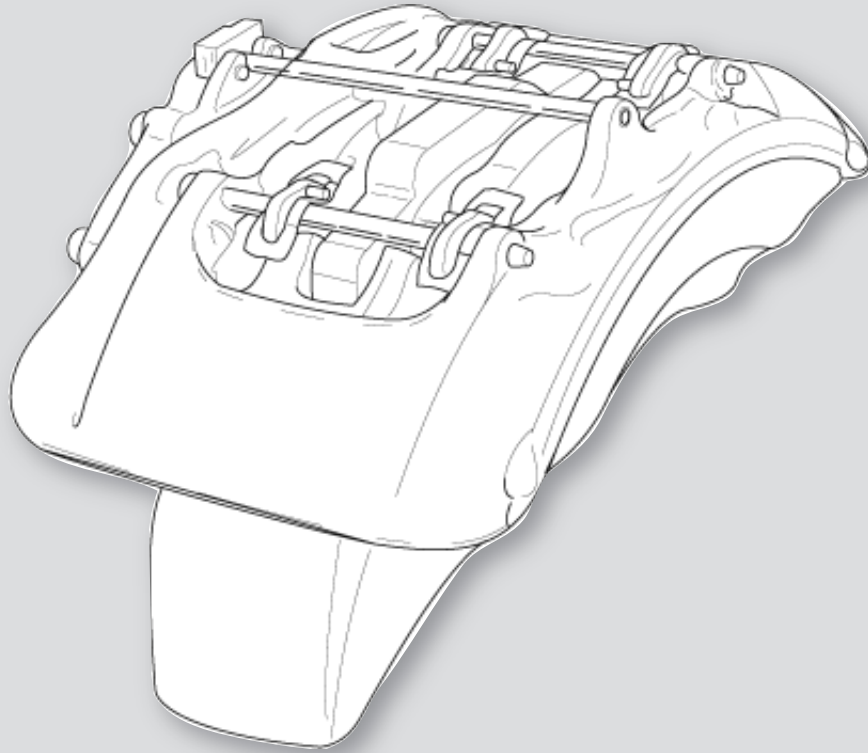


MAINTENANCE MANUAL NO. MM-0264



Meritor Inc. Air Disc Brake Service Manual C & D LISA

(Air actuated with load insensitive side adjuster)

Issued: 05/2013



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Document No. MM-0264

Edition: May 2013

Before You Begin

This publication provides installation and maintenance procedures for the C & D Lisa Reaction Beam Air Disc Brakes.

The information contained in this publication was current at the time of printing and is subject to revision without notice or liability.

You must understand all procedures and instructions before you begin maintenance and service procedures.

You must follow your company's maintenance and service guidelines.

You must use special tools, when required, to avoid serious personal injury and damage to components.

Meritor uses the following notations to alert the user of possible safety issues and to provide information that will help to prevent damage to equipment and components.

WARNING

A **WARNING** indicates a procedure that you must follow exactly to avoid serious personal injury.

CAUTION

A **CAUTION** indicates a procedure that you must follow exactly to avoid damaging equipment or components. Serious personal injury can also occur.


NOTE: A note indicates an operational, procedure or instruction that is important for proper service. A **NOTE** can also supply information that will help to make service quicker and easier.





This symbol indicates that you must tighten fasteners to a specific torque.


Safety Instructions

- Observe the manufacturer's safety instructions for jacking up and securing the vehicle
- Only use original Meritor HVS parts
- Use only the tools recommended
- Observe the following service instructions and notes
- When working on the brake you must ensure that it cannot be activated inadvertently
- Always ensure appropriate safety glasses and gloves are worn when carrying out the procedures detailed in this publication.
- Never use compressed air to remove brake dust or for the purpose of drying. Any type of dust can be injurious to health if inhaled. Use Meritor HVS brake cleaner for cleaning the brake.
- When removing or fitting a complete brake, you should remember it has a dead weight of up to 117lbs (53kg). Use a lifting system, taking care not to damage the brake.
- When the servicing has been completed, it is essential that you road test the vehicle and try out the brakes.

 **CAUTION:** Ensure any grease removed from the assembly/components, or contaminated cloth, is disposed of in accordance with local environmental regulations.

 **CAUTION:** You must always renew the brake pads on both wheels of an axle. Only use the brake pads that have been approved by the vehicle manufacturer.

 **CAUTION:** Ensure any discarded friction product, or cloth contaminated with brake dust, is disposed of in accordance with local environmental regulations.

 **CAUTION** You must always renew the rotor on both wheels of an axle. Only use rotors that have been approved by the vehicle manufacturer.

Access Information on Meritor HVS's Web Site

Additional maintenance and service information for Meritor HVS's commercial vehicle systems component lineup is also available at www.meritorhvs.com

To access information go to Products & Services Icon; from drop down menu click on Literature on Demand. The screen will display an index of publications by type.

Terms used in this manual

Manufacturer:

MERITOR HVS

Manual:

Maintenance manual no. MM-0264

Device:

C & D - Lisa Reaction Beam Air Disc Brake.

Technician:

Qualified personnel working on brake maintenance and servicing.

Maintenance and servicing:

Maintenance and servicing refer to periodical checks and/or replacement of air disc brake parts or components. It also refers to the determining of the cause of a malfunction in order to restore the initial operating conditions.

Operator:

Any person who will use the air disc brake as part of a more complex device.

Warranty

Warranty applies to the air disc brake installed on vehicles for which it was designed. Warranty is void in the following cases:

- Improper use of the vehicle on which the air disc brake is installed (usage conditions, overloading etc.)
- Tampering with vehicle components that may affect brake performance.
- Use of spare parts not approved by Meritor CVS.
- Improper installation, adjustment, repair or modification.
- Poor or improper maintenance (including consumables other than those specified).

Further information on warranty conditions may be obtained directly from the manufacturer or by referring to the Meritor HVS web site www.meritorhvs.com

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Introduction

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Exploded View

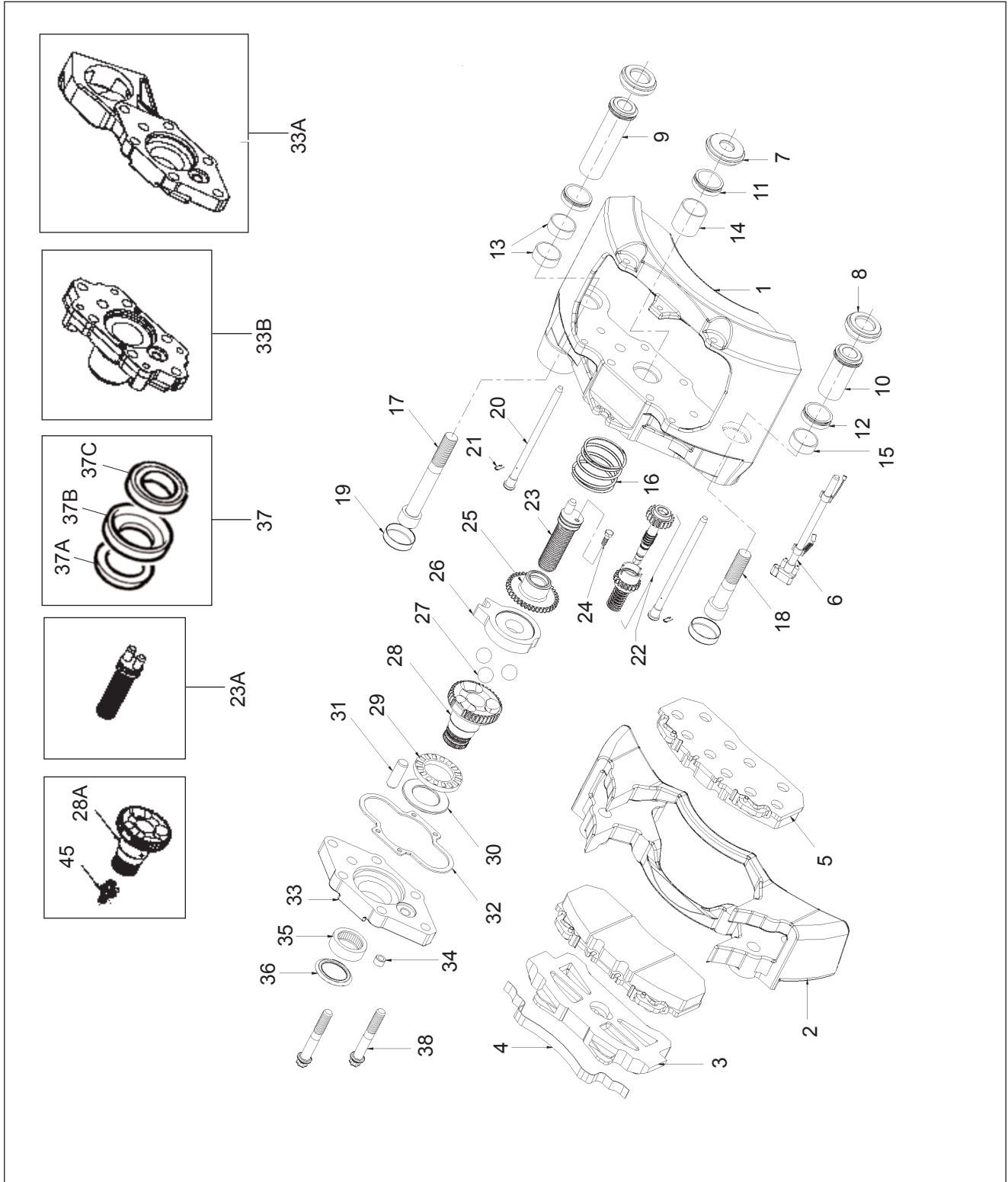


Fig. 1.1

Parts List

Item	Description	Item	Description
1	Housing	26	Fixed ramp
2	Carrier (saddle)	27	Balls
3	Spreader plate	28	Operation shaft
4	Spreader plate spring	28a	Alternative Operation shaft - with grease nipple
5	Pad assembly	29	Thrust bearing
6	Pad wear warning Indicator	30	Thrust washer
7	Tappet excluder	31	Anti rotation pin
8	Guide sleeve excluder	32	Gasket
9	Guide sleeve assembly (long)	33	Cover plate
10	Guide sleeve assembly (short)	33A	Alternative cover plate
11	Tappet excluder retainer	33B	Alternative cover plate
12	Guide sleeve excluder retainer	34	Adjuster stem excluder
13	Guide sleeve bush (Plain)	35	Needle roller bearing
14	Tappet bush	36	Operation shaft seal
15	Guide sleeve bush (oval)	37	Alternative operation shaft seal arrangement
16	Main return spring		37A - 'GAMMA' Seal
17	Guide sleeve screw (long)		37B - Shield
18	Guide sleeve screw (short)		37C - Seal
19	Guide sleeve end cap	38	Cover plate screw
20	Pad retaining pin	39	Lever
21	'R' clip	40	Adjuster Wheel
22	Adjuster assembly	41	Wrap Spring
23	Tappet assembly	42	Multi-plate Clutch
23A	Alternative tappet assembly	43	Slotted Wheel
24	Spreader plate retaining screw	44	Adjuster stem
25	Adjuster nut	45	Grease nipple

Section View - Brake

Early level Operating Shaft arrangement - without Grease Nipple

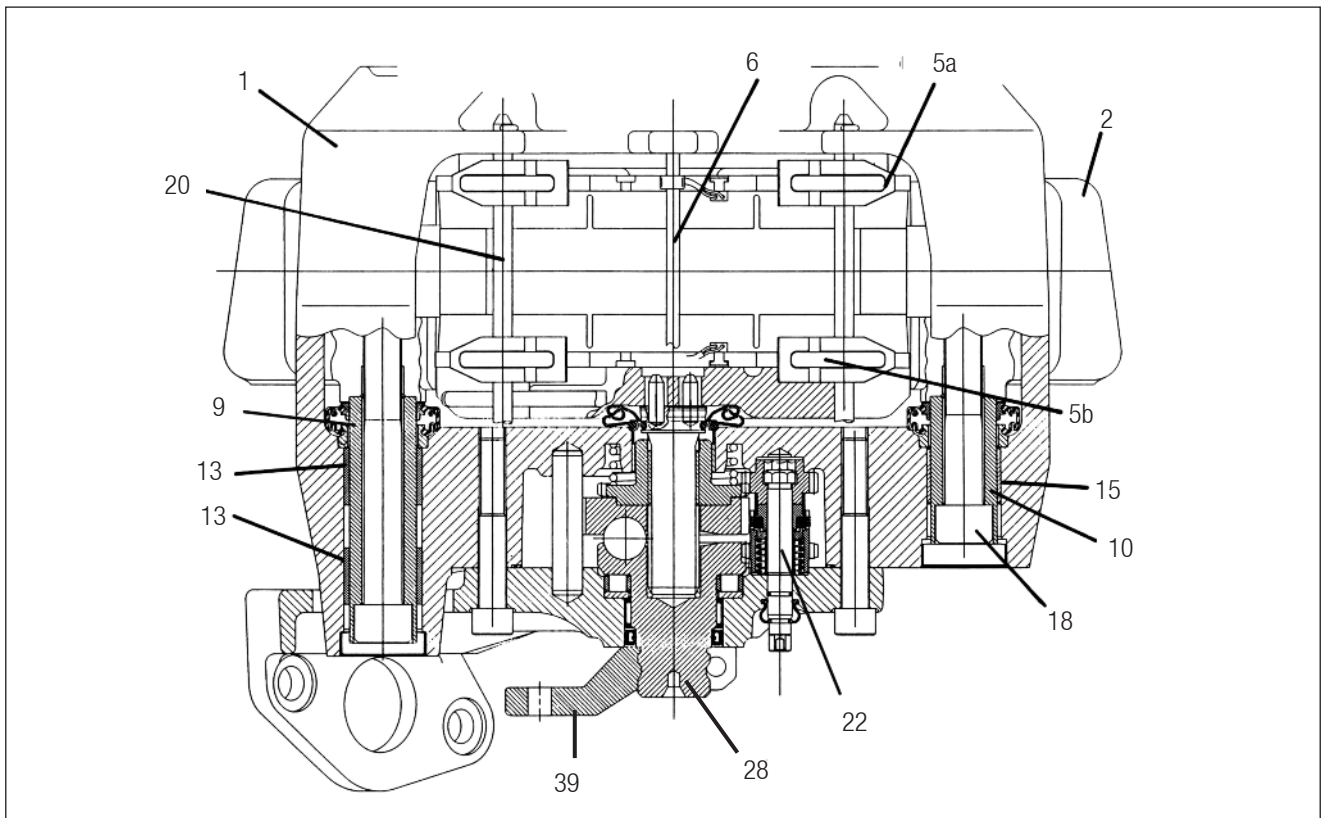


Fig. 1.2a

Later level Operating Shaft arrangement - with Grease Nipple

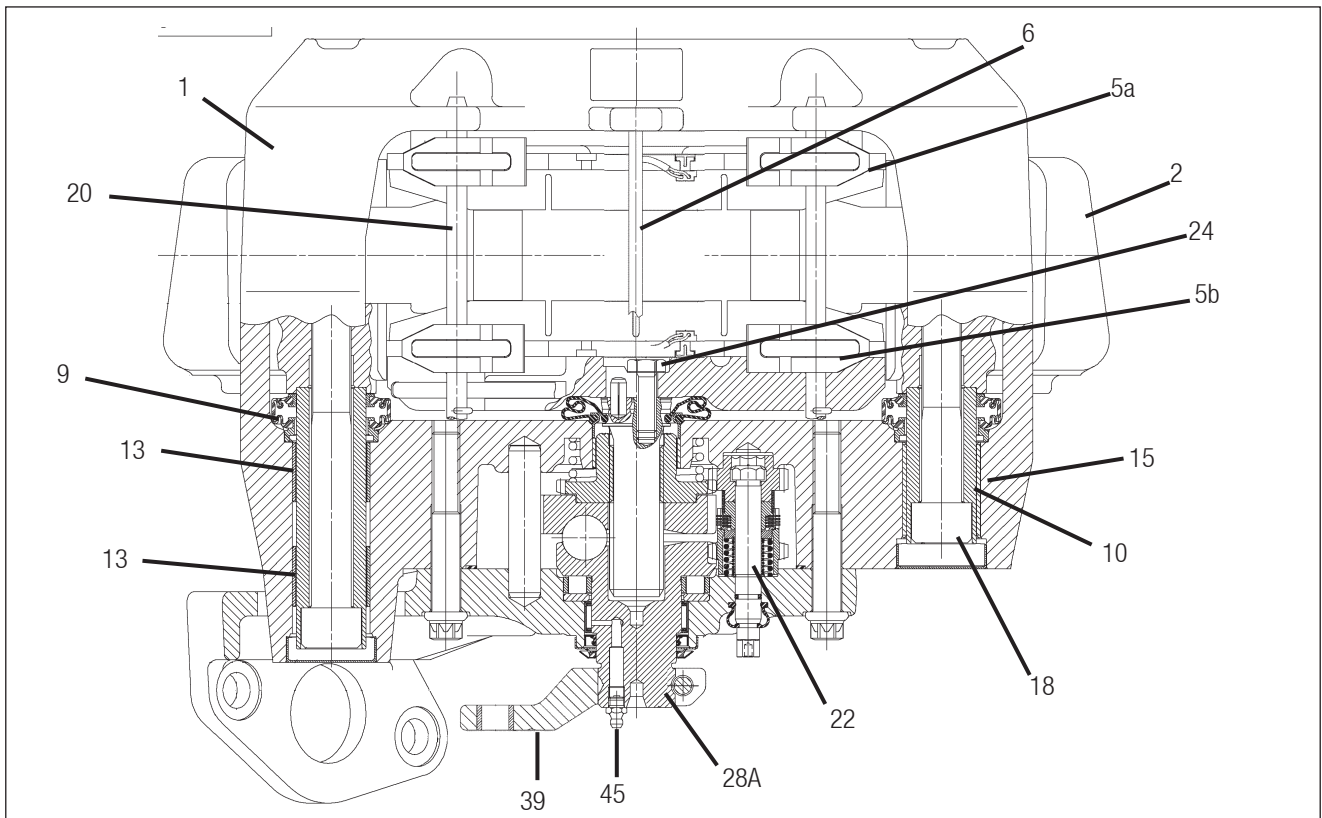


Fig. 1.2b

Section View - Operating Shaft / Adjuster

Early level Operating Shaft arrangement - without Grease Nipple

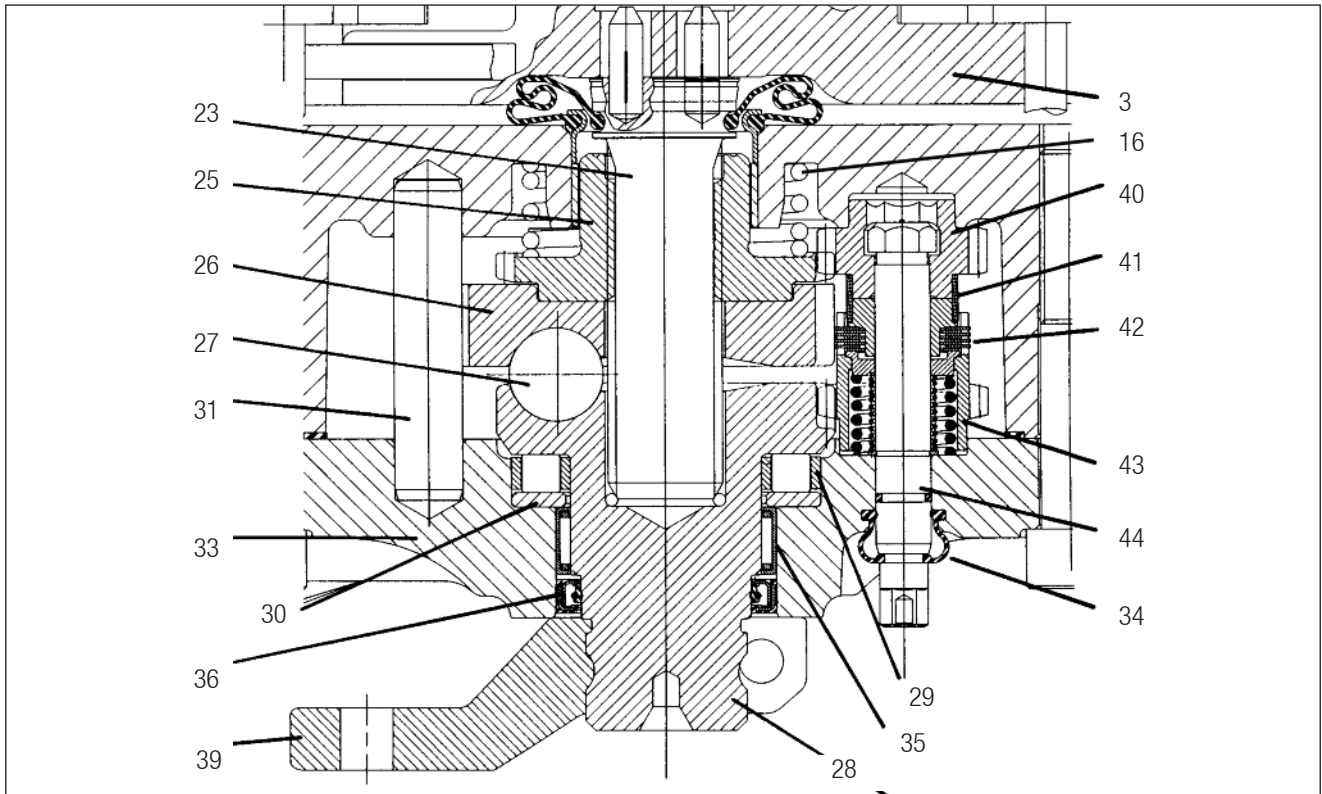


Fig. 1.3a

Later level Operating Shaft arrangement - with Grease Nipple

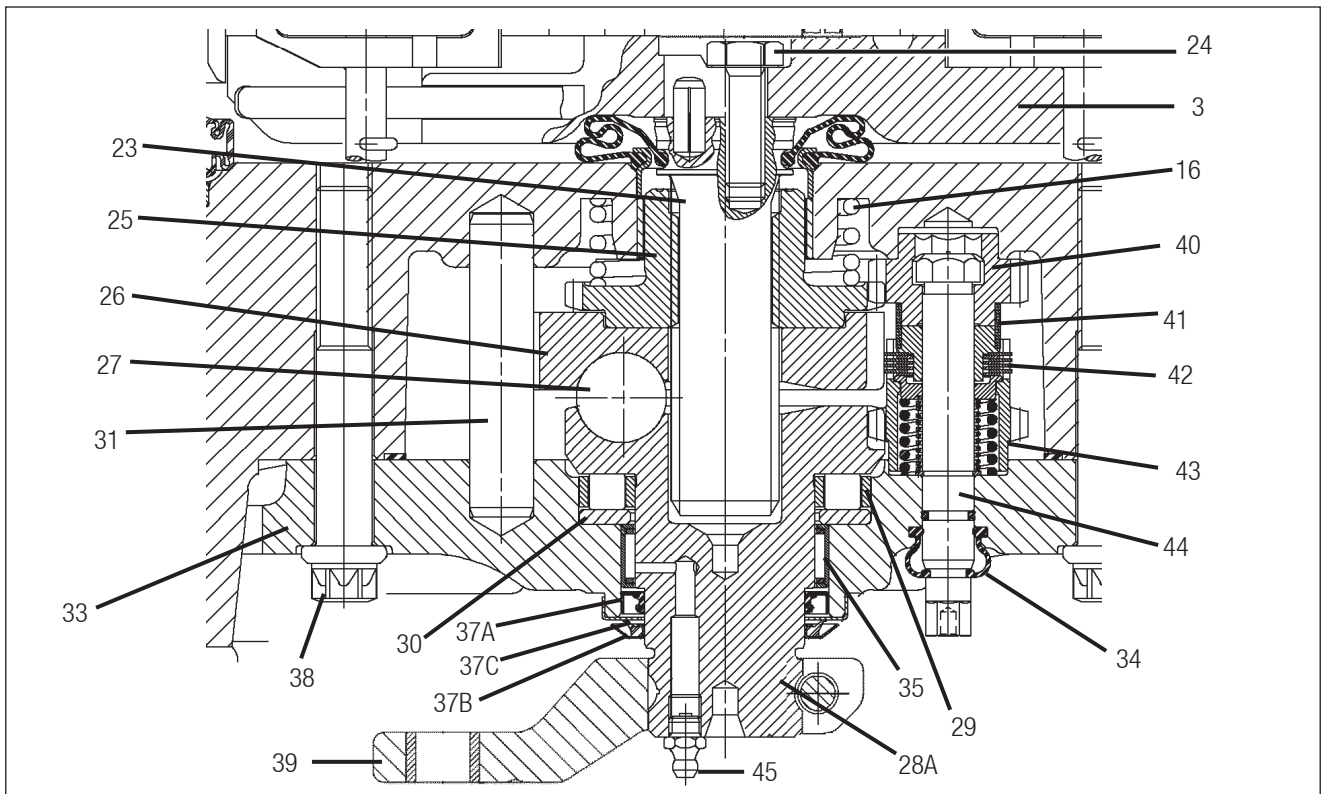


Fig. 1.3b

1 Introduction

Introduction

The air actuated disc brake (Fig 1.1) has been designed for vehicles in the 12 - 19 ton range. The brake, detailed in the section views (Fig 1.2a & Fig 1.2b) can be fitted to either front or rear axles and can be used for vehicle parking when a service/spring brake chamber is fitted.

The basic operation of the brake is simple, but it is important that the features of the load insensitive automatic adjuster are clearly understood. It is essential that the correct service procedures are observed to ensure that the brake gives satisfactory service throughout its working life.

How it Works

The air chamber/actuator is attached to the brake body (1) and connected by a lever (39) to the brake operating shaft (28). The carrier (2) is secured to the vehicle and straddles the rotor. The body assembly (1) slides on two fully sealed guide pins (9 & 10) screwed to the carrier (Fig 1.2a & Fig 1.2b) and the brake pads (5) are supported on the pad retaining pins (20). As the pads wear adjustment takes place automatically by an integral load insensitive adjusting mechanism (22).

NOTE: "Load Insensitive" means adjustment takes place under very small clamping forces only, therefore preventing over-adjustment and minimising air consumption.

Brake Application - No adjustment required

The actuating mechanism is mechanically driven and incorporates an operating shaft (28), three hardened balls (27), ramp (26) and tappet arrangement (23) together with a fully integrated, automatic, load insensitive adjusting mechanism (22). The adjuster mechanism (Figs 1.3a & 1.3b) is situated to the side of the operating shaft/ramp assembly and consists of a multi plate friction clutch (42) and wrap spring clutch (41) arranged in series. The multi plate clutch (42) is loaded by a spring and is designed to slip at a controlled torque, in either direction, the wrap spring clutch (41) however will lock in one direction whilst free to slip in the opposite direction. When the footbrake is applied the air chamber applies a load to the actuating lever (39) thus rotating the operating shaft (28).

As the operating shaft rotates the hardened balls (27), which sit in helical pockets in both operating shaft (28) and ramp (26), begin to rise up the helix of the pockets and thus generate expansion between operating shaft and ramp. The ramp which is prevented from turning by the anti-rotation pin (31) is therefore pushed away from the operating shaft in a linear direction. The linear expansion or "clamp force" as it is more commonly known is transmitted by the adjuster nut (25) threads to the tappet (23). The tappet in turn transmits the load to the spreader plate (3) which distribute the load evenly across the pad forcing the inner disc pad (5b) against the rotor. A reaction force transmitted through the thrust bearing (29), thrust washer (30), cover plate (33) and cover plate screws presses the outer pad (5a) against the rotor. As the operating shaft (28) rotates it also turns the automatic adjuster slotted wheel (43) due to the meshing of the outer gear forms on both components. The internal wrap spring (41) locks and act as a solid link, the clearance between the slotted wheel (43) and multi plate clutch (42) is taken up. The free movement represents the pad to rotor running clearance in the brakes off condition. The multi plate friction clutch (42) tries to transmit the torque from the slotted wheel (43) to the adjuster wheel (40) and thus tappet adjuster nut (25). When the pads contact the rotor any further rotation of the operating shaft will increase the clamp load and therefore the torque level between the tappet and adjuster nut to a level which is greater than the controlled torque of the adjuster assembly friction clutch. The friction clutch slips thus preventing any adjustment of the brake. When the brake is released the return spring (16), in conjunction with the actuator, returns the operating mechanism to the brakes off position.

Brake Application - Adjustment required

The actuator operates in the same manner as described above and the adjuster slotted wheel (43) takes up the free play between itself and the tags on the clutch plates (42) (Fig 1.3). Because the clearance between pad and rotor is greater than the pre-set running clearance no load is generated to cause the friction clutch to slip. As a result the clutch becomes a solid link rotating the adjuster wheel (40), which in turn rotates the tappet adjuster nut (25), extending the length of the tappet screw (23) to reduce the pad to rotor clearance.

1 Introduction

Once the pads contact the rotor any further rotation of the operating shaft (28) will increase the clamp load between pad and rotor and cause the friction clutch (42) to slip and the adjuster stops operating, preventing over adjustment. When the brake is released the clamp load on the pads is removed. The operating shaft rotating in the off direction rotates the slotted wheel (43) through the free play of the slot until the friction clutch plate tangs contact the side of the slot. Further rotation of the operating shaft in the off direction rotates the slotted wheel and friction clutch assembly, however, no movement is transferred to the adjuster nut (25) due to the wrap spring clutch (41) slipping. The tappet (23) therefore remains in its adjusted position with the correct running clearance maintained.

Manual Adjustment

The brake adjuster assembly is provided with a manual override facility (Fig 1.4) which allows the brake to be de-adjusted and adjusted manually when fitting new pads.

To manually adjust or de-adjust the brake locate a 10 mm socket wrench on the adjuster stem and depress the stem until it engages in the adjuster wheel. Whilst still held depressed rotate the adjuster stem with the socket wrench in the appropriate direction.

NOTE: The direction of rotation depends on whether adjusting or de-adjusting the brake, turning the adjuster stem against the direction of lever travel will adjust the brake and turning the adjuster stem in the direction of lever travel will de-adjust the brake.

WARNING

Always de-adjust/adjust the brake carefully by hand with a suitable wrench. Never exceed a maximum torque of 15Nm (11lb.ft.) in either direction and NEVER use power tools.

Brake Identification

The brake identification details are located on the brake housing in the positions A shown in Fig 1.5.

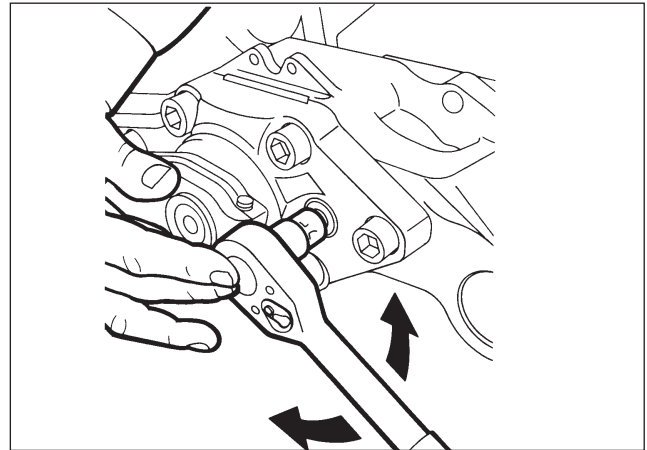


Fig. 1.4

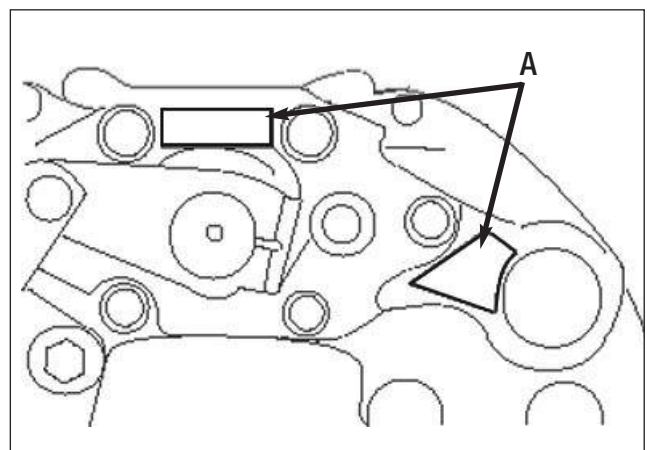


Fig. 1.5

1 Introduction

Operational Checks

2

- pg. 14 Lever Travel Check
- pg. 15 Automatic Adjuster Test
- pg. 17 Sliding Action Check
- pg. 17 Slide Pin Wear Check
- pg. 20 Pad Wear
- pg. 21 Rotor Wear & Maintenance

2 Operational Checks

Lever Travel

Park the vehicle on hard ground and chock the road wheels. Apply air pressure to release the park brake and wind off the spring brake retraction screw (where appropriate). Jack up the axle and fit suitable axle stands securely.

Measure the dimension from the centre of the lever clevis hole to the air chamber mounting face on the mounting bracket (Fig 2.1), record the measurement (X). Ensure that it conforms to the dimension specified by the vehicle manufacturer.

Actuate the brake and measure the dimension from the centre of the lever clevis hole to the air chamber mounting face on the mounting bracket again (Fig 2.1), record the measurement (Y).

Subtract measurement (X) from measurement (Y) to determine the lever travel achieved.

eg. $Y - X = \text{Lever Travel}$.

Select the appropriate lever travel for the test from the table below for the combination of Actuator type and air pressure present on the vehicle. All values are for the current 72mm length operating lever.

IMPORTANT: Exceeding the relevant lever travel shown in the table below indicates immediate investigation of the brake/adjuster function is required.

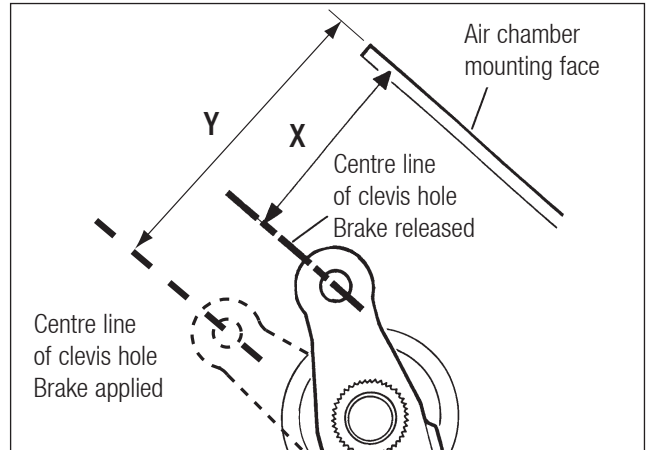


Fig. 2.1

Lever travel Check Table			
Requires Actuators with 65mm minimum working stroke and 72mm Lever length			
Actuator Size	Maximum line pressure (BAR)		
	6	8	10
T16	38	44	50
T18	43	49	54
T20	48	55	62
T22	53	61	(69)
T24	60	(68)	(-)

2 Operational Checks

Automatic Adjuster Function Test

This operation can usually be carried out with the wheels on over an inspection pit or with the vehicle lifted.

Where the vehicle is standing on its wheels chock the wheels securely and release the parking brake.

If it is necessary to remove the wheels ;

Park the vehicle on hard ground and chock the road wheels.

Apply air pressure and fully charge the system to ensure the park brake is fully released (where appropriate). Jack up the axle and fit suitable axle stands securely. Remove the road wheels

Procedure

Set an increased pad to rotor clearance by de-adjusting the brake one turn of the adjuster stem, or, with the wheels removed, a measured gap of approximately 2-3 mm between the outboard pad backplate and the bridge abutment face (Fig 2.1).

To de-adjust the brake locate a suitable 10 mm socket wrench on the adjuster stem. Depress the stem to engage the adjuster wheel and with the stem depressed rotate the wrench in the direction of lever travel (brake application stroke) when viewed from the air chamber side.(Fig. 2.2)

CAUTION: If the wrench stops rotating while de-adjusting turn the wrench in the opposite direction 1/2 turn

WARNING:

Always de-adjust/adjust the brake carefully by hand with a suitable wrench. Never exceed a maximum torque of 15 Nm in either direction and NEVER use power tools.

As an adjuster function indicator; depress the adjuster stem with a thumb (Fig. 2.3) to engage the adjuster mechanism. Hold the adjuster stem depressed during the adjuster function check.

WARNING: Ensure hands are kept clear of the operating lever and air chamber pushrod during the adjuster function check.

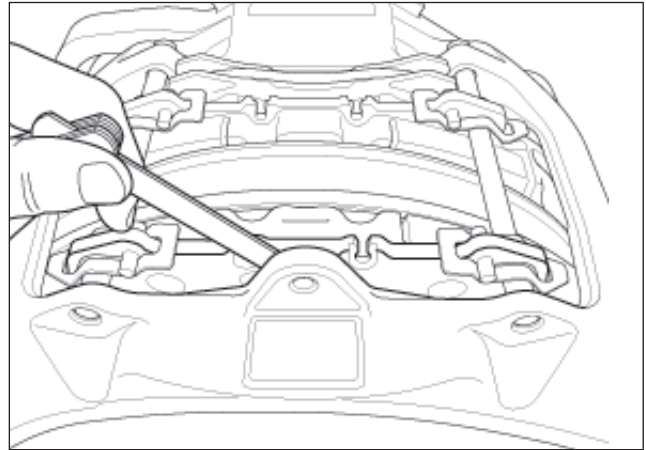


Fig. 2.1

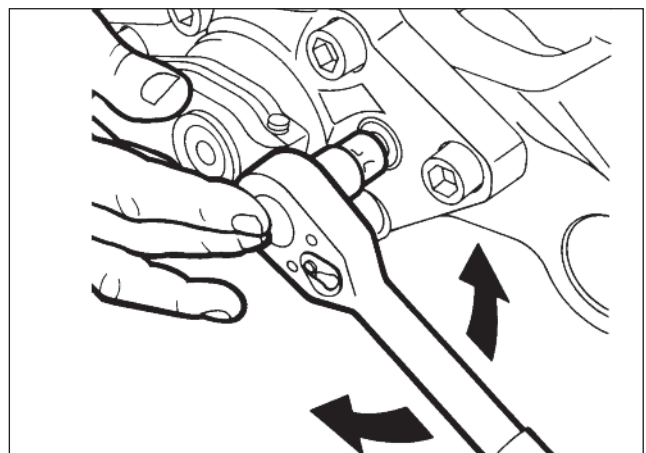


Fig. 2.2

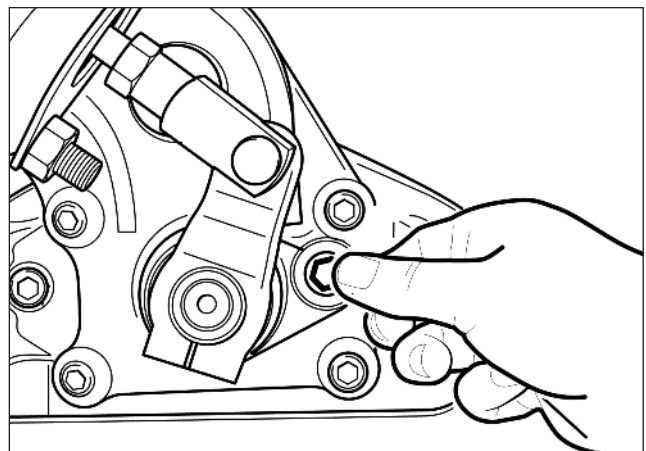


Fig. 2.3

2 Operational Checks

Operate the service brake several times with approximately 1 to 2 bar air pressure.

It should be possible to feel the adjuster stem turning. The adjuster stem should turn against the direction of lever travel (brake application stroke) when viewed from the air chamber side as shown in Fig 2.4 or Fig. 2.5

NOTE: As the number of brake applications increase, the movement of the adjuster stem will become smaller.

Possible faults:

- Adjuster stem does not turn
- Adjuster stem turns backwards and forwards.

If any of the above faults arise, the adjuster assembly or housing assembly must be replaced, refer to **Operating Shaft and Adjuster replacement - Section 13, or Housing replacement - Section 7.**

To establish the automatic adjuster is functioning correctly, check the clearance between the outboard pad backplate and the bridge abutment face (Fig 2.1). The minimum clearance should not be less than 0.6mm.

Set the running clearance between outboard pad backplate and the bridge abutment face. To do this, turn the adjuster stem against the direction of lever travel (brake application stroke) when viewed from the air chamber side, until an increase in resistance is felt and both pads touch the rotor. Then turn the adjuster back 1/2 a turn, thus creating a running clearance.

Charge the air system and apply the brakes 5 times to settle the pads and allow the auto adjuster to set the correct running clearance.

To confirm the correct lever travel, refer to **Lever Travel** on page 14.

Where the road wheels have been removed to carry out the adjuster test, check that the rotor is free to rotate.

Where applicable, refit the wheels and tighten the nuts to the vehicle manufacturers torque specification. Jack the vehicle down to the ground.

Road test.

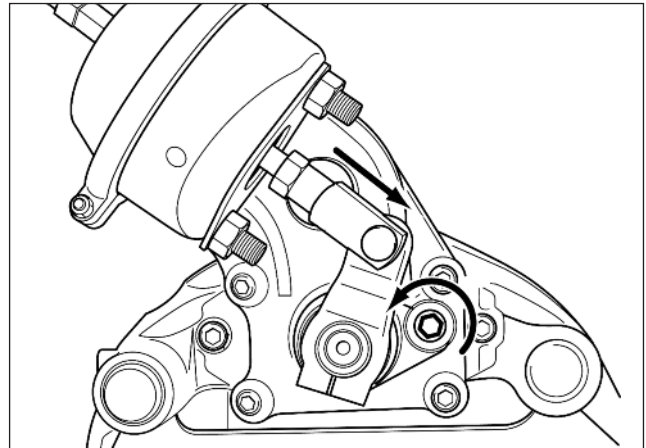


Fig. 2.4

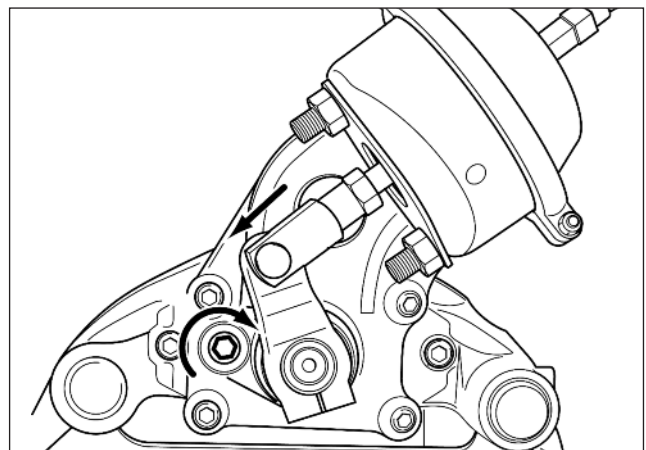


Fig. 2.5

2 Operational Checks

Checking the Sliding action of the Housing

Park the vehicle on hard ground and chock the road wheels. Apply air pressure to release the park brake and wind off the spring brake retraction screw (where appropriate). Jack up the axle and fit suitable axle stands securely. Remove the road wheels and exhaust all air from the system.

Remove pads as described in **Section 3**

Move the housing backwards and forwards in the direction of the arrow, as shown in Fig. 2.6. It must be possible to push/pull the housing easily by hand.



CAUTION Take care not to trap fingers whilst sliding the brake

NOTE: Be careful not to damage the guide sleeve excluders when sliding the housing.

With the brake pads removed check the integrity of the guide pin and tappet dust covers. They should be secure and free from any signs of damage.



Fig 2.6

Checking Slide Pin Bush Wear

Radial Test

Remove the pads as described in **Pad replacement - section 3**.

Securely clamp the Meritor service tool MST 1018 (Fig. 2.7) to the lug with the retaining hole for the pad wear warning assembly in the correct position (Fig. 2.8) with a 6mm screw, nut and washers. The slot in the tool must be parallel to the rotor.

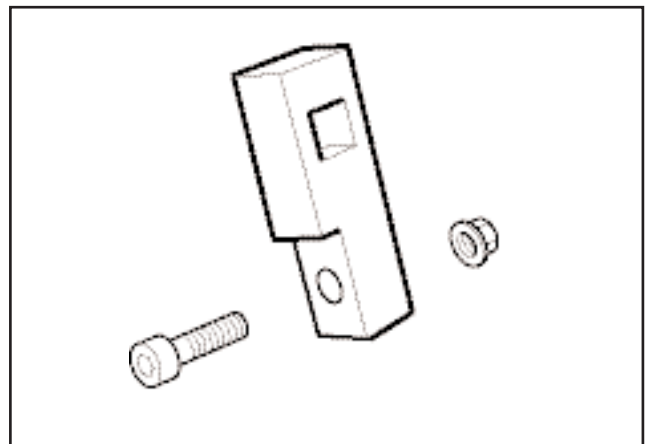


Fig 2.7

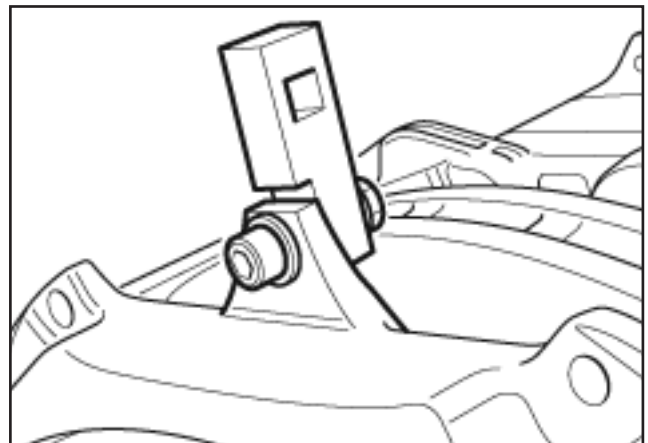


Fig 2.8

2 Operational Checks

Position the brake in the new pad condition. This is achieved by sliding the brake housing fully in the direction of arrow A (Fig. 2.9) (Towards the wheel hub)



CAUTION: Take care not to trap fingers whilst sliding the brake.

Mount a dial gauge in a suitable position on the vehicle hub and set against the service tool as shown in Fig. 2.10. Ensure the hub cannot rotate

Set the dial gauge to zero.

Fit a torque wrench to the tool in the position as shown in Fig. 2.11.



Apply the torque wrench in the correct direction (Fig 2.11) up to 25Nm (18lb. ft.) without allowing the brake to slide and note the dial gauge reading.

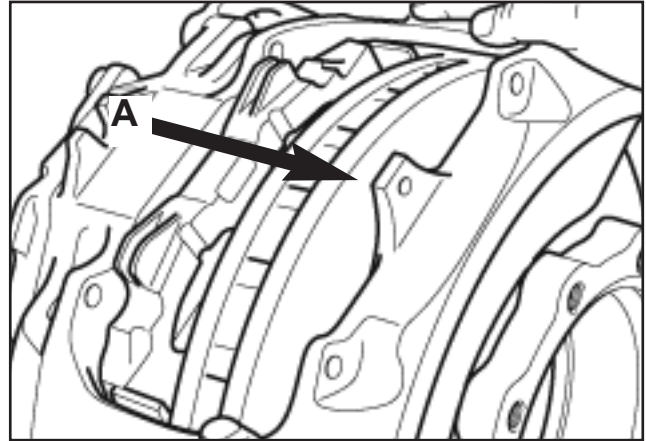


Fig 2.9

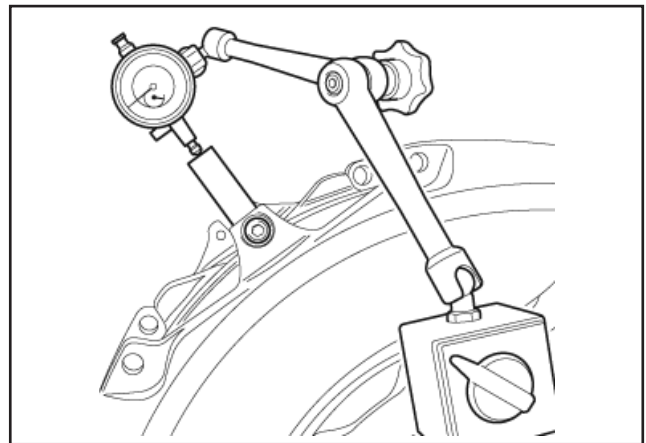


Fig 2.10

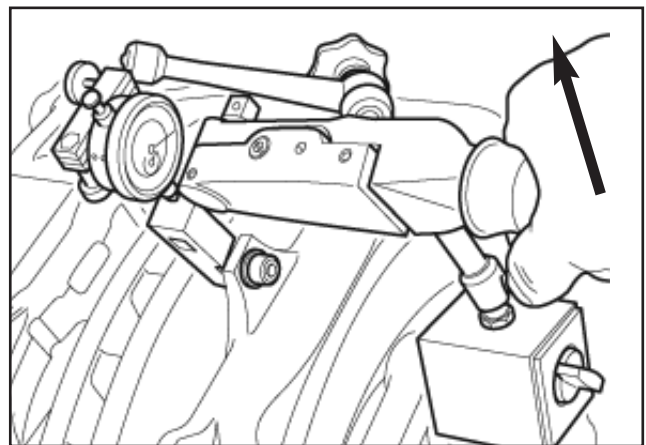


Fig 2.11

2 Operational Checks

Remove the torque wrench and fit to the opposite side socket in the service tool Fig. 2.12.

NOTE: DO NOT RESET THE DIAL GAUGE.

T Apply the torque wrench in the correct direction (Fig 2.12) up to 25Nm (18lb. ft.) without allowing the brake to slide and note the dial gauge reading.

NOTE: Take care not to disturb the position of the dial gauge when applying the torque wrench.

Add the two dial gauge readings together to give total free play measurement.

NOTE: Max acceptable free play measurement is 2.0mm

If this figure is exceeded the guide sleeve pins and bushes require attention.

Using the correct service kits overhaul the slide pins following the procedure detailed in **Guide Pin replacement - Section 14**.

Remove the service tool MST 1018

Replace the pads as described in **Pad replacement - section 3**.

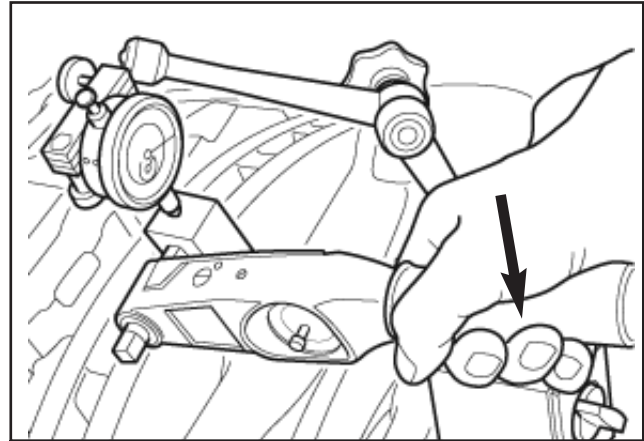


Fig 2.12

2 Operational Checks

Pad Wear Check

The Lisa Air Disc Brake incorporates a PWWI device (Fig 2.13) to monitor pad wear. This will illuminate a warning lamp on the vehicle instrument panel to indicate that a pad change is required.

Brake pad should be replaced when the lining thickness has worn to 3.0 mm.

⚠ CAUTION You must always renew the brake pads on both wheels of an axle. Only use the brake pads that have been approved by the vehicle manufacturer. Brake pads must be replaced when the lining thickness has worn to 3mm minimum.

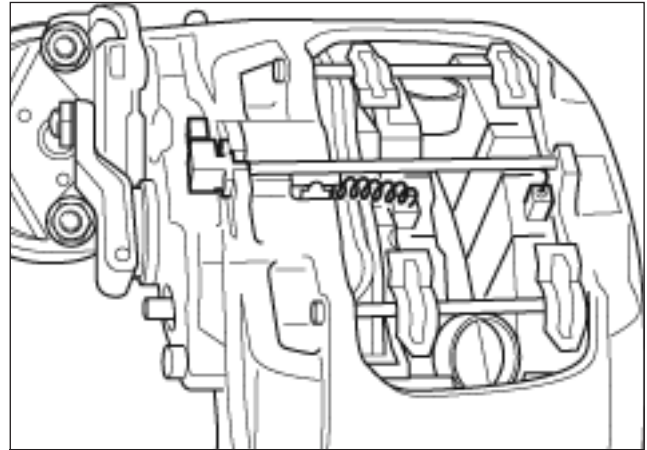


Fig 2.13

Manual adjustment

To set an initial running clearance locate a 10mm socket on the adjuster stem and turn it against the direction of lever travel (brake application stroke) when viewed from the air chamber side (Fig 2.14).

Continue to adjust the brake until an increase in resistance is felt and both pads touch the rotor. Turn the adjuster back by 1/2 a turn of the wrench, thus creating a running clearance. Ensure the rotor is free to turn.

NOTE: de-adjustment requires a higher torque than adjustment.

⚠ WARNING

Always de-adjust/adjust the brake carefully by hand with a suitable wrench. Never exceed a maximum torque of 15Nm (11lb.ft.) in either direction and NEVER use power tools.

Charge the air system and apply the brakes 5 times to settle the pads and allow the automatic adjuster to set the correct running clearance. Check that the rotor is free to rotate.

Fit the wheels and tighten the retaining nuts to the vehicle manufacturers torque specification.
Jack the vehicle down to the ground.

Road test.

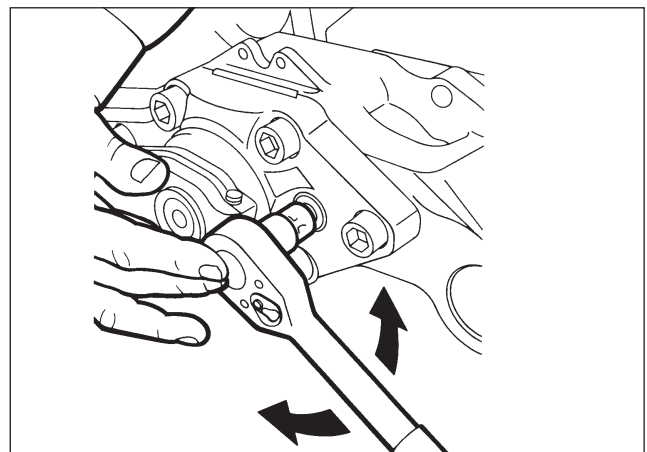


Fig. 2.14

2 Operational Checks

Rotor Inspection and Maintenance

Check the rotor for grooves, cracks, heat crazing, scoring and bluing.

Whilst wearing suitable eye protection remove scale, dirt and corrosion etc from around the edge of the rotor. Use an emery cloth if necessary.

NOTE: One way to remove corrosion is to support a screwdriver or scraper on the brake body and rotate the rotor.

Rotor

Check that the rotor's thickness dimension meets the manufacturer's specification and those detailed in the Rotor Wear Conditions, **Section 15**. If there is any doubt in the serviceability of the rotor refer to the vehicle manufacturer for corrective action.

NOTE: If the rotor's thickness dimension is not high enough to permit expected wear before the next brake pad change: Replace the rotor.

CAUTION: You must always renew the rotor on both wheels of an axle. Only use the rotors that have been approved by the vehicle manufacturer.

Inspect both rotor surfaces for the following conditions.

Cracks (Fig 2.15)

Cracks that extend through to the vent of a ventilated rotor or 25% through the thickness at the outer edge of a solid rotor: Replace the rotor.

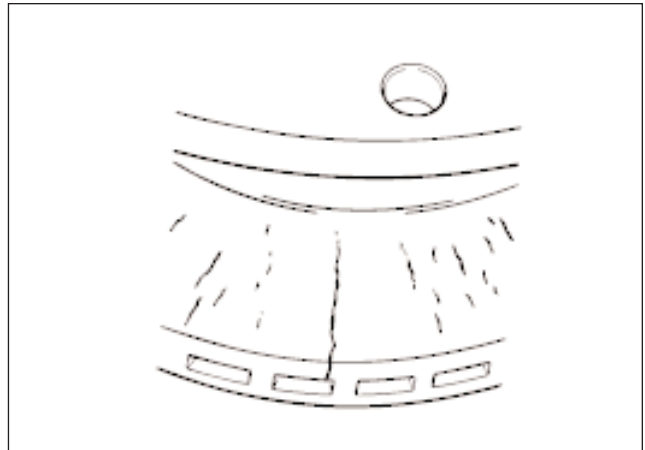


Fig 2.15

Heat Crazing (Fig 2.16 & Fig 2.17)

Heat crazing is fine cracks on the rotor's surface.

This is a normal condition that results from continuous heating and cooling of the friction surface.

Braking under normal operating conditions can cause cracks to separate and deepen, increasing lining wear.

There are two types of heat crazing: light and heavy.

Light Heat Crazing (Fig 2.16)

Light heat crazing is fine, tight cracks in the rotor's surface.

Continue to use a rotor with light heat crazing.

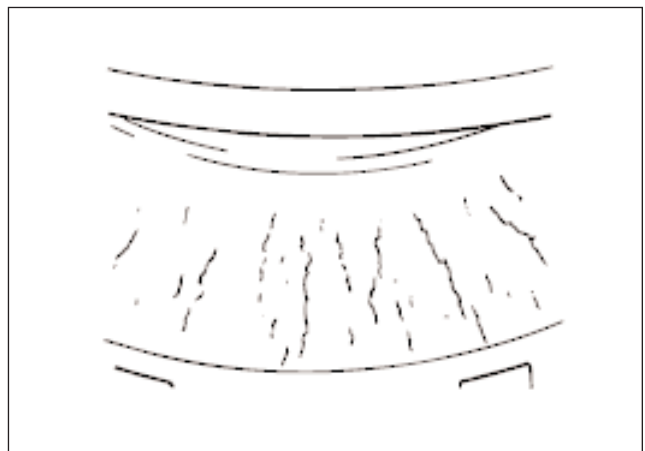


Fig 2.16

2 Operational Checks

Heavy Heat Crazing (Fig 2.17)

Heavy heat crazing is cracks in the rotor's surface that extend radially and have an individual length of up to 75% brake path width.

Refinish or replace a rotor that has heavy heat crazing.

NOTE: Surface finish after machining should be 5 microns maximum.

NOTE: Localised crazing / blue patches / cracking in only one part of the rotor could be caused by rotor run-out or thickness variation. Refer to vehicle manufacturer for tolerances.

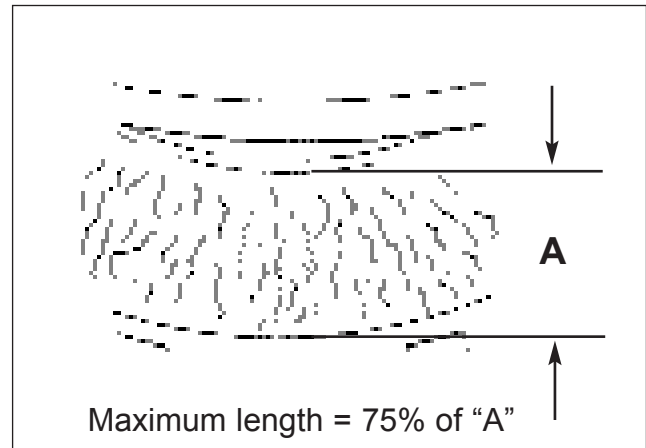


Fig 2.17

Scoring (Fig 2.18)

Scoring is deep circumferential grooves that can occur on both sides of the rotor's surface. If the groove or multiple scores are of a depth less than 0.5 mm, continue to use the rotor. If the groove / scores are greater than 0.5 mm, refinishing the rotor is recommended.

Refinishing the rotor is recommended before fitting new brake pads.

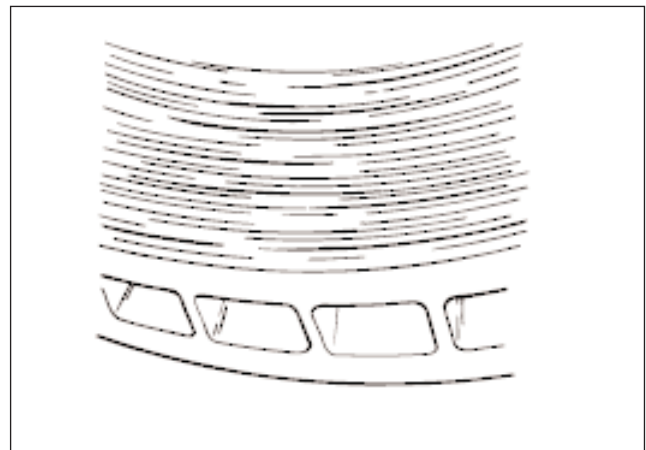


Fig 2.18

"Blue" Rotor (Fig 2.19)

Blue marks or bands on the rotor indicate that extremely high temperatures occurred during operation. Refinishing the rotor is recommended before fitting new brake pads.

CAUTION Reasons for the excessively high temperatures must be investigated as this will adversely affect brake performance and lining wear rate. Continued operation at excessively high temperatures will eventually adversely affect brake function.

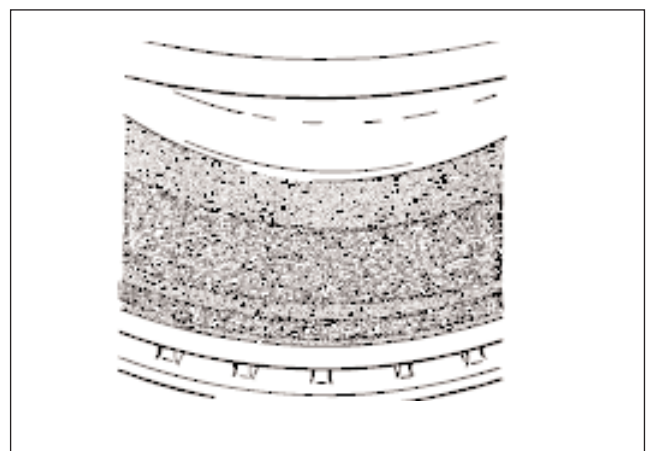


Fig 2.19

Pad Replacement

3

- pg. 24 Removing Brake Pads
- pg. 24 PWVI Removal
- pg. 26 Cleaning & Inspection
- pg. 27 Fitting New Pads
- pg. 28 Pad Adjustment

3 Pad Replacement

Fitting new pads

CAUTION You must always renew the brake pads on both wheels of an axle. Only use the brake pads that have been approved by the vehicle manufacturer. Brake pads must be replaced when the lining thickness has worn to 3mm minimum.

Removing Brake Pads

Park the vehicle on hard ground and chock the road wheels. Apply air pressure to release the park brake and wind off the spring brake retraction screw (where appropriate). Jack up the axle and fit suitable axle stands securely. Remove the road wheels and exhaust all air from the system. Remove any dirt from the brake assembly with a wire brush, avoiding damage to the rubber dust excluders.

CAUTION Never use an airline to blow dust from the brake rotor area. If inhaled any form of dust can at best be an irritant, at worst dangerous. Whenever possible remove dry brake dust with a vacuum brush. Alternatively wipe the areas with a damp cloth, never try to accelerate drying time by using an air line.

CAUTION: Ensure any discarded friction product, or cloth contaminated with brake dust, is disposed of in accordance with local environmental regulations.

PWWI Removal

Carefully remove the pad wear indicator cable inserts from the pads (Fig 3.1). Disconnect the pad wear indicator assembly from the vehicle wiring harness. Remove the pad wear indicator assembly from the brake by squeezing the two tangs at the connector end of the assembly and pushing the indicator out of its location in the housing, as shown in Fig 3.2.

IMPORTANT: Check the condition of the pad wear indicator assembly, pay particular attention to the pad inserts and cables. If there is any evidence of wear or damage replace with a new pad wear warning indicator assembly.

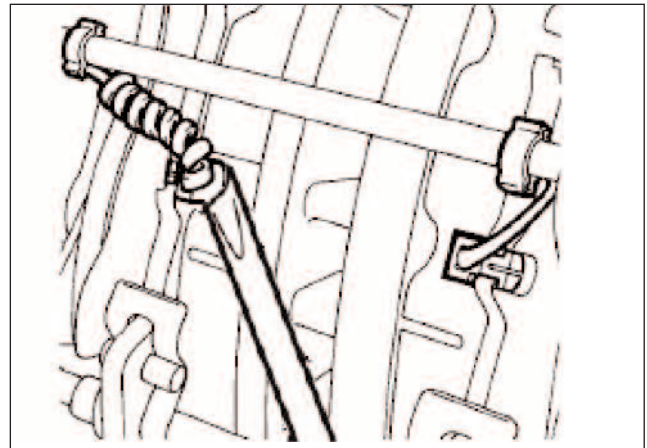


Fig. 3.1

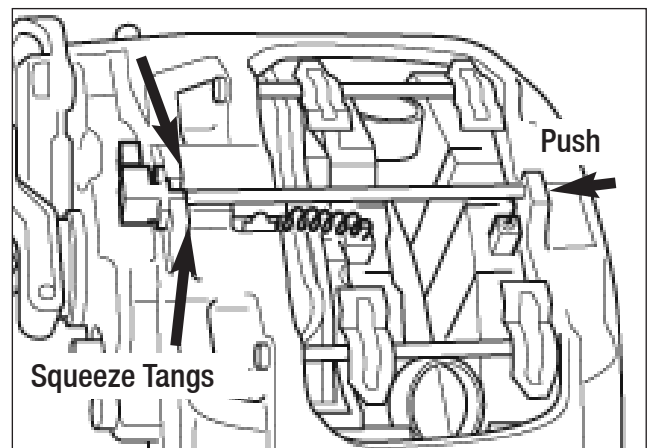


Fig. 3.2

3 Pad Replacement

Remove the pad retaining pin clips (Fig 3.3) and carefully tap out the pad retaining pins with a hammer and suitable drift (Fig 3.4).

NOTE: The spreader spring is held in tension on the spreader plate by the pad retaining pins. Hold the spring in position whilst tapping out the pins and prevent it springing from the brake.

It may be necessary to de-adjust the brake initially to remove the worn brake pads. Locate a suitable 10 mm socket wrench on the adjuster stem. Depress the stem to engage the adjuster wheel and with the stem depressed rotate the wrench in the direction of lever travel (brake application stroke) (Fig 3.5).

IMPORTANT: During de-adjustment it is necessary to keep the loose spreader plate located on the tappet head, by hand pressure if necessary. If the tappet pins slip out of engagement with the spreader plate no further de-adjustment will occur.

⚠ WARNING: Always de-adjust / adjust the brake carefully by hand with a suitable wrench.

Never exceed a maximum torque of 15Nm (11lb.ft.) in either direction and NEVER use power tools, air or electric, to de-adjust or adjust the brake.

De-adjust the brake until it is possible to remove the outboard pad. With the worn outboard pad removed continue to de-adjust the brake until, with the housing assembly pulled across, there is a sufficient aperture to fit the new outboard pad.

NOTE: Do not fit the now outboard pad at this point.

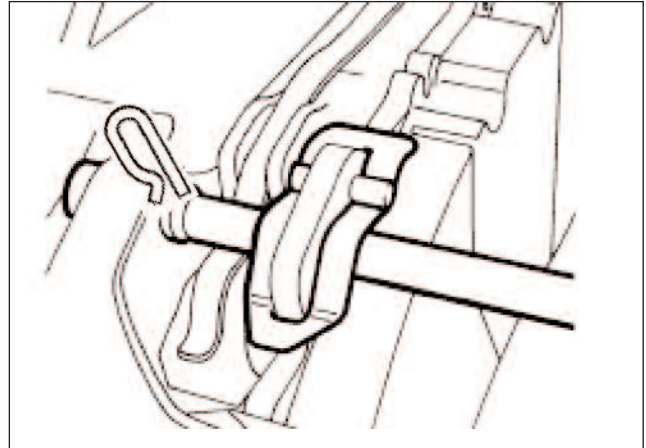


Fig. 3.3

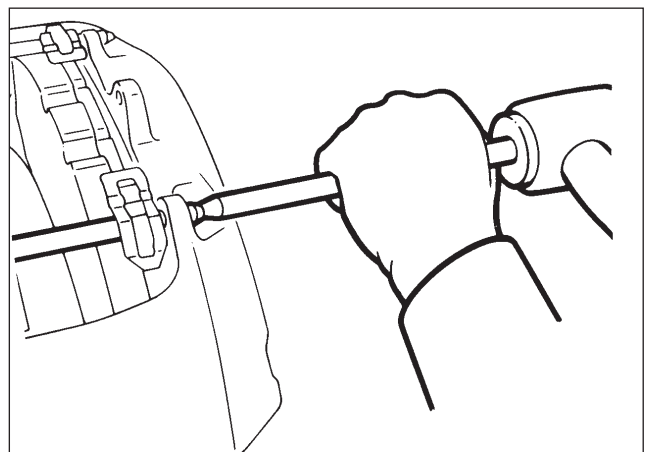


Fig. 3.4

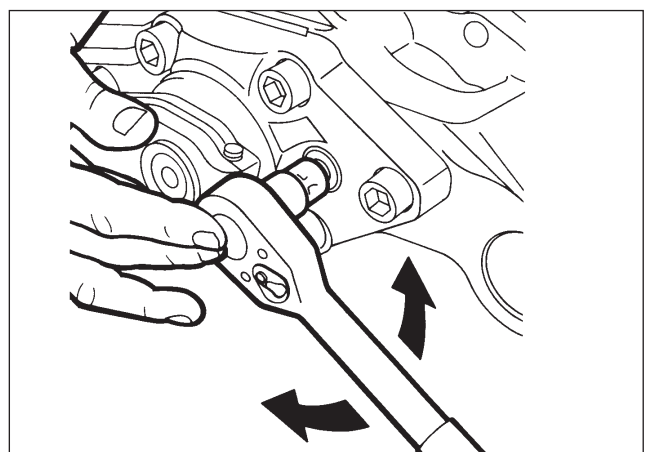


Fig. 3.5

3 Pad Replacement

Remove the worn inboard pad and where loose the spreader plate (Fig 3.6). Where the spreader plate is secured to the tappet head (Fig 3.7) it is not necessary to remove, unless replacing.

Cleaning and Inspection

With the brake pads removed check the integrity of the guide pin and tappet dust excluders. They should be secure and free from any signs of damage. Check that the brake housing assembly slides freely on the guide pins.



CAUTION:

Take care not to trap fingers whilst checking the sliding action of the brake.

Examine the spreader plate for signs of damage or wear. If there is any doubt in the suitability for further service, replace following the procedures detailed in **Section 5 Spreader plate replacement**.

Examine the brake rotor for corrosion, grooving, signs of deep crazing as detailed in the rotor inspection & maintenance information contained in **Section 2 Operational Checks**. Check the wear dimensions as detailed in the **Rotor Wear Conditions, Section 15**. If there is any doubt in the serviceability of any component refer to the vehicle manufacturer for corrective action.

Whilst wearing suitable eye protection remove all traces of scale, dirt etc., from the pad apertures/abutment faces and around the edge of the rotor, particularly that encroaching onto the braking area. A scraper, or old screwdriver, supported on the brake body whilst the rotor is rotated will remove most of the corrosion. Finish off if necessary with emery cloth. Remove all traces of scale, dirt etc., from the pad/spreader plate apertures and abutment faces which may restrict the movement of the pads/spreader plate and efficient automatic adjustment of the brake.

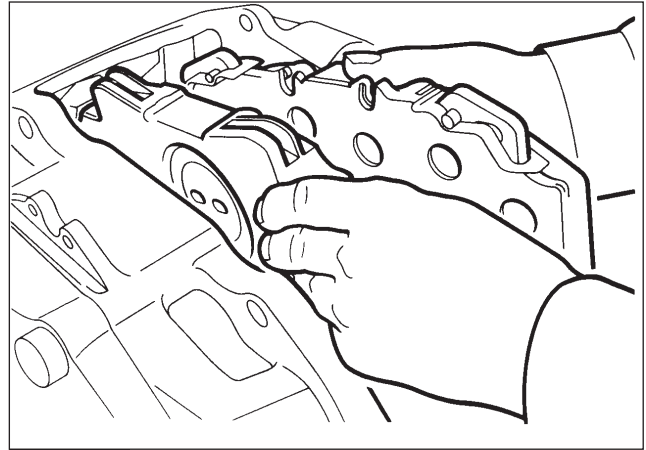


Fig. 3.6

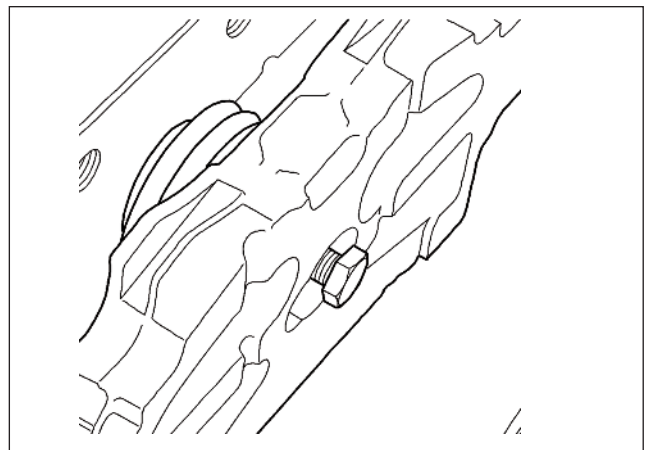


Fig. 3.7

3 Pad Replacement

Fitting New Pads

NOTE: For certain applications the pad springs A and spring retaining pins B (Fig 3.8) may be supplied loose with the pads. The springs must be fitted to the pads before the pads are fitted to the brake. Locate the springs A correctly onto the pad backing plate and retain with the pins B as shown in Fig 3.8.

Refit the spreader plate. Where the spreader plate is loose, ensure the two pins on the tappet head locate correctly into the spreader plate (Fig 3.9).

T If replacing a secured spreader plate. Fit the new spreader plate into the brake ensuring it locates correctly on the tappet head. fit a new retaining screw and torque to 42 – 50Nm (31 - 37lb. ft.) (Fig 3.10).

Pull the housing across and fit the now outboard pad first. Push the housing back towards the rotor until the new pad contacts the rotor face. Depress the adjuster stem and continue to de-adjust the brake until the aperture gap between the spreader plate and the rotor face is large enough to accept the new pad.

NOTE: This dimension should be approximately 28.5mm-29mm.

⚠ WARNING: Do not exceed the 15Nm (11lb.ft.) maximum torque on the adjuster shaft.

Locate a new spreader spring correctly on the spreader plate and hold in position while one of the pad retaining pins is tapped in from the inboard side of the brake.

NOTE: Some applications use two spreader springs on the spreader plate

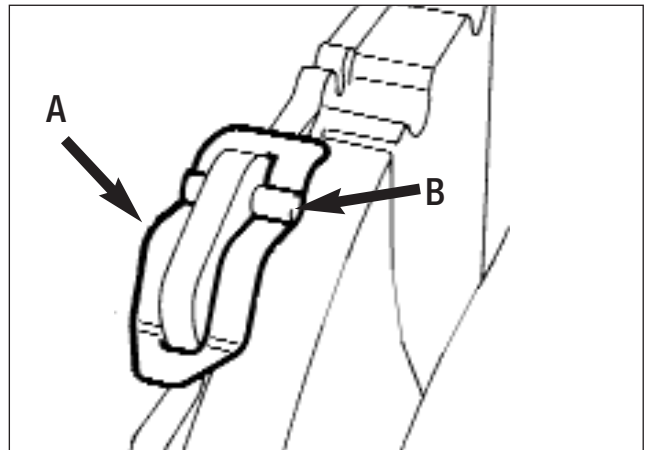


Fig. 3.8

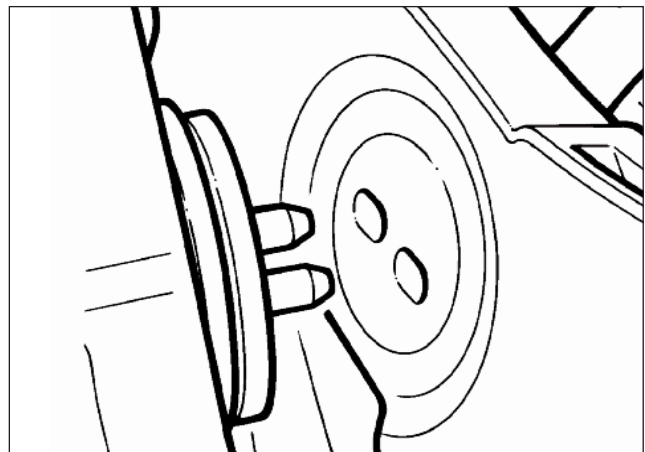


Fig. 3.9

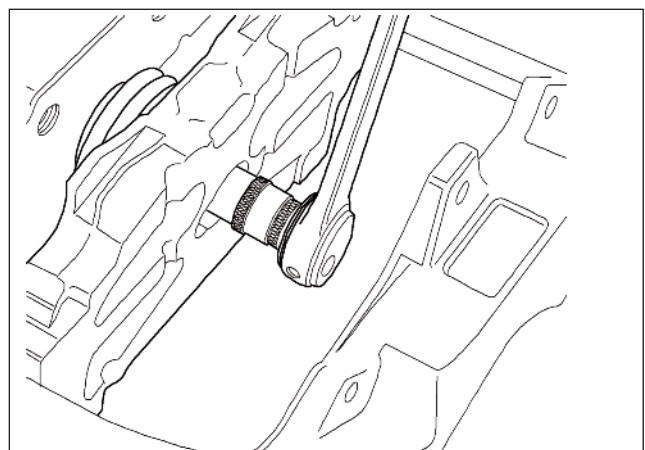


Fig. 3.10

3 Pad Replacement

Ensure the pad retaining pin locates correctly under the integral pad springs (Fig 3.11) when it is tapped fully in.

Repeat this operation for the second pad retaining pin and secure both pins with new clips. Fit the pad wear indicator assembly into the location in the housing ensuring both tangs lock in position in the housing. (Fig 3.12)

NOTE: Both cables must be to the same side of the pad wear indicator assembly (Fig 3.12).

Carefully insert the cable plugs to the pad backplates.

NOTE: Do not stretch or damage the cables.

Pad Adjustment

To adjust the pads locate the 10mm socket wrench on the adjuster stem. Depress the stem and turn it in the opposite direction to lever travel (brake application stroke) (Fig 3.13). Continue to adjust the brake until the pads contact the rotor.

WARNING: Do not exceed 15Nm (11lb.ft.) torque on the adjuster stem.

De-adjust the brake by turning the adjuster stem back 1/2 a revolution. Ensure the brake rotor is just free to spin. Wind in the spring brake retraction screw (where applicable). Refit the road wheels, remove the axle stands and lower the vehicle to the ground. Charge the system with air.

NOTE: Before driving the vehicle or applying the park brake, apply the service brake five times at low pressure to ensure correct adjustment of the pads.

Road test.

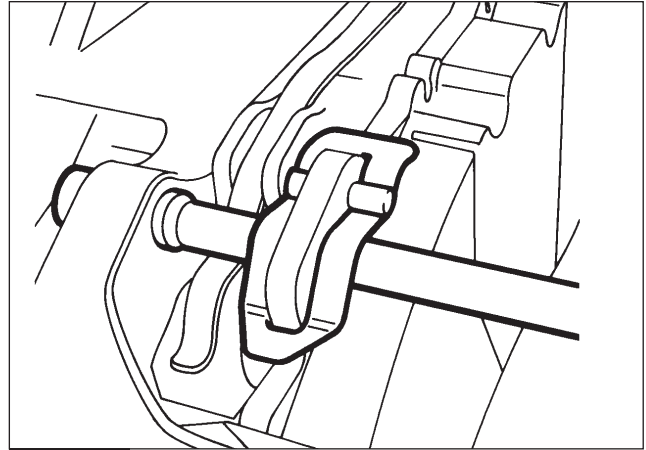


Fig. 3.11

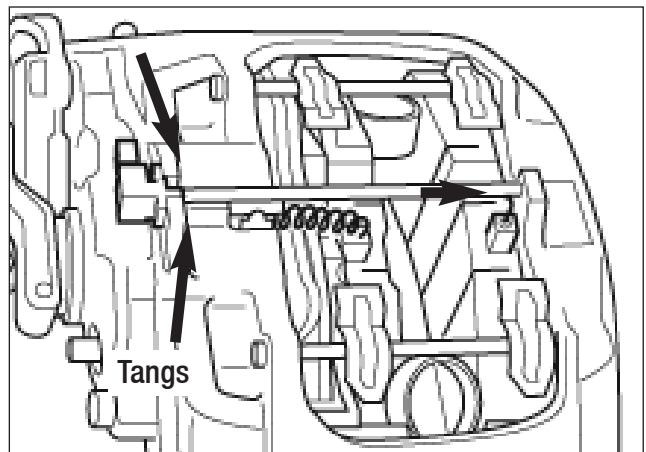


Fig. 3.12

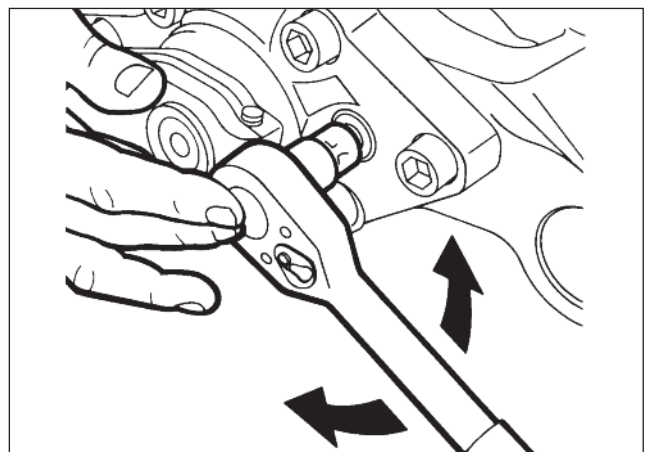


Fig. 3.13

Pad Retaining Pin Replacement

4

pg. 30 Retaining Pin Removal
pg. 30 Retaining Pin Fitment

4 Pad Retaining Plate Replacement

Park the vehicle on hard ground and chock the road wheels. Apply air pressure to release the park brake and wind off the spring brake retraction screw (where appropriate). Jack up the axle and fit suitable axle stands securely. Remove the road wheels and exhaust all air from the system. Remove any dirt from the brake assembly with a wire brush, avoiding damage to the rubber dust excluders.

CAUTION Never use an airline to blow dust from the brake rotor area. If inhaled any form of dust can at best be an irritant, at worst dangerous. Whenever possible remove dry brake dust with a vacuum brush. Alternatively wipe the areas with a damp cloth, never try to accelerate drying time by using an air line.

CAUTION: Ensure any discarded friction product, or cloth contaminated with brake dust, is disposed of in accordance with local environmental regulations.

Pad retaining pin removal

Remove the pad retaining pin clips (Fig 4.1) and carefully tap out the pad retaining pins with a hammer and suitable drift (Fig 4.2).

NOTE: The spreader spring is held in tension on the spreader plate by the pad retaining pins. Hold the spring in position whilst tapping out the pins and prevent it springing from the brake.

Check the condition of the pads and pad wear indicator. Where necessary replace with new pads as described in **Section 3 Pad Replacement**.

CAUTION You must always renew the brake pads on both wheels of an axle. Only use the brake pads that have been approved by the vehicle manufacturer. Brake pads must be replaced when the lining thickness has worn to 3mm minimum.

Pad retaining pin fitment

While holding the spreader spring correctly in position on the spreader plate tap one of the pad retaining pins in from the inboard side of the brake.

NOTE: Some applications use two spreader springs on the spreader plate

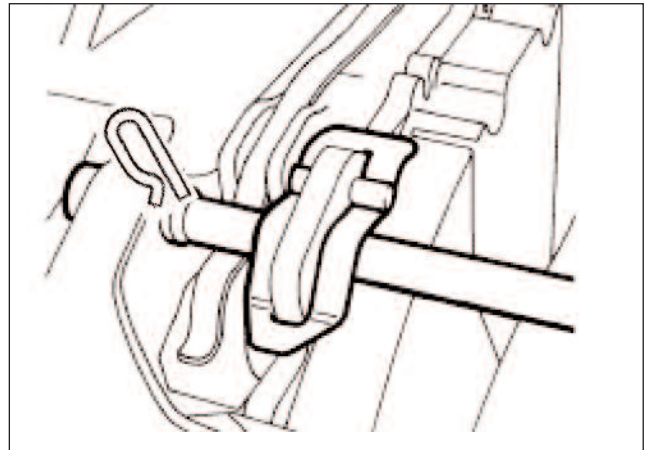


Fig. 4.1

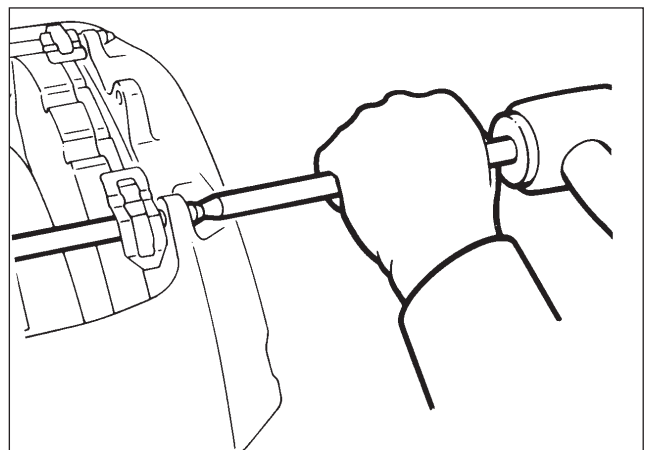


Fig. 4.2

Ensure the pad retaining pin locates correctly under the integral pad springs (Fig 4.3) when it is tapped fully in.

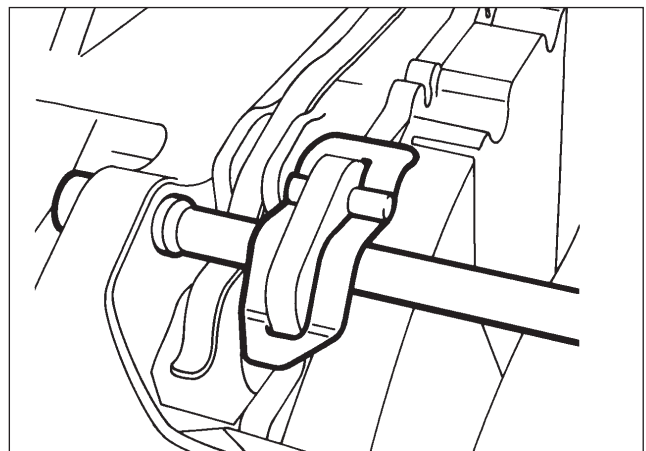


Fig. 4.3

4 Pad Retaining Plate Replacement

Repeat this operation for the second pad retaining pin and secure both pins with new clips.

Wind in the spring brake retraction screw (where applicable). Refit the road wheels, remove the axle stands and lower the vehicle to the ground. Charge the system with air.

NOTE: Before driving the vehicle or applying the park brake, apply the service brake five times at low pressure to ensure correct adjustment of the pads.

4 Pad Retaining Plate Replacement

Spreader Plate Replacement

5

pg. 34 Spreader Plate Removal

pg. 35 Fitting a new Spreader Plate

5 Spreader Plate Replacement

Park the vehicle on hard ground and chock the road wheels. Apply air pressure to release the park brake and wind off the spring brake retraction screw (where appropriate). Jack up the axle and fit suitable axle stands securely. Remove the road wheels and exhaust all air from the system.

Important: The brake assembly number should be noted in order to obtain the correct service kit.

Disconnect and remove the pad wear warning indicator assembly. Remove the pads as described in the **Pad Replacement section 3**.

Spreader Plate Removal

Loose Spreader Plate

Remove the spreader plate from the brake (Fig 5.1).

Bolted Spreader Plate

Remove the bolt retaining the spreader plate to the tappet head (Fig 5.2) and remove the spreader plate from the brake.

Cleaning and Inspection

With the brake pads and spreader plate removed check the integrity of the guide pin and tappet dust excluders. They should be secure and free from any signs of damage. Check that the brake housing assembly slides freely on the guide pins.

CAUTION: Take care not to trap fingers whilst checking the sliding action of the brake.

Examine the brake rotor for corrosion, grooving, signs of deep crazing as detailed in the rotor inspection & maintenance information contained in **Section 2 Operational Checks**. Check the wear dimensions as detailed in the **Rotor Wear Conditions, Section 15**. If there is any doubt in the serviceability of any component refer to the vehicle manufacturer for corrective action.

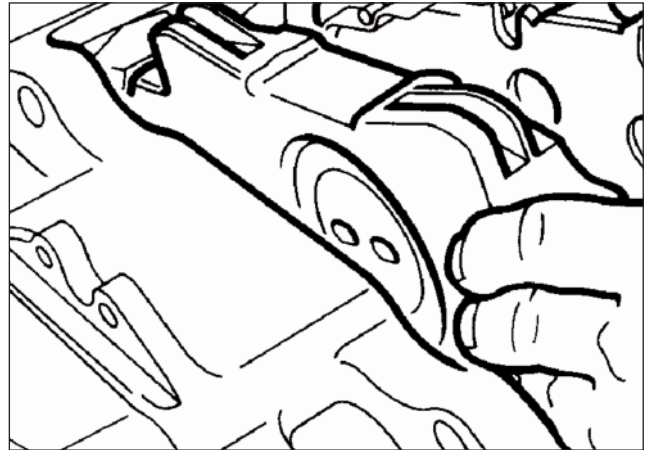


Fig. 5.1

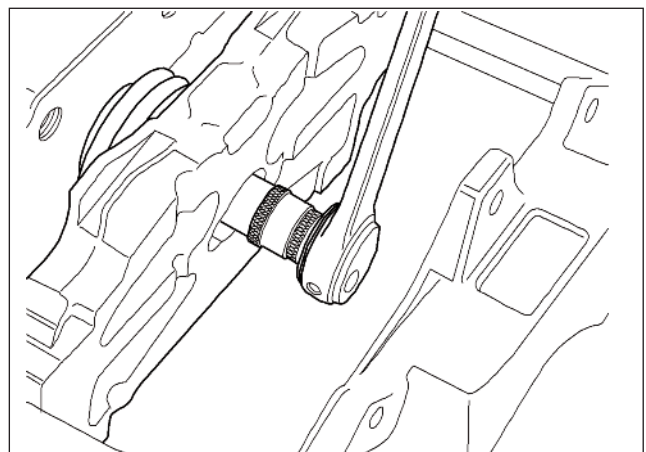


Fig. 5.2

Whilst wearing suitable eye protection remove all traces of scale, dirt etc., from the pad apertures/abutment faces and around the edge of the rotor, particularly that encroaching onto the braking area. A scraper, or old screwdriver, supported on the brake body whilst the rotor is rotated will remove most of the corrosion. Finish off if necessary with emery cloth. Remove all traces of scale, dirt etc., from the pad/spreader plate apertures and abutment faces which may restrict the movement of the pads/spreader plate and therefore prevent efficient de-adjustment of the brake.


5 Spreader Plate Replacement

Fitting a New Spreader Plate


Loose Spreader Plate

Fit the new spreader plate into the brake and ensure the two pins on the tappet head locate correctly into the spreader plate (Fig 5.3).

Bolted Spreader Plate

 Fit the new spreader plate into the brake ensuring it locates correctly on the tappet head. Secure with the new retaining bolt (Fig 5.4) and tighten the bolt to a torque of; 42 - 50Nm (31 - 37lb. ft.)

Re- fit the brake pads, or fit new pads, and adjust the pad / rotor clearance as detailed in Section 3 Pad Replacement.

 **CAUTION** You must always renew the brake pads on both wheels of an axle. Only use the brake pads that have been approved by the vehicle manufacturer. Brake pads must be replaced when the lining thickness has worn to 3mm minimum.

Charge the system with air and release the spring brake caging screw (where applicable). Where necessary reinstall the wheels and remove the axle stands. Lower the vehicle to the ground.

NOTE: Before driving the vehicle or applying the park brake, apply the service brake five times at low pressure to ensure correct adjustment of the pads.

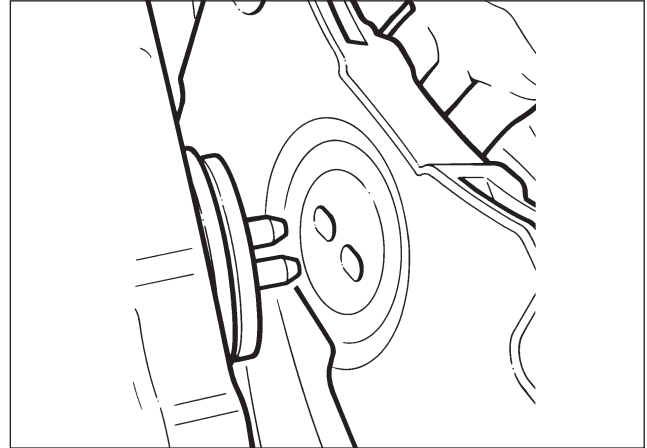


Fig. 5.3

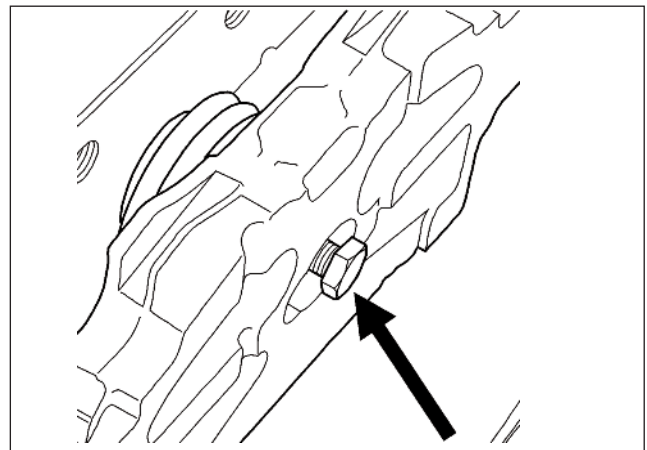


Fig. 5.4

5 Spreader Plate Replacement

Brake Replacement

6

pg. 38 Brake Removal
pg. 39 Brake Fitment
pg. 39 Lever Position

6 Brake Replacement

Park the vehicle on hard ground and chock the road wheels. Apply air pressure to release the park brake and wind off the spring brake retraction screw (where appropriate). Jack up the axle and fit suitable axle stands securely. Remove the road wheels and exhaust all air from the system. Remove the clevis pin securing the air chamber clevis to the actuating lever. Remove the air chamber from the mounting bracket.

NOTE: support the air chamber under the vehicle wheel arch in a position which does not interfere with brake removal or cause undue strain on the connected air pipe

Where applicable, remove the separate actuator mounting bracket (Fig 6.1).

Important: The brake assembly number should be noted in order to obtain the correct service kit.

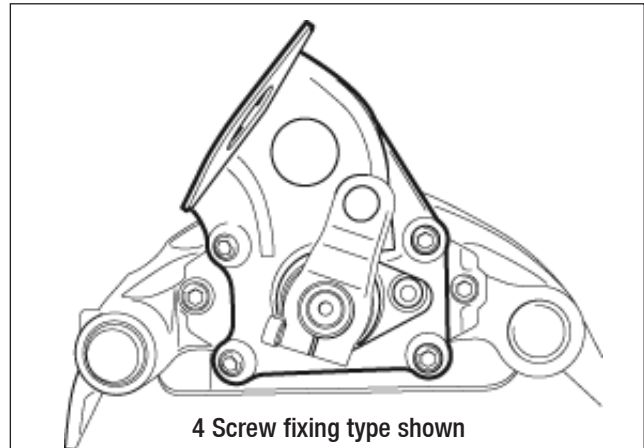


Fig. 6.1

Brake Removal

Disconnect and remove the pad wear warning indicator assembly. Remove the pads and spreader plate as described in the **Pad Replacement section 3**.

WARNING: The brake assembly is heavy, approximately 53kg (117lbs). Ensure you have the help of an assistant, or preferably suitable lifting equipment, before attempting to remove the brake from the vehicle.

CAUTION: When lifting the brake assembly avoid trapping fingers between the brake housing and carrier bracket which are free to slide relative to each other. Also prevent any sudden movement which may result in rapid sliding of the components which may cause damage to rubber dust excluder areas.

6 Brake Replacement

Brake Fitment

Preferably using suitable lifting equipment, or with the help of an assistant, carefully lower the brake assembly into position on the stub axle mounting. Avoid excessive movement of the brake during location and do not allow the brake to drop into position on the stub axle, either action could result in damaged dust excluders.

Fit new retaining screws and torque to the vehicle manufacturers recommendations.

T Where applicable, refit separate actuator mounting bracket (Fig 6.1) and torque the fixing screws as follows:

3 x hexagon head screws - 106 - 132Nm (80 - 98 lb. ft)

4 x M12 socket head screws - 106 - 132Nm (80 - 98 lb. ft)

Lever Position

Check the operating lever position relative to the air chamber mounting bracket. Push the lever towards the mounting bracket until a resistance is felt.

Check the dimension from the centre of the lever clevis hole to the air chamber mounting face on the mounting bracket (Fig 6.2), ensure that it conforms to the dimension specified by the vehicle manufacturer.

T When the lever has been positioned correctly refit retaining screw and tighten to a torque of 60 - 72Nm (44 - 53lb.ft.). Offer the air chamber to the mounting bracket and check the alignment of the clevis and lever clevis hole. Adjust the air chamber clevis where necessary to achieve correct alignment. Secure the air chamber to the mounting bracket

NOTE: Do not attempt to move the Lever from its natural 'OFF' position to achieve alignment of the clevis and lever hole.

Fit the clevis pin.

Fit the spreader plate and refit, or fit new, pads and the PWWI. Set the initial running clearance and test as described in **Section 3 Pad replacement.**

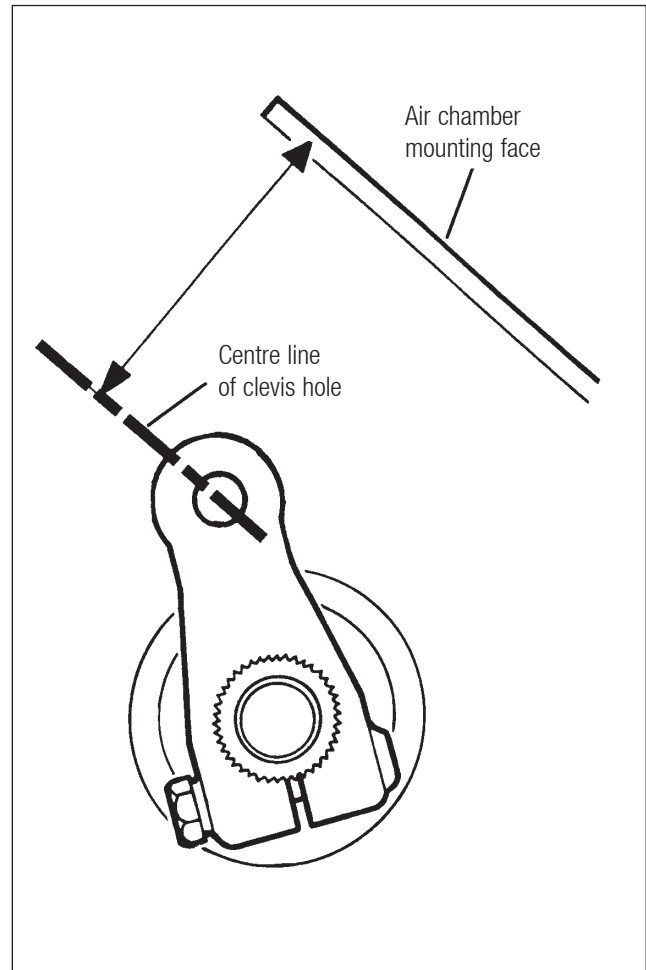


Fig. 6.2

! CAUTION: You must always renew the brake pads on both wheels of an axle. Only use the brake pads that have been approved by the vehicle manufacturer. Brake pads must be replaced when the lining thickness has worn to 3mm minimum.

6 Brake Replacement

Housing Replacement

7

pg. 42 Removing the Housing
pg. 42 Fitting a new Housing

7 Housing Replacement

Removing the Housing

Support the vehicle and remove the air chamber as detailed in the **Brake Replacement Section 6**.

Important: The brake assembly number should be noted in order to obtain the correct service kit.

Remove any dirt from the brake assembly with a wire brush, avoiding damage to the rubber dust excluders.

Remove the Pad wear indicator assembly, brake pads and spreader plate as detailed in the **Pad Replacement Section 3**. Tap out the guide pin caps (Fig 7.1) and loosen the guide pin screws. Supporting the weight of the housing assembly remove the guide pin screws and carefully lift the housing assembly from the carrier. Remove the guide sleeves from the brake housing. Clean the guide sleeves using a suitable brake cleaner and examine for signs of wear or corrosion, if there is any doubt in the suitability for continued service replace with new components. Clean and inspect the carrier for signs of damage or wear paying particular attention to the pad and spreader plate abutment areas **A** and guide sleeve location points **B** (Fig 7.2). If any doubt exists as to the suitability for further service replace with a new carrier as described in **Section 9 Carrier Replacement**. Clean and inspect the brake rotor as detailed in the **Operational Checks Section 2**.

Fitting a New Housing

Carefully remove the guide sleeve dust excluders from the new housing, lightly lubricate the inner surface of the dust excluders with grease and fit them to the guide sleeves ensuring they locate correctly in the guide sleeve retainer groove.

Apply grease to the guide sleeves and housing guide sleeve bores.

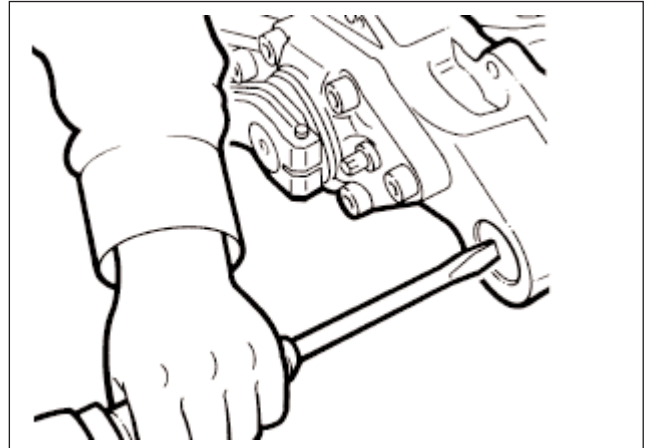


Fig. 7.1

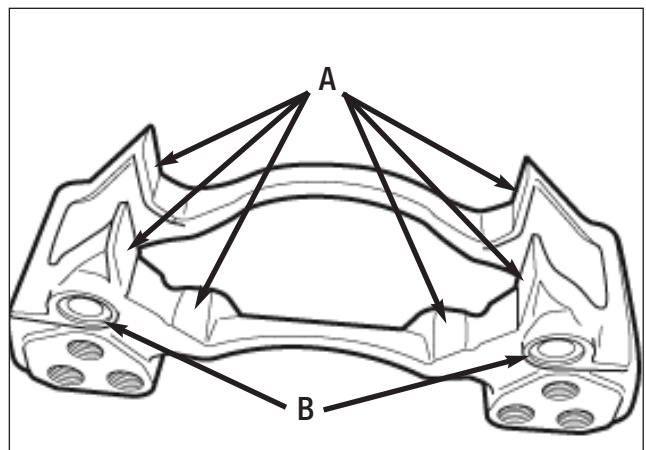


Fig. 7.2

7 Housing Replacement

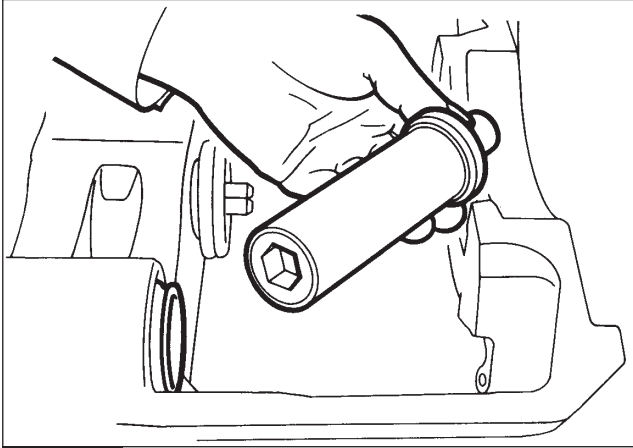


Fig. 7.3

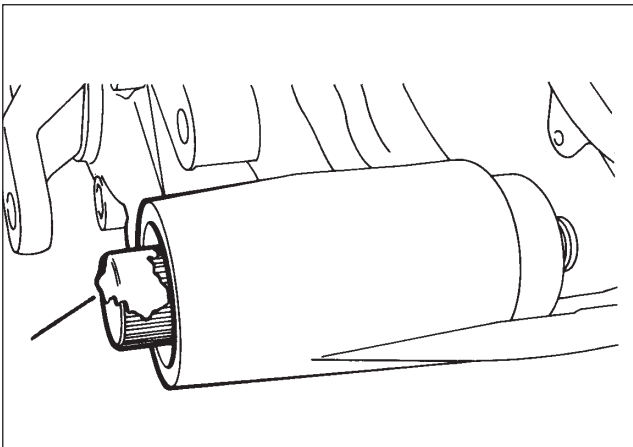


Fig. 7.4

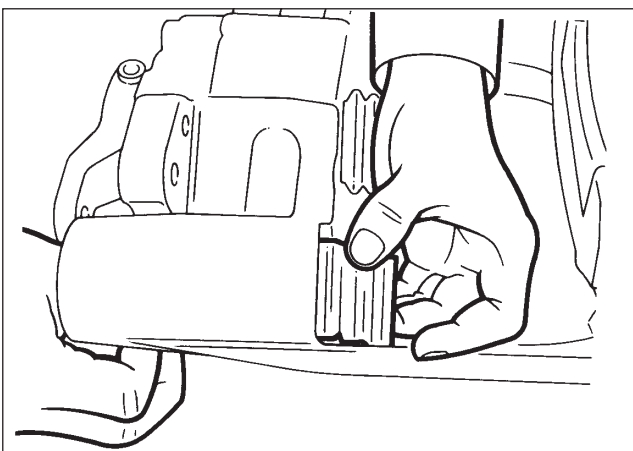


Fig. 7.5

NOTE: Only use the grease supplied with replacement components/kits or that specified by the vehicle manufacturer. Under no circumstance should any other type of grease be used.

Assemble the now guide pin screws into the guide sleeves and carefully fit the guide sleeves into the new brake housing (Fig 7.3). The action of fitting the guide pin screws into the guide sleeves, before they are fitted into the housing, prevents a build up of grease on the guide sleeve/screw head faces which could affect the torque level of the guide pin screws on final tightening. Remove the screws and wipe off any excess grease from the screw heads (Fig 7.4) and re-apply to the guide sleeve behind the dust excluder. Locate the guide pin dust excluder onto the housing retainers and gently pull the guide sleeve to check the secure location. (Fig 7.5). Carefully lower the housing assembly into position on the carrier and ensure the guide sleeves locate in the counter bores machined in the carrier (Fig 7.6).

⚠ WARNING: Take care not to damage the guide pin or tappet dust excluders when locating the housing on the carrier.

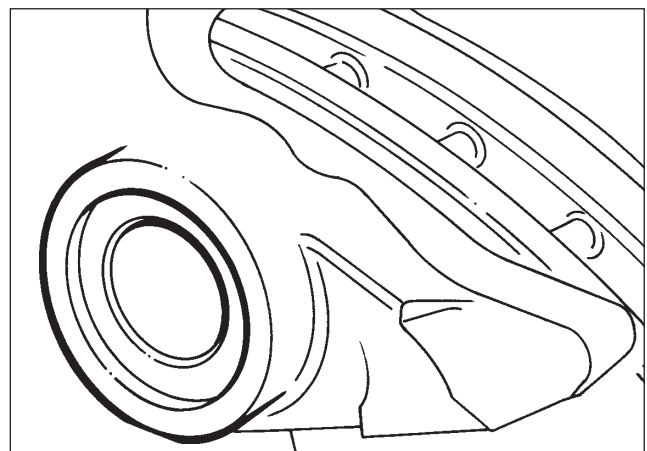


Fig. 7.6

7 Housing Replacement

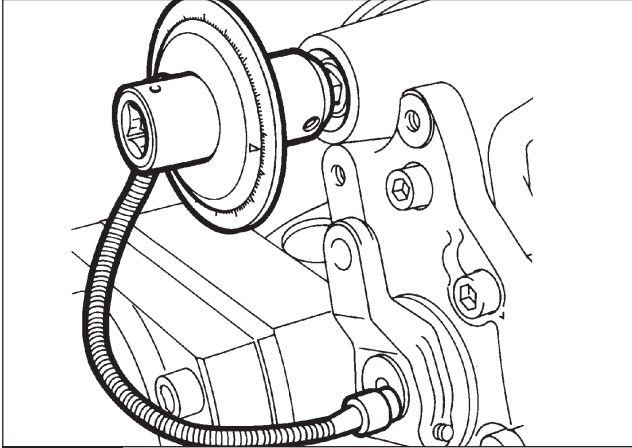


Fig. 7.7

T Fit the new guide pin screws and torque to an initial torque of 50Nm (37lb. ft.) only at this stage. Slide the housing backwards and forwards several times to check the smooth movement of the housing on the guide pins. Using a suitable torque angle attachment (Fig 7.7) locate on the longer guide pin screw.

Zero the angle gauge and tighten to:

- D LISA = 127-137 degrees
- C LISA = 130-140 degrees

Locate the tool on the shorter guide pin screw; zero the angle gauge again and tighten to:

- D LISA = 97-107 degrees
- C LISA = 93-103 degrees

This method of tightening the screws ensures an accurate and constant screw clamp load.

NOTE: The angle measurement must never be less than the minimum figure quoted above.

Check again the free movement of the housing assembly on the guide pins. Using a copper faced mallet, carefully tap one of the new guide pin caps into the housing until it retains itself. Then, using a suitable size tool (fig 7.8), tap the cap into the bore until it abuts against the shoulder.

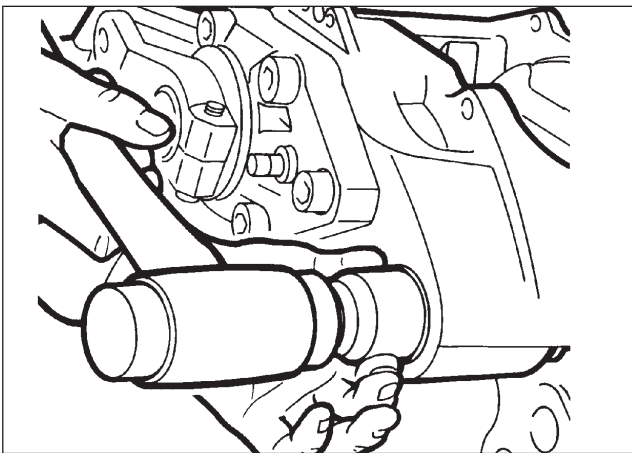


Fig. 7.8

Refit actuator / bracket / lever and set lever position as described in **Brake Replacement Section 6**

Refit, or fit new, pads and the PWWI. Set the initial running clearance and test as described in **Section 3 Pad replacement**.

CAUTION: You must always renew the brake pads on both wheels of an axle. Only use the brake pads that have been approved by the vehicle manufacturer. Brake pads must be replaced when the lining thickness has worn to 3mm minimum.

Lever Replacement

8

pg. 46 Lever Removal

pg. 46 Fitting a new Lever

8 Lever Replacement

Either, position the vehicle over a pit, raise on a suitable ramp, or park on hard level ground. Chock the road wheels. Release the park brake and wind off the spring brake caging screw (where applicable). Where applicable, jack up the axle and place suitable axle stands securely. Exhaust all air from the brake system. Remove any dirt from the brake assembly with a wire brush, avoiding damage to rubber dust excluders.

⚠ WARNING: Never use an air line to blow dust from the brake/rotor area. If inhaled any form of dust can at best be an irritant, at worst dangerous. Whenever possible remove dry brake dust with a vacuum brush. Alternatively wipe the areas with a damp cloth, never try to accelerate drying time by using an air line.

⚠ CAUTION: Ensure any discarded friction product, or cloth contaminated with brake dust, is disposed of in accordance with local environmental regulations.

Removing the Lever

Remove and discard the split pin retaining the lever clevis pin (Fig 8.1) and remove the clevis pin.

Remove the lever retaining screw and carefully withdraw the lever from the operating shaft. Discard the lever and retaining screw.

Fitting a new Lever

Refit the lever onto the operating shaft. Push the lever towards the air chamber mounting face until a resistance is felt. Check the dimension from the center of the clevis hole in the lever to the air chamber mounting face on the mounting bracket (Fig 8.2).

The measurement should be as specified by the vehicle manufacturer. Slight adjustment of the air chamber clevis position may be necessary to align clevis pinhole and lever.

NOTE: Do not attempt to move the Lever from its natural 'OFF' position to achieve alignment of the clevis and lever hole.

T Fit the clevis pin and retain with a new split pin (Fig 8.1) When the lever has been positioned correctly re-fit retaining screw and tighten to a torque of 60 - 72Nm (44 - 53lb.ft).

Wind in the spring brake retraction screw (where applicable). Refit the road wheels, remove the axle stands and lower the vehicle to the ground. Charge the system with air.

NOTE: Before driving the vehicle or applying the park brake, apply the service brake five times at low pressure to ensure correct adjustment of the pads.

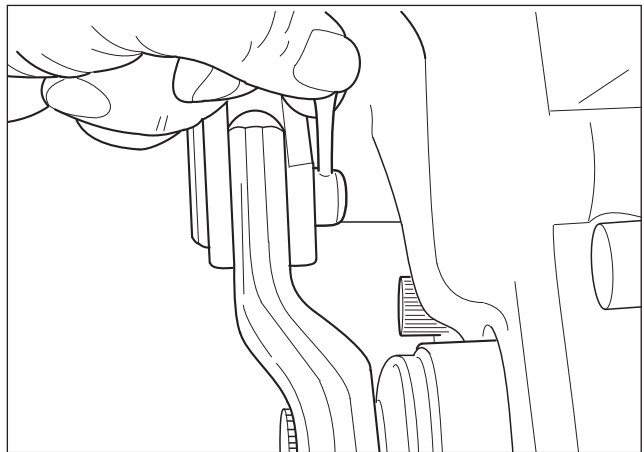


Fig. 8.1

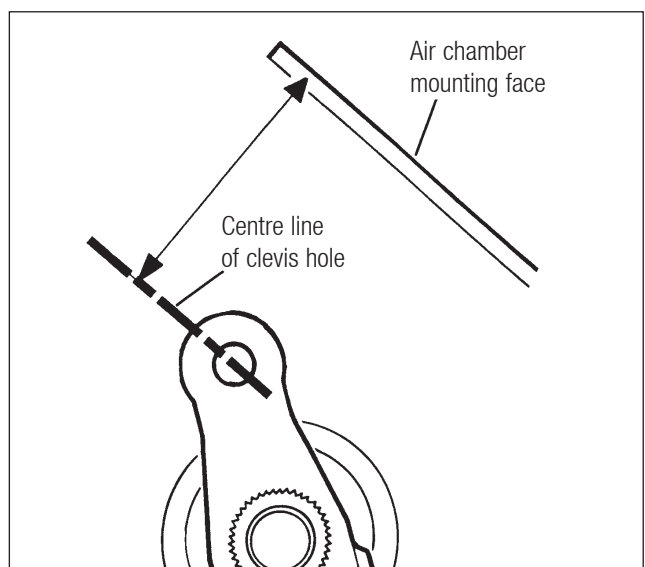


Fig. 8.2

Carrier Replacement

9

pg. 48 Carrier Removal

pg. 48 Carrier Fitment

9 Carrier Replacement

Support the vehicle and remove the air chamber as detailed in the **Brake replacement Section 6**.

Important: The brake assembly number should be noted in order to obtain the correct service kit.

Removing the Carrier

Remove any dirt from the brake assembly with a wire brush, avoiding damage to the rubber dust excluders.

⚠ WARNING: Never use an air line to blow dust from the brake/rotor area. If inhaled any form of dust can at best be an irritant, at worst dangerous. Whenever possible remove dry brake dust with a vacuum brush. Alternatively wipe the areas with a damp cloth, never try to accelerate drying time by using an air line.

Remove the Pad wear indicator assembly, brake pads and spreader plate as detailed in the **Pad Replacement Section 3**.

Remove the housing assembly as described in **Section 7 Housing replacement**.

Remove the screws securing the carrier to the stub axle and remove the carrier from the vehicle (Fig 9.1). Discard the carrier and fixing screws.

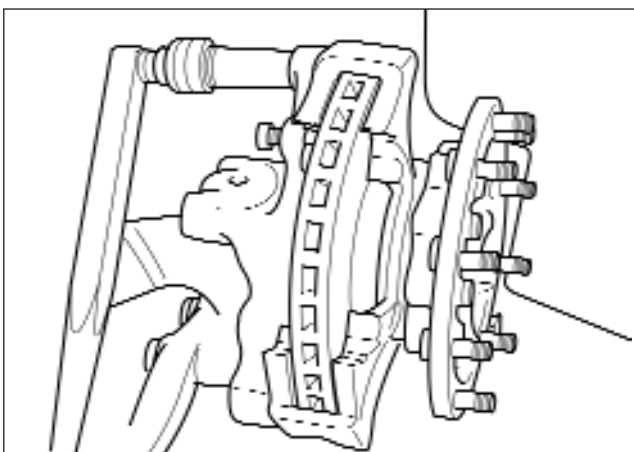


Fig. 9.1

Cleaning and Inspection

Remove the guide sleeves from the housing. Clean the guide sleeves and housing bores using a suitable brake cleaner and examine for signs of wear or corrosion, if there is any doubt in the suitability for continued service replace with new components as described in **Section 7 Housing replacement** or **Section 14 Guide sleeve replacement**. If any doubt exists as to the suitability for further service.

Examine the brake rotor for corrosion, grooving, signs of deep crazing as detailed in the rotor inspection & maintenance information contained in **Section 2 Operational Checks**. Check the wear dimensions as detailed in the **Rotor Wear Conditions, Section 15**. If there is any doubt in the serviceability of any component refer to the vehicle manufacturer for corrective action.

Fitting the Carrier

Locate the new carrier in position on the stub axle, over the rotor. Secure the carrier to the axle using new retaining screws.

T Tighten the screws, torquing to the vehicle manufacturer's specifications.

Refit the housing as described in **Section 7 Housing replacement**.

Refit the air chamber as described in **Section 6 Brake replacement**.

Refit, or fit new, pads and the PWVI. Set the initial running clearance and test as described in **Section 3 Pad replacement**.

⚠ CAUTION You must always renew the brake pads on both wheels of an axle. Only use the brake pads that have been approved by the vehicle manufacturer. Brake pads must be replaced when the lining thickness has worn to 3mm minimum.

Cover Plate Assembly Replacement

10

pg. 50 Dismantling
pg. 52 Reassembly

10 Cover Plate Assembly Replacement

WARNING:

Worn brakes should be replaced by new brakes. If it is decided to service a used brake particular attention should be paid to the following instructions. If in doubt fit a new brake.

NOTE: This procedure may be done with the vehicle on suitable axle stands and the wheels removed, or, except for some early vehicles*, with the vehicle positioned over a pit / raised on a ramp with the wheels on or off.

Important: The brake assembly number should be noted in order to obtain the correct service kit.


* Date code identification (Fig 10.1). Before brake date code MJ24 (first letter not important) = 1999 week 24.

Dismantling

Either, position the vehicle over a pit, raise on a suitable ramp, or park on hard level ground. Chock the road wheels. Release the park brake and wind off the spring brake caging screw (where applicable). Where applicable, jack up the axle and place suitable axle stands securely. Exhaust all air from the brake system and where necessary remove the wheels. Remove any dirt from the brake assembly with a wire brush, avoiding damage to rubber dust excluders.

WARNING:

Never use an air line to blow dust from the brake/rotor area. If inhaled any form of dust can at best be an irritant, at worst dangerous. Whenever possible remove dry brake dust with a vacuum brush. Alternatively wipe the areas with a damp cloth, never try to accelerate drying time by using an air line.

 **CAUTION:** Ensure any discarded friction product, or cloth contaminated with brake dust, is disposed of in accordance with local environmental regulations.

Screwed Spreader Plate

Locate a suitable 10mm socket wrench on the adjuster stem (Fig 10.2) and depress the stem until it engages in the adjuster wheel.

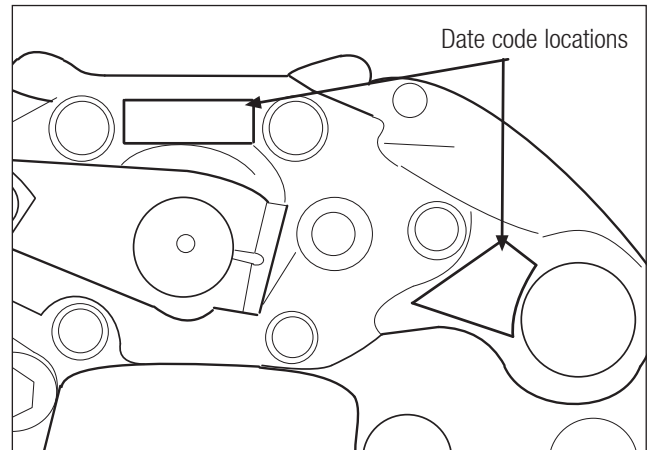


Fig. 10.1

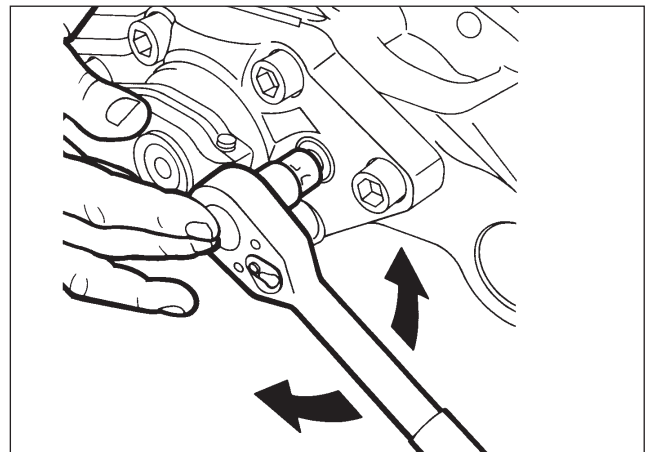


Fig. 10.2

While still held depressed rotate the adjuster stem with the socket wrench in the appropriate direction to fully de-adjust the brake.

IMPORTANT:

Always adjust/de-adjust the brake by hand. Do not exceed 15Nm (11lb.ft) torque on the adjuster stem. Do not use power tools to adjust/de-adjust the brake

NOTE: The direction of rotation depends on whether adjusting or de-adjusting the brake (Fig 10.2). Turning the adjuster stem in the opposite direction of lever travel (Brake application stroke) will adjust the brake and turning the adjuster stem in the direction of lever travel (Brake application stroke) will de-adjust the brake.

10 Cover Plate Assembly Replacement

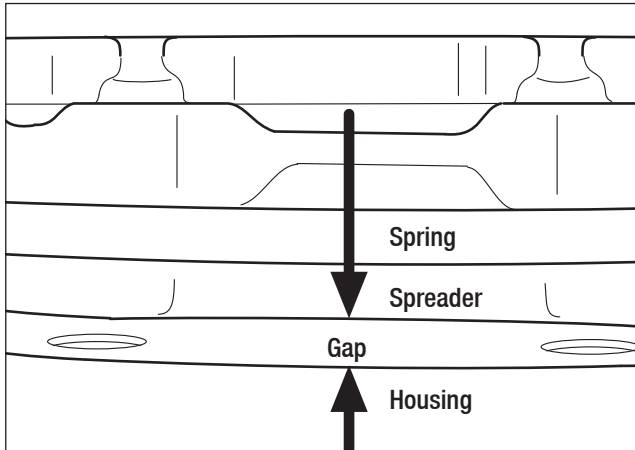


Fig. 10.3

When fully de-adjusted there should be minimal clearance between the brake housing and the spreader plate (Fig. 10.3).

NOTE: de-adjusting the brake will result in the compression of the internal main return spring which will ease dismantling and re-assembly of the brake.

Loose Spreader Plate

Remove Pads and spreader plate as detailed in Section 3 Pad Replacement.

Remove the Tappet Excluder and wind the tappet screw into the brake. Restrain the tappet screw with a 'C' plate or other means to keep the internal return spring compressed (Fig. 10.4).

The spring load is a maximum of 130N (29 lbf).

Remove and discard the split pin retaining the lever clevis pin (Fig 10.5) and remove the clevis pin.

Remove the air chamber. Where applicable, remove the retaining screws securing the chamber mounting bracket to the brake housing and lift the bracket from the brake (Fig 10.6).

NOTE: Depending on application the bracket may be secured by 3 or 4 screws.

NOTE: support the air chamber/bracket under the vehicle wheel arch in a position which does not cause undue strain on the connected air pipe

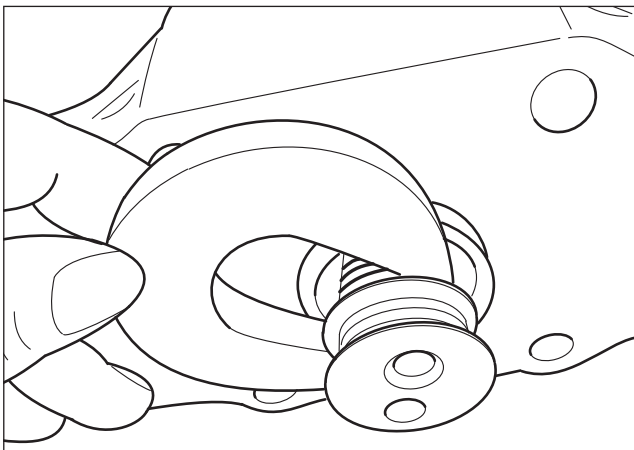


Fig. 10.4

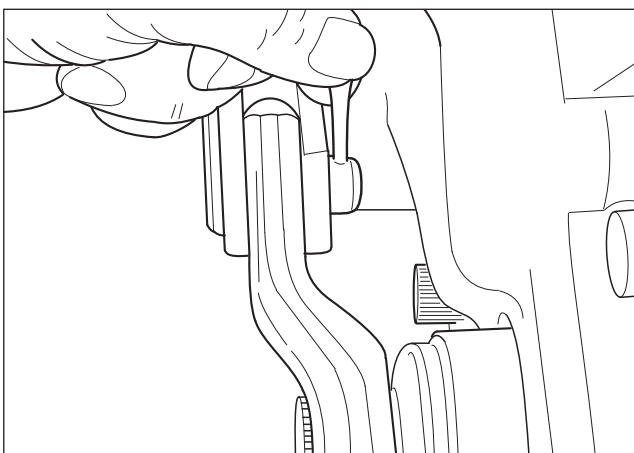


Fig. 10.5

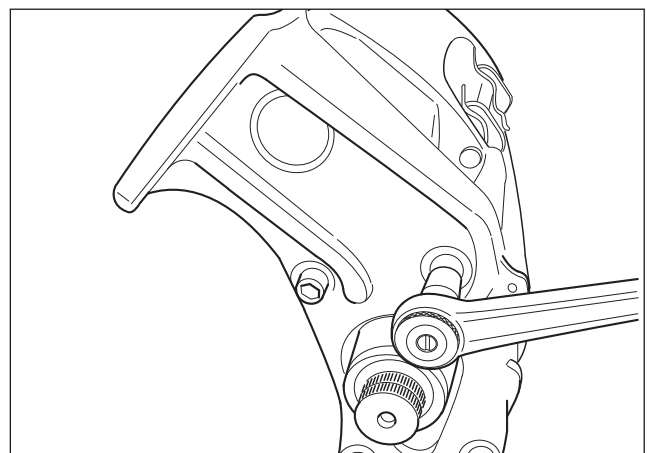


Fig. 10.6

10 Cover Plate Assembly Replacement

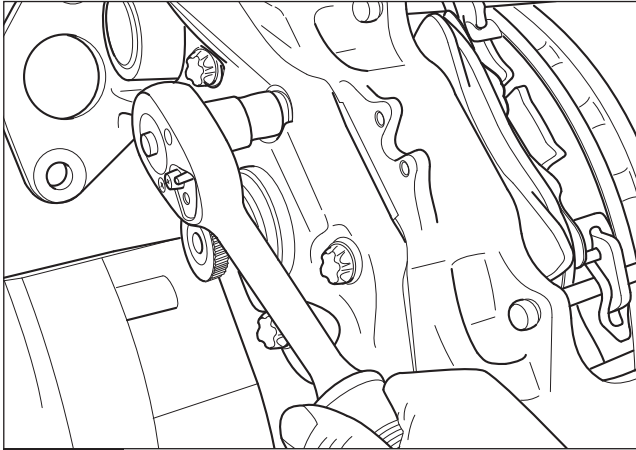


Fig. 10.7

Remove the lever retaining screw and carefully withdraw the lever from the operating shaft.

Remove the six cover plate screws (Fig 10.7) and discard.

NOTE: The brake may be fitted with either Allen head or Torx head screws.

Using a suitable mallet carefully tap the cover plate to release it from locating pins (Fig 10.8).

Remove the cover plate, together with operating shaft, adjuster assembly and gasket, from the brake housing.

Discard the cover plate and op-shaft, retain the adjuster assembly for re-assembly.

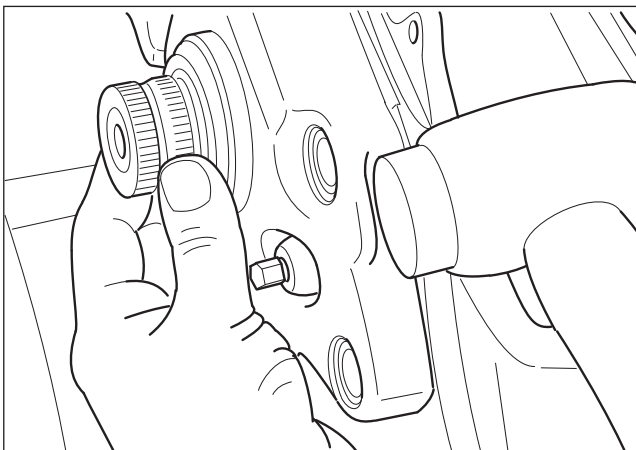


Fig. 10.8

NOTE: If the adjuster assembly remains in the brake housing when the cover plate is removed, carefully lift it from the housing and place to one side for re-assembly.

Remove the three balls from the ramp pockets and discard.

Remove all contamination from the housing opening and remaining internal components. Clean the gasket mounting face and ball pockets in the ramp (Fig 10.9).

Re-assembly

If the locating pins were removed with the original cover plate, install the new locating pins into the brake housing (Fig 10.10).

If the original pins remain secure in the housing, do not remove.

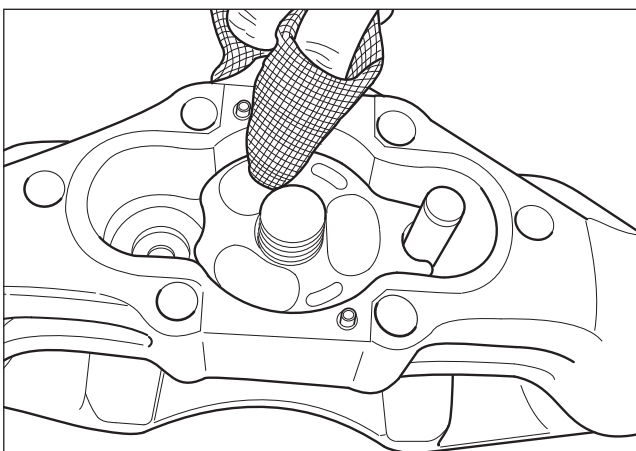


Fig. 10.9

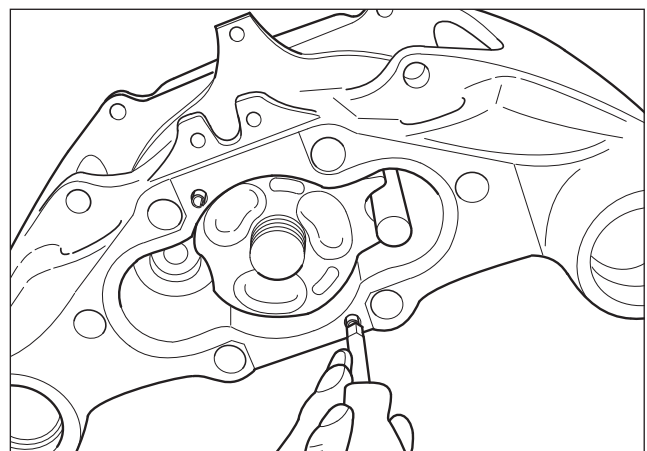


Fig. 10.10

10 Cover Plate Assembly Replacement

Liberal grease the ball pockets in the ramp and fit the ramp into the housing ensuring correct location on the anti-rotation pin (Fig 10.11).

NOTE: Only use the grease supplied with replacement components/kits or that specified by the vehicle manufacturer. Under no circumstance should any other type of grease be used.

Fit the three new balls in to the ramp pockets (Fig 10.12).

NOTE: There should be sufficient grease to hold the balls in position during re-assembly.

Fit the new gasket provided to the brake housing ensuring that it is positioned correctly over the locating pins and within the gasket recess (Fig 10.13).

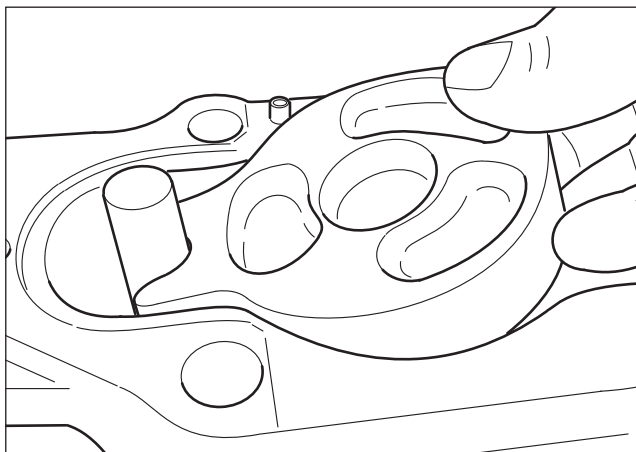


Fig. 10.11

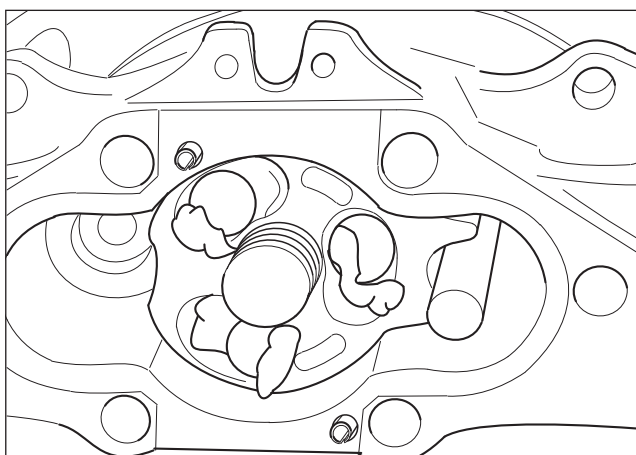


Fig. 10.12

Component Identification: Components are handed left hand (LH) & right hand (RH) to suit left & right hand brakes.

Adjuster

- LH adjuster assemblies are identified by a green marking on the wrap spring (Fig 10.14).
- RH adjusters are identified by a plain wrap spring.

Cover plate

Identified by an L or R cast into the plate (Fig 10. 15).

- L = LH
- R = RH

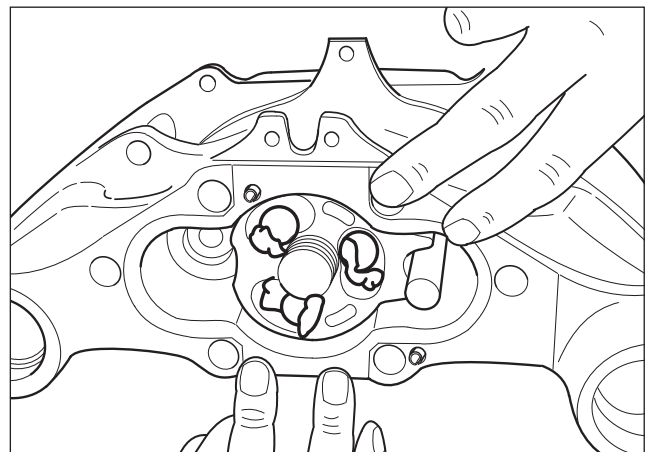


Fig. 10.13

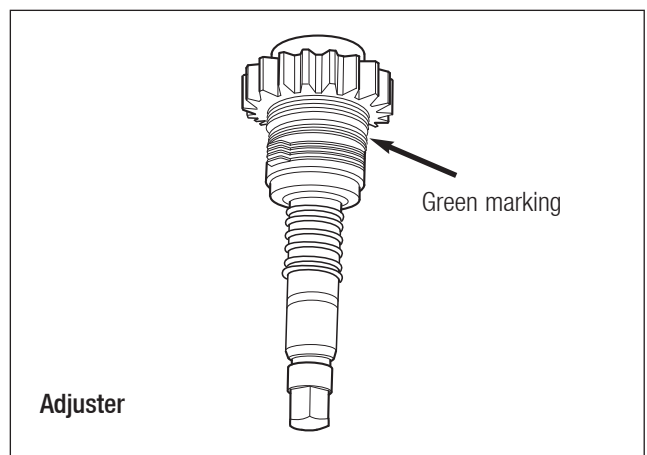


Fig. 10.14

Adjuster

10 Cover Plate Assembly Replacement

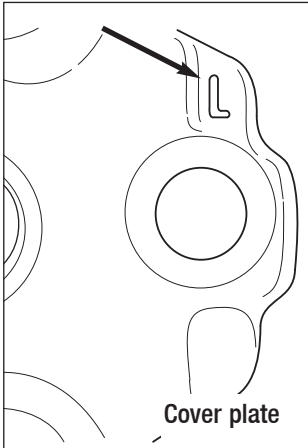


Fig. 10.15

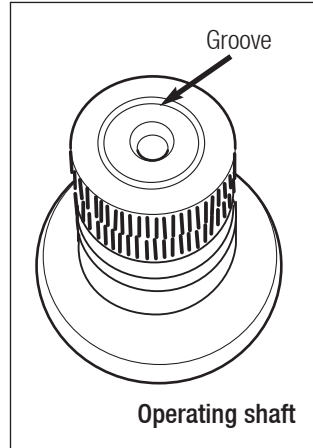


Fig. 10.16

Operating shaft

- LH op-shafts are identified by a machined groove in the end face, lever end (Fig 10. 16).
- RH have no machined groove.

Examine the adjuster assembly for wear, damage or corrosion, if in any doubt in the suitability for further use, replace with a new assembly. Grease the gear teeth, adjuster sleeve and stem and install the adjuster assembly and spring into the brake housing (Fig 10.17).

Ensure it locates correctly in the bottom of the housing and the adjuster wheel meshes with the adjuster nut.

Liberal grease the needle roller bearing (Fig. 10.18), and thrust bearing (Fig 10.19)

NOTE: Only use the grease supplied with replacement components/kits or that specified by the vehicle manufacturer. Under no circumstance should any other type of grease be used.

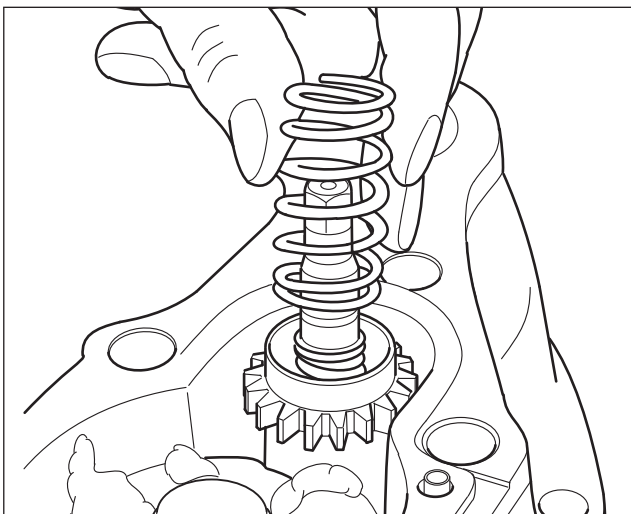


Fig. 10.17

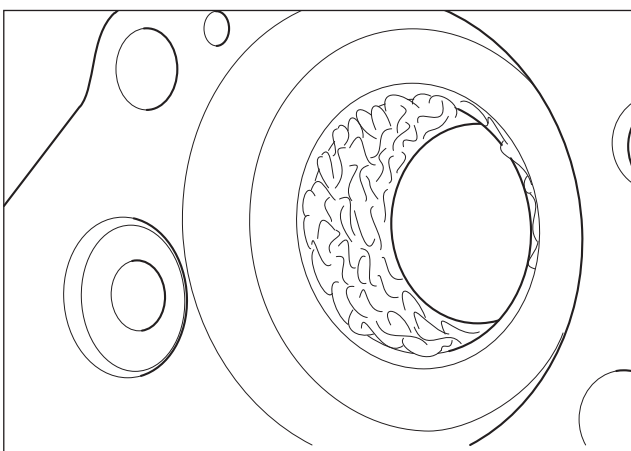


Fig. 10.18

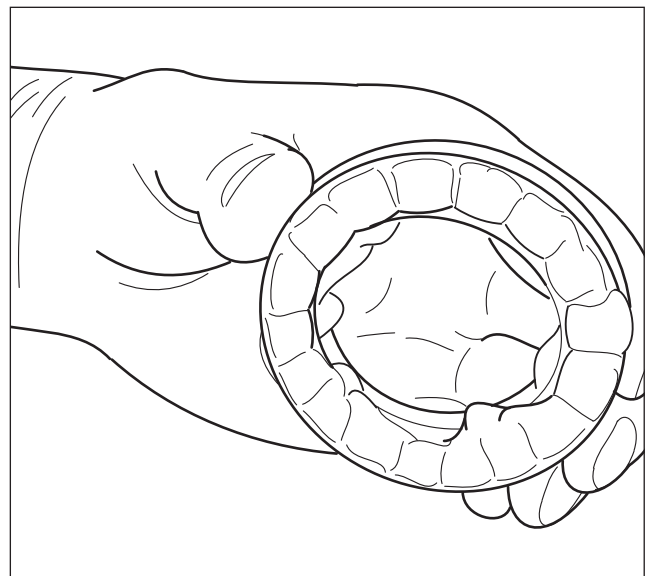


Fig. 10.19

10 Cover Plate Assembly Replacement

Place the new thrust bearing and thrust washer on to the operating shaft (Fig. 10.20) and fit the operating shaft in to the cover plate.

NOTE: Remove any grease that has extruding between operating shaft and cover plate.

CAUTION: Ensure any grease removed from the assembly/components, or contaminated cloth, is disposed of in accordance with local environmental regulations.

Rotate the operating shaft to ensure that when the cover plate is fitted to the housing, the pockets in the operating shaft align with the balls and corresponding pockets in the ramp (Fig 10.21).

Fit the cover plate on to the housing and insert two of the new "Torx" head retaining screws provided into the two end holes of the cover plate (Fig 10.22).

NOTE: Ensure the cover plate locates correctly over the adjuster stem and the adjuster dust excluder is not dislodged from its seat.

Fit the lever onto the operating shaft but do not fit the retaining screw at this stage.

While tightening the two cover plate screws, slightly rotate the operating shaft back and forth (Fig 10.23) to engage the adjuster drive wheel with the gear teeth on the operating shaft.

NOTE: Tighten each of the two retaining screws alternately and equally so that the cover plate is drawn on to the housing evenly. The locating pins will aid alignment of the cover plate.

IMPORTANT: Any miss-alignment of components will prevent the cover plate from being pulled down evenly on to the housing. Do not use excessive torque to draw the cover plate on to the housing.

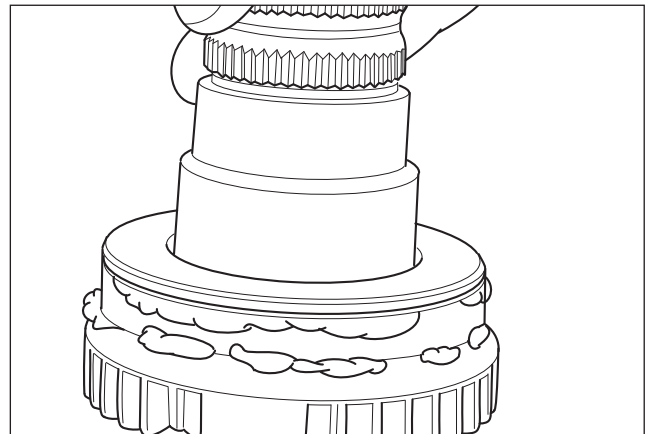


Fig. 10.20

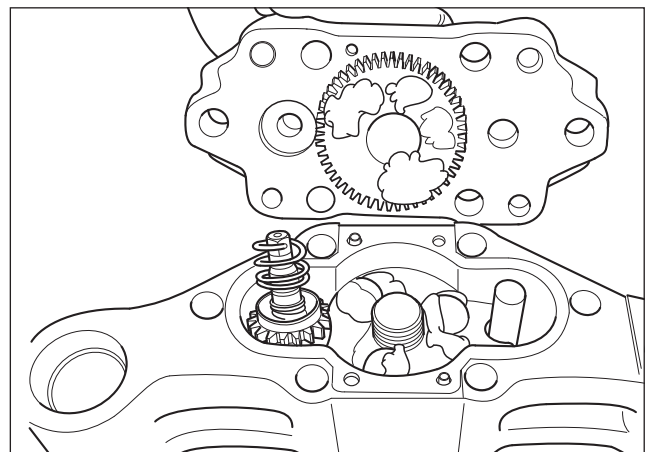


Fig. 10.21

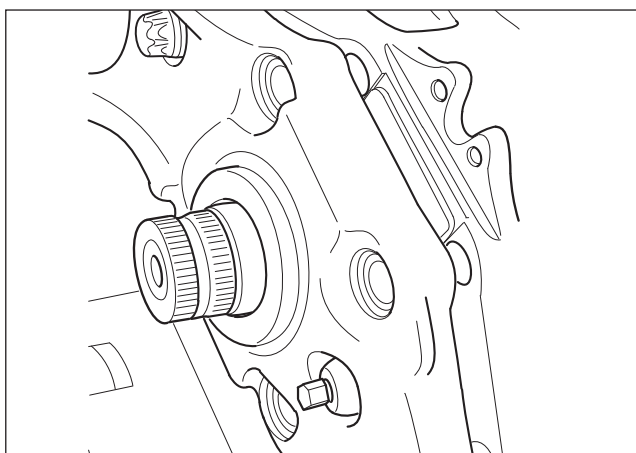


Fig. 10.22

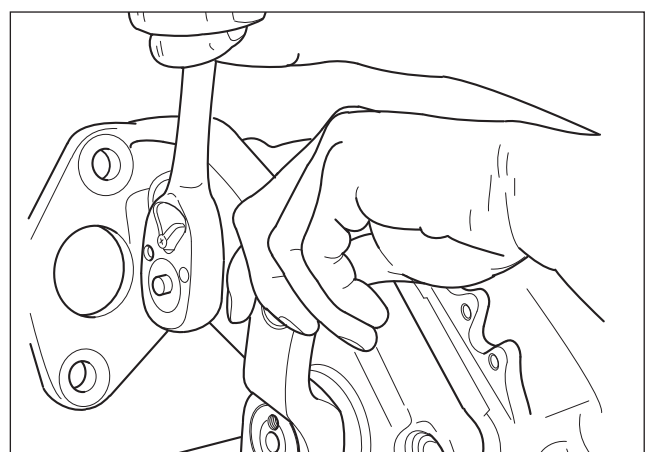


Fig. 10.23

10 Cover Plate Assembly Replacement

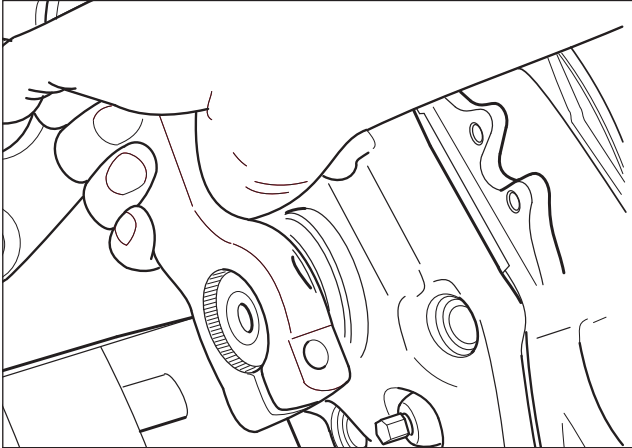


Fig. 10.24

When the cover plate is clamped to the housing, where applicable, remove the 'C' plate or other restraint from the tappet screw.

Fit a new dirt excluder.

Actuate the brake by hand several times (Fig 10.24) to observe that the brake is applying, releasing and adjusting.

T Fit the remaining four cover plate retaining screws and tighten all six screws to a torque of 190 - 210Nm (140-154lb.ft).

Remove the lever.

Locate the new cover shield over the op-shaft and on to the cover plate (Fig 10.25).

Using the Meritor CVA Service Tool MST 1050, carefully tap and rotate the service tool until it abuts the cover plate (Fig. 10.26). This will ensure the shield is fitted correctly.

NOTE: Where applicable, The grease nipple does not need to be removed from the op-shaft to use the Service Tool MST 1050.

CAUTION: Do not use excessive force when tapping the shield in to position. The use of excessive force will result in damage to components.

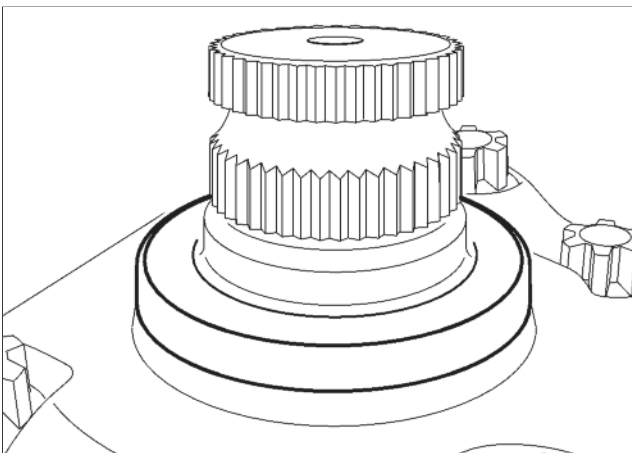


Fig. 10.25

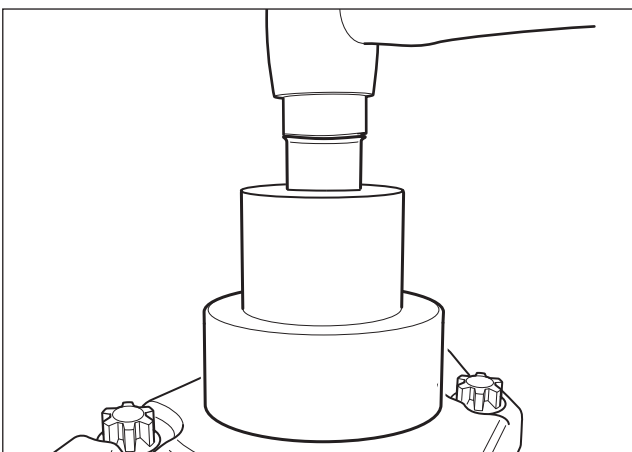


Fig. 10.26

10 Cover Plate Assembly Replacement

Fit the new 'GAMMA' seal over the op-shaft (Fig 10.27).

Using the Meritor CVA Service Tool MST 1049, carefully tap the new seal into position. While rotating the tool in a clockwise direction, tap the tool in four opposing positions (Fig 10.28), until the service tool abuts the cover plate (Fig. 10.29). This will ensure the 'GAMMA' seal is fitted correctly.

NOTE: Where applicable, the grease nipple does not need to be removed from the op-shaft to use the Service Tool MST 1049.

CAUTION: Do not use excessive force when tapping the 'GAMMA' seal in to position. The use of excessive force will result in damage to components.

Refit the lever onto the operating shaft.

The clearance between the 'GAMMA' seal and the shield must be less than 1.00mm. Using a 1.00mm feeler gauge, check the clearance between the 'GAMMA' seal and the shield in four places, as shown in Fig 10.30 (lever is not shown for clarity). It should not be possible to fit the 1.00mm feeler gauge between the 'GAMMA' seal and shield.

NOTE: If a 1.00mm feeler gauge fits between the 'GAMMA' seal and shield at any of the four points shown in Fig 10.30, the seal must be removed. Check the shield is fitted correctly and refit the "GAMMA" seal, as detailed above.

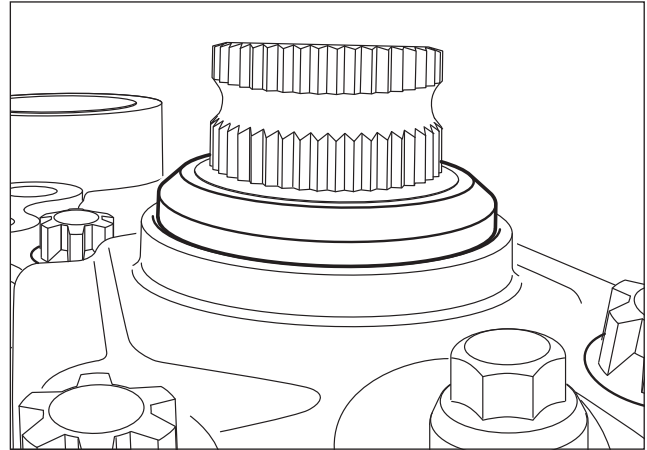


Fig. 10.27

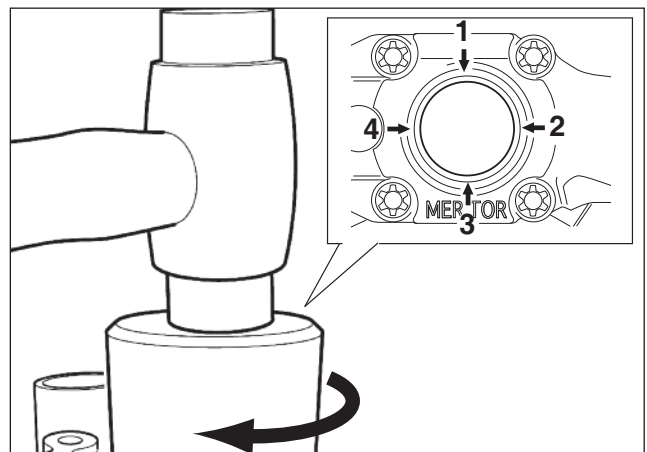


Fig. 10.28

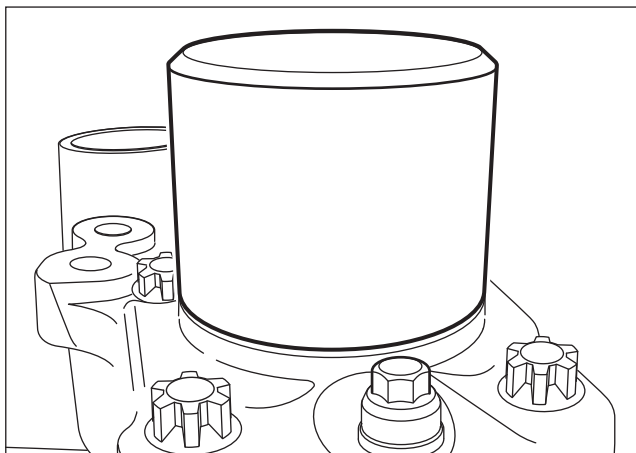


Fig. 10.29

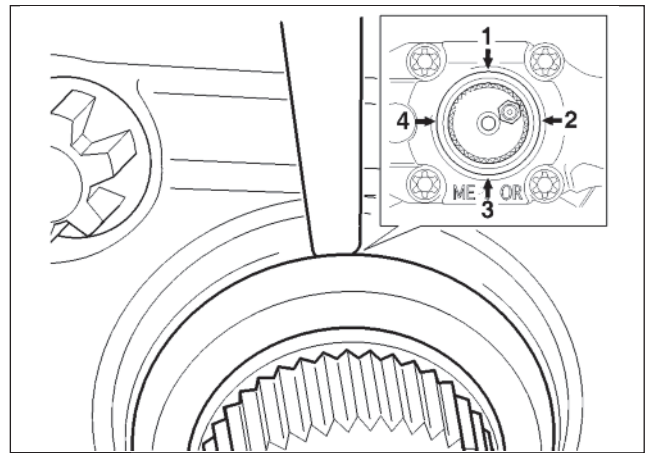


Fig. 10.30

10 Cover Plate Assembly Replacement

T Where applicable, refit separate actuator mounting bracket (Fig 10.31) and torque the fixing screws as follows:

3 x hexagon head screws - 106 - 132Nm (80 - 98 lb. ft)

4 x M12 socket head screws - 106 - 132Nm (80 - 98 lb. ft)

Push the lever towards the air chamber mounting face until a resistance is felt. Check the dimension from the center of the clevis hole in the lever to the air chamber mounting face on the mounting bracket (Fig 10.32).

The measurement should be as specified by the vehicle manufacturer. When the lever has been positioned correctly re-fit retaining screw and tighten to a torque of 60 - 72Nm (44 - 53lb.ft).

Later level op-shafts are fitted with a grease nipple.

Where applicable apply grease through the nipple (Fig 10.33) until grease purges past the outer seal (Fig. 10.34).

CAUTION: Grease must be injected into the Operation Shaft via the use of a hand pump only. Do not use a pneumatic pump to inject the grease. If there is no sign of grease emerging after 6 pumps of the grease gun stop.

Dismantle lever, operating shaft and cover plate to check all parts are fitted correctly

NOTE: Only use the grease supplied with replacement components/kits or that specified by the vehicle manufacturer. Under no circumstance should any other type of grease be used.

Re-fit the air chamber. Slight adjustment of the air chamber clevis position may be necessary to align clevis pinhole and lever.

It is important that the lever is not pulled beyond its off position, (brakes off direction) in order to fit the clevis pin.

T Tighten both air chamber fixing nuts to an initial torque of 100Nm (74lb.ft) and a final torque of 190 - 210Nm (140-154lb.ft).

IMPORTANT: Do not attempt to alter the lever setting, detailed above, to achieve alignment of the clevis and lever hole.

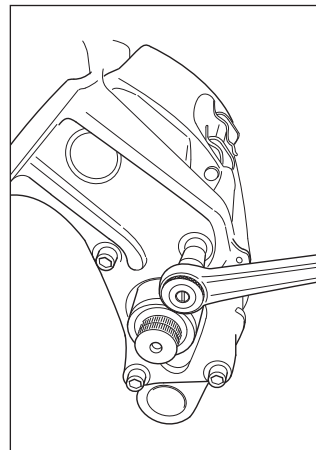


Fig. 10.31

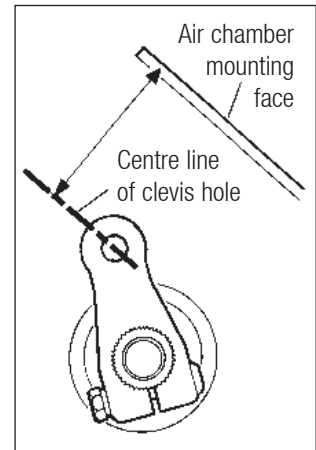


Fig. 10.32

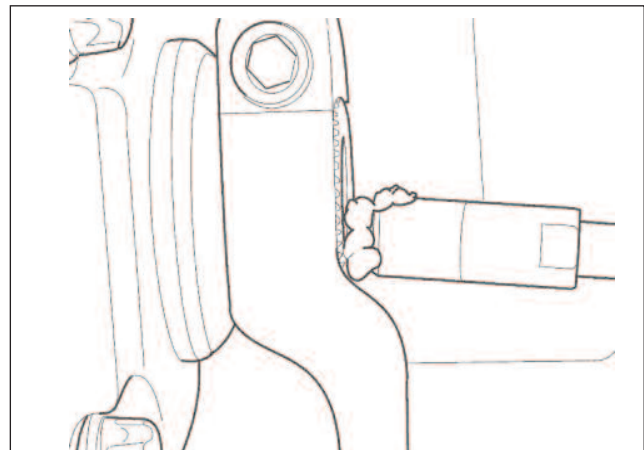


Fig. 10.33

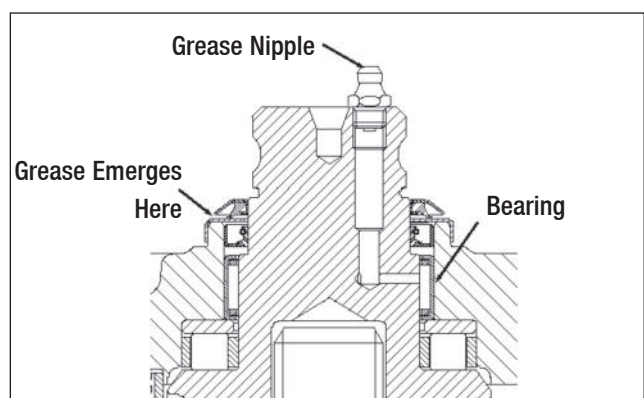


Fig. 10.34

Refit, or fit new, pads and the PWWI. Set the initial running clearance and test as described in **Section 3 Pad replacement**.

Carry out an automatic adjuster function check, as described in **Section 2 Operational Checks**.

Cover Plate Overhaul

11

pg. 60 Dismantling
pg. 62 Reassembly

11 Cover Plate Overhaul

⚠ WARNING: Worn brakes should be replaced by new brakes. If it is decided to service a used brake particular attention should be paid to the following instructions. If in doubt fit a new brake.

NOTE: This procedure may be done with the vehicle on suitable axle stands and the wheels removed, or, except for some early vehicles*, with the vehicle positioned over a pit / raised on a ramp with the wheels on or off.

Important: The brake assembly number should be noted in order to obtain the correct service kit.

* Date code identification (Fig 11.1). Before brake date code MJ24 (first letter not important) = 1999 week 24

Dismantling

Either, position the vehicle over a pit, raise on a suitable ramp, or park on hard level ground. Chock the road wheels. Release the park brake and wind off the spring brake caging screw (where applicable). Where applicable, jack up the axle and place suitable axle stands securely. Exhaust all air from the brake system and where necessary remove the wheels.

Remove any dirt from the brake assembly with a wire brush, avoiding damage to rubber dust excluders.

⚠ WARNING: Never use an air line to blow dust from the brake/rotor area. If inhaled any form of dust can at best be an irritant, at worst dangerous. Whenever possible remove dry brake dust with a vacuum brush. Alternatively wipe the areas with a damp cloth, never try to accelerate drying time by using an air line.

Remove cover plate assembly as detailed in **Section 10 Cover plate replacement**.

Wipe all grease from the ball pockets in the ramp (fig.11.2)

Using a suitable soft faced mallet carefully remove the operating shaft from cover plate (Fig. 11.3).

⚠ CAUTION: Ensure any grease removed from the assembly/components, or contaminated cloth, is disposed of in accordance with local environmental regulations.

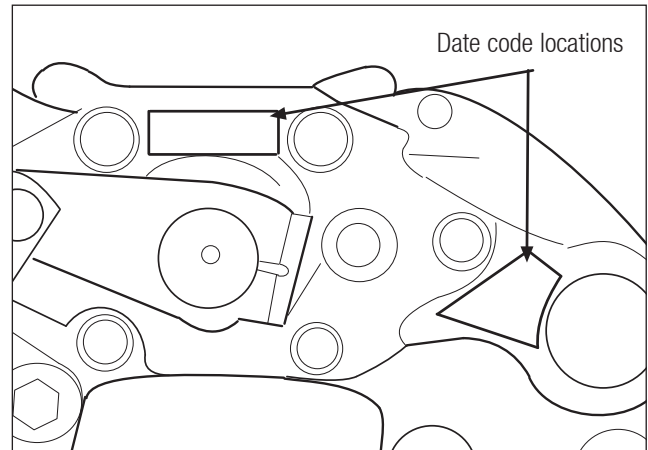


Fig. 11.1

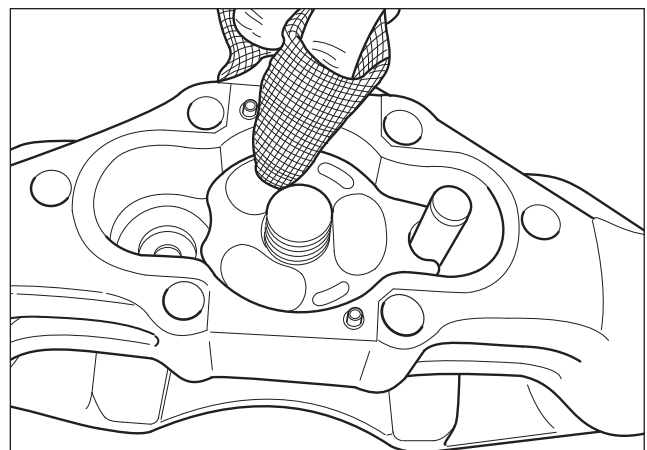


Fig. 11.2

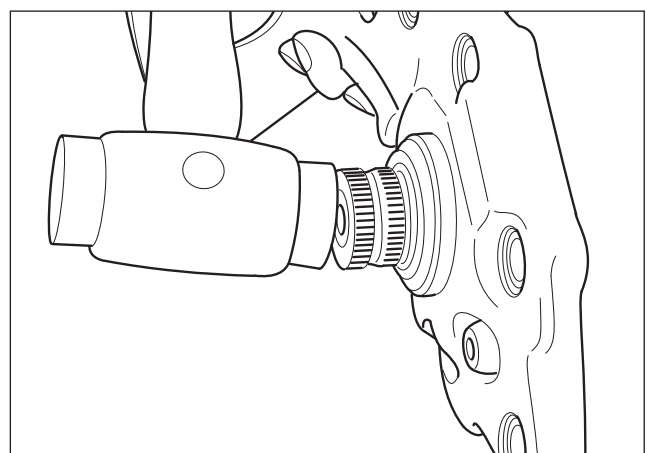


Fig. 11.3

11 Cover Plate Overhaul

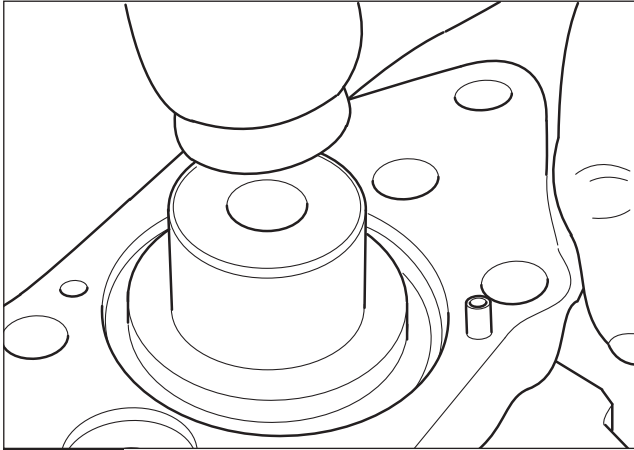


Fig. 11.4

IMPORTANT:

Later level op-shafts are fitted with a grease nipple. Do not damage the grease nipple when tapping the op-shaft out of the cover plate.

Using a suitable tool, drift out and discard the needle roller bearing, seal and shield (Fig. 11.4).

Remove the adjuster dust excluder from the cover plate and discard (Fig 11. 5). Remove the seal from the adjuster stem and discard (Fig 11. 6)

Component Identification:

Certain components are handed left hand (LH) & right hand (RH) to suit left & right hand brakes. Always ensure that the correct components are used for re-assembly

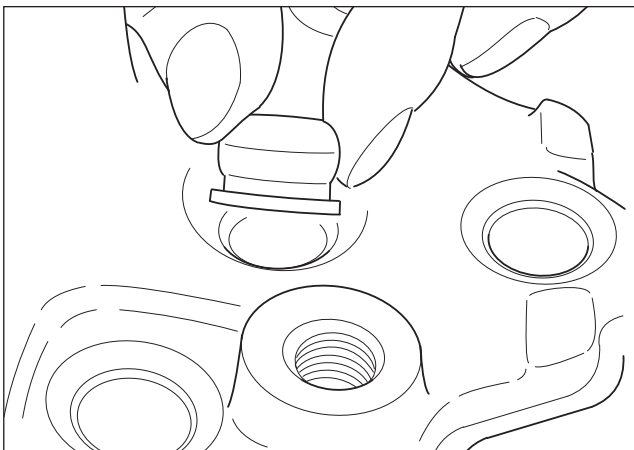


Fig. 11.5

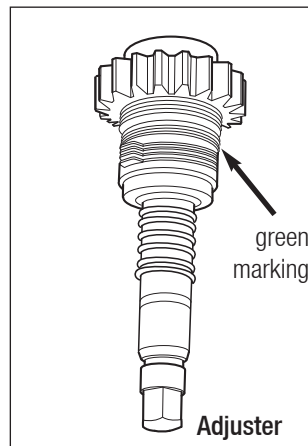


Fig. 11.7

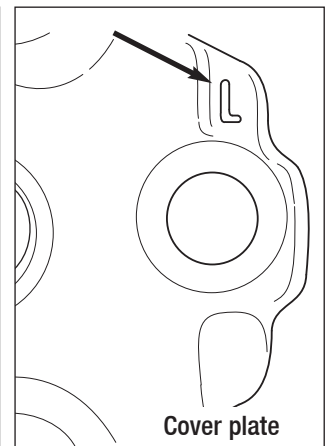


Fig. 11.8

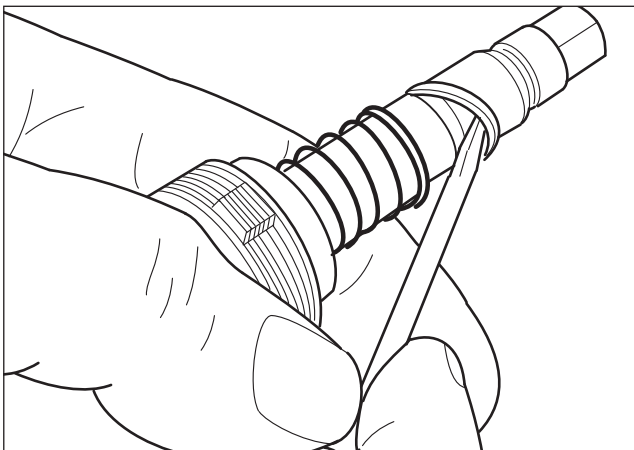


Fig. 11.6

Adjuster

- LH adjuster assemblies are identified by a green marking on the wrap spring (Fig 11.7).
- RH adjusters have a plain wrap spring.

Cover plate

Identified by an L or R cast into the plate (Fig 11. 8).

- L = LH
- R = RH

11 Cover Plate Overhaul

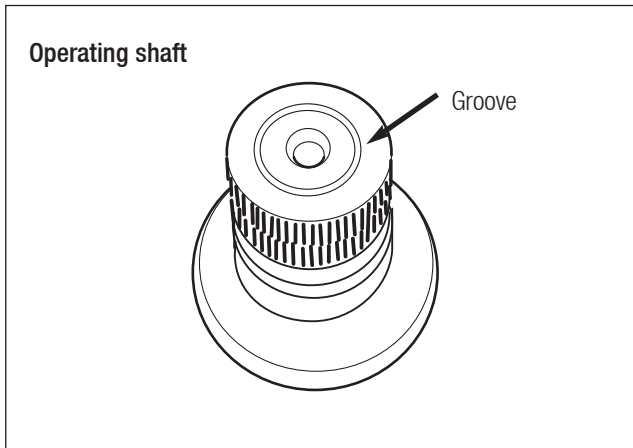


Fig. 11.9

Operating shaft

- LH op-shafts are identified by a machined groove in the end face, lever end (Fig 11.9).
- RH have no machined groove.

Re-assembly

Clean and inspect all parts removed. If there is evidence of damage, wear or corrosion, replace with new components or housing assembly.

NOTE: During re-assembly use only the grease supplied with replacement parts/kits or that specified by the vehicle manufacturer. Do not use any other type of grease.

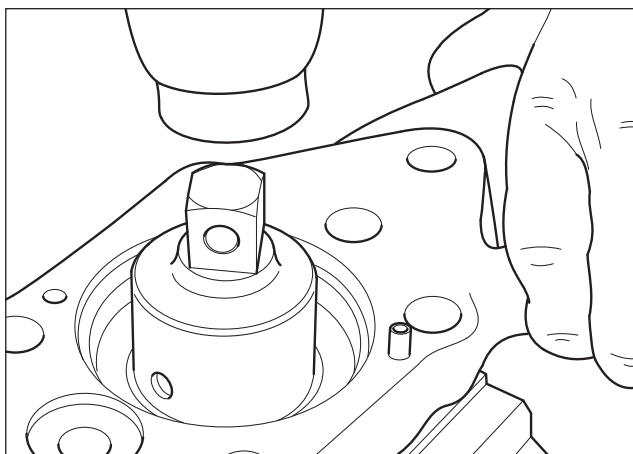


Fig. 11.10

Using a suitable size socket, tap or press a new needle roller bearing into the cover plate (11. 10)

Place a new operating seal into position in the coverplate, ensuring it is in the correct orientation, as shown in Fig 11.11.

Carefully tap or press the new operating shaft seal into the cover plate (Fig.11.12).

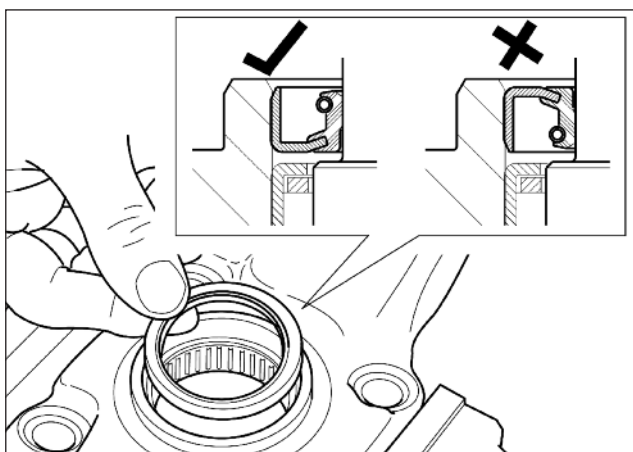


Fig. 11.11

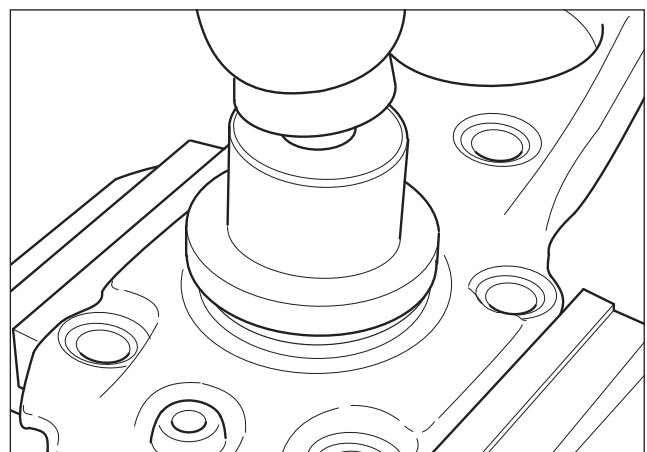


Fig. 11.12

11 Cover Plate Overhaul

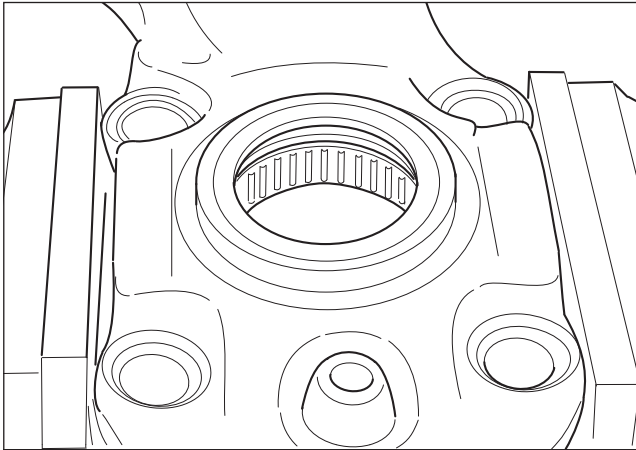


Fig. 11.13

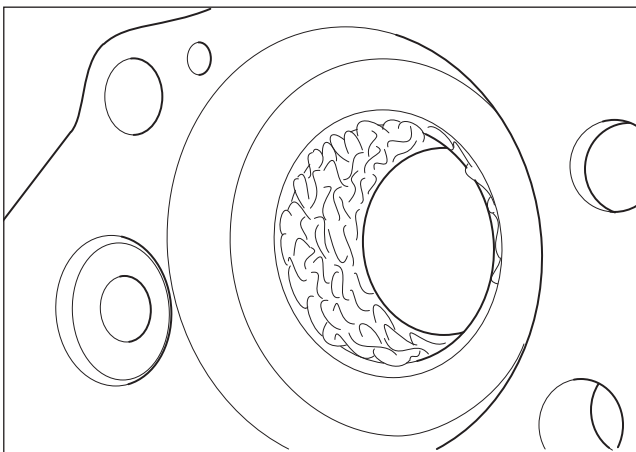


Fig. 11.14

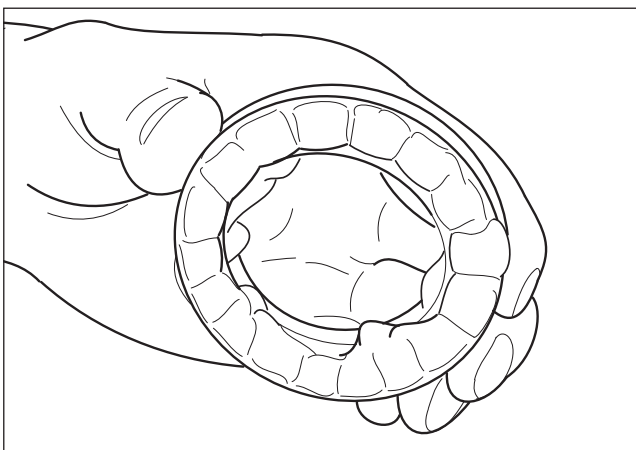


Fig. 11.15

Fill the void in cover plate seal with grease (Fig 11.13)
Liberally grease the needle roller bearing (Fig. 11.14), and thrust bearing (Fig 11.15)

NOTE: Only use the grease supplied with replacement components/kits or that specified by the vehicle manufacturer. Under no circumstance should any other type of grease be used.

Place the new thrust bearing and thrust washer on to the operating shaft (Fig. 11.16) and fit the operating shaft in to the cover plate.

NOTE: Remove any grease that has extruding between operating shaft and cover plate.

CAUTION: Ensure any grease removed from the assembly/components, or contaminated cloth, is disposed of in accordance with local environmental regulations.

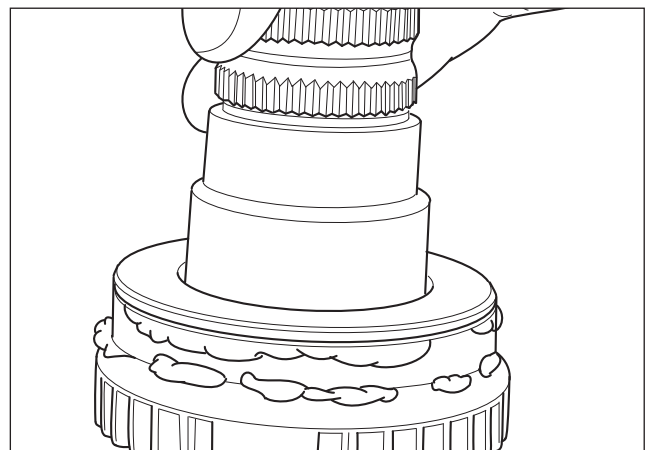


Fig. 11.16

11 Cover Plate Overhaul

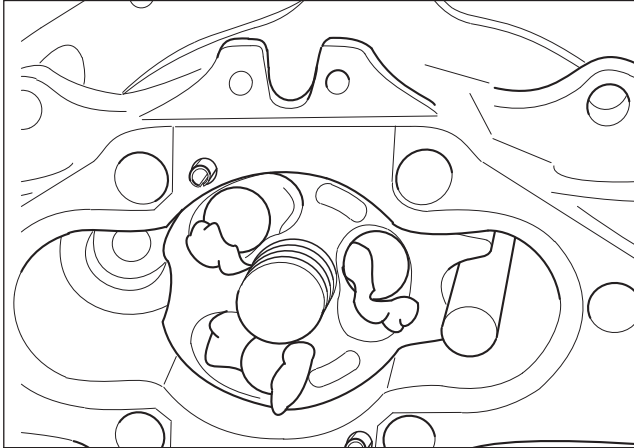


Fig. 11.17

Liberally grease the ball pockets in the operating shaft and ramp (Fig. 11.17) and fit three new balls.

NOTE: There should be sufficient grease to hold the balls in position during re-assembly.

Fit a new gasket provided to the brake housing ensuring that it is positioned correctly over the locating pins and within the gasket recess (Fig 11.18).

Fit a new adjuster stem seal onto the adjuster stem (Fig 11. 19) and fit a new adjuster dust excluder into the cover plate ensuring it is correctly located (Fig 11. 20).

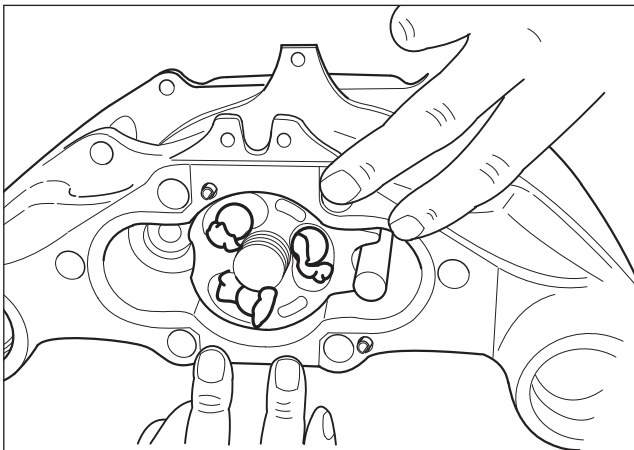


Fig. 11.18

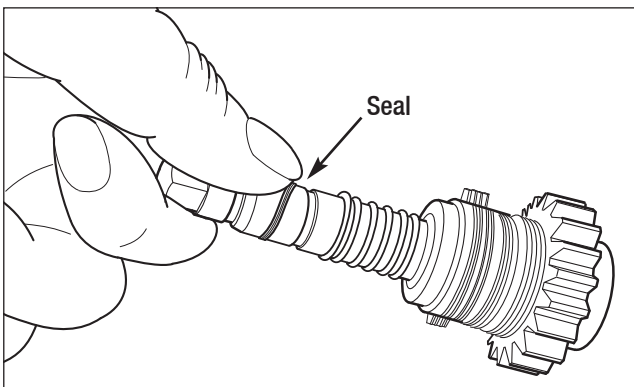


Fig. 11.19

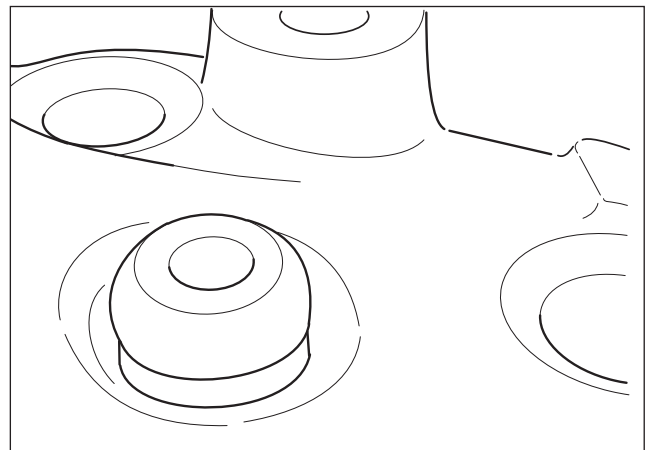


Fig. 11.20

11 Cover Plate Overhaul

Examine the adjuster assembly for wear, damage or corrosion, if in any doubt in the suitability for further use, replace with a new assembly. Grease the gear teeth, adjuster sleeve and stem and install the adjuster assembly and spring into the brake housing (Fig 11.21).

Ensure it locates correctly in the bottom of the housing and the adjuster wheel meshes with the adjuster nut.

Place the new cover plate assembly, complete with op-shaft, into position against the housing.

Rotate the operating shaft to ensure that when the cover plate is fitted to the housing, the pockets in the operating shaft align with the balls and corresponding pockets in the ramp (Fig 11.22).

Fit the cover plate on to the housing and insert two of the new "Torx" head retaining screws provided into the two end holes of the cover plate (Fig 11.23).

NOTE: Ensure the cover plate locates correctly over the adjuster stem and the adjuster dust excluder is not dislodged from its seat.

Fit the lever onto the operating shaft but do not fit the retaining screw at this stage.

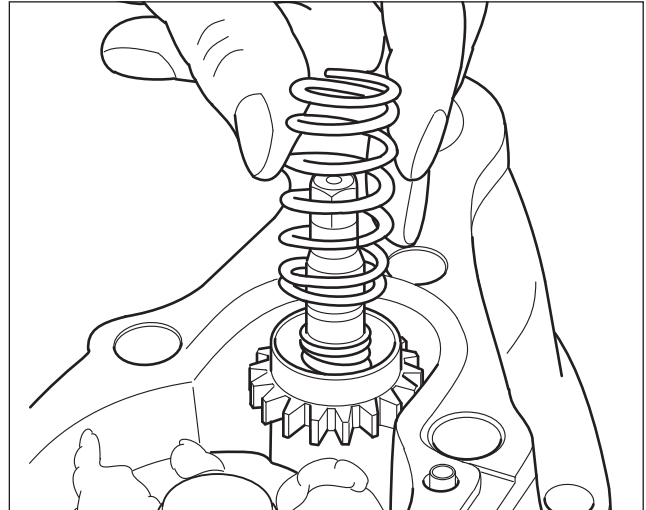


Fig. 11.21

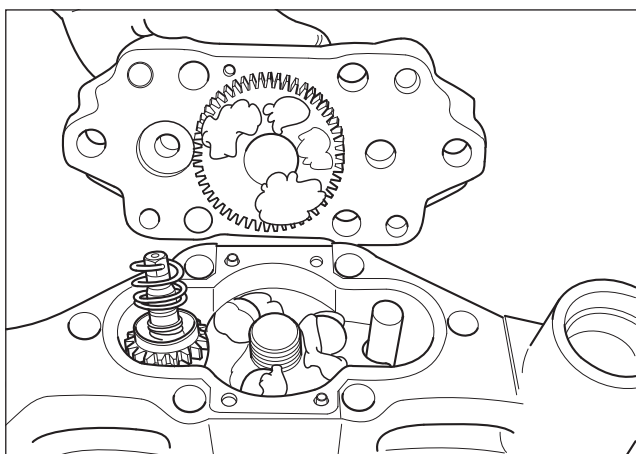


Fig. 11.22

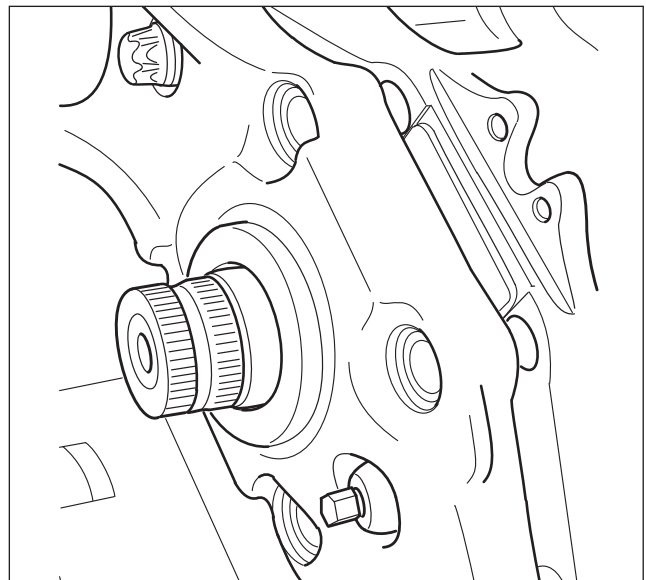


Fig. 11.23

11 Cover Plate Overhaul

While tightening the two cover plate screws, slightly rotate the operating shaft back and forth (Fig 11.24) to engage the adjuster drive wheel with the gear teeth on the operating shaft.

NOTE: Tighten each of the two retaining screws alternately and equally so that the cover plate is drawn on to the housing evenly. The locating pins will aid alignment of the cover plate.

IMPORTANT: Any miss-alignment of components will prevent the cover plate from being pulled down evenly on to the housing. Do not use excessive torque to draw the cover plate on to the housing.

Actuate the brake by hand several times (Fig 11.25) to observe that the brake is applying, releasing and adjusting.

T Fit the remaining four cover plate retaining screws and tighten all six screws to a torque of 190 - 210Nm (140-154lb.ft).

Remove the lever.

Locate the new cover shield over the op-shaft and on to the cover plate (Fig 11. 26). Using the Meritor CVA Service Tool MST 1050, carefully tap and rotate the service tool until it abuts the cover plate (Fig. 11.27). This will ensure the shield is fitted correctly.

NOTE: Where applicable, The grease nipple does not need to be removed from the op-shaft to use the Service Tool MST 1050.

CAUTION: Do not use excessive force when tapping the shield in to position. The use of excessive force will result in damage to components.

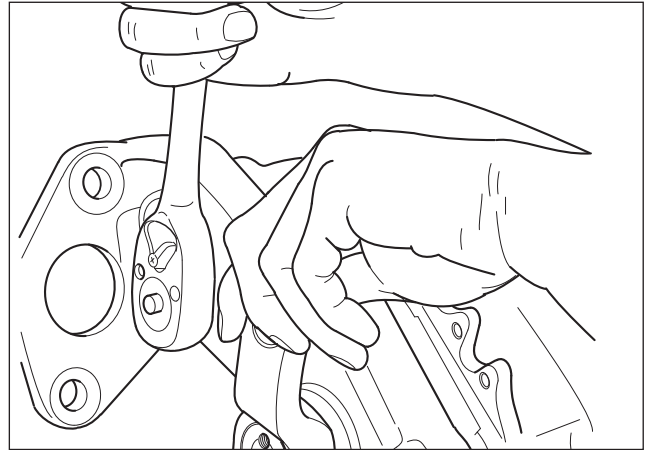


Fig. 11.24

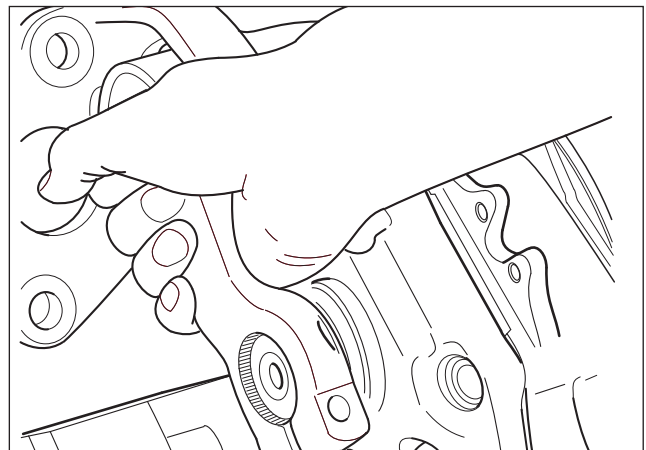


Fig. 11.25

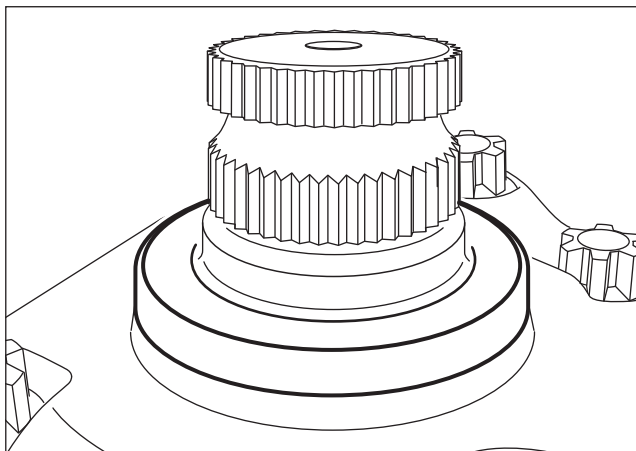


Fig. 11.26

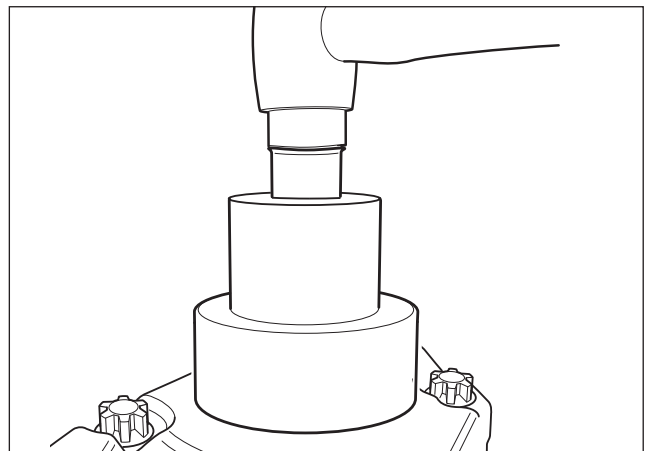


Fig. 11.27

11 Cover Plate Overhaul

Fit the new 'GAMMA' seal over the op-shaft (Fig 11. 28).

Using the Meritor CVA Service Tool MST 1049, carefully tap the new seal into position. While rotating the tool in a clockwise direction, tap the tool in four opposing positions (Fig 11.29), until the service tool abuts the cover plate (Fig. 11.30). This will ensure the 'GAMMA' seal is fitted correctly.

NOTE: Where applicable, the grease nipple does not need to be removed from the op-shaft to use the Service Tool MST 1049.

CAUTION: Do not use excessive force when tapping the 'GAMMA' seal in to position. The use of excessive force will result in damage to components.

Refit the lever onto the operating shaft.

The clearance between the 'GAMMA' seal and the shield must be less than 1.00mm. Using a 1.00mm feeler gauge, check the clearance between the 'GAMMA' seal and the shield in four places, as shown in Fig 11.31 (lever is not shown for clarity). It should not be possible to fit the 1.00mm feeler gauge between the 'GAMMA' seal and shield.

NOTE: If a 1.00mm feeler gauge fits between the 'GAMMA' seal and shield at any of the four points shown in Fig 11.31, the seal must be removed. Check the shield is fitted correctly and refit the "GAMMA" seal, as detailed above.

Complete the re-assembly procedure and setting of the brake as detailed in **Section 10 Cover plate Replacement**.

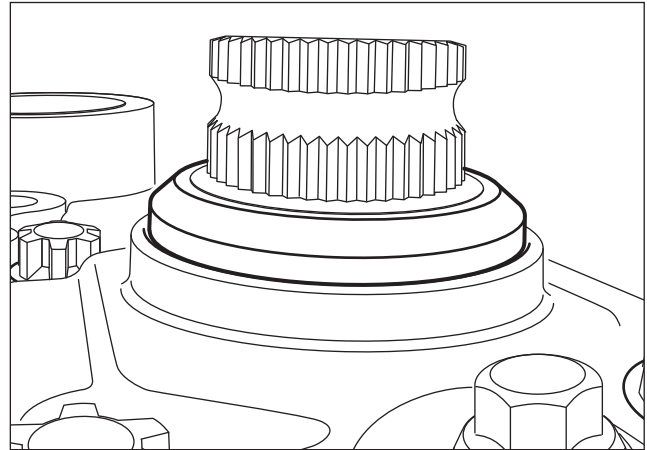


Fig. 11.28

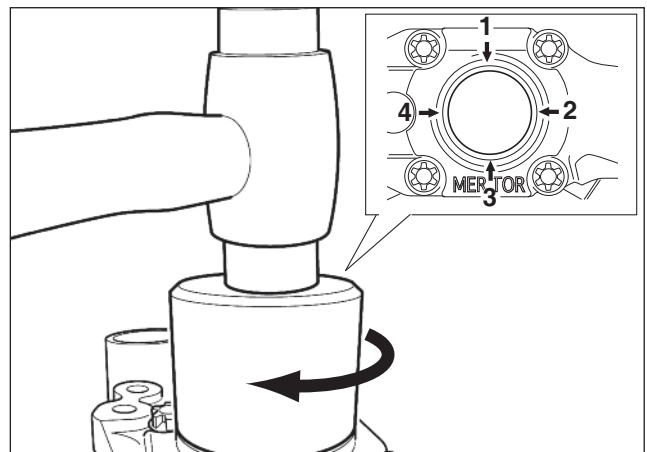


Fig. 11.29

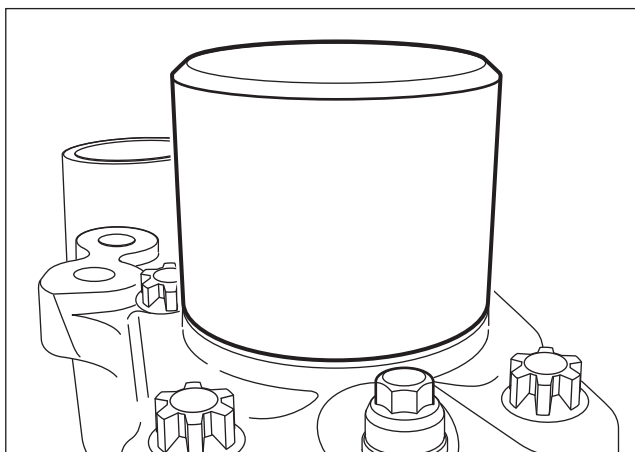


Fig. 11.30

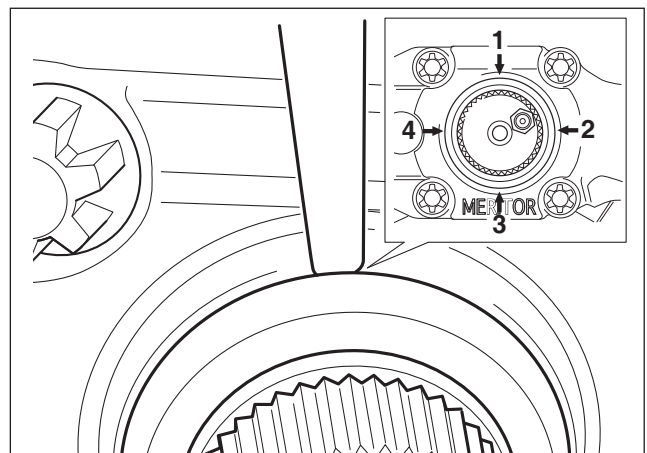


Fig. 11.31

11 Cover Plate Overhaul

Tappet, Dust Excluder, Retainer & Bush Replacement

12

pg. 70 Dust Excluder & Retainer Replacement
pg. 71 Tappet Assembly & Bush Replacement

12 Tappet, Dust Excluder, Retainer & Bush Replacement

Park the vehicle on hard ground and chock the road wheels. Apply air pressure to release the park brake and wind off the spring brake retraction screw (where appropriate). Jack up the axle and fit suitable axle stands securely.

Remove the road wheels and exhaust all air from the system.

Remove any dirt from the brake assembly with a wire brush, avoiding damage to the guide pin and adjuster rubber dust excluders.

CAUTION:

Never use an airline to blow dust from the brake rotor area. If inhaled any form of dust can at best be an irritant, at worst dangerous. Whenever possible remove dry brake dust with a vacuum brush. Alternatively wipe the areas with a damp cloth, never try to accelerate drying time by using an air line.

Remove pad wear indicator, pads and spreader plate as detailed in **Section 3 Pad Replacement**.

Dust excluder and Retainer replacement

Remove the tappet excluder (Fig. 12.1)

Clean the dust excluder retainer and adjacent area of the housing with a suitable brake cleaner.

NOTE: Do not allow dirt or debris to enter the exposed housing/adjuster nut area.

Examine the dust excluder retainer for any signs of damage if replacement is necessary carefully tap the damaged retainer out of the housing (Fig 12.2).

Place a new retainer in the mouth of the housing and carefully tap it in until it abuts the bush (Fig 12.3).

WARNING:

Do not disturb the position of the bush in the housing bore when fitting a new dust excluder retainer.

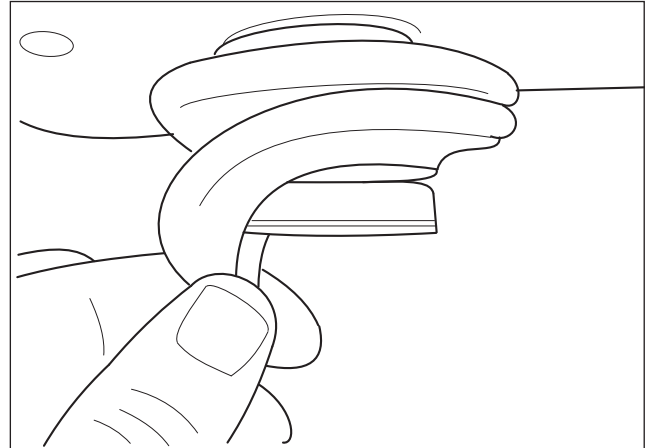


Fig. 12.1

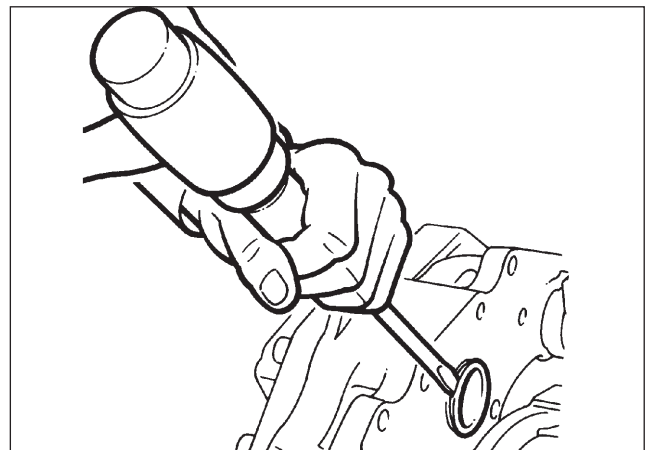


Fig. 12.2

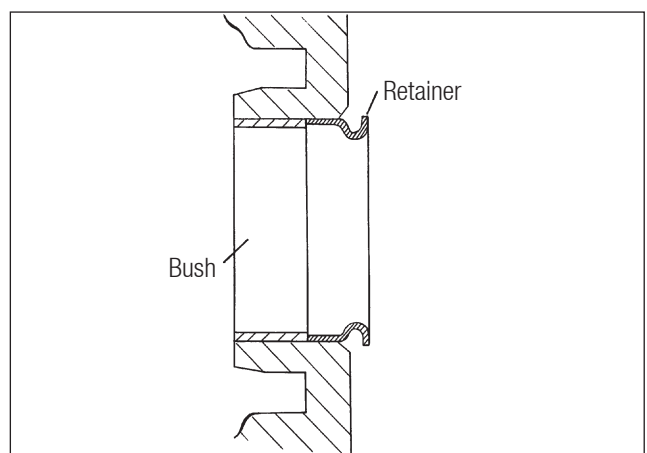


Fig. 12.3

12 Tappet, Dust Excluder, Retainer & Bush Replacement

Wipe all grease from the front face of the adjuster nut and apply new grease provided with the service components or that specified by the vehicle manufacturer.

CAUTION: Ensure any grease removed from the assembly/components, or contaminated cloth, is disposed of in accordance with local environmental regulations.

Apply the same grease to the internal threads of the adjuster nut and screw the tappet into the adjuster nut leaving approximately 20mm (0.75in) of the tappet extended from the adjuster nut to allow easier dust excluder fitment.

NOTE: Use only the grease supplied with replacement parts/kits or that specified by the vehicle manufacturer. DO NOT use any other type of grease.

WARNING: When fitting new Tappet Excluders, do not use any grease to aid assembly. Hands should be clean and free from grease. To disregard this instruction may cause premature failure of Tappet excluders.

Carefully fit the dust excluder over the tappet and locate on the retainer (Fig 12. 4). Finally locate the new dust excluder into the groove on the head of the tappet screw and ensure both dust excluder location points are secure (Fig 12. 5).

Refit Spreader Plate as described in **Section 5 Spreader Plate Replacement**. Refit, or fit new, pads and the PWWI. Set the initial running clearance and test as described in **Section 3 Pad replacement**.

Tappet Assembly and Bush Replacement

Remove pad wear indicator, pads and spreader plate as detailed in **Section 3 Pad Replacement**.

Remove brake from vehicle as detailed in **Section 6 Brake Replacement**, and place on a suitable bench.

Tappet Assembly Removal

Remove the tappet excluder as detailed above. Screw the tappet into the brake and restrain it with a "C" plate or other means to keep the internal return spring compressed when the cover plate is removed (Fig. 12.6).

The spring load is a maximum of 130N.

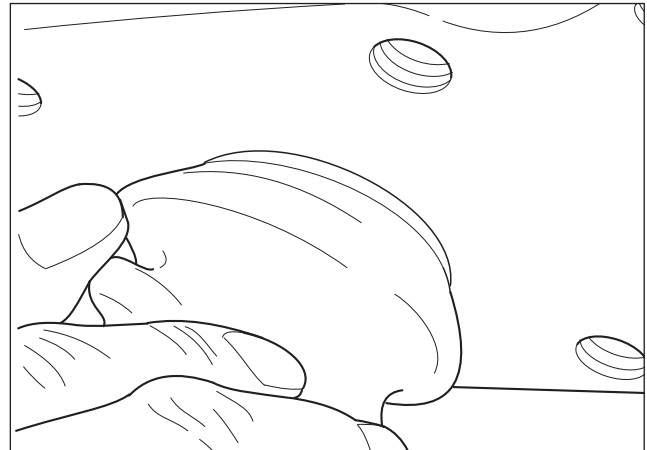


Fig. 12.4

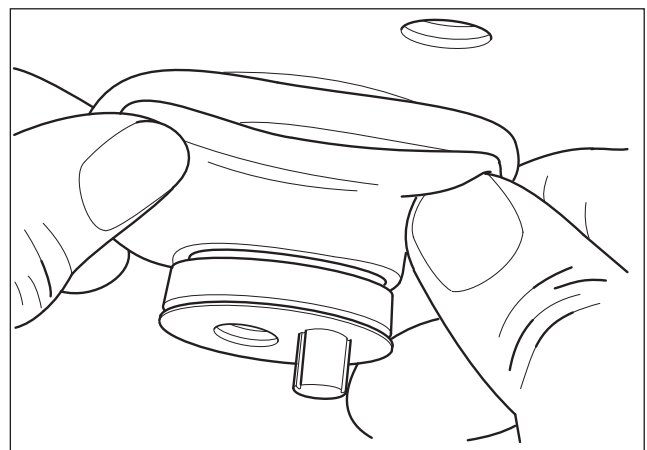


Fig. 12.5

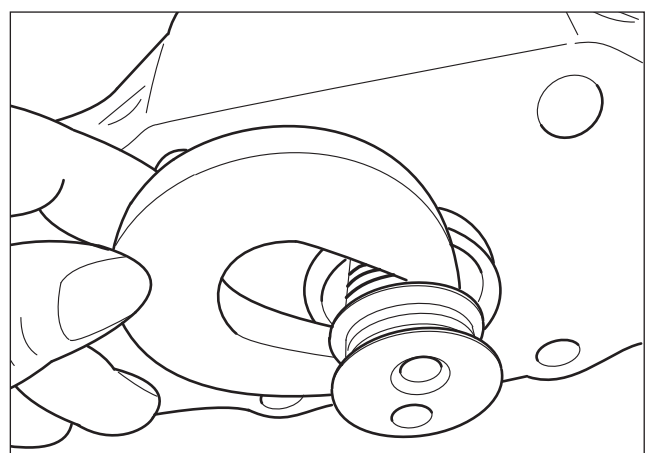


Fig. 12.6

12 Tappet, Dust Excluder, Retainer & Bush Replacement

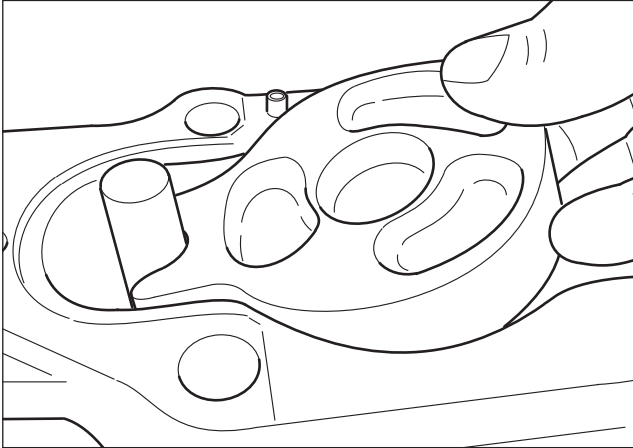


Fig. 12.7

Remove cover plate assembly and adjuster as detailed in **Section 10 Cover plate Replacement**.

Lift out the ramp plate (Fig. 12.7).

Press down on the exposed adjuster nut / screw by hand until the "C" washer restraint can be removed from the tappet screw (Fig.12.8).

Carefully release the pressure on the adjuster nut and lift out the assembly from the housing (Fig. 12.9).

Remove the main return spring.

Clean and inspect all parts for wear, damage or corrosion. Replace with new components as necessary.

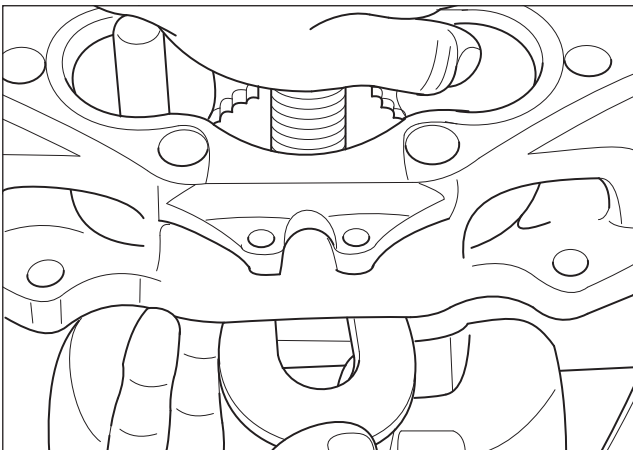


Fig. 12.8

Tappet Bush Removal

Carefully drift out the bush using a suitable mandrel or similar tool (Fig. 12.10). This action will also remove the dust excluder retainer.

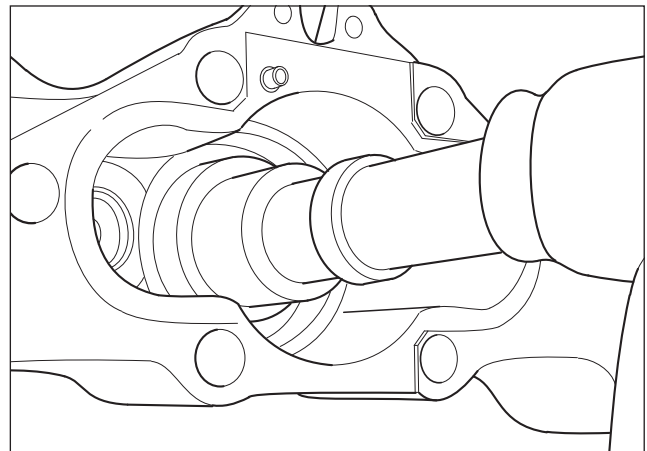


Fig. 12.10

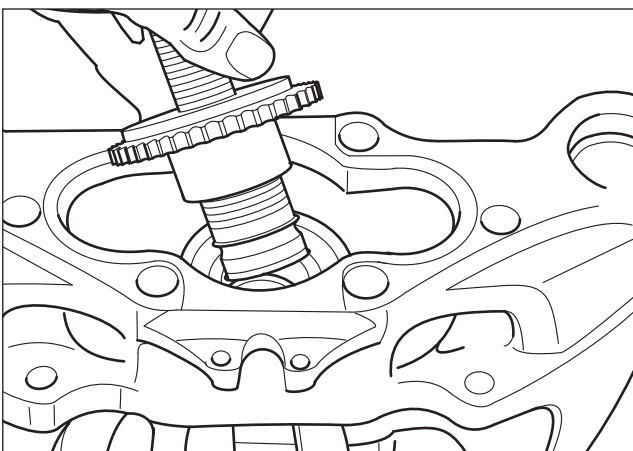


Fig. 12.9

12 Tappet, Dust Excluder, Retainer & Bush Replacement

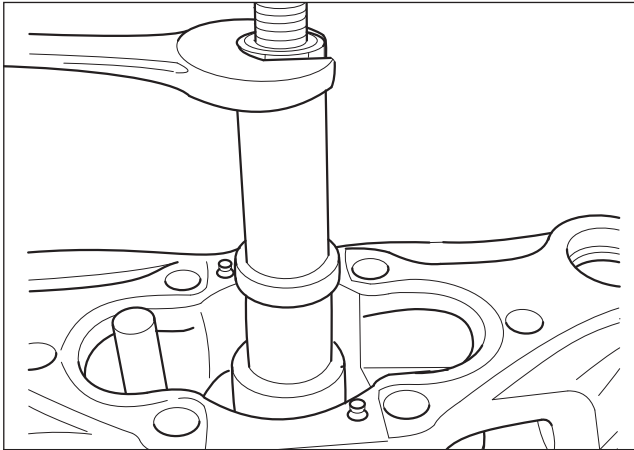


Fig. 12.11

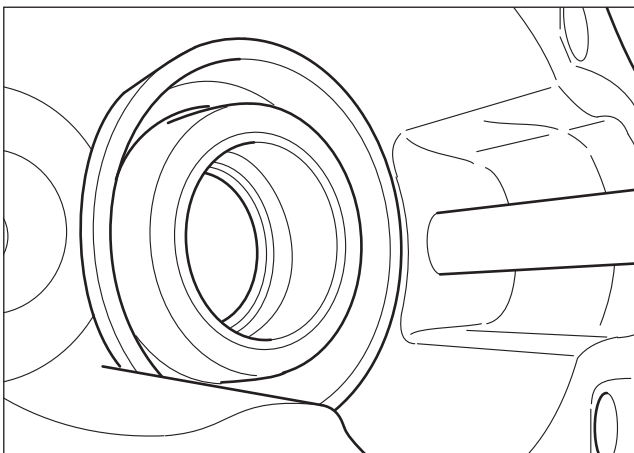


Fig. 12.12

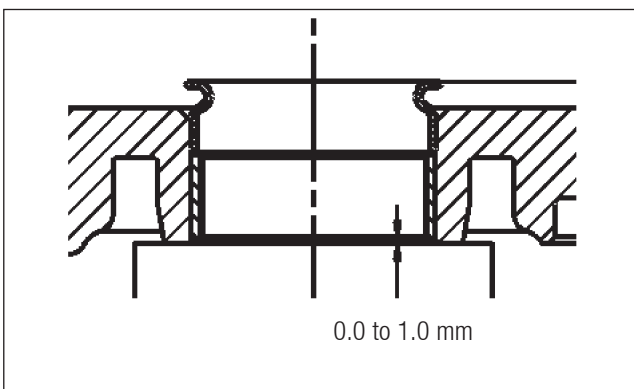


Fig. 12.13

Re-assembly

Using service tool MST 1000 locate a new tappet bush in the housing, from the operating shaft side of the bore and pull the new tappet bush into position in the bore (Fig 12.11) until it is flush to 1mm below the housing face

(Fig.12.12 & 12.13).

Locate a new excluder retainer in the housing, pad aperture side of the bore, and press in to position as shown in Fig 12.14 & Fig 12.15.

⚠ WARNING :

Do not disturb the position of the bush in the housing bore when fitting a new dust excluder retainer.

NOTE: Use only the grease supplied with replacement parts/kits or that specified by the vehicle manufacturer. DO NOT use any other type of grease.

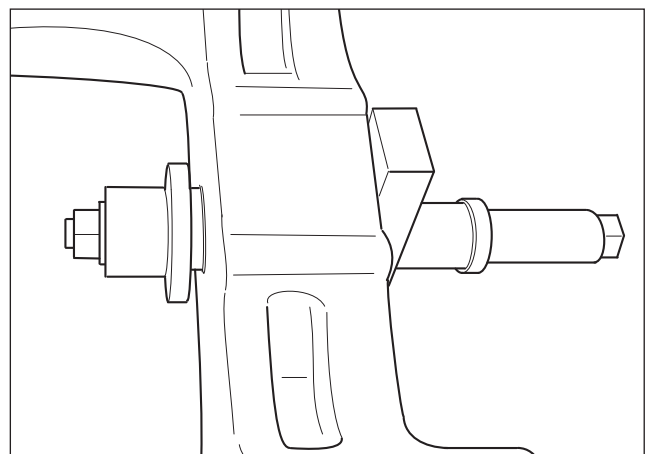


Fig. 12.14

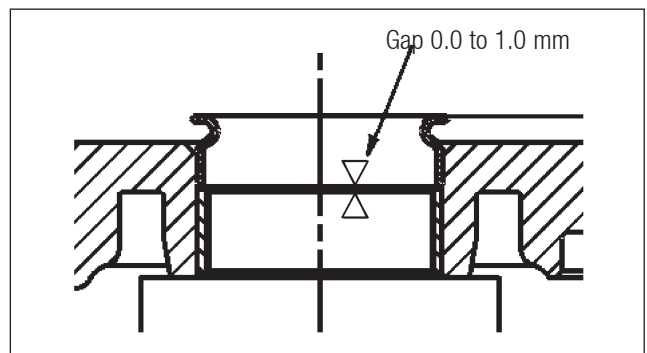


Fig. 12.15

12 Tappet, Dust Excluder, Retainer & Bush Replacement

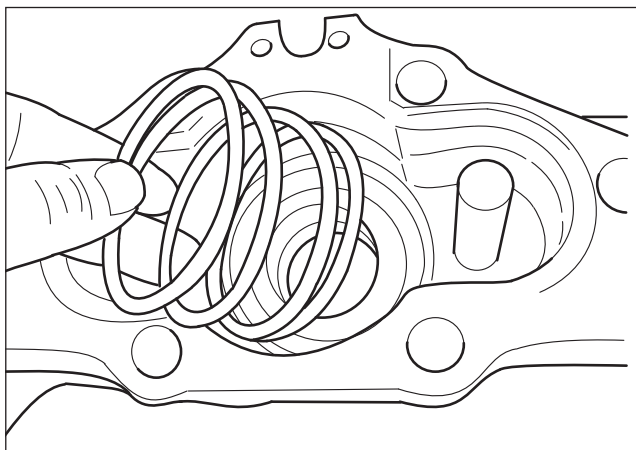


Fig. 12.16

Lightly grease the bush. Grease both ends of the main return spring and fit it into the housing (Fig 12.16).

Lightly grease the new adjuster tappet screw thread.

Screw it fully into the new adjuster nut.

Liberaly re-grease the exposed tappet screw thread.

Unscrew the tappet screw by approximately 20mm to assist assembly.

Grease the adjuster nut journal (Fig 12.17) and fit the new assembly into the housing (Fig 12.18).

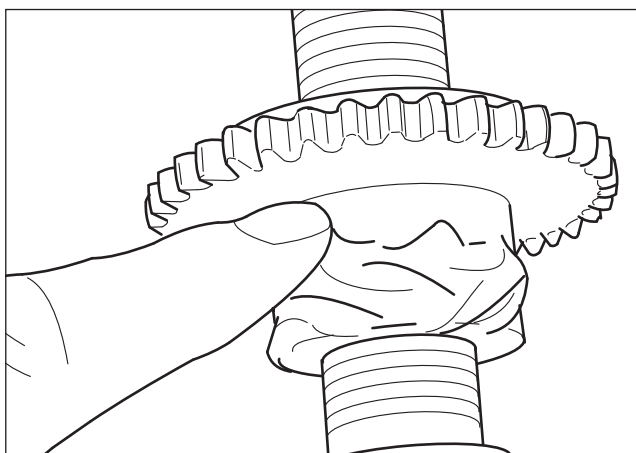


Fig. 12.17

Press the assembly into the housing and re-fit the 'C' plate or other restraint to the tappet screw head. Release the pressure on the tappet assembly.

NOTE: Ensure the new tappet screw threads are not damaged when fitting the C plate.

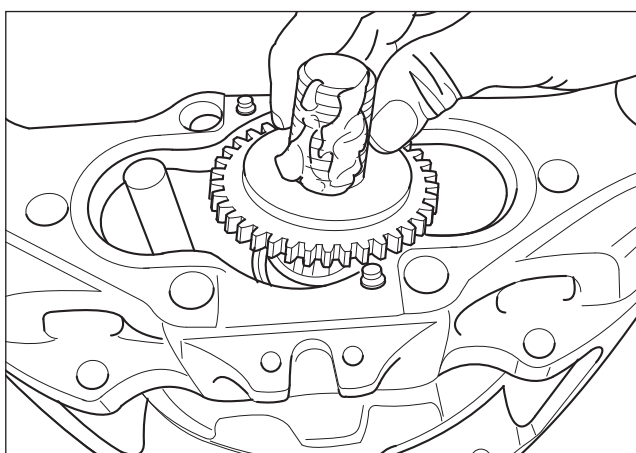


Fig. 12.18

12 Tappet, Dust Excluder, Retainer & Bush Replacement

Liberally grease the ramp plate recess and the fork recess (Fig. 12.19). and re-fit the ramp as shown (Fig 12.20).

Continue to re-assemble the brake as detailed in **Section 10 Cover plate Replacement.**

Remove the "C" plate or other restraint from the tappet screw. Fit a new tappet excluder as detailed above.

Replace Spreader Plate following the procedures detailed in Section 5 Spreader plate Replacement.

Re-fit the brake assembly to the vehicle as detailed in **Section 6 Brake Replacement.**

Refit, or fit new, pads and the PWWI, set the initial running clearance and test as described in **Section 3 Pad Replacement.**

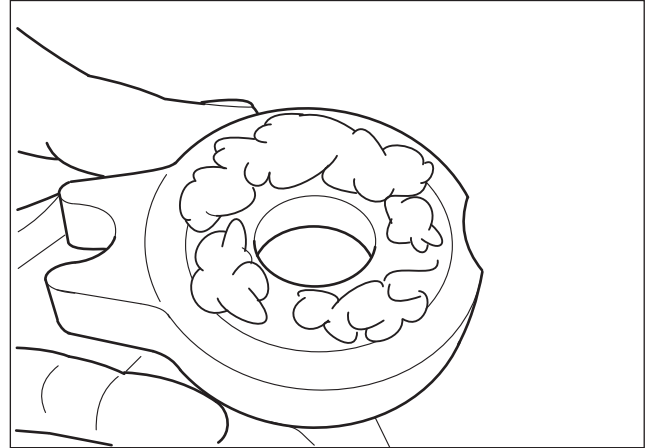


Fig. 12.19

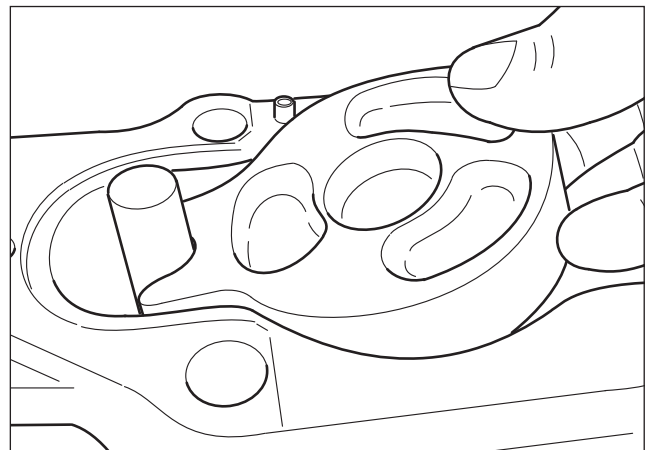


Fig. 12.20

12 Tappet, Dust Excluder, Retainer & Bush Replacement

Operating Shaft & Adjuster Replacement

13

pg. 78 Operating Shaft Replacement
pg. 81 Adjuster Replacement

13 Operating Shaft & Adjuster Assembly Replacement

Park the vehicle on hard ground and chock the road wheels. Apply air pressure to release the park brake and wind off the spring brake retraction screw (where appropriate). Jack up the axle and fit suitable axle stands securely. Remove the road wheels and exhaust all air from the system. Remove any dirt from the brake assembly with a wire brush, avoiding damage to the rubber dust excluders.

CAUTION:

Never use an airline to blow dust from the brake rotor area. If inhaled any form of dust can at best be an irritant, at worst dangerous. Whenever possible remove dry brake dust with a vacuum brush. Alternatively wipe the areas with a damp cloth, never try to accelerate drying time by using an air line.

Important: The brake assembly number should be noted in order to obtain the correct service kit.

Remove pad wear indicator, pads and spreader plate if necessary, as detailed in **Section 3 Pad Replacement**.

Remove brake from vehicle as detailed in **Section 6 Brake Replacement**, and place on a suitable bench.

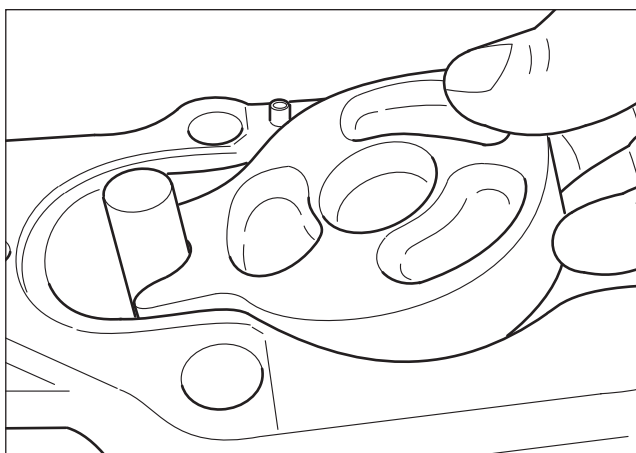


Fig. 13.1

Operating Shaft Replacement

Remove the cover plate as detailed in **Section 10 Cover plate Replacement**.

If the adjuster assembly or drive ring remained in the housing when removing the cover plate, remove and clean with suitable brake cleaner. Examine the components for wear, damage or corrosion and replace as necessary.

Remove the three balls and ramp from the calliper housing and discard (Fig 13. 1)

Using a suitable mallet carefully remove the operating shaft from cover plate (Fig. 13.2).

IMPORTANT:

Later level op-shafts are fitted with a grease nipple. Do not damage the grease nipple when tapping the op-shaft out of the cover plate.

Remove the thrust washer and thrust bearing from the operating shaft.

Clean and examine the thrust washer, thrust bearing removed, and needle roller bearing, seal and shield remaining in/on the cover plate. If there is any doubt in their suitability for further service replace with new components as detailed in **Section 11 Cover plate Overhaul**.

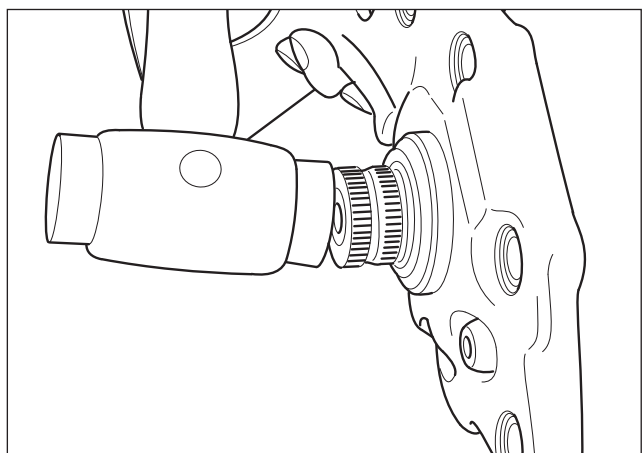


Fig. 13.2


13 Operating Shaft & Adjuster Assembly Replacement

Remove the anti-rotation pin from the housing. It may be necessary to grip the pin in a vice and work the housing off the pin (Fig 13. 3)

CAUTION:

When lifting the brake assembly avoid trapping fingers between the brake housing and carrier which are free to slide relative to each other. Also prevent any sudden movement which may result in rapid sliding of the components which may cause damage to rubber dust excluder areas.

Remove the remaining grease from the housing and examine the tappet assembly for sign of damage, wear or corrosion. If there is any doubt in the suitability for further use replace as detailed in Section 12 Tappet Replacement.

 CAUTION: Ensure any grease removed from the assembly/components, or contaminated cloth, is disposed of in accordance with local environmental regulations.

Re-assembly

Component Identification:

Components are handed left hand (LH) & right hand (RH) to suit left & right hand brakes.

Adjuster

- LH adjuster assemblies are identified by a green marking on the wrap spring (Fig 13.4).
- RH adjusters are identified by a plain wrap spring.

Cover plate

Identified by an L or R cast into the plate (Fig 13.5).

- L = LH
- R = RH

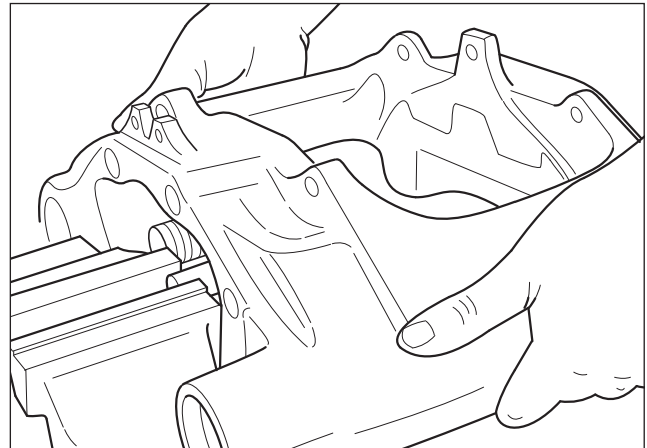


Fig. 13.3

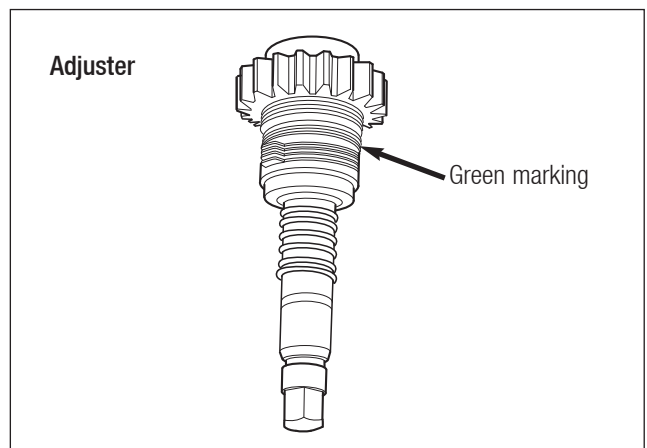


Fig. 13.4

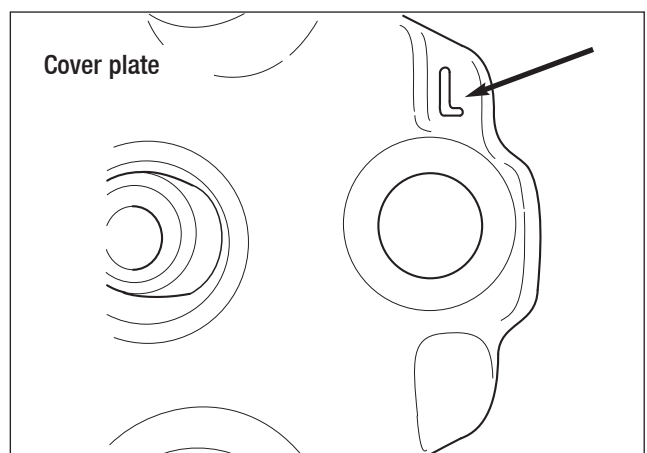


Fig. 13.5

13 Operating Shaft & Adjuster Assembly Replacement

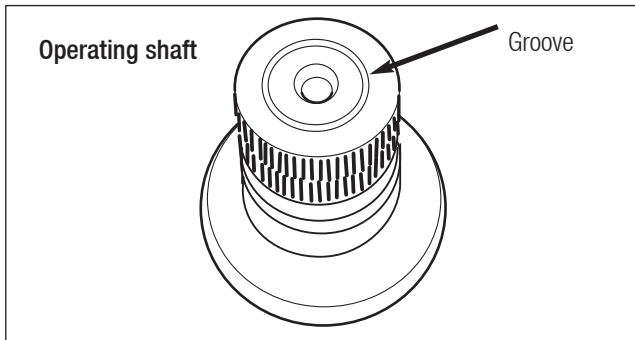


Fig. 13.6

Operating shaft

- LH op-shafts are identified by a machined groove in the end face, lever end (Fig 13.6).
- RH have no machined groove.

Carefully tap a new anti-rotation pin in to the housing (Fig 13. 7)

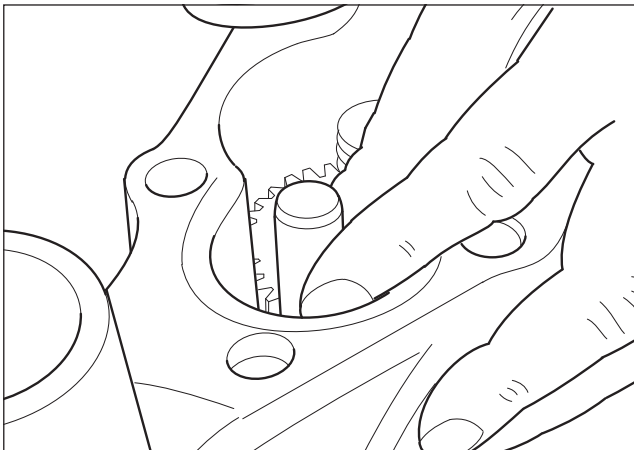


Fig. 13.7

NOTE: Only use the grease supplied with replacement components/kits or that specified by the vehicle manufacturer. Under no circumstance should any other type of grease be used.

Liberally grease the tappet assembly, new ramp plate recess and the fork recess (Fig. 13.8) with the grease provided or specified by the vehicle manufacturer, DO NOT use any other grease.

Fit the new ramp (Fig 13.9).

Liberally grease the ball pockets in the operating shaft and ramp and fit three new balls into the ramp pockets (Fig 13.10).

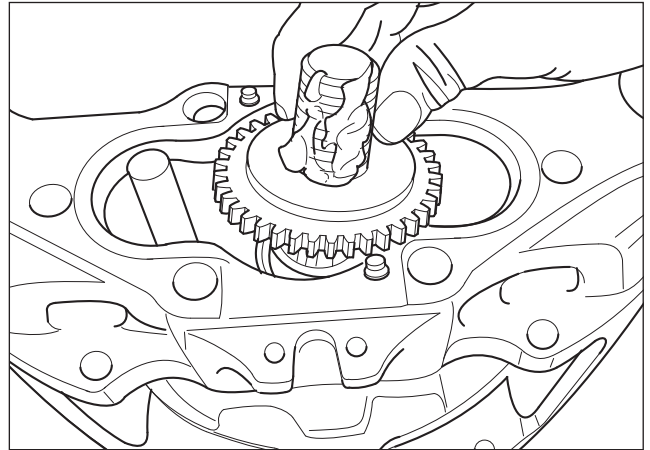


Fig. 13.8

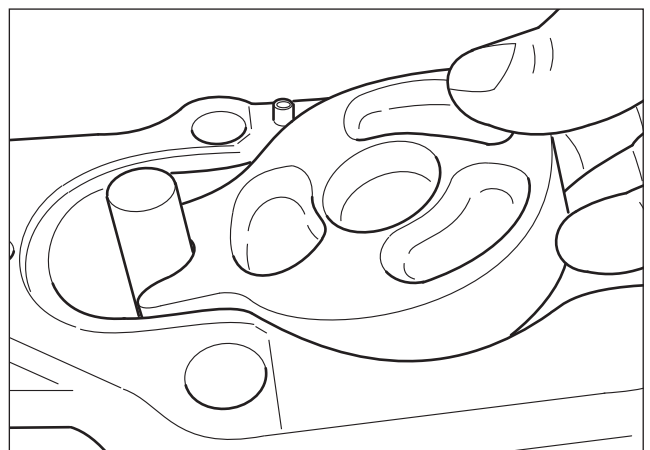


Fig. 13.9

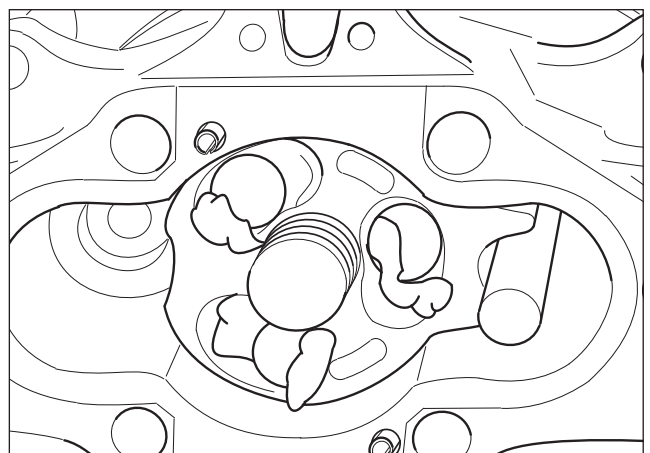


Fig. 13.10

13 Operating Shaft & Adjuster Assembly Replacement

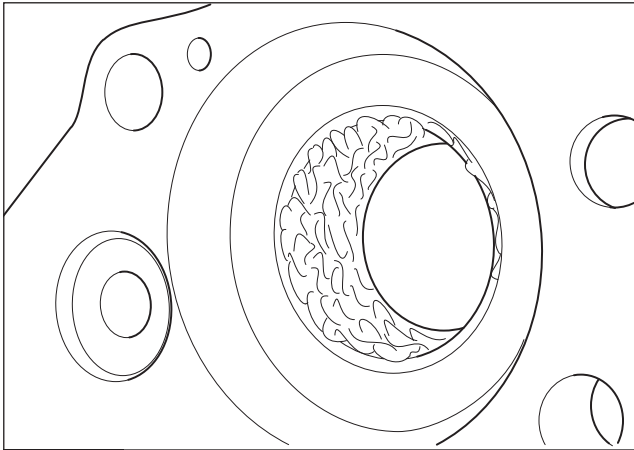


Fig. 13.11

NOTE: There should be sufficient grease to hold the balls in position during re-assembly.

Liberal grease the needle roller bearing (Fig. 13.11), and thrust bearing (Fig 13.12)

Place the thrust bearing and thrust washer on to the operating shaft (Fig. 13. 13).

Fit the operating shaft in to the cover plate.

NOTE: Any grease extruding between operating shaft and shield is satisfactory, do not wipe clean.

Continue to re-assemble the brake and fit a new operating shaft outer seal, as detailed in **Section 10 Cover plate Replacement**.

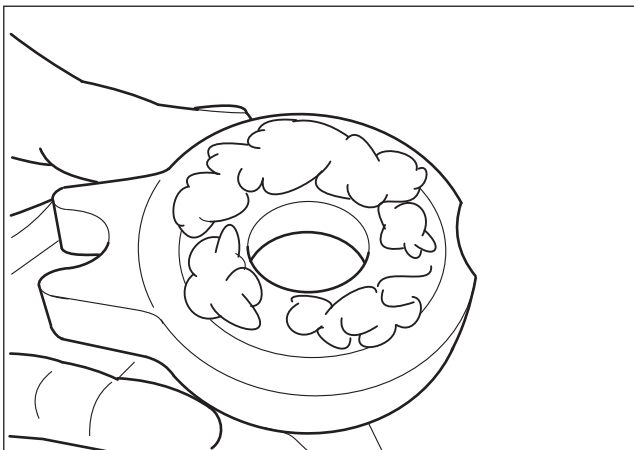


Fig. 13.12

Adjuster Replacement

Remove the cover plate and operating shaft as detailed in **Section 10 Cover plate Replacement**.

Remove the adjuster assembly and drive ring from the cover plate, or housing, and discard.

Remove the adjuster dust excluder from the cover plate and discard (Fig 13.14).

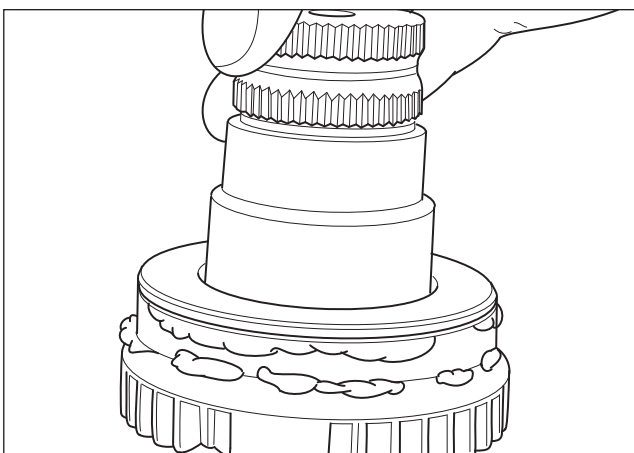


Fig. 13.13

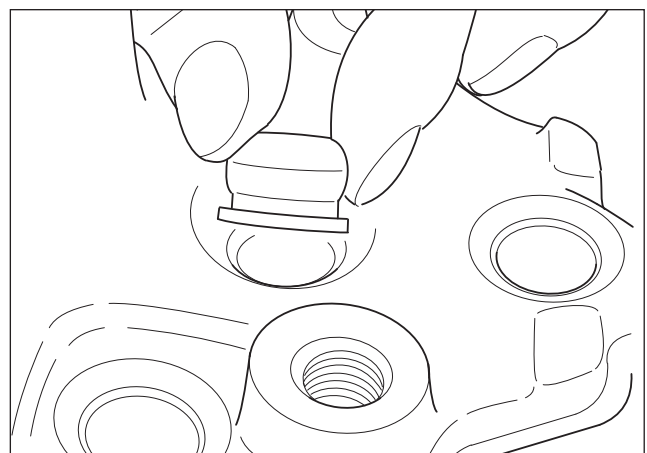


Fig. 13.14

13 Operating Shaft & Adjuster Assembly Replacement

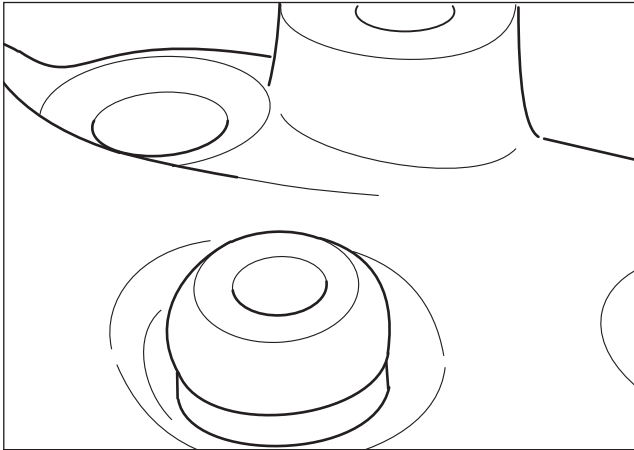


Fig. 13.15

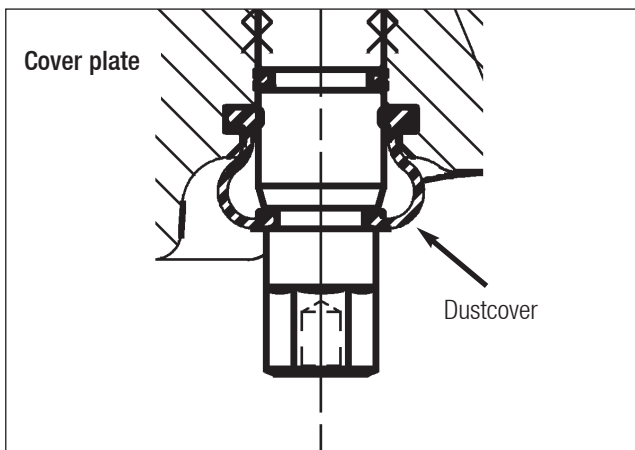


Fig. 13.16

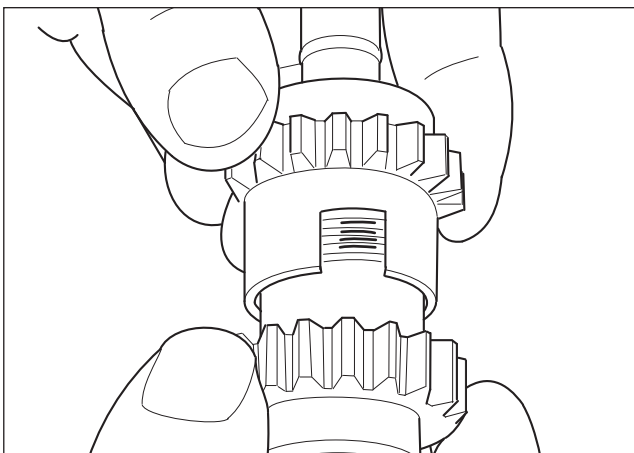


Fig. 13.17

Re-Assembly

Examine the cover plate assembly and housing internal components for wear, damage or corrosion. Replace with new components as necessary.

Clean the adjuster dust excluder location in the cover plate with suitable brake cleaner.

NOTE: Only use the grease supplied with replacement components/kits or that specified by the vehicle manufacturer. Under no circumstance should any other type of grease be used.

Lightly lubricate the internal surface of the new dust excluder and fit it to the cover plate (Fig 13. 15). Ensure the dust excluder is correctly located in the cover plate (Fig 13. 16).

Liberal grease the new adjuster assembly and drive ring and fit the drive ring onto the adjuster assembly ensuring the clutch plates locate correctly in the drive ring slots (Fig 13. 17).

Fit the new adjuster assembly and spring into the brake housing ensuring the drive ring gear meshes correctly with the tappet nut (Fig 13. 18)

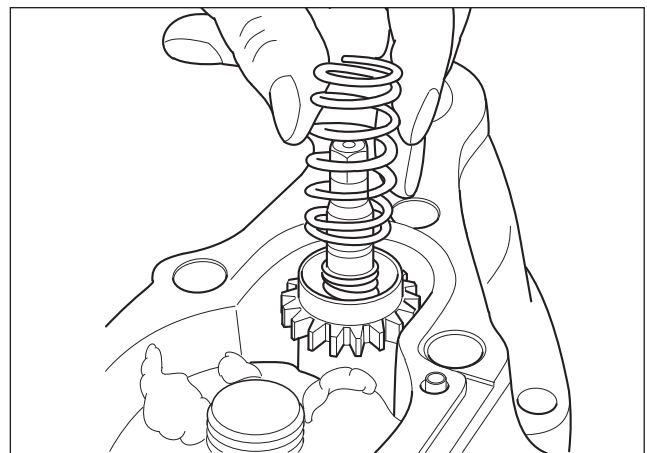


Fig. 13.18

13 Operating Shaft & Adjuster Assembly Replacement

Re-fit the cover plate assembly and fit a new operating shaft outer seal, as detailed in **Section 10 Cover plate Replacement**.

Ensure the adjuster dust excluder is not disturbed from its location in the cover plate and locates correctly on the adjuster stem (Fig 13. 19)

Where necessary replace spreader plate following the procedures detailed in **Section 5 Spreader plate Replacement**.

Refit the brake assembly to the vehicle as detailed in **Section 6 Brake Replacement**.

Refit, or fit new, pads and the PWWI, set the initial running clearance and test as described in **Section 3 Pad Replacement**.

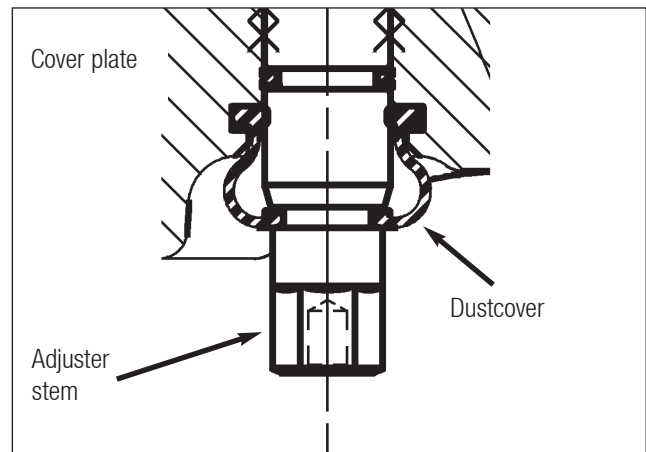


Fig. 13.19

13 Operating Shaft & Adjuster Assembly Replacement

Guide Sleeve, Dust Excluder, Retainer & Bush Replacement

14

- pg. 86 Identification & Bush alternatives
- pg. 86 Guide Sleeve Removal
- pg. 86 Removing Bushes & Dust Excluder Retainers
- pg. 88 Fitting New Bushes
- pg. 88 Fitting Dust Excluder Retainers
- pg. 89 Fitting Guide Pins & Dust Excluders

14 Guide Sleeve, Dust Excluder, Retainer & Bush Replacement

Important: The brake assembly number should be noted in order to obtain the correct service kit.

Identification of Early and Later Level Brakes

Later level brakes are identified with a drill point close to the guide pin adjacent to the manual override adjuster stem.(Fig. 14.1)

Guide sleeve bush alternatives

Short guide sleeve bore

The single brass oval bush changed in length from 30mm to 48mm. They are interchangeable.

Long guide sleeve bore

Early level brakes were fitted with 2 black plastic bushes.

Later level brakes were fitted with 2 steel backed plastic bushes.

The black plastic and steel backed plastic bushes are not interchangeable.

NOTE: 2 pairs of bushes are supplied in the service kit to enable both levels of brake assembly to be serviced. Only 1 pair of bushes is required for a brake assembly. Service kits contain instructions for correct assembly.

Guide Sleeve Removal

Remove the housing assembly as described in the **Housing Replacement Section 7**. Transfer to a suitable workbench and place upside down to expose the guide sleeve areas. Detach the guide sleeve dust excluders from the housing and withdraw the guide sleeves, together with dust excluders, from the housing.

Removing Bushes & Dust excluder Retainers

The process of removing the guide sleeve bushes from the housing will at the same time remove the dust excluder retainers which are pressed into the mouth of the guide sleeve bores.

NOTE: It is important to ensure correct orientation of the new brass oval bush. The notches in the bush must be positioned as shown in Fig. 14.2.

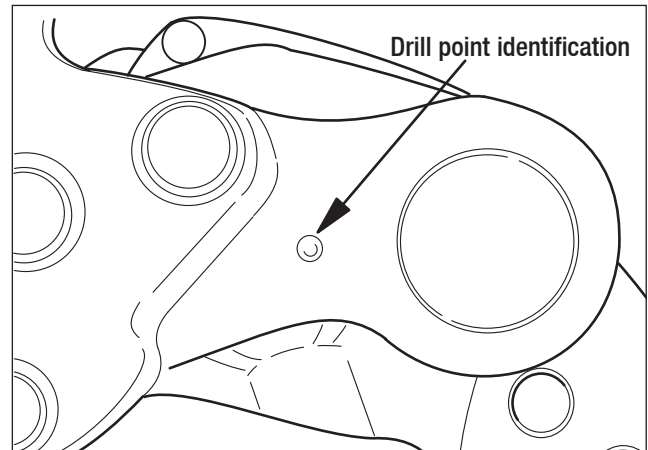


Fig. 14.1

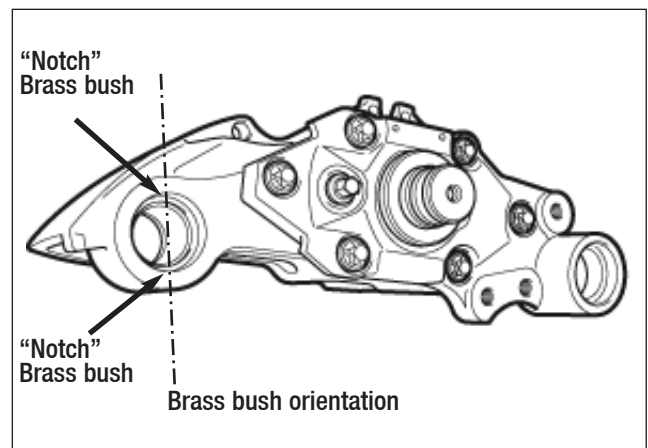


Fig. 14.2

14 Guide Sleeve, Dust Excluder, Retainer & Bush Replacement

Before removing the brass oval bush from the short guide sleeve bore, mark its position precisely as follows.

Turn the housing so the operating shaft is uppermost. Looking into the guide sleeve bore observe the two notches on the bush edge (Fig 14.3). Join the two notches with a rule or straight edge and mark the housing turret (Fig 14.4).

Using suitable drift tools press out the brass oval bush from the short guide sleeve bore and the two plastic bushes from the longer guide sleeve bore, together with the dust excluder retainers (Fig 14.5). Ensure the housing bore is not damaged.

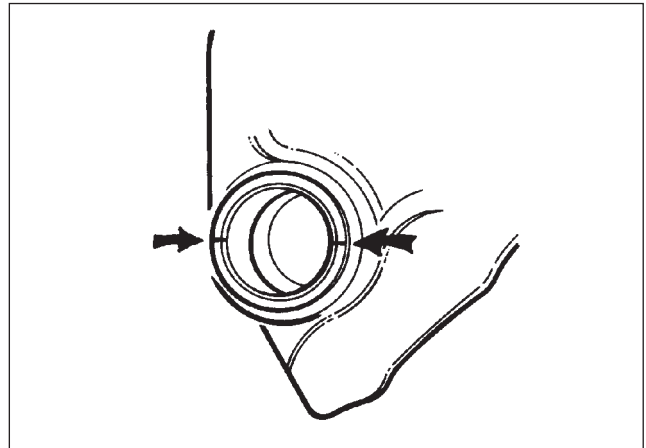


Fig. 14.3

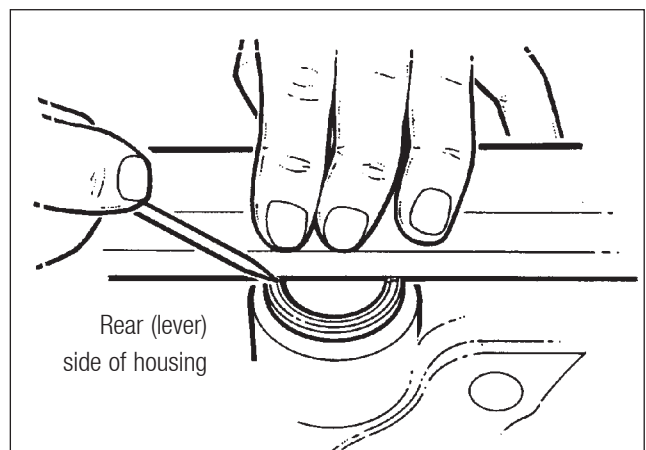


Fig. 14.4

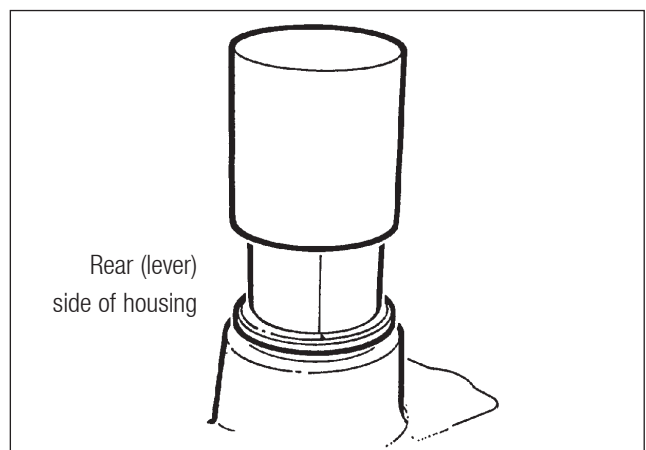


Fig. 14.5

14 Guide Sleeve, Dust Excluder, Retainer & Bush Replacement

Fitting New Bushes

Clean the guide sleeve bores with a suitable cleaner. Examine the condition of the bores for wear, corrosion or damage. If there is any doubt in the suitability for further service, replace with a new housing assembly.

NOTE: Both the brass and plastic bushes should be fitted from the rear of the housing. Do not attempt to fit from the front (tappet side) of the housing as access is limited and may cause misalignment or damage to the bushes/brake housing.

Brass Oval Bush - short guide sleeve

The brass bush has two notches on each edge. Place the bush on the housing and ensure that the notches align with the marks on the guide sleeve turret. Press the bush into the bore with tool MST1000 or a suitable drift (Fig 14.6), the front edge of the bush should be flush with the recess in the mouth of the housing bore (Fig 14.7).

NOTE: Do not press the bush past the recessed shoulder.

Plastic Bushes - longer guide sleeve

Press the first bush into the housing with tool MST1000 or a suitable drift, the front edge of the bush should be flush with the recess in the mouth of the housing bore (Fig 14.8).

NOTE: Do not press the bush past the recessed shoulder.

Press the second plastic bush into the bore to a depth of 27 - 28 mm (Fig 14.8).

Fitting Dust Excluder Retainers

Place a new dust excluder retainer into the mouth of a guide sleeve bore - tappet side, and using tool MST1000 as shown in Fig 14.6, carefully pull the retainer squarely into position until it abuts against the recessed shoulder in the mouth of the bore (Fig 14.7).

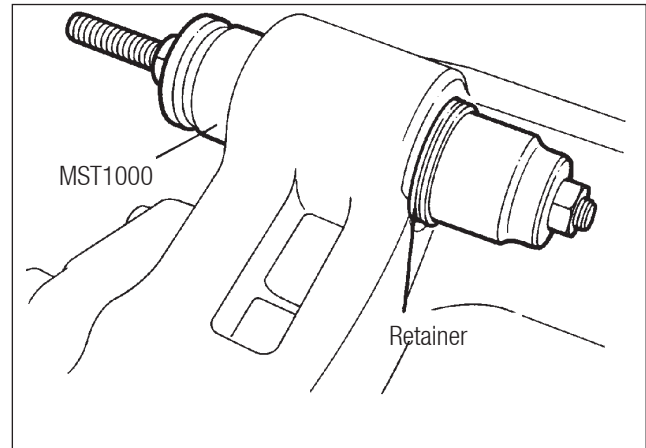


Fig. 14.6

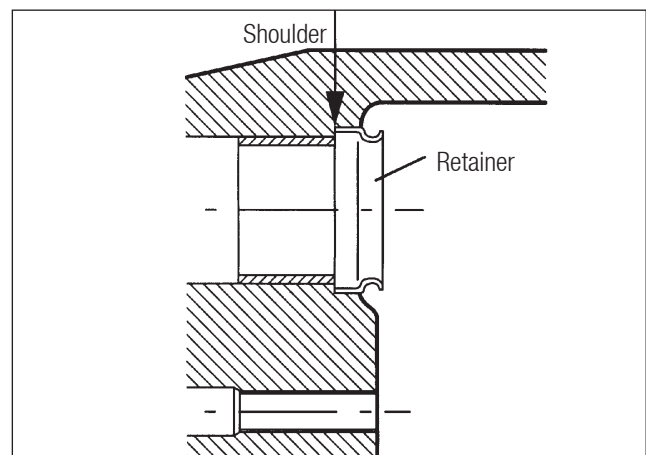


Fig. 14.7

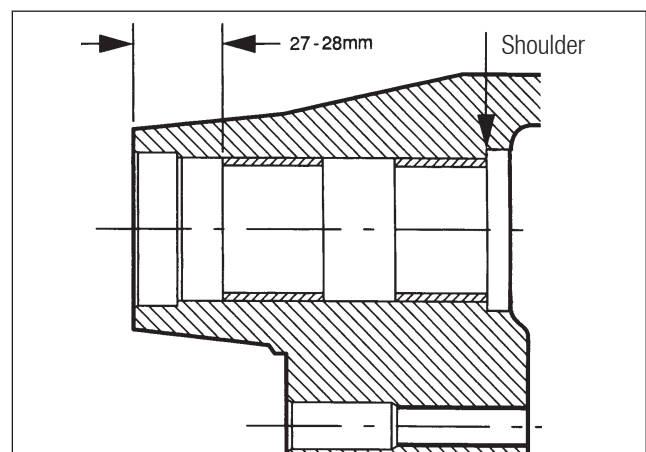


Fig. 14.8

14 Guide Sleeve, Dust Excluder, Retainer & Bush Replacement



WARNING:

Do not damage the dust excluder location lip on the retainer.

Fit the second retainer following the same procedure.

Fitting Guide Pins & Dust Excluders

Lightly lubricate the now guide sleeves including the dust excluder location groove, the dust excluder retainers in the housing and the guide pin dust excluders, on the inside only, with the grease provided in the service kit or specified by the vehicle manufacturer.

NOTE: Only use the grease supplied with replacement components/kits or that specified by the vehicle manufacturer. Under no circumstance should any other type of grease be used.

Fit the new dust excluders onto the guide sleeves ensuring they locate correctly in the guide sleeve retainer groove. Assemble the guide pin screws into the guide sleeves and carefully fit the guide sleeves into the brake housing (Fig 14.9). The action of fitting the guide pin screws into the guide sleeves, before they are fitted into the housing, prevents a build up of grease on the guide sleeve/screw head faces which could affect the torque level of the guide pin screws on final tightening. Remove the screws and wipe off any excess grease from the screw heads (Fig 14.10) and re-apply to the guide sleeve, behind the dust excluder. Locate the guide pin boots onto the housing retainers and gently pull the guide sleeve to check the secure location (Fig 14.11).

Refit the housing assembly to the carrier and torque the guide pin screws as detailed in **Section 7 Housing Replacement**.

Refit, or fit new, pads and the PWWI. Set the initial running clearance and test as described in **Section 3 Pad Replacement**.

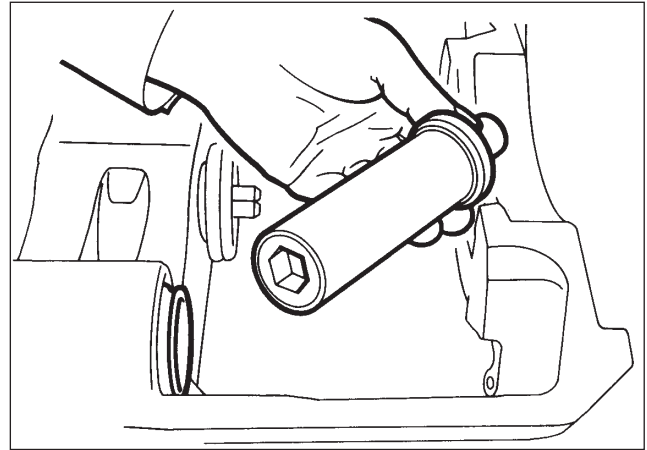


Fig. 14.9

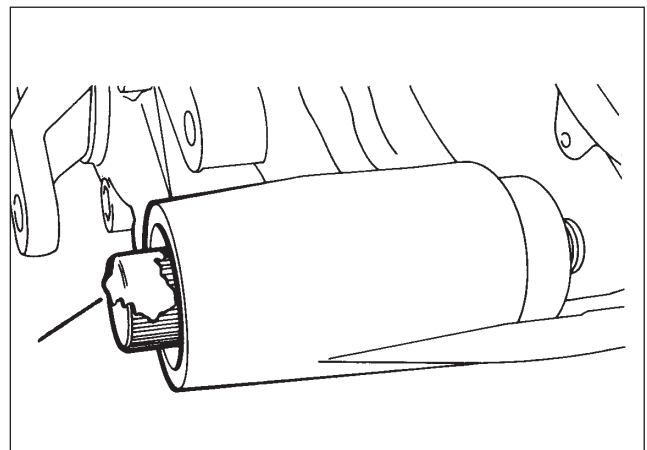


Fig. 14.10

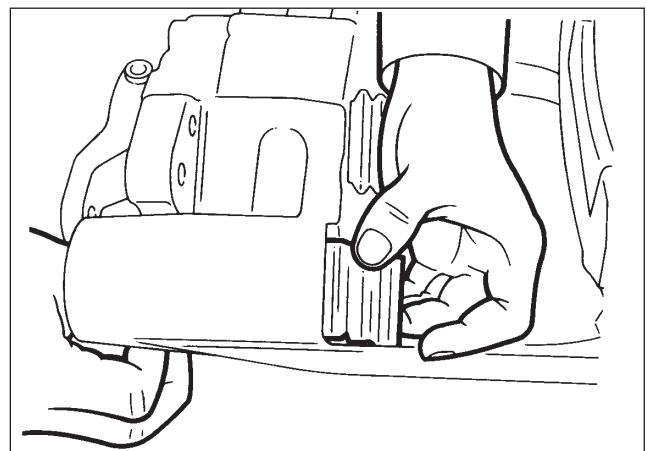


Fig. 14.11

14 Guide Sleeve, Dust Excluder, Retainer & Bush Replacement

Rotor Wear Conditions for Rework or Replacement

15

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D-LISA
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C-LISA

15 Rotor Wear Conditions for Rework or Replacement

D-LISA Air Disc Brake

This document explains safe working practices for the limitations of a rotor life for the D-LISA Meritor Air Disc Brake, with a pad back plate thickness of 8mm or above.

Dimension Detail	mm
New Rotor Thickness	45
Minimum Resurfacing Thickness	41
Minimum Fully Worn Thickness	39
Pad Back Plate Thickness	8
Carrier Rotor Gap	48.4
Minimum Friction Material Thickness	3

New Rotor Condition - Fig 15.1

The rotor nominal maximum thickness (new condition) is 45mm. The rotor gap between the carrier abutments of the brake assembly is 48.4mm nominally. Therefore, if the rotor is central to the carrier abutments an equal clearance of 1.7mm nominally is achieved either side of the rotor. However, due to tolerances the rotor is not always central to the carrier abutment gap and this may result in the rotor requiring to be replaced before being worn to the minimum thickness.

Maximum permissible Rotor Wear - Fig 15.2

The rotor is permitted to wear to a minimum thickness of 39mm provided that there is a maximum wear of no more than 3mm off anyone rotor face. When equal wear is achieved on both sides of the rotor, the rotor maintains a central position in the carrier abutments.

Uneven Rotor Wear - Fig 15.3

In many cases where uneven wear takes place the rotor is required to be replaced before wearing down to the minimum 39mm thickness. In the case of uneven rotor wear it is important that the gap between rotor and carrier abutment must not exceed 4.7mm.

WARNING: To ignore these recommendations could result in severe damage to the wheel end assembly due to heat damage from metal pad back plate contacting the rotor. To wear the pad back plate down to a thickness where it is possible to be trapped between carrier abutments and rotor could cause the wheel to lock at best and pad back plates to come out of the brake assembly at worst. If these recommendations are not followed this negates any warranty claim and Meritor HVS cannot be held responsible for operator neglect.

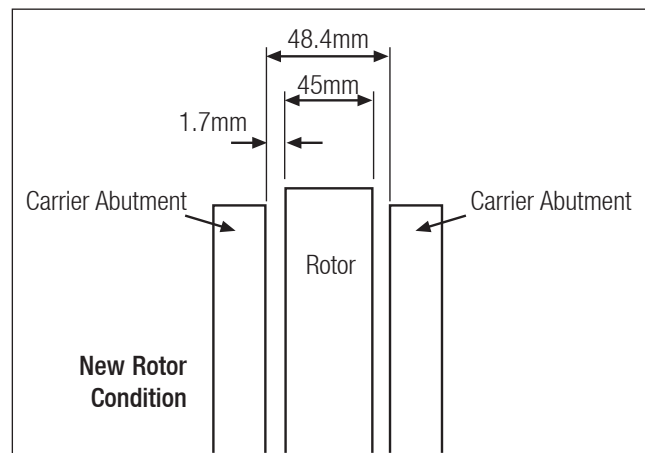


Fig. 15.1

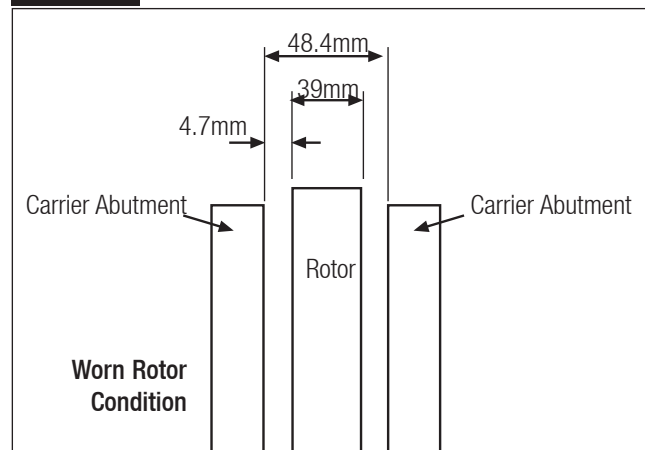


Fig. 15.2

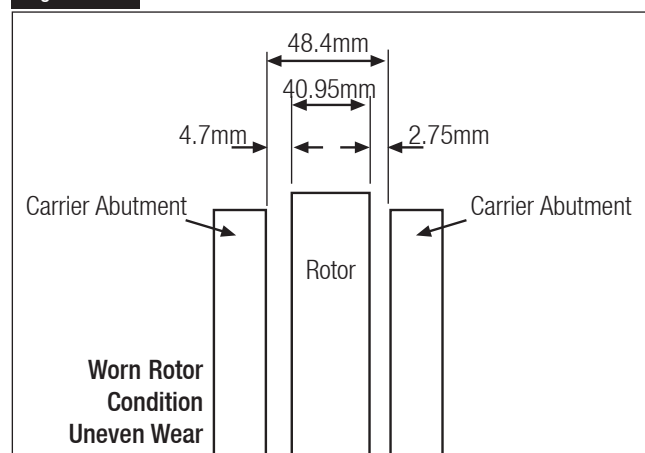


Fig. 15.3

CAUTION You must always renew the rotor on both wheels of an axle. Only use rotors that have been approved by the vehicle manufacturer.

15 Rotor Wear Conditions for Rework or Replacement

C-LISA Air Disc Brake

This document explains safe working practices for the limitations of a rotor life for the C-LISA Meritor Air Disc Brake, with a pad back plate thickness of 8mm or above.

Dimension Detail	mm
New Rotor Thickness	45
Minimum Resurfacing Thickness	41
Minimum Fully Worn Thickness	39
Pad Back Plate Thickness	8
Carrier Rotor Gap	48.4
Minimum Friction Material Thickness	3

New Rotor Condition - Fig 15.4

The rotor nominal maximum thickness (new condition) is 45mm. The rotor gap between the carrier abutments of the brake assembly is 48.4mm nominally. Therefore, if the rotor is central to the carrier abutments an equal clearance of 1.7mm nominally is achieved either side of the rotor. However, due to tolerances the rotor is not always central to the carrier abutment gap and this may result in the rotor requiring to be replaced before being worn to the minimum thickness.

Maximum permissible Rotor Wear - Fig 15.5

The rotor is permitted to wear to a minimum thickness of 39mm provided that there is a maximum wear of no more than 3mm off anyone rotor face. When equal wear is achieved on both sides of the rotor, the rotor maintains a central position in the carrier abutments.

Uneven Rotor Wear - Fig 15.6

In many cases where uneven wear takes place the rotor is required to be replaced before wearing down to the minimum 39mm thickness. In the case of uneven rotor wear it is important that the gap between rotor and carrier abutment must not exceed 4.7mm.

WARNING: To ignore these recommendations could result in severe damage to the wheel end assembly due to heat damage from metal pad back plate contacting the rotor. To wear the pad back plate down to a thickness where it is possible to be trapped between carrier abutments and rotor could cause the wheel to lock at best and pad back plates to come out of the brake assembly at worst. If these recommendations are not followed this negates any warranty claim and Meritor HVS cannot be held responsible for operator neglect.

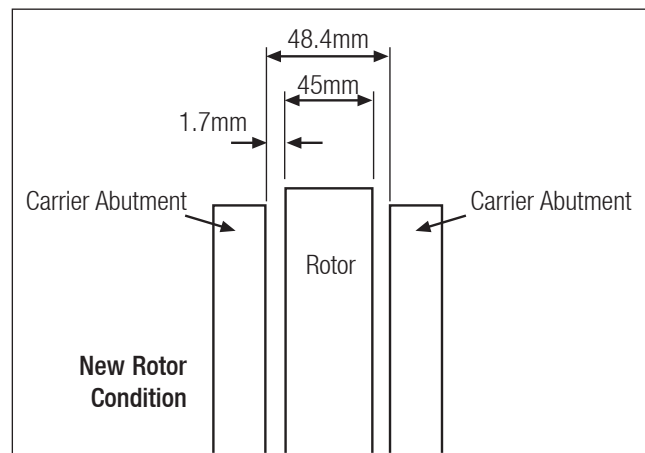


Fig. 15.4

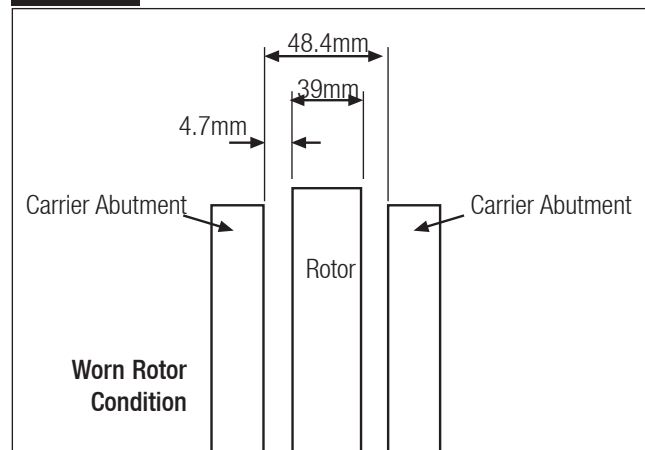


Fig. 15.5

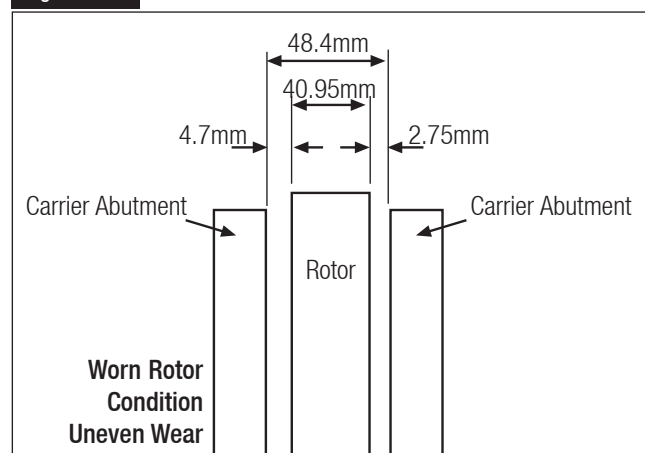


Fig. 15.6

CAUTION You must always renew the rotor on both wheels of an axle. Only use rotors that have been approved by the vehicle manufacturer.

15 Rotor Wear Conditions for Rework or Replacement

Servicing & Maintenance


16


pg. 96 Service Schedules


pg. 97 3 Year Housing Service


pg. 106 Torque Values


16 Servicing & Maintenance

 **CAUTION:** Ensure any grease removed from the assembly/components, or contaminated cloth, is disposed of in accordance with local environmental regulations.

 **CAUTION** You must always renew the brake pads on both wheels of an axle. Only use the brake pads that have been approved by the vehicle manufacturer.

 **CAUTION:** Ensure any discarded friction product, or cloth contaminated with brake dust, is disposed of in accordance with local environmental regulations.


 **CAUTION** You must always renew the rotor on both wheels of an axle. Only use rotors that have been approved by the vehicle manufacturer.


 **CAUTION** Take care not to trap fingers whilst checking the sliding action of the brake.

Every 3 months or 20,000 Km:

A visual assessment of the pad life remaining should be made. Brake pads should be replaced when the lining thickness has worn to 3mm (1/8"). The brake lever travel must be checked and should conform to the dimensions specified in **Section 2 Operational Checks**. Visually inspect the general condition of the brake assembly for damage or corrosion. If there is any doubt in the suitability for further service replace/rectify in accordance with the vehicle manufacturers recommendations.

On later model brakes, there is a grease nipple fitted to the Operation Shaft. Where applicable apply grease through the nipple until grease purges past the outer seal.

 **CAUTION:** Grease must be injected into the Operation Shaft via the use of a hand pump only. Do not use a pneumatic pump to inject the grease. If there is no sign of grease emerging after 6 pumps of the grease gun, stop. Dismantle lever, operating shaft and cover plate to check all parts are fitted correctly.

 **CAUTION:** Do not use any other type of grease other than that recommended by the vehicle manufacturer. The use of another grease may contaminate sealing components and or affect the performance of the automatic adjuster inside the brake.

Every 12 months - regardless of mileage:

Remove the road wheels and brake pads as described in the pad replacement section.

NOTE: if the pads are to be re-used it is advisable to remove the pads and pad wear indicator assembly together, thus not disturbing the wear indicator plug inserts in the pad backplates.

Inspect the guide pin and tappet dust excluders and ensure they are undamaged and securely located. If any of the dust excluders are damaged or detached the relevant area of the brake should be dismantled and the components examined for corrosion or damage. Replace/rectify in accordance with the vehicle manufacturers recommendations. .

Carry out the Operational Checks in Section 2 of this manual

If there is any doubt in the suitability for further service replace with new components.

Check the brake rotor for signs of heavy grooving, cracking or corrosion as shown in **Operational Checks in Section 2** and the thickness dimension is in accordance with those detailed in Rotor rework and replacement **Section 15**, or the vehicle manufacturers recommendations. Replace as necessary.

16 Servicing & Maintenance

Every 3 Years - regardless of mileage: Housing Service to Remove Excess Grease Build Up

NOTE: Excessive grease in the housing cavity can interfere with the efficient operation of the automatic adjustment function of the brake.

NOTE: This procedure should be done with the brake assembly removed from the vehicle. Refer to **Section 6 Brake Replacement** for the correct brake assembly removal procedure..

Dismantling

Either, position the vehicle over a pit, raise on a suitable ramp, or park on hard level ground. Chock the road wheels.

Where applicable, jack up the axle and place suitable axle stands securely. Exhaust all air from the brake system and where necessary remove the wheels. Remove any dirt from the brake assembly with a wire brush, avoiding damage to rubber dust excluders.

WARNING: Never use an air line to blow dust from the brake/rotor area. If inhaled any form of dust can at best be an irritant, at worst dangerous. Whenever possible remove dry brake dust with a vacuum brush. Alternatively wipe the areas with a damp cloth, never try to accelerate drying time by using an air line.

CAUTION: Ensure any discarded friction product, or cloth contaminated with brake dust, is disposed of in accordance with local environmental regulations.

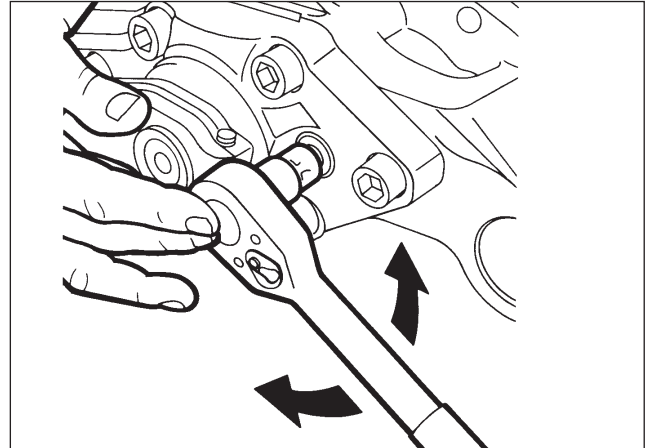


Fig. 16.1

Screwed Spreader Plate

Locate a suitable 10mm socket wrench on the adjuster stem (Fig 16.1) and depress the stem until it engages in the adjuster wheel. While still held depressed rotate the adjuster stem with the socket wrench in the appropriate direction to fully de-adjust the brake.

IMPORTANT: Always adjust/de-adjust the brake by hand. Do not exceed 15Nm (11lbf.ft) torque on the adjuster stem. Do not use power tools to adjust/de-adjust the brake

NOTE: The direction of rotation depends on whether adjusting or de-adjusting the brake (Fig 16.1). Turning the adjuster stem in the opposite direction of lever travel (Brake application stroke) will adjust the brake and turning the adjuster stem in the direction of lever travel (Brake application stroke) will de-adjust the brake.

Remove Pads as detailed in **Section 3 Pad Replacement**.

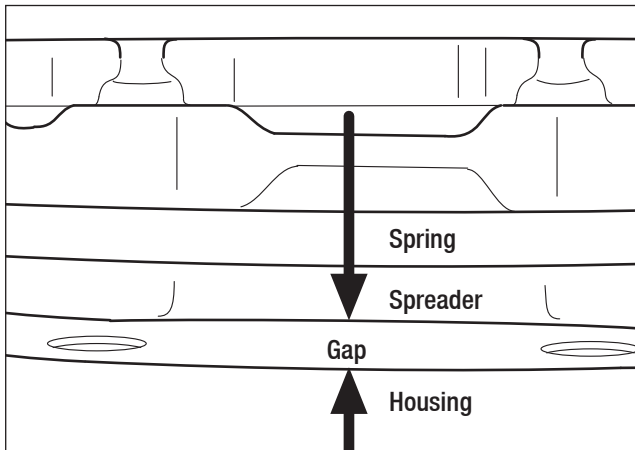


Fig. 16.2

When fully de-adjusted there should be minimal clearance between the brake housing and the spreader plate (Fig. 16.2).

NOTE: de-adjusting the brake will result in the compression of the internal main return spring which will ease dismantling and re-assembly of the brake.

Loose Spreader Plate

Remove Pads and spreader plate as detailed in **Section 3 Pad Replacement**.

Remove the Tappet Excluder and wind the tappet screw into the brake. Restrain the tappet screw with a 'C' plate or other means to keep the internal return spring compressed (Fig. 16.3).

The spring load is a maximum of 130N (29 lbf).

Remove and discard the split pin retaining the lever clevis pin (Fig 16.4) and remove the clevis pin.

Remove the air chamber. Where applicable, remove the retaining screws securing the chamber mounting bracket to the brake housing and lift the bracket from the brake (Fig 16.5).

NOTE: Depending on application the bracket may be secured by 3 or 4 screws.

NOTE: support the air chamber/bracket under the vehicle wheel arch in a position which does not cause undue strain on the connected air pipe

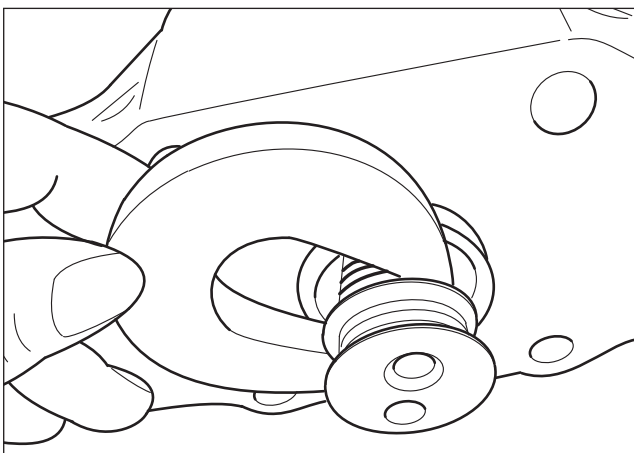


Fig. 16.3

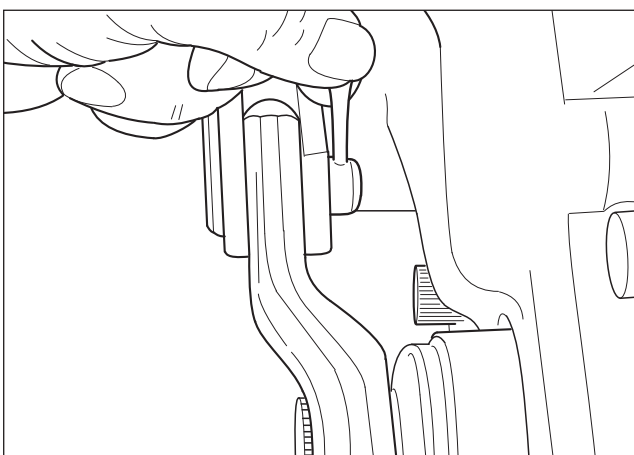


Fig. 16.4

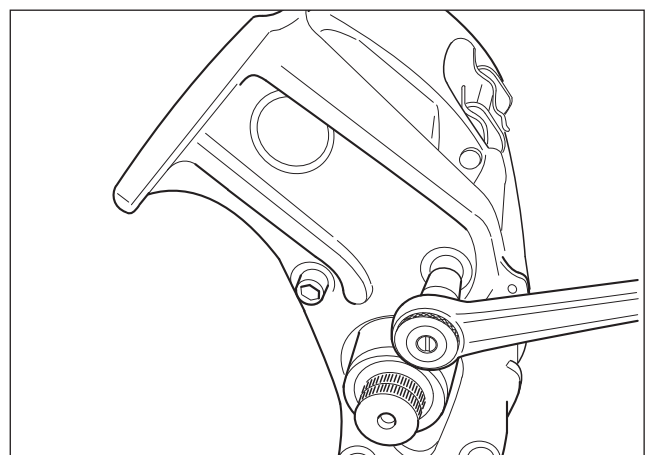


Fig. 16.5

16 Servicing & Maintenance

Remove the brake assembly from the vehicle, as detailed in **Section 6 Brake Replacement**.

Remove the lever retaining screw and carefully withdraw the lever from the operating shaft.

Remove the six cover plate screws (Fig 16.6) and discard.

NOTE: The brake may be fitted with either Allen head or Torx head screws.

Using a suitable mallet carefully tap the cover plate to release it from locating pins (Fig 16.7).

Remove the cover plate, together with operating shaft, adjuster assembly and gasket, from the brake housing.

Discard the gasket.

Remove the adjuster assembly from the cover plate and place to one side for re-assembly.

NOTE: If the adjuster assembly remains in the brake housing when the cover plate is removed, carefully lift it from the housing and place to one side for re-assembly.

Using a suitable soft faced mallet carefully remove the operating shaft from cover plate (Fig. 16.8).

IMPORTANT: Do not damage the grease nipple when tapping the op-shaft out of the cover plate.

NOTE: The GAMMA seal will be removed during the op-shaft removal process. Discard the GAMMA seal.

Remove the three balls from the ramp pockets and place to one side for re-assembly.

Check that the adjuster stem excluder remains correctly located in the cover plate.

Using a clean cloth, clean the surface of the Stainless steel shield.

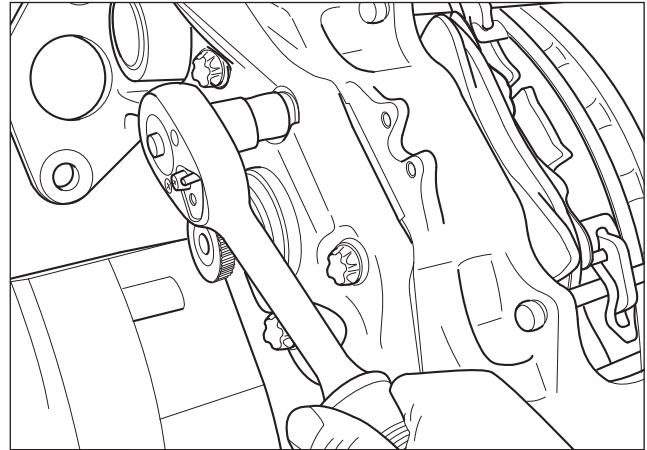


Fig. 16.6

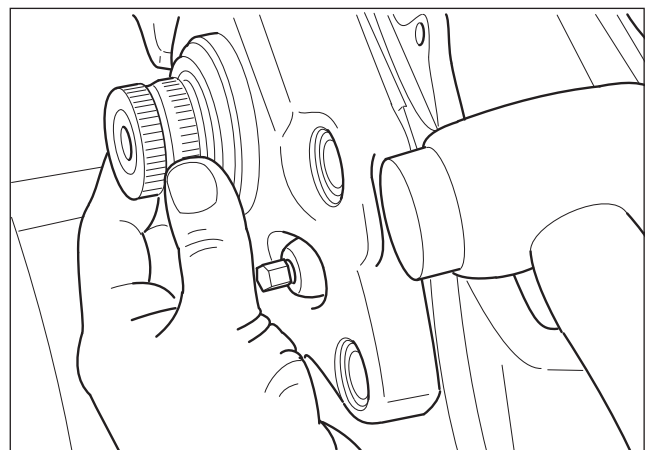


Fig. 16.7

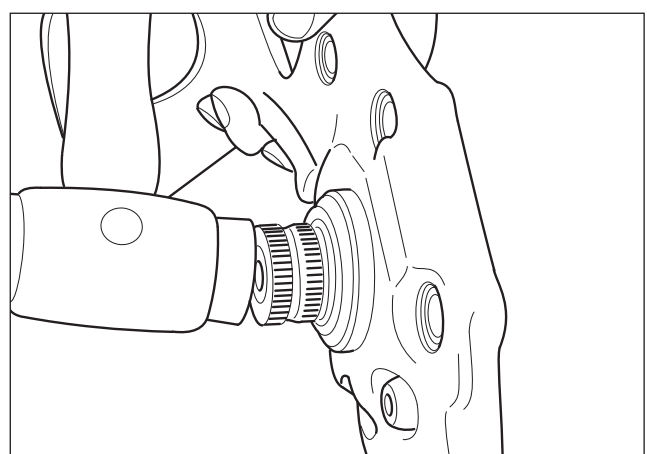


Fig. 16.8

16 Servicing & Maintenance

Cleaning and Inspection

Remove all the grease from the housing cavity, coverplate, op-shaft and internal components.

CAUTION: Ensure any grease removed from the assembly/components, or contaminated cloth, is disposed of in accordance with local environmental regulations.

Using a clean cloth, clean the gasket mounting face and ball pockets in the ramp (Fig 16.9).

Check the housing cavity, coverplate, op-shaft and internal components for any evidence of water ingress, corrosion or wear. If there is any doubt in the suitability for further service replace the housing assembly as described in **Section 7 Housing Replacement**, or the coverplate assembly as described in **Section 10 Coverplate Replacement**, with new Meritor guaranteed parts.

Examine the adjuster assembly for wear, damage or corrosion, if in any doubt in the suitability for further use, replace with a new assembly. Check the O ring seal on the adjuster stem is located correctly and has no evidence of damage, if in any doubt replace the O ring seal.

Re- Assembly

Liberal grease the needle roller bearing (Fig. 16.10), and thrust bearing (Fig 16.11)

NOTE: Only use the grease supplied with replacement components/kits or that specified by the vehicle manufacturer. Under no circumstance should any other type of grease be used.

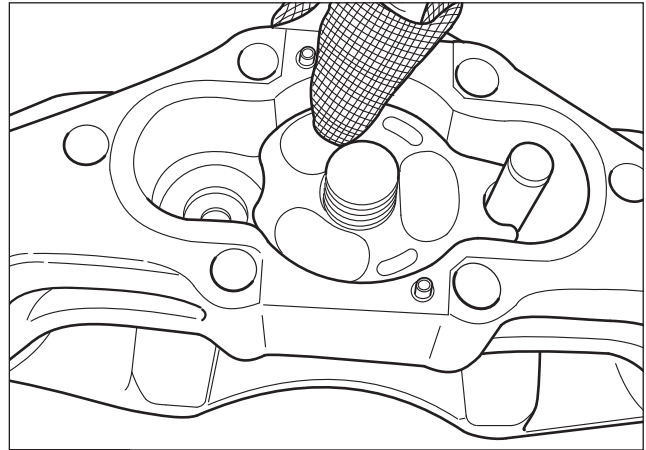


Fig. 16.9

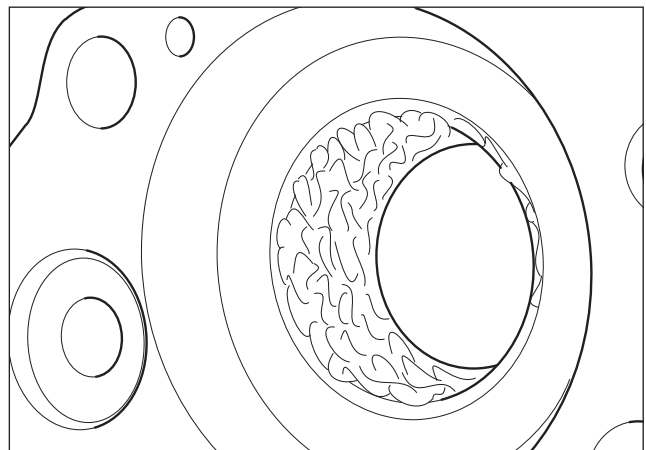


Fig. 16.10

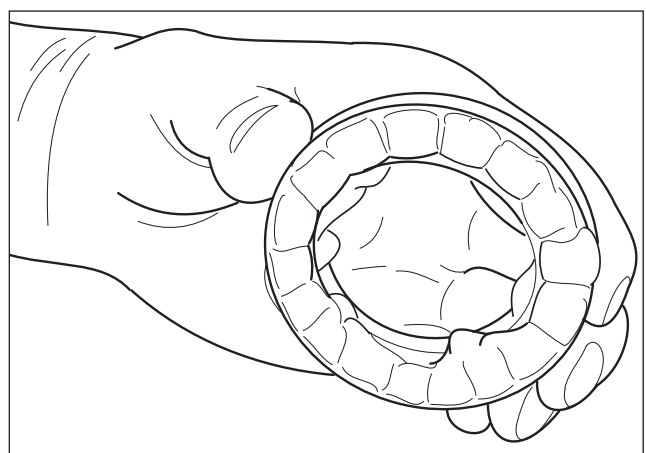


Fig. 16.11

16 Servicing & Maintenance

Place the thrust bearing and thrust washer on to the operating shaft (Fig. 16.12) and fit the operating shaft in to the cover plate.

CAUTION: Ensure any grease removed from the assembly/components, or contaminated cloth, is disposed of in accordance with local environmental regulations.

Liberal grease the ball pockets in the ramp and ensure the ramp is correctly located on the anti-rotation pin (Fig 16.13).

NOTE: Only use the grease supplied with replacement components/kits or that specified by the vehicle manufacturer. Under no circumstance should any other type of grease be used.

Fit the three balls in to the ramp pockets (Fig 16.14).

NOTE: There should be sufficient grease to hold the balls in position during re-assembly.

Fit a new gasket to the brake housing ensuring that it is positioned correctly over the locating pins and within the gasket recess (Fig 16.15).

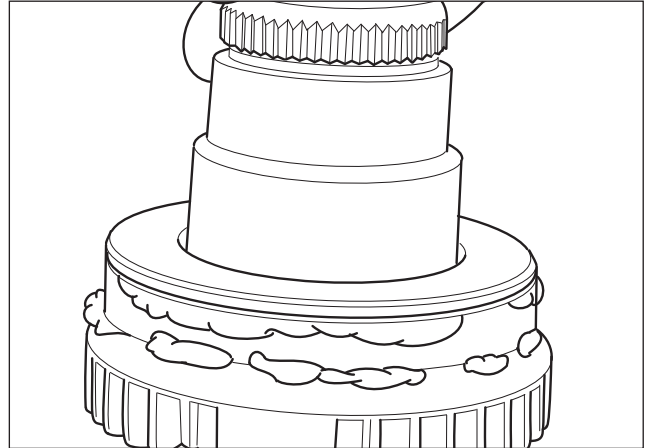


Fig. 16.12

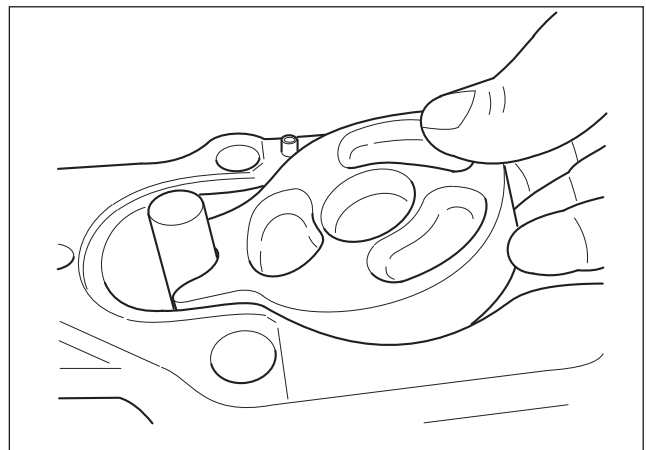


Fig. 16.13

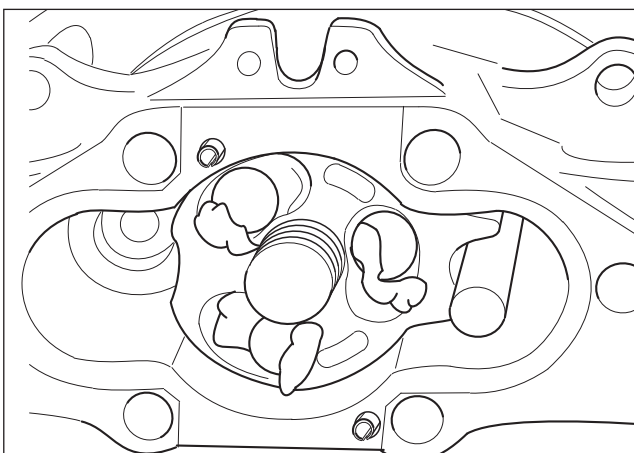


Fig. 16.14

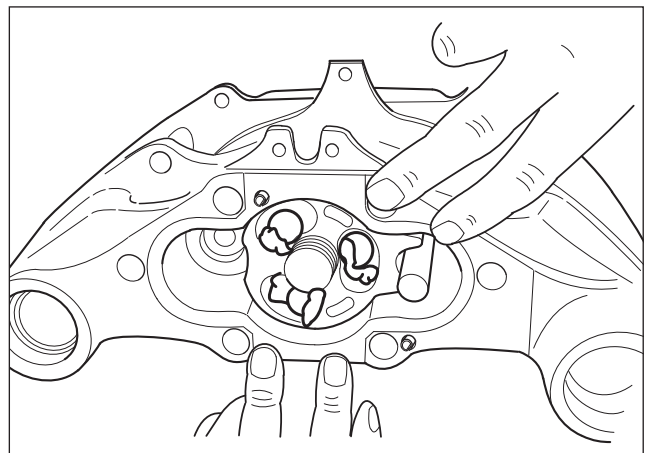


Fig. 16.15

16 Servicing & Maintenance

Grease the adjuster gear teeth, adjuster sleeve and stem and install the adjuster assembly and spring into the brake housing (Fig 16.16). Ensure the adjuster assembly locates correctly in the bottom of the housing and the adjuster wheel meshes with the adjuster nut.

Rotate the operating shaft to ensure that when the cover plate is fitted to the housing, the pockets in the operating shaft align with the balls and corresponding pockets in the ramp (Fig 16.17).

Fit the cover plate on to the housing and insert two new "Torx" head retaining screws into the two end holes of the cover plate (Fig 16.18).

NOTE: Ensure the cover plate locates correctly over the adjuster stem and the adjuster dust excluder is not dislodged from its seat.

Fit the lever onto the operating shaft but do not fit the retaining screw at this stage.

While tightening the two cover plate screws, slightly rotate the operating shaft back and forth (Fig 16.19) to engage the adjuster drive wheel with the gear teeth on the operating shaft.

NOTE: Tighten each of the two retaining screws alternately and equally so that the cover plate is drawn on to the housing evenly. The locating pins will aid alignment of the cover plate.

IMPORTANT: Any miss-alignment of components will prevent the cover plate from being pulled down evenly on to the housing. Do not use excessive torque to draw the cover plate on to the housing.

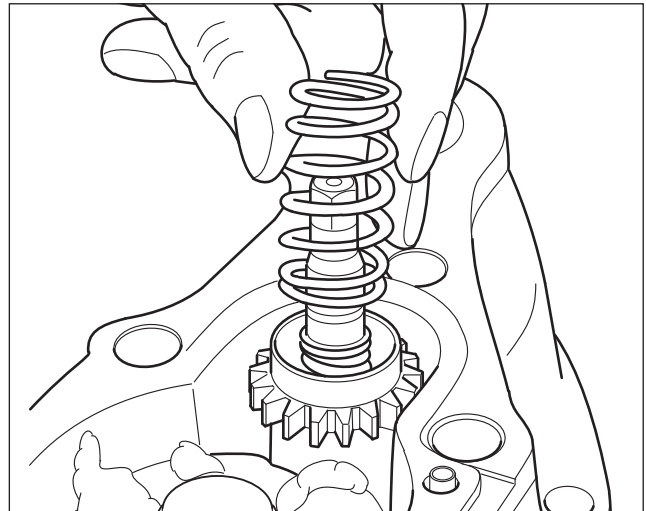


Fig. 16.16

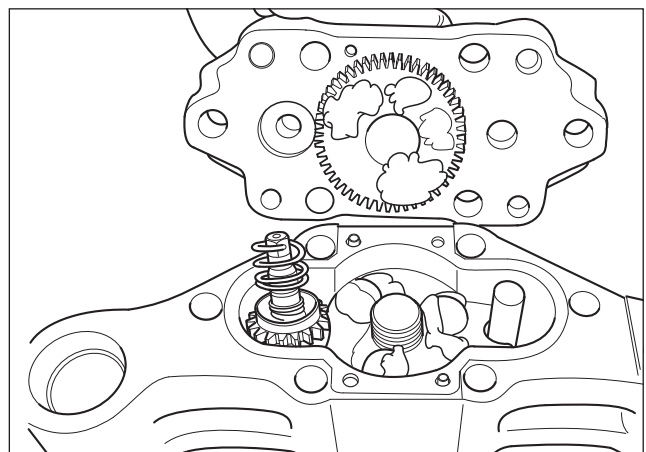


Fig. 16.17

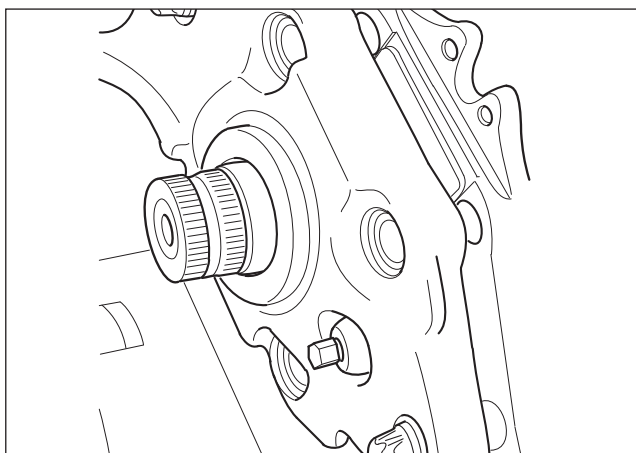


Fig. 16.18

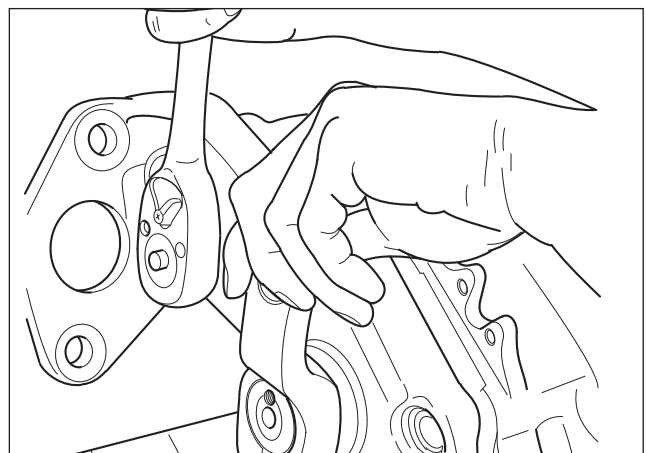


Fig. 16.19

16 Servicing & Maintenance

When the cover plate is clamped to the housing, where applicable, remove the 'C' plate or other restraint from the tappet screw.

Actuate the brake by hand several times (Fig 16.20) to observe that the brake is applying, releasing and adjusting.

T Fit the remaining four new cover plate retaining screws and tighten all six screws to a torque of 190 - 210Nm (140-154lb.ft).

Remove the lever.

Fit a new 'GAMMA' seal over the op-shaft (Fig 16.21).

Using the Meritor CVA Service Tool MST 1049, carefully tap the new seal into position. While rotating the tool in a clockwise direction, tap the tool in four opposing positions (Fig 16.22), until the service tool abuts the cover plate (Fig 16.23). This will ensure the 'GAMMA' seal is fitted correctly.

NOTE: Where applicable, the grease nipple does not need to be removed from the op-shaft to use the Service Tool MST 1049.

CAUTION: Do not use excessive force when tapping the 'GAMMA' seal in to position. The use of excessive force will result in damage to components.

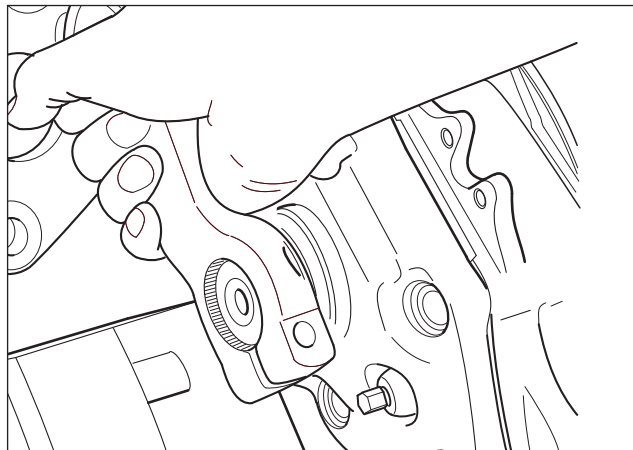


Fig. 16.20

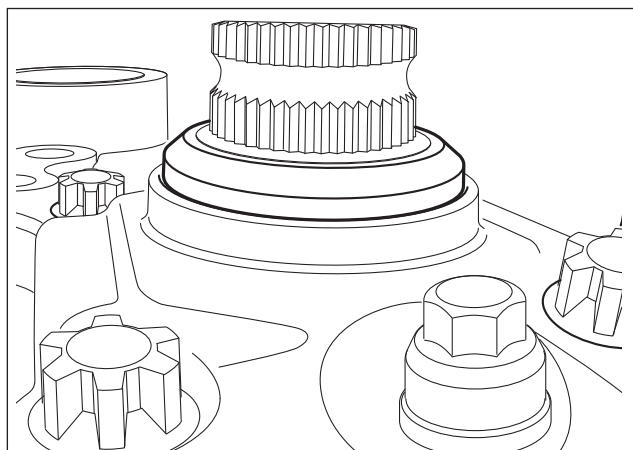


Fig. 16.21

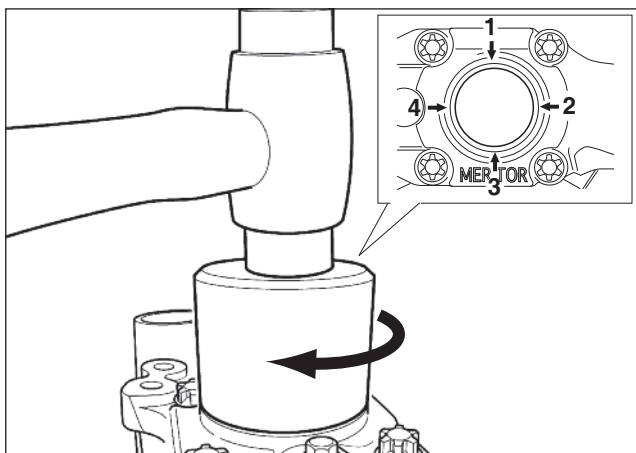


Fig. 16.22

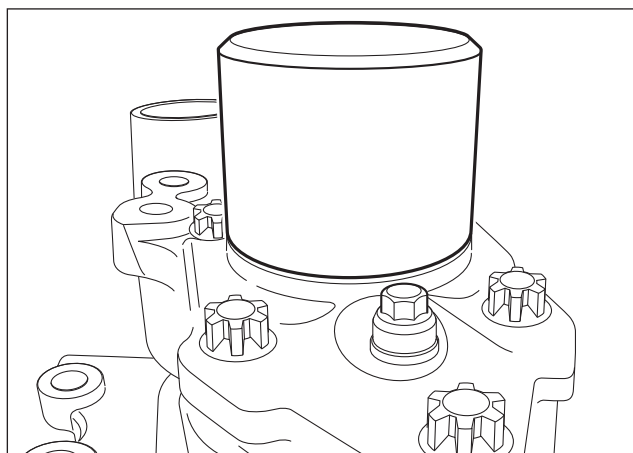


Fig. 16.23

16 Servicing & Maintenance

Refit the lever onto the operating shaft.

The clearance between the 'GAMMA' seal and the shield must be less than 1.00mm. Using a 1.00mm feeler gauge, check the clearance between the 'GAMMA' seal and the shield in four places, as shown in Fig 16.24 (lever is not shown for clarity). It should not be possible to fit the 1.00mm feeler gauge between the 'GAMMA' seal and shield.

NOTE: If a 1.00mm feeler gauge fits between the 'GAMMA' seal and shield at any of the four points shown in Fig 16.24, the seal must be removed. Check the shield is fitted correctly and refit the "GAMMA" seal, as detailed above.

T Where applicable, refit the separate actuator mounting bracket (Fig 16.25) and torque the fixing screws as follows:

3 x hexagon head screws - 106 - 132Nm (80 - 98 lb. ft)

4 x M12 socket head screws - 106 - 132Nm (80 - 98 lb. ft)

Push the lever towards the air chamber mounting face until a resistance is felt. Check the dimension from the center of the clevis hole in the lever to the air chamber mounting face on the mounting bracket (Fig 16.26).

The measurement should be as specified by the vehicle manufacturer. When the lever has been positioned correctly re-fit retaining screw and tighten to a torque of 60 - 72Nm (44 - 53lb.ft).

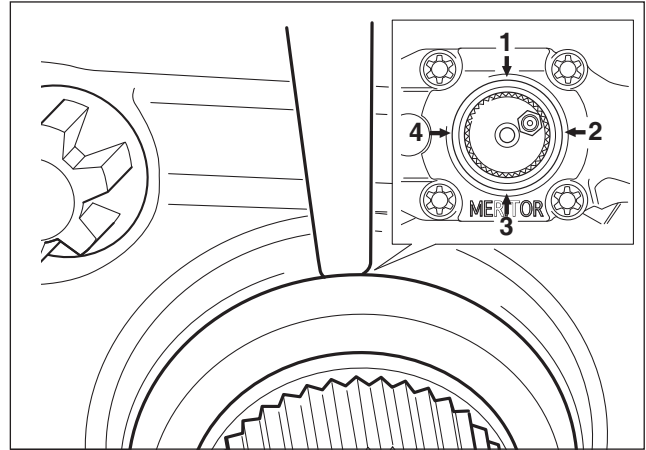


Fig. 16.24

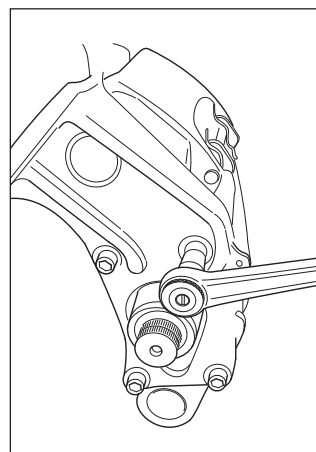


Fig. 16.25

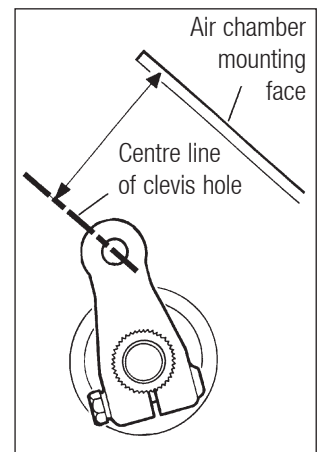


Fig. 16.26

16 Servicing & Maintenance

Later level op-shafts are fitted with a grease nipple.

Where applicable apply grease through the nipple (Fig 16.28) until grease purges past the outer seal (Fig. 16.29).

CAUTION: Grease must be injected into the Operation Shaft via the use of a hand pump only. Do not use a pneumatic pump to inject the grease.

If there is no sign of grease emerging after 6 pumps of the grease gun, stop. Dismantle lever, operating shaft and cover plate, as detailed in **Section 10 Cover plate Replacement**, to check all parts are fitted correctly

NOTE: Only use the grease supplied with replacement components/kits or that specified by the vehicle manufacturer. Under no circumstance should any other type of grease be used.

Re-fit the brake assembly to the vehicle, as described in **Section 6 Brake Replacement**.

Re-fit the air chamber. Slight adjustment of the air chamber clevis position may be necessary to align clevis pinhole and lever.

It is important that the lever is not pulled beyond its off position, (brakes off direction) in order to fit the clevis pin.

T Tighten both air chamber fixing nuts to an initial torque of 100Nm (74lb.ft) and a final torque of 190 - 210Nm (140-154lb.ft).

IMPORTANT: Do not attempt to alter the lever setting, detailed above, to achieve alignment of the clevis and lever hole.

Refit, or fit new, pads and the PWWI. Set the initial running clearance and test as described in **Section 3 Pad replacement**.

Carry out an automatic adjuster function check, as described in **Section 2 Operational Checks**.

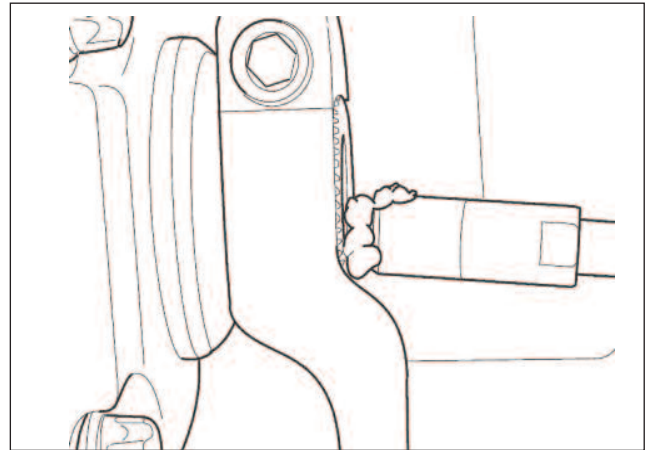


Fig. 16.28

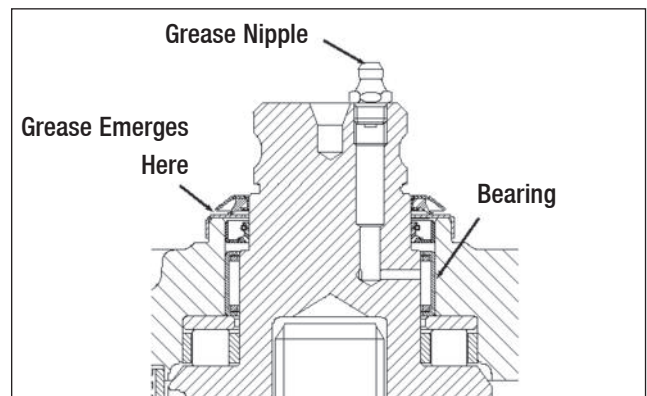


Fig. 16.29

16 Servicing & Maintenance

Grease

NOTE: Only use the grease supplied with replacement components/kits, or that specified by the vehicle manufacturer. Under no circumstance should any other type of grease be used.

Torque Values

Description	Torque
Long guide Pin Screw - D Lisa (Torque & Angle)	50Nm (37lb. ft.) + 127-137 degrees
Long guide Pin Screw - C Lisa (Torque & Angle)	50Nm (37lb. ft.) + 130-140 degrees
Short guide Pin Screw - C Lisa (Torque & Angle)	50Nm (37lb. ft.) + 97-107 degrees
Short guide Pin Screw - D Lisa (Torque & Angle)	50Nm (37lb. ft.) + 93-103 degrees
Cover Plate Screw	190 - 210Nm (140 - 154lb. ft.)
Spreader Plate Screw (where applicable)	42 - 50Nm (31 - 37lb. ft.)
Lever Pinch Screw	60 - 72Nm (44 - 53lb. ft.)
Actuator Mounting Bracket Screw - 4 Socket Head	106 - 132Nm (80 - 98lb. ft.)
Actuator Mounting Bracket Screw - 3 Hexagon Head	106 - 132Nm (80 - 98lb. ft.)
Brake Carrier Screw	To Vehicle Manufacturers Specification
Air Chamber Nuts	To Vehicle Manufacturers Specification or 100Nm (74lb. ft.) initial torque 190-210Nm (140 - 154lb. ft.) final torque

Service Diagnosis

pg. 108 Service Diagnosis Tables

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17 Service Diagnosis

Condition	Possible Cause	Check For	Corrections
Brake Drag	Incorrect initial adjustment	Correct pad-to-rotor clearance	Readjust to set the correct rotor-to- pad clearance
	Incorrect pad-to-rotor clearance	Automatic adjuster function	Replace adjuster, housing or brake assembly
	Spring or service brake not releasing	Correct operation of air system or air chamber	Refer to the vehicle manufacturer's instructions. Repair or replace parts as required
	Vehicle air system		
	Air line too short	Correct air line length	Replace the air line. Refer to the vehicle manufacturer's instructions
	Brake not releasing	Damaged guide pin excluders; Housing should move back and forth by hand with linings removed	Replace guide pins, excluders and bushes
			Replace the brake assembly
		Water entry or seized operation shaft, internal	Replace operating shaft and air chamber
Replace housing or brake assembly and air chamber			
Tappets not releasing: Damaged tappet excluders	Replace tappets, bushes and excluders		
	Replace housing or brake assembly		
Short brake pad lining life	Refer to Brake Drag	Refer to Brake Drag	Refer to Brake Drag
	Damaged rotor surface	Cracks or heavy heat spotting / banding	Refer to the vehicle manufacturers instructions or brake maintenance manual. Repair or replace parts as required
	Vehicle overload	Refer to weight limitations on the vehicle identification plate	Observe the vehicle manufacturers load recommendations
	Companion brakes do not work correctly	Inspect the companion vehicle brakes and air system.	Adjust or repair as required
Smoking brakes	High brake temperature	Refer to Brake Drag and Short brake pad lining life	Refer to Brake Drag and Short brake pad lining life: Can be a temporary situation with new or low mileage pads
	Contamination on the linings or rotor	Grease, oil, undercoating, paint, etc., on the linings or rotor	Inspect the hub seal. Replace as required
			Clean the rotor and brake assembly
		Replace the axle set of pads	

17 Service Diagnosis

Condition	Possible Cause	Check For	Corrections
. Poor stopping power . Long stopping distances . High brake pressures . Poor driver feel . Vehicle pulls to one side	Vehicle air system malfunction	Correct air pressure at the chamber inlet	Have the air system evaluated by a qualified brake system specialist
	Contamination on the linings or rotor	Grease, oil, undercoating, paint, etc., on the linings or rotor	Inspect the hub seal. Replace as required
			Clean the rotor and brake assembly
			Replace the axle set of pads
	Companion brakes not working correctly	Inspect the companion vehicle brakes and air system	Adjust or repair as required
	Brakes out-of-adjustment	Excessive pad-to-rotor clearance	Readjust to set the correct pad-to-rotor clearance
		Automatic adjuster function	Replace adjuster or housing assembly
	Pads not sliding in carrier / saddle	Excessive dirt / corrosion in pad locations	Clean pads and carrier / saddle locations
		Excessive wear in pad locations	Fit new carrier / saddle
	Incorrect pads installed	Refer to the vehicle manufacturer for the correct pads	Replace the axle set of pads
	Spreader / Thrust Plate not sliding smoothly in carrier / saddle	Spreader / Thrust Plate not sliding smoothly in carrier / saddle	Loosen plate fixing screw/s. Reposition plate on pistons / tappets. Re-tighten screw/s to specified torque
	Brake seized or sticking on guide pins	Damaged guide pin excluders; housing should move back and forth by hand with linings removed	Replace guide pins, excluders and bushes
			Replace the brake assembly
Vehicle overload	Refer to the weight limitations on the vehicle identification plate	Observe the vehicle manufacturer's load recommendations	
Brake noise/ Judder	Incorrect pad installation	Friction material facing the brake not the rotor surface	Correct the pad installation. Replace the pads and rotor, if necessary
	Incorrect pads installed	Refer to the vehicle manufacturer for the correct pads	Replace the axle set of pads

17 Service Diagnosis

Condition	Possible Cause	Check For	Corrections
Brake noise/ Judder, continued	Brake pads not free to move in the brake	Corrosion or debris on the pads or carrier / saddle pad locations	Clean or replace the pads, if necessary. Clean the pad locations on the carrier / saddle
		Excessive wear in pad locations	Fit new carrier / saddle
	Worn brake pads	Lining thickness	Replace the axle set of pads, if necessary
	Loose pads	Bent pad retainer or loose pad retainer screw	Replace or tighten the pad retainer
	Pad spring damaged or not installed	Correct pad spring installation	Install the pad springs
	Rotor cracks or excessive run-out / thickness variation	Excessive cracking, heat spotting / banding or run-out / rotor thickness variation	Refer to the vehicle manufacturer's instructions or brake maintenance manual. Repair or replace parts as required
	Brake component attachments are not installed to specification	Check for loose connections and fasteners	Tighten the connections and fasteners to the specified torque

Service Tools

18

pg.112 MST 1000 - Bush fitting tool

pg. 113 MST 1049 - 'GAMMA' Seal fitting tool

pg. 113 MST 1050 - Shield fitting tool

pg. 113 MST 1018 - Slide pin bush wear check tool

18 Service Tools

The following tools can be purchased from Meritor Commercial Vehicle Aftermarket

MST 1000 Bush Fitting Tool

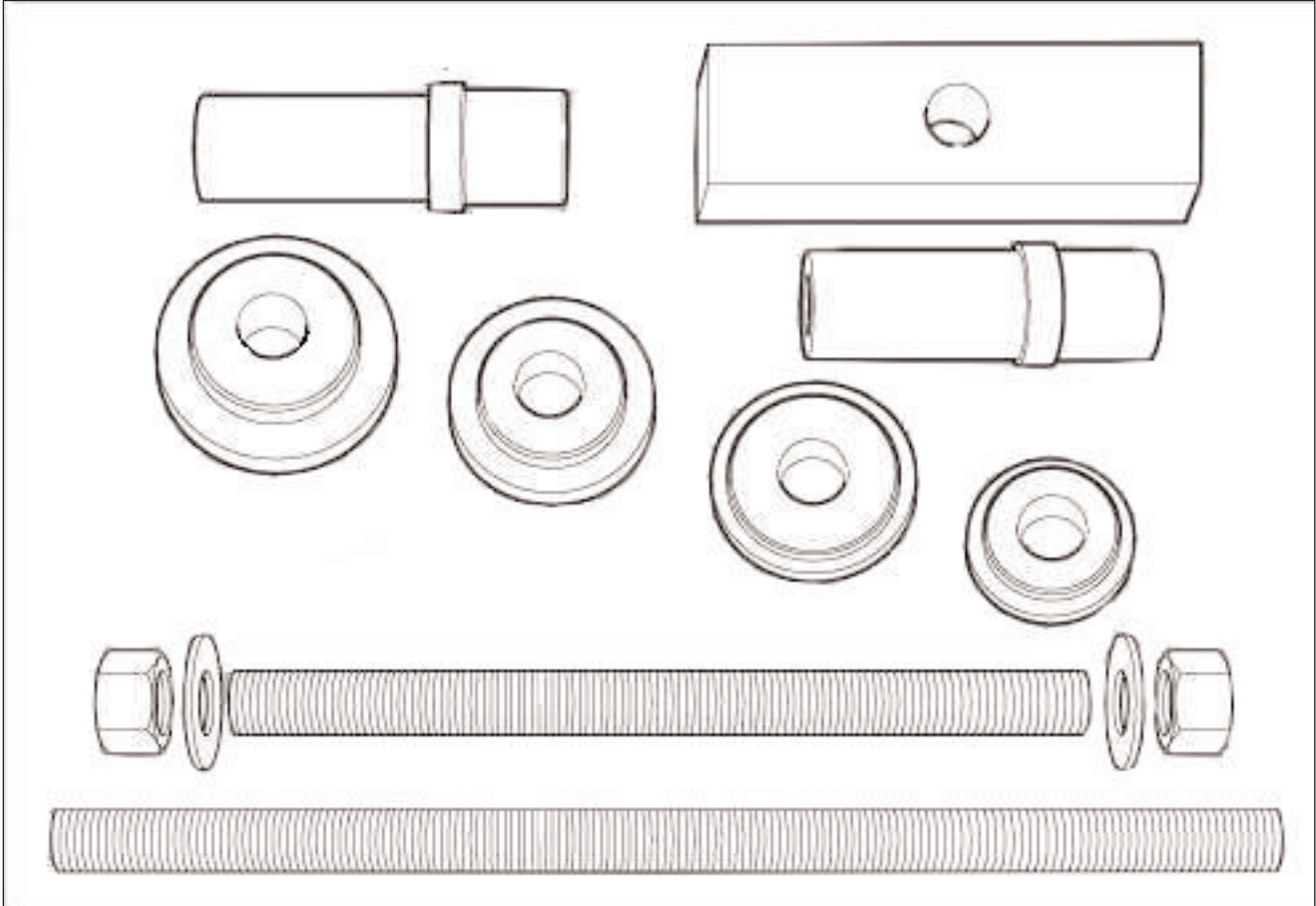


Fig. 18.1

18 Service Tools

MST 1018 Slide Pin Wear Tool

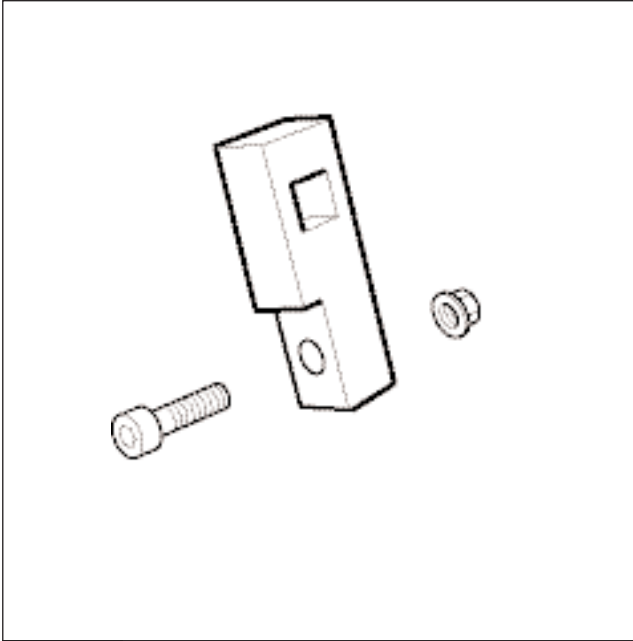


Fig. 18.2

MST 1049 'GAMMA' Seal Fitting Tool

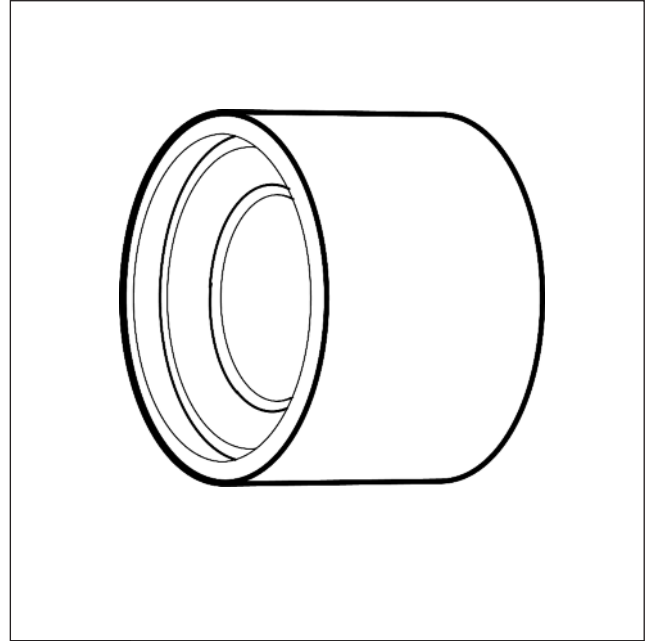


Fig. 18.3

MST 1050 Shield Fitting Tool

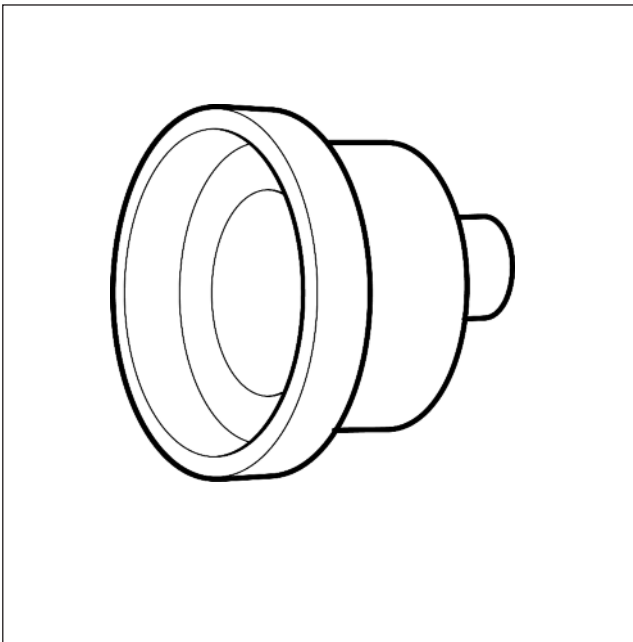


Fig. 18.4

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