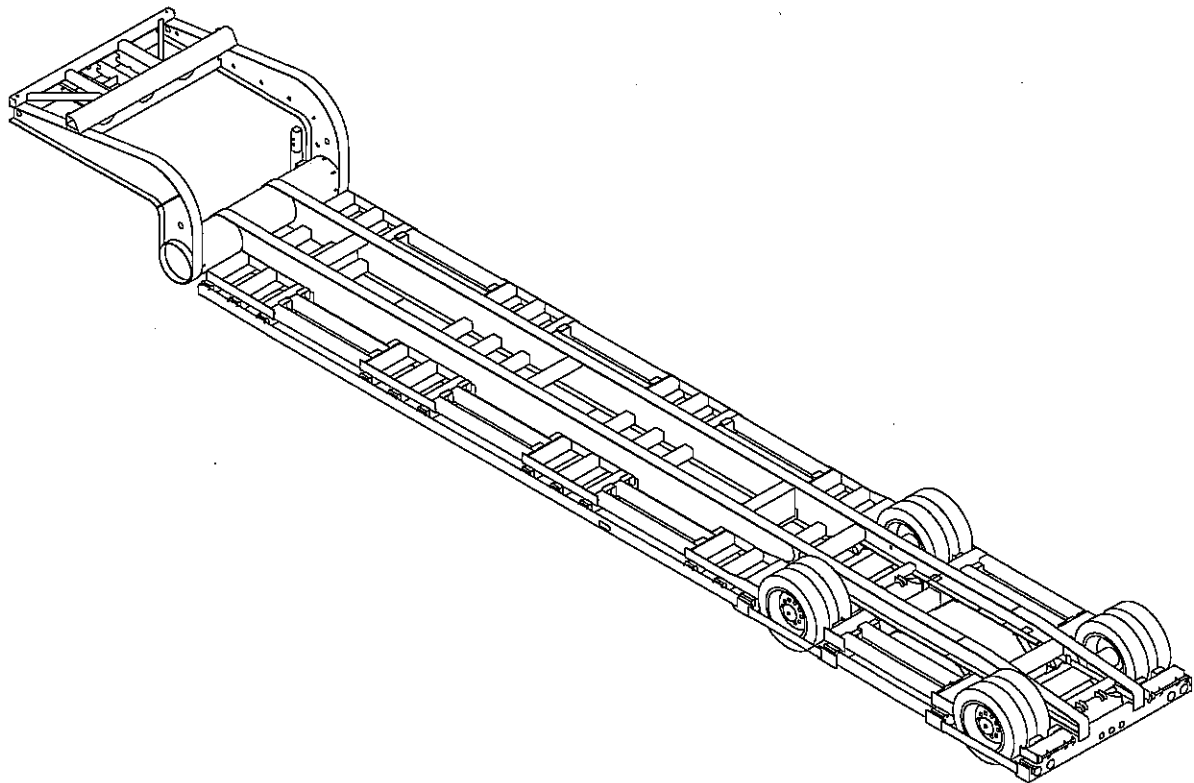




**MODEL 160
SEMITRAILER
OPERATOR'S MANUAL**



**1900 North Street
Marysville, KS 66508
(785)562-5381**

WARRANTY

MANUFACTURER'S GUARANTEE POLICY

LANDOLL CORPORATION WARRANTY

LANDOLL warrants each new and unused LANDOLL machine, when properly assembled, adjusted, and operated, to be free of defects in material and workmanship, in normal use and when properly serviced, for a period of twelve (12) months after date of delivery by the Dealer to the original retail purchaser. LANDOLL shall repair or replace, at its option, freight on board (f.o.b.) at its factory or designated DEALER location, any part or parts of such new and unused machine which shall have been reported in writing to LANDOLL within thirty (30) days from date of failure thereof and which LANDOLL inspection shall disclose to have been defective. Defective parts must be returned to the LANDOLL factory, freight prepaid. LANDOLL will not be liable for labor, transportation, or any other charges resulting from replacement of a defective part. This warranty is void if any part not supplied by LANDOLL is used in assembly or repair, or if the machine has been altered, abused, or neglected. LANDOLL repair parts are warranted for ninety (90) days from date of replacement or for the unexpired warranty period of the applicable LANDOLL machine, whichever period is longer. LANDOLL makes no warranty, whatsoever, as to purchased component parts and other trade accessories, except to the extent that such items are warranted by the manufacturer thereof. THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER EXPRESSED, IMPLIED, OR STATUTORY (INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PURPOSE), AND LANDOLL SHALL NOT BE LIABLE FOR SPECIAL OR CONSEQUENTIAL DAMAGES OF ANY KIND ON ACCOUNT OF ANY LANDOLL PRODUCT.

NO EMPLOYEE OR REPRESENTATIVE IS AUTHORIZED TO CHANGE THIS WARRANTY, VERBALLY OR IN WRITING, OR GRANT ANY OTHER WARRANTY.

LANDOLL CORPORATION, WHOSE POLICY IS ONE OF CONTINUOUS IMPROVEMENT, RESERVES THE RIGHT TO MAKE CHANGES WITHOUT OBLIGATION TO MODIFY PREVIOUSLY PRODUCED EQUIPMENT.



**MODEL 160
SEMITRAILER
OPERATOR'S MANUAL**

PURCHASED FROM: _____ **DATE** ____ / ____ / ____

ADDRESS: _____

PHONE NO.: _____ **SERIAL NO.:** _____

REPORTING SAFETY DEFECTS

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

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

To contact NHTSA, you may either call the Auto Safety Hotline toll-free at 1-800-424-9393 (or 366-0123 in Washington, D.C. area) or write to: NHTSA, U.S. Department of Transportation, Washington, D.C. 20590. You can also obtain other information about motor vehicle safety from the Hotline.

In the event of a defect or problem with your LANDOLL equipment, please notify LANDOLL CORPORATION:

**LANDOLL CORPORATION
SALES AND SERVICE
1900 NORTH STREET
MARYSVILLE, KANSAS 66508**

**OR PHONE:
(785)562-5381
1-800-HAULOLL
(1-800-428- 5655)
FAX NO.: (785) 562-4893**

TABLE OF CONTENTS

SECTION	DESCRIPTION	PAGE NO.
1	INTRODUCTION.....	1-1
2	STANDARD SPECIFICATIONS.....	2-1
3	OPERATING INSTRUCTIONS.....	3-1
3-1	GENERAL.....	3-1
3-2	PRE-COUPLING OF SEMITRAILER AND TRACTOR.....	3-1
3-3	COUPLING OF THE TRACTOR TO THE SEMITRAILER.....	3-2
3-4	CONNECTING TRACTOR SERVICES TO THE SEMITRAILER.....	3-2
3-5	TRACTOR AND SEMITRAILER HOOK-UP AND CHECK-OUT.....	3-2
3-6	TOWING THE SEMITRAILER.....	3-3
3-7	PARKING THE SEMITRAILER.....	3-3
3-8	UNCOUPLING TRACTOR FROM SEMITRAILER.....	3-3
3-9	LOADING THE TRAILER.....	3-4
3-10	UNLOADING THE TRAILER.....	3-4
3-11	COLD WEATHER OPERATION.....	3-4
3-12	HOT WEATHER OPERATION.....	3-5
4	MAINTENANCE AND LUBRICATION.....	4-1
4-1	GENERAL.....	4-1
4-2	MAINTENANCE SCHEDULE.....	4-1
4-3	MAINTENANCE PROCEDURES.....	4-2
4-4	FRAME AND DECKS.....	4-2
4-5	ELECTRICAL SYSTEM.....	4-2
4-6	BRAKE SYSTEM MAINTENANCE.....	4-3
4-7	HUB AND DRUM MAINTENANCE.....	4-8
4-8	WHEEL BEARING.....	4-10
4-9	SUSPENSION ADJUSTMENT.....	4-10
4-10	ALIGNMENT.....	4-11
4-11	TIRES AND WHEELS.....	4-14
5	TROUBLESHOOTING.....	5-1

SAFETY PRECAUTIONS



THIS IS THE INTERNATIONAL SAFETY ALERT SYMBOL. IT ALERTS THE OPERATOR TO IMPORTANT SAFETY MESSAGES ON THE MACHINE AND IN THIS MANUAL. CAREFULLY READ AND STUDY THESE LABELS AND MESSAGES BEFORE MACHINE ASSEMBLY AND OPERATION. THERE ARE THREE TYPES OF SAFETY ALERT MESSAGES:

DANGER

A LIFE THREATENING SITUATION EXISTS. DEATH CAN OCCUR if safety measures or instructions on this label are not properly followed.

WARNING

SERIOUS INJURY OR DEATH CAN OCCUR if safety measures or instructions on this label are not properly followed.

CAUTION

SERIOUS EQUIPMENT OR OTHER PROPERTY DAMAGE CAN OCCUR if instructions on this label are not properly followed.



INTRODUCTION

This manual provides operating, servicing, and maintenance instructions, with detailed parts lists for Model 160 semitrailer, manufactured by Landoll Corporation, Marysville, Kansas 66508.

- SECTION 1** gives basic instructions on the use of this manual.
- SECTION 2** gives specifications for the semitrailer, including measurements and component specifications. A Standard Bolt Torque Table is provided to give guidelines for bolt torques to be used when servicing this product.
- SECTION 3** gives instructions for the proper operation of the equipment.
- SECTION 4** gives general maintenance procedures, a maintenance schedule, and a lubrication schedule. Improper maintenance will void your warranty.

IF YOU HAVE ANY QUESTIONS CONTACT:

**LANDOLL CORPORATION
1900 NORTH STREET
MARYSVILLE, KANSAS 66508
or phone:
(785) 562-5381 or
(800) 428-5655
or FAX:
(785) 562-4893**

- SECTION 5** is a troubleshooting guide to aid in diagnosing and solving problems with the semitrailer.
- PARTS LIST** is a separate manual showing the various assemblies, subassemblies, and systems. Refer to that manual when ordering Landoll replacement parts. Order parts from your Landoll dealer

WARRANTY The Warranty Registration form is located with the product documents. Fill it out and mail it within 15 days of purchase. The Warranty is printed inside the front cover.

NOTE: IMPROPER ASSEMBLY, MODIFICATION, OR MAINTENANCE OF YOUR LANDOLL MACHINE CAN VOID YOUR WARRANTY.

COMMENTS Address comments or questions regarding this publication to:

**LANDOLL CORPORATION
1900 NORTH STREET
MARYSVILLE, KANSAS 66508
ATTENTION: PUBLICATIONS - DEPT. 55**

STANDARD SPECIFICATIONS

CAPACITY* (FRAME DESIGN): 60,000 LB. DISTRIBUTED, 20,000 CONCENTRATED IN 10'

OVERALL LENGTH: 53'

OVERALL WIDTH 100"

WEIGHT 14,300 LBS.

GOOSENECK:
LENGTH: 9'-7"
DROP 35"

DECK:
LENGTH 43'-5"
HEIGHT 18-1/2"-24-1/2"

FIFTH WHEEL:
HEIGHT: 48"
KINGPIN: 2"Dia.

TURNING CLEARANCE:
FROM KINGPIN 76"
FORWARD SWING CLEARANCE FROM KINGPIN 53"

SPECIFIC BOLT TORQUES

AIR RIDE SUSPENSION:
EQUALIZER BEAM PIVOT BOLT: 600 FT.-LBS.
SHOCK ABSORBER MOUNTING: 150 FT.-LBS.
AXLE CLAMP U-BOLTS** 680 FT.-LBS.
AIR SPRING MOUNTING: 1/2" 25 FT.-LBS.
 3/4" 35 FT.-LBS.

FRONT AXLE CONNECTION BOLT 1-1/8"- 7 800 FT.-LBS.

WHEEL FASTENERS:
OUTER SPINDLE NUTS 250-400 FT.-LBS.
INNER WHEEL NUTS 450-500 FT.-LBS.
OUTER WHEEL NUTS 450-500 FT.-LBS.

**LANDOLL CORPORATION
GENERAL TORQUE SPECIFICATIONS (REV. 4/97)**

THIS CHART PROVIDES TIGHTENING TORQUES FOR GENERAL PURPOSE APPLICATIONS WHEN SPECIAL TORQUES ARE NOT SPECIFIED ON PROCESS OR DRAWING.
 ASSEMBLY TORQUES APPLY TO PLATED NUTS AND CAPSCREWS ASSEMBLED WITHOUT SUPPLEMENTAL LUBRICATION (AS RECEIVED CONDITION). THEY DO NOT APPLY IF SPECIAL GRAPHITE MOLY-DISULFIDE OR OTHER EXTREME PRESSURE LUBRICANTS ARE USED.
 WHEN FASTENERS ARE DRY (SOLVENT CLEANED), ADD 33% TO AS RECEIVED CONDITION TORQUE.
 BOLT HEAD IDENTIFICATION MARKS INDICATE GRADE AND MAY VARY FROM MANUFACTURER TO MANUFACTURER.
 THICK NUTS MUST BE USED ON GRADE 8 CAPSCREWS.
 USE VALUE IN [] IF USING PREVAILING TORQUE NUTS.
TORQUE IS SPECIFIED IN FOOT POUNDS

UNC Size	SAE Grade 2		SAE Grade 5		SAE Grade 8		UNF Size	SAE Grade 2		SAE Grade 5		SAE Grade 8	
1/4-20	4	[5]	6	[7]	9	[11]	1/4-28	5	[6]	7	[9]	10	[12]
5/16-18	8	[10]	13	[16]	18	[22]	5/16-24	9	[11]	14	[17]	20	[25]
3/8-16	15	[19]	23	[29]	35	[43]	3/8-24	17	[21]	25	[31]	35	[44]
7/16-14	24	[30]	35	[43]	55	[62]	7/16-20	27	[34]	40	[50]	60	[75]
1/2-13	35	[43]	55	[62]	80	[100]	1/2-20	40	[50]	65	[81]	90	[112]
9/16-12	55	[62]	80	[100]	110	[137]	9/16-18	60	[75]	90	[112]	130	[162]
5/8-11	75	[94]	110	[137]	170	[212]	5/8-18	85	[106]	130	[162]	180	[225]
3/4-10	130	[162]	200	[250]	280	[350]	3/4-16	150	[188]	220	[275]	320	[400]
7/8-9	125	[156]	320	[400]	460	[575]	7/8-14	140	[175]	360	[450]	500	[625]
1-8	190	[237]	408	[506]	680	[850]	1-14	210	[263]	540	[675]	760	[950]
1-1/8-7	270	[337]	600	[750]	960	[1200]	1-1/8-12	300	[375]	660	[825]	1080	[1350]
1-1/4-7	380	[475]	840	[1050]	1426	[1782]	1-1/4-12	420	[525]	920	[1150]	1500	[1875]
1-3/8-6	490	[612]	110	[1375]	1780	[2225]	1-3/8-12	560	[700]	1260	[1575]	2010	[2512]
1-1/2-6	650	[812]	1460	[1825]	2360	[2950]	1-1/2-12	730	[912]	1640	[2050]	2660	[3325]

METRIC

COARSE THREAD METRIC CLASS 10.9 FASTENERS AND CLASS 10.0 NUTS AND THROUGH HARDENED FLAT WASHERS, PHOSPHATE COATED, ROCKWELL "C" 38-45.
 USE VALUE IN [] IF USING PREVAILING TORQUE NUTS.

Nominal Thread Diameter mm	Standard Torque		Nominal Thread Diameter mm	Standard Torque	
	Newton-Meters	Foot-Pounds		Newton-Meters	Foot-Pounds
6	10	[14]	7	[10]	
7	16	[22]	12	[16]	
8	23	[32]	17	[24]	
10	46	[60]	34	[47]	
12	80	[101]	60	[75]	
14	125	[155]	90	[115]	
16	200	[240]	150	[180]	
18	275	[330]	205	[245]	
			20		385 [450]
			24		670 [775]
			27		980 [1105]
			30		1330 [1470]
			33		1790 [1950]
			36		2325 [2515]
			39		3010 [3210]
					290 [335]
					500 [625]
					730 [825]
					990 [1090]
					1340 [1450]
					1730 [1870]
					2240 [2380]

Table 2-1 General Torque Specifications

**LANDOLL CORPORATION
HYDRAULIC FITTING TORQUE SPECIFICATIONS
37° JIC, ORS, & ORB (REV. 10/97)**

THIS CHART PROVIDES TIGHTENING TORQUES FOR HYDRAULIC FITTING APPLICATIONS WHEN SPECIAL TORQUES ARE NOT SPECIFIED ON PROCESS OR DRAWING.

ASSEMBLY TORQUES APPLY TO PLATED CARBON STEEL AND STAINLESS STEEL FITTINGS ASSEMBLED WITHOUT SUPPLEMENTAL LUBRICATION (AS RECEIVED CONDITION). THEY DO NOT APPLY IF SPECIAL GRAPHITE MOLY-DISULFIDE OR OTHER EXTREME PRESSURE LUBRICANTS ARE USED.

BRASS FITTINGS AND ADAPTERS - 65% OF THE TORQUE VALUE FOR STEEL. STAINLESS STEEL, ALUMINUM AND MONEL - THREADS ARE TO BE LUBRICATED.

TORQUE IS SPECIFIED IN FOOT POUNDS

PARKER BRAND FITTINGS

Dash Size	37 Degree JIC	O-Ring (ORS)	O-Ring Boss (ORB)
-4	11-13	15-17	13-15
-5	14-16	—	21-23
-6	20-22	34-36	25-29
-8	43-47	58-62	40-44
-10	55-65	100-110	57.5-62.5
-12	80-90	134-146	75-85
-16	115-125	202-218	109-121
-20	160-180	248-272	213-237
-24	185-215	303-327	238-262
-32	250-290	—	310-340

**LANDOLL CORPORATION
HYDRAULIC FITTING TORQUE SPECIFICATIONS
37° JIC, ORS & ORB (REV. 10/97)**

THIS CHART PROVIDES TIGHTENING TORQUES FOR HYDRAULIC FITTING APPLICATIONS WHEN SPECIAL TORQUES ARE NOT SPECIFIED ON PROCESS OR DRAWING.

ASSEMBLY TORQUES APPLY TO PLATED CARBON STEEL AND STAINLESS STEEL FITTINGS ASSEMBLED WITHOUT SUPPLEMENTAL LUBRICATION (AS RECEIVED CONDITION). THEY DO NOT APPLY IF SPECIAL GRAPHITE MOLY-DISULFIDE OR OTHER EXTREME PRESSURE LUBRICANTS ARE USED.

BRASS FITTINGS AND ADAPTERS - 65% OF THE TORQUE VALUE FOR STEEL.

TORQUE IS SPECIFIED IN FOOT POUNDS.

AEROQUIP BRAND FITTINGS

Dash Size	37 Degree JIC	O-Ring (ORS)	O-Ring Boss (ORB)
-4	11-12	10-12	14-16
-5	15-16	—	18-20
-6	18-20	18-20	24-26
-8	38-42	32-35	50-60
-10	57-62	46-50	72-80
-12	79-87	65-70	125-135
-14	—	—	160-180
-16	108-113	92-100	200-220
-20	127-133	125-140	210-280
-24	158-167	150-165	270-360
-32	245-258	—	—


Table 2-2 Hydraulic Fitting Torque Specifications

3-1 GENERAL

This section provides instructions for the proper operation of the semitrailer. A description of the location and use of each of the controls on this semitrailer is provided. Read all instructions, warnings, cautions and danger notes before attempting to operate the semitrailer.

A hydraulic pump must be coupled to the trailer hydraulic system, or the optional hydraulic engine package started, before using hydraulic controls.

The towing vehicle's air system must be coupled to the semitrailer and charges to 90 psi minimum before the brakes will function.

**WARNING**

DO NOT OPERATE THE SEMITRAILER WITH ANY KNOWN FAULT THAT MIGHT ENDANGER THE OCCUPANTS, NEARBY WORKERS, OTHER TRAFFIC, THE LOAD, OR THE EQUIPMENT.

3-2 PRE-COUPLING OF SEMITRAILER AND TRACTOR

3-2.1 Slowly back the tractor/truck (towing vehicle) up to the front end of the semitrailer so the kingpin of the semitrailer is centered between the tractor fifth wheel jaws. Stop the towing vehicle just inches ahead of the semitrailer. Set tractor parking brake.

3-2.2 Check the semitrailer kingpin plate height. The kingpin plate should be the same height, to slightly lower, than the latch area of the fifth wheel plate of the towing vehicle. If the kingpin plate height needs to be adjusted, raise the kingpin plate up and pin the parking stand so the proper height is obtained.

3-2.3 Connect the service and emergency air hoses of the towing vehicle to their respective gladhand on the front of the semitrailer. The towing vehicle's air hose couplings are attached and locked to the appropriate gladhands; **red emergency line** to the gladhand with the "EMERGENCY" tag, and the **blue service line** to the gladhand with the "SERVICE" tag (see Fig. 3-1). Chock the trailer wheels before activating the semitrailer air supply valve in the towing vehicle. Set the trailer brakes.

3-2.4 Check the air brake operations of the semitrailer as follows:

- a. Apply brakes and inspect brake action on all wheels for prompt application.
- b. Release brakes. All brakes should release immediately. Air pressure should discharge quickly from the relay emergency valve.
- c. Disconnect the emergency air line from the semitrailer gladhand. Trailer brakes should promptly set.
- d. Re-connect the emergency air line to the trailer and activate the trailer air supply valve. The trailer brakes should set.

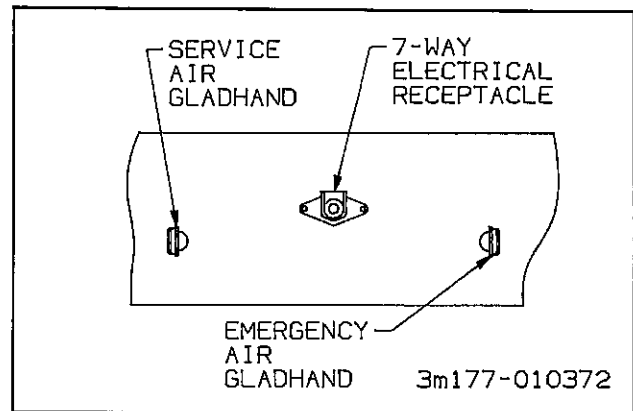


Fig. 3-1 Service Hookups (Front View)

3-3 COUPLING OF THE TRACTOR TO THE SEMITRAILER



DANGER

KEEP ALL PERSONNEL CLEAR OF FRONT, REAR, AND SIDES OF TOWING VEHICLE AND SEMITRAILER DURING COUPLING, COMPONENT OPERATIONS, AND UNCOUPLING. FAILURE TO STAY CLEAR CAN RESULT IN SERIOUS PERSONAL INJURY OR DEATH.

3-3.1 Verify the trailer wheels are chocked and brakes function properly.

3-3.2 Make sure the towing vehicle's fifth wheel coupler is open.

3-3.3 Slowly back the towing vehicle so the fifth wheel contacts the front of the kingpin plate on the

semitrailer and slips under it. Continue backing until the fifth wheel coupler locks onto the semitrailer kingpin.

3-3.4 Try to pull the tractor forward a few inches to verify the vehicle coupling is secure. If the tractor disconnects from the trailer, locate the source of the coupling failure. Repair before continuing and repeat Steps 3-3.3 and 3-3.4.



CAUTION

PUSHING THE TRAILER BACKWARDS CAN DAMAGE PARKING STANDS.

3-3.5 Check that the towing vehicle couples securely to the semitrailer before setting towing vehicle and trailer parking brakes.

NOTE: Keep brakes engaged for remainder of Hookup, Check-out Procedures, and for parking.

3-4 CONNECTING TRACTOR SERVICES TO THE SEMITRAILER

3-4.1 Connect the towing vehicle 7-way electrical plug to the electrical receptacle on the front of the semitrailer (see Fig. 3-1).

NOTE: The key on the plug and the keyway in the socket must be properly aligned before inserting the plug into the trailer socket.

3-5 TRACTOR AND SEMITRAILER HOOK-UP AND CHECK-OUT

3-5.1 Raise parking stands and pin in raised position.

3-5.2 Check the operation of all lights on the semitrailer for proper response to switch positions and signals (stop, right turn, left turn and clearance).

3-5.3 Check tire inflation, adjust as needed to maintain pressure listed on each tire.

3-5.4 Check tractor/trailer rig for air leaks. If air leakage is found, repair the defect before transporting.

3-5.5 Check the oil in each hub for proper level and freedom from contamination. If hubs contain water, dirt, or other foreign matter, clean them before transporting.

3-5.6 Check tractor air pressure. Pressure must not fall below the 85 to 95 psi range, after activating the brakes twice. Set emergency brake and try pulling forward. The trailer wheels must not rotate. If trailer brakes

do not apply, do not transport until defect, or defects, are repaired.



WARNING

FAILURE TO PROPERLY SET AND CHECK PARKING BRAKE, AND CHOCK WHEELS WHEN PARKING AND DURING STORAGE, COULD ALLOW MOVEMENT OF THE TRACTOR/TRAILER RIG RESULTING IN SERIOUS PERSONAL INJURY, DEATH, OR DAMAGE TO PROPERTY IN ITS PATH.

3-5.7 Set parking brake and carefully remove all wheel chocks. If brakes are not properly set, the tractor/trailer may roll when removing wheel chocks.

3-6 TOWING THE SEMITRAILER

3-6.1 Driving the towing vehicle with the semitrailer coupled behind requires constant attention to the overall length of the combination. Turning, passing, acceleration, braking, stopping, and back-up require special attention to the "hinged-in-the-middle" configuration of the semitrailer. When executing steep grades or turning tight curves, the semitrailer must not be allowed to push the towing vehicle, or jackknifing the semitrailer with the towing vehicle may result. Application of the semitrailer brakes to keep the trailer in tow will help prevent this pushing. Braking should begin before descending a hill or attempting a curve, to assure control.

3-6.2 Make a moving test of the semitrailer brakes at low, and medium speeds *before* traveling at highway speed.

3-6.3 Monitor the air pressure gauge on the dash of the towing vehicle. Pressure should not fall below the 85 to 95 psi range at any time.

3-6.4 The semitrailer wheels track to the inside of the towing vehicle during turns. Thus, turning corners requires a wide swing to prevent "curb hopping", and to

allow the semitrailer wheels to clear any obstacle on the inside of the corner.

3-6.5 To stop, use a gradual and smooth application of brakes. If grabbing occurs, apply less pressure. Grabbing brakes are not efficient.



DANGER

ALWAYS CHECK BEHIND AND UNDER THE TRACTOR AND SEMITRAILER FOR PERSONS OR OBJECTS BEFORE MOVING. FAILURE TO CHECK CAN LEAD TO SERIOUS PERSONAL INJURY OR DEATH TO OTHERS, OR DAMAGE TO PROPERTY.

3-6.6 Backing should be done with care. Tail overhang, trailer length, and allowable space must be taken into consideration.

3-7 PARKING THE SEMITRAILER

3-7.1 Position tractor/trailer rig on a level, solid surface.

3-7.2 Set the *PARKING BRAKE*, *not the trailer hand brake*, and check for proper brake holding.

3-7.3 Chock wheels.

3-7.4 Check for any air leaks in lines, relay valve, brake air chamber, or any other air system component.

3-8 UNCOUPLING TRACTOR FROM SEMITRAILER

3-8.1 Park the semitrailer according to instructions in Paragraph 3-7.

3-8.2 Lower the parking stands to the ground. Place pin in the hole that allows the stand to be as close to the ground as possible.

3-8.3 Disconnect emergency and service air lines and attach them to the tractor gladhand holders.

3-8.4 Disconnect the 7-way cable from the trailer and store with the tractor.

3-8.5 Pull the tractor fifth wheel plate latch release lever.

3-8.6 Attempt to pull the tractor forward. If the tractor uncouples, verify that all service lines are disconnected and trailer wheels are chocked. If tractor does not disconnect, repeat Steps 3-8.5 and 3-8.6.

3-8.7 Pull the tractor away from the trailer.

3-9 LOADING THE TRAILER

3-9.1 Practice all standard industrial safety standards. Do not load any payload that will overload any component of the trailer or cause an unsafe condition.

3-9.2 Park towing vehicle and trailer on relatively level ground.

3-9.3 Set towing vehicle's brakes.

3-9.4 Position the outriggers in either the flipped in position or the flipped out position depending on the payload carried. Tractors usually require the flipped in position and combines the flipped out position. No more than 1/4 of the payload's support tire shall be overhanging past the outrigger tubes.

3-9.5 The removable outrigger tubes must be properly secured with lock pins in place to assure they cannot come out of the outrigger u-brackets.

3-9.6 Keeping hands and feet away from areas where they can become pinched, hook loading ramps onto support rods of rear outriggers.

3-9.7 The base of the ramp shall be equally supported across the whole width of the ramp.

3-10 UNLOADING THE TRAILER

3-10.1 Practice all standard industrial safety standards.

3-10.2 Park towing vehicle and trailer on relatively level ground.

3-10.3 Set towing vehicle's brakes.

3-10.4 Keeping hands and feet away from areas that they can become pinched, hook loading ramps onto support rods of rear outriggers.

3-10.5 The base of the ramp shall be equally supported across the whole width of the ramp.

3-10.6 Making sure the payload will not roll in any direction, remove the payload tie-downs.

3-10.7 Unload the payload from the trailer, checking for proper clearance as it comes off. If trailer has an air suspension air raise/lower valve, then adjust to achieve proper clearance during unloading. (See Section 3-11 for air raise/lower operation.)

3-9.8 Load the pay load onto the trailer using the ramps and check for proper clearance as the load comes on. If the trailer has an air suspension air raise/lower valve, then adjust height to achieve proper clearance during loading. (See Section 3-11 for air raise/lower operation.)

3-9.9 Secure the load using approved standard tie-down methods.

3-9.10 Place the loading ramps back onto the trailer and secure to trailer.

3-9.11 Assure maintenance schedule is up-to-date and trailer is ready to be pulled.



DANGER

FAILURE TO USE OUTRIGGER TUBE LOCK PIN MAY RESULT IN TUBE COMING OUT OF U-BRACKET AND RESULT IN SERIOUS INJURY.

3-10.8 Place the loading ramps back onto the trailer and secure to trailer.

3-10.9 If outriggers are flipped out, flip outriggers in. The removable outrigger tubes must be properly secured with lock pins in place to assure they can not come out of the outrigger u-brackets.



DANGER

FAILURE TO USE OUTRIGGER TUBE LOCK PIN MAY RESULT IN TUBE COMING OUT OF U-BRACKET AND RESULT IN SERIOUS INJURY.

3-11 AIR SUSPENSION RAISE/LOWER OPERATION

3-11.1 Locate the air suspension height control valve at rear of trailer near the rear air suspension.



WHEN VEHICLE IS IN MOTION, THE RAISE/LOWER SWITCH MUST BE IN THE "OFF" POSITION FOR NORMAL HEIGHT CONTROL VALVE AUTOMATIC OPERATION.

3-11.2 To raise or lower trailer, place raise/lower switch in "on" position and regulate the height of the vehicle with the hand valve. The hand valve regulates the height by inflating or exhausting air from the air suspension valves.

3-11.3 The hand valve has 3 positions. The turned clockwise position allows air to go into the air bags to raise the trailer. The center position traps air in the air bags. The turned counter-clockwise position allows air to exhaust from the air bag to lower the trailer.

3-11.4 After the air raise/lower feature is no longer required and before moving the trailer, place raise/lower switch to "off" position.

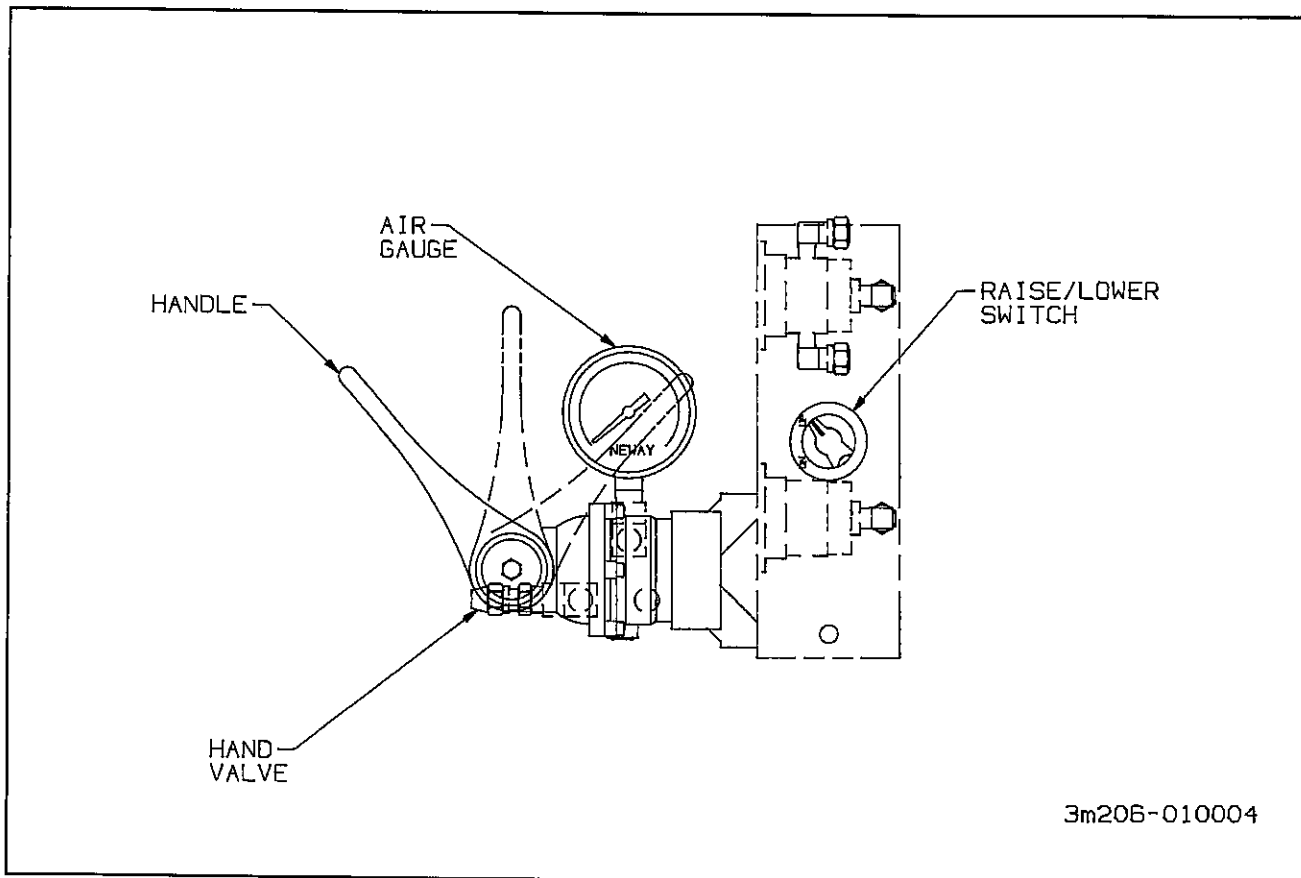


Figure 3-2 Manual Height Control

3-12 COLD WEATHER OPERATION

3-12.1 Cold weather causes lubricants to congeal, insulation and rubber parts to become hard, which may lead to problems found in bearings, electrical systems, and air systems. Moisture attracted by warm parts can condense, collect and freeze to immobilize equipment. The tractor/trailer operator must always be alert for indicators of cold weather malfunctions.

3-12.2 During any extended stop period, neither the service nor parking brake should be used as they can freeze up. Use wheel chocks to secure the vehicle from moving.

3-12.3 Check all structural fasteners, air system fittings, gaskets, seals and bearings for looseness that can develop due to contraction with cold. Do not over-tighten.

3-12.4 Check tire inflation. Tire inflation decreases when the temperature decreases.

3-12.5 Periodically check drain holes in the bottom of the relay valve and storage compartments. They must be open at all times to avoid moisture entrapment.

3-13 HOT WEATHER OPERATION

3-13.1 Hot weather operation can cause expansion of parts, resulting in tightening of bearings, fasteners, and moving parts. Failure of gaskets or seals can occur.

3-13.2 The semitrailer should be parked in the shade if possible. Long exposure to the sun will shorten service life of rubber components (i.e., tires, light and hose grommets, hoses, etc.) and paint life.

3-13.3 Check tire pressure early in the day before beginning operations while the tire is cool. Put all valve stem caps back on after checking.

3-13.4 If the area is extremely humid, protect electrical terminals with ignition insulation spray. Coat paint and bare metal surfaces with an appropriate protective sealer.

3-13.5 The use of a filter in the towing vehicle's air delivery system is recommended.

4-1 GENERAL


This section contains instructions necessary for proper maintenance of the semitrailer. The 160 semitrailer is designed for years of service with minimal

maintenance. However, proper maintenance is important for durability and safe operation and is an owner/user responsibility.

4-2 MAINTENANCE SCHEDULE.

Semitrailer maintenance includes periodic inspection and lubrication. Table 4-2, **Maintenance Schedule**, lists the recommended maintenance and lubrication tasks by time interval and by accumulated mileage (use whichever occurs first).


4-2.1 Inspection

 **DANGER**

OPERATING THE TRACTOR OR TRAILER WITH DEFECTIVE, BROKEN OR MISSING PARTS MAY RESULT IN SERIOUS INJURY OR DEATH; DAMAGE TO THE TRACTOR/TRAILER, ITS CARGO, OR PROPERTY IN ITS PATH.

Inspect the towing vehicle, the trailer, and trailer parts periodically for damage or signs of pending failure. Damaged or broken parts must be repaired or replaced at once. Determine the cause of any binding or hydraulic leakage at once. Correct the problem before using the tractor or semitrailer.

4-2.2 Lubrication. Table 4-1 details lubrication points and intervals, method of application, and lubricant required, and illustrates the location of each part to be lubricated. During inspections of the semitrailer, if lubricants are found to be fouled with dirt or sand, those parts should be cleaned with solvent, dried, and relubricated immediately. Dirt in a lubricant forms an abrasive compound that will wear parts rapidly.

 **WARNING**

PAINT THINNER AND OTHER SOLVENTS ARE FLAMMABLE AND TOXIC TO THE EYES, THE SKIN, AND THE RESPIRATORY TRACT. AVOID SKIN AND EYE CONTACT. GOOD GENERAL VENTILATION IS NORMALLY ADEQUATE. KEEP AWAY FROM OPEN FLAMES OR OTHER COMBUSTIBLE ITEMS.

4-3 MAINTENANCE PROCEDURES

4-3.1 Repair Parts. Repair parts are illustrated and listed in Parts Manual. Replacement of parts due to wear is determined by examination and measurement in the Maintenance Procedures of this section.

4-3.2 Tools and Equipment. Tools, equipment, and personnel normally found in a facility capable of making truck repairs will be adequate for maintenance of the semitrailer. No other special tools or equipment should be necessary.

4-3.3 Standard Torque Values. Table 2-1 lists torque values for standard hardware and is intended as a guide for average applications involving typical stresses and mechanical 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 takes priority over values given in this table. Replace original fasteners with hardware of equal grade. Table 2-1 illustrates the markings on the heads of steel bolts and screws that indicate their ASTM and SAE grades.

4-3.4 Cleaning

a. Wash semitrailer to remove all accumulated dirt and grime.

b. Use any mineral spirits paint thinner (or its equivalent) to remove grease and oil from all parts of the trailer. Rinse degreasing solution off with cold water.

c. Inspect semitrailer for cause of any reported troubles.

d. Scrape, sand, prime, and repaint areas where finish is missing or where there is evidence of corrosion.

e. Replace any missing or illegible decals. Replace any missing or damaged reflective tape. See **Parts Manual** for a list of required decals and reflective tape.

f. Use the Troubleshooting Guide to check for "SYMPTOMS" and "PROBLEMS" of any semitrailer system not functioning correctly. Administer "REMEDY" according to the right-hand column of the Troubleshooting guide.

g. After disassembling any components, thoroughly clean dirt and old lubricant from all parts. Do not use a wire brush on any bearing parts or surfaces — use a stiff bristle brush. Do not use compressed air, or spin bearing parts when cleaning. These practices can throw solvents, dirt, or metal particles into your eyes. Dry clean parts with lint free, clean, soft, absorbent, cloth or paper. Wash and dry hands.

h. Inspect seals, seal wiping surfaces, any bearing caps, and bearing cones for wear, pitting, chipping, or other damage.

4-4 FRAME AND DECKS

The trailer should be thoroughly checked daily for cracks or material fatigue. Cracks will normally show best under loaded conditions. If any cracks or breaks are

found, immediately contact the Landoll factory for repair. Any defective parts must be replaced immediately.

4-5 ELECTRICAL SYSTEM

4-5.1 Maintenance of the electrical system consists of inspection and minor servicing. Any wire, connection or electrical component showing signs of corrosion, wear, breakage or unraveling must be repaired or replaced.

4-5.2 Frayed or unraveling wire must have the defective section removed and replaced with wire of the same color and gauge. Seal all connections and insulate.

4-5.3 Corroded terminals must have the corrosion removed, source of corrosion neutralized and the terminals resealed, protected and insulated.

4-5.4 Fuse or circuit breaker burn-out or "blow-out" usually indicates an electrical short-circuit, although a fuse can occasionally fail from vibration. Insert a second fuse or reset the breaker. If this fuse immediately burns out or the breaker trips, locate the cause of the electrical short and repair.

4-5.5 Lights with a repeated lamp burn-out usually indicates a loose connection, poor system ground, or a malfunctioning voltage regulator. Locate the source of the problem and repair. System grounds must be grounded to bare metal surfaces. Paint, grease, wax, and other coatings act as insulators. Replacement lamps must be equivalent to the factory installed lamp.

4-6 BRAKE SYSTEM MAINTENANCE

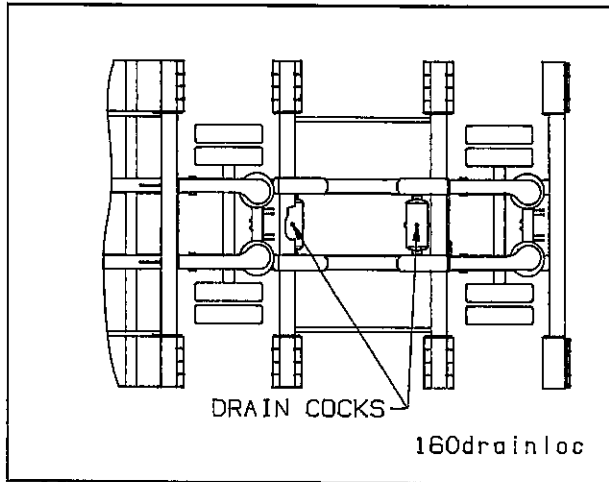


Fig. 4-1 Drain Cock Locations

WARNING

USE GREAT CARE IF WHEELS OR BRAKE DRUMS MUST BE TOUCHED OR HANDLED. THEY MAY BE VERY HOT AND CAN CAUSE SERIOUS INJURY.

4-6.1 General.

- a. Check air hoses for chafing, bends, kinks, or damaged fittings. Replace defective hoses.
- b. Check the brake system for loose, missing, deformed, or corroded fasteners. Replace and tighten defective hardware.
- c. Check brake linings for excessive wear or distortion.
- d. Drain air reservoir daily. A drain cock on the bottom of each air reservoir vents the tank to drain collected water and oil. If held open, air pressure in the tanks is relieved, causing the emergency or parking brakes to be applied (see Figure 4-1).

4-6.2 Air Brake Chamber Maintenance

Repair or replace faulty units. Check the condensation holes on the underside of the brake chambers to make sure they are open. The front brake chambers and the rear brake chambers have two brake chambers, a service chamber and an emergency chamber or spring chamber. Service brake chambers should be disassembled

and cleaned at 50,000 miles or yearly. The diaphragm and any marginal parts should be replaced. The spring chamber should not be serviced. Replace entire unit if spring chamber becomes faulty. When replacing the service diaphragm, replace the corresponding parts for the other chamber on the same axle (to aid in even brake application and release). Examine yoke pin for wear and replace as necessary.

DANGER

WHEN CRAWLING UNDER THE SEMITRAILER IS NECESSARY, CHOCK ALL WHEELS OF THE TRAILER AND TRACTOR. WHEN JACKING IS NECESSARY, CHOCK ALL WHEELS AND SUPPORT THE SEMITRAILER UNDERCARRIAGE WITH JACK STANDS SUFFICIENT TO WITHSTAND THE WEIGHT OF THE SEMITRAILER AND LOAD. FAILURE TO TAKE ADEQUATE SAFETY MEASURES CAN RESULT IN SERIOUS PERSONAL INJURY OR DEATH.

ALWAYS CHOCK WHEELS BEFORE RELEASING BRAKES TO PREVENT SERIOUS PERSONAL INJURY OR DEATH.

THE SPRING BRAKE CHAMBER EMPLOYS A SPRING WITH HIGH FORCES. SERVICE SHOULD NOT BE ATTEMPTED. SERIOUS INJURY OR DEATH MAY RESULT.

a. Caging the Power Spring

1. Chock the trailer wheels.
2. Remove dust cap from spring brake chamber.
3. Remove the release bolt from its holding brackets and insert it into the spring brake chamber. DO NOT USE AN IMPACT WRENCH TO CAGE THE SPRING BRAKE!

4. Turn the bolt until the spring brake is caged. This should be 2-1/4 to 2-1/2 inches of release bolt extension.
5. The brakes should now be released. Do not operate loaded trailer with brake manually released.
6. To reset the spring brake, turn the release bolt until the spring is released. Remove the release bolt and store it in its brackets.
7. Snap the dust cap back in place on the chamber.

b. Removal

1. Chock all tractor and trailer wheels and drain the air system.
2. Mark the brake chamber for proper air line port alignment for reassembly.
3. CAGE THE POWER SPRING following the steps outlined in Paragraphs 4-6.2 a.
4. Disconnect the slack adjuster from the connecting rod by removing the clevis pin (See Figure 4-4).
5. Mark all air service lines for proper re-installation and disconnect from the brake chamber.
6. Remove the brake chamber from the axle brackets.

c. Installation

1. CAGE THE POWER SPRING following the steps outlined in Paragraphs 4-6.2 a.
2. Position the inlet ports by loosening the service chamber clamp bands and rotating the center housing so the ports align with marks made during disassembly. Then re-tighten the clamp bands.
3. Position the breather hole in the downward facing position by loosening the clamp bands on the spring brake chamber and rotating the chamber housing until the breather hole faces downward. Re-tighten the clamp bands.
4. Remount the brake chamber on the axle brackets and reconnect the air service hoses and the slack adjuster connecting rod (See Figure 4-4).

NOTE: Be sure the service line is on the service chamber port and the emergency line is on the spring brake port.

d. Check for leakage by charging the air system to a minimum of 90 psi and apply soap suds to the brake chamber and connections. If a growing bubble is detected or bubbles are blown away, locate the source of the leak and repair.

e. Insure that the clamp band is properly seated and tight before uncaging the power spring.

4-6.3 Relay Emergency Valve



REPAIR OR REPLACEMENT OF THE RELAY EMERGENCY VALVE IS A COMPLEX OPERATION AND SHOULD BE PERFORMED BY TRAINED SERVICE PERSONNEL. IF THE RELAY OR EMERGENCY VALVE NEEDS REPAIR, CONTACT A LANDOLL AUTHORIZED SERVICE CENTER OR THE LANDOLL FACTORY FOR SERVICING.

Every 3600 operating hours, 100,000 miles (161,000 km), or yearly, depending upon operating conditions and experience, the Relay Emergency Valve should be disassembled, cleaned, and lubricated. Rubber parts and parts subject to wear should be replaced if worn or damaged.

4-6.4 Brake Assembly Maintenance.

The brake assemblies should be inspected and adjusted every 2,000 miles or monthly. Examine the brake linings visually to locate the lining showing the greatest amount of wear. The wheel and drum should be removed and the linings replaced if the thinnest portion of the lining is 3/8 in. (9.5 mm) or less. Do not allow the linings to wear thin enough that the lining rivet contacts the drum. (see Figure 4-2).

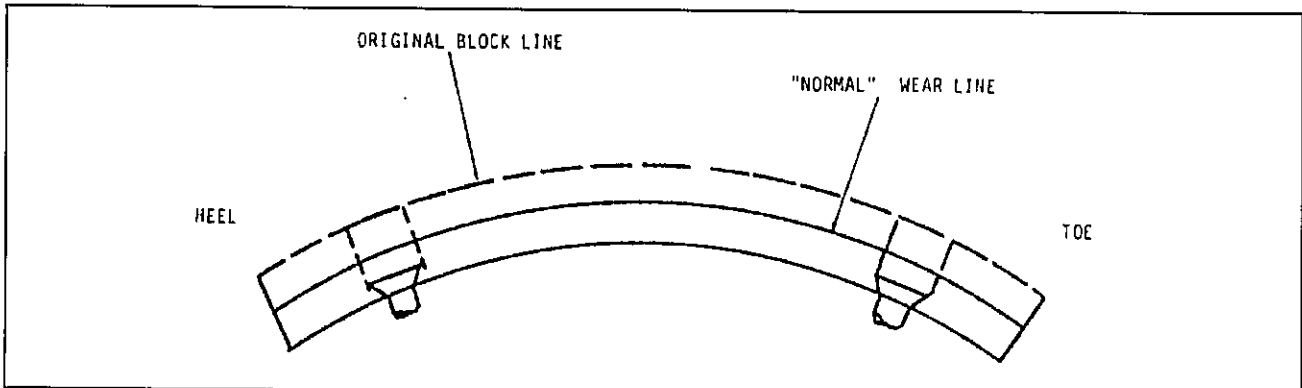


Fig. 4-2 Brake Lining Wear

a. **Brake Adjustment** This trailer is equipped with automatic slack adjusters which compensate for brake lining wear and keep brakes adjusted. Brakes should not be adjusted manually except when relining brakes (see page 4-7).

b. **Disassembly for 16-1/2" X 7" Brakes (see Figure 4-3)**

1. Release brakes and back off slack adjuster.
2. Remove slack adjuster lock ring and slack adjuster.
3. Remove drum assembly (see page 4-8).
4. Disengage the roller retainers from the rollers.
5. Press down on the bottom brake shoe and remove the lower cam roller. Lift the top shoe and take out the top cam roller.
6. Lift out the shoe retractor spring, which is now free of tension.
7. Swing the lower shoe back approximately 180° to relieve the tension on the shoe keeper springs. Remove the springs and slip the shoes off the anchor pins.
8. Remove camshaft lock ring, spacer washer(s) and camshaft.
9. After removing the shoes, completely inspect all brake components, servicing as necessary.

c. **Reassembly for 16-1/2" X 7" Brakes (see Figure 4-3)**

1. Install new anchor pin bushings, camshaft bushing and camshaft seals into the spider.

NOTE: When installing camshaft seals, the seal on the slack adjuster side is installed facing into spider. This allows grease to purge outside the brake assembly when greasing the camshaft bushing.

2. Install cam roller, retainer clip and retractor spring retainers onto the brake shoes.
3. Install 1/8" thick camshaft washer onto the camshaft.
4. Install the cam shaft into the spider. Install spacer washer and lock ring on camshaft before sliding the camshaft through the camshaft support bracket. Install the slack adjuster, washer and lock ring.
5. Install the brake keeper springs onto the shoes. Install shoes onto the spider by placing shoes in place on the anchor pins, then "wrap" the two shoes into place about the spider.
6. Install the shoe retractor spring onto the shoes.
7. Connect slack adjuster to brake chamber pushrod.
8. Adjust automatic slack adjuster as outlined on page 4-7.

4-6.5 Automatic Slack Adjusters.

The semitrailers automatic slack adjusters provide the means for routine brake adjustment to compensate for lining wear. Inspect slack adjusters every 2,000 miles to assure correct operation.

a. **Operational Check (see Figure 4-4)**

1. Block wheels to prevent vehicle from rolling.
2. Check that the push rod is fully retracted, apply air to release spring brake.
3. Turn adjustment hex counterclockwise to create an excessive clearance condition. (A ratcheting sound will occur.)
4. Make a full service brake application. On release, allow sufficient time for brake to fully retract. During the brake release, observe rotation of the adjustment hex (attach a wrench on the hex to make this movement easier to see). This rotation indicates that an excessive clearance condition has been determined by the slack adjuster, and it is making an adjustment to compensate. On each subsequent brake release the amount of adjustment and push rod travel will be reduced until the desired clearance is achieved
5. The push rod stroke should be 1 1/2" to 2" with an 80 to 90 PSI service brake application.
6. Measure the movement of the push rod from the completely released position to the applied position by marking the push rod where it exits the air chamber before and after application.
7. If the brakes have been running tight, the control arm location should be checked.



WARNING

IF THE ADJUSTER APPEARS NOT TO BE OPERATING, CHECK THE FOUNDATION BRAKE FOR PROPER FUNCTION AND ELIMINATE ANY BINDING. RE-CHECK THE AUTOMATIC SLACK ADJUSTER. IF THE ADJUSTER IS NOT FUNCTIONING, THE UNIT MUST BE REPLACED BECAUSE FAILURE OF PROPER ADJUSTMENT FUNCTION WILL RESULT IN LOSS OF BRAKES.

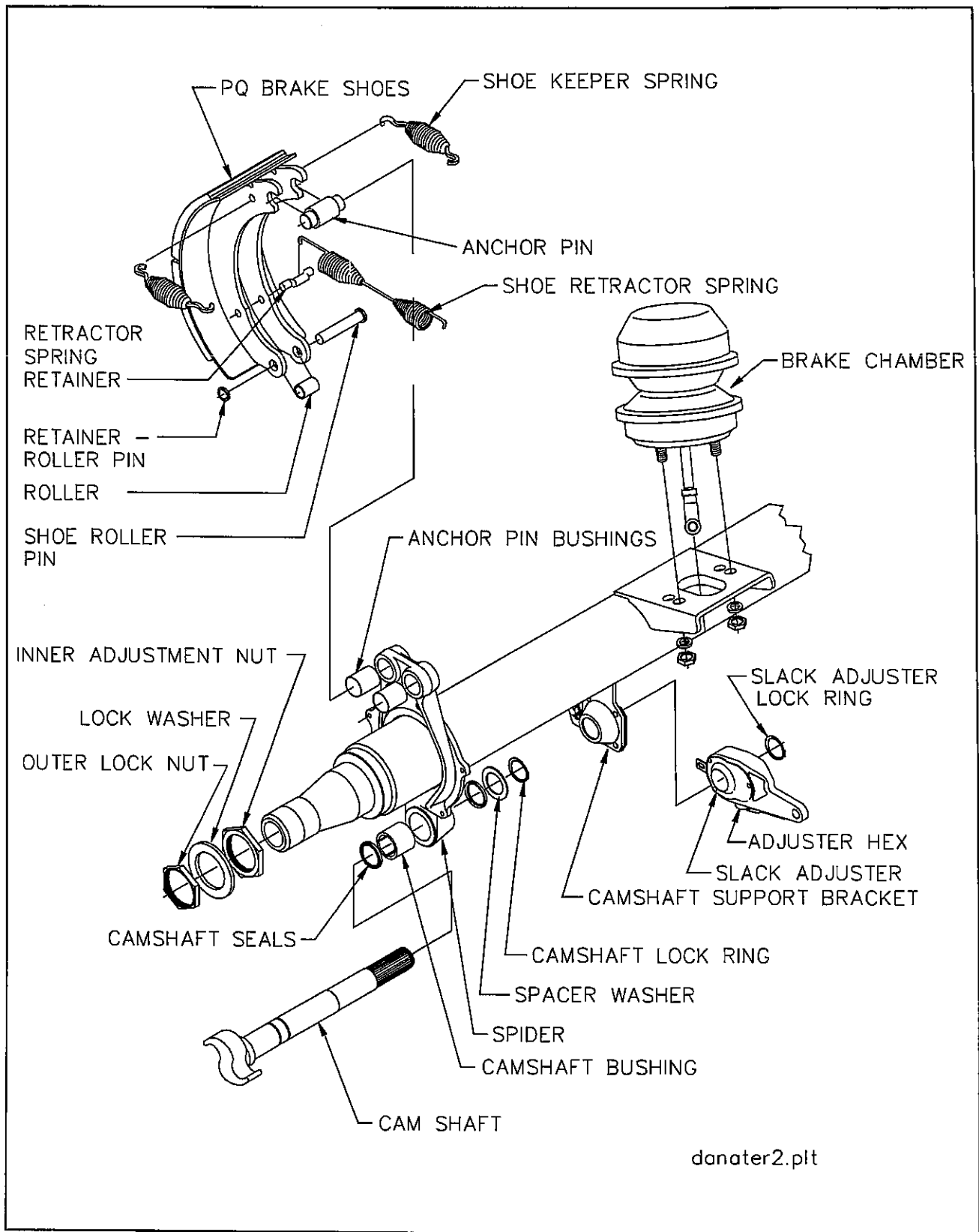


Fig. 4-3 Axle and Brake Assembly

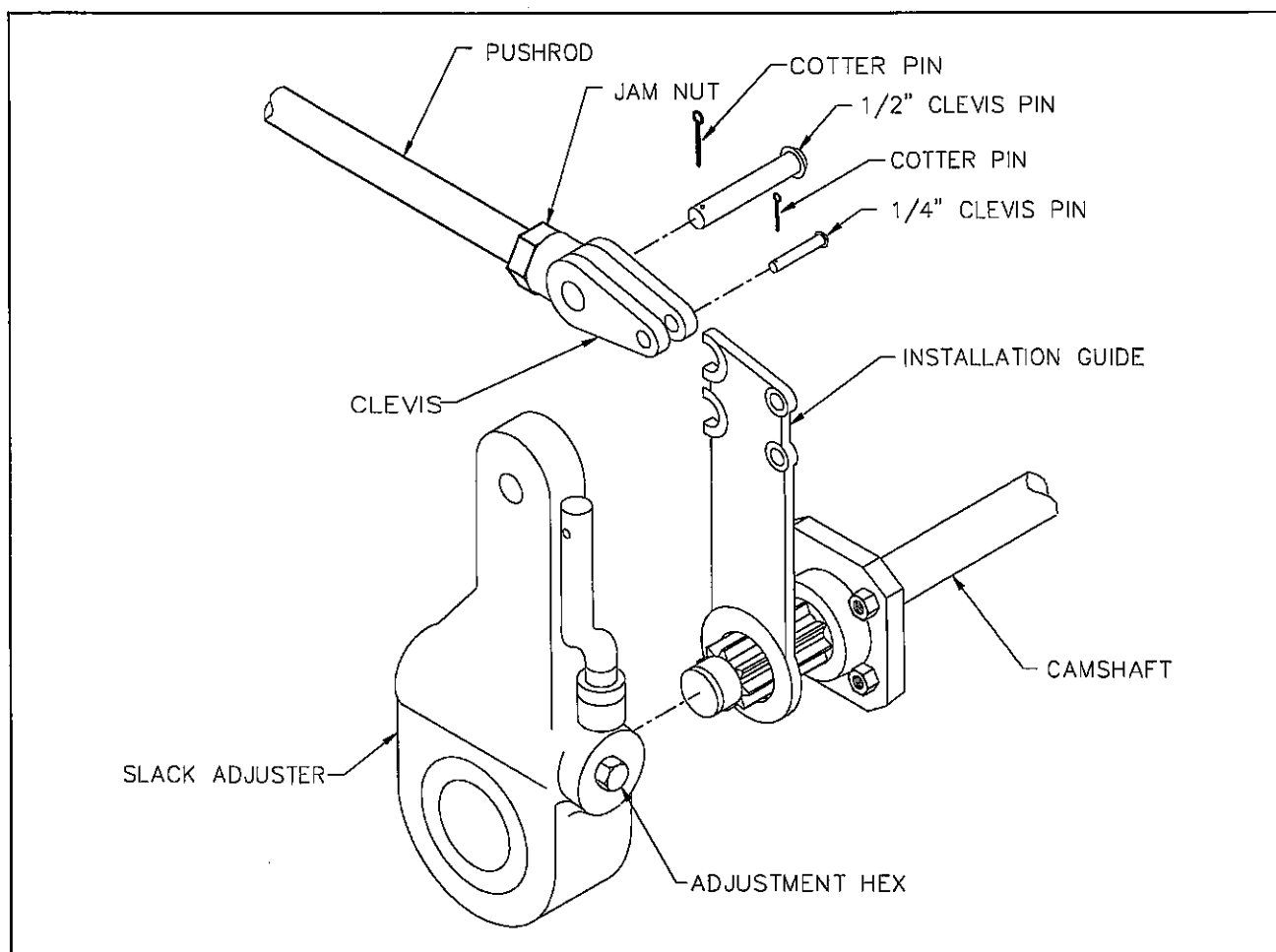


Fig. 4-4 Slack Adjuster (Crewson Brunner)

b. Replacing Slack Adjuster (See Figure 4-4)

1. Chock wheels to prevent vehicle from rolling. Release spring and service brake. Air chamber push rod must be **fully released**.
2. To maintain a fully released parking brake, a minimum of 80 psi reservoir pressure must be maintained. If air pressure is not available, the spring brake must be manually caged.
3. Remove the existing slack adjuster and clevis - **DO NOT REMOVE EXISTING JAM NUT**.
4. Install the new clevis (with 1/2" pin) onto the push rod up to the jam nut - **DO NOT TIGHTEN JAM NUT**.
5. Fit the installation guide over the s-cam splines so the 1/2" pin slots face the air chamber.
6. Swing the guide into the clevis until the appropriate slot totally engages 1/2" pin.
7. Observe the guide pointer arrow:
If the guide pointer is above the clevis, rotate clevis counterclockwise for alignment.
If the guide pointer is below the clevis, rotate clevis clockwise for alignment.
8. Reposition clevis until the guide pointer aligns with the clevis pointer.
9. Verify by engaging 1/4" pin through the clevis and guide.
10. Tighten jam nut to 50 ft.-lbs. torque minimum.
11. Remove the guide from s-cam shaft.
12. If the push rod threads extend through the clevis more than 1/16", remove clevis and cut rod to length.
13. If the push rod is not fully engaged in clevis body, install a new push rod - cut to length.
14. Install the slack adjuster on the s-cam shaft.
15. Rotate the manual adjuster shaft clockwise until the slack adjuster arm holes align with the clevis. Install 1/2" and 1/4" pins and cotter pins

c. Adjusting Crewson Brunner Slack Adjuster

1. Rotate the manual adjuster clockwise until brake shoes contact drum.
2. Back off manual adjuster 1/2 turn (counterclockwise).
3. Manually uncage the spring brake.
4. Build up vehicle air pressure.

5. Fully apply and release the brakes several times to check for adequate clearance to all adjacent components.
6. Measure the distance from air chamber to 1/2" pin. Apply brakes with 80-90 psi air pressure and remeasure distance to 1/2" pins.
7. The stroke (difference of these two measurements) must be less than 2 inches.

4-7 HUB AND DRUM MAINTENANCE

4-7.1 Clean and inspect the brake drums whenever relining the brakes. To be suitable for further service, the brake drum should pass the following checks.

- a. The brake surface should be free of scoring, excessive heat checks and cracks.
- b. The brake surface diameter should be within the maximum diameter cast or stamped on the drum.
- c. The mounting holes and pilot must be round and true.
- d. The mounting surface must be clean and flat.



WARNING

FAILURE TO REPLACE FAULTY BRAKE DRUMS WILL RESULT IN AN UNRELIABLE BRAKING SYSTEM, AND MAY LEAD TO AN ACCIDENT.

4-7.2 It may be necessary to turn or resurface the braking surface to remove small heat checks or other surface defects resulting from normal use.

a. The maximum diameter cast into the back plate portion of the brake drum is the maximum diameter or discard diameter to which the brake drum may be turned or worn and still be usable. If any portion of the brake surface exceeds the maximum diameter it must be discarded. The maximum is .120 over the nominal new diameter unless stated otherwise on the casting. The maximum diameter cast into the brake drum supersedes all published information.

b. When resurfacing a drum, allow at least 0.040 inches under the maximum diameter for additional wear.



WARNING

TURNING A BRAKE DRUM BEYOND 0.040 INCHES UNDER THE MAXIMUM DIAMETER WILL RESULT IN A WEAKER BRAKE DRUM AND MAY RESULT IN AN ACCIDENT.

4-7.3 Replacement of the brake drum is required if any of the following conditions exist:

- a. The brake drum is cracked.
- b. The brake surface is heat checked, grooved or worn beyond the rebores limit or the maximum diameter.
- c. The back plate is cracked.
- d. The bolt holes are elongated.
- e. The brake drum has been severely overheated.
- f. The brake drum is out-of-round.

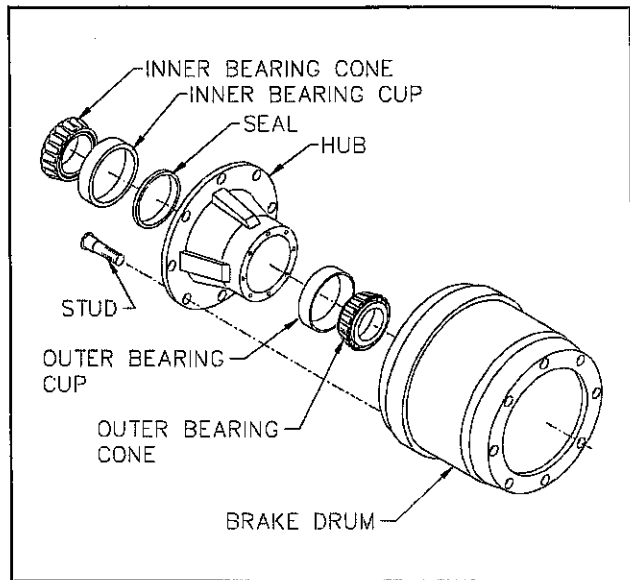


Fig. 4-5 Hub and Drum Assembly

4-7.4 Replace the hub and drum as follows (see Figure 4-5):

a. Remove the brake drum. It may be necessary to release the slack adjuster.



CAUTION

REPLACE BRAKE DRUMS IN PAIRS TO ACHIEVE THE SAME BRAKING POWER ON BOTH WHEELS AND MAINTAIN AN EVEN BRAKING LOAD ON THE AXLE. FAILURE TO DO THIS MAY SIGNIFICANTLY REDUCE THE PERFORMANCE, SERVICE LIFE, AND/OR SAFETY OF YOUR VEHICLE.

- b. Remove hub cap and catch lubricant in a pan.
- c. Remove outer spindle nut, spindle locking washer, inner spindle nut, and bearing. Remove hub from axle.
- d. Using an appropriate driver, remove inner bearing cone, and seal.
- e. Using an appropriate driver, remove bearing cups from hub.
- f. Check that the hub cavity is clean.
- g. If hub is to be reused, clean it thoroughly.
- h. Insert bearing cups into hub.
- i. Clean the mounting surfaces with a good grade commercial cleaner and soft rag. Dry all component parts with a clean, absorbent cloth or paper. Lubricant will not adhere to surfaces wet with solvent.
- j. Make sure the drum seats flat against the hub flange and mates properly with the hub pilot. There should be no interference between the brake drum pilot chamfer and the corner radius on the hub.
- k. Install inner bearing, cone, and seal.

NOTE: Do not mix new cups with old cones or new cones with old cups.

l. Right hand (R) hubs should be installed on the curbside of the vehicle. Left hand (L) hubs should be installed on the driver side.



CAUTION

FAILURE TO USE THE CORRECT STUD ON THE CORRECT SIDE MAY CAUSE LOOSENING OF THE HUB STUDS DURING OPERATION, RESULTING IN LOSS OF A WHEEL.

- m. Place the hub over the axle spindle, being careful to align the hub bore with the axle. Do not damage the seal. Support the hub assembly until the outer bearing cone and spindle nut are installed, to avoid damaging the seal.
- n. Install the outer bearing cone and inner spindle nut, tightening the nut until it is snug against the outer bearing cone. Remove the hub support allowing the hub to rest on the bearings.
- o. Install and adjust bearings (see **Wheel Bearing Lubrication and Adjustment**).
- p. Install the hub cap with proper gasket. Tighten the cap screws of the hub cap to 15 to 20 ft-lb of torque.
- q. Remove the filler plug and fill the hub cavity to the recommended level with a gear type oil.
- r. Place the drum over the hub and brake shoes being careful not to damage the threads on the studs. Make sure the drum seats flat against the hub flange and mates properly with the hub pilot. There should be no interference between the brake drum pilot chamfer and the corner radius on the hub. If interference exists, the hub will not be able to function properly.

4-8 WHEEL BEARING

With trailer sitting level, the oil level must be checked daily and maintained between the "ADD" and "FULL" lines on the hub cap window. Check for cracked windows, missing filler plugs and oil leaks. Add hub oil through the "POP-IN" filler plug located in the center of the hub windows. Re-install the "POP-IN" plugs after filling each hub.

4-8.1 Adjustment

- a. With a drain pan under the hub cap, remove the hub cap assembly allowing oil to drain.
- b. Lift the wheel off of the ground.
- c. Adjust slack adjuster to eliminate brake drag during tire/wheel rotation (see page 4-7).

d. Remove the outer spindle nut and locking washer (see Figure 4-3).

e. Rotate the tire by hand and tighten the inner nut until there is a slight bind. Back off the inner spindle nut 1/4 turn (3/8 turn max.) to allow free rotation of wheel.

f. Install lock ring. Lock ring must engage pin on inner adjusting nut. Nut must engage nearest pin hole.

g. Install tab washer and outer spindle nut. Torque outer spindle nut to 250 (min.) - 300 (max.) ft-lb. Bend 3 tabs over outer nut flats to secure.

h. Install hub cap with new gasket and fill with oil to the full mark. Use 90 weight gear oil.

i. Check hub oil level after the wheel has set level in one position for a few minutes to allow the oil to work into the bearings.

4-9 SUSPENSION ADJUSTMENT

4-9.1 Air Ride Height Adjustment

The following is the procedure for adjusting the air ride height (See Figure 4-6 for parts identification).

a. Before adjusting, vehicle must be empty with the gooseneck kingpin at operating height and air supplied to the semitrailer.

b. Disconnect linkage at the control arms and raise control arms to the "up" position, raising the trailer the full extent of suspension travel.

c. Position a wood block between the axle caps and undercarriage frame so the ride height is 5-1/2".

d. Lower the trailer by exhausting all air from the system. Recheck the ride height.

e. Move the control arms to the "down" position (about 45 degrees) for 10-15 seconds. Slowly return the arms to the center position and insert locating pins into the nylon block and bracket on the automatic height control valves (see Figure 4-6).

f. Loosen the 1/4" lock nut located on the nylon blocks, allowing the control arm to move approximately 1 inch.

g. Reconnect the linkage to the control arm lower brackets and re-tighten the 1/4" lock nut.

h. Repeat this procedure for the other valve.

i. Remove the locator pins, pressurize the trailer air system, and raise the trailer. The height control valves may be used as an improvised jack by disconnecting the control arms at the lower bracket and pushing the control arms to an "up" position.

j. Remove the spacers and reconnect the linkage. This allows the **Automatic Height Control Valves** to resume normal operation.

k. Check the air ride height. If necessary, go through the adjustment procedure again until the proper air ride height is achieved.

l. Check the air ride height periodically and adjust as needed.

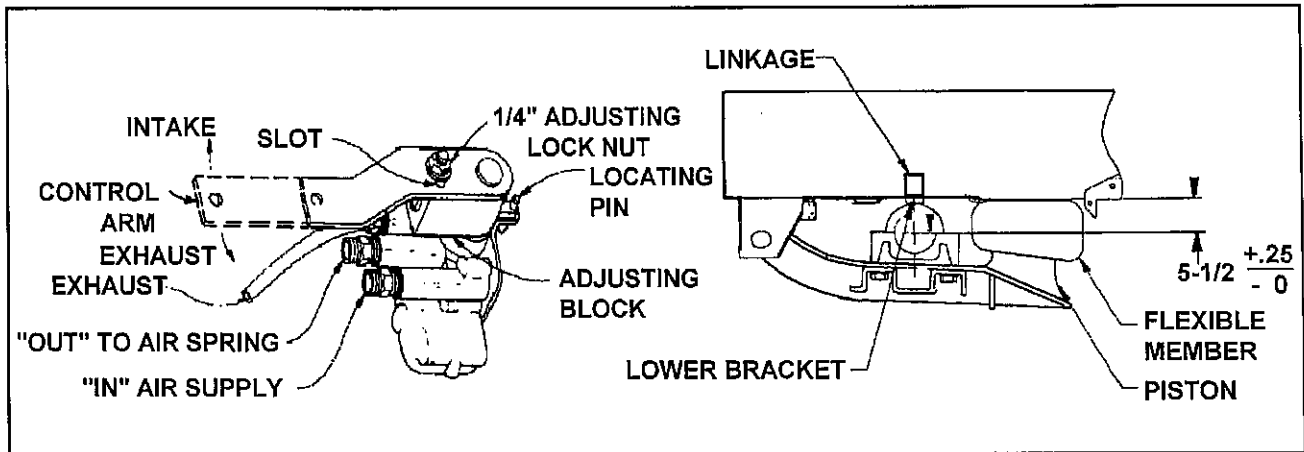


Fig. 4-6 Air Ride Adjustment

4-10 ALIGNMENT

4-10.1 Wheel Alignment



TO PREVENT A POTENTIALLY LIFE THREATENING ACCIDENT:

1. SUPPORT THE TRAILER SO THE TIRES ARE OFF THE GROUND.

2. SUPPORT THE TRAILER ON JACK STANDS WITH SUFFICIENT CAPACITY TO SUPPORT THE TOTAL WEIGHT OF THE TRAILER AND ANY LOAD WHICH IT MAY BE CARRYING.

When trailer tires show signs of scuffing, feathering or uneven wear, examine the semitrailer for damaged suspension (frame, shocks, linkage, etc.), axle, wheel bearings and wheels. Proper wheel alignment and wheel bearing adjustment is essential for proper tire wear. The simplest form of checking wheel alignment "toe" is by running the trailer over a "SCUFF GAUGE". A scuff gauge reading of 16 feet or less per mile is considered satisfactory. If a scuff gauge is not readily available, or edge wear on one side of a tire is occurring signifying positive or negative camber, alignment can be checked as follows:

a. Remove wheel, hub and bearing assemblies.

b. Place a 3-point axle gauge against the front side of the axle, and adjust each axle gauge point to the axle. (Double point end against the inner and outer wheel bearing surfaces of the spindle being checked and the other point on the inner bearing surface on the other spindle)(see Figure 4-8).

c. Move the axle gauge and place against the back side of the axle. If either of the points of double point end fails to touch the axle surface, a bent spindle is evident. A point gap of .015" or more is considered excessive tire "toe" and the axle must be replaced (see Figure 4-8).

d. Follow the same procedures as in Paragraph 4-10.1 b and c, except place the axle gauge above and below the axle. If gauge point gap is found, the axle has positive or negative camber. The semitrailer axle has no camber from the factory, thus if it is found to have positive or negative camber, axle replacement is necessary (see Figure 4-7 for examples of camber).

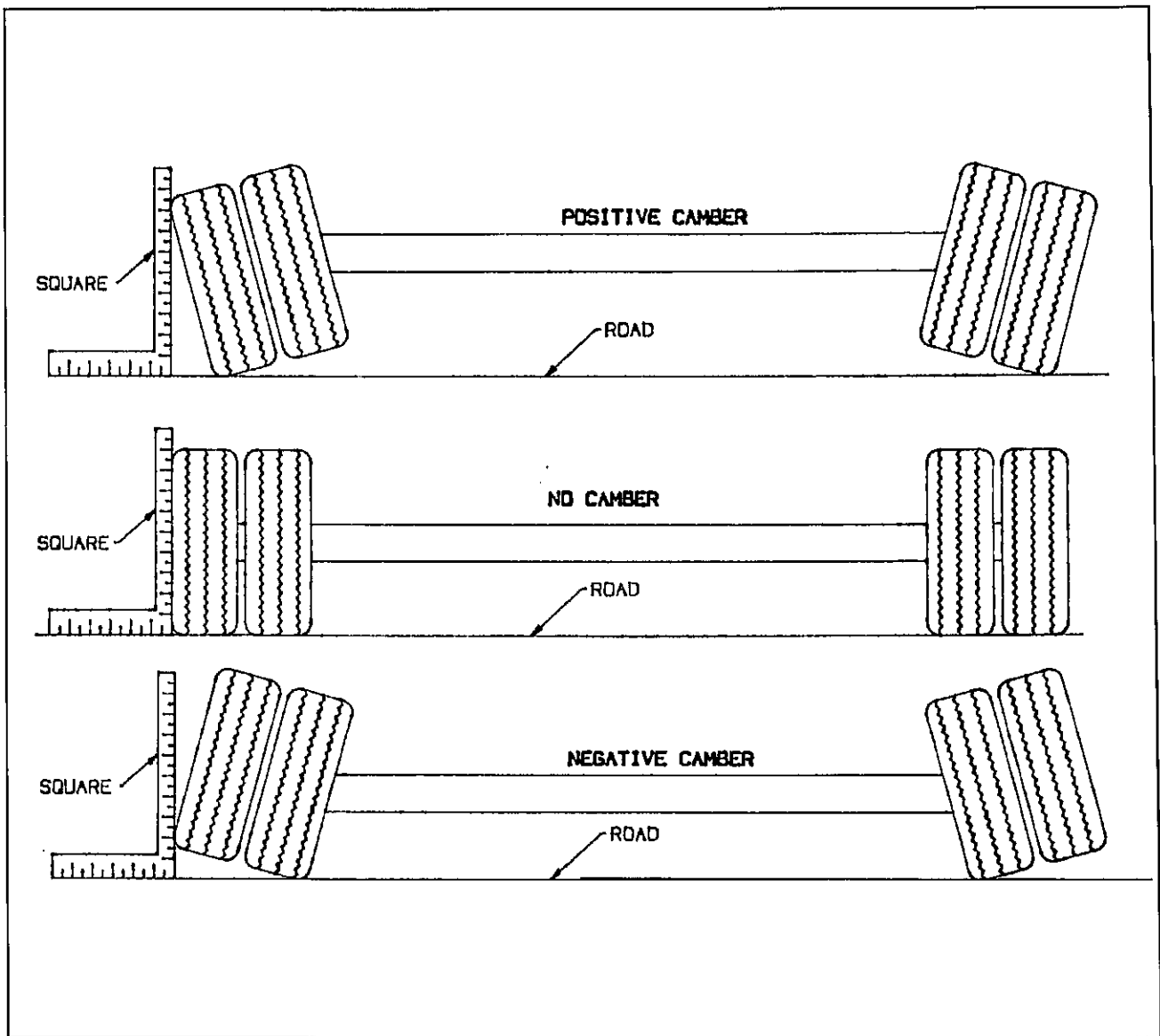


Fig. 4-7 Examples of Camber

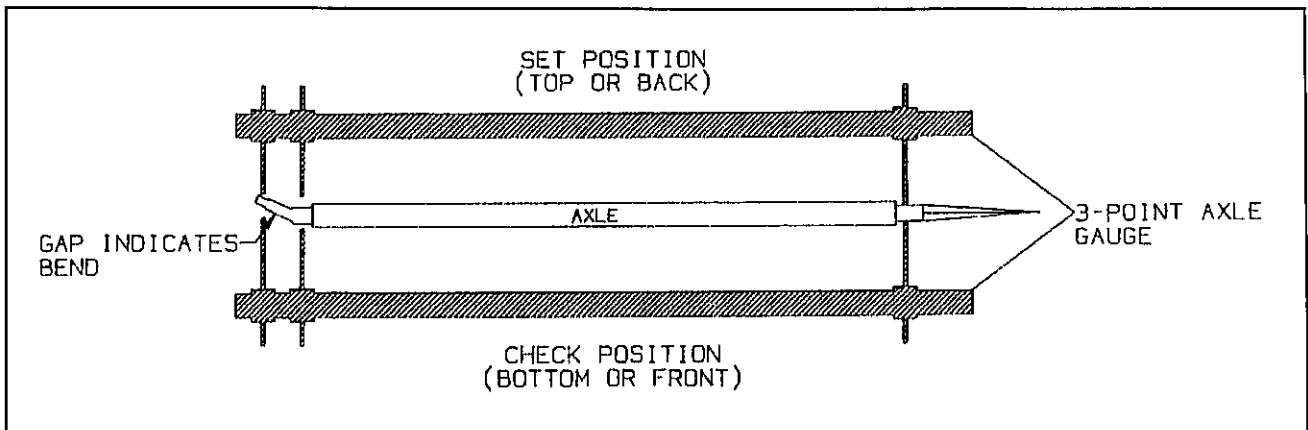


Fig. 4-8 Checking Axle for Bend

4-10.2 Axle Alignment

Proper axle to king pin alignment is necessary to obtain straight tracking. If axle alignment is off, "dog-tracking" occurs. Check alignment manually or by using a trailer alignment machine. In either case, a thorough inspection of the complete suspension must be performed and all defects corrected before aligning.

a. Manual Alignment Procedure

1. Position trailer on a firm and level surface. Insure that the undercarriage is in the rear most position. Eliminate any suspension binding due to sharp turns or unusual maneuvers.
2. Detach tractor from the trailer and jack the trailer up sufficiently to permit measuring from the underside of the trailer.
3. Suspend a plumb bob at axle height from the center of the king pin.
4. Measure (D) from the plumb bob to the center point on one end of the axle. Record this measurement (See Figure 4-9).
5. Measure (D1) to the other end of the axle in the same manner as in Step 4. Record this measurement (See Figure 4-9).
6. It is usually necessary to set D about 1/8" shorter than D1 to insure proper trailer tracking on slope of road.
7. Loosen the front axle connection bolt on the passenger's side.
8. Turn the cam adjustment bushing on the front axle until the proper alignment has been achieved.
9. Tighten the 1-1/8"-7 front axle connection bolt to 800ft-lb lubricated torque to lock in the alignment of the front axle.
10. Align the rear axle to the front axle in the same manner, using the cam adjustment bushing for adjusting. The rear axle should be parallel with the front axle, with the dimensions Y and Y1 being the same.
11. Tighten the rear axle 1-1/8"-7 connection bolt to 800 ft-lbs lubricated torque.
12. In all cases, all suspensions must be in good repair with no binding or other restrictions before the alignment process can be undertaken properly. All defective parts of the suspension or axles must be replaced immediately.

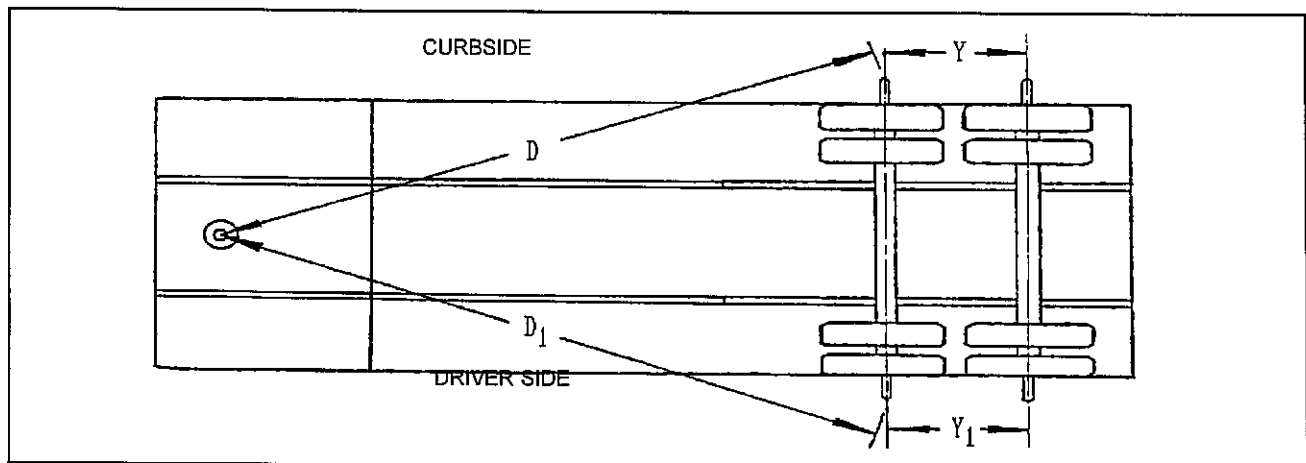


Fig. 4-9 Checking Axle Alignment

4-11 TIRES AND WHEELS.

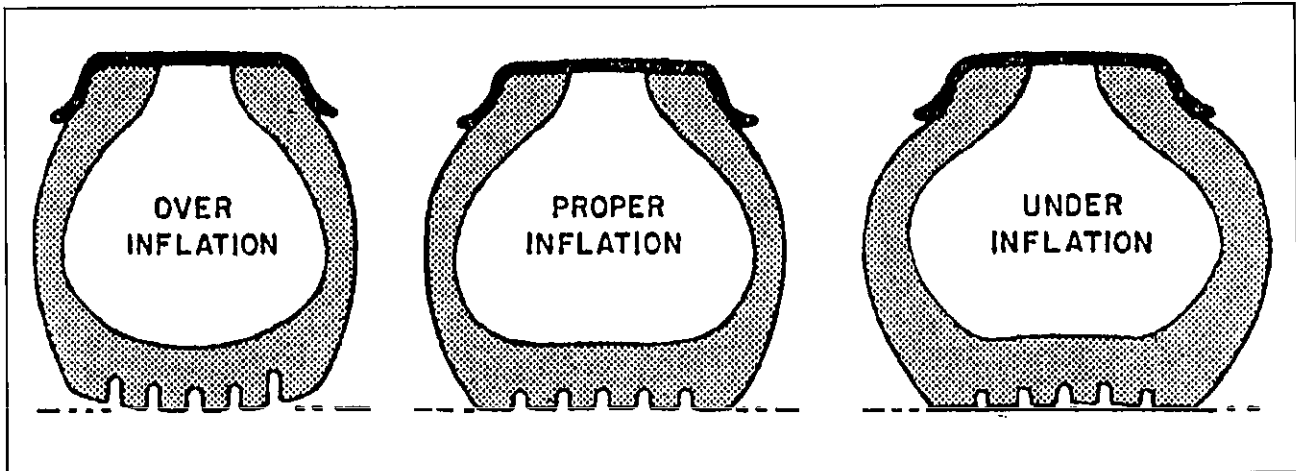


Fig. 4-10 Tire Inflation Examples

4-11.1 Tire Inflation. Tire inflation will cause tire to ground contact characteristics as shown in Figure 4-10. Tire inflation should be checked daily while the tire is cold, and during road stops. Checking the tire pressures while tires are hot will give a faulty increased pressure reading. Adjusting tire air pressure to the specified amount while tires are hot will produce improper tire to road contact and thus abnormal wear. Do not exceed cold inflation pressure listed on the trailer VIN plate located on the front of the semitrailer. Exceeding cold inflation pressure will result in damaged tire bodies, rims, and wheels. Replace all valve stem caps when pressure checking/adjusting has been completed. Remove any foreign objects from between duals.

4-11.2 Tire Matching. Both tires on the same spindle must be the same size in order to properly distribute the load and braking forces between them. The tire must be mounted on a rim and properly inflated before measuring. If there is an allowable difference in size the smaller tire should be mounted to the inside position of the duals.

a. Tape Measuring Method.: Measure around each tire on the tread surface. A maximum difference of $3/4$ " is allowed between the two mating tires of a dual (See Figure 4-11).

b. Straight Edge or String Method: (This method can not be used if tire and wheel assemblies are not mounted on the axle.) Jack trailer up until the wheels are off of the ground. Hold a straight edge against the tires of both ends of an axle. A gap at one tire indicates a smaller tire. A maximum of $1/8$ " gap is allowed (See Figure 4-12).

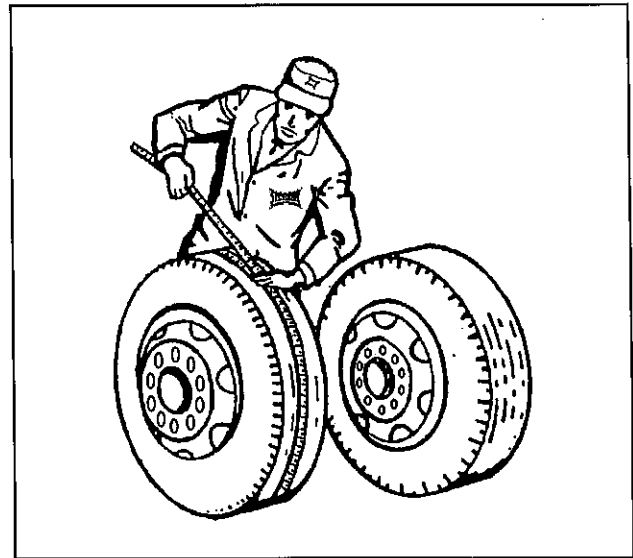


Figure 4-11 Tape Measuring Method

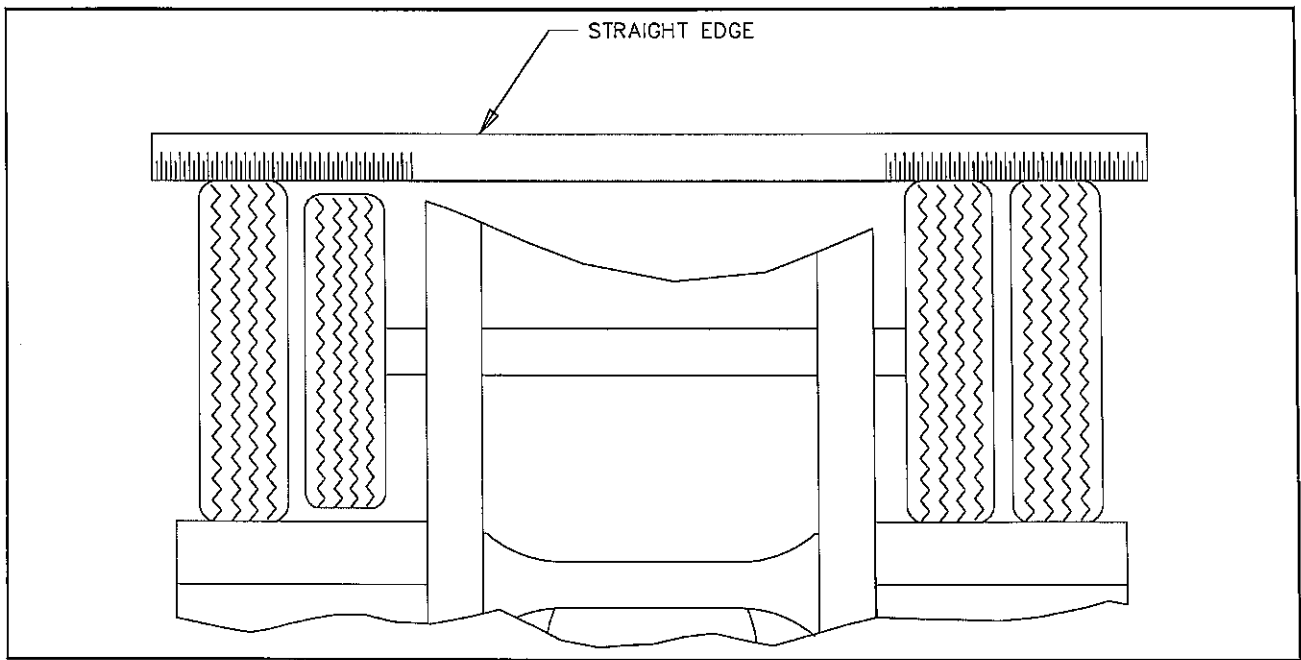


Figure 4-12 Straight Edge Method

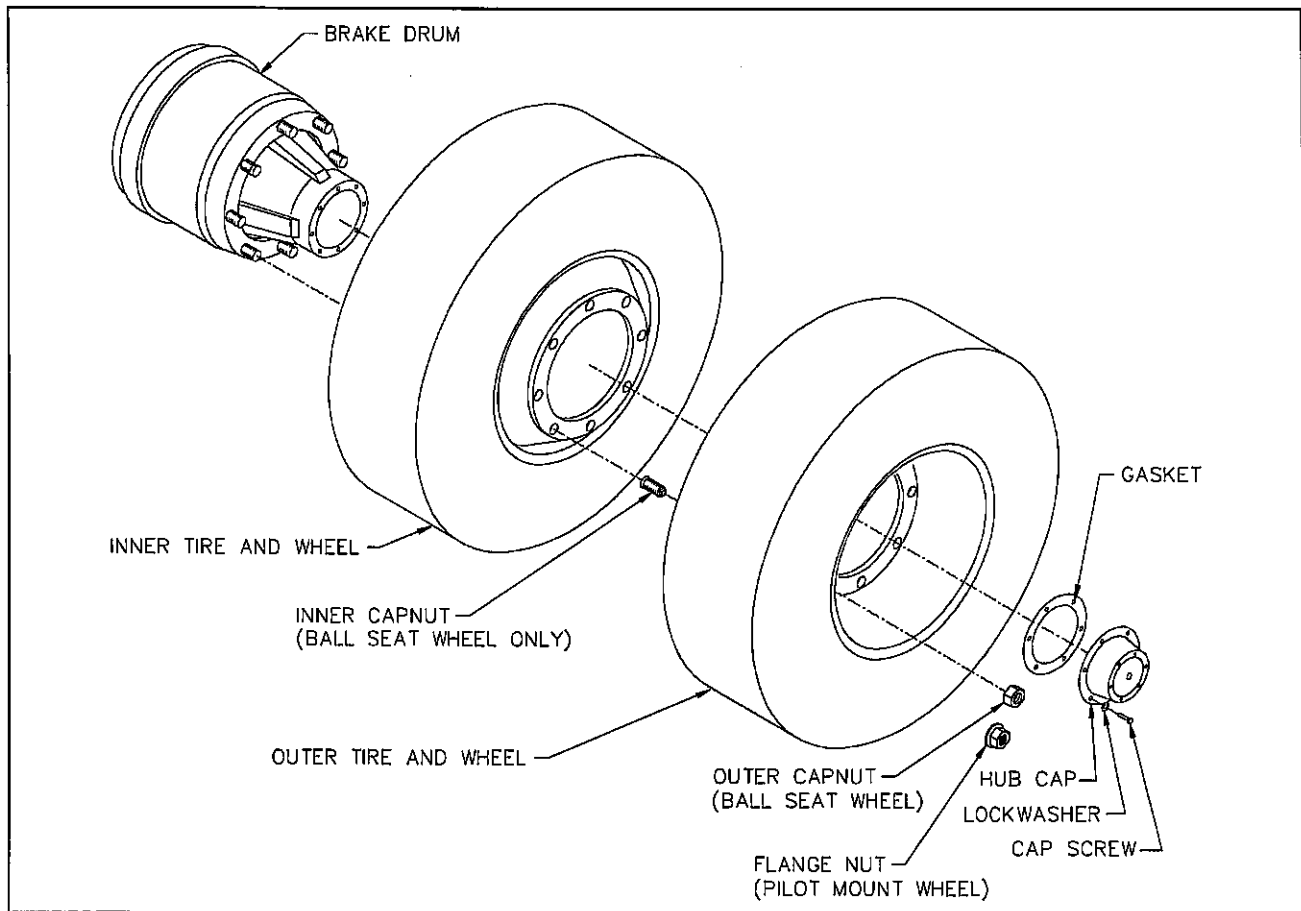


Figure 4-13 Mounting Tires and Wheels

4-11.3 Mounting Tire and Wheel (Hub Type)

a. Make sure that all mounting surfaces are clean and free of rust, dirt or paint. A wire brush may be used to clean these surfaces (see Figure 4-13).

b. Position the inner disc wheel over the studs, being careful not to damage the stud threads. Make sure that the disc wheel is flat against the mounting surface and that there is clearance between the disc wheel taper and brake drum.

c. For ball seat mounted wheels only, install the inner capnuts on the studs and tighten to fifty foot-pounds using the sequence illustrated in Figure 4-14. Make certain that the left-handed threads are installed on the driver side of the vehicle and the right-handed threads are installed on the curbside of the vehicle.

d. Tighten the inner capnuts to full torque of 450 to 500 foot-pounds using the same sequence in Figure 4-14.

e. For pilot mounted wheels skip steps c and d.

f. Position the outer disc wheel over the capnuts being careful not to damage the inner capnut threads. Be sure the valve stems for both the inner and outer tire are accessible.

g. Install the outer capnuts (ball seat) or flange nut (pilot mount) and tighten to 50 foot-pounds using the sequence in Figure 4-14. Then tighten to full torque of 450 to 500 foot-pounds for ball seat and 500 to 550 foot-pounds for pilot mount, using the same sequence.

4-11.4 Torque will drop after the first 50 to 100 miles of operation. Check the capnuts or flange nuts for proper torque after this interval and retighten them. Loosen the outer capnuts and retighten the inner and outer capnuts per steps d to g.



WARNING

USE A TORQUE WRENCH TO ASSURE PROPER TORQUE. INSUFFICIENT TORQUE CAN CAUSE STUD BREAKAGE AND DAMAGE WHEEL PILOTS. OVERTORQUE CAN OVERSTRESS THE STUDS AND STRIP THE THREADS.

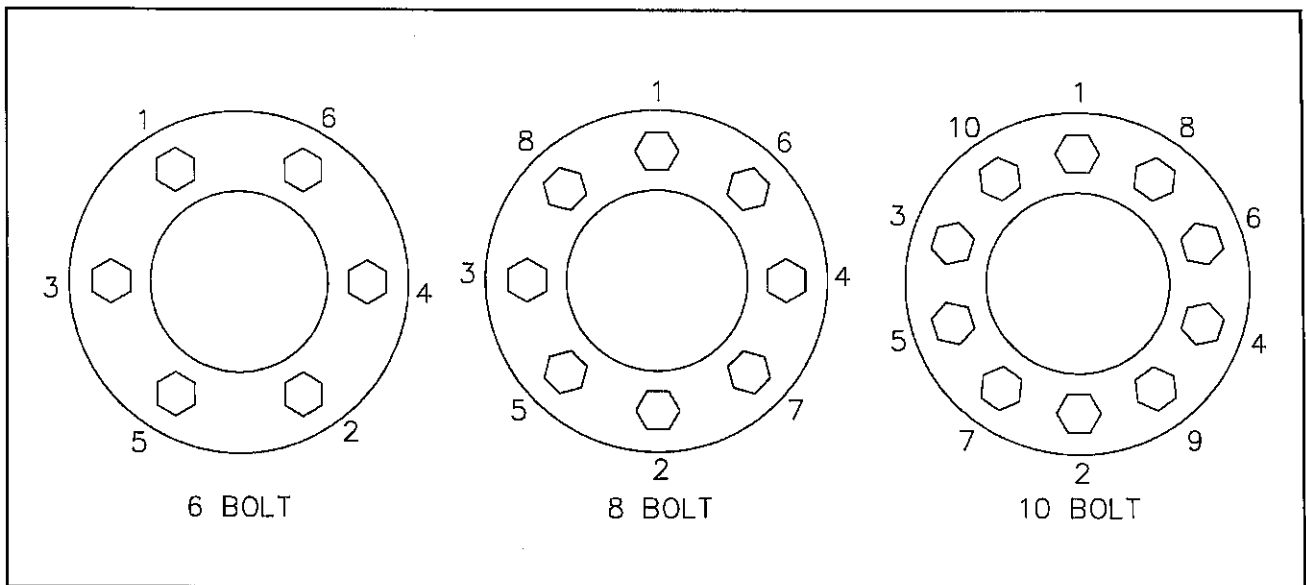


Figure 4-14 Stud Tightening Sequence

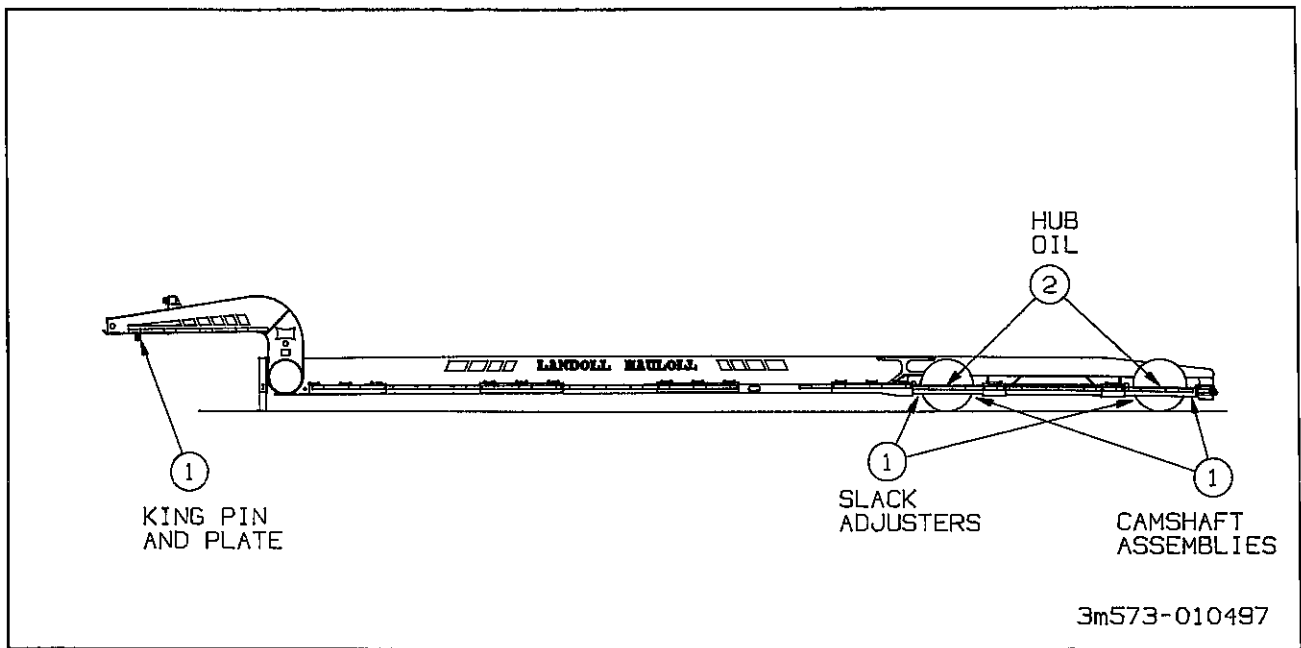


Fig. 4-15 Lubrication Points

LUBE	BRAND AND PRODUCT (WEIGHT AND/OR TYPE)			
	AMOCO	EXXON	PHILLIPS	TEXACO
1	Lit-Multi-purpose Grease	Rondex Multi-purpose Grease	Phil Lube M.W. Grease	MarFax All Purpose
2	Multi-purpose 90	Gear Oil GTX 85-140	Phil Lube All-purpose Gear SAE 90 #90501	Multi-gear EP 80W90

Table 4-1 Lubrication Specifications

NORMAL OPERATING SERVICE INTERVALS ^a							
SERVICE INTERVAL :	1st 5 Hrs	Weekly	Monthly	6 Months	Yearly	LUBE #	NOTES
ITEM	50	500	2,000	12,000	25,000		
LIGHTS	I	I					
WIRING & CONNECTIONS	I		I				
FASTENERS	I, T		I				b
KING PIN & PLATE	I		C, I, L			1	c
BRAKE AIR SYSTEM	I	I	I				
RELAY VALVES					I, C		
BRAKE ADJ & WEAR	I		I, T				d
SLACK ADJUSTERS	I	I			L	1	c
CAMSHAFT ASSYS	I	I			L	1	c
HUB OIL	I	I, L			R	2	c
WHEEL BEARINGS	I			I, T		2	c
TIRE INFLATION & WEAR	I	I					e
WHEEL LUG NUTS	I, T	I	I, T				b
SUSPENSION			T		I, T		
SUSPENSION ALIGNMENT	I		I				

I – Inspect, R – Replace, T– Tighten/ Adjust Torque, L – Lubricate, C – Clean

NOTES:

a. Perform at the time shown. Shorten service intervals when operating in severe or dirty conditions.

b. See Table 2-1 (Bolt Torque Chart) for correct torque.

c. See Table 4-1 (Lube Specification Chart) for recommended lubricant.

d. Call Landoll Customer Services for procedures to replace.

e. See Serial Number Plate on the front of the semitrailer for proper inflation requirements.

Table 4-2 Maintenance Schedule

NOTES:

Troubleshooting should be performed by a trained and competent technician. Landoll Corporation is not responsible for equipment that is improperly maintained. Contact an authorized Landoll Service center or contact the Landoll factory for servicing.

5-0.1 Electrical

Most electrical system problems show up as a burned out light or fuse, or inoperative electrical component. Wiring, grounds or components may be at fault. Locate the symptom in this section that best identifies your electrical problem. Check out each possible problem under that symptom. If the problem cannot be located, see an automotive electrical specialist. For maintenance procedures see Page 4 -2.

SYMPTOM	PROBLEM: REMEDY
NO LIGHTS	Fuse blown on tractor: Replace fuse. Loose connection at plug-in: Tighten connection. Broken or corroded wires: Replace wire. Ground wire loose: Clean and tighten ground.
LIGHTS FLICKERING	Wires shorted or loose: Locate, insulate, replace, or tighten.
LIGHTS DIM	Voltage difference between trailer & tractor: Tractor supply wire or circuit components too low capacity - enlarge wire or component, match bulbs with tractor voltage.
LIGHTS BRIGHT & BURN OUT	Ground wire disconnected: Self-explanatory. Voltage difference between trailer & tractor: Tractor supply wire or circuit components too low capacity - enlarge wire or component, match bulbs with tractor voltage.
FUSE BLOW-OUT OR CIRCUIT BREAKER TRIPPING	Vibration: Locate source of vibration and repair. Short circuit: Replace fuse and try all accessories. If fuse blows right away, locate short and repair.
LAMP BULB BURN OUT	Vibration: Locate source of vibration and repair. Short circuit: Replace fuse and try all accessories. If fuse blows right away, locate short and repair. Loose connection: Check lamp sockets and ground connections. Intermittent short: Locate short and repair. Improper voltage: Check voltage regulator output.

5-0.2 Tires - Wheels - Suspension

Most tire, wheel, and suspension related problems are due to excessive loads, extreme conditions, and improper maintenance. Tire, wheel, and suspension problems can be easily detected and solved by checking the following guide. For maintenance procedures see Pages 4-10 thru 4 -16.

TABLE 3-4 TROUBLESHOOTING, Continued

SYMPTOM	PROBLEM: REMEDY
VIBRATIONS WHILE DRIVING	<p>Improper tire inflation: Inflate to proper pressure. Tires cupped or have flat spots: Replace tires. Wheels bent or loose: Replace or tighten. Tires incorrectly mounted: Remount. Mud in wheels: Clean wheels. Tire(s) out of balance: Balance tires. Brakes dragging: Locate cause and repair. Object(s) stuck between duals: Remove object(s).</p>
<p>RAPID TIRE WEAR/DETERIORATION: CENTER TREAD WEAR SHOULDER TREAD WEAR - BOTH SHOULDERS</p>	<p>Over inflation: Deflate to correct inflation. Under inflation: Increase inflation to correct psi. Check axle alignment. Overload: Loads are above rated tire capacity. <i>Do not load above rated tire capacity.</i></p>
SHOULDER TREAD WEAR - ONE SHOULDER	<p>Axle damage: Straighten or replace axle. Axles not parallel: Check axle alignment.</p>
OVERALL TREAD WEAR	<p>Overloading: Check tire load rating. High speeds: Adjust speed according to road and load conditions. Incorrect dual matching: Properly match dual tires</p>
TIRE FLAT SPOTS	<p>Quick stops: Adjust braking practices. Grabbing brakes: Adjust brakes properly. Worn or loose wheel bearings: Adjust or replace as needed. Out of balance wheels and tire: Balance wheels and tires.</p>
UNEVEN WEAR	<p>Suspension bushings worn: Replace bushings. Worn or loose wheel bearings: Adjust or replace as needed. Out of balance wheels and tires: Balance wheels and tires.</p>
<p>RIM FAILURE*: CRACKING</p>	<p>Overinflated tires: Deflate tire to proper psi. High speeds: Adjust speed according to road and load conditions. High speed cornering: Adjust cornering practices. Over loading: Check rim load rating.</p>

*In all instances of rim failure, replace the rim immediately!

TABLE 3-4 TROUBLESHOOTING, Continued

BENDING OR WARPING	Curb-hopping or potholes: Adjust turning practices and adjust speed accordingly with road conditions. Improper tightening sequence: Follow proper tightening sequence.
BROKEN STUDS*	Over-tightening: Use correct torque and tightening sequence when mounting.
*Replace broken studs before using the semitrailer!;	
TRAILER TRACKING PROBLEMS:	
TRACKS TO ONE SIDE	Axle alignment: Re-align axle.
TRACKS TO EITHER SIDE	Axles not parallel: Adjust axle spacing to be parallel.
AIR RIDE PROBLEMS:	
TOO HIGH	Axle to control valve linkage: Readjust linkage. Height Control Valve internal leak: Repair or replace valve.
TOO LOW	Axle to control valve linkage: Readjust linkage. Height Control Valve filter plugged: Clean or replace valve. Pressure Protection Valve filter plugged: Clean or replace valve. System air pressure low (65 PSI minimum required): Troubleshoot air supply.
UNEVEN FROM SIDE TO SIDE	Linkage adjustment: Readjust linkage so both sides are the same. Exhaust port plugged: Clean or replace valve(s). Height control valve internal leak: Repair or replace valve. Supply line to one height control valve pinched, restricted, or plugged: Repair or replace line.
REPEATED SHOCK ABSORBER FAILURE	Over-extending shock absorbers: Improper ride height.
AXLE MISALIGNED	Pivot bushing worn: Replace with proper Service Repair Kit and torque to proper specifications.
AXLE OFF TRACKING	Loose or worn axle connection: If loose, tighten connection. Then check axle alignment and realign if necessary. If axle adapter is worn, then replace.

5-0.3 Brakes

For maintenance procedures see Page 4-3.

TABLE 3-4 TROUBLESHOOTING, Continued

SYMPTOM	PROBLEM: REMEDY
NO BRAKES OR BRAKES ARE INTERMITTENT	<p>Brake air system improperly connected: Reconnect gladhands properly.</p> <p>Relay/Emergency valve plugged: Clean valve.</p> <p>Defective tractor protection valve: Repair or replace.</p> <p>Restricted tubing or hose line: Locate and eliminate restriction.</p> <p>Broken line: Locate break and repair.</p> <p>Tractor air system failure: Troubleshoot tractor air system and repair.</p>
SINGLE BRAKE DRAGGING OR LOCKED	<p>Broken internal brake component: Locate and replace broken part.</p> <p>Flat spot on cam roller or cam shaft: Replace and lubricate.</p> <p>Improper adjustment: Adjust slack adjusters.</p> <p>Spider bushing or cam bracket bushing binding: Lubricate or replace bushing.</p> <p>Improper lubrication: Lubricate per Figure 4-15.</p> <p>Worn brake shoe bushing: Replace bushing.</p> <p>Brake drum distortion: Replace drum.</p> <p>Brake chamber pushrod binding: Realign brake chamber bracket.</p> <p>Air brake line loose or broken: Tighten or repair.</p>
UNEVEN BRAKES	<p><i>See "SINGLE BRAKE DRAGGING OR LOCKED"</i></p> <p>Restriction in hose: Locate restriction and remove.</p> <p>Worn brake linings: Reline brakes.</p> <p>Grease on linings: Reline brakes.</p> <p>Broken slack adjuster: Replace slack adjuster.</p> <p>Call Factory or see qualified Trailer/Brake Technician.</p> <p>Leaking brake chamber diaphragm: Replace diaphragm.</p>
BRAKES APPLY TOO SLOWLY	<p>Brakes need adjusting or lubrication: Adjust or lubricate as needed.</p> <p>Low air pressure in brake system (below 90 psi): Check tractor air system.</p> <p>Restricted tubing or hose: Locate restriction and remove.</p> <p>Worn or broken relay valve: Replace.</p> <p>Call Factory or see qualified Trailer/Brake Technician.</p>

TABLE 3-4 TROUBLESHOOTING, Continued

SYMPTOM	PROBLEM: REMEDY
BRAKES RELEASE TOO SLOWLY	<p>Brakes need adjusting or lubrication: Adjust or lubricate as needed.</p> <p>Brake rigging binding: Align brakes or replace bent parts.</p> <p>Exhaust port of relay valve restricted or plugged: Replace valve.</p>
ALL BRAKES DO NOT RELEASE	<p>Air system improperly connected to tractor: Tighten or adjust connections.</p> <p>Brake valve on tractor is applied: Release brake.</p> <p>Relay emergency valve in emergency position: Check line pressure and check valve.</p> <p>Restricted tubing or line: Locate restriction and remove.</p> <p>Tractor protection valve failure: Troubleshoot tractor air system.</p> <p>Parking brakes locked: Troubleshoot air system.</p> <p>Moisture in air system: Check air system.</p>
INSUFFICIENT BRAKES	<p>Brakes need adjusting: Adjust brakes.</p> <p>Cams need lubricating: Lubricate cams.</p> <p>Brakes need relining: Reline brakes.</p> <p>Low air pressure: Troubleshoot air system.</p> <p>Relay emergency valve failure: Replace.</p> <p>Brakes overheated: Stop and allow brakes to cool, locate cause of overheating.</p>
BRAKES GRABBING	<p>Grease on brake linings: Reline brakes.</p> <p>Brake rigging binds: Align brakes or replace bent parts.</p> <p>Brake valve on tractor failed or worn: Replace valve.</p> <p>Relay emergency valve failed or worn: Replace valve.</p>
EXCESSIVE LEAKAGE WITH BRAKES RELEASED	<p>Relay emergency valve leaking: Replace valve.</p> <p>Leaking tube or hose: Replace part(s).</p>
EXCESSIVE LEAKAGE WITH BRAKES APPLIED	<p>Relay emergency valve leaking: Replace valve.</p> <p>Leaking brake chamber diaphragm: Replace brake chamber.</p> <p>Call Factory or see qualified Trailer/Brake Technician</p> <p>Leaking tubing or hose: Replace part(s).</p>
EXCESSIVE LEAKAGE WITH EMERGENCY SYSTEM ONLY APPLIED - NO LEAKAGE WITH NORMAL BRAKING	<p>Relay emergency valve failure: Replace valve.</p>
EXCESSIVE WATER PRESENT IN BRAKE SYSTEM	<p>Reservoir not drained often enough: Drain reservoir daily.</p>
EXCESSIVE OIL PRESENT IN BRAKE SYSTEM	<p>Compressor on tractor passing excessive oil: Refer to <i>Tractor Repair manual</i>.</p>

TABLE 3-4 TROUBLESHOOTING, Continued

SYMPTOM	PROBLEM: REMEDY
BRAKE WILL NOT APPLY PROPERLY	<p>Flat spot on cam roller or camshaft: Replace and lubricate.</p> <p>Initial air pressure too low: Allow air system to build up to minimum 90 psi and stabilize.</p> <p>Relay valve failure: Replace valve.</p> <p>Air line leak: Locate leak and repair.</p> <p>Brake chamber leak: Replace brake chamber.</p>

5-0.4 Brake Drums

For maintenance procedures see See Page 4-6.

SYMPTOM	PROBLEM: REMEDY
EXCESSIVE LOSS OF BRAKES OR FADING	<p>Overheated brake drums: Check for defective or misadjusted brake linings, distorted or over-machined drums. Also check for operating conditions or loads that create severe or excessive brake applications.</p>
BRAKES PULL TO EITHER SIDE	<p>Drums of different diameters: Replace with drums of same diameter.</p> <p>Foreign matter in drums: Clean drums out.</p>
ROUGH OR NOISY BRAKING ACTION	<p>Worn drums: Pull drums and inspect for any of the following: Heat spotted drums, grease spotting, blue drums, scored drums, excessive wear at rivet holes or edges, polished drums, out of round drums, unbalanced drums, worn/damaged brake components, foreign matter in drums. Correct situation or replace worn part(s).</p>
VIBRATION IN RIDE	<p>Worn or out-of-round drums: Replace drums.</p> <p>Out-of-balance drums: Balance drums.</p>

NOTES:
