

AL-KO **AXIS**

- **Axles & Parts**
- **Trailer Accessories**
- **ESC - Towing Safety**
- **Metal Fabrication**
- **Ag Products**

Owner's Manual

AL-KO  **AXIS**



WWW.AL-KOAXIS.COM
574-294-6651

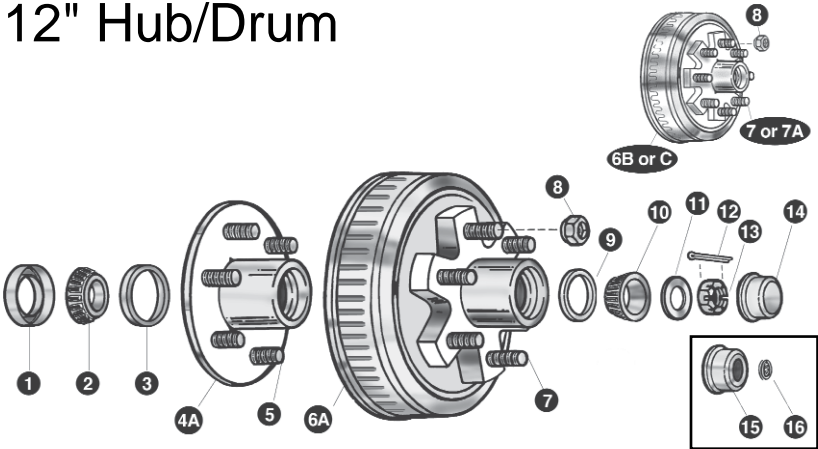
USA WORLD HEADQUARTERS • ELKHART, IN

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MAN500-7K0514

Axles, Brakes, Hubs and Drums
500 lbs. to 7,000 lbs.

Service Replacement Parts 12" Hub/Drum



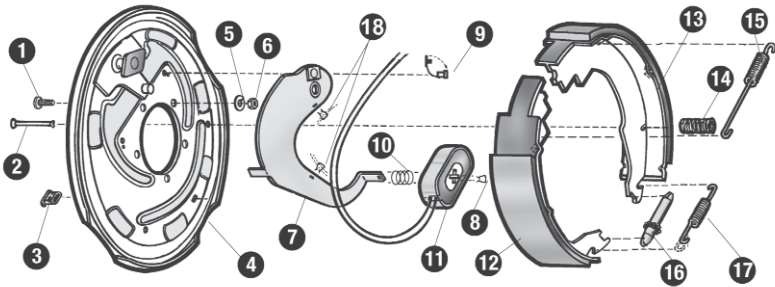
Parts List

No.	Brake Part Description	AL-KO Axis, Inc.	Hayes Part No.
1	Grease Seal Double Lip 2 ¹ / ₄ " Shaft (prior to 1997)	363497	09103304
1	Grease Seal Double Lip 2 ¹ / ₈ " Shaft	568862	09103304L
2	Inner Bearing Cone 25580	363196	093703
3	Inner Bearing Cup 25520	363911	093701
4	Idler Hubs w/ Cups & Studs	—	—
4A	6 on 5.5" Bolt Circle	363200	09080134
4B	8 on 6.5" Bolt Circle	363902	09080448
5	Stud 1/2" - 20 x 1.81 Long Knurl	363907	09251525
6	Hub & Drum w/Cups & Studs	—	—
6A	6 on 5.5" Bolt Circle (for 15123)	363239	09084604
6B	8 on 6.5" Bolt Circle (for 14125A)	363236	09089264
6C	8 on 6.5" Bolt Circle (for 14125A) 9/16"	568182	09089324
7	Stud 1/2" - 20 x 2.50 Long Knurl	363909	09251512
7A	Stud 9/16" - 18 x 2.50 Long Knurl	363906	09251100
8	Wheel Nut, 1/2" - 20 60° Cone	363203	090608
8	Wheel Nut, 9/16" - 18 60° Cone	363895	090640
9	Outer Bearing Cup (15245) for 6 on 5.5" BC	363916	093725
9	Outer Bearing Cup (14276) for 8 on 6.5" BC	363915	093719
10A	Outer Bearing Cone (15123) for 6 on 5.5" BC	363420	093709
10	Outer Bearing Cone (14125A) for 8 on 6.5" BC	363397	093720
11	Spindle Washer 1" x 2" OD	568326	09050901
12	Cotter Pin	363528	091901
13	Spindle Nut 1" - 14	363257	09060101
14	Grease Cap for 15123 Bearing	363199	092101
14	Grease Cap for 14125A Bearing	363419	092110
15	Grease Cap for 15123 Bearing (UL)	363496	09210102
15	Grease Cap for 14125A Bearing (UL)	363775	09210103
16	Rubber Plug (UL)	568067	09213611

* Contact Customer Service 574-294-6651 for Import / Cross Reference / Domestic Part Numbers.

Service Replacement Parts

12" x 2" Electric Brake



Parts List

No.	Brake Part Description	AL-KO Axis, Inc.*	Hayes Part No.
0	RH Brake Assembly Complete	363233.1	60208712
0	LH Brake Assembly Complete (Shown)	363233.2	60208713
1	Brake Mounting Stud 3/8" - 24	363989	090761
2	Shoe Hold Down Pin	568094	09661106
3	Plug Adjuster Slot	568089	096932
4	Backing Plate Assembly	—	—
5	Brake Lock Washer 3/8"	363334	090532
6	Brake Mounting Nut 3/8" - 24	363333	090625
7	RH Lever Assembly	568113	60283200
7	LH Lever Assembly (Shown)	568114	60283100
8	Clip, Wire & Magnet	568092	09680815
9	Strain Relief, Wire	568090	—
10	Magnet Spring	568103	096522
11	Magnet Assembly (White Wire)	K568111	M144
12	Primary Shoe & Lining	K568126	SL126B
13	Secondary Shoe & Lining	K568126	SL126B
14	Shoe Hold Down Spring	568093	10443
15	Shoe Retract Spring	568096	096527
16	Adjuster Screw Assembly	568110	60272401
16	Adjuster Screw Socket	568086	60272801
17	Adjuster Screw Spring	568095	096526
18	Clip, Wire Retainer	568183	—

* Contact Customer Service 574-294-6651 for Import / Cross Reference / Domestic Part Numbers.

Introduction

AL-KO Axis, Inc. (“AL-KO”) is a major supplier to the light trailer industry. Our axles, brakes, hubs and drums are in operation around the world, helping trailers tow smoothly and stop safely. Our product line is the result of years of advanced engineering in the United States as well as Germany, where vehicular technology is unsurpassed. AL-KO products have undergone years of exhaustive testing and we continue to strive for superior reliability, safety and performance.

This manual contains information about axle assemblies, attaching parts, electric brakes and hub/drum assemblies.



Leaf Spring Axle Assemblies



Rubber Torsion Axle Assembly



*Attaching Parts For
Leaf Spring Axles*



Hub/Drum and Electric Brake

Adhering to the recommended service schedule on page 11 will ensure the finest towing and stopping action available.

Safety First

This manual describes service and repair procedures for AL-KO Axis, Inc. ("AL-KO") trailer axles. Technicians must follow their employer's procedures and these procedures when servicing or repairing equipment or components. Before performing any service or maintenance, review the trailer manufacturer's recommendation for procedures and warnings.

The service and maintenance procedures are provided for use by qualified service technicians. Do not attempt to service, repair or work on brakes or axles unless you have appropriate mechanical knowledge and skills. You must understand all procedures and instructions before you begin to work on a unit. Some procedures require the use of special tools for safe and correct service. Failure to use special tools when required can cause damage to equipment and components. Lack of proper training, failure to follow proper procedures, or not using proper tools or safety equipment, can result in property damage, serious personal injury, or loss of life.

The following symbols are used to warn the user of potential dangers that could cause serious damage to equipment or cause personal injury or death.



WARNING

This indicates a procedure that you must follow exactly to avoid damaging equipment or components and to avoid serious personal injury, or loss of life.



FASTENER TORQUE WARNING

Fasteners must be tightened to a specific torque value. The technician must use the proper torque wrench to perform these operations. Improper torque can result in product failure which could cause property damage, serious injury, or loss of life.



ASBESTOS FIBER WARNING

Current AL-KO and Hayes brake linings are asbestos free. Other brake linings may contain asbestos fibers, a cancer and lung disease hazard. Many brake linings contain non-asbestos fibers, whose long-term effects to health are unknown. You must use caution when you handle both asbestos and non-asbestos materials. (See page 15.)

DANGER

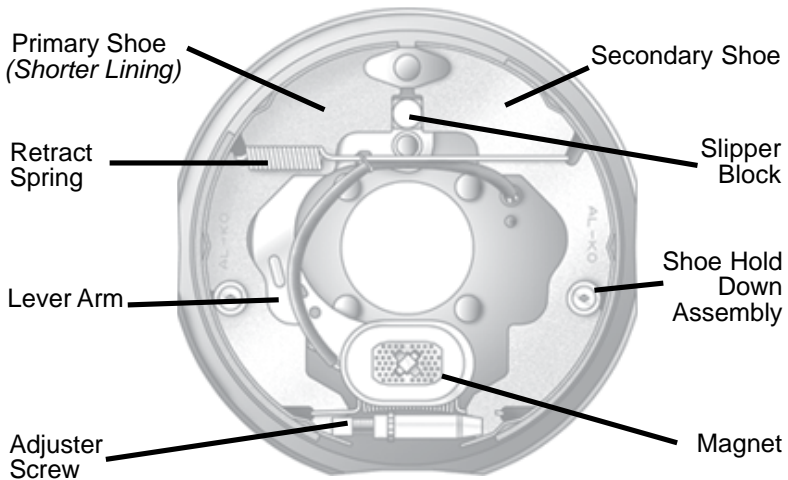
**SAFETY GLASSES
REQUIRED**

To prevent serious eye injury, always wear safety eye protection when you perform vehicle maintenance or service.

Electric Brake Operation

AL-KO Axis, Inc. electric brakes are cam actuated, self energizing drums brakes. Their operation is similar to automotive drum brakes but the actuation system is different. Electric brakes are actuated electrically through a magnet rather than hydraulically through a wheel cylinder. The magnet is positioned so its poles are close to an armature surface, which is machined or bolted inside the brake drum. When the magnet is energized, it is attracted to the armature surface causing a frictional force that pivots the lever arm and slipper block. This forces the primary shoe against the drum which energizes the secondary shoe.

Electric Brake Assembly
(10" Left Hand Shown)



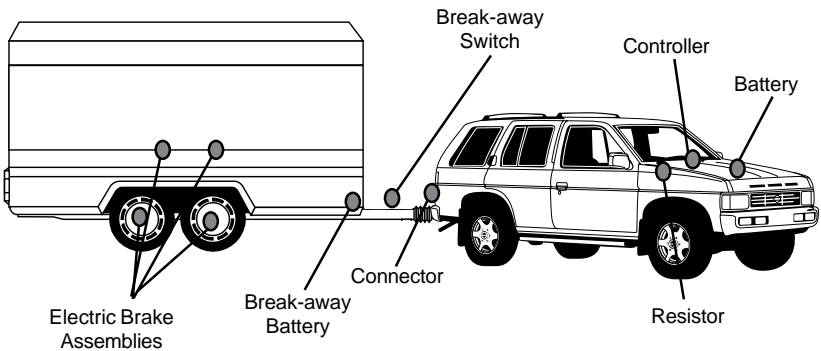
← Trailer Front

Typical Brake System

AL-KO Axis, Inc. ("AL-KO") supplies electric brake assemblies as shown on the opposite page. Many components make up the entire "braking system". Several components are **not supplied by AL-KO** including:

Brake Controller
Resistors
Connectors
Break-away Switch
Battery
Fuses
Wire Harness.


The specific components on your braking system may vary at the discretion of the trailer manufacturer or dealer. Below is a schematic showing possible components and general locations.




Of this total system, AL-KO supplies the brake assemblies. Since proper function of your brakes depends on many components, please follow the vehicle or component manufacturer's recommendations when installing, using or servicing these components.

Before The First Trip


① **Adjust brakes** after the first 200 miles and then as outlined on page 11. A “green brake” is an unburnished brake. Normal manufacturing tolerances dictate that there is a break-in period required after which the lining will seat and become perfectly concentric with the drum. During this break-in period, the user must be aware that additional brake adjustments are mandatory to achieve optimum braking performance.

 **WARNING** *Failure to adjust brakes can result in brake lockup, reduced brake performance, or total loss of brakes which can lead to serious personal injury or loss of life.*

② **Set the hitch or pin height** of the tow vehicle so that the trailer is being pulled in a horizontal position. Trailers must be towed as level as possible. If the trailer leans down in the front it will distribute too much weight to the front axle. If the hitch or pin height is too high, the rear axle will receive too much of the load. Either condition can overload an axle even if the trailer is not overloaded.


 **WARNING** *Improper trailer position can cause tow vehicle handling problems resulting in property damage, serious personal injury, or loss of life.*

③ **Set wheel nut torque** as it may loosen several times before the wheel is properly seated to the wheel mounting surface. Wheel nut torque must be checked with a torque wrench and adjusted if necessary. Do not overtighten. Be sure to follow the instructions on page 24.


 **FASTENER TORQUE WARNING** *Torque wheel nuts now and then every fifty miles for the first 200 miles and then according to the schedule on page 11. Over or under torqued wheel nuts can cause the wheel to separate from the wheel mounting surface during operation. Wheel separation can result in property damage, serious personal injury, or loss of life. (See page 25 for torque specifications.)*

Before The First Trip

- ④ **Synchronize the trailer brakes** with the tow vehicle brakes. Trailer brakes are designed to stop the trailer. They cannot stop both the tow vehicle and trailer. Improper synchronization between the trailer and tow vehicle brakes can overload the brakes and generate excessive heat, causing brake fade or failure. Proper synchronization is achieved when the trailer's brakes have a slight lead over the tow vehicle's brakes. This is accomplished by adjusting the brake controller. There are several types of brake controllers available. See the manufacturer's recommendation for adjusting the controller. When done properly, there should be no sensation of the trailer "pushing" or "pulling" the tow vehicle.

 **WARNING** *Road test before using. Be sure area is clear of traffic and pedestrians. Do not exceed 30 m.p.h. Follow procedures outlined by the controller manufacturer. Failure to do so could result in property damage, serious personal injury, or loss of life.*

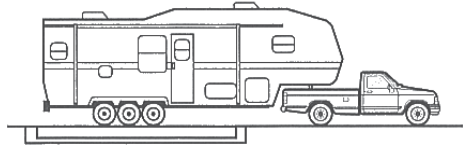
- ⑤ **Weigh the trailer** after it is fully loaded and ready for use. Axles, brakes, wheels, tires, frames and suspension components are designed to carry a specific maximum weight. Locate the VIN (Vehicle Identification Number) plate on the trailer. It will show the GVWR (Gross Vehicle Weight Rating). The GVWR is the total amount your trailer (including tongue weight) can weigh when it is completely loaded including holding tanks, propane etc. The GAWR (Gross Axle Weight Rating) is the maximum load that the axles will carry and the maximum load the brakes will stop. Follow the instructions on page 10 for weighing the trailer and determining weight distribution.

 **WARNING** *Exceeding the GVWR (Gross Vehicle Weight Rating), the GAWR (Gross Axle Weight Rating) or having improper weight distribution can result in reduced performance or failure of the axle(s), brakes, and other suspension components. This failure can lead to property damage, serious personal injury, or loss of life.*

Weighing The Trailer

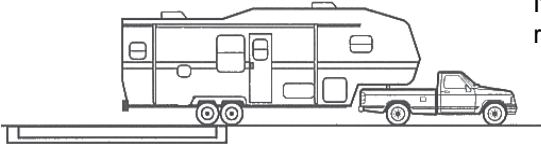
Find a scale large enough to weigh the trailer. They are generally available at truck stops, concrete yards, grain elevators, etc.

- ① First, weigh the trailer in its entirety (including the tongue weight) while detached from the tow vehicle. This weight must be less than the GVWR (Gross Vehicle Weight Rating) on the VIN plate. If overweight, contents must be unloaded until it is within the GVWR limits.
- ② Attach the trailer to the tow vehicle. Weigh the total of all trailer wheels making sure the tow vehicle is off of the scale. If this reading exceeds the GAWR, contents must be unloaded.



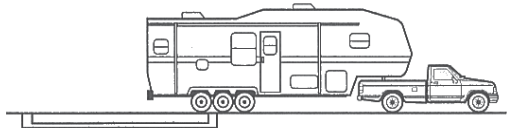
It is equally important that the load is distributed evenly among all of the axles and wheels. **One axle or wheel may be overloaded even if the GVWR and GAWR weights are within limits.**

- ③ Pull the trailer forward until the front axle is off of the scale. On tandem axle trailers, both axles should be carrying about the same load. If not, level the trailer or redistribute the load.



- ④ For triple axle trailers, pull the trailer forward again until the front two axles are off the scale. Calculate the weight of each axle and balance accordingly.

Also, check weight distribution at each wheel. Use the above technique weighing only the right or left side. Calculate the weight at each wheel. **Be sure that no one wheel is overloaded.** If you have trouble calculating or interpreting the weights, contact your dealer or vehicle manufacturer.



General Maintenance

To keep a trailer towing smoothly and stopping safely it is recommended that service be done at the intervals below. (*Severe conditions including excessive brake use, extremely rough roads, etc. may require more frequent maintenance.*)



WARNING

Improper or inadequate maintenance could result in premature wear or component failure which could result in property damage, serious personal injury, or loss of life.

Component	Check	Break-In Service Service During "Break In" Period	Standard Service Schedule				Reference
			Daily	Weekly	6,000 Miles or 6 Months whichever comes first	12,000 Miles or 12 Months whichever comes first	
Trailer Brakes	Test for proper function.	Before First Trip	✓				See Controller Manufacturer's Instructions
Tires	Inflate to proper pressure. Check for abnormal wear.	Before First Trip	✓				Page 25
Wheel	Inspect for damage, nicks, or out of round.	Every 50 miles for first 200 miles			✓		See Wheel Manufacturer's Instructions
Wheel Nuts (Lug Nuts)	Tighten to proper torque specs.	Every 50 miles for first 200 miles		Repeat "Break-In Service whenever wheel is removed"	✓		Page 24
Break-away Switch	Check for proper function. Inspect connections.	Before First Trip	✓				See Manufacturer's Instructions
Break-away Battery	Check for proper function. Inspect connections.	Before First Trip		✓			Measure Voltage
Brake Adjustment	Test brake drag and adjust if required.	After First 200 Miles			✓		Page 14
Brake Assembly	Check for adequate lubrication	None				✓	Page 16
Brake Magnets	Inspect for uneven wear.	None				✓	Pages 17-18
Wheel Bearings	Repack bearings, inspect for wear or damage.	None				✓	Pages 20-21
Hub/Drum Assemblies	Check for heavy scoring or wear.	None				✓	Pages 22-23
Seals	Inspect for damage or wear.	None				✓	Pages 20-21
Springs	Check for broken, separated or flattened springs.	Check After First 500 Miles				✓	Visual Inspection
Suspension Components	Check fastener torque and for worn or bent parts.	Visually Check After First 500 Miles.				✓	Pages 30-31

Storage Maintenance

Before Storing

- ① Disconnect the break-away battery and store indoors. Periodically check and recharge if necessary
- ② Park trailer on a level area.
- ③ Lift trailer per instructions on page 13.
- ④ Place auxiliary blocking under the frame so that all weight is removed from the wheels.



WARNING

See manufacturer's recommendation for position of blocks. Never use the axle or any portion of the suspension to lift or support the trailer. This will damage the axle and lead to premature failure which could result in property damage, serious personal injury, or loss of life.

- ⑤ Lubricate the moving suspension parts. (See page 31.) If axles have been exposed to immersion or excessive moisture, check hub/drum and bearing for moisture and repack if necessary. (See page 20-21.)
- ⑥ Hot or warm grease may settle in the hub/drum. Rotate the wheel after one to two weeks to redistribute grease.

After Storage (Two Months or Longer)

- ① Follow instructions on page 13 for "Service Preparation". Mark location for each wheel and hub/drum. They will be reinstalled on the same spindle.
- ② Check suspension for wear and proper fastener torque. (See page 31.)
- ③ Install a fully charged break-away battery.
- ④ Follow all hub/drum and brake service procedures. Replace or repair any worn or damaged parts. **Be sure to repack bearings.** (See pages 20-21.)
- ⑤ Reinstall hub/drums and wheels in same position as removed.



FASTENER TORQUE WARNING

Wheel nut torque must be checked with a torque wrench and adjusted if necessary. Do not overtighten. Be sure to follow the instructions on page 24.

Service Preparation

The service and maintenance procedures are provided for use by qualified service technicians. Do not attempt to service, repair or work on brakes or axles unless you have appropriate mechanical knowledge and skills. You must understand all procedures and instructions before you begin to work on a unit. Some procedures require the use of special tools for safe and correct service. Failure to use special tools when required can cause damage to equipment and components. Lack of proper training, failure to follow proper procedures or not using proper tools or safety equipment, can result in property damage, serious personal injury, or loss of life.

Lifting Trailer

Many service and maintenance procedures require the trailer to be elevated. Follow the trailer manufacturer's recommendations for lifting the trailer.



WARNING

Do not work under a vehicle supported only by jacks or jack stands. Use additional auxiliary blocking. Jacks or jack stands could fail resulting in property damage, serious personal injury, or loss of life.

- ① Lift the trailer until wheel rotates freely and secure trailer with appropriate jacks and auxiliary blocking. ***Never use the axle or any portion of the suspension to lift or support the trailer. This will damage the axle and lead to premature failure.***
- ② If service requires the hub/drum to be removed, remove the wheel and follow steps 3-5. ***Refer to the schematic on page 23.***

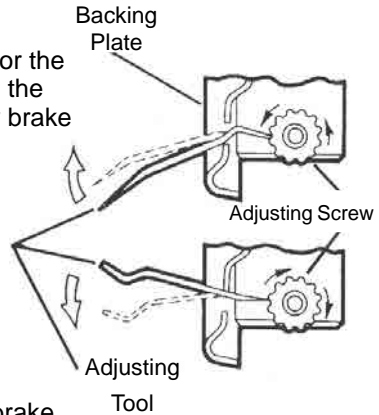


ASBESTOS FIBER WARNING

- ③ Remove the hub/drum assembly by removing the grease cap, cotter pin, castle nut, spindle washer (where required) and outer bearing. If a bearing drops it may be damaged and should be replaced. Pull the drum straight off the spindle being careful not to damage the spindle, bearings or races. The inner bearing and seal may stick to the spindle. If so, use a bearing puller to remove inner bearing.
- ④ Pry the seal with a seal removing tool or screw driver. Do not drive seal out by hitting, punching, or tapping the inner bearing.
- ⑤ Wash bearings and races with solvent. Do not use water or steam as they may damage components or cause components to come loose. Apply a thin layer of grease until ready to repack.

Brake Adjustment

- ① Lift trailer as outlined on page 13 "Service Preparation".
- ② **Do not remove the wheels or hub/drum assembly.**
- ③ Locate the adjusting slot at the bottom of the backing plate and remove the protective cover
- ④ While spinning the wheel, use a standard brake adjusting tool or the blade of a screw driver to rotate the star wheel until there is a heavy brake drag.
- ⑤ Loosen until the wheel turns freely about 3/4 to one full turn.
- ⑥ Replace the protective plug to keep dirt and moisture out.
- ⑦ Repeat procedure for other wheels. Never adjust just one brake. It is recommended that all brakes on the trailer, or at least both brakes of one axle, be adjusted at the same time.



WARNING

Improper brake adjustment can result in reduced brake performance or loss of brakes. Reduced brake performance can lead to property damage, serious personal injury, or loss of life.

Replacing Complete Brake Assembly

- ① Follow "Service Preparation" instructions on page 13.
- ② Remove fasteners which attach the brake backing plate to the brake flange. See schematics on pages 36-44.
- ③ Install new brakes. Be sure to use the proper side and install the brake with the magnet on the bottom. Reinstall fasteners. 7/16" fasteners (7" & 10" brakes) and 3/8" fasteners (12" brakes) Should be torqued to 32 to 50 ft. lbs.
- ④ Reinstall hub/drum per instructions on page 23.
- ⑤ Follow instructions on page 24 for "Completing Service".



FASTENER TORQUE WARNING

Improper brake nut torque can cause the backing plate to become detached from the brake flange causing brake failure. Reduced brake performance can lead to property damage, serious personal injury or loss of life.

Inspecting & Replacing Brake Linings

To prevent serious eye injury, always wear safety eye protection when you perform vehicle maintenance or service.



ASBESTOS FIBER WARNING

Current AL-KO Axis, Inc. ("AL-KO") and Hayes brake linings are asbestos free.

Other brake linings may contain asbestos fibers, a cancer and lung disease hazard. Many brake linings contain non-asbestos fibers, whose long-term effects to health are unknown. You must use caution when you handle both asbestos and non-asbestos materials. (See page 44.)

Follow "Service Preparation" procedures on page 13. With the trailer lifted and the hub/drum removed, inspect the linings for wear or contamination from oil or grease. Hairline heat fissures are not uncommon in bonded shoes and pose no cause for concern. If there are any questions concerning the severity of cracking, consult with an expert. If the lining is worn to 1/16" or less, or shows irregular wear or contamination from foreign substances, the shoes should be replaced with original AL-KO Axis parts.



WARNING

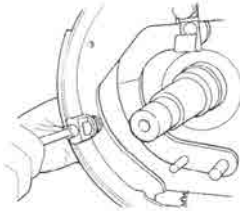
Brake shoes should always be replaced in pairs, both brakes on the same axle.

Failure to replace in pairs can result in reduced brake performance or loss of brakes which could result in property damage, serious personal injury, or loss of life.

Inspecting & Replacing Brake Linings

Replacing Brake Linings

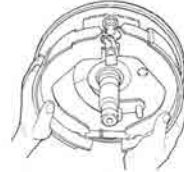
① Remove the brake shoe retract spring.



② Remove the shoe hold down assembly by holding the back of the pin with one hand and pushing against the spring and twisting with a hold down spring tool until the cup is released.



③ Remove both shoes together leaving the adjuster assembly and spring intact.



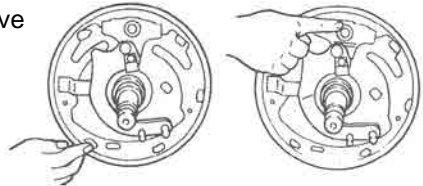
④ Clean the backing plate and lever arm.

⑤ Inspect magnet arm for any loose or worn parts.

⑥ Replace any spring that is broken, bent, or weak.

⑦ Apply a light film of automotive

lubricant / block grease or similar lubricant to the anchor pin and shoe rest pads & backing plate area that are in contact with the lever arm.



⑧ Attach the adjuster screw and spring to the new brake shoes. The star wheel and adjuster must be positioned as before.

⑨ Install the new shoes on the backing plate and reinstall shoe retract spring.



WARNING

Use only genuine AL-KO Axis, Inc. ("AL-KO") or Hayes replacement parts. Other shoes may "fit" but not function properly. Installation of non-AL-KO or non-Hayes parts could result in reduced brake performance or loss of brakes. Reduced brake performance can lead to property damage, serious personal injury, or loss of life.

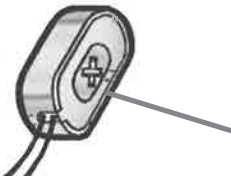
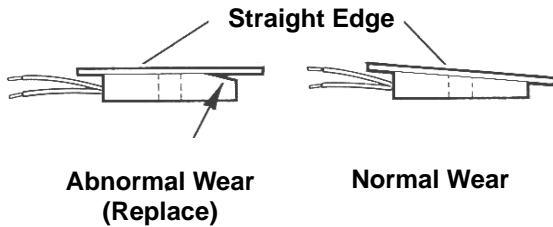


FASTENER TORQUE WARNING

Torque wheel nuts after reinstalling wheel and then every fifty miles for the following 200 miles. Over or under torqued wheel nuts can cause the wheel to separate from the wheel mounting surface during operation. (See page 24 for specifications.) Wheel separation can lead to property damage, serious personal injury, or loss of life.

Inspecting & Replacing Brake Magnets

- ① Follow the procedures on page 13 for “Service Preparation”.
- ② The magnet assembly can be inspected for wear while it is still assembled to the brake. Lay a straight edge over the length of the magnet face and check for flatness.



③ All AL-KO Axis, Inc. (“AL-KO”) electric brakes use magnets that are similar in design. Properly functioning magnets that show normal wear may be used until copper coil is visible through the friction material in the center of the magnet.

- ④ If magnet shows abnormal wear, inspect the brake drum armature surface. The brake drum may also need to be replaced. (See page 22.)
- ⑤ If you suspect that the magnet is not functioning properly and it shows no sign of abnormal or excessive wear, check for a short circuit.

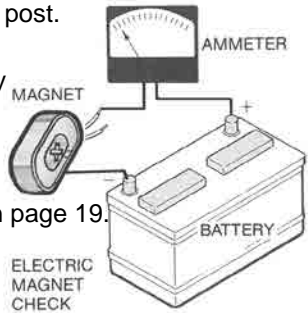
Remove the magnet from the brake as follows.

- ✓ Disconnect the magnet leads from the trailer’s wiring harness and remove the strain relief, to allow the magnet leads to be pulled through the backing plate.
- ✓ Remove clips holding magnet leads to the lever arm or return spring.
- ✓ Remove clips holding magnet to lever arm and remove magnet. Keep the clips and magnet spring. Follow procedures on page 19.

Magnet Electrical Evaluation

Coil To Housing Short Circuit Test

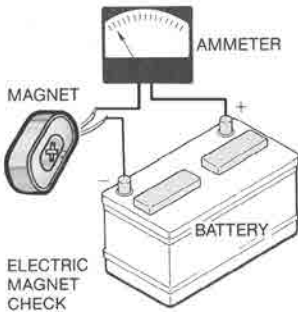
- ① Connect one end of an ammeter (*the ammeter must have a minimum scale of 5 amps*) to either of the magnet wires. This test requires only one of the magnet leads.
- ② Connect the other end of the ammeter lead to the positive battery post.
- ③ Connect a separate piece of 16 gauge wire from the negative battery post to the magnet housing.
- ④ If the ammeter registers current, a short is indicated and the magnet must be replaced per instructions on page 19.



Note: The short may be intermittent. If there is no initial reading tap the magnet and move the leads.

Coil Short Circuit Test

- ① Connect one magnet wire to one of the ammeter leads.
- ② Connect the other magnet wire to the negative battery post.
- ③ Connect remaining ammeter lead to positive battery post.
- ④ If the amperage reading at 12 volts is greater than 3.2 amps, the magnet should be replaced per instructions on page 19.
- ⑤ If the amperage reading is lower than 2.8 amps, check battery charge.



Note: The magnets must be checked as soon as power is connected. The amperage readings will drop as the temperature increases.

WARNING

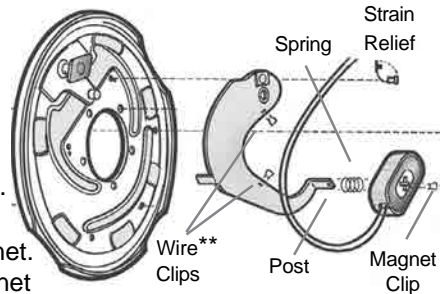
Improper magnet function can result in reduced brake performance or loss of brakes. Reduced brake performance can lead to property damage, serious personal injury, or loss of life.

Replacing Brake Magnet

To prevent serious eye injury, always wear safety eye protection when you perform vehicle maintenance or service.



- ① Follow the procedures outlined on page 13 for "Service Preparation".
- ② Orient the magnet over the lever arm post such that the magnet leads are in the correct position for routing.
- ③ Push magnet over the lever arm post compressing the magnet spring between the magnet and the lever arm.
- ④ Insert the magnet clip in the slot of the magnet. Be sure to orient the magnet clip so it will "snap" into place.
- ⑤ Press down on the magnet and install the magnet clip.
- ⑥ Be sure that the magnet moves up and down freely on the lever arm post.
- ⑦ Route the wiring in the same manner noted on removal. Be sure that wires cannot bind, pinch or rub. Manually actuate lever arm to insure there is no interference.
- ⑧ Install strain relief bushing, allowing enough slack in the wiring to allow the lever arm to move without straining the wires. Be sure the wire cannot come in contact with the armature surface.
- ⑨ Connect the magnet leads to the trailer wiring harness. Reinstall hub and drum. (See page 23-24.)



⚠ WARNING *Road test before using. Be sure area is clear of traffic and pedestrians. Do not exceed 30 m.p.h. Follow procedures outlined by the controller manufacturer. Failure to do so could result in property damage, serious personal injury, or loss of life.*

*** Some brakes do not use wire clips. Route magnet wire with loom retaining ring, as previously installed.*

Inspecting Bearings Races & Seals

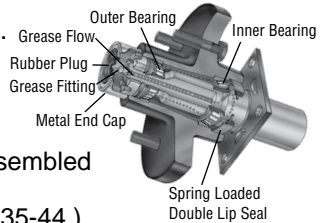
Most trailer axle bearings are unlike those in your motor vehicle in that they require periodic maintenance (see page 11) to ensure reliable, safe operation of your trailer.

- ① Follow the procedures outlined on page 13 for “Service Preparation”. Refer to the schematic on pages 35-44.
- ② Wash the bearings and races with solvent cleaner to remove all old grease. Do not use compressed air or steam. They may damage components or cause components to come loose.
- ③ Check the bearings and races for worn, scored, damaged, grooved, indented, etched, spalled, gouged, nicked, corroded or otherwise damaged parts.
- ④ Check seal for nicks, tears or wear.
- ⑤ Replace damaged seals, bearings or races (see page 20-21).
Always replace bearings and races in matched sets.



There is no need to lift the trailer before greasing axles equipped with Ultralube:

- ✓ Remove the rubber plug from grease cap.
- ✓ Insert grease gun on the grease zerk.
- ✓ Pump until new grease begins to appear.
- ✓ Replace rubber plug.



Hubs and components should also be disassembled yearly and inspected for worn or otherwise damaged parts. (See schematics on pages 35-44.)



Improperly torqued spindle nut can cause the hub/drum & wheel to separate from the axle resulting in property damage, serious personal injury, or loss of life.

BEARING AND SEAL REPLACEMENT CHART

AXLE CAPACITY	SPINDLE DIAMETER	INNER BEARING / CUP	OUTER BEARING / CUP	SEAL NUMBER
500 - 2,000 lbs.	1"	44643 / 44610	44643 / 44610	12192TC
2,200 lbs.	1 - 1/16"	44649 / 44610	44649 / 44610	15192TC
3,500 lbs.	1 - 1/16" - 1 - 3/8"	68149 / 68111	44649 / 44610	568861
4,400 lbs.	1 - 1/16" - 1 - 3/8"	6814 / 6811	67048 / 67010	N/A
6,000 lbs.	1 - 1/4" - 1 - 3/4"	25580 / 25520	15123 / 15245	568862*
7,000 lbs.	1 - 1/4" - 1 - 3/4"	25580 / 25520	14125 / 14276	363497**

* = 2 1/8"
** = 2 1/4"

Installing Bearings Races & Seals

To prevent serious eye injury, always wear safety eye protection when you perform vehicle maintenance or service.



Follow the procedures outlined on page 13 for "Service Preparation".

Install Races

Always replace bearings and races as a set. Install races (*new hub/drums should have races already installed*) using a mild steel drift or bar. Do not use hardened steel or brass bars as they may damage, chip or leave deposits on the races. Final setting of the race against the shoulder should be checked with feeler gauges and be within 0.002" of the shoulder in the hub/drum.

Pack Bearings

Prior to repacking bearings, all grease must be removed from the hub/drum and bearings. Bearings should be packed by machine or by hand methods to insure that grease is forced into the cavities between the rollers, cone and cage of the bearings. For axles equipped with Ultrulube refer to page 20.

Grease

Use a high temperature, automotive type wheel bearing grease produced by a reputable manufacturer. The soap type should be lithium complex or equivalent. Use NLGI Grade 2 product with a minimum dropping point of 440° F.

Installing Seals

It is recommended to install a new seal after removing the hub/drum. Be sure that the inner race and fully packed inner bearing are installed. Use the correct size seal driver. If this is not available, use a clean block of wood which is large enough to cover the entire seal. Tap block to seat seal.



WARNING

Improper seal or bearing installation or adjustment or insufficient maintenance can lead to wheel bearing failure which could cause the hub/drum and wheel to separate from the axle during operation resulting in property damage, serious personal injury, or loss of life.

Brake Drum

Inspecting The Brake Drum

Follow the procedures outlined on page 13 for "Service Preparation".

Check the armature surface for excessive galling due to severe contamination (mud, stones, etc.). One or two light score marks are not cause for resurfacing or replacing the brake drum. Under normal conditions, the armature surface should last indefinitely.

Inspect the drum's shoe surface. This surface should have a dull gray appearance and be free from heavy scoring and/or excessive wear. One or two light score marks are not cause for resurfacing or replacing the brake drum. If there are any questions concerning the condition of a drum, consult an expert. Drums heavily scored, worn to more than 0.020" oversize, or with 0.015" runout should be replaced or resurfaced. Do not exceed the maximum diameter cast in the brake drum.



WARNING

Heavily scored, worn or oversized drums can result in reduced brake performance or loss of brakes. This could result in property damage, serious personal injury, or loss of life.

Resurfacing The Brake Drum

A standard drum lathe may be used to machine the shoe surface. Do not exceed the maximum diameter cast into the brake drum. The drum should be replaced if it must be bored more than the maximum diameter cast in the brake drum.

Armature surface machining is a difficult process with most drum lathes and is not recommended. If it is resurfaced it should be machined to a 120 micro inch finish and must have 0.060" above the stud heads. Do not remove more than 0.030" of material.

Be sure to remove any metallic chips and contamination resulting from drum machining.



WARNING

Failure to remove chips could cause bearing failure which could cause the hub/drum and wheel to separate from the axle. This could result in property damage, serious personal injury, or loss of life.

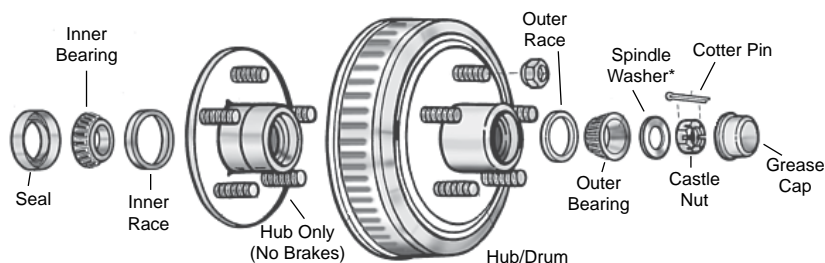
Reinstall races per instructions on page 20-21. Replacement or new hub/drums should have races already installed.

Installing Brake Drum

Note: When installing a new or resurfaced drum be sure to use new brake shoes and magnets.

DANGER
SAFETY GLASSES
REQUIRED

- ① Install packed inner bearing and seal in hub/drums. (See page 22-21.)
- ② Slide hub/drum onto spindle taking care not to damage spindle bearing or seal. Press until inner bearing stops against the inner bearing journal.



- ③ Install packed outer bearing.
- * ④ Re-install washer when required (see pgs. 32-40).

Bearing Adjustment

- ① To get the proper “feel” for bearing clearance, the spindle nut must turn freely on the spindle and the brake must be readjusted so that there is no drag on the drum.
- ② While slowly turning the hub/drum tighten the spindle nut to approximately 20 ft/lbs then loosen. This is especially important if new bearing races have been installed.
- ③ With drum stationary (do not rotate), retighten the spindle nut to 7 ft/lbs (zero clearance) then back off one slot (0.001"-0.010" end play) and align cotter pin hole. Insert cotter pin and bend both ends both ends over end of spindle. Install grease cap.





WARNING

Improper bearing adjustment can lead to wheel bearing failure which could cause the hub/drum and wheel to separate from the axle during operation. This could result in property damage, serious personal injury, or loss of life.

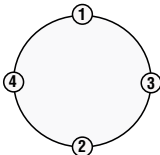
Completing Service

- ① Be sure that all components have been properly installed.
- ② Adjust the brakes (page 14). For new brakes, shoes, drums, or magnets, follow break in procedure (pg. 11).
- ③ Check brake function while trailer is still raised. Connect trailer wiring to tow vehicle and apply brake. The trailer brakes should activate and prevent the hub/drum from turning. Repeat for all brakes.
- ④ Install the wheels.

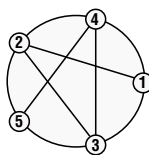
 **WARNING** *When installing wheels other than those originally installed on the trailer, see the “Wheel Compatibility” warning on page 39. Installation of incorrect wheel could cause wheel separation which could result in property damage, serious personal injury, or loss of life.*

 **FASTENER TORQUE WARNING** *It is important to maintain proper torque to provide safe and secure attachment of the wheel to the hub/drum. Be sure to use wheel nuts that are compatible with the coin in the wheel. Improperly torqued wheel nuts can cause the wheel to separate from the wheel mounting surface during operation. This could result in property damage, serious personal injury, or loss of life.*

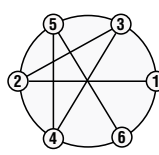
- ⑤ Start all lug nuts by hand to prevent cross threading.
- ⑥ Wheel nut torque requirements vary depending on the size and manufacturer of the wheel. Always use the wheel manufacturer's recommendation but do not exceed 120 ft/lbs on 1/2" studs. Never exceed wheel manufacturer's recommendations.
- ⑦ **Tighten each lug nut in the order shown to the torque shown in the chart.**



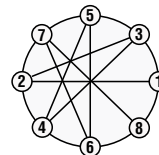
4 Lug Bolt Pattern



5 Lug Bolt Pattern




6 Lug Bolt Pattern



8 Lug Bolt Pattern

- ⑧ Lower trailer and stow jacks, jack stands and auxillary blocking.

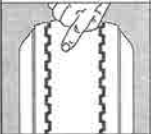
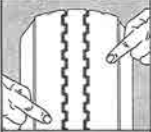
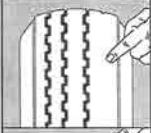
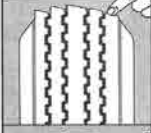

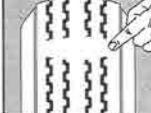
 **WARNING** *Road test before using. Be sure area is clear of traffic and pedestrians. Do not exceed 30 m.p.h. Follow procedures outlined by the controller manufacturer. Failure to do so could result in property damage, serious personal injury, or loss of life.*

Tire Inspection



WARNING


When replacing tires consult wheel and tire manufacturers' specifications for compatibility. Improperly matched wheels and tires may fail and cause property damage, serious personal injury, or loss of life. See "Wheel Compatibility" warning on page 26.

	Condition	Possible Cause	Remedy
	Even Center Wear	Over Inflation	Check & Adjust Pressure When Cold
	Inside & Outside Wear	Under Inflation	Check & Adjust Pressure When Cold
	Smooth, Side Wear - One Side	Loss of Camber or Overloading	Check & Unload As Necessary Have Alignment Checked
	"Feathering" Across The Face	Axle Not Square To Frame or Incorrect Toe In	Square Axles Have Alignment Checked
	Cupping	Loose Bearings or Wheel Balance	Check Bearing Adjustment and Wheel & Tire Balance
	Flat Spots	Wheel Lockup	Adjust Brakes

WHEEL TORQUE REQUIREMENTS

Wheel Size	1st Stage	Torque Sequence 2nd Stage	3rd Stage
12"	20 - 25	35 - 40	50 - 75
13"	20 - 25	25 - 40	50 - 75
14"	20 - 25	50 - 60	90 - 120
15"	20 - 25	50 - 60	90 - 120
16"	20 - 25	50 - 60	90 - 120

Wheel Compatibility

 **WARNING** *Be sure to read and understand the following information before installing wheels. Installation of wheels which are not compatible with the axle assembly could result in wheel separation which can lead to property damage, serious personal injury, or loss of life.*

AL-KO Axis, Inc. (“AL-KO”) Corporation manufactures hubs and drums that are compatible with many wheels used in the trailer industry that have matching bolt patterns. AL-KO does not manufacture wheels, nor do they recommend a specific wheel for compatibility with the hubs and drums they manufacture. The wheel manufacturer should be contacted for proof of compatibility before use.

Customers using wheels which have not been tested for compatibility, must do so to insure they are compatible with AL-KO hubs and drums. Elements of compatibility include but are not limited to:

- ✓ Diameter of the hub mounting surface.
- ✓ Stud length and diameter.
- ✓ Location and number of studs.
- ✓ Center hole diameter for the wheel.
- ✓ Wheel mounting offset from the rim center.
- ✓ Rated capacity of the wheel.
- ✓ Wheel fastener torque.
- ✓ Wheel nut size and shape.
- ✓ Impact of the use of any wheel accessories (such as decorative center caps) that could affect the proper seating of the wheel to the hub surface.

A cornering fatigue test based on SAE J1095/SAE J267 and field tests are recommended for all wheels and rims to be installed on AL-KO hubs and drums. These tests require special expertise and equipment. Persons without such equipment or expertise should contact the wheel manufacturer to verify that a wheel is compatible with the AL-KO hubs and drums. AL-KO is not responsible for wheels or rims that are installed on their hubs or drums.

Troubleshooting

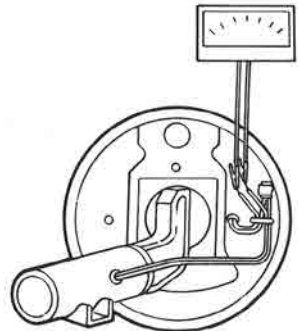
The most common reason for poor brake performance is improper brake adjustment. The first step in correcting brake problems is to adjust the brakes. (See page 14.) This standard maintenance should be performed according to the schedule on page 11.

The second most common problem is faulty, improperly installed or improperly used wiring or electrical components. These components are not supplied or installed by AL-KO Axis, Inc. but can greatly affect the performance of the brakes.

If **none of the brakes** are working, they probably have no power. If **all of the brakes** experience the same problem it is probably caused by an improper signal to the brakes. Possible causes include operator error, improper synchronization, faulty controller or break-away switch and any wiring or circuit problem. The first step in isolating brake problems is to identify the amount of power going to the brakes.

System voltage is measured at the magnets by connecting a volt meter to the magnet lead wires. Connect the trailer wire connector to the tow vehicle. The engine of the tow vehicle should be running. The voltage should start at 0 volts. As the controller bar is slowly actuated, it should **gradually** increase to about 12 volts. If the increase is not gradual the brakes would apply instantaneously. The lower the threshold voltage the smoother the brakes will apply.

System amperage is the amperage being drawn by all brakes on the trailer. Single magnet amperage can be measured with an ammeter attached at the magnet lead wires. Follow procedure above. Each magnet should draw about 3 amps at 12 volts. To check the total system the controller output to the brakes must be disconnected and the ammeter put into series in the circuit. With magnets cold (70° F), the ammeter should read about 3 amps for each brake or 12 amps for a tandem axle trailer (4 brakes). (Amperage is affected by the length and gauge of wire between ammeter and brake as well as between the power source and brakes.)



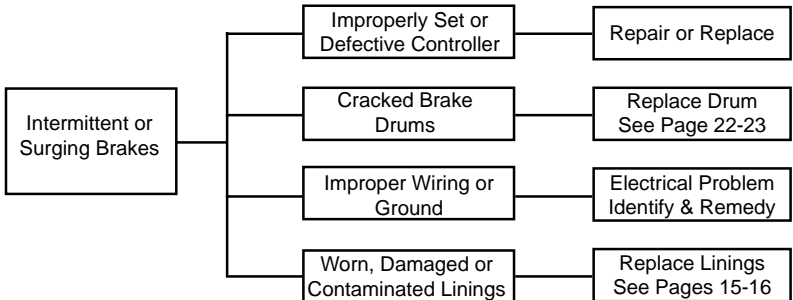
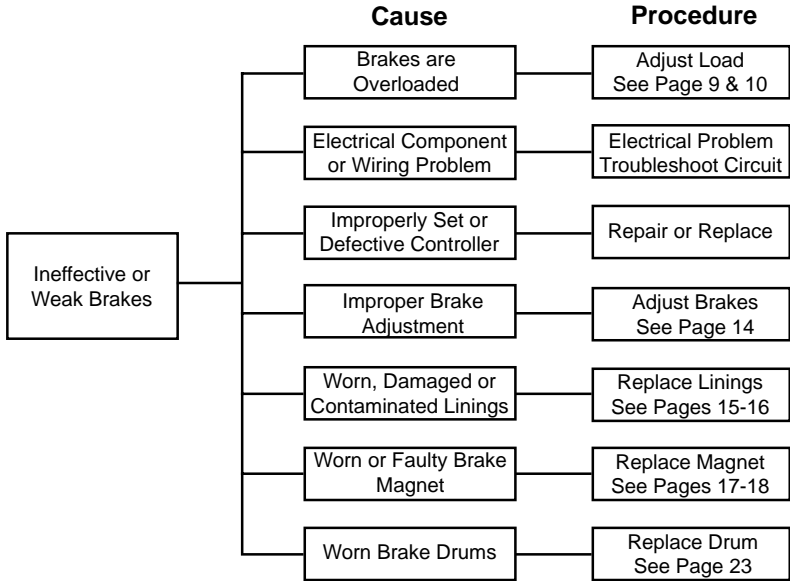
Use either alligator clips or volt/ohm meter probes



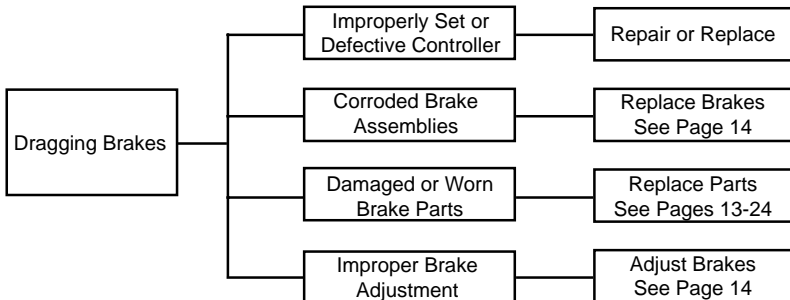
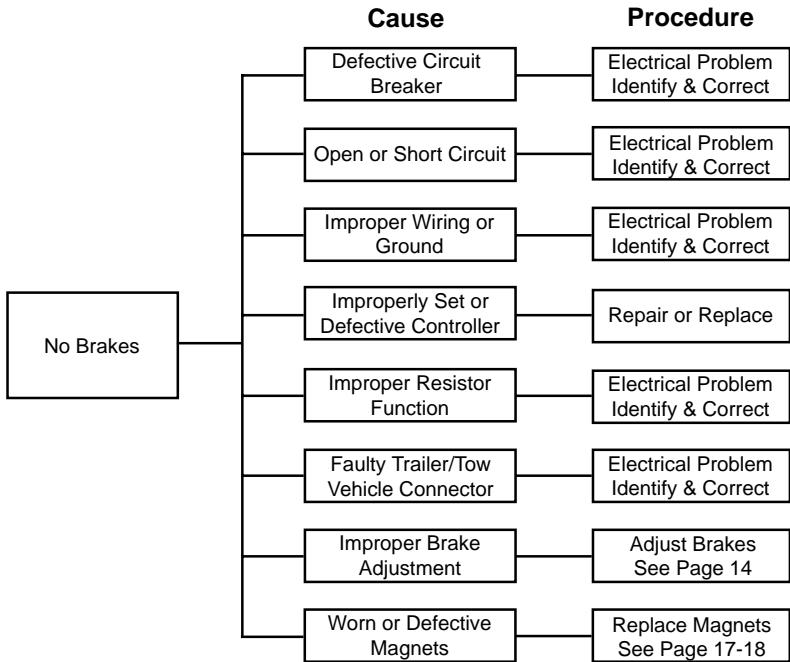
Avoid working in wet conditions. Although you are not likely to get seriously shocked by 12 volt D.C. current, it can create a spark and ignite anything flammable.

Troubleshooting

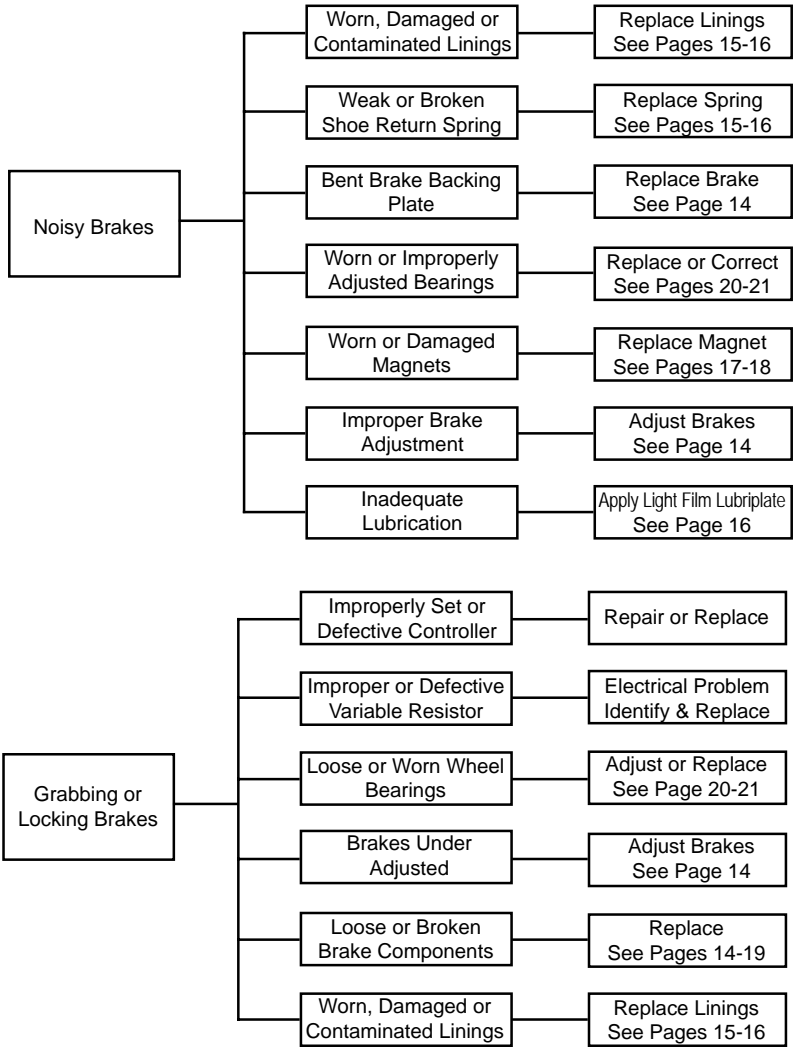
Many brake problems result from faulty wiring or a faulty component in the circuit. AL-KO Axis, Inc. does not supply or install these components. For electrical problem assistance contact the trailer manufacturer, dealer or component (eg. brake controller) manufacturer.



Troubleshooting



Troubleshooting



Leaf Spring Suspension

All suspension components should be visually inspected at least every 12,000 miles or 12 months. Check for loose fasteners and torque to proper values.

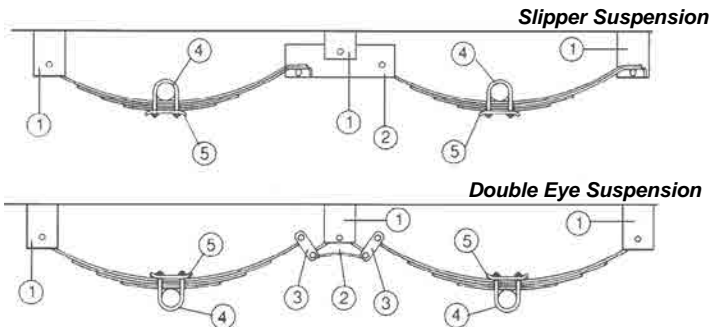


FASTENER TORQUE WARNING

Improper torque can cause component failure and the axles to become detached from the frame. This could result in property damage, serious personal injury, or loss of life.



WARNING See "Lifting Trailer" instructions on page 13. Failure to adhere to these instructions could result in property damage, serious personal injury, or loss of life.



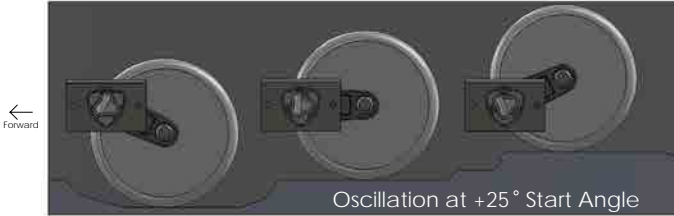
- ① Spring Hanger ② Equalizer ③ Shackle Link ④ U-Bolt ⑤ Tie Plate

TORQUE VALUES		
Description	Torque (Ft. Lbs.)	
	MINIMUM	MAXIMUM
3/8" U - Bolt	30	40
1/2" U - Bolt	45	60
Spring Eye Bolt Shackle Bolt Equalizer Bolt	Parts must be able to rotate freely. Tighten to snug fit only.	
Shoulder Bolt	30	50

- ① Follow the procedures outlined on page 13 for "Service Preparation".
- ② Place suitable blocks under the axle beam. The blocks are only to support the axle weight once components are disconnected. Frame must be supported as outlined in "Service Preparation" on page 13.
- ③ Disassemble the U-Bolts, nuts and tie plates and rest the axle assembly on the blocks.
- ④ Replace axle, springs, spring eye bushings, shackle links, equalizers and /or fasteners as required.
- ⑤ Reinstall repaired or replaced parts using proper torque values.
- ⑥ Although routine lubrication is not required, pivotal suspension points may be greased if desired.

Rubber Torsion Suspension

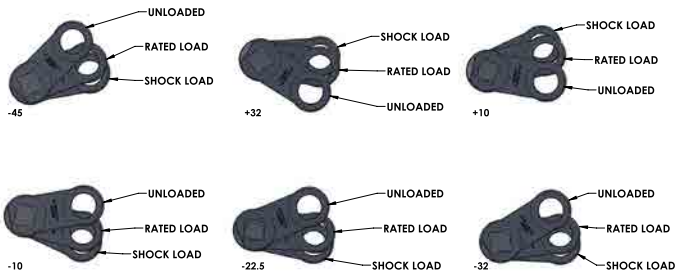
AL-KO Axis, Inc. ("AL-KO") rubber suspension axle utilizes three rubber cords on each side of the axle assembly. They are encased under pressure between a hexagonal outer tube and a triangular inner tube. A trailing arm (must be mounted as shown) is welded to each inner tube. As the axle operates, the arm swings up and down, thus rolling the rubber.



The position of the trailing arm varies depending on the starting angle. Three common start angles (+25 , 0 , and -20) are shown below.



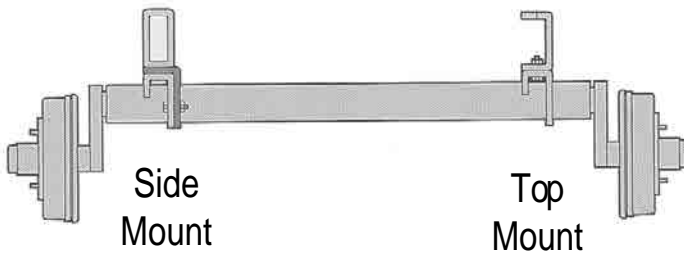
Depending on part number or the starting angle (with no weight on axle) will determine the suspensions terminology for down/up or plug negative. For more clarification please call 574-294-6651.



Rubber Torsion Suspension

When used properly, the AL-KO Axis, Inc rubber torsion suspension requires no maintenance and will provide years of reliable and uninterrupted service. (Abuse such as overloading or impact will greatly reduce axle life.) Brakes and hub/drum assemblies must be serviced according to the schedule on page 11.

Some rubber torsion axles may be welded to the frame. Axle mounted with bolts should be checked at least every 12,000 miles or 12 months and the bolts torqued to proper values. Bolts may be located in the top or side of the axle mounting bracket (see below).



Description	Torque (Ft. Lbs.)	
	Minimum	Maximum
1/2" Bolt	110	120
5/8" Bolt	145	155



FASTENER TORQUE WARNING

Use a torque wrench to set these values. Improper torque can cause component failure which could result in property damage, serious personal injury, or loss of life.

Triple 7K Axle System



Part Numbers:

Front & Rear Axles: 1445598

Center Axle: 1445597

AL-KO Axis, Inc. does not recommend or warrant customer configured triple torsion axle assemblies. However, AL-KO Axis, Inc. does provide an innovative square tube torsion solution, that is covered by AL-KO's Limited Warranty.

When the benefits of rubber suspension axles are needed in a "triple-axle" configuration, maximum performance of the final product and lasting satisfaction is best achieved when three axles are purposely designed to work together as a unit...a Triple Axle System.

The design involves a combination of increased capacity, improved side load capability, and empty load ride enhancement. The AL-KO Axis Advance Design (21,000 lb. capacity) Triple Axle System addresses the additional forces that axles are subject to when placed in this type of three-axle design.

- This product is only available as a Q-Flex with a 21,000 lb.capacity.
- The best way to identify the axle system after installation will be the axle tags.
- Standard 7K Q-Flex overhang and start angles apply.
- Standard Q-Flex 5 year warranty.
- Subject to maintenance and inspection procedures referenced in AL-KO Axis, Inc. Owner's Manual page 11.