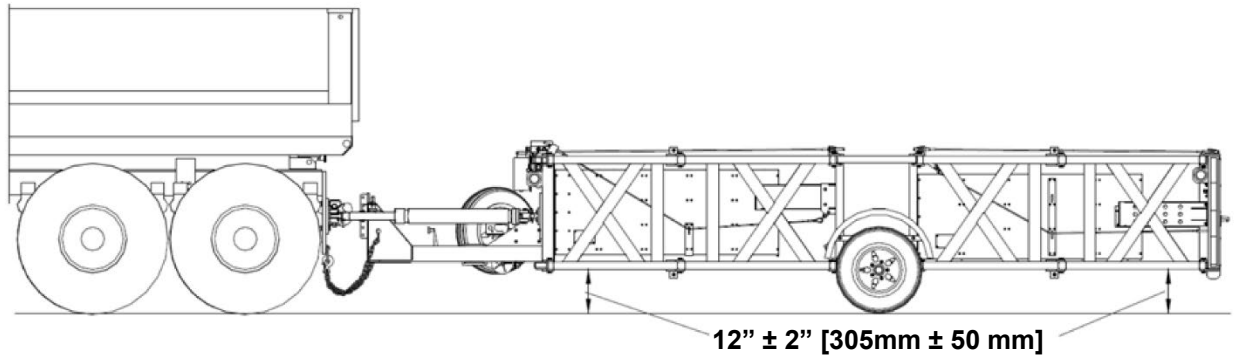


Figure 4

- Make sure all twenty-four (24) pivot pins are in position and that all retaining pins are assembled correctly (Figure 5).
- The SST® is designed to absorb a crash and to support its own weight if impacted within the applicable NCHRP Report 350 criteria. Do not drag the TMA or place anything on its top: damage may result (Figures 6 and 7).

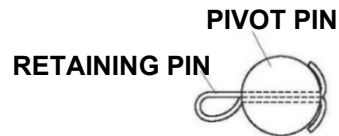


Figure 5

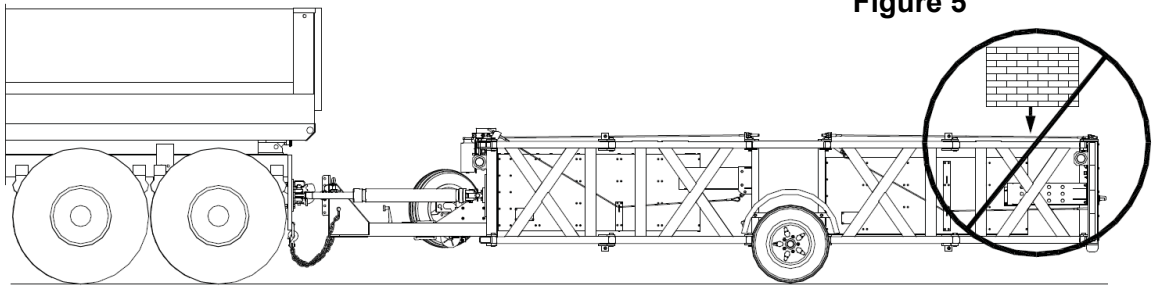


Figure 6

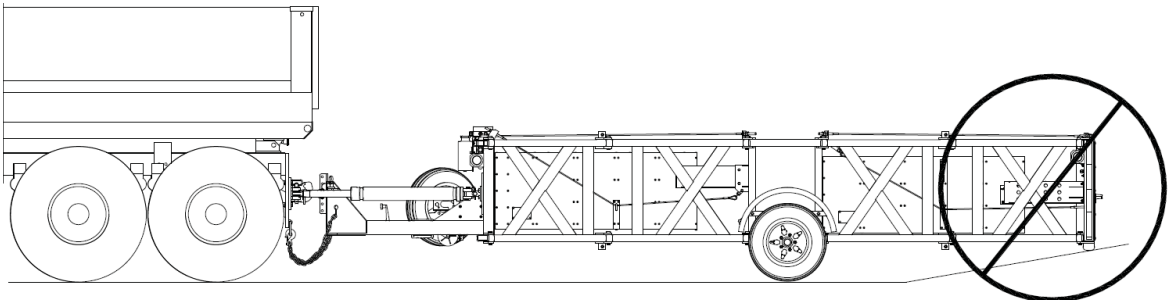


Figure 7



Caution: Do not sit, stand or lean on any part of the TMA.

5. Ballast and other heavy objects **MUST BE ADEQUATELY ANCHORED** to the truck to prevent shifting during an impact. The force on the tie-down straps could be 20 times the weight of the ballast (Figure 8).

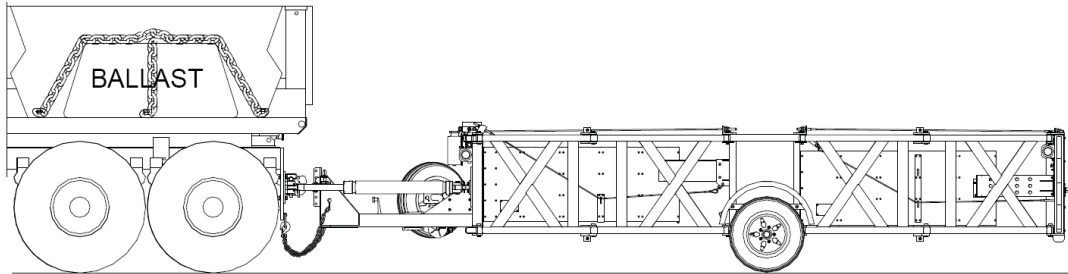


Figure 8

6. The agency or highway authority responsible for the truck should inspect it for adequate operator safety equipment (e.g., seat belts, head rests, etc.).
7. Make certain that the applicable highway authority's current specifications as to TMA reflectivity are evaluated and complied with. It is the operator's responsibility to make sure that all applicable reflectivity standards are met and the appropriate taping of indicators is placed on the TMA before use on the highways.
8. Make sure that the performance and safety of the SST® is not impaired by damage or corrosion.



Warning: Failure to comply with these instructions can result in improper TMA performance and possible personal injury. This TMA is intended to be used as an impact attenuator on the rear of trucks which meet the minimum requirements for this system (p. 13).

9. Regular maintenance of the SST® is important for safe use. Refer to the Routine Maintenance section of this manual for additional information (p. 33).
 - a. Regular inspection of frame members, cartridges, and pins is necessary to ensure proper system performance.
 - b. Regular inspection of hoses, cylinders, and tires is important. A broken or damaged hose or cylinder will cause the system to function improperly. Low tire pressure could cause a blowout.
 - c. Keep electrical connections clean to prevent arcing. Clean any hydraulic spills or leakage to prevent bodily injury, fire, etc.
10. This system is a crash cushion and is therefore used in high traffic areas as directed by the appropriate highway authority. Stay clear of traffic whenever possible. If an accident is to occur, even during an NCHRP Report 350 criteria impact, there may be fragments from the truck or impacting vehicle that could cause injury.
11. Do not use any part of the TMA for towing or hauling a load.
12. Ensure your truck is appropriate for attaching an SST®. See the Assembly section on page 14 for further details.
13. Mindfulness when moving hydraulic cylinders is encouraged so as not to pinch hands or drop cylinders on your feet.
14. When cylinders are not in use, make sure they are stored on the cylinder storage pins with the lynch pins fastened to keep the cylinders secure.
15. Periodically check the hydraulic fluid level.

Trailer Safety Instructions



Caution: Noncompliance with these instructions can lead to damage of the SST® components or render the SST® unfit for protection.

1. The Jack is used to support the TMA when it is detached from the truck. When the TMA is attached to the truck, the Jack must be fully rotated 90 degrees to the travel position.
2. The driver should be extra cautious while backing the truck with the SST® so that injury and/or damage will not result.
3. Periodically check and correct tire pressure to recommended pressure noted in this manual. Never exceed the maximum pressure listed on the tire side wall.
4. Make sure the wheel lug nuts/bolts on the SST® are tightened to the correct torque as recommended in the Maintenance section.
5. Be sure the pintle hook and pintle eye are connected and properly tightened and adjusted.
6. Make sure all lights are working correctly.
7. On a regular basis per maintenance schedule, verify that the breakaway brakes are functioning properly.
8. Avoid sudden stops and starts that can cause loss of vehicle control.
9. Avoid sudden steering maneuvers that might create sway or undue side force on the SST®.
10. Slow down when traveling over bumpy roads, railroad crossings and ditches.
11. Make wider turns at curves and corners.
12. When uncoupling the SST®, place blocks or wheel chocks at the front and rear of the trailer tires to ensure that the trailer does not roll away when the coupling is released.
13. Lightly coat all electrical terminal connections periodically with non-conducting (dielectric), light waterproof grease.
14. Periodically check axle bearings. Maintain per maintenance schedule (p. 33).
15. Always use safety chains when towing to prevent runaway trailer in case of system detachment.
16. Cross safety chains under coupling to prevent tongue from dropping to ground in case of connection failure.
17. Allow only enough slack for tight turns.
18. Do not let safety chains drag on the ground.
19. Twist safety chains equally from hook ends to take up slack.
20. The truck operator is completely responsible for monitoring the condition of the trailer components as they relate to safe highway transit of their vehicle.

21. Check that the wiring is properly connected and not touching the road, but loose enough to make turns without disconnecting or damaging the wires.



Caution: Trailer towing can be hazardous.

22. Do not modify or change the trailer in any way.
23. Never weld, bolt or modify anything on the trailer. The added weight could affect impact performance.
24. Use a correctly rated pintle hook (20 tons or greater).

Electric Brakes Safety Instruction



Caution: Noncompliance with these instructions can lead to damage of TMA components or render the SST[®] unfit for protection.

1. In case of a connection failure, the SST[®] is equipped with a breakaway cable that activates the electric brakes by pulling the breakaway pin mechanism.
2. It is the responsibility of the truck operator to set the attachment point of the breakaway cable on the truck, so that the trailer brakes do not activate during normal towing.
3. If the truck operator connects the breakaway cable too tightly to the truck, the breakaway mechanism will activate. The results of an improper connection can be catastrophic and will result in damage to the trailer brakes and possibly the loss of tire and hub as bearings are destroyed due to overheating.

Tires & Axle

1. Periodically check and correct tire pressure. Inflate trailer tires to a minimum of 35 psi. Never exceed the maximum pressure indicated on the tire side wall.
2. All trailer tires have a maximum speed rating of 65 mph [105 kph].
3. Three to five years is the projected life of a normal trailer tire.
4. The mileage expectation of a trailer tire is 5,000 - 12,000 miles [8,050 - 19,300 km].



Warning: Incorrect tire pressure can cause loss of control resulting in injury and equipment damage.

5. Always replace trailer tires with (ST) Special Trailer tires.
6. Wheels and tires offset is the distance from the mounting surface to the centerline of the tire. The SST[®] axle bearing sets are designed for wheels with 0 to 1/2" [13 mm] offset. Exceeding this offset will shorten bearing life and may lead to bearing failure.
7. Wheels and tires must be matched. The wheel will have a label stating its rim diameter, width and contour. The tire selected must be approved by the Tire and Rim Association for use on that particular size wheel.
8. When replacing tires, the tire capacity selected should not exceed the capacity rating of the wheel.
9. When replacing tires, the tire inflation pressure must not exceed the pressure rating of the wheel.



Warning: The use of tires that are not approved for use on a wheel could result in explosive separation of the tire and wheel and could cause a serious accident.

10. Make sure the wheel lug nuts are tightened to the correct torque.
11. Do not jack up the trailer on the suspension components because of potential for damage. Use the trailer frame when jacking up the trailer.
12. Never weld to the Torflex[®] axle. The Torflex[®] axle contains rubber cords to provide the suspension system and can be damaged by heat generated from welding on the bracket or tube.
13. Trailer wheels carry substantially more weight than truck wheels of the same size and more disc flexing can occur due to side loading stresses. It is necessary to re-torque the lug nuts several times until the wheels nut torque stabilizes.



Warning: Be careful to use only the recommended lug nut torque as specified for that wheel and fastener. It is possible to permanently damage a wheel that has been over torqued and may cause the loss of that wheel from the trailer.



Warning: Never use oil or grease on studs or nuts for wheels. Assembling wheels without good metal to metal contact could cause loosening of the wheel nuts.

Controlling Skid Distance and Roll-Ahead

The use of a SST® on the back of a truck will not:

- Affect the skid (roll ahead) distance of an impacted truck. **KEEP WORK CREWS CLEAR!**

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 weight: 9,920 lbs. [4,500 kg] or greater.

Roll-Ahead Distance for Shadow Vehicles

Weight of Shadow Vehicle (Moving)	Prevailing Speed mph [kph]	Weight of Impacting Vehicle to be Contained*			
		4,500 lbs [2,040 kg]	10,000 lbs [4,536 kg]	15,000 lbs [6,804 kg]	24,000 lbs [10,886 kg]
10,000 lbs [4,536 kg]	60-65 [96-105]	100' [30 m]	175' [53 m]	225' [69 m]	275' [84 m]
	50-55 [80-88]	100' [30 m]	150' [46 m]	175' [53 m]	200' [60 m]
	45 [72]	75' [23 m]	100' [30 m]	125' [38 m]	150' [46 m]
15,000 lbs [6,804 kg]	60-65 [96-105]	75' [23 m]	150' [46 m]	175' [53 m]	225' [69 m]
	50-55 [80-88]	75' [23 m]	125' [38 m]	150' [46 m]	175' [53 m]
	45 [72]	50' [15 m]	100' [30 m]	100' [30 m]	100' [30 m]
24,000 lbs [10,886 kg]	60-65 [96-105]	75' [23 m]	100' [30 m]	150' [46 m]	175' [53 m]
	50-55 [80-88]	50' [15 m]	75' [23 m]	100' [30 m]	150' [46 m]
	45 [72]	50' [15 m]	75' [23 m]	75' [23 m]	100' [30 m]

Note: Distances are appropriate for shadow vehicle speeds up to 15 mph [25 kph].

Roll-Ahead Distance for Barrier Vehicles

Weight of Barrier Vehicle (Stationary)	Prevailing Speed mph [kph]	Weight of Impacting Vehicle to be Contained*			
		4,500 lbs [2,040 kg]	10,000 lbs [4,536 kg]	15,000 lbs [6,804 kg]	24,000 lbs [10,886 kg]
10,000 lbs [4,536 kg]	60-65 [96-105]	50' [15 m]	100' [30 m]	150' [46 m]	200' [60 m]
	50-55 [80-88]	25' [8 m]	75' [23 m]	100' [30 m]	150' [46 m]
	45 [72]	25' [8 m]	50' [15 m]	75' [23 m]	100' [30 m]
15,000 lbs [6,804 kg]	60-65 [96-105]	25' [8 m]	75' [23 m]	100' [30 m]	150' [46 m]
	50-55 [80-88]	25' [8 m]	50' [15 m]	75' [23 m]	100' [30 m]
	45 [72]	25' [8 m]	25' [8 m]	50' [15 m]	75' [23 m]
24,000 lbs [10,886 kg]	60-65 [96-105]	25' [8 m]	50' [15 m]	75' [23 m]	100' [30 m]
	50-55 [80-88]	25' [8 m]	25' [8 m]	50' [15 m]	75' [23 m]
	45 [72]	25' [8 m]	25' [8 m]	25' [8 m]	50' [15 m]

Shadow or Barrier Vehicle Recommended Weight

Recommended minimum Barrier/Shadow vehicle weight: 9,920 lbs [4,500 kg].

*Weights of Typical Vehicles:

Midsize automobile - 2,250 lbs [1,020 kg]
 Full-size automobile - 3,500 lbs [1,500 kg]
 Loaded 3/4-ton pickup truck - 6,000 lbs [2,750 kg]
 Loaded 1-ton cargo truck - 10,000 lbs [4,500 kg]
 Loaded 4-yard dump truck - 24,000 lbs [11,000 kg]

Source: "Use of Truck Mounted Attenuators in Work Zones" by T. Darcy Sullivan, P.E and Jack B. Humphreys, P.E., University of Tennessee.

Assembly

Read and understand all instructions before beginning assembly.



Important: The truck weight shall be 9,920 lbs [4500 kg] minimum.

The system must be attached to the truck by pintle hook and cylinder attachment brackets. The truck frame must be suitable and accessible for mounting a TMA system. If there are any questions regarding the suitability, contact the Customer Service Department for assistance.

1) Shipping list

Check the shipping list against the actual parts received to make sure all items were received. Review the drawing package and familiarize yourself with the assembly and part numbers.

2) Recommended tools:

- Welding equipment (for 1/2" [13 mm] plate) GMAW or SMAW
- Cutting torch
- Hammer
- Drift pin or Alignment pin (12" [305 mm] long)
- Tape measure
- 1/2" drive socket wrench with 6" extension
- 1/2" drive sockets (9/16", 3/4", 7/8", 1-1/8" deep well)
- Open end wrenches (9/16", 1-1/8")
- 12" crescent wrenches – (2) (optional)
- Marking implement (pencil, soap stone)
- Floor jack
- Drill motor for 13/16" diameter bit
- 13/16" diameter bit and pilot drill for same
- Center punch
- Torque wrench – 90 ft lbf [120 N-m]
- Torque wrench – 25 ft-lbf [34 N-m]
- Forklift
- Hydraulic fluid (Dexron® III fluid only) *Shipped with system
- Vise Grips
- Allen Wrench 5/32"
- Phillips Screw Driver #2
- Wire Cutters

Note: The above list of tools is a general recommendation and should not be considered an extensive list. Depending on specific conditions and the complexity of the assembly specified by the appropriate highway authority the required tools may vary. Decisions as to what tools are needed to perform the job are entirely within the discretion of the specifying highway authority and the authority's selected contractor performing the assembly of the system.

Preparation

3A) Assembly must be performed on a level surface

The TMA framework is very heavy and pivots in several areas. Until the framework is secured with the cables, it can swing out in an approximate 7' [2 m] radius from either side of the trailer axle. A level surface is required to maintain control of the framework when it is being extended to its full length.

3B) Truck ballast

Use a bubble level to verify that the truck is parked on a level surface. The truck should be as close to the final driving weight as possible. If ballast is needed to meet 9970lbs [4500kg] minimum, 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 tongue weight of the Trailer TMA is supported by the back of the vehicle, be sure not to exceed the manufacturer's published maximum axle loads.



Important: It is the responsibility of the TMA operator to ensure the truck manufacturer's center-of-gravity zone is known and applied when adding ballast.

4) Check for interference

Before attempting to assemble the cylinder brackets and pintle hook, check for interference problems.

Temporarily position the cylinder brackets and pintle hook on the truck frame and check for interference problems (p. 17). Interference problems with tail lights, springs, dump bodies (in the up or down positions), etc., shall be corrected before proceeding.

Prepare the truck for the cylinder brackets and pintle hook. The truck frame shall be two C-channels spread 34" \pm 1" apart. Most trucks have a 1/2" plate welded across the back frame members and a pintle hook. If not, start by making sure the frame is square by measuring back from the spring shackles. Cut the frame square first if needed. Once the frame is squared, the plate can be welded or bolted on.

Welding Procedures

- Start by grinding the inside and outside of the frame ends to prepare for the weld (Figure 9).
- The plate needs to be a minimum of 1/2" thick and wider than 36" (Figure 10).
- Grind the plate in the locations where the frame is to be welded.
- Tack the plate into position and make sure that the rear plate is positioned correctly.
- Continue welding the inside and outside frame to the plate.

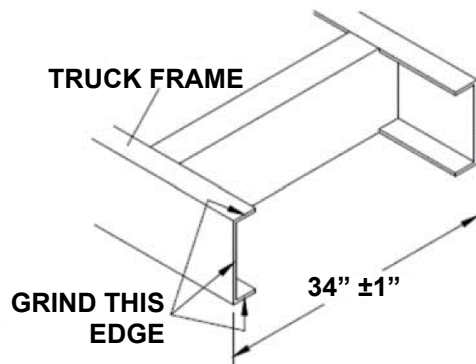


Figure 9

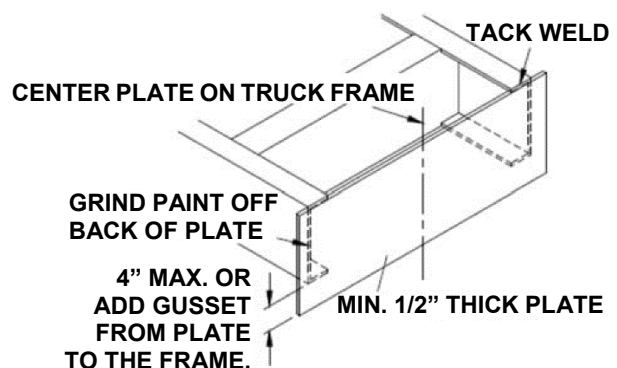


Figure 10

Bolt-on Procedures

- Start by cutting two (2) 4" x 4" x 1/2" steel angle the height of the C channel.
- Measure and mark the angle for four (4) 1-1/16" holes (Figure 11). The spacing needs to be equal distances vertical and horizontal. Make sure the holes are spaced at least 2-1/16" apart.
- Drill holes in the angle.
- Use the angle as a template for marking and drilling holes in the truck frame (Figure 12).
- Bolt the angle in place using two (2) 1" diameter (grade 5) bolts on each side.
- The plate needs to be a minimum of 1/2" thick and wider than 36" (Figure 13).
- Drill matching holes in the plate.
- Mount plate using four (4) 1" diameter (grade 5) bolts. If the plate is greater than 4" below the C channel frame, you must gusset from the plate to the frame.

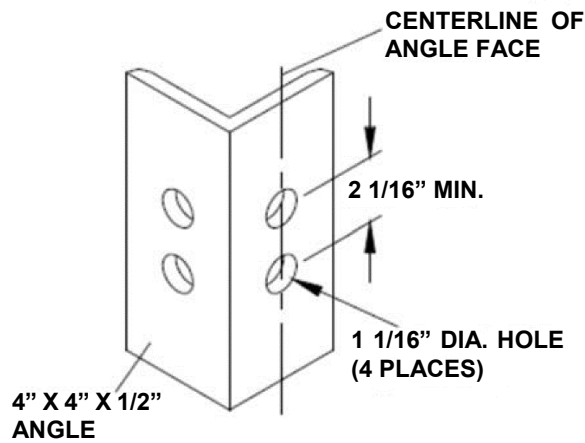


Figure 11

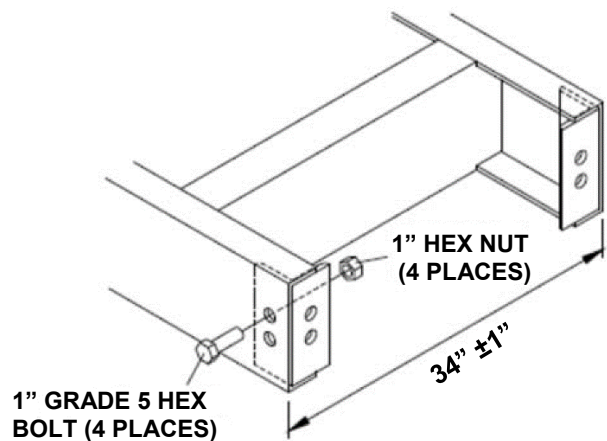


Figure 12

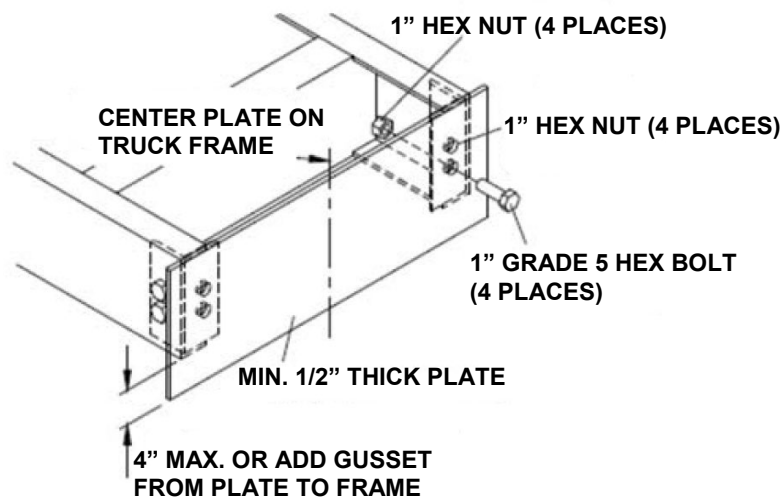


Figure 13

5) Underride Assembly

With the truck at its actual driving weight and parked on a level surface, measure the distance from the ground to the pintle hook. Attach the pintle eye to the trailer at the same height with the trailer frame at $12" \pm 2"$ [305 ± 50 mm] above the ground, front and rear.

Note: The truck's springs may settle with the weight of the TMA. Adjust the height to compensate for anticipated settling.

Position the Cylinder Brackets in line horizontally with the pintle hook $\pm 5"$ [127 mm] and in line vertically with the truck frame rails as shown below. Weld two opposing sides of each bracket or bolt the brackets to the truck.

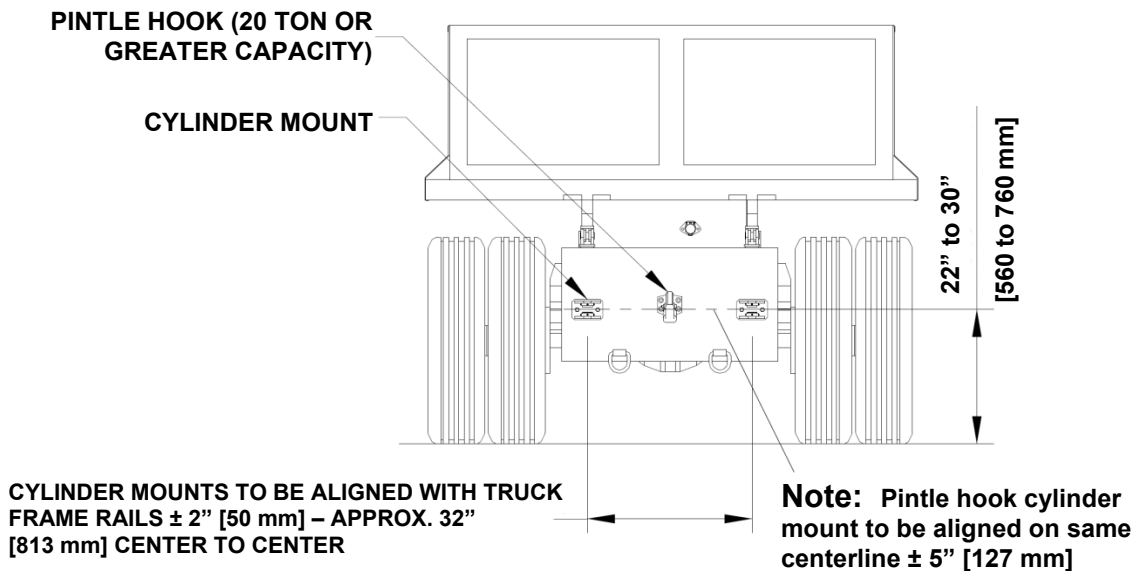


Figure 14
Rear of Support Truck



Caution: The truck frame is high carbon steel. Do not weld or apply excessive heat to bottom flange forward of rear-most leaf spring hangers to avoid cracking.

Prime and paint all welded areas.

6a) If TMA is fully assembled; attach the TMA to the truck. Go to Step 23.

6b) Uncrate the TMA

See Uncrating Instructions, Part No. 616787B.

7) Extend the Support Frame

Slowly and evenly pull the frame out to its full extent.



Warning: Use extreme care. The frame can be unwieldy even when supported by a forklift.



Warning: Until the cables are attached, the system may shift to one side (Figure 15).

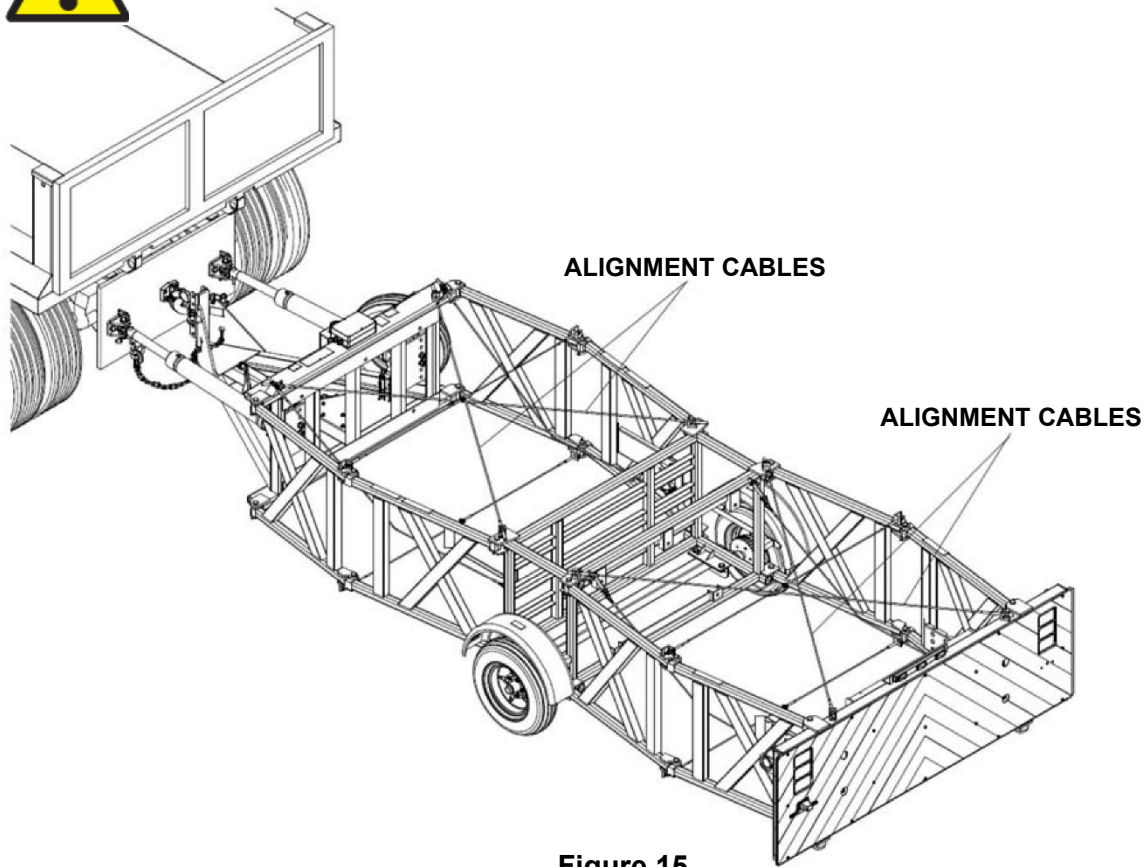


Figure 15

8) Attach Fenders

Attach Fenders as shown below. Do not tighten bolts yet. Attach nylon ties through hole in bracket to secure light cable.

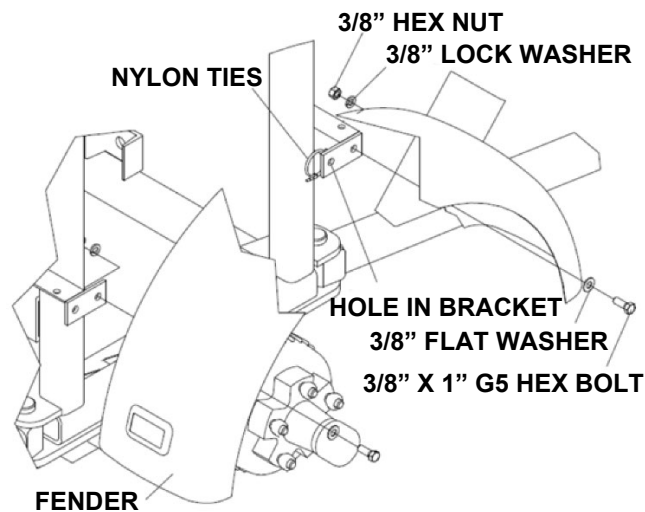
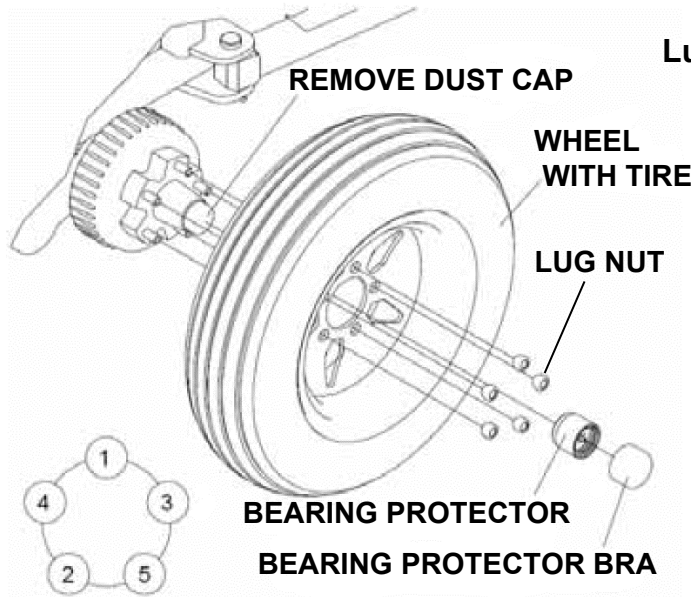


Figure 16
Fender Assembly

9) Mount Wheels

Attach wheels as shown below using the torque sequence and stages for tightening.



Lug nut torque requirements:

- A. Start all nuts by hand to prevent cross threading.
- B. Torque nuts in stages as follows:
 - 1st stage 20-25 lbf-ft**
 - 2nd stage 35-40 lbf-ft**
 - 3rd stage 70±5 lbf-ft**
- C. Follow torque sequence in Figure 17.

Figure 17

10) Align Fenders

Align Fenders and tighten bolts.

11) Assemble Fender Clearance Lights

Attach Fender Clearance Lights. Use nylon zip tie straps as shown in Figure 16 to keep the wire away from the tire (Figure 18).

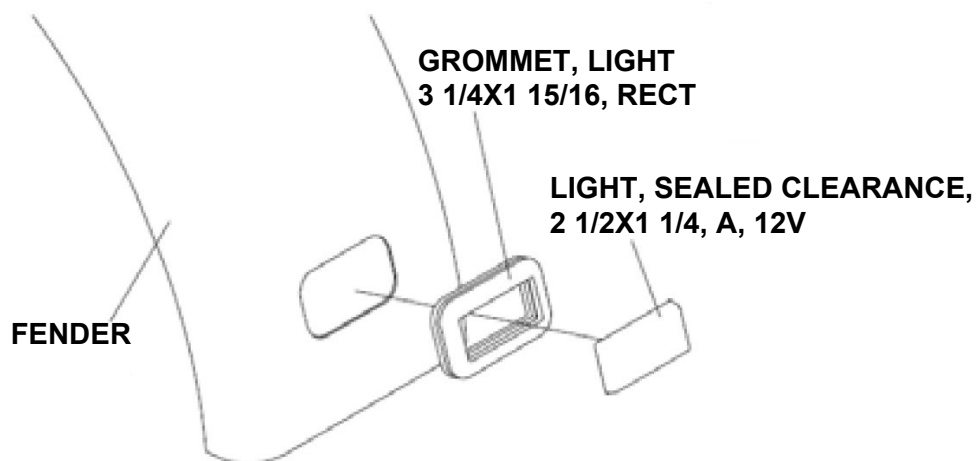
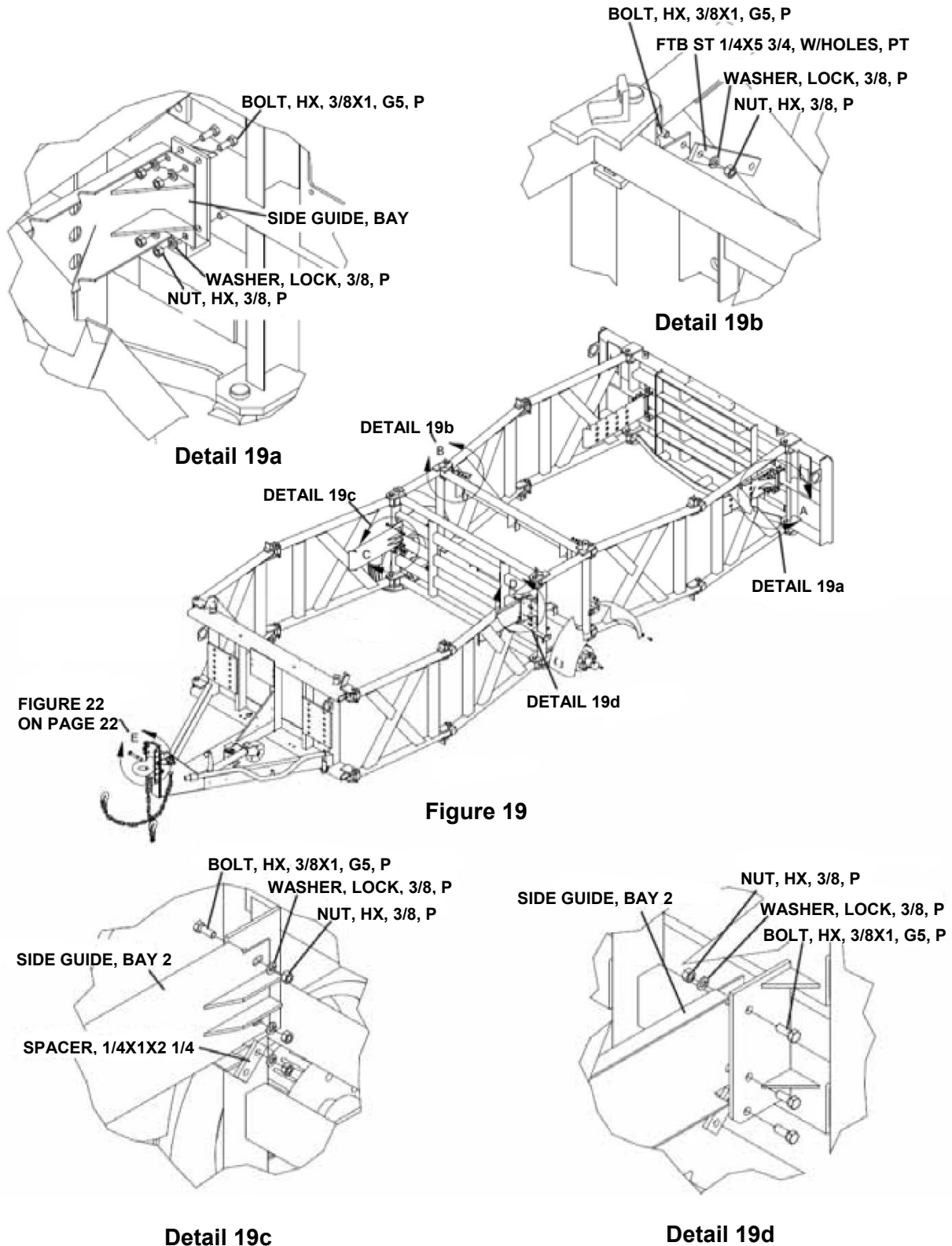


Figure 18
Fender Clearance Light Assembly

12) Assemble Side Guides

There are four Side Guides, two for Bay 1 and two for Bay 2. Attach Side Guides as shown in Detail 19a, Detail 19c & Detail 19d and tighten bolts.



13) Assemble Impact Face

Using the self-tapping screws provided, attach the Impact Face as shown in Figure 20.

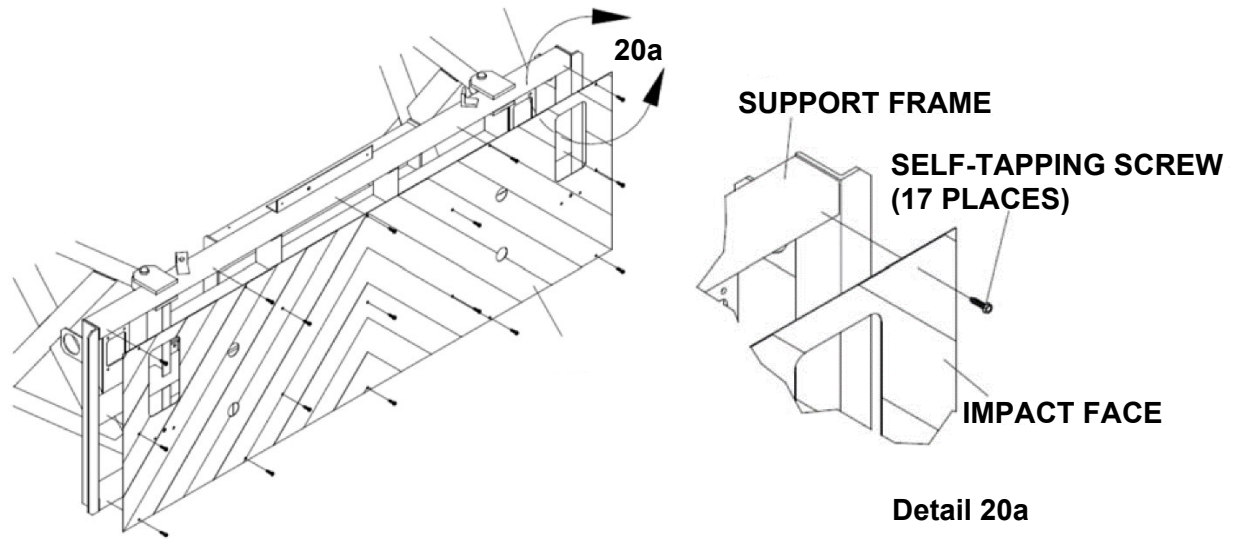


Figure 20



Warning: It is the operator's responsibility to only use Release Cables supplied by Valtir. Failure to use authorized parts could result in serious injury or death in the event of a vehicle impact with a system.

14) Attach the Bottom Release Cable across the Arm Assemblies.

Verify that the frame is extended as far as it will go. Attach the Bottom Release Cable across Arm Assemblies (Figure 21). Torque the nuts to 25 lbf-ft \pm 2 [34 N-m \pm 3] making sure that roughly an equal amount of threads protrude from nuts on both ends of cable.

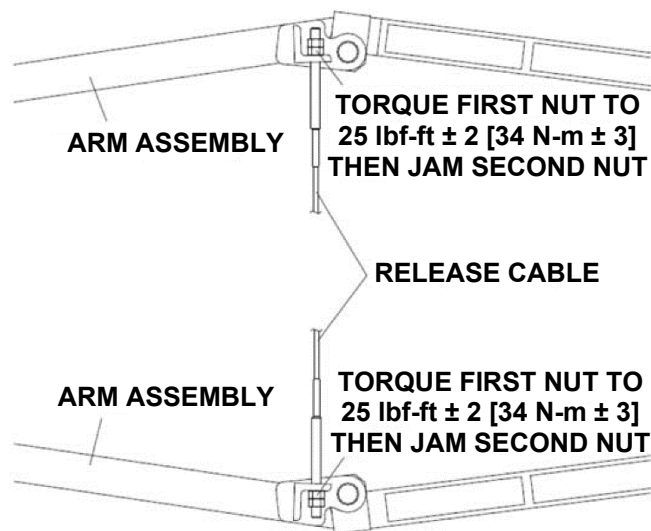


Figure 21

15) Verify Pintle Eye Height

Verify that the system frame is 12"±2" [305±50 mm] from the ground at the front and rear of the system. It may be necessary to adjust the pintle eye and trailer Cylinder Brackets to the correct height (Figure 22).

The initial height of the trailer will be on the high side of the tolerance. Within the first couple of months, the Torflex® suspension will settle down approximately 1 to 1 1/2" [25 mm to 38 mm]. Torque fasteners to: 100 lbf-ft ± 5 [135 N-m ± 7].

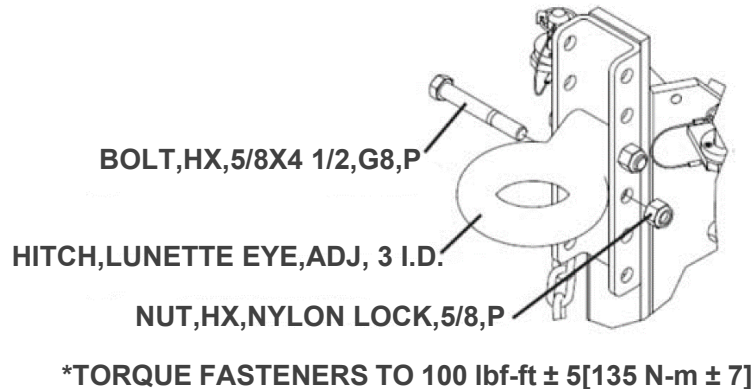


Figure 22

16) Attach Cartridges

Remove one end of each Alignment Cable from the TMA and set aside to clear the top side of each bay. Using a forklift and sling, place Cartridge B in position and secure it using the flat washers, lock washers and nuts provided. Torque the nuts to 90 ft-lb ±5 [120 N-m ±7] and repeat procedure for Cartridge A (Figure 23).

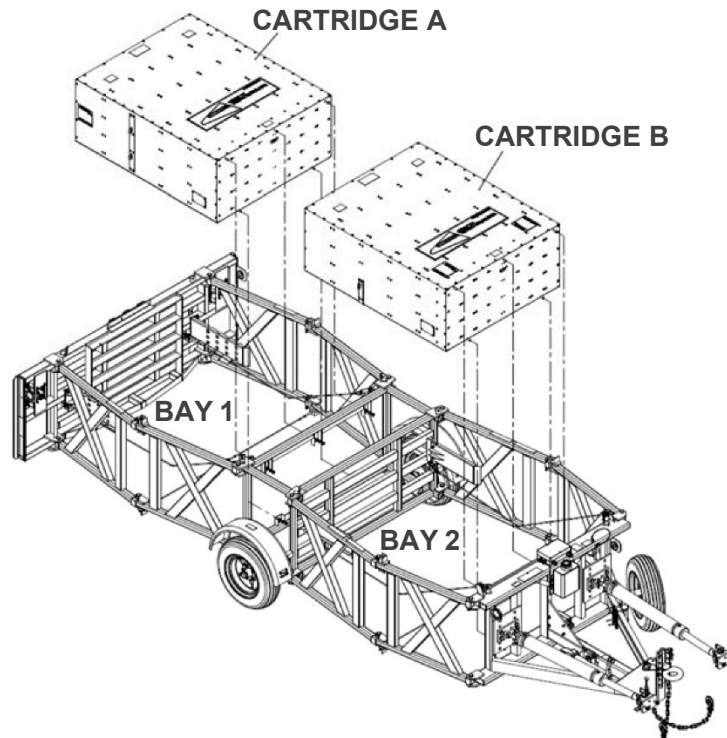


Figure 23

17) Attach the Cartridge Support Cables

There are four Cartridge Support Cables. Attach the cables as shown in Detail 24a, Detail 24b, Detail 24c & Detail 24d. Attach thimble end of all Cartridge Support Cables to the Mid Frame using the provided shackles (Detail 24a & Detail 24b). Pass the stud end of the cable through the corresponding cartridge chain loop, and attach as shown in Detail 24c & Detail 24d using a die spring, washer, and nuts.

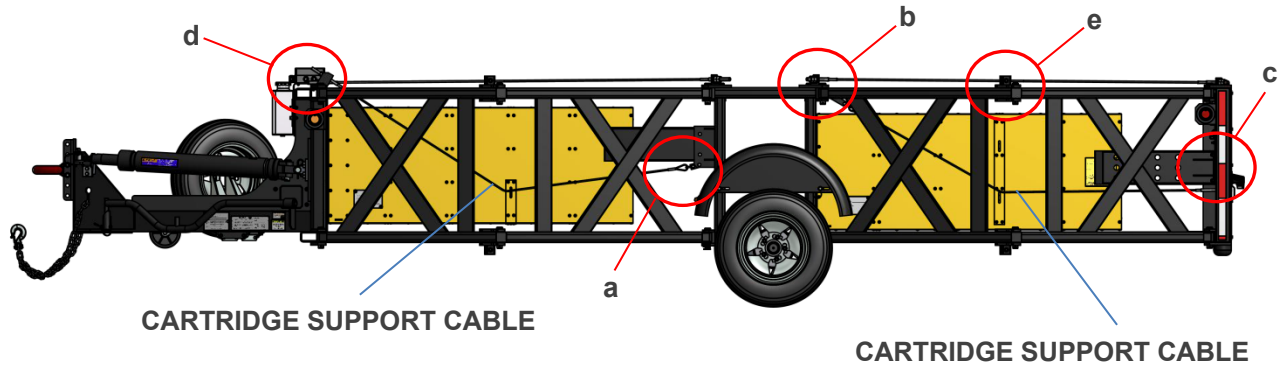
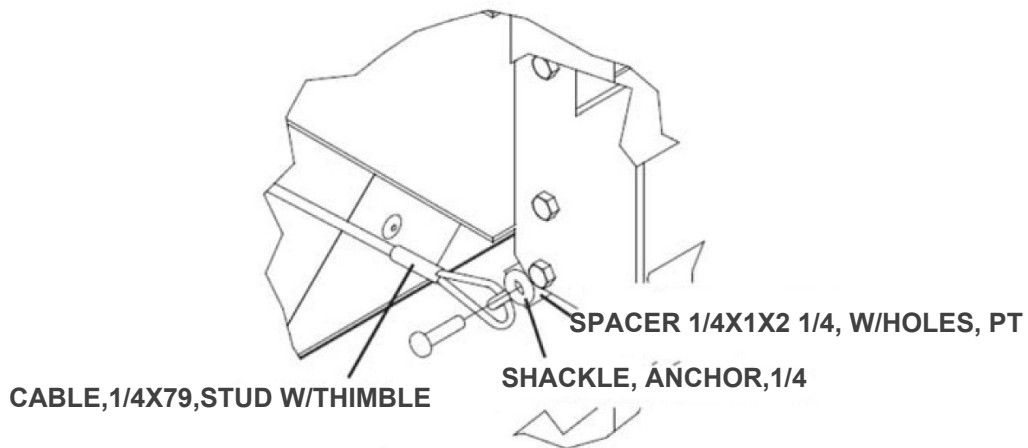
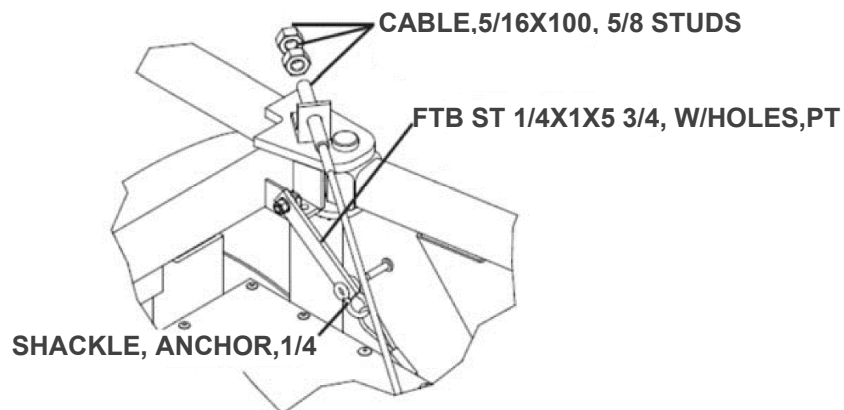


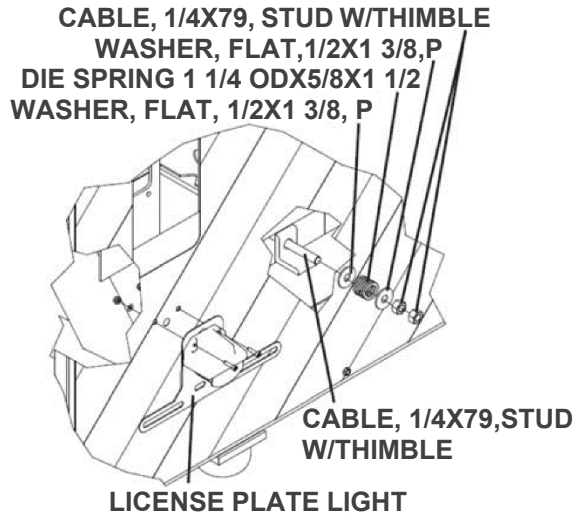
Figure 24



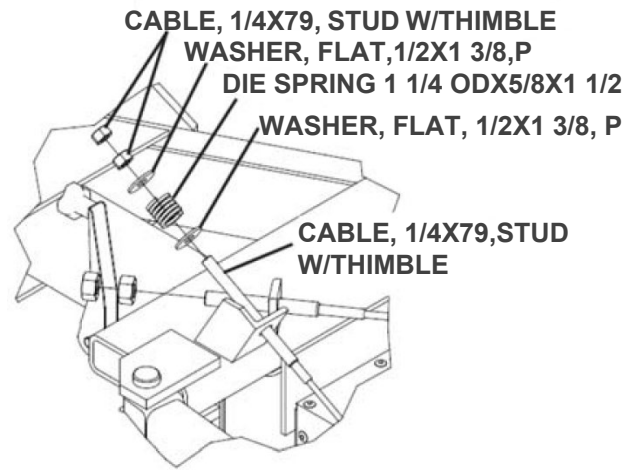
Detail 24a



Detail 24b



Detail 24c



Detail 24d

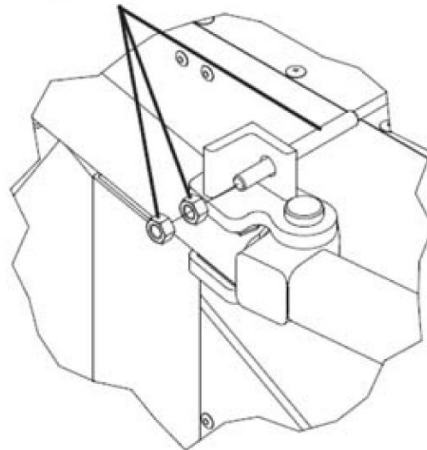
18) Tension the Cartridge Support Cables

To properly tension the Cartridge Support Cables, tighten the first nut on one cable until all slack is removed and then tighten it until the Tensioning Springs have been compressed to 1 1/4" ± 1/16" [32 mm ± 1 mm] in height. Lock this nut in place with the second "jam" nut. Repeat this tensioning procedure with the other cables (Detail 24c and Detail 24d).

19) Attach the Top Release Cables across the Arm Assemblies

Attach the Top Release Cables across the Arm Assemblies (Detail 24e). Torque the nuts to 25 lbf-ft ± 2 [34 N-m ± 3], making sure that roughly an equal amount of threads protrude from nuts on both ends of cable. Lock cable in place using the remaining fasteners as "jam" nuts.

RELEASE CABLE ASSY



Detail 24e

20) Re-torque Bottom Release Cable

After re-torqueing bottom release cable, lock cable in place using the remaining fasteners as "jam" nuts.

21) Attach License Plate Light Assembly

Attach license plate holder and connect wires (Detail 24c).

22) Attach and Adjust the Alignment Cables

There are four Alignment Cables (two for each bay). Attach the Alignment Cables as shown in Figure 25. Measure the diagonals of each bay and adjust the cables so that the diagonal measurements in each bay are the same within the given tolerance ($A = B \pm 3/16"$ [2 mm], $C = D \pm 3/16"$ [2 mm]) and taut. Cables are "taut" when they deflect 1 1/2"-2" [38 mm - 50mm] when pressed by hand at the midpoint. Lock each cable in place using the second nut as a "jam" nut.

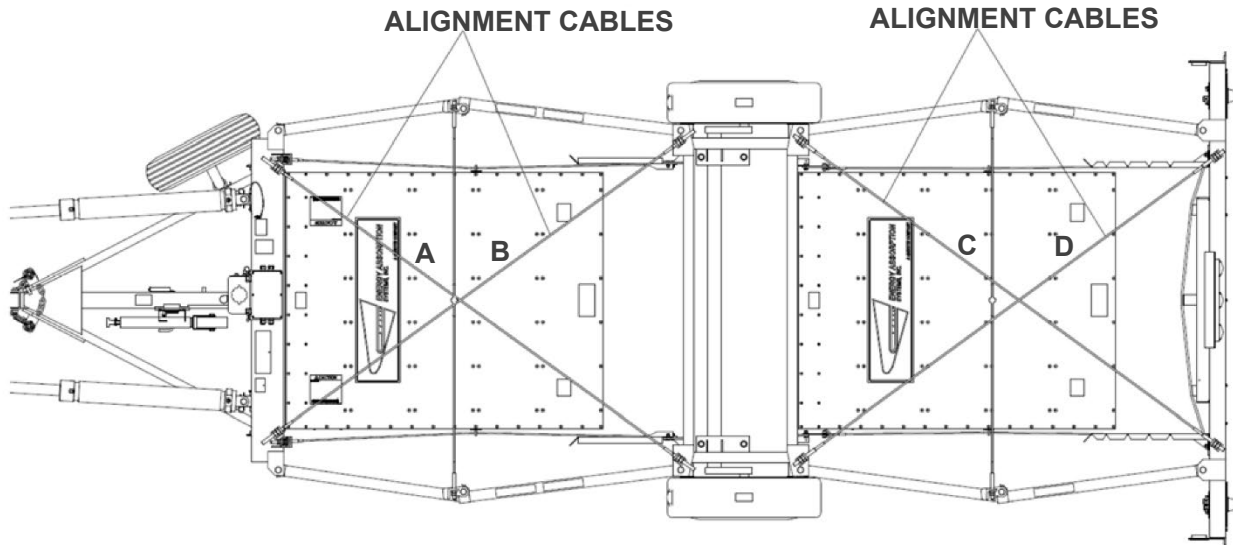


Figure 25

23) Assemble Spare Tire Carrier (Purchase Option)

Using the hardware provided, attach Spare Tire Carrier to the SST[®] Tongue Assembly (Figure 26).

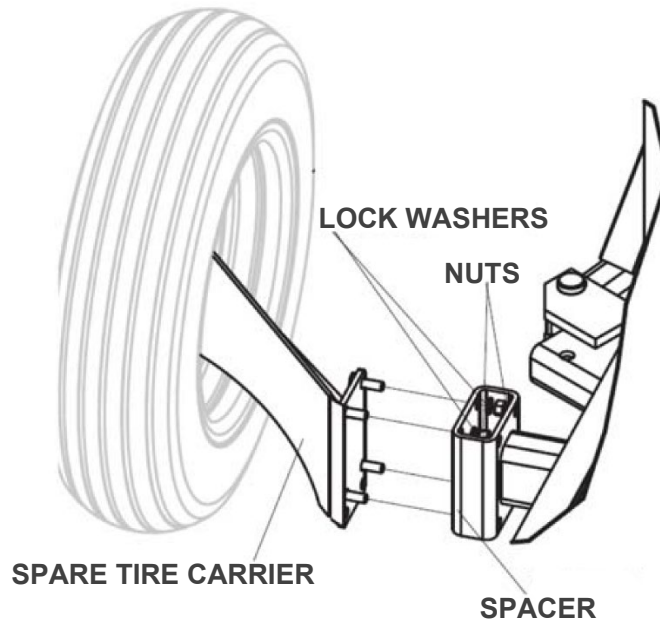


Figure 26
Spare Tire Carrier Assembly

24) Check the Hydraulic System

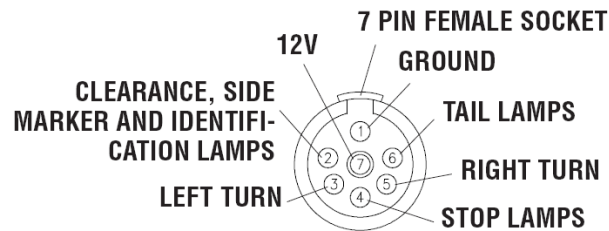
Before operating the system, add hydraulic fluid to the reservoir. It is approximately 3/4 full when cylinders are in their stored positions. Cycle each cylinder slowly 10 complete cycles. Continue to add hydraulic fluid as necessary. The system should take 7 quarts. Add only Dexron® III fluid. Do not overfill. Replace the vent plug in the filler port.

25) Connect the Lights and Controls

Locate the female TMA socket connector in a convenient location on the truck. Make sure that the electrical cord on the TMA can reach this location (View A-A).

The Truck battery must be of the proper voltage. The SST® is available in 12 volt and 24 volt systems.

26) Connect the Safety Chains (Safety Instructions, 15-19, p. 10).



View A-A
Back side of socket
(Truck) connector

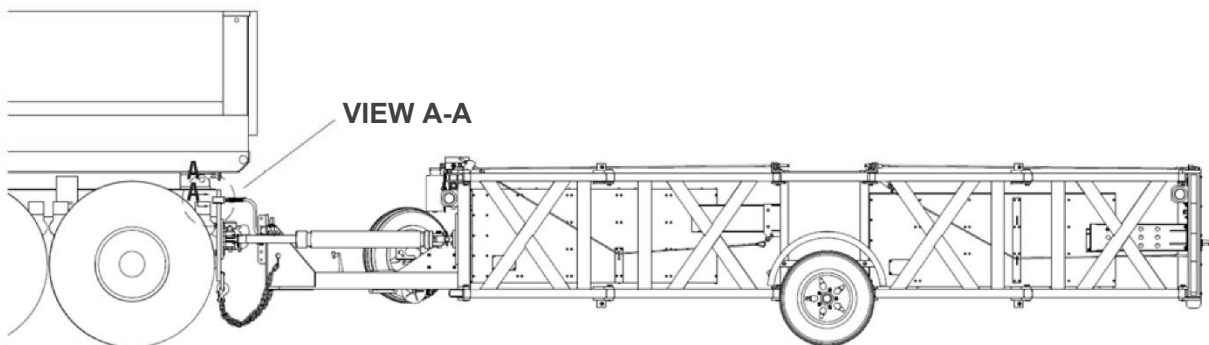


Figure 27

27) Store the Jack

The Jack is provided to facilitate the attachment and removal of the TMA. Make sure the Jack is rotated to the stored position when the TMA is connected to the truck (Figure 28).

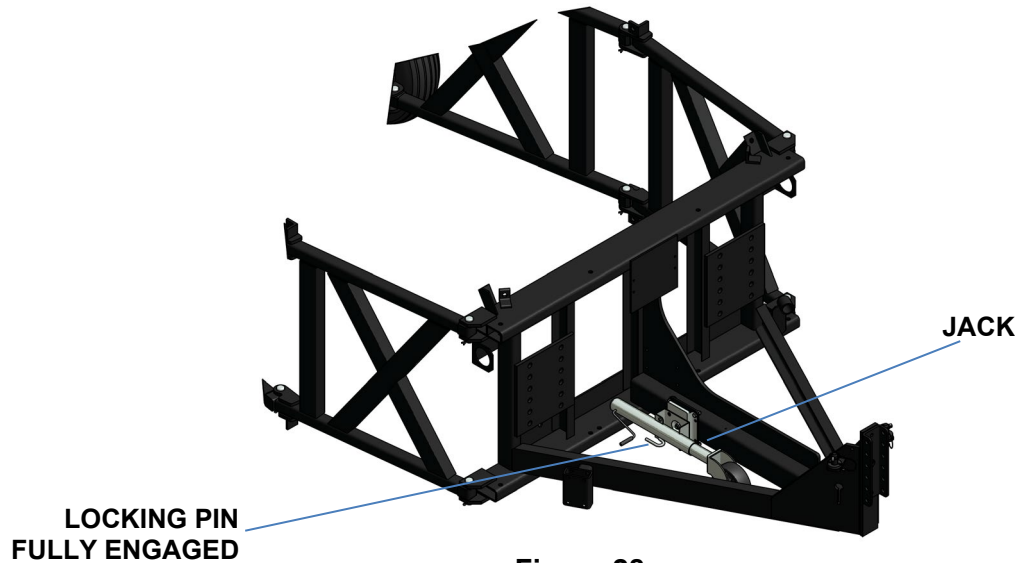


Figure 28
Jack in Stored Position

28) Check System Lights For Proper Operation

Verify that all the turn / stop / tail / clearance lights are working properly. Replace any non-functioning bulbs or fixtures.

29) Braking System Review

Check breakaway brakes for proper operation. Activate the electric brakes by pulling the breakaway pin. Jack the wheels off the ground and rotate the wheels. The brake will engage after 1/4 to 1 full rotation.

30) Final Assessment

Check the tightness of all fasteners. Double check the height and level of the TMA.

31) Ready to Use

The SST[®] is now ready for use. To ensure proper and safe operation, all TMA users should be given operating and safety training, as given in this manual and as specified by the owner and local regulations.

Before operating the SST[®], thoroughly read and understand these instructions and the safety section 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 Cartridge A and one Cartridge B, in their proper positions as shown in Figure 23 (p. 22).



Warning: For proper system performance, do not mount anything to the mid frame. The added weight could cause the SST[®] not to perform as designed. Mount Arrowboard and spare tire to the TMA tongue.

Assembly Checklist (Complete and File)

Performed by: _____

Date: _____

Location: _____

- SST sits level with the bottom of the frame at 12" (+/- 2") above grade (p. 9)
- Truck is properly setup to withstand force of impact and attachment of trailer (p. 16-18)
- Minimum 20-ton pintle and anti-rotation cylinder mounts are properly installed (p. 18)
- SST is fully assembled, cartridges attached and all cables assembled and properly tensioned/aligned (p. 18-27)
- Lug nuts are properly torqued (p. 19)
- Safety chains are properly installed and attached to the truck (p. 26)
- Hydraulic System functions properly and has adequate fluid in the reservoir (p. 26)
- All lights/turn signals are installed and functioning properly per pin functions (p. 26)
- Back-up battery for emergency braking system receives 12V+ charge voltage from vehicle, typically center pin of lighting socket (p. 26)
- Jack is in travel position (p. 27)
- Emergency braking system functions properly (p. 27)
- TMA is attached to the truck using pintle ring and anti-rotation cylinders (p. 29)
- Cold tire pressure on trailer is between 35-50 psi (p. 36)
- License plate is installed

Trailer Operations

Backing up the SST®



Caution: Make sure the area behind the system is clear of all objects before proceeding. Under no circumstances should anyone be allowed behind the system during backing maneuvers.



Warning: The system will not serve its intended purpose with the hydraulic cylinders disconnected. The hydraulic cylinders must be connected during shadow or barrier vehicle operations.

The cylinders must be attached anytime the SST® is deployed.

The cylinders are connected directly to the trailer hitch support frame and the rear of the truck.



Figure 29
Cylinder Arrangement

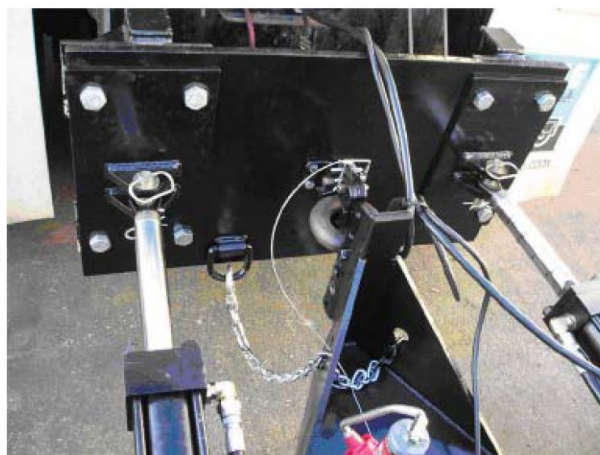


Figure 30
Cylinder Mounts on Truck



Figure 31
Cylinder Mounts on Support Frame

The cylinders operate in two modes:

- A. During an impact, the cylinders behave as active structural members. In this mode, the cylinders operate to perform two functions:
 - 1. They serve to prevent the SST® TMA from rotating during an offset or angled impact. During an impact the cylinders resist rotation. The design of the hydraulic system prevents the pistons from moving during impulsive loading. In essence, they behave like rigid rods during an impact.
 - 2. They transfer forces from the SST® TMA to the frame rails of the truck. As the energy of the impacting vehicle is smoothly contained and controlled, the forces are transferred from the support frame of the trailer to the frame rails of the truck. Typically, TMA's are rigidly connected to the rear of the truck. The hydraulic system on the SST® performs this function during an impact.

Note: If the cylinders are not in place during an impact, the force loading takes place at the pintle hook only. Forces would not be transferred to the frame rails adequately.

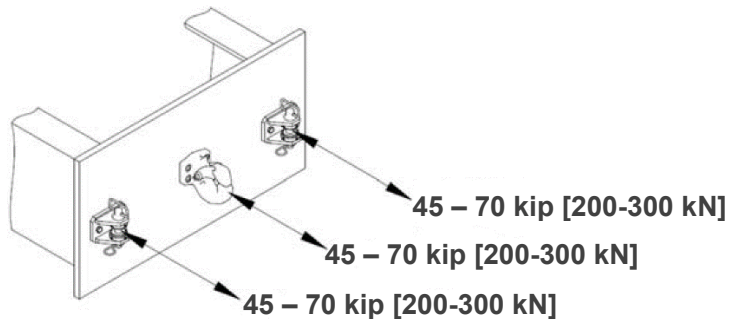


Figure 32
Anticipated Loads on Rear Bumper (Free Body diagram) 0 Degrees, 0 Offset Impact



Figure 33
Top View of Turning Maneuver



Figure 34
Side View of Turning Maneuver

- B. During driving conditions, the cylinders act as passive members, following the motion between the truck and SST®. The cylinders are designed to operate passively during driving and turning operations (transit). Turning maneuvers cycle the cylinders slowly and smoothly. During transit mode, the cylinder pistons slide in and out freely with minimal resistance. Regarding the hydraulic system, there is no pump to actuate the cylinders. The articulating motion between the truck and trailer takes place slowly enough that the cylinders are essentially following the motion between the two.

Attaching the TMA

1. Connect the SST® by moving it toward the truck and aligning the pintle eye to the pintle hook using the Jack. Close the pintle hook and insert the retaining pin.
2. Lower and rotate the Jack to the stored position.
3. Cross - connect Safety Chains to the truck. Twist chains to remove excess slack.
4. Connect the Breakaway Cable to the truck.
5. Attach the Cylinders to the truck Cylinder Brackets. The cylinder tool will be required to move the Cylinders in and out as necessary. Ensure both hairpin and cotter pins are inserted to secure SST® connection.
6. Connect the electrical light plug.



Step 1



Step 2



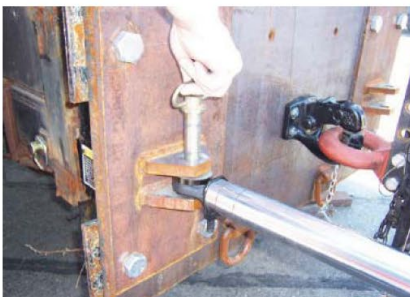
Step 3



Step 4



Step 5



Step 5

Trip Preparation Checklist

1. Verify pintle hook and eye connection.
2. Check tire pressure and wear.
3. Verify breakaway brakes are operational.
4. Check trailer height: 12" ± 2" [305 mm ± 50 mm].
5. Ensure hydraulic cylinders are attached properly to tow vehicle.
6. Check hydraulic fluid level.

Detaching TMA

1. Disconnect electrical light plug.
2. Disconnect Cylinders from the truck and compress to stow position using the Cylinder Tool. Once the Cylinders are in stored position, lock them into place using the cotter pins.
3. Disconnect the Breakaway Cable.
4. Rotate Jack into use position. Crank Jack until it takes the TMA load off the pintle hook.
5. Disconnect Safety Chains.
6. Release pintle hook and detach TMA from truck.

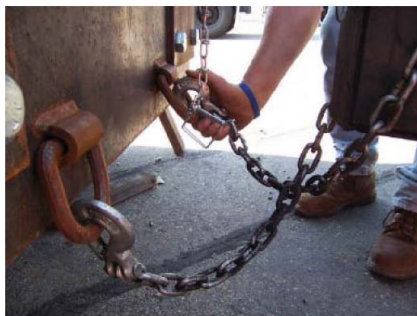


Step 2



Step 3

Step 4



Step 5

Step 6

Inspection Schedule

Item	Inspection Intervals	First use	Each use	1 Month	3 Months	5 Years
TMA	Check cartridges for damage	•	•			
	Check pins to make sure they are held in position by retaining pin	•	•			
	System height and levelness 305 mm ± 51 mm [12" ± 2"]	•	•			
	Cartridges support cables (Spring length 32 mm [1 1/4"± 1/16"])	•	•	•		
	Alignment Cables (Equal lengths within 5 mm [3/16"])	•	•	•		
	Release Cables (Torque to 34 Nm ± 3 [25 ft- lb ± 2])	•	•	•		
	Check fasteners for tightness			•		
	Check tire pressure (35-50 psi) (Include spare tire)	•	•			
	Check tires for wear				•	
	Check tires for tread and sidewall damage					
	Replace tires					•
Wheels	Check and repack wheel bearings					•
	Check seals for damage					•
	Inspect hub/drum for damage					•
	Check trailer brakes wiring for damage	•	•			
	Check electrical brakes for operation	•	•			
	Check brake lining for wear or contamination					•
	Check brake magnets for wear and current draw					•
	Check lug nut torque	•	•		•	
	Check brakes adjustment					•
		Check pintle eye for wear	•	•		
Trailer	Check pintle hook for wear	•	•			
	Check condition of Jack and wheel	•	•	•		
	Lubrication (grease fittings for cylinders & bearing buddies)	•	•	•		
	Check hydraulic fluid level	•	•			
	Change hydraulic fluid					•
	Check hydraulic ram for adequate movement resistance	•	•		•	
	Check hydraulic hoses for cracks and leaks	•	•			
	Check breakaway battery	•	•			
	Check breakaway pin connector	•	•			
	Inspect suspension parts for damage	•	•			
Electrical	Check and replace lights as required	•	•			
	Check and clean electrical connections			•		
	Coat electrical terminal with dielectric grease	•	•	•		
	Check condition of wiring harness					•

Routine Maintenance

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 fluid level monthly. The reservoir is full when the fluid level is between 1/2 and 3/4 on the sight gauge with the hydraulic cylinders in the stored position. When the hydraulic cylinders are connected to the truck, the fluid level is between 1/4 and 1/2 on the sight gauge. Use only Dexron® III fluid.

2) Grease Swivel Jack

Oil the swivel Jack every six months as shown in Figure 35.

**GREASE JACK HERE
(FITTING UNDER CRANK)**

3) Change Hydraulic Fluid

Change the hydraulic fluid once every 5 years, or if you suspect the oil is contaminated with water. Use only Dexron® III fluid. The empty oil capacity of the reservoir, hoses, and cylinders is approximately 7 quarts [6.6 L] (the capacity of the reservoir alone is approximately 4 quarts [3.8 L]).

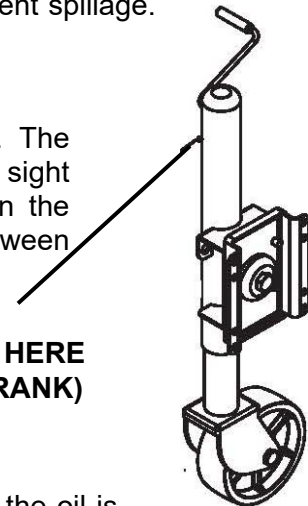


Figure 35

The reservoir and hydraulic system may need to be filled and cycled several times with the cylinder tool to remove air that may be in the system.

Brakes

1. Federal traffic safety law specifies that all trailers that require brakes shall have means of activating the trailer brakes under trailer breakaway conditions. An electrical brake system requires an emergency battery backup system that will provide electrical power to the brakes during a breakaway brake activation process.
2. The breakaway switch uses a pull pin and cable, and when attached to the truck, will provide electrical activation of the trailer brakes if the trailer disconnects from the truck.
3. Electric brakes are designed to slow the trailer at a controlled rate and not designed to lock up the wheels.
4. The electric brakes have a self-adjusting feature. If manual adjusting is required, use the following procedure:
 - a. Jack up the trailer and secure it on adequate jack stands. Make sure the wheels rotate freely.



Warning: Do not lift or support the trailer on any part of the axle or suspension system. Never go under any trailer unless it is properly supported on Jack stands which have been rated for the load. Improperly supported vehicles can fall unexpectedly and cause serious injury or death.

- b. Remove the adjusting hole cover from the adjusting slot on the bottom of the brake backing plate.

- c. With a screwdriver or brake adjusting tool, rotate the star wheel of the adjuster assembly to expand the brake shoes. Adjust the brake shoes out until the pressure of the linings against the drum makes the wheel very difficult to turn.
 - d. Then turn the star wheel in the opposite direction until the wheel turns freely with a slight lining drag.
 - e. Replace the adjusting hole cover and lower the wheel to the ground.
 - f. Repeat the procedure above for the other brake.
5. The SST[®] brakes must be inspected and serviced immediately if loss of performance is indicated.
- a. Magnets and shoes must be changed when they become excessively worn or scored, a condition that can reduce vehicle stopping.
 - b. Clean the backing plate, magnet arm, magnet, and brake shoes.
 - c. Make certain that all the parts removed are replaced in the same brake and drum assembly.
 - d. Inspect for any loose or worn parts, stretched or deformed springs and replace as necessary.
 - e. Before reassembling, apply a light film of grease or anti-seize compound on the brake anchor pin, the actuating arm bushing and pin, and the areas on the backup plate that are in contact with the brake shoes and magnet lever arm. Apply a light film of grease on the actuating block mounted on the actuating arm.



Caution: Do not get grease or oil on the brake linings, drums or magnets.

- f. Magnets should be inspected and replaced if worn unevenly or abnormally. A straightedge should be used to check magnet condition. For best results, the magnet should be flat.
 - g. The magnet should be replaced if any part of the magnet coil has become visible through the friction material facing of the magnet. It is also recommended that the drum armature surface be re-faced when replacing the magnet.
 - h. Magnets should be replaced in pairs - both sides of the axle.
6. A simple visual inspection of your brake linings will tell if they are in need of replacement.
- a. Replace the lining if it is worn to within 1/16" [2mm] or less or contaminated with grease or oil, or abnormally scored or gouged.
 - b. When replacement is necessary, it is important to replace both shoes on each brake and both brakes on the same axle. This will help retain the balance of your brakes.

Electrical

1. Make sure connector-plug prongs and receptacles, light bulb sockets, and ground connections are clean and shielded from moisture. Lightly coat all connections with non-conducting (dielectric), light waterproof grease.

Tires & Wheels

1. Always replace trailer tires with ST (Special Trailer) tires.
2. Tire presser 35 – 50 psi.
3. Inspect tires for damage.
4. Check inflation pressure before each use to insure the maximum tire life and tread wear.

Wheel Attachment

1. Proper procedure for attaching wheels:
 - a. Start all bolts or nuts by hand to prevent cross threading.
 - b. Tighten bolts or nuts in the sequence as shown in Figure 36.
 - c. Torque the nuts in the following stages:
 - d. 1st stage: 20 to 25 lbf-ft [27 to 34 N-m].
 - e. 2nd stage: 35 to 40 lbf-ft [47 to 54 N-m].
 - f. 3rd stage: 70±5 lbf-ft [95 ±7 N-m].
2. Maintain proper lug nut torque.
3. Wheel nuts should be torqued after each wheel removal, re-torque after 50 miles [80 km] and approximately 3,000 miles [4830 km] frequency thereafter.
4. The SST® tire size is ST20575D14. The bias ply tire provides stiffer side walls and more resistance to sway.
5. Replace tires every three to five years, whether they look like they are worn out or not. Trailer tires lose about 1/3 of their strength in 3 to 5 years.
6. Ensure necessary adjustments are made and any damaged or worn parts are replaced.

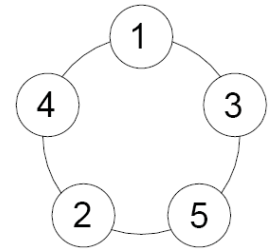








Figure 36

Tire Wear Diagnostic Chart					
Wear Pattern	Cause	Action	Wear Pattern	Cause	Action
 Center Wear	Over inflation	Adjust pressure to particular load per tire catalog.	 Toe Wear	Incorrect toe-in	Align at alignment shop.
 Edge Wear	Under inflation	Adjust pressure to particular load per tire catalog.	 Cupping	Out of balance	Check bearing adjustment and balance tires.
 Side Wear	Loss of camber or overloading	Align at alignment	 Flat Spots	Wheel lockup and tire skid-	Avoid sudden stops when possible and adjust brakes.

Axle



Important: Refer to the Dexter Axle “Operation Maintenance Service Manual” (LIT-001-00) at dexteraxle.com/products/torsion-axes/Torflex-light-duty for complete Torflex axle and brake servicing information.



Warning: Never weld to the Torflex® axle. The Torflex® axle contains rubber cords to provide system suspension and can be damaged by heat generated from welding on the bracket or tube.

1. Recommended wheel bearing lubrication specifications:

Grease

Suggested Sources

- Thickener Type: Lithium Complex
 - Dropping Point: 215 Degree C (419 Degree F) Minimum
 - Consistency: NLGI No. 2
 - Additives: EP, Corrosion and Oxidation Inhibitors
 - Viscosity Index: 80 Minimum
- Mobil Oil
Mobilegrease HP, Mobilith AW2
 - Exxon/Standard
Ronex MP
 - Kendall Refining Co.
Kendall L-427
 - Ashland Oil Co.
Valvoline Multipurpose GM
 - 76 Lubricants
76 Multiplex EP
 - Citgo Petroleum
Lithoplex MP#2
 - Mystik
Mystik JT-6 Hi Temp Grease
 - Pennzoil Product Co.
Premium Wheel Bearing
Grease 707L

2. The Bearing Buddy® should be filled with grease until the grease forces the Bearing Buddy® piston outward about 1/8” [3 mm].
3. The Bearing Buddy® has an automatic pressure relief feature that prevents overfilling and over pressurization. Without this feature, the inner seal will be damaged.
4. While the hub is removed, inspect the seal to assure that it is not nicked or torn and is still capable of properly sealing the bearing cavity.
To replace the seal:
 - a. Pry the seal out of the hub with a screwdriver. Never drive the seal out with the inner bearing as you may damage the bearing.
 - b. Tap the new seal into place using a clean wood block.
5. Grease can be added to the Bearing Buddy® through an easily accessible grease fitting located in the center of the piston. Lubricant level can be checked quickly by pressing on the edge of the moveable piston. If you can rock or move the piston, the hub is properly filled.
6. Bearing Buddy® recommends inspecting your bearings once every 5 years, provided they are properly maintained with grease level in the hubs.

7. When adding grease, always use a hand grease gun. An automatic grease gun will destroy the hub's inner seal.
8. Hub removal:
 - a. Elevate and support the trailer by the frame.
 - b. Remove the wheel.
 - c. Remove the Bearing Buddy®.
 - d. Remove the cotter pin.
 - e. Unscrew the spindle nut (counterclockwise) and remove the spindle washer.
 - f. Remove the hub from the spindle, being careful not to allow the outer bearing cone to fall out. The inner bearing cone will be retained by the seal.
9. Bearing adjustment:
 - a. If the hub has been removed or bearing adjustment is required, the following procedure must be followed:
 - 1) After placing the hub, bearing, washers, and spindle nut back on the axle spindle in reverse order, rotate the hub assembly slowly while tightening the spindle nut to approximately 50 ft-lb [68 N-m] (12" wrench or pliers with full hand force.).
 - 2) Loosen the spindle nut to remove torque. Do not rotate the hub.
 - 3) Finger-tighten the spindle nut until snug.
 - 4) Back the spindle nut out slightly until the first notch lines up with the cotter key hole and insert the cotter pin.
 - 5) Bend the cotter pin legs over to secure the nut.

Storage

1. Storage:
 - a. The ideal storage is in a cool, dark garage with the tires at maximum inflation.
 - b. Put trailer on jack stands to take the weight off the tires, lower the air pressure and cover tires to protect from the direct sunlight.
2. Storage Preparation:
 - a. If the trailer is to be stored for an extended period of time or over the winter, it is important that the trailer be prepared properly.
 - b. Remove the emergency breakaway battery and store inside, out of the weather. Charge the battery at least every 90 days.
 - c. Jack the trailer and place Jack stands under the trailer frame so that the weight will be off the tires.
3. After Prolonged Storage:
 - a. Remove all wheels and brake drums.
 - b. Inspect brakes and hubs.
 - c. Lubricate all brake moving parts.
 - d. Remove any rust from braking surface.
 - e. Reassemble brake drums and wheels.
 - f. Reassemble emergency breakaway battery.
 - g. Remove the Jack stands.

Technical Specifications

1) Weight

Cartridge A	157	lbs	71	kg
Cartridge B	185	lbs	84	kg
Frame Components	2251	lbs	1021	kg
<u>Jack</u>	<u>13</u>	<u>lbs</u>	<u>6</u>	<u>kg</u>
Total	2606	lbs	1182	kg

2) Dimensions

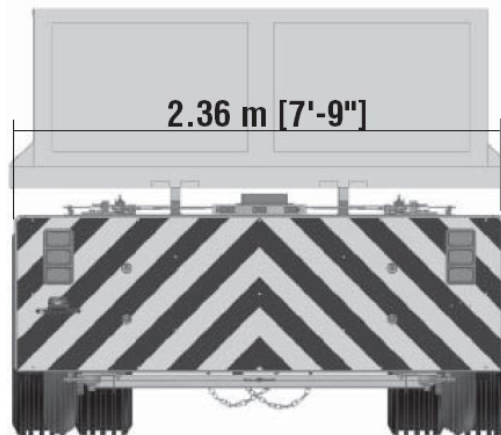


Figure 37

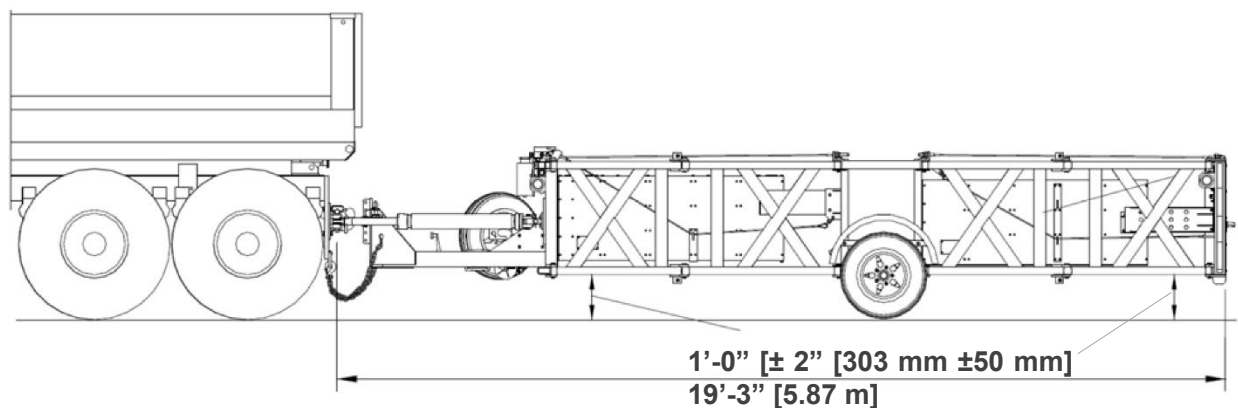


Figure 38

Repair Instructions

Items that most likely need replacement after an impact are as follows:

- Cartridge A Part # 605924B
- Cartridge B Part # 606033B
- Impact Frame Plate Part # 610370B
- Side Guide, Bay A Part # 614196B
- Side Guide, Bay B Part # 614199B
- Trigger Cable Part # 613713B (4 per system)
- Fender Assy., Right Part # 608234B
- Fender Assy, Left Part # 608232B
- License Plate Light Assy Part # 611204B

Other items that could become damaged, wear out or become lost over time are as follows:

- Safety Chain Part # 606174B
- Safety Chain Clevis Hook Part # 115153G (2 per chain)
- Hydraulic Cylinder Tool Part # 615988B
- Pintle Eye Part # 610243B
- Jack Part # 005678B
- Jack Wheel Part # 118148G
- Truck Cyl. Bracket Washer Part # 616773B (4 for the 2 brackets)
- Trailer Breakaway Kit Part # 117814B
- Hydraulic Cylinder Part # 606699B (2 per TMA)



Important: Valtir makes no recommendation whether use or reuse of any part of the system is appropriate or acceptable following an impact. It is the sole responsibility of the local highway authority and its engineers to make that determination. It is critical that you inspect this product after assembly is complete to make certain that the instructions provided in this manual have been strictly followed.

I. Post Impact

- 1) Inspect the frame for damaged parts.

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

- 2) Inspect pins and bolts for damage.

Replace all bolts and pins that have been damaged. Refer to the system drawings for the part numbers and descriptions of the parts.

- 3) Extend the frame and detach one end of each of the four Alignment Cables.



Caution: Frames may swing side to side.

4) Remove crushed Cartridges and spent Release Cables from system.



Important: Do not attempt to repair a damaged Cartridge. For full impact capacity, the Cartridges will need to be replaced even if slightly crushed.

5) Attach the Bottom Release Cable across the Arm Assemblies.

Verify that the frame is extended as far as it will go. Attach the Bottom Release Cable across Arm Assemblies (Figure 39). Torque the nuts to 25 lbf-ft \pm 2 [34 N-m \pm 3] making sure that roughly an equal amount of threads protrude from nuts on both ends of cable.



Warning: Until the cables are attached, the system may shift to one side.

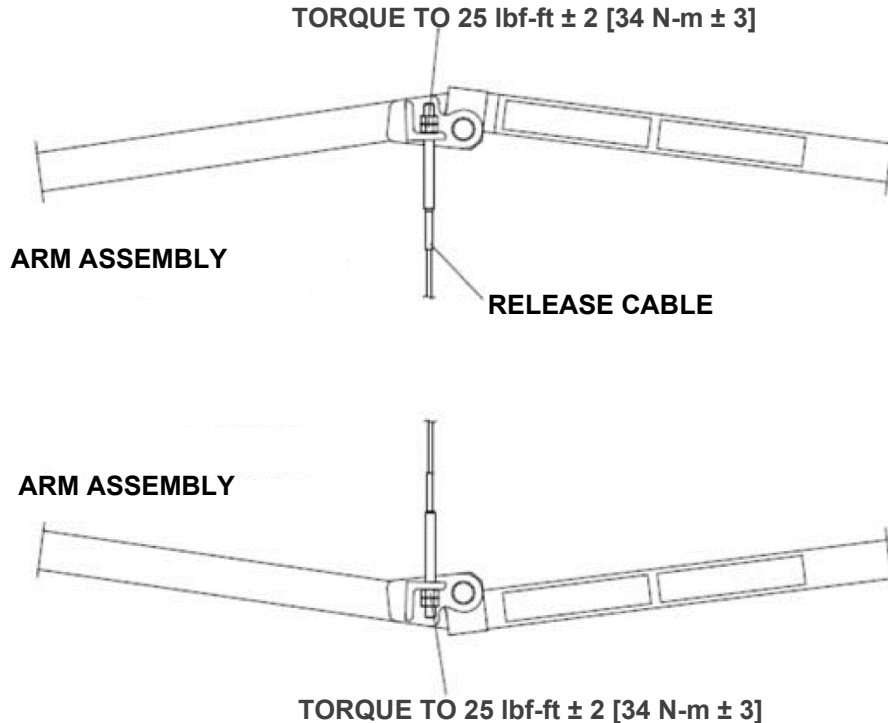


Figure 39

6) Attach Cartridges

Using a forklift and sling, place Cartridge B in position and secure it using the flat washers, lock washers and nuts provided. Torque the nuts to 90 ± 5 lbf-ft [$120 \text{ N-m} \pm 7$]. Repeat procedure for Cartridge A (Figure 40).

7) Attach the Top Release Cables across the Arm Assemblies

Attach the top release cables across the Arm Assemblies (Figure 39). Torque the nuts to $25 \text{ lbf-ft} \pm 2$ [$34 \text{ N-m} \pm 3$], making sure that roughly an equal amount of threads protrude from nuts on both ends of cable. Lock cable in place using remaining fasteners as "jam" nuts.

8) Re-torque Bottom Release Cable

Re-torque Bottom Release Cable and lock cable in place using the remaining fasteners as "jam" nuts.

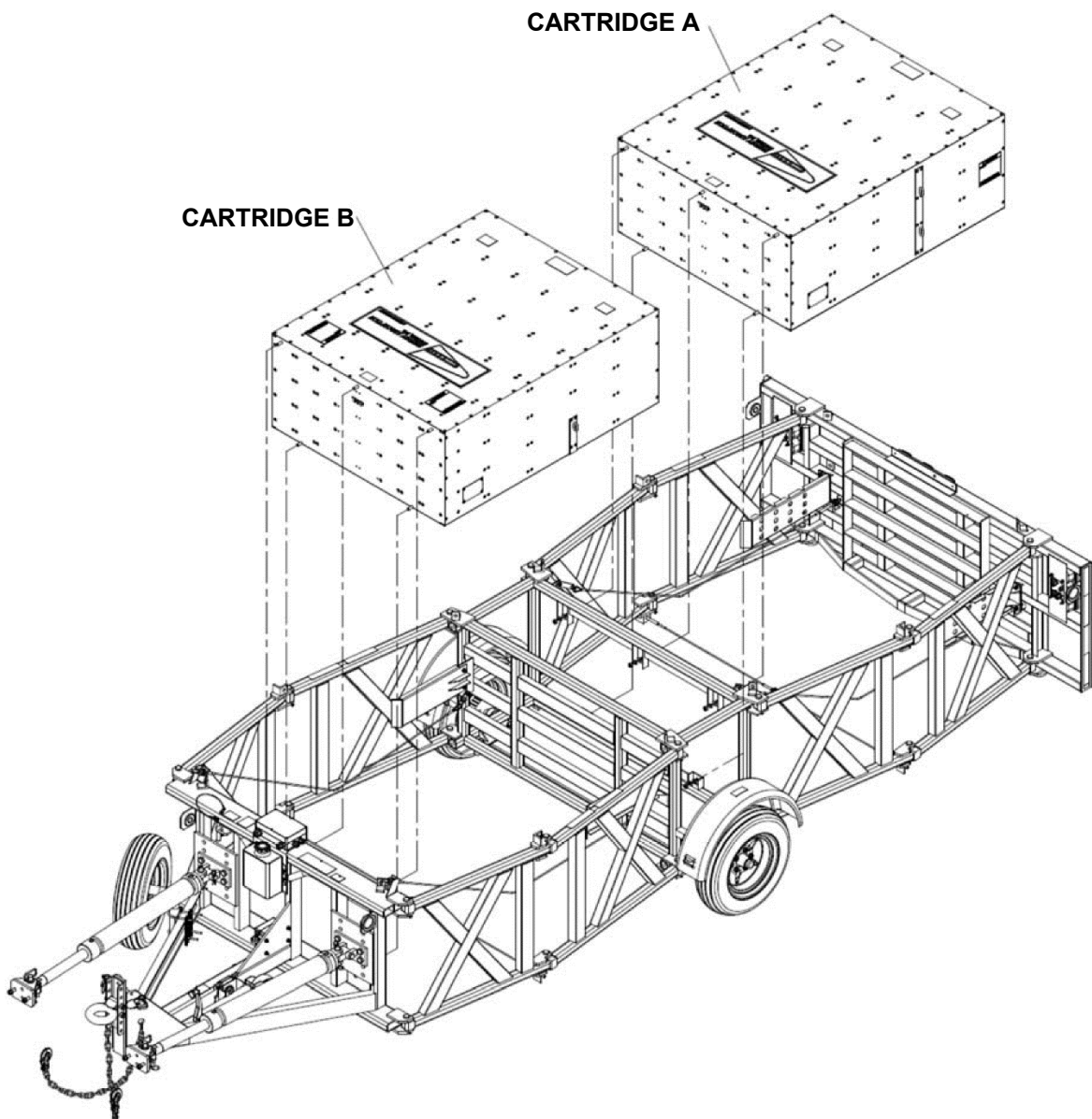


Figure 40

9) Reattach and Adjust the Alignment Cables

There are four (4) Alignment Cables (two for each bay). Reattach the Alignment Cables as shown in Figure 41. Measure the diagonals of each bay and adjust the cables so that the diagonal measurements in each bay are the same ($A=B \pm 3/16"$ [5 mm], $C=D \pm 3/16"$ [5 mm]). Lock each cable in place using the second nut as a "jam" nut.

10) Replace Side-Guides

The Side-Guides must be inspected and replaced if damaged. The Side-Guides are sacrificial and can be easily attached to their respective mounts.

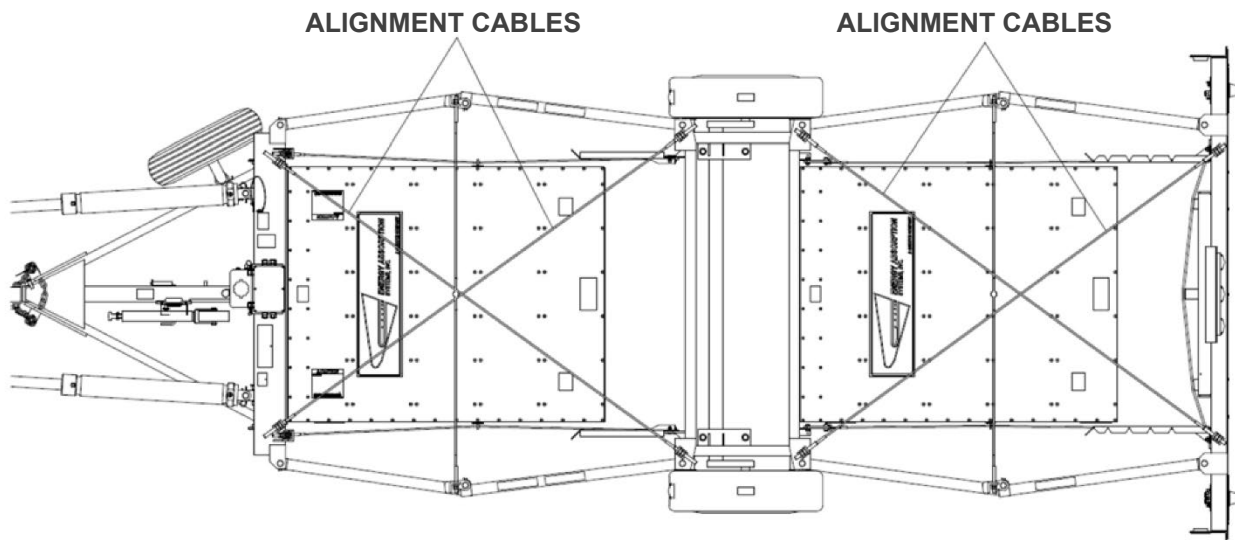


Figure 41

11) Attach and Tension the Cartridge Support Cables

There are four Cartridge Support Cables. Pass the stud end of the cable through the corresponding Cartridge chain loop and attach as shown in Figure 42 using a die spring, washer, and nuts.

To properly tension the Cartridge Support Cables, tighten the first nut on one cable until all slack is removed, then tighten it until the tensioning springs have been compressed to $1 \frac{1}{4}"$ [32 mm] in length. Lock this nut in place with the second "jam" nut. Repeat this procedure with the other cables.

12) Adjust the height and level of the system frame

Verify the frame is $12'' \pm 2''$ [305 \pm 50 mm] from the ground at the front and rear.

13) Verify position of hydraulic / electrical lines

Check the location of all the hydraulic and electrical lines ensure they will not be damaged.

14) Check system lights for proper operation

Verify that all lights are working properly. Replace any faulty bulbs/fixtures.

15) Final check

Check the tightness of all the fasteners. Check all steel cables to verify that they are properly attached and tightened.

16) Ready to use

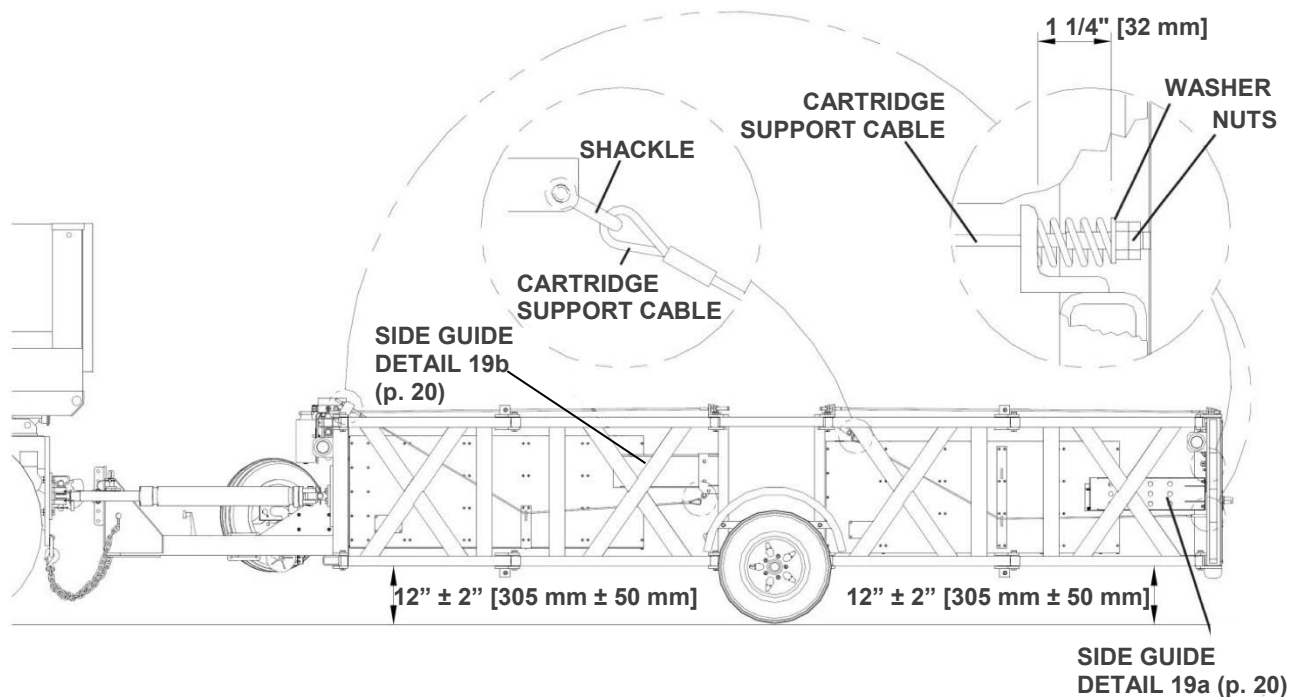


Figure 42

Troubleshooting Guide

Safety Notes

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

In general, consult Valtir Customer Service Department if problems associated with operating or repairing the TMA should arise. This guide is meant to be an aide for performing minor repairs, not a detailed repair manual.

Note: For any problems not listed here, please contact Valtir at (888) 323-6374.

Test Equipment

The following is a recommended list of test equipment required to troubleshoot electrical systems.

1) 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 voltage in the electrical circuit. With the alligator clip grounded, the light glows when the probe comes into contact with a hot electrical component.

2) Continuity Tester

A continuity tester is an item of electrical test equipment used to determine if an electrical path can be established between two points. It is used for testing electrical circuits when the components are not connected to a power source.

3) 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.

4) Ohm Meter

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

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, should always show some non-infinite value of resistance.

5) 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 Valtir Customer Service Department for assistance at (888) 323-6374.

Hydraulic Fluid

1) Purpose

The main purpose of hydraulic fluid is to transfer energy during an impact to resist rotation. These traits are achieved when the oil has a good lubricity (slipperiness), and with additives that inhibit oxidation and the entrapment 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 flow through the cylinders for use. For all of these reasons, automatic transmission fluid (ATF, Dexron®) 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 operating temperature range

Note: Consult with the Valtir Customer Service Department when considering and before changing hydraulic fluid to assure compatibility with existing components at (888) 323-6374.

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 specifics should be discussed with your local oil distributor:

- A. Fluid must be compatible with Buna-N sealing compounds.
- B. The Pour Point must be below the lowest anticipated temperature that will be encountered.
- C. It should contain Rust or Oxidation inhibitors as well as other detergent type inhibitors.
- D. The viscosity (SUS) should lie between 80 and 375 in the operating range, 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 as listed by most oil manufacturers:

[1] Viscosity (SUS)

100 deg. F [37 deg. C]	185 to 205
210 deg. F [99 deg. C]	45 to 55
Pour Point	-45 deg. F [-44 deg. C] -35 deg. F [-37 deg. C]
Viscosity Index	145 to 165

Note: In a cold weather emergency application only, SAE 10W non-detergent oil can be mixed by volume with no more than 30% #1 fuel oil or kerosene.

Hydraulic System

Finding & Solving Problems



Caution: Repair of hydraulic components shall only be performed by fully qualified individuals or hydraulic shops. In most cases, the customer should contact Valtir Customer Service Department for advice on repair or replacement of TMA parts. All replacement components must be approved for use or provided by Valtir to guarantee quality and correctness.

Hydraulic system failures can occur in a gradual or sudden loss of pressure or flow. Any of the system's components could be the cause. Start with the checklist below that most applies to the symptom at hand.

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

Troubleshooting Guide Cylinders

Symptom	Causes	Remedies
Cylinders operate rough or erratic	Insufficient or no oil in system	Fill system and check for leaks
	Wrong oil in system	Change oil to Dexron
	Oil line restricted; line dirty or collapsed	Clean or replace oil line
	Worn cylinder	Replace cylinder
	Leakage (Air in system)	Check all fittings for tightness Inspect hoses for leaks and replace if damaged
Cylinders operate slowly or cavitate	Oil viscosity too high or cold oil	Replace oil with lower viscosity oil
	Low oil level	Fill system and check for leaks
	Air in system	Check for leaks and tighten fittings as necessary Cycle cylinders several times to relieve air from system
	Oil leaks	Tighten fittings, replace seals or damaged hoses
	Worn cylinders	Check for cause of wear. Replace worn cylinders.
	Restriction in line	Clean lines Replace hoses
Leaky cylinder(s)	Seal worn or damaged	Replace cylinder(s)
	Rod damage	Replace cylinder(s)

Reservoir

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

1) USE RECOMMENDED FLUID:

Fill the reservoir with Dexron® III fluid (Hydraulic Fluid section p.46).

2) PROPER FILLING:

- A. Fill the reservoir so that fluid is 1/2 on the sight glass.
- B. Operate the unit several times starting with short cylinder strokes, increasing the length of each successive stroke.
- C. Recheck fluid level often and add as necessary.
- D. Reattach the filter/breather plug provided.

3) RESERVOIR PROBLEMS

- A. Clear fluid flowing out of the filler port usually means the reservoir was completely filled before the cylinders were fully collapsed.
- B. Foamy fluid flowing out of the filler port points to air present in the system; the response is usually spongy, or the cylinders may move with a jerking motion.
- C. Water in the fluid:

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 fluid if you suspect contamination.

Electrical Problems

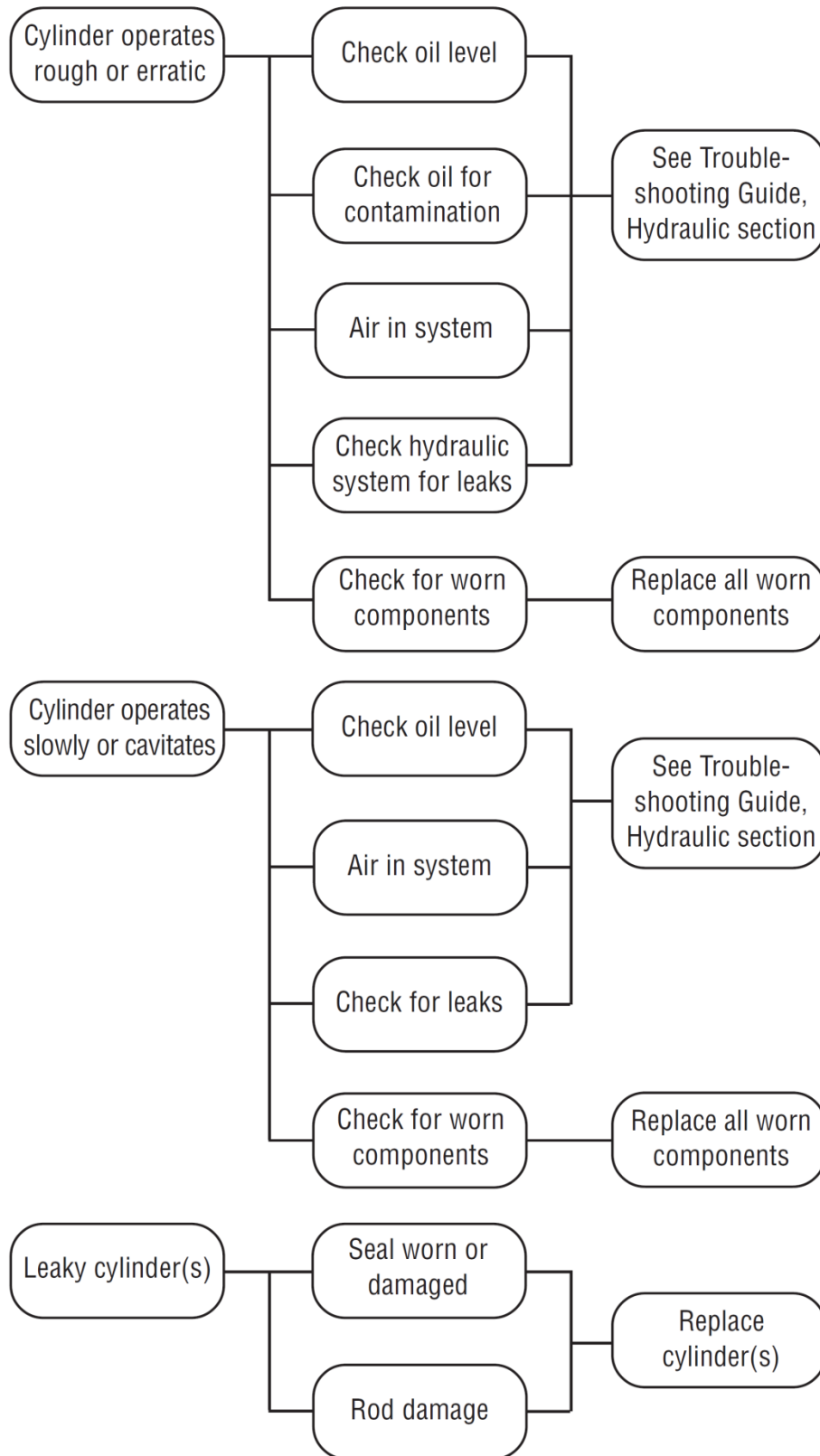
1) ELECTRICAL SHORTS OR OPEN CIRCUITS

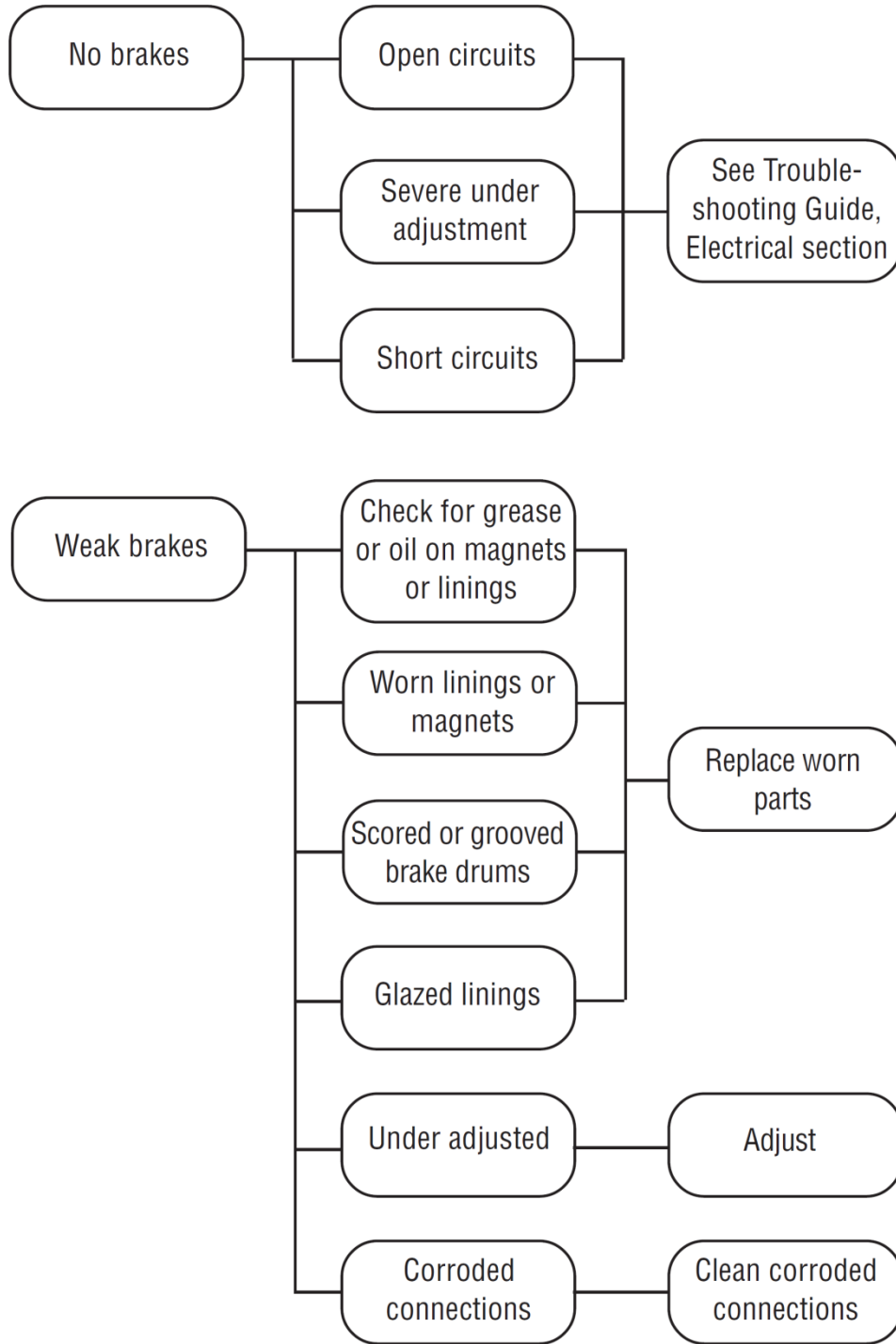
- A. Shorts occur when wires with power come in contact with a ground. A short will cause a fuse to blow or a wire to burn. Look for pinched or cut wires.
- B. An open circuit is simply a break which prohibits current flow. Look for pinched or cut wires.

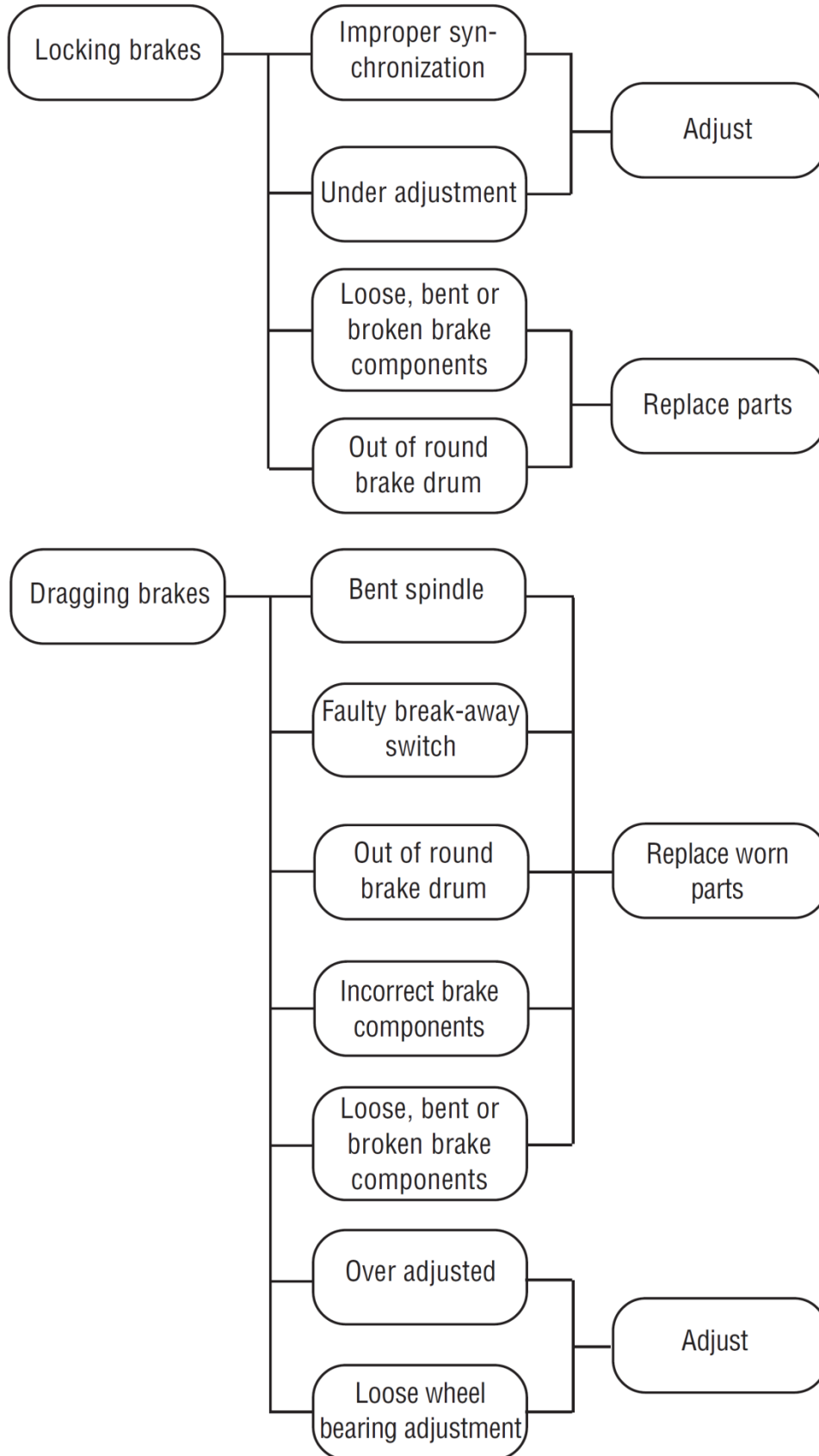
Troubleshooting Guide Electric Brakes

Symptom	Causes	Remedies
No brakes	Open circuits	Find and correct
	Severe under adjustment	Adjust brakes
	Short circuits	Find and correct
Weak brakes	Grease or oil on magnets or linings	Clean or replace
	Corroded connections	Clean and correct cause of corrosion
	Worn linings or magnets	Replace
	Scored or grooved brake drums	Machine or replace
	Under adjustment	Adjust brakes
	Glazed linings	Refinish or replace
Locking brakes	Over adjustment	Adjust brakes
	Improper synchronization	Correct
	Loose, bent or broken brake components	Replace
	Out of round brake drum	Machine or replace
Dragging brakes	Over adjustment	Readjust
	Out of round brake drum	Machine or replace
	Incorrect brake components	Replace
	Loose, bent or broken brake components	Replace
	Faulty break-away switch	Replace or repair
	Loose wheel bearing adjustment	Adjust wheel bearing
	Bent spindle	Replace axle

Quick Reference Troubleshooting Guide





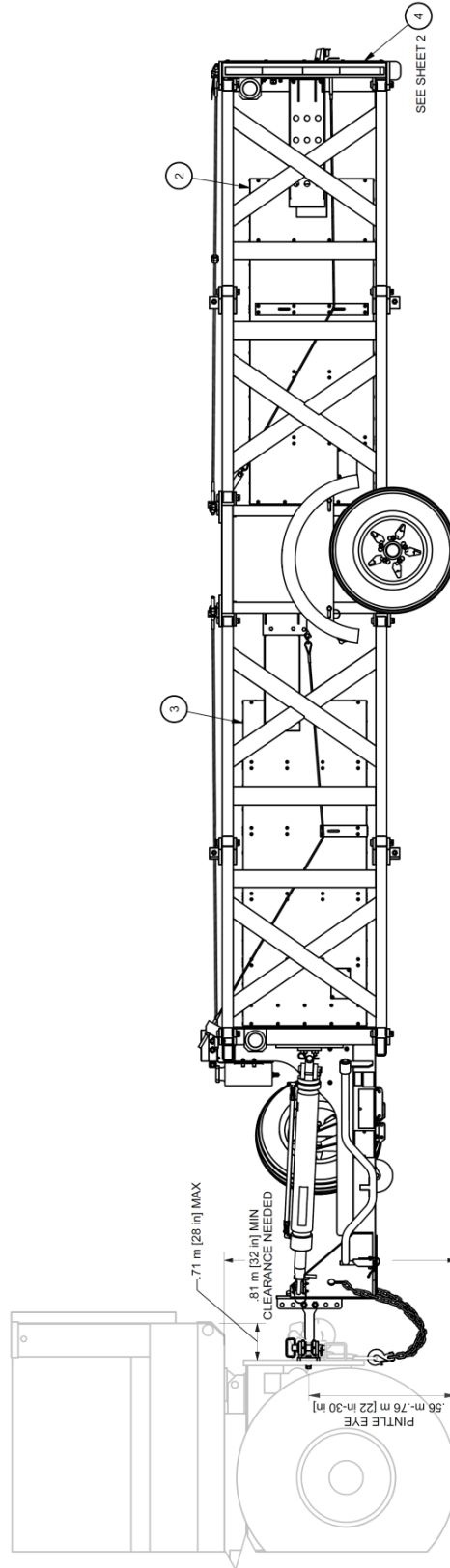


TMA9000 1 of 2

PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	615964B	TMA9000,SST,TRAILER,LESS CART	1
2	606924B	CARTRIDGE A ASSEMBLY,TMA,9181	1
3	606033B	CARTRIDGE B ASSEMBLY,TMA,9180	1
4	610370B	IMPACT FRAME PLATE ASSY,9180	1

ORDER SEPARATELY

** WHEELS AND SPARE ORDERED SEPARATELY (SEE SUPPORT FRAME ASSY)



- NOTES:
1. IT IS RECOMMENDED THAT THE SST TRAILER TMA BE MOUNTED TO TRUCKS WITH A WEIGHT OF 4500 kg (9920 lbs) OR GREATER.
 2. JACK MUST BE ROTATED TO TRAVEL POSITION WHENEVER TRAILER IS ATTACHED TO VEHICLE.
 3. SEE THE SST TRAILER TMA MANUAL FOR DESIGN LIMITATIONS & ASSEMBLY INSTRUCTIONS BEFORE ASSEMBLING A SYSTEM. INFORMATION AND COPIES OF ABOVE MANUAL ARE AVAILABLE BY CALLING CUSTOMER SERVICE DEPARTMENT AT (312) 467-6750.

REFERENCES

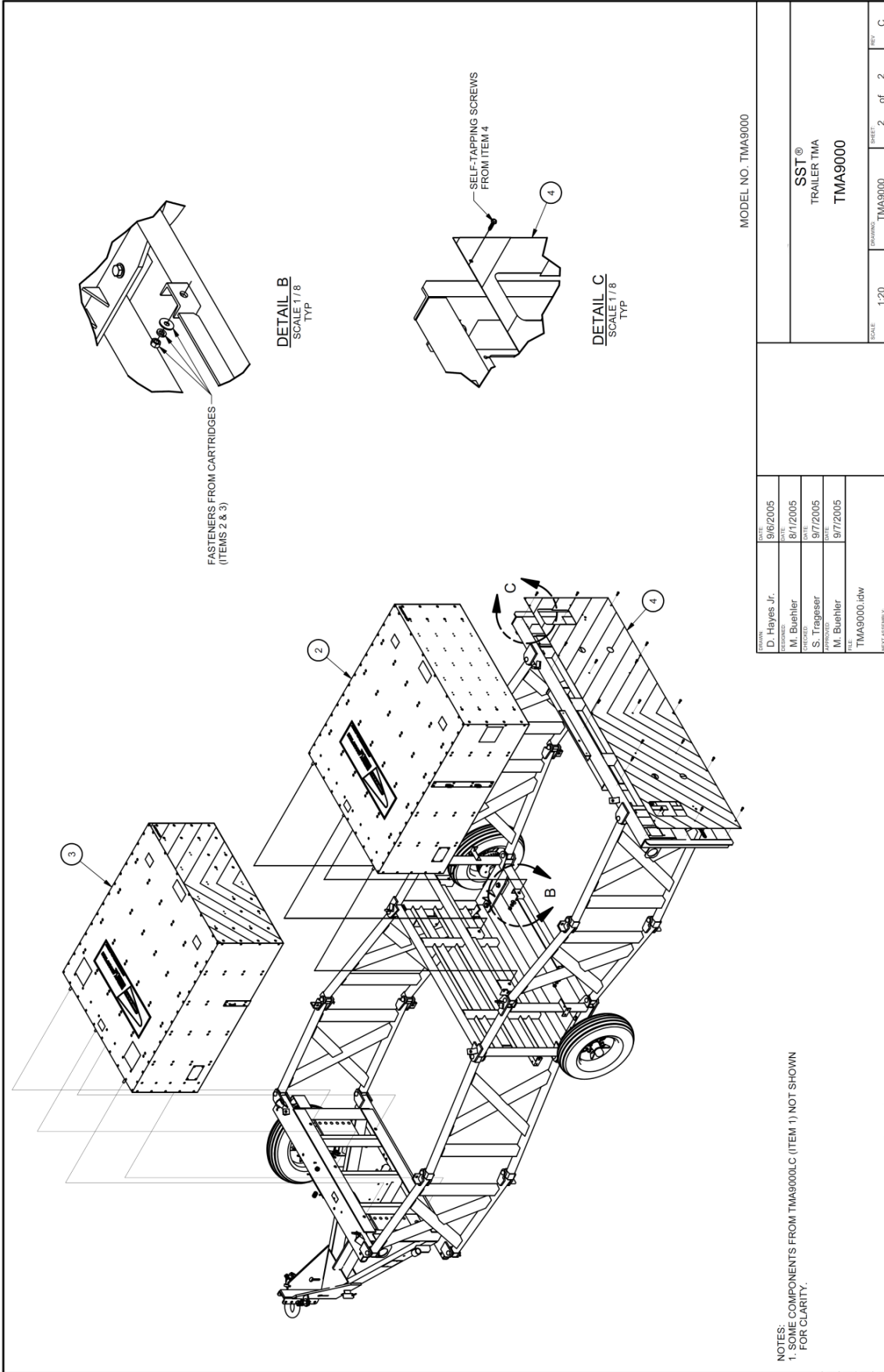
TMA9000 SST,TRAILER,LESS CART	615964
SUPPORT FRAME	615475
HYDRAULIC ASSY	610296
MISC HARDWARE	611321
LIGHTING ASSY	611240

DESIGNER	D. Hayes Jr.	DATE	9/6/2005
REVISION	M. Buehler	DATE	8/1/2005
CHECKED	S. Trageser	DATE	9/7/2005
APPROVED	M. Buehler	DATE	9/7/2005
FILE	TMA9000.lsw		
DRAWN ASSEMBLY			

MODEL NO. TMA9000

SCALE	1:20	DRAWING	TMA9000	SHEET	1 of 2	REV	C
SST® TRAILER TMA TMA9000							

TMA

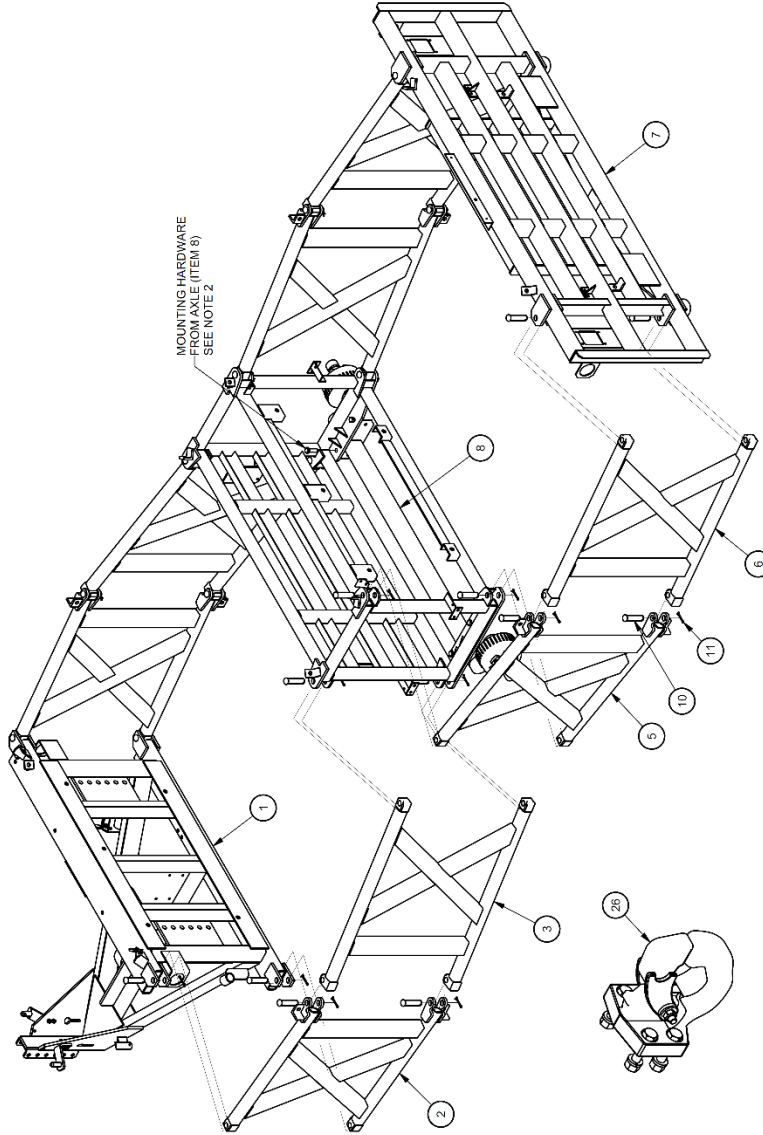


ITEM	STOCK NO.	DESCRIPTION	QTY
1	617889	SUPPORT FRAME BACKUP, TMA9000, 1200LB JACK	1
2	604284	ARM, FRONT W/MOUNT, 9182, PT	2
3	604311	ARM, REAR W/MOUNT, 9182, PT	2
4	615545	SUPPORT FRAME, MID, TMA9000	1
5	604283	ARM, FRONT, 9182, PT	2
6	604310	ARM, REAR, 9182, PT	2
7	610380	IMPACT FRAME, 9181, PT	1
8	113287	AXLE, TORFLEX, 74, 3/4X0 DEG DOWN, 3500LB	1
10	116386	PIN, CLEVIS, 1X3, 3/4 P	24
11	116276	PIN, COTTER, 3/16X1 1/2 P	2
15	616773	TUBE, PU, 2 O.D X 50 WALL X 3/8 W/HOLES	2
16	116870	SCREW, FL, 10-32X1 1/4, PHILLIPS S	4
17	116019	NUT, HX, NYLON LOCK #10-32, S	4
19	116288	PIN, LINC, 1/4X1 9/16, P	2
20	115960	CABLE, LANYARD, 1/4X8X8	2
21	005678	TMA-JACK (1200LB, XP10)	1
22	113358	BEARING PROTECTOR, 1.98 OD, BIB #1980SS	2
23	113357	BEARING PROTECTOR, BRA, 1.98, BIB #19B	2
24	SEE CHART	WHEEL W/TIRE	**
27	113588	BOLT, HX, 3/8X1, G5 P	4
28	118083	WASHER, LOCK, 3/8 P	4
29	115961	NUT, HX, 3/8, G5 P	4
30	621447	BRACKET, HYD STORAGE, BOLT-ON	2
31	113584	BOLT, HX, 3/8X1 1/2, G5, G	4
32	118082	WASHER, LOCK, 3/8, G	4
33	115960	NUT, HX, 3/8, G	4

** 2 TIRES REQUIRED FOR STANDARD SYSTEM
 ** 1 TIRE REQUIRED FOR SPARE TIRE CARRIER

* ORDERED SEPARATELY

ITEM	STOCK NO.	DESCRIPTION	QTY
24	118151	WHEEL, W/TIRE (GALVANIZED)	1
24	118152	WHEEL, W/TIRE (WHITE)	1
25	614571	SPARE TIRE CARRIER, SST	1
25	614573	SPARE TIRE CARRIER, ARROWBOARD, SST	1
26	612047	PINTLE HITCH ASSY, 20 TON (SEE NOTE 1)	1



PINTLE HOOK
 SCALE 1:1.6
 SEE NOTE 1

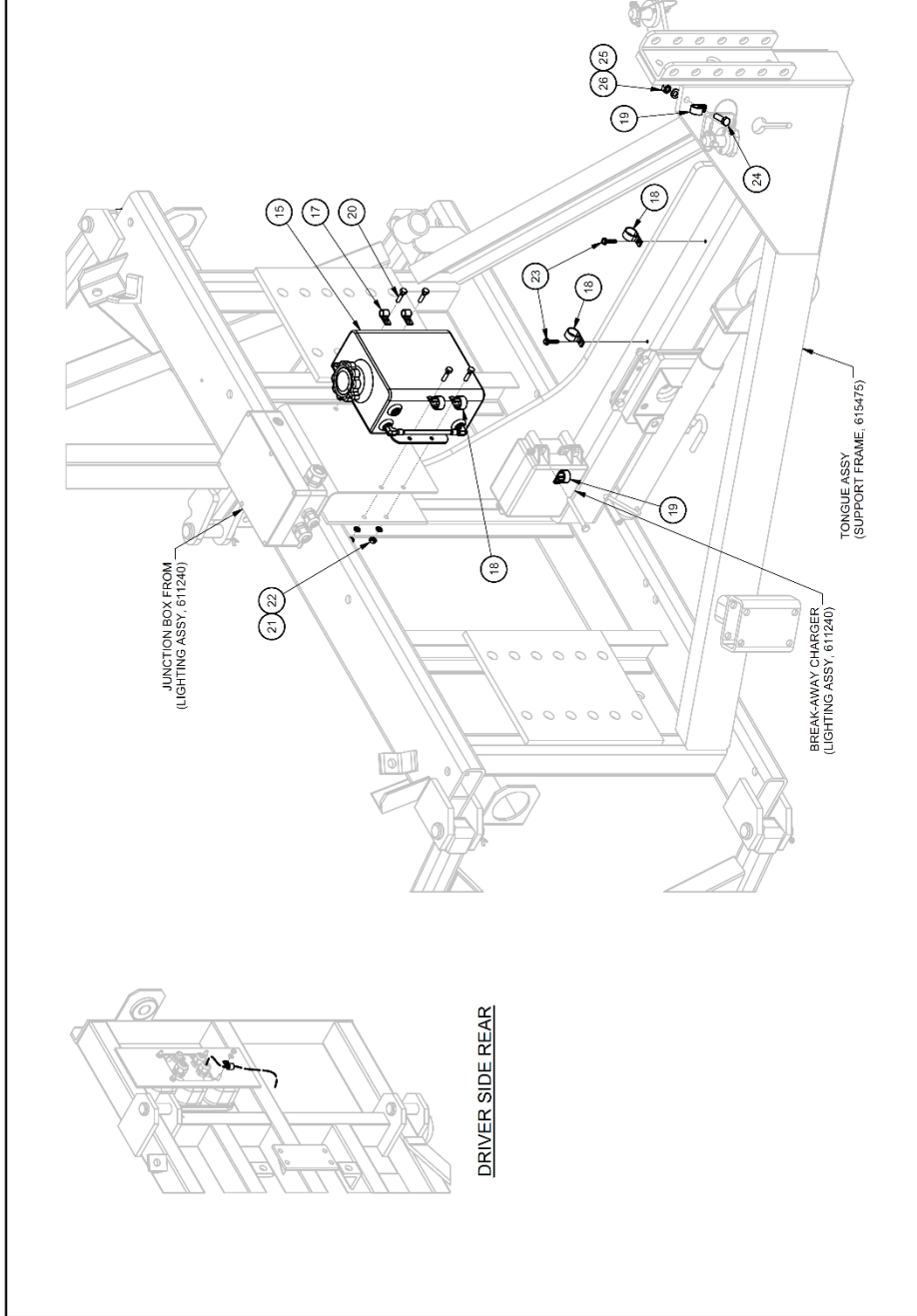
NOTES:
 1. SEE INSTALLATION MANUAL FOR MOUNTING INSTRUCTIONS.
 2. TORQUE AXLE MOUNTING FASTENERS TO 150 FT.LBS. ± 45 FT.LBS. MOUNTING HARDWARE PROVIDED WITH AXLE. ONLY USE FOUR (4) OF THE WASHERS PROVIDED AND INSTALL WASHER BENEATH EACH NUT. DO NOT PLACE A WASHER BENEATH BOLT HEAD. DISCARD FOUR (4) ADDITIONAL WASHERS.

DATE	BY	REV.	DESCRIPTION
8/23/2005	D. Hayes Jr.	1	TOI ANGLAR ± 1°
8/23/2005	W. Baehler	2	TOI FRACTIONAL .XX ± .01
		3	TOI DECIMAL .XXX ± .005
DIMENSIONS ACCORDING TO ASME Y14.5M AND ASME Y14.5M-2002 UNLESS OTHERWISE SPECIFIED			
DO NOT SCALE DRAWING			

SUPPORT FRAME ASSY, SST		REV.	0
PART NUMBER		615475	1 of 2

610296 1 of 2

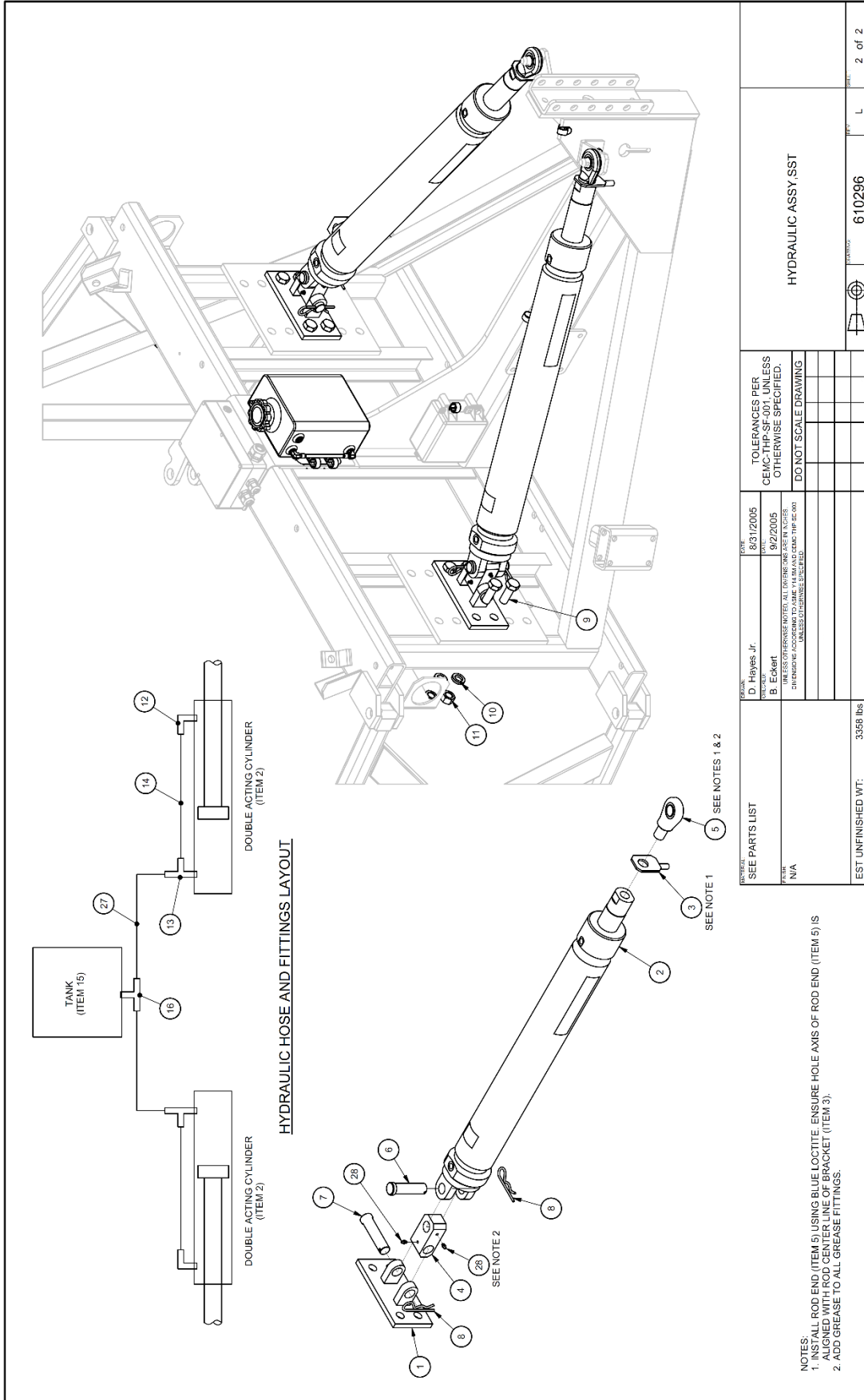
ITEM	STOCK NO.	DESCRIPTION	QTY
1	605473	BRACKET, HYDRAULIC, SST, PT	2
2	306899	CYLINDER, SST, W/DECALS	2
3	605472	BRACKET, HYD, TOOL, SST, PT	2
4	609140	FTB ST.1 7/16X24, W/HOLES	2
5	116763	ROD END, SPHERICAL, 1, RH	2
6	118386	PIN CLEVIS, 1X3, 3/4 P	2
7	116266	PIN CLEVIS, 1X4 P	2
8	116291	PIN HAIR, COTTER 7/8 TO 1" SHAFT	4
9	113554	BOLT, HX, 3/4X2, 65 P	8
10	118090	WASHER, LOCK, 3/4 P	8
11	115956	NUT, HX, 3/4 P	8
12	114785	ELBOW, #6 M, JIC X #6 M, ORB P	2
13	117702	TEE, #6 M, JIC X #6 M, ORB X #6 M, JIC P	2
14	115171	HOSE ASSY, HYDRAULIC, #6 F ENDS, 24 3/4	2
15	117700	TANK, ALUMINUM, 1 GAL, W/GAUGE	1
16	117700	TEE, #6 M, JIC X #6 M, JIC X 1/4 NPT P	1
17	117521	STRAP, CUSHIONED LOOP, 3/8 O.D.G	3
18	117522	STRAP, CUSHIONED LOOP, 3/8 O.D.G	4
19	114116	CLAMP, WIRE, INSULATED, 3/4	2
20	113509	BOLT, HX, 1/4X1, 65 P	4
21	118086	WASHER, LOCK, 1/4 P	4
22	115947	NUT, HX, 1/4 P	4
23	116900	SCREW, HW, 1/4X1, SELF DRILL/TAP P	2
24	113580	BOLT, HX, 3/8X1, 1/4, 62 P	1
25	118093	WASHER, LOCK, 3/8 P	1
26	115963	NUT, HX, 3/8 P	1
27	115164	HOSE ASSY, HYD, #6 F JIC, #6 F JIC 90 DEG, 19	2
28	115067	GREASE FITTING, 1/4-28, STR	4



DRIVER SIDE REAR

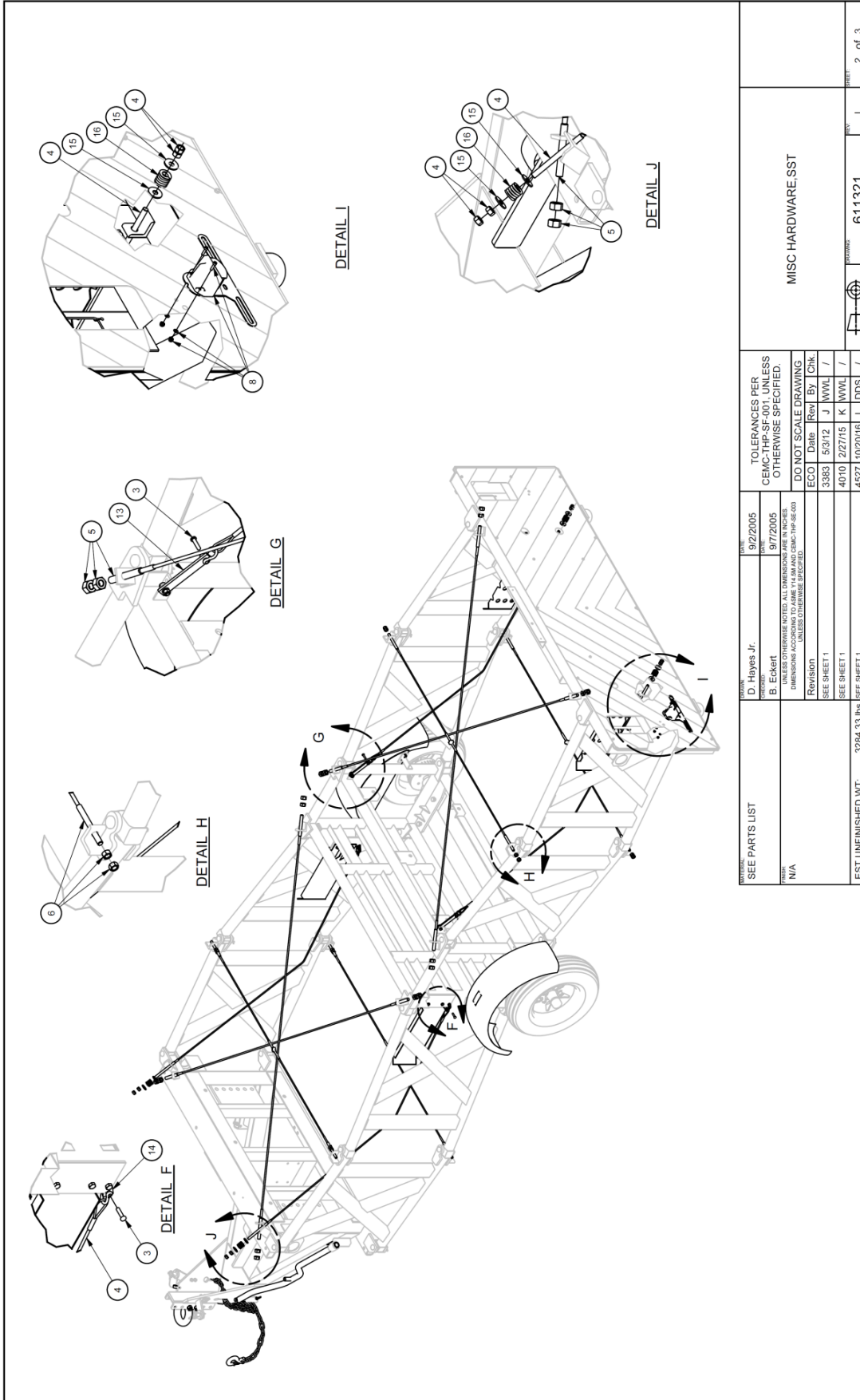
REVISED BY	D. Hayes Jr.	DATE	8/31/2005
DESIGNED BY	B. Eckert	DATE	9/2/2005
REVISIONS	REVISIONS LISTED IN REVISIONS DIMENSIONS ACCORDING TO CASE 114 AND 114A (PAGE 200) UNLESS OTHERWISE SPECIFIED		
SCALE	DO NOT SCALE DRAWING		
EST UNFINISHED WT.	3358 lbs		
SEE PARTS LIST		TOLERANCES PER CEMC-THP-SF-001, UNLESS OTHERWISE SPECIFIED.	
HYDRAULIC ASSY, SST		DO NOT SCALE DRAWING	
610296		REV	1 of 2

Hydraulic Assembly

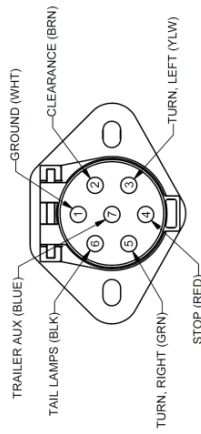


REVISION	DATE	TOLERANCES PER CEMC-THP-SF-001, UNLESS OTHERWISE SPECIFIED.	DO NOT SCALE DRAWING TOLERANCES PER CEMC-THP-SF-001, UNLESS OTHERWISE SPECIFIED. DO NOT SCALE DRAWING
DESCRIPTION	DATE	DO NOT SCALE DRAWING	
DESIGNED BY	DATE		
DRAWN BY	DATE		
CHECKED BY	DATE		
APPROVED BY	DATE		
EST UNFINISHED WT:	3358 lbs		
ITEM NO.	610296		
REV	L		
			2 of 2

611321 2 of 3

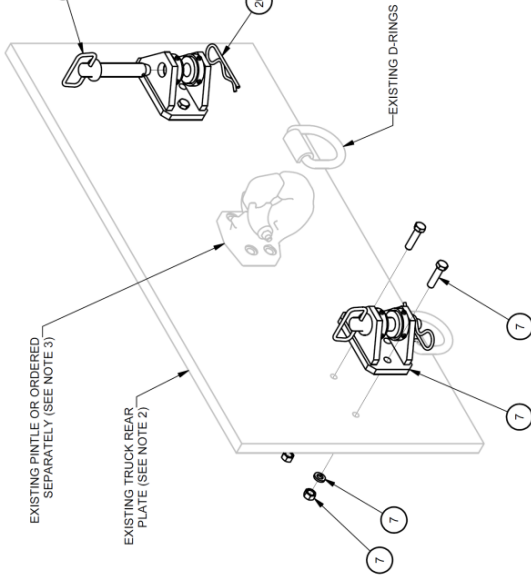


REVISION:	SEE PARTS LIST	DESIGNER:	D. Hayes Jr.	DATE:	9/2/2005	TOLERANCES PER	CEMC-THP-SF-001, UNLESS OTHERWISE SPECIFIED.				
APPROVED:	N/A	CHECKED:	B. Eckert	DATE:	9/7/2005	DO NOT SCALE DRAWING					
		UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES				ECO	Date	Rev	By	Chk.	
		DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.				3383	5/3/12	J	WWL	/	
						4010	2/27/15	K	WWL	/	
						4527	10/20/16	L	DDS	/	
EST UNFINISHED WT.		3284.33 lbs				PART NO.		611321		REV. L	
						SHEET		2		OF 3	



DETAIL K
P/N: 117406
7 PIN SOCKET IS OPTIONAL

P/N: 117406 (OPTIONAL)
SEE NOTE 4



± 127 mm [5 in]
SEE NOTE 5

560 mm [22 in]
TO

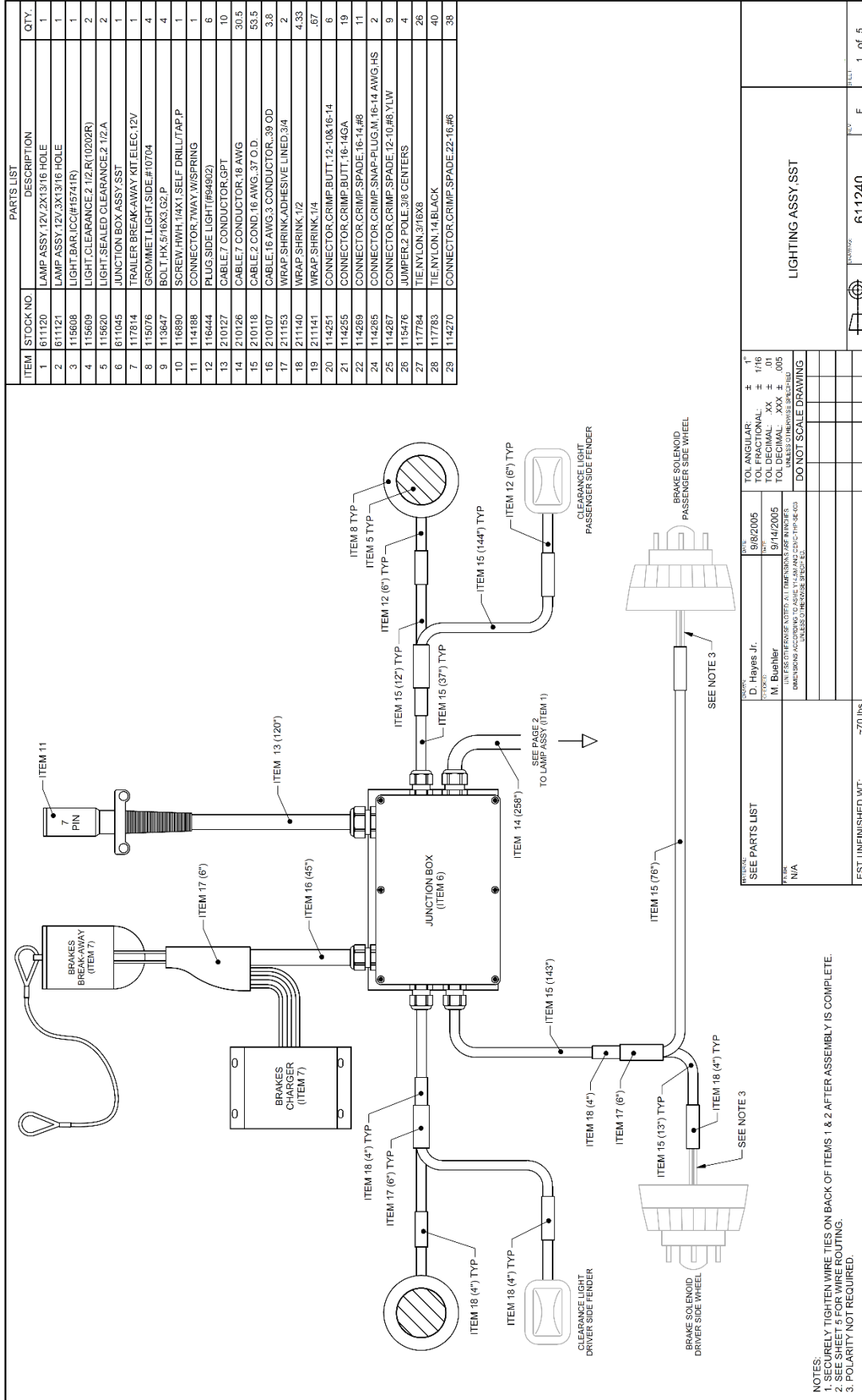
760 mm [30 in]

SEE NOTE 1

- NOTES:**
1. HYDRAULIC CYLINDER BRACKET CENTER LINE (ITEM 7), ALIGNED WITH TRUCK FRAME RAILS AS REQUIRED ± 50 mm [2 in].
 2. TRUCK REAR PLATE, SAFETY D-RINGS ARE EXISTING EQUIPMENT IN GENERAL LOCATION
 3. PINTLE HOOK (20 TON) EITHER EXISTING OR ORDERED SEPARATELY (PART NO: 612047).
 4. LOCATE FEMALE CONNECTOR IN A CONVENIENT LOCATION ON TRUCK SO TRAILERING WILL BE EASY.
 5. BRACKETS (ITEM 7) MUST BE PARALLEL WITHIN 3 mm [1/8 IN] AND ± 127 mm [5 in] TO C OF PINTLE.

REVISIONS	DATE	9/2/2005	TOLERANCES PER CEMC-THP-SF-001, UNLESS OTHERWISE SPECIFIED.				
	BY	D. Hayes Jr.					
DESIGN	DATE	9/7/2005	DO NOT SCALE DRAWING				
	BY	B. Eckert					
DIMENSIONS	UNLESS OTHERWISE SPECIFIED	MM AND FRACTIONS	ECO	Date	Rev	By	Chk
	UNLESS OTHERWISE SPECIFIED	INCHES	3383	5/3/12	J	WW/L	/
EST UNFINISHED WT:	3284.33 lbs	SEE SHEET 1	4010	2/27/15	K	WW/L	/
	SEE SHEET 1	SEE SHEET 1	4527	10/20/16	L	DDS	/
PARTS LIST		MISC HARDWARE, SST		611321		REV L	

611240 1 of 5

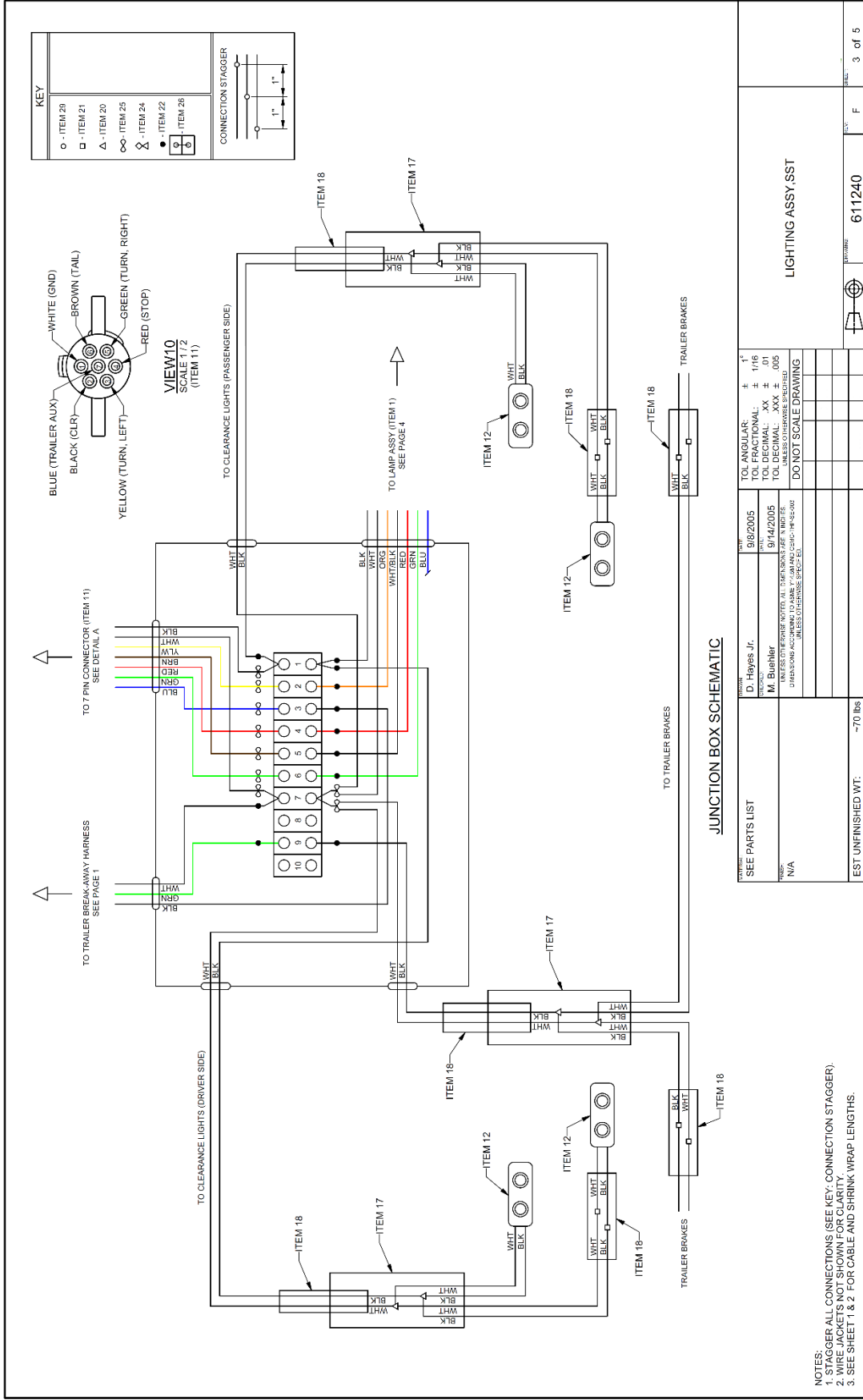


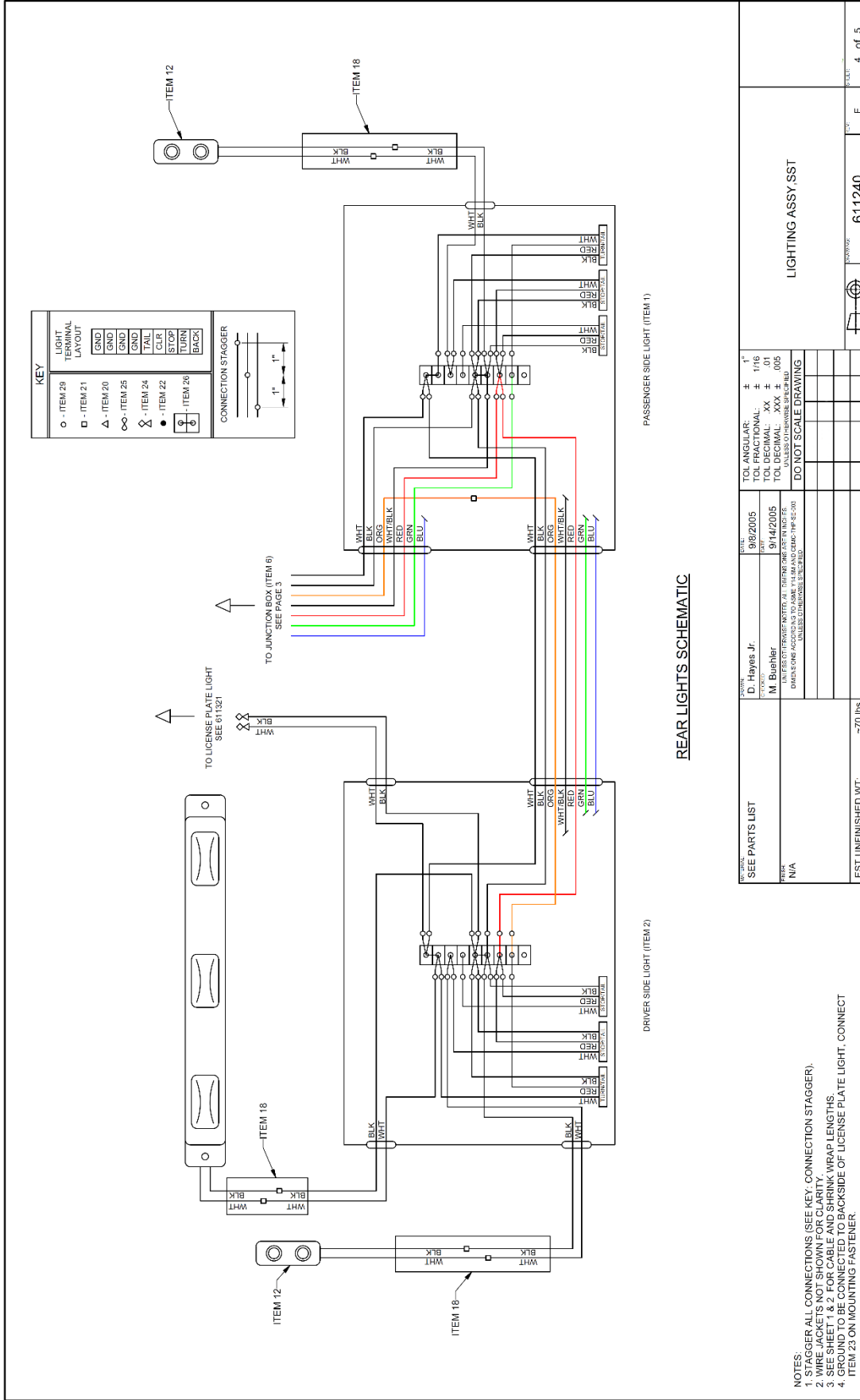
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	61120	LAMP ASSY, 12V, 2X13/16 HOLE	1
2	61121	LAMP ASSY, 12V, 3X13/16 HOLE	1
3	115608	LIGHT BAR, ICC (#15741R)	1
4	115609	LIGHT, CLEARANCE 2 1/2 R (10202R)	2
5	115620	LIGHT, SEALED CLEARANCE 2 1/2 A	2
6	611045	JUNCTION BOX ASSY, SST	1
7	117814	TRAILER BREAK-AWAY KIT ELEC, 12V	1
8	115076	GROMMET LIGHT SIDE, #10704	4
9	113847	BOLT, HX, 5/16X3, GZ, P	4
10	116890	SCREW, HW, 1/4X1, SELF DRILL/TAP, P	1
11	114188	CONNECTOR, T-WAY, W/SPRING	1
12	116444	PLUG SIDE LIGHT (#64902)	6
13	210127	CABLE, 7 CONDUCTOR, GPT	10
14	210126	CABLE, 7 CONDUCTOR, 18 AWG	30.5
15	210118	CABLE, 2 COND, 16 AWG, .37 O. D.	53.5
16	210107	CABLE, 16 AWG, 3 CONDUCTOR, .39 OD	3.8
17	211153	WRAP, SHRINK, ADHESIVE LINED, 3/4	2
18	211140	WRAP, SHRINK, 1/2	4.33
19	211141	WRAP, SHRINK, 1/4	.87
20	114251	CONNECTOR, CRIMP, BUTT, .12-10# 16-14	6
21	114255	CONNECTOR, CRIMP, BUTT, 16-14GA	19
22	114269	CONNECTOR, CRIMP, SPADE, 16-14 #8	11
24	114265	CONNECTOR, CRIMP, SNAP-PLUG, M, 16-14 AWG, HS	2
25	114287	CONNECTOR, CRIMP, SPADE, 12-10 #8, YLW	9
26	115476	JUMPER, 2 POLE, 3/16X8	4
27	117784	TIE, NYLON, 3/16X8	26
28	117783	TIE, NYLON, 1/4 BLACK	40
29	114270	CONNECTOR, CRIMP, SPADE, 22-16 #6	36

REVISED BY: SEE PARTS LIST	DESIGNED BY: D. Hayes Jr.	DATE: 9/8/2005	TOL ANGLAR: ± .1°
APPROVED BY: M. Buehler	DATE: 9/14/2005	TOL DECIMAL: .XX ± .01	TOL DECIMAL: .XXX ± .005
DATE: N/A	UNLESS OTHERWISE SPECIFIED:	DO NOT SCALE DRAWING	
EST UNFINISHED WT: ~70 lbs	EST. WEIGHT: 611240	REV: F	SHEET: 1 of 5

NOTES:
 1. SECURELY TIGHTEN WIRE TIES ON BACK OF ITEMS 1 & 2 AFTER ASSEMBLY IS COMPLETE.
 2. SEE SHEET 5 FOR WIRE ROUTING.
 3. POLARITY NOT REQUIRED.

Lighting Assembly





NOTES:
 1. REFER ALL CONNECTIONS (SEE KEY, CONNECTION STAGGER).
 2. WIRE LENGTHS NOT SHOWN FOR CLARITY.
 3. SEE SHEET 1 & 2 FOR CABLE AND SHRINK WRAP LENGTHS.
 4. GROUND TO BE CONNECTED TO BACKSIDE OF LICENSE PLATE LIGHT. CONNECT ITEM 23 ON MOUNTING FASTENER.

REV. NO.	REV. DATE	REV. BY	REV. REASON
1	9/8/2005	D. Hayes Jr.	
2	9/14/2005	M. Bluphar	
3			
4			
5			

SEE PARTS LIST

EST UNFINISHED WT.: ~70 lbs

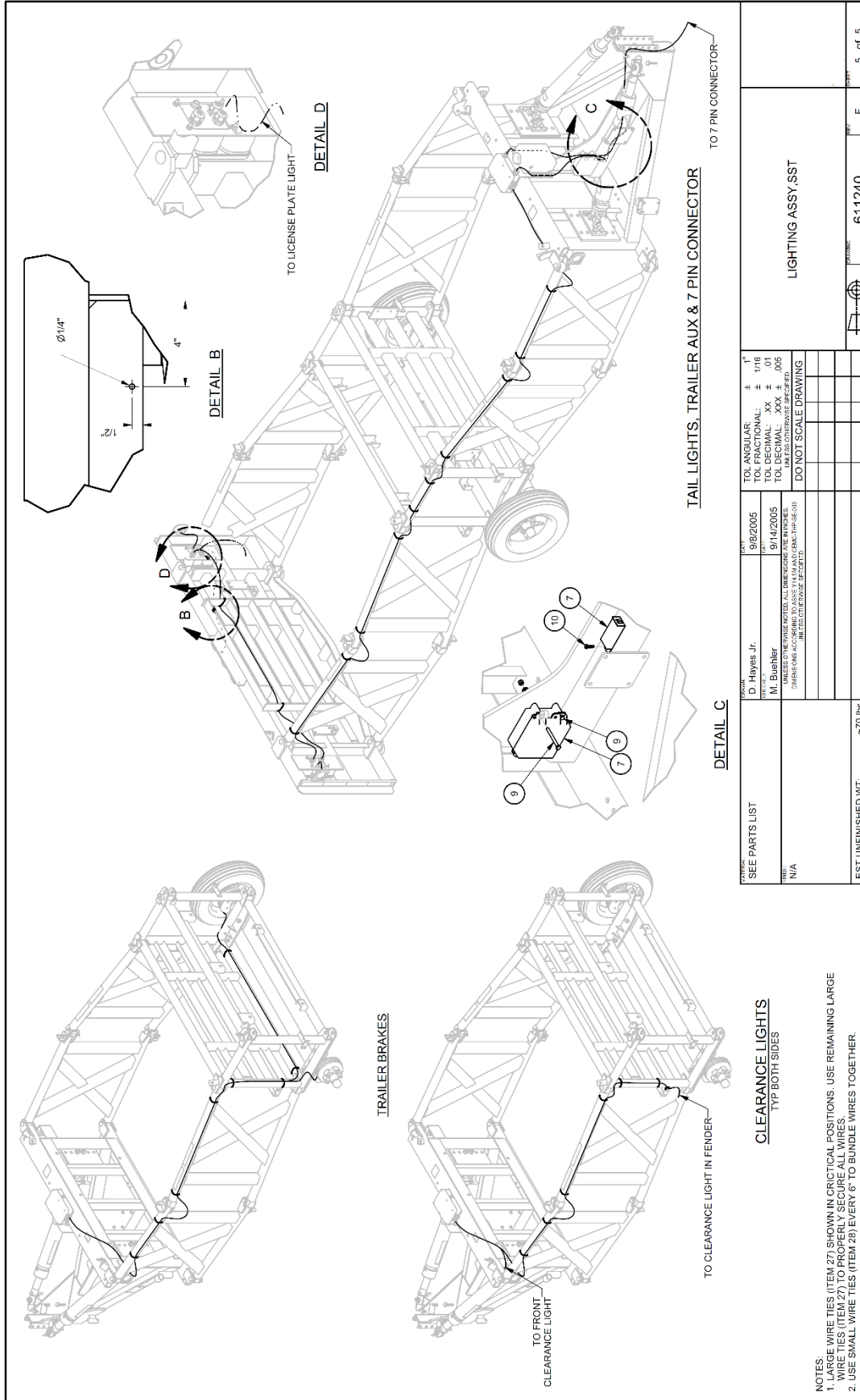
DO NOT SCALE DRAWING

TOL. ANGULAR: ± 1/16"
 TOL. DECIMAL: .XX ± .01
 TOL. DECIMAL: .XXX ± .005
 UNLESS OTHERWISE SPECIFIED

LIGHTING ASSY, SST

611240

4 of 5



DATE:	9/6/2005	REV:	1
DESIGNER:	D. Hayes Jr.	TOL ANGULAR:	± 1/16
DRAWN:	M. Bushler	TOL FRACTIONAL:	± 0.01
DATE:	9/14/2005	TOL DECIMAL:	± .005
DESCRIPTION:	TAIL LIGHTS, TRAILER AUX & 7 PIN CONNECTOR		
REVISIONS:	1. DIMENSIONS ACCORDING TO ASSY V H AND C (FRAC) TR-SE-08 2. DIMENSIONS ACCORDING TO ASSY V H AND C (FRAC) TR-SE-08 3. DIMENSIONS ACCORDING TO ASSY V H AND C (FRAC) TR-SE-08 4. DIMENSIONS ACCORDING TO ASSY V H AND C (FRAC) TR-SE-08 5. DIMENSIONS ACCORDING TO ASSY V H AND C (FRAC) TR-SE-08		
SCALE:	DO NOT SCALE DRAWING		
EST UNFINISHED WT:	-70 lbs	REV:	F
PART:	611240	REV:	5 of 5

CLEARANCE LIGHTS
TYP BOTH SIDES

TRAILER BRAKES

CLEARANCE LIGHTS
TYP BOTH SIDES

TO FRONT CLEARANCE LIGHT

TO CLEARANCE LIGHT IN FENDER

TO CLEARANCE LIGHTS - TYP BOTH SIDES

TO LICENSE PLATE LIGHT

TO 7 PIN CONNECTOR

DETAIL B

DETAIL C

DETAIL D

NOTES:
 1. LARGE WIRE TIES (ITEM 27) SHOWN IN CRITICAL POSITIONS. USE REMAINING LARGE WIRE TIES (ITEM 27) TO PROPERLY SECURE ALL WIRES.
 2. USE SMALL WIRE TIES (ITEM 26) EVERY 6" TO BUNDLE WIRES TOGETHER.



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