

WALINGA[®]

INC.



Truck



Trailer

OPERATOR'S MANUAL

for

End Dump Units



WHEEL NUT INSPECTION REPORT

Customer/Driver: This form must be filled out and returned to Walinga immediately upon delivery.

CHECK WHEEL NUT TORQUE AFTER FIRST 50-100 MILES OF SERVICE! TORQUE TO 500 FT- LBS

I have read this notice and I understand the importance of the instruction.

Customer Name: _____

Address _____

City, Prov./State _____

Date: ____ ____ ____

Driver/Customer Signature: _____

Walinga employee or delivery personnel:

- 1) Instruct driver or customer to sign Walinga Copy and Customer Copy
- 2) Return the Walinga Copy to Walinga.

In the US return to Walinga USA Inc. 1190 Electric Ave., Wayland, MI 49348
In Canada return to Walinga Inc, 5656 Highway 6N, Guelph, ON N1H 6J2

Walinga Copy



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Customer Copy

V.I.N. PLATE LOCATION

Always give your dealer the V.I.N. (Vehicle Identification Number) of your Walinga Unit when ordering parts or requesting service or other information.

Please mark the number in the space provided for easy reference. Also obtain and mark down the Serial Number, Production Year, and other pertinent information of your Trailer/Truck Unit in the space provided.



Truck



Trailer

V.I.N. Number	_____	Wheels	_____
Model Number	_____	Tires	_____
Length	_____	Date Purchased	_____
Suspension	_____	Dealer Purchased	_____
Axles	_____	From	_____
		Address	_____

This image shows a full page of blank white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page, providing a template for writing or drawing. There are no margins, text, or other markings present.

END DUMP UNIT

Warranty Registration Form & Inspection Report

WARRANTY REGISTRATION (3 part form - please print)

This form must be filled out by the dealer and signed by both the dealer and the customer at the time of delivery.

Delivery Date: mm / dd / yyyy

<i>COMPANY / CUSTOMER NAME</i>		<i>DEALER NAME</i>	
<i>Phone</i>		<i>Phone</i>	
<i>Mobile phone</i>		<i>Mobile phone</i>	
<i>Email : @</i>		<i>Email : @</i>	
<i>Street Address</i>		<i>Street Address</i>	
<i>City</i>	<i>Prov/State</i>	<i>City</i>	<i>Prov/State</i>
<i>Postal/Zip</i>	<i>Country</i>	<i>Postal/Zip</i>	<i>Country</i>
<i>Truck Model</i>		<i>VIN Number</i>	

DEALER INSPECTION REPORT		SAFETY	
☐	Landing Gear Moves Freely and Crank Stowed	☐	Safety Signs Installed
☐	Air & Hydraulic Lines Properly stowed (no leaks)	☐	Operator's Manual Supplied
☐	Electrical Connections Stowed	☐	All Reflectors Installed & Clean
☐	Tires at Specified Pressure	☐	All Lights Functioning
☐	Rims & Tires Torqued	☐	Brakes Release at Proper Pressure
☐	Brakes Adjusted Properly	☐	Review Operating and Safety Instructions

I have thoroughly instructed the buyer on the above described equipment which review included the Operator's Manual content, equipment care, adjustments, safe operation and applicable warranty policy.

Date _____ Dealer's Rep. Signature _____

The above equipment and Operator's Manual have been received by me and I have been thoroughly instructed as to care, adjustments, safe operation and applicable warranty policy.

Date _____ Owner's Signature _____

199 05132016

*3 Part Form
Please Print*

WHITE	YELLOW	PINK
WALINGA	DEALER	CUSTOMER

Walinga Inc. Warranty Terms

Engineered Transportation Equipment

Walinga Inc. is committed to providing a quality product that will meet or exceed your expectations for many years to come. Our warranty terms and our warranty claim process has been designed to ensure that each warranty claim will be resolved in an orderly, fair and timely manner.

The Warranty

Walinga Inc. ("Walinga") warrants that all new engineered transportation products sold by Walinga Inc. will be free from defects in material and workmanship (the "Walinga Warranty").

Warranty Period

The warranty period for the Walinga Warranty shall expire one (1) year after the date of delivery to the original customer.

Limitations of and exclusions from the Walinga Warranty

- The Walinga Warranty applies to material and workmanship only.
- With respect to any component parts that are supplied or manufactured by others, the warranty coverage on such component parts will be strictly limited to the warranties of the manufacturers of such component parts.
- The Walinga Warranty shall only be for the benefit of the original purchaser of the transportation equipment.
- A Walinga Warranty may be transferable by the original purchaser to a third party for the balance of the warranty period then remaining, provided that Walinga consents in writing to such transfer of warranty.
- The Walinga Warranty is conditional upon proper storage, installation, use, maintenance, operation and compliance with any applicable recommendations of Walinga.

Warranty Claim Procedure

Should you encounter any difficulties with your unit within its warranty period, please contact your local Walinga dealer or sales representative, your local Walinga Service department or Walinga's Warranty Department to submit a warranty claim application.

To speak with a Walinga Warranty Coordinator, contact:

- Canada 1-888 - WALINGA (ext 258)
International +1-519-824-8520 (ext 258)
Email – warranty.canada@walinga.com
- USA 1-800-466-1197 (ext 8)
Email – warranty.usa@walinga.com
- Australia 07-4634-7344
Email – mail@customvac.com.au

Required Warranty Claim information

The following information must be provided to Walinga in order for us to properly process and consider your warranty application:

- Customer name and contact information (email if available).
- The equipment serial number and/or Vehicle Identification Number (if applicable).
- Date of claimed failure.
- Equipment mileage at the time of claimed failure.
- Details, description and photos (upon request) of the claimed failure and the corrective repairs attempted.

Warranty Conditions

- **Equipment must be registered within 30 days of being received by the buyer. It will be within the sole and unfettered discretion of Walinga as to whether it will honour its warranty on non-registered equipment.**
See over for page 2 -->
-

(continued from page 1)

- The buyer is responsible for promptly notifying Walinga of any defects to the equipment. The buyer is also responsible for making the equipment available to Walinga or its authorized repair facility for evaluation and repair.
- Prior to making any repairs or parts replacements, a warranty application and any estimated associated costs must be approved with the issuance of a claim number by an authorized Walinga representative. Undertaking any work prior to receiving warranty authorization may result in a partial or complete loss of warranty coverage.
- At Walinga's discretion, warranty repairs may be authorized to be completed at a repair facility convenient to the buyer. In such situations the estimated labour time must be approved by Walinga prior to undertaking any work. Labour hours will be reimbursed at the facilities posted hourly labour rate.
- At Walinga's request, parts in question must be returned to the nearest Walinga service facility for evaluation. In such situations a Returned Goods Authorization (RGA) number will be provided to the buyer. The returning shipment must be clearly labeled with the assigned RGA number and include a copy of the RGA form. Unless otherwise arranged, these parts are to be returned to Walinga within 30 days to ensure timely processing of your warranty claim. Failure to return such parts may result in partial or complete loss of warranty coverage.
- Replacement parts provided under warranty are covered for the remainder of the original equipment warranty period.
- Walinga reserves the right to use new, remanufactured or refurbished components when performing warranty repairs and replacements.
- Walinga is entitled to a reasonable amount of time and a reasonable number of attempts to assess the claim, diagnose the problem, and perform any necessary repairs.
- The warranty offered on used or refurbished equipment is limited to that specified on the purchase contract. Where a warranty period has not been stipulated on the purchase contract, and where such equipment is "used", then such equipment is considered by Walinga to be sold "as is, where is" without the Walinga Warranty.

Without limitation, Walinga reserves the right to reject a warranty claim or for any one or more of the following reasons:

- The warranty claim information provided is insufficient.
- The product evaluation does not substantiate the claim.
- The unit has been operated above and beyond its capacity or not maintained or serviced properly, resulting in damages incurred to major components.
- It is apparent that the operator's manuals have not been followed
- The equipment is not registered

Without limitation, Walinga's Warranty does not cover:

- Damage or deterioration due to lack of reasonable care or maintenance.
- Damage caused or affected by unapproved modifications to the equipment.
- Damage caused by negligence or misuse of the equipment.
- Damage caused by using the equipment for purposes for which it was not designed or intended.

Walinga's liability under this warranty, whether in contract or tort, is limited to the repair, replacement or adjustment of defective materials and workmanship. In no event will Walinga be responsible for any direct, indirect, loss of time, incidental or consequential expenses including, but not limited to, equipment rental expenses, towing, downtime, inconvenience, or any losses resulting from the inability to use the equipment. Further, Walinga shall not be liable for any damages or inconvenience caused by any delay in the supply or delivery of any equipment or component parts thereof.

The selling Dealer/Sales Person makes no warranty of its own and has no authority to make any representation or promise on behalf of Walinga, or to modify the terms or limitations of the Walinga Warranty in any way.

Punitive, exemplary or multiple damages may not be recovered unless applicable law prohibits their disclaimer.

Warranty related claims may not be brought forward as a class representative, a private attorney general, a member of a class of claimants or in any other representative capacity.

The Walinga Warranty and all questions regarding its enforceability and interpretation are governed by the law of the country, state or province in which you purchased your Walinga equipment. The laws of some jurisdictions limit or do not allow the disclaimer of consequential damages. If the laws of such a jurisdiction apply to any claim against Walinga, the limitations and disclaimers contained here shall be to the greatest extent permitted by law.

Dear Customer:

Thank you for choosing **WALINGA TRANSPORTATION EQUIPMENT**. For your convenience, should you require any information related to Parts, Service or Technical Engineering, please contact one of the following Walinga Personnel:

CANADIAN CUSTOMERS: 1-888 925-4642

TECHNICAL -ENGINEERING:

Janus Droog -Technical Field Support (ext: 259).....email:jad@walinga.com

WARRANTY CLAIMS:

Gary Nijenhuis: (ext:258)..... email:gary.nijenhuis@walinga.com

SERVICE MANAGER:

Andy Nijenhuis (ext:228)..... .email:andy@walinga.com

PARTS MANAGER:

Jack Lodder (ext: 224).....email: jel@walinga.com
Parts Department Fax: (519) 824-0367

CUSTOMERS IN USA: 1-800-466-1197

Fax (616) 877-3474

WARRANTY CLAIMS:

Jonathan Medemblik: (ext: 8).....email:jtm@walinga.com

PARTS MANAGER:

John VanMiddelkoop (ext: 3).....email: jvm@walinga.com

SERIAL NUMBER LOCATION:

The serial number plate is located on the Drivers Side of the unit, at the front of the body on the truck, and at the landing gear on trailers. Please mark the serial number and the date of manufacture of the body in the space provided for easy reference.

DATE OF MANUFACTURE: _____ / _____ / _____

SERIAL NUMBER: _____

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1 INTRODUCTION

Walinga appreciates your patronage and trust this unit will give you many years of trouble-free use. We are pleased to have you join a growing number of people operating Walinga units.

We take pride in building products to meet the demands of discriminating buyers in the transportation industry. We have sought to anticipate your needs with respect to safety, convenience, design and engineering for your unit. Walinga provides information and service support to its customers through its distributor and dealer network. Contact them at once should you need assistance.

Safe, efficient and trouble free operation of your unit requires that you and anyone else who will be operating or maintaining the unit, read this manual carefully and understand the Safety, Operation, Maintenance and Trouble Shooting information contained within the Operator's Manual. Failure to read and follow the manual could lead to serious injuries or costly repairs.



Truck



Trailer

Although some of the diagrams and pictures may not apply to all units, we have tried to show details of common adjustments and features that are on standard production units.

Use the Table of Contents or Index as a guide in locating the specific information applicable to your unit. Keep this manual handy for frequent reference and to pass on to new operators or owners.

OPERATOR ORIENTATION -- The directions left and right as mentioned throughout this manual, are taken as if the operator was in the driver's seat and facing in the direction of travel using the North American convention of driving on the right hand side of the road.

2 SAFETY

SAFETY ALERT SYMBOL

This Safety Alert symbol means

**ATTENTION! BECOME
ALERT! YOUR SAFETY
IS INVOLVED!**



The Safety Alert symbol identifies important safety messages on the Walinga Unit and in the manual. When you see this symbol, be alert to the possibility of personal injury or death. Follow the instructions in the safety message.

Why is SAFETY important to you?

3 Big Reasons :

- Accidents Disable and Kill**
- Accidents Cost**
- Accidents Can Be Avoided**

SIGNAL WORDS:

Note the use of the signal words **DANGER**, **WARNING** and **CAUTION** with the safety messages. The appropriate signal word for each message has been selected using the following guidelines:

- DANGER -** Indicates an imminently hazardous situation that, if not avoided will result in death or serious injury. This signal word limited to the most extreme situations, typically for machine components that, for functional purposes, cannot be guarded.
- WARNING-** Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.
- CAUTION -** Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

SAFETY

YOU are responsible for the **SAFE** operation and maintenance of your Walinga Unit. **YOU** must ensure that you and anyone else who is going to operate, maintain or work around the unit be familiar with the operating and maintenance procedures and related **SAFETY** information contained in this manual. This manual will take you step-by-step through your working day and alerts you to all good safety practices that should be adhered to while operating the unit.

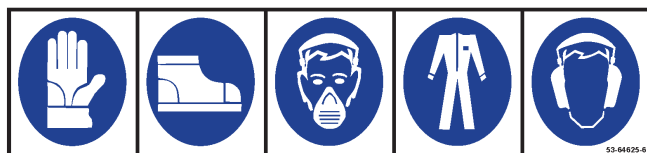
Remember, **YOU** are the key to safety. Good safety practices not only protect you but also the people around you. Make these practices a working part of your safety program. Be certain that **EVERYONE** operating this equipment is familiar with the recommended procedures and follows all the safety precautions. Remember, most accidents can be prevented. Do not risk injury or death.

- Remember the difference between being just a driver and an efficient operator. Drivers may only drive but an operator is a very safe, cost efficient and professional person.
- Owners must give operating instructions to operators or employees before allowing them to operate the equipment, and at least annually thereafter.
- The most important safety feature on this equipment is a **SAFE** operator. It is the operator's responsibility to read and understand **ALL** Safety and Operating instructions in the manual and to follow these. All accidents can be avoided.
- Walinga feels that a person who has not read, understood and been trained to follow all operating and safety instructions is not qualified to operate the equipment. An untrained operator exposes himself and bystanders to possible serious injury or death.
- Do not modify the equipment in any way. Unauthorized modification may impair the function and/or safety of the equipment and affect the life of the machine.
- Think SAFETY! Work SAFELY!

2.1 GENERAL SAFETY

1. Read and understand the Operators' Manual and all safety signs before operating, maintaining, adjusting or unplugging the unit.
2. Only trained competent persons shall operate the unit. An untrained operator is not qualified to operate the unit.
3. Have a first-aid kit available for use should the need arise, and know how to use it.
4. Have a fire extinguisher available for use should the need arise and know how to use it.
5. Do not allow riders outside the cab.

6. Wear appropriate protective gear.
This list includes but is not limited to:
 - A hard hat
 - Protective shoes with slip resistant Soles
 - Protective goggles
 - Heavy Gloves
 - Wet weather gear
 - Hearing protection



7. Place all controls in neutral, disengage PTO clutch, stop the engine, set the park brake, remove the ignition key and wait for all moving parts to stop before servicing, adjusting, repairing or unplugging.

8. Wear appropriate hearing protection when operating for long periods of time.
9. Know where overhead electrical lines are located and stay away from them. Electrocution can occur without direct contact.
10. Review safety related items annually with all personnel who will be operating or maintaining the unit.

2.2 OPERATING SAFETY

1. Read and understand all the Operator's Manual and all safety signs before operating or adjusting the Walinga unit.
2. Perform circle check before driving.
3. Do not allow riders outside the cab during road or highway travel.
4. Drive very carefully when negotiating hilly or uneven terrain.
5. Keep hands, feet, clothing and hair away from all moving parts.
6. Place all controls in neutral, disengage PTO clutch, stop the engine, set park brake, remove ignition key and wait for all moving parts to stop before servicing, adjusting, repairing or maintaining.
7. Stay away from power lines when operating hoist or climbing on top of the unit. Electrocution can occur without direct contact.
8. Use care when climbing on ladder(s) and/or platform(s) to prevent falling.
9. Maintain running gear in good condition at all times. In addition, on trailers, maintain kingpin and fifth wheel assembly in good condition.
10. Clear the area of all bystanders, especially children, before starting up and operating the units.
11. Make sure that all lights and reflectors that are required by the local highways and transport authorities are in place, clean and can be seen clearly by all overtaking and oncoming traffic.
12. Do not operate unit with spring brakes caged or brakes disabled. Block wheels if unhooked.
13. Before disconnecting the tractor from the trailer unit(s) make sure that the tractor and trailer are on level ground and that the trailer wheels are securely blocked. Lower landing gear and provide extra support if the ground is soft. Deflate air ride if so equipped prior to uncoupling.
14. Do not unload unless all axles are on a firm level surface.
15. Do not go under or within tipping arc of trailer box frame when hoist is operating. Keep others away.
16. Review safety items with all personnel annually.

2.3 UNLOADING SAFETY

1. Position unit on a firm level surface before raising hoist or unloading. Soft or uneven terrain can result in frame tipping when raising hoist.
2. Do not raise hoist unless there is a firm level surface under all tires and each axle.
3. Position tractor and trailer in a straight line to provide maximum stability when raising hoist.
4. On semi units, lower stabilizer legs before raising hoist (If so equipped).

5. Do not go under or within tipping arc of box frame when hoist is operating. Keep others away.
6. Stay away from power lines when raising hoist. Electrocutation can occur without direct contact.
7. Use care when on ladder or on top of unit to prevent falling. Stay away from power lines to prevent electrocution.
8. Stay out of truck box when unloading, and when engine is running.
9. Lower box to the frame before releasing the latches on the bottom of the divider(s).
10. Do not raise hoist in high wind conditions.
11. Do not move unit unless box is fully down.
12. Do not park unit with box in the raised position.
13. Do not use the cylinder as a stabilizer when the hoist is raised. The cylinder is strictly a lifting device and is not a structural member of the unit.
14. Have parking brakes set before raising hoist.
15. Stay at controls while using the hoist or unloading. Lower hoist immediately if shifting or leaning of the box occurs.
16. Feather the unit down slowly to avoid a high pressure build-up in the cylinder when the box stops suddenly.

2.4 MAINTENANCE SAFETY

1. Read and understand all the information in the Operator's Manual regarding maintenance, adjusting and servicing the Bulk Commodity unit.
2. Place all controls in neutral, disengage PTO clutch, stop the engine, remove ignition key and set the park brake before adjusting, servicing or maintaining any part of the unit.
3. Block or support the box before servicing or maintaining any components on truck frame or running gear.
4. Follow good shop practices:
 - Keep service area clean and dry.
 - Be sure electrical outlets and tools are properly grounded.
 - Use adequate light for the job at hand.



2.5 HYDRAULIC SAFETY

1. Always place hydraulic controls in neutral and relieve pressure before disconnecting from tractor or working on hydraulic system.
2. Make sure that all components in the hydraulic system are kept in good condition and are clean.
3. Replace any worn, cut, abraded, flattened or kinked hoses or lines.
4. Do not attempt any makeshift repairs to the hydraulic fittings or hoses by using tape, clamps or cements. The hydraulic system operates under extremely high pressure. Such repairs will fail suddenly and create a hazardous and unsafe condition.

5. If injured by a concentrated high-pressure stream of hydraulic fluid, seek medical attention immediately. Serious infection or toxic reaction can develop from hydraulic fluid piercing the skin surface.
6. Wear proper hand and eye protection when searching for a high pressure hydraulic leak. Use a piece of wood or cardboard as a backstop instead of hands to isolate and identify a leak.

2.6 TRAVEL SAFETY

1. Read and understand all the information in the operator's manual regarding procedures and safety when operating the unit on the road.
2. Make sure all the lights and reflectors that are required by the local highway and transport authorities are in place, are clean and can be seen clearly by all overtaking and oncoming traffic.
3. Drive carefully and defensively at all times and especially when negotiating uneven or hilly terrain.
4. Do not allow riders outside the cab during road and highway travel.
5. Make sure you are in compliance with all local regulations regarding transporting on public roads and highways. Consult your local law enforcement agency for further details.

2.7 TIRE SAFETY

1. Failure to follow proper procedures when mounting a tire on a wheel or rim can produce an explosion which may result in serious injury or death.
2. Do not attempt to mount a tire unless you have the proper equipment and experience to do the job.
3. Have a qualified tire dealer or repair service perform required tire maintenance.
4. Ensure that the tires are kept inflated to the proper pressure.

2.8 SAFETY SIGNS

1. Keep safety signs clean and legible at all times.
2. Replace safety signs that are missing or have become illegible.
3. Replaced parts that displayed a safety sign should also display the current sign.
4. Safety signs are available from your Distributor or the factory.

How to Install Safety Signs

- Be sure that the installation area is clean and dry.
- Be sure temperature is above 50°F (10°C).
- Decide on the exact position before you remove the backing paper.
- Remove the smallest portion of the split backing paper.
- Align the sign over the specified area and carefully press the small portion with the exposed sticky backing in place.
- Slowly peel back the remaining paper and carefully smooth the remaining portion of the sign in place.
- Small air pockets can be pierced with a pin and smoothed out using the piece of sign backing paper.

3 SAFETY SIGN LOCATIONS

Below are of some of the safety signs and locations on the equipment .Good safety requires that you familiarize yourself with the various safety signs, the type of warning and the area, or particular function related to that area, that requires your SAFETY AWARENESS.

- Think SAFETY! Work SAFELY!



Fig. 3-1 Front of Trailer



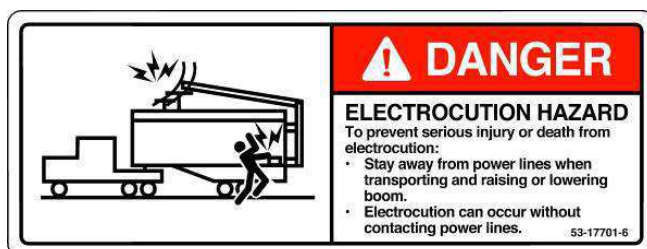
Fig. 3-2



A



B



C



D

REMEMBER - If safety signs have been damaged, removed, become illegible or parts replaced without signs, new signs must be applied. New signs are available from your authorized dealer or factory direct.

Below are of some of the safety signs and locations on the equipment .Good safety requires that you familiarize yourself with the various safety signs, the type of warning and the area, or particular function related to that area, that requires your SAFETY AWARENESS.

- Think SAFETY! Work SAFELY!

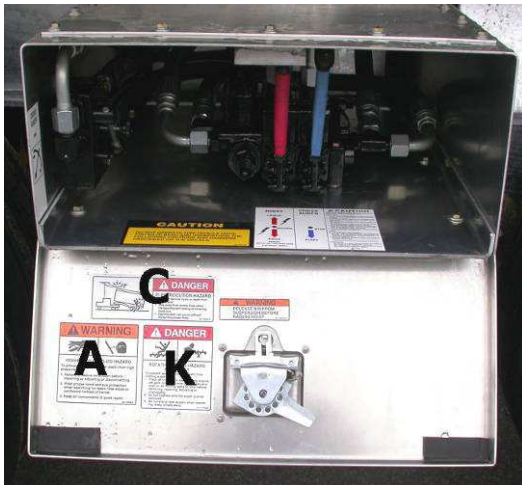


Fig. 3-3 Control Box Truck (Typ)



Fig. 3-4 Control Box Trailer (Typ)

⚠ CAUTION

1. Read Operator's Manual and safety signs before operating.
2. Do not load unit in excess of the gross vehicle weight rating shown on the certification plate.
3. Do not allow riders on the box.
4. Keep hands, feet, clothing and hair away from moving parts.
5. Place all controls in neutral, stop the engine, set park brake, remove ignition key and wait for all moving parts to stop before servicing, adjusting, repairing or maintaining.
6. Maintain all running gear components in good condition at all times.
7. Make sure that all lights and reflectors are clean and working when transporting on public roads.
8. Keep all hydraulic lines, fittings and hoses tight, free of leaks and in good condition at all times.
9. Do not operate unit with spring brakes caged or brakes disabled.
10. Stay away from overhead power lines when raising box or raising side compartments to prevent electrocution.
11. Do not go under or within tipping arc of trailer when hoist is operating. Keep others away.
12. Install frame brace before working under box frame.
13. Raise box only when unit is on firm, level ground and evenly loaded.
14. Review safety items with personnel annually.

53-18567-6

E

⚠ WARNING

**RELEASE AIR FROM
SUSPENSION BEFORE
RAISING HOIST**

53-15875-6

F



Fig. 3-5 Hoist Control on Trailer (optional control location)

⚠ WARNING

**PINCH POINT HAZARD
KEEP AWAY**

To prevent serious injury or death from pinching:

1. Stay away from rear gate and side compartment when engine is running. Components can move unexpectedly.
2. Keep others away.

53-18569-6

G

REMEMBER - If safety signs have been damaged, removed, become illegible or parts replaced without signs, new signs must be applied. New signs are available from your authorized dealer or factory direct.

Below are some of the safety signs and locations on the equipment. Good safety requires that you familiarize yourself with the various safety signs, the type of warning and the area, or particular function related to that area, that requires your SAFETY AWARENESS.

- Think SAFETY! Work SAFELY!



Fig. 3-6 Tailgate



G



L



M



REMEMBER - If safety signs have been damaged, removed, become illegible or parts replaced without signs, new signs must be applied. New signs are available from your authorized dealer or factory direct.

Below are of some of the safety signs and locations on the equipment .Good safety requires that you familiarize yourself with the various safety signs, the type of warning and the area, or particular function related to that area, that requires your SAFETY AWARENESS.

- Think SAFETY! Work SAFELY!



Fig. 3-7 Controls - In Cab of Truck

! CAUTION

THE FOLLOWING HOIST OPERATING PROCEDURES ARE RECOMMENDED:

Operation:

1. Do not load vehicle beyond rated capacity. Loads must be evenly distributed and free flowing.
2. Tractor and trailer must be in a straight line and must be on firm level surface when dumping.
3. Do not move vehicle while dump body is elevated.
4. Do not attempt to dislodge sticking loads by jogging body with control valves.
5. Stay at controls while raising and lowering body and place control valve in neutral position immediately after lowering.
6. Check condition of hydraulic hoses weekly and replace as necessary.

HOIST

7. Lubricate pin eyes weekly.
8. Do not adjust AUTOMATIC air bleeders. Hoists not equipped with automatic air bleeders should have air bled regularly to free all trapped air.
9. Keep hydraulic system clean and filled to proper level with.

! WARNING

Synthetic or water based fluids are NOT to be used in this hydraulic system. Any attempt to adjust hoist must be done by authorized service centre.

53-08147-6

REMEMBER

If safety signs have been damaged, removed, become illegible or parts replaced without signs, new signs must be applied. New signs are available from your authorized dealer or factory direct.

4 OPERATION GUIDELINES



OPERATING SAFETY

1. Read and understand all the Operator's Manual and all safety signs before operating or adjusting the Walinga Unit.
2. Perform circle check before driving.
3. Do not allow riders outside the cab during road or highway travel.
4. Drive very carefully when negotiating hilly or uneven terrain.
5. Keep hands, feet, clothing and hair away from all moving parts.
6. Place all controls in neutral, disengage PTO clutch, stop the engine, set park brake, remove ignition key and wait for all moving parts to stop before servicing, adjusting, repairing or maintaining.
7. Stay away from power lines when operating hoist or climbing on top of the trailer. Electrocutation can occur without direct contact.
8. Use care when climbing on ladder(s) and/or platform(s) to prevent falling.
9. Maintain running gear in good condition at all times. In addition, on trailers, maintain kingpin and fifth wheel assembly in good condition.
10. Clear the area of all bystanders, especially children, before starting up and operating the units.
11. Make sure that all lights and reflectors that are required by the local highways and transport authorities are in place, clean and can be seen clearly by all overtaking and on coming traffic.
12. Do not operate unit with spring brakes caged or brakes disabled. Block wheels if unhooked.
13. Before disconnecting the tractor from the trailer unit(s) make sure that the tractor and trailer are on level ground and that the trailer wheels are securely blocked. Lower landing gear and provide extra support if the ground is soft. Deflate air ride if so equipped prior to uncoupling.
14. Do not unload unless all axles are on a firm level surface.
15. Do not go under or within tipping arc of trailer box frame when hoist is operating. Keep others away.
16. Review safety items with all personnel annually.

4.1 TO THE NEW OPERATOR OR OWNER

Walinga Units combine light weight construction methods combined with high strength materials to become a safe, reliable and efficient hauling unit. Be sure to familiarize yourself with the unit by reading this Operator's Manual, the Safety Alerts, and any other material provided with the unit before attempting to operate it. With careful use and a good maintenance schedule, the unit will give many years of trouble-free use.

It is the responsibility of the owner and operator to be familiar with the weight and loading of your trailer. Trailer weight and loading requirements vary from jurisdiction to jurisdiction. Be familiar with your requirements, and any that you will be traveling through.

4.2 TERMINOLOGY

The Walinga unit is available as a semi-trailer, and straight frame truck. High strength aluminum is used for the body and structural components to minimize weight and maximize payload.

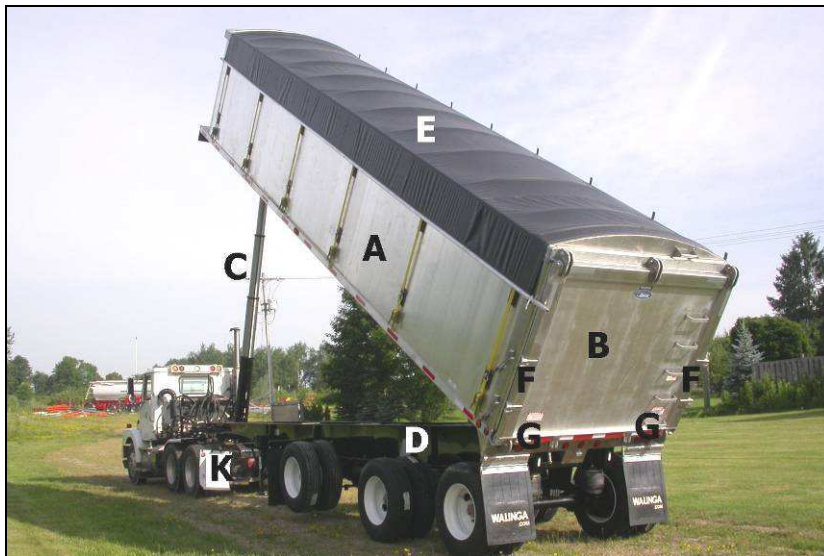
If equipped with solid lids on top of the box, the lids on top of the box raise up to allow product to be loaded. Close again when the assembly lowers. If equipped with a tarp roof, the roof is retracted prior to loading and dumping the box.

If equipped with dividers, the dividers can be positioned to accommodate the largest or smallest volume of material.

Open the rear tailgate fully before raising the box to unload the material. Lower the box to the frame if equipped with dividers before releasing the bottom of the divider. Close and lock the tailgate before reloading the unit.

The controls for the hoist are typically located in a control box on the left rear corner. A Trailer unit may have an additional hoist control (optional) at the front left side of the box as well as in the control box on the left rear. Each truck or tractor unit must be equipped with hydraulic power to provide oil flow to the hydraulic motors.

The semi-trailer can be equipped with stabilizer legs for added stability when raising the hoist.



- A Body**
- B Tailgate**
- C Hoist**
- D Controls**
- E Tarp Roof**
- F Auxiliary Locks**
- G Tailgate Locks**
- H Stabalizers**
- J Landing**
- K Fifth Wheel**



Fig. 4-1 Components

4.3 BREAK-IN

Break-in is the most important time in a Truck or a Trailer's life. It is critical that the unit be checked frequently during the first 5000 miles to be sure that all components and systems are properly adjusted and performing as required.

The following inspection schedule is provided as a guide for normal operating conditions. More frequent inspections are recommended in severe or extreme conditions.

Inspect at:

50-100 miles, 1-2 hours

500 miles, 8-10 hours

1500 miles, 25-30 hours

5000 miles, 100 hours:

1. Brakes

It takes a few weeks of operation for the brake shoes to mate with the drum contour and burnish the surface. During this period of time, the operator should check the brakes every day. After the first month, inspection of the brakes every 2 weeks or every 10,000 miles is required. Check the function and adjustment of the brakes on each axle. All brakes should apply evenly. No shoes should drag on the drum when the brakes are not applied.

2. Tires

Tires are designed to provide maximum life and performance when maintained at their specified inflation pressure. Although the tires are inflated to their specified pressure at the factory, the pressure can change before going into service. Always use an accurate gauge to check the pressure when the tire is cold.

3. Wheels/Rims

Although lug bolts and rim fasteners are always tightened to their specified torque at the factory, it is normal for them to lose some of their torque during the first few miles of operation. Always retorque lug bolts and rim fasteners to be sure that they stay tight. Then go to the retorquing interval defined in the Maintenance section of every 25,000 miles.

Keep all fasteners tightened to their specified torque to prevent damaging any components.

Whenever a wheel is removed from an axle, the above retorquing procedure must be followed to be sure that the wheel is secured to the axle. If any component is damaged due to loose fasteners, it will have to be replaced.

4. Axles

Each wheel bearing is assembled at the factory with the required end play (refer to Section 8.5). This end play should be checked to insure proper axle and bearing function. Check the temperature of the hub by hand after 10 to 15 miles (15 to 25 km) during the first trip. A hot hub must have the bearing end play reset before continuing.

5. Hub Lubricant Levels

a. Oil Bath:

Oil bath hubs are used on some trailers and are filled at the factory. Check hubs frequently (at least daily) during the first few weeks of operation. Always check when the oil is cold and the trailer is on the level. Use the level mark on the hub face when checking oil level. Replace seals and gaskets if hub has an oil leak. Do not operate without oil in the hub.

b. Grease Packed:

Grease packed hubs are used on some trailers and do not require servicing unless the wheel end is being serviced or removed.

c. Grease or Semi-fluid Grease:

Loosen the dust shield every 3-6 months and inspect for grease seeping through the seal. To check for leaks, look at the inboard side of the hub.

4.3 BREAK-IN (cont'd)

6. Suspension

A suspension system connects the axles to the frame. All fasteners must be maintained at their specified torque to ensure that all clamping and anchoring forces remain intact. If these forces are not maintained, components can shift or move and affect the performance and component life. Refer to Maintenance Section for the list of required torque values for all fasteners in suspension system. Any loosening can lead to component shifting, misalignment and/or twisting. Any of these items can cause erratic handling, broken components, or rapid tire wear. Always tighten the nut end of fastener. Specified torque values apply only to nut end torquing.

7. Axle Alignment

Axle alignment is properly set at the factory when the unit is new and will remain aligned unless fasteners loosen or components wear. Use a steel measuring tape to check the alignment. Refer to Maintenance Section for alignment checking procedure. Axles that are out of alignment can cause erratic handling characteristics, broken components and accelerated tire wear.

8. Fifth Wheel Assembly Components

The king pin, anchor frame and upper and lower fifth wheel assemblies must be inspected to check for mechanical integrity of all components. All components and systems must be kept in good condition to safely and reliably transmit the accelerating, braking and side loads between the trailer.

a. King Pin:

Check the king pin for cracks, chips, or whether it is bent. Check that there are no cracks or distortions between the king pin and its anchor frame. If any defects are found, replace the king pin and its anchor frame before resuming work.

b. Fifth Wheel Assembly:

The fifth wheel assembly consists of the king pin locking mechanism, surface plate, frame, pivot and anchor system. Check that the king pin locking mechanism locks and unlocks easily and that all moving surfaces are coated with grease. Check that the surface plate is free of grit and coated with grease.

Check the surface plate and anchor frame for cracks, bends or distortions. Replace any damaged components. Retorque fasteners to maintain the proper clamping forces on all components. Loose fasteners can cause components to move or bend and create mechanical or safety problems during operation.

9. Electrical, Hydraulic and Air Lines.

Electrical, hydraulic and air lines extend from the front of the unit to each electrical, hydraulic and air operated component. Although they are all anchored along their routing pathways from the factory, they occasionally do come loose and will sag. Inspect all lines. Use plastic ties to secure line to frame if any are loose and sag. Replace if any are pinched, kinked, cut or abraded. Extra care should be taken in cold or extreme operating conditions. Ice, mud or brush can pull lines loose from their anchors and cause damage. Clean components, repair damage, re-anchor and install protectors if appropriate. Do not operate with damaged components.

4.4 PRE-OPERATION VEHICLE INSPECTION PROCEDURE

The safe and trouble-free use of a Walinga Unit requires the operator to maintain the unit in good operating condition. To assist the operator, a pre-operation checklist is provided that should be followed each time before the unit is used.

NOTE:

The tractor items, part of the Department of Transport (D.O.T.) walk around sequence, have been omitted.

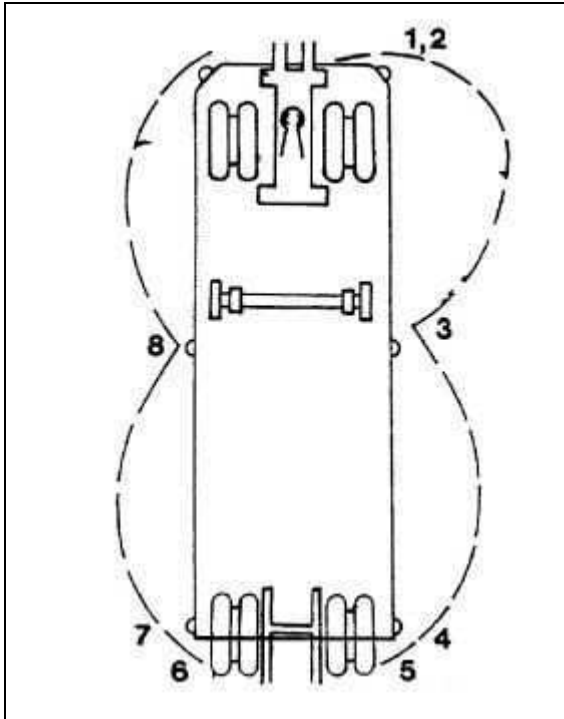


Fig. 4-2 Walkaround Sequence

WALK AROUND SEQUENCE

Step 1 - Trailer Frontal Area

1. **Air, Hydraulic and Electrical Connections**
 - a. Glad hands properly mounted, free of damage, not leaking and not worn.
 - b. Electrical line receptacle properly mounted, free of damage, plug adequately seated and safety catch engaged to prevent accidental disconnection.
 - c. Hydraulic couplers properly seated and tightened, no leaks and properly secured against tangling, snagging and chafing, with sufficient slack for turning.
 - d. Air, electrical and hydraulic lines properly secured against tangling, snagging and chafing with sufficient slack for turns.
2. **Lights and Reflectors**
 - a. Front trailer clearance and identification lights – should+ be clean, operating and proper color.
 - b. Reflectors and conspicuity tape clean and proper color.

Step 2 - Coupling System Area

1. **Fifth Wheel (Lower)**
 - a. Securely mounted to frame.
 - b. No missing or damaged parts.
 - c. No visible space between upper and lower fifth wheel.
 - d. Locking jaws around the shank and not the head of kingpin.
 - e. Release lever properly seated and safety latch lock engaged.
2. **Fifth Wheel (Upper)**
 - a. Kingpin not worn, bent or damaged.
 - b. Anchor frame not cracked, bent, worn or damaged.
3. **Air, Hydraulic and Electric Lines Visible From This Point**
 - a. Should be secure from dangling, snagging and chafing.
 - b. Should be free from damage and clean.

4.4 PRE-OPERATION VEHICLE INSPECTION PROCEDURE (cont'd)

Step 3 - Right Side of Trailer Area

1. **Front Trailer Support (Landing Gear)**
 - a. Fully raised and secured, no missing parts, not bent or otherwise damaged.
 - b. Crank handle present and secured (typically on left side).
2. **Spare Tires**
 - a. Carrier or rack not damaged.
 - b. Tire and/or wheel securely mounted in the rack.
 - c. Tire and wheel condition adequate. Proper spare tire size, correctly inflated.
3. **Lights and Reflectors**
 - a. Trailer side clearance lights clean, operating and proper color.
 - b. Reflectors and conspicuity tape clean and proper color.
4. **Frame and Body**
 - a. Frame and cross members not bent, cracked, damaged or missing.
 - b. Body parts not damaged or missing.

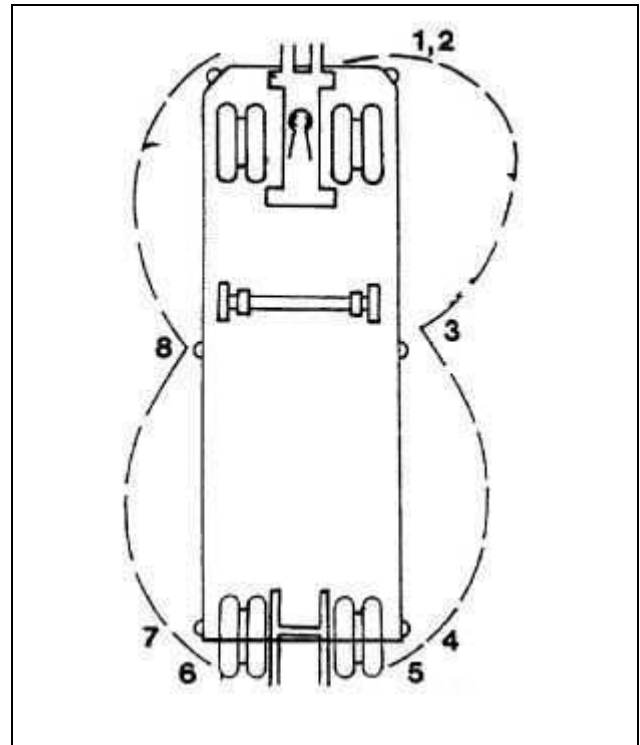


Fig 4-3 Walkaround Sequence

5. **Air Tank**
 - a. Drain moisture from air tank(s). Pull on cable attached to drain valve. Hold cable until the tank moisture is drained.

NOTE

In cold weather, it is best to drain the moisture from the tanks at the end of the day to prevent ice build-up in the tanks.

Step 4 - Right Rear Trailer Wheel Area

1. **Dual Wheels**
 - a. Condition of wheels and rims, no cracked or bent rims, broken spacers, studs, clamps or lugs.
 - b. Condition of tires - properly inflated, valve stems not touching wheel rims or brake drums, valve caps in place, no serious cuts, bulges, tread wear or any signs of misalignment and no debris stuck between the tires.
 - c. Tires all same type e.g. do not mix radial and bias types on the same axles.
 - d. Wheel bearings and hub - no obvious leaking.
 - e. Mud flaps in place and in good condition.
2. **Tandem or Triaxles**
 - a. Repeat wheel and tire inspection as above.
 - b. Flexible air lines not cracked, cut, crimped or otherwise damaged, secured against tangling, dragging or chafing.
 - c. Sliding axle anchor pins locked in place.
3. **Suspension**
 - a. **Mechanical:**
Condition of spring(s), spring hangers, equalizers and U-bolts.
 - b. **Air:**
Condition of air bag(s), axle clamping bolts, pivot arm and height control valve.
 - c. Check that air suspension is inflated and at proper ride height.

4. Box Pivot (Body Hinge)

- a. Hinge shaft should go through pivot frame brackets.
- b. All pivot frame brackets and adjacent frame should be in good condition.

Step 5 - Brakes

1. Brakes

- a. Condition of brake drum(s).
- b. Condition of hoses, lines and valves.
- c. Check slack adjusters.
- d. Check air chamber mounting.
- e. Check spring brakes (if so equipped).
- f. Drain moisture from air tank with cable.

Step 6 - Rear of Trailer

1. Lights and Reflectors

- a. Rear clearance and identification lights, clean and operating and proper color.
- b. Reflectors and conspicuity tape clean and proper color.
- c. Tail-lights clean, operating and proper color.

2. Check Unloading Systems

Check that rear doors and unloading door are closed and secured, compartment gates are stowed and secured, compartment covers are closed, control box door closed and secured, and all guards in place and secured.

Step 7 - Left Rear Trailer Wheel Area

Check all items as done on right side (Step 4 "Right Rear Trailer Wheel Area").

Step 8 - Left Side of Trailer Area

1. Check all items as done on right side (Step 3 "Right Side of Trailer Area").

2. Air System

- a. Check that all air line plugs are installed and secured.

Step 9 - Trailer Functional Check (Tractor Attached)

1. Check for proper connection of the air brake gladhands, hydraulic system couplers, and secure contact of electrical connection.
2. Start engine.
3. Build up air pressure in the tractor-trailer systems.
4. Turn on lights and inspect for proper function of:
 - a. Clearance lights.
 - b. Identification lights.
 - c. Turn signals and 4-way flasher.
 - d. Sidemarker lights.
 - e. Tail lights.
 - f. Stop lights.
5. Check the function of brakes.
 - a. Apply service brakes.
 - b. Apply parking/emergency brakes.
 - c. Stop engine.
 - i. Release trailer emergency brakes.
 - ii. Apply service brakes. Air loss should not exceed:
3 psi per minute on single vehicles.
4 psi per minute on combination.

4.5 HOOKING UP/UNHOOKING TRAILER

Special care should be taken when hooking up or unhooking trailer or pup to be sure the equipment is in good condition and all systems are functioning as required.

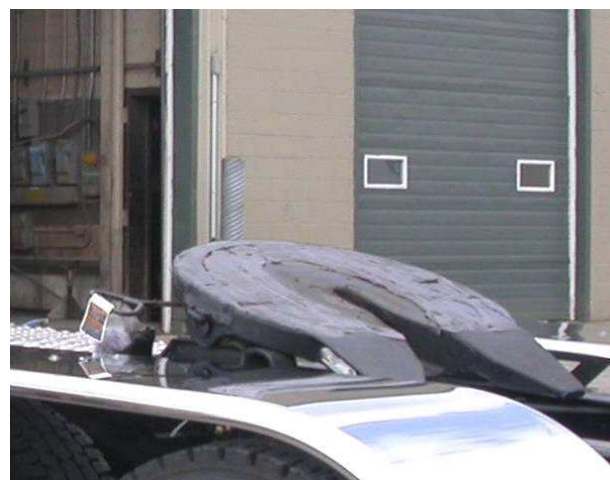
4.5.1 HOOKING UP TRAILER

Follow this procedure when hooking up the trailer to tractor:

1. Back the tractor up in a straight line to the trailer and align the fifth wheel opening with the trailer king pin.
2. Stop before the fifth wheel makes contact with the trailer and hook up the brake jumper lines. Now apply the towing vehicle hand-service brake to trailer.
3. Inspect all the coupling components before hooking up:
 - a. Inspect trailer coupling components. Check that king pin is not broken, bent or chipped. Check that the anchor frame is not distorted or cracked. If problems found, correct before proceeding.
 - b. Inspect fifth wheel coupling components. Check that the fifth wheel assembly is securely anchored to the tractor frame. Check that the structure of the frame, pivot and fifth wheel is not bent, broken or cracked. Check that the jaws of the lock are open. If problems found, correct before proceeding.
 - c. Be sure that the fifth wheel plate is cleaned and greased.



King Pin



Fifth Wheel

Fig. 4-4 Coupling Components

4. Check that the trailer is at the required height to slide onto the fifth wheel.
 - a. Use the crank on the landing gear to raise or lower the trailer as required.
 - b. Put the blocks or chocks in front of and behind wheels.

The trailer frame should contact the fifth wheel just behind the pivot point as the tractor backs under the trailer. Put the blocks or chocks in front of and behind wheels.

5. Connect brake and electrical lines.
Route the lines so they do not get pinched.
6. Back slowly under trailer keeping the king pin centered in the fifth wheel jaws.
7. Back up until the fifth wheel coupler locks on the trailer king pin.
8. Move the towing vehicle forward sharply while the trailer brakes are engaged to check that the jaws have locked around the king pin.
9. Set tractor parking brake, stop engine and dismount.
10. Visually check that the coupler jaws are securely locked around the king pin and the coupler release lever is in the locked position. Release and hook up again if the jaws are not Securely locked around the king pin.
11. Check that the trailer frame is resting on the fifth wheel.
12. Check brake application by applying and releasing brakes. If brakes do not release, air lines may be crossed. Do not continue unless brakes are functioning properly.
13. Connect and secure the pressure and return hydraulic lines. Start hydraulic pump and check that there are no leaks.
14. Check that all electrical circuits are completed and that all lights are working.
15. Route the electrical, hydraulic and air lines to prevent snagging, dragging and pinching.
16. Raise the landing gear. Use the crank to raise the legs. Place drive gear in low ratio and stow crank.
17. Check that air ride bags are inflated to proper height.
18. Remove blocks or chocks from the wheels.
19. Perform Pre-Operation Inspection before starting.



5th Wheel

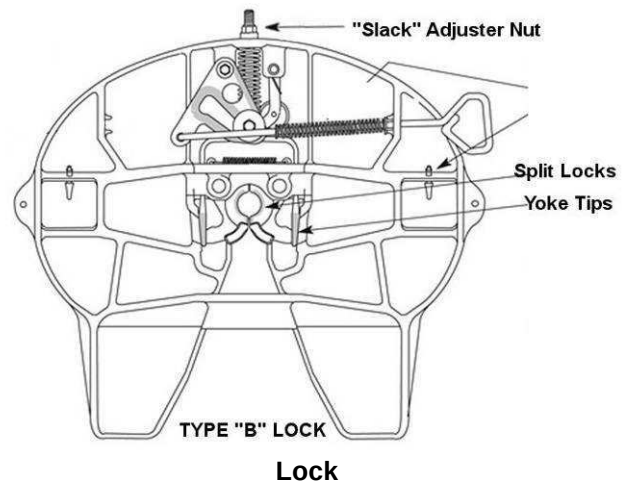


Fig. 4-5 Coupler Locks

4.5.2 UNHOOKING TRAILER

1. Position tractor and trailer in a straight line on a clear, level and firm surface.
2. Apply the trailer brakes and the parking brakes on the tractor before dismounting.
3. Place blocks or chocks in front of and behind trailer wheels on any level or unlevel surface.
4. Check that the surface under the landing pads can support the trailer. Support with blocks or planks if required. This is particularly important if the trailer is loaded or will be loaded while unhooked.
5. Deflate air suspension system.
6. Lower landing gear.
7. Unhook fifth wheel coupler.
8. Release tractor parking brake and pull slowly forward until the trailer frame just slides down the fifth wheel ramp. Stop.
9. Set the parking brake on the tractor before dismounting.
10. Disconnect air and hydraulic lines and electrical connect.
11. Install glad hands on dead end connectors if so equipped.

NOTE

Don't load the front on a short trailer supported only on landing gear legs.

12. Drive tractor away from trailer.
13. Drain air tanks if operating in cold temperatures to eliminate ice build-up.
14. Inspect the equipment. Document problems found so they can be corrected before the unit will be used the next time. Record problems and repairs for your files.



Fig. 4-6 Landing Gear



Fig. 4-7 Connections

4.6 CONTROLS

Before starting to work, all operators should familiarize themselves with the location and function of all controls. Each function is controlled by the controls on the left rear corner of the unit.

4.6.1 Trailer Controls

1. Control Box (Trailer) :

a/b Stabilizers: (optional)

This spring-loaded to neutral centre 3 position hydraulic valve controls the operation of the left & right hand stabilizers at the rear axles. Push the lever in and hold to lower the stabilizer. To stop stabilizer, release the lever and the centring spring will return it to its centred neutral position. Pull the lever and hold to raise the stabilizer. Release the lever for it to return to its centred neutral position.

c. Hoist:

This spring-loaded to neutral centre 3 position hydraulic valve controls the flow of oil to the hoist on the front of the frame. Push the lever in and hold to lower the hoist or box. Feather the valve while lowering to reduce the shock loads encountered when stopping suddenly. To stop hoist movement, release the lever and the centring spring will return it to its centred neutral position. Pull the lever and hold to raise the hoist and lift the box. Release the lever for it to return to its centred neutral position

d. Cross Auger: (optional)

This 3 position hydraulic valve controls the flow of oil to the cross auger. Push the lever into stop the flow of oil and the cross auger. Pull out to run the cross auger.

e. Air Activated Tailgate Lock (optional)

To release the tailgate, pull up the yellow collar and move the control to the open position. To activate the tailgate lock, pull up the yellow collar and move the control down to the closed position.

f. Manual Flow Control:

This manual flow control valve controls the amount of oil flowing to the cross auger. Set the pointer between 0 and 10 on the scale to adjust the speed ratio between 0 and 100% of the available speed.

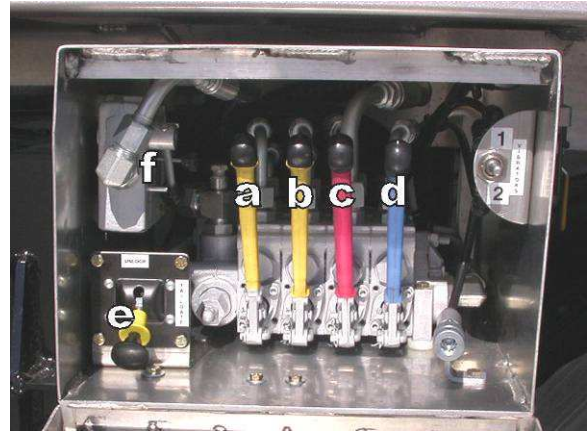


Fig. 4-8 Trailer-Control Box



Fig. 4-9 Trailer (optional hoist control)

4.6 CONTROLS (cont'd)

4.6.2 Truck Controls

2. Cab Controls:

Each tractor or power unit must be equipped with an auxiliary hydraulic system to provide pressurized oil to operate the unit. The systems are powered through the PTO drive system with the control located in the doorway to the left of the driver.

Each air control system is labeled.

Pull the yellow collar up and move the knob forward to engage the PTO and drive the auxiliary system. Push down to disconnect the drive and stop the system. This knob controls the hydraulic system. Most systems are not "live" and cannot be engaged and disengaged without depressing the master clutch.

NOTE

Put the truck transmission in gear first to stop transmission clash when engaging PTO. Then shift transmission into neutral again when PTO engaged. Slowly disengage clutch.

When so equipped, the hoist air control operates a hydraulic valve to let flow in or out. When the body is loaded, always feather in lower position to prevent damage.



Fig. 4-10 PTO Hoist Control in Cab

4.7 OPERATION



OPERATING SAFETY

1. Read and understand all the Operator's Manual and all safety signs before operating or adjusting the Walinga End Dump Unit.
2. Perform circle check before driving.
3. Do not allow riders outside the cab during road or highway travel.
4. Drive very carefully when negotiating hilly or uneven terrain.
5. Keep hands, feet, clothing and hair away from all moving parts.
6. Place all controls in neutral, disengage PTO clutch, stop the engine, set park brake, remove ignition key and wait for all moving parts to stop before servicing, adjusting, repairing or maintaining.
7. Stay away from power lines when operating hoist or climbing on top of the trailer. Electrocuting can occur without direct contact.
8. Use care when climbing on ladder(s) and/or platform(s) to prevent falling.
9. Maintain running gear in good condition at all times. In addition, on trailers, maintain kingpin and fifth wheel assembly in good condition.
10. Clear the area of all bystanders, especially children, before starting up and operating the units.
11. Make sure that all lights and reflectors that are required by the local highways and transport authorities are in place, clean and can be seen clearly by all overtaking and on coming traffic.
12. Do not operate unit with spring brakes caged or brakes disabled. Block wheels if unhooked.
13. Before disconnecting the tractor from the trailer unit(s) make sure that the tractor and trailer are on level ground and that the trailer wheels are securely blocked. Lower landing gear and provide extra support if the ground is soft. Deflate air ride if so equipped prior to uncoupling.
14. Do not unload unless all axles are on a firm level surface.
15. Do not go under or within tipping arc of trailer box frame when hoist is operating. Keep others away.
16. Review safety items with all personnel annually.

Follow these operating procedures to obtain maximum performance and long life:

1. Review and follow pre-operation inspection and checklist before operating.
2. Review the location and function of all controls.

1. Loading Unit:

A. Preparation:

- a. Be sure the inside of the unit is clean to prevent contaminating the next load.
- b. Be sure the tailgate is closed and latched on the top and bottom.
- c. Open top lids or tarp covers.
- d. Be sure PTO's are engaged and in neutral.



2. Transport to next stop.

3. Starting:

- a. Open control box door and place all controls in neutral or OFF/STOP position.
- b. **Engaging PTOs:**
 - Start engine and run at low idle (1000 RPM or less).
 - Depress clutch and shift transmission into gear.
 - Pull up on collar and move levers forward.
 - Shift transmission into neutral.
 - Release the clutch to start the hydraulic pump.
- c. Set engine speed at "speed posted on the dash" to provide sufficient oil flow to hydraulic system.

Fig. 4-11 PTO Clutch

4. Dumping the Loaded Unit

- a. Before backing into the pit area, walk to the rear of the unit, and release the auxiliary locks on the tailgate.
- b. Watching for directions from the flag man, position the back of the unit over the pit area.
- c. Release the main lock on the tailgate.
- d. Exhaust the air from the air suspension system if so equipped.
- e. On the trailers equipped with stabilizers, lower the stabilizers on each side to help support the unit.
- f. Open the lids or roll tarp cover.
- g. Using the controls, raise the hoist. Stay away from power lines.
- h. Slowly lower the hoist when the body is empty by feathering the hoist valve.

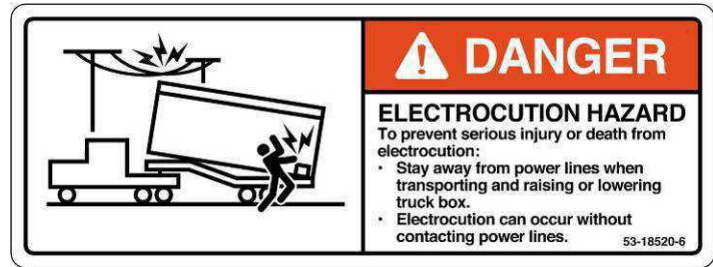


Fig 4-12 Raising the Body

IMPORTANT

Lowering the box rapidly and then stopping suddenly will cause large pressure spikes in the hoist hydraulic system as the box stops. Feathering the valve carefully will minimize the pressure spikes. This is particularly important if the box contains front compartments that are full of material.



Fig. 4-13 Fully Raised Body

4.7 OPERATING PROCEDURES (CONT'D)

5. Raising the Hoist:

Each unit is equipped with a large multi-stage hydraulic cylinder to raise the front of the box for unloading. It is a simple system that allows for simple, fast and convenient unloading. However, each operator must be aware of the common sense rules that must be followed when using the hoist.



Fig. 4-14 Raising the Body

- a. Position unit on a firm level surface before raising hoist or unloading. Soft or uneven terrain can result in frame tipping when raising hoist.
- b. Do not raise hoist unless there is a firm level surface under all tires and each axle.
- c. On semi units, position tractor and trailer in a straight line to provide maximum stability when raising hoist.
- d. On semi units equipped with stabilizers, lower stabilizer legs before raising hoist.
- e. Do not go under or within tipping arc of box frame when hoist is operating. Keep others away.
- f. Stay away from power lines when raising hoist. Electrocutation can occur without direct contact.
- g. Use care when on ladder or on top of unit to prevent falling. Stay away from power lines to prevent electrocution.
- h. Stay out of body compartment when unloading, or when engine is running.
- i. Do not raise hoist in high wind conditions.
- j. Do not move unit unless box is fully down.
- k. Do not park unit with box in the raised position.
- l. Do not use the cylinder as a stabilizer when the hoist is raised. The cylinder is strictly a lifting device and is not a structural member of the unit.
- m. Have parking brakes set before raising hoist.
- n. Stay at controls while using the hoist or unloading. Lower hoist immediately if shifting or leaning of the box occurs.
- o. Feather the unit down slowly to avoid a high-pressure build-up in the cylinder when the box stops suddenly.

These instructions are posted next to the control box to remind the operator of recommended procedures.

6. Operating Suggestions:

- a. Use only fully trained operators at all times. Review safety and operating instructions annually.
- b. Position the unit on a firm level surface to unload. Be sure the tractor and trailer are in a straight line for unloading to provide maximum stability.
- c. Be sure all the axles are supported by firm soil before raising the hoist.
- d. Stay away from power lines when raising the hoist or climbing on the top platform. Electrocution can occur without direct contact.

⚠ CAUTION

THE FOLLOWING HOIST OPERATING PROCEDURES ARE RECOMMENDED:

Operation:

1. Do not load vehicle beyond rated capacity. Loads must be evenly distributed and free flowing.
2. Tractor and trailer must be in a straight line and must be on firm level surface when dumping.
3. Do not move vehicle while dump body is elevated.
4. Do not attempt to dislodge sticking loads by jogging body with control valves.
5. Stay at controls while raising and lowering body and place control valve in neutral position immediately after lowering.
6. Check condition of hydraulic hoses weekly and replace as necessary.

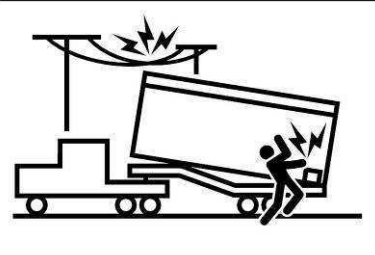
HOIST

7. Lubricate pin eyes weekly.
8. Do not adjust AUTOMATIC air bleeders. Hoists not equipped with automatic air bleeders should have air bled regularly to free all trapped air.
9. Keep hydraulic system clean and filled to proper level with.

⚠ WARNING

Synthetic or water based fluids are NOT to be used in this hydraulic system. Any attempt to adjust hoist must be done by authorized service centre.

53-08147-6



⚠ DANGER

ELECTROCUTION HAZARD

To prevent serious injury or death from electrocution:

- Stay away from power lines when transporting and raising or lowering truck box.
- Electrocution can occur without contacting power lines.

53-18520-6

4.8 TRANSPORTING

Although all operating and transporting instructions are common sense, it is wise to review them periodically to refresh your memory. Good operational procedures result in a safe workplace for the operator and others.

4.8.1 OPERATING INSTRUCTIONS

Since this equipment can be used in a variety of conditions, it is difficult to give instructions appropriate for all applications. However, these general guidelines apply to all situations:

1. Be sure that the trailer is securely attached to the towing vehicle and locked into position.
2. Be sure that the air, hydraulic and electrical lines are securely connected and that they have sufficient slack for turns.
3. Be sure that the brakes are properly adjusted and in good working condition.
4. Be sure that the electrical harness is securely attached and all lights and reflectors are clean and operating.
5. Maintain the mud flaps in good condition to minimize road splash in wet conditions.
6. Always maintain the unit in good mechanical condition.

4.8.2 BRAKING GUIDELINES

Safe, reliable and trouble-free operation of your unit requires that the brakes be maintained in good operating condition at all times and the driver follows good application techniques when driving. The irresponsible use of brakes by the driver when traveling can contribute to low brake life or result in system malfunctions, short life and poor tire wear patterns. The following list summarizes some basic operational guidelines for the driver.

1. Check the function of the brake system at the start of each day.
2. Maintain a safe vehicle speed at all times. Slow down for rough road or slippery surface conditions, winding roads or congested areas.
3. Always provide sufficient vehicle spacing on the road to allow for a safe stopping distance.
4. Apply brakes gradually to produce an even deceleration until the vehicle is stopped.
5. Watch traffic patterns ahead. Anticipate pattern changes that could result in an emergency. Apply the brakes gradually in sufficient time to produce a controlled stop.
6. Shift to a lower gear to use engine compression as the retarding force when going down steep grades.
7. Do not apply brakes for a long period of time such as when traveling on a long downgrade. The brakes will overheat. Instead, apply both the tractor and trailer brakes for short periods of time and the brakes have a chance to cool between applications.
8. Dry the brakes by applying them several times after going through water.
9. Release the brakes just before going over railroad tracks or other rough conditions. By allowing the wheels to turn over rough road surfaces, there will be no shock loads to the brake system components or produce flat spots on the tires.
10. Wet, icy or snow-packed surfaces require special care. Make cautious, intermittent applications by fanning or pumping the brakes to reduce speed without skidding or locking the wheels.
11. Use wheel chocks, apply trailer and tractor parking brakes and place tractor in low gear when parking the unit.

4.8.2 BRAKING GUIDELINES (cont'd)

12. Maximum brake retarding occurs just before the wheels lock up and the tires skid. Release the brakes should you feel them lock-up and reapply them.
13. When trailer brakes are applied with hot drums, it may result in a cracked drum. Allow them to cool before reapplying the brakes.
14. Fanning or repeated on-and-off applications will use up the system air reserves. This procedure is not recommended unless adverse road conditions are encountered. The wasting of air reserves in this way could result in insufficient application pressure should an emergency arise.
15. Hard or panic stops can overheat the linings and drums. Overheating will cause brake fade. Severe overheating and fade can result in the complete loss of braking capability. This will substantially reduce the expected life of brakes.

4.8.3 TIRES

When operating the unit, it is the responsibility of the driver to check the tires frequently. Inflation pressures, wear patterns and matching are critical parameters that must be monitored. The following factors affect tire care:

1. **Inspection frequency:**

Tires should always be checked at the start of a day and twice during the day or every 4 operating hours, whichever comes first. It is also a good practice to check the tires at each rest period during the day. When a driver hears unusual noise or experiences unusual handling characteristics, the first item to check is the tires.

Problems found early, during frequent tire checks, can save more serious problems later on. A sampling of typical abnormal wear patterns are shown in the Maintenance section along with their causes. Always correct the cause of the tire wear problem before proceeding.

2. **Inflation pressure:**

Tires should always be operated at their specified pressures. At their specified pressures, the tire is designed to run with the full width of the tread flat on the contact surface. Operating at other than specified pressures will change the tread contact patterns and can dramatically shorten tire life. In addition, the tires will run hotter and can lead to blow-outs.

Check tire pressure when the tire is cold. A hot tire can read as much as 20 psi higher than a cold tire. If tires are over-inflated, check for poor load distribution, uneven surface contact, over-loading or poor operating conditions.

3. **Tire matching:**

Do not mix ply types on the same axle. Their operating characteristics are different and will lead to uneven tire loading, rapid tire wear and adverse handling characteristics. Matching also includes combining tires that have the same amount of tread remaining. A tire with more tread has a larger rolling radius and will have to carry a higher load. The best performance will be obtained when the rolling radius is within 1/8" for all tires on an axle.

4.8.4 OPTIONAL EQUIPMENT

The trailers can be equipped with several options or attachments to adapt it to special customer requirements.

Remote controls.

The remote control allows the operation of the hydraulic functions, allowing the operator to stand back.

The green button activates the remote.

The red button stops all functions.

The remote operates an air actuator that is air over electric.



Fig. 4-15 Remote Control

Air operated tailgate lock.

Never activate the tailgate lock with the hoist in the raised position!

Only activate before raising the hoist.

Pressure wand.

A pressure wand can be used to blow out residue left in the body.

Solid Roof.

A solid roof prevents water entry into the body



Fig. 4-16 Air Activated Tailgate

5. SERVICE AND MAINTENANCE

Review the manual provided with the truck for service and maintenance information.

This section provides information on daily and periodical service and maintenance of the unit. Follow these recommendations for safe and dependable operation of the unit. Refer to the safety section at the front of the operator's manual for all applicable safe maintenance and operating procedures.

Be sure that all operators are familiar with the operation and maintenance procedures and related safety information contained in the operator's manual.

5.1 SERVICE

5.1.1 FLUIDS AND LUBRICANTS

1. Grease:

Use an SAE multi-purpose lithium based grease with extreme pressure (EP) characteristics.

2. Wheel Hub Oil:

- Use an SAE 80W90 for normal temperature conditions (-10°F to 100°F ambients).
- Use an SAE 85W140 for hot temperature conditions (100°F and hotter ambients).
- Use an SAE 30W motor oil for ambients below -10°F.

Capacity: 1 pint (500 ml) approximately

3. Hydraulic Oil:

Refer to 5.1.3 for Hydraulic Oil Specifications.

4. Storing Lubricants:

Your unit can operate at top efficiency only if clean lubricants are used. Use clean containers to handle all lubricants. Store them in an area protected from dust, moisture and other contaminants.

5.1.2 GREASING

Refer to Section 5.1.1 for recommended grease. Use the Service Record checklist provided to keep a record of all scheduled servicing.

- It is recommended that a hand-held grease gun be used for greasing. An air-powered greasing system can damage the seals on bearings and lead to early failure.
- Wipe grease fitting with a clean cloth before greasing, to avoid injecting dirt and grit.
- Replace and repair broken fittings immediately.
- If fittings will not take grease, remove and clean thoroughly. Also clean lubricant passageway. Replace fitting if necessary.



MAINTENANCE SAFETY

- Read and understand all the information in the Operator's Manual regarding maintenance, adjusting and servicing the unit.
- Place all controls in neutral, disengage PTO clutch, stop the engine, remove ignition key and set the park brake before adjusting, servicing or maintaining any part of the unit.
- Block or support the box before servicing or maintaining any components on truck frame or running gear.
- Follow good shop practices:
 - Keep service area clean and dry.
 - Be sure electrical outlets and tools are properly grounded.
 - Use adequate light for the job at hand.
- Block wheels before de-activating brakes.
- Maintain air system and brake components in top condition at all times.
- Maintain fasteners in running gear systems at their specified torque at all times.
- Lower box to the frame, disconnect hydraulic lines and relieve pressure before working on hoist.
- Establish and maintain a Trailer Preventative Maintenance (TPM) program on your equipment. Some jurisdictions require this program and the maintenance of records on every commercial vehicle on the road for future reference.

5.1.2 Greasing (cont'd)

NOTE:

When greasing bearings it is very important that bearings are not over-greased.

The use a handgun is recommended .

When greasing bearings once a month or every 10,000 miles apply only one pump of grease per bearing. This applies to all auger and paddle bearings when servicing the unloading system. (for details and specs on greasing refer to section 5 and 7 of this operator's manual)

IF A BEARING IS OVER-GREASED IT WILL VOID THE WARRANTY

5.1.3 HYDRAULIC SYSTEM

1. Oil Specifications:

PUMP MODEL	Min. Start-up (No Load)	Minimum Operating Temperature	Maximum Operating Temperature
P197 (PERMCO)	-16°C/3°F	-2°C / 28°F	82°C /180°F
P3100 / P5000/ DMD25-064 (PERMCO)	-16°C/3°F	-10°C / 14°F	82°C /180°F

NOTE:

To avoid damage to equipment HYDREX* XV hydraulic oil must be used. The use of alternative hydraulic oils without Walinga's written consent may void the terms of the equipment warranty.

a. All hydraulic systems will be filled with Hydrex XV.

b. Check with dealer or factory for oil requirements when using other oils or in other temperature ranges.

2. System Operation:

a. Be sure your oil specifications meet or exceed the pump manufacturer requirements.

b. Do not exceed starting and operating temperatures as specified above.

c. When operating a unit and the oil temperature is over 180°F (82°C), the pump system must be shut down, or run slower until the system cools down.

d. If overheating persists, check the system for possible causes (see Section 10.7).

e. Hydraulic oil filter must be changed before the gauge needle is in red on 10 MICRON return filters.

f. Hydraulic oil should be checked regularly. (Testing of oil is recommended once a year).

g. Always maintain a proper level in the hydraulic tank and keep oil clean.

h. Do not over speed the hydraulic pump, it causes overheating of the hydraulic oil. (Run the engine as shown on RPM tag on dash).

i. Check vent filler cap and keep it clean.

6 TRAILER SERVICING INTERVALS

A standard servicing schedule on your trailer unit is provided as a guide for your convenience. In unusual or extreme operating conditions, increase the frequency or perform additional service items to customize this schedule to your application.

Refer to the Service Section of the truck manual for truck servicing information.

A. Servicing:

8 Hours, Daily or 500 Miles

1. Drain moisture from air tanks (use cables to open drain valves)

2. Check tire air pressure. Add as required.



Fig 6-2 Tires (Typical)

Weekly, 10 Days or 5000 Miles

1. Grease slack adjusters
(1 location each adjuster).

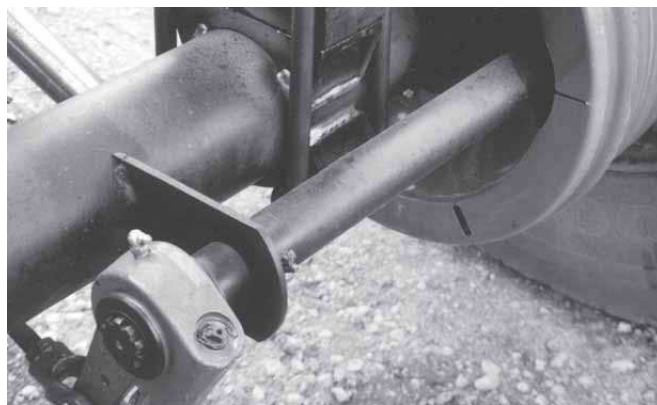


Fig. 6-3 Slack Adjuster (Typical)

2. Grease camshaft bearings
(1 location each camshaft).

IMPORTANT
Do not overgrease



Fig. 6-4 Camshaft Bearing

3. Check wheel hub oil levels.



Fig. 6-5 Hub Oil Level

Weekly, 10 Days or 5000 Miles (cont'd)

4. Retorque the following fasteners:

- a. Brake/wheel end system fasteners.
Refer to section 6

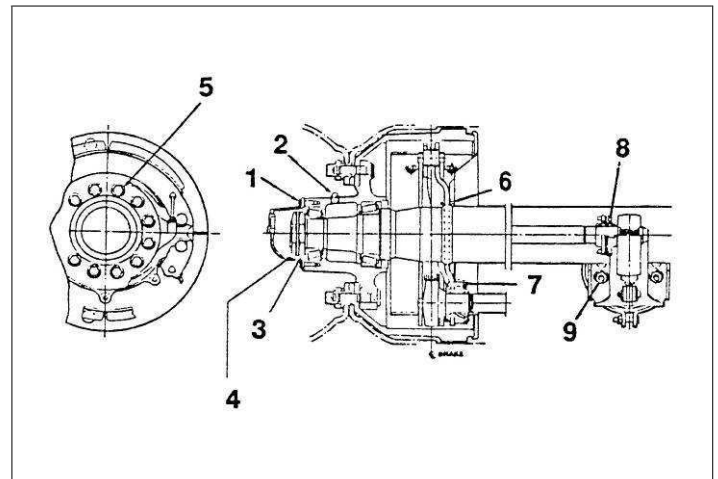


Fig. 6-7 Brake / Wheel End

- b. Landing gear bolts.

1/2 in. 115 ft. lbs.

5/8 in. 220 ft. lbs.



Fig. 6-8 Landing Gear Mounting Bolts

IMPORTANT

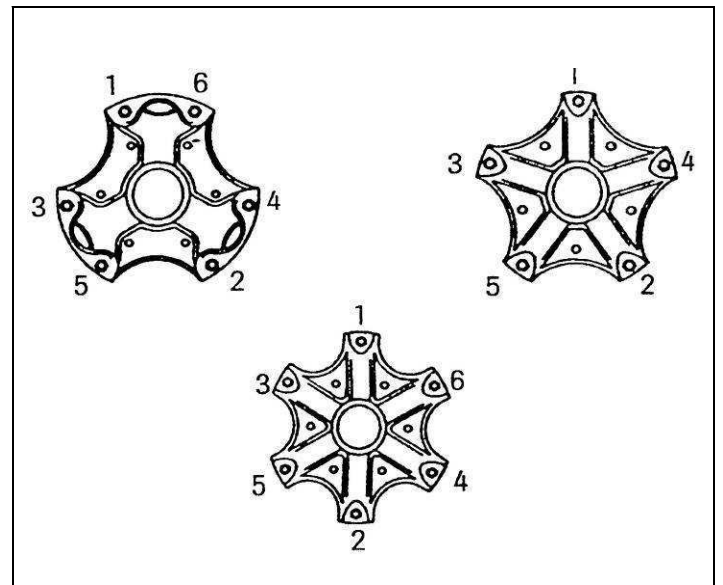
Do not over-torque fasteners. Over-torquing can strip threads, collapse spacers or lead to other problems that cause loose fasteners. Use an accurate torque wrench when tightening fasteners.

Weekly, 10 Days or 5000 Miles (cont'd)

c. Retorque cast spoke wheel rim nuts if so equipped.

Table 2 Recommended Wheel Bolt Torque (Spoke Wheels)

Bolt Size	Ft-lbs Torque (Dry)
5/8 in -11	150-175
3/4 in -10	210-260



Torquing Sequence



Wheel (Typical)

Fig. 6-8 Cast Spoke Wheel Rim Nuts and Wedges

Weekly, 10 Days or 5000 Miles (cont'd)

- d. Retorque for stud pilot inner and outer wheel nuts if so equipped.

Table 3 Recommended Wheel Stud Torque (Disc Wheels)

Stud Size	Wheel Type	Ft-lbs Torque (Dry)
3/4" – 16	Disc	450 – 500
1-1/8" – 16	Disc	750 – 900
15/16 – 12	Disc	750 – 900
1-5/16 - 12	Bud Unimount 10	390 – 440
	WHD-8	400 - 600

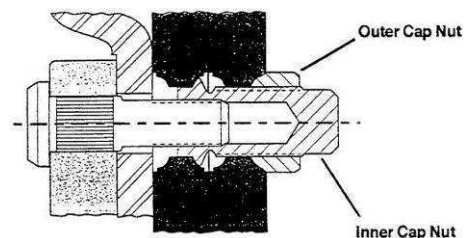
- e. Retorque hub piloted wheel single nuts if so equipped.

Table 4 Recommended Wheel Stud Torque

Stud Size	Ft-lbs Torque (Oiled)
M22 x 1.5 (33 mm or 1-1/2 Hex)	450 – 500
M20 x 1.5 (30 mm Hex)	280 - 330

IMPORTANT

Do not over-torque fasteners. Over-torquing can strip threads, collapse spacers or lead to other problems that cause loose fasteners. Use an accurate torque wrench when tightening fasteners.

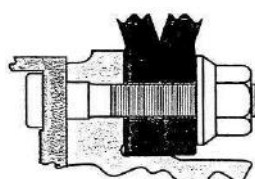


Inner Schematic (Typical)



Outer

Fig. 6-9 Stud Wheel Nuts



Fastener Schematic



Fig. 6-10 Single Nuts

Weekly, 10 Days or 5000 Miles (cont'd)

- f. Retorque suspension system fasteners. (Refer to charts for torque levels in Maintenance Section 8)

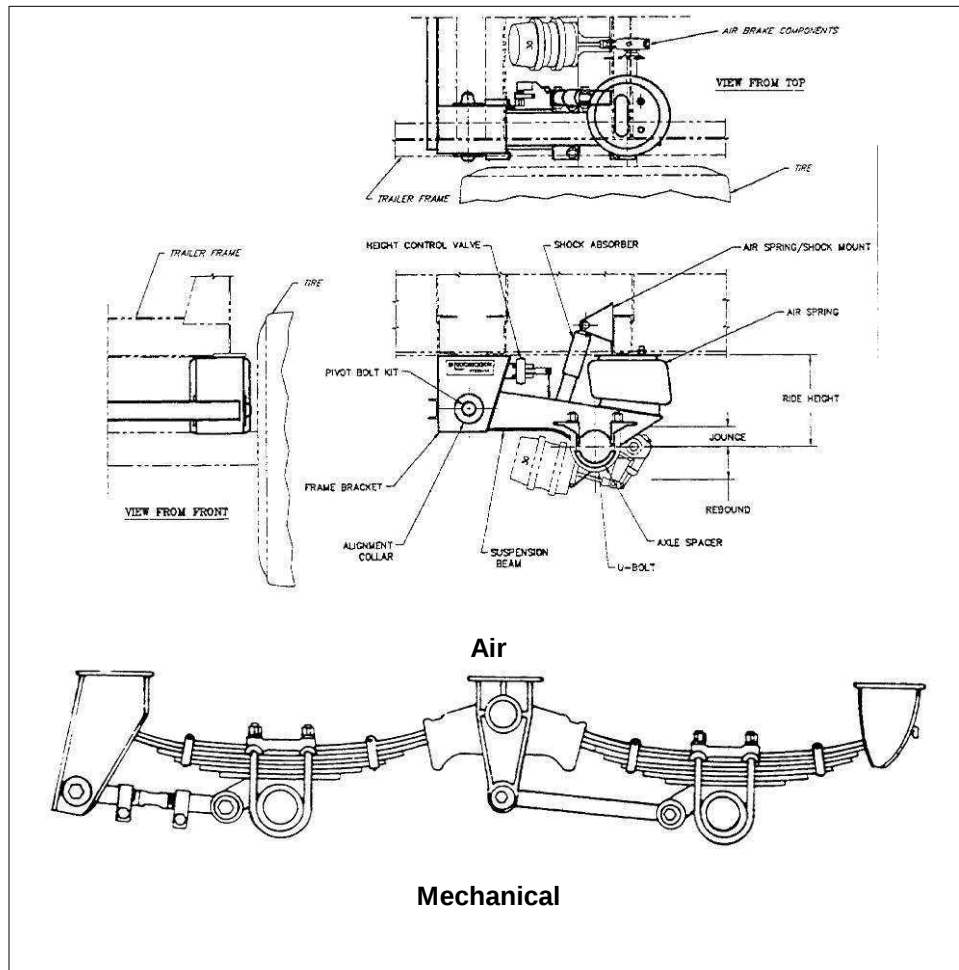


Fig. 6-11 Suspension System U-Bolts

10,000 Miles (15,000 km) or Monthly

1. Grease landing gear bearings. 4 locations

2. Retorque landing gear and suspension.

a. Landing gear.



Fig. 6-12 Landing Gear

b. Torque mechanical system suspension (refer to Section 8.1).

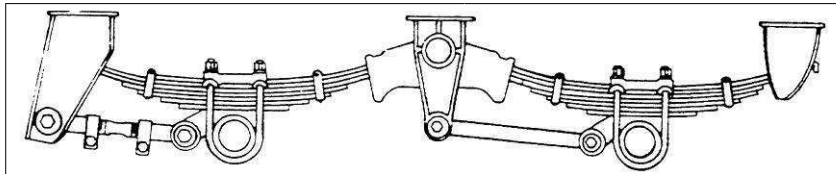


Fig. 6-13 Mechanical Suspension System

25,000 Miles (40,000 km), Quarterly or Every 3 Months

1. Check condition of wheel ends. Release brakes, jack up the axle and spin the wheel.

Check:

- a. Wheel bearings.
- b. Wobble.
- c. Rims and tires.
- d. Brake drag.



Fig. 6-14 Wheel End

2. Inspect frame and structure for bends, distortions or cracks.
 - a. Kingpin.
 - b. Fifth wheel and mounts.
 - c. Longitudinal and transverse frames.
 - d. Compartment structure.
 - e. Unloading system structure.
 - f. Suspension system anchorage.
 - g. Axles.
 - h. Optional Accessories
 - i. Side Covers
 - ii. Top Covers
3. Inspect electrical system components for:
 - a. Binding.
 - b. Rubbing /abrasion.
 - c. Looseness / dangling.
 - d. Cracks / tears in harness.
 - e. Burned out lights.



Fig. 6-15 Electrical (Typical)

25,000 Miles (40,000 km), Quarterly or Every 3 Months (cont'd)

4. Inspect air system and components for:
 - a. Leakage by performing leak-down test.
 - b. Rubbing / abrading.
 - c. Cracked hoses.

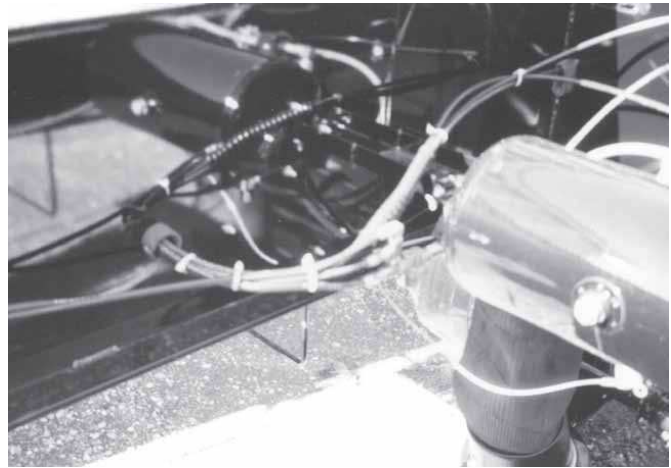


Fig. 6-16 Air system (Typical)

5. Clean gladhand screens if so equipped.



Fig. 6-17 Gladhand Screens

6. Check brake lining thickness. Replace as required.

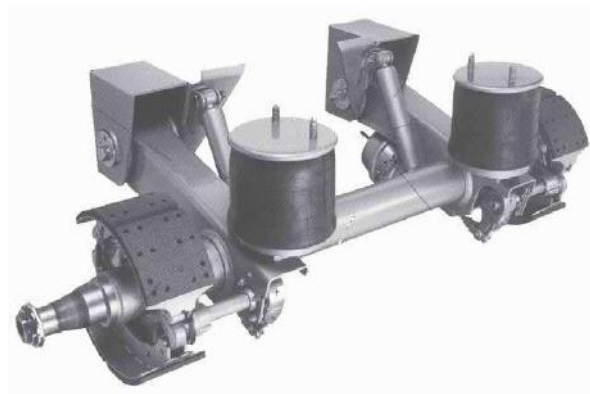


Fig. 6-18 Brake Lining

100,000 Miles (150,000 km) or Annually

1. Reline brakes as required.

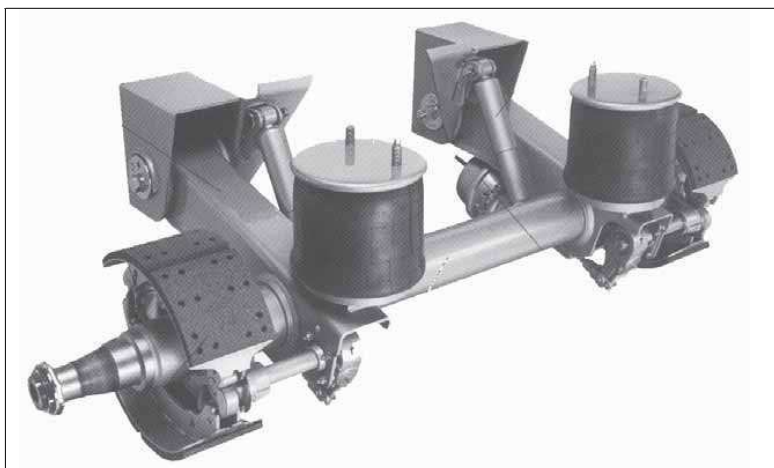


Fig. 6-19 Brakes

2. Change oil in hubs.



Fig. 6-20 Hub Oil (Typical)

6.1 SERVICE RECORD SUMMARY (LUBRICATION)

LOCATION	DESCRIPTION	FREQUENCY	LUBRICANT
Fifth wheel. Coat pivot pins and lock	Coat bearing surface.	Daily or as needed.	Chassis grease.*
Landing gear	Gearbox and screws.	Periodic basis (weekly).	Chassis grease.*
Wheels	Check oil level.	Weekly, 10 Days or 5000 miles (8000 km)	
	Bearings.	25,000 miles (40,000 km).	SAE 80W90 gear oil.
	Change oil.	100,000 miles (150,000 km).	SAE 80W90 gear oil.
Brakes			
Camshaft bearing	Lubricate	5,000 miles (8,000 km) or monthly.	Chassis grease.*
Slack adjuster	Lubricate	5,000 miles (8,000 km) or monthly.	Chassis grease.*
Brake shoe anchor pin bushing	Lubricate	30,000 miles (50,000 km) or yearly.	Chassis grease.*
Also at brake reline.		As appropriate.	
* Use a good quality lithium based extreme pressure grease throughout. MIL-G-25013C in below -40°F.			
NOTE: Do not use excessive lubricant.			

7 UNLOADING SYSTEM SERVICING

7.1 SERVICING INTERVALS

A standard servicing schedule on your trailer unit is provided as a guide for your convenience.

In unusual or extreme operating conditions, increase the frequency or perform additional service items to customize this schedule to your application.

Refer to the Service Section of the truck manual for truck servicing information.

A. Servicing: Daily, 8 Hours or 500 Miles

1. Check hydraulic system filter.



Fig. 7-1 Hydraulic System Filter

Weekly, 10 Days or 5000 Miles

1. Grease the hoist.
 - a. Upper anchor pin (1 location).
 - b. Lower anchor pin (2 locations).



Fig. 7-2 Upper and Lower Hoist Pins

Weekly, 10 Days or 5000 Miles (cont'd)

2. Grease rear box hinges (2 locations).



Fig. 7-3 Box Hinges (Typical)

Bi-Monthly, 2 Weeks or 10,000 Miles

1. Check oil level in hydraulic tank.

NOTE

Always check oil level when the oil is cold and the box is fully down. Oil should be no less than 1-1/2 inches below level plug.



Fig. 7-6 Hydraulic Tank (Typical)

100,000 Miles (150,000 km) or Annually

1. Change hydraulic system oil.



Fig. 7-7 Drain Plug

2. Change hydraulic system filter.



Fig. 7-8 Filter

7.1 SERVICE RECORD

See Lubrication and Maintenance sections for details of service.
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8 PERIODIC MAINTENANCE AND ADJUSTMENTS



MAINTENANCE SAFETY

1. Read and understand all the information in the Operator's Manual regarding maintenance adjusting and servicing the unit.
2. Place all controls in neutral, disengage PTO clutch, stop the engine, remove ignition key and set the park brake before adjusting, servicing or maintaining any part of the unit.
3. Follow good shop practices:
 - Keep service area clean and dry.
 - Be sure electrical outlets and tools are properly grounded.
 - Use adequate light for the job at hand.
4. Block wheels before de-activating brakes.
5. Maintain air system and brake components in top condition at all times.
6. Maintain fasteners in running gear systems at their specified torque at all times.
7. Establish and maintain a Trailer Preventative Maintenance (TPM) program on your equipment. Some jurisdictions require this program and the maintenance of records on every commercial vehicle on the road for future reference.

Your trailer can only operate at top efficiency when it is maintained in good operating condition. The maintenance procedures are summarized from the component manufacturers instructions included with this manual. Only standard industry and component procedures are required to keep your trailer in top condition. All maintenance intervals are established for normal operating conditions. In light or intermittent conditions, the servicing and maintenance intervals can be extended. In heavy, extended or severe off-highway application, reduce the intervals for servicing and maintenance to keep the equipment in good condition. When a problem is found, correct the condition before continuing.

A good maintenance program will find conditions early when they are easily and quickly corrected before they become major problems. Operating your trailer in a defective condition, can lead to serious mechanical problems or can create safety hazards for the driver, bystanders or other operators.

8.1 TORQUE SPECIFICATION SUMMARY

Table 5 Recommended Torque Specifications

1. Air Ride Suspension

Description	Size	Torque (Ft-Lbs)
Quik-Align™Pivot Bolt	7/8"-9	475-525
Shock Bolt	3/4"-10	150-175
Air Spring Bolt (Lower)	1/2"-13	25-35
Air Spring Nut (Upper)	3/4"-16	45-55
Brake Dust Shield Bolt	5/16"-18	160-180
ABS Bracket Bolt	1/4"-20	75-100

Table 5 Recommended Torque Specifications (cont'd)

2. Mechanical Suspension

Description	Size	Torque	
		Ft-Lbs.	N.m
Equalizer Shaft (All Spread)	1-1/4" Nut	575-625	780-850
49" Spread	3/4" Capscrew	200-225	270-305
54"-65-1/2" Spread	2-1/2" Nut	300-325	410-445
72"-109" Spread	1-1/2" Nut	200-225	270-305
U-Bolt Nuts		300-325	410-445
Torque Arm Bolt Nuts	1"	160-200	216-270
Torque Arm Clamping Nuts	1/2"	80	110
	3/4"	175-200	236-270
Spring Retainer Nuts	1/2"	80	110

3. Wheel End Components

Description	Torque Range		Fastener Size
	(lb-ft)	N.m	
1. Hub-cap bolts	10-15 "	13-20	5/16"
2. Hub fill plug	15-20	20-27	3/8"
3. Adjustment nut - manual bearing adjustment (double nut)	Tighten to 200, loosen, tighten to 50, loosen 1/4 turn and check end play.	136 68	Size depends on axle model and adjustment method.
4. Jam nut - manual bearing adjustment	250-300	340-408	
5. Brake mounting bolt	130-165	177-224	5/8"
6. Two-piece dust shield bolts (shown)			
• Forged spider	15-20	20-27	3/8"
7. Bolt-on bushing bolts	25-35	34-48	3/8"
8. Cam bushing bolts	25-35	34-48	3/8"
9. Air chamber nuts	80-125	109-170	5/8"

4. Wheel Nut

Stud Size	Wheel Type	Ft-Lbs Torque (Dry)
3/4" - 16	Disc	450 – 500
1-1/8" - 16	Disc	450 – 500
	Bud Unimount 10	390 – 440
	WHD-8	400 - 600

Bolt size	Ft-Lbs Torque (Dry)
5/8" - 11	150 – 175
3/4" - 10	210 - 260

8.2 KINGPIN AND FIFTH WHEEL PLATE

The kingpin at the front of the trailer is the structural component used to transmit accelerating and decelerating loads into the trailer frame. It must be in good condition to perform as required.

Visually inspect the kingpin as part of the pre-trip inspection, at 5,000 miles (8,000 km) or weekly and annually as part of your normal preventative maintenance program. Be sure the kingpin does not have excessive wear, looseness, chipped out areas, cracks or bent mounting frame. If any kingpin shows such defects, it should be replaced immediately.



Fig. 8-1 Kingpin

Visually inspect the frame and structure for bends, cracks or distortions as part of the pre-trip inspection procedure. Thoroughly inspect the structural integrity of the assembly every 25,000 miles (40,000 km) or every three months as part of your preventative maintenance program. Replace the entire assembly if any structural defects are found.

8.3 FIFTH WHEEL

A fifth wheel system is used on the towing tractor to secure the kingpin and carry the weight of the attached trailer. It must be maintained in good condition to perform as intended.

Visually inspect the fifth wheel as part of the pre-trip inspection to check for cracks, bends, chips or distortions of the frame and upper plate.



Fig. 8-2 Fifth Wheel

NOTE

Use a high-pressure washer or steam cleaner to remove all the dirt and grease from the fifth wheel assembly prior to each weekly inspection. Apply a fresh coat of grease to the fifth wheel assembly prior to hooking-up the trailer.

Clean the assembly every 5,000 miles (8,000 km) or bi-monthly and annually to perform a thorough inspection. Check the frame and upper plate for cracks, bends, chips or distortions.

When the components are clean, check that the lock closes completely around the kingpin.

To adjust the lock:

1. Obtain a Holland kingpin lock tester and place in the throat of the lock. Close the lock.
2. The jaws should be snug around the tester but not binding.
3. Use the adjusting nut on the front edge of the fifth wheel to set the clearance of the jaws.
4. Use a light oil to lubricate all moving parts prior to returning to service.

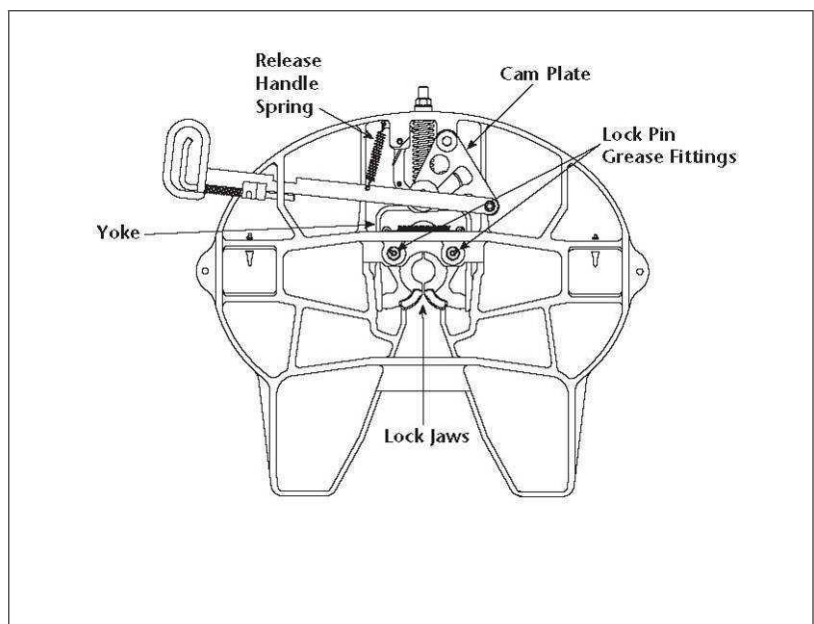


Fig. 8-3 Kingpin Lock

8.4 AXLE ALIGNMENT

A standard axle is used as the main transverse structural member to transmit loads between the trailer frame and the surface contacting components. All running gear components are attached to or form part of the axle assembly.

Although there is very little that can go wrong with the axle itself, loose, bent or damaged attaching components can cause the axle to go out of alignment. This misalignment will be found during the regularly scheduled 25,000 mile inspection. However, axle misalignment shows itself most commonly by accelerated tire wear and dog tracking by the trailer. Visually check the tire wear when checking air pressure. The driver should identify these handling characteristics to service personnel for correction.

To check axle alignment, follow this procedure:

1. Select a working area that is level, with a compacted surface and is large enough to provide access from all sides.
2. Move the trailer forward and backward several times to remove any binding from the components.
3. Stop the trailer when moving in the forward direction without using trailer brakes. This will give the components a forward bias with no binding.
4. Unhook the trailer and support on the landing gear at the normal height or parallel to the ground.
5. Install a commercially available axle extender on each axle or remove the wheels to prevent any components from interfering with the measurements.

8.4 AXLE ALIGNMENT (cont'd)

6. Attach an S hook to a steel tape and measure the distance between the kingpin and the end of each axle. Dimensions A and B should be equal within $\pm 1/8$ inch (0.125 in) (3.1 mm).
7. Adjust the suspension mounting system as required to set dimension A and B within $1/8$ inch (0.125 in) (3.1 mm). Refer to suspension system instruction brochure for detailed adjustment procedure.

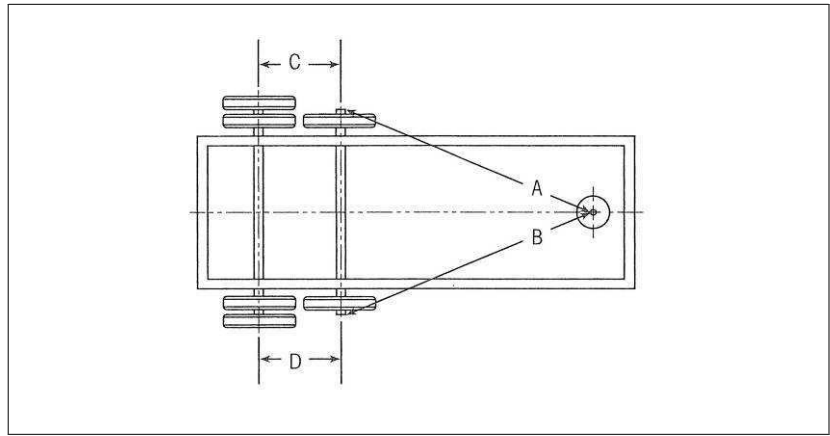


Fig. 8-4 Axle Dimensions

8. Use a trammel bar to measure the road and curbside dimensions between the first and second axles. Dimensions C and D should be within $1/16$ inch (0.0625 in) (1.6 mm).
9. Adjust the suspension system as required to set this dimension to its recommended tolerance.
10. Repeat measuring and adjustment procedure on the third axle if so equipped.
11. Tighten all fasteners to their specified torque. Do not allow any suspension system or running gear fasteners to loosen.

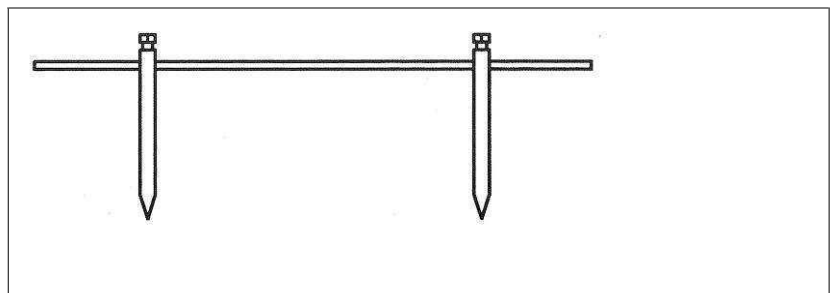


Fig. 8-5 Trammel Bar

IMPORTANT

Always use a torque wrench when tightening fasteners. The correct torque on a fastener provides the proper clamping force on the adjacent components and they will perform as expected.

12. The front axle must be aligned to the kingpin with second and third axles adjusted to the front axle.
13. Always check axle alignment after repairing the suspension system.

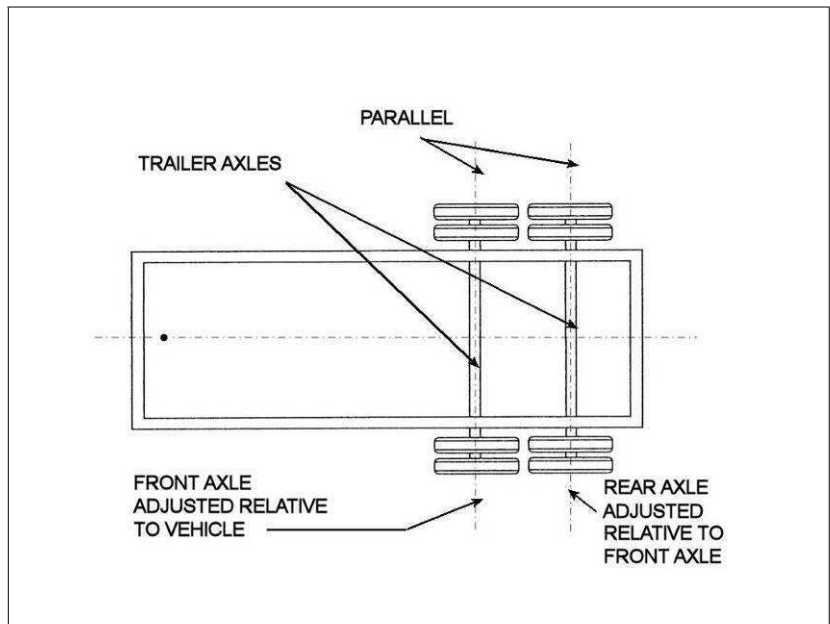


Fig. 8-6 Aligned

8.5 WHEEL HUBS/BEARINGS

Some axles use an oil bath design for lubricating wheel bearings. It is a virtual zero maintenance system providing that the oil remains in the hub.

Visually check the hub every day for leaks when checking tire pressure during pre-trip, daily, refueling, or rest stop inspections. If oil leaks are detected on any hub, repair the leak and refill the hub before proceeding.

A. Oil Leaks:

Visually inspect the hub for leaks every time the tire pressures are checked. Leaks will normally be visible as dust collects on the escaping oil. Stop and correct the leak immediately to prevent running the hub low on oil. Running low or without oil will quickly overheat the hub and cause the bearings to seize. Change the oil in the hub when installing new seals to correct a leak.

B. Oil Level:

1. Check the oil level in each wheel hub every 5,000 miles (8,000 km) or weekly and whenever an oil leak is found. Clean the end plate of the hub to remove the dust, dirt or mud build-up.

The oil should be visible to the top of the outer concentric circle of the end cap. Add oil as required through the fill plug in the hub. Always use clean oil and prevent contaminants from entering the hub when adding or changing oil.

2. Change the oil every 100,000 miles (160,000 km), annually or whenever the axle nuts are retorqued or the brakes are relined. The hub cavities must be opened when retorquing axle nuts and changing oil should be done as part of the procedure.

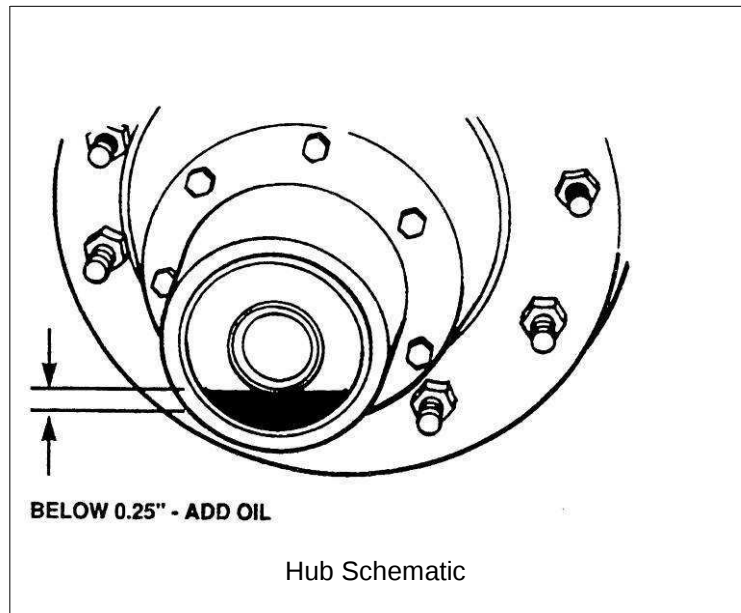


Fig. 8-7 Oil Level

WHEEL HUBS/BEARINGS (cont'd)

C. Wheel Bearings:

Wheel bearings carry and transmit the load between the wheels and the axles. In addition to proper lubrication, the bearings must have the recommended end play to perform as expected. Bearing end play is set and controlled by the torque of the axle nuts on the end of each spindle. Each hub must seat securely on its bearings to prevent wobble or slop in the system. Turning the wheel or wobbling it indicates the condition and tightness of the hub/bearing assembly.

1. Turning/Wobble:

- a. Park the trailer on a level, hard surface and release the brakes.
- b. Place chocks in front of and behind each wheel.
- c. Jack each axle up until the tire clears the ground.
- d. Support the axle on a safety stand to prevent slipping or tipping.
- e. Turning the wheel slowly to check the condition of the bearings and to determine if the brakes are dragging.
- f. Dragging Brakes: Can be felt as a steady drag on the turning of the wheel or at the same position or arc of the rotation. Adjust the brakes to eliminate the drag before resuming work.
- g. Bearing Condition: Can be felt as the wheel turns. Bearings in good condition turn easily and smoothly. Bearings in poor or bad condition can be felt through the wheels as scraping, grinding, dragging or bumps.
Replace bearings before resuming work.
- h. Wobble: Grasp each side of the wheel or tire and wiggle the wheel and assembly. If the wheel or hub wobble on the spindle, the bearings have lost their end play and the axle nuts require tightening.



Fig. 8-8 Wheels

NOTE

If the bearings are not in good condition, replace them before setting the end play.

8.5 WHEEL HUBS/BEARINGS (cont'd)

C. Wheel Bearings (cont'd):

Note:
For more detailed and comprehensive maintenance procedures, refer to Hendrickson L496 "Wheel-end Maintenance procedures"

2. Bearing End Play:

- a. Place a pan under the hub drain plug.
- b. Remove the drain plug from the hub and drain the oil.
- c. Remove the hub end plate and lay to the side.
- d. Remove the set screw from the jam nut.
- e. Remove the jam nut and perforated lockwasher from the spindle.
- f. Use a torque wrench to tighten the adjusting nut 200 ft-lbs. (136 N.m) while rotating the wheel assembly in both directions.
- g. Back the adjusting nut off to zero torque.
- h. Retorque the adjusting nut again to 50 ft-lbs (68 N.m) of torque while rotating the wheel assembly in both directions.
- i. Loosen the nut 1/4 turn.
- j. Install the perforated lock washer. Be sure the adjusting nut pin aligns with the hole in the lock washer. Turn washer over and/or adjusting parts as required.
- k. Install jam nut and tighten to 250-300 ftlbs. (340-408 N.m).

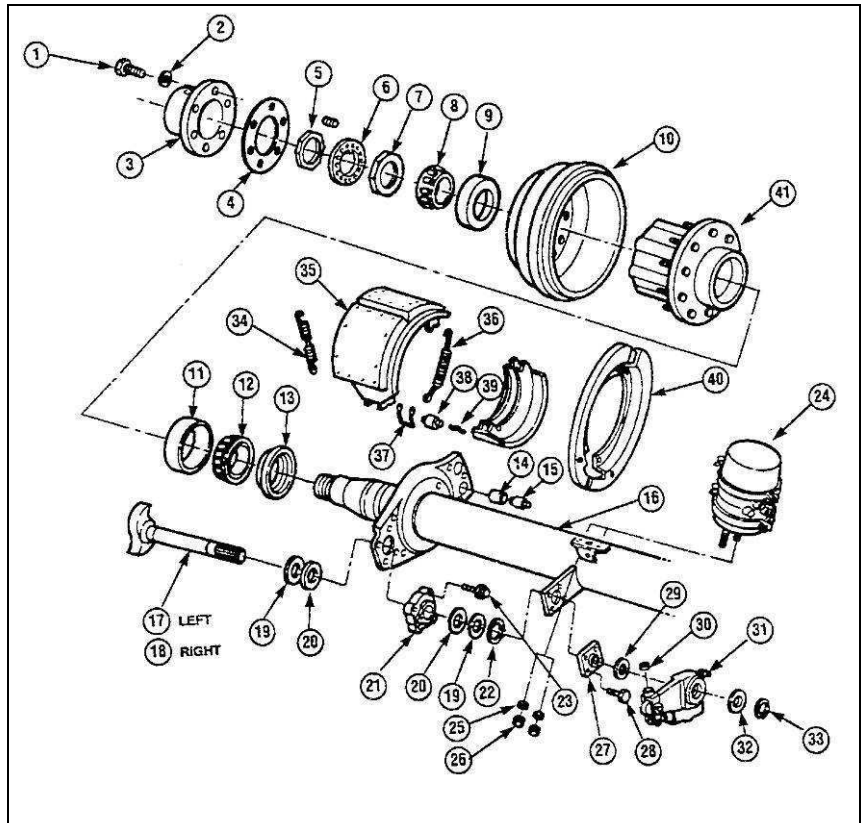


Fig. 8-9 Spindle Components.

I. Check bearing end play by:

- i. Attaching a magnetic base dial gauge indicator to the end of the spindle.
- ii. Push the wheel in while rotating the wheel slightly until the dial gauge reading doesn't change.
- iii. Zero dial gauge.
- iv. Pull wheel assembly out while rotating wheel slightly until dial reading doesn't change.
- v. Dial indicator will read bearing end play.
- vi. If end play does not register between .001-.005 inches (0.025-.125 mm), readjust end play.
- vii. Replace components if re-adjusting does not give end play tolerance within specs.
- m. Install a new gasket on hub face cap.
- n. Install hub face cap and tighten mounting cap screws to their specified torque.

- o. Add the specified amount of oil to the hub and secure fill plug. Check for leaks. Correct leaks before resuming operation.
- p. Remove safety stand from under axle and lower wheel to the ground.
- q. Repeat checks on all other axles.

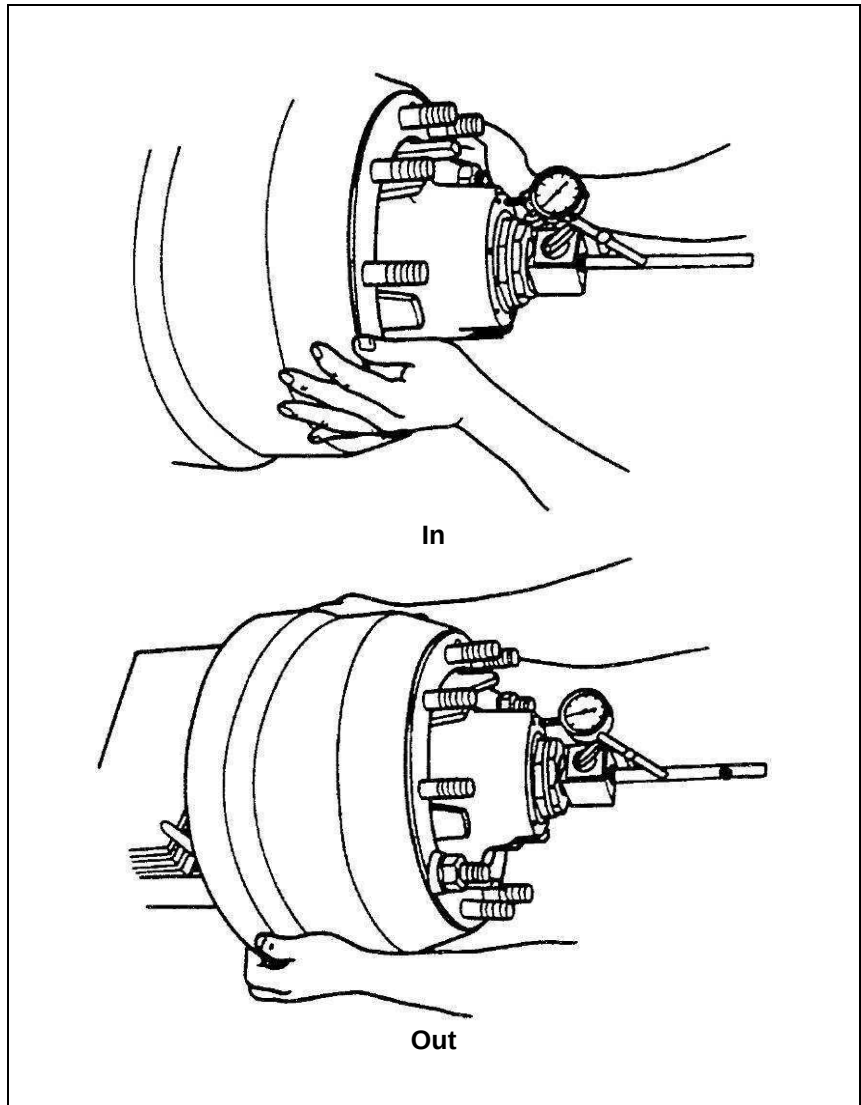


Fig. 8-10 Dial Indicator.

8.6 WHEELS

A variety of steel or aluminum wheels can be used on the trailer depending on customer preference or application requirements. Wheels must be maintained in good condition and all fasteners tightened to their specified torque level to obtain the expected life and performance. Loose fasteners are the most common cause of wheel problems on a trailer. Always retorque the wheel fasteners per the break-in schedule of 100, 500, 1500 and 5,000 miles (160, 800, 2500 and 8000 km) when the unit is new and after a wheel has been removed. Always use an accurate calibrated torque wrench when tightening fasteners. A loose fastener is defined as one that is not tightened to its specified torque. A loose fastener does not provide the required clamping, anchoring or holding forces to stabilize the adjacent components. Insufficient clamping forces can lead to flexing, bending, cracking, hole elongation or other component deterioration that cause failures and/or accidents. Always keep fasteners tightened to their specified torque. Over-torquing can overload certain components, causing compression cracks and strip nuts or studs. Over-torquing fasteners can be as detrimental as undertorquing. Always tighten fasteners to their specified torque.

Use an accurate torque wrench to retorque wheel fasteners every 10,000 miles (15,000 km) or monthly whichever comes first. Always retorque wheels per the break-in schedule whenever a wheel is removed and remounted.

Always follow the recommended mounting procedure when installing wheels to the trailer.

1. Disc Wheels (Stud Pilot Style):

- Mount single or inner dual wheel on hub. Be careful not to damage the threads on any of the studs.
- Snug the nuts up in the alternating sequence shown to center it on the hub and insure an even contact between the wheel and hub.

IMPORTANT

Left-hand threads are used on the left side of the vehicle. Right-hand threads on right.

- Tighten nuts to their specified torque using the same alternating sequence.
- Mount outer dual. Do not damage the threads when sliding the wheel over the studs.
- Snug up the nuts in the alternating sequence shown to center it on the hub and to provide even contact.
- Tighten the outer wheel nuts to their specified torque.

IMPORTANT

When retorquing inner nuts of double nut design, always back off outer nut several turns, then retorque them.

Table 6 Recommended Wheel Stud Torque (Disc Wheels)

Stud Size	Wheel Type	Ft-lbs Torque (Dry)
3/4"-16	Disc	450 – 500
1-1/8"-16	Disc	450 – 500
15/16-12	Disc	750 – 900
1-5/16-12	Disc	750 – 900
	Bud Unimount 10	390 – 440
	WHD-8	400 – 600

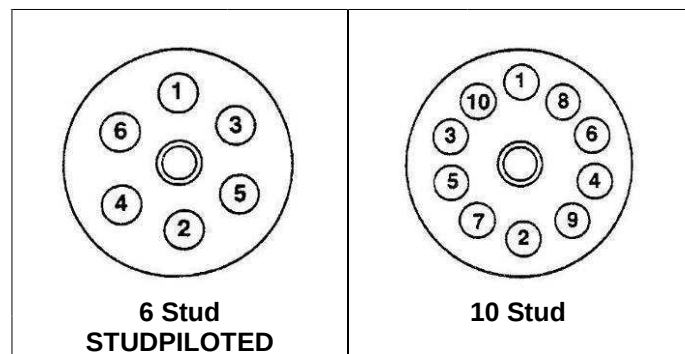


Fig. 8-11 Nut Torque Sequence

2. Hub Piloted Wheels

- Mount inner wheel on the hub.
- Slide on the hub guide until the wheel is snug against the hub. Be careful not to damage the threads on any of the studs.
- Mount outer dual wheel on the hub and snug up against the inner wheel.

NOTE

Add a drop or 2 of oil on the end of the bolt, threads and the nuts and flanges.

- Install nuts and tighten in alternate sequence shown.

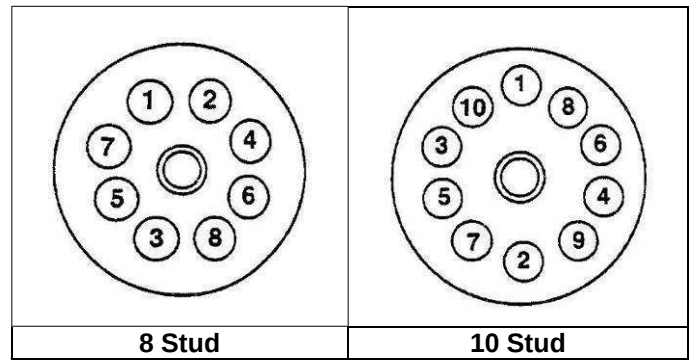


Fig. 8-12 Hub Piloted

IMPORTANT

Do not over-torque fasteners. Over-torquing can strip threads, collapse spacers or lead to other problems that cause loose fasteners. Use an accurate torque wrench when tightening fasteners.

Table 7 Recommended Wheel Bolt Torque

Stud Size	Ft-lbs Torque(Oiled)
M22 x 1.5 (33 mm or 1-1/2 Hex)	450 – 500
M20 x 1.5 (30 mm Hex)	280 - 330

3. Rim/Wheel (Cast Spoke):

- Inspect and clean all the parts. Replace any damaged components.
- Place rims and spacer band on wheel. Be sure to space valve stem between spokes.
- Secure clamps evenly in position.
- Snug up the nuts in the alternating sequence shown to allow the inside rim to seat itself on the mounting bevel and avoid wheel wobble.
- Tighten the nuts evenly in small increments in the shown alternating sequence until all nuts are tightened to their specified torque.
- Check for runout and redo if necessary.

Table 8 Recommended Wheel Bolt Torque (Spoke Wheels)

Bolt Size	Ft-lbs Torque (Dry)
5/8" - 11	150-175
3/4" - 10	210-260

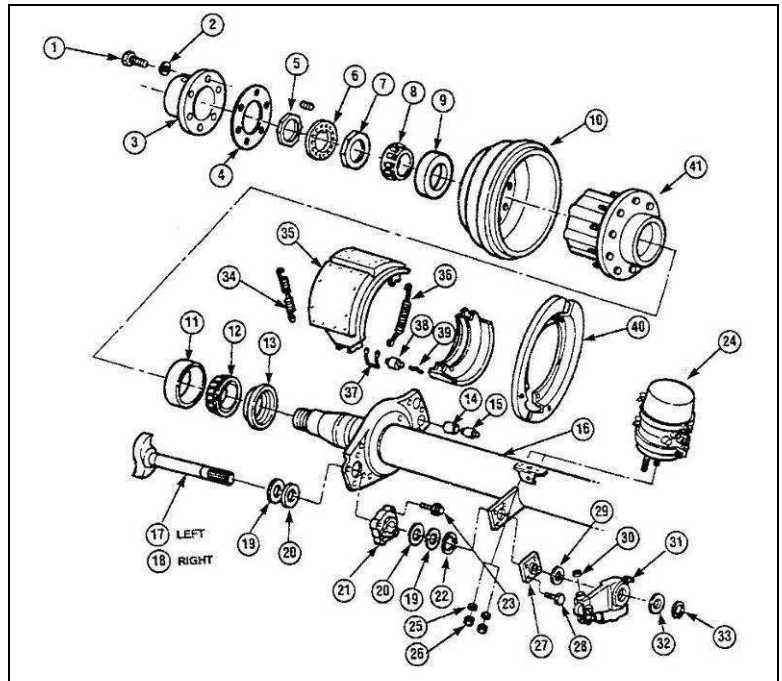


Fig. 8-13 Rim/Wheel Torque Sequence

8.7 TIRES

Tires are one of the most important components on a trailer and must be maintained in top condition to obtain their desired load carrying capacity and durability. Tire wear rate can be used as an indicator of the condition of the axle alignment or suspension system. Poorly maintained tires will wear rapidly or deteriorate and fail quickly and suddenly. A poorly maintained tire can and will affect adjacent components leading to their potential failure as well.

Proper tire maintenance includes but is not limited to:

1. Inflation Pressure:

Operating at an incorrect inflation pressure is the most common maintenance problem with tires. Tires should be checked frequently to be sure they are at their specified pressure.

It is recommended that tire pressure be checked at the start of each working day and at least one other time during the day. Always use an accurate hand gauge when checking the pressure and check each tire. Carry it with your unit so it is always available when needed. Best time to take tire pressure is when tire is cold. Every tire has its specified operating pressure molded into the sidewall. Adjust the pressure as required to obtain the specified inflation pressure when the tire is cold.

Tire pressure will normally increase 10 to 15psi during operation as the tire heats up. If the pressure exceeds this normal increase, it indicates the tire may be overloaded, underinflated, driven too fast, improperly sized or a combination of these factors. Identify the cause of the problem and correct it before resuming work.

a. Under-inflation:

Operating at lower than the specified pressure is a tire's worst enemy. Use an accurate tire pressure gauge to check the pressure at the start of each working day, every few hours during the day and/or whenever the handling characteristics change suddenly. Under-inflation will increase tread wear and cause a deterioration of the tire body leading to a separation of the tread from the body. An underinflated tire is soft and deflects more than it should causing fatigue cracks or breaks in the body cord construction leading to sudden air loss. Operation with a low or flat tire on a dual will generate a lot of heat in the underinflated tire from internal friction that it can and will disintegrate or catch on fire. It also causes overloading of the adjacent tire on the axle or axles and could lead to their failure also.

b. Over-inflation:

Inflating a tire over its specified pressure can also lead to serious problems. Over-inflation creates a more rigid tire that does not absorb road shocks as well as it should. Shock loading from impacting bumps or pot holes can break the fabric of the tire and/or transmit the higher loads into the rim, wheel and adjacent components causing them to fail as well. Overinflated tires cut, snag or puncture more easily than properly inflated tires. Also overinflating tire will not increase its load carrying capacity.

2. Tire Matching and Spacing on Duals

Tires on a dual assembly must be matched for size (diameter or rolling radius) and type of construction to obtain the desired and expected performance and life.

a. Matching of Size:

Tire sizes can vary between manufacturers and as they wear. Special care must be taken to be sure the tire size (rolling radius, diameter or circumference) is within the following dimensions:

Rolling radius: 1/8 inch (3 mm)

Diameter: 1/4 inch (6 mm)

Circumference: 3/4 inch (19 mm)

Measure the tire when it is mounted, inflated to its specified pressure and not loaded. The easiest method is to use a steel tape to measure the circumference of the tire.

Unequal sized tires will require the larger tire to carry more of the load and potentially overload it. Overloading accelerates the wear and can lead to tire failure. When the one tire fails, the remaining tire or tires will then also be overloaded. The smaller tire will not contact the road surface properly and will wear in an irregular manner giving poor durability.

b. Tire Construction:

Customers can use radial or bias ply tires on their trailer. However, it is recommended that different types of tires not be mixed on an axle. Each type of tire has different deflection, cornering and spring characteristics. These differing characteristics cause the tires to always fight each other during operation and will give erratic handling and poor wear characteristics when mounted on the same axle. Different types can be mounted on different axles but not on the same axle.

c. Tire Spacing:

A wide variety of rims can be used on the trailer and each will provide a different offset. Select the rims to provide sufficient space and clearance between the sidewalls of the tires. Normally there should be at least 2 inches (50 mm) and 3 inches (75 mm) between the sidewall of a bias ply and radial dual tire assembly respectively. This spacing will provide sufficient clearance for each type of tire to deflect as they rotate and when they impact a pothole or bump in the road. If they touch during operation, they will wear or abrade at the contact point. In addition, tires that are too close do not shed dirt, trash or stones that can get between them during operation as well as properly spaced tires.

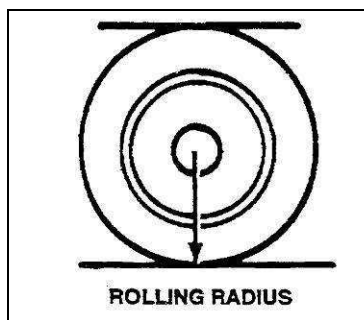


Fig. 8-14 Tire Dimensions

8.8 BRAKES

All components in the brake system must be maintained in good condition for the system to perform at top efficiency. It is recommended that brakes and associated components be checked, serviced and maintained per the Trailer Preventative Maintenance Schedule (TPM) for the trailer. In this section, the basic brake disassembly and assembly procedure will be covered. Refer to the axle manufacturers service manual for a more detailed repair and rebuilding procedure.

Check brakes frequently to keep them in top condition. Poorly maintained brakes will not stop the trailer as effectively as well-maintained brakes and in the extreme could fail completely leaving no brakes or no ability to stop the unit.

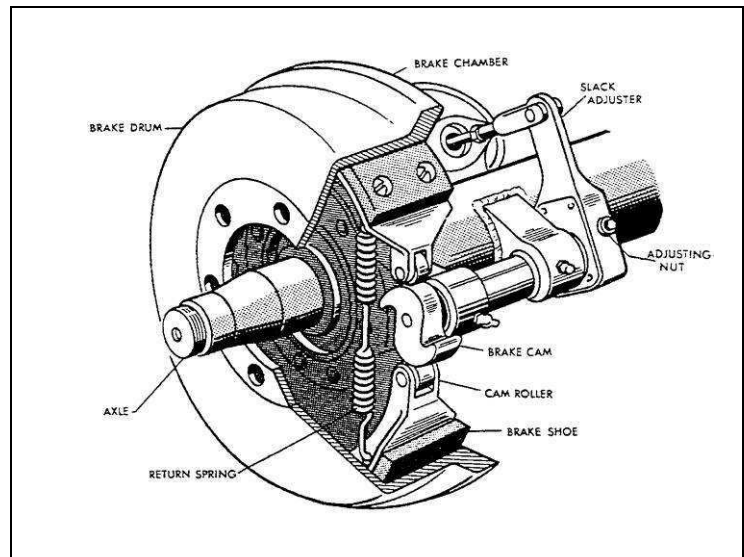


Fig. 8-15 Brake System

It is recommended that the driver checks the brakes at least once during each working day when checking tire pressure and performing a quick visual of the unit. Use your hand to check the temperature of the drum. All drums should be approximately the same temperature if the system is functioning properly. If any drum is significantly warmer or colder than the rest, it indicates a problem. Determine the cause of the problem and correct it before resuming work. By discovering and correcting it while it is minor, major repair, expense and down time can be prevented.

At 25,000 miles (40,000 km) or every 3 months when the axle is raised off the ground for the complete wheel end inspection, check the brakes at the same time. When the wheels are turned by hand, the wheel end should decrease speed slowly. If it does not, the brakes could be dragging or there could be a problem with the bearings. Dragging brakes will also be detected by hot drums during the daily drum temperature checks. Adjust the brakes to correct the problem.

8.8 BRAKES (cont'd)

Remove the brake dust covers (if so equipped) to access the shoes. Check the thickness of the linings. Reline or replace shoes when the lining thickness is less than 1/8 inch (3 mm). Uneven wear among the brake shoes on a trailer indicate that the braking system has not been set or maintained properly causing uneven application and wear. If uneven lining wear appears, reset the system to provide even application of all the shoes. Do not operate when the linings are less than 1/8 mile (3 mm) to prevent the lining anchor rivet or bolts from contacting the drum. Head contact with the drum will cut grooves in the surface and require extra machining to remove them when rebuilding the brakes.

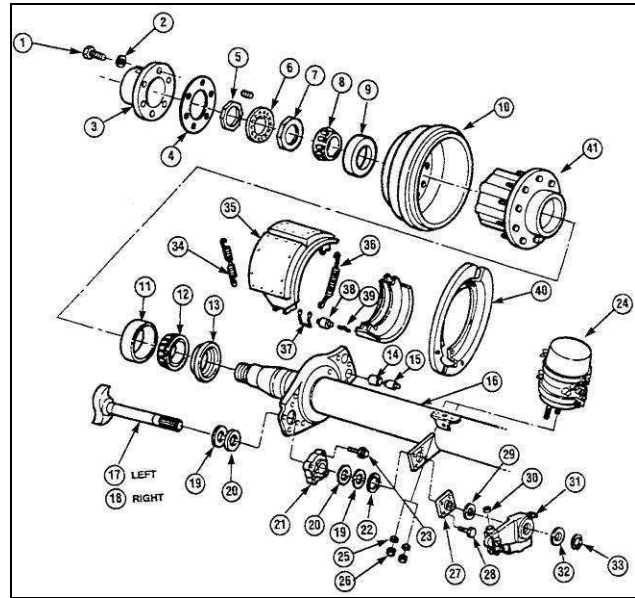


Fig. 8-16 Exploded View

Several types of friction material are available for use on the brake shoes. Each has its own friction coefficient and braking characteristics. Select the one that best fits your application but do not mix materials on the same trailer. Differing materials require different application forces to obtain the same braking force and a braking system can only apply one force when it is properly set.

Recent changes in environmental laws have banned the use of asbestos including brake linings. Always use the appropriate safety gear when removing brake shoes containing asbestos from your trailer. Replace the shoes that are equipped with approved material.

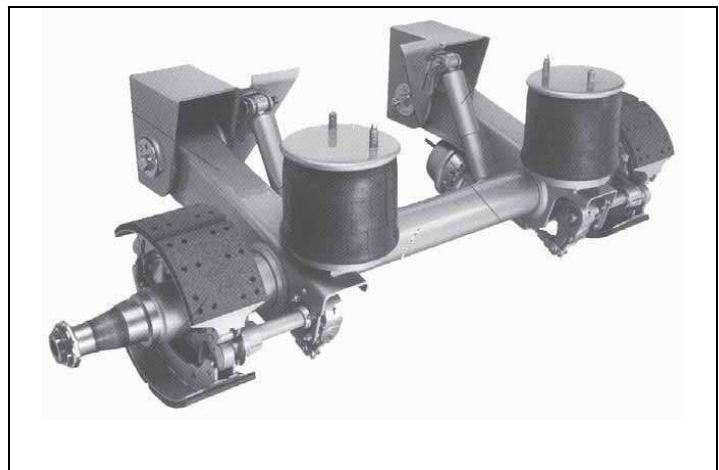


Fig. 8-17 Axle

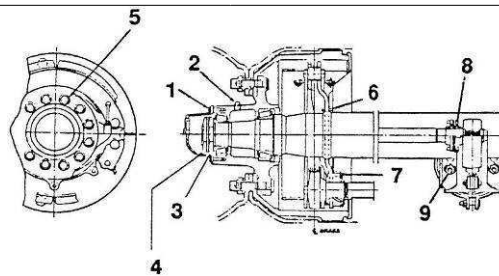
8.8 BRAKES (cont'd)

A. Removing Brakes:

1. Position the trailer on a level hard surface.
2. Exhaust all the air from the air system.
3. Jack the axle up and place on safety stands.
4. Remove the wheel assembly from the axle.
5. Release the slack adjuster
(Refer to Section 8.6).
6. Disable or cage spring brakes if so equipped.
7. Drain oil from hub and remove spindle end components.
8. Remove the hub and drum assembly. Support with a hoist as the assembly slides off the spindle. Use a puller if required.
9. Remove roller retaining clip from the bottom and top brake shoe cam rollers.
10. Disconnect and remove bottom shoe return spring.
11. Rotate bottom shoe to remove retaining springs.
12. Lift top shoe to remove.
13. Disconnect push rod from slack adjuster.
14. Back off and remove slack adjuster.
15. Remove cam shaft.

B. Installing Brakes:

1. Inspect all the components. Replace any that are cracked, bent or worn.
2. Lubricate the camshaft spline, slack adjuster gear and slack adjuster pins with anti-seize compound.
3. Install cam shaft and slack adjuster. Secure with snap rings.
4. Adjust slack adjuster to its required angle and attach to the push rod. Release slack adjuster pawl if so equipped.
5. Use a good quality brake grease to lubricate the anchor pins and rollers where they contact the brake shoes.
6. Place the upper shoe in position.
7. Place the lower shoe in position and attach 2 new retaining springs.
8. Rotate lower shoe forward and attach new brake shoe return spring.
9. Install both cam rollers and secure with retainers.
10. Install and secure the remaining wheel and components.
11. Repeat with other wheel ends as required.
12. Tighten all fasteners to their specified torque.



Description	Torque Range		Fastener Size
	(lb-ft)	N.m	
1. Hub-cap bolts	10-15	13-20	5/16"
2. Hub fill plug	15-20	20-27	3/8"
3. Adjustment nut - manual bearing adjustment (double nut)	Tighten to 200, loosen, tighten to 50, loosen 1/4 turn	136 68	Size depends on axle model and adjustment method.
4. Jam nut - manual bearing adjustment.	250-300	340-408	
5. Brake mounting bolt	130-165	177-224	5/8"
6. Two-piece dust shield bolts (shown) • Forged spider	15-20	20-27	3/8"
7. Bolt-on bushing bolts	25-35	34-48	3/8"
8. Cam bushing bolts	25-35	34-48	3/8"
9. Air chamber nuts	80-125	109-170	5/8"

Fig. 8-18 Brake Wheel Components

8.9 SLACK ADJUSTERS

*Crewson Industries Automatic Brake Adjusters are typical on Walinga units.
Below are the maintenance procedures for Crewson Industries Automatic Brake Adjusters.
For maintenance procedures on other slack adjusters refer to the manufacturers instructions.*

AUTOMATIC BRAKE ADJUSTER FIELD INSPECTION

No Automatic Brake Adjuster can compensate for Braking System Deficiencies. The brakes should be in good operating condition and be well maintained. Crewson Industries Automatic Brake Adjusters should not require manual adjustment except for initial installation and brake relines. The Automatic Brake Adjuster unit must be installed with a Crewson Industries clevis and template.

Note: By constantly manually deadjusting the ABA, the internal clutch life will be shortened.

***If the stroke is correct, the Automatic Brake Adjuster is operating properly. No other tests are necessary. The following only apply if the air chamber stroke is past the readjustment stroke.**

AUTOMATIC BRAKE ADJUSTER ON THE VEHICLE:

Free Stroke

Free stroke is the distance the slack arm moves in order to make the brake shoes contact the drum. Move the slack arm with a small pry bar and measure the movement distance. This distance should be 3/8" to 5/8".

If free stroke is greater than 5/8", check the foundation brake components. Repair and replace as needed.

Push Rod Power Stroke

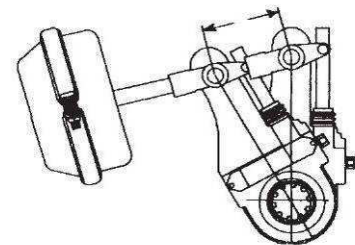
Measure the power stroke (the difference between when the brake is off and when it is fully applied) at 90 PSI application pressure.

This distance must be less than or equal to the maximum in the chart below.

Chamber Types	Adjusted Stroke
9, 12	less than or equal to 1-3/8"
16, 20, 24	less than or equal to 1-3/4"
30	less than or equal to 2"
36	less than or equal to 2-1/4"

LONG STROKE CHAMBERS

16, 20	less than or equal to 2"
24 (3 in max.)	less than or equal to 2-1/2"
30	less than or equal to 2-1/2"



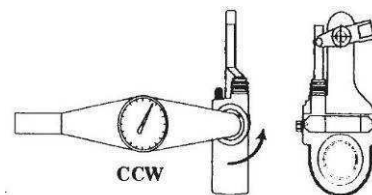
STROKE

Back Torque

This procedure should only be used if:

- A) The foundation brake system has no deficiencies.
- B) The Push Rod Power Stroke exceeds the specified values.

With the automatic brake adjuster correctly installed on the vehicle or trailer axle back torque (CCW Rotation of Hex Shaft) can be measured. Using an inch/pound type torque wrench turn the hex adjusting shaft CCW very slowly. Back torque will increase to a peak value, then return to zero as the clutch ratchet teeth disengage.



****NOTE:**** Do not turn the hex adjusting shaft more than 5 "clicks" (ratchet teeth) while taking readings. If the back torque reading is below 120 inch pounds (10 FT-LBS) and the Push Rod Power Stroke is beyond the specified limits, replace the Automatic Brake Adjuster. If the Back Torque exceeds 400 inch pounds (33 FT-LBS), replace the Automatic Brake Adjuster.

8.9 SLACK ADJUSTERS (cont'd)

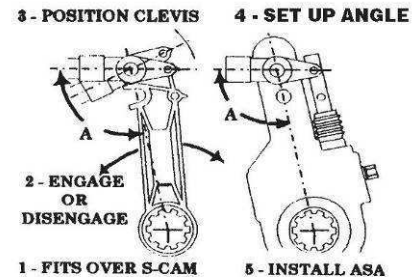
AUTOMATIC BRAKE ADJUSTER REMOVED FROM VEHICLE:

Crewson Automatic Brake Adjusters are fully lubricated at the factory. A grease fitting is provided for normal maintenance.

Crewson Industries Automatic Brake Adjusters can not be disassembled in the field. Never tamper with the units factory settings. This will void the warranty.

Verify Automatic Brake Adjuster Set Up

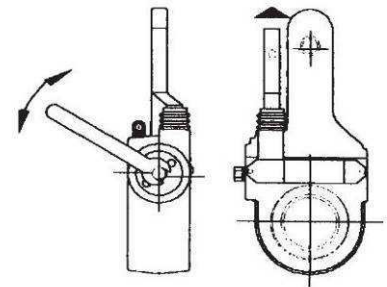
1. Select the correct template for spline size and armhole locations.
2. Fit Installation Template over S-Cam and put 1/2" pin to clevis.
3. Swing Template to engage 1/2" pin.
4. Screw clevis CW or CCW on Push Rod until 1/4" holes in clevis and template line up.
5. Template now indicates correct set up angle "A".
6. Remove template and 1/2" pin. Install ABA on S-Cam and turn the Hex nut CW until 1/2" and 1/4" holes line up with the clevis.
7. Install and secure clevis pins. Turn nut CW until shoes contact drum.
8. Backoff Hex nut 1/2 turn CCW to complete setup.



Actuation Rod Movement

The Actuation Rod will move as a slight force is used to turn the Adjusting Shaft Hex. 1/4 turn will cause full movement of the Actuation Rod. Full movement of the Actuation Rod is about 1/2".

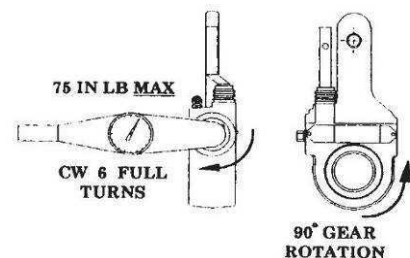
- CW movement of the Adjusting Shaft Hex will move the Actuation Rod into the Slack Body.
 - CCW movement of the Adjusting Shaft Hex will move the Actuation Rod out of the Slack Body.
- Replace Automatic Brake Adjuster if Actuation Rod does not move.



Gear Movement & Front Torque

Using a torque wrench, rotate Adjusting Hex Nut through 6 full revolution. Front Torque will increase to a peak value then return to zero several times on each revolution.

- The spline should rotate about 90 degrees.
 - The Front (CW) Torque should be less than 100 in. lbs.
- Replace Automatic Brake Adjuster if spline does not rotate or if torque readings are greater than 100 in lbs.



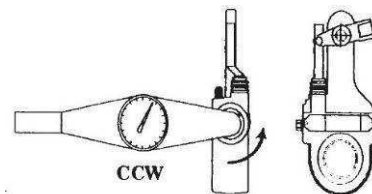
Back Torque

This procedure should only be used if:

- A) The foundation brake system has no deficiencies
- B) The Push Rod Power Stroke exceeds the specified values

With the Automatic Brake Adjuster correctly installed on the vehicle or trailer axle back torque (CCW Rotation of Hex Shaft) can be measured. Using an inch pounds type torque wrench turn the hex adjusting shaft CCW very slowly. Back torque will increase to a peak value, then return to zero as the clutch ratchet teeth disengage.

****NOTE:**** Do not turn the hex adjusting shaft more than 5 "clicks" (ratchet teeth) while taking readings. If the back torque reading is below 120 inch pounds (10 FT-LBS) and the Push Rod Power Stroke is beyond the specified limits, replace the Automatic Brake Adjuster. If the Back Torque exceeds 400 inch pounds (33 FT-LBS), replace the Automatic Brake Adjuster.



8.10 SUSPENSION

The suspension system is the group of components that connect the axle to the main trailer frame and absorb the shock loads from the road. Walinga trailers can be equipped with either a mechanical or air ride suspension system. Either system works well and will provide many years of trouble-free service.

8.10 Air Ride Suspension

An air ride suspension consists of air springs that are inflated and pressurized by the trailer air system and controlled by a height control valve. It is a simple system that requires minimal servicing and maintenance to perform well.

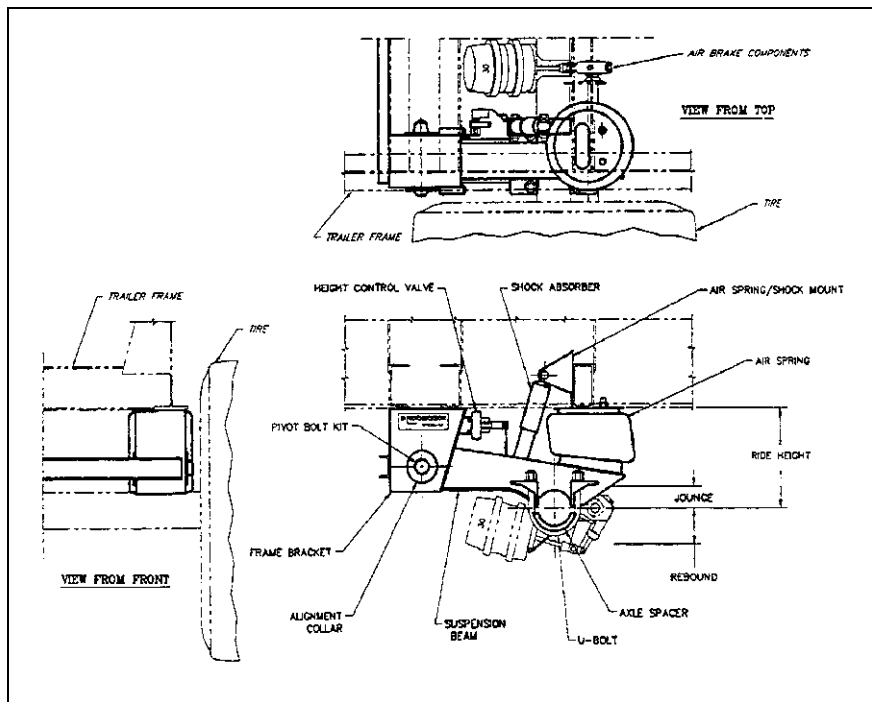


Fig. 8-19 Suspension

Visually inspect the trailer at the start of the day or trip to check the condition of the suspension. When the suspension is in good condition, the frame will be level and at the proper ride height. Also, check for loose fasteners or damaged components. Correct any problems before placing the trailer into service. Problems caught early and corrected minimize cost and downtime.

Table 9 Bolt Torque Values for Hendrickson Turner Suspensions

Description	Size	Torque Ft.-Lbs (unless noted)
Quik-Align™ Pivot Bolt	7/8"-9	475-525
Shock Bolt	3/4"-10	150-175
Air Spring Bolt (Lower)	1/2"-13	25-35
Air Spring Nut (Upper)	3/4"-16	45-55
Brake Dust Shield Bolt	5/16"-18	160-180 In. Lbs.
ABS Bracket Bolt	1/4"-20	75-100 In. Lbs.

Every 5,000 miles (8,000 km) or monthly, check the clearance around all the suspension system components. Correct any interference problem. Retorque all the fasteners to their specified torque.

Every 25,000 miles (40,000 km) or 3 months, visually inspect all components and welds for cracks, distortions or other damage. Repair or replace all defective components before placing unit into service.

8.10 Air Ride Suspension (cont'd)

Typical repairs include but are not limited to:

1. Air Spring Replacement:

Air springs are designed to be virtually trouble-free throughout their life. Problems seldom occur unless they are cut, punctured, abraded, pinched or torn and then they must be replaced.

- a. Block the wheels to prevent trailer movement.
- b. Exhaust air from the suspension system.
- c. Raise and support the frame on safety stands.
- d. Disconnect the air lines to the air spring(s).
- e. Loosen mounting bolts and remove air spring(s).
- f. Install new air spring(s).
- g. Tighten mounting bolts to their specified torque of 50 ft. lbs. (68 N.m).
- h. Install air lines and tighten to their specified torque.
- i. Repeat on other air springs.
- j. Remove stands from under frame.

NOTE:

Do not raise frame too high unless shock absorbers are installed to prevent over-extending the air spring.

2. Shock Absorber Replacement:

Shock absorbers remove energy from the suspension system as the trailer encounters holes and bumps on the road surface. They also act as a stop for the air springs to prevent the axle from moving too far away from the frame and tearing or damaging the air spring.

- a. Remove the upper and lower mounting bolts.
- b. Remove old shock and install new one.
- c. Secure shock by tightening mounting bolts to their specified torque of 250 ft. lbs. (338 N.m).

IMPORTANT

Use only correct Hendrickson Turner replacement parts. Substitute parts do not work with the suspension system.

3. Pivot Bushing:

Pivot bushings are a very durable, long lasting component. Bushing failures are rare and should be attempted only when all other problem causes have been eliminated. A bushing removal/installation tool is available from Hendrickson Turner when replacing the bushing and can be borrowed from your dealer or distributor. A 10 ton portable hydraulic press must be supplied by the customer. Purchase the bushing replacement kit that includes a new bushing, pivot bolt kit and lubricant.

When replacing the bushing, follow this procedure:

- a. Use a torch to "cut off" the Huck fasteners from the clamping bolt.
- b. Press out the old bushing and press in the new one.
- c. Install the clamping bolt and tighten the fastener to 800 ft. lbs. (1080 N.m).
- d. Tack weld the nut to the bolt to prevent loosening.

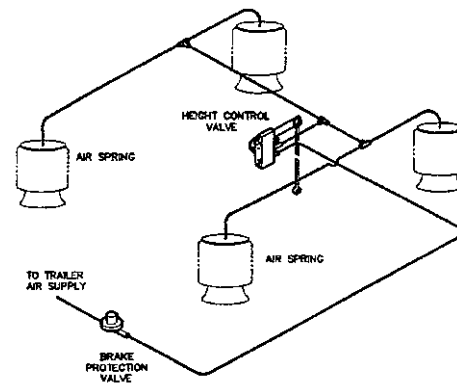
8.10 Air Ride Suspension (cont'd)

4. Air Control (Ride Height Control):

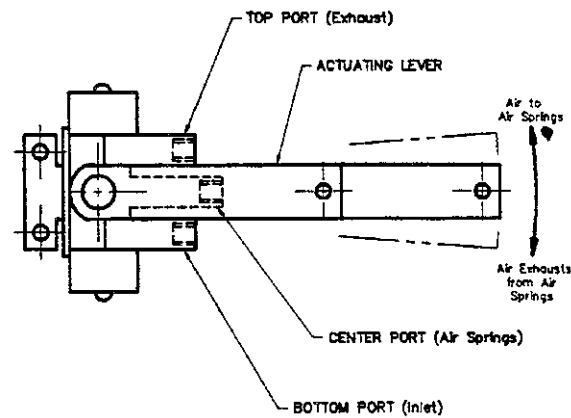
An air ride suspension system uses the air from the tractor to pressurize the air springs. A single height control valve is used to monitor the height of the frame above the axle and add/exhaust air from the system as required to maintain this dimension. Normally this dimension is set for your trailer and never changes.

The height control valve is located on the rear axle of the axle assembly area on the trailer and controls the adding/exhausting of air to the air springs. As the dimension between the frame and axle increases, the control lever moves down and air is exhausted from the system. As the dimension decreases, air is added to raise the frame. All valves incorporate a 5 to 15 second time delay to minimize jerking or cycling. Replace valve if not functioning properly.

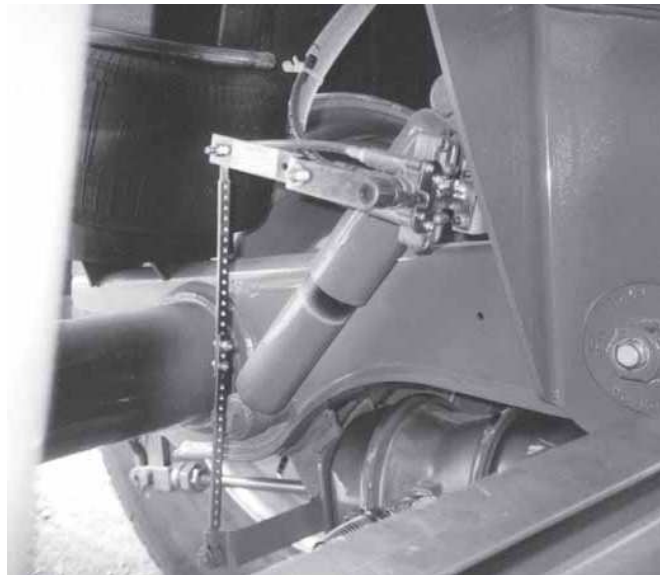
Note:
Setting of the height control depends on the suspension model.
Most Hendrickson trailer suspensions are set at 17"-17 ½ " measured from the center of the axle to the underside of the frame.



System Schematic



Valve Schematic



Valve

Fig. 8-20 Ride Height Control

8.10 Air Ride Suspension (cont'd)

5. Dump Valve:

All air control systems are equipped with a dump valve that allows the operator to exhaust the air from the system as required.

- a. **Always dump the air when parking the trailer and before unhooking.**
- b. Dumping the air is optional when:

- i. **Loading:**

The rapid or sudden addition of load to the trailer can cause the control valve to search for neutral. Exhausting the air rests the frame on the interval bumper and prevents the valve from searching. When the loading is completed, close the valve to repressurize the system.

- ii. **Unloading:**

Dumping rapidly can also require the valve to search for neutral. Close the valve when the unloading is completed to repressurize the system.

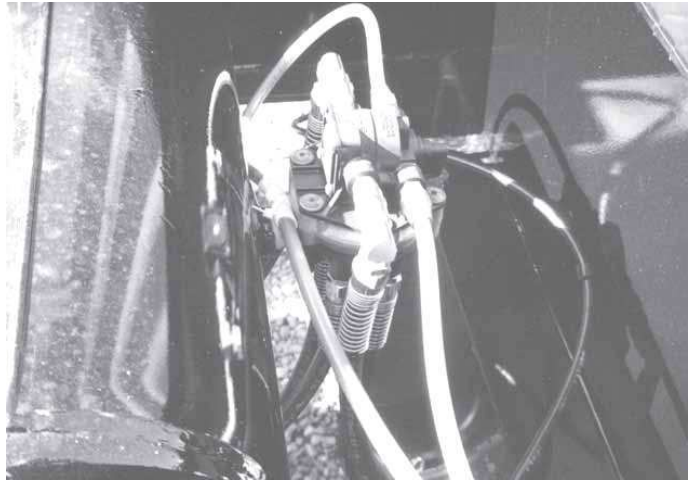


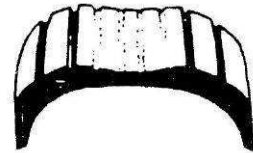
Fig. 8-21 Dump Valve

8.11 TIRE WEAR PATTERNS

The way your tires wear is a good indicator of other parts of the suspension. Abnormal wear patterns are often caused by the need for simple maintenance or axle alignment.

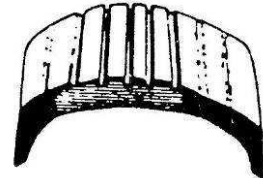
a. **Over-Inflation:**

Excessive wear at the center of the tire indicates the air pressure in the tire is consistently too high. The tire is riding on the center of the tread and wearing it prematurely. Occasionally, this wear pattern can result from outrageously wide tires on narrow rims. The cure for this is to replace either the tires or the wheels.



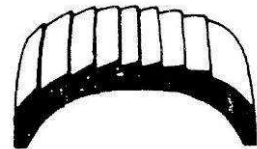
b. **Under-Inflation:**

This type of wear usually results from consistent under-inflation. When a tire is underinflated, there is too much contact with the road by the outer treads, which wear prematurely. When this type of wear occurs, and the tire pressure is known to be consistently correct or the need for axle alignment could be indicated.



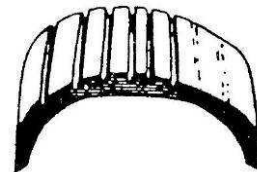
c. **Feathering:**

Feathering is a condition when the edge of each tread rib develops a slightly rounded edge on one side and a sharp edge on the other. By running your hand over the tire, you can usually feel the sharper edges before you will be able to see them. The most common causes of feathering are incorrect toe-in setting, deteriorated bushing in the suspension or misalignment.



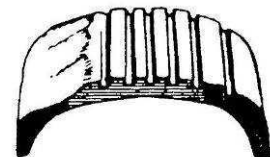
d. **One-Side Wear:**

When an inner or outer rib wears faster than the rest of the tire, the need for axle alignment is indicated. There is excessive camber in the axle causing the wheel to lean too much excessive load on the one side of the tire. Misalignment could also be due to sagging springs, or worn suspension system components.



e. **Cupping:**

Cups or scalloped dips appearing around the edge of the tread almost always indicate worn (sometimes bent) suspension parts. Adjustment of axle alignment alone will seldom cure the problem. Any worn component that connects the wheel to the suspension can cause this type of wear. Occasionally, wheels that are out of balance will wear like this, but wheel imbalance usually shows up as bald spots between the outside edges and center of the tread.



f. **Second Rib Wear:**

Second rib wear is usually found only in radial tires, and appears where the steel belts end in relation to the tread. It can be kept to a minimum by paying careful attention to tire pressure and frequently rotating the tires. This is often considered normal wear but excessive amounts indicate that the tires are too wide for the wheels.



8.12 AIR SYSTEM

Trailers are equipped with an air system, that is pressurized by a compressor on the tractor, for operating the discharge gates, brakes and air suspension (if so equipped). All components must be in good condition for the system to function and perform as intended. The air system must be inspected to be kept in good condition and functional checks performed to be sure it is operating as required.

8.12.1 AIR SYSTEM INSPECTION

The pre-trip or pre-start inspection include several air system related checks, inspections or tasks including but not limited to:

Daily

1. Check that the glad hands are clean and in good condition. Check seals in glad hand Clean, repair or replace as required.
2. Check that the air hoses between the tractor and the trailer are routed to prevent rubbing, chaffing or pinching. Reroute to correct condition if required.
3. Drain moisture from all air tanks. Pull on the cable attached to drain valve on the bottom of each tank until the water or spray no longer can be seen.

IMPORTANT: Tanks must be drained daily in high humidity and cold temperature conditions to prevent getting water or ice in the system.

4. Check that all the lines and hoses conveying air along the frame are tied up and secured to prevent dragging, scuffing or snagging. Tie up or protect as required to correct the condition. Damaging an air system component can cause a sudden loss of pressure and result in a loss of service brakes.

IMPORTANT: New FMVSS-121 regulations mandate higher pressures in the supply line to insure proper brake operation. Set the compressor pressure for cut-in to 105 psi and cut-out to 120 psi. Do not use additives in the air systems.

8.12.2 AIR SYSTEM FUNCTIONAL

A vehicle air system is a combination of the components on the tractor and the trailer. All must be maintained in good condition for the entire system to function as required. Although a visual check will indicate the outer condition of the components, it does not indicate the leaks or responsiveness of the system. To evaluate the integrity and responsiveness of the system, perform these functional checks:

1. Attach the trailer to a tractor and connect all the air and electrical lines.
2. Block wheels.
3. Stop tractor engine and exhaust air from all tanks.
4. Start engine and run at fast idle (1200-1500 RPM) to charge the air system.

Verify that:

- a. Low pressure alarm goes off when the system pressure exceeds 50 psi.
- b. Increasing the system pressure between 50 psi and 80 psi takes less than 3 minutes.
- c. The compressor cuts out when the system pressure exceeds 120 psi.
- d. Fan brakes to use air. Compressor must engage when system pressure drops below 105 psi.

NOTE: Release spring brakes before fanning service brakes.

5. Push emergency valve to charge trailer system. Apply and release service brakes.
6. Build system above 120 psi and stop engine.

Verify that:

- a. Main tank pressure does not drop more than 18 psi when brakes are fully applied using brake pedal. If pressure drop exceeds 18 psi, adjust brakes and recheck.
- b. System pressure should not drop more than 4 psi per minute. Listen for audible leaks.
- c. Release foot valve, fan treadle to drop main reservoir pressure. Brakes should dynamite automatically when the pressure drops below 60 psi.

Adjust or repair system until these conditions are met.

8.13 ABS VEHICLE CONTROL SYSTEM

The standard ABS system on Walinga Trailers is Meritor Wabco's Enhanced Easy-Stop™

For other ABS systems refer to the specific manufacturers maintenance and service directions. Trailer ABS is a system that controls the brakes on a trailer to prevent wheel lock-up when braking.

The ABS section below is extracted from the Meritor Wabco Maintenance Manual MM-0180. Please refer to the Arvin Meritor website for additional maintenance, and more comprehensive service information.

arvinmeritor.com
call 800-535-5560 or <http://www.meritorwabco.com>

Definition of Enhanced Easy Stop™ Trailer ABS

Enhanced Easy-Stop™ Trailer ABS is an electronic, self-monitoring system that works with standard air brakes. It consists of three major components with connecting cables:

- Electronic Control Unit (ECU)/ABS modulator valve assembly (single or dual)
- ABS external modulator valve (for 4S/3M)
- Wheel speed sensor assembly

The ECU contains a microprocessor which controls the system. Several configurations, consisting of a different number of sensors and ABS modulator valves, make Enhanced Easy-Stop™ Trailer ABS adaptable to nearly every trailer.

Features

Enhanced Easy-Stop™ features include:

- Power Line Carrier (PLC) communication
- Generic Input and Output (I/O) (future expanded capability)
- Dual relay modulator for the 2S/2M Standard, and 2S/2M, 4S/2M and 4S/3M Premium systems
- Serviceability — ECU and valve can be replaced individually

PLC Communication

PLC stands for Power Line Carrier, which is a method used to communicate information by multiplexing data on the same wire used for the ABS electrical power. PLC communications convert signal messages data to a radio frequency (RF) signal on top of the +12V power line providing electrical power to the trailer. PLC was introduced to meet Federal Motor Vehicle Safety Standards (FMVSS) 121 requirements that call for the trailer ABS indicator lamp to illuminate on the instrument panel of the tractor to alert the driver of a fault in the trailer ABS.

Theory of Operation

The ECU receives wheel speed information from sensors located in the wheel ends of the axles. There may be two or four sensors on the trailer or dolly, depending on the number of axles and the ABS configuration.

Sensors continuously monitor wheel speed and send this information to the ECU. When a wheel starts to lock, the ECU, using the wheel-speed information and programmed data, sends output signals to control the operation of the ABS modulator valves.

The ECU monitors the air pressure in the brake chambers to prevent wheel lockup and provide precise braking control during over-braking. ABS takes over control of the air pressure only when a wheel starts to lock up. The ECU controls the ABS modulator valves to modulate air pressure to the brake chambers to prevent wheel lockup.

In the event of a malfunction in the system, the ABS in the affected wheel(s) is disabled. That wheel still has normal brakes; the other wheels keep the ABS function.

ABS System Continued

Terms and Definitions

ABS Axle Control

The 2S/1M configuration uses one ECU/modulator valve assembly and two wheel speed sensors. The ABS monitors wheel speed on one axle only. This is referred to as axle control.

ABS Side-to-Side Control

The 2S/2M and 4S/2M configurations use one ECU/dual modulator valve assembly, and two or four wheel speed sensors. ABS sensors are mounted on one or two axles only; the curb and road sides of the trailer are controlled separately. This is referred to as side-to-side control.

ABS Modulator (Relay) Valve

This solenoid controlled valve regulates air pressure at the brake chambers during ABS operation.

ABS System Configuration

The system configuration defines the number of wheel speed sensors (S) and modulator valves (M) used in the Enhanced Easy-Stop™ Trailer ABS system. These configurations are 2S/1M, 2S/2M, 4S/2M and 4S/3M.

ABS Trailer Indicator Lamp (Dash Mounted)

This lamp illuminates to alert the driver to an ABS fault in the trailer ABS.

ABS Indicator Lamps

NOTE: When replacing the bulb, to ensure proper lamp operation use an incandescent type DOT-approved lamp, or a LED with integral load resistor.

ABS Indicator Lamp (on Dash)

With Enhanced Easy-Stop there are two ABS indicator lamps; one on the vehicle dash and one on the side of the trailer.

ABS Indicator Lamp (on Trailer)

This indicator lamp enables a driver to monitor the ABS at all times. Refer to the OEM operating manual for the mounting location of the indicator lamp.

The indicator lamp is powered by stoplight or constant power:

- If the trailer was manufactured prior to February 28, 1998, or was manufactured outside of the United States, the ABS may be either stoplight or constant powered.
- If the trailer was manufactured March 1, 1998 or later — and was manufactured in the United States — it will have constant power capability. This is mandated by Federal Motor Vehicle Safety Standard (FMVSS) 121.

Check your vehicle specification sheet to determine the type of ABS power. **Table x** and **Table x** in this section illustrate indicator lamp operation on stoplight and constant powered ABS systems.

An ECU with part number 472 500 001 0 manufactured **prior to September 1997** requires all sensed wheels to detect a 4 mph signal to shut off the ABS indicator lamp. Do not confuse this with a faulty ABS system. If the indicator lamp stays on when the brakes are applied to a moving vehicle, service the ABS system.

Most trailers manufactured **prior to February 1998** require that the brakes be applied to operate the ABS indicator lamp. If the indicator lamp stays on when the brakes are applied to a moving vehicle, service the ABS system.

The trailer ABS indicator lamp on the side of the trailer indicates the status of the trailer ABS. If it comes ON and stays ON when you apply the brakes to a moving vehicle, there is an ABS malfunction. It is normal for the lamp to come ON and go OFF to perform a bulb check, but it should not stay ON when the vehicle is moving above 4 mph. As with any safety system, it is important not to ignore this indicator. If the indicator lamp indicates a malfunction, the vehicle can be operated to complete the trip, but it is important to have it serviced as soon as possible using the appropriate maintenance manual to ensure proper braking performance and that the benefits of ABS remain available to your drivers. Typical ABS indicator lamp mounting on a trailer is illustrated in Fig.8-22

When a fault exists in the ABS, standard braking returns to the affected wheel, and the ABS still controls other monitored wheels. This lets you complete the trip. You should not ignore the indicator lamp and should have the vehicle serviced as soon as possible after the lamp comes ON and stays ON.

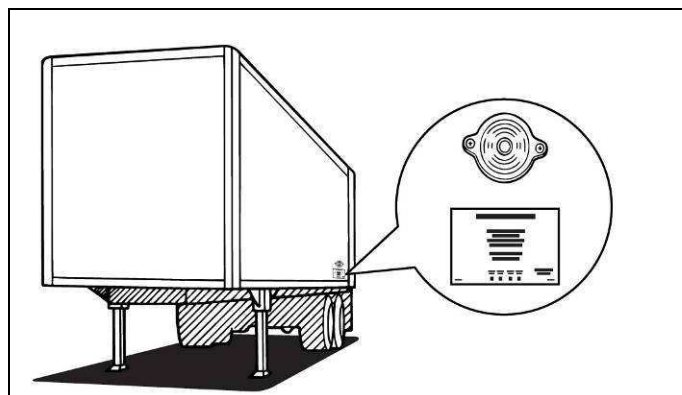


Fig. 8-22 Typical ABS Indicator Lamp Mounting Location on Side of Trailer

All trailers with ABS must have an amber light at the front driverside to indicate low air pressure.

Table 10 Stoplight Power

System Power Comes from Activating the Stoplight Circuit.			
Brakes	Fault in System	Vehicle Speed	Indicator Lamp
Released	N.A.	N.A.	OFF
Applied	NO	Less than 4 mph	ON for 3 seconds, then goes OFF.
Applied	NO	Greater than 4 mph	Flashes once, then stays OFF for remainder of stop.
Applied	YES	N.A.	ON

Table 11 Constant Power

System Is Ignition Powered.				
Brakes	Ignition	Fault in System	Vehicle Speed	Indicator Lamps (Trailer and Dash)
Released	OFF	N.A.	N.A.	OFF
	ON	NO	Less than 4 mph	ON for 3 seconds, then go OFF.
	ON	NO	Greater than 4 mph	OFF
	ON	YES	N.A.	ON
Applied	OFF	NO	Less than 4 mph	ON for 3 seconds, then go OFF.
	OFF	YES	N.A.	ON
	ON	NO	Less than 4 mph	ON for 3 seconds, then go OFF.
	ON	NO	Greater than 4 mph	OFF
	ON	YES	N.A.	ON

8.14 ABS SCHEMATICS

8.15 ELECTRICAL SYSTEM

All trailers are equipped with an electrical system for providing power for lights and electrical controls. All components are designed to minimize the effects of foul weather and adverse operating conditions. However, it is the responsibility of the operator to check and verify that all components are in good condition and functioning as intended.

During the daily or pre-trip inspection, always verify that each light functions as required. It may be helpful to work with another individual to verify the function of the brake or turn signal lights. A properly functioning electrical system is the only way an operator can communicate his intentions to other drivers. Checking the electrical system includes but is not limited to:

1. Replace any bulb that is burned out.
2. Clean all reflective lenses. Replace any that are cracked or broken.
3. Clean all connections and terminals to a light that is flickering.
4. Reroute and secure any wires or cables that are dangling or have snagged on something.
5. Check the integrity of the seal around each light. Replace any seal that is cracked or damaged.

Table 12 Trailer Light Requirements

Function	P/N	Size (Watts)
4" Tail Lamp		8
Signal/Brake		27
Side Signal		27
Clearance		8
Marker		5



Electrical Connections



Terminal Box

8.16 ELECTRICAL SCHEMATICS

8.17 HYDRAULIC SCHEMATICS V20-HOIST CTRL

9 TROUBLE SHOOTING

The Walinga Unit uses a simple and reliable system that requires minimum maintenance. In the following section, we have listed many of the problems, causes and solutions to the problems that you may encounter.

If you encounter a problem that is difficult to solve, even after having read through this trouble shooting section, please call your Walinga dealer. Before you call, please have this Operator's Manual and the serial numbers from your unit ready.

PROBLEM	CAUSE	SOLUTION
1. Air Ride Suspension		
Trailer leans... ...constantly in one direction	Suspension beams installed out of parallel.	Determine which beam is out of parallel, cut from axle, reposition and re-weld.
...varies from side to side.	Axle welds missing or broken.	Clear away old welds, reposition the beams to be parallel and reweld to axle.
...varies in one direction.	Failed pivot bushing (rare).	Contact Hendrickson Turner Technical Service Department.
Trailer "Dog-Tracks"...		
...constantly to one side.	Trailer out of alignment.	Remove weld from the alignment collars on those axles requiring adjustment. Realign per procedure provided by Hendrickson Turner.
...from side to side. ...to one side under load.	Missing or broken alignment collar welds.	Clear away failed welds and realign per procedure provided by Hendrickson Turner.
	Suspension not square to axle.	Contact the Hendrickson Turner Technical Service Department.
	Air springs misaligned.	Compare the installation to the suspension drawing and reposition mountings as required.
	Failed pivot bushing (rare).	Contact the Hendrickson Turner Technical Service Department.
Bushing Walk		
The suspension beams have shifted from the center of the pivot bushings).	Incorrect alignment.	Re-bush the suspension and re-align as per Hendrickson Turner instructions.
	Suspension beams out of parallel (vertically or longitudinally).	Determine which beam(s) is out of position, cut from axle, reposition and weld. Re-bush both suspension pivots.
	Frame bracket centers do not match the suspension beam centers.	Compare the installation dimensions to the suspension assembly drawing. Reposition the incorrect components and re-bush both suspension pivots.
	Use of improper bushing lubricant.	Re-bush using lubricant supplied by Hendrickson Turner.

PROBLEM	CAUSE	SOLUTION
1. Air Ride Suspension (cont'd) Bushing Walk (cont'd)		
Pivot can be moved vertically.	Faulty or worn bushing.	Replace bushing.
Bushing protrudes from the bushing tube.	Failed bushing.	Rubber protruding from both ends of the bushing tube is normal. Excess rubber protruding from one end can indicate a bushing walk condition.

PROBLEM	CAUSE	SOLUTION
2. Mechanical Suspension		
Improper suspension spring action	Broken or cracked spring leaves.	Replace complete spring.
	Uneven load distribution.	Rearrange load for proper distribution.
	Weak spring.	Replace spring.
	Springs out of alignment in hangers due to loose U-bolts.	Align springs and tighten U-bolts to proper torque.

PROBLEM	CAUSE	SOLUTION
3. Tires		
	Over or under inflation.	Inflate to proper pressure.
	Loose wheel stud nuts or clamps.	Tighten wheel stud nuts or clamps.
	Loose or tight wheel bearing.	Adjust bearings.
	Axle bent or out of alignment.	Straighten, align or replace axle.
	Tires not properly matched.	Match tires.
	Improper acting brakes.	Correct brakes as required.
	Rapid stopping.	Apply brakes slowly when approaching stops.
	High speed.	Reduce speed.
	Over or under inflation.	Inflate to proper pressure.
	Excessive speed on turns.	Reduce speed.
	Tire wobble due to uneven rim clamping.	Torque tighten all rim clamps.
	Worn or damaged wheel bearings.	Replace bearings.
	Bent wheel or rim.	Replace wheel or rim.
	Bent axle.	Replace or straighten axle.
	Leaf spring broken.	Replace leaf or complete spring.
	Bent axle.	Replace or straighten axle.
	Frame or suspension (axles) out of alignment.	Straighten frame or align axles.
Loss of tire air pressure.	Puncture in tire.	Repair or replace tire.
	Faulty valve or valve core.	Replace valve assembly or core.
	Wheel or rim damage.	Replace wheel or rim.

PROBLEM	CAUSE	SOLUTION
4. Electrical		
Lights flicker or do not come on.	Bad connection.	Check electrical system circuits.
	Frayed wires.	Repair as required.
	Battery on tractor not sufficiently charged.	Charge battery.
	Damaged or disconnected wire on ground cable.	Repair or replace cable.
	Poor ground at sockets.	Repair as necessary.
Complete loss of trailer lights.	Broken main harness.	Repair or replace.
	Junction box failure.	Replace junction box.
	Frayed wires.	Repair as required.
	Damaged or disconnected ground cable.	Repair or replace cable as required.
	Loose or corroded connection in ground lead between tractor and trailer.	Repair or replace.
Lights flash improperly or appear to be crossed.	Internal short in junction box.	Repair or replace junction box.

PROBLEM	CAUSE	SOLUTION
5. Air System		
Excessive compressor cycling.	Air leak.	Check air line fittings and hose connections on service or supply line. Check service chamber at clamp housing, push rod for damage. Check service chamber diaphragm. Check emergency chamber clamp and vent holes for leakage. Repair or replace air chamber as required. Check FFVII brake valve if so equipped. Repair or replace as required.
Trailer brakes slow and sluggish.	System or component failure.	Check slack adjuster and chamber/ spring brake push rod alignment for interference. Assure slack adjuster and chamber/ spring brake push rod angle 90° applied with proper adjustment. Assure open lines - no kinks, bends, closed shut-off cocks, restrictions, excessive elbows. Assure adequate tractor brake function. Have authorized service center check for adequate pressure and timing balance relative to tractor/trailer application.
Trailer brakes drag.	System or component failure	Assure emergency line exceeds 120 psi pressure; check and maintain governor at max. cut-in. Check slack adjuster and chamber/spring brake push rod alignment for interference. Assure slack adjuster and chamber/spring brake push rod angle 90° applied with proper adjustment. Assure open lines - no kinks, bends, closed shut-off cocks, restrictions, excessive elbows. Check for trapped service air pressure at trailer service/delivery hoses. If air pressure is noted, check for full release of all application valves (tractor/truck/trailer).

PROBLEM	CAUSE	SOLUTION
5. Air System (cont'd)		
Trailer brakes won't apply (service).	System or component failure.	Check air delivery to emergency system. Check air delivery to service gladhand. Check air delivery to air chamber or spring brake. Check air delivery to all reservoirs at system working pressure. Check slack adjuster and chamber/spring brake push rod alignment for interference. Check slack adjuster and chamber/spring brake push rod angle 90° applied with proper adjustment. Check air jumper hoses are not crossed between tractor and trailer.
Park/emergency brakes won't release.	System or component failure.	Check air jumper hoses are not crossed between tractor and trailer. Check air delivery to emergency gladhands exceeds 120 psi. Check air delivery to FFV valve. Check air delivery to all reservoirs at system working pressure. Check open lines - no kinks, bends, closed shut-off cocks, restrictions, excessive elbows. Check that brake shoes are not frozen to drums.
Park/emergency brakes won't hold.		Check slack adjuster and chamber/ spring brake push rod alignment for interference. Assure slack adjuster and chamber/spring brake push rod angle 90° applied with proper adjustment.
Air reservoir leaks or loose mounting.	System or component failure.	Replace/use rubber grommets with integral brackets.

PROBLEM	CAUSE	SOLUTION
Semi-trailer "Runs-Up" on tractor.	Check brake linkage.	Assure slack adjuster and chamber/spring brake push rod angle 90° applied with proper adjustment. Check gladhand connection. Assure open lines - no kinks, bends, closed shut-off cocks, restrictions, excessive elbows. Have authorized service center check for adequate pressure and timing balance relative to tractor/ trailer application.
Poor braking performance.	Uneven brakes.	Check slack adjuster and chamber/spring brake push rod angle 90° applied with proper adjustment. Check open lines - no kinks, bends, closed shut-off cocks, restrictions, excessive elbows. Check for leaks in system by applying service brake and inspecting.
	Trailer brake lining wear excessive.	Have authorized service center check for adequate pressure and timing balance relative to tractor/ trailer application. Proceed per problem "trailer brakes drag." Check slack adjuster and chamber/spring brake push rod angle 90° applied with proper adjustment. Check air delivery to all reservoirs at system working pressure. Check open lines - no kinks, bends, closed shut-off cocks, restrictions, excessive elbows. Have authorized use of "jumper hose analyzer " and duplex gauge to pin-point brake imbalance. Check functional return spring in service chamber or spring brake. Check open lines - no kinks, bends, closed shut-off cocks, restrictions, excessive elbows.
	Trailer service brakes slow to release.	Have authorized use of "jumper hose analyzer " and duplex gauge to pin-point brake imbalance.
	Slack adjuster not auto adjusting.	Check for damaged actuator rod. Replace as required. Slack adjuster internal components seized. Replace.

PROBLEM	CAUSE	SOLUTION
5. Air System (cont'd)		
Poor braking performance (cont'd)	Cracked housing.	Replace slack adjuster.
	Worn clevis pin bushing.	Replace bushing
	Full function valve (FFV) leaks at exhaust port with all brakes released.	Replace FFV valve.
	Full function valve (FFV) leaks at exhaust port with service brakes applied.	Replace FFV valve.
	Spring parking brake (service only service chamber side of spring brake) drags or won't release.	Check for: - Improper adjustment, restriction or broken line. - Diaphragm failure. - System pressure too low (120 psi min). - Replace entire unit or piggy-back emergency section.
	Spring parking brake leaks when pressurized for park brake release.	Check for: - Ruptured spring side diaphragm. - Hose leaks. - Repair hose leak or replace spring brake chamber.

PROBLEM	CAUSE	SOLUTION
6. Hydraulic System No oil pressure.	Hose hook up incorrect.	Reverse hoses on pump.
	Loose coupling in driveline.	Check setscrews in driveline.
	Loose connection.	Check hose fittings.
	Air in oil.	Check hose fittings.
Noisy pump.	Bent drive shaft.	Check driveline.
	Low oil supply.	Increase oil in reservoir.
	Air in oil.	Check hose fittings.
PROBLEM	CAUSE	SOLUTION
7. Orbit Motor Slow operation.	Plugged filter.	Replace filter element or clean filter.
	Relief setting too low.	Set relief valve for proper PSI.
	Worn pump.	Repair or replace pump.
	Worn motor.	Replace worn parts or motor.
	Extremely high fluid temperature causing pump and motor to slip (temperature increase as pump and motor wear).	Increase reservoir size and use a high viscosity index such as 20W40.
	Inadequate size oil lines.	Increase oil lines.
	Pump cavitation.	Increase oil line size to pump, in cold weather, use 5W20 oil.
Motor will not turn	Shaft seized in housing due to excessive side load or misalignment (Note 500 lb. max. radial loading on shaft).	Replace housing assembly set if damaged.
	Large contaminating particles in fluid such as machining chips or sand - very dirty fluid.	Flush new systems - use better filtration.
	Broken shaft from extreme side loads or misalignment.	Correct and replace.
Motor runs without turning shaft.	Broken shaft.	Replace shaft assembly – check housing for wear and replace if necessary.
Leak at shaft.	Worn or cut quad-ring.	Replace quad-ring, polish shaft at seal area with #600 wet or dry sanding cloth.

PROBLEM	CAUSE	SOLUTION
7. Orbit Motor (cont'd)		
Leak between flange and housing.	Loose flange.	Tighten.
	Damaged seal between housing flange.	Replace seal. Check housing surface at seal for sharp nicks or deep scratches.
	Leak in body plug seal.	Replace faulty o-rings.
Leak between housing and plates and gerotor.	End cap bolts loose. (Note: All motors are tested and rated at a maximum back pressure of 1000 PSI)	Tighten the cap screws at gerotor end of motor - if the threads are accidentally stripped in the housing, the hole may be drilled and tapped deeper and the motor reassembled with longer bolts.
Leak between gerotor and end cap.	Dirt between surfaces. Scratches or nicks on surfaces.	Reassemble - clean and dry parts. Polish very carefully on a flat, hard surface - use #600 or finer abrasive cloth and very little pressure - avoid rounding edges.
Cracked front flange.	Use installation bolts which are too long and bottom against housing.	Replace flange and use proper size bolts.
Leak at oil ports.	Poor fittings.	Replace fittings carefully.
	Damaged threads.	Replace housing or use nut such as true seal.

PROBLEM	CAUSE	SOLUTION
8. Hoist		
Failure to tip.	Shortage of oil.	Fill up tank.
	Air locked in system.	Bleed pump, check joints in low pressure flexible pipe.
	Oil not reaching ram.	Check for shortage of oil, wrong grade of oil, or faulty pump.
	Oil not reaching pump.	
	Control valve spool clogged.	Check for stoppage in feed pipe and oil filter.
	Pressure relief valve.	Clean out valve thoroughly.
		Insert gauge and check pressure, this should be 1800 psi.
Body creeps slowly downwards.	Dirt wedged under lowering valve, check valve or overload valve seat.	Flush valves by opening and closing quickly with pump running. If this does not cure the trouble, remove and clean valve thoroughly.
Sluggish operation.	Shortage of oil.	Tighten all joints. Replace if necessary.
	Air locked in system.	
	Leaking joints.	
	Worn pump.	
Hoist operates jerkily.	Air locked in system.	

10. SPECIFICATIONS

11.1 BOLT TORQUE

CHECKING BOLT TORQUE

The tables shown below give correct torque values for various bolts and cap screws. Tighten all bolts to the torques specified on chart unless otherwise noted. Check tightness of bolts periodically, using bolt torque chart as a guide. Replace hardware with the same strength bolt.

Table 13 Imperial Torque Specifications

Bolt Diameter "A"	Bolt Torque *					
	SAE 2 (N.m) (lb-ft)		SAE 5 (N.m) (lb-ft)		SAE 8 (N.m) (lb-ft)	
1/4"	8	6	12	9	17	12
5/16"	13	10	25	19	36	27
3/8"	27	20	45	33	63	45
7/16"	41	30	72	53	100	75
1/2"	61	45	110	80	155	115
9/16"	95	60	155	115	220	165
5/8"	128	95	215	160	305	220
3/4"	225	165	390	290	540	400
7/8"	230	170	570	420	880	650
1"	345	225	850	630	1320	970

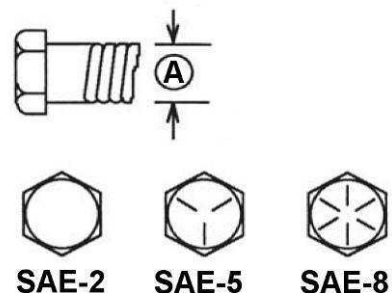
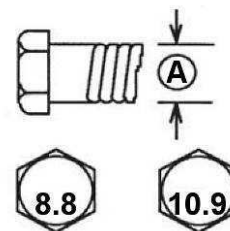


Table 14 Metric Torque Specifications

Bolt Diameter "A"	Bolt Torque *			
	8.8 (N.m) (lb-ft)		10.9 (N.m) (lb-ft)	
M3	.5	.4	1.8	1.3
M4	3	2.2	4.5	3.3
M5	6	4	9	7
M6	10	7	15	11
M8	25	18	35	26
M10	50	37	70	52
M12	90	66	125	92
M14	140	103	200	148
M16	225	166	310	229
M20	435	321	610	450
M24	750	553	1050	774
M30	1495	1103	2100	1550
M36	2600	1917	3675	2710



Torque figures indicated above are valid for non-greased or non-oiled threads and heads unless otherwise specified. Therefore, do not grease or oil bolts or cap screws unless otherwise specified in this manual. When using locking elements, increase torque values by 5%.

* Torque value for bolts and cap screws are identified by their head markings.

11.2 HYDRAULIC FITTING TORQUE

TIGHTENING FLARE TYPE TUBE FITTINGS*

1. Check flare and flare seat for defects that might cause leakage.
2. Align tube with fitting before tightening.
3. Lubricate connection and hand tighten swivel nut until snug.
4. To prevent twisting the tube(s), use two wrenches. Place one wrench on the connector body and with the second tighten the swivel nut to the torque shown.

*The torque values shown are based on lubricated connections as in reassembly.

Table 15

Tube Size OD	Nut Size Across Flats	Torque Value*		Recommended Turns to Tighten (After Finger Tightening)	
		(N.m)	(lb-ft)	(Flats)	(Turn)
3/16	7/16	8	6	1	1/6
1/4	9/16	12	9	1	1/6
5/16	5/8	16	12	1	1/6
3/8	11/16	24	18	1	1/6
1/2	7/8	46	34	1	1/6
5/8	1	62	46	1	1/6
3/4	1-1/4	102	75	3/4	1/8
7/8	1-3/8	122	90	3/4	1/8

TIGHTENING O-RING FITTINGS*

1. Inspect O-ring and seat for dirt or obvious defects.
2. On angle fittings, back the lock nut off until washer bottoms out at top of groove.
3. Hand tighten fitting until back-up washer or washer face (if straight fitting) bottoms on face and O-ring is seated.
4. Position angle fittings by unscrewing no more than one turn.
5. Tighten straight fittings to torque shown.
6. Tighten while holding body of fitting with a wrench.

*The torque values shown are based on lubricated connections as in reassembly.

Table 16

Tube Size OD	Nut Size Across Flats	Torque Value*		Recommended Turns to Tighten (After Finger Tightening)	
		(N.m)	(lb-ft)	(Flats)	(Turn)
3/8	1/2	8	6	2	1/3
7/16	9/16	12	9	2	1/3
1/2	5/8	16	12	2	1/3
9/16	11/16	24	18	2	1/3
3/4	7/8	46	34	2	1/3
7/8	1	62	46	1-1/2	1/4
1-1/16	1-1/4	102	75	1	1/6
1-3/16	1-3/8	122	90	1	1/6
1-5/16	1-1/2	142	105	3/4	1/8
1-5/8	1-7/8	190	140	3/4	1/8
1-7/8	2-1/8	217	160	1/2	1/12



WALINGA[®]
INC.

Head Office: RR#5 Guelph, Ontario, N1H 6J2
PHONE (888) 925-4642 FAX (519) 824-5651
www.walinga.com

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Sioux Center, Iowa USA 51250
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