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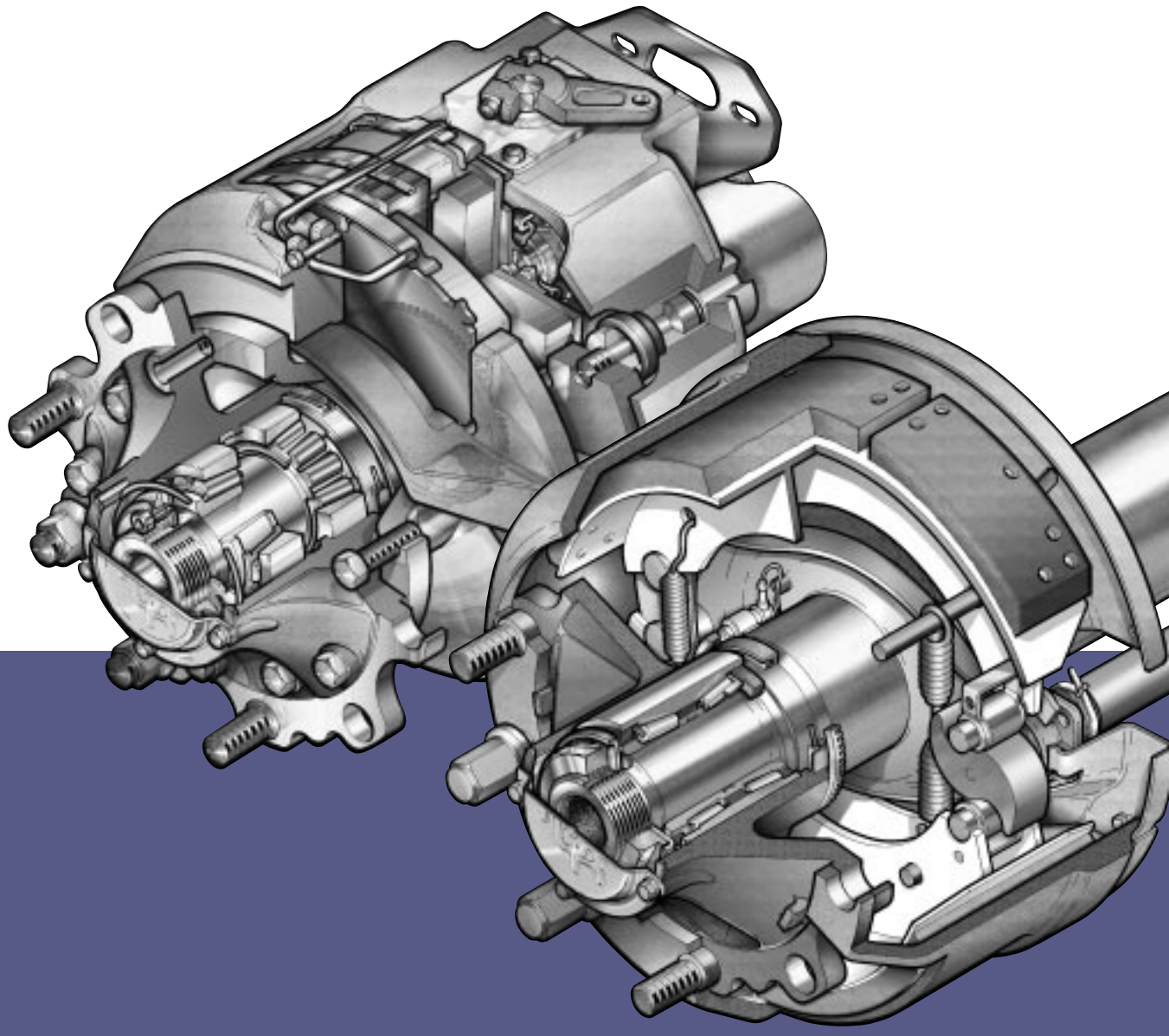
Meritor
Axle & Brake Service Manual

LM and LMC Series Axles including Disc and Drum Brake variants



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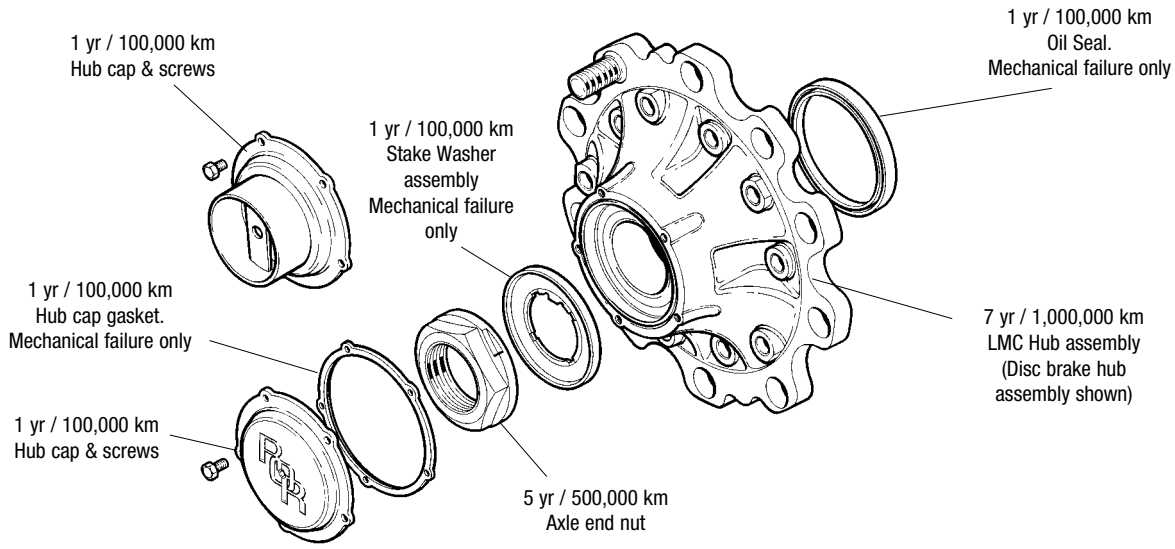
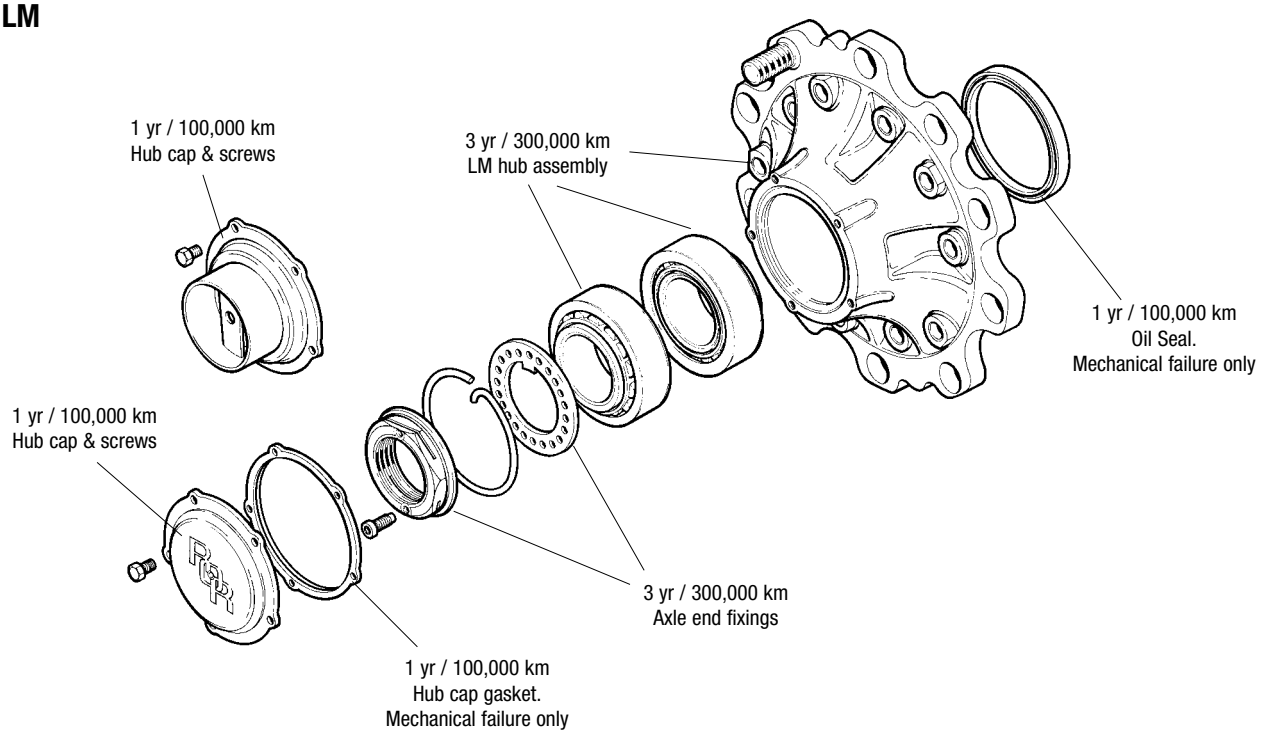
Quick Warranty Reference Chart

LMC and LM Hubs
Any component not referred to below is covered by a 1 yr / 100,000 km warranty for mechanical failure only.
Labour costs can only be claimed at an agreed rate with Meritor Service Department prior to work commencing.
For full warranty terms and conditions see 'Meritor Warranty Terms and Conditions' Publication No 4.84.1

LMC

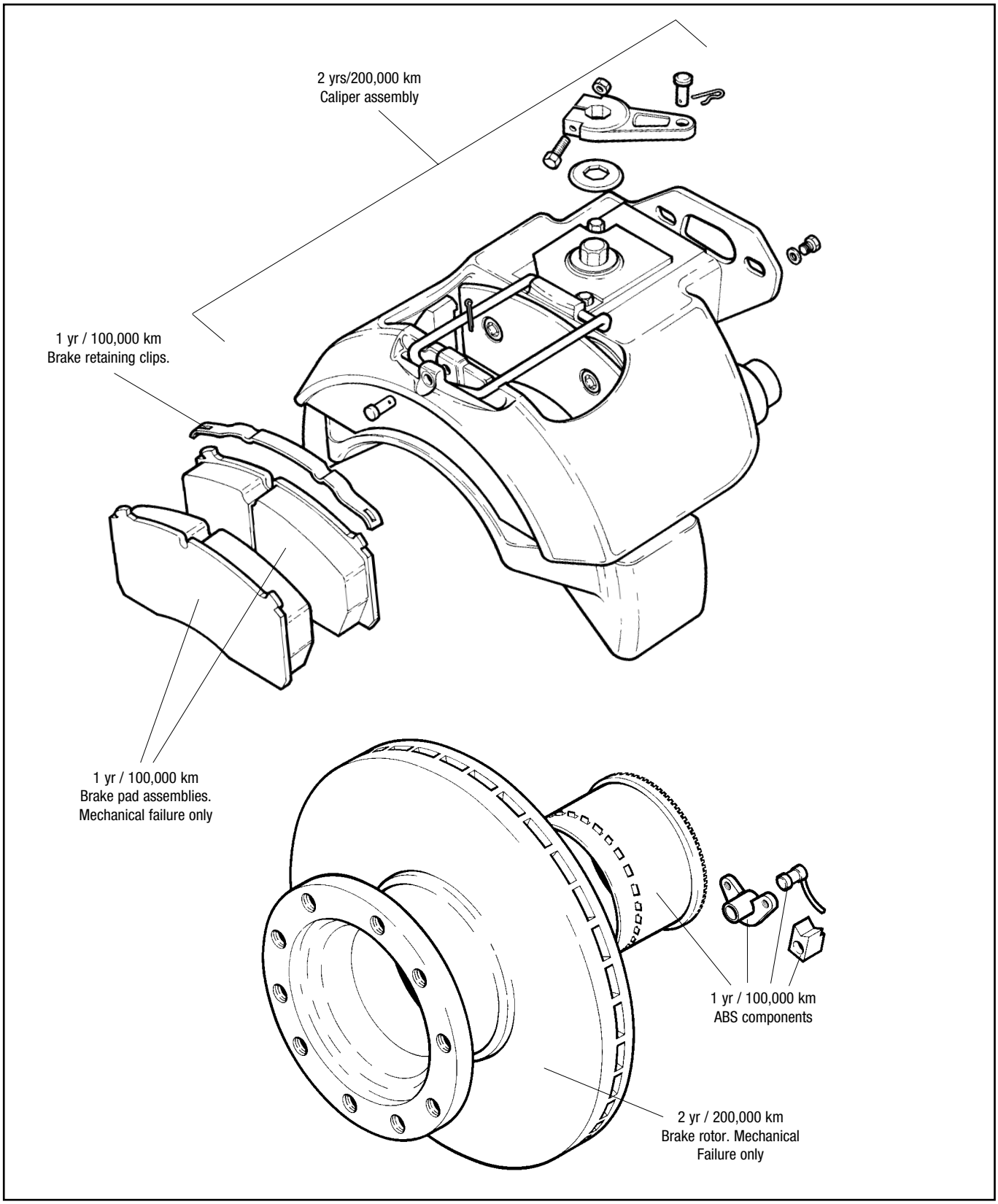


LM



Quick Warranty Reference Chart

DX 195 Disc Brake for LM Axles
Any component not referred to below is covered by a 1 yr / 100,000 km warranty for mechanical failure only.
Labour costs can only be claimed at an agreed rate with Meritor Service Department prior to work commencing.
For full warranty terms and conditions see 'Meritor Warranty Terms and Conditions' Publication No 4.84.1



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Quick Warranty Reference Chart

LM Axle shown

Any component not referred to below is covered by a 1 yr / 100,000 km warranty for mechanical failure only.

Labour costs can only be claimed at an agreed rate with Meritor Service Department prior to work commencing.

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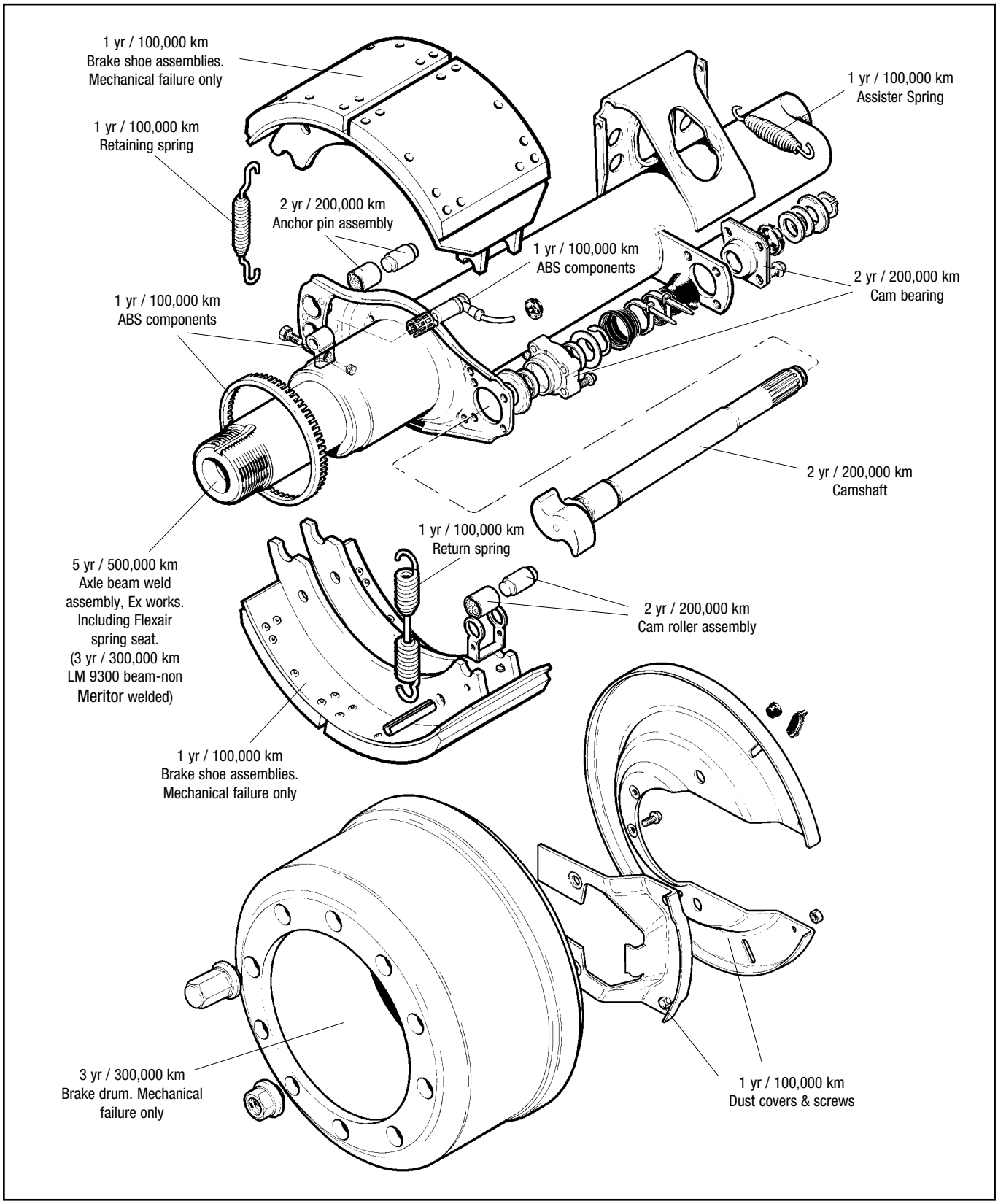
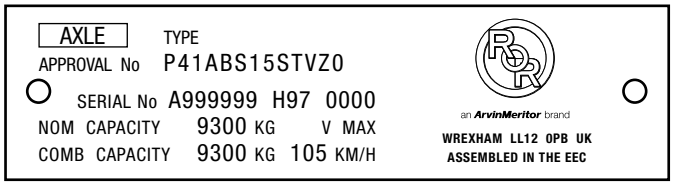


LM & LMC Service

The Axle Identification Plate

Every axle leaving the Meritor factory is fitted with an identification plate which contains all the information needed to ensure the correct replacement parts are obtained.



IDENTIFYING THE AXLE TYPE

All LM series axles are fitted with 10 stud, ISO 4107 spigot mount wheel fixings and asbestos free brake pads or linings as standard. Other options are as shown below.

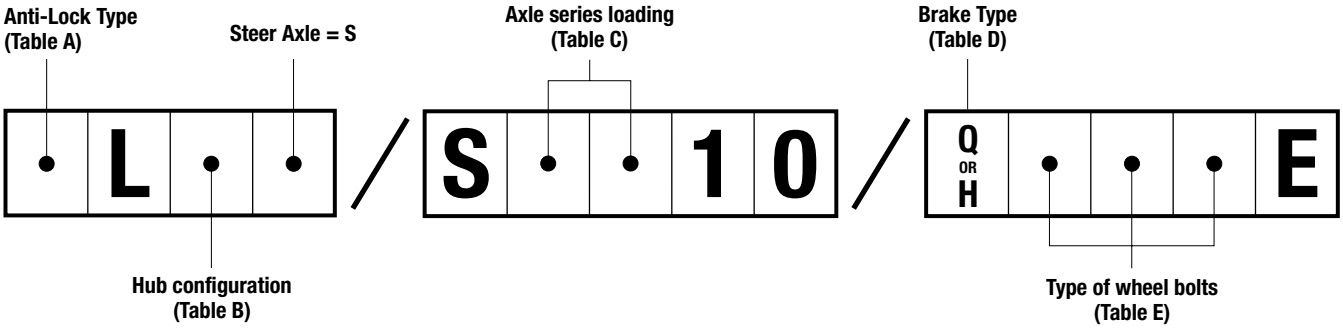


Table 'A'

Axle Letter Code	Exciter Ring Type	Suitable For
W	100t Solid Ring	Wabco Bosch Grau DGX & MGX100

Table 'B'

Axle Letter Code	Hub Configuration
M	Standard bearing hub
C	Cartridge bearing hub

Table 'C'

Axle Series	Nominal Highway Rating, Kg	Wall Thickness	Max Offset*
90	9000	13mm	460mm
93**	9300	16mm	490mm

Table 'D'

Axle Letter Code	Brake Type
Q	Drum Brake
H	Disc Brake

Table 'E'

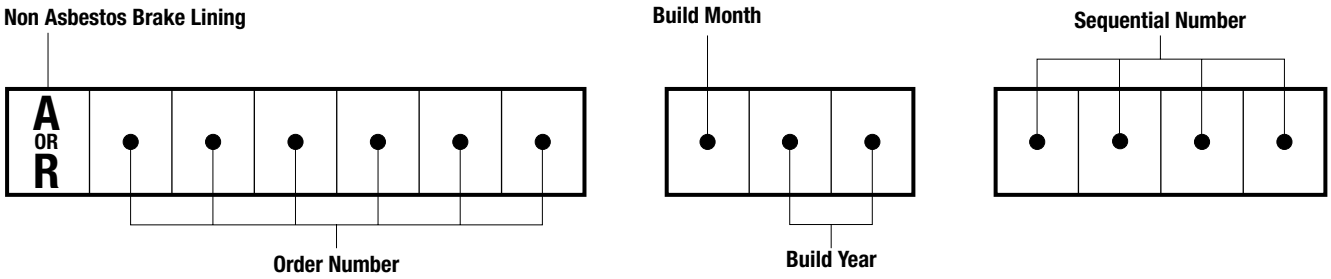
Axle Letter Code	ISO 4107 Wheel Mounting Type
MX	M22 x 1.5p wheel studs for single steel wheels
MXA	M22 x 1.5p wheel studs for single alloy wheels

$$* \text{ Offset} = \frac{\text{Track} - \text{spring centres}}{2}$$

** For use with non Meritor air suspensions

The axle ratings shown are for normal highway use and any special application must be approved by Meritor Technical Sales.

IDENTIFYING THE SERIAL NUMBER



LM & LMC Service

Introduction to the LM Axle Range

The Meritor LM range of axles are manufactured to the same high standards expected of all Meritor products.

The LM Series has been specifically designed, as its name implies, for Low Maintenance and hence reduced cost of ownership whilst furthering Meritor's reputation for low weight – especially when used with Meritor Flexair Suspension.

Its use is predominantly intended for tri-axle, on-highway applications running on super single tyres fitted to 22.5" wheel rims at combined bogie weights up to 27 tonnes.

Introduction to the LMC Concept

The LMC cartridge bearing hub is an innovative addition to the standard LM axle range, offering a fully sealed, maintenance free bearing unit – a unique feature in European trailer axles.

The LMC offers the optimum combination of bearing performance and reduced service times.

The cartridge bearing is manufactured to extreme levels of accuracy allowing it to be operated in a precisely controlled preloaded condition for optimum life performance

Whilst the hub can be left for up to 7 years without removal from the beam, the sealed bearing allows for quick and clean routine brake servicing should the hub need to be removed more frequently.

Introduction to Meritor DX195 Disc Brake

The Meritor DX195 Air Disc Brake is one of a family of modular high performance, low weight, high efficiency brakes designed for Trailers, Trucks, Coaches, Buses and other Commercial vehicles.

The brake has a cast caliper, which straddles the brake rotor and houses two lining pads. Clamping force is produced by a standard industry air chamber, amplified via a high efficiency shallow throw eccentric and balance beam assembly.

The caliper is carried on a saddle which is a fixed support bolted to a torque plate on the axle beam.

Equalised clamping action on the inner and outer pads is generated by allowing the caliper to "float" on the two slide pins fixed to the saddle. Clamping force created by the primary actuation is applied to the inner pad, which forces it into contact with the rotor. Reactive force through the caliper body applies equal clamping force to the outer "Fixed" pad.

The slide pins also allow the caliper to freely position itself on the saddle to compensate for the reduction in lining pad thickness due to wear.

Lining wear would result in correspondingly longer actuation lever throw and excessive chamber stroke. To eliminate the problem, the brake incorporates an inbuilt automatic adjustment mechanism.

The auto-adjuster operates on each clamping action to sense excessive pad-rotor clearance, and reduces excessive clearance by a fixed proportion with each actuation.

For brake set up and new lining installation, the brake incorporates provision for manual adjustment, easily made using a standard Hexagon key.

Axle Installation

The following notes and recommendations are offered as a guide to the trailer manufacturer and service engineer. They are based on experience gained from both the manufacture and servicing of single and multiple axle installations.

LIMITATIONS OF USE

The following limitations apply to the LM series axles fitted with super single tyres and used in tandem or tri-axle arrangements.

For normal road and RO–RO use at 9 tonne axle weight the LM9000 (13mm wall) beam is authorised for Meritor air and mechanical suspensions only when assembled by Meritor. In all other instances of normal road, RO–RO, and unrestricted tipper use at 9 tonne axle weight using non-Meritor suspensions, air or mechanical, the LM9300 (16mm wall) beam must be used.

For extreme conditions, i.e. narrow frame centres (<1100mm), high centre of gravity (>2000mm) please consult Meritor Technical Sales Department.

In cases where suspensions of non-Meritor manufacture are used, the trailer builder or suspension manufacturer must satisfy themselves as to the suitability and compatibility of the axle and suspension, particularly from a durability standpoint. Meritor will be pleased to assist in assessing such compatibility, but cannot warrant the fitment of its axles to suspensions of unknown characteristics.

STRESSES AND WELDING

During use the axle beam is subjected to a wide variety of forces. These are caused by the payload, bumps in the road surface, cornering and braking. Because these forces are constantly varying, the stresses in the axle beam also vary, causing fatigue. The top and bottom of the beam generally experience the greatest stresses and hence the most fatigue, whilst the section of beam around the horizontal centre line sees the least stress and fatigue.

Welds in the high stress areas will adversely affect the fatigue strength, for this reason do not weld in the area 95mm wide top and bottom of the beam, or 50° either side of the vertical centre line, as shown in the diagram below. Weld tacks or weld spatter are not allowed in this area.

The beam material is controlled to ensure that pre-heating is normally not necessary when welding as per BS5135.

The direction of welding should be as near the horizontal as possible and welding around the corners of brackets or spring seats should be avoided. Separate drawings exist on request from the Meritor Technical Sales Department detailing seat welding procedures for both air and mechanical Meritor suspensions.

The effects of welding will be minimised if:

(a) all tack welds are at least 25mm long.

(b) the number of tack welds is kept to a minimum. If possible clamp the bracket tightly to the beam and eliminate the tack welds.

(c) the welding procedure recommended in the Meritor suspension manual is followed.

(d) more than one weld run is required make the following run with a different start/finish point and before the previous run has cooled down. Descale between runs.

(e) oil, rust and thick deposits of paint are removed from the surfaces to be joined.

(f) the welding consumables meet the relevant British Standards and are used as recommended by the manufacturer.

(g) at the end of fillet welds, the weld is ‘backed up’ to fill the crater.

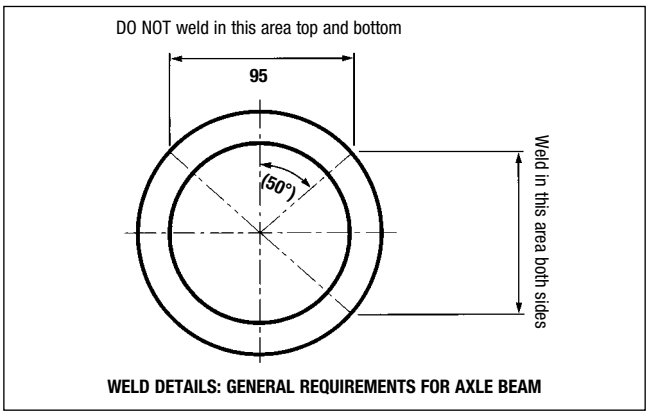
The following precautions will prevent damage to the axle and suspension during welding and improve service life:

(a) prevent weld spatter from falling on the axle and road springs.

(b) ensure the earth connection is made to the axle beam, preventing the passage of current through the wheel bearings.

(c) do not test the arc on the axle beam or springs.

(d) remove scale and slag from fillet welds before painting to prevent corrosion.



WELD DETAILS: GENERAL REQUIREMENTS FOR AXLE BEAM

LM & LMC Service

LM Axle Maintenance Schedule

SERVICE ROUTINE	FREQUENCY
LM, LMC – Disc & Drum **CHECK BRAKE ADJUSTMENT AND CHECK WHEEL NUT TORQUES:**	• Before entering service. • After 150 km. • After 1500 km. • Every 3 months. • After any wheel fixing removal. • After any brake service.
LM, LMC – Drum **LUBRICATE CAMSHAFT BEARINGS:**	• Recommended maximum at 3 monthly intervals. Note: If other than Meritor Brake Lubricant Total Fina is used or where vehicles are in contact with severe abrasives a max of 6 week interval necessary.
LM, LMC – Drum **BRAKE INSPECTION & SERVICE**	• Linings should be inspected every 6 weeks or 25,000 kms and must be replaced as an axle set if worn down to the wear indicator (8mm). Full stripdown should be prior to 2nd annual test or at 1st reline, whichever is soonest. THEN Annually or at every subsequent brake reline. Whichever is most frequent.
LM, LMC – Disc **BRAKE INSPECTION & SERVICE**	• Pads, caliper and rotor should be inspected every 50,000 kms or 3 months. Pads must be replaced when worn to a minimum lining thickness of 3mm. Always replace pads as an axle set. At intervals of 100,000 kms, or every 6 months, (preferably when changing pads), the opportunity should be taken to remove any accumulations of wear debris and rust from the edge of the rotor, and from the pad location points in the caliper. Check also condition and location of sealing boots. The above service intervals are recommended maximums under normal operating conditions. Unusual ambient temperatures or adverse operating conditions (e.g. dusty atmospheres or severe gradients) will require more frequent service intervals. It is the responsibility of the vehicle operator to establish these intervals.
LM – Disc & Drum **HUB AND BEARING INSPECTION: INCLUDING OIL SEAL REPLACEMENT**	• Whenever hubs are removed from axle. • Annually after 1st major hub overhaul.
LM – Disc & Drum **MAJOR HUB SERVICE**	• If a problem is found during inspection. • Prior to 2nd annual test or after 300,000 km, whichever occurs first.
LMC – Disc & Drum **HUB AND BEARING INSPECTION: INCLUDING OIL SEAL REPLACEMENT**	• The LMC hub assembly is maintenance free. However a visual inspection should be carried out and the auxiliary oil seal replaced whenever the hub is removed from the axle. Note: The LMC hub is not a serviceable item. Any problems should be reported to Meritor Service Department.

Technical Data Tables

TABLE 1:
FASTENER TORQUE VALUES – DRUM/DISC BRAKE

Hub cap bolts	11/15 Nm
Dust cover bolts	50/60 Nm
Dust cover nuts	11/15 Nm
Spherical bearing bolts (spline end)	50/60 Nm
Spherical bearing bolts (cam head end)	50/60 Nm
Sensor fixing bolts	30/50 Nm
LM Axle lock nut	Refer to setting procedure, Section 3.17
Button head screws (axle lock nut)	15/20 Nm
LMC Axle lock nut	700/750 Nm
Wheel nuts	680/750 Nm

TABLE 2:
FASTENER TORQUE VALUES – DISC BRAKE ONLY

Rotor flange bolts	230/270 Nm
Caliper retaining bolts	280/320 Nm
Blanking plug adjuster access	10/17 Nm
Lever clamp bolt/nut	31/37 Nm
Air chamber nuts	175-200 Nm

TABLE 3:
RECOMMENDED LUBRICANTS

Hub Bearings:

Meritor Hub Grease, Blue Lithium EP2
Elf Lithium EP2
Total Multis EP2
Shell Calithia EP2T
Texaco Multifak EP2
BP LS EP2
Silkolene G62
Eurol Universalfett EP2
Axel Christiernsson Lithac 162 EP
Castrol Spheerol EPL2
Shell Alvania Grease EP(LF)2
Mobil Mobilux EP2
Fina Marson EPL2
SKF LGEP2
GB Lithium EP2
Esso Beacon EP2

Brake Components and Camshaft Bearings:

Meritor Brake Lubricant – (Total Fina CERAN WRC2)

Spindle Bearing Journal:

Optimol Optimoly White Paste T

TABLE 4:
HUB & BEARING GREASE FILL VOLUMES

LM Hub

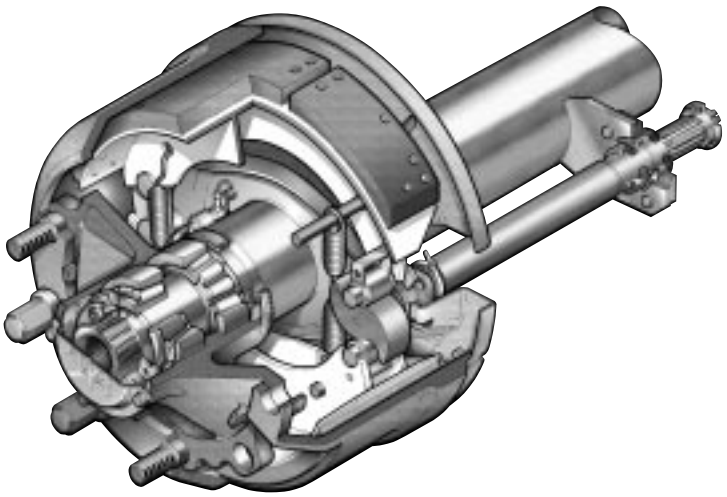
Hub Cavity	150-200 gm
Inner Bearing	45-50 gm
Outer Bearing	45-50 gm
Hub Cap	Nil

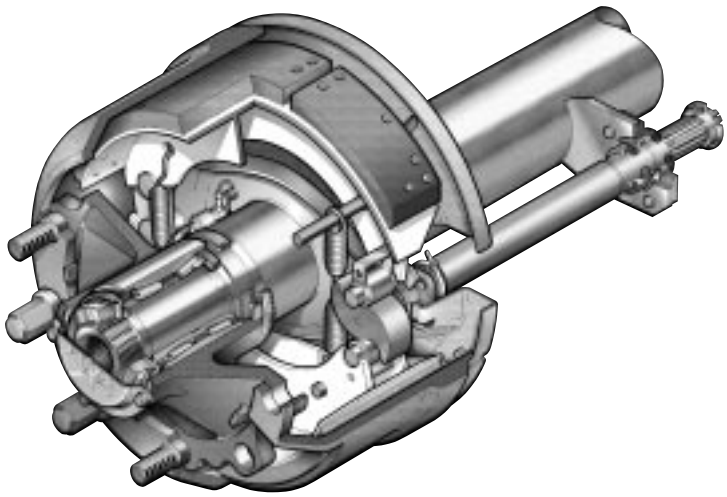
LMC Hub

Hub is pre-packed no maintenance unit

Section 1

LM/LMC
Drum Brake Service





SECTION 1

Major Brake Service – Hubs Not Removed

1.1 DE-ADJUST BRAKES

Using the manual adjustment nut on the slack adjuster fully de-adjust the brake. Follow the appropriate procedure for the type of automatic slack adjuster fitted. Instructions are available through the Meritor Technical Sales Department.

1.2 REMOVE ROAD WHEELS

1.3 REMOVAL OF BRAKE DRUM

Use two suitable M12 x 1.75 screws to jack the brake drum face from the hub. The screws should be tightened evenly to prevent the drum from jamming on the hub spigot (Fig. 1).

The brake drum can then be lifted clear of the hub.

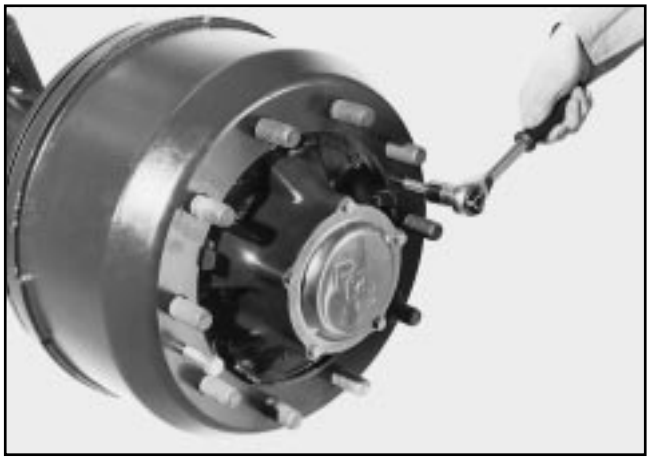


FIG. 1

1.4 REMOVAL OF BRAKE SHOES

Remove the two brake shoe retainer springs (Fig. 2).

Note: *The brake shoes fitted to the LM axle are the latest 'Q Plus' design and are NOT interchangeable with brake shoes on other Meritor products. The 'Q plus' brake shoes can be identified by two 'plus' shaped holes stamped through the shoe platform. The 'Q plus' linings can be identified by the yellow edge markings. Additionally, the 'Q plus' brake shoe and lining have a unique rivet hole pattern.*

Clearly identify the LEADING & TRAILING brake shoe in order that they are refitted to the same position on re-assembly.

Press down on the lower brake shoe to disengage from the anchor pin. The lower brake shoe can now be lifted to the side of the brake anchor bracket. The upper brake shoe can now be lifted clear of the anchor bracket and both brake shoes, connected by the brake return spring, can be lifted clear of the axle.

FIG. 2

1.5 REMOVAL OF ANCHOR PINS

Remove both anchor pins by sliding out of their bushes in the brake anchor bracket (Fig. 3).

FIG. 3

LM Anchor Pin Bush Removal Drift part no. 21226353 and Intallation Tool part no. 21226692 are required for removing and replacing bushes in axles manufactured after April 2000 and for any replacement of the latest bush being fitted to older axles. (Fig.4)

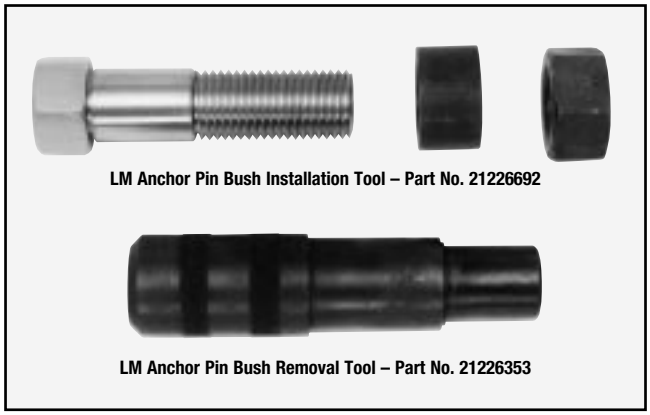


FIG. 4

1.6 CLEAN ANCHOR BRACKET AND ANCHOR PIN BUSHES

Using a wire brush, clean each side of the anchor bracket in the area of the anchor pin bushes, clean the bore of the anchor pin bushes.

Apply a small amount of Meritor Brake Lubricant to the bores of the anchor pin bushes and a light covering to both sides of the anchor bracket around the anchor pin bushes.

1.7 CLEAN AND REPOSITION ABS SENSOR

If the axle is fitted with an ABS sensor system, clean the exposed portion of the sensor and then push the sensor from the rear until it contacts the pole wheel (Fig. 5).

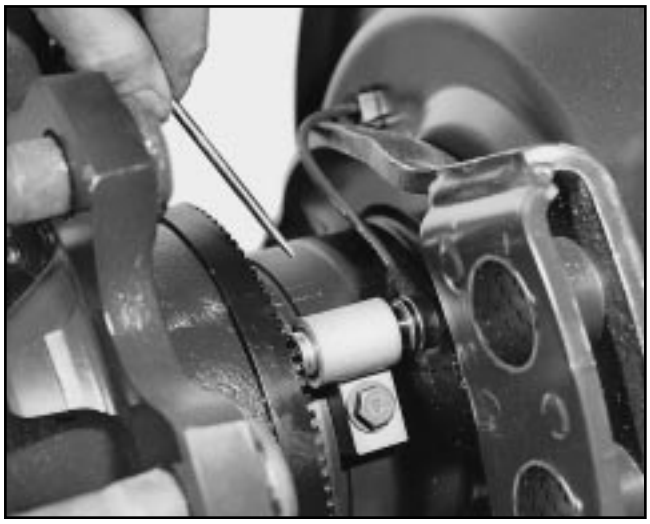


FIG. 5

1.8 REMOVE CAM ROLLERS FROM BRAKE SHOES

Insert a screwdriver into the hole in the brake shoe gusset and carefully press the retaining tab of the cam roller clip whilst gently pulling the roller. Keeping pressure on the cam roller turn the brake shoe over and repeat on the other side. The cam roller and clip will now pull out from the shoe (Fig. 6).

FIG. 6

Remove the clip from the roller and examine for damage to the retaining tabs.

Remove the pin from the roller (Fig. 7).

FIG. 7

1.9 INSPECT CAMSHAFT AND CAMSHAFT BEARINGS FOR WEAR

Place a lever between the camshaft and axle beam close to the cam head bearing and lever up and down to detect free movement (Fig. 8).

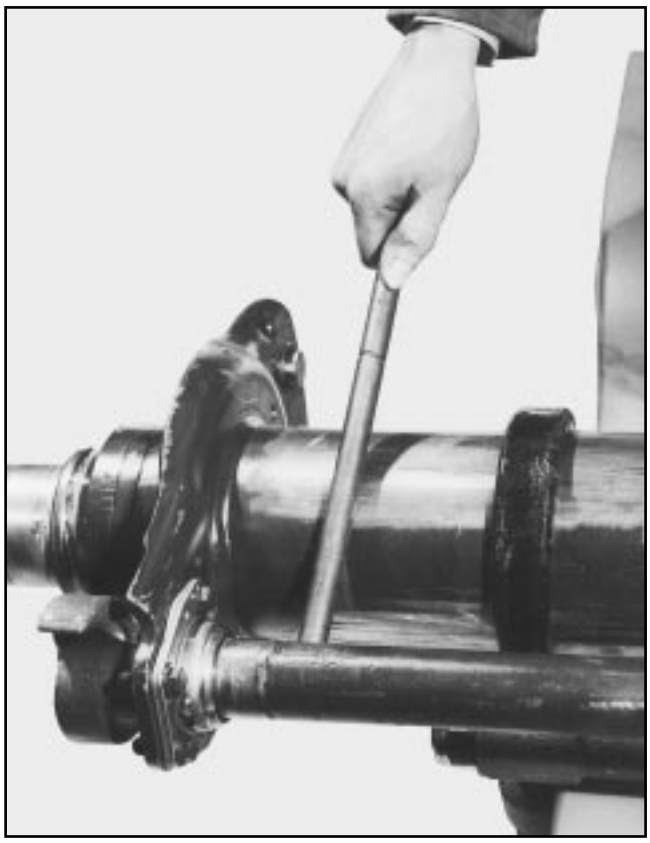


FIG. 8

This should not exceed 3.0mm total movement at the bush (the amount at the lever will depend on the lever length so discretion and judgement is required).

Similarly place the lever between the axle and camshaft close to the spherical bearing at the spline end of the camshaft and lever up and down checking for similar play as at the cam head bearing. If the play exceeds the above amount this suggests wear has occurred and the camshaft and bearings should be replaced as necessary.

1.10 CAMSHAFT AND CAMSHAFT BEARING REMOVAL

1.10.1 With Dust Covers Fitted:

Remove the clevis pin connecting the slack adjuster to the brake chamber and rotate the slack adjuster out of the clevis by turning the adjusting nut. Refer to the appropriate procedure for the type of slack adjuster fitted. Remove the circlip, packing washers, slack adjuster and outer rubber boot from the camshaft.

Release the clips from the spherical bearing and cam head bearing rubber boots.

Release the camshaft from the cam head bearing retaining clip by striking the end of the shaft with a copper mallet (Fig. 9).

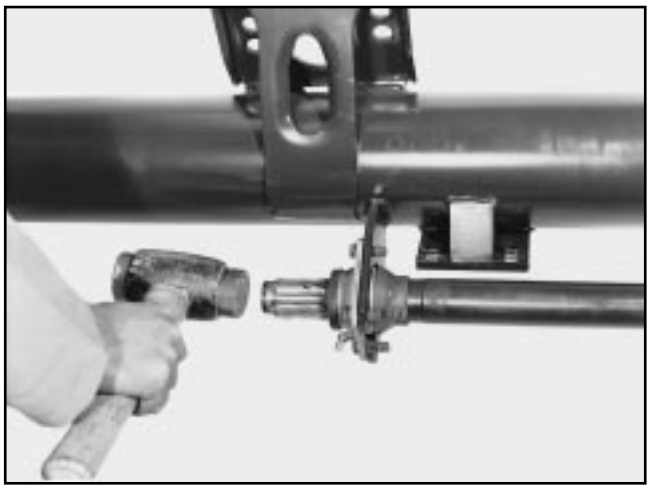


FIG. 9

Remove the M10 retaining screws securing the cam head and spline end spherical bearings (Fig. 10) and remove the spline end spherical bearing assembly from the camshaft.

If the cam head spherical bearing is to be re-used, thoroughly clean the full length of the camshaft prior to removal.

The camshaft can now be removed by sliding it forwards through the brake anchor bracket, tilting it to pass between the scallops of the hub (Fig. 11).

1.10.2 With Dust Covers Removed:

Remove the dust cover by releasing the two M10 screws and the two M8 flange nuts (Fig. 12). Release the ABS sensor cable strain relief bush and pass the cable through the dust cover.

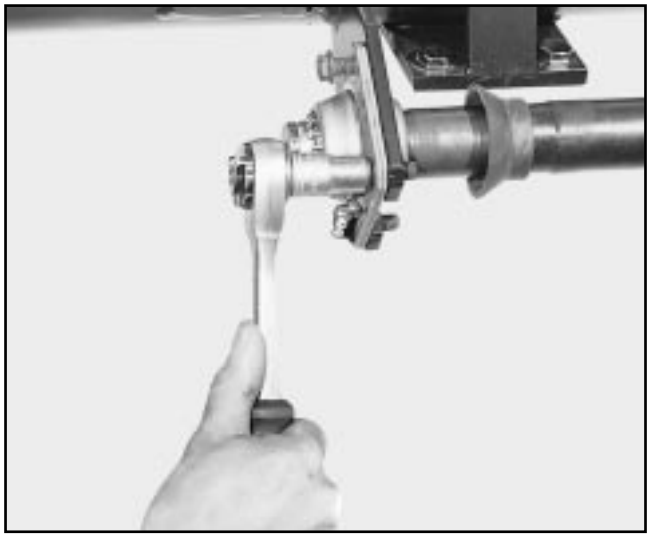


FIG. 10

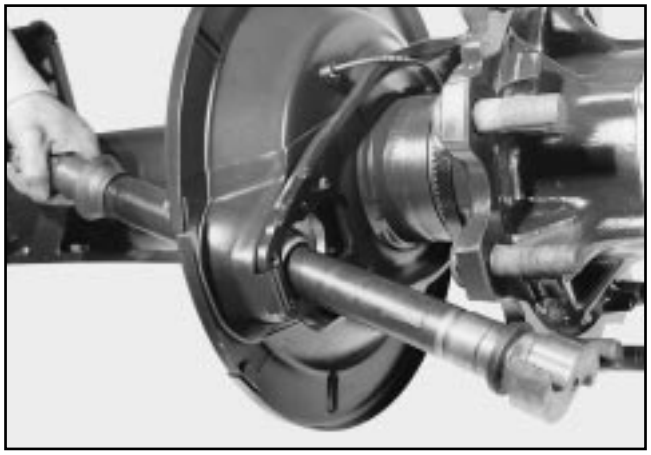


FIG. 11

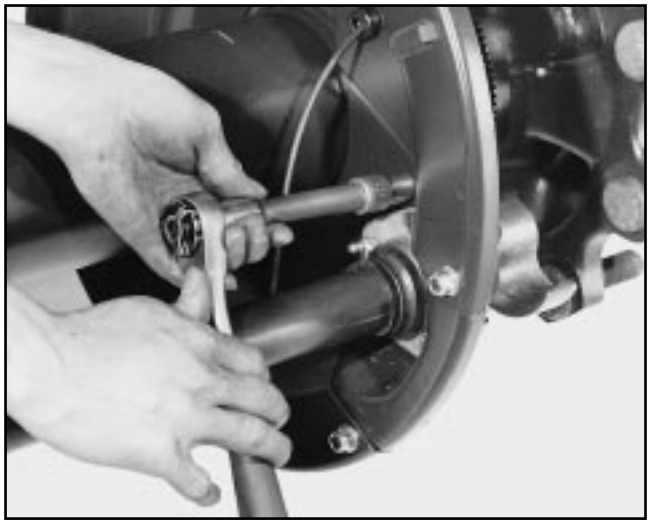


FIG. 12

The two M10 screws securing the cover plate should now be removed and the camshaft removed rearwards through the keyhole slot in the brake anchor bracket (Fig. 13).

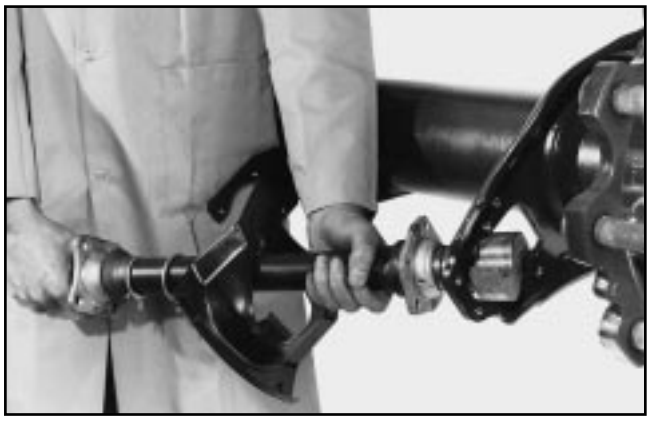


FIG. 13

NOTE
This method of removal is not possible on axles built after Sept '99 follow Section 1.10.1

1.11 REPLACEMENT OF CAMSHAFTS AND CAMSHAFT BEARINGS

1.11.1 With Dust Covers Fitted:

Clean the full length of the camshaft prior to assembly.

Ensure the faces of the anchor bracket and camshaft bracket are clean.

Slide the under-head rubber boot onto the camshaft. Pass the camshaft through the brake anchor bracket from the outboard side, slide the cam head bearing, inner rubber boots and spline end spherical bearing onto the camshaft.

Fasten both camshaft bearings in place using the M10 screws. DO NOT FULLY TIGHTEN THE BEARING SECURING SCREWS UNTIL THE BRAKE SHOES ARE RE-ASSEMBLED.

A hard tap on the cam head with a copper mallet will be required to locate the spring clip into the camshaft groove.

With the camshaft in position refit the spline end rubber boot, slack adjuster, packing washers and circlip.

1.11.2 With Dust Covers Removed:

Clean the full length of the camshaft prior to assembly. Slide the under-head rubber boot onto the camshaft, lightly grease the cam head journal and slide the cam head bearing onto the camshaft towards the cam head until the spring clip is ready to engage in the groove (light resistance will be felt).

Slide the inner rubber boots, cover plate and spline end spherical bearing onto the camshaft.

Ensure the faces of the anchor bracket and camshaft bracket are clean.

Pass the cam head through the key hole slot in the brake anchor bracket and slide the spline end through the cam bracket slot. Fasten both camshaft bearings in position using the M10 screws. DO NOT FULLY TIGHTEN THE BEARING SECURING SCREWS UNTIL THE BRAKE SHOES ARE RE-ASSEMBLED.

Ensure the filler plate locating tag is engaged around the end of the anchor bracket and secure with two M10 screws. Tighten to the torque specified in table 1.

Fit the one piece dust cover (Fig. 14) ensuring it is correctly located onto the two filler plate studs. Tighten the two M10 screws and the two M8 nuts to the torque values specified in table 1. (Page 10)

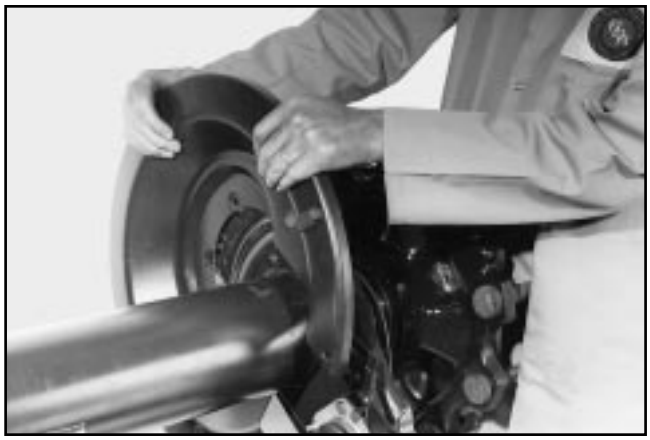


FIG. 14

1.12 CLEAN CAM ROLLERS AND ANCHOR PINS

The working surfaces of the cam rollers, cam roller pins and the anchor pins should be cleaned to remove any build up of compressed debris. Care should be taken to avoid damage. Do not use abrasives as surface damage will result.

1.13 RE-ASSEMBLE CAM ROLLERS AND ANCHOR PINS

Lubricate anchor pins and bushes with Meritor Brake Lubricant. (Fig. 15)

Push both anchor pins into their bushes in the brake anchor bracket.

FIG. 15

FIG. 15a

Push the cam roller pins into their sleeves. Assemble the cam roller clips to the rollers. (Fig. 15a).

1.14 INSPECT BRAKE LININGS

Do not disturb the brake lining surfaces if these show normal working appearance. Do not contaminate the surface of the linings with grease etc. Clean any compressed lining debris from the rivet holes. The brake lining surface may be carefully cleaned by hand using suitable abrasive paper if contaminated by dirt etc. DO NOT USE ANY FORM OF POWER TOOL.

1.15 RE-ASSEMBLE BRAKE SHOES

Clean any corrosion from both the anchor pin and the cam roller pivot areas of the brake shoes using emery cloth.

Fit the cam roller and clip assembly into the brake shoe, ensuring the locking clips engage securely into the location holes in the brake shoe.

Inspect the brake return spring and retaining springs for damage. ANY SPRING SHOWING SIGNS OF COIL SEPARATION MUST BE REPLACED.

Fit the brake return spring over the roll pins of both brake shoes.

The brake shoes are now ready for refitting to the axle.

Ensuring the brake shoes are refitted to their correct original positions place the roller of the upper shoe in the dwell of the cam head and locate the “D” slots onto the top anchor pin.

Tilt the lower brake shoe and locate the cam roller in the lower cam head dwell and locate the “D” slots onto the shoulders of the lower anchor pin. Refit the brake shoe retainer springs (Fig. 16).

With the shoes sitting correctly on the cam head apply the brake several times by manually pulling on the slack adjuster. When the shoes have settled back in the “OFF” position tighten the head and spline end cam bearing assembly mounting bolts to the torque specified in table 1 (Page 10). (Fig. 17)

Ensure the brake linings are clean, wiping, if necessary, with clean absorbent paper.

FIG. 16

FIG. 17

1.16 GREASE CAMSHAFT BEARINGS

Grease the camshaft bearings using a grease gun (Fig. 18). Always use Meritor Brake Lubricant.

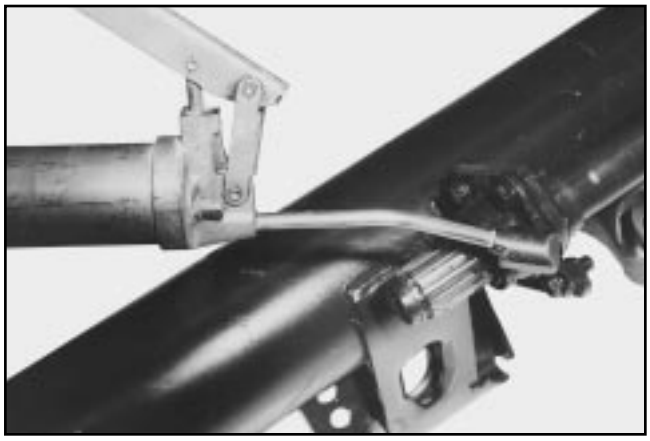


FIG. 18

1.17 INSPECT BRAKE DRUM

Clean excess brake dust from the brake drum and inspect the drum braking surface for corrosion, excessive wear or other damage.

Remove light corrosion by using coarse emery cloth at an angle of 45 degrees in one direction and then 45 degrees in the other direction to produce a cross hatch effect. DO NOT USE ANY FORM OF POWER TOOL.

If the drum braking surface shows signs of light heat crazing it usually can be reused (Fig. 19A) but if the heat crazing is severe the drum should be replaced. (Fig. 19B)

FIG. 19A

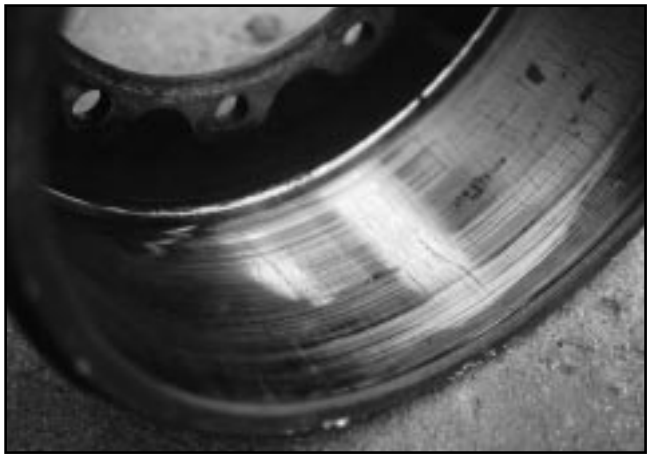


FIG. 19B

Should the drum life be extended by turn-out machining the recommended machining limit should be 423 mm diameter so that during the projected wear-out life of the shoes the final drum diameter must not exceed 424.0 mm.

Similarly excessively worn drums should be inspected and on no account should drums of diameter exceeding 423 mm be re-assembled with new brake shoes.

1.18 REPLACEMENT OF BRAKE DRUM

Replace the brake drum by fitting over the ten wheel studs. To assist with future drum removal, ensure the two threaded jack – off holes in the drum flange are aligned with the two bosses on the hub flange.

Ensure the drum is fully seated on its location spigots.

WARNING:
THE BRAKE DRUM IS NOT POSITIVELY SECURED TO THE HUB AND IS LOOSE ON THE AXLE UNTIL THE ROAD WHEEL IS REPLACED AND THE WHEEL NUTS SECURED.

IF THE TRAILER IS TO BE MOVED OR LEFT UNATTENDED PRIOR TO REPLACEMENT OF THE ROAD WHEEL, ENSURE THE BRAKE DRUM IS TEMPORARILY SECURED BY FITTING A MINIMUM OF TWO WHEEL NUTS PLACED DIAMETRICALLY OPPOSITE TO EACH OTHER.

1.19 LUBRICATE BRAKE CHAMBER CLEVIS PIN ASSEMBLY

Lubricate the clevis pin assembly from both sides with oil, and make sure the brake can be operated easily by pulling the slack adjuster by hand.

1.20 PUSH ROD SETTING LENGTHS FOR MANUAL AND AUTOSLACK ADJUSTERS (Haldex)

To ensure the correct installed slack adjuster positions, it is necessary to identify the type of air chamber bracket installed.

The dimensions shown are from the chamber / bracket interface to the centre of the clevis pin (NB. NOT the push rod cutting length – This will vary depending on the throat depth of the clevis yoke "X").

The dimensions shown are correct for all Ø420 brakes – ie. LM 'Q+', TE 'Q', TM 'Q' and TM 'Z'. Follow the published procedure for auto slack installation and setting once these dimensions are set. (Fig. 19)

1.21 RE-ADJUST BRAKES

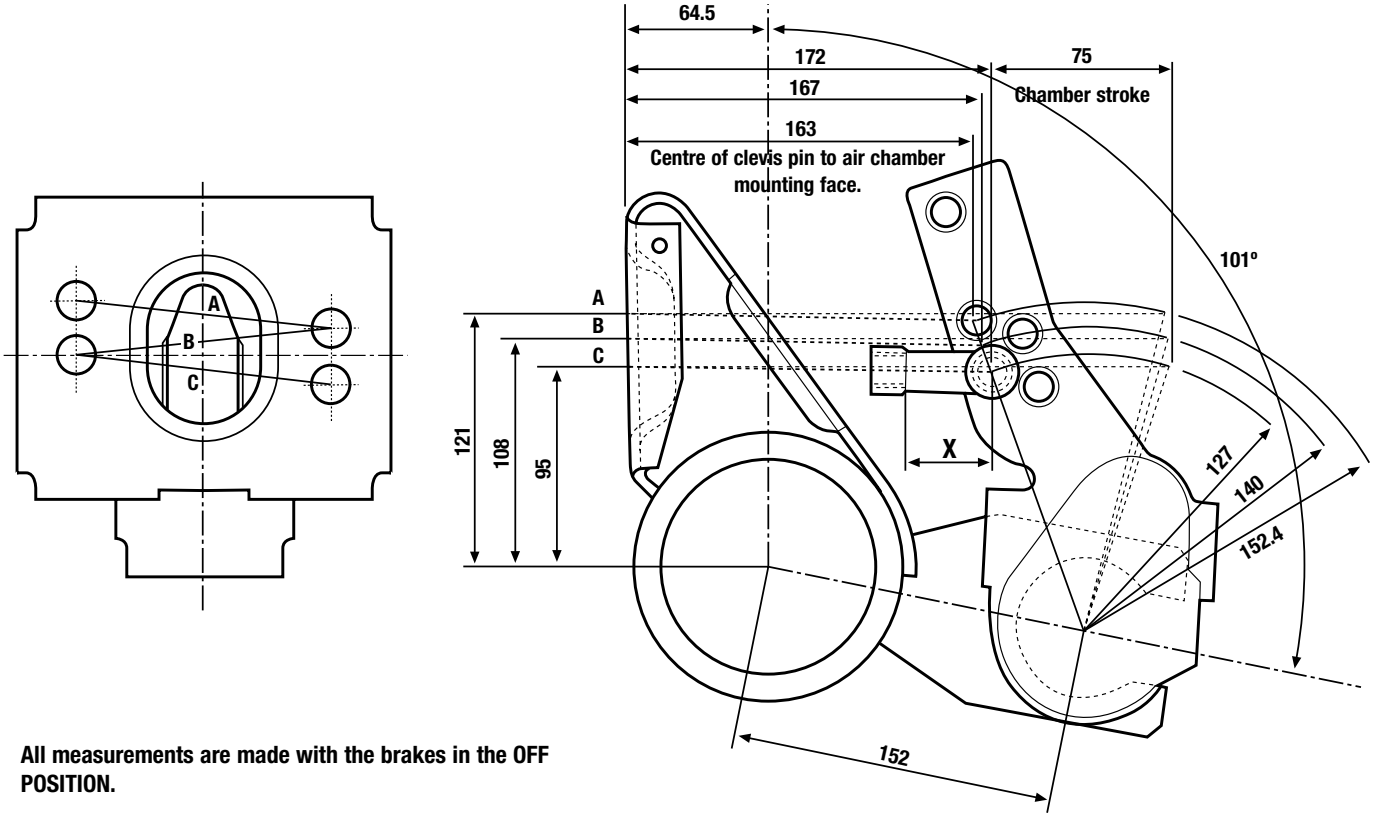
1.21.1 Manual Slack Adjusters:

Using the manual adjustment nut on the slack adjuster, adjust the brake until the wheel can not be turned by hand. Where applicable, ensure the locking sleeve around the adjustment nut is fully depressed. Back off the adjustment until it is just possible to freely turn the wheel without resistance from the brake linings. Ensure the locking sleeve has re-engaged.

1.21.2 Automatic Slack Adjusters:

Follow the appropriate setting procedure for the type of automatic slack adjuster fitted. Instructions are available through the Meritor Technical Sales Department.

Ø 420 Brakes LM, TE, TM Post - 97.



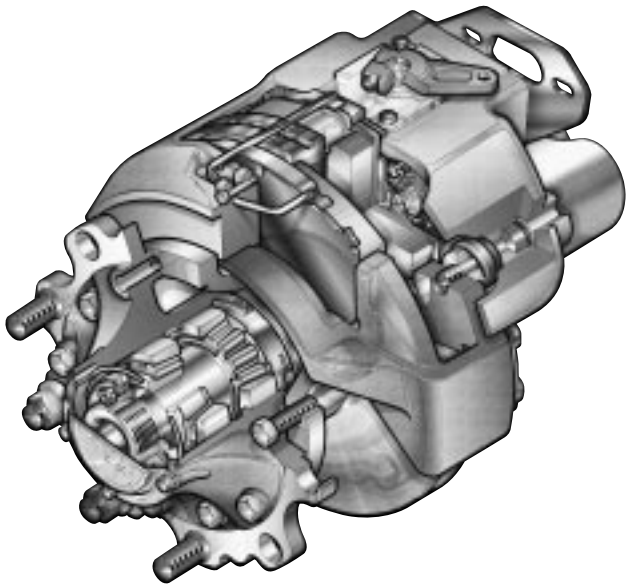
All measurements are made with the brakes in the OFF POSITION.

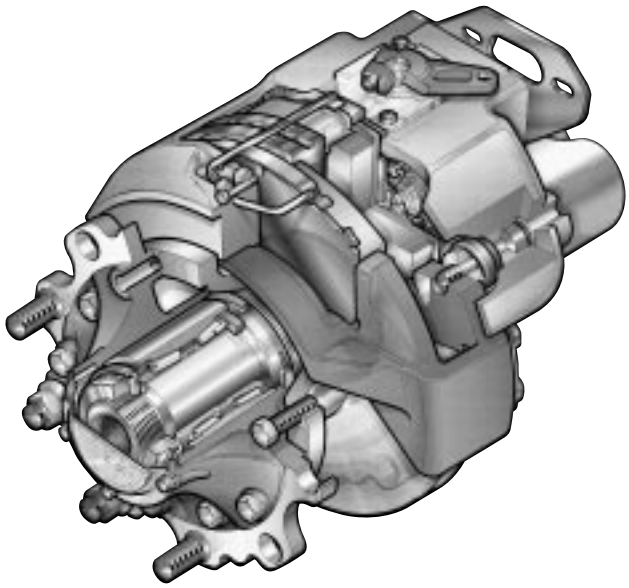
For installation and adjustment of Meritor ASA's, Refer to Meritor Auto Slack Brochure, Publication No. 4.61.2

Fig.19

Section 2

LM/LMC
Disc Brake Service





SECTION 2

Brake and Servicing

2.1 NOMENCLATURE

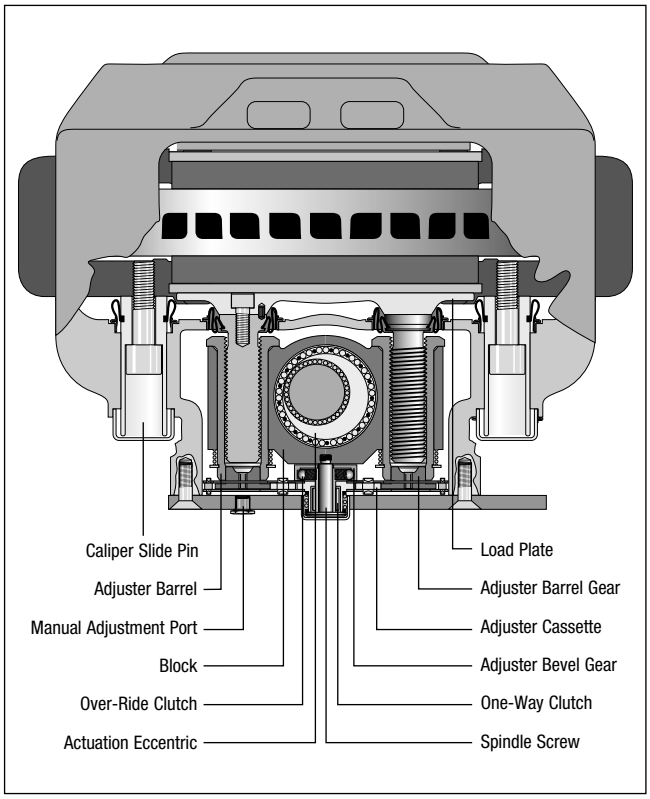


FIG. 1

2.2 OPERATING PRINCIPLES:

Actuation:

Linear force from the Air Chamber is translated by lever action to rotary torque on the main actuation shaft and eccentric.

The eccentric is located in a balance beam (actuation block) and rotation of the shaft causes the block to "lift" or travel forward (Fig. 2).

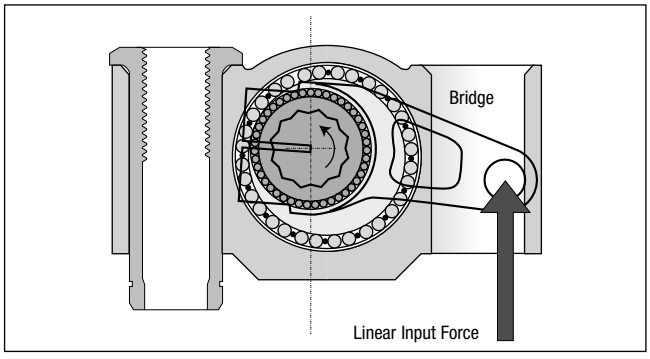


FIG. 2

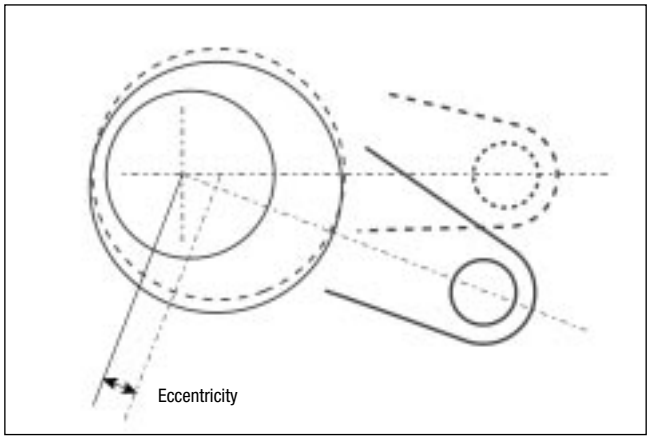


FIG. 3

All radial loads in the eccentric shaft and block are taken through precision needle roller assemblies maintaining an efficiency of around 97%, due to the complete absence of any sliding friction in the system.

Clamping:

The caliper assembly is free to "float" on the slide pins attached to the fixed saddle. Clamping force exerted on the inner pad by the eccentric action on the balance beam creates an equal and opposite reactive force in the caliper body (Fig. 4).

This reaction provides the clamping force for the outer pad, ensuring that both pads are loaded onto the rotor with an equal force.

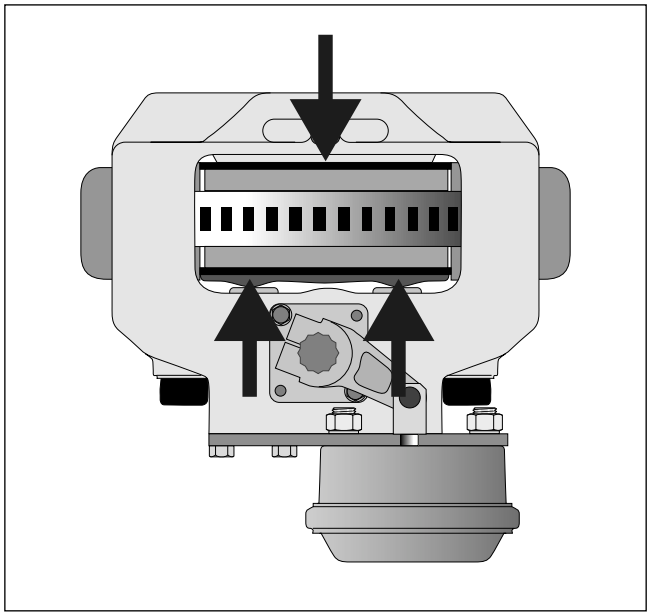


FIG. 4

2.3 MAIN AUTO-ADJUST PARTS

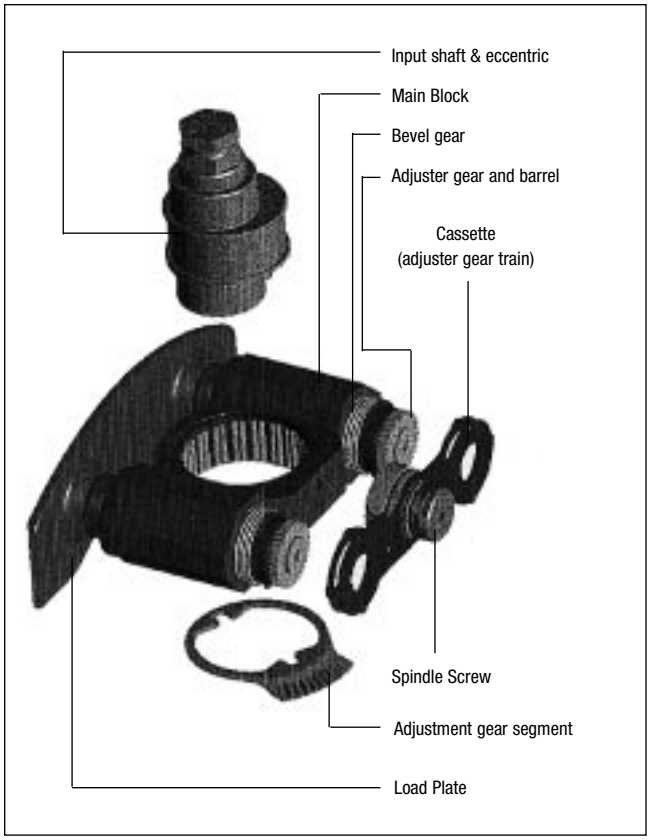


FIG. 5

2.4 AUTOMATIC ADJUSTMENT MECHANISM

Step 1:

- Actuating lever moves and eccentric shaft rotates.
- Block "lifts", begins to move forward, carrying the adjuster sleeves and pistons (Fig. 6).
- Eccentric shaft turns within the gear plate segment – taking up clearance between tongue and shoulders (Fig. 7).

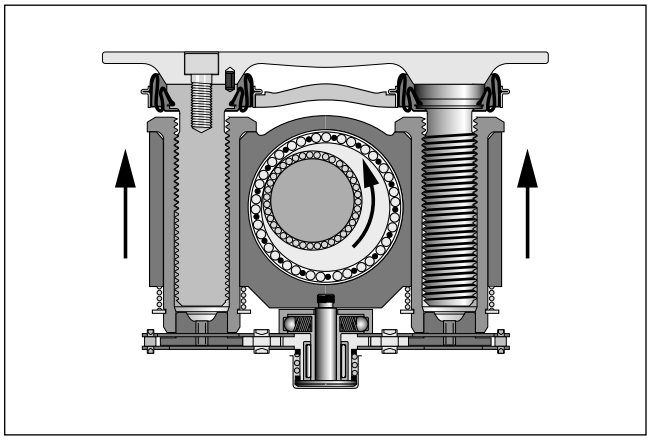


FIG. 6

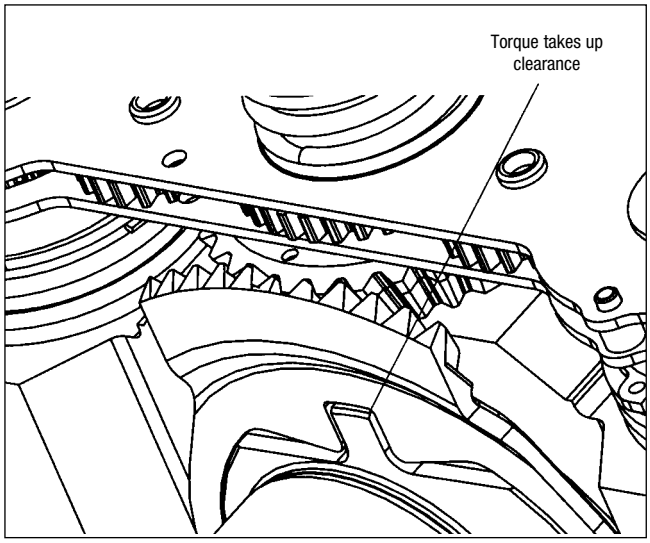


FIG. 7

NOTE:
This clearance governs the final pad/rotor running clearance, and is specific to each brake. It is vital that the correct (original) gear plate segment is retained matched to the eccentric shaft. Use of an unmatched gear plate segment, will alter the pad rotor running clearances perhaps outside of permissible limits.

STEP 2:

- Gear segment begins to turn.
- Main adjuster gear turns, in mesh with lower gear segment.
- Main adjuster drives through the one way clutch and the over-ride clutch to turn the central gear.
- Complete gear train turns, in mesh with the central gear. The adjuster barrels begin to turn.

At this stage one of two conditions will be encountered: SEE STEP 3A OR 3B.

STEP 3A:

No Adjustment is required as clearance is correct

- At the point when the adjusters begin to turn, the pads contact the rotor and clamping force begins to build up.
- The clamping force generates friction in the screw threads between the adjuster sleeves and pistons, and friction under the flanged head of the adjuster sleeves. (Fig. 8).

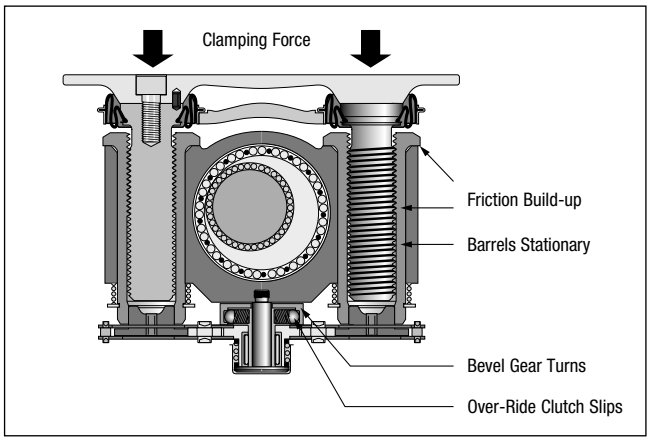


FIG. 8

- The friction build up prevents rotation of the adjuster sleeves – instead the over-ride clutch begins to slip. The adjuster drive train is locked by the friction in the system and no adjustment takes place. The main gear turns but does not transmit motion beyond the over-ride clutch into the adjuster train.

STEP 3B

Adjustment is required as clearance is excessive.

- Before the pads contact the rotor, the adjuster sleeves are turned by the gear train. Rotation of the sleeves has the effect of unscrewing the adjuster piston within the sleeves thus increasing the effective length of the pistons and decreasing the travel required (Fig. 9).

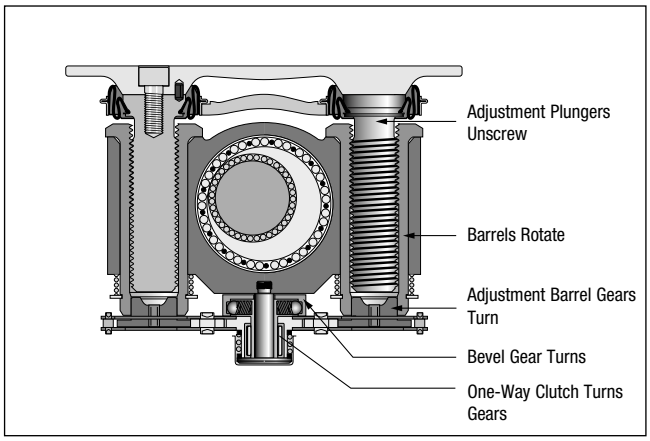


FIG. 9

- When the pads contact the rotor a clamping force is generated and this is fed back into the adjuster sleeves and pistons, generating friction in the adjuster screw threads, and friction under the flanged head of the adjuster sleeves. (Fig. 8).
- The friction build up prevents further rotation of the adjuster sleeves – instead the over-ride clutch begins to slip. The adjuster drive train is locked by the friction in the system and no adjustment takes place. The main gear turns but does not transmit motion beyond the over-ride clutch into the adjuster train (Fig. 8).

STEP 4

Brakes Released

- When the pressure to the air chamber is relieved – the actuating lever will be retracted. The eccentric shaft and quadrant gear will reverse with the centre gear.

The one way clutch free-wheels preventing reverse transmission into the adjuster gear train and the adjuster sleeves do not move, thus holding the adjustment (Fig. 10).

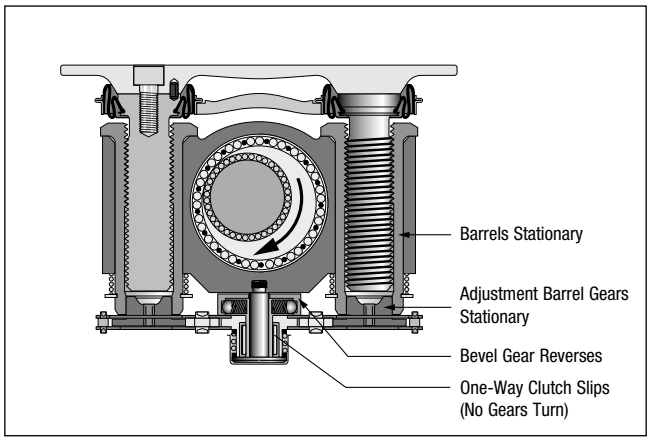


FIG. 10

Damping

- Compression springs ensure that the adjuster train has the necessary amount of predetermined friction, which prevents vibration in service from disturbing the clearance setting (Fig. 11).

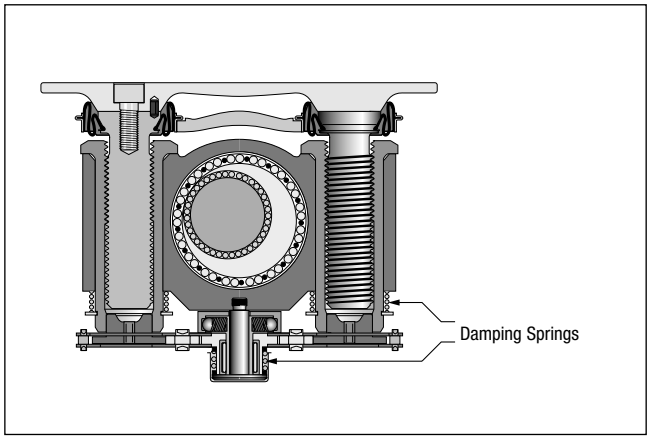


FIG. 11

2.5 MANUAL ADJUSTMENT

Under normal operation the automatic adjustment mechanism will maintain correct pad to rotor clearance.

Provision is made for manual adjustment of the brake which may be required under the following conditions:

1) Where the pads cannot be removed due to wear on the rotor – in this case the pads will have to be retracted by back adjusting the brake.
2) Where new pads are to be fitted – it will be necessary to fully retract the adjusters to accommodate full thickness pads.

The brake is manually adjusted by turning one of the adjuster barrels by means of a 6mm standard hexagon key. The gear train will ensure that the other adjuster barrel will be turned by an equal amount.

Access for the hexagon key is gained by removal of the blanking plug (Fig. 12) in the back plate.

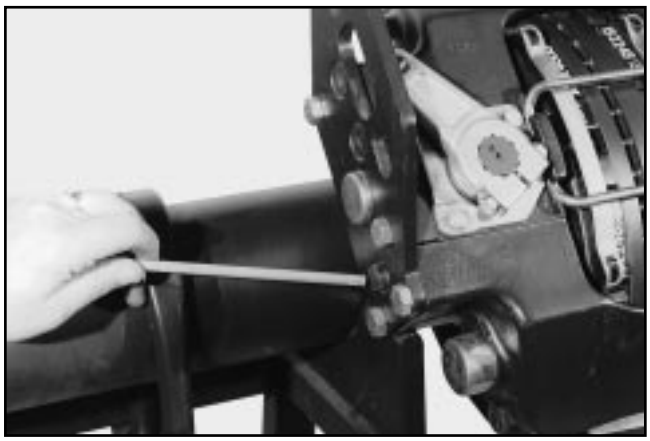


FIG. 12

The adjustment direction depends on the particular installation of the brake – the handing of the eccentric, and the air chamber position.

In general, de-adjustment or "back adjustment" is achieved when the key is turned in the direction which produces load clicks. (This indicates that the torque limiter is working). Turning in the opposite direction will result in a smoother silent action, which will give positive adjustment and reduce pad to rotor clearance (Fig. 13).

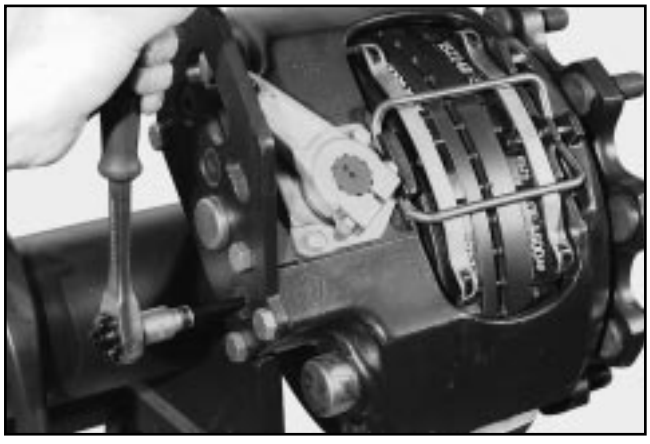


FIG. 13

NOTE:
Opening the adjusters from fully worn pad condition to fully retracted position requires approximately 20 turns.

CAUTION:
When backing the brake off stop turning the key when resistance is felt. This indicates that the adjuster pistons are fully retracted. Further turning could lock the adjuster pistons in the sleeves and cause damage to the internal components. When this resistance is felt, adjust the brake out 1/4 turn to ensure that Auto Adjustment will take place.

*** DO NOT USE AN AIR GUN**

2.6 BRAKE INSPECTION AND TROUBLE SHOOTING

WARNING:
Do not work under a vehicle supported only by jacks. Jacks can slip or fall over and cause serious personal injury. Support the vehicle with safety stands, block the wheels to prevent the vehicle from moving.

Inspection Schedules

Inspect the brake according to one of the following schedules. Use the schedule that gives the most frequent inspection.

- The schedule for chassis lubrication used by your fleet.
- The schedule for chassis lubrication recommended by the manufacturer of the chassis.
- At least every 3 months.
- During tyre replacement.

Inspection should include the following:

1. **Stroke length:** Check the adjusted chamber stroke as follows (Fig. 14).
   a. Measure the distance from the bottom of the air chamber to the centre of the large clevis pin while the brakes are released.
   b. Have another person apply the brakes using 80-90 psi of air pressure.

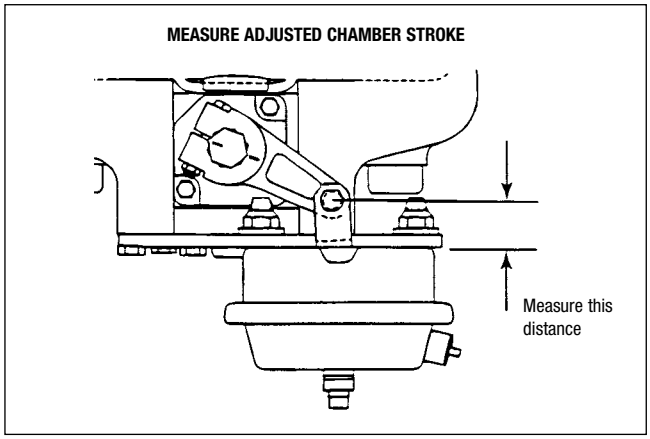


FIG. 14

NOTE
If the vehicle does not have an application pressure gauge, build tank pressure to 100 psi, shut off the engine, then make and hold a full brake application. This will give 80-90 psi in the air chamber.

c. Measure the distance from the air chamber to the centre of the large clevis pin while the brakes are applied.

d. The difference between the measurement is the adjusted chamber stroke.

2. **Pad wear:** The pads must be replaced at or before the amount of pad material reaches a thickness of 2mm.

3. **Anti-rattle springs:** The pads have anti-rattle springs attached. Inspect for bent, cracked or broken springs. If springs are damaged, replace with new. Refer to "Pad Removal and Replacement".

4. **Seals:** Caliper should be replaced if any of the seals are found to be cracked, torn or damaged in any way.

5. **Caliper slides freely on slide pins:** Clearance between the rotor and the pad should be transferred from the inboard rotor surface to the outboard rotor surface by sliding the caliper back and forth.

6. **Disc (Rotor):** Inspect the rotor for cracks, deep scores or other damage. Replace the rotor when necessary.

Inspection and Troubleshooting

CONDITION	POSSIBLE CAUSES	CHECK FOR	CORRECTIONS
1 Air Chamber exceeds 50mm maximum stroke requirement at 80 to 90 psi	Improper initial adjustment or inoperative automatic adjuster	Recheck chamber stroke after twenty brake applications.	If the air chamber still overstrokes then replace the caliper/saddle assembly per Section 2.9
2 Brake Drag	Incorrect pad to rotor clearance	Minimum stroke at 80-90 psi to be 22mm	Replace caliper/saddle assembly
	Improper initial adjustment		Readjust per Section 2.7
	Vehicle air system malfunction		Repair or replace parts as required
3 Short outboard/inboard pad life	Caliper seized or sticking on slide pins	Damaged slide pin seals Caliper should move back and forth by hand with pads removed	Replace caliper/saddle assembly
4 Short pad life	Refer to 2 and 3	Refer to 2 and 3	Refer to 2 and 3
	Abusive use of brake system	Driver technique	Train drivers
	Rotor surface	Cracks or heavy heat checking. Refer to Section 1.8	Refer to Section 2.8 for rotor inspection
	Non genuine pads		Fit Meritor pads
	Vehicle overload	See GAWR limitations on vehicle I.D. plate.	Observe vehicle manufacturers load recommendations
	Companion brakes not working properly	Inspect companion vehicles brakes and air systems	Adjust or repair as required
5 Brake smoking	High brake temperature	Refer to 2, 3 and 4	Refer to 2, 3 and 4
	Contamination of pads	Grease, oil etc., on pads	Inspect hub seal. Replace as required. Clean rotor and caliper assembly. Replace pads per Section 2.7
6 Poor stopping power	Vehicle air systems malfunction	Proper air pressure at the chamber inlet	Have the air system evaluated by a qualified brake system specialist
• Long stopping distances	Brakes out of adjustment	Stroke exceeds 50mm requirement	Replace caliper/saddle assembly. Refer to Section 2.9
• Poor driver feel • High brake pressures	Vehicle overload	See GAWR limitations on vehicle I.D. plate	Observe vehicle manufacturer's load recommendations
• Lack of normal response	Contamination on pads	Grease, oil etc., on pads	Inspect hub seal and replace pads per Section 2.7
• Vehicle pulls to one side	Companion brakes not working properly	Inspect companion vehicle brakes and air system	Adjust or repair as required
7 Shimmey or brake pull	Refer to 1, 2 and 6	Refer to 1, 2 and 6	Refer to 1, 2 and 6
	Rotor run out and thickness variation		Replace hub and rotor assembly

2.7 PAD REMOVAL AND REPLACEMENT

The pads must be replaced at or before the amount of pad materials reaches a thickness of 2mm.

WARNING:
Caution should be exercised in handling both asbestos and non-asbestos materials.

CAUTION:
Replace the pads on both brakes of a single axle, or all six brakes of a triaxle at the same time. If you do not replace all the pads at the same time, poor brake performance may occur.

1. Put blocks in front and behind the wheel so that the vehicle cannot roll.

WARNING:
Do not work under a vehicle supported only by jacks. Jacks can slip or fall over and cause serious personal injury. Support the vehicle with safety stands. Block the wheels to prevent the vehicle from moving.

2. Raise the vehicle enough to get clearance to remove the wheel and tyre. Support the axle with safety stands. Remove the wheel and tyre.
3. Remove the adjuster plug from the air chamber bracket (Fig. 12).
4. Using a 6mm Allen key, carefully back off the brake. (Fig. 13 and 14a). **CAUTION – Read section 2.5, Manual Adjustment.**

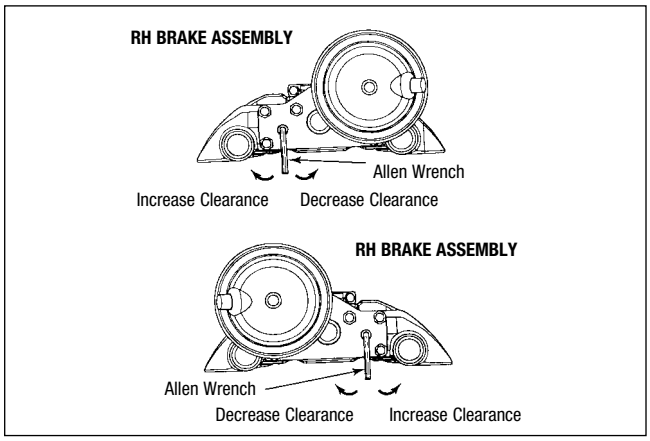


FIG. 14a

5. Remove the stabiliser bar split pin and stabiliser bar retainer pin. Hinge the stabiliser bar up and out of the way. (Fig. 15 and 16).
6. Lift the inner pad out of the caliper assembly. If these pads are not to be replaced, mark the pads as inboard and outboard (Fig. 17).
7. Slide the caliper outward and remove the outboard pad.
8. Verify that the caliper will slide freely on the slide pins. The caliper can get jammed if moved past its working range. If this occurs use a rubber mallet to get the caliper back to its working range and verify that it will slide freely.
9. Remove any dirt or rust from the pad contact surfaces on the saddle.

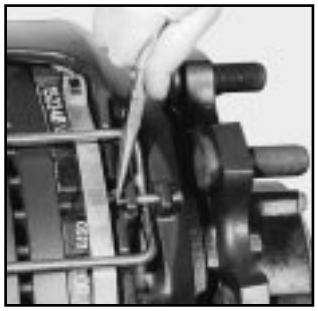


FIG. 15

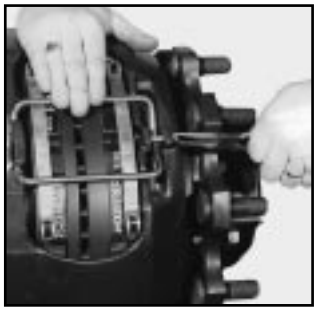


FIG. 16

10. Inspect for damaged boots and **replace the caliper if boots are damaged.**
11. See Section 2.8 for rotor inspection and instructions.
12. Slide the caliper outboard then install the pad and spring assembly in the outboard side. If pads are to be reused, place the pad marked outboard (in Step 6) back in the outboard position. Take care to prevent the load plate hanging up on the saddle guides.
13. Slide the caliper inboard and install the inboard pad and spring assembly. If pads are to be reused, place the pad marked inboard (in Step 6) back in the inboard position.
14. Pull down the stabiliser bar compressing the springs and install the stabiliser bar retainer pin and split pin bending its long leg.
15. To adjust the initial caliper clearance, adjust the caliper by reducing the caliper to rotor clearance to zero (See Fig. 14a for the adjusting direction). Make sure that the load plate is in full contact with the pad backing plate. Back-off the brake seven clicks to set the initial clearance.
16. Reinstall the adjuster plug and washer.(Fig. 12). Tighten to the torque value specified in table 1.

FIG. 17

2.8 ROTOR INSPECTION

Rotors should be examined in situ, whenever the brakes are serviced or new pads are fitted – or immediately if erratic braking performance is noted. The rotor condition should be visually checked for the following surface conditions, and replaced with a new rotor if suspect or defective.

A Surface Crazing (Fig 18a)
Light short random crazing surfaces are normal and acceptable.

B Radial Cracks (Fig 18a)
Short light cracks up to 0.5mm in width and a maximum of 1.0mm in depth are acceptable – providing they do not extend radially across more than 75% of the braking surface.

C Tangential Scoring (Fig 18a)
A series of light circular grooves is normal, and permissible if the maximum depth of the grooves is 0.5mm. Severe grooving indicated that skimming of the rotor is required – providing the minimum thickness of the rotor can be maintained (see skimming). Wear and grooving should be approximately equal on both surfaces. If the wear patterns differ significantly, the brake is not functioning correctly and should be examined.

D Heat Spotted Rotor (Fig 18a)
This condition indicates that the rotor has been subjected to extremely high temperatures that have caused a structural change in the rotor material and have caused the rotor to be more susceptible to cracking. Rotors may be turned to remove hard raised areas (See skimming). If resurfacing does not remove the spots the rotor must be replaced.

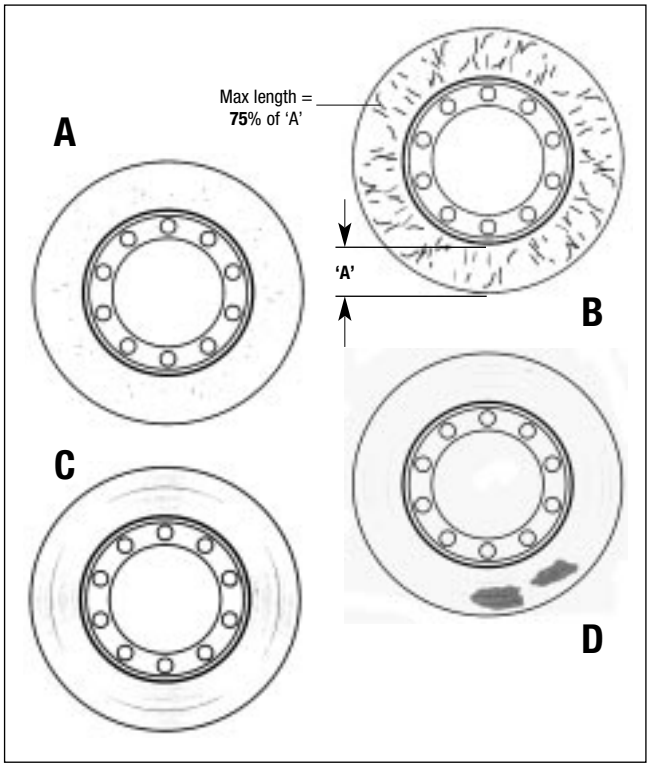


FIG. 18a

Rotor Run Out
Use a Dial test Indicator (DTI) to check the run-out both axially and radially as in (Fig. 18b).

Axial
Run-out should not exceed 0.3mm over the rotor braking surface when the rotor is turned on properly adjusted wheel bearings. Excessive run-out may be due to incorrect mounting of the hub, fastener torque's or mal-adjusted bearings.

Radial
Run out should not exceed 0.8mm total indicator reading.

Thickness
Rotor thickness must not vary by more than 0.13mm across any two points of the rotor faces.

Skimming
Resurfacing the rotor is permissible until the minimum thickness is reached 41mm.

Surface finish after machining should be 5 microns maximum.

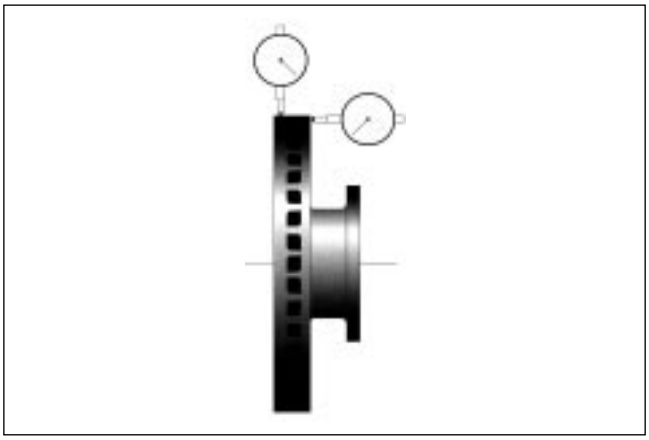


FIG. 18b

2.9 CALIPER REMOVAL AND REPLACEMENT

CAUTION:
Note to assist assembly on some axles. The two extreme fixings engage slots on the torque plate. Never leave the caliper with only these two fixings in place. ***Falling hazard!*** *(Fig. 19a and Fig. 19b).*

CAUTION:
Do not used the stabiliser bar for handling purposes. Damage to the bar could result.

FIG. 19a

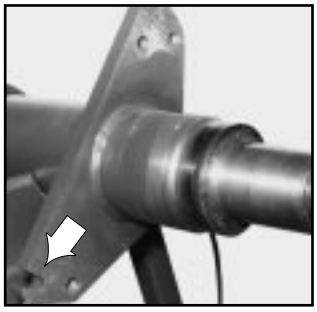


FIG. 19b

LM & LMC Service

Removing the caliper assembly: Refer to (Fig. 25)

1. Follow steps 1-7 of the lining change procedures (Section 2.7) to remove the linings.
2. Remove the 'R' clip and clevis pin from the lever (Fig. 20).

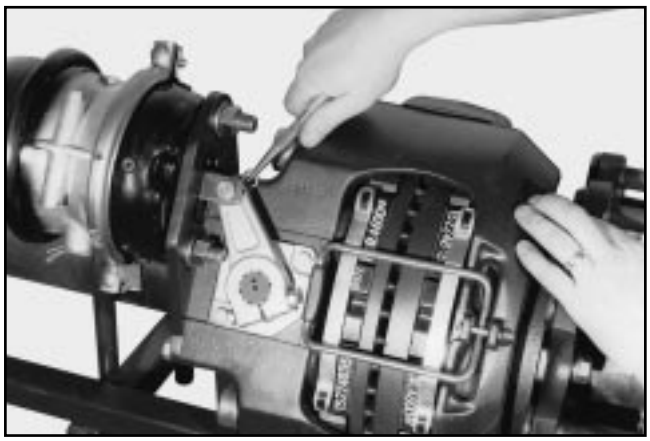


FIG. 20

3. Remove the air chamber (Fig. 21).

FIG. 21

4. Remove the caliper mounting bolts. Take care not to allow the caliper to fall (Fig. 22). Remember that the caliper has a weight of 35kgs!

FIG. 22

5. Lift the caliper away from the disc.

Installing the caliper assembly:

1. Lift the caliper over the rotor. Read CAUTION Page 26 Fig. 19a, Fig. 19b if assembly slots exist on the torque plate.
2. Align the bottom caliper bolt holes and hand start one of the inner fasteners, fitted with a hardened washer.
3. Hand start the remaining 5 bolts, starting on the top half of the torque plate.
4. Tighten the six fasteners to the torque value specified in table 1 using a 24mm 1/2" drive square socket. (Fig. 23)

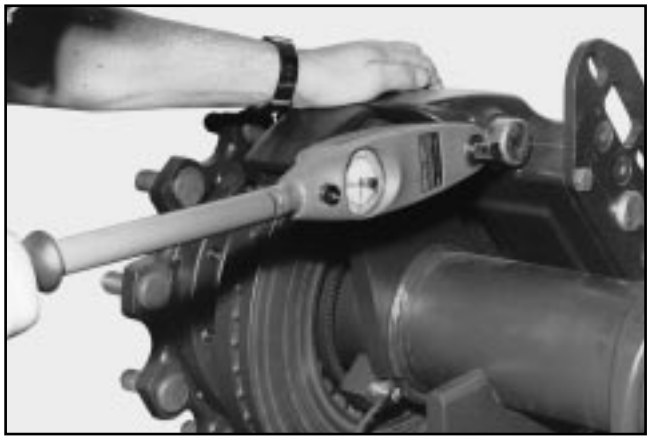


FIG. 23

Important
For 80mm levers, chamber fits lower (near) end of slot
For 90mm levers, chamber fits upper (far) end of slot

5. Mount the air chamber to the caliper assembly.(Fig. 24). Tighten the air chamber nuts and washers to to the torque value specified in table 1. (Page 10)

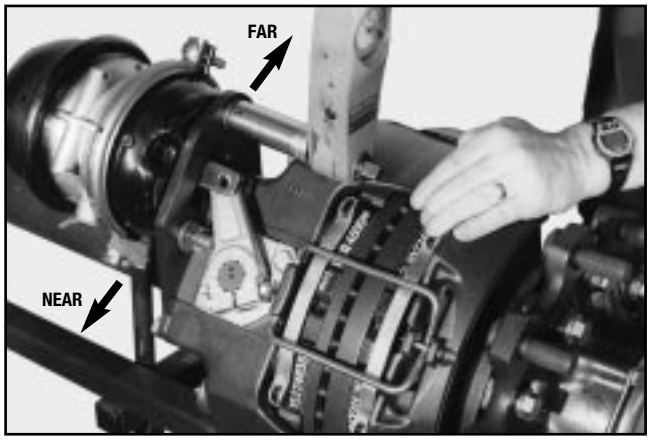


FIG. 24

6. Install the clevis in and 'R' clip (Fig. 20).
7. Follow steps 12 to 16 described in Section 2.7 to fit the pads and adjust the brake.

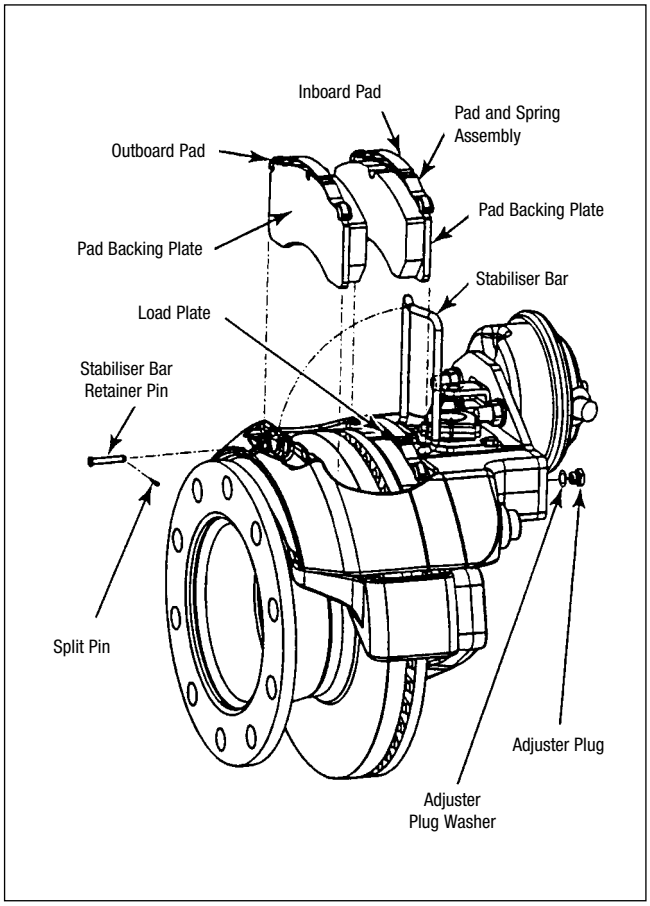


FIG. 25

2.10 FITTING A NEW ROTOR AND ABS RING

Place the hub on a suitable flat clean surface with the rotor placed loose on its mounting spigot. Push the ABS tube into the rotor (Fig. 26).

FIG. 26

Using an LM oil seal drift (Meritor part No. 21224749), gently tap the ABS tube over its spigot on the hub (Fig. 27).

FIG. 27

Keep the pole wheel square at all times and do not use excessive force to avoid damage to the thin tube. When the pole wheel is approximately 4mm below the face of the rotor, gently lift the rotor up off the hub spigot and lower it back, to ensure the barbs on the tube engage properly onto the step in the rotor bore. (Fig. 28).

FIG. 28

By hand fit at least two opposite rotor mounting bolts and washers before turning the assembly over.

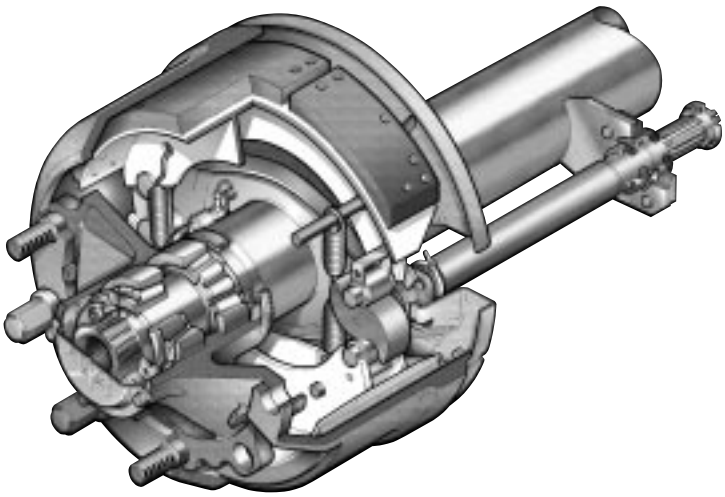
Fit the remaining fasteners and hardened washers. Apply a nominal torque of no more than 30 Nm to all fasteners to seat the rotor. Check the correct length of bolt has been used in all 10 positions.

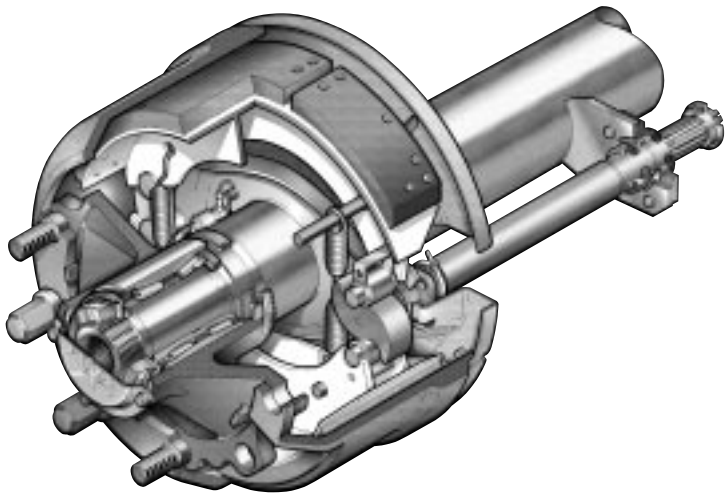
NB: All rotor fixings must be tightened to the torque value specified in table 1

WARNING: ROTOR WEIGHT IS 32 KGS

Section 3

LM/LMC Hub Service for Drum Brakes





SECTION 3

LM Hub and Bearing Inspection

The following procedures can be performed either with the road wheel and brake drum assembled to the hub or with the road wheel and brake drum removed. In the latter instance refer to Sections 1.1-1.3.

For clarity, the brake drum has been removed in the following photographs.

3.1 DE-ADJUST BRAKES

See Section 1.1.

3.2 REMOVAL OF HUB LOCKNUT

Remove the five M8 hub cap screws.

Remove hub cap and gasket (Fig. 1).

Remove the two socket button head screws using 5mm A/F Allen key (Fig. 2).

The hub locknut should be removed using hub nut spanner (Meritor part number 21224839).

FIG. 1

FIG. 2

It is recommended that the retaining clip and retaining washer are left in the hub until the hub assembly has been removed from the spindle.

3.3 REMOVAL OF HUB

Remove the hub assembly from the axle using a hub puller (Meritor part number 21224863). The five M8 hub cap screws may be used to secure the hub puller to the hub face (Fig. 3).

If the hub is to be removed whilst still assembled to the road wheel and brake drum, use a wheel dolly to support the weight of the assembly.

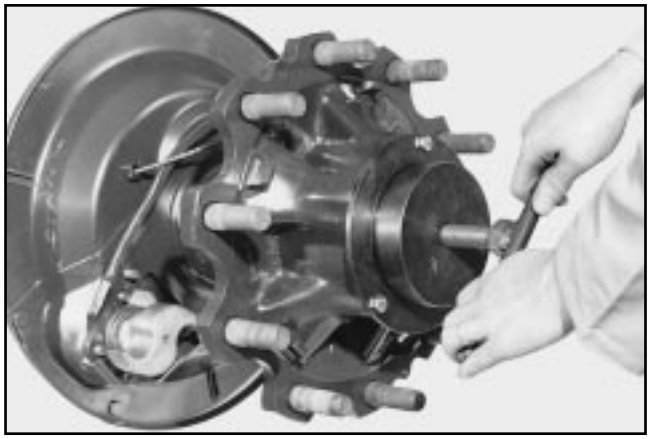


FIG. 3

3.4 REMOVAL OF OIL SEAL AND INNER BEARING CONE

The oil seal should be removed from the hub using an oil seal removal plate (Meritor part number 21224938) and suitable lever (Fig. 4).

THE SEAL MUST BE DISCARDED. NEVER RE-USE AN OIL SEAL AFTER THE HUB HAS BEEN DISMOUNTED FROM THE AXLE SPINDLE.

Remove the inner bearing cone and place it in a clean area. Identify the bearing cone clearly to ensure that it is refitted to its original position in the hub.

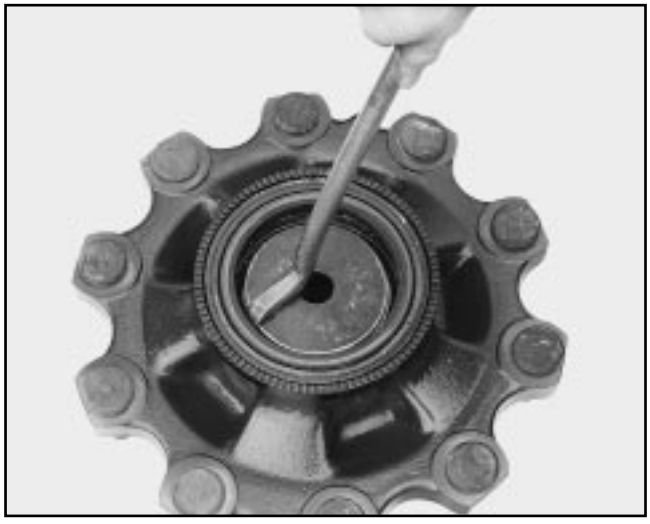


FIG. 4

3.5 REMOVAL OF RETAINING WASHER AND OUTER BEARING CONE

The retaining clip can now be removed from the outer side of the hub with a pair of pliers or suitable screw driver.

Remove the retaining washer (Fig. 5).

Remove the outer bearing cone and place it in a clean area. Identify the bearing cone clearly to ensure that it is refitted to its original position in the hub.

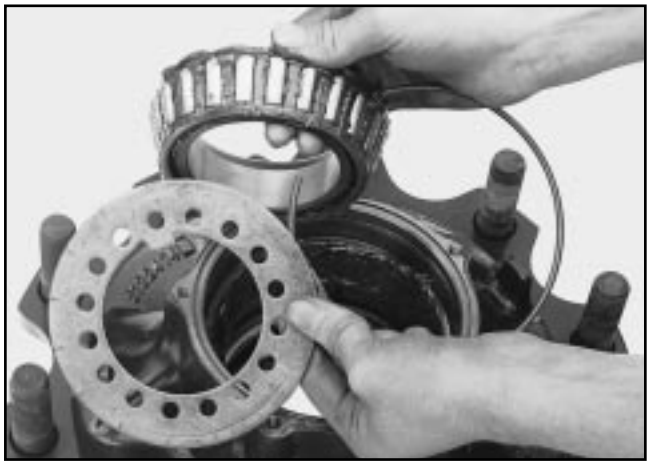


FIG. 5

3.6 CHECK GREASE CONDITION

If the grease within the bearing is clean and does not appear burnt there should be no necessity to totally clean down the assembly.

Check the hub cavity for any grease contamination caused during hub removal from the spindle. Any contamination must be removed or if this is excessive a complete hub clean down must be carried out. Refer to Section 3.7.

3.7 CLEANING OF HUB

Wipe clean the hub cavity removing all the old grease and any contamination.

3.8 INSPECT BEARINGS

Check both bearings, cones and raceways for:

Cage damage
Corrosion
Roller and raceway damage or pitting
Metallic debris or flaking
Bearing cup security – Ensure both bearing cups are well secured in the hub, by checking they are fully seated within the hub bore, and with a good grip of the cups try to rotate them. If any movement of the cups is detected then the hub will have to be replaced. Do not attempt to fit new bearings into a hub with worn bores.

If any of the above defects are evident the complete bearing (cup and cone) **MUST** be replaced.

3.8.1 Replace Hub:
It is advisable to replace with a complete new hub and bearing assembly which is available from Meritor Aftermarket Distributors.

3.8.2 Individual Bearing Replacement Procedure:
Drift out the bearing cup from the hub ensuring that the bearing bore within the hub is not damaged.

Bearing Cup Refitment:

ALWAYS USE GENUINE MERITOR BEARINGS – STANDARD ISO BEARINGS CANNOT BE USED.

Insert the bearing cup into the hub and using a bearing cup driver (Meritor part number 21225228) drive the cup fully home ensuring the cup sits squarely against the hub shoulder.

3.9 REGREASE BEARINGS

Thoroughly pack both bearing cones with Meritor Hub Grease, Blue Lithium EP2 and refill the bearing cavity. Refer to table 3 for correct grease quantities.

Note: Greased bearings should always be placed in a clean area.

3.10 REFIT INNER BEARING

Refit inner bearing cone into the inner bearing cup pressing fully home to assist location of oil seal driver.

3.11 FIT NEW OIL SEAL

Press a **NEW OIL SEAL** onto the oil seal driver (Meritor part number 21224749) ensuring the 'OIL SIDE' marking on the seal is visible (i.e. faces away from the plate of the driver) such that the seal will be installed the correct way round in the hub.

Locate the nose of the driver into the bore of the inner bearing cone and drive the seal fully home ensuring the seal remains square to the hub at all times (Fig. 6). The outer face of the seal should be flush with the back face of the hub when fully installed.

Check the hub cavity grease and top up as necessary with Meritor Hub Grease, Blue Lithium EP2. Refer to table 3 for correct grease quantity.

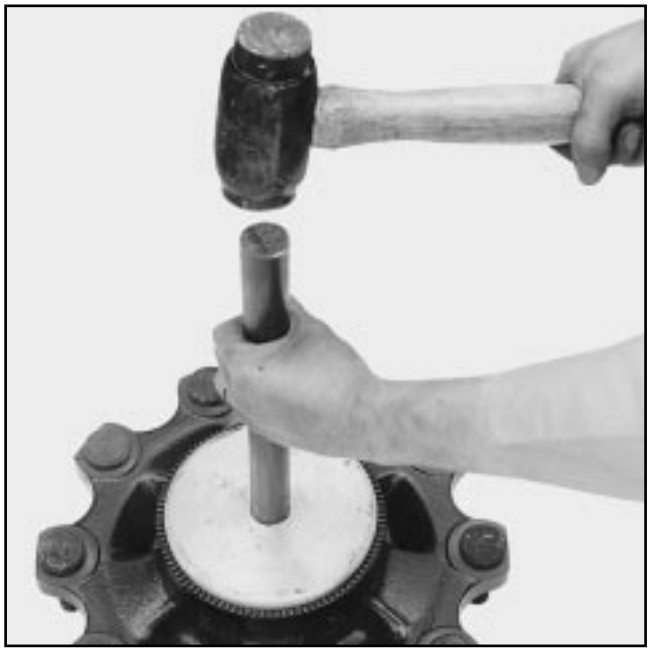


FIG. 6

3.12 REFIT OUTER BEARING AND RETAINING WASHER

Refit the outer bearing cone. Fit the retaining washer into the hub, ensuring the adjustment indicator markings are facing outwards and fit the retaining clip to hold the bearing cone in place ready for re-assembling hub to axle spindle (Fig. 7). Refer to Section 3 for refitting procedure.

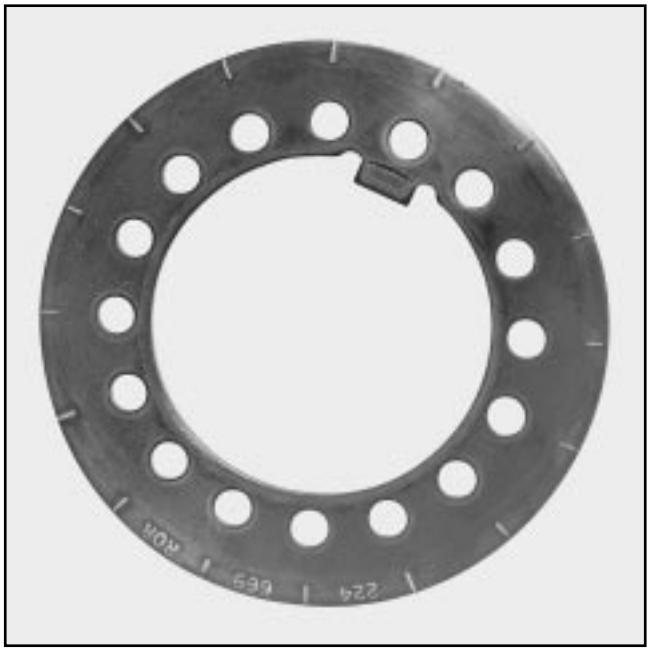


FIG. 7

LM Hub Re-Fitment Procedure

3.13 CLEAN SPINDLE BEARING JOURNAL

Prior to re-assembling the hub onto the spindle, check the spindle for damage and remove any fretting or rust on bearing journals using medium grade emery cloth strip. Also ensure the inner bearing abutment shoulder is clean and free from damage.

Clean the oil seal journal, removing brake dust or corrosion from adjacent areas.

3.14 CHECK SPINDLE END THREAD

Any minor damage can be repaired using a M82 x 2 die nut and holder (Meritor part numbers 21224939 and 21224940).

Apply a thin, even coating of Optimol 'Optimoly White Paste T' (available from Meritor Aftermarket Distributors) to the bearing journal and bearing abutment shoulder (Fig. 8).

This will reduce spindle wear and assist future removal of the hub assembly.

FIG. 8

3.15 RE-MOUNT HUB ASSEMBLY

If the hub is still assembled to the road wheel and brake drum, use a wheel dolly to align the hub assembly with the axle spindle, adjusting the height until the brake drum fits over the brake linings.

If the hub is to be replaced separately from the road wheel and brake drum, ensure the hub is squarely aligned to the axle spindle during refitting.

Push the hub or hub, drum and wheel assembly onto the axle spindle and align the key on the retaining washer with the keyway in the spindle end. Push the assembly fully onto the spindle taking care not to damage the oil seal or spindle threads.

3.16 REFIT HUB LOCKNUT

Fit the hub locknut (Fig. 9) and tighten using hub nut spanner (Meritor part number 21224839) until the nut is fully engaged on the spindle thread.

FIG. 9

3.17 HUB LOCKNUT SETTING PROCEDURE

3.17.1 Torque the nut to 100 Nm WHILST ROTATING THE HUB. The hub MUST be rotated 5-10 revolutions whilst the end nut torque is continuously applied.

3.17.2 Back off the nut one flat of the socket (i.e. 1/8 turn) anti-clockwise.

3.17.3 Remove the hub nut spanner. Rotate the nut in a CLOCKWISE direction (i.e. in the 'tightening' sense) until the corners of the nut align with the NEXT nearest mark on the face of the retaining washer (Fig. 10).

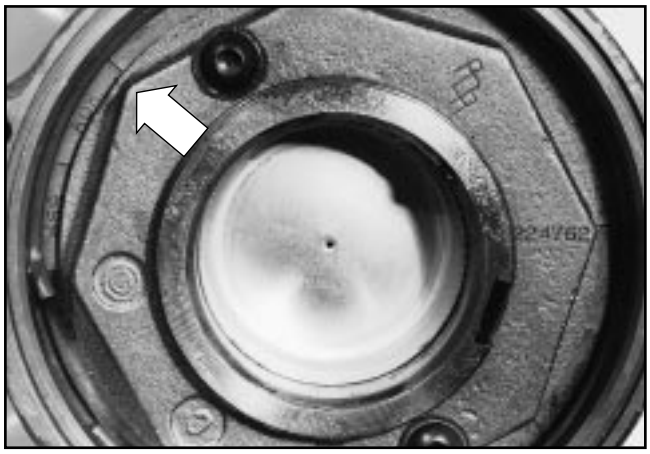


FIG. 10

Should the corners of the nut already line up EXACTLY with an index mark, do not further rotate the nut.

3.17.4 Fit the two button-head screws to the locknut and tighten evenly until both the heads are flush with the face of the locknut.

Ensure the screws correctly engage into the holes in the lockwasher.

NOTE:
From March 1998 the button-head screws include a nylon thread locking patch. The locking properties of this patch are effective for two further applications of the screw after initial factory assembly. The screws should then be replaced.

3.17.5 Tighten the two button-head screws to the torque value specified in table 1 using a 5mm A/F Allen socket and torque wrench (Fig. 11).

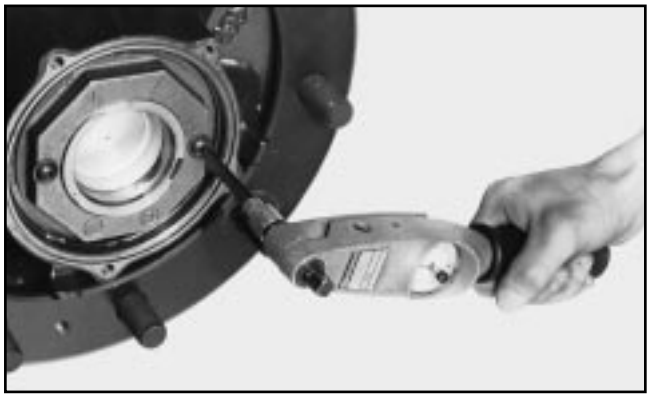


FIG. 11

NOTE:
This torque value should be used for all screw types - i.e. with or without the nylon locking patch.

3.18 CHECK BEARING ADJUSTMENT

Check for free rotation of the hub assembly and ensure the bearing clearance is not excessive.

If in doubt repeat procedure 3.17.

3.19 REFIT HUB CAP

Check the seal location groove in the hub face is clean and fit the hub cap gasket (Fig. 12), engaging the raised rib of the gasket into the groove in the hub face and align the hub cap bolt holes.

FIG. 12

Fit the hub cap and tighten the bolts evenly. Finally tighten the hub cap screws to the torque value specified in table 1. Ensure the gasket is compressed evenly and is not damaged (Fig. 13).

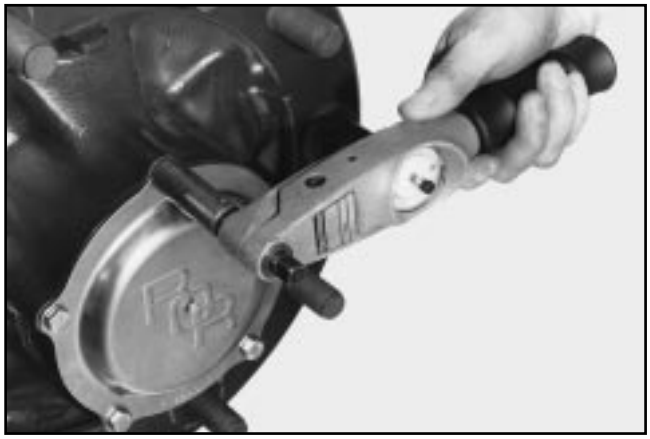


FIG. 13

LMC Hub Removal Procedure

The LMC hub and bearing assembly is fully sealed and can normally be left undisturbed for a 7 year or 1 Million Km (whichever is the soonest) maintenance free period.

The LMC axle fitted with the Q + drum brake features an outboard mounted brake drum, thus enabling complete brake service to be performed without the removal of the hub assembly. This practice is strongly recommended by Meritor.

Should it however prove necessary to remove the hub, the following procedures can be performed either with the road wheel and brake drum assembled to the hub or with the road wheel and brake drum removed. In the latter instance refer to Sections 1.1 – 1.3 for details of drum removal.

3.20 REMOVAL OF HUB CAP

Remove the five M8 hub cap screws.

Remove the hub cap and gasket (Fig. 14).

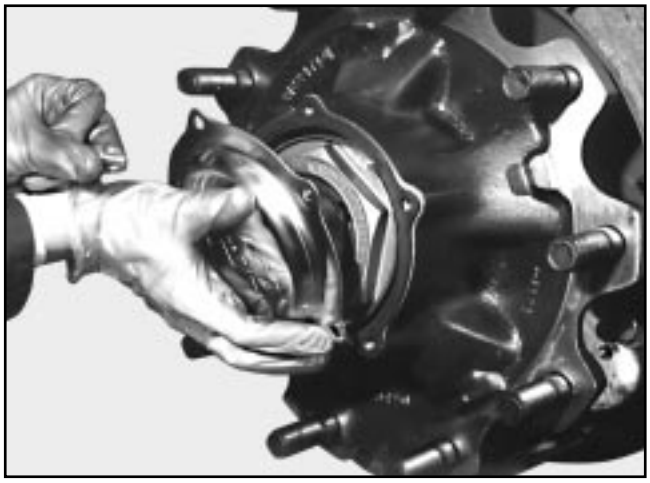


Fig. 14

3.21 UNDO LOCKING STAKE

Using a suitable small chisel or screwdriver, lever back the flange of the staking washer where it has been staked to one of the slots in the axle end nut. Ensure the washer flange is clear of the nut flange (Fig.15).

3.22 REMOVAL OF AXLE END NUT AND RETAINING WASHER ASSEMBLY

The axle end nut can now be removed using the end nut socket from the Meritor LMC service kit (Meritor part No. 21225804) and a suitable ¾" drive wrench.

NOTE: The torque required to remove the nut will be at least 700Nm.

Fully remove the axle end nut and lift away the retaining washer assembly (Fig. 16)

Fig.15

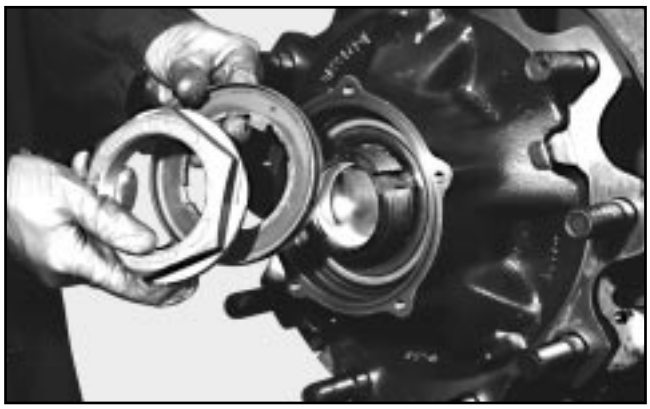


Fig. 16

3.23 REMOVAL OF THE HUB ASSEMBLY

Remove the hub assembly from the axle using a hub puller (Meritor part No. 21224863).

The five M8 hub cap screws may be used to secure the hub puller to the hub face (Fig. 17)

If the hub is to be removed whilst still assembled to the road wheel and brake drum, use a wheel dolly to support the weight of the assembly.

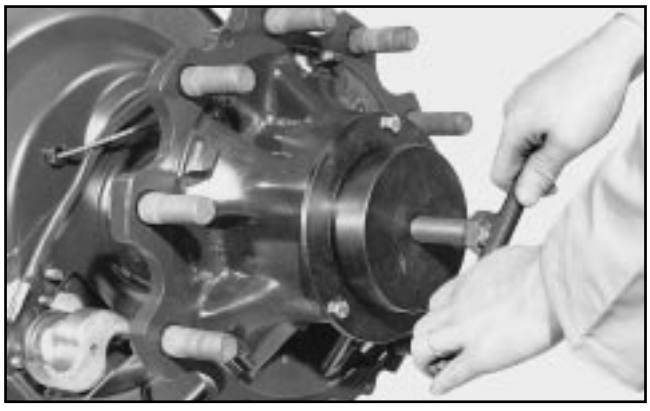


Fig. 17

3.24 HUB AND BEARING INSPECTION

The LMC bearing unit is fully sealed and cannot be serviced.

It is however, recommended that for maximum bearing life, the auxiliary seal at the back of the hub is replaced whenever the hub is removed from the axle, as damage may have occurred during the hub removal process.

The oil seal should be removed from the hub using an oil seal removal plate (Meritor part No. 21224938) and suitable lever (Fig. 18).

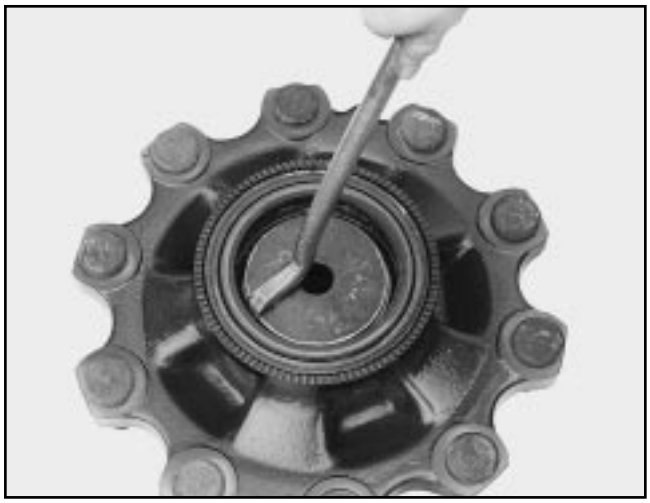


Fig. 18

This seal must not be confused with the inner and outer main bearing seals which are integral to the bearing unit and cannot be serviced.

Inspect the hub assembly for general signs of damage. Check the two bearing oil seals for leakage. NOTE: A small witness of grease may be in evidence around the seals. This is normal and should simply be wiped clean.

Wipe the inner bore of the bearing unit with clean dry paper to remove any residue of assembly paste.

Inspect the spring clip between the two halves of the bearing cone for damage.

NOTE: Never attempt to remove:-

- **The circular spring bearing retaining clip from the hub**
- **The bearing assembly from the hub**
- **Either of the two oil seals integral to the bearing unit from the bearing**
- **The spring clip between the two halves of the inner bearing cone.**

THIS WILL CAUSE IRREPARABLE DAMAGE TO THE HUB ASSEMBLY AND AUTOMATICALLY INVALIDATE ALL HUB WARRANTY.

3.25 FIT NEW AUXILIARY OIL SEAL

Press a new oil seal onto the oil seal driver (Meritor part No.21224749) ensuring the 'oil side' marking on the seal is visible (i.e. faces away from the plate of the driver) such that the seal will be installed the correct way round in the hub.

Locate the nose of the driver into the bore of the inner bearing cone and drive the seal fully home ensuring the seal remains square to the hub at all times (Fig. 19). The seal will bottom out on the inner hub shoulder and the outer face will remain proud of the hub when fully installed.

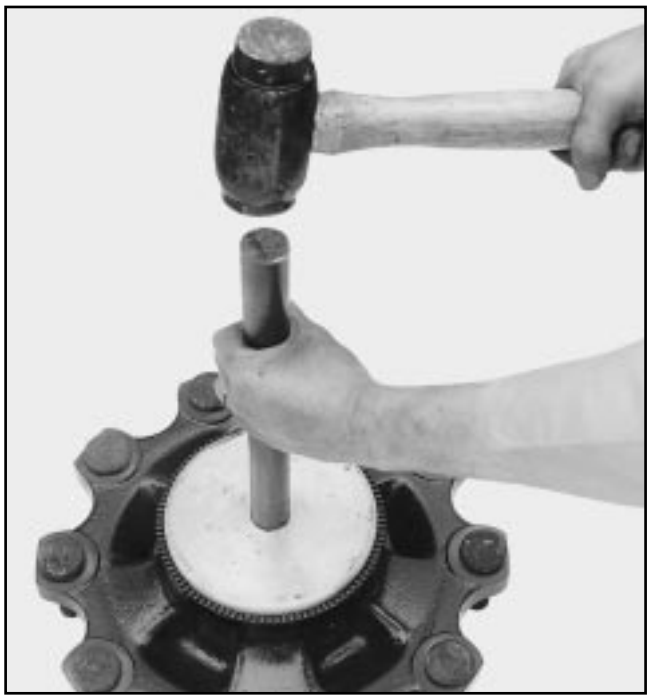


Fig. 19

LMC Hub Re-fitment Procedure

3.26 CLEAN SPINDLE BEARING JOURNAL

Prior to re-assembling the hub onto the spindle, check the spindle for damage and remove any fretting or rust on bearing journals using medium grade emery cloth strip. Also ensure the inner bearing abutment shoulder is clean and free from damage.

Clean the oil seal journal, removing brake dust or corrosion from adjacent areas.

3.27 CHECK SPINDLE END THREAD

Any minor damage can be repaired using a M82 x 2 die nut and holder (Meritor part numbers 21224939 and 21224940).

Apply a thin, even coating of Optimol 'Optimoly White Paste T' (available from Meritor Aftermarket Distributors) to the bearing journal and bearing abutment shoulder (Fig. 20).

This will reduce spindle wear and assist future removal of the hub assembly.

Fig. 20

3.28 RE-MOUNT HUB ASSEMBLY

If the axle is fitted with ABS:
In the case of the Drum Brake; check the condition of the sensor and pull it fully forward in its mounting block.

In the case of the Meritor LM DX195 Disc Brake, refer to Section 5.7 for ABS installation instructions.

If the hub is still assembled to the road wheel and brake drum, use a wheel dolly to align the hub assembly with the axle spindle, adjusting the height until the brake drum fits over the brake linings.

If the hub is to be replaced separately from the road wheel and brake drum, ensure the hub is squarely aligned to the axle spindle during refitting.

Push the hub or hub, drum and wheel assembly onto the axle spindle and align the key on the retaining washer with the keyway in the spindle end. Push the assembly fully onto the spindle taking care not to damage the oil seal or spindle threads.

3.29 REFIT THE RETAINING WASHER ASSEMBLY

The retaining washer assembly may be re-used twice after original factory fitment. After the flange of the staking washer has been bent over in three positions the retaining washer assembly MUST be replaced.

Lightly lubricate the full dished face of the stake washer with Optimol 'Optimoly white paste T' or a conventional hub bearing grease.

Fit the retaining washer assembly (Fig. 21) by aligning the retaining washer key with the spindle keyway. Ensure the washer assembly is fitted the correct way round with the dish of the stake washer facing outwards (Fig. 22)

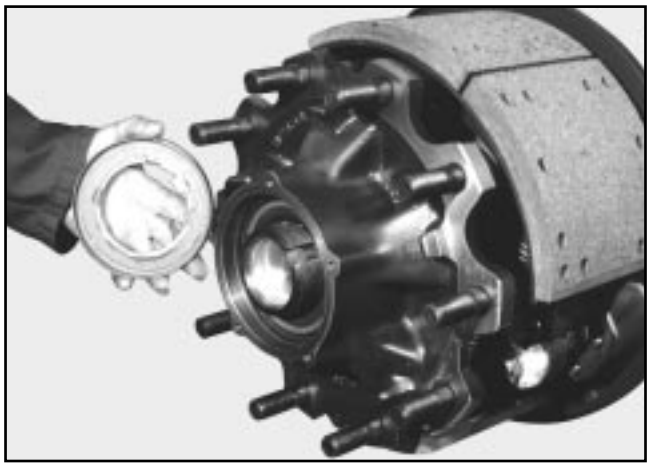


Fig. 21

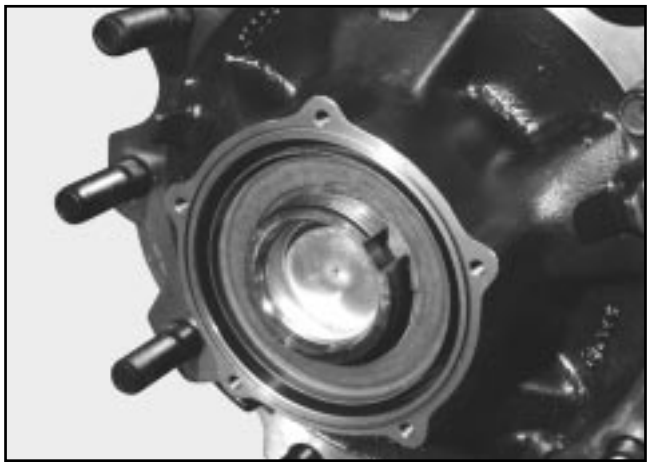


Fig. 22

3.30 REFIT AXLE END NUT

Fit the axle end nut to the spindle thread. Wind the nut down the spindle thread using the end nut socket from the Meritor LMC Service Kit (Meritor part No. 21225804). Continue until the hub is fully located and at the same time continuously rotate the hub (15 - 20 complete revolutions) to ensure the bearing rollers are seated.

LM & LMC Service

Using a suitable ¾" drive torque wrench, apply a final tightening torque to the value specified in table 1. Continue to rotate the hub whilst the final torque is applied (Fig. 23).

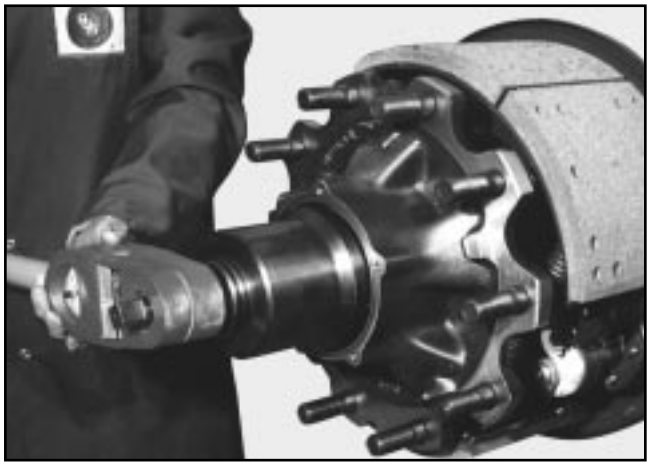


Fig. 23

3.31 STAKING THE WASHER TO AXLE END NUT

Using the staking tool from the Meritor LMC Service Kit (Meritor part No. 21225804) stake a previously unused section of the outer flange of the stake washer into ONE of the slots on the face of the nut flange (Fig. 24). The washer material should be split along the edge of the flat end of the slot in the nut and formed over progressively into the remaining length of the slot so as to resist the unwinding of the nut in the event that torque is lost (Fig. 25).

Fig. 26 and Fig. 27 show incorrect locking procedure.

It is possible to complete the staking operation by using a piece of 10mm x 10mm square bar by placing the end of the bar on the staking washer flange at a shallow angle. Carefully align it so that the one side of the bar is in line with the flat end of the slot in the nut flange.

Do not use a sharp bladed tool such as a chisel or screw driver.

Fig. 24

Fig.25

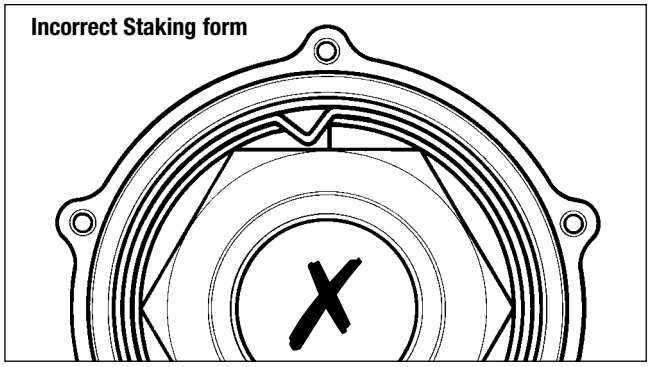


Fig.26

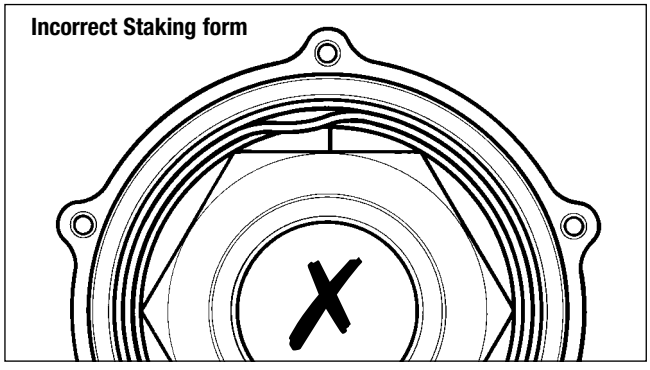


Fig.27

3.32 CHECKING THE BEARING SETTING

Check for free rotation of the hub assembly. It should not be possible to detect any axial bearing clearance.

3.33 REFIT HUB CAP

Check the seal location groove in the hub face is clean and fit the hub cap gasket (Fig. 28), engaging the raised rib of the gasket into the groove in the hub face and align the hub cap bolt holes.

Fit the hub cap and tighten the bolts evenly. Finally tighten the hub cap screws to the torque value specified in table 1 (Page 10). Ensure the gasket is compressed evenly and is not damaged (Fig. 29).

Fig. 28

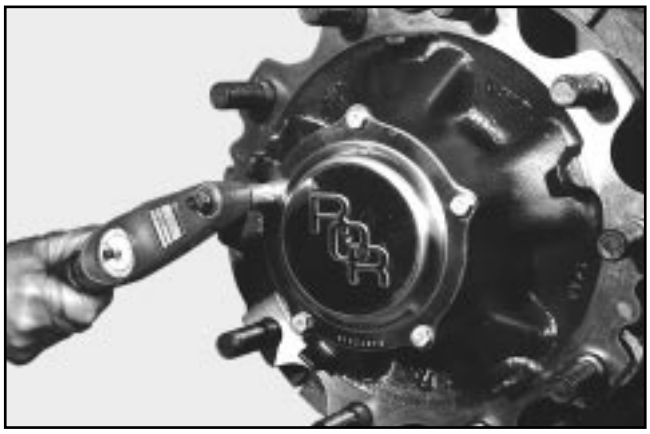
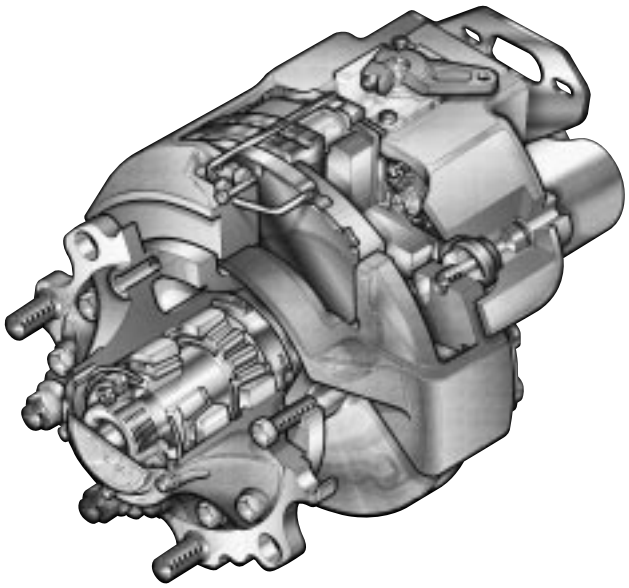
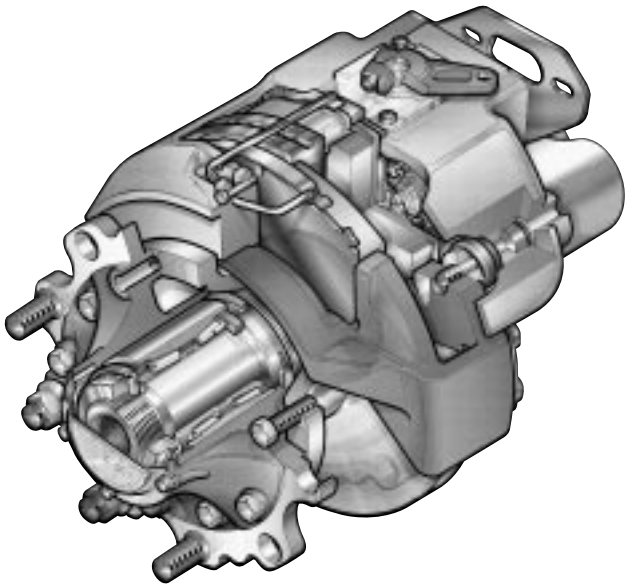


Fig. 29

Section 4

LM/LMC Hub Service for Disc Brakes





SECTION 4

Hub and Bearing Inspection

LMC WITH DISC BRAKES.

The LMC hub and bearing assembly is fully sealed and can normally be left undisturbed for a 7 year or 1 Million Km (whichever is the soonest) maintenance free period.

The LMC axle fitted with the DX195 disc brake would normally only require hub removal when it is necessary to change the disc rotor. In this instance refer to the Meritor LM DX195 Disc Brake Service procedure (Section 2).

4.1 SLACKEN ROTOR BOLTS:
(IF REPLACING ROTOR)

Before lifting the axle slacken wheel nuts.

Lift axle enough to get clearance to remove wheel. Support axle with safety stands and remove wheel and tyre.

With the park brake applied slacken rotor bolts. (Fig. 1)

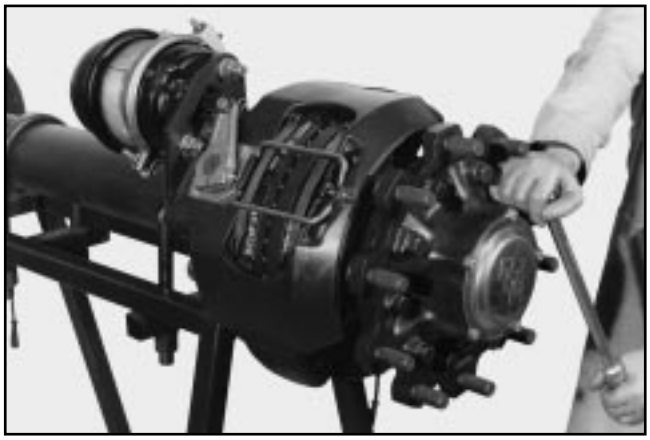


FIG. 1

4.2 DE-ADJUST BRAKES

Release trailer brakes and de-adjust caliper and remove pads. (See section 2.7 Pad Removal and Replacement).

4.3 REMOVE CALIPER

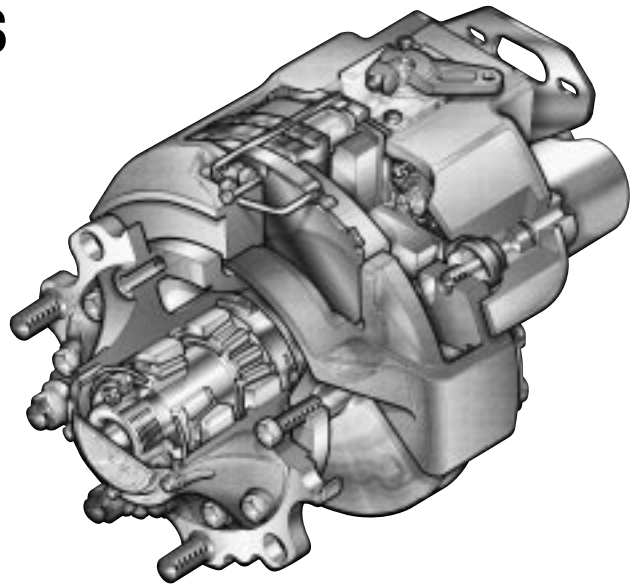
(See section 2.9 Caliper Removal and Replacement)

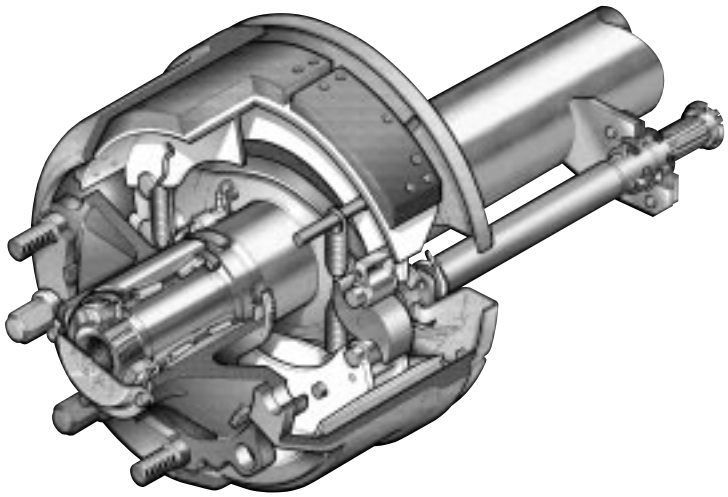
4.4 HUB REMOVAL AND REPLACEMENT PROCEDURE

See Section 3.20.

Section 5

Additional Procedures for Disc & Drum Brakes





SECTION 5

Additional Procedures

5.1 REMOVAL AND REFITTING OF WHEEL BOLTS (DRUM BRAKES)

With the hub removed from the axle, support it by placing blocks under the flange. Using the wheel bolt removal tool (Meritor Part No. 21205455) drive out the wheel bolts (Fig. 1).

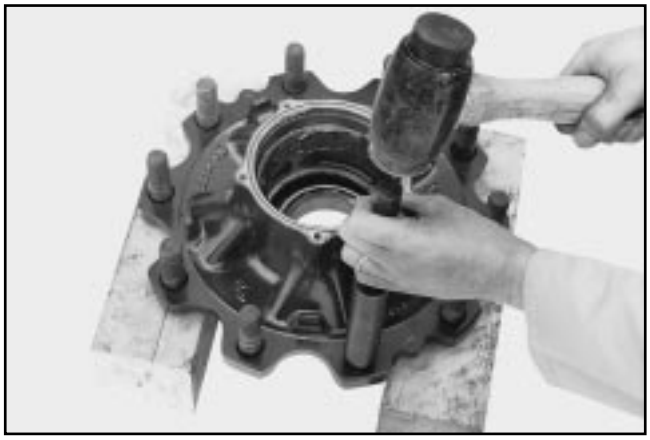


FIG. 1

FIG. 2

To replace the wheel bolts, turn the hub over, oil seal end upwards, and support the hub on the brake drum aligning the holes in both hub and drum. Using the wheel bolt driving tool (Meritor Part No. 21211274) drive the bolts until the heads are fully seated against the hub flange (Fig. 2).

5.2 FITTING AN ABS POLE WHEEL

With the hub removed from the axle, place it, oil seal end upwards, on a clean, flat surface and cover the bore with a clean cloth to protect the bearings and grease from contamination. Check that the pole wheel mounting spigot on the hub is clean and free from rust using medium emery paper to clean it up if necessary. Ensure no emery dust or other debris contaminates the bearings or grease.

The pole wheel can be fitted hot or cold using the oil seal driving tool (Meritor Part No. 21224749). If fitting hot, heat the pole wheel evenly to a **maximum** of 150ºC using a hot plate or induction heater and place onto the hub spigot ensuring it fully seats. If fitting cold, use the oil seal driving tool to drive the pole wheel onto the hub spigot ensuring it bottoms out against the mounting shoulder (Fig. 3).

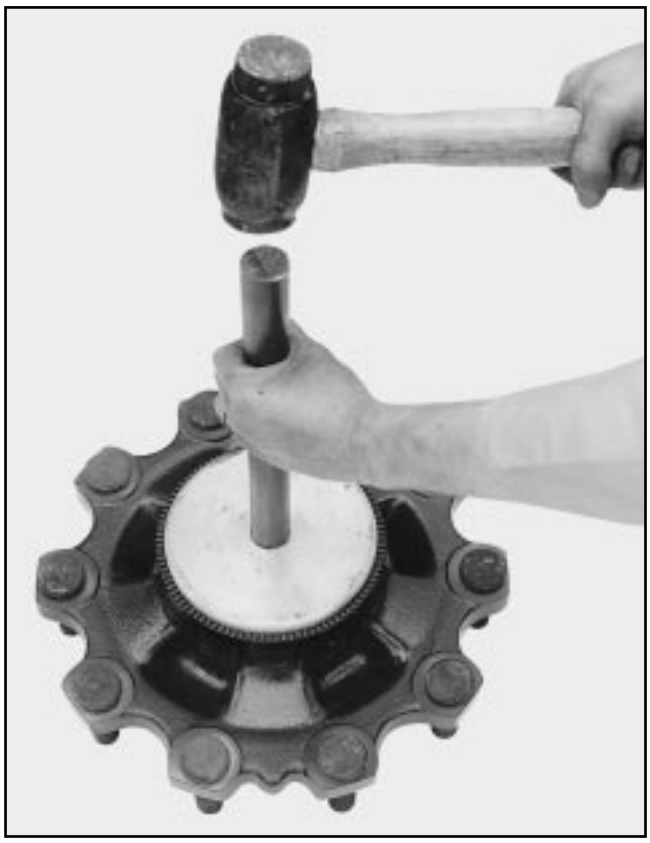


FIG. 3

5.3 FITTING AN ABS SENSOR

5.3.1 Sensor Block Assembly:

Apply Meritor Brake Lubricant grease to bush.

Assembly the spring bush into the sensor mounting block (Fig. 4). Push the sensor fully into the mounting block assembly.

When the hub is refitted the pole wheel will push the sensor back thus attaining the correct clearance.

FIG. 4

5.3.2 Fix Sensor Block Assembly to Axle Beam:

All axle beams are provided with a sensor block bolt fixing hole and location groove. The hole is located on the spindle end behind the oil seal journal and is orientated between the two anchor pin bushes.

Note:
The sensor must be assembled into the sensor mounting block as described in procedure 5.3.1 prior to fixing the block assembly to the axle beam. The sensor cannot be fitted once the block is in position.

Position the mounting block assembly so that the two small feet on the front edge of the block locate into the radial groove in the spindle just forward of the bolt hole.

Line up the bolt hole in the block with the hole in the beam and engage the M10 thread forming fixing bolt. ALWAYS USE THE CORRECT BOLT. Refer to Meritor Parts List.

Tighten the fixing bolt evenly to the torque specified in table 1. Ensure the block is correctly seated and fully clamped.

The sensor may be rotated in the mounting block to allow the cable to pass either side of the anchor bracket.

Pass the sensor cable through the dust cover using the uppermost hole and fit the strain relief grommet.

Ensure the lower cable exit hole in the dust cover is fitted with a blanking plug.

5.3.3 Checking Sensor Output:

Connect the output cable to a suitable multimeter. Rotate the hub by hand at a constant rate of approximately 30 rpm and note the maximum and minimum readings. The minimum permissible voltage reading is 400 millivolts and the ratio of maximum/minimum should not exceed 2. If either values are not obtained check the installed air gap between the sensor and pole wheel does not exceed 0.7 millimeters and the pole wheel run out does not exceed 0.2 millimeters. If the installation is still not correct, contact the supplier of the ABS equipment for further advice.

5.4 FITTING OF HUBODOMETER

The LM axle may be fitted with an hubodometer by using a special hub cap. It is not possible to fit an hubodometer to a standard hub cap and attempting to do so will affect the hub sealing and may damage the spindle.

For hubodometer types up to 85mm outside diameter use hub cap Meritor Part No. 21224904.

It is advisable to assemble the hubodometer to the hub cap prior to fitting the hub cap to the axle. Place the hub cap on a clean, flat surface. Fit the nut to a suitable open ended spanner and using a small amount of grease place the washer onto the nut.

Using the spanner, position the nut and washer under the mounting hole in the cross bar of the hub cap. Lower the hubodometer through the hole to engage the thread. Rotate the hubodometer to screw the nut along the mounting stud until hand tight. Finally tighten the nut with the spanner in the normal way (Fig. 5).

The hub cap and gasket can now be fitted to the axle as described in Section 3.

FIG. 5

5.5 REMOVAL AND REFITTING OF WHEEL BOLTS (DISC BRAKES)

With the hub removed from the axle, support it by placing blocks under the flange. Using the wheel bolt removal tool (Meritor Part No. 21205455) drive out the wheel bolts (Fig. 6)

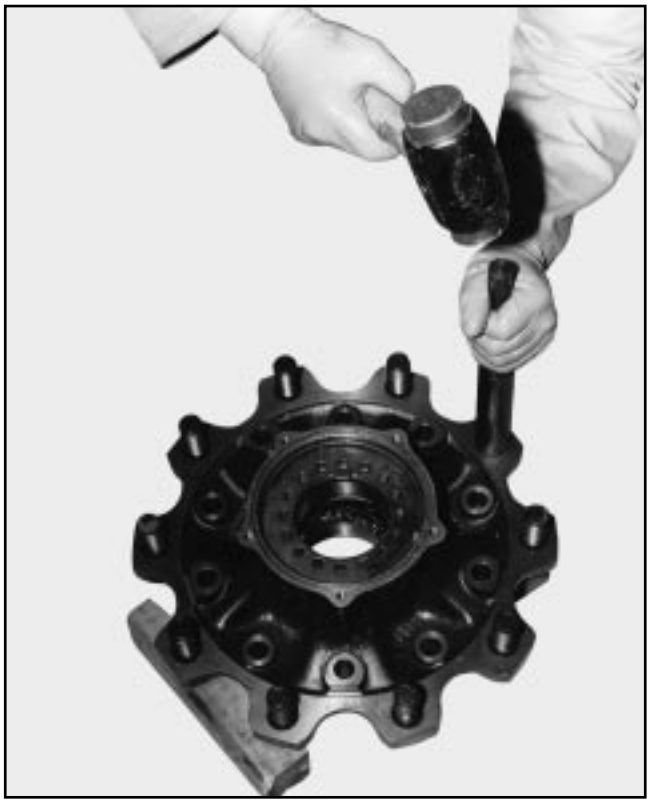


FIG. 6

Wind the new stud into the hub using spacer washers and a wheel nut. Ensure the gap under the bolt head does not exceed 0.1mm. (Fig. 7)

FIG. 7

5.6 LEVER REMOVAL AND REFITTING

5.6.1 Removal:

Before the actuating lever can be lifted off the camshaft the clamp bolt must be removed. When pulling the lever off care should be taken not to damage the boot and seal underneath. Open the lever jaw with a screw driver or wedge prior to lifting off the hex of the cam (Fig. 8).

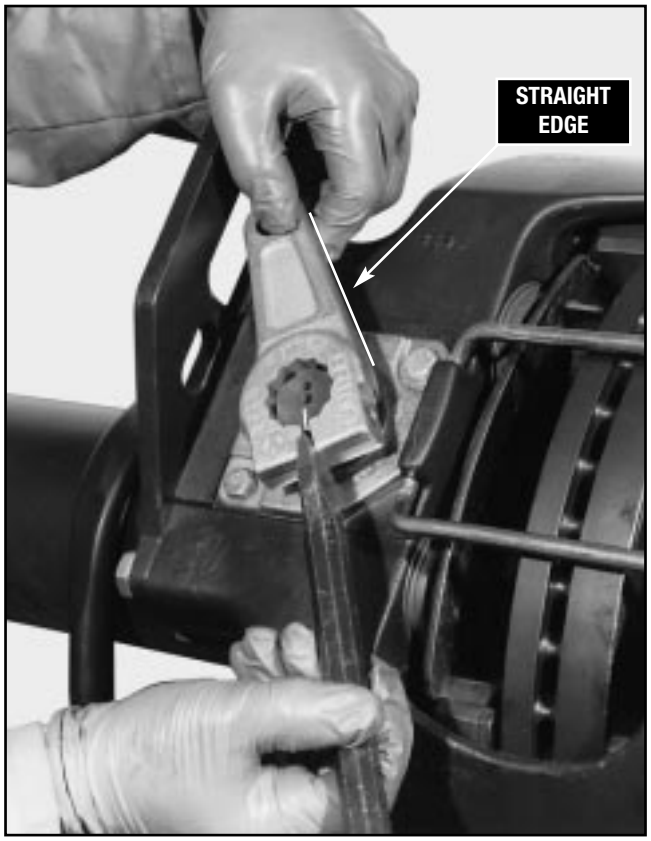


FIG. 8

5.6.2 Refitting:

Fit lever ensuring that the mark on the eccentric is aligned with the slot on the lever and the cut-out is facing the mounting plate to avoid the chamber mounting stud (straight side of lever facing rotor. Fig. 48).

Note: The lever is a very tight fit and will require a wedge to be inserted into the slot to open the splined bore. Do not hammer into position.

Fit clamp bolt and nut. Tighten to the torque value specified in table 1.

5.7 FITTING AN ABS SENSOR

5.7.1 Sensor Block Assembly:

Apply Meritor Brake Lubricant grease to bush.

Assemble the spring bush into the sensor mounting block (Fig. 9). Push the sensor fully into the mounting block. Check when the hub and rotor has been fitted and that the sensor has been pushed up to the pole wheel.

When the hub is refitted the pole wheel will push the sensor back thus attaining the correct clearance.

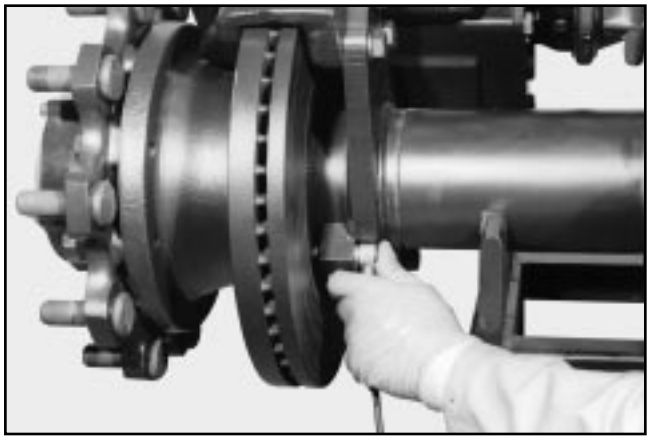


FIG. 9

5.7.2 Checking Sensor Output:

Connect the output cable to a suitable multimeter. Rotate the hub by hand at a constant rate of approximately 30 rpm and note the maximum and minimum readings. The minimum permissible voltage reading is 400 millivolts and the ratio of maximum/minimum should not exceed 2. If either values are not obtained check the installed air gap between the sensor and pole wheel does not exceed 0.7 millimeters and the pole wheel run out does not exceed 0.2 millimeters. If the installation is still not correct, contact the supplier of the ABS equipment for further advice.

5.8 FITTING OF HUBODOMETER

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For hubodometer types up to 85mm outside diameter use hub cap Meritor Part No. 21224904.

It is advisable to assemble the hubodometer to the hub cap prior to fitting the hub cap to the axle. Place the hub cap on a clean, flat surface. Fit the nut to a suitable open ended spanner and using a small amount of grease place the washer onto the nut.

Using the spanner, position the nut and washer under the mounting hole in the cross bar of the hub cap. Lower the hubodometer through the hole to engage the thread. Rotate the hubodometer to screw the nut along the mounting stud until hand tight. Finally tighten the nut with the spanner in the normal way (Fig. 10) to a maximum of 27 Nm.

The hub cap and gasket can now be fitted to the axle as described in Section 3.

FIG. 10

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