Ausco Products Inc.

LC Brake System 99414
Wet Parking and Service with Pump Pack

Operation Manual

Ausco's LC Brake is a braking system designed to survive the rugged conditions and harsh environments of the mining industry. Ausco's LC Brake not intended or designed for on-highway driving. Ausco's LC Brake is a drop in replacement to the Toyota OEM brakes. This allows for simplicity in changeover and overall better performance and control of the braking system.

This manual describes daily operation and service requirements for optimum performance.

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FAILURE TO FOLLOW THESE SAFETY WARNINGS CAN RESULT IN SERIOUS INJURY OR DEATH.

- This brake is not safe or legal for on-highway use.
- This brake should only be used on vehicles whose maximum speed does not exceed 25 mph [40 kph].
- This brake should only be used on vehicles driven in 4WD.
- This brake should only be used with an Ausco pump kit. Do not use a pump kit from any other manufacturer.
- **NEVER USE AFTERMARKET PARTS WITH THIS BRAKE. AFTERMARKET PARTS MAY CAUSE THE BRAKE TO FAIL.**
- **It is unsafe to attempt any in-service brake adjustments. It can cause brake failure.**

Contact Ausco products (www.auscoproducts.com) for technical assistance with application or design questions.

LC Brake Advantages

The LC Brake is designed for the model 70 Toyota Land Cruiser. It is not designed for on-highway use. The LC Brake is designed expressly for mining applications. It is a drop in replacement to the OEM brakes. Minimal modifications are required to install it onto the OEM Toyota Land Cruiser axles. This brake is supplied pre-assembled and ready to install. The LC Brake design features Double 2-Stage technology, which utilizes the stock Toyota master cylinder and provides great pedal feel for strong, smooth stops. Operators and maintenance personnel alike will appreciate Ausco's commitment to reducing downtime through design features that include:

- High energy carbon lining for low maintenance and less downtime.
- Internal cooling chamber to lower operating temperatures for longer life.
- Fail-to-safe braking at the wheels allows for safe emergency stops with no driveline damage.
- Use of readily available fluid for easier service.
- Pre-assembled one piece design for easy installation and removal.
- Dual grease barrier sealing configuration to protect the hub and brake from water intrusion and contamination.
- Lightweight, hard-coat anodized aluminum housing design that:
    - Cools the brake faster for less fade
    - Increases brake life
    - Reduces corrosion in salty or acidic environments
    - Easier to handle for service

Description - What the LC Brake System Contains

The system contents include wet service and park brakes. They are fitted to the existing Toyota Land Cruiser OEM axle with little to no modification required. The Ausco service brakes use the existing stock Toyota master cylinder and vacuum booster. The addition of a supplementary hydro-boost or similar system is not necessary.

Parking brakes are integrated into the service brakes at wheel locations. The parking system is spring applied and hydraulically released. The park brakes are operated by an electric over hydraulic system that operates independent of the service brake system. The electric over hydraulic system, or Pump Pack, may be mounted along the interior back wall of the cab. It is sealed in a compact steel enclosure, and contains an electric motor, hydraulic pump, and PLC.

Operators have convenient access to park brake controls. The integrated dash panel control fits directly into the existing dash panel slot for the radio or can be mounted in an optional floor box. The dash panel control informs the operator of conditions that impact park brake ability. Through a series of light patterns, the operator is informed of the absence of engine oil pressure, an open door, low system pressure, or excessive leakage. A TOW MODE feature allows the operator to release the park brake for safe towing in the event of an engine failure.

As an option for the LC Brake, Ausco has designed a hose kit specifically for the Toyota Land Cruiser. It is highly recommended to be included in the purchase of the braking system. The convenience of this hose kit ensures a proper fit-up of lines and hoses to the Toyota Land Cruiser. This reduces installation time dramatically. It is also designed for high durability in the harsh underground mining environment. Contents include stainless-steel fittings, flexible hoses, brakelines, brackets, and mounting hardware for service, parking, and venting lines. Service lines attach the master cylinder to the brakes. Parking lines connect the Pump Pack to the parking brakes. Vent lines connect service brakes to filtered vents located around the Toyota Land Cruiser.

Manual Layout

This manual describes the operation of the LC Brake System for the Toyota Land Cruiser. This manual describes the parking, driving (service) and towing options. Additionally, we have provided a trouble shooting guide to assist in diagnosing any brake concerns that may arise.

! WARNING ! – Throughout this manual you will find: **! WARNING !, ! CAUTION !, ! NOTE !** and **! ALERT !,** notes.

DISREGARDING THESE SAFETY NOTICES MAY RESULT IN SERIOUS INJURY OR DEATH.

The safety of operators and those who service brakes is a primary concern.

When in doubt, do not hesitate to contact your LC Brake distributor or Ausco (www.auscoproducts.com) for assistance.

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SECTION 1

OPERATING PROCEDURES

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Contact Ausco products (www.auscoproducts.com) for technical assistance with application or design questions.

IN THE EVENT THAT THE SERVICE BRAKE IS NOT FUNCTIONING, ENGAGE THE PARKING BRAKE IMMEDIATELY. THIS WILL BRING THE VEHICLE TO A SAFE STOP.

Set the PARK BRAKE:

1. Push the PARK BRAKE button.

2. The red light will be on steady.

RELEASE the PARK BRAKE:

1. Twist to release PARK BRAKE button.

2. The red light will flash until system pressure is achieved.

3. The green light will be on steady when system pressure is achieved and the brake is released.

Driving a vehicle with LC Brakes

There are no additional processes or procedures to follow in normal operation. Feedback from the braking system may not be as firm and pedal travel distance may be slightly increased.

Set TOW MODE: The Tow Mode feature of the pump pack provides the ability to disengage the Park Brake in the event engine oil pressure is lost (engine failure). All braking functions are still available to the operator. That is to say, if you push the red dash button, the park brake will engage. If the door switch is connected, and door is opened, the brake will engage. Tow mode ONLY causes the pump pack to ignore oil pressure. No other braking function is affected. This allows the vehicle to be towed safely for service.

To Engage **TOW MODE**:

1. Push the PARK BRAKE button in.

2. Press in and release the TOW MODE button. Do not hold the button down. The green light will flash while the red light stays on until the brake is released.

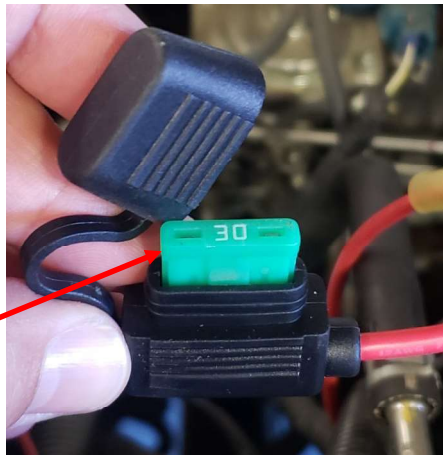
3. Twist to release the PARK BRAKE button. The red light will flash until pressure is achieved. When pressure is achieved, the red light will turn off and the green light will continue to flash.

Should the vehicle start (engine oil pressure reestablished), Tow Mode will automatically disengage and normal operation will resume. The indicator lights on the dash panel will display that the system is ready for operation. The green light will stop flashing and will remain on continuously.

Hand pump procedure

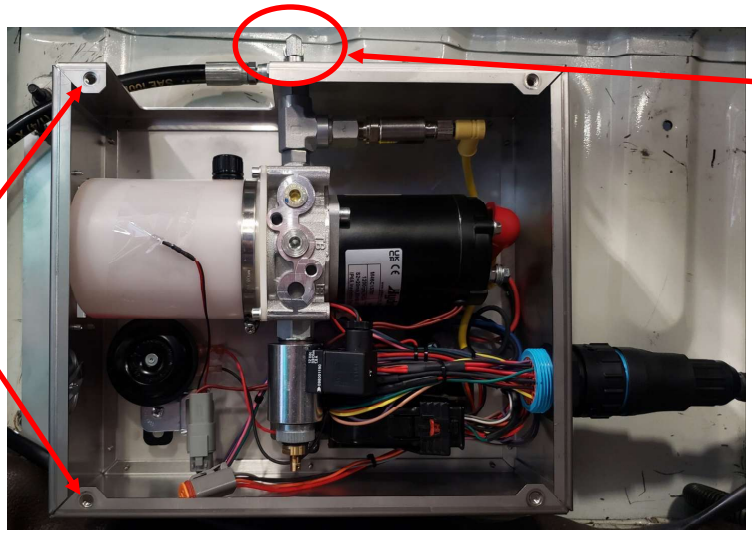
This procedure explains the process of connecting a hand pump to the pump pack for the purpose of releasing the park brake when the vehicle's electrical system is not functioning properly, and Tow Mode is disabled.

The system must have electrical power in order for Tow Mode to operate properly. In the event electrical power is unavailable, it is recommended to use a manual hand pump with a pressure gage to restore system pressure.



1. Before connecting the manual hand pump, remove 30A fuse located in the engine compartment.

2. Remove the pump pack cover by unscrewing each of the four cover bolts with sealing washers. Set the cover aside.



3. Disconnect the hose at the pump pack and attach it to the hand pump.

4. Manually pump the system up to 117-103 Bar (1700-1500 PSI).

This will release the park brake.

Troubleshooting

Problem: Pedal travel is excessive

Solution: Check the master cylinder reservoir fluid level. Fill if necessary.

Solution: Re-bleed the brakes. Air could be trapped in the brake line.

Solution: Check fittings and hoses for leaks. Replace and repair as required.

Solution: Verify the wear pin height. If height is less than 0.255” (6.48 mm), brake is worn. Service the brake as required.

Problem: The pedal feel is soft or spongy

Solution: Check the master cylinder reservoir fluid level. Fill if necessary.

Solution: Re-bleed the brakes. Air could be trapped in the brake line.

Solution: Check fittings and hoses for leaks. Replace and repair as required.

Problem: Poor braking performance

Solution: Verify the wear pin height. If height is less than 0.255” (6.48mm) brake is worn. Service the brake as required.

Solution: Bleed the brakes.

Solution: Contact Ausco (www.auscoproducts.com). The brake(s) may require new slave cylinder(s).

!WARNING! The Ausco LC brake is not designed for in-service adjustments. Attempting to adjust the brake for wear can result in brake malfunction. **SERIOUS INJURY OR DEATH MAY RESULT.**

Problem: Diagnosing the Pump Pack dash panel codes.

Number of Red Flashes	Diagnostic	Problem / Corrective Action
1	No engine oil pressure	• Vehicle not on • Low engine oil level • Check the oil pressure switch
2	Does not achieve system hydraulic pressure within 15 seconds at startup	• Low fluid level in Pump Pack reservoir. • Leaks in hoses, brake tubes, or fittings. • The system may have overheated. Remove the enclosure cover to allow pump to cool. • Pump Pack pump/motor not generating pressure. • Faulty pressure transducer/dump valve.
3	Slow leak—pump runs 3 times within 3 minutes	• Check fluid level in Pump Pack reservoir. • Check hoses, brake tubes, and fittings for leaks. • Fluid may be leaking into the brakes. Check oil level in the brakes.
4	Vehicle door is open	• Shut vehicle door. • Verify door switches are functional. • Chase door wire and verify wire is intact.
5	Seat belt not engaged	• Latch seat belt. • Verify seat belt switch is functional. • Chase seat belt wire and verify wire is intact.
6	Auxiliary System Error	• Auxiliary system has signaled to apply brake.
7	Motor Overload	• Pump motor is overheated. Allow to cool. • Fuse at battery is blown. Replace with 30 amp automotive fuse. Look for shorts and wire damage.

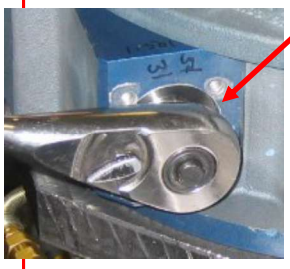
Problem: Diagnosing the Pump Pack dash panel codes.

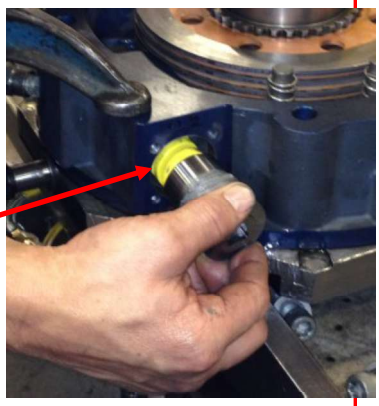
Number of Red Flashes	Diagnostic	Problem / Corrective Action
8	Does not achieve system hydraulic pressure within 15 seconds during operation	• Find a safe place to park the vehicle as soon as possible. • Low fluid level in Pump Pack reservoir. • Leaks in hoses, brake tubes, or fittings. • The system may have overheated. Remove the enclosure cover to allow pump to cool. • Pump Pack pump/motor not generating pressure. • Faulty pressure transducer/dump valve.
Alternating red/green flashes	System pressure below minimum allowed	• Prepare for emergency stop. • Low fluid level in Pump Pack reservoir. • Leaks in hoses, brake tubes, or fittings. • The system may have overheated. Remove the enclosure cover to allow pump to cool. • Pump Pack pump/motor not generating pressure. • Faulty pressure transducer/dump valve.

HYDRAULIC CIRCUIT INTEGRITY FAILURE:

If the system has lost pressure and a hand pump will not charge and maintain pressure, it may be necessary to mechanically release the park brake to move the vehicle.

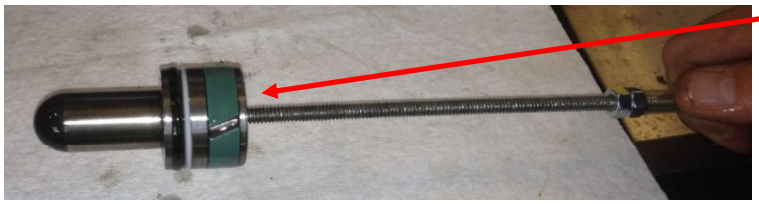
!DANGER! THIS PROCESS DISABLES THE PARKING/FUNCTION OF THE LC BRAKE SYSTEM. THE PARK BRAKE WILL BE UNABLE TO APPLY RESPONSE TO AN EMERGENCY SITUATION.

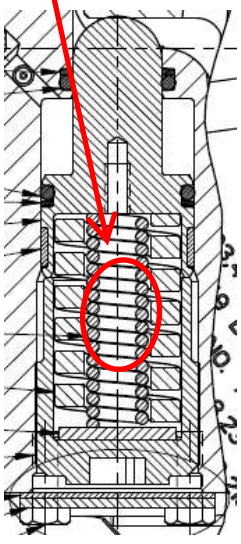




1. Secure and jack up the vehicle. Support the vehicle using jack stands or other suitable devices.
2. Remove the wheels.
3. Remove the four bolts from the plate.
4. Remove the plate and the gasket.
5. Remove end cap with a ½" driver.
6. Remove the two nested springs.
7. If the hub turns freely, continue to step 8. If the hub does not turn freely, insert a 1/4"-28 threaded rod into the piston bore. Thread the rod into the piston as shown below. Retract the piston until the hub moves freely. The piston should need to move less than 10 mm to release brake.

   DO NOT remove the piston from the brake.





8. Replace the piston cap, gasket and end cap cover and put the cover bolts back in.
9. Disconnect the parking brake hydraulic line and plug the line with an appropriate fitting.
10. Do not reinstall compression springs. Safely store compression springs for later use.
11. Test the other brake for release. Repeat process if necessary on remaining brakes.

SECTION 2

INSPECTION INTERVALS

Section 2: Inspection Intervals

Periodic inspections and maintenance will help keep your LC Brake performing at its best.

Oil Change	Every **1000 hours** if required. Environment and severity of use can affect the life of the Ausco LC Brake Oil. See following pages for additional details.
Service	Every **250 hours** or at engine fluid changes (whichever is more frequent).
Inspections	See following pages for additional details.

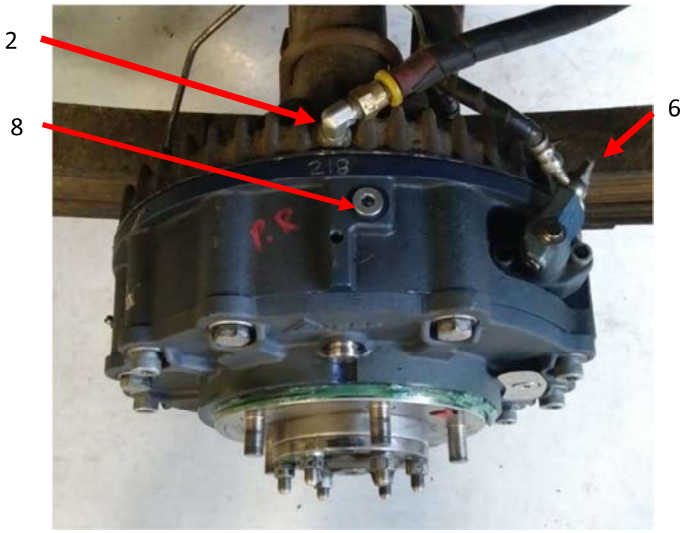
- **Wear pin height**	This is an indicator of remaining brake life.
- **Oil condition**	Early detection of brake issues.
- **Grease barriers**	Prevents foreign particle and water intrusion.
- **Seal condition**	Prevents foreign particle and water intrusion and keeps LC Brake Oil inside the brake.
- **Pump Pack**	Generates pressure to release park brake.
- **Tube & Hose Leaks**	Prevent fluid loss.

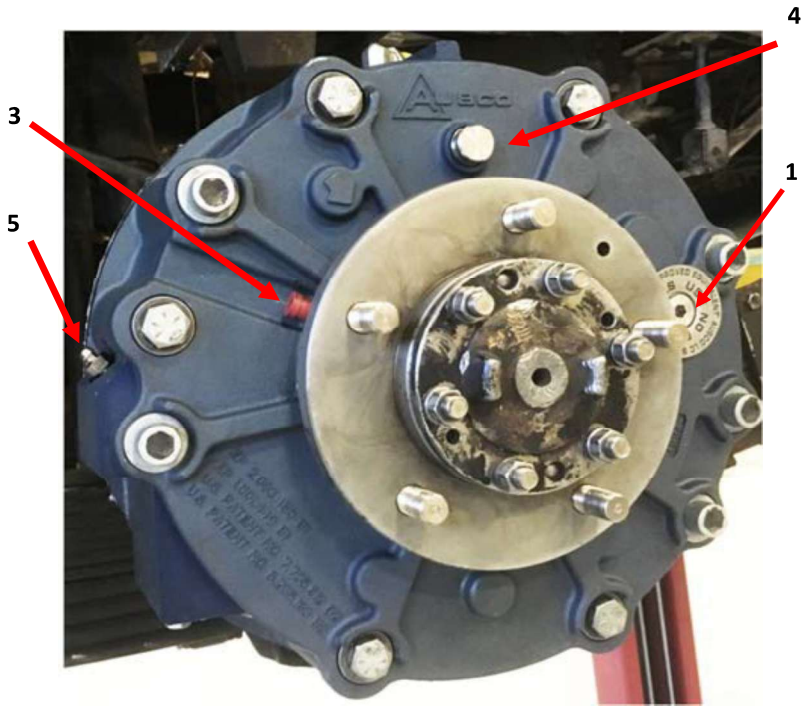
Service Kit Compatibility				
	98820-4	**98820-6**	**99414-4**	**99414-6**
97563 - Mounting O-Ring Kit	X	X	X	X
97574 - Connector Tube Kit	X	X	X	X
97781 - Adapter Kit - Disc Brake Shim	X	X	X	X
98335 - Mounting Adapter Kit	X	X	X	X
98336 - Slave Cylinder Kit	X	X	X	X
98338-3 - Hub Kit (with Bearings)	X	X	X	X
98339 - Seal Kit (Complete)	X		X	
98339-1 - Seal Kit (Complete)		X		X
98901 - SAHR Kit	X	X		
98902-1 - Rebuild Kit	X			
98902-2 - Rebuild Kit		X		
99662 - SAHR Kit			X	X
99663-1 - Rebuild Kit			X	
99663-2 - Rebuild Kit				X
101221 - Wheel Stud (Single)	X	X	X	X
102005 - Seal Kit (Hub)	Purchase 98339	X	Purchase 98339	X
“X” indicates compatible brakes and kits				

Drawings of kits are available on our website at: http://www.auscoproducts.com/service-sheets/

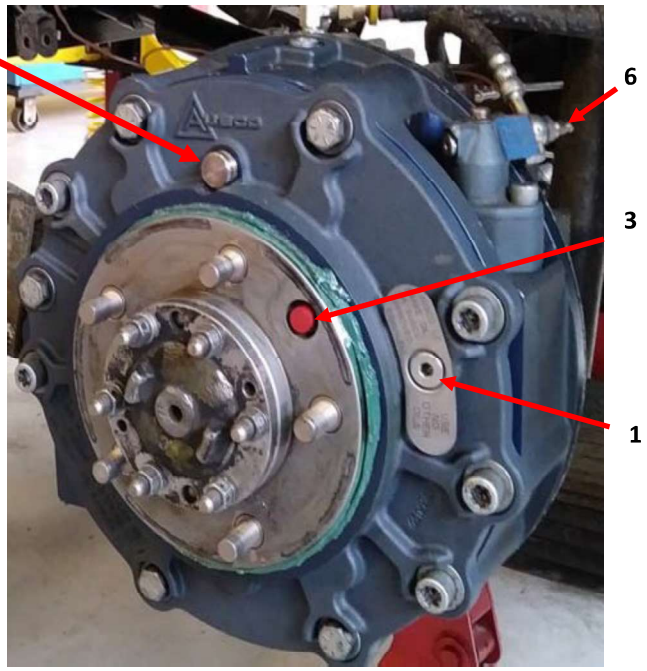
Service Point Identification

1 – Oil level port
2 – Vent port
3 – Grease fitting for hub seal
4 – Wear indicator plug
5 – Parking hydraulic bleeder (ATF)
6 – Service brake bleeder (DOT 3)
7 – Brake cavity oil drain (bottom of brake)
8 – Fill port (top of brake)
9 – Pump pack fluid level (with parking brake applied)

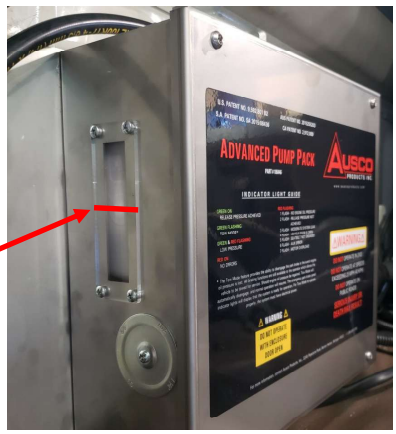




99414-4 & 99820-4 LC Brakes



99414-6 & 99820-6 LC Brakes

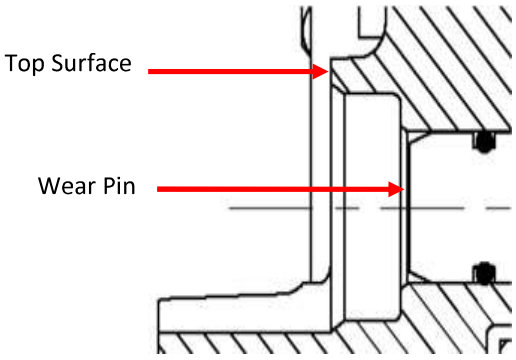


Section 2: Inspection Intervals

Checking wear pin height – Remove wear pin plug and clean the top surface of wear pin bore. Wear pin plug can be removed by prying with a screw driver or other flat tool. Park brake must be applied for an accurate wear reading. Measure the height of the wear pin face to the top surface of the wear plug bore on the end plate face. If the pin measures 6.48 mm (0.255”) or less the brake is worn and requires rebuilding.

99414-4 & 99820-4 LC Brakes

99414-6 & 99820-6 LC Brakes



Dimension	Brake Condi-tion	Action
7.62 mm (0.300 in min)	New - Park brake applied (pump pack off)	None
7.62 mm (0.300 in min) to 6.48 mm (0.255 in)	In Service - Park brake applied (pump pack off)	Monitor wear over time
6.48 mm (0.255 in) or less	Worn - Park brake applied (pump pack off)	Rebuild Brake

Section 2: Inspection Intervals

Check oil:

- Remove plug from oil level port and examine oil.
- Oil level should be up to oil level port. Use only an approved Ausco LC Brake Oil.
- If oil is milky change oil and replace seals. Water intrusion is the likely cause. Oil can be drained through drain port on bottom of brake.
- If oil is thicker than normal or if any sludge is present change oil and replace seals. Grease in the oil will degrade performance. Brake may require rebuild depending on severity of contamination.
- If oil smells burnt, change oil.
- If there are metal particles in oil, seek service. Brake may need to be rebuilt or replaced.
- When refilling or adding oil, add an approved Ausco LC Brake Oil at fill port until it reaches the oil level port.

! DANGER ! Using fluids other than an approved Ausco LC Brake Oil will affect brake performance creating hazardous conditions.

! WARNING ! Using fluids other than an approved Ausco LC Brake Oil will void brake warranties.

Ausco LC Brake Approved Oils	
All weather Conditions	**CATERPILLAR TDTO OW-20**
For use only in warm climates with temperatures above 0° C (32° F)	**CATERPILLAR TDTO 10 W**

Grease Barrier & Seal Condition:

The –4 and –6 brakes have different configurations for the seals and grease barriers. The main difference is that the –6 brake has a wiper and second grease chamber. Another feature of note is that the –6 seals can be serviced from the exterior of the brake. Care and maintenance for both versions are basically the same.

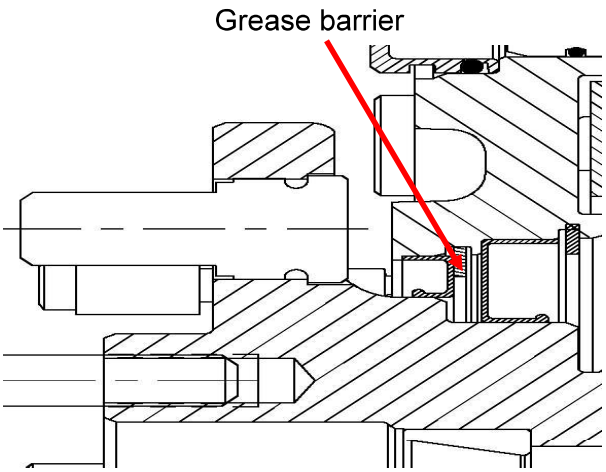
Approved Greases
BP ENERGREASE LS3
SHELL GADUS S 5 T100
SHELL GADUS S 5 V100
MAGNALUBE-G

- Inspect seals and wiper for obvious damage. Replace as necessary.
- Inspect seals for oil leaks. Replace as necessary.
- Apply fresh grease through the grease fitting.
  - -4 brake grease fitting is located on the end plate of brake.
  - -6 brake grease fitting is located in the hub face.
  - **! WARNING !** Do not use **EP GREASE**. This may cause lining damage in some cases..
  - **! NOTE !** Parking brake must be released to allow hub rotation.
  - Use only an approved high temperature grease from chart.

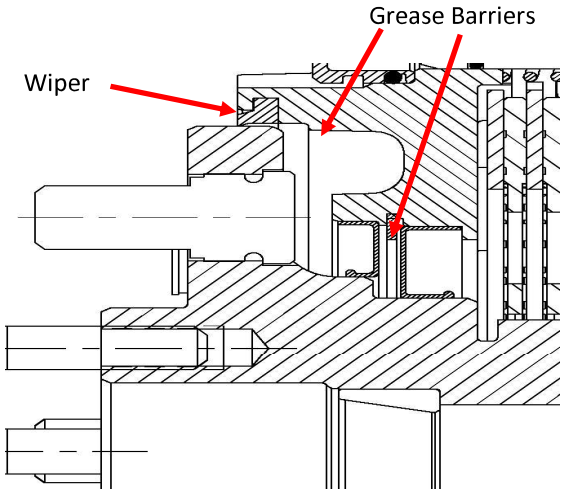
! NOTE ! -4 brakes will fill quickly when grease is applied. Total volume needed is low. **DO NOT** use a power greaser. Fill only with a manual grease gun.

! NOTE ! -6 brakes have a much larger grease barrier. It will require approximately 400g of grease for a new install.

Apply grease at grease port until grease appears around lip of outer seal, then rotate hub 90 degrees. Repeat greasing in this manner 3 times. Add grease until fresh grease appears around outer seal or wiper. If water or debris are expelled from seal, continue to add grease until all water or debris is removed. Clean any excess grease.



99414-4 & 99820-4 LC Brakes



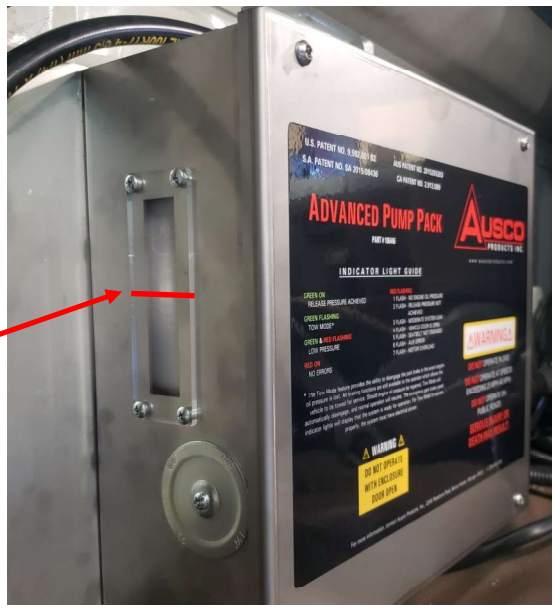
99414-6 & 99820-6 LC Brakes

Pump Pack:

- Inspect plumbing and fittings for leaks.
- Maintain proper fluid level in pump reservoir as follows:
  - With parking brake applied, the pump reservoir should be at least 1/2 full.
  - Use Dex/Merc ATF fluid in normal temperature (above 0° C) operating environments.
  - Use Kendall Glacial Blue in cold operating environments (below 0° C).

Tubes, Hoses, and Fittings:

- Inspect all plumbing and fittings for leaks.
- Inspect all plumbing and fittings for wear or other damage.
- Verify fitting connections are tightened appropriately.
- Verify all plumbing is secured to vehicle and is routed to be free from any pinch points



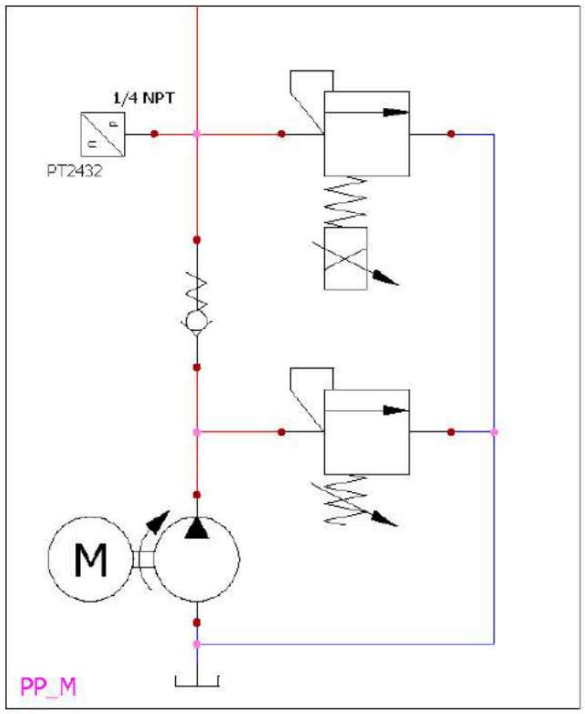
SECTION 3

ABOUT THE

PUMP PACK

Hydraulic Schematic

To Park Brakes

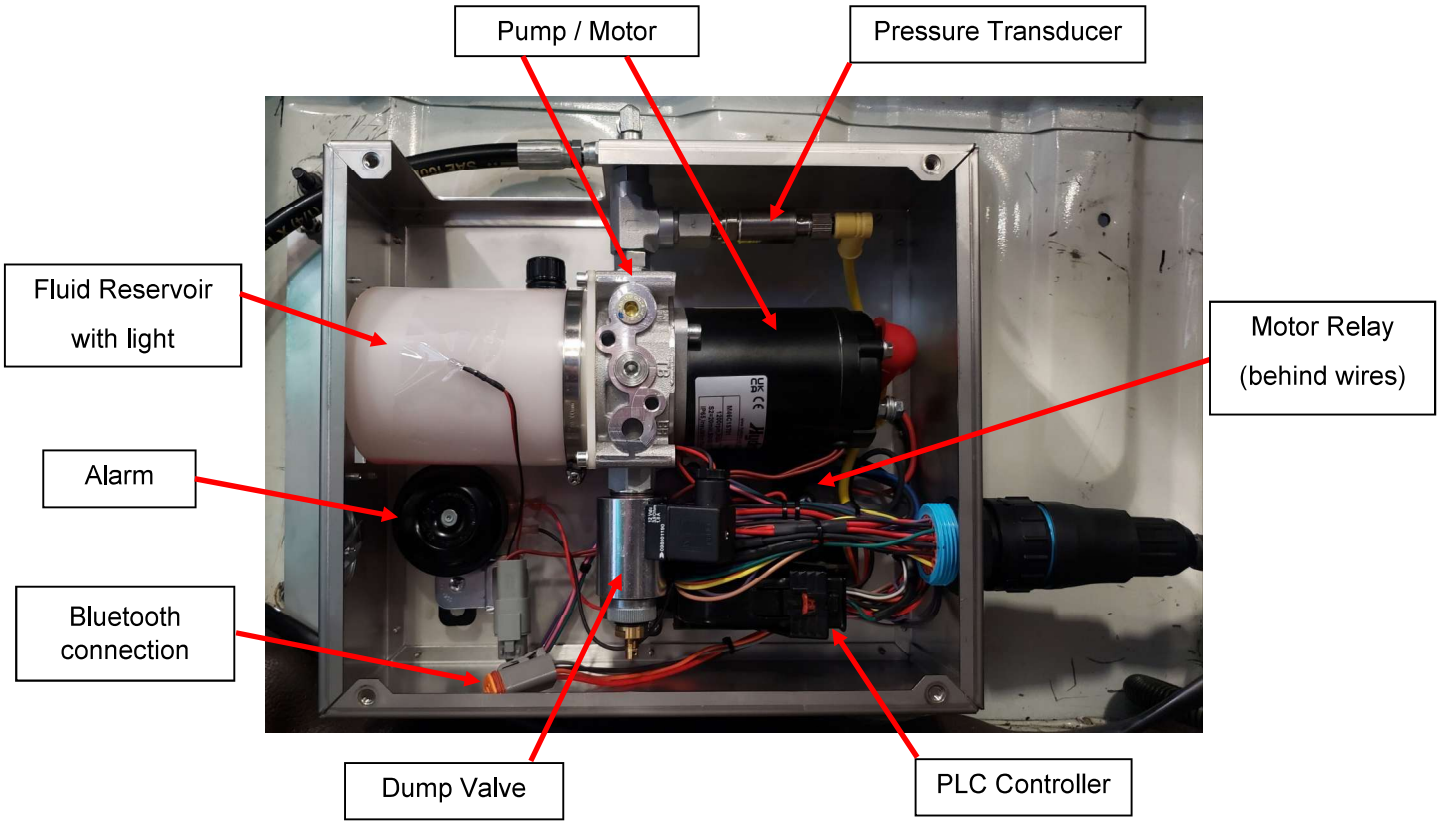


Dash Panel Control

Push to APPLY

Twist to RELEASE

Component Content Map in Enclosure



Basic Theory of Operation:

The pump pack provides hydraulic pressure to release the spring applied park brake in Ausco's LC Brake. The pump pack contains a pump/motor with a reservoir and a programmable logic controller (PLC). When the vehicle ignition is turned on, the PLC is activated, and the red LED light illuminates continuously indicating that the park brakes are applied. It is important to note that the engine must be started to release the park brake.

The PLC monitors system pressure continuously. The PLC also monitors the position of the dash Park Brake switch while the vehicle engine is running. After the PARK BRAKE button on the dash panel is twisted to the release position, the solenoid dump valve is energized (closed), and the hydraulic system energizes the pump and builds pressure. During this phase, the alarm will sound inside the enclosure. The pressure transducer measures the pressure, and the pressure is read by the PLC. The red LED light will flash indicating that the park brake is being released. When the pressure reaches normal operating pressure, the pump is shut off, and the green LED will illuminate. If the pressure drops below minimum system operating pressure, the pump is again energized, until the pressure returns to normal operating pressure. If pressure drops below minimum operating pressure and normal operating pressure cannot be achieved, the red light flashes 8 times. If pressure stays below minimum, the red & green light flash alternately, the horn sounds, and the park brake is applied. In addition, if the pump runs too frequently, the red LED will flash three times repeatedly on the dash panel.

The PLC also monitors the engine oil pressure switch. If engine oil pressure is lost, the PLC will dump pressure and apply the park brake. The red LED will flash once repeatedly on the dash panel.

A door switch option is also available. If a door is opened, the PLC cuts power to the solenoid dump valve, which releases hydraulic pressure and applies the park brake. The red LED will flash four times repeatedly on the dash panel.

A seat belt switch option is also available. If the seat belt is unbuckled, the PLC cuts power to the solenoid dump valve, which releases hydraulic pressure and applies the park brake. The red LED will flash five times repeatedly on the dash panel.

An auxiliary input signal is also available for any aftermarket systems. The PLC will monitor this input for a ground signal. If a ground signal is detected, the PLC cuts power to the solenoid dump valve, which releases hydraulic pressure and applies the park brake. The red LED will flash six times repeatedly on the dash panel.

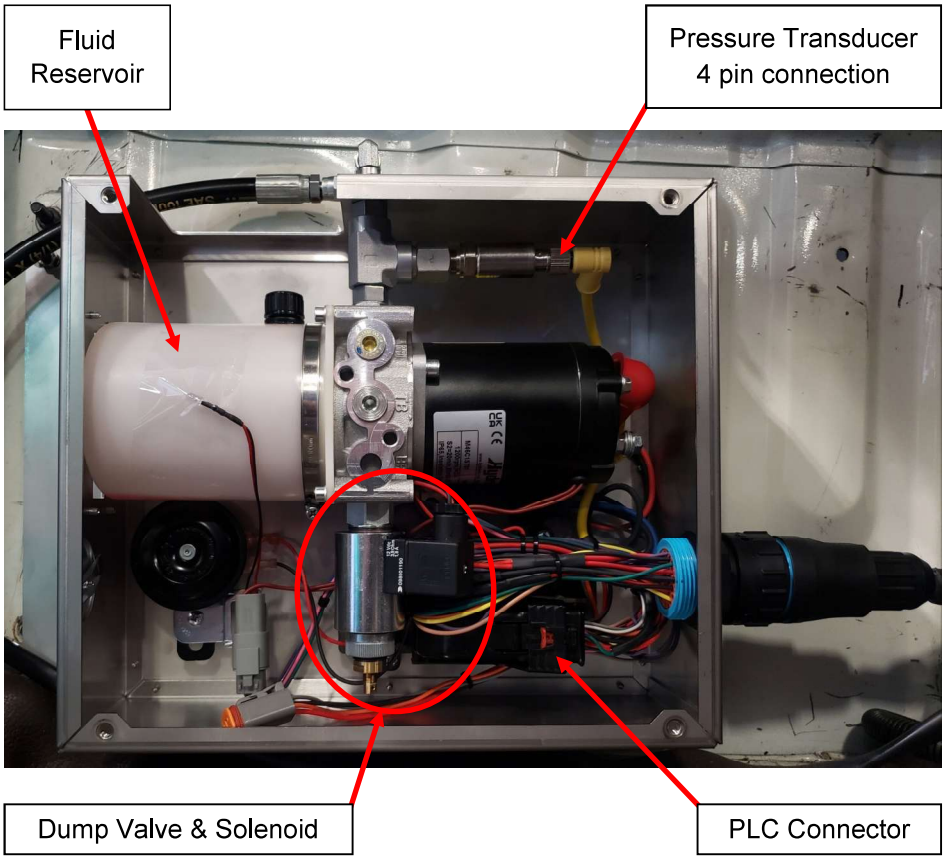
During normal operation when the park brake button is pressed, power to the pump and the solenoid valve is discontinued. This dumps all pressure back to the reservoir, and the red LED will illuminate continuously.

Basic Theory of Operation:

A “Tow Mode” switch is installed on the dash control panel in case of engine failure. “Tow Mode” bypasses the engine oil pressure switch to release the parking brakes without the engine running. If the door is opened during “Tow Mode,” it will still cause the park brake to apply. If at any point the engine is started, and engine oil pressure is detected, “Tow Mode” is discontinued, and the system will operate normally.

The pump pack runs continuously. What should I do?

This diagnostic helps determine if the pressure transducer in the pump pack is causing the pump to run continuously.



- Hydraulic check
  - A 180 bar (2500 psi) or larger pressure gauge installed in-line is helpful but not required.
  - If the problem occurs after the vehicle has been in use, check the fluid temperature in the pump reservoir. The fluid may have become too thin to pump if the temperature is over 70°C [158°F].
  - Pressure transducer test process:
    - Start the vehicle.
    - Twist to release the park brake button.

      -Wait 7 seconds for the pump to build pressure.

      -With the vehicle in 3rd gear low range, try to move the vehicle while the pump is running.

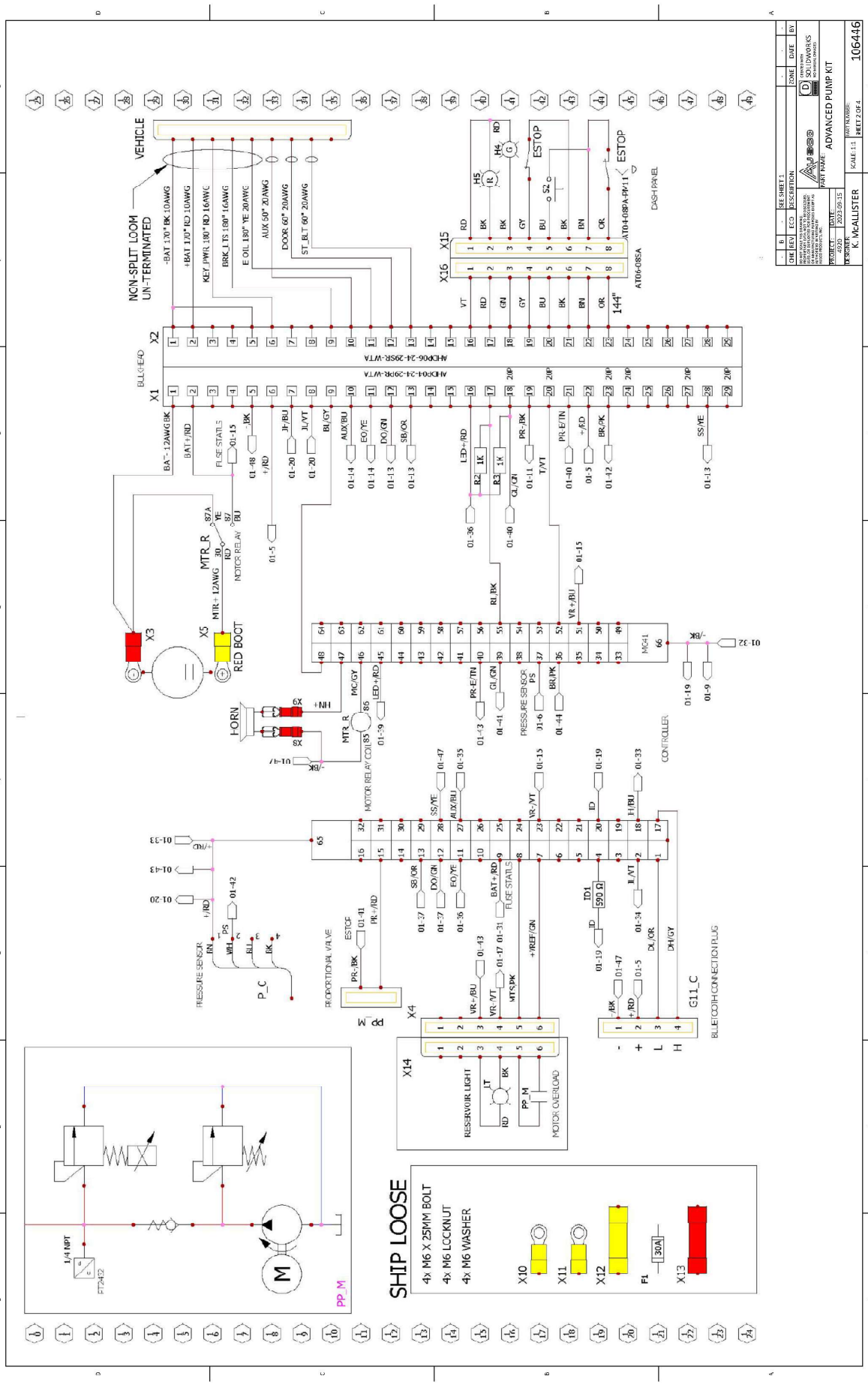
      ◊ Brake will reapply after 15 seconds of the pump motor running.

- Results:
    - If after 7 seconds the vehicle moves easily, then the pump is building pressure but not reaching 1900 psi or the transducer is not telling the pump to shut off.
    - For verification by pressure gauge:
        - Brakes fully release at 103 Bar (1500 PSI).
        - Pump motor shuts off at 131 Bar (1900 PSI).
    - If the vehicle still does not move, the solenoid dump valve is likely stuck open (no significant pressure created). Replace valve.
    - If you have an Ausco p/n 107393 IQAN Bluetooth dongle, you can use it to view the pressure as read by the pump transducer. See page 49.

Quick Operators Guide

Ausco LC Wet Brakes with Pump Pack

Daily checks		
	Park brake	
		See your supervisor.
Checks @ 250 service hours		
	Check brake oil	
		Remove plug from site port. Examine oil.
		Milky, water intrusion – change oil.
		Burnt smell – change oil.
		Metal particles present – seek service.
	Grease zerk fittings	
		Add grease while rotating hub until ring of grease appears around shaft. Remove excess grease.
	Measure wear indicator	
		Remove wear plug. Measure depth. If less than 0.255" (6.48 mm) remove vehicle from service and rebuild or replace the brake.
	Pump pack	
		Turn off breaker or remove inline fuse located in engine compartment. Remove the cover. Verify that the fluid reservoir is at least 1/2 full.
Pump Pack trouble shooting guide – !**DO NOT OPERATE VEHICLE WITHOUT ENCLOSURE COVER INSTALLED!**		
Tow Mode -		
The Tow Mode feature of the pump pack provides the ability to disengage the park brake in the event engine oil pressure is lost. All braking functions are still available to the operator. This allows the vehicle to be towed for service. Should the vehicle start (engine oil pressure reestablished), Tow Mode will automatically disengage, and normal operation will resume. The indicator lights on the dash panel will display that the system is ready for operation. In order for Tow Mode to operate properly, the system must have electrical power. In the event electrical power is unavailable it is recommended to use a manual hand pump with a pressure gage to restore system pressure. To connect the manual hand pump, turn off the breaker or remove the inline fuse located in the engine compartment. Remove the cover from the pump pack; then disconnect the quick-connect and connect to the hand pump. Pump the system up to 1600+/-100 psi, and the park brake will disengage.		


VEHICLE
NON-SPLIT LOOM
UN-TERMINATED
ESTOP
DASH PANEL
ADVANCED PUMP KIT
106446
K. McALLISTER
MOTOR RELAY
RED BOOT
HORN
CONTROLLER
PRESSURE SENSOR
PROPORTIONAL VALVE
RESERVOIR LIGHT
MOTOR OVERLOAD
BLUE COM CONNECTION PLUG
SHIP LOOSE
4x M6 X 25MM BOLT
4x M6 LOCKNUT
4x M6 WASHER
1/4 NPT

SECTION 4

Bluetooth Diagnostic Features

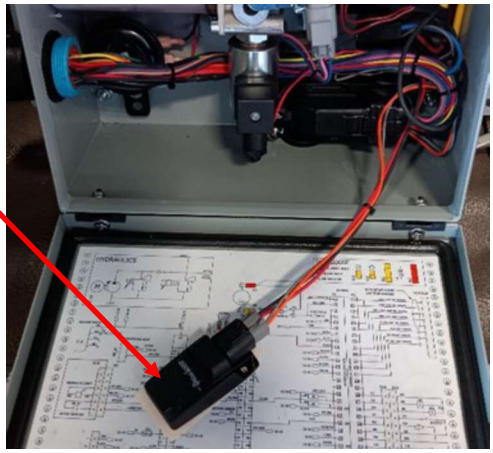
Section 4: Bluetooth Diagnostic Features

To use IQAN Diagnostics, you will need:

- Ausco part # 107393 Parker IQAN G12 Bluetooth Dongle
- A Bluetooth ready smartphone or tablet with IQANgo ap installed.

IQANgo can be downloaded from the Apple App Store or Google Play.

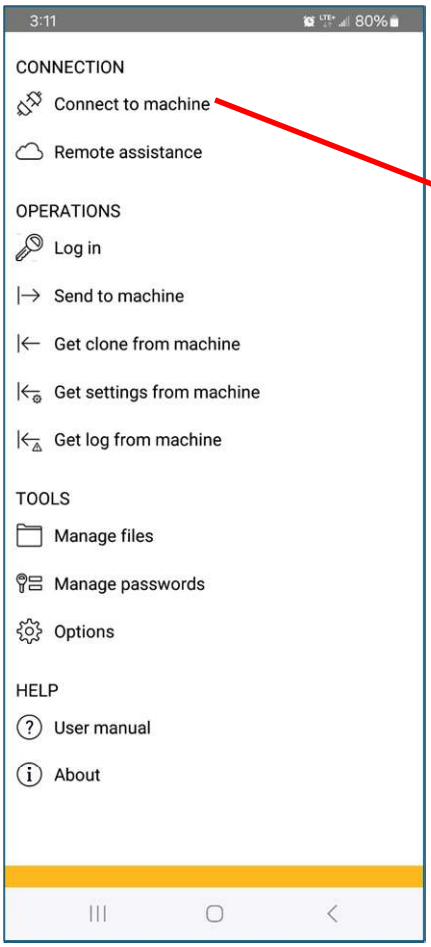
Connect the Bluetooth Dongle to the loose connection in the pump enclosure.

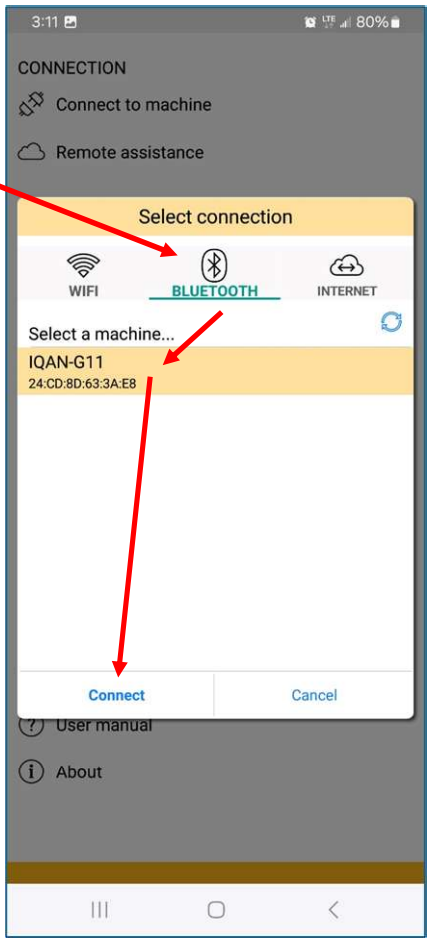


Open the IQAN ap and select “Connect to machine”

Select Bluetooth and then IQAN-G11 or IQAN-G12. Then select Connect.

If the ap asks for a passkey, try 0000 or 00000 (all zeros).





Section 4: Bluetooth Diagnostic Features

Once connected, you will see a row of options at the bottom of the screen in yellow.

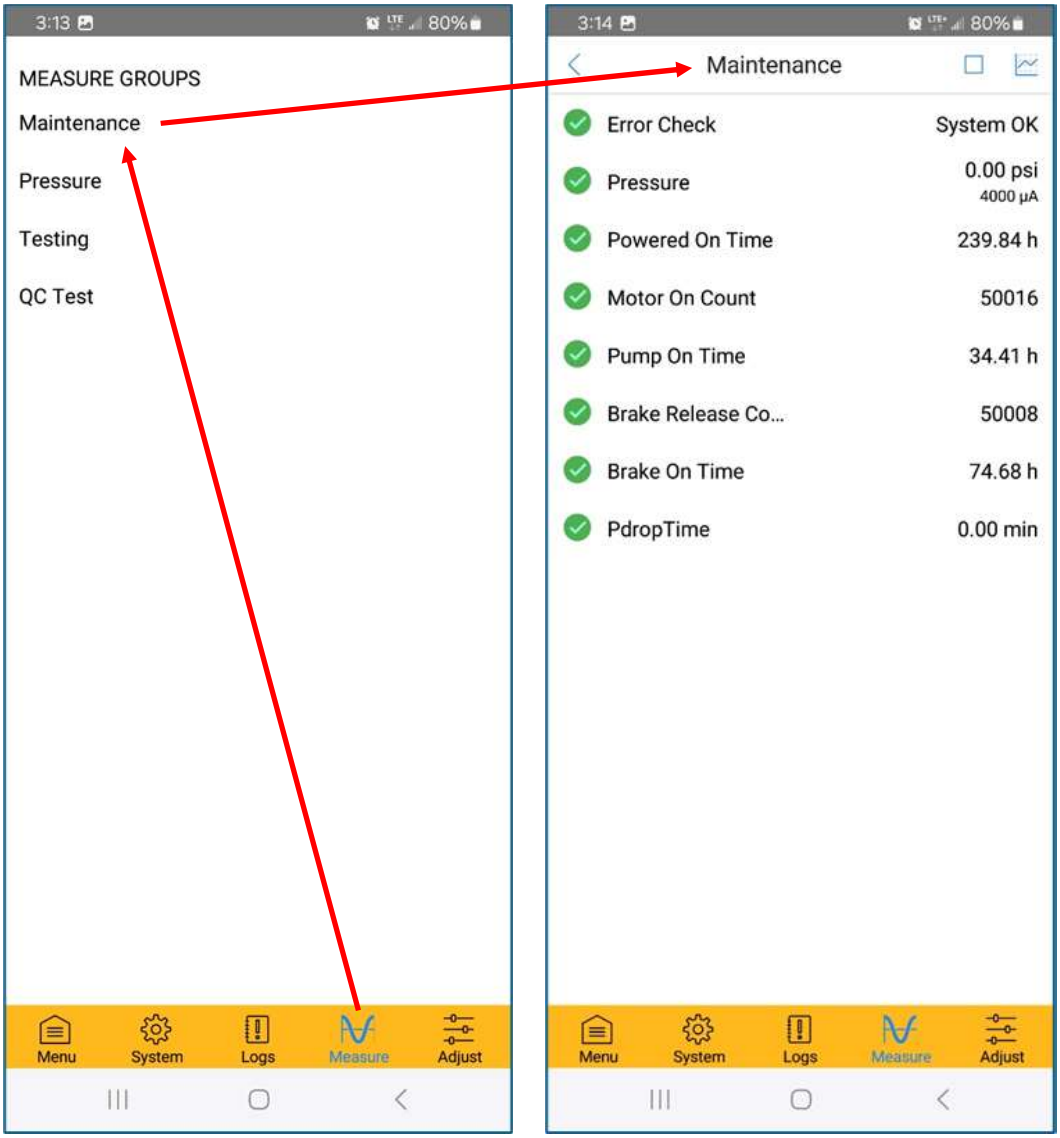
Some options such as “Adjust” are locked out and are only available to Ausco distributors.

Select Measure 

at the bottom of the screen. You will see the following menu (below left):

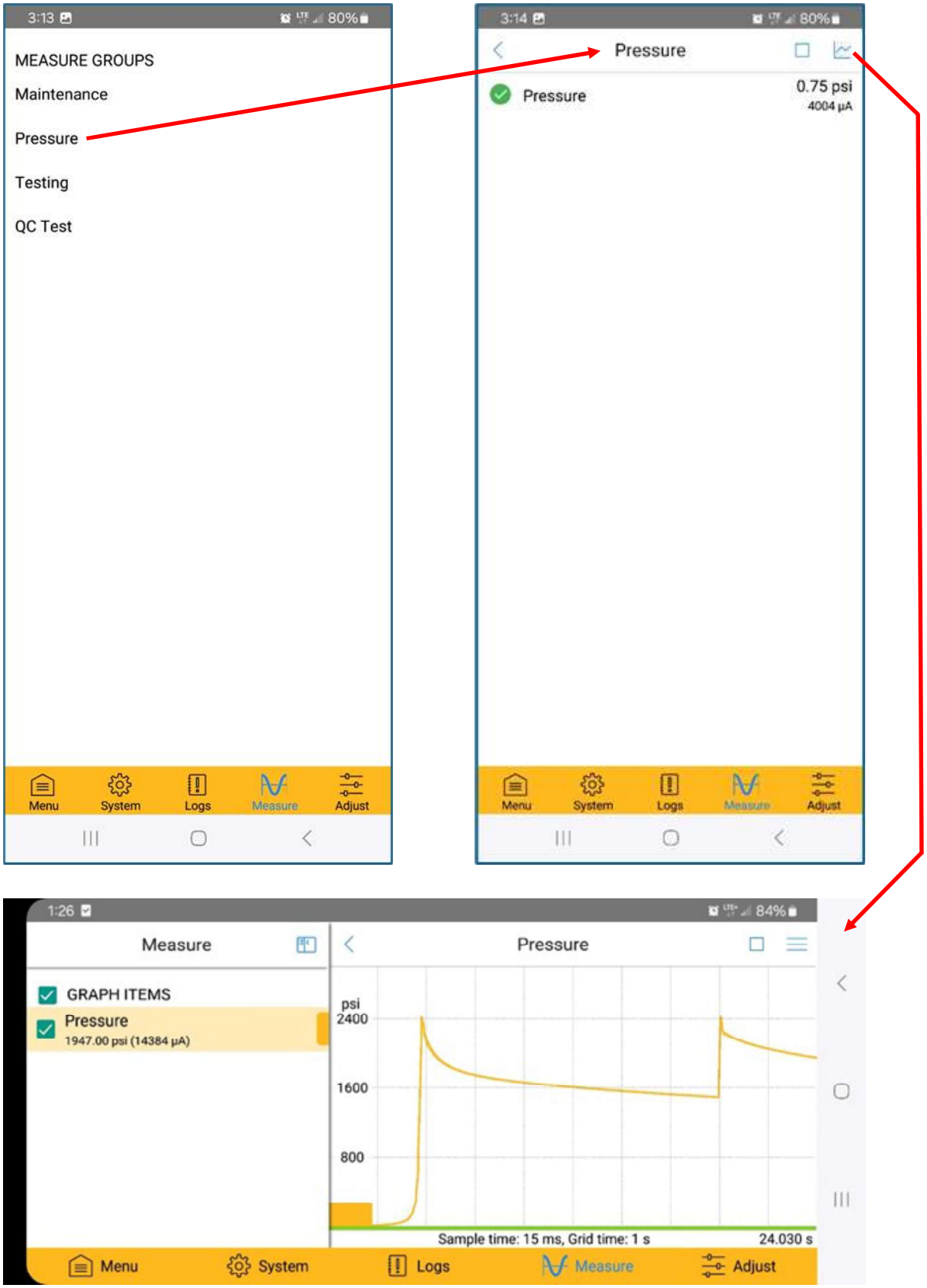
From here you can pick from the list of groups to check the status of the Ausco Pump Pack.

The Maintenance group will show you current pressure as well as counters and hour meter totals of the system.



Section 4: Bluetooth Diagnostic Features

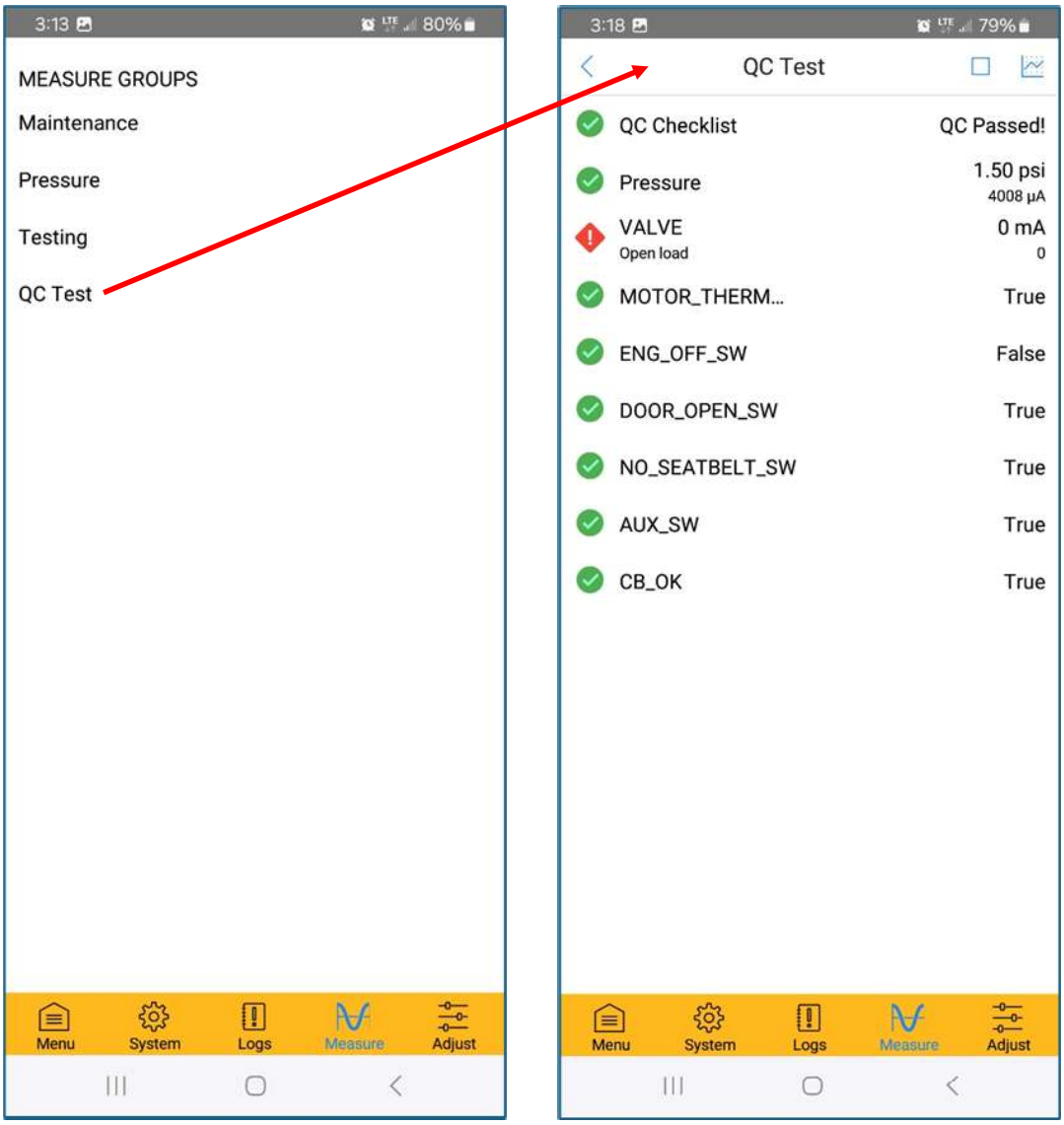
The Pressure group shows the current pressure. You can select the graph in the upper right corner to see a running graph of pressure over time. Turning your device to landscape will show more information.



Section 4: Bluetooth Diagnostic Features

The QC Test group will show you status of system inputs. “True” means that the switch is in a condition to allow the pump to release the brakes. “False” status of any input will cause a fault if the operator attempts to release the brakes. In the example below:

- ENG_OFF_SW is False because the engine does not have oil pressure (engine not running).
- “<!> Valve Open Load” is normal when the e-stop button is in the depressed position.
- MOTOR_THERM… will indicate false if the pump motor has overheated or the under-hood fuse is blown.



SECTION 5

SERVICING THE

REAR HUB

FAILURE TO FOLLOW THESE SAFETY WARNINGS CAN RESULT IN SERIOUS INJURY OR DEATH.

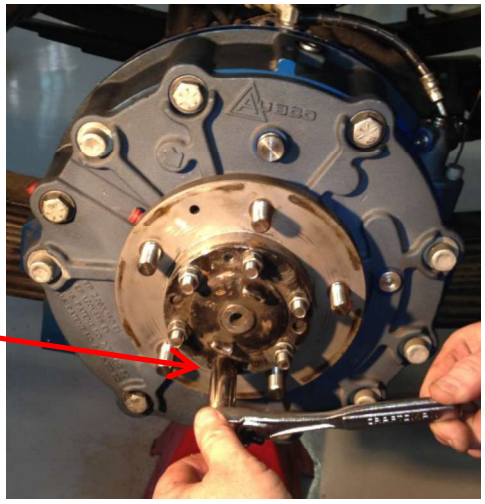
- This brake is not safe or legal for on-highway use.
- This brake should only be used on vehicles whose maximum speed does not exceed 25 mph [40 kph].
- This brake should only be used on vehicles driven in 4WD.
- This brake should only be used with an Ausco pump kit. Do not use a pump kit from any other manufacturer.
- **NEVER USE AFTERMARKET PARTS WITH THIS BRAKE. AFTERMARKET PARTS MAY CAUSE THE BRAKE TO FAIL.**
- **It is unsafe to attempt any in-service brake adjustments. It can cause brake failure.**

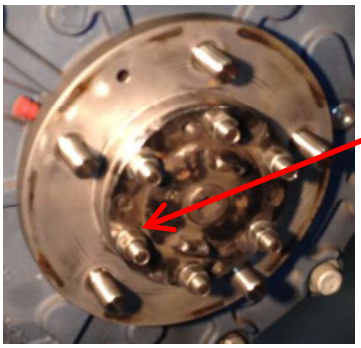
Contact Ausco products (www.auscoproducts.com) for technical assistance with application or design questions.

Use of the Rear Hub Kit (P/N 98338.3) may be used to accomplish this service.

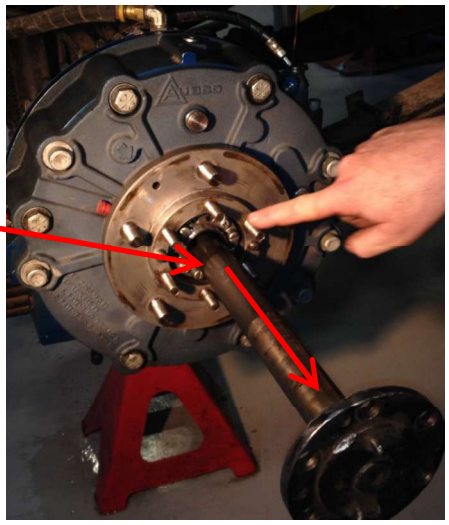
! NOTE ! The brake does not need to be removed from the vehicle to service the hub and bearings.

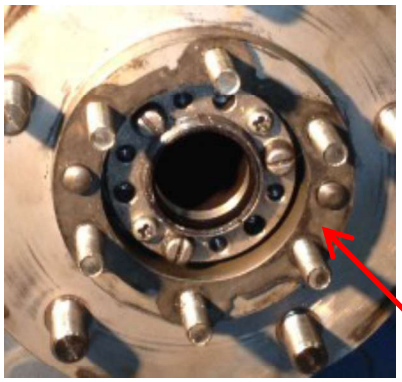
1. Remove the drain plug and drain the oil from the brake. Do not remove the slave cylinder.





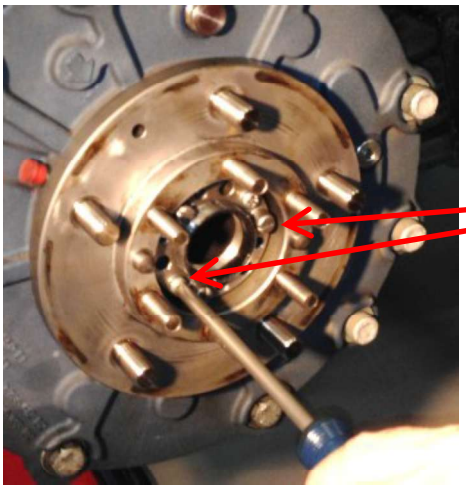
2. Remove the six cone washers, flat washers and nuts.





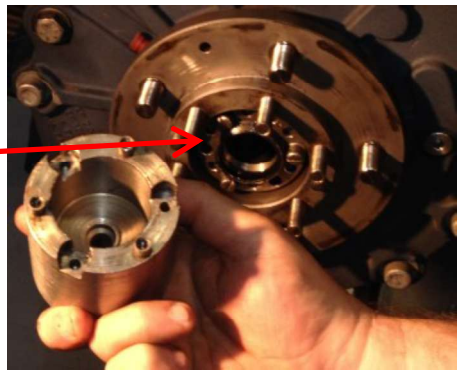
3. Remove axle shaft. Gently set off to the side and inspect for wear or damage.

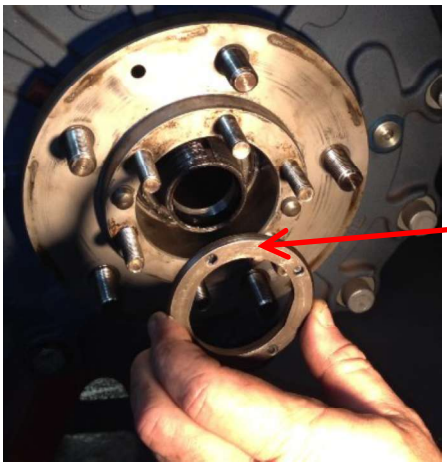
4. Remove the gasket.



5. Remove the locking screws.

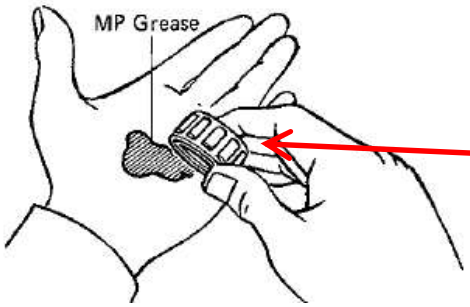
6. Remove the locking nut.



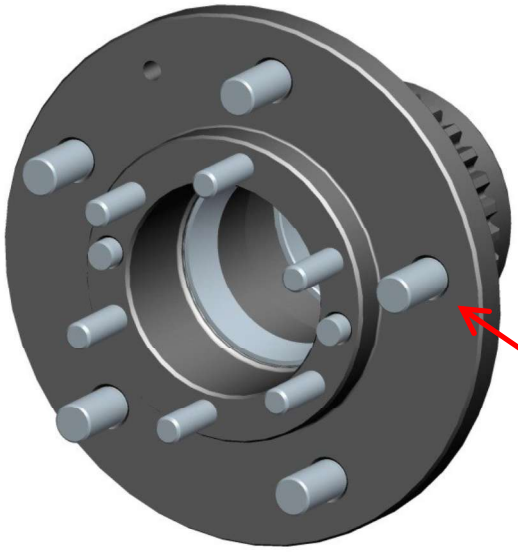


7. Remove the thrust washer.

8. Remove the bearing and the hub. **! WARNING ! DO NOT** release the park brake while the hub is removed. This will cause the rotating discs to become misaligned.



9. Remove the inboard bearing cone and replace with the inboard bearing cone (P/N 96915) from the Rear Hub Kit. Pack with grease.

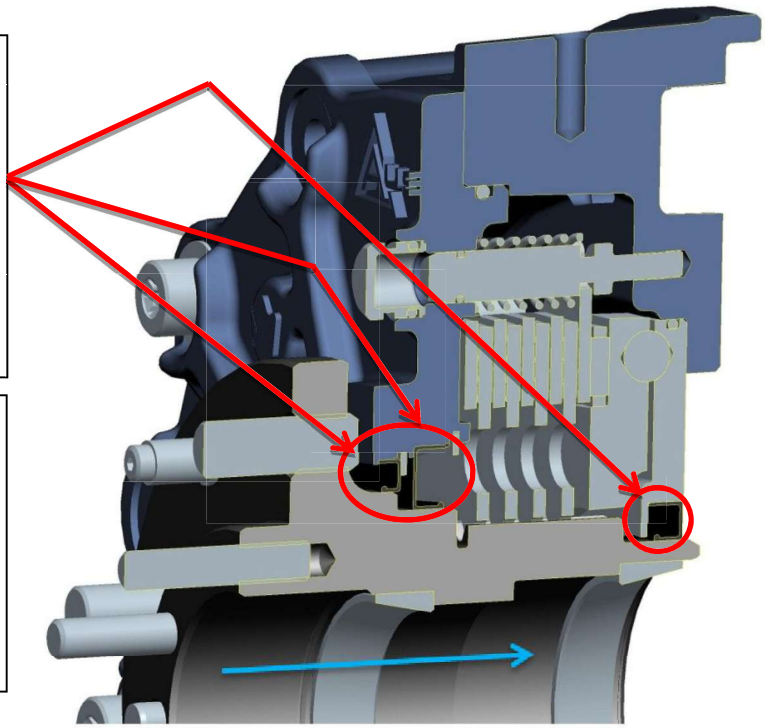


10. Install bearing cone on spindle.

11. The Rear Hub Kit (P/N 98338-3) comes with the dowel pins, wheel studs, axle studs and bearing cups already installed as shown.

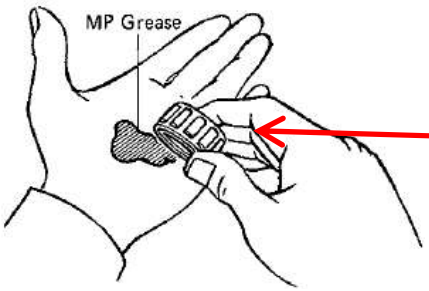
12. Inspect the noted seals for wear and damage. Replace if necessary. Lubricate the seal lips.

! note ! A **–4** brake must be removed to replace any of these seals. For a **–6** the paired outer seals can be replaced without removing the brake.

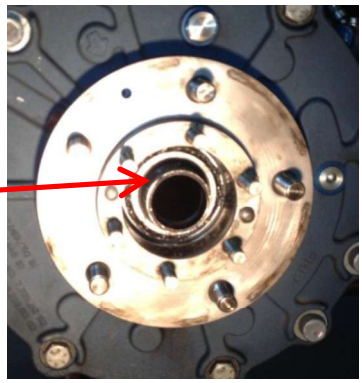


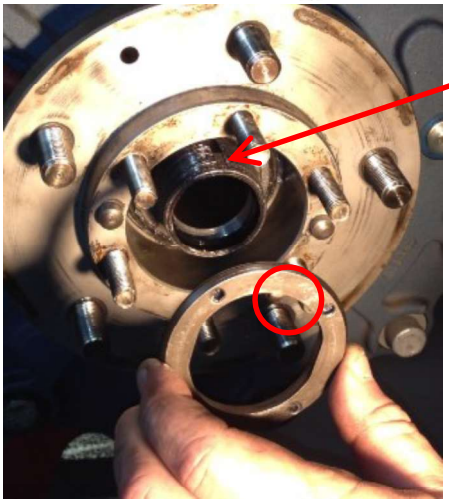
13. Slide the hub assembly into the brake by lining up the splines on the hub shaft with the splines in the brake.

! CAUTION ! Care must be taken not to damage or roll the seals lips while installing.



14. Locate the outboard bearing cone (P/N 96916) from the Rear Hub Kit. Pack with grease. Install bearing cone.



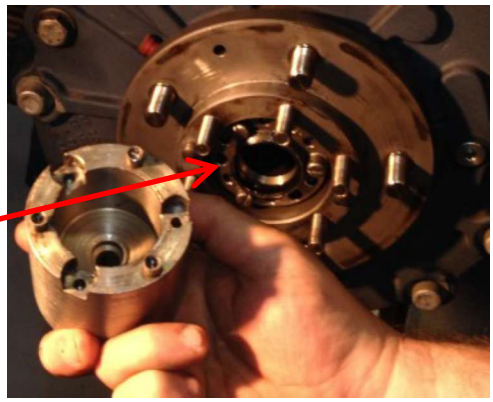


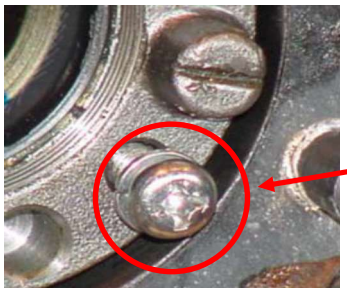
15. Install thrust washer. Be sure to align tab with the slot in the spindle.

! WARNING ! To set the bearings properly the brake must be released.

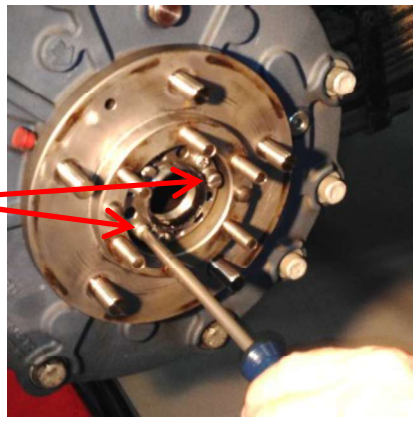
DO NOT PROCEED until brake is released.

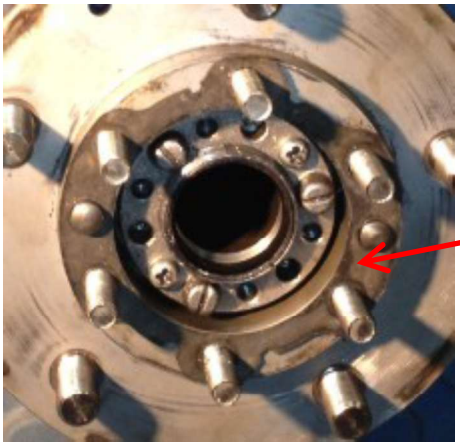
16. Install lock nut. Torque lock nut to 59 Nm (43 ft lbs). Turn the hub left and right several times. Loosen until the nut can be turned by hand. Torque to 59 Nm (43 ft lbs). Align witness marks for hole alignment.



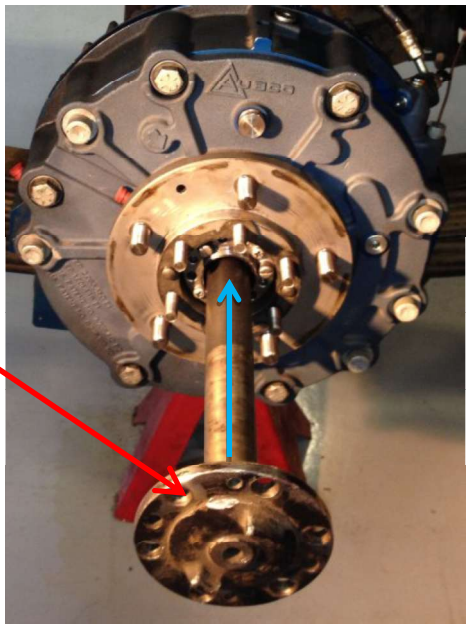


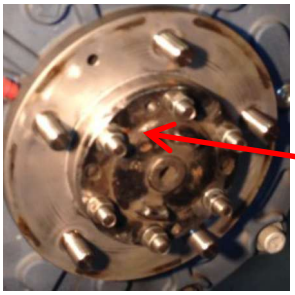
17. Install locking screws. Torque to 5.5 Nm (49 in-lbs).



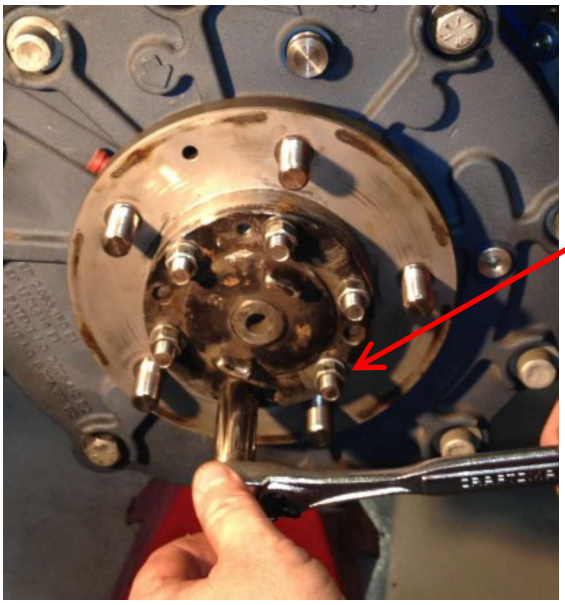


18. Install gasket.





19. Install axle shaft. Gently tap into place if necessary.

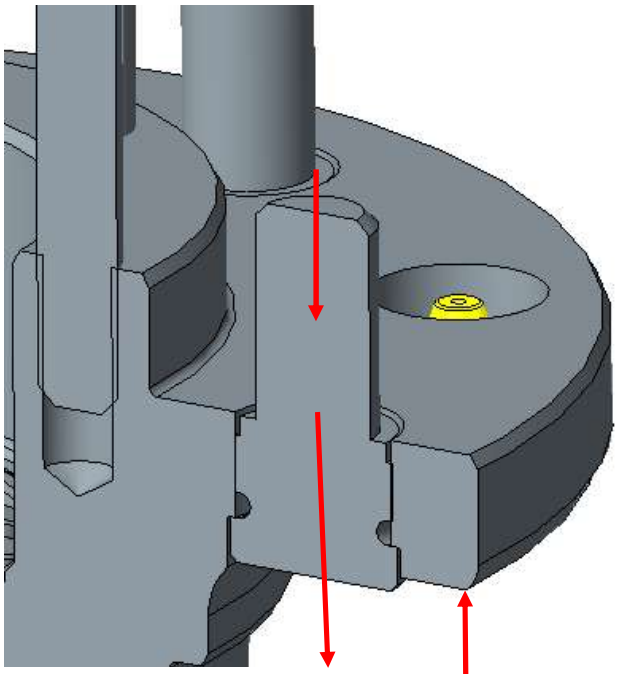


20. Install six cone washers, flat washers and nuts.
Torque the nuts to 37 Nm (27 ft lbs).

! WARNING ! Refill the brake with oil prior to use. See Section 2 for refill requirements.

Rear hub service is complete

Knurled Wheel Stud Removal

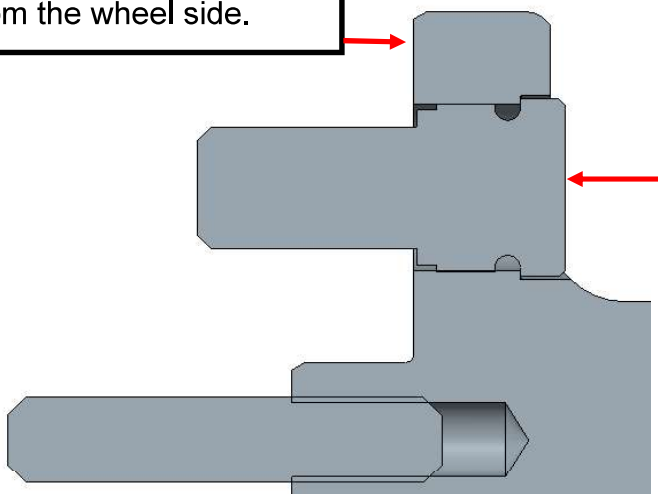


1. Support the hub flange from brake side.

2. Drive the stud out of the hub flange. A mallet or an arbor press may be used. Repeat for all five studs.

Knurled Wheel Stud Installation - Knurled Stud p/n 101221

1. Flip the brake over and support the hub flange from the wheel side.



2. Drive the stud down thru the hub flange. Press the stud until it bottoms in counterbore recess. A mallet or an arbor press may be used. Repeat for all five studs.

SECTION 6

SERVICING THE

SLAVE CYLINDER

FAILURE TO FOLLOW THESE SAFETY WARNINGS CAN RESULT IN SERIOUS INJURY OR DEATH.

- This brake is not safe or legal for on-highway use.
- This brake should only be used on vehicles whose maximum speed does not exceed 25 mph [40 kph].
- This brake should only be used on vehicles driven in 4WD.
- This brake should only be used with an Ausco pump kit. Do not use a pump kit from any other manufacturer.
- **NEVER USE AFTERMARKET PARTS WITH THIS BRAKE. AFTERMARKET PARTS MAY CAUSE THE BRAKE TO FAIL.**
- **It is unsafe to attempt any in-service brake adjustments. It can cause brake failure.**

Contact Ausco products (www.auscoproducts.com) for technical assistance with application or design questions.

Service Kit Instruction for the Slave Cylinder

For replacement refer to Slave Cylinder Kit (P/N 98336).

1. Remove the slave cylinder from the brake.

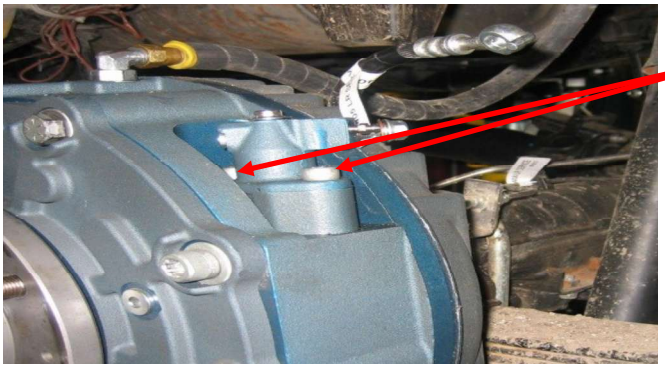
1. Remove any debris from the slave cylinder area that may contaminate the brake when the slave cylinder is removed. This may require the use of a power washer.

! WARNING ! If a power washer is used, take care that water does not enter the brake.

Inspect slave cylinder boot for damage, tears or signs of leakage.

! WARNING ! The slave cylinder is not a serviceable item. A replacement slave cylinder **MUST** be installed should any part of the slave cylinder require service.

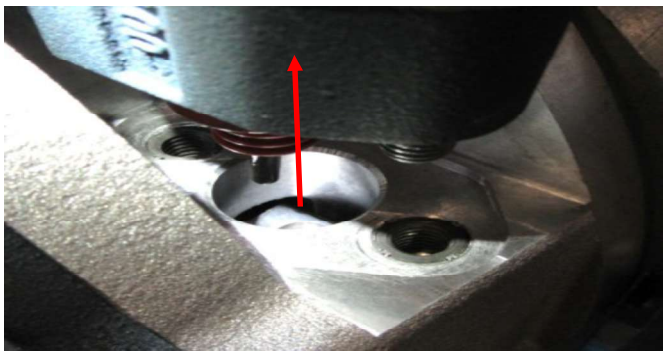
! CAUTION ! The brake **MUST** be drained and removed from vehicle If DOT 3 brake fluid leaks into the brake. **ALL** rubber parts inside the brake must be replaced. Seek help from a certified rebuilder. Specialized tooling and training required to service these



2. Remove the slave cylinder from the brake by unbolting the two socket head cap screws and carefully lifting the slave cylinder assembly off of the brake.

! CAUTION ! Be careful not to allow contaminants to fall into the slave cylinder bore in the brake housing.

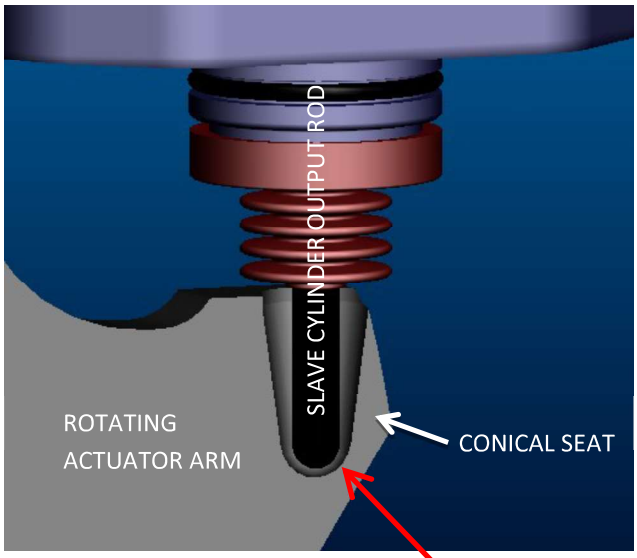
! NOTE! Occasionally debris and deposits around the slave cylinder will prevent easy removal. If the slave cylinder is stuck in its bore, the brake pedal can be used to push the slave cylinder out of the bore. It may be necessary to have the vehicle running to take advantage of full brake line pressure.

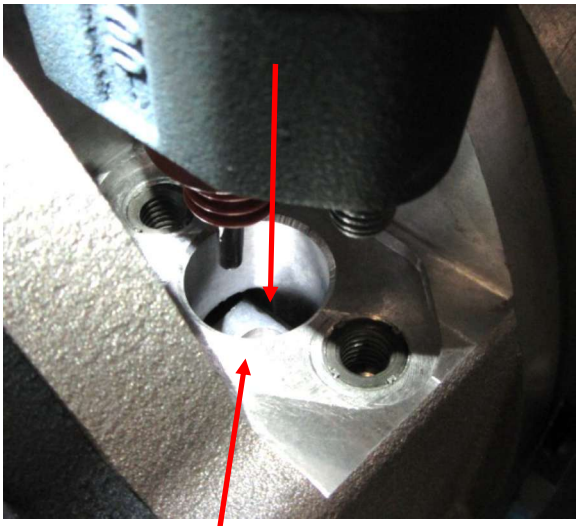


3. Carefully pinch the flexible brake line using a clamp or similar device to prevent brake fluid from spilling when the banjo bolt is disconnected.

4. Disconnect the banjo fitting and move the brake line out of the way.

2. Install the slave cylinder.





1. Make sure the output rod of the slave cylinder is lined up in the conical seat of the rotating actuator arm.

! CAUTION ! The parking brake **MUST** be released during slave cylinder installation to ensure proper position of the actuator arm.

2. Insert and tighten the two socket head cap screws in the slave cylinder to the brake housing. Torque to 48.8 Nm (36 ft lbs).

3. Reconnect the banjo line and remove the clamp that was used to pinch the line. Torque Banjo Bolt to 15 ft-lbs (20.3 Nm).

! WARNING ! Refill the brake with oil if drained. See Section 2 for refill requirements.

Bleed the service brakes. See following page.

3. Bleed the service brakes.

1. Be sure all brake line connections are secure and that the lines are free of any temporary clamps used during installation.
2. You will need a box-end or line wrench sized to fit the service brake bleeder, a clear plastic tube to fit over the bleeder and a clean container to collect the brake fluid. Note that using an open end wrench may lead to stripping the hex off the bleeder.

3. For a quicker bleed time, a power bleeder may be used to initially fill and bleed the system. **! WARNING !** A power bleeder will not reliably get all of the air from the slave cylinders. Use the two person bleed procedure to ensure that all of the air is removed.
4. **! WARNING !** For proper service brake bleeding, the park brakes must be released.
5. With the engine running, (or the key on with oil pressure switch and door switches by-passed), twist the PARK BRAKE button on the dashboard clockwise to engage the pump to release the brakes. Wait for the green light to illuminate. If the green light does not illuminate, see Section 6.
6. Be sure the master cylinder reservoir (in the engine compartment) is at least 2/3 full of DOT-3 brake fluid. During the bleed procedure, it is important to keep the master cylinder reservoir filled with brake fluid.
7. Two people are required to perform this bleed procedure. One person slowly pumps the brake pedal until it is firm and holds pressure in the brake line. The other person connects a clear tube and a wrench to the bleeder on the brake and puts the other end of the tube into a container. Then open the bleeder to allow the air to escape from the brake line. Be sure to keep the end of the tube below the fluid line in the container to keep air from backing into the lines.

! IMPORTANT ! Push and hold the pedal. Open the bleeder. When fluid flow stops, close the bleeder, then release the pedal.

8. Repeat this procedure until all of the air is out of the brake system.
9. Check for leaks at the banjo bolt fittings. Make sure there are no leaks.
10. When finished, the brake pedal should feel firm.

SECTION 7

REPLACEMENT AND INSTALLATION

FAILURE TO FOLLOW THESE SAFETY WARNINGS CAN RESULT IN SERIOUS INJURY OR DEATH.

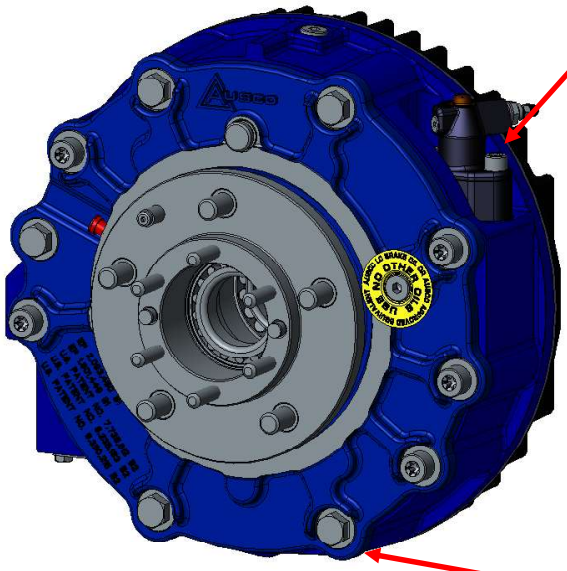
- This brake is not safe or legal for on-highway use.
- This brake should only be used on vehicles whose maximum speed does not exceed 25 mph [40 kph].
- This brake should only be used on vehicles driven in 4WD.
- This brake should only be used with an Ausco pump kit. Do not use a pump kit from any other manufacturer.
- **NEVER USE AFTERMARKET PARTS WITH THIS BRAKE. AFTERMARKET PARTS MAY CAUSE THE BRAKE TO FAIL.**
- **It is unsafe to attempt any in-service brake adjustments. It can cause brake failure.**

Contact Ausco products (www.auscoproducts.com) for technical assistance with application or design questions.

Ausco has designed the LC Brake to reduce vehicle downtime and maintenance costs.

Should maintenance be required on the LC Brake beyond adding oil or checking the wear pin it is designed to be quickly pulled off the vehicle and replaced with a new or rebuilt brake.

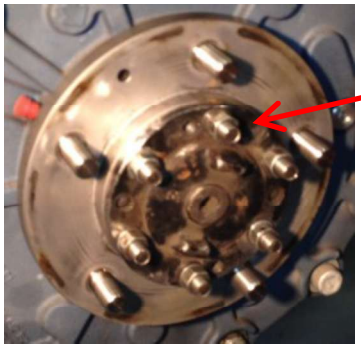
!WARNING! DO NOT attempt to repair, adjust, or rebuild the brake without the proper tools and training. If any modification is done without proper tools and training, the brake will be damaged. **SERIOUS INJURY OR DEATH MAY RESULT.**



Remove brake line.

Remove drain plug from bottom of brake and drain the brake cavity of oil.

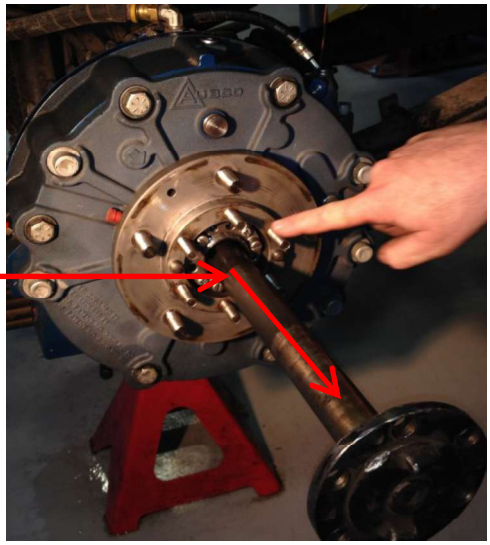
Disconnect the SAHR inlet line from the mounting adapter fitting. Cap the line off to prevent hydraulic fluid from spilling.

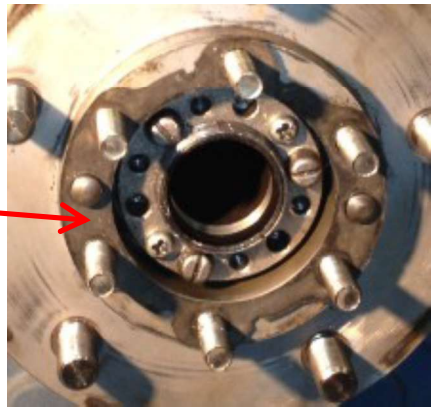


5. Remove the six cone washers, flat washers and nuts.

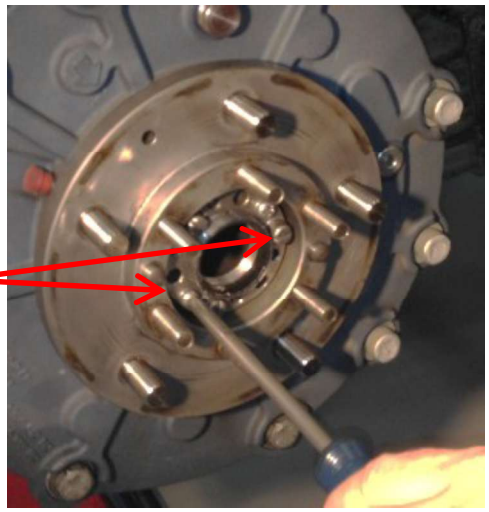
6. Remove axle shaft.

Gently set off to the side and inspect for wear or damage.



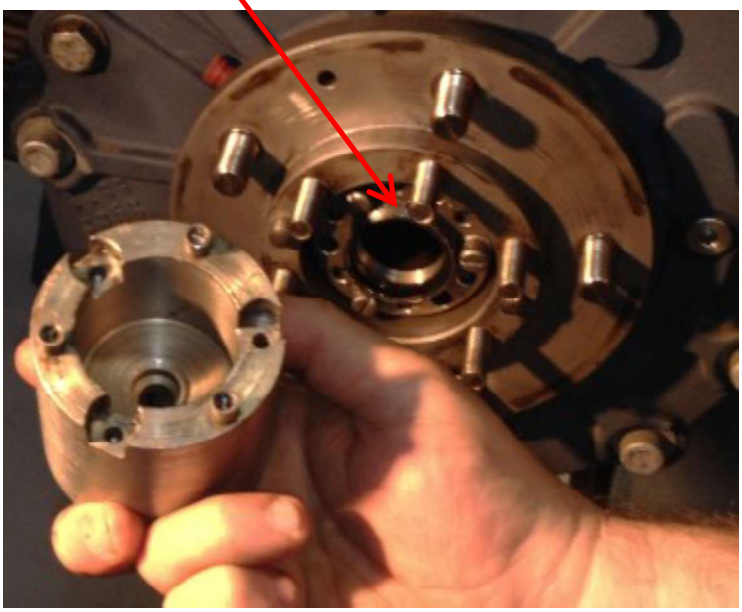


7. Remove the gasket.

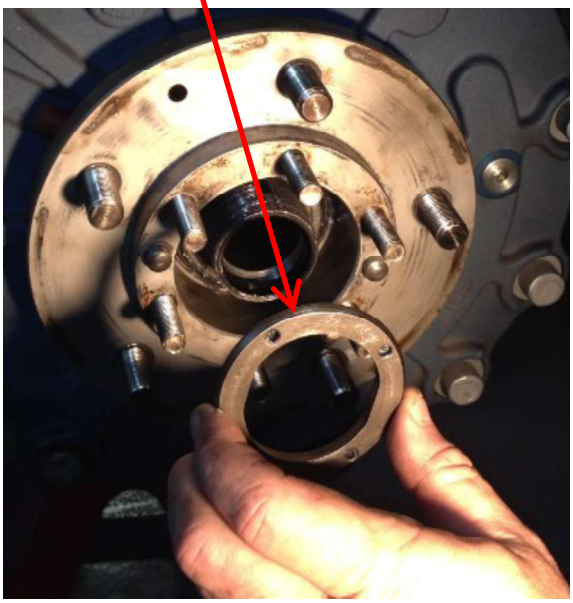


8. Remove locking screws.

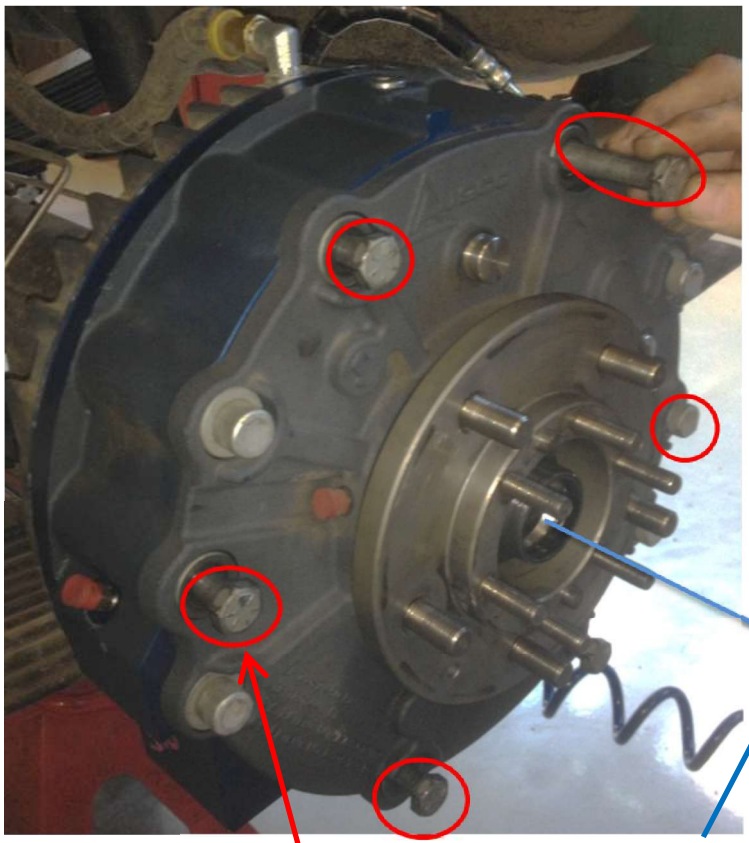
9. Remove locking nut.



10. Remove the thrust washer.



11. Remove the bearing cone.

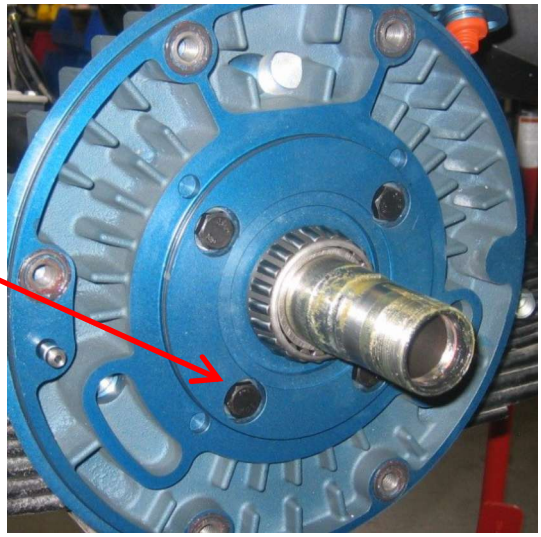


12. Remove the five hex mounting bolts and five washers. Save for later.

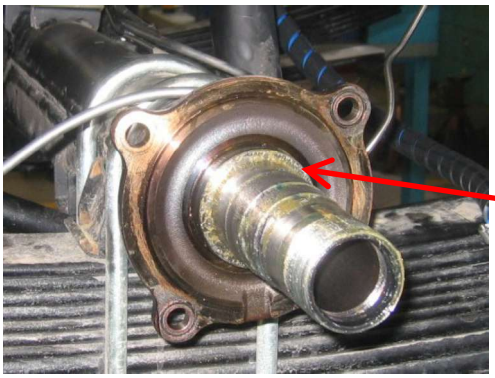
13. Slide the rear brake assembly off the spindle.

14. Remove the bearing cone from the spindle.

14. Remove the four hex bolts and slide the mounting adapter off the spindle. Discard the O-rings and connector tube.

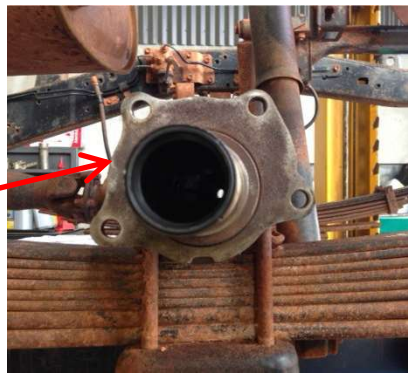


2. Install the mounting adapter to the rear axle tube flanges.

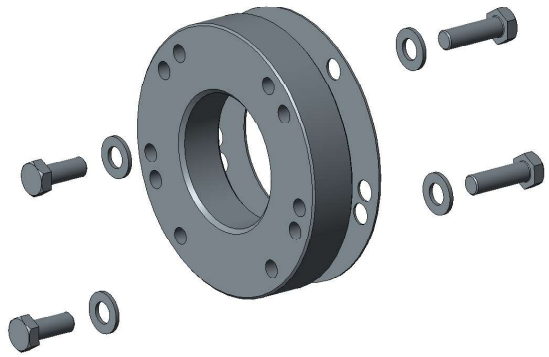


OEM drum brake spindle

1. The spindle surfaces must be clean and smooth for sealing. Repair or replace as necessary.

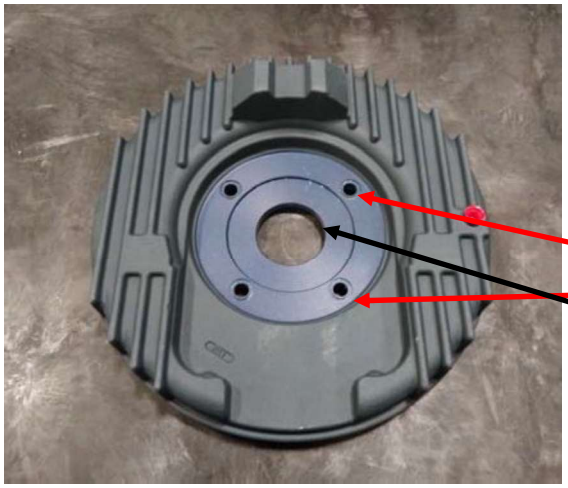


! NOTE ! Your Toyota Land Cruiser was originally equipped with OEM drum or disc brakes. If your LC brakes were installed on a disc brake spindle the spacers shown to the right were installed to compensate for the differences between the spindles. Ensure the surfaces are clean and smooth for sealing.



! NOTE ! See below for a list of approved greases to use in O-ring installation.

Approved Greases
BP ENERGREASE LS3
SHELL GADUS S 5 T100
SHELL GADUS S 5 V100
MAGNALUBE-G



2. From the Rear Mounting Adapter Kit (P/N 98335) locate:
(4) (P/N 84653) O-rings and

(1) (P/N 98126) O-ring. Install O-rings in the indicated locations and hold in place with grease.

3. From the Rear Mounting Adapter Kit locate:

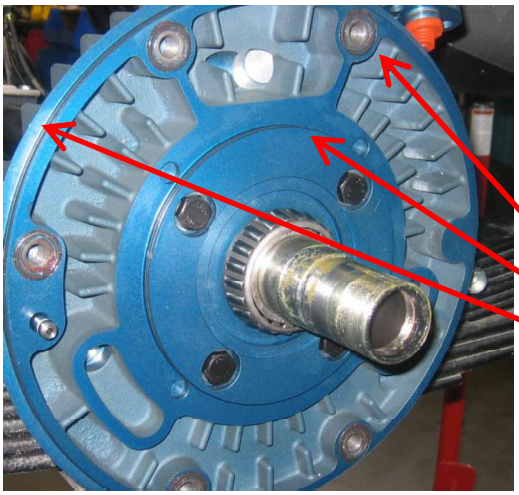
(4) (P/N 97629) bolts. Apply Loctite 262 (Red) as shown. Note: Loctite 262 is preferred; if unavailable use SAF-T-LOK T62 or LOXEAL 55-04 or equivalent MIL SPEC S-46163 TYPE II GRADE 0.

(4) (P/N 97631) flat washers

(4) (P/N 97634) hex nuts

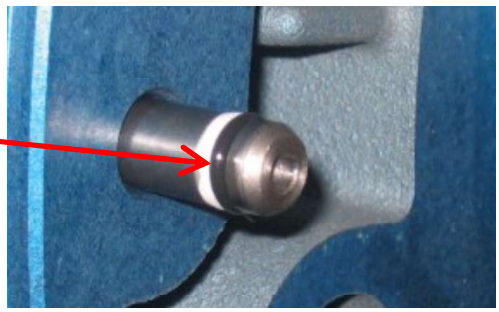
Insert the washer and bolt then secure the nut from behind. Torque to 108 Nm (80 ft lbs).

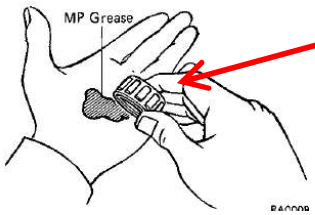
Mount the Rear LC spare brake and hub to mounting adapter.



1. Locate from O-ring Kit 97563 the following O-rings:
(5) (P/N 75036) O-rings- lubricate.
(1) (P/N 79654) O-ring - lubricate.
(1) (P/N 84216) O-ring - lubricate.
Lubricate with an approved Ausco LC Brake Oil
Assemble into the appropriate highlighted groove.

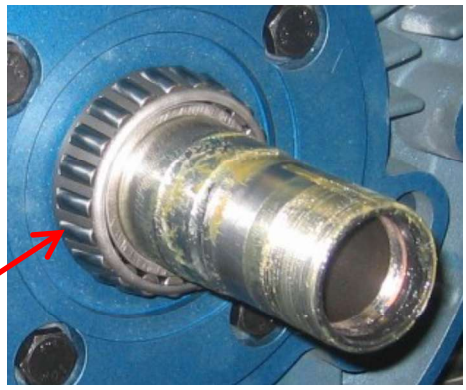
2. Apply lubricant to O-rings and install connector tube (P/N 97574) into mounting adapter. Tap tube with a soft face mallet if needed.





3. Locate the inboard bearing cone (P/N 96915) from the Bearing Cone Kit and pack with grease.

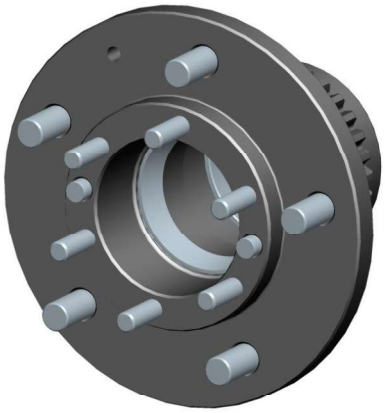
4. Install the bearing cone on the spindle.



5. Take the hub assembly off the old brake.

6. Inspect the bearing cups. If worn or damaged replace the bearing cup.

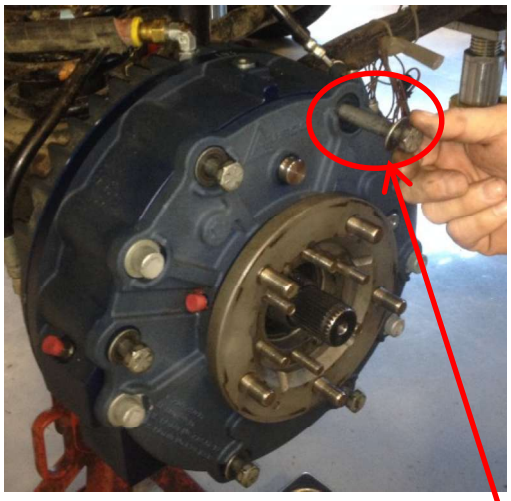
7. Inspect the seal surfaces on the hub. If grooved, replace hub.

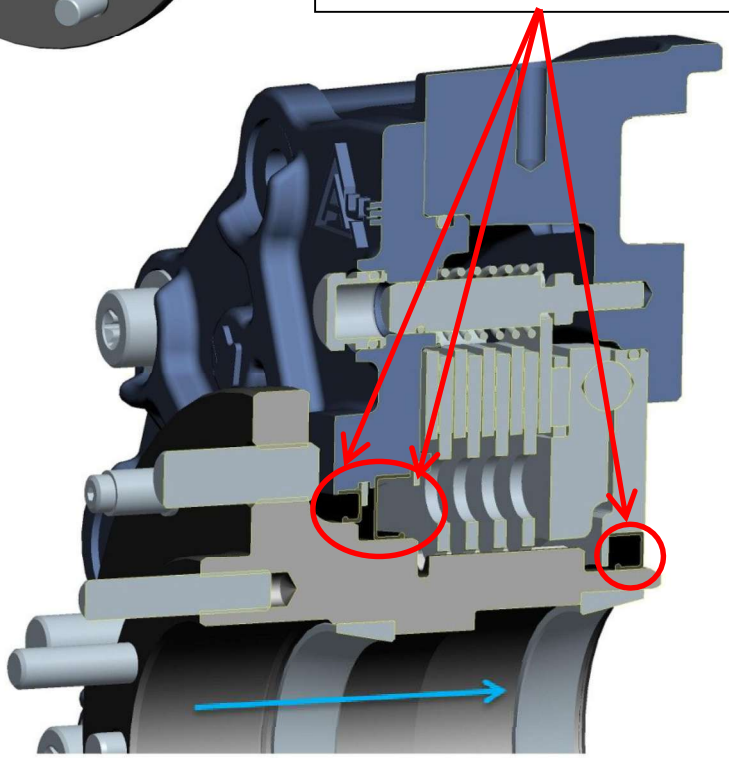


8. Slide the hub assembly into the brake by lining up the splines on the hub shaft with the splines in the brake.

! CAUTION ! Care must be taken not to damage or roll the seals while installing.

9. Slide the brake onto the axle and snug up to the mounting adapter. Be sure to align the connector tube from the adapter to the brake. DO NOT bend the connector tube.

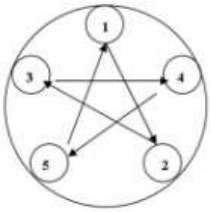




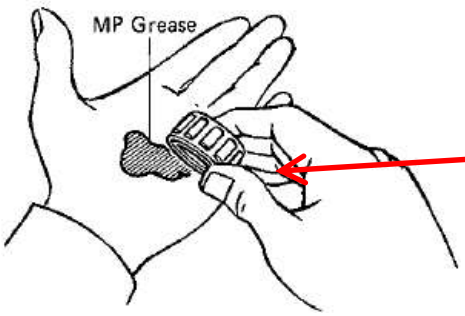
10. Locate (previously set aside):

(5) (P/N 93467) hex bolts & (5) (P/N 96299) flat washers

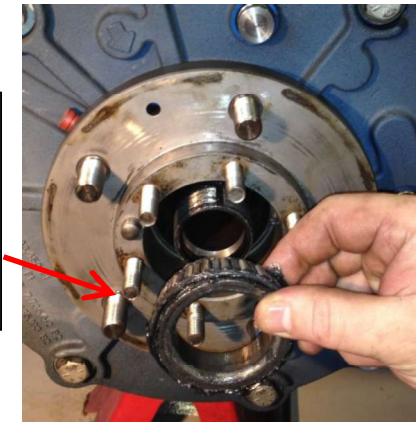
Insert bolts and washers into the five brake mounting holes. Start with the bolt closest to the connector tube and tighten bolts one to two turns at a time using the bolt pattern shown until torque is reached. Torque mount bolts to 115 Nm (85 ft lbs).

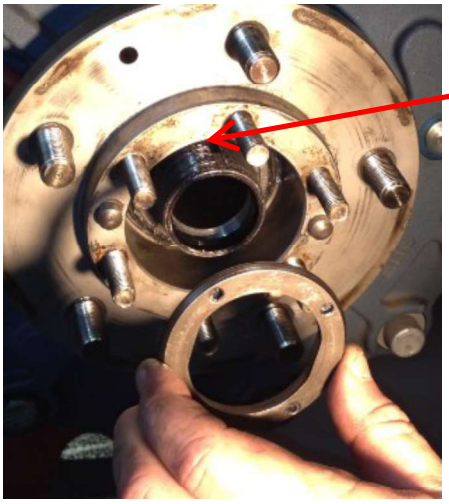


Five-Bolt



11. Locate the outboard bearing cone (P/N 96916) from the Bearing Cone Kit and pack with grease. Install the bearing cone.

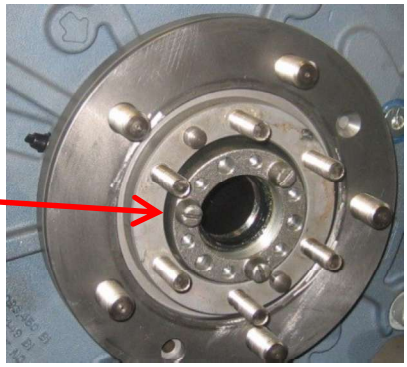




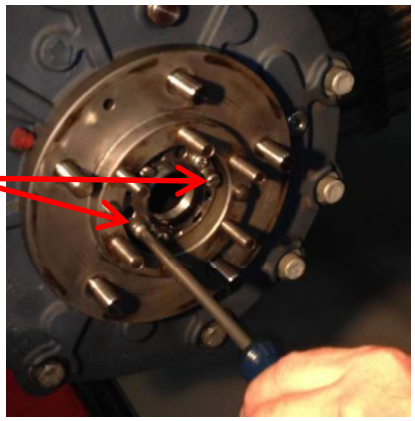
12. Install the thrust washer. Be sure to align tab with the slot in the spindle.

! WARNING ! To set the bearing properly the park brake must be released. **DO NOT PROCEED until brake is released.**

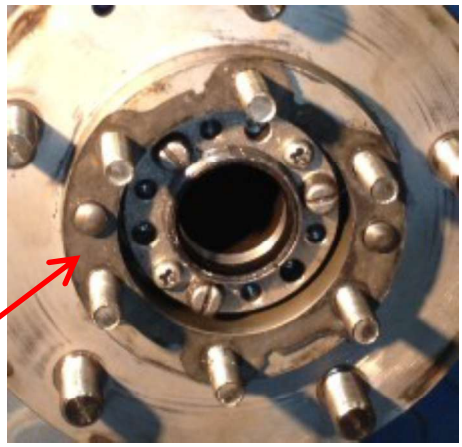
13. Install adjusting nut using Toyota Retainer Socket SST 09607-6002. Torque to 59 Nm (43 ft lbs). Turn the hub left and right several times. Loosen until the nut can be turned by hand. Retighten to 49 Nm (36 ft lbs). Torque nut to 64 Nm (47 ft lbs).

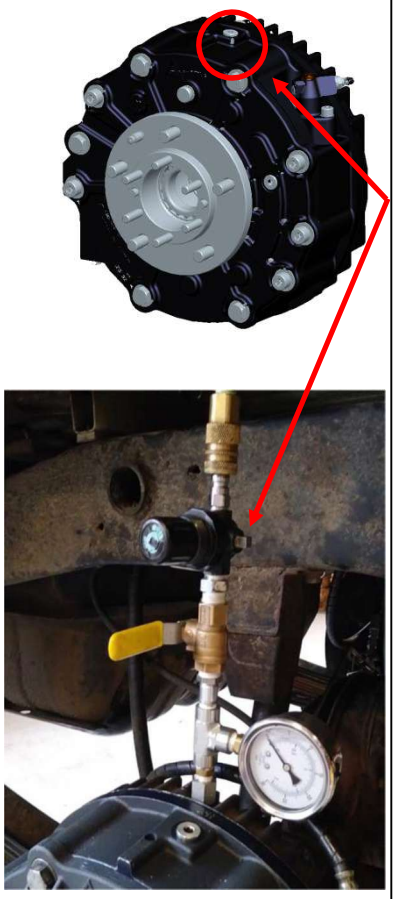


14. Install locking screws. Torque to 5.5 Nm (49 in lbs).



15. Install gasket.





After assembly is complete, verify that all the seals have been assembled and not damaged. This can be done by performing an air test and a leak test

A. Air test is done by using a positive air pressure source and a regulator (example set-up left). Apply 0.7 Bar (10 psi) to the brake housing at the top port (vent port). **! WARNING !** DO NOT EXCEED 1.1 Bar (15 psi). Lock off air pressure source with ball valve. Hold for 60 seconds. No drop in air pressure allowed. If leak occurs:

- Check all seals
- Replace any damaged or missing O-rings
- Re-test

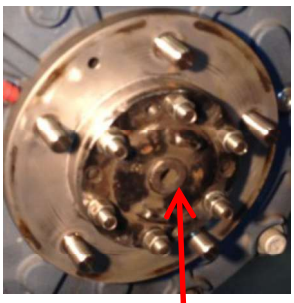
B. Leak test is done by filling the brake with oil and letting it sit for an hour. Then inspect the mating faces for any traces of oil seeping from the mating surfaces. If leak occurs:

- Check all seals
- Replace any damaged or missing O-rings
- Re-test.

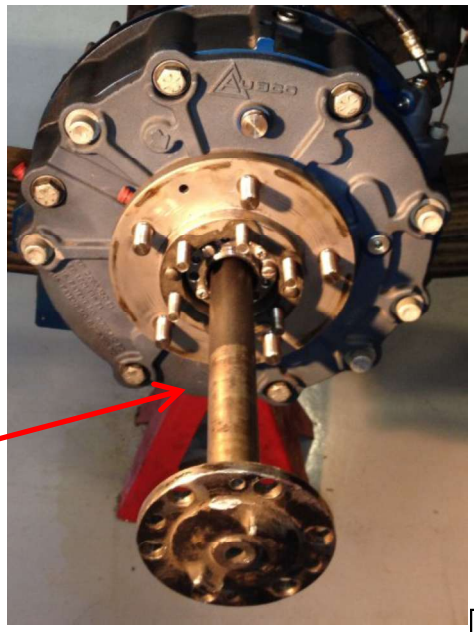
If leaks persist contact Ausco for assistance.

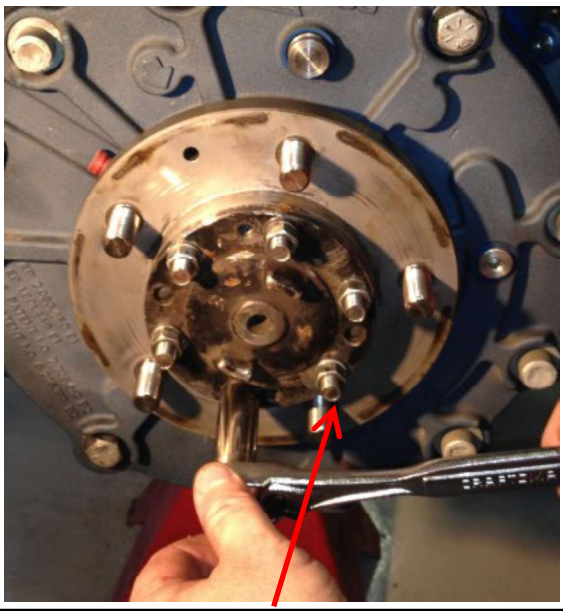
! WARNING ! USE ONLY AUSCO APPROVED LC BRAKE OIL

Ausco LC Brake Approved Oils	
All weather Conditions	**CATERPILLAR TDTO OW-20**
For use only in warm climates with temperatures above 0° C (32° F)	**CATERPILLAR TDTO 10 W**



16. Install axle shaft. Gently tap into place if necessary.

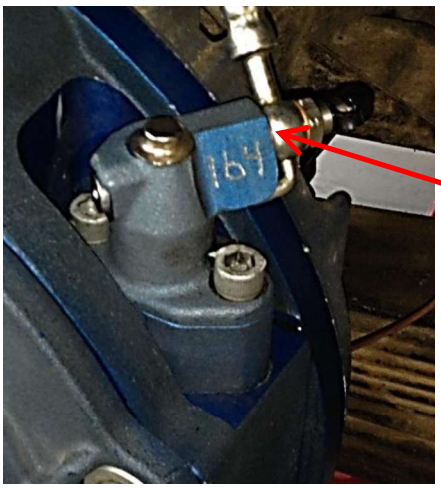




17. Install cone washers, flat washers and nuts.

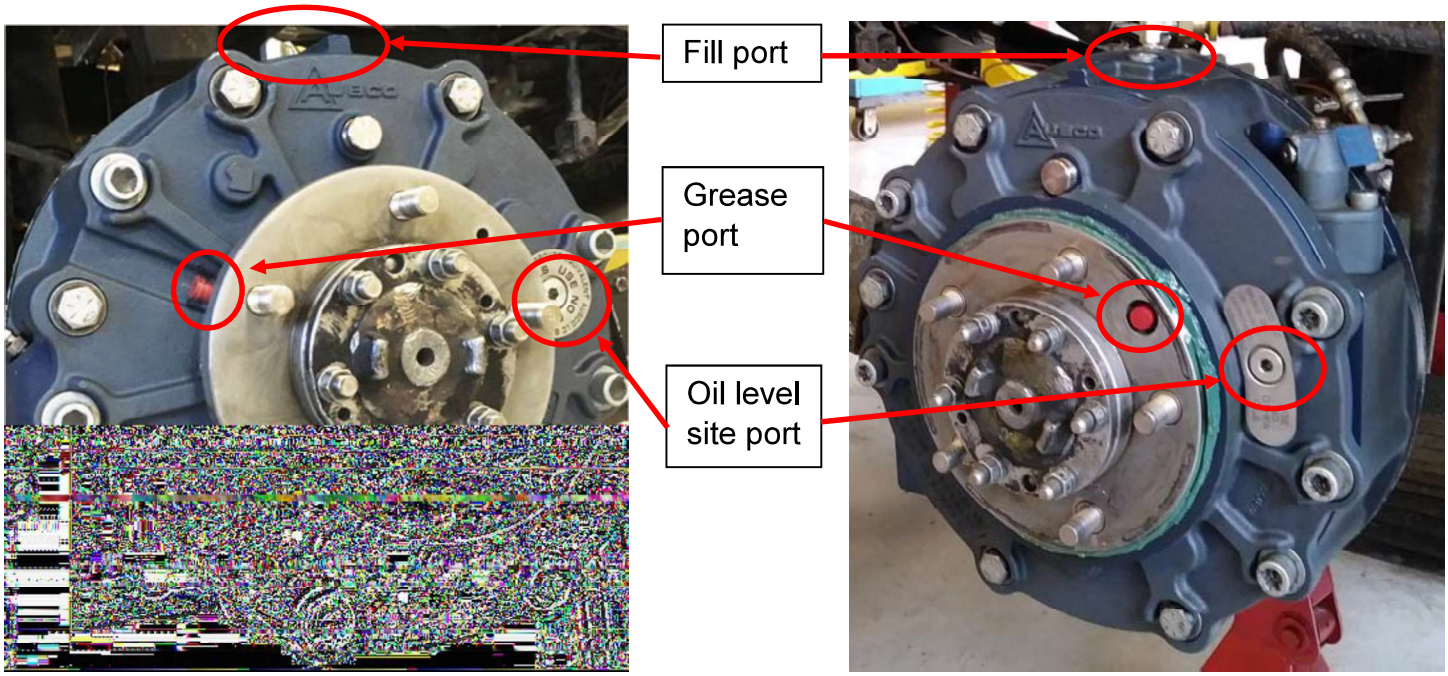
Torque the six nuts to 37 Nm (27 ft lbs).

Attach the brake line.



Attach the brake line.

1. Remove the oil level sight port plug and the fill port plug from the LC brake.
2. Use a funnel or carefully pour an Ausco approved Ausco LC Brake Oil into the brake.
3. Watch the oil level port and continue to fill until the oil reaches the oil level port. If filling a new brake the volume of oil will be approximately 1700 mL (1.8 US qt).
4. Reinstall the fill port and oil level port plugs.



99414-4 & 99820-4 LC

99414-6 & 99820-6 LC Brakes

Grease hub seals.

Approved Greases
BP ENERGREASE LS3
SHELL GADUS S 5 T100
SHELL GADUS S 5 V100
MAGNALUBE-G

! WARNING ! Do **NOT** use grease that contains EP additives. EP additives can attack the lining material in the brake and lead to brake lining damage, which can create a hazardous condition. See chart to the right for Ausco approved greases.

! NOTE ! Parking Brake must be released to rotate hub.

! NOTE ! **-4** BRAKES will fill quickly when grease is applied. Total volume needed is low. **DO NOT** use a power greaser. Fill only with a manual grease gun.

! NOTE! **-6** BRAKES have a much larger grease barrier. It will require approximately 400g of grease for a new install.

Apply grease at grease port until grease appears around lip of outer seal, then rotate hub 90 degrees. Repeat greasing in this manner 3 times. Clean any excess grease.