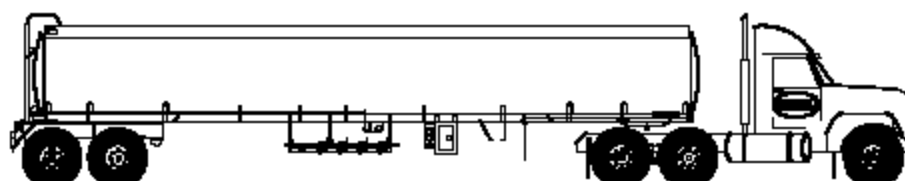
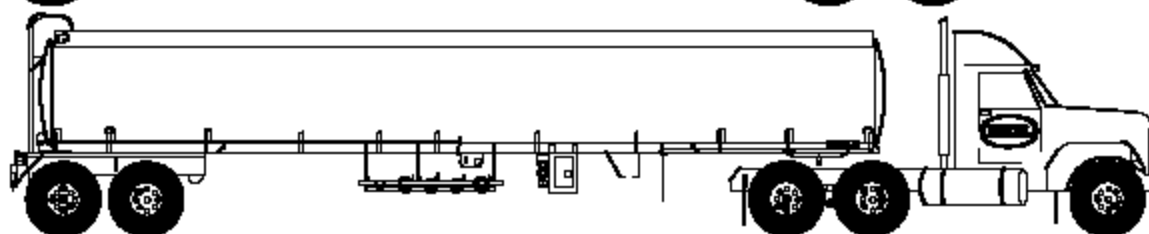
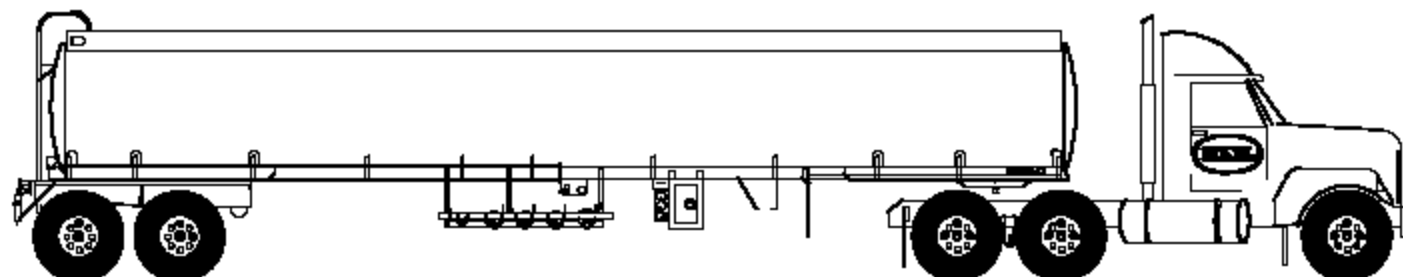
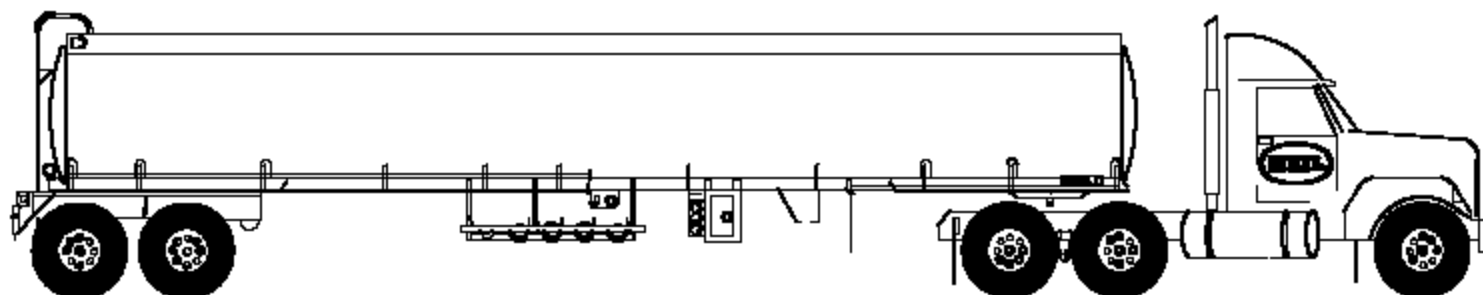


PE05-067
HEIL TRAILER
12/19/2005
EXHIBIT 7
SEE INRD-PE05067-23782

HEIL TRAILER INTERNATIONAL



**P e t r o l e u m T r a n s p o r t
O w n e r ' s / O p e r a t o r ' s M a n u a l**



WARRANTY STATEMENT

Heil Trailer International warrants its Tank Trailer Equipment to be free from defects in material and workmanship under normal use, when proper service and maintenance as described in its Service Bulletin and Operation Manuals are performed, for a period of twelve (12) months from the date when these products are delivered to the first purchaser.

This warranty is expressly limited to the repair or replacement of any component or part thereof, of any such unit manufactured by Heil Trailer International, that is proven to Heil's satisfaction to have been defective in material or workmanship. Such components or parts thereof shall be repaired or replaced without cost to the first purchaser for parts and labor provided such unit is returned for such repair or replacement to an authorized Heil Distributor, or such other place as may be designated by Heil, within twelve (12) months from the date on which the unit was delivered to such first purchaser.

Heil Trailer International neither warrants, nor does it accept liability for products manufactured by others and installed by Heil. Purchaser and or end user must pursue any claims of any nature whatsoever, including warranties with the manufacturer of said product.

We make no other warranty, expressed or implied, and make no warranty of merchantability or of fitness for any particular purpose.

Heil Trailer International does not assume any other liability of any nature whatsoever, including but not limited to, any direct or indirect or consequential loss, transportation charges, loss of profits, damages, or delays. Any improper use, operation beyond rated capacity, substitution of parts not approved by us, or any alteration or repair by others in such manner as in our judgment affects the product materially and adversely, shall void this warranty.

Other than extension of the warranty period under Heil's Extended Warranty Program, no employee or representative is authorized to change this warranty in any way or grant any other warranty.

Heil Trailer International warrants that this trailer is manufactured in accordance with the specifications on the order. Heil Trailer International does not warranty this piece of equipment for use in hauling any specific product. Heil Trailer International accepts no responsibility for damage to the equipment, or for cargo losses, due to an adverse effect on the equipment caused by the incompatibility of the product being hauled in the trailer. Where tanks are prepared for lining, all agreements, that concern the tank barrel lining will be the responsibility of the customer and the lining company. In this connection, Heil Trailer International makes no warranty of products, including lining manufactured and/or installed by others, the same being subject to warranties, if any, of their respective manufacturers or installers. The customer shall bear the risk for damage or loss to the tank or injury to property or person, while the tank is either at or in transit to or from the lining company. In those instances where the lining application is performed by a Heil Trailer International facility, no warranty will be provided to the installation or application of those lining materials.

Heil Trailer International does not assume any liability for interior cleanliness and finish requirements of trailers due to different operations and circumstances. As such, Heil Trailer International does not certify that trailers are ready to be placed in service for product upon delivery. The trailer must be inspected, cleaned, washed and otherwise prepared for its intended service by the user to the requirements of the customer prior to placing into service.

The above warranty supersedes and is in lieu of all other warranties expressed or implied.

HEIL TRAILER INTERNATIONAL AS MANUFACTURER OF THE EQUIPMENT THAT IS COVERED BY THIS MANUAL, IS PROVIDING A PRODUCT TO THE USER WHO HAS ACKNOWLEDGED TO HAVE SUPERIOR KNOWLEDGE OF THE CONDITIONS OF THE USE TO WHICH THE PRODUCT WILL BE PUT. HEIL TRAILER INTERNATIONAL RELIES UPON THE USER'S SUPERIOR KNOWLEDGE IN SPECIFYING ANY CHANGES OR MODIFICATIONS INCLUDING BUT NOT LIMITED TO THE INCLUSION OR NONINCLUSION OF OPTIONS THAT ARE REQUIRED BY THE USER AND THE HEIL PRODUCT, AND FOR THE PARTICULAR APPLICATION OF THE USER RELATIVE TO THE HEIL PRODUCT.

WARNING

If incorrectly used, this equipment can cause severe injury. Those who use and maintain the equipment should be trained in its proper use, warned of its dangers, and should read this entire manual before attempting to set up, operate, adjust, or service the equipment. Keep this manual with the trailer for future reference.

HEIL TRAILER INTERNATIONAL GROUP LOCATIONS

CORPORATE OFFICES

Heil Trailer International
5741 Cornelison Road,
6400 Building A
Chattanooga, TN 37414
(423) 499 - 1300 - 1 800 400 - 6913

MANUFACTURING PLANTS

**Heil Trailer International
Athens**
P.O. Box 160
1125 Congress Pkwy.
Athens, Tn 37303
(423) 745 - 5830

Heil Asia, Limited
168, Moo 16, Udomsornayut Rd.
Bang Gra-san, Bang Pa-in
Ayutthaya 13160, Thailand
011 (663) 522-1098

**Heil Trailer International
Lancaster**
P.O. Box 4807
3249 Hempland Rd.
Lancaster, PA 17604
(717) 397 - 7771

Heil Trailer Internacional S.A.
Ruta 3 Km. 66,300
(1814)Cañuelas
Provincia de Buenos Aires
Argentina
011 (54 2226) 431810

Heil Texas-North
P.O. Box 247
500 Randall Street
Rhome, TX 76078
(817) 636 - 2201

Heil Texas-South
P.O. Box 161759
1121 Cantrell-Sansom Rd
FL Worth, TX 76161-1759
(817) 232- 0900

HEIL UK
Great Bridge Road
Bliston, West Midlands.
UK WV 14 8NP
011 44 1902 353141

HEIL TANK SERVICE REPAIR FACILITIES

3308 Bells Lane
Louisville, KY 40211
1 (800) 428 - 7101 / 1 (502) 778 - 2300

PARTS FACILITIES

45 West 21st Street
Linden, NJ 07036
1 - 800 - 526 - 4122

Houston, TX 77013
1 - 800 - 237 - 4345

2412 E. Broadway
Maryville, TN 37804
1 - 800 - 441 - 4345

3308 Bells Lane
Louisville, KY 40211
1 - 800 - 428 - 7101

All replacement parts referred to in this manual can be obtained from your nearest
Heil Repair and Parts Facilities

Visit us on the web: www.heiltrailer.com

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GENERAL

INTRODUCTION

This manual is intended to help ensure the safe and efficient operation of the HEIL Super Flo Dry Bulk Transport.

Recommended operating practices furnished in this manual are general practices. HEIL cannot possibly know, evaluate, or advise anyone of all conceivable ways a Super Flo Dry Bulk Transport might be operated or of all possible consequences of each way.

Every person who operates a dry bulk transport must first satisfy themselves thoroughly that neither their safety nor the general public will be jeopardized by any method they select.

HEIL requires the return of the Warranty Registration (included with the invoice) including the END-USER (Owner) Pre-trip Inspection Report immediately upon receiving your HEIL Super Jet Dry Bulk Transport. This serves as proof that you have performed the safety checks upon receipt of your tank trailer which ensures it's safe operation and aids in the event of a HEIL/Federal (NHTSA) DOT vehicle recall as per 49CFR, Part 575. It also helps us serve you much quicker should a problem arise.

TO THE OWNER

We at Heil Trailer International take pride in the units we manufacture. We hope you will be satisfied with your purchase. Properly operated and maintained, the HEIL Super Flo Dry Bulk Transport will give you many years of low-cost, trouble free service.

WARRANTY CLAIMS & INQUIRES

The Heil Standard Warranty is included in this manual. Should a problem arise, contact your distributor for service and repair procedures, or Heil Trailer International Field Service office in Chattanooga, TN, at (423) 499-1300.

For all parts inquiries, refer to the model and serial number of your unit. This information is found on the identification plate (Figure 1) welded to the left framerrail on the street side of the front hopper.

DIRECTIONAL REFERENCE

The side of the dry bulk transport are determined by facing in the direction of forward travel. The right side is the "Curbside", while the left side is the "Streetside".

MFD BY: HEIL TRAILER INTERNATIONAL, INC.	
DATE OF MFG	
GVWR	LBS* GAWR ALL AXLES LBS
DUAL TIRES	AT PSI COLD
RIMS	
THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR VEHICLE SAFETY STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE	
VIN	TEST PRES. PSIG
CAPACITY	
TYPE	
WARRANTED UNDER CURRENT PUBLISHED WARRANTY *BASED ON UNIFORM WEIGHT DISTRIBUTION	
	

Figure 1. Identification Plate

REPORTING SAFETY DEFECTS

If you believe that your vehicle has a defect which could cause a crash or could cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying Heil Trailer International.

If the NHTSA receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, the NHTSA cannot become involved in individual problems between you, your dealer, or Heil Trailer International.

To contact the NHTSA, you may either call the Auto Safety Hotline toll free at 1 (888) 327 - 4236 (or 366 - 0123 in the Washington, D.C. area) or write to:

NHTSA - U.S. Department of Transportation - Washington, D.C. 20590

You can also obtain other information about motor vehicle safety from the Hotline.

REPORTING SPILLS AND ACCIDENTS

The Department of Transportation requires under Title 49 Code of Federal Regulation Section 171.15 the following:

An immediate telephone notice (800 - 424 - 8802) is required whenever, during the course of transportation (including loading, unloading, and temporary storage), one of the following circumstances or events occurs as the direct result of the hazardous material:

- A person is killed or hospitalized.
- Estimated carrier and/or property damage exceeds \$50,000.
- Evacuation of the general public occurs lasting one or more hours.
- One or more major transportation arteries or facilities are closed or shut down for one or more hours.
- The operational flight plan or routing of an aircraft is altered.
- Fire, breakage, spillage, or suspected contamination occurs involving the shipment of radioactive materials.
- Fire, breakage, spillage, or suspected contamination occurs involving the shipment of etiological agents.
- There has been a release of a marine pollutant in a quantity exceeding 450L (119 gallons) for liquids or 400kg (882 lbs.) for solids.
- The carrier judges that the situation should be reported even though it does not meet the above criteria.

Heil also requests immediate notification (423 - 499 - 1300) if any of the previous conditions are met as a direct result of the hazardous material.

SAFETY MESSAGES

	DANGER	THESE SAFETY ALERT SYMBOLS INDICATE IMPORTANT SAFETY MESSAGES IN THIS MANUAL. WHEN YOU SEE THESE SYMBOLS, CAREFULLY READ THE MESSAGES THAT FOLLOW AND BE ALERT TO THE POSSIBILITY OF PERSONAL INJURY OR DEATH TO YOURSELF OR OTHERS.
	WARNING	
	CAUTION	

	CAUTION	
Inspection of equipment, safety devices, and working areas must be performed before each trip to ensure personal and operational safety and to correct potential or actual hazards.		

	DANGER	
Do not alter or modify any of the equipment or components provided with this tank trailer. Use of non-HEIL parts or non-OEM component parts may cause serious personal injury, including death.		

	WARNING	
Before moving the tank trailer inside a building, the tank must be free of product and checked with an approved gas analyzer to ensure it is free of hazardous and/or flammable vapors.		

	DANGER	
Do not enter the tank trailer until each of the following conditions has been satisfied:		
+ The pressure in the vessel has been completely relieved. + The tank has been thoroughly purged and ventilated. + The tank has been degassed and cleaned by an authorized cleaning facility. + The MSDS for the last product(s) haled has been reviewed. + The OSHA 1910.126 Confined Space Entrance Requirements are strictly complied to.		
Failure to follow any one of these instructions may result in serious personal injury, including death.		



CAUTION



Decals are posted on the tank trailer to alert the operator or to give important safety instructions. Decals should be replaced if they are worn or damaged or if they become illegible.



CAUTION



After cleaning the tank, keep the manhole open until the tank has cooled.



CAUTION



The tank trailer shall not be operated if any of the following conditions exists:

- + Damage to the lighting fixtures, wiring, or electrical conduits, or Inoperative lights.
- + Leaking or malfunctioning equipment.
- + Damage to the tractor or the tank trailer, including, but not limited to, Interior damage.
- + Inoperative brake systems (primary or parking).
- + Vents or valves plugged, Inoperative, or removed. A plugged or Inoperative vent or valve can cause extensive shell damage. If the design pressure is exceeded or a vacuum situation is created.

Failure to correct or repair any of these conditions may result in extensive property damage and / or serious personal injury, including death.



WARNING



Proper operation of the tank trailer primary brake system is essential for safe operation of the vehicle. A functional system check is necessary each time the tank trailer is put into service.



CAUTION



Like any other vehicle, tank trailers can tip or slide out of control if turns are negotiated at too high a speed or when making violent maneuvers such as abrupt lane changes. Such unsafe and improper operation may cause serious personal injury, including death, to the operator, handlers, and bystanders.



WARNING



If the tank trailer is to be uncoupled in mud, snow, or sand, use extra shoring to provide an adequate base for the landing gear support pads.



WARNING



Never set a loaded tank trailer on landing legs that are not intended for the purpose. Never set a multiple compartment tank trailer with only the front compartment loaded on landing legs.



DANGER



Mechanical uncaging of the spring brakes is not recommended. Under no circumstances should a trailer with a mechanically uncaged spring brake be pulled in transit. Such unsafe and improper operation may cause serious personal injury, including death, to the operator, handlers, and bystanders.



CAUTION



All loading and unloading operations must be performed outside.



CAUTION



Ensure grounding connections are made properly and firmly before any loading operations begin.



DANGER



Operators must always be alert for leaking or malfunctioning equipment. Stop all operations immediately at the first sign of a leak or malfunction. Failure to do so may result in extensive property damage and/or serious personal injury, including death.



DANGER



The top of the tank trailer is not intended for use as a heavy work area. Observe the following procedures when the ladder or walkway must be used:

- + The user of the ladder and walkway area is recommended **ONLY** when other access is unavailable.
- + Always keep three (3) limbs, either both hands and one foot or both feet and one hand, in firm contact with the ladder when in use.
- + When the top of the tank must be used as a work area, a stationary platform, the guard rails should be used, a safety harness should be worn, and the abrasive surface at the top of the tank should be kept free of oil, grease, and/or product.
- + If the abrasive surface is worn or missing, replace it immediately.

Failure to follow these procedures may cause serious personal injury, including death.



DANGER



Check all vents daily to ensure their proper operation. Consult the individual manufacturer's data for proper maintenance. Failure to do so may result in severe damage to the tank trailer, including buckled (reversed) bulkheads.



DANGER



Do not introduce pressure into the void area between double bulkheads. This can cause severe damage to the tank trailer, including buckled (reversed) bulkheads, and personal injury, including death.



WARNING



The tractor engine should not be running during loading and/or unloading operations.



DANGER



Most tank trailers are equipped with a Pressure Actuated Fill (P.A.F.) cover incorporated into the manhole cover. When bottom loading or any other time the internal pressure of any compartment reaches 3 psi, this P.A.F. functions as a relief vent. Test this vent/fill daily to ensure it opens at 3 psi. A malfunctioning or improperly maintained P.A.F. may cause extensive shell damage, bulk head damage, and/or serious personal injury, including death.



WARNING



Most substances being loaded or unloaded are hazardous. Know what you are dealing with and know where to acquire first aid in case of an emergency.



DANGER



Always clean a tank before loading a different type of product. When a tank trailer is emptied of fuel, a mixture of vapor and air remains that is within the flammable range. Refilling the trailer with a type of product other than that which was just emptied may denote that mixture and cause an explosion, which may cause extensive property damage and/or serious personal injury, including death.



DANGER



Failure to relieve the internal pressure through a positive vent or an open manhole cover when loading can result in over pressurizing and cause severe damage to the tank and serious personal injury, including death.



WARNING



Be prepared to stop the supply of product at the loading facility in the event of a high level shutoff malfunction or if an apparent leak or other unusual condition is noticed.



WARNING



If the unit is equipped for bottom loading, it usually will have a positive vent for each compartment that opens automatically when the emergency calce is opened. If so equipped, make sure the vent is operating properly. Note the vent will be concealed under the vapor collector if the unit is equipped for a vapor recovery hood.



CAUTION



The tank trailer should be loaded through the top only when bottom loading is not possible. Bottom loading minimizes the level of static electricity build-up.



CAUTION



When top loading through a fill cover, the automatic shutdown device on the tank trailer is not utilized. Use the capacity indicator located in each compartment to determine when it is full.



DANGER



On tanks without vapor recovery systems or without top vents, open the manhole before opening the outlet valve. Failure to do so will cause a vacuum to be created in the tank which will result in extensive damage to the vessel and could cause serious personal injury, including death.



CAUTION



Replace gaskets when they are broken, crushed, swollen, or no longer provide an adequate seal. Use only genuine HEIL or OEM replacement parts.



DANGER



When using a two piece rim, always deflate the tire prior to removal from the tank trailer. The rim and ring may come apart with explosive force, causing serious personal injury, including death.



WARNING



Insufficient mounting torque can cause rim slippage, resulting in broken valves, worn parts, and damaged tires. Excessive mounting torque can cause damage by stripping studs, collapsing spacer bands, or forcing rims into an out of round condition.



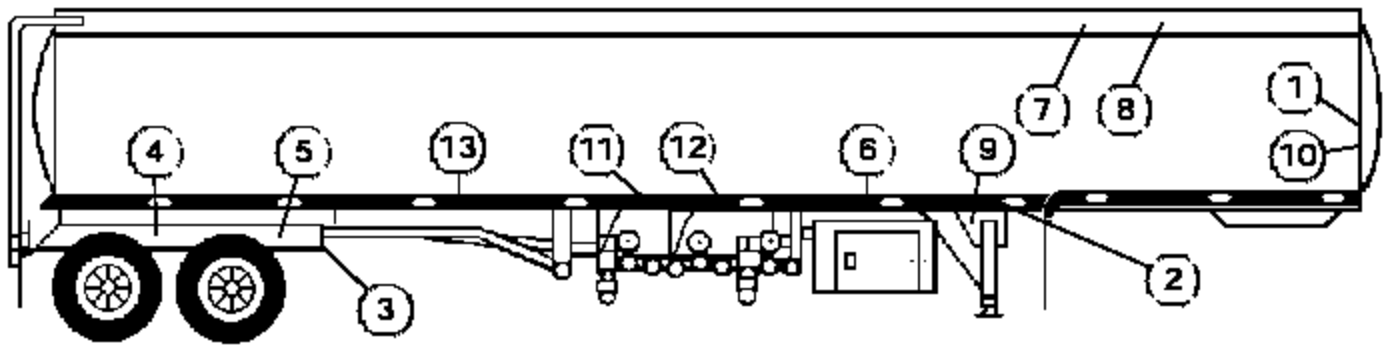
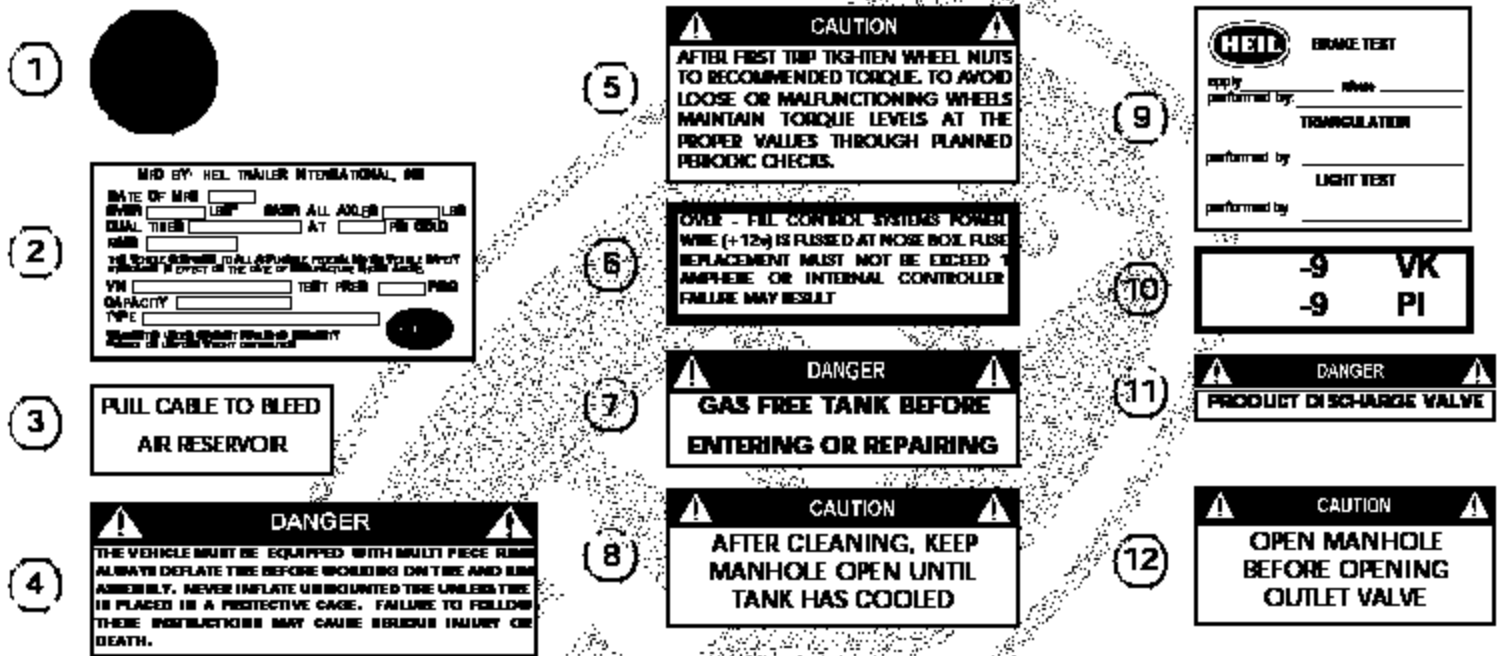
WARNING



Insufficient mounting torque can cause wheel shimmy, resulting in damage to wheel and axle parts and extremely excessive tire tread wear. Excessive mounting torque can cause studs to break and discs to crack in the stud hole area.

SAFETY DECALS

Each tank trailer is equipped with Caution, Warning, and Danger decals located at critical areas of the vehicle. Please refer to the Parts and Maintenance / Adjustment Manual for a detailed illustration showing the location of all Heil decals, as well as those of individual manufacturers of component parts and the Department of Transportation. Familiarize yourself with all of the operating cautions before you operate your Petroleum Transport. The following decals are standard on each Heil Petroleum Transport.



1. Emergency Rollover Drain Locations	4
2. I.D. Plate	1
3. Bleed Reservoir	1
4. Danger, Two Piece Rim	2
5. Caution, Tighten Wheel Nuts	1
6. Overfill Control Fuse	1
7. Danger, Gas Free Tank	Each m/hole
8. Caution, Cool After Cleaning	Each m/hole
9. Brake Test	1
10. HM 183 Test	1
11. Danger, Discharge Valve	1
12. Caution, Open Manhole Before Valve	1
13. Conspicuity Tape	See NOTE

NOMENCLATURE

These illustrations show the general location of the main components of the tank trailer.

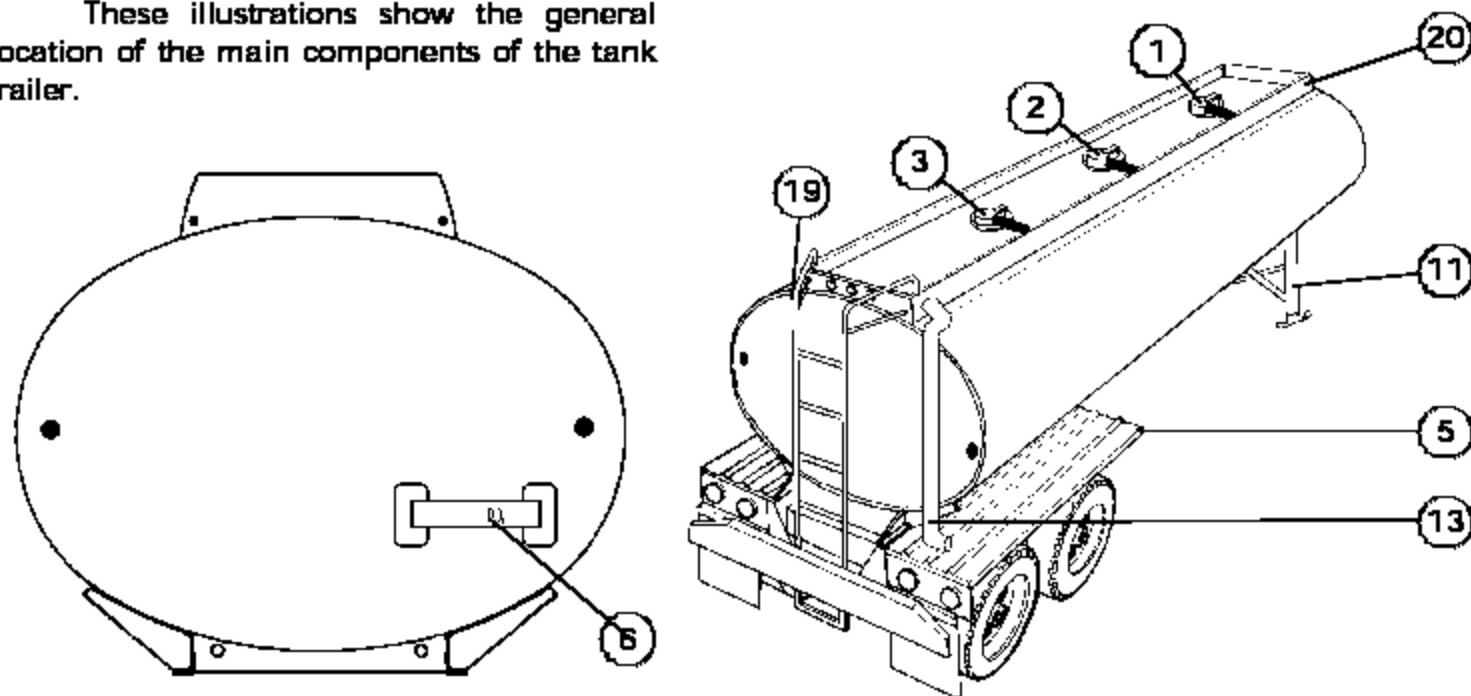


Figure 2a. HEIL Petroleum Transport - Front and Top Views

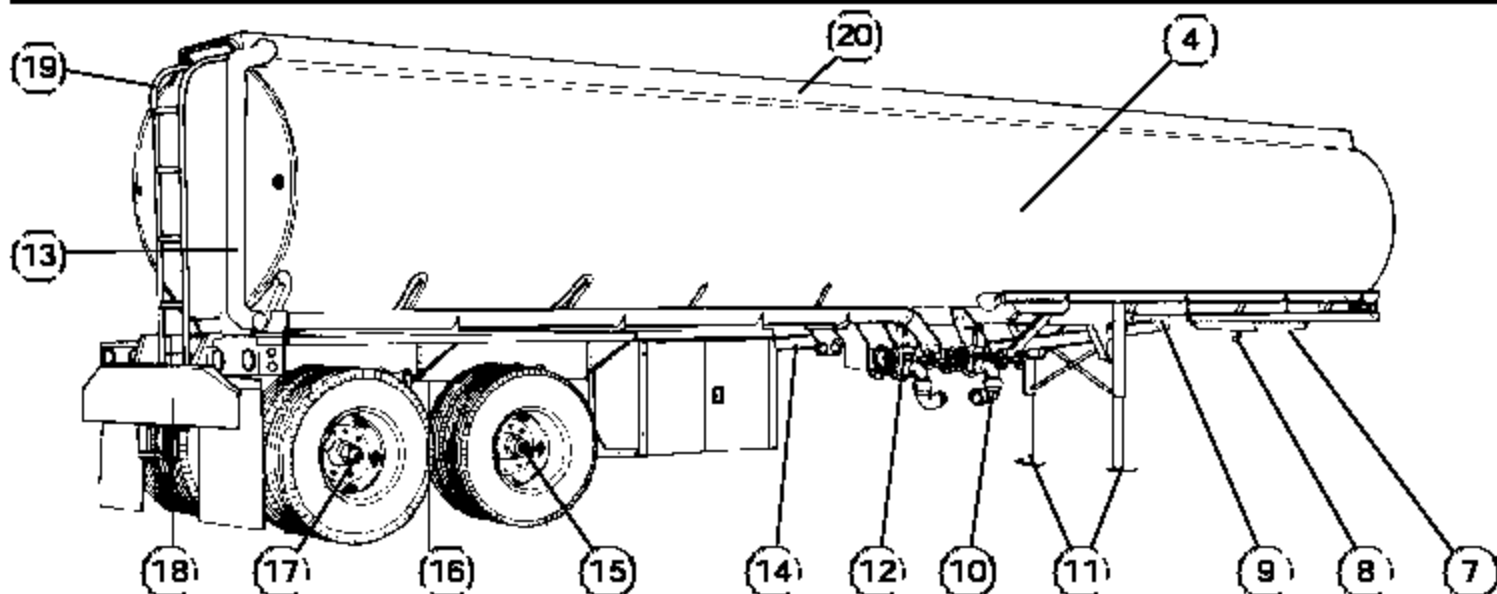


Figure 2b. HEIL Petroleum Transport - Side View

- | | |
|---|---|
| 1. Manhole Cover, P.A.F. | 11. Landing Gear |
| 2. Positive Vent, Atmospheric Vent, and Vapor Recovery Hood | 12. Discharge Valves |
| 3. Secondary Shutdown System | 13. Vapor Recovery Downline |
| 4. Tank Proper | 14. Piping |
| 5. Curbside (Right) Rear Fender | 15. Axle |
| 6. Gladhands | 16. Suspension |
| 7. 5th Wheel | 17. Wheels, Hubdomoter, Hubcaps and Seals |
| 8. Kingpin | 18. Suspension Mounting Frame and Bumper |
| 9. Emergency Valve Location | 19. Ladder |
| 10. Swivel Joints, API Adapters, "Y" Valves, etc. | 20. Overturn / Vapor Recovery Rail |

OPERATING INSTRUCTIONS

PRE-TRIP INSPECTION

DANGER

The tank trailer shall not be operated if any of the following conditions exist:

- + Damage to the lighting fixtures, wiring, or electrical conduits, or inoperative lights.
- + Leaking or malfunctioning equipment.
- + Damage to the tractor or tank trailer, including, but not limited to, interior damage such as buckled heads.
- + Inoperative brake systems (primary or parking).
- + Vents plugged, inoperative, or removed. Pressure, vacuum, and fusible vents are installed to meet code requirements and protect the tank trailer from damage. A plugged or inoperative vent can cause extensive shell damage if the design pressure is exceeded or a vacuum situation is created.

Failure to correct or repair any of these conditions may result in extensive property damage and/or serious personal injury, including death.

Before each trip, for your safety and that of the motoring public, your petroleum transport trailer should be inspected by a person trained and familiar with the operations and functions of the tank trailer and, to ensure proper and safe operation, proper corrective action should be taken in all of the following areas:

1. **TIRES** - Check for cuts, bruises, tread wear, and improper air pressure.
2. **RIMS AND WHEELS** - Check for cracks and deformation.
3. **BRAKE SYSTEMS** - Check for air leakage with and without service brakes applied. Check for damaged, worn or cracked brake hoses and drums.
4. **LANDING GEAR** - Ensure all braces are intact and the gear is operable in the event it is needed due to a breakdown en route.
5. **EQUIPMENT SECURITY** - Ensure the spare tire, hoses, tools, fittings, and emergency equipment are properly secured in their respective compartments with chains, latches, etc., in good restraining condition.
6. **LADDER AND WALKWAY** - Ensure all ladder bolts are tight. If the walkway is painted on, ensure it is present and in good shape. If it is expanded metal, make sure it is welded down sufficiently.
7. **LIGHTING SYSTEM** - Ensure all lights perform their proper function and are clearly visible.
8. **UPPER 5TH WHEEL** - Ensure the 5th wheel plate is properly lubricated and is free of measurable thinning, gouges, or unusual distortion. Ensure tightness of the bolts fastening the plate assembly to the frame.

9. **KINGPIN** - Check the kingpin for wear. Do not exceed allowable wear.
10. **TRACTOR ELECTRICAL CABLE AND AIR HOSES** - Ensure electrical cable and air hoses are free of cuts and abrasions.
11. **ELECTRICAL RECEPTACLE** - Check tractor cable receptacle for good electrical contact and mechanical security.
12. **TRACTOR WIRING** - Ensure the tractor is wired per J.T.M.A. RP14-84, dated 8/20/84.

HOOKING TRACTOR TO TRAILER

Prior to backing the tractor under the trailer, check the following items:

- * Trailer brakes are set or wheels blocked to prevent trailer from rolling.
- * Upper 5th wheel is at approximate height of lower 5th wheel.
- * Latch on lower 5th wheel is in the "OPEN" position.
- * Adequate clearance exists between the tractor frame and all parts of the tank.
- * All personnel are clear of the area.

Then proceed as follows:

1. Back the tractor under the trailer, aligning the king pin with the slot in the lower 5th wheel. When the latch "sets" around the king pin, check the hookup by attempting to pull forward.
2. Shut down the engine and apply the parking brake. Ensure it's proper operation.
3. Double check the latch on the 5th wheel to ensure it is fully engaged.
4. Connect the tractor supply and control brake hoses to the glad hands on the trailer (the glad hands are marked for correct installation).

	WARNING	
Proper operation of the tank trailer primary brake system is essential for safe operation of the vehicle. A functional system check is necessary each time the tank trailer is put into service.		

5. Connect the electrical connector to the receptacle on the trailer.
6. Raise the landing gear legs (see page 15).
7. Check the brakes and lights for proper operation.

OPERATING TRACTOR WITH TANK TRAILER ATTACHED

Over-the-Road Safe Handling Information

Petroleum tank trailers are used to carry products that are hazardous and flammable. Only properly licensed and qualified drivers are permitted to operate a tractor trailer combination. When operating a tank trailer loaded with a hazardous material, you have a double obligation to yourself and to the public to drive safely.

DANGER

Like any other vehicle, tank trailers can tip or slide out of control if turns are negotiated at too high a speed or when making violent maneuvers such as abrupt lane changes. Such unsafe and improper operation may cause serious personal injury, including death, to the operator, handlers, and bystanders.

Traffic accidents that cause a spill can turn into disasters including explosions and environmental damage. **YOU - THE OPERATOR** - have control over the most important factors that affect vehicle stability. The tank trailer is an important tool in our transportation industry, and, like any tool, is safe in the hands of a qualified operator.

Handling Partially Loaded Tanks

It is an accepted fact that liquid tanks filled to their normal capacity (with 5% outage or less) handle essentially the same as a similar vehicle with a solid load. However, as the tanks are partially loaded due to product density or legal requirements, mobility of the load or "sloshing" can be detected and must be taken into account when establishing safe driving practices. In general, a partially loaded tank will be less stable under cornering and braking conditions than an ordinary liquid tank loaded to its normal capacity. This factor must be given full consideration when determining the handling characteristics of the unit and establishing the knowledge required for safe driving of the unit. A specific suggestion is that the driver of a downloaded tank should learn the characteristics of the load and handle his/her braking efforts accordingly for smoothest stopping. It is also a good practice to keep the brakes on full for a few moments after coming to a stop to avoid vehicle movement in the event that the braking sequence has developed a wave action inside of the tank.

Driving Instructions

When driving a tractor and tank trailer, the overall length of the unit must be kept in mind while passing other vehicles and while turning. Because the unit is "hinged in the middle", turning, parking, and sight range are affected.

Turning Instructions

When turning corners, remember that the tank trailer has a larger turning radius than the tractor. To make a right turn at a road intersection, it is necessary for the tractor to continue forward to about the center of the crossroads and then turn sharply to the right to allow for the larger turning radius of the tank trailer. If the tank trailer is to be backed to the right, the steering wheel of the tractor should be turned to the left, or counterclockwise. The front of the tank trailer will be pushed to the left and the tank trailer wheels will steer to the right.

Stopping Instructions

In normal operation, the brakes of the tractor and those of the tank trailer are applied at the same time. Brake pressure should be applied gradually and smoothly.

Parking Instructions

When the tractor-with-trailer combination is to be parked and left unattended, set the parking brake on the tractor firmly.

UNHOOKING TANK TRAILER FROM TRACTOR

**WARNING**

If the tank trailer is to be uncoupled in mud, snow, or sand, use extra shoring to provide an adequate base for the landing gear support pads.

1. Disconnect the tractor supply and control brake hoses from the gladhands on the tank trailer. The tank trailer spring brakes will set automatically when the supply (emergency) air brake hose is uncoupled.
2. Drain any water from the air reservoir by pulling the cord attached to the drain valve at the bottom of the air reservoir.
3. Disconnect the electrical cable from the receptacle on the tank trailer.
4. Lower the landing gear legs. (See Raising and Lowering of Landing Gear Legs).

**WARNING**

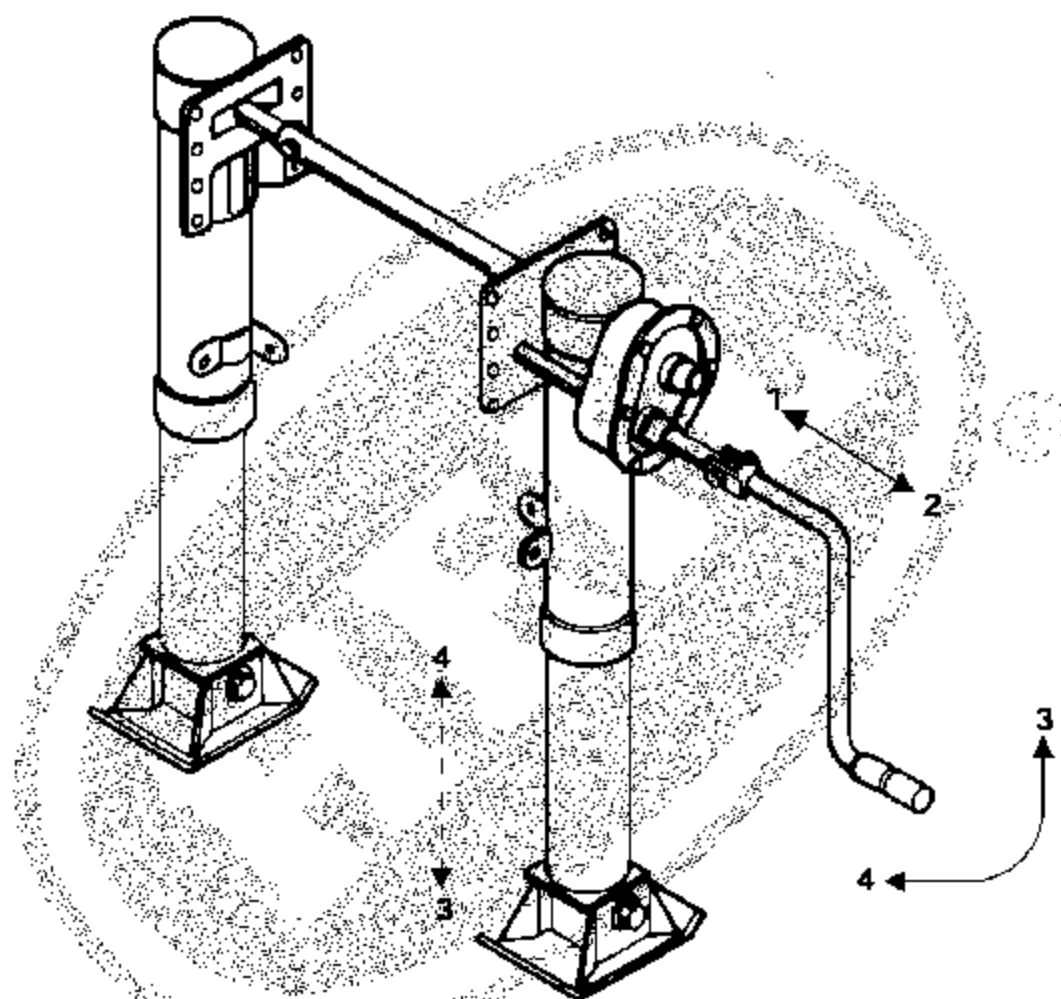
Never set a loaded tank trailer on landing legs that are not intended for this purpose. Never set a multiple compartment tank trailer with the front compartment only loaded on landing legs.

5. Release the tank trailer kingpin from the tractor's 5th wheel latch.
6. Pull the tractor out from under the tank trailer, allowing the trailer to lower slowly until the landing gear shoes are firmly on the ground.

RAISING AND LOWERING OF LANDING GEAR LEGS

Crank Operated Landing Gear

Release the operating crank from its clip and engage the crank on its shaft. Refer to Figure 3 for operating instructions.



1. Push crank **IN** for low speed operation.
2. Pull crank **OUT** for high speed operation.
3. Rotate crank counterclockwise to **LOWER** the support legs.
4. Rotate crank clockwise to **RAISE** the support legs.

Figure 3. Raising and Lowering Landing Gear Legs

Telescopic Type Landing Gear

The trailer must be coupled to a towing vehicle to raise or lower pinned type telescopic support legs. To raise the support legs, remove the retaining pin (Figure 4) from the pin on the support leg. Remove the pin and push the lower leg into the upper leg until the holes align, and then replace the pin and retaining pin. Repeat this procedure for the other support leg. To lower the legs, remove the retaining pin (Figure 4) from the pin on the support leg. Remove the pin and set the lower leg on the ground. Now raise the lower leg slightly until one of the three sets of holes in the lower leg aligns with the holes in the upper leg. Replace the pin and retaining pin. Repeat this procedure for the other leg.

WARNING

Never set a loaded tank trailer on landing legs that are not intended for this purpose. Never set a multiple compartment tank trailer with only the front compartment loaded on landing legs.

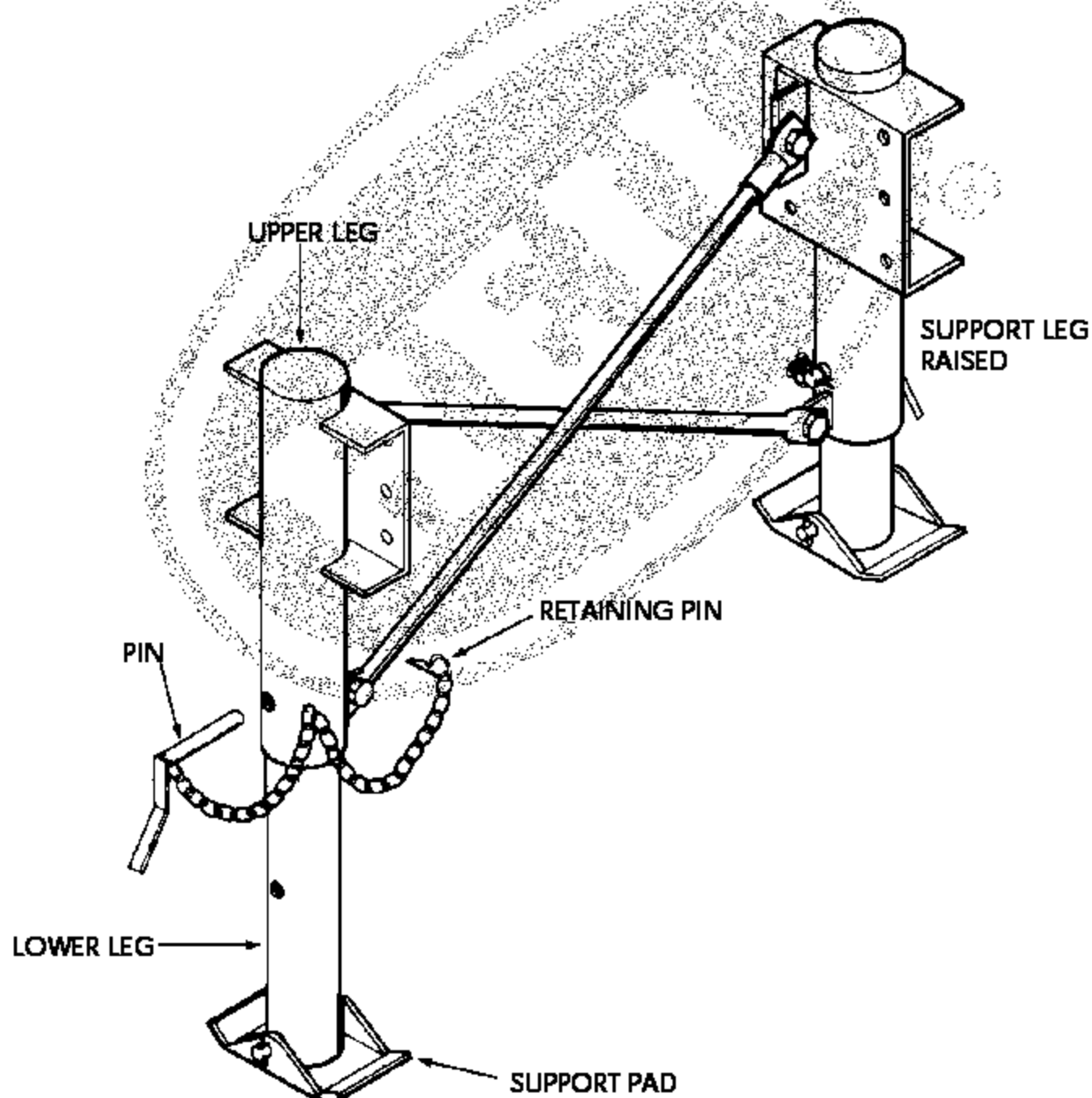
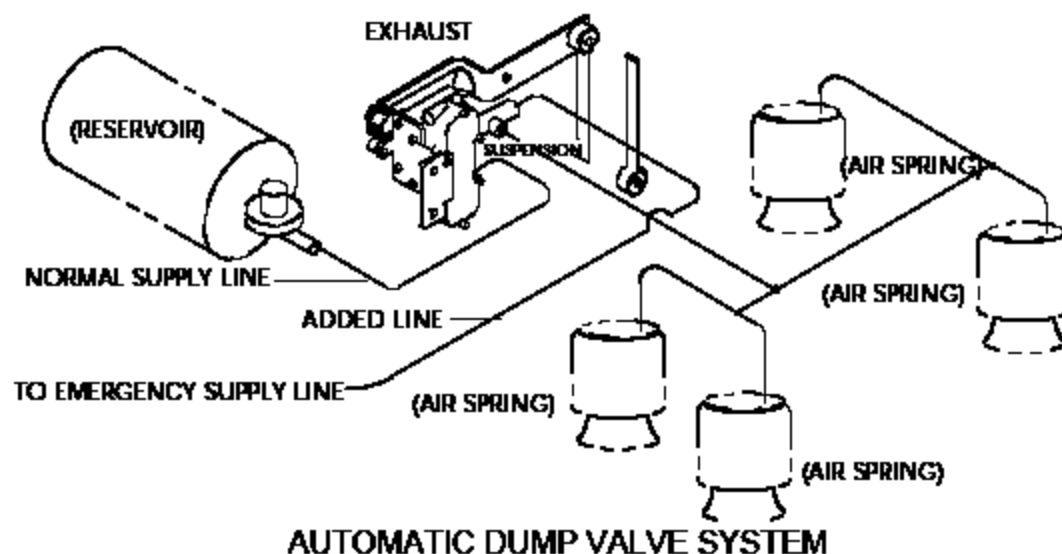


Figure 4. Raising & Lowering Telescopic Landing Gear

RELEASING A LOADED TRAILER EQUIPPED WITH AIR RIDE SUSPENSION

Unhitching from a loaded trailer equipped with air ride suspension and setting it primarily on the landing legs may cause damage to the trailer. Due to the loss of air pressure in the air bags the trailer will slowly move forward over a period of time applying lateral pressure on the landing gear therefore bending it and causing potentially serious structural damage to the trailer. To avoid this occurrence the air springs must be fully deflated before removing the truck from the trailer 5th wheel (hitch) when the trailer is loaded. This may also be accomplished by the use of an automatic, manual or electric dump valve.



DANGER

Mechanical uncaging of the spring brakes is not recommended. Under no circumstances should a trailer with a mechanically uncaged spring brake be pulled in transit. Such unsafe and improper operation may cause serious personal injury, including death, to the operator, handlers, and bystanders.

PRODUCT HANDLING INSTRUCTIONS

GENERAL INFORMATION

- > **SAFETY.** It is important that every operator, before loading or unloading any product, familiarize himself/herself with the tank's operational characteristics; including manholes, vents, discharge valves, pump off valves, etc. It is also important that every possible safety precaution be taken when loading or unloading any product to avoid personal injury or material damage.

CAUTION

All loading and unloading operations must be performed outside.

- > **GROUNDING.** Grounding is electrically connecting the unit to a ground to discharge any static potential, either existing or generated, to the earth. Grounding procedures are presented in specific paragraphs on loading and unloading.



CAUTION



Ensure grounding connections are made properly and firmly before any loading operations begin.

- > **FIRE EXTINGUISHER.** Always know the location of the fire extinguisher (either on the trailer or in the tractor) in case of an emergency.
- > **SPILLS AND LEAKS.** All spills must be cleaned up immediately. Most states have laws concerning spill size. Know the laws for your state and report spills to the proper authorities (Title 49 CFR Sec. 171.15 requires immediate telephone notice to the D.O.T. of any spill meeting the criteria outlined on page 2 at 800-424-8802). Suitable containers must be placed under hose connections and similar locations to collect spillage or leaks.



DANGER



Operators must always be alert for leaking or malfunctioning equipment. Stop all operations immediately at the first sign of a leak or malfunction. Failure to do so may result in extensive property damage and/or serious personal injury, including death.

- > **LADDERS AND WALKWAYS.** Be sure ladders and walkways are well maintained. If the abrasive surface on the walkways is worn, damaged, or missing, repair or replace it immediately.



DANGER



The top of the tank trailer is not intended for use as a heavy work area. Observe the following procedures when the ladder or walkway must be used:

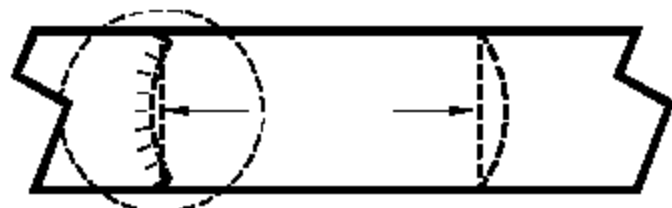
- + The use of the ladder and walkway area is recommended **ONLY** when other access is unavailable.
- + Always keep three (3) limbs, either both hands and one foot or both feet and one hand, in firm contact with the ladder when in use.
- + When the top of the tank must be used as a work area, a stationary platform with guard rails should be used, a safety harness should be worn, and the abrasive surface at the top of the tank should be kept free of oil, grease, and/or product.
- + If the abrasive surface is worn or missing, replace it immediately.

Failure to follow these procedures may cause serious personal injury, including death.

OPERATING PRESSURE



BULKHEADS DURING NORMAL OPERATION



BULKHEADS DURING ABNORMAL OPERATION
WITH HIGH POSITIVE PRESSURE



BULKHEADS DURING NORMAL OPERATION
WITH HIGH VACUUM

Figure 6. Effect of Differential Pressure on Bulkheads

Pressure is an extremely dangerous entity with regard to a Petroleum Transport. For this reason, knowledge of proper vent function is critical. Your Petroleum Transport is designed to operate at no more than six (6) ounces psia vacuum and no more than one (1) psig pressure (FTMA RP 45-93). This pressure is regulated by the atmospheric vent. During normal operation, these pressures should not be exceeded. If there is a malfunction of some type, such as a plugged or stopped vent, or an operator error, such as failure to open the positive vent, the pressure may rise above one (1) psig pressure or more than six (6) ounces psia vacuum. These are extremely dangerous situations and should be watched for at all times. If the pressure rises to three (3.63) psig, as in the case of an accident or other extreme situation, the Pressure Actuated Fill (P.A.F.) will release and discharge the pressure. The P.A.F. differs from the atmospheric vent and the positive vent in that it is a large capacity vent. All trailers equipped for bottom loading should be equipped with at least one P.A.F. per compartment. Check the atmospheric vent, positive vent, and P.A.F. daily to ensure their proper operation. On tanks equipped with vapor recovery systems, always be sure to open all valves and remove all caps in the vapor line whenever loading or unloading the trailer. Failure to do so could result in the differential (positive or vacuum) pressure inside the tank trailer to rise to an unsafe level. Any differential pressure higher than three (3) psi could result in severe damage to the structure of the tank trailer, including buckled (reversed). (Figure 6)

DANGER

Check all vents daily to ensure their proper operation. Consult the individual manufacturer's data for proper maintenance. Failure to do so may result in severe damage to the tank trailer, including buckled (reversed) bulkheads.

DANGER

Do not introduce pressure into the void area between double bulkheads. This can cause severe damage to the tank trailer, including buckled (reversed) bulkheads, and serious personal injury, including death.

Vapor Recovery System

The vapor recovery system plays a critical role in relieving pressure from the tank trailer. The positive vent releases pressure in the form of vapors into the overturn rail which is in line with the vapor recovery downline. This downline is what the vapor recovery hose is hooked to. It is important to maintain an open path for vapor release by ensuring proper vent operation every day and by opening any valves and removing any caps in the vapor recovery line before loading or unloading your petroleum transport. Take care to notice what type of fitting is on the downline, as some (such as dry brake) may need a special adapter at the rack to open.

LOADING INSTRUCTIONS

	WARNING	
The tractor engine should NOT be running during loading and/or unloading operations.		

	DANGER	
Most tank trailers are equipped with a Pressure Actuated Fill (P.A.F.) cover incorporated into the manhole cover. When bottom loading or any other time the internal pressure of any compartment reaches 3 psi, this P.A.F. functions as a relief vent. Test this vent/fill daily to ensure it opens at 3 psi. A malfunctioning or improperly maintained P.A.F. may cause extensive shell damage, bulk head damage, and/or serious personal injury, including death.		

	WARNING	
Most substances being loaded or unloaded are hazardous. Know what you are dealing with and know where to acquire first aid in case of an emergency.		

	CAUTION	
All loading and unloading operations must be performed outside.		

Precautions to Observe Before Loading Tanks

- Ensure all product discharge valves and emergency valves are in operating order and are closed. The remote emergency valve control (usually located at the front of the tank) should be functional and the fusible link in the emergency valve operator should be in place.
- Ensure the correct commodity placards are in place.

- Ensure the manhole cover gasket is intact and the closing mechanism functions properly to secure the lid tightly.
- Ensure the unit is equipped with spring loaded emergency venting. Fusible venting, if so equipped, may not be replaced with caps or plugs.
- Ensure the tank is clean, since some products can react violently when mixed.
- Know the nominal capacity of the compartment and the commodity capacity of the tank to avoid spillage due to overfilling.

DANGER

Always clean a tank before loading a different type of product. When a tank trailer is emptied of fuel, a mixture of vapor and air remains that is within the flammable range. Refilling the trailer with a type of product other than that which was just emptied may detonate that mixture and cause an explosion, which may cause extensive property damage and/or serious personal injury, including death.

- CFR 173.24b requires that there be enough vapor space to allow for expansion due to any rise in product temperature during transit. In no case is this to be less than 1% for flammable liquids.
- If the unit is to be bottom loaded and is not equipped with a positive vent or P.A.F., open the top fill cover or the manhole before loading.

DANGER

Failure to relieve the internal pressure through a positive vent or an open manhole cover when loading can result in over pressurizing and cause severe damage to the tank and serious personal injury, including death.

Precautions to Observe While Loading Tanks

- Always set the parking brake before loading.
- If the product is flammable, ground the tank to the loading rack.
- Do not load the vehicle beyond the maximum product load specified on the metal certification plate or on the vehicle certification label which specifies the Gross Vehicle Weight Rating (GVWR). The GVWR is the maximum allowable total weight of the vehicle, payload, and equipment on the vehicle.

1. Ground the tank trailer (Figure 7).
2. Make sure all compartments to be loaded are empty and know their nominal capacity.
3. Connect the vapor recovery piping to the loading rack vapor receiver. Ensure all valves are open and there is no restriction in any line. If the loading rack is not equipped with a vapor receiver, Ensure the vapor line on the tank trailer is connected to hoses or lines which conduct vapors away from the unit to a safe venting area, or open the manhole.
4. Make sure the secondary shutdown devices (if so equipped) are connected from the loading rack to the tank trailer, are compatible, and are functional.
5. Know the location of the fire extinguisher. Remove it and bring it to the point of operation. Read the instructions on the fire extinguisher and be prepared to use it.
6. Ensure the meter on the loading rack is set at a quantity equal to or less than the nominal capacity of the compartment being loaded.

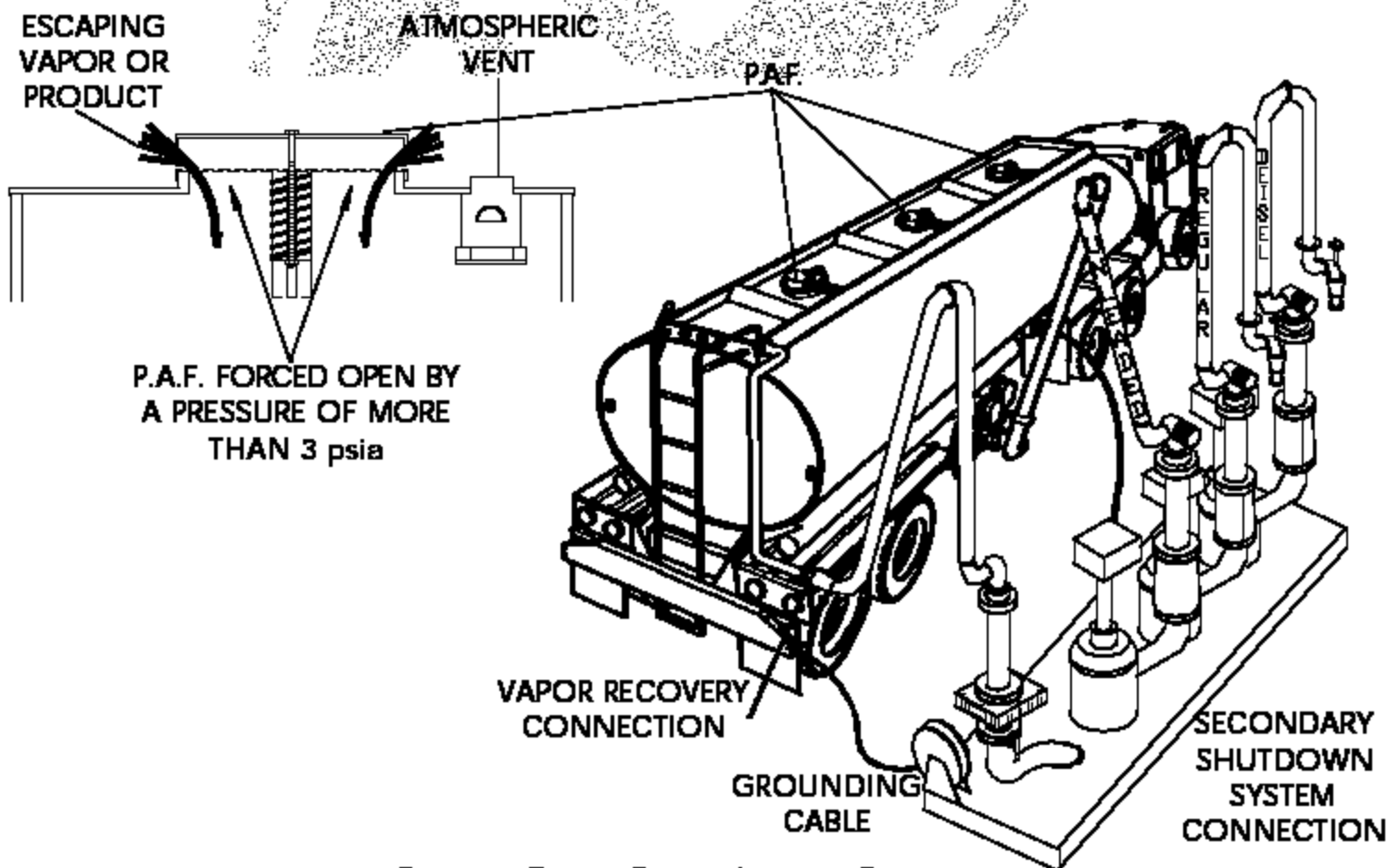


Figure 7. Typical Bottom Loading Operation



WARNING



Be prepared to stop the supply of product at the loading facility in the event of a high level shutoff malfunction or if an apparent leak or other unusual condition is noticed.

7. Connect the product hose from the loading rack to the bottom load fitting for the particular compartment being loaded.
8. Open the necessary valves on the tank trailer and the loading rack.
9. After loading the tank, make sure the product hose, the vapor hose, and the high level shutoff devices are disconnected.
10. Disconnect the grounding wire.



WARNING



If the unit is equipped for bottom loading, it usually will have a positive vent for each compartment that opens automatically when the emergency valve is opened. If so equipped, make sure the vent is operating properly. Note the vent will be concealed under the vapor collector if the unit is equipped for a vapor recovery hood.

Top Loading



CAUTION



The tank trailer should be loaded through the top only when bottom loading is not possible. Bottom loading minimizes the level of static electricity build-up.



CAUTION



When top loading through a fill cover, the automatic shutdown device on the tank trailer is not utilized. Use the capacity indicator located in each compartment to determine when it is full.

1. Ground the tank trailer (Figure 8).
 - a. When loading at a rack or stand, connect the grounding cable of the loading rack or stand to the tank trailer before opening the fill cover.

- b. When loading with a hose at a storage facility, the hose may have a metal fitting on the free end but the other end may not be bonded internally. Such a fitting is insulated and could become statically charged. Connect a grounding cable to the tank trailer and to some part of the permanent piping of the loading facility before opening the fill cover.
2. Ensure all compartments to be loaded are empty and all of the valves on the tank trailer are closed before filling the tank. Know the nominal capacity of each compartment before to be filled.
 3. Know the location of the fire extinguisher. Remove it and bring it to the point of operation. Read the instructions on the fire extinguisher and be prepared to use it.
 4. Ensure the meter on the loading rack is set at a quantity equal to or less than the nominal capacity of the compartment being loaded.
 5. Slowly open the fill cover on the compartment to be loaded and insert the fill pipe far enough to keep the end near the bottom of the tank. Slowly fill the compartment until the end of the fill pipe is submerged to reduce turbulence and static electricity build-up.
 6. Fill the compartment no further than to the bottom of the highest marker on the capacity indicator rod.
 7. When the compartment is full, shut off the supply, remove the fill pipe, and close and secure the fill opening.
 8. Fill the other compartments using the above instructions.
 9. When loading is completed, remove the grounding wire(s).

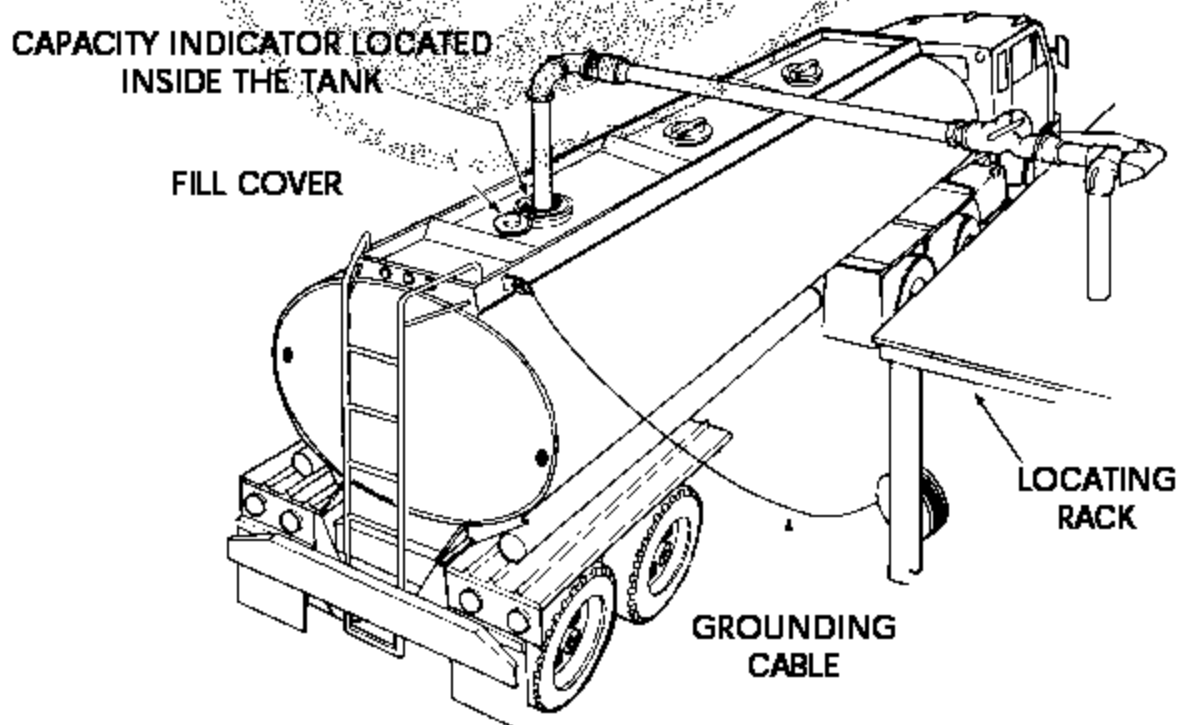


Figure 8. Typical Top Loading Operation

Partial Loading of Compartmented Tanks

The recommendations concerning the partial loading of compartmented tanks are illustrated in Figure 9. These procedures are intended to minimize surging of the product and to maximize traction of the tractor trailer combination.

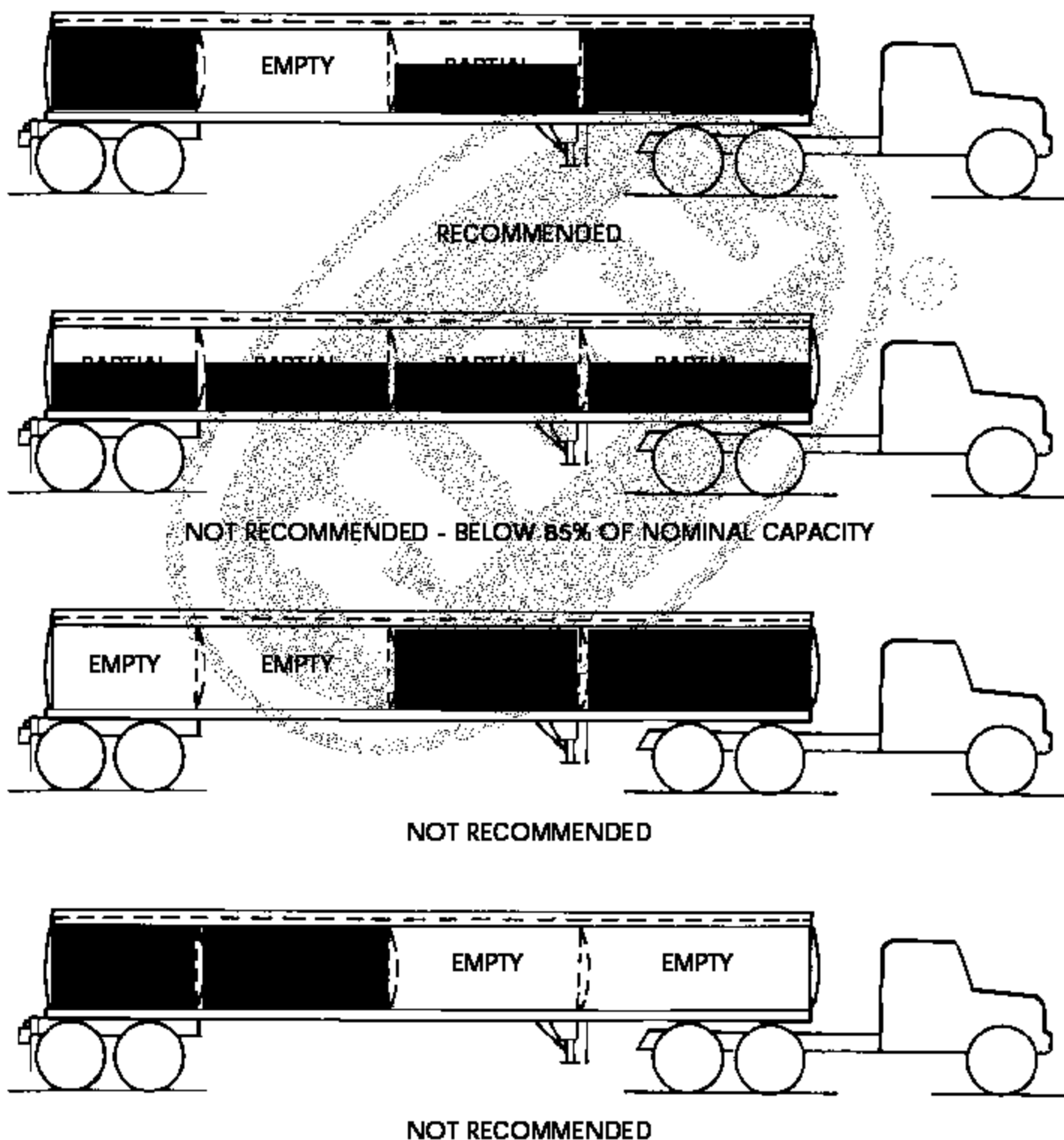


Figure 9. Partial Loading of Compartmented Tanks

	WARNING	
Most substances being loaded or unloaded are hazardous. Know what you are dealing with and know where to acquire first aid in case of an emergency.		

	WARNING	
The tractor engine should not be running during loading and/or unloading operations.		

	CAUTION	
All loading and unloading operations must be performed outside.		

Precautions to Observe Before Unloading Tanks

- Always set the parking brakes before unloading.
- See that discharge lines, valves, and transfer hoses are empty and clean. Ensure all hoses are compatible with the product to be unloaded.
- Remain clear of rotating drives if the product is to be pumped off, to prevent entanglement in machinery. When pumping off product, run the pump for several minutes after the suction breaks air. Then close the valve and open the small air intake valve, if provided, to purge the hose.
- In case of an emergency, product flow must be stopped by the remote emergency valve control. **KNOW ITS LOCATION!**

Unloading Procedure

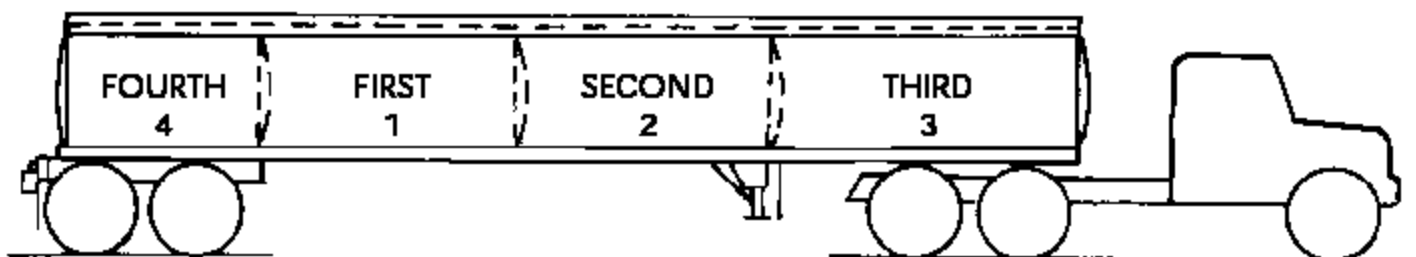
1. Before unloading any compartment, refer to Figure 10 for the recommended unloading sequence of compartments. If traction is a problem during transportation, reverse the order of the last two compartments.
2. Set the parking brakes on both the tractor and the tank trailer.
3. Connect a ground cable(s) to the trailer if needed.

4. Connect the vapor hose from the trailer to the vapor connection on the receiving tank. Make sure all valves in this line are open.
5. Make sure all vent valves in the top of the trailer are operating correctly. If vapor is not to be recovered, open the valves or remove the caps on the trailer's vapor line. If the trailer is not equipped with a vapor recovery or vent valve, open the manhole cover. Failure to provide vacuum relief by one of the above methods may result in tank collapse.

DANGER

On tanks without vapor recovery systems or without top vents, open the manhole before opening the outlet valve. Failure to do so will cause a vacuum to be created in the tank which will result in extensive damage to the vessel and could cause serious personal injury, including death.

6. Connect the product hose from the trailer to the receiving tank.
7. After both ends of the product hose are secured, open the emergency valve. Open the product discharge valve slowly and check for leakage before leaving the valve.
8. After the load is discharged, ensure the piping is completely drained and there is no product in the vapor recovery system.
9. Close the emergency valves, product discharge valves, and manhole covers, and return all hoses to their proper places.
10. Disconnect the ground cable(s).



INTRODUCTION

The importance of regular inspection and preventive maintenance cannot be overemphasized. Making necessary adjustments, tightening bolts and nuts, and checking air lines and wiring connections as needed, will go far toward avoiding serious trouble and delays on the road.

You, The Operator, are the first line of defense in preventive maintenance. You are responsible for reporting all need for adjustment or repair, and for performing a vehicle safety check daily prior to operation.

LUBRICANTS

It is not the policy of Heil Trailer International to publish lists of approved lubricants or to guarantee lubricant performance. The responsibility for the quality of any lubricant rests solely with the manufacturer of the lubricant.

DELIVERY INSPECTION

All units are thoroughly tested and inspected at the factory prior to shipping. As an added precaution, the following items should be double checked upon delivery:

Axles	Ensure proper alignment with king pin
Wheels	*Ensure proper lug torque
Brakes	Ensure proper operation and adjustment
Lights	Ensure proper operation
Suspension Bolts and Axle U-bolts	*Ensure proper torque
Gasketed and Flanged Joints	*Ensure proper bolt torque
Piping	Check for leaks
Manhole Cover	Check clamping device for improper cover closure
Landing Gear Bolts	Ensure tightness
Supports and Braces	Ensure bolt tightness
Ladders and Walkways	Ensure bolt tightness and safe condition
Decals	Ensure proper installation

(Refer to page 9 and to the Parts and Maintenance / Adjustment Manual)

*For proper torque values, see charts on pages 41 and 42.



	CAUTION	
Replace gaskets when they are broken, crushed, or no longer provide an adequate seal. Use only genuine HEIL or OEM replacement parts.		

PREVENTIVE MAINTENANCE SCHEDULE.

DAILY

Ladder	Ensure bolt tightness
Brakes	Ensure proper operation
Upper 5th Wheel Plate	Check for missing bolts, improper tightness, and improper wear; ensure adequate lubrication
Lights	Ensure proper operation
All Bolts	Visually ensure tightness
Air Reservoirs	Drain at the end of each shift
Tires	Check for improper inflation or improper wear
Emergency Valve Operators	Check cables for adjustment needs
Piping	Check for leaks or damage, particularly at gaskets and couplings
Manhole and Fill Cover	Check for leaks or damage; particularly at gaskets
P.A.F. and Other Vents	Ensure proper operation

WEEKLY

Oil Seals	Check for oil leakage or improper oil level
Wheel Lugs	Ensure proper torque
Wiring	Ensure all connections
Axle U-Bolts	Ensure proper torque
Manhole	Check clamping device for improper cover closure and gasket for damage or swelling
Landing Gear Bolts	Ensure tightness

MONTHLY

Manhole	Clean manhole and lubricate clamps
Supports and Braces	Ensure stability
Emergency Valve Cables	Lubricate
Flanges and Emergency Valves	Ensure proper bolt torque

EVERY 5,000 MILES (8,047 KM)

Axles	Ensure proper alignment with kingpin
Brakes	Lubricate camshafts and adjust as needed
Wiring	Check for chafed or broken wires, improper ground connections, and loose retaining clips
Upper 5th Wheel Plate	Lubricate
Suspension	Ensure proper bolt torque
Piping	Check all piping supports and their bolt torque
Camshafts	Lubricate all grease fittings

EVERY 10,000 TO 25,000 MILES (16,093 - 40,234 KM)

Wheel Bearings	Check for looseness
Brakes	Inspect linings, slack adjusters, and air brake chambers; free up shoes and anchor pins

LUBRICATION AND SERVICE CHART

Ensure proper operation of P.A.F. and other vents.	X				
Drain any water from the air reservoir.	X				
Check the manhole clamps, cover closure, and gasket.		X			
Clean the manhole and lubricate its clamps.			X		
Check the operation of all lights.	X				
Check all wiring connections.		X			
Check for broken or chafed wires.				X	
Check the brake operation.	X				
Adjust the brakes (Pg. 31).				X	
Inspect the brake linings, slack adjusters, and air brake chambers.					X
Free up brake shoes and anchor pins.					X
Check the suspension bolt torque (Pg. 41).				X	
Check the tires for damage.	X				
Check the axle alignment to the king pin (Pg. 37).				X	
Check the axle U-bolt torque (Pg. 41).		X			
Check the oil level and the oil seal on the axles (Pg. 32).		X			
Check the ladder bolts tightness.	X				
Lubricate the brake camshafts and grease fittings on the axle.				X	
Check the bolt torque on emergency valve and flanges (Pg. 42).			X		
Check the wheel bearings (Pg. 32).					
Check the lug nut torque (Pg. 42).		X			
Check the adjustment of the emergency valve cables (Pg. 39).	X				
Check the piping supports and their mounting cables (Pg. 39).				X	
Check all valves, piping, and manhole or fill covers for leaks.	X				
Check the landing gear mounting bolt tightness.		X			
Check upper 5th wheel for loose or missing bolts or improper wear.	X				
Lubricate the upper 5th wheel				X	
Visually check tightness of all bolts.	X				
Check all supports and braces.			X		
Lubricate the emergency valve cables.			X		
	DAILY	WEEKLY	MONTHLY	5,000 MILES	10k- 25K miles

MAINTENANCE PROCEDURES

AIR RIDE SUSPENSIONS

Due to the complexity of the air ride suspensions, it is critical that all preventive maintenance instructions are carried out specifically as requested. Consult the manufacturer for a detailed list of their recommended preventive maintenance schedules.

BRAKES

Every 5,000 miles the brake camshaft should be lubricated with an approved chassis lubricant. Every 10,000 to 25,000 miles the brakes should be serviced as follows:

1. Remove wheels and hubs.
2. Inspect the brake roller shafts, cam rollers, anchor pins, camshaft support bushings, spider bushings, and camshaft for wear. Replace them if necessary. Always lubricate upon reassembly.
3. Inspect brake linings for wear, loose rivets, and any signs of grease on the braking surface. Oil soaked linings are not reusable and must be replaced. Check to ensure that the linings have not worn to the point that the rivet heads are contacting the inside surface of the drum. Reline or replace the brake shoes if necessary.
4. Check the inside surface of the drum. If the drum is worn, replace it. Reboring of drums is not recommended, as the strength of refaced drums is greatly reduced.
5. Service the wheel bearings and seals if required (see Wheel Bearings and Seals). Reassemble the hubs and wheels.

Slack Adjusters

Most trailers are equipped with automatic slack adjusters to compensate for brake lining wear. Manual adjustment of an automatic slack adjuster should be done only after lubricating, relining, or overhauling the brake, or when installing a new slack adjuster.

Please refer to the manufacturer of the slack adjuster (manual or automatic) for proper installation, replacement, and preventive maintenance procedures.

Anti-Lock Brakes

If your trailer is equipped with an anti-lock brake system (ABS), please refer to the manufacturer's maintenance manual for proper instructions and preventive maintenance procedures.

WHEEL BEARINGS AND SEALS

The wheel hub revolves around the axle spindle on two tapered roller bearings. The bearings are oil lubricated and the hub cavity is sealed against leakage by a seal which rides around an axle ring on the spindle shoulder. Figure 11 illustrates the bearing and seal arrangement.

Check the oil level and check for leaks around the oil seal at least once a week. If it is low, refill the hub to the oil level line on the hub cap. Use SAE 90 wt. oil.

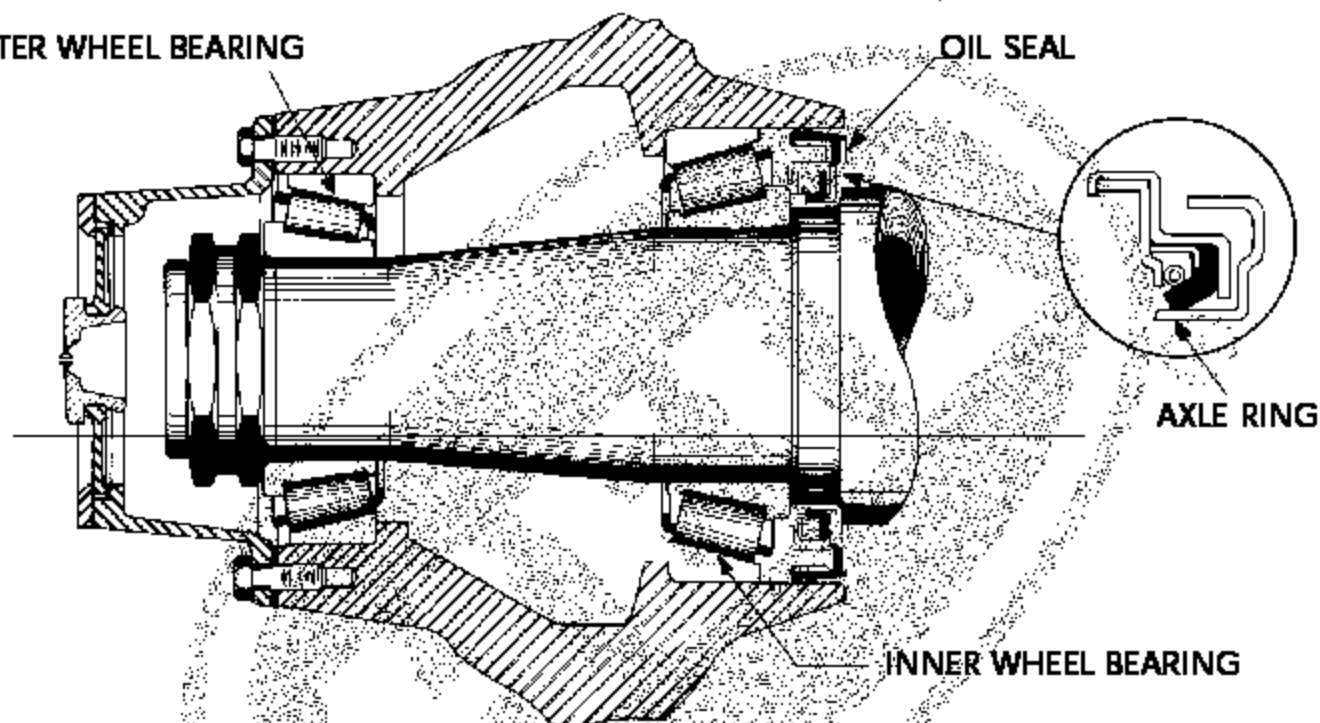


Figure 11. Typical Cross Section of Wheel Hub

Wheel Bearing Adjustment

1. Tighten the jam nut while turning the wheel until there is a slight bind.
2. Back off the inner jam nut $1/3$ turn to allow the wheel to rotate freely.
3. Snug the washer to the inner jam nut and tighten the outer jam nut.
4. After the final adjustment, end play should be between 0.001" and 0.008".

Oil Seal Replacement

*This procedure is for Stemco Guardian® oil seals. If your trailer has a different type oil seal, consult the manufacturer for instructions before attempting to replace the seal.

1. Remove the wheels and hubs.
2. Remove and discard the old seal.
3. Remove all burrs from the hub bore and thoroughly clean the entire wheel cavity.

4. Lay the wheel down and after oiling the inner bearing, place it into the bearing cup.
5. Apply a thin coat of No. 2 sealant on the O.D. of the seal and position it in the starting position on the hub bore. Place the proper installation tool on the seal with the handle in the vertical position and strike the tool sharply to start. Drive the seal into the bore until it is completely bottomed against the axle shoulder. Check that there is at least 1/32" clearance between the cone and seal.
6. Oil the I.D. of the bearing cone and align the wheel with the axle. Slip the wheel into place on the axle, being careful not to damage the seal. If the wheel does not slip back in place easily, remove it and check for burrs or possible component damage.
7. Install the outer bearing, lock nut, and axle nut. Tighten and adjust the bearings to manufacturer's recommendations.
8. Install the hub cap with gasket and fill the cavity with oil until the proper level is reached. Check for leaks.

Axle Ring Replacement

1. Remove the old ring (taking care not to damage the spindle).
2. Thoroughly clean the spindle and axle shoulder. Remove any burrs on the shoulder and foreign matter in the threaded area. Apply a thin layer of No. 2 sealant to the O.D. of the axle shoulder (Figure 12).

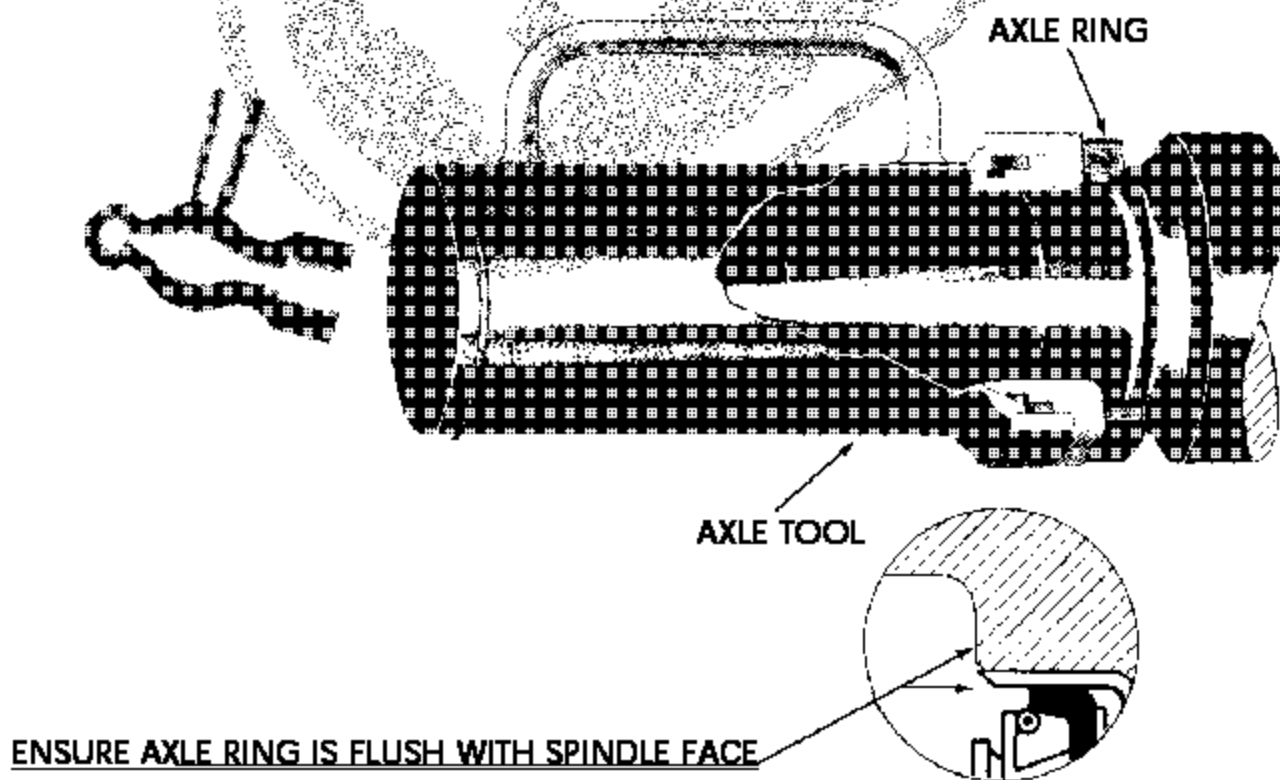


Figure 12. Axle Ring Installation

3. Using the axle tool and a hammer, drive the seal squarely and evenly into the bore. The seal should bottom evenly against the bearing cup. DO NOT continue to hammer after the seal has bottomed evenly, or damage to the seal will result.
4. Check the position of the axle ring. The edge of the ring should be flush with the shoulder face. Remove any excess sealant.

WHEELS AND TIRES

General

Proper tire inflation and correct installation of the rims and wheels is essential to the safe, economical, trouble free operation of the tank trailer.

Check the tire pressures daily. Recommended inflation pressure is imprinted on the tires and rims. DO NOT over inflate the tires. This is a common cause of rim failures and accidents. NEVER run your vehicle on one tire of a dual wheel assembly. This practice excessively overloads the other tire in the dual set.

When checking tire pressures, visually check the studs and rim for looseness, cracks, or other damage. Inspect the tires for uneven wear, cuts, cracks, etc., which would render the tire unfit for further service. If any doubts as to the tires durability exist, replace the tire immediately.

	DANGER	
When using a two piece rim, always deflate the tire prior to removal from the tank trailer. The rim and ring may come apart with explosive force, causing serious personal injury, including death.		

Check the wheel lug torques at least once a week. Recommended dry torque for all lug nuts on spoke wheels is 200 - 250 ft-lbs. Proper dry torque on both the inner and outer 3/4"-16 lug nuts on ball seat mounted (stud piloted) disc wheels is 450 - 500 ft-lbs. Pilot mounted (hub piloted) disc wheels should be torqued to 500 - 550 ft-lbs. For a complete list of recommended torque values, refer to the chart on page 42.

Wheel Removal

- > **DISC WHEELS (Ball Seat Mounted).** Remove the outer nuts (Figure 14) and remove the outside wheel and tire. If the inner wheel and tire must be removed, remove the inner cap nuts and remove the inner wheel and tire.
- > **DISC WHEELS (Pilot Mounted).** Remove the lug nuts (Figure 15) and remove both the inner and outer wheels.

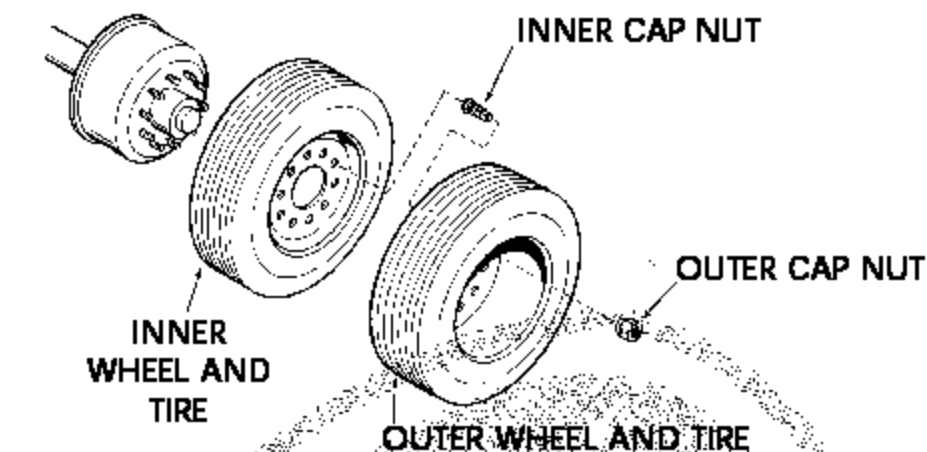


Figure 28. Ball Seat Mounted Disc Wheel Removal

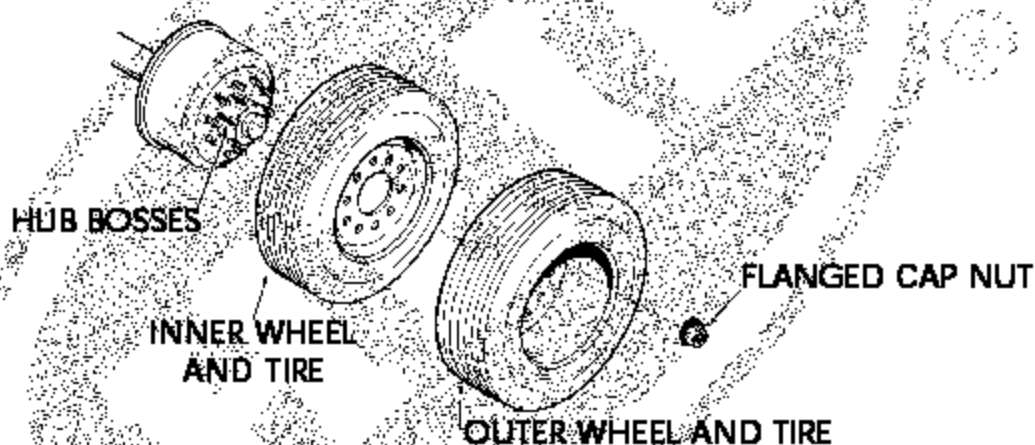


Figure 29. Pilot Mounted Disc Wheel Removal

WARNING

Insufficient mounting torque can cause rim slippage, resulting in broken valves, worn parts, and damaged tires. Excessive mounting torque can cause damage by stripping studs, collapsing spacer bands or forcing rims into an out of round condition.

Pilot mounted Disc Wheel Installation

1. Check the wheels and hubs for damage. Ensure that all studs, lug nuts, and mounting faces of the hubs and wheels are clean and free from grease. Replace any defective parts.
2. Mount both wheels over the hub bosses, being careful not to damage the stud threads. Draw up the lug nuts alternately in the sequence shown in Figure 17. **DO NOT TIGHTEN THEM FULLY.** This procedure will allow the uniform seating of the lug nuts and insure the even, face-to-face contact of the wheels and hub.

3. Tighten the lug nuts fully, using the same criss-cross pattern. The correct dry torque for the lug nuts is 500 - 550 ft-lbs.



WARNING



Insufficient mounting torque can cause wheel shimmy, resulting in damage to wheel and axle parts and extremely excessive tire tread wear. Excessive mounting torque can cause studs to break and discs to crack in the stud hole area.

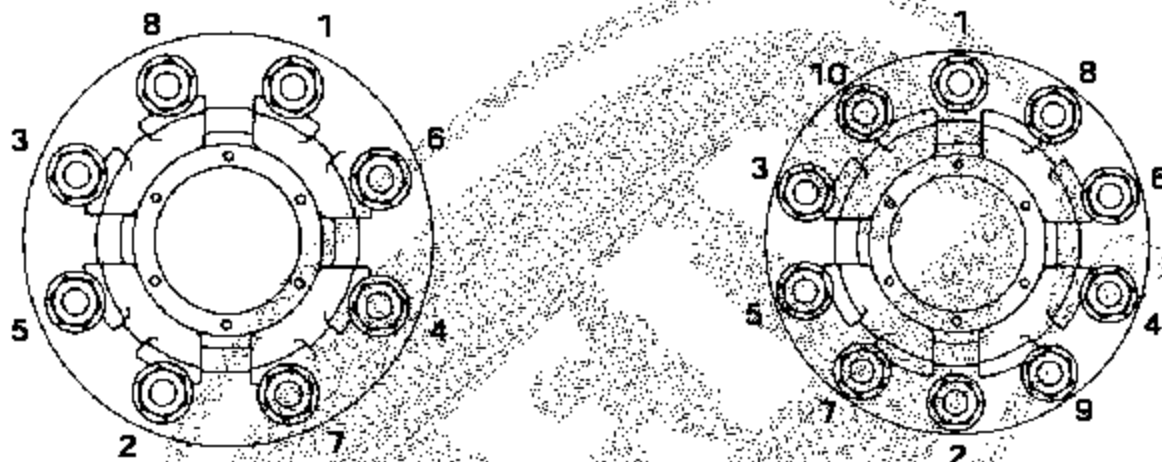


Figure 30. Disc Wheel Torque Sequence

Ball Seat Mounted Disc Wheel Installation

1. Check wheels and hubs for damage. Ensure that all studs, lug nuts, and mounting faces of hubs and wheels are clean and free from grease. Replace any defective parts.
2. Mount the inner wheel over the studs, being careful not to damage the stud threads. Draw up the lug nuts alternately in the sequence shown in Figure 17. **DO NOT TIGHTEN THEM FULLY.** This procedure will allow the uniform seating of the lug nuts and insure the even, face-to-face contact of the wheels and hub.
3. Tighten the lug nuts fully, using the same criss-cross pattern. The correct dry torque for the 3/4"-16 lug nuts is 450 - 500 ft-lbs.
4. Mount the outer wheel and repeat the entire procedure. Be sure to tighten the lug nuts only to the recommended torque value.

AXLE ALIGNMENT (TRIANGULATION)

Improper axle alignment will cause dog-tracking and excessive tire wear. To check the alignment of the axles to the king pin, use the following procedure:

1. Set an empty roller on a level smooth surface, disconnect the trailer brakes, and bleed the air tank. Rock the tank trailer back and forth for a distance of approximately 10 feet (3.05 m) to relieve any binding in the brakes or springs. Make sure the spring ends are free and not

binding in the hangers or equalizer. Tow the trailer straight forward for a distance of approximately 30 feet (9.14 m). Stop the trailer with the tractor gears or tractor brakes only. Disconnect the tractor from the trailer and level the trailer suspension by measuring from the front and rear hangers (at the spring bearing surface) to the ground. Use the trailer landing gear to level the trailer. When the trailer is level, the equalizers must be horizontal. Check this before and after the aligning operation by measuring from each end of the equalizer to the frame.

1. Do not remove the wheel, but remove all of the hub caps and install axle center extensions. Use a suitable kingpin jack or center extension to insure a clear path from the kingpin centerline to the axle center extensions.
2. Measure from the kingpin extensions to both of the front axle center extensions (Figure 18). This distance should be the same on both sides. If it is not, loosen the forward adjustable torque arm clamping nuts and adjust the axle to be square with the kingpin. Make sure there are no obstacles in front of the wheel during the alignment procedure.
3. Measure from the kingpin extensions to both of the front axle center extensions (Figure 31). This distance should be the same on both sides. If it is not, loosen the forward adjustable torque arm clamping nuts and adjust the axle to be square with the kingpin. Make sure there are no obstacles in front of the wheel during the alignment procedure.

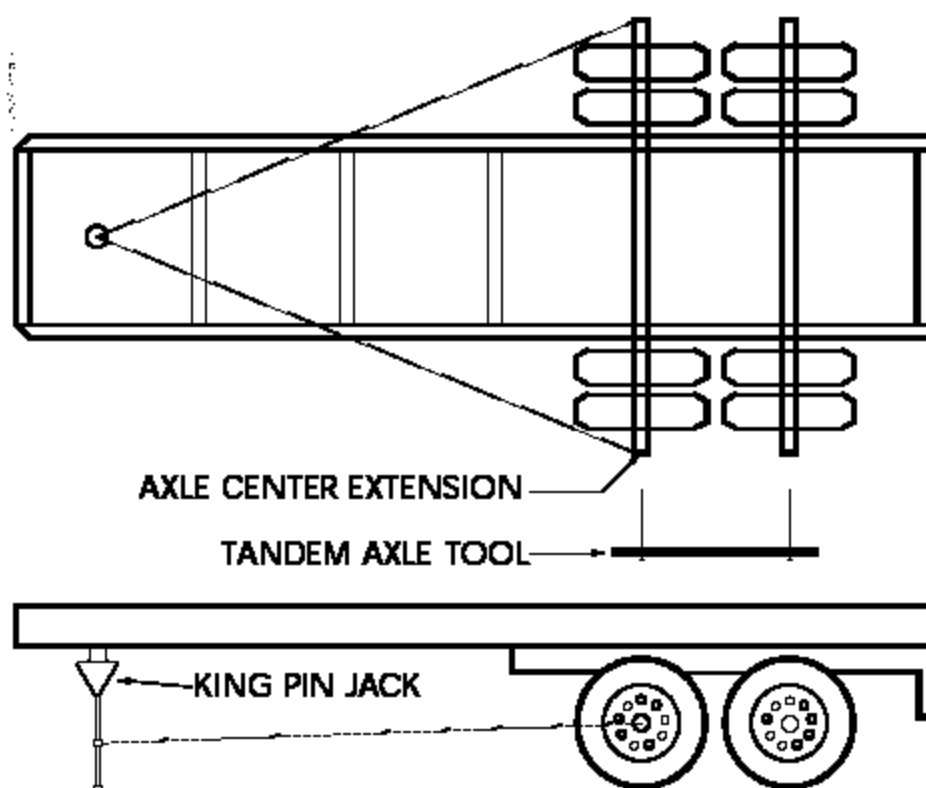


Figure 31. Axle Alignment (Triangulation)

4. Measure from the front axle center extensions to the rear axle center extensions. This distance should be the same on both sides. If it is not, loosen the clamping nuts on the rear adjustable torque arm and adjust the rear axle to be parallel with the front axle. The suspension should now be in proper alignment with the kingpin.
5. Retighten all of the adjustable torque arm clamping nuts to the recommended torque value (see torque chart on page 41). Remove all of the center extensions and replace the hubcaps.
6. Connect the tractor to the trailer and connect the trailer brakes on the lot. Make four or five tight figure eights and an equal number of severe brake stops. Bring the trailer back into the shop and check the axle alignment again. If the axles are not in proper alignment, check for loose or worn bushings and bearings, or loose or broken hangers, crossmembers, side rails, or kingpin.

EMERGENCY VALVE CABLE ADJUSTMENT

Procedure one (Figure 19):

1. Loosen the jam nut on the adjusting bolt on the operator arm linkage.
2. Tighten the adjusting nut to shorten the cable.
3. Ensure the emergency valve will open and close. Repeat if necessary.

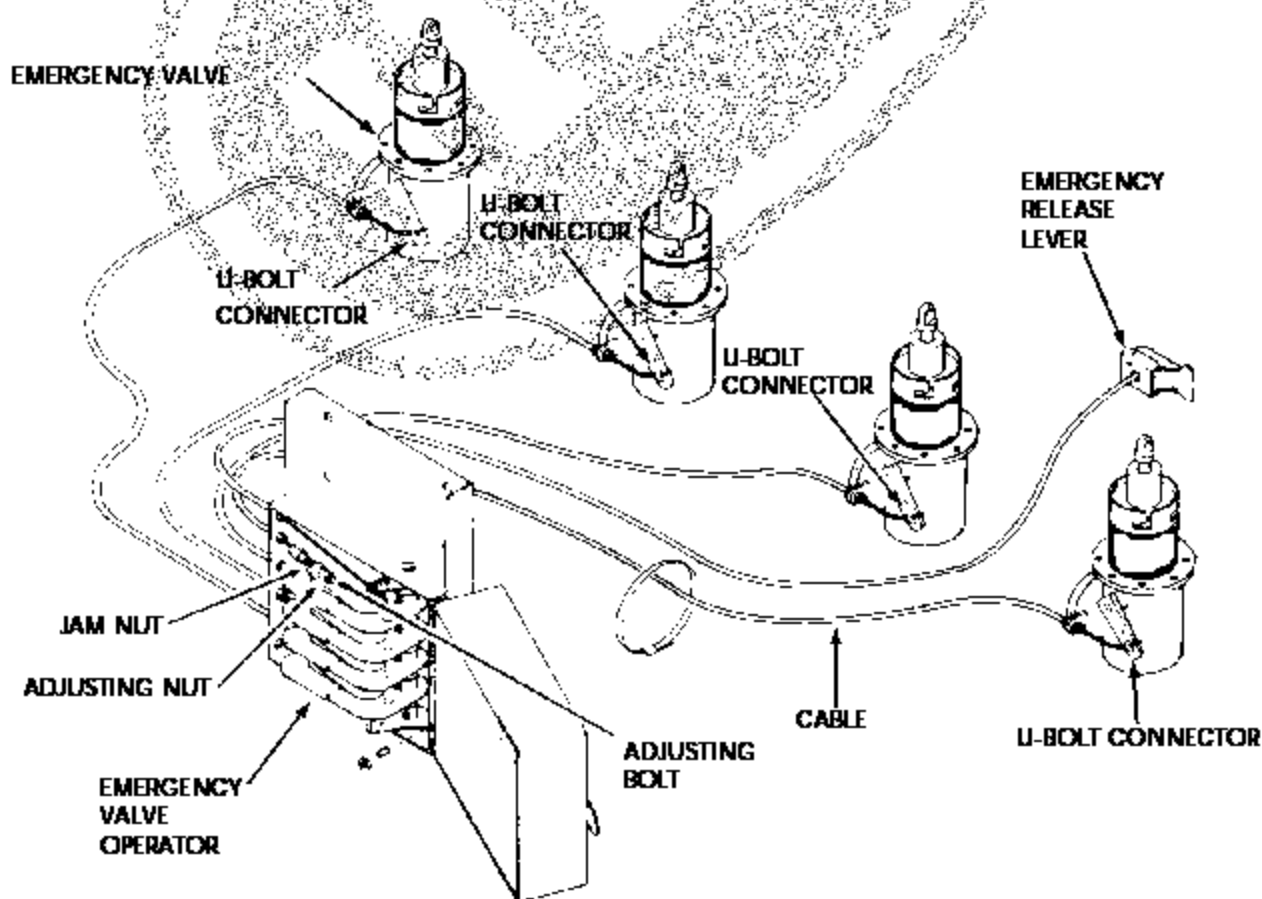


Figure 19. Emergency Valve Cable Adjustment

Procedure two (Figure 19):

1. Loosen the U-bolt connector at the emergency valve.
2. Pull the cable tight and tighten the U-bolt connector.
3. Ensure the emergency valve will open and close. Repeat if necessary.

CAPACITY INDICATOR ADJUSTMENT

1. Locate the tank trailer on level ground.
2. Ensure the compartment and it's corresponding piping is empty.
3. Fill the compartment by metering in the proper amount of water (or any other non-flammable liquid) to be held in the compartment.
4. Loosen the jam nut on the capacity indicator rod and screw the round level indicator up or down, as required, until the liquid level just touches the bottom of the indicator (Figure 20). Hold the indicator firmly and tighten the jam nut.
5. Repeat for each compartment.

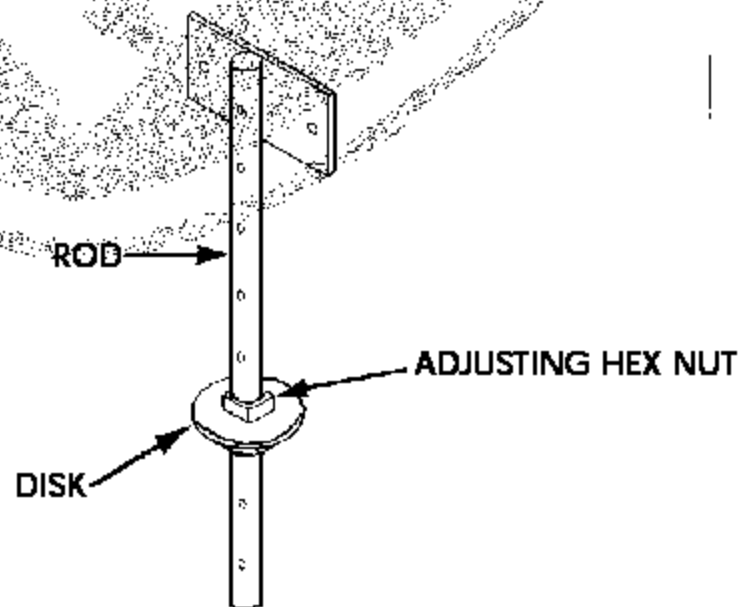


Figure 20. Capacity Indicator Adjustment

TORQUE CHARTS

Check torque values after the "break in" period of approximately 1000 miles (1600 KM) and periodically (every 5000 miles or 8050 KM) thereafter. The retorquing after the break in period is required to comply with warranty requirements and to assure long, trouble free performance.

Recommended Suspension Torque Values

SUSPENSION	BOLT SIZE	COMPONENT IDENTIFICATION	DRY TORQUE (FT-LB)
REYCO AND *TRANSPRO	1/2"	Spring retainer nuts	75 - 80
	5/8"	Adjustable torque arm clamp nuts	125 - 150
	3/4"	U-Bolts	300 - 325
	7/8"	U-Bolts	
	1"	Torque arm end nuts	160 - 200
		Equalizer bolts	450 - 500

Due to the lightweight construction of the Transpro suspension and the complexity of the air ride suspensions, it is extremely important that the proper preventive maintenance consideration be given to these types of suspensions. Please refer to the manufacturer for details.

Torque Values for Composite Springs

SUSPENSION	BOLT SIZE	COMPONENT IDENTIFICATION	DRY TORQUE (FT-LB)
REYCO AND *TRANSPRO	1/2"	Spring retainer nuts	75 - 80
	5/8"	Adjustable torque arm clamp nuts	125 - 150
	3/4"	U-Bolts	250 - 270
	7/8"	U-Bolts	
	1"	Torque arm end nuts	160 - 200
		Equalizer bolts	450 - 500

Recommended Air Ride Suspension Torque Values

SUSPENSION	BOLT SIZE	COMPONENT IDENTIFICATION	DRY TORQUE (FT-LB)
REYCO AND *TRANSPRO	1/4"	Height control valve adjustment nuts	24 - 48
	1/2"	Air springs	35
	5/8"	Lift axle yolk half bolts	150
	3/4"	Shock Absorber Bolts	
		Air Springs	35
		Varied	150
	1"	Varied	
		U-Bolts	680
	1 - 1/8"	Pivot connection bolts	800
		Axle connection bolts	
	1 - 1/4"	Varied	700
Hendrickson- Turner Intraax	3/4" - 10	Quick - Align™ pivot bolt	475-525
	7/8" - 9	Shock bolt	150-175
	1/2" - 13	Air spring bolt (lower)	25-35
	3/4" - 16	Air spring bolt (upper)	45-55
	5/16" - 18	Brake dust shield bolt	160-180
	1/4" - 20	ABS bracket bolt	75-100

- Due to the lightweight construction of the Transpro suspension and the complexity of the air ride suspensions, it is extremely important that the proper preventive maintenance consideration be given to these types of suspensions. Please refer to the manufacturer for details.

Recommended Air Ride Suspension Torque Values

WHEEL TYPE	TORQUE (FT-LB)	TORQUE (FT-LB)
Spoke	All	200 - 250
Disc-pilot Mounted (Hub Piloted)	1 - 1/16" - 16	300 - 400
	All Others	500 - 550
Disc Ball Seat Mounted (Stud Piloted)	3/4" - 16	450 - 500
	15/16" - 12	750 - 900
	1 - 1/8" - 16	450 - 500
	1 - 5/16" - 12	750 - 900

- > Torque values are the same for aluminum and steel wheels.
- > Check the lug nut torque after the first 50-100 miles of operation.
- > Recheck the lug nut torque after every 2,000 - 4,000 miles of operation and after wheel bearing maintenance (10,000 - 25,000 miles).
- > Long stud mounts (1.75" - 1.87") must not be used with dual steel disc wheels.
- > Use grade 8 strength (or greater) for aluminum disc wheels.

Other Recommended Torque Values

COMPONENT IDENTIFICATION	BOLT SIZE	TORQUE (FT-LB)
Emergency Valve to Sump	1/2"	60 - 70
TTMA Flange	3/8"	25 - 35
*Sight Glass		*25 - *35
Upper Fifth Wheel	5/8" - 18	160 - 200
Rungear Frame to Rear Longmember		

- * The torque values for the sight glass must be strictly adhered to, as over-torque or under-torque will cause cracking of the acrylic material.

HENDRICKSON QUICK-ALIGN® Alignment Procedures

Alignment Features

Quik-Align® Alignment Feature

The Quik-Align alignment feature incorporates two flanged washers (collars) that are inserted into slots on each side of the frame bracket. The outboard flanged washer is eccentric (Figure 1). It's outside diameter is guided by an adjustment guide. Rotation of the eccentric washer clockwise or counter clockwise provides fore and aft movement of the suspension axle (Figure 2). The pivot connection is clamped together with our own heavy hex cap screw, hardened washers, and **TORQ-RITE® NUT**. The **TORQ-RITE® NUT** will ensure proper clamping force without the use of a torque wrench.

WELDED ALIGNMENT COLLAR

The alignment collars are clamped together using a huck fastener or a 1 - 1/8" heavy hex cap screw. **After alignment**, both collars are welded to the hanger. The welds must be removed to move the pivot joint for realignment.

AXLE ALIGNMENT AREA

The axle alignment site area should be flat, level, and free of debris.

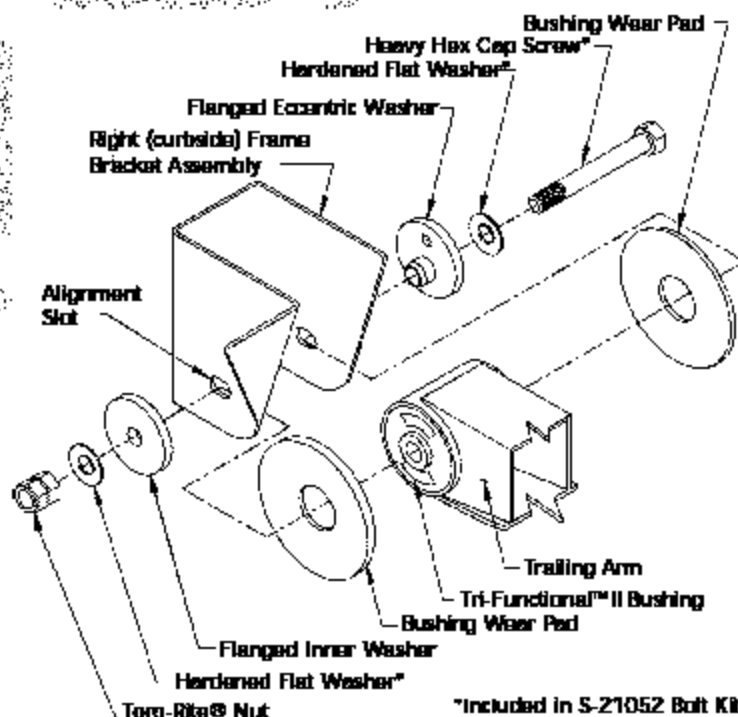


Figure 1- Exploded view of QUIK-ALIGN
AXLE ALIGNMENT PROCEDURES
FIXED SUSPENSION

1. Set the trailer bolster plate (5th wheel plate) to its designed height. It may be necessary to

adjust the landing gear (if unattached) or attach a tractor with the proper designed 5th wheel height to the unit.

2. Set the suspension(s) at the ride height specified on the suspension assembly drawing and the suspension data plate (Figure 3).
3. Inspect each tire set. Tires of each dual wheel set must be matched to a maximum of 1/8" tire radius or a maximum of 3/4" variation in tire circumference.
4. Secure the trailer and release the trailer brakes. Wheel rotation will now occur, while positioning the suspension for and aft.
5. Complete an initial alignment check by measuring from the trailer's king pin to both ends of the axle spindle. The measurement should be an equal distance side to side (Figure 4 "A" & "B").

IMPORTANT: A maximum of 1/8" side-to-side tolerance is typically considered acceptable.

6. After completing the alignment on the forward axle, align all additional axles to the forward axle. Both ends of additional axles should be equal in distance from the forward axle.

IMPORTANT: A maximum alignment tolerance of 1/16" is typically considered acceptable on additional axle(s) (Figure 4 "C" & "D").

AXLE ADJUSTMENT QUIK-ALIGN COLLARS

1. Remove and discard the pivot bolts and nuts from the axle being adjusted and replace with new pivot bolts and TORQ-RITE NUTS.

IMPORTANT: Only remove and discard the pivot bolts and nuts when doing a realignment. Do not follow step 1 for a new alignment.

2. Tighten the TORQ-RITE NUTS on the pivot bolts

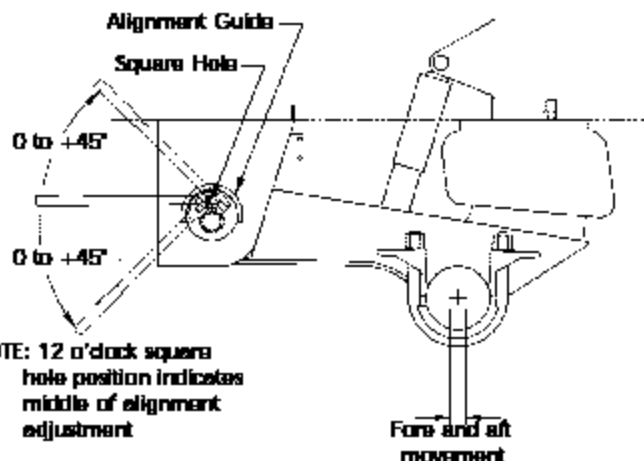


Figure 2 - Adjustment of the flanged eccentric washer

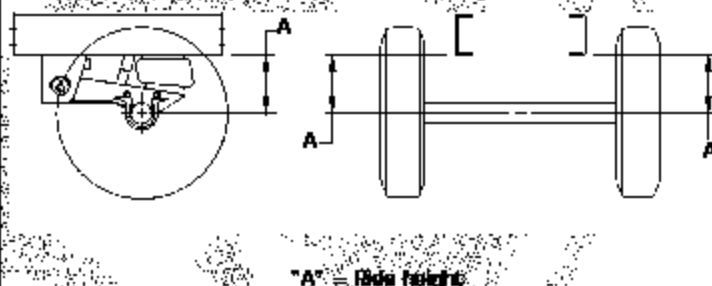


Figure 3 - Description of ride height

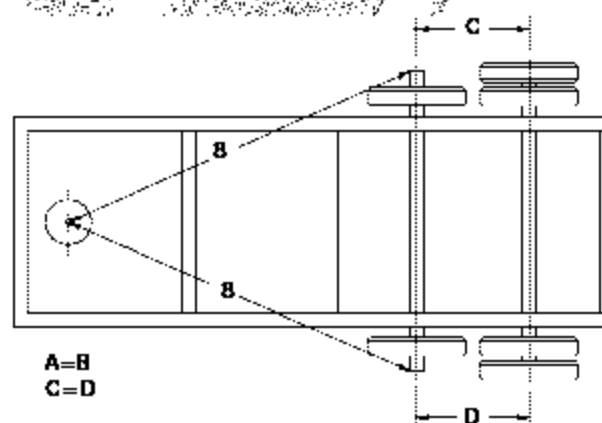


Figure 4 - Measuring distances for proper alignment

to hold the flanged eccentric washers (collars) in place against the adjustment guide, but loose enough to permit hardened washers to be rotated by hand.

CAUTION: Do not allow any type of lubricant or contamination to contact the threads of pivot connection fasteners. Lubricant will reduce the

friction between the threads of the pivot fastener and nut. Failure of the pivot fastener could result.

CAUTION: Reuse of pivot joint fasteners is NOT recommended. A new fastener kit part number S-21052 must be used to prevent pivot connection failure due to insufficient clamp load. Hendrickson assumes no liability for pivot joint failures when a pivot bolt and TORQ-RITE NUT are reused.

3. Inspect the orientation of the square holes on the flanged eccentric washers (collars).

IMPORTANT: If the square holes are not at the 12:00 position, Hendrickson Trailer Suspension Systems recommends the adjustment of the flanged eccentric washer, so it can have maximum range for adjustment.

4. If necessary follow these steps to make the recommended adjustment of the flanged eccentric washer:

- a. Back off the TORQ-RITE NUT, so the flanged eccentric washer is loosened and can be rotated by hand.

- b. Insert and rotate a 1/2" breaker bar in the square hole. Position the square at the 12:00 position. Rotation of the flanged eccentric washer will also produce fore and aft axle movement.

5. Recheck the alignment and adjust the flanged eccentric washers on both sides of the forward axle until the ends of the axle are an equal distance from the king pin. Adjust both sides of the axles to prevent binding of the pivot joint. Snug the pivot connection fasteners.

IMPORTANT: Check the axle movement occurred without compressing the TRI-FUNCTIONAL BUSHING.

CAUTION: Always wear eye protection when operating pneumatic tooling.

CAUTION: Always pin socket to pneumatic tooling.

6. Use a Hendrickson socket (S-20947 for 3/4" & S-21058 for 1") or shallow 1-7/16" impact socket to apply torque to the TORQ-RITE NUT until the outer hex shears off.

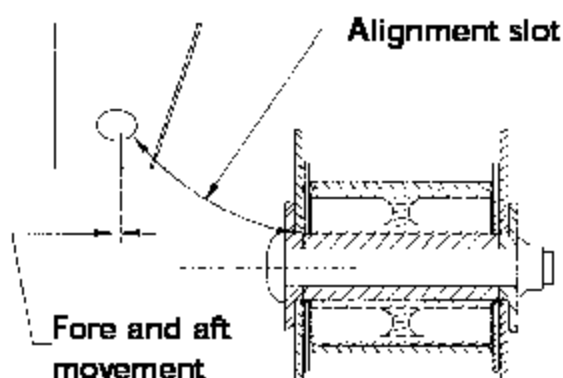


Figure 5 - Showing fore and aft movement for the Welded Collar

7. Align additional axles to the forward axle by rotating their eccentric flanged washers until both ends of the axle are equal distance from the front axle. Repeat steps 1 through 5.

IMPORTANT: A maximum alignment tolerance of 1/16" is typically considered acceptable on the additional axle(s) (Figure 4 "C" & "D").

WELDED ALIGNMENT COLLARS

The following steps are axle adjustment procedures for welded collars only. If you have a QUIK-ALIGN design, see the instructions on page C.17.

1. When minor adjustments are necessary, the collars on one frame bracket (hanger) may only need adjusting; follow these steps:

- a. Determine which side should be adjusted by looking inside the frame bracket at the elongated slots which allow the collars to move for and aft.

- b. Adjust the side with the maximum available adjustment (Figure 5).

IMPORTANT: The alignment slot will appear on the beam side plate of the Y-beam style underslung suspension.

2. On the selected frame bracket, carefully grind or cut the welds securing the alignment collars to the frame bracket.

IMPORTANT: DO NOT REMOVE THE SUSPENSION PIVOT BOLT OR THE HUCK FASTENER. Suspension realignment DOES NOT require the disassembly of the pivot joint.

3. Measure the distance from the trailer king pin to the ends of the forward axle. Move the

suspension fore and aft until both ends of the axle are equal in distance from the king pin (Figure 4 "A" & "B").

IMPORTANT: A maximum of 1/8" side-to-side tolerance is typically considered acceptable.

4. Remove all the equipment used for repositioning the axle to be sure that the axle movement has been achieved without deflecting the bushing.

5. Tack weld the alignment collars in place.

6. Recheck the alignment.

7. Weld around the collar (inboard and outboard) with a 1/4" fillet weld.

8. Check the weld on the alignment collars; the weld should be a 1/4" fillet weld that goes all around the collars (Figure 6).

9. If additional axles are being aligned, recheck the distance between the ends of additional axles and the ends of the forward axle, and adjust as necessary.

IMPORTANT: A maximum tolerance of 1/16" is typically considered acceptable.

IMPORTANT: If the measurements exceed the acceptable tolerances, then repeat steps 1 through 6 of this procedure.

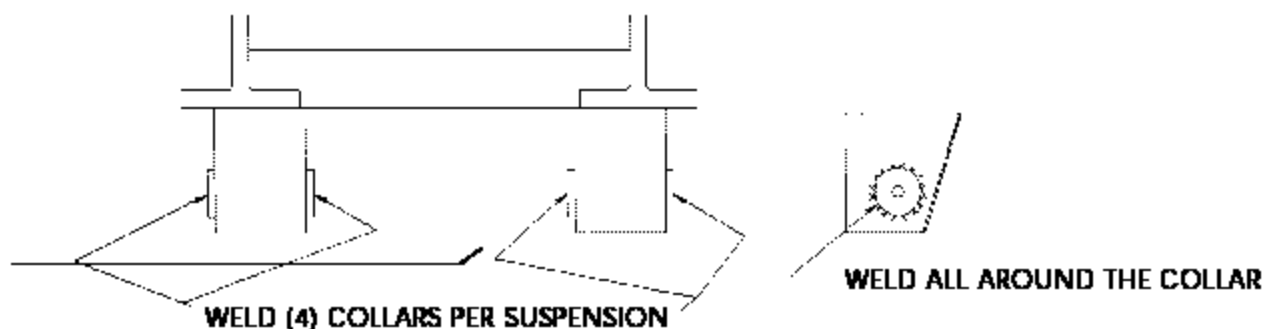


Figure 6 -Welding locations on welded collars

DOUBLE HEAD - VOID PRECAUTIONS

Effective 1990, the U.S. Department of Transportation (D.O.T.) required that all specification cargo tanks be subject to periodic inspections and tests as specified in 49 CFR, 180.409.

In addition, companies that make welded repairs to the cargo tank vessel must hold either a current ASME "U" stamp, or a National Board "R" Stamp and be registered with D.O.T. to perform such work (180.413).

Companies performing inspections and tests to cargo tanks must also be registered with D.O.T. to perform such work (107.502 & 107.503).

Periodic inspections and test will require getting on top of, or entering into the cargo tank. All OSHA safety regulations must be met for the work to be performed.



WARNING



Before attempting to repair a D.O.T. specification cargo tank the repair shop must become familiar with all HM183 rules and guidelines. Failure to do so may result in extensive damage and/or serious personal injury, including death.



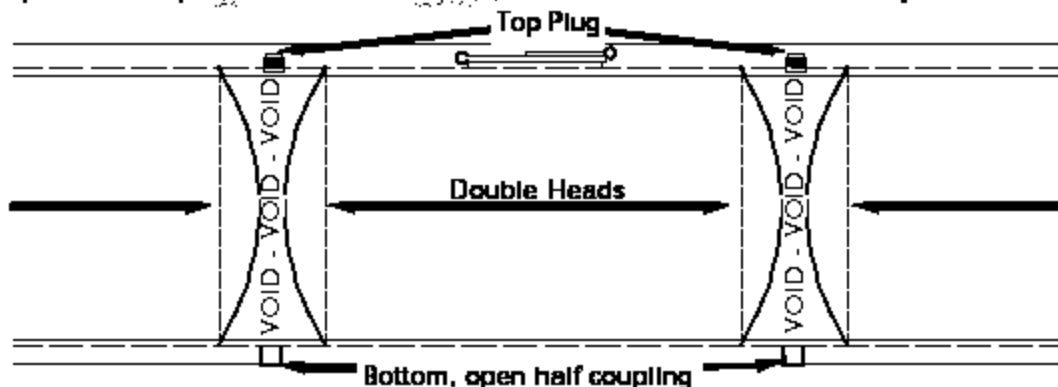
DANGER



Void area between double heads must be degassed, cleaned and monitored prior to making any repair whatsoever to the tank trailer. Failure to do so may result in extensive property damage and/or serious personal injury, including death.

Precautions to Observe

Double head voids are equipped with both top and bottom couplings. During normal operation ensure that the top coupling is plugged and that the bottom coupling is open and free from debris to allow complete drainage of condensation and prevent residual pressure variances. If a leak into the void area between double heads is detected by product seepage from the bottom coupling, remove the plug from the top coupling, install it into the bottom coupling to halt seepage, and proceed to the nearest qualified repair center for evaluation. **Do not continue to operate the unit.**





CAUTION



Prior to any repair of trailers equipped with double heads, double head voids must be cleaned & degassed in such a manner that pressure does not exceed 3 P.S.I. may damage double heads. Failure to follow these guidelines may result in extensive property damage and/or serious personal injury, including death.

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