



Crude Oil Transport



Operation



Maintenance



Safety



E.D. ETNYRE & CO. 1333 S. Daysville Road, Oregon, Illinois 61061

Phone: 815-732-2116 or 800-995-2116 • Fax: 800-521-1107 • www.etnyre.com

M-313-12

Crude Oil Transport

Operation, Safety and Maintenance Manual

HOW TO ORDER PARTS

To assure prompt delivery when ordering parts, please furnish the following information: **1)** Complete name and address of consignee. **2)** Method of shipment preferred. **3)** Is shipment to be prepaid or collect? **4)** Serial numbers of units to which parts apply. **5)** Complete part numbers and descriptions. **6)** Any special instructions. Part numbers beginning with 9250000 are category numbers and must include descriptive term to complete the order (such as, length, color, etc.). These items when listed in the parts manual will indicate what information must be included.

Specify unit serial number when ordering parts!

WARRANTY

E.D. Etnyre & Co. warrants to the original Purchaser, its new product to be free from defects in material and workmanship for a period of twelve (12) months after date of delivery to original Purchaser. The obligation of the Company is limited to repairing or replacing any defective part returned to the Company and will not be responsible for consequential damages or any further loss by reason of such defect.

The company excludes all implied warranties of merchantability and fitness for a particular purpose. There are no warranties, express or implied, which extend beyond the description of the goods contained in this contract.

This warranty does not obligate the Company to bear the cost of machine transportation in connection with the replacement or repair of defective parts, nor does it guarantee repair or replacement of any parts on which unauthorized repairs or alterations have been made or for components not manufactured by the Company except to the extent of the warranty given by the original Manufacturer.

This warranty does not apply to:

- (1) Normal start-up services, normal maintenance services or adjustments usually performed by the selling dealer, factory service representative or customer personnel.
- (2) Any product manufactured by E.D. Etnyre & Co. purchased or subjected to rental use.
- (3) Any product or part thereof which shows improper operation, improper maintenance, abuse, neglect, damage or modification after shipment from factory.
- (4) Any product or part thereof damaged or lost in shipment. Inspection for damage should be made before acceptance or signing any delivery documents releasing responsibility of the delivering carrier.

This warranty and foregoing obligations are in lieu of all other obligations and liabilities including negligence and all warranties of merchantability or otherwise, express or implied in fact or by law.



E. D. ETNYRE & CO., Oregon, Illinois 61061-9778
1333 South Daysville Road Phone: 815/732-2116 Fax: 815-732-7400

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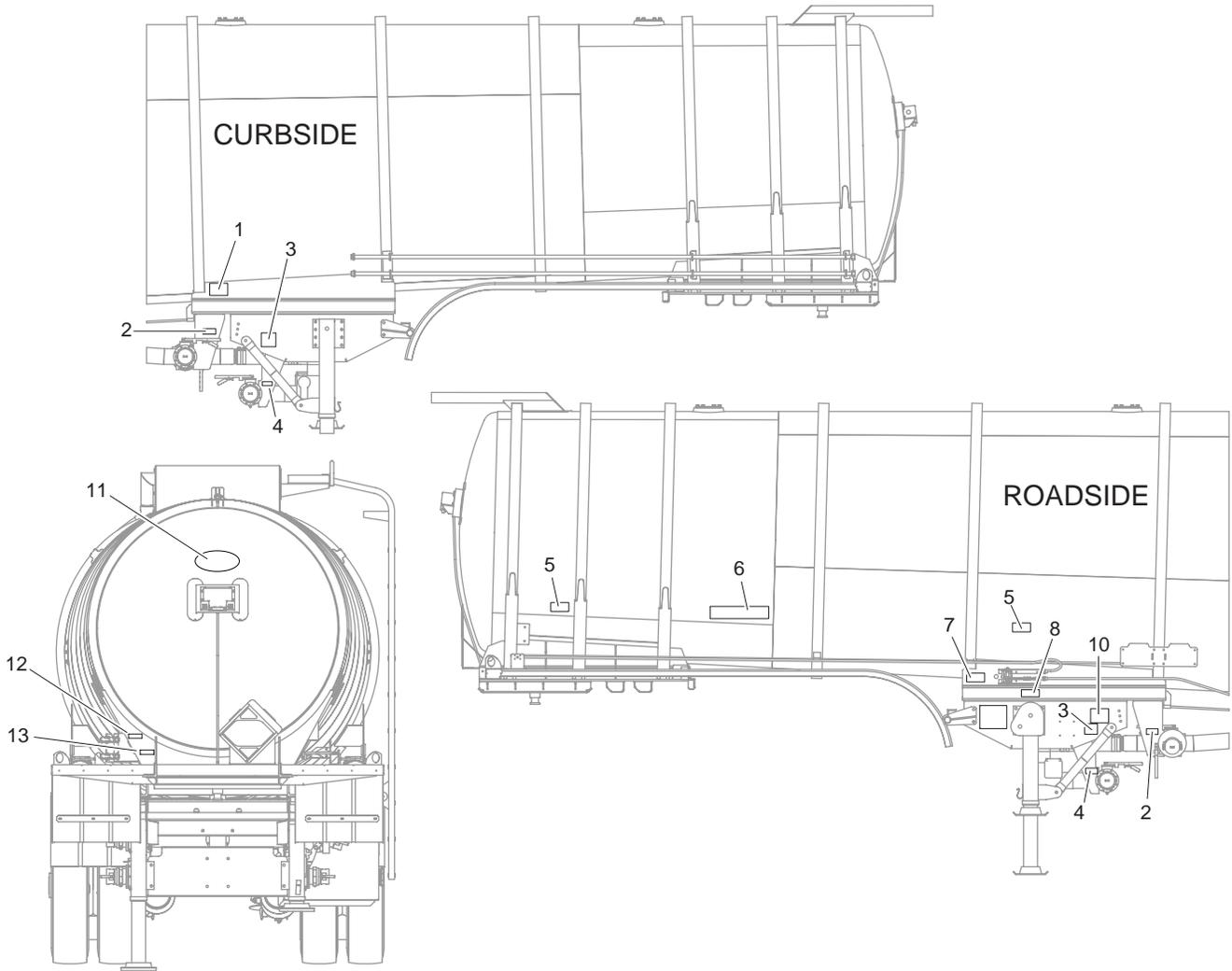
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WARNING AND INSTRUCTION PLATES



⚠ For operator safety and possible liability protection, all Safety and Instruction plates should remain in place and be legible

⚠ Should a plate be removed, lost, or become illegible, reorder and replace it immediately

⚠ If plates become difficult to read because of material coating the surface, clean with solvent

REF	PART NO.	QTY	DESCRIPTION	REF	PART NO.	QTY	DESCRIPTION
1	2790004	1	Name Plate-Hauling, Tank Brass	7	2790017	1	Label-Cert., FMVSS, Trailer, 1/81
2	2742476	2	Decal:Gravity	8	6320960	1	Decal: Open-Close
3	3390681	2	Decal: Warning, Remain Clear	9	2790530	1	Plate-Name, Spec, 178.345, Var Sh
4	2742477	2	Decal: Pump	10	6320935	1	Decal: Control Valve
5	6320815	2	Decal: Emergency	11	3390191	2	Decal: Oval, Etnyre
6	6320816	1	Decal: Inspection 180.407	12	Q451435	1	Decal: Pressure
				13	Q451436	1	Decal: Return

This manual covers standard features and options. If your unit incorporates custom features, some of the information contained in this manual may not apply. If you have any questions regarding this manual or your unit, contact your dealer or the E. D. ETNYRE Service Department at 1-800-995-2116



WARNING

Unsafe operation of equipment may cause injury.

Read, understand and follow the manuals when operating or performing maintenance.



CAUTION

GENERAL - TIRE CARRIER

Loss of tire in transit can cause bodily injury or property damage. Carry only one spare tire at a time. Do not carry the tire loose in the carrier. Tightly wrap the chain around the tire to eliminate slack and always fasten the chain in the locking retainer plate.

Inspect carrier annually. Check for bent members and fatigue in welds. Closely examine chain, chain retainer and fastener for signs of wear, corrosion or fatigue. Replace or repair damaged or worn parts promptly.

Reporting Safety Defects

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

If NHTSA receives similar complaints, it may open an investigation. If it finds a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, NHTSA cannot become involved in individual problems between you, your dealer, or E.D. Etnyre & Co.

To contact NHTSA, you may call the Auto Safety Hotline toll-free at 1-800-424-9393 (or 366-0123 in the Washington, D.C. area). Or, you may write to: U.S. Department of Transportation, Washington, D.C. 20696. You may also obtain other information about motor vehicle safety from the Auto Safety Hotline.

E.D. Etnyre & Co., Oregon, Illinois 61061, Phone Area Code 815-732-2116.

PROPOSITION 65 WARNING

Diesel Engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

Please note this warning and remember -

Always start and operate the engine in a well-ventilated area;

If in an enclosed area, vent the exhaust to the outside;

Do not modify or tamper with the exhaust system.

GENERAL

The operation of a Bituminous Transport normally requires handling of liquid products at elevated temperature. Also, these liquids may be of a volatile nature. A heating system may be supplied to raise or maintain the product temperature, and these systems use highly combustible fuels. As with any type of construction equipment, there are certain hazards associated with careless or improper operation.

Safety warnings have been provided to call attention to any potentially hazardous situation that may cause property damage, personal injury or death to the operator or bystanders. These safety warnings will be shown at various times throughout this manual, as they are applicable to the subject being presented.

In addition to these, you will find notes throughout the manual.

NOTE - A note provides general information that the operator should be aware of when performing an operation.

Safety Precautions, Hazard Seriousness Level

You will find safety information boxes throughout this manual. These boxes contain information alerting you to situations or actions to avoid.

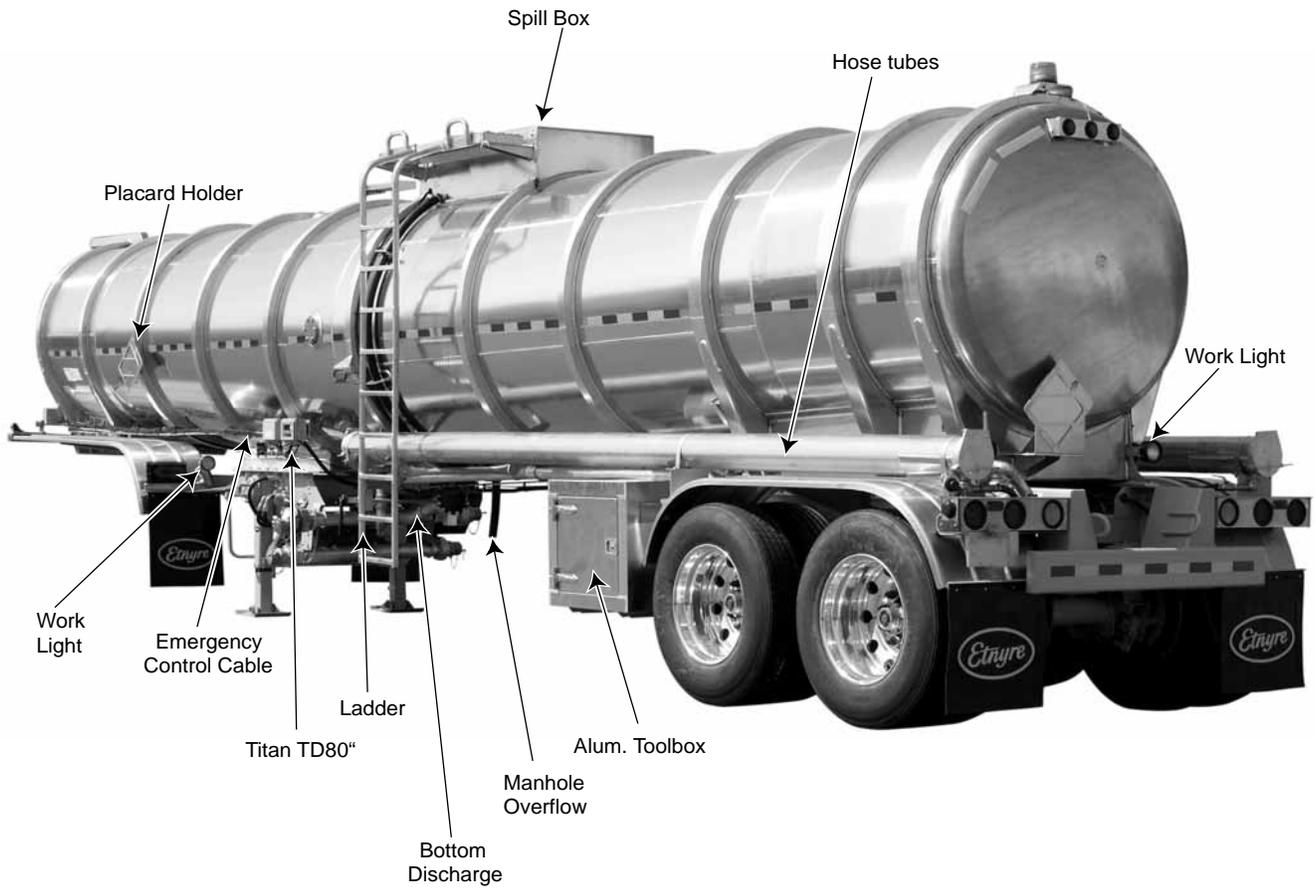
Signal words (DANGER, WARNING and CAUTION) are used to identify levels of hazard seriousness. Their selection is based on the likely consequence of human interaction with a hazard. Definitions of hazard levels are as follows.

 **DANGER** - Immediate hazards which **will** result in severe personal injury or death.

 **WARNING** - Hazards or unsafe practices which **could** result in severe personal injury or death.

 **CAUTION** - Hazards or unsafe practices which could result in minor personal injury or product or property damage.

GENERAL IDENTIFICATION



SPECIFICATION CHECK LIST

Serial No. _____

Tank _____ Model _____ Size _____

Suspension _____

Tire Size _____

Rims _____

Axles _____

Brakes _____

Wheels _____

Drums _____

Hubodometer _____

Oil Seals _____

Landing Gear _____

Manhole _____

Manhole _____

Overflow _____

Drain _____

Valve _____

Front Pump Off Valve _____

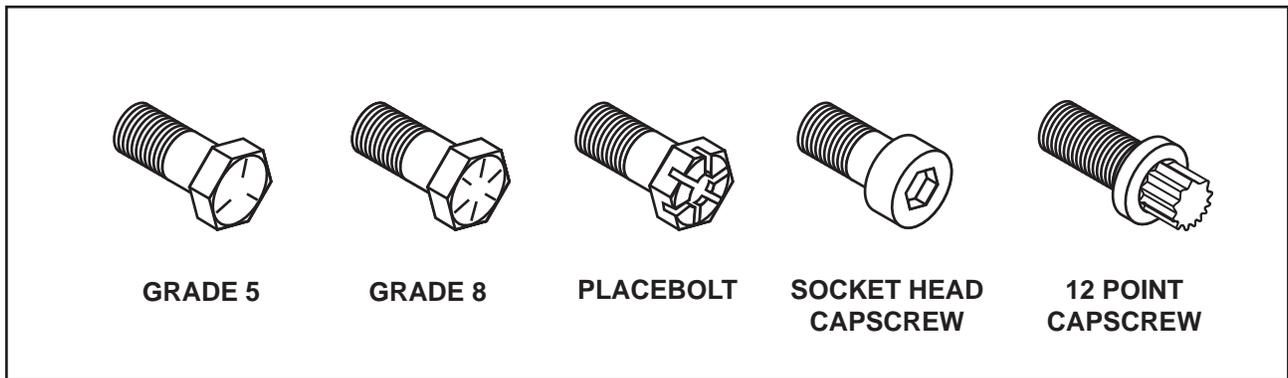
Rear Pump Off Valve _____

Etnyre Connection _____

Table 1. Torque Specifications for Standard Hardware

Nominal Size	Thread Series	SAE Grade 5 Capscrews				SAE Grade 8 Capscrews			
		Torque (ft. lbs.)		Torque (Nm)		Torque (ft. lbs.)		Torque (Nm)	
		DRY	LUBED	DRY	LUBED	DRY	LUBED	DRY	LUBED
1/4	20 UNC	8	6	11	9	12	9	16	12
	28 UNF	10	7	13	10	14	10	19	14
5/16	18 UNC	17	13	24	18	25	18	33	25
	24 UNF	19	14	26	20	27	20	37	28
3/8	16 UNC	31	23	42	31	44	33	59	44
	24 UNF	35	26	47	36	49	37	67	50
7/16	14 UNC	49	37	67	50	70	52	95	71
	20 UNF	55	41	75	56	78	58	105	79
1/2	13 UNC	75	57	100	77	105	80	145	110
	20 UNF	85	64	115	86	120	90	165	120
9/16	12 UNC	110	82	145	110	155	115	210	155
	18 UNF	120	91	165	125	170	130	230	175
5/8	11 UNC	150	115	205	155	210	160	285	215
	18 UNF	170	130	230	175	240	180	325	245
3/4	10 UNC	265	200	360	270	375	280	510	380
	16 UNF	395	225	405	300	420	315	570	425
7/8	9 UNC	430	320	580	435	605	455	820	615
	14 UNF	475	355	640	480	670	500	905	680
1	8 UNC	645	485	875	655	910	680	1230	925
	14 UNF	720	540	980	735	1020	765	1380	1040
1 - 1/8	7 UNC	795	595	1080	805	1290	965	1750	1310
	12 UNF	890	670	1210	905	1440	1080	1960	1470
1 - 1/4	7 UNC	1120	840	1520	1140	1820	1360	2460	1850
	12 UNF	1240	930	1680	1260	2010	1500	2730	2050
1 - 3/8	6 UNC	1470	1100	1990	1490	2380	1780	3230	2420
	12 UNF	1670	1250	2270	1700	2710	2040	3680	2760
1 - 1/2	6 UNC	1950	1460	2640	1980	3160	2370	4290	3210
	12 UNF	2190	1650	2970	2230	3560	2670	4820	3620

NOTE: This table lists torque values for standard hardware and is intended as a guide for average applications involving typical stresses and machined surfaces. Values are based on the physical limitations of clean, plated and lubricated hardware. In all cases, when an individual torque value is specified, it should take priority over values given in this table. Replace original hardware with hardware of equal grade.



Standard Hardware

LOADING AND UNLOADING OPERATIONS

Trailer to Tractor Connecting Procedures

1. Inspect the fifth wheel area and the trailer frame for wear, structural cracks, damaged or broken steel.

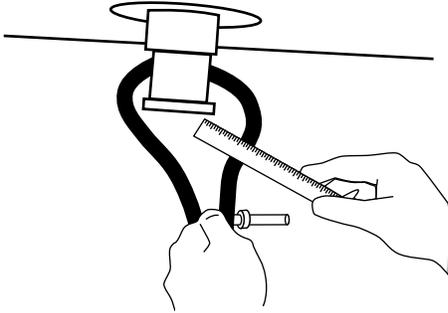


Figure 1. Measuring Kingpin

2. Check the kingpin for wear or damage. Replace it if the diameter measures less than 1 7/8" at any point (see figure 1).
3. Check the bolts for tightness. Tighten if required. Refer to the torque table for correct torque values.
4. Connect the trailer to the fifth wheel.
5. Connect the glad hands and build up reservoir air pressure.
6. Connect the plug into the electrical socket.

WARNING

Check to insure that the kingpin is locked into the tractor fifth wheel.



Figure 2. Location of TD80™ Dual Rod / Coax Probe

Refer to your TD80™ Dual Rod / Coax Probe Installation and Operation manuals for further details.

7. Check the lights, turn signals and reflectors for operation.
8. Before operating the trailer, test the airbrake system using the following procedure:
 - a. Check the air system pressure. The system must hold 100 psi (7 Bar) minimum.
 - b. Apply the brakes. Inspect the brake action on all the wheels for proper application.
 - c. Release the brakes. The brakes must release promptly. The air pressure must discharge quickly from the relay emergency valve.
 - d. Disconnect the emergency line to the trailer. The trailer brakes must automatically apply.
 - e. Connect the emergency line to the trailer. The trailer brakes must release.
9. Check the tires for proper inflation pressure. Inspect the tires for cuts or other damage.

WARNING

These suggested directions are not exhaustive since transports are of varying design to meet the requirements of the first purchaser. Therefore, the user must satisfy himself that his safety, the safety of the public, and the integrity of the transport and lading are not jeopardized.

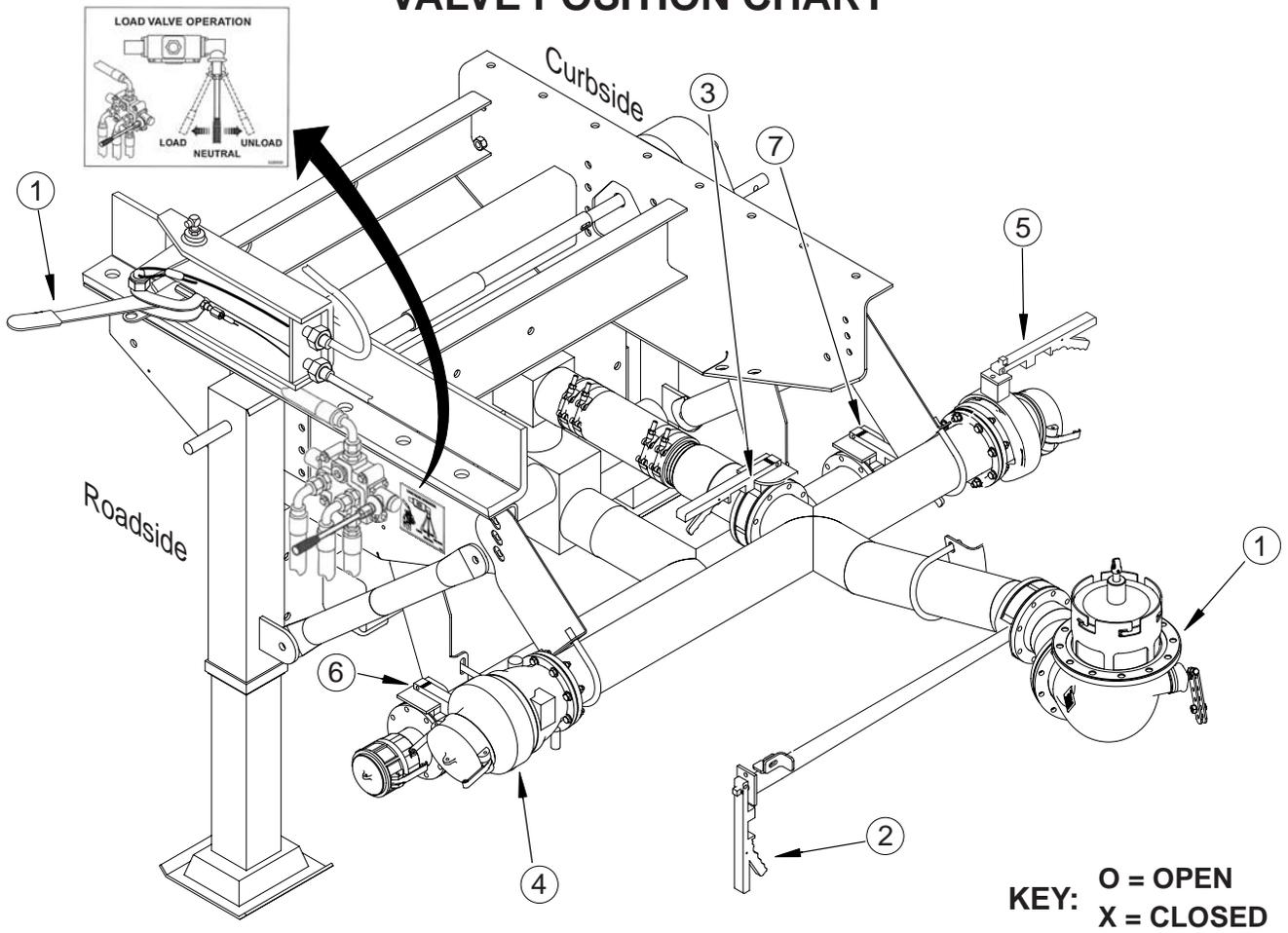
Loading and Unloading Procedures

Before loading and/or unloading, familiarize yourself with its operational characteristics, including man-holes, vents, gravity discharge valves, pump off valves, heating procedures and material characteristics. **Know what commodity you are loading and know what commodity was last carried in the transport.**

Before using the Valve Position Chart on the next page:

1. Ground tank as applicable.
2. Remove cap from vapor recovery line.
3. Connect vapor recovery line if available.
4. Attach hose to pump or gravity line.
5. Always open valve #1 last.
6. Before engaging pump, set valves per chart.

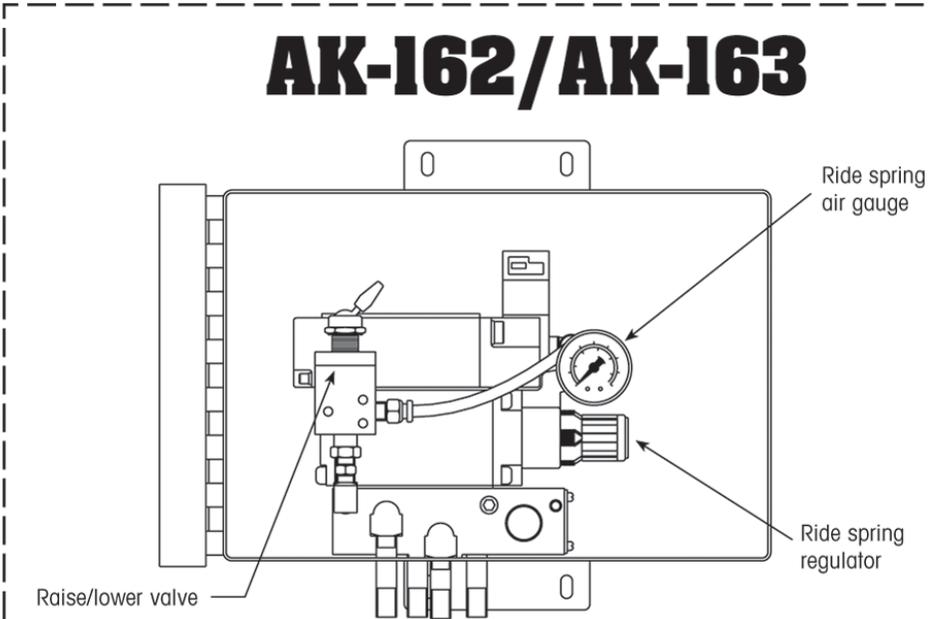
VALVE POSITION CHART



VALVE	Gravity Unload Road Side	Gravity Unload Curb Side	Load From External Pump Road Side	Load From External Pump Curb Side	Load With Onboard Pump Road Side	Load With Onboard Pump Curb Side	Unload With Onboard Pump Road Side	Unload With Onboard Pump Curb Side	Travel
①	O	O	O	O	O	O	O	O	X
②	O	O	O	O	O	O	O	O	X
③	X	X	X	X	O	O	O	O	X
④	O	X	O	X	X	X	X	X	X
⑤	X	O	X	O	X	X	X	X	X
⑥	X	X	X	X	O	X	O	X	X
⑦	X	X	X	X	X	O	X	O	X

Lift Axle Operation

If your unit is equipped with an air lift axle, it is necessary to determine the proper air pressure required in the ride spring bags in order to have the axle support its correct share of the load. The procedure is described on the Hendrickson decal, L402, which is on the inside of the air lift control box door.



CAUTION

- Regulate the ride air spring pressure to the correct operating pressure to ensure that the suspension is properly loaded. Contact Hendrickson for information on the suspension operating pressures.
- Raise and lower the vehicle axle(s) according to the suspension installer's specification.
- Avoid overloading the other trailer axle(s) when lifting the lift axle(s).

Trailer Suspension Systems
2070 Industrial Place SE
Canton, OH 44707-2600 USA
800.455.0043
330.489.0045
Fax 800.696.4416

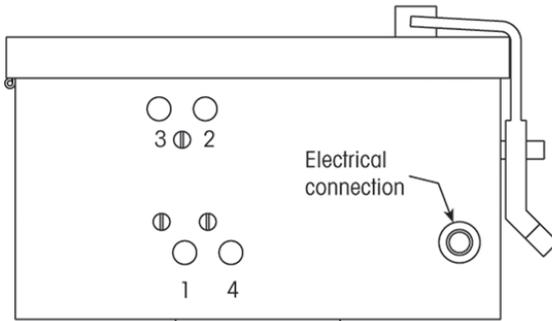


Supersedes previous versions of L402 and replaces L403.
L402 D 11-00 Printed in United States of America.

Hendrickson Air Lift Control Decal L402

It is also shown here, along with a schematic of the entire system. It is important to follow this procedure in order to have the axle support its correct share of the load and also to avoid having the tires on the lift axle lock up while braking.

LIFT AXLE CONTROL



Air Port Identification

- 1-Air reservoir input
- 2-Ride air springs
- 3-Lift air springs
- 4-Exhaust

AXLE LIFT CONTROL FOR AIR RIDE/AIR LIFT SUSPENSIONS

1. Raise the air lift suspension(s) by using the axle raise/lower valve in the control box or a remote electrical switch, if available.
2. Adjust the ride air springs with the ride spring regulator to match the axle loading.
 - a. Use a certified scale to properly adjust air pressure in the ride air springs.
 - b. Record the indicated air pressure(s).
 - c. Use the recorded air pressure setting(s) when using the air lift suspension.
 - d. Push in knob on ride spring regulator to lock pressure setting.

IMPORTANT: Adjustment of the ride air springs should occur prior to first use of the trailer and periodically to check the accuracy of the gauge.

IMPORTANT: On the AK-163 only, the lift axle service brakes are disconnected when lifting the axle(s).

RICKSON

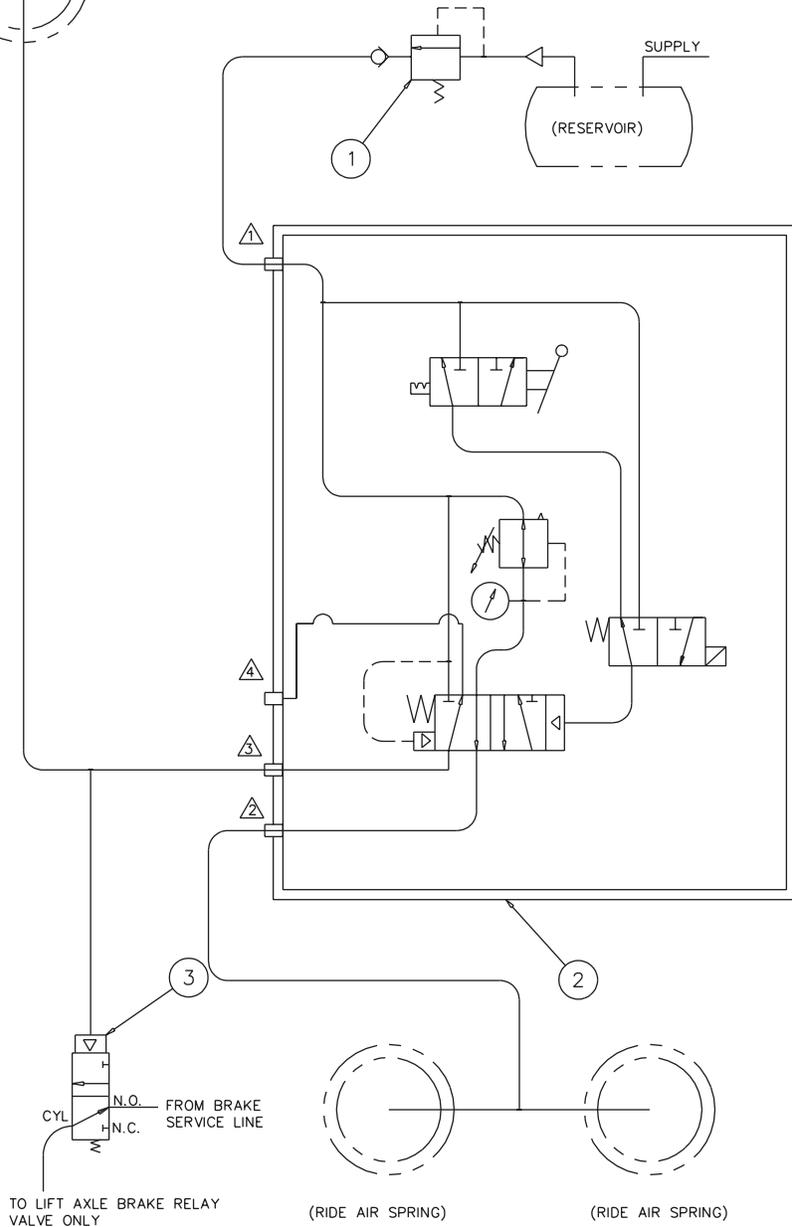
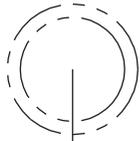
Trailer Suspension Systems
250 Chrysler Drive, Unit #3
Brampton, ON L6S 6B6 Canada
905.789.1030
Fax 905.789.1033

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www.hendrickson-intl.com

- AIR PORT IDENTIFICATION**
- △ AIR RESERVOIR INPUT
 - △ RIDE AIR SPRINGS
 - △ LIFT AIR SPRINGS
 - △ EXHAUST OUTPUT

(LIFT AIR SPRINGS)



FUNCTION

MANUAL OR ELECTRIC OPERATION OF AIR OPERATED LIFT AXLE SUSPENSION(S), WITH MANUALLY REGULATED RIDE SPRING PRESSURE. LIFTED AXLE'S SERVICE BRAKES ARE DISCONNECTED WHEN THE AXLE IS RAISED.

OPERATION

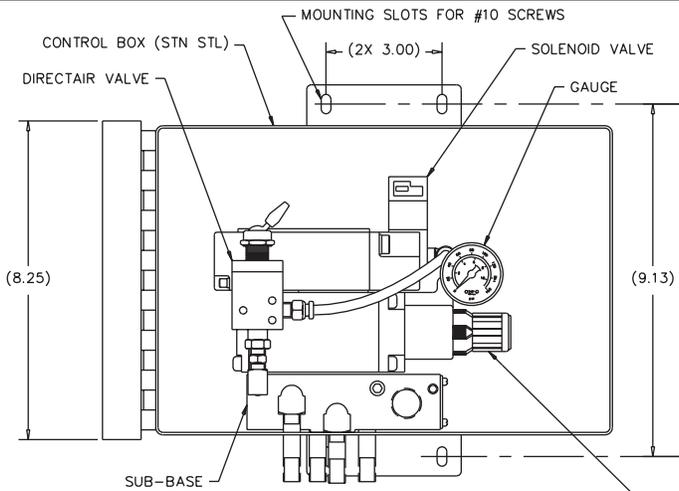
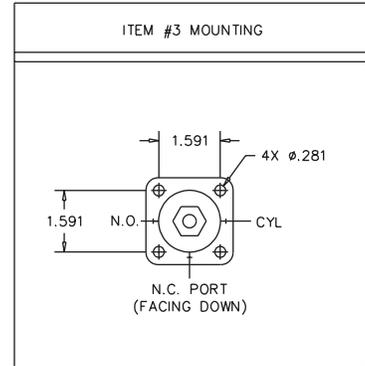
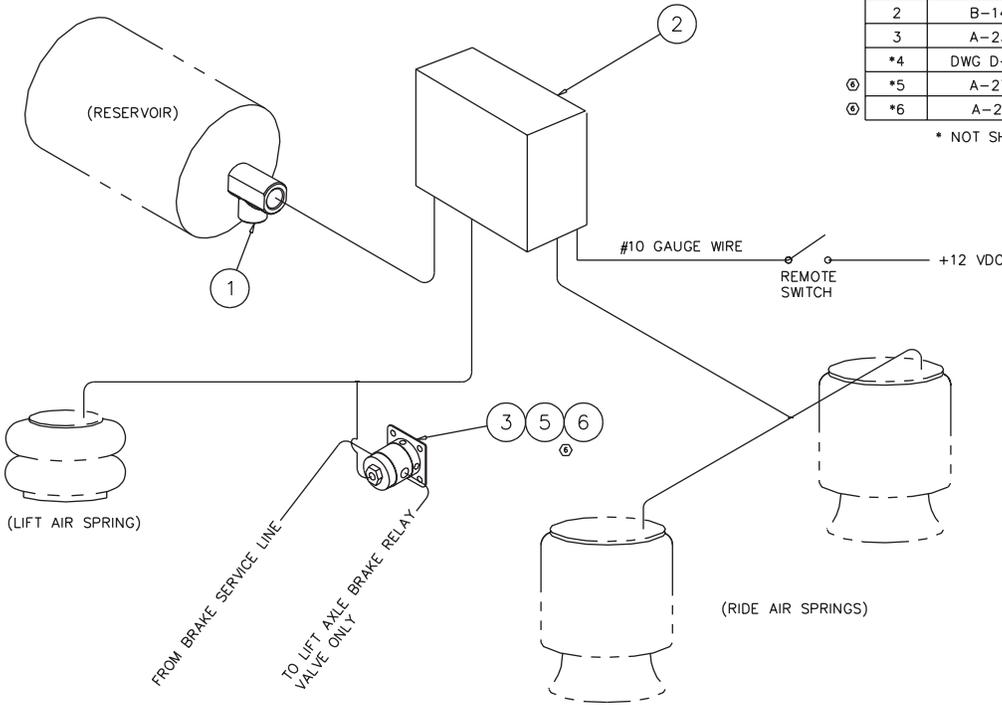
- THE REGULATOR IS USED TO CONTROL THE AIR PRESSURE IN THE RIDE SPRINGS. THE LIFT BAGS RECEIVE LINE PRESSURE.
- USING THE TOGGLE VALVE IN THE BOX TO RAISE THE AXLE WILL INFLATE THE LIFT SPRINGS AND EXHAUST THE RIDE SPRINGS.
- USING THE TOGGLE VALVE IN THE BOX TO LOWER THE AXLE WILL INFLATE THE RIDE SPRINGS AND EXHAUST THE LIFT SPRINGS.
- WITH AN ELECTRIC SWITCH (ADDED BY THE INSTALLER), THE SWITCH WILL RAISE THE AXLE BY SENDING POWER TO THE CONTROL WHEN THE TOGGLE VALVE IS IN THE DOWN POSITION.
- WHEN NO POWER IS SENT TO THE CONTROL, THE AXLE IS POSITIONED BY THE TOGGLE VALVE. THE TOGGLE VALVE WILL NOT FUNCTION IF THE AXLE IS LIFTED ELECTRICALLY.
- WHEN THE AXLE IS LIFTED, LINE PRESSURE IS USED TO DISCONNECT THE LIFTED AXLE'S SERVICE BRAKES FROM THE SERVICE LINE.

- AIR PORT IDENTIFICATION**
- △ AIR RESERVOIR INPUT
 - △ RIDE AIR SPRINGS
 - △ LIFT AIR SPRINGS
 - △ EXHAUST OUTPUT

Hendrickson Air Lift Control Kit AK-163 Schematic

ITEM	PART NO.	DESCRIPTION	QTY.
1	A-14149	PRESSURE PROTECTION VALVE	1
2	B-14355	AIR KIT ENCLOSURE	1
3	A-23588	AIR PILOTED VALVE (3 WAY)	1
*4	DWG D-14340	AK-163 AIR KIT DRAWING	1
⑤	A-27360	BARBED TUBE FITTING	1
⑥	A-27361	3/8" ID TUBE	1

* NOT SHOWN



NOTES:

- DO NOT ADD LUBRICATION TO AIR SYSTEM.
- ALL CONNECTIONS MUST BE LEAK PROOF
- AVOID BENDS IN AIR LINES
- APPLICATION:
ALL AIR RIDE / AIR LIFT SUSPENSIONS USING AIR TO LIFT AXLE WHERE REMOTE CONTROL LIFT SWITCH IS REQUIRED.
- AIR LINE FITTINGS AND LINES TO BE FURNISHED BY INSTALLER. 3/8" OD D.O.T. APPROVED TUBING RECOMMENDED.
- ⑥. WEIGHT: 16.46 LB.

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MOUNTING DETAILS FOR ITEM #2

<p>2070 INDUSTRIAL PLAZA S.E. CANTON, OH 44707-2600 U.S.A.</p>	UNLESS OTHERWISE NOTED: TOLERANCES ARE: DIMENSIONS ARE:		DRAWN BY: J. BURGESS 2-13-93	SCALE: .50=1.00 SIZE: D PAGE: 1 OF 1
	.X: ± .01 .XX: ± .005 .XXX: ± .003 ANGULAR: ± 0.5°	INCHES: 6 FEET: 5 MILLIMETERS: 4 3RD ANGLE PROJECTION DIMENSIONS ADHERE TO ANSI Y14.5M-1982 (REV)	1/18/93 8/25/93 7/24/93 6-10-92 ECN NO. BY DATE	DWD BY: V. SUKOSD 2-25-93 APP'D BY: R. FRANKS

AIR CONTROL KIT AK-163

D-14340

MAINTENANCE INSTRUCTIONS

General

This section contains instructions for the care and maintenance of the Etnyre Transport. This section is divided into two subsections: a **Maintenance Schedule** and **Maintenance Procedures**. The maintenance schedule lists the recommended distance/time intervals between maintenance checks. The procedures subsection provides detailed instructions for performing the maintenance checks. The instructions listed in the procedures subsection are given by systems and are not necessarily in the order listed in the table.

Keep unit clean for operating safety and appearance.

Inspection and Maintenance, Tank Proper

The inner tank barrel itself is an important piece of equipment. The barrel serves the purpose of transporting the product and must carry the weight of the product in addition to the weight of the barrel. The barrel is strongest when in its originally manufactured condition. A substantial amount of the load bearing capability is lost if bucking or distortion occurs in the tank shell due to an accident, overloading or any of the following:

1. Loading with a product that is hotter than the maximum temperature rating of the trailer.
2. Repeated travel over rough roadways at speeds that are not reasonable for longevity of any type of vehicle.
3. Dropping loaded trailer on the landing gear which creates unusual shock, instead of setting it down gently.
4. Operating the trailer at a continuous speed at which the frequency (vibration) is at its peak. Every trailer has such a frequency and a change in speed of two or three miles per hour either faster or slower reduces the vibration out of the peak range.

Maintenance Schedule

The Maintenance Schedule, seen on the following page, lists the recommended maintenance checks. It is outlined in two schedules: the periodic schedule and the mileage schedule. Perform maintenance on the basis of whichever occurs first.

ITEM NO.	ITEM	SCHEDULE					QUAN-TITY	TYPE or REMARKS
		Day	Wk	Mo.	25,000 mi.	50,000 mi.		
1	Fifth Wheel Plate and Kingpin	X	L					Multipurpose Grease Inspect
2	Frame	X						Check
3	Undercarriage	See Operator's Guide for the undercarriage specific to your trailer						
4	Wheel Bearings (Oil Lubricated)	X				C	3 pints per axle	Check Multipurpose Gear Oil Grade 90
5	Rims and Brake Drums			X				Inspect
6	Wheels	X	X					Visual Check. Tighten Cap Nuts or Rim Clamps.
7	Tires	X						Check Inflation Remove Debris Between Duals.
8	Air Lines	X		X				Test. See Page 33 Inspection
9	Air Reservoir	X						Drain Condensation
10	Relay Emergency Valve					X		Clean
11	Brake Chambers			X		X	2 Dia- phragms per axle.	Check Condensation Holes Clean. Inspect and replace Diaphragm.
12	Slack Adjuster and Yoke Pin				X		2 Zerks per Axle	Inspect. Lubricate with Multipurpose Grease.
13	Brakes	X			X		4 Fittings per Axle	Check for Overheating. Inspect and Adjust.
14	Manhole Caulking		X					Inspect and Recaulk As Necessary
15	Lights and Reflectors	X						Check Operation.
16	Anti-Corrosion Paint							Inspect and Repaint or Repair As Necessary

L = Lubricate X = Check C = Change

Table 2. MAINTENANCE SCHEDULE

Maintenance Procedures

Fifth Wheel Plate and Kingpin Inspection & Lubrication

Inspect the kingpin throat for signs of wear. Replace the kingpin if worn 1/8 inch (3.18 mm) undersize (see figure 1).

If the grease remaining on the fifth wheel plate contains sand and dirt, clean it before lubricating. The kingpin and the fifth wheel plate should be greased thoroughly with multipurpose grease before connecting the tractor and trailer.

Wheel Bearings

The oil level must be maintained between the "add" and "full" lines on the hub cap windows (see figure 3). Check for cracked windows, missing vent plugs and for oil leaks around the hub cap. Oil can be added through either the vent plug or the filler plug. Clean and inspect the bearings and change the oil at 50,000 miles or at brake relinings.

Undercarriage

The undercarriage must be visually examined for broken and missing parts. Check brackets, adjusting screws and walking beam ends. Replace faulty parts. Check the rim clamps or cap nuts for tightness daily. See Figure 4 for torque specifications and tightening sequence. Brake drums should be carefully examined for cracks.

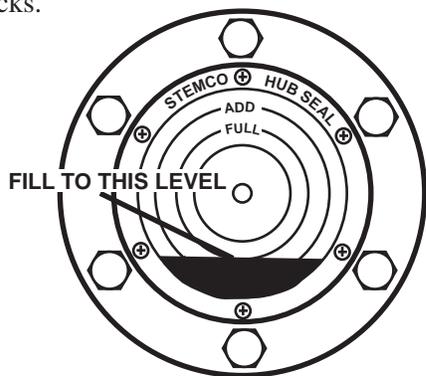


Figure 3. Oil Level of Oil Lubricated Bearings

CAUTION

Do not allow brake drums to become excessively worn or expensive repairs will be required.

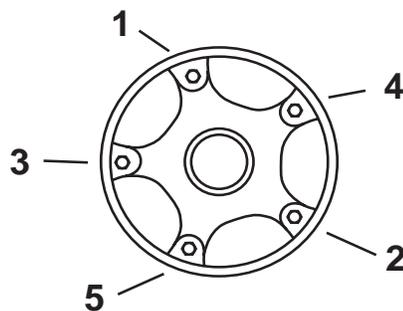


Figure 4. Lug Tightening Sequence

Suspension Alignment & Fastener Torque

The major source of costly repair bills on suspensions is insufficient torque. After an initial shake-down run of 1,000 miles and every 25,000 miles thereafter, nuts on the suspension should be restored to original torque specifications.

Torque Specifications

Item	Transpro	Reyco 21B
U-bolt nuts	300 lb-ft	300 lb-ft
Torque arm nuts	400 lb-ft	160 lb-ft
Torque arm clamps	140 lb-ft	140 lb-ft
Equalizer Bolts	500 lb-ft	450 lb-ft

Alignment Adjustment

To assure proper alignment of the suspension, the following steps should be followed exactly:

- Step 1. Locate the trailer on a flat, smooth surface and disconnect trailer brakes.
- Step 2. With the brakes disconnected, roll the trailer forward and rearward a distance of approximately 10 feet to relieve any binding which might be caused by turning or braking.
- Step 3. Remove the tractor from the trailer and level the trailer body until it is parallel to the ground, using the landing gear adjustment. Trailer should be leveled by measuring from the frame to the ground at the front and rear hanger.
- Step 4. Check to make sure that there is no interference between the springs and the hanger brackets.

Alignment Adjustment (cont)

- Step 5. Tighten all torque arm bolt nuts and Ubolt nuts to the torque specified above.
- Step 6. Remove hub caps from all four trailer wheels and install axle extensions on each end of each axle.
- Step 7. Install a Bazooka-type kingpin extension and center the sight level.
- Step 8. Measure from the kingpin extension to either end of the front axle and make necessary adjustments.
- Step 9. With the front axle properly aligned, measure between the axle extensions on either end of each axle and make necessary adjustments.
- Step 10. Remove the axle extension, kingpin extension and install hub caps.
- Step 11. Check the nuts on the adjustable torque arm tube clamps to insure they are tightened to torque shown in the Torque Specifications chart.

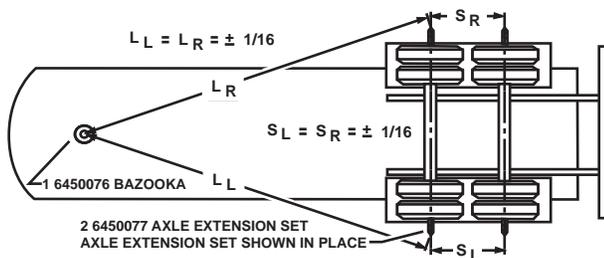


Figure 5. Checking Alignment

- Note A. Steps one and two are very important in the proper alignment of your suspension and should be done before any attempt is made to align the suspension.
- Note B. The slot in the adjustable torque arm should be located in the down position and in alignment with the open part of the clamp to insure proper clamping.
- Note C. The adjustable torque arm tube retaining nuts should be tightened to the torque shown in the Torque Specifications chart.

Tires, Rims and Disc Wheels

Tire Inflation

Proper and improper inflation will produce the tire section and ground contact characteristics shown in Figure 6. Tire inflation must be checked daily while tires are cold.

Either overinflation or underinflation will cause premature tire wear.

CAUTION

Do not attempt to adjust the inflation pressure while the tires are hot.

CAUTION

Do not exceed the cold inflation pressures. In some cases the rim or disc wheel will have a lower inflation pressure than the tire, in which case the lower pressure must be used. The maximum inflation pressure to be used is shown on the certification label. Tire inflation must be checked during road stops to locate air losses. Also, remove any foreign objects jammed between the dual wheels.



Figure 6. Proper Tire Inflation

WARNING

Repair any leaks immediately. All tires must be equipped with valve caps.

Tire Overinflation

Overinflation weakens the cord body of the tire by reducing its ability to absorb road shocks.

Overinflation can cause failure due to fatigue cracks. Overinflation can also cause rim and wheel damage.

WARNING

Do not overinflate tires.

Tire Overinflation (cont)

1. Inflate to correct pressure when tires are cool.
DO NOT OVERINFLATE TIRES.
2. Never "bleed" tires to relieve excessive pressure buildup when the tires are warm. Excessive buildup of air pressure can be due to load, underinflation, speed, or a combination of the three.

Tire Underinflation

Underinflation causes rapid wear and premature failure. Underinflation or overloading of the tires on any vehicle driven at sustained speeds will result in weakening of the tire cords. This can make the tire susceptible to further damage or failure even under normal load and inflation conditions.

Matching Dual Tires

Matching of the duals by size will result in longer tire life. Improper matching will cause the larger diameter tire to carry an overload. This will cause typical overloaded tire difficulties. The smaller diameter tire will also wear more rapidly due to scuffing. Differences of not more than 1/4 inch (6.35 mm) in diameter or 3/4 inch (19.1 mm) in circumference are allowed.

NOTE: The smaller of the two tires should be mounted in the inside position.

Removing Tire and Rim Assemblies

 WARNING
Before removing the tire and rim or the tire and disc wheel assemblies, remove the valve core and exhaust all air from both tires in the dual assembly. Check the valve stem by running a piece of wire through the stem to make sure it is not plugged.

Removing Tire and Disc Wheel Assemblies

With the trailer supported by jacks and blocks, remove all the air from the tires (see warning Above). Remove the cap nuts (see figures 8 and 9). Remove the outside tire and disc wheel. Remove the inside tire and disc wheel if it must be changed.

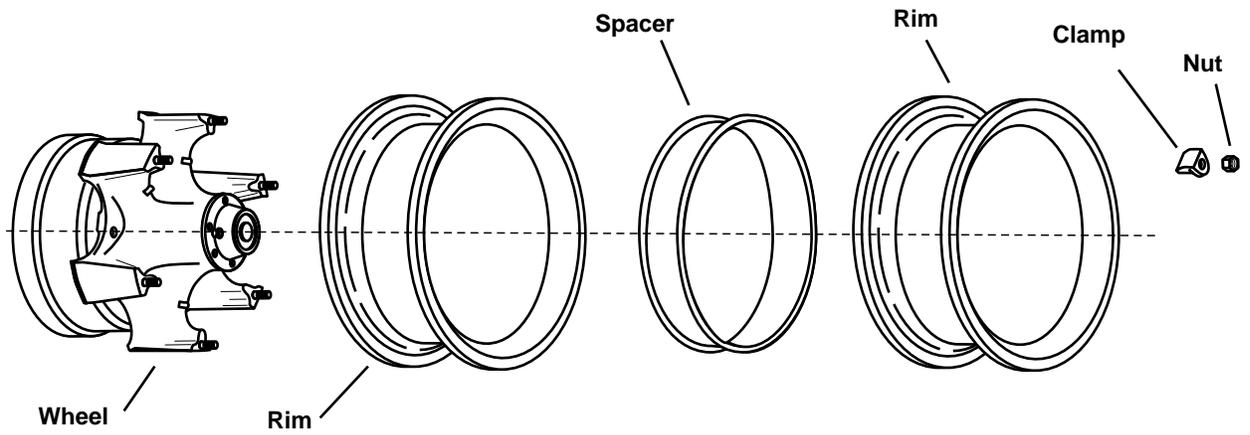


Figure 7. Removal of Rims on Cast Spoke Wheels

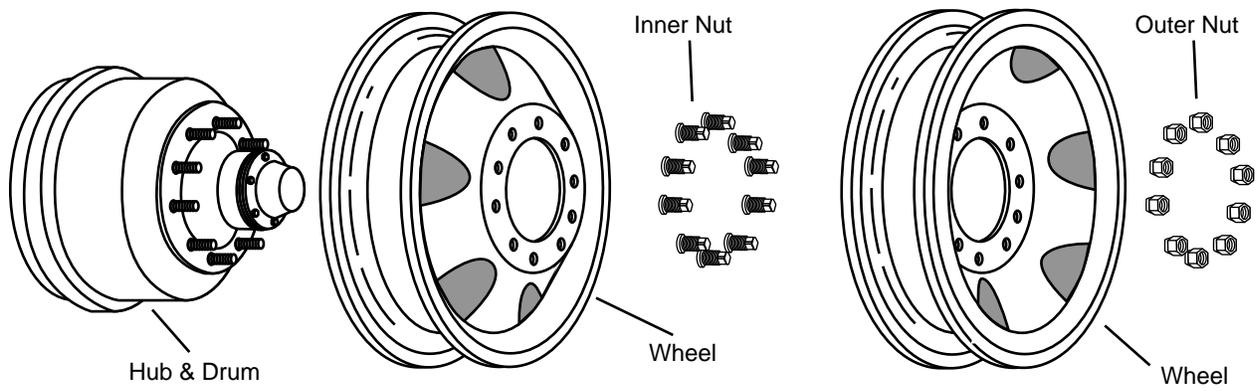


Figure 8. Removal of Tires and Ball Seat Wheels

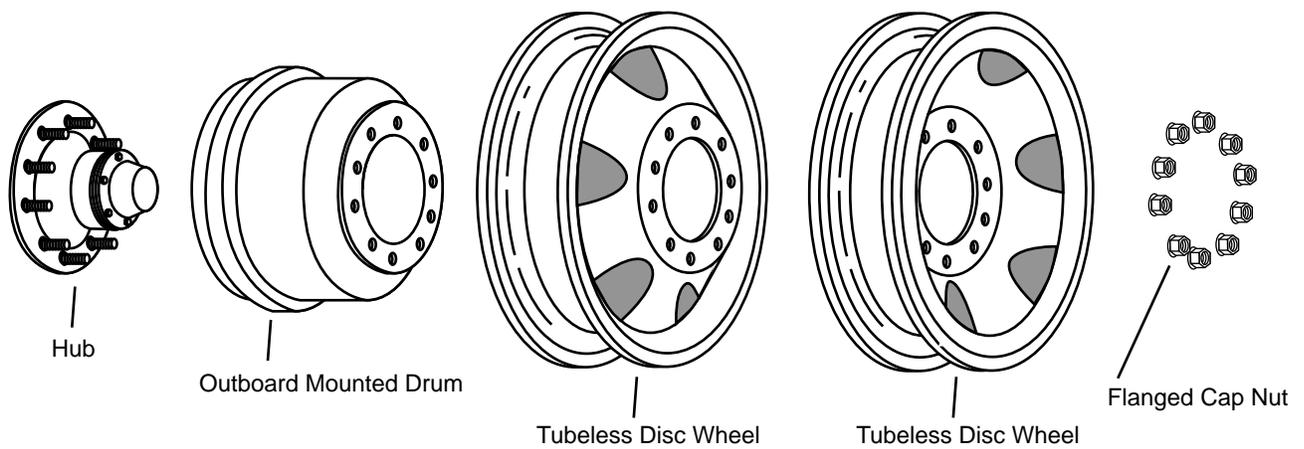


Figure 9. Removal of Tires and Hub Piloted Wheels

Mounting and Demounting Tires on Rims or Disc Wheels

The following points must be considered when changing or repairing tires on rims or disc wheels.

 WARNING
Mounting and demounting of tires must be done by trained personnel only!
Always use industry approved procedures.

1. Do not mix rim or wheel components. They may come apart during inflation.
2. Check the rim base, side rings and lock rings for cracks or other damage. Do not attempt to repair rims or disc wheels. Scrap damaged parts.
3. Match the duals (see page 17).
4. Use only correct rim sizes.
5. Keep rims clean and painted to avoid corrosion.
6. Use proper valve stems and extensions. If valve spacers are used, be sure they are in place before reassembling.
7. Do not overinflate tires.

 WARNING
Use properly constructed cages, guards or baskets when inflating tires.
Tires are to be mounted by trained service personnel only!

8. When the tires are worn, the tube will also be worn. Replace the tube. Use the proper size tube.
9. Replace chafed, pinched, stretched or creased tubes.
10. Replace twisted, creased or folded flaps.

Mounting Tire and Rim Assemblies

Place the inside tire and rim on the wheel.

NOTE: If the inside tire and rim were not removed, be sure the side ring and/or lock ring are seated properly. Install the valve core, but do not inflate the tire.

Put on the spacer band and the outside tire and rim. Put on the rim clamps and nuts. Tighten to the torque and in the sequence shown in figure 4.

NOTE: Tighten in several stages to avoid distorting the rim. If the inside tire and rim were not removed,

inflate the tire to the proper pressure.

Checking Tightness on Cast Wheel/Rim Assemblies

After the first 50 - 100 miles of service, check the clamp nut torque. Tighten the clamp nuts as shown in Figure 13.

Mounting Tire and Hub Piloted Type Disc Wheels

Before mounting the disc wheel, clean the mounting face of dirt and excess paint.

Place the inside tire and disc wheel assembly on the hub. Place the outside tire and disc wheel assembly on the hub and start the flange nuts. Valve stems for the two wheels should be mounted in different circumferential positions for easy inflation. Tighten the flange nuts to the torque and in the sequence shown in Figure 16. If the inside tire and disc wheel assembly was not removed, inflate the tire to the proper pressure.

Mounting Tire and Ball Seat Type Disc Wheel Assemblies

Before mounting the disc wheel, clean the mounting face of dirt and excess paint.

 WARNING
Mounting faces which have been damaged must be repaired or replaced.

Right-hand threads are on the right side of the vehicle, and left-hand threads are on the left side.

Place the inside tire and disc wheel assembly on the hub and start the inner cap nuts. Tighten the inner cap nuts to the torque and in the sequence shown for your arrangement (see figure 14). Tighten in several stages to avoid distortion of the disc.

NOTE: If the inside tire and disc wheel assembly was not removed, tighten the inner cap nuts as described. Be sure the side ring and/or lock ring are seated properly. Install the valve core, but do not inflate the tire.

Place the outside tire and disc wheel assembly on the hub and start the outer cap nuts. Valve stems for the two wheels should be mounted in different circumferential positions for easy inflation. Tighten the outer cap nuts to the torque and in the sequence shown in Figure 14. If the inside tire and disc wheel assembly was not removed, inflate the tire to the proper pressure.

Wheels and Hubs

Two types of wheels are commonly used on Etnyre trailers. Disc wheels mounted on hubs are standard. Cast wheels with demountable rims are optional. Bearing cups are pressed into the wheel “spider” on cast wheels and into the hubs for disc wheels.

Checking Tightness on Mounted Disc Wheels

Check the inner and outer cap nut (ball seat style) or flange nut (cast spoke style) torque after the first 50 - 100 miles of service. Loosen the outer cap nut before tightening the inner cap nut. Tighten the nuts as shown in figure 14.

Cast Wheel or Hub Removal

Demountable rims and disc wheels must be removed before removing cast wheels or hubs. Support the cast wheel or hub assemblies prior to removal. The cast wheel and drum or hub and drum are removed as an assembly using the following procedure.

1. Loosen the brake adjustment by turning the adjusting screw on the slack adjuster.
2. Remove the hub.
3. Bend the flap or tang of the lockwasher from the flat of the outer spindle nut.
4. Remove the outer spindle nut, two (2) lockwashers, and the inner spindle nut.
5. Pull the cast wheel and drum or hub and drum assemblies carefully to avoid damage to the bearing, spindle, and inner seal. Catch the bearing cones as the wheel or hub is removed from the spindle.

Inspection and Cleaning

While the wheel or hub is removed, inspect the condition of the brake drum and linings. Also check the condition of the cups, cones, seal, and axle ring.

Preparing Bearing for Assembly

Coat the bearing cones and cups with oil prior to assembly.

Cast Wheel or Hub Installation

(see Figure 7)

After the parts have been cleaned, inspected and bearings oiled, install as follows:

1. Assemble the inner cone and seal into the wheel or hub.
2. Place the wheel or hub over the spindle, being careful to avoid damage to the spindle, seal and brake.
3. Put the outer cone into position.
4. Tighten the inner spindle nut while rotating the wheel or hub both directions until a slight bind is felt.
5. Loosen the nut 1/4 turn. The wheel or hub must rotate freely.
6. Install the inner nut lock and place the outer lock washer on the spindle.
7. Tighten the outer nut.
8. The end play must be .001 in. (.0254 mm) to .010 in. (.254 mm).
9. Lock the outer spindle nut in place by bending the tangs or edge of the lockwasher over one flat on the outer nut.
10. Install the hub cap gasket and hub cap. Fill the hub to the "Full" line on the hub cap window (see Figure 3).
11. Adjust the brakes.

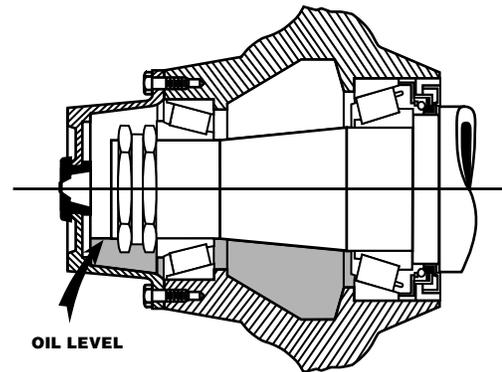


Figure 10. Checking Oil Level in Hub

Rim Mounting Instructions

Careless Mounting is the Major Cause of Tire and Rim Problems

That means that the tire and rim assemblies must be correctly installed, and the rim clamps and nuts correctly tightened, in order to assure maximum service life - - - and maximum safety - - - for your equipment.

Mounting Procedure

1. Use a wire brush to clean the wheel mounting surfaces, being sure that they are free from dirt, rust and paint. The mounting surface of the wheel is the 28° taper on the inboard side of each spoke.

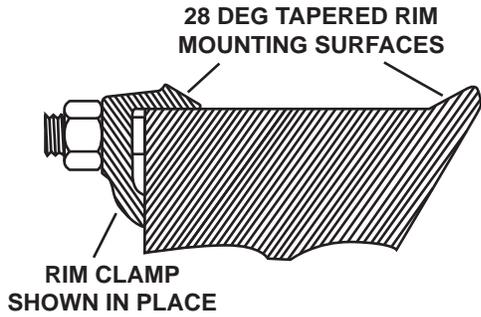


Figure 11. Rim Mounting Surfaces

2. Slide the inside tire and rim assembly over the wheel and push it back into position against the tapered mounting surface. Be sure that the valve stem faces out and is centered between two spokes.
3. Slide the rim spacer in place over the wheel.
4. Slide the outside tire and rim assembly over the wheel. Be sure that this valve stem faces in, and is located in the same relative position on the wheel as the inner valve stem.
5. Push the whole assembly into position, so that inner rim fits snugly against tapers all around, spacer fits snugly and uniformly against inner rim, and outer rim fits snugly and uniformly against spacer.

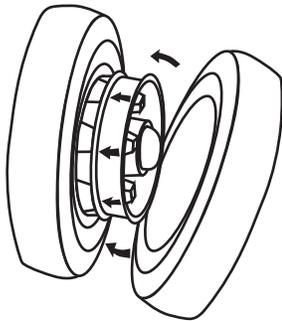


Figure 12. Assembling Rims and Spacers

6. Install rim clamps and nuts all around. Run nuts up until the end of each stud is flush with the face of its nut, then rotate the wheel a half turn to allow parts to seat naturally.

A gap is permissible, but not required, between the clamp and the spoke wheel. If the gap exceeds 1/4" or if clamp bottoms out before reaching 80% of recommended torque, check to insure that proper clamps and spacer are being used.

7. Tighten the stud nuts a quarter turn at a time, following the crisscross pattern shown. This is very important. Failure to tighten nuts in this crisscross sequence will cause misalignment of tire.

Continue until all stud nuts are tightened to these torque specifications:

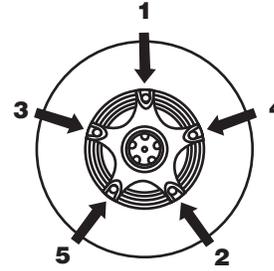


Figure 13. Rim Clamp Tightening Sequence

Torque Specifications	
Stud Size and Threads Per Inch	Recommended Torque in Pound-Feet
5/8" x 11	175
3/4" x 10	190-225

Note: Studs MUST be clean and dry.

Check Wheel Alignment

To do this, place a block of wood or other object on the floor beside tire, and rotate the tire and wheel assembly. Note variations if any, in space between the tire and the block as the tire is rotated. If this variation exceeds 1/16" for front rims or 1/8" for rear duals, the rim is not properly mounted.

To correct misalignment, loosen nuts where the greatest deviation occurs, and tighten on the opposite side. Recheck and correct until deviation is eliminated.

After running a short distance recheck the stud nuts for tightness. Parts will usually seat naturally and torque on nuts will drop. Retighten all nuts to specified torque; this second tightening will assure a tight, properly aligned wheel assembly.

Check torque on all stud nuts once each week.

Special Note on Aluminum Wheels

Rim Clamps - To provide adequate metal thickness around the rim stub, special rim clamps are required. Use only the recommended Kelsey Hayes/Gunite rim clamps.

Rim Studs - 3/4" diameter high grade steel studs are factory installed. They are coated with 'Galenite' to insure a solid fit. A special shoulder on the stud insures proper assembly and prevents possible damage to the aluminum threads in the wheel. Use only WP-395 Rim Studs.

Examine Wheels at Frequent Intervals

Avoid Abuse - Use only plastic, rubber or leather faced tools in assembly or disassembly of tires and rims. Whenever tires and rims are removed, examine wheels for damage, especially the 28° angle ramp. This is the most critical area on the wheel. All mounting surfaces on rim clamps and wheel must be clean and smooth.

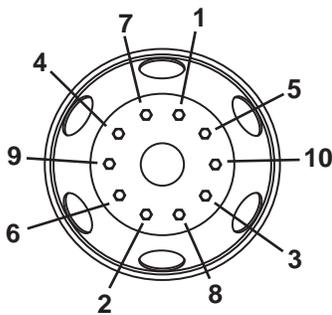
Keep Rim Clamps Tight - check frequently.

Recommended rim clamp torque is 160 to 175 ft. lbs.

Note that special clamps, designed for aluminum wheels, must be used.

Do not, under any circumstances, attempt to weld or heat the wheel for straightening or repair.

10 Stud Disc Wheel Tightening Sequence Gunite Disc Wheels



Hub-Piloted (Two piece flange nuts)	
Wheel Stud	Torque
Thread Size	Lbs. Ft. (Oiled*)
M22x1.5 (W/1-1/2" Hex)	450 - 500
Torque Values for Dual Wheels	
Dry Threads - No Lubrication	
Stud Size	Inner & Outer Capnut
3/4 - 16	450 - 500 ft. lbs.
Backnut Torque	
Size	Torque
3/4 - 16	175 - 200 ft. lbs.

Figure 14. Tightening Sequence of Standard Gunite Disc Wheels

For other wheel brands, follow manufacturers recommended sequence.

Air Systems and Brakes

This section contains a description of the operation of the trailer brake air supply system.

Also included in this section are test instructions, disassembly and assembly procedures and a troubleshooting guide.

Air System Tests

A series of tests must be run daily before operating trailers with air brakes.

1. Connect the air lines, turn on the air, and pressurize the system. The system must hold 100 PSI (7 Bar) pressure minimum.
2. Apply the brakes. Inspect the brake action on all the wheels for proper application.
3. Release the brakes. The brakes must release promptly. Air pressure must discharge quickly from the relay emergency valve.
4. Disconnect the emergency line from the trailer. The trailer brakes must automatically apply.
5. Connect the emergency line. The brakes must release.

Air Reservoir

Drain condensation from the reservoir while the reservoir is pressurized. Listen for leaks after closing the drain valve. The drain valve is located on the underside of the reservoir.

Air Hoses and Tubing

Air hoses and tubing must be checked for chafing, bends, and kinking. Replace faulty parts.

Brake Relay Emergency Valve

The air system tests may disclose a malfunction of the relay emergency valve. Repair or replace faulty units. Contact an authorized representative of the original equipment manufacturer for relay valve servicing.

Air Brake Chambers

The air system tests should disclose any malfunctioning brake chambers. Repair or replace faulty units. The diaphragm and any worn parts must be replaced. When replacing the diaphragm or the spring, replace the corresponding parts for the other chamber on the same axle, to aid in even brake application and release. Examine the yoke pin for wear and replace it if necessary.

Brake Air Supply System Description

(see Figure 17)

The trailer relies on the tractor for its air supply. A description of the system operation follows:

1. When the service and emergency lines are connected to the towing vehicle, the reservoir is charged to approximately the same pressure as is present in the tractor reservoir. The relay emergency valve will keep the trailer brakes apped until the emergency line pressure reaches 60 PSI (4.14 Bar). The brakes will then be released.
2. When the towing vehicle and the trailer are traveling over the road, the brakes are released and the emergency line and reservoir are charged to full pressure.
3. When the service brakes are applied in the towing vehicle, the pressure is increased in the service line. This fills the brake chambers with the same pressure as the service line, and applies the trailer brakes.
4. Releasing the service brakes will cause the pressure in the service line to decrease, causing the relay emergency valve to exhaust the pressure from the brake chambers.
5. The trailer brakes can also be applied independently from the tractor brakes by actuating a hand controller. This supplies air pressure to the service line.
6. The brakes will also apply if the pressure in the emergency line is reduced to about 30 PSI (2.07 Bar). A gradual decrease in the emergency line pressure will cause a gradual increase in the pressure to the brake chambers.
7. A sudden release of pressure in the emergency line will cause a full release of reservoir pressure into the brake chambers, resulting in full brake application.

Relay Emergency Valve

(see Figure 15)

The relay emergency valve senses the line pressures and relays the response to the brake chambers. Daily operating tests are described elsewhere in this manual. Before conducting further tests, check the tractor air pressure gauge against an accurate test gauge.

 **WARNING**

Block the wheels during these tests

1. Connect the service and emergency lines. When the pressure reaches 60 -65 PSI (4.14 - 4.48 Bar), the brakes must automatically release.
2. Apply and release the service brake several times. Check for prompt brake application and release.
3. Release the brakes and stop the engine with the system pressure between 90 - 100 PSI (6.2 -6.9 Bar). A two minute check must show a pressure drop of no more than 6 PSI (0.41 Bar) for the combination vehicle system.
4. If step "3" indicates possible leakage, apply soap suds at the relay emergency valve exhaust port. A one inch (25.4 mm) soap bubble in not less than five seconds is permissible.
5. Apply soap suds at the pipe plugs and fittings. Correct all leaks as indicated.
6. With the engine stopped and the pressure at 90 - 100 PSI (6.2 - 6.9 Bar) make and hold a full service brake application. A two minute check must show a pressure drop of no more than 8 PSI (0.55 Bar) for the combination vehicle system.
7. If Step "6" indicates possible leakage, apply soap suds on the relay emergency valve cover and exhaust port. A one inch (25.4 mm) bubble in not less than three seconds is permissible. Correct all leaks as indicated.
8. Place the tractor protection control valve in "emergency" position or close the cutoff valve on the emergency line. Disconnect the emergency line coupling. The trailer brakes must apply promptly. Check for leakage at the emergency coupling. A leak indicates a leaking check valve or O-rings in the relay emergency valve. Also check the service line. A leak here indicates leaking O-rings in the relay emergency valve. Recharge the system. The brakes must release at 65 PSI (4.48 Bar) emergency line pressure.
9. Stop the engine with the system fully charged. Make a series of foot valve applications. Reduce the pressure to 30 PSI (2.07 Bar). The trailer brakes must apply automatically at this pressure or at the emergency setting of the tractor protection equipment.

If the valve does not function properly or leakage is excessive, it must be repaired or replaced.

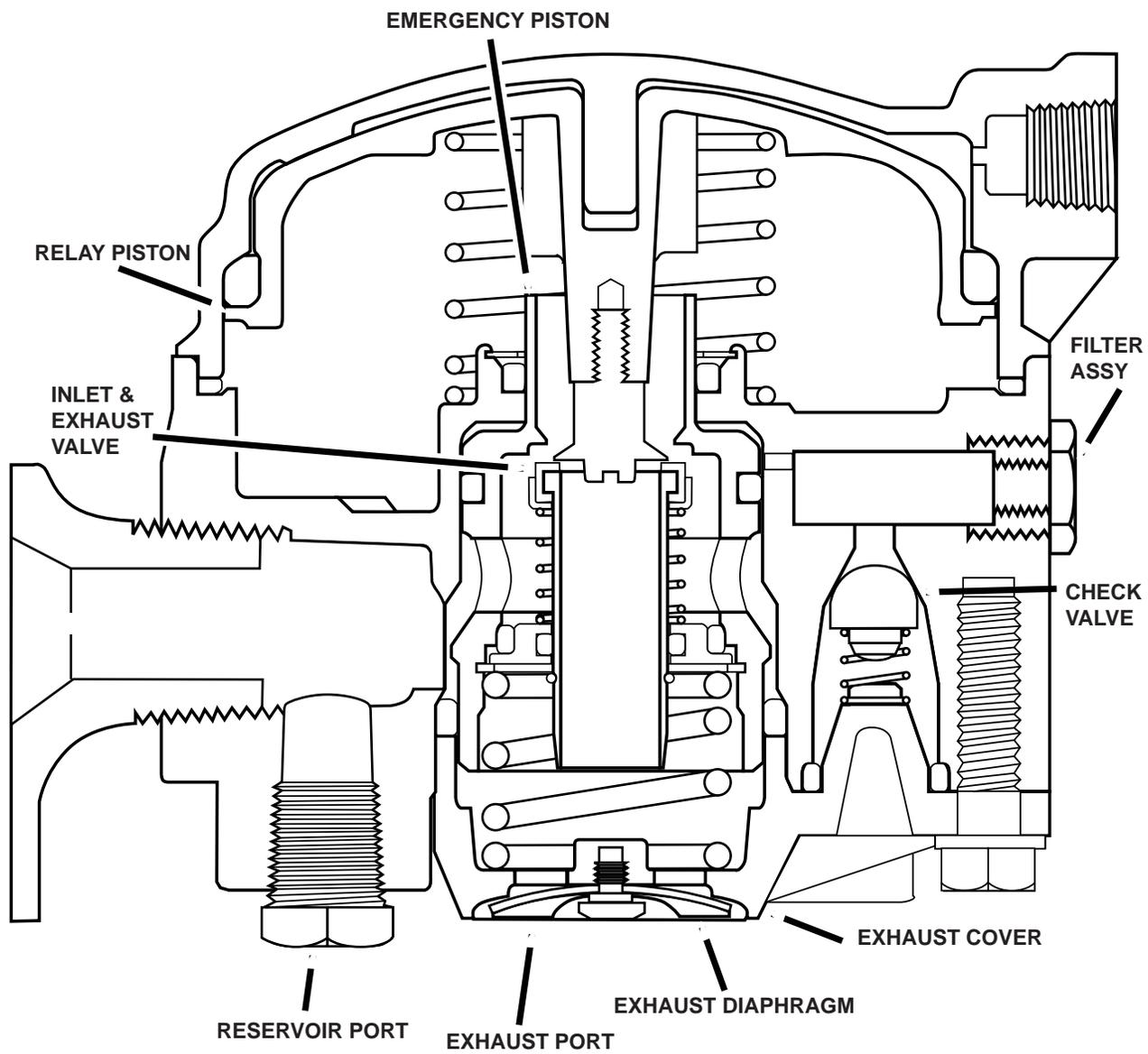


Figure 15. Relay Emergency Valve

Brake Chambers

Air pressure on the pressure plate side of the brake chamber diaphragm pushes the diaphragm against the push rod assembly. This extension of the push rod pushes against the slack adjuster, which actuates the brakes.

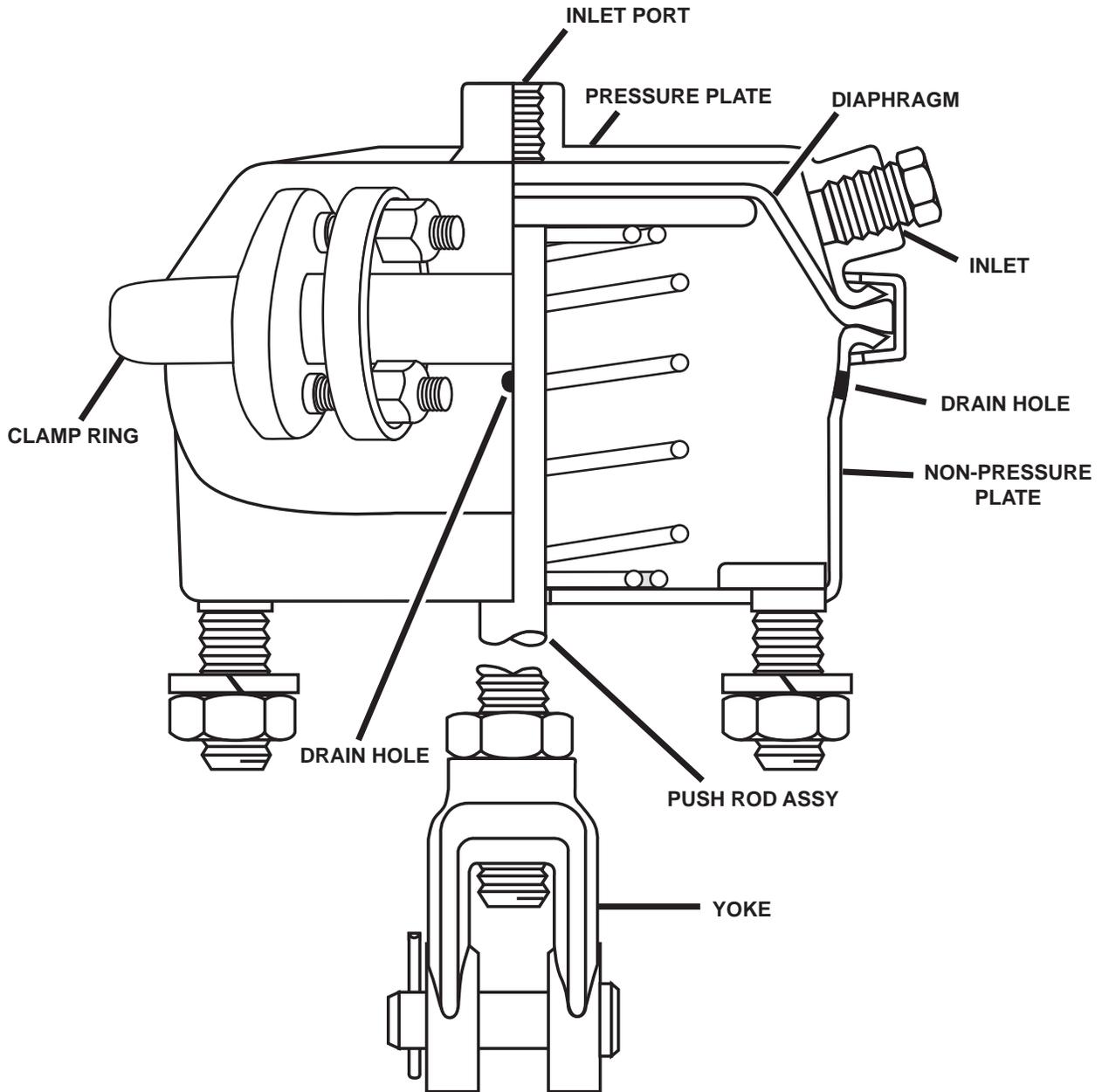


Figure 16 . Brake Chamber

Brake Chamber Servicing

If an air leak is detected around the clamp ring, the bolts can be tightened to stop the leak.

 CAUTION
Overtightening the bolts can cause permanent distortion of the clamp ring. Do Not exceed a torque of 130 inch lbs. (14.7 Nm.)

Brake Chamber Removal

Disconnect the air line and the push rod yoke. Remove the nuts from the mounting studs. Remove the air chamber.

Brake Chamber Disassembly

1. Clean the exterior of the brake chamber.
2. Put a mark on the parts so they can be reassembled in the same relative positions.
3. Pull out the push rod and clamp the push rod in the extended position with vise grip pliers.

NOTE: Tape the grips to prevent damage to the push rod.

4. Remove the bolts from the clamp ring.
5. Spread the clamp ring and remove it.

 CAUTION
Use care not to bend the clamp ring out of shape.

6. Remove the pressure plate and diaphragm.
7. Remove the locknut and the yoke from the push rod.
8. Release the grip on the push rod.
9. Remove the push rod and the spring.

Cleaning and Inspection of Parts

Clean the metal parts in a solvent. Inspect all the parts for damage, wear or deterioration and replace defective parts.

Brake Chamber Assembly

1. Stand the push rod assembly on a flat surface.
2. Put the return spring in position.

3. Place the non-pressure plate over the push rod.
4. Push the non-pressure plate down against the flat surface. Hold it in place with vise grip pliers clamped to the push rod.

NOTE: Tape the grips to prevent damage to the push rod.

5. Place the clamp ring over the non-pressure plate clamping surface.
6. Position the diaphragm in the pressure plate. Assemble it with the non-pressure plate by working the clamp ring over the pressure plate. Align all the marks made during disassembly.
7. Draw the clamp lugs together. Start the clamp bolts and nuts. Tighten the nuts to a maximum torque of 130 inch lbs. (14.7 Nm.).

 CAUTION
Overtightening the bolts can cause permanent distortion of the clamp ring.

Installation

Place the brake chamber in the mounting bracket and tighten the nuts on the studs. The drain hole must be placed in the down position. Install the yoke and the locknut on the push rod. Connect the push rod to the slack adjuster with the yoke pin. Adjust the brakes. Check the angle formed by the slack adjuster and the push rod with the brakes applied. This angle must not be less than 90° with the brakes adjusted. Turn the yoke to obtain this angle. The angle must be the same for all slack adjusters to obtain equal braking force at all wheels.

Trailer ABS

Meritor WABCO ABS is an electronic system that monitors and controls wheel speed during braking. The system works with standard air brake systems.

ABS monitors wheel speed at all times and controls braking during wheel lock situations. The system improves vehicle stability and control by reducing wheel lock during braking.

The ECU receives and processes signals from the wheel speed sensors. When the ECU detects a wheel lockup, the unit activates the appropriate modulator valve, and the air pressure is controlled.

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.

An ABS warning light lets drivers know the status of the system.

For a complete description of diagnostic and maintenance procedures refer to Meritor WABCO Maintenance Manual no. 33.

Air Brakes - General

Etnyre trailers are equipped with cam actuated brakes. Braking force is supplied by air pressure in the brake chamber, which pushes a pushrod against the end of the slack adjuster. The slack adjuster rotates the camshaft, which forces the brake shoes against the brake drum.

Operating Checks

During road stops, check the brake drums for heating.

A cool brake drum may indicate an inoperative brake.

 WARNING
Proceed cautiously. Malfunctioning or misaligned brakes can cause the drum to become extremely hot. Do not operate the vehicle until the problem causing the overheating is corrected.

Brake Assembly

Examine the brake linings visually to locate the lining showing the greatest amount of wear.

 CAUTION
<i>Do Not</i> allow the linings to wear thin enough so the lining bolts or rivets contact the drum.

Grease the anchor pins, camshaft bracket bearing and the spider bushing at four (4) grease fittings. Do Not use an excessive amount of grease on the anchor pins and spider bushing. Avoid getting grease on the brake lining surfaces.

Slack Adjuster

Crewson Brunner Automatic Slack Adjuster

 WARNING
This section is valid only for Crewson Brunner slack adjusters. If your Transport is equipped with any other OEM's slack adjusters, contact the appropriate OEM for maintenance and adjustment instructions.

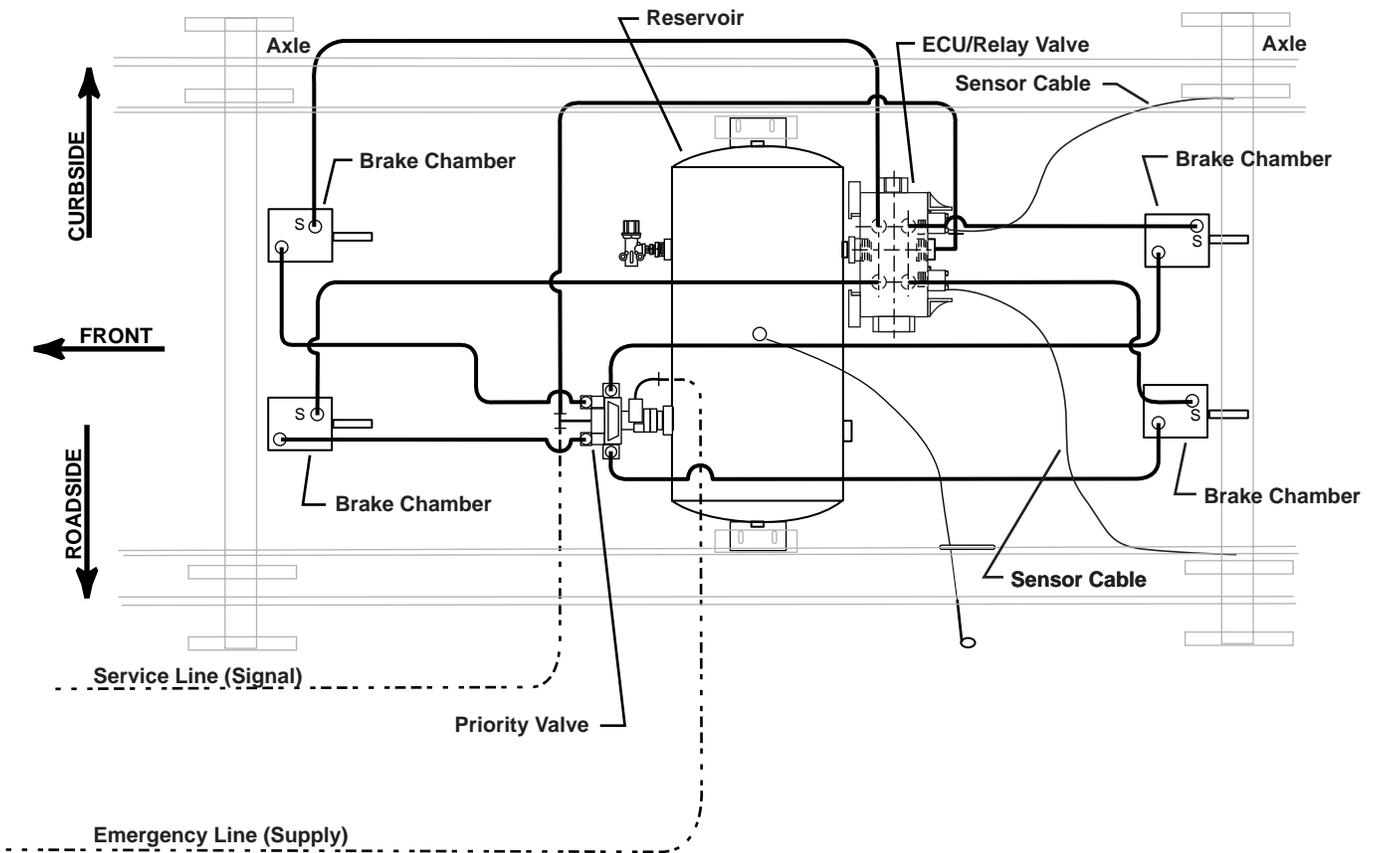


Figure 17. Std ABS Air Schematic

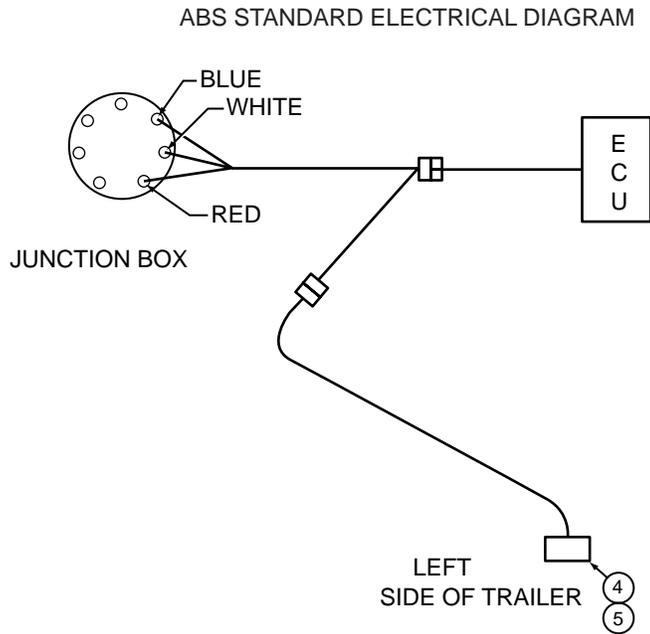


Figure 18 . Std ABS Electrical Schematic

Recommended Preventive Maintenance

Every Three Months or 25,000 Miles

1. Check the condition of the brakes, including drums, shoes and linings, cams, rollers, bearings, etc.
 2. Check for structural damage of the automatic slack adjuster housing and condition of the boot for cuts, tears, etc. Replace if necessary.
 3. After allowing brake drum to cool to room temperature, check for correct chamber stroke.
- See chart below for correct stroke measurements.

Chamber Type	Maximum Stroke
12.....	less than 1-3/8"
16.....	less than 1-3/4"
20.....	less than 1-3/4"
24.....	less than 1-3/4"
30.....	less than 2"

Every Six Months or 50,000 Miles

The Crewson Brunner automatic slack adjusters are factory lubricated and extensively sealed to protect against dirt, water, salt and other corrosive elements. Nevertheless, periodic lubrication is recommended.

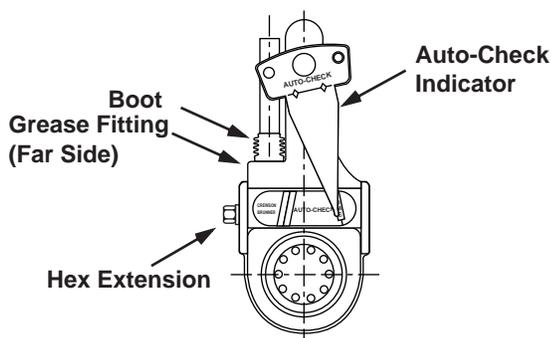


Figure 19. Slack Adjuster Lubrication Points

1. Grease the automatic slack adjuster.
 - (a) The styles of grease plugs or reliefs may vary according to models.
 - (b) See Crewson Brunner service data for the approved types of lubricant.
2. Test adjuster function.

Testing Adjuster Function

Check the operation of the slack adjuster by observing the auto-check indicator during several applications of the brakes. The pointer should return to the “Home” position and not go into the red zone when the brakes are applied. Another way to check the operation is to measure the maximum stroke during brake application. If maximum stroke at 90 psi of the Crewson Brunner automatic slack adjuster is less than the distance in the **Maximum Stroke Chart** below, the adjuster is functioning properly.

Chamber Type	Maximum Stroke
12.....	less than 1-3/8"
16.....	less than 1-3/4"
20.....	less than 1-3/4"
24.....	less than 1-3/4"
30.....	less than 2"

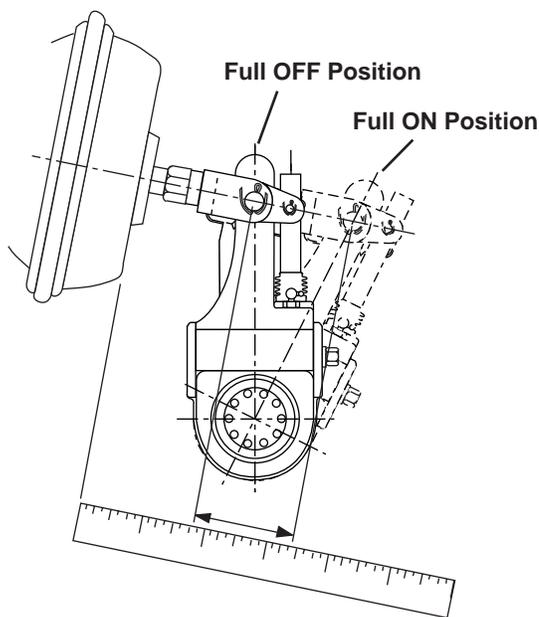


Figure 20. Measuring Maximum Stroke

1. The Crewson Brunner Automatic Slack Adjuster should not require manual readjustment. If the maximum chamber stroke is within the range for the size chamber used, the slack should not be manually readjusted. If the chamber stroke exceeds the limit, and does not adjust to within the specifications, either the brake linings or the slack adjuster should be replaced. Apply the brakes several times and watch for the hex to rotate. A box wrench on the hex makes an

excellent indicator to magnify the movement. The hex extension must rotate. The adjustment is intentionally made in small increments so it will take several cycles to bring the adjuster within the stroke limit shown in the chart.

2. If the hex extension did not rotate, the automatic slack must be replaced.

Slack Adjuster Replacement

1. Chock the wheels.
2. Fully cage the spring chamber with 100 psi air pressure or a threaded T-bolt only.
3. Remove the existing slack adjuster and clevis. Do not move the existing jam nut.
4. Clean and apply anti-seize compound to the push rod threads.
5. Thread the Crewson Brunner clevis onto the push rod and install the 1/2" clevis pin. Do not tighten the jam nut.
6. Slide the installation template over the "S" cam spline. Swing the template into the clevis until the appropriate slot totally engages the 1/2" clevis pin.
7. Once the template has been swung into place, install the 1/4" clevis pin. If the 1/4" pin does not slide freely into the clevis and template, remove the template from the clevis. Rotate the clevis clockwise or counterclockwise several turns and reinstall the template in the clevis.
8. Position the clevis on the pushrod so both pins fit freely in the clevis and the template.
9. If the pushrod threads extend through the clevis more than 1/16", remove the clevis and cut the rod to length. A minimum of 1/2" thread engagement in the clevis body is required. If this is not the case, install a new pushrod and cut to length or use an extended length Crewson Brunner clevis.
10. Tighten jam nut to a minimum of 50 ft-lbs.
11. Remove both clevis pins and template.
12. Before installing auto slack adjuster, coat the "S" cam spline, both clevis pins, and the pushrod threads with anti-seize compound.
13. Install the slack adjuster on the "S" cam spline. Using a 7/16" wrench, manually rotate the adjuster shaft clockwise until the slack adjuster arm holes line up with the clevis holes.
14. If your slack adjuster is equipped with an auto-check indicator, insert the 1/4" and 1/2" pins in to the auto-check holes. The clevis pin heads

should be toward the front of the auto-check. The auto-check should face the center of the vehicle.

15. Insert the clevis pins through the auto-check and clevis and secure with cotter pins. If you do not have an auto-check insert the pins through the clevis and secure with cotter pins.
16. Using a 7/16" wrench, manually rotate the adjuster clockwise until the brake shoes contact the brake drum.
17. Install any washers and the snap ring on the "S" cam shaft.
18. Manually back off the adjuster counterclockwise 1/2 turn.
19. Uncage the spring brake.
20. Build up the vehicle air pressure to 90 psi.
21. Fully apply and release the brakes several times to check for adequate clearance to all of the adjacent components.
22. Measure the distance from the air chamber to the center of the 1/2" pin.
23. Apply the brakes with 80 to 90 psi air pressure, and measure the distance to the 1/2" pin. The difference between these 2 measurements is the stroke. The stroke, or difference between these two measurements must be less than as shown on the charts shown on the next page.

Chamber Type	Maximum Stroke
12.....	less than 1-3/8"
16.....	less than 1-3/4"
20.....	less than 1-3/4"
24.....	less than 1-3/4"
30.....	less than 2"

Long Stroke Chamber	Maximum Stroke
16.....	less than 2"
20.....	less than 2"
24 (below 3" max stroke).....	less than 2"
24 (3" max stroke version)....	less than 2 1/2"
30.....	less than 2 1/2"

The auto-check pointer will point to the home position to verify proper installation.

 **WARNING**

An auto slack adjuster should never have to be manually adjusted while in service. The only time it should be manually adjusted is during installation or at brake relining. By constantly manually adjusting the hex shaft the internal clutch life can be shortened. The proper way of checking an auto slack to see if it is working within specifications is to measure the working stroke.

 **CAUTION**

Check the brake adjustment frequently during the first 500 miles after relining. Overloading or using only the trailer brakes to stop the complete tractor-trailer unit will cause the heat absorption capacity of the brake to be exceeded. Hotter brake linings and drums, longer stopping distances, and shorter brake lining life will result.

Trouble Analysis for Air Brakes

Trouble	Probable Cause	Corrective Action
No brakes or intermittent brakes.	Brake air system improperly connected.	Reconnect correctly.
	Relay emergency valve contains water or oil.	Clean valve.
	Tractor protection valve malfunction.	Repair or replace valve.
	Restricted tubing or hose line.	Locate and remove restriction.
	No air pressure due to: a. Broken line. b. Failure in tractor air supply.	Locate leak and repair. Troubleshoot tractor air system.
Single brake dragging or locked.	Broken component within brakes: a. Retract spring. b. Cam roller. c. Shoe. d. Lining fasteners. e. Anchor pin. f. Spider.	Replace broken part.
	Flat spot on cam roller or camshaft	Replace defective parts. DO NOT lubricate mating surfaces of cam roller.
	Improper adjustment.	Adjust slack adjusters.
	Spider bushing or cam bracket bushing binding.	Lubricate or replace bushing.
	Improper lubrication.	Lubricate.
	Worn anchor pin bushing.	Replace bushing.
	Brake drum distortion.	Repair or replace drum.
	Broken brake chamber spring.	Replace spring.
	Brake chamber pushrod binding.	Realign brake chamber bracket or install correct brake chamber.
	Uneven brakes.	<i>See "Single brake dragging or locked" in this section.</i>
Restriction in brake hoses.		Locate and remove restriction.
Leaking brake chamber diaphragm.		Replace diaphragm.
Linings worn out.		Reline brakes.
Grease on linings.		Reline brakes.
Broken slack adjuster.		Replace slack adjuster.
Brakes apply too slowly.		Brakes need adjustment or lubrication.
	Low air pressure in brake system (below 80 PSI) (5.5 Bar).	Check tractor air system.
	Restricted tubing or hose.	Locate and remove restriction.
	Defective relay emergency valve.	Clean and repair or replace valve.
(continued)		

Trouble Analysis for Air Brakes (continued)

Trouble	Probable Cause	Corrective Action
Brakes release too slowly.	Brakes need adjustment or lubrication.	Adjust and lubricate brakes.
	Brake components binding.	Align brackets or replace bent components.
	Exhaust port or relay emergency valve restricted or plugged.	Clean valve.
All brakes do not release.	Brake air system improperly connected.	Reconnect correctly.
	Brake valve on towing vehicle applied.	Release brake.
	Relay emergency valve in emergency position.	Check line pressure and valve.
	Restriction in brake hoses.	Locate and remove restriction.
	Tractor protection valve malfunction.	Troubleshoot tractor air system.
Insufficient brakes.	Brakes need adjustment.	Adjust brakes.
	Brakes need lubrication.	Lubricate brakes.
	Lining worn away.	Reline brakes.
	Defective relay emergency valve.	Repair or replace valve.
	Brakes overheated.	Stop and allow to cool. Locate the cause of overheating.
	Low air pressure.	Troubleshoot tractor air system.
Brakes grabbing.	Lubricant on brake lining.	Reline brake.
	Brake components binding.	Locate cause and repair, adjust or replace components.
	Defective brake valve on towing vehicle.	Repair or replace valve.
	Defective relay emergency valve.	Repair or replace valve.
Excessive leakage with brakes released.	Relay emergency valve leaking.	Repair or replace valve.
	Leaking tubing or hose line.	Tighten or replace leaking lines.
Excessive leakage with brakes applied.	Relay emergency valve leaking.	Repair or replace valve.
	Leaking brake chamber or diaphragm.	Tighten clamp ring or replace diaphragm.
	Leaking tubing or hose line.	Tighten or replace leaking lines.
	(continued)	

Trouble Analysis for Air Brakes (continued)

Trouble	Probable Cause	Corrective Action
Excessive leakage with emergency system only applied - no leakage with normal brake application.	Defective relay emergency valve.	Clean and repair, or replace valve.
Excessive water present in brake system.	Reservoir not drained often enough.	Drain reservoir daily.
Excessive oil present in brake system.	Compressor on towing vehicle passing excessive oil.	Repair compressor.
Brake will not apply.	Flat spot on cam roller or camshaft.	Replace defective parts.

