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Trailer Axle Electric Brakes (AU)

Installation and Owner's Manual

(For Aftermarket Applications)

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Trailer Axle Electric Brake Kits	
Part #	Description
801911	10" electric brake kit; includes wheel-end components
801912	12" electric brake kit; includes wheel-end components



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Introduction

The electric brake kits for trailers include installation hardware and wheel-end components. There are 10" and 12" electric brake kits available. LCI brake drums and pads are machined to round to ensure optimal braking function.

NOTE: Images used in this document are for reference only when assembling, installing and/or operating this product. Actual appearance of provided and/or purchased parts and assemblies may differ.

Additional information about this product can be obtained from lci1.com/support or by using the myLCI app. Replacement kits can be ordered from <https://store.lci1.com/> or by using the myLCI app.

The myLCI app is available for free on iTunes® for iPhone® and iPad® and also on Google Play™ for Android™ users.

iTunes®, iPhone®, and iPad® are registered trademarks of Apple Inc.

Google Play™ and Android™ are trademarks of Google Inc.

Safety

Read and understand all instructions before installing or operating this product. Adhere to all safety labels. This manual provides general instructions.

Many variables can change the circumstances of the instructions, i.e., the degree of difficulty, operation and ability of the individual performing the instructions.

This manual cannot begin to plot out instructions for every possibility, but provides the general instructions, as necessary, for effectively interfacing with the device, product or system.

Failure to correctly follow the provided instructions may result in death, serious personal injury, severe product and/or property damage, including voiding of the LCI limited warranty.

WARNING

THE "WARNING" SYMBOL ABOVE IS A SIGN THAT AN INSTALLATION PROCEDURE HAS A SAFETY RISK INVOLVED AND MAY CAUSE DEATH, SERIOUS PERSONAL INJURY, SEVERE PRODUCT AND/OR PROPERTY DAMAGE IF NOT PERFORMED SAFELY AND WITHIN THE PARAMETERS SET FORTH IN THIS MANUAL.

WARNING

FAILURE TO FOLLOW THE INSTRUCTIONS PROVIDED IN THIS MANUAL MAY RESULT IN DEATH, SERIOUS INJURY, UNIT DAMAGE OR VOIDING OF THE COMPONENT WARRANTY.

CAUTION

THE "CAUTION" SYMBOL ABOVE IS A SIGN THAT A PROCEDURE HAS A SAFETY RISK INVOLVED AND MAY CAUSE PERSONAL INJURY, PRODUCT AND/OR PROPERTY DAMAGE IF NOT PERFORMED SAFELY AND WITHIN THE PARAMETERS SET FORTH IN THIS MANUAL.

CAUTION

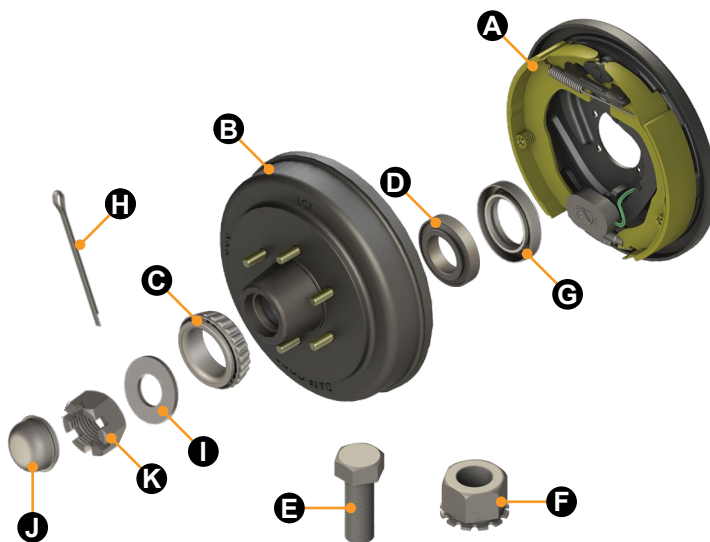
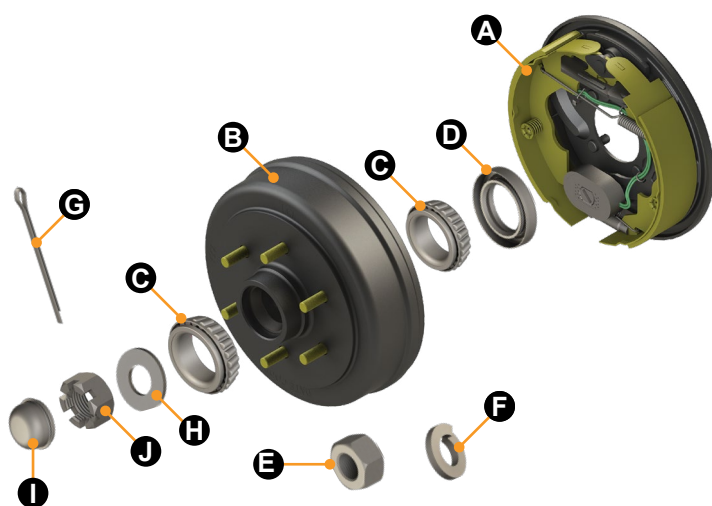
MOVING PARTS CAN PINCH, CRUSH OR CUT. KEEP CLEAR AND USE CAUTION.

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Parts List



10" Brake Kit PN 801911			
Letter	PN	Description	Qty
A	368337	10" brake LH	1
	368338	10" brake RH	1
B	369688	Brake drum	2
C	122092	Bearing cone, inner and outer	4
D	351862	Bearing seal	2
E	122085	Hex nut, 7/16" - 20	8
F	122086	Lock washer, 7/16"	8
G	807029	Cotter pin, 3/16" x 1 1/2"	2
H	808530	Washer, 1"	2
I	351709	Dust cap	2
J	727148	Castle nut	2

12" Brake Kit PN 801912			
Letter	PN	Description	Qty
A	368339	12" brake LH	1
	368340	12" brake RH	1
B	351389	Brake drum	2
C	122091	Outer bearing cone	2
D	351333	Inner bearing cone	2
E	139061	Bolt, 3/8" - 24	10
F	122077	Self-locking nut, 3/8" - 24	10
G	351683	Bearing seal	2
H	807029	Cotter pin, 3/16" x 1 1/2"	2
I	808530	Washer, 1"	2
J	351709	Dust cap	2
K	727148	Castle nut, 1" - 14	2

NOTE: Part numbers are shown for identification purposes only. Not all parts are available for individual sale. All parts with a link to the Lippert Store can be purchased.

Resources Required

- 1 to 2 persons, depending on task
- Personal protective equipment
- Pneumatic air or impact gun
- Hardwood block of wood
- Torque wrench
- Hammer
- Floor jacks and jack stands
- Grease (See specifications)
- Aerosol brake cleaner
- Probes or alligator clips
- Amp clamp



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Preparation

Brake Hub Removal

⚠ WARNING

ALWAYS LIFT THE CARAVAN BY ITS FRAME AND NEVER BY ITS AXLE OR SUSPENSION. UNLIKE TRAILER FRAMES, AXLE AND SUSPENSION COMPONENTS ARE NOT DESIGNED OR RATED FOR THE DEAD WEIGHT POINT-OF-CONTACT LOADS. DO NOT GO UNDER THE CARAVAN UNLESS IT IS SUPPORTED BY APPROPRIATELY-RATED JACK STANDS. IMPROPERLY SUPPORTED CARAVANS CAN COLLAPSE, RESULTING IN DEATH, SERIOUS PERSONAL INJURY AND/OR SEVERE PRODUCT AND PROPERTY DAMAGE.

⚠ WARNING

WEAR APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT (PPE) WHEN PERFORMING SERVICE OR MAINTENANCE OPERATIONS. ALWAYS WEAR EYE PROTECTION WHEN SERVICING CARAVAN AXLES, BRAKES, HUBS, SPRINGS AND WHEELS. NOT USING PPE MAY RESULT IN DEATH, SERIOUS PERSONAL INJURY AND/OR SEVERE PRODUCT AND PROPERTY DAMAGE.

Disassemble the brake hub assembly for brake replacement, inspection or maintenance as follows:

1. Make sure caravan is on level ground.
2. Create a clean area to place removed parts to prevent possible contamination or damage to removed parts.
3. Chock tires before beginning wheel disassembly. Chocked tires will prevent caravan from rolling while brakes are disengaged during disassembly, cleaning, inspection and assembly operations.
4. Loosen wheel lug nuts before raising the caravan to prevent tire from spinning during lug nut removal.
5. After lug nuts have been loosened, raise the caravan until the tire spins freely.
6. Continue to lift and support caravan per manufacturer's recommendations. Use appropriately-rated jack stands.

Place jack stands under the caravan's frame only.

7. Remove all lug nuts from wheel, then remove wheel from brake hub.

8. Set wheel and lug nuts aside for later re-assembly.

NOTE: Do **NOT** lean removed tire against caravan or any jacks. Leaning a heavy tire against a suspended caravan could cause damage to the outside of the caravan or place undue side pressure against a jack, possibly causing the caravan to become unstable.

9. Remove dust cover from hub by prying its edge out of the hub.

A. If servicing a brake drum, remove the lubed dust cap with the installed lubed rubber plug.

B. If servicing an idler hub, remove the non-lubed dust cap.

10. Pull cotter pin from castle nut and discard.

NOTE: The cotter pin is a one-time-use item. Do **NOT** reinstall removed cotter pin.

11. Remove the castle nut.

NOTE: Remaining grease on components can act as a mastic. Inspect removed castle nut for attached spindle washer. If spindle washer did not come off with the castle nut, inspect the outer bearing. Grease may have allowed the washer to stick to it.

12. Remove spindle washer.

13. Pull brake or idler hub off of spindle as follows:

A. Make sure brakes have been disengaged.

B. To prevent outer bearing cone falling freely from the assembly, place one hand on the back side outer rim of the hub and the other hand over the outside of the hub bore to cover the bearing cone.

C. Slightly turn the hub while pulling to free the hub from the spindle.

D. Secure the bearing and place it in the clean, removed-part area.



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NOTE: The inner bearing cone and cup remains installed within the hub contained by the grease seal and will not fall out.

14. Remove the grease seal from the hub bore as follows:

- A.** Set the brake or idler hub aside on a clean, solid surface with the outer bearing cup side facing down.
- B.** Use a seal puller or equivalent to remove grease seal from hub.

NOTE: Do not reinstall removed seal. Discard removed seal.

Clean Brake Drum

⚠ WARNING

THIS PROCEDURE CAN BE A POTENTIAL ASBESTOS DUST HAZARD. DO NOT USE COMPRESSED AIR, A DRY BRUSH OR DRY RAG TO REMOVE BRAKE DUST. DISTURBED BRAKE DUST CAN BECOME AN AIRBORNE IRRITANT THAT CAN BE INHALED OR INGESTED, CAUSING SERIOUS PERSONAL ILLNESS OR DEATH. WEAR APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT (PPE). USE AEROSOL BRAKE CLEANER TO WASH BRAKE DUST AWAY.

Prior to brake drum inspection, clean the brake drum to remove any brake dust or lubricant film. Avoid creating or breathing any brake dust. Do not machine, file or grind brake linings.

- 1.** Use an aerosol brake cleaner to wash away brake dust.
- 2.** Place a drip pan underneath the brake drum to catch the brake cleaner to permit proper disposal.
- 3.** Completely wash the entire brake drum, including the backing plate, magnet arm and brake shoes.
- 4.** Inspect brake drum, braking components and backing plate for any remaining pockets of oil, grease or dust.
- 5.** Repeat brake washing step if necessary.
- 6.** Proceed with brake drum inspection.

Brake Drum Inspection

⚠ CAUTION

RESURFACING PROCEDURES CAN PRODUCE METAL CHIPS AND BRAKE DUST THAT CAN CONTAMINATE THE WHEEL BEARINGS AND CAUSE COMPONENT FAILURE. MAKE SURE THE WHEEL BEARING CAVITIES ARE CLEAN AND FREE OF CONTAMINATION BEFORE REINSTALLING BEARINGS AND SEALS.

The brake shoes contact the drum's inner surface and the brake magnet contacts the armature. These surfaces are subject to wear and should be inspected periodically.

- 1.** The drum's inner surface should be re-machined if wear is more than 0.030" or out of round by more than 0.015".
- 2.** The drum should be replaced if scoring or wear is greater than 0.090".

NOTE: If the brake drum must be re-machined, refer to the Brake Drum Specifications chart for the maximum allowable rebore inner diameter. If the size of the machined bore diameter exceeds the specified dimension, a new brake drum must be used.

Brake Drum Specifications

Drum	Maximum Rebore Diameter
10"	10.09"
12"	12.09"

- 3.** The inner surface of the brake drum that contacts the brake magnet is the armature surface. If the armature surface is scored or worn unevenly, it should not be machined more than 0.030".
- 4.** The magnets should be replaced whenever the armature surface is refaced.
- 5.** Similarly, whenever the brake magnet is replaced, the armature surface should be refaced.



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Bearing Inspection

⚠ WARNING

WEAR PERSONAL PROTECTIVE EQUIPMENT (PPE) WHEN USING CAUSTIC MATERIALS. AEROSOL, LIQUID AND OIL-BASED PASTE MATERIALS CAN PRESENT SPLASH HAZARDS AND SKIN CONTACT ENVIRONMENTS THAT CAN RESULT IN SERIOUS ADVERSE EYE AND SKIN IRRITATIONS. FOLLOW ALL RECOMMENDED SAFETY PRECAUTIONS WHEN USING SUCH MATERIALS.

Upon inspection, bearings should look new and can be reassembled and used if in this condition.

Bearing cones and cups are not interchangeable after installation. Each bearing must be matched with its mating cup. Bearing cones and cups are replaced in matching sets of one cone and one cup.

1. Wash all grease and oil from the bearing cones using a suitable solvent.
2. Dry bearing cones with a clean, lint-free cloth.
3. Inspect bearing cone cages and rollers for any pitting, spalling, corrosion, flat spots, abnormal condition or discoloration.
4. If any of these imperfections are present, then the bearing cone and cup (race) must be replaced at the same time.
5. To remove a bearing cup (race) for replacement from the brake hub, go to Bearing Cup Inspection and Removal procedure.

Bearing Cup Inspection and Removal

⚠ WARNING

WEAR APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT (PPE) WHEN PERFORMING SERVICE OR MAINTENANCE OPERATIONS. ALWAYS WEAR EYE PROTECTION WHEN SERVICING CARAVAN AXLES, BRAKES, HUBS, SPRINGS AND WHEELS. NOT USING PPE MAY RESULT IN SERIOUS PERSONAL INJURY OR DEATH.

Clean brake or idler hub in accordance with Clean Brake Drum procedure and as follows:

1. Wipe all grease and oil from the hub, using care not to scratch or otherwise mar the bearing race.
2. Apply brake cleaner to hub.
3. Use lint-free cloths to dry the hub and bearing cups.
4. Inspect bearing cups (raceways) for pitting, spalling, corrosion, flat spots, abnormal condition or discoloration.
 - A. If the bearing cup (race) is in good condition, and its mating bearing cone is in reusable condition, the cup can remain installed in the hub for reuse.
 - B. If the bearing cup (race) is in good condition, but the bearing cone is not, the cup must be replaced.
 - C. If the bearing cup (race) is damaged, the cup must be replaced.
5. Replace damaged bearing cups (race) as follows:
 - A. For either inner or outer bearing cup, use a brass drift punch and hammer to lightly tap around the cup's exposed bearing race edge to push it out.
 - B. Move the drift punch evenly around the bearing cup edge to make sure the cup is pushed out evenly to prevent binding or damage to the bearing cup or hub bore.
 - C. Set the removed bearing cup aside and place it with its mating bearing cone.

NOTE: Removed bearing cones and cups are not interchangeable.

NOTE: Used bearing cone and cup sets must remain matched and re-installed as a matched set until the set is replaced with a new matching set.

6. After removal of the bearing cups from the hub, reapply brake cleaner to the hub and the hub bearing cup bores to make sure all surfaces are properly prepared for component reassembly.

NOTE: Make sure a drip pan is placed underneath the hub to capture the cleaner and permit its proper disposal.



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Installation

Install the brake or idler hub onto the brake drum or spindle as follows:

1. Obtain appropriate hub for installation.
2. Inspect hub for cleanliness.
3. If both bearing cups are installed in the hub bearing bores, go to the Inner Bearing Cone and Grease Seal procedure.

⚠ CAUTION

BEARING CUP REPLACEMENT IS A PRECISE PROCEDURE. WHEN INSTALLED, THE BEARING CUP MUST BE FULLY SEATED AGAINST THE RETAINING SHOULDER OF THE HUB. IF THE CUP IS NOT SEATED CORRECTLY, DAMAGE TO THE COMPLETED HUB ASSEMBLY MAY OCCUR, VOIDING WARRANTY.

4. If either one of the bearing cups is not installed in the hub, do as follows:
 - A. Place hub on a solid, flat surface with installed bearing cup side of the hub facing down.
 - B. Obtain the appropriate bearing cup for installation.
- NOTE:** Bearing cup replacement is a precise procedure. Consult LCI prior to replacing a bearing cup. The caravan should be taken to a certified service center for this work to be done.
- C. Gently place new bearing cup into hub bearing bore.
 - D. Using a brass drift punch, lightly tap around the outer edge of the cup to drive it into the hub bearing bore.
 - E. Continue tapping the drift punch around the circumference of the cup's edge until the cup is fully seated against the hub's bearing bore retaining shoulder.
 - F. Wipe the inside of the bearing cup (race) with a clean, lint-free cloth.
 - G. Inspect the bearing cup (race) to make sure no damage occurred during installation.

5. If no bearing cups are installed in the hub, do as follows:

- A. Perform step 4 of this procedure.
 - B. Flip hub, exposing the other, open hub bearing bore.
 - C. Perform step 4 of this procedure again.
 - D. Make sure both bearing cup races are clean and ready for bearing cone and grease seal installation.
6. After both bearing cups have been installed in the brake or idler hub, go to Inner Bearing Cone and Grease Seal procedure.

Inner Bearing Cone and Grease Seal

1. Make sure all old grease has been removed from wheel hub, bearings and axle spindle.
2. Make sure all mating surfaces for new bearing cone and grease seal are clean.
3. Bearings should be packed by machine, if possible. However, packing by hand is a viable alternative.

⚠ WARNING

DO NOT MIX LITHIUM, CALCIUM, SODIUM OR BARIUM COMPLEX GREASES. MIXING OF THESE INCOMPATIBLE COMPOUNDS CAN CREATE A CORROSIVE AND/OR TOXIC CHEMICAL WITH FUMES THAT CAN RESULT IN A SERIOUS HEALTH RISK IF EXPOSED TO SKIN OR LUNGS. WHEN CONVERTING FROM ONE GREASE TO ANOTHER, MAKE SURE ALL OLD GREASE IS REMOVED COMPLETELY PRIOR TO APPLYING NEW GREASE.

4. Hand pack inner bearing cone as follows:
 - A. If previously removed inner bearing cone is in reusable condition, place a generous amount of grease into the palm of your hand (Fig.1).
- NOTE:** Select an appropriate grease that is temperature-rated for the wheel's application. Reference Recommended Wheel Bearing Grease Specifications and Approved Sources - Bearing Grease charts.
- B. If the previously-removed inner bearing cone cannot be reused, obtain a new inner bearing cone and place a generous amount of grease into the palm of your hand (Fig.1).

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C. Press widest end of bearing into the outer edge of the grease pile, forcing grease into the inner area of the bearing between two adjacent rollers (**Fig.1**).

D. Repeat this process while turning bearing from roller to roller until all rollers are coated.

E. Apply a light coat of grease into the bearing cup surface (race).

F. Install new grease-packed bearing cone into the cup.

5. LCI recommends replacing the grease seal whenever bearing packing is required. Install a new grease seal into the hub seal bore to capture the inner bearing cone as follows:

A. Place the new grease seal into the seal bore.

B. Apply a light film of sealant onto the outer rim of the seal.

C. Make sure seal is set square to the hub seal bore before pressing the seal all the way in or the seal may become damaged.

D. Use a clean, hardwood block of wood and hammer to drive the seal into the seal bore (**Fig.2**).

E. Place the wood block evenly across the seal.

F. Hold the wood block firmly in place as you begin to tap the seal squarely into the seal bore with the hammer.

G. Continue to tap the seal inward until the seal's outer face is flush to the hub's seal bore face.



Fig.2

Recommended Wheel Bearing Grease Specifications

Thickener type	Lithium complex
Dropping point	230° C (446° F) minimum
Consistency	NLGI No. 2
Additives	EP, corrosion and oxidation inhibitors
Base oil	Solvent refined petroleum oil
Base oil viscosity	@40° C (104° F) 150cSt (695 SUS) minimum
Viscosity index	80 minimum
Pour point	-10° C (14° F) minimum

Approved Sources - Bearing Grease

Mobil Oil	Mobilgrease HP
Exxon/Standard	Ronex MP
Kendall Refining Co.	Kendall L-427
Ashland Oil Co.	Valvoline Val-plex EP Grease
Pennzoil Prod. Co	Premium Wheel Bearing Grease 707L



Fig.1

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Lubricate Brake Assembly

Prior to reassembling the brake drum assembly, do as follows:

1. Apply a light film of white grease or an anti-seize compound to:
2. The brake anchor pin.
3. The actuating arm bushing and pin.
4. The areas of the backing plate that are in contact with the brake shoes and magnet lever arm.
5. On the actuating block mounted to the actuating arm.

Castle Nut Adjustment

The proper method to assemble the castle nut is as follows:

1. After hub installation onto spindle, install outer bearing.
2. Install spindle washer, if equipped, and thread on castle nut with slots facing outward.
3. Torque castle nut with properly-calibrated torque wrench to 68 N·m (50 ft-lbs).
4. Back off torque usually one-quarter turn so that you can finger-tighten the castle nut.
5. Finger-tighten, drop cotter pin through slot and hole in spindle. If slot in nut does not align with either hole in spindle, back off nut until it does.

NOTE: Never tighten past finger-tight. Use cotter pin hole that provides the least amount of end-play clearance.

6. Bend legs of cotter pin over end of spindle and make sure legs do not interfere with the dust cap upon reassembly.

Connect Parking Brake

1. Connect suitable cable to the parking brake lever (Figs.3 and 4), located on the back side of the brake.

NOTE: When pulled, the cable actuates the parking brake feature that spreads the shoes into the drum and stops wheel rotation.



Fig.3



Fig.4

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Wheels

Wheel Selection

⚠ WARNING

AIR PRESSURE ON A WEAKENED OR CRACKED RIM CAN CREATE AN UNSAFE, EXPLOSIVE CONDITION RESULTING IN SERIOUS PERSONAL INJURY OR DEATH. DO NOT ATTEMPT TO MODIFY OR REPAIR A WHEEL. REPLACE DAMAGED OR WEAKENED WHEEL AND RIM WITH NEW PARTS.

⚠ WARNING

USE MANUFACTURER'S SUGGESTED RIM CONTOURS ONLY. FAILURE TO USE RECOMMENDED RIM CONTOURS MAY RESULT IN DRAMATIC SEPARATION BETWEEN TIRE AND WHEEL, RESULTING IN POSSIBLE SERIOUS PERSONAL INJURY OR DEATH.

Caravan wheels, tires and axles **MUST** be properly matched when specifying or replacing caravan wheels. Make sure the following critical wheel replacement characteristics are observed:

1. Bolt Circle — Wheels have varying bolt circle patterns, some close enough to allow installation of mismatched wheel bolt patterns to axle hub bolt patterns.

2. Capacity — Wheel load capacity must match tire and caravan maximum load ratings.

3. Offset — The relationship of the tire's centerline to the axle's hub face must match across replacement parts. Failure to match offset reduces axle carrying capacity.

4. Rim Contour — Replacement wheels must directly match the mating rim contour.

Torque Requirements

It is extremely important to maintain proper wheel mounting torque limits on your caravan axle. Use of torque wrenches will ensure proper torque limits are applied to wheel mounting lug nuts. Use no other method to torque wheel lug nuts.

Make sure wheel fasteners match the cone angle of the wheel (usually 60 or 90 degrees) being serviced. Attach new wheel to the axle hub as follows:

1. Start all bolts or nuts by hand to prevent cross threading.
2. Continue to hand-tighten wheel lug nuts in the sequential pattern shown in figure 5.
3. After wheel lug nuts are fully hand-tightened, torque nuts in stages in the sequential pattern shown in figure 5.
4. Torque wheel lug nuts to the torque values listed in the Wheel Torque Requirement Chart.

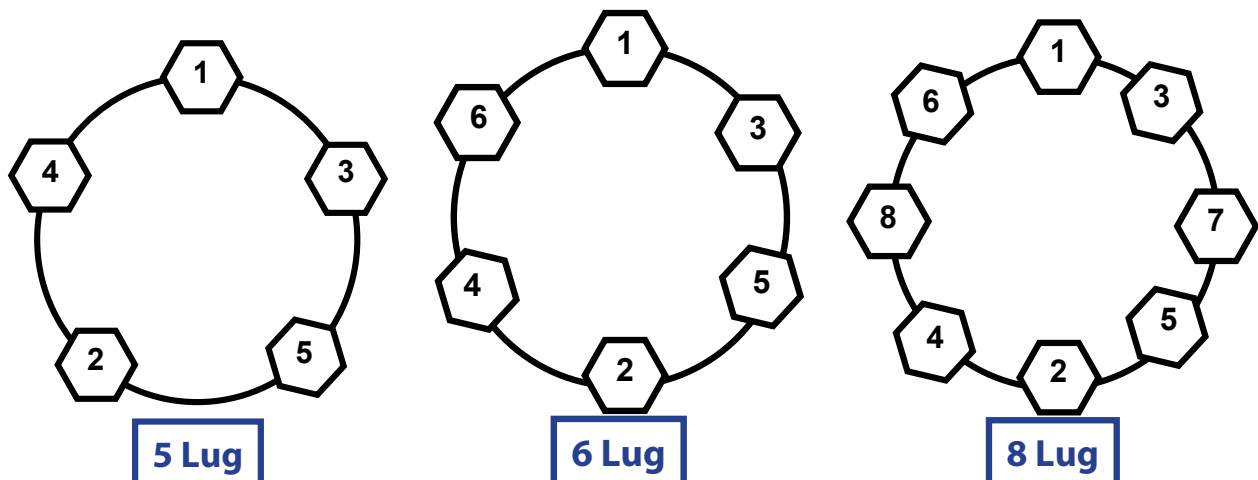


Fig.5

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Wheel Torque Requirement Chart

Wheel Size	Stud Size	Torque Sequence		
		1st Stage	2nd Stage	3rd Stage
14"	½"	27-34 N·m	68-81 N·m	122-163 N·m
15"	½"	27-34 N·m	68-81 N·m	122-163 N·m
16"	½"	27-34 N·m	68-81 N·m	122-163 N·m
16.5" x 6.75"	½"	27-34 N·m	68-81 N·m	122-163 N·m
16"	⅝"	27-34 N·m	81-95 N·m	163-176 N·m
16.5" x 6.75"	⅝"	27-34 N·m	81-95 N·m	163-176 N·m
16" Dual and 17.5" Cone Nut	⅝"	68-81 N·m	136-163 N·m	258-285 N·m
16" Dual and 17.5" Flange Nut	⅝"	68-81 N·m	203-271 N·m	373-441 N·m
14.5" Demount	½"	Tighten sequentially to 115-129 N·m		

Tires

Prior to mounting tires onto wheels, do as follows:

1. Make sure rim size and contour are approved by the Tire and Rim Association Yearbook or the tire manufacturer's catalog.
2. Verify tire load rating. If the load is not evenly distributed across all tires, use the tire rated for the heaviest wheel position.
3. Consult the Rubber Manufacturers Association or the tire manufacturer's guidelines for wheel mounting procedures.

Break-in Period for Electric Drum Brakes

NOTE: Brakes should be manually adjusted after the first 320 kilometers of operation, then periodically every 4800 kilometers.

The break-in period is a typical phenomenon with drum brakes and especially electric drum brakes. Electric drum brakes will require a break-in period to achieve full performance. This break-in period applies for new axles and any time new brake shoes and/or magnets are

installed as part of regular maintenance. LCI has found through extensive brake testing that the break-in period for drum brakes can range from 20 to 50 brake applications.

Brakes can be seated in by applying approximately 8-10 volts to the caravan brakes at an initial speed of 65 km/h and allowing the tow vehicle/caravan combination to slow down to 32 or 40 km/h. For best results, do not use tow vehicle brakes during this procedure

The caravan brakes will seat in faster by using them to stop both the tow vehicle and caravan. The easiest method is to apply the caravan brakes using the manual activation lever located on the in-cab brake controller.

Care must be taken to not overheat the lining material; therefore brake applications conducted at one mile intervals will suffice. The driver should feel a noticeable difference in the brake performance during this period, sometimes in as few as 10 applications.

After 50 applications, the brake lining material will be fully cured from the heat and develop close to 100 percent contact with the brake drum surface.

This break-in period not only seats the shoe lining material but also seats in the brake electromagnets. During the break-in period, the linings will wear at a faster rate than they do after they are seated in.

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Troubleshooting

Most brake malfunctions can be corrected by taking action based on recommendations in the Troubleshooting Chart. Mechanical failure is the most common form of malfunction. However, if the brake system fails and it's not mechanical, it is usually electrical. A voltmeter and ammeter are essential tools to diagnosing these problems.

Mechanical problems are mostly self-evident; something is bent or broken. Consult the Troubleshooting Chart to determine the probable cause and corrective actions for a variety of issues with the braking system.

Use LCI replacement parts on these systems. Refer to the Parts List section and consult the limited warranty or call the Service Department for any other related issues.

Electrical Troubleshooting

If all caravan lights and brakes do not work, check the wiring plug connection. Make sure the ball is making solid contact with the coupler (that is how a caravan is grounded). Too much grease on the ball and coupler can cause this to happen.

Measuring Voltage

The braking system voltage is measured at the two lead wires of the magnet on any brake. Use the pin probes inserted through the insulation of the lead wires. To ensure that the battery is indicating a full charge, the towing vehicle engine should be running with the caravan coupler connected when checking the voltage.

Voltage in the system should begin at zero volts and, as the brake pedal of the tow vehicle is applied, voltage will

gradually increase to about 12 volts. If the system does not indicate at least 12 volts, problems may occur in the wiring of the system, the battery or alternator of the tow vehicle.

When the brakes are applied, a gradual increase in voltage is preferable to a quick increase to 12 volts. A gradual increase in voltage ensures smooth and firm caravan braking. A quick increase in voltage will cause the braking system to feel like the caravan is grabbing too quickly.

NOTE: Taking a voltage reading is usually done with probes inserted into the wire connector (**Fig.6**).

Measuring Amperage

Braking system amperage is the amount of current flowing through the system when all magnets have been energized. Amperage will change proportionately with voltage. To ensure the battery is fully charged, the tow vehicle engine should be running with the caravan coupler connected when checking the voltage.

If a resistor is used in the brake system, it must be set at zero or bypassed completely to obtain the maximum amperage reading. Individual amperage draw can be measured by inserting the ammeter in the line at the magnet you want to check. Disconnect one of the magnet lead wire connectors and attach the ammeter between the two wires. Consult Amperage Chart for normal amp readings. Make sure that the wires are properly reconnected and sealed after testing is completed.

NOTE: Testing for amperage can be done with probes (**Fig.7**) or alligator clips on the leads or an amp clamp (**Fig.8**).



Fig.6



Fig.7



Fig.8



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Amperage Chart			
Amps/ Magnet	Two Brakes	Four Brakes	Six Brakes
3.0	6.0	12.0	18.0

Low or no voltage are the most common problems with the braking system. Amperage at the brakes is also a relatively common issue. Common causes of these conditions are:

1. Low-quality electrical connections.
2. Open circuits.
3. Insufficient wire gauge. Reference the Caravan Wire Gauge chart.

Caravan Wire Gauge Chart		
Wire Gauge and Type	Number of Axles	Length of Run
16 Ga stranded copper	1	N/A
14 Ga stranded copper	2	Under 9.1 m (30 ft.) from hitch to center of axles
12 Ga Stranded Copper	2 or 3	Over 9.1 m (30 ft.) from hitch to center of axles

4. Broken wires.
5. Blown fuses (fusing of brakes is not recommended).
6. Short circuits (indicated by high amperage).

Possible causes of shorts are:

- A. Shorted magnet coils.
- B. Bare wires contacting a grounded object.

Finding the cause of a short circuit in the system is done by isolating one section at a time. If the high amperage reading drops to zero by unplugging the trailer, then the short is in the trailer. If the amperage reading remains high with all the brake magnets disconnected, the short is in the trailer wiring.



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Troubleshooting Chart

What Is Happening?	Why?	What Should Be Done?
No brakes	Open circuits	Find and correct
	Short circuits	Test and correct
	Severe under-adjustment	Adjust brakes
Weak brakes	Grease or oil on magnets, linings	Clean or replace
	Corroded connections	Clean, correct cause of corrosion
	Worn linings or magnets	Replace
	Scored or grooved brake drums	Machine or replace
	Improper synchronization	Correct
	Under-adjustment	Adjust brakes
Locking brakes	Glazed linings	Re-burnish or replace
	Under-adjustment	Adjust
	Improper synchronization	Correct
	Loose, bent or broken brake components	Test and correct
	Out-of-round brake drums	Machine or replace
Intermittent brakes	Insufficient wheel load	Adjust system resistor, synchronize
	Broken wires	Test and correct
	Loose connections	Repair or replace
Brakes pull to one side	Faulty ground	Find and repair
	Wrong magnet lead wire color	Adjust
	Incorrect adjustment	Correct
	Grease/oil on linings or magnets	Clean or replace
	Broken wires	Find and repair
Harsh brakes	Bad connections	Find and repair
	Under-adjustment	Adjust
	Improper synchronization	Correct



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Troubleshooting Chart - Continued

What Is Happening?	Why?	What Should Be Done?
Noisy brakes	Under-adjustment	Adjust
	Broken component	Replace component
	Incorrect brake components	Correct
Surging brakes	Grease/oil on linings or magnets	Clean or replace
	Out-of-round/cracked brake drums	Machine or replace
Dragging brakes	Over-adjustment	Readjust
	Out-of-round brake drums	Machine or replace
	Incorrect brake components	Replace
	Loose, bent or broken brake components	Replace
	Faulty breakaway switch	Repair or replace
	Loose wheel bearing adjustment	Adjust
	Bent spindle	Replace Axle

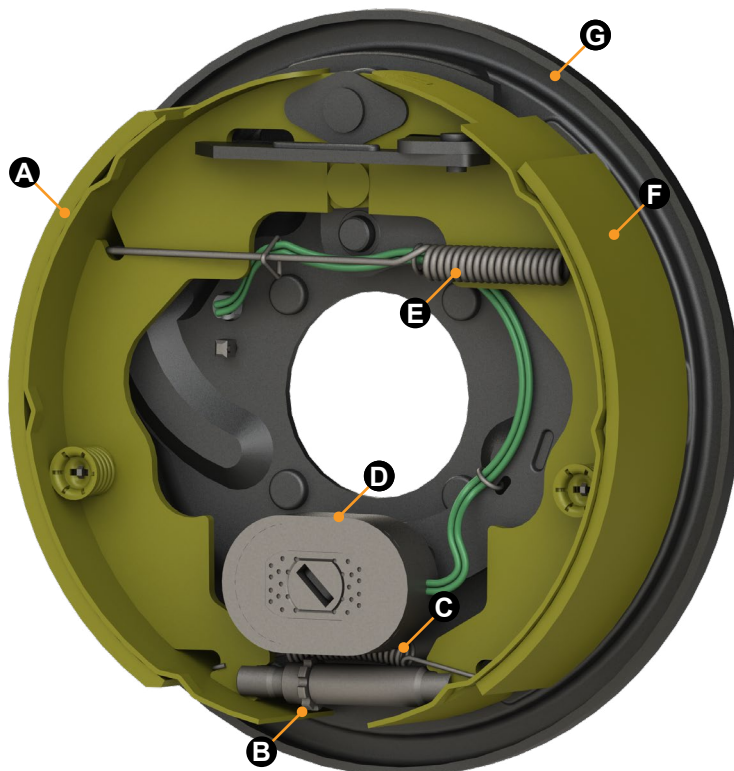
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Maintenance

Item	Function Required	3 months/ 4800 km	6 months/ 9700 km	12 months / 19 800 km (Whichever comes first)
Brakes	Test that they are operational.	At every use		
Brake adjustment	Adjust to proper operating clearance. Not required for self-adjusting brakes.	◆		
Brake magnets	Inspect for wear and current draw.		◆	◆
Brake linings and pads	Inspect for wear or contamination.			◆
Hub/drum and rotors	Inspect for abnormal wear or scoring.			◆
Wheel bearing	Inspect for corrosion or wear. Clean and repack.			◆
Seals	Inspect for leakage. Replace if removed.			◆



Periodic Bearing Inspection: Should be performed annually or every 19 800 kilometers, whichever comes first.

Bearing Lubrication Inspection: Should be performed annually unless periodic brake inspections reveal abnormal braking performance.

Brake Cleaning and Inspection: Should be performed annually or every 19 800 kilometers, whichever comes first.

Brake Components	
Callout	Description
A	Primary shoe and lining
B	Adjustment screw
C	E-brake spring
D	Magnet
E	Reactor spring
F	Secondary shoe and lining
G	Backing plate



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Brake Adjustment

⚠ WARNING

PRIOR TO TESTING OR ADJUSTING BRAKES, MAKE SURE AREA IS CLEAR OF ANY PEOPLE AND VEHICLES. FAILURE TO PERFORM TEST IN A CLEAR AREA MAY RESULT IN SERIOUS INJURY OR DEATH.

⚠ WARNING

LIFT THE CARAVAN BY ITS FRAME AND NEVER THE AXLE OR SUSPENSION. UNLIKE TRAILER FRAMES, AXLE AND SUSPENSION COMPONENTS ARE NOT DESIGNED OR RATED FOR THE DEAD WEIGHT POINT-OF-CONTACT LOADS. DO NOT GO UNDER THE CARAVAN UNLESS IT IS PROPERLY SUPPORTED BY JACK STANDS. UNSUPPORTED CARAVANS CAN FALL RESULTING IN DEATH, SERIOUS PERSONAL INJURY AND/OR SEVERE PRODUCT AND PROPERTY DAMAGE.

The LCI electric brakes are offered in a manual and automatic adjusting form. If manual brake adjusting is required, do as follows:

1. Jack up caravan and secure on adequate-capacity jack stands.
2. Follow caravan manufacturer's recommendations for lifting and supporting the caravan.
3. Make sure the wheel and drum rotate freely.
4. Remove the adjusting hole cover from the adjusting slot on the bottom of the brake backing plate.
5. With an adjusting tool, rotate the starwheel of the adjuster assembly to expand the brake shoes.
6. Adjust the brake shoes out until the pressure of the linings against the drum makes the wheel very difficult to turn.
7. Rotate the starwheel in the opposite direction until the wheel turns freely with a slight lining drag, or approximately 10 click adjustments.

NOTE: A screwdriver will be needed to push the auto-adjusting lever away from the adjuster starwheel so that the starwheel can be rotated backward in the case of a self-adjusting brake.

8. Replace the adjusting hole cover and lower the wheel to the ground.
9. Repeat the above procedure on all brakes.

NOTE: For best results, the brakes should all be set at the same clearance. If the first brake's clearance was adjusted to 10 clicks, then adjust the remaining brake clearances to the same amount.

Clean and Inspect Brakes

In the event the braking system encounters symptoms of improper application or failure, immediate inspection and service must be implemented.

During normal use, servicing the braking system once a year is considered normal. Above normal use will require servicing based on a 4800-9700 km increment schedule.

Change worn magnets and shoes as needed to maintain maximum braking capability.

When disassembling the brakes for cleaning, make sure to:

1. Clean the backing plate, magnet arm, magnet and shoes.
2. Make sure all parts removed for cleaning are placed back into the same brake drum assembly.
3. Check for parts that have become loose or worn.
4. Service or replace loose or worn parts.

Periodic Bearing Inspection

A physical bearing inspection should be conducted every 19 800 kilometers or 12 months, whichever comes first. An inspection of the bearing condition can detect early bearing issues.

Upon inspection, bearings should look brand new and can be reassembled and used if in this condition. If discoloration, pitting, corrosion, flat spots or some abnormal condition is observed, the bearing and race should be replaced at the same time. Bearings are available at auto part stores.



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Magnets

The LCI electric braking system uses electromagnets to actuate the brake shoes. These electromagnets provide force and friction to safely and effectively stop the caravan.

Inspect and service the electromagnets annually if the caravan has seen normal use, more often if the caravan is used extensively. Inspect the electromagnets and do as follows:

1. Use a straight edge to check the electromagnet surface for uneven wear (**Fig.9**).

NOTE: Figure 9 shows an electromagnet with little or no wear.

2. Surface of electromagnet should be completely flat. If abnormal or uneven wear is indicated by pronounced gaps, replace the electromagnet.

3. If the magnet's coil is exposed in any way, even if normal wear is evident, the magnets should be replaced immediately.

4. If the electromagnets are replaced, the drum armature surface should be refaced.

NOTE: If an electromagnet is replaced on one side of an axle, LCI recommends replacing the electromagnet on the opposite brake assembly. This will ensure an even braking capacity.

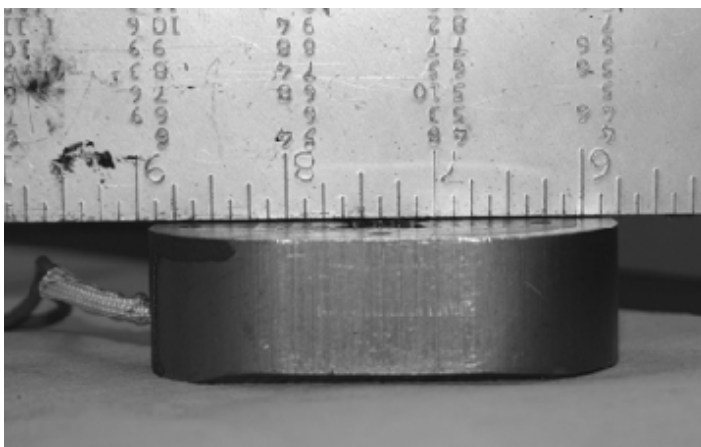


Fig.9

Shoes and Linings

Inspect brake shoes and linings for:

- Grease or oil.
- Surface scoring, pitting or gouges.

1. Replace both shoes if lubricant contamination or physical damage is present, even if found on only one shoe.

2. Replace both shoes on the brake and on both brakes installed on the same axle. Replace brake parts at the same time. This will ensure an even braking capacity.

3. Measure lining thickness.

A. Lining thickness shall not be less than 1.6 mm ($\frac{1}{16}$ in.).

B. If lining measures less than 1.6 mm ($\frac{1}{16}$ in.), replace the shoe.

NOTE: Heat cracks are normal and rarely require attention.

After replacing the brake shoes and linings, burnish in caravan brakes. See Break-In Period For Electric Drum Brakes.

Hub Replacement

To adjust bearings or replace removed hub, follow procedures below:

4. Place hub, bearing, washers and castle nut back on axle spindle in the reverse order from which they were removed. Castle nut should be torqued to 68 N·m (50 ft-lbs). Hub will rotate during this process.

5. Loosen castle nut to back off the torque.

6. Tighten castle nut finger-tight until snug.

7. Insert cotter pin. If cotter pin does not line up with hole, back castle nut up slightly until pin can be inserted.

8. Bend cotter pin over to lock nut in place. Nut should be free to move with only the cotter pin keeping it in place.

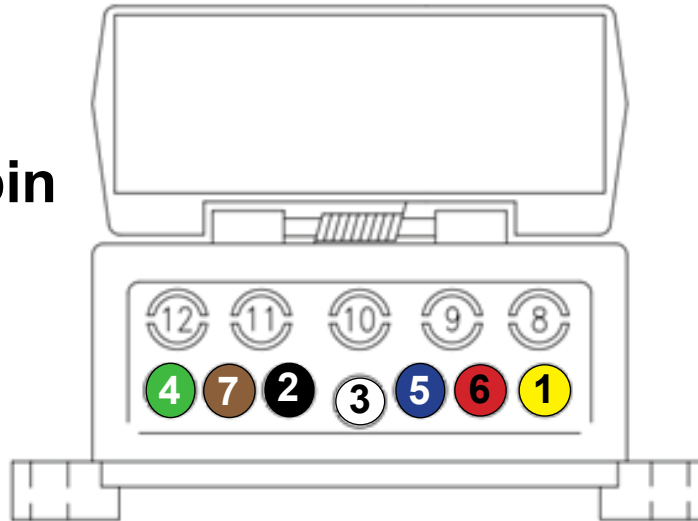


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Wiring Diagram

7- / 12-pin Plug



Pin #	Function	Color	Min. Wire Size	
			mm ² *	AWG
1	Left Indicator	Yellow	1.25	16
2	Reverse	Black	1.25	16
3	Ground	White	3.0	12
4	Right Indicator	Green	1.25	16
5	Electric Brakes	Blue	2.0	14
6	Stop Lamp	Red	1.25	16
7	Tail Lamps	Brown	1.25	16

*mm² refers to the cross-sectional area of the copper in the wire.



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Notes



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