

Torrel Industries Ltd.

Installation Guide for the Torrel Disc Brake Conversion for Series II, IIA, and III Land Rovers.

Section 1 Introduction

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Installing the Torrel disc brake system in a Series Land Rover is a straight forward process. The existing front drum brakes are removed and the disc brakes are installed using the stub axle bolts that hold the original drum brake backing plate in place. No other modifications to the vehicle are required. The disc brake conversion can be fitted to any Series II, IIA or III Land Rover equipped with 16 inch rims (wheels). The disc brakes work well with the early Series Land Rover single line brake master cylinder (without vacuum assist) although the brake pedal pressure required to stop may be slightly greater than that required with the original drum brake system. The Torrel system also works well with the dual master cylinder, vacuum assist systems supplied on Series Land Rovers from 1970 onwards. The dual line system is a significant improvement to the single line system.

Torrel Industries' brake conversion kit provides all the material necessary to convert the front axel of a Series II, IIA or Series III Land Rover from the stock drum brakes to 11 inch vented disc brakes based on GM's dual piston floating caliper disc brake system. Brake caliper mounting brackets, brake calipers and fittings, brake pads, and brake lines compatible with the *AC Delco Dual Piston Front Brake* design are used in this system.

Detailed information on maintaining and servicing the AC Delco based components can be found in service manuals for GM vehicles equipped with the AC Delco Dual Piston Front Brake system. This system was used in some models of the Chevy Lumina and Monte Carlo, Pontiac Grand Prix, Oldsmobile Cutlass Supreme and Buick Regal manufactured in the period 1988 thru 2001.

For further information on the Torrel Disc Brake Conversion for Series Land Rovers

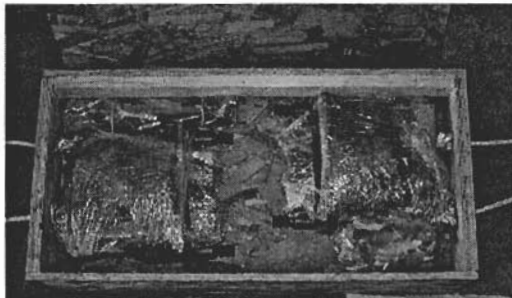
contact

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The installer should refer to the *Series Land Rover Service Manual* and to this *Installation Guide* during the disc brake system installation. The installer should proceed with care as properly functioning brakes are critical to the safe operation of the vehicle.

The disc brake system is shipped in a wooden case containing the following parts:



1. Two hubs-with-disc(rotor)-mounts complete with wheel studs and nuts
2. Two 11" vented discs (rotors) complete with mounting bolts
3. Two mounting plates – one right and one left
4. Two caliper mounting brackets complete with bushings and mounting bolts
5. Two calipers – one right and one left complete with mounting hardware
6. Two brake lines and two brake line adaptors
7. One set of brake pads
8. Gaskets and seals for hub reinstallation

When unpacking the shipping case the installer should take care to keep the parts clean. The kit is shipped with the discs (rotors) temporarily mounted to the hubs. The installer should separate the hub and disc before installing the hub wheel bearings and rear seal.

When reinstalling the discs onto the hub make sure thread locking compound is used on the fasteners and they are tightened to the proper torque setting.

Fitting the disc brake conversion requires loosening the upper swivel pin and transferring the wheel bearings and seals. It presents an opportunity for the customer to replace or upgrade these components. The customer may wish to acquire replacement bearings, a new distance piece and upgrade to a Railko type swivel pin for improved performance.

Section 2 (cont'd)

Disc Brake Installation Guide 3/11

The tools and materials required for the disc brake installation are:

1. An automobile jack, a small axle jack and jack stands
2. The basic SAE/Whitworth shop tools required to service a Series Land Rover front axle and brakes. Refer to a Land Rover Service Manual for the tools required.
3. 13mm and 15mm metric sockets, 8mm hex driver
4. 11mm and 10mm metric box-end wrenches
5. Torx T60 and torque wrench with range to 150 ft/lbs
6. Brake Parts Cleaner and Removable Thread Locking Compound

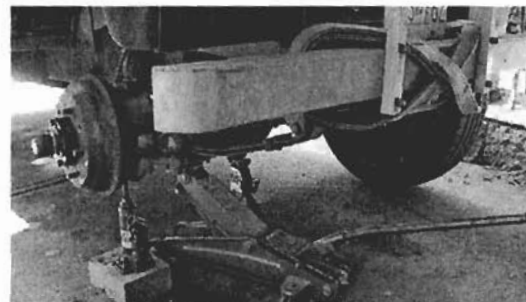
Section 3 Removing existing drum brakes and preparing axle for disc brake installation

For detail information on how to perform the operations listed below the installer should refer to the Series Land Rover Service Manual

Raise front axel and secure with axle jacks.
Block rear wheels.

Use a small axle jack under the steering arm to support the swivel ball housing.

Remove front wheels(s).

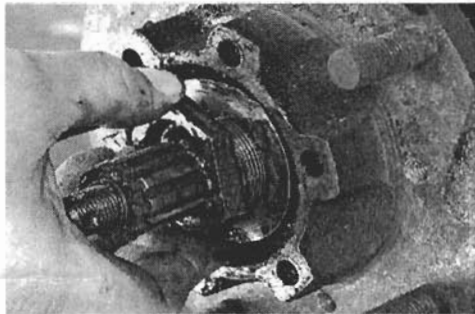
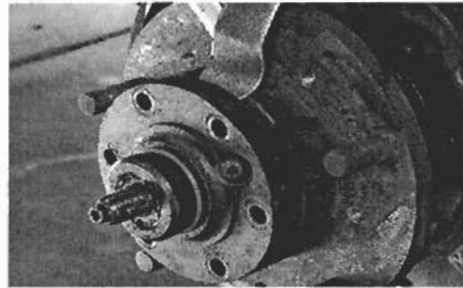


Release brake shoe adjusters and remove brake drums.

Section 3 (cont'd)

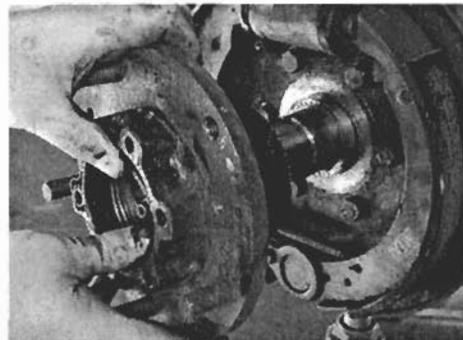
Remove dust cap, and drive axle retaining castle nut.

Remove drive flange – retain fasteners.



Remove wheel hub retaining nuts and locking ring.

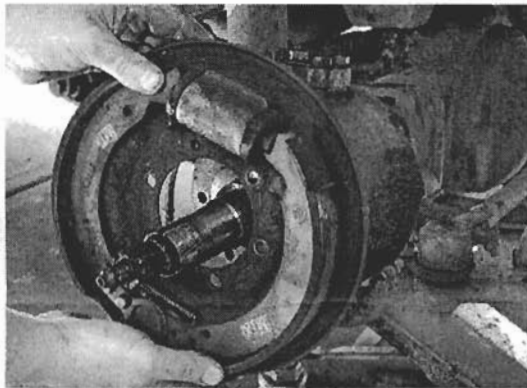
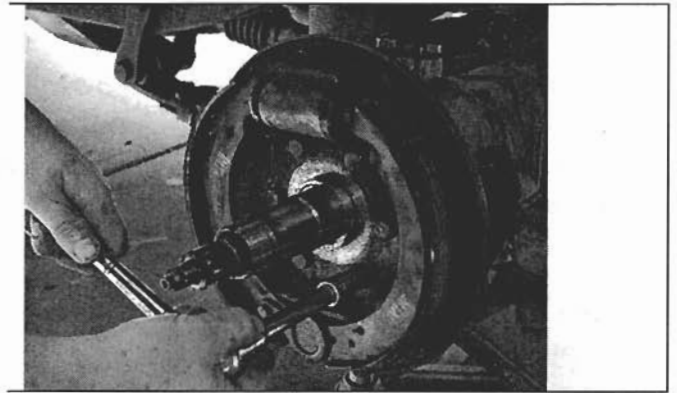
Remove wheel hub.



Separate 3/16" brake pipe from brake hose – temporarily seal brake pipe to avoid loss of brake fluid during installation process.

Section 3 (cont'd)

Remove six (6) stub axle retaining bolts, retain for reuse. Be prepared to catch some swivel ball housing oil that may leak from the lower stub axle retaining bolt holes



Carefully remove brake backing plate complete with brake shoes, cylinders and brake hose.

It is not necessary to remove stub axle from swivel ball housing.

Clean stub axle and inspect distance piece for wear. Replace if necessary.

Note: temporarily reinstall stub axle retaining bolts - use several washers on each bolt so as not to damage the threads in the swivel ball housing - if you are replacing the distance piece while the stub axle remains on the swivel ball housing.



Clean the area around the upper swivel pin and remove (4) four upper swivel pin bolts (or studs if so equipped).

Do not remove the swivel pin but loosen it so that it can be rotated 90 degrees.

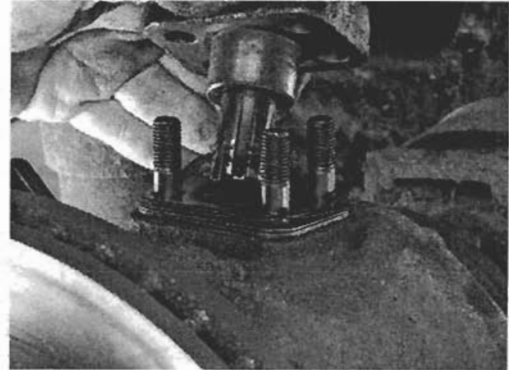
Be careful not to damage the swivel pin shims.



Section 3 (cont'd)

If you have a Series II or earlier Land Rover with swivel pin studs, rather than bolts, you may have to remove the swivel pin to remove some or all of the studs.

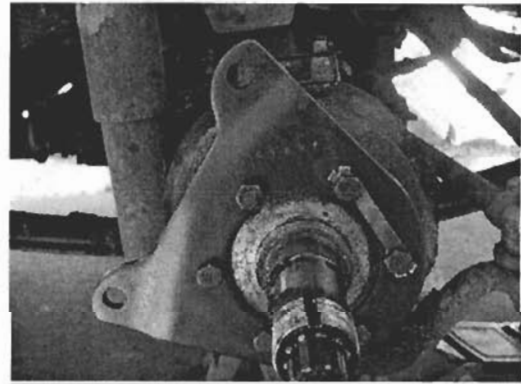
Note: When replacing studs make sure the correct end is installed in the swivel ball housing.



Section 4 Installing new disc brake system

Attach mounting plate to stub axle using the retained stub axle mounting bolts and new locking tabs.

Tighten to Land Rover specifications for your vehicle.



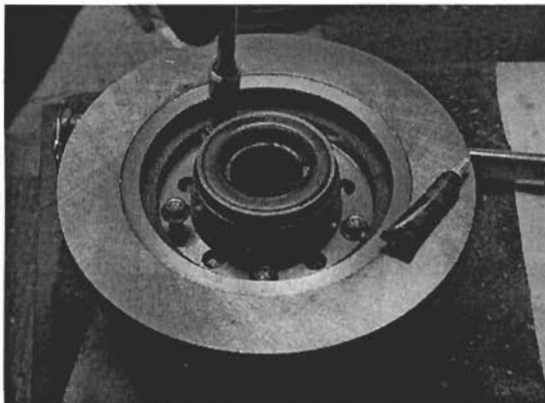
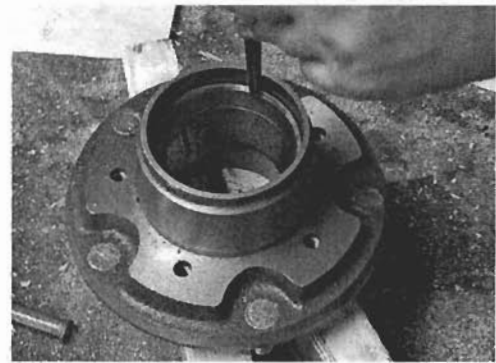
Note: The mounting plate marked "left" should be used on the left side of the vehicle, the one marked "right" on the right side of the vehicle. The "ears" on the mounting plate should incline towards the centre of the vehicle. The hole on upper "ear" of the mounting plate should align with swivel pin rear bolt holes and the hole on the lower ear should align with the swivel ball housing oil filler plug – correct orientation of the mounting plate is necessary to provide adequate clearance for the calipers.



Carefully remove the outer and inner bearings and inner seal from the original hubs and.....

.... reinstall in the new disc brake hubs.

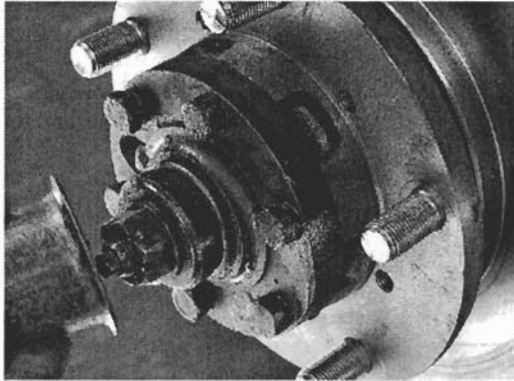
Lubricate bearings and install the new inner hub seal supplied. If the wheel bearings show signs of wear they should be replaced.
(Refer to a Land Rover Service Manual for details.)



Mount disc (rotor) to hub using the five (5) metric 10mm x 1.5 fasteners provided. Apply one drop of Removable Thread Locking Compound to each fastener before installation. Tighten fasteners to 50 ft/lbs.

Install new hub assembly on stub axle. Use new locking washer provided. Tighten hub retaining nuts to Land Rover specifications.



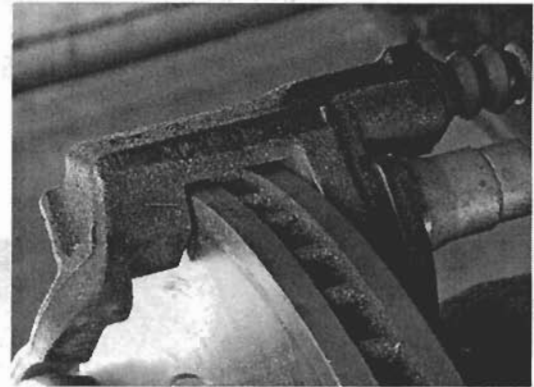


Attach driving flange, (or free wheeling drive systems if fitted) to hub using retained fasteners and reinstall drive axle retaining nut. Use new gasket and seal provided and tighten to Land Rover specifications.

Replace dust cap.

Attach caliper mounting bracket to the mounting plate using special fasteners provided. Do not tighten to final torque setting at this time.

Ensure that the Caliper Mounting Bracket is centered on the disc (rotor) and that the hub rotates freely. If necessary use shims (provided) between the mounting plate and the caliper mounting bracket.



Remove swivel housing oil filler plug. If, during removal, the filler plug interferes with the caliper mounting bracket fastener, it should be shortened. The amount to be removed (if any) will vary for each filler plug (typically 3/16" is required).



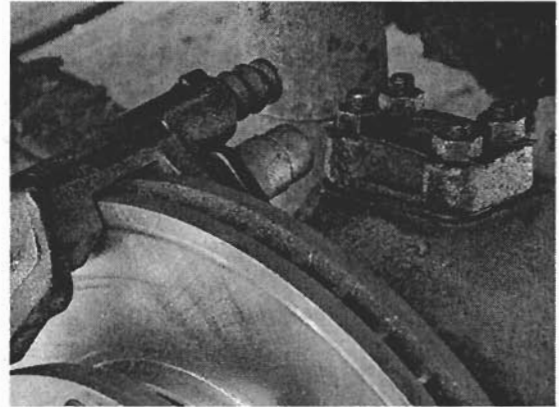
Tighten caliper mounting bracket fasteners to 148 ft/lbs using a Torx T60 driver.

Be careful that the vehicle is not pulled off the jacks

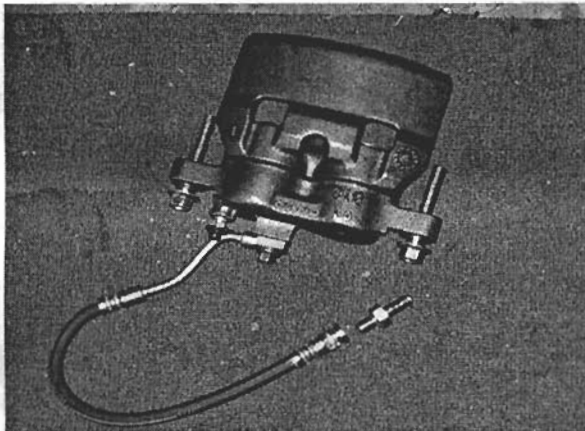
Section 4 (cont'd)

Realign the swivel pin and replace the four (4) swivel pin bolts and locking tabs.

Tighten to Land Rover specifications.



The oil level in swivel ball housing should be checked and the oil replaced or topped up as necessary.
Remove protective coating from disc (rotor) surface with brake cleaner.



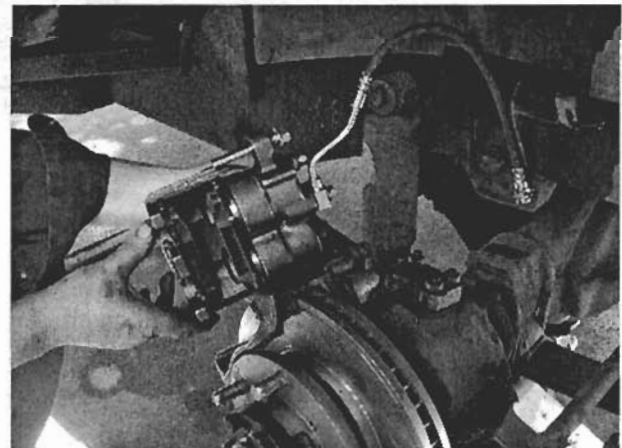
Attach the brake line adaptor to the brake hose – use the 10mm end of the adaptor.

Tighten to 18 ft/lbs.

Attach brake hose to brake caliper using a copper washer on each side of the brake line fitting.

Tighten brake hose fastener to 32 ft/lbs.

Note: attach the brake line with a hex end with one point rounded to the L caliper and fit to right side of vehicle, attach the brake line with a round end with tang to the R caliper and fit to the left side of the vehicle.



Section 4 (cont'd)

Disc Brake Installation Guide 10/11

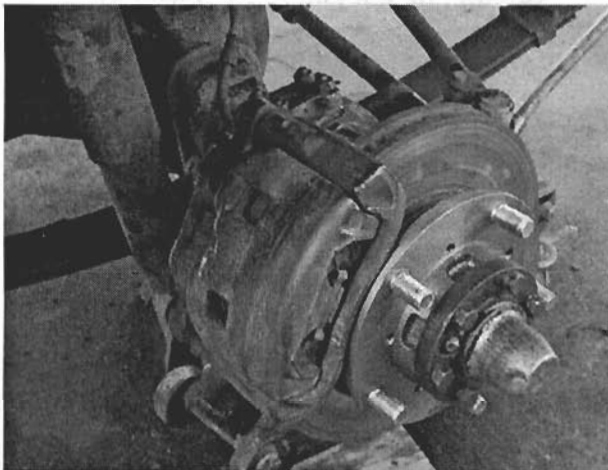
Note: Mount the caliper with the casting mark **R** on the **LEFT** side of the vehicle, the caliper marked **L** on the **RIGHT** side of the vehicle. The brake line attaching bolt and bleed screw will be located on the upper end of the caliper. The brake line should curve inwards to provide bleeder valve clearance

Attach brake hose adaptor to the chassis fitting used to hold the original brake hose.
Tighten to 18 ft/lbs.

Attach the 3/16" brake pipe to the brake line adaptor. Tighten to 11ft/lbs



The completed installation



Bleed brakes as per the Land Rover Service Manual Tighten bleed valve to 62 inch/lbs.

Check for proper operation of brakes and ensure there are no brake fluid leaks in the system.

Top up the master brake cylinder reservoir with DOT 3 brake fluid.

Reinstall road wheels.

Section 5 Post Installation procedures

1. Before test driving the vehicle the installer should check the rear brakes and adjust for proper operation. The test drive should be done on a quiet and level road. The brake pedal should be firm (expect less brake pedal travel than that of a drum brake system).
2. For systems without power assisted brakes, the driver should expect brake pedal pressure to be the same or slightly higher than that of an original drum brakes system in good repair.
3. Although the front-to-rear braking balance in the front disc/rear drum system is similar to that of the original all drum system the driver should become familiar with the characteristics of the new brake installation. The driver should try quick stops under controlled conditions on a variety of surfaces and grades (wet and dry pavement, gravel etc.) to ensure that they are familiar with the new disc brake system's performance over a full range of driving conditions.

Section 6 Maintenance

The disc brake system requires no adjustments but the condition of the pads and rotors should be inspected every 5000km.

Pads are replaced by removing the slide pins and lifting the caliper off the caliper mounting bracket. Retract the caliper pistons and install the new pads. At the time the pads are replaced the brake lines, caliper seals and mounting bracket bushings and seals should be inspected and replaced if worn or defective.

Rotors can be resurfaced but should be replaced when thickness is reduced to 24.7mm.

Detailed information on maintaining and servicing the AC Delco based components of the system can be found in service manuals for GM vehicles equipped with the AC Delco Dual Piston Front Brake system. This system was used in *some* models of the Chevrolet Lumina and Monte Carlo, Pontiac Grand Prix, Oldsmobile Cutlass Supreme and Buick Regal manufactured during the period 1988 thru 2001. Source replacement parts as for a 2001 Chevrolet Lumina - some useful part numbers are:

Caliper - Left Hand	ACDelco	177-1436		
Caliper - Right Hand	ACDelco	172-1437		
Brake Pads	ACDelco	171-577		
Brake Hoses	Coni-Seal	Midas	Wagner	Bendix
"Left Hand"	BH178221	2145	132332	78221
"Right Hand"	BH178222	2146	132329	78222

Note: Mount the caliper marked (L) and the "left hand" brake hose on the **right** side of the vehicle.
 Mount the caliper marked (R) and the "right hand" brake hose on the **left** side of the vehicle.

See AC Delco's on line Parts Catalogue at <http://www.acdelco.com/html/catalog/> for additional information.