

Meritor Inc. Air Disc Brake Service Manual ELSA 2

Issued: 02/2014



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Before You Begin

This publication provides installation and maintenance procedures for the ELSA 2 Reaction Beam Air Disc Brake. The information contained in this publication was current at the time of printing and is subject to revision without notice or liability.

The designated trademarks are registered marks of their respective owners and MERITOR Inc. and its affiliates are not commercially connected, affiliated, or associated with any of the owners of such marks. The MERITOR Inc. products presented herein are not endorsed or authorized by any of the trademark owners.

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 Inc. 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 manufacturers safety instructions for jacking up and securing the vehicle
- Only use original MERITOR Inc. parts
- Use only the tools recommended
- Observe the following service instructions and notes
 - Always ensure appropriate safety glasses and gloves are worn when carrying out the procedures detailed in this publication.
 - When working on the brake you must ensure that it cannot be activated inadvertently
 - 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 CVA. brake cleaner for cleaning the brake.
 - When removing or fitting a complete brake, you should remember it has a dead weight of up to 108lbs (49 kg). 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 the rotors that have been approved by the vehicle manufacturer.

Service Manual Issue Update Detail

The table below provides a brief description of the changes made from the previous (April 2008) edition of the service manual;

Date	Update	Page
02/2014	New layout style.	All
	New service notes section, latest standards.	2 & 3
	New exploded views and all annotations.	6 to 12
	Caution - Piston housing screw removal.	3,13, 48
	Actuator identification	16
	Housing actuator seal replacement	43
	Original Section 11 deleted	NA
	Servicing and maintenance section revised.	80
	Environmental warnings added.	2, 23, 25, 29, 31, 36, 40, 42, 54, 70 & 80

Access Information on MERITOR Inc.'s Web Site

Additional maintenance and service information for MERITOR Inc.'s commercial vehicle systems component lineup is also available at www.meritor.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 Inc.

Manual:

Maintenance manual no. MM-1130

Device:

ELSA 2 Reaction Beam Air Disc Brake
(Eccentric Lever Side Actuation)

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:

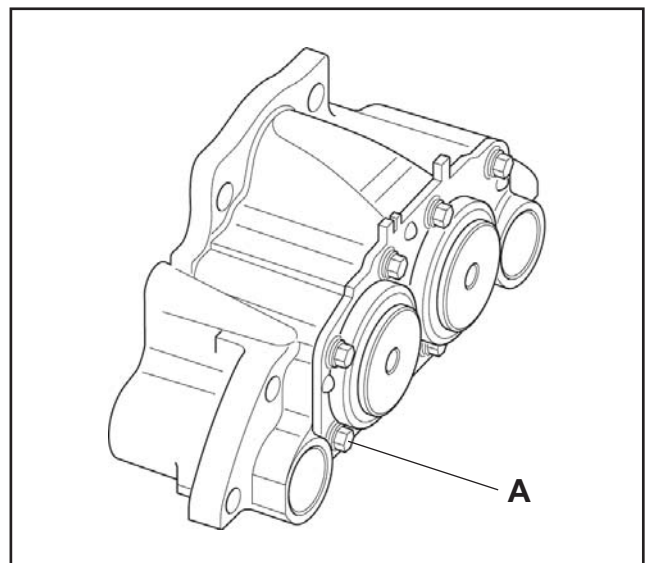
- Improper use of the vehicle on which the air disc brake is installed (usage conditions, overloading etc.)
- Tampering with vehicle components that may affect brake performance.
- Use of spare parts not approved by Meritor CVS.
- Improper installation, adjustment, repair or modification.
- Poor or improper 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 Inc. web site www.meritor.com

NOTE: The exploded and section views contained in this manual are for reference only. The internal components are not serviceable



CAUTION: The screws **A**, shown below, which secure the piston housing to the brakes assembly housing **MUST NOT** be removed. Evidence of tampering with the screws will void any warranty claim.



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Introduction

1

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Exploded View - Typical Axial Brake

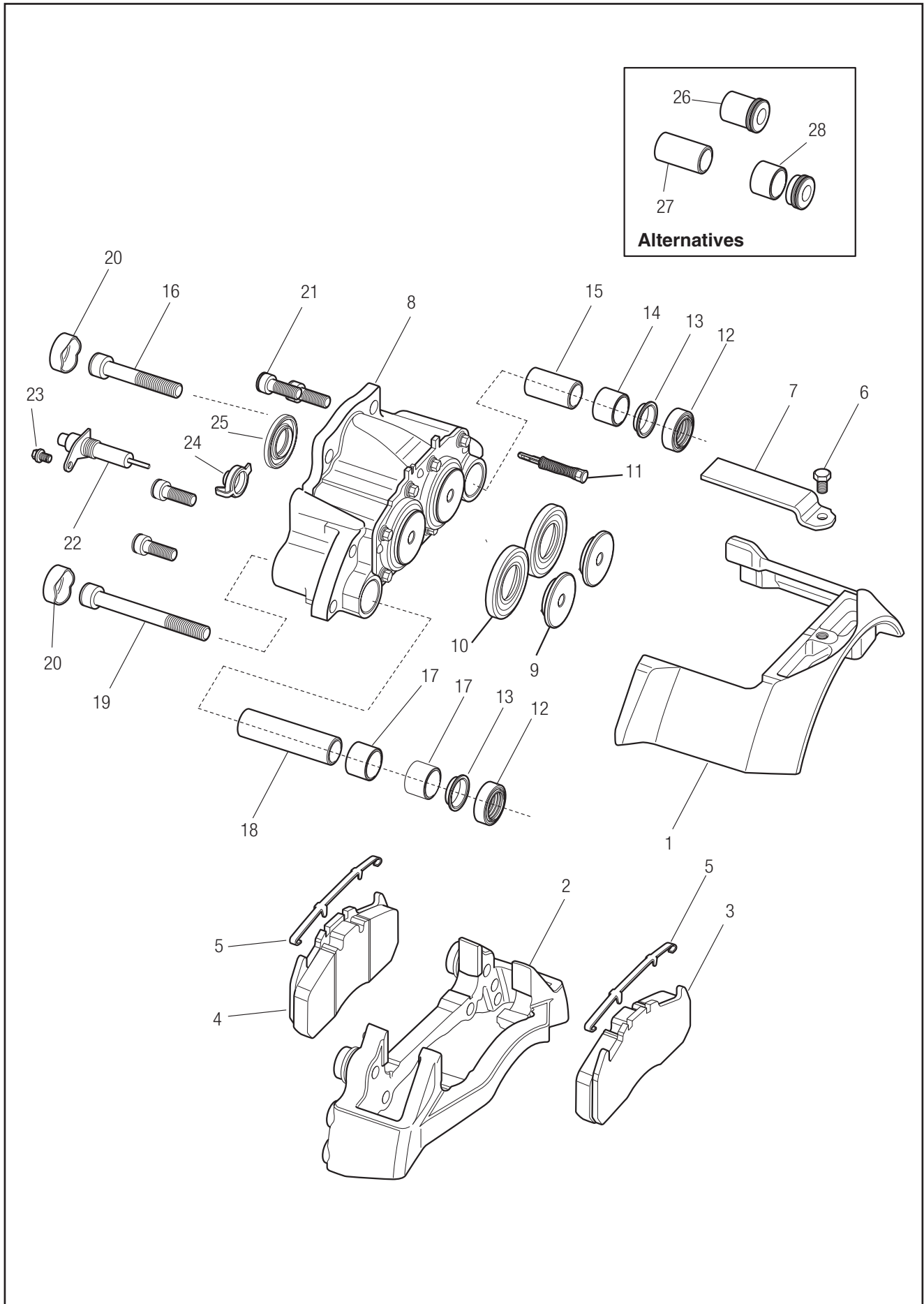


Fig 1.1

Exploded View Parts List - Axial Brakes

Ref	Description
1	Bridge
2	Carrier
3	Outer Pad
4	Inner Pad
5	Pad spring
6	Screw
7	Pad Retaining Plate
8	Housing
9	Piston Head
10	Tappet Excluder
11	Visual Pad Wear Indicator
12	Guide Sleeve Excluder
13	Guide Sleeve Excluder Retainer
14	Guide Sleeve Bush (Plain)
15	Oval Guide Sleeve (Short)
16	Guide Sleeve Screw (Short)
17	Guide Sleeve Bush (Plain)
18	Guide Sleeve (Long)
19	Guide Sleeve Screw (Long)
20	End Cap
21	Bridge Screw
22	Continuous Wear Sensor or Wear Switch
23	Retaining Screw
24	Manual Override Stem Cap
25	Actuator Seal

Alternatives

26	Guide Sleeve Bush (Rubber)
27	Plain Guide Sleeve (Short)
28	Guide Sleeve Bush (Oval)

Exploded View - Typical Radial Brake

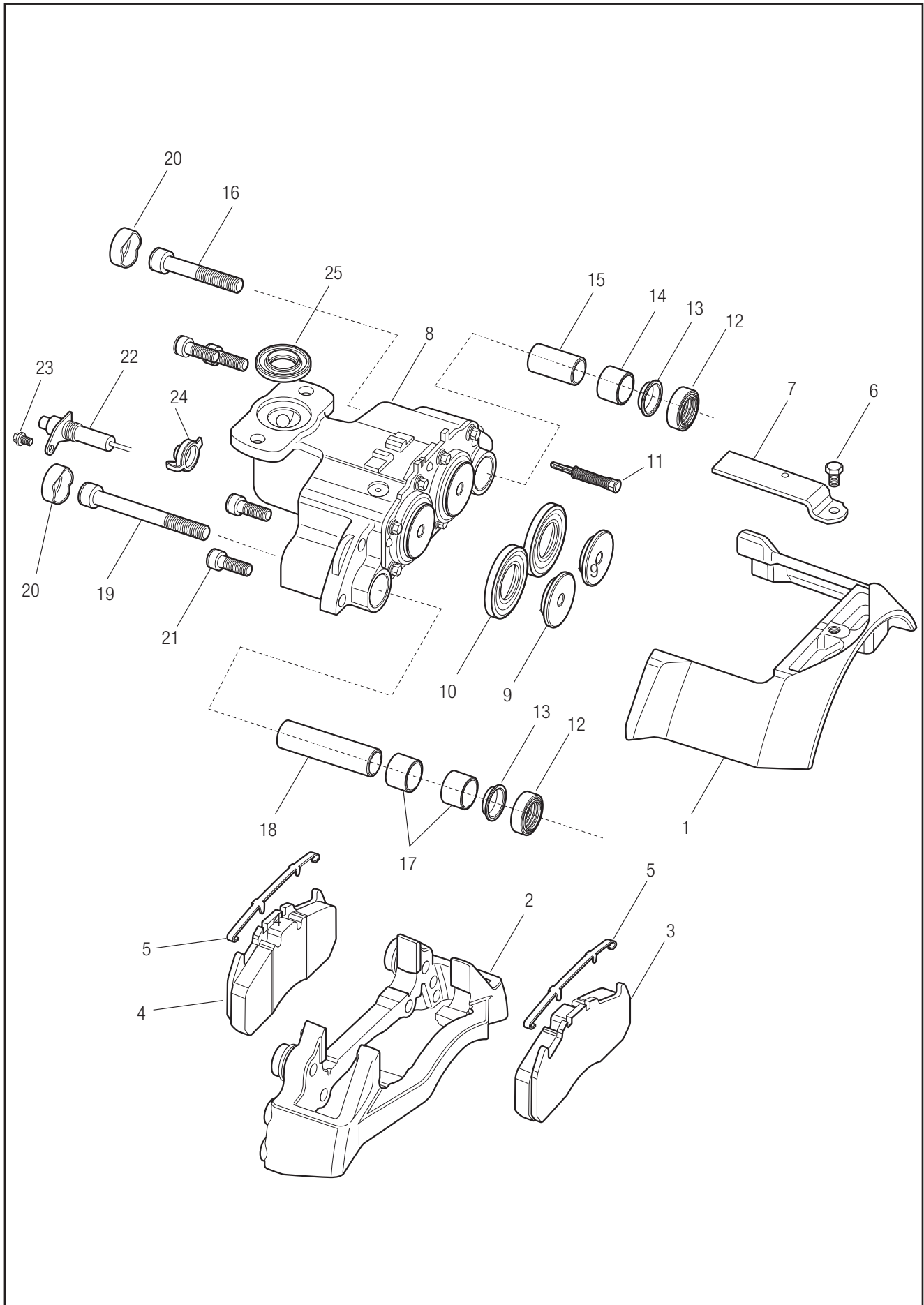


Fig 1.2

Exploded View Parts List - Radial Brakes

Ref	Description
1	Bridge
2	Carrier
3	Outer Pad
4	Inner Pad
5	Pad spring
6	Screw
7	Pad Retaining Plate
8	Housing
9	Piston Head
10	Tappet Excluder
11	Visual Pad Wear Indicator
12	Guide Sleeve Excluder
13	Guide Sleeve Excluder Retainer
14	Guide Sleeve Bush (Plain)
15	Oval Guide Sleeve (Short)
16	Guide Sleeve Screw (Short)
17	Guide Sleeve Bush (Plain)
18	Guide Sleeve (Long)
19	Guide Sleeve Screw (Long)
20	End Cap
21	Bridge Screw
22	Continuous Wear Sensor or Wear Switch
23	Retaining Screw
24	Manual Override Stem Cap
25	Actuator Seal

Section View - (Typical Brake Assembly)

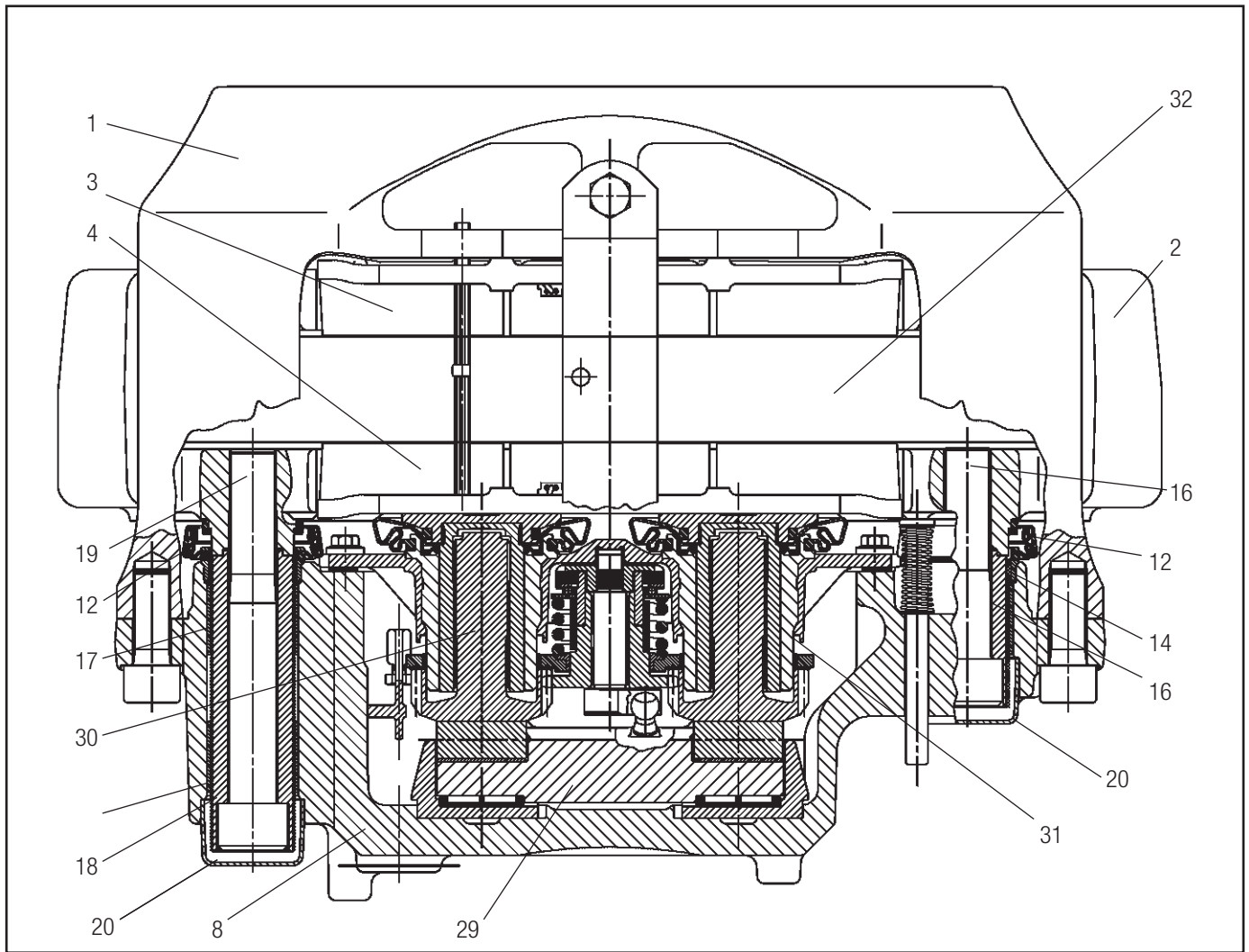


Fig 1.3

Ref	Description	Ref	Description
1	Bridge	17	Bush
2	Carrier	18	Guide sleeve - long
3	Outer pad	19	Guide sleeve screw - long
4	Inner pad	20	End cap
8	Housing	29	Operating shaft
12	Dust excluder	30	Tappet
14	Bush	31	Piston
15	Guide sleeve - short	32	Rotor
16	Guide sleeve screw - short		

Section View - (Typical Housing Assembly)

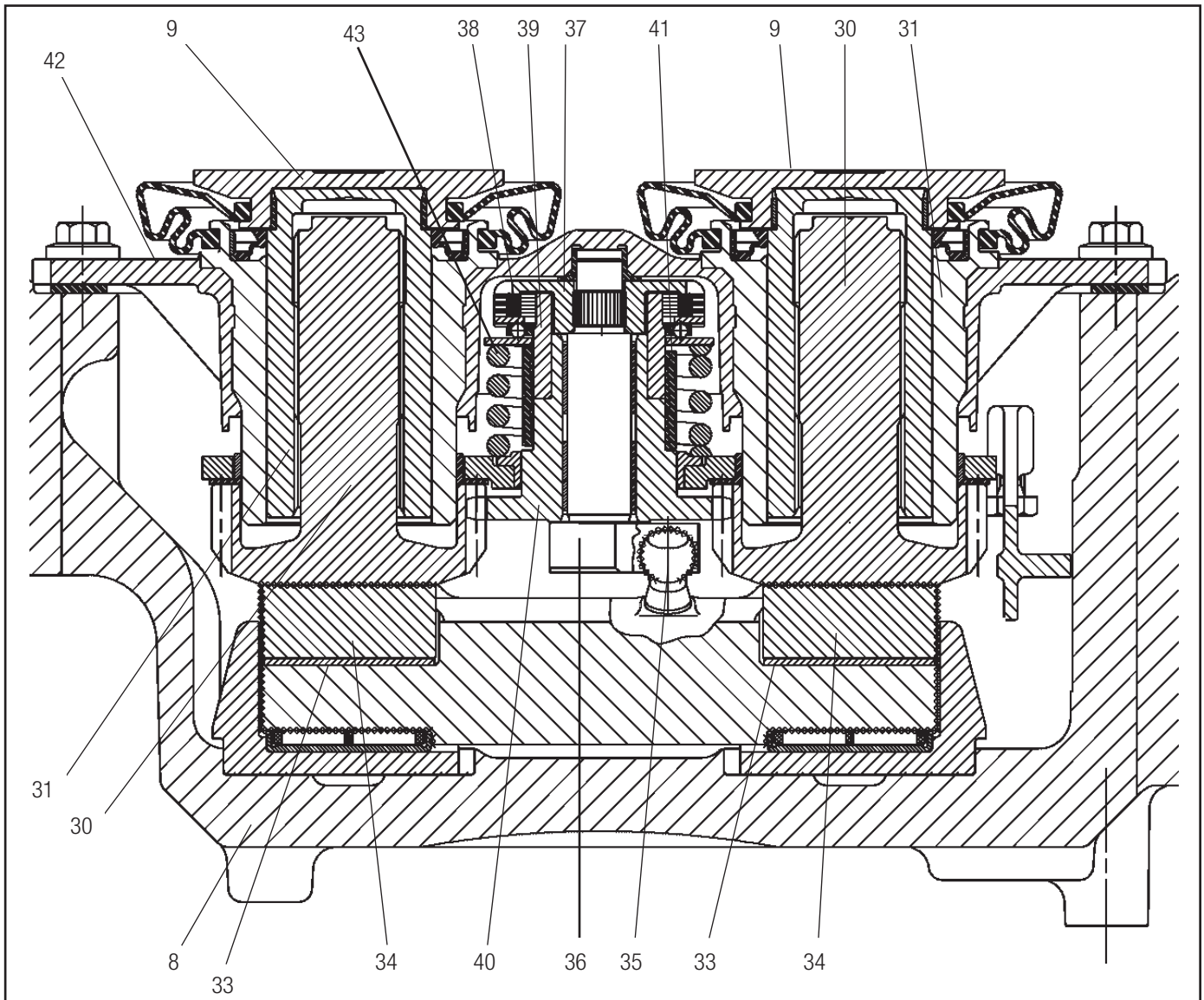


Fig 1.4

Ref	Description	Ref	Description
8	Housing	39	Adjuster inner drive sleeve
9	Piston head	40	Intermediate gear
30	Tappet	41	Unidirectional friction spring
31	Piston	42	Piston housing
33	Half bearing	43	Return spring
34	Roller		
35	Adjuster drive pin		
36	Adjuster fork & shaft		
37	Adjuster outer drive sleeve		
38	Adjuster clutch pack		

Section View - CWS (Continuous Wear Sensor)

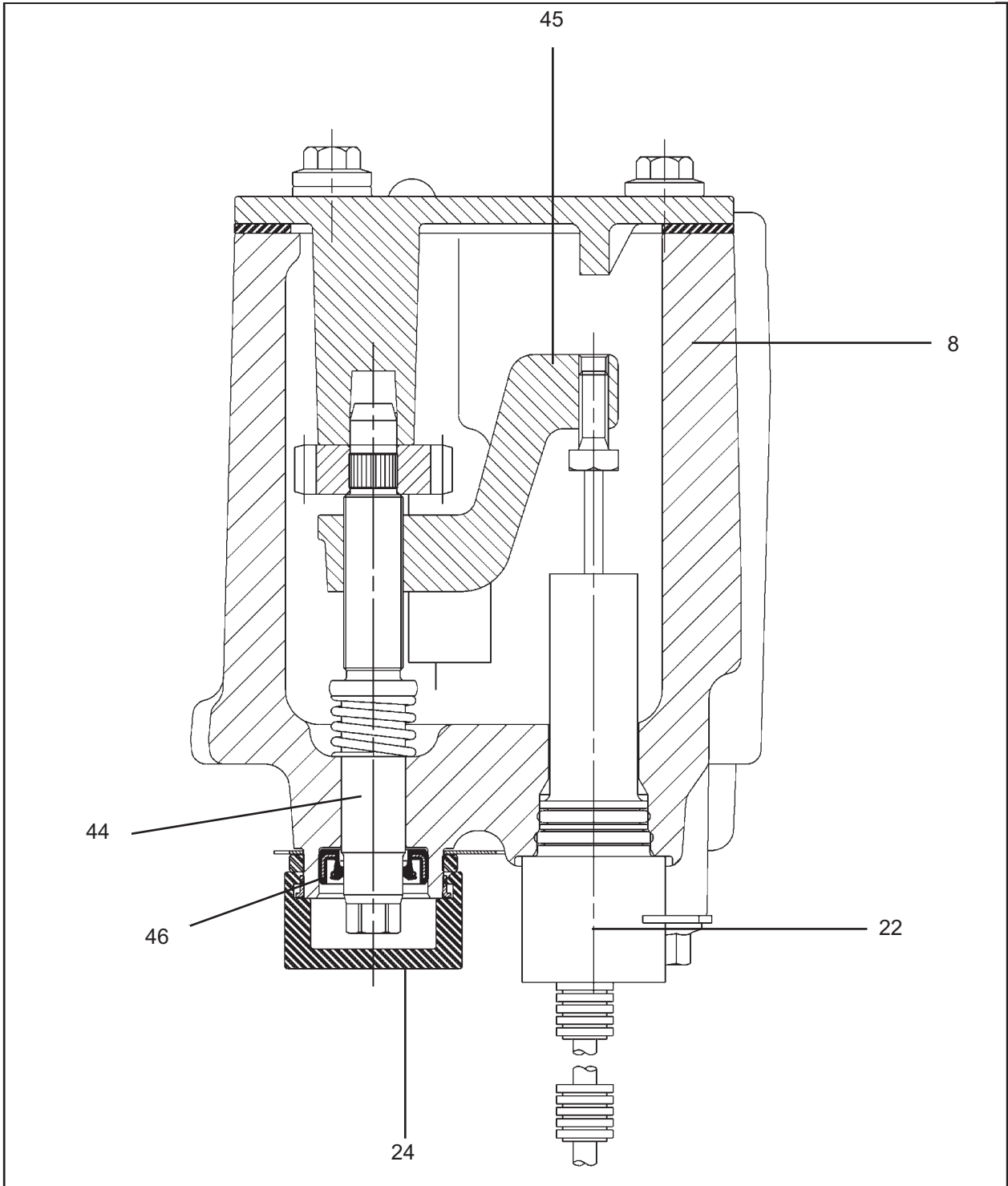


Fig 1.5

Ref	Description	Ref	Description
8	Housing	44	Manual adjuster shaft
22	Continuous wear sensor	45	Arm - wear sensor
24	Manual Override Stem Cap	46	Shaft seal

1 Introduction

Introduction

The air actuated disc brake has been designed to incorporate a direct mounted air chamber which is mounted axially as shown in Fig. 1.6 and radially mounted as shown in Fig. 1.7

The brake, detailed in the exploded view, 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 be observed to ensure that the brake gives satisfactory service throughout its working life.

NOTE: The exploded (Figs 1.1 & 1.2) and section views (Figs 1.3, 1.4 & 1.5) contained in this manual are for reference only. The internal components are not serviceable. The screws which secure the piston housing to the brakes assembly housing **MUST NOT** be removed.

Brake Identification Plate

The brake identification plate is located adjacent to the manual adjuster stem cover.

How it works

(Refer to Cross Sections - page 10, 11 & 12)

The air chamber/actuator is attached to the brake body and operates directly onto the internal operating shaft assembly, thus removing the necessity for the conventional external lever and linkage arrangement. Sealing between actuator and brake is achieved by seals located in the brake housing and actuator assembly. The carrier, secured to the vehicle, straddles the rotor and supports the brake pads. The body assembly slides on two fully sealed guide sleeves screwed to the brake carrier.

As the pads wear, adjustment takes place automatically and independently of load.

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

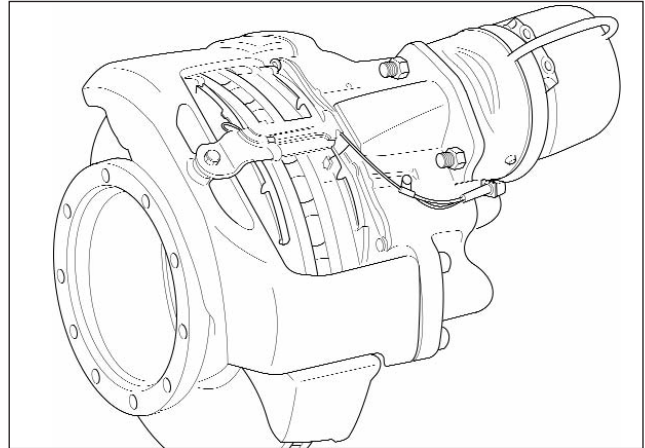


Fig. 1.6

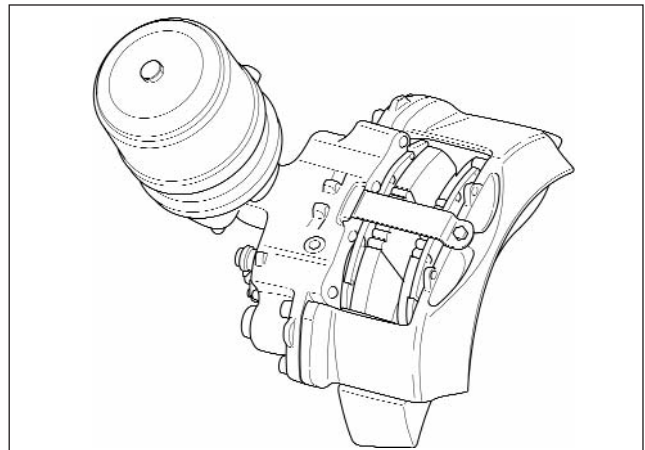


Fig. 1.7

Two guide sleeves (15, 18) are screwed on to the brake carrier (2) by means of guide sleeve screws (16, 19).

The brake carrier is connected to the stub axle. The housing (8) is mounted so that it floats on the guide sleeves and a bridge (1) is fixed to the housing (8) to provide the reaction force on the outboard pad (3).

The housing and bridge slide on 3 bushes (14, 17) which are pressed in to the housing (8). On the short guide sleeve side (15), the sleeve itself is oval to accommodate brake deflection during braking, note on the later brakes the ovality is transferred from the guide sleeve to the bush, whereas the longer sleeve (18) provides a more positive location for the housing. The guide sleeves are sealed externally by dust excluders (12) and two end caps (20).

1 Introduction

The force introduced from the air chamber is amplified by the geometry of the operating shaft (29). This clamping force is transferred to the inboard pad (4) via the half-bearings (33), the rollers (34), the tappets (30), the pistons (31) and the piston heads (9). Once the inboard pad (4) has been applied, the force of reaction acting through the floating housing (8) and bridge (1) pulls the outboard pad (3) on to the brake rotor (32).

The forces created by the friction of the brake pads on the brake rotor are transferred at the ends of the pads on to the carrier (2), which is rigidly mounted to the axle.

The brakes are released by reducing the input force on the operating shaft (29), thus reducing the clamp force of the brake.

The return spring (43) then returns the clamping mechanism and the operating shaft back to their starting position, leaving the pads with a defined running clearance to the rotor.

The small run-out of the brake rotor and hub-bearing clearances will then generate a small clearance for the outboard pad (3) through only a few revolutions of the rotor.

In some applications, an Electronic Continuous Wear Sensor (22) is fitted. This is shown in pages 11 & 12 and **Section 5** CWS replacement and constantly monitors the distance across the pads and the rotor, allowing the system to monitor and adjust brake balance as pad wear is recorded. The wear sensor (22) is driven by an arm (45) that runs up and down a fine thread on the manual adjuster stem (44). The arm cannot rotate within the housing (8) and as adjustment of the brake mechanism occurs, the manual adjuster stem (44) rotates and the arm travels up the length of the shaft, driving the sensor.

Automatic adjustment

The automatic adjuster makes an adjustment to the operation of the brake pad to compensate for pad wear. Every time the brake is applied, the system senses whether adjustment is required or whether the running clearance of the brake pads to the brake rotor is still within the built-in tolerance and does not need to be adjusted.

The built in tolerance is determined in the design by the clearance between the ball-ended drive pin (35) that is rigidly fixed to the operating shaft and the fork on the end of the adjuster shaft (36).

Operation without adjustment

From the rest position, the push rod of the air cylinder moves forward, rotating the operating shaft. Just as the pistons (31) have moved forward by the inbuilt running clearance, the ball-ended drive pin (35) starts to contact the driving side of the fork on the end of the adjuster shaft (36). Further movement of the air chamber push rod rotates the operating shaft (29), now causing the adjuster shaft (36) to rotate because the inbuilt clearance has been taken up. The outer drive sleeve (37) is fixed to the adjuster shaft (36) and rotates the inner drive sleeve (39) via the clutch pack (38). The inner drive sleeve (39) is linked to the intermediate gear (40) by a unidirectional friction spring (41) and this tries to rotate the tappets (30). However, the friction in the threads of the tappets (30) and pistons (31) has started to increase due to the clamping force on the pads and this prevents the pistons and tappets rotating relative to one another. The pistons cannot rotate in their housing (42) and due to the high torque to turn the tappets (30) the clutch pack (38) 'slips', preventing adjustment of the mechanism below the correct running clearance.

1 Introduction

Operation with adjustment

As a result of pad or rotor wear, the running clearance is now greater than the inbuilt tolerance and adjustment of the mechanism is now required. From the rest position, the push rod of the air cylinder moves forward, rotating the operating shaft (29). Just as the pistons (31) have moved forward by the inbuilt running clearance, the ball-ended drive pin (35) starts to contact the driving side of the fork on the end of the adjuster shaft (36). Further movement of the operating shaft, now causes rotation of the adjuster shaft (36) via the ball-ended drive pin (35). Driving through the clutch pack (38) and the unidirectional friction spring (41), the intermediate gear (40) rotates. Due to the excessive running clearance the tappets now rotate in the pistons. The pistons (31) cannot rotate and are, therefore, wound out from their housing (42). When the pads finally contact the rotor, the clamping force increases the thread friction in the tappets (30) and pistons (31). The torque to turn the tappets (30) then increases and the clutch pack (38) driving the intermediate gear (40) starts to slip, preventing further adjustment. The adjustment is not wound back during the return of the actuation mechanism. As the operating shaft (29) now returns to the brakes-off position, the ball-ended drive pin (35) travels back through the clearance in the fork on the end of the adjuster shaft (36). Once this clearance is taken up, the adjuster shaft (36) then rotates in the reverse direction, rotating the inner drive sleeve (39) via the clutch pack (38). However, in this direction, the unidirectional friction spring (41) cannot drive the intermediate gear (40), leaving the tappets (30) and intermediate gear (40) in the adjusted state. The system is now once again in its starting position.

Manual adjustment and de-adjustment during a pad change

Manual adjustment of the brake must only be made at a pad change. No manual intervention is required between pad changes.

A manual adjuster stem (44) runs in constant mesh with the gear form on the outside of the tappets (30). The end of this stem comes out from the brake housing through a seal (46) and is protected further by an adjuster cap (24). To increase the gap between the Piston Heads (9) and the bridge (1) in order to fit new pads, remove the adjuster cap (24) and rotate the shaft (44) in an anti-clockwise direction.

After fitting new pads an initial running clearance needs to be set and some manual adjustment may be required. To reduce the gap between the Piston Heads (9) and the bridge (1), remove the adjuster cap (24), locate a 10mm socket on the adjuster stem (44) and turn it clockwise viewed from the air actuator side.

NOTE: Ensure, if fitted, the electrical wear sensor cable is not damaged when using the manual adjust/de-adjust stem (Fig 1.8).

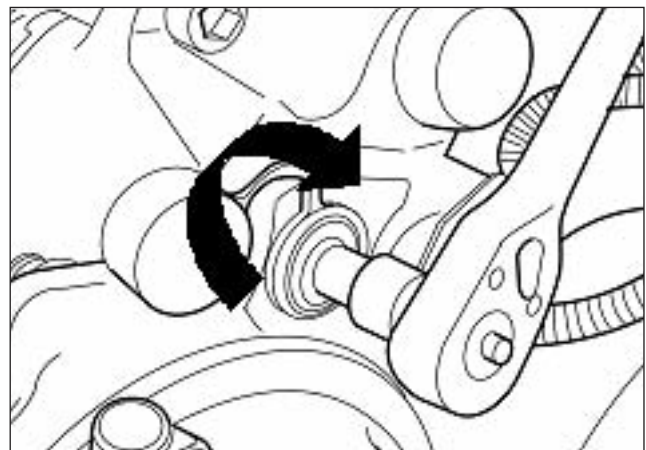


Fig. 1.8

Continue to adjust the brake until the pads lightly grip the rotor. De-adjust the brake by $\frac{1}{2}$ a turn of the wrench, this will give a nominal 1mm pad to rotor clearance.

Ensure the rotor is free to turn. Replace the adjuster cap (24).



WARNING:

Always de-adjust/adjust the brake carefully by hand with a suitable wrench. Never exceed a maximum torque of 40 Nm in either direction and NEVER use power tools.

1 Introduction

Actuator

The ELSA 2 disc brake uses a 76 mm stroke actuator, (Fig. 1.9).

This actuator is supplied with a pushrod setting length of 20 mm.

It is important the correct actuator is fitted. Shorter stroke actuators have a 15mm pushrod length, and are not suitable for ELSA 2 brakes.



CAUTION: If an incorrect brake actuator is fitted, difference in push rod length will result in partial application of the brake when the actuator is bolted to the housing, this may lead to the brake dragging.

The actuator can be identified by part number on the actuator nameplate.

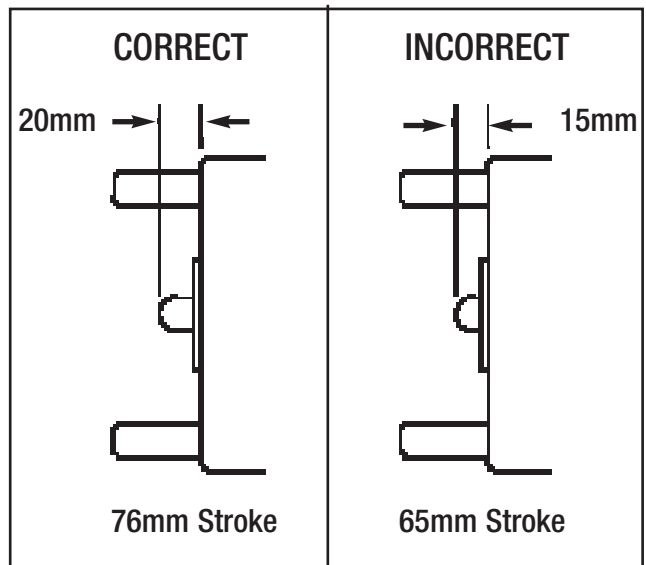


Fig 1.9

Operational Checks

2

- 18 Automatic adjustment function test
- 20 Checking guide pin sliding action
- 20 Checking guide sleeve wear
- 23 Pad wear check
- 24 Rotor inspection & maintenance

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 parking brake is fully released (where appropriate). Jack up the axle and fit suitable axle stands securely. Remove the road wheels

Procedure

Remove the dust cap on the adjuster stem (Fig. 2.1).

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 pad and the rotor.

To de-adjust the brake locate a suitable 10 mm socket wrench on the adjuster stem and rotate the wrench in an anticlockwise direction as 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 ¼ turn

WARNING

Always de-adjust/adjust the brake carefully by hand with a suitable wrench. Never exceed a maximum torque of 40 Nm in either direction and NEVER use power tools.

As an adjuster function indicator; position a 10 mm ring wrench on the adjuster stem, (Fig. 2.3) to allow at least ¼ turn of free movement in the clockwise direction viewed from the air chamber side.

CAUTION: While operating the brake, DO NOT hold the wrench.

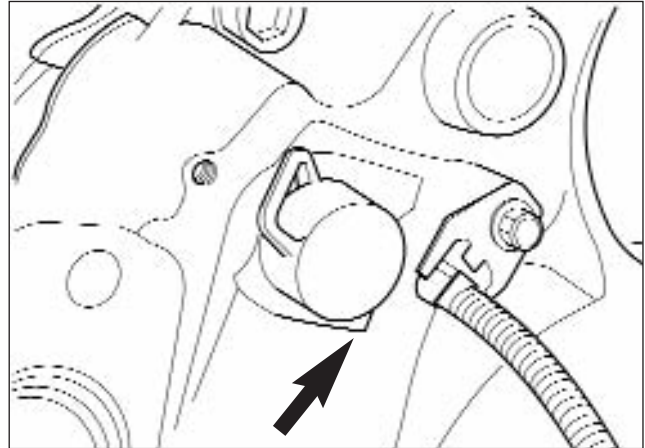


Fig. 2.1

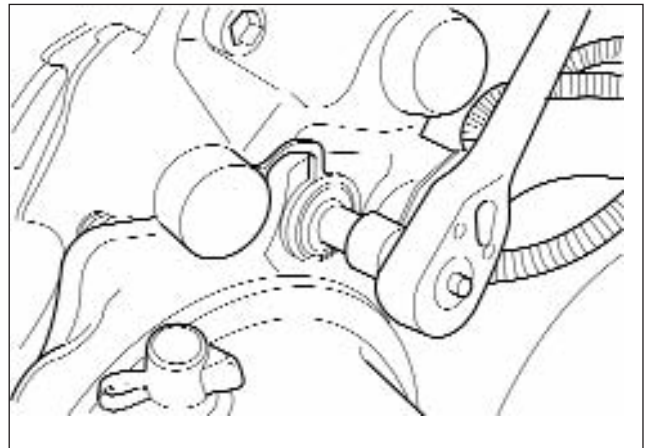


Fig. 2.2

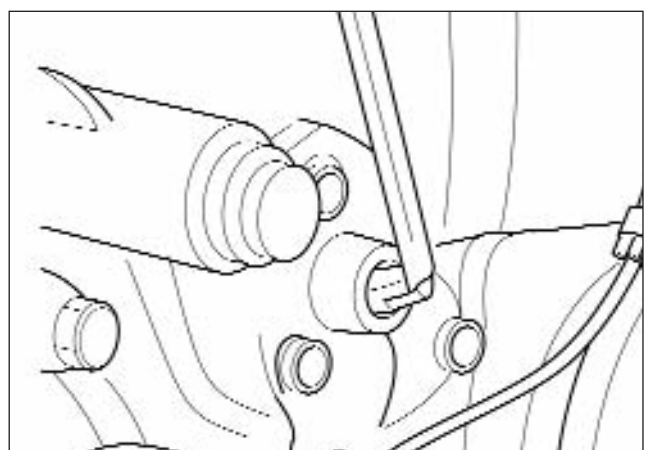


Fig. 2.3

2 Operational Checks

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

Observe the direction of rotation of the ring wrench. This should be in a clockwise direction viewed from the air chamber side as shown in Fig 2.4 or 2.5

NOTE: As the number of brake applications increase, the movement of the ring wrench will become smaller.

Possible faults:

- Ring wrench does not turn
- Ring wrench turns backwards and forwards.

If any of the above faults arise, the housing assembly must be replaced, see **Section 8**.

After a successful check set the running clearance between the brake rotor and pad. To do this, turn the adjuster stem in the clockwise direction viewed from the air chamber side until an increase in resistance is felt. If the wheels have been removed check both pads touch the rotor. Then turn the adjuster back $\frac{1}{2}$ turn thus creating a running clearance.

Refit the dust cap on the adjuster stem

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.

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.

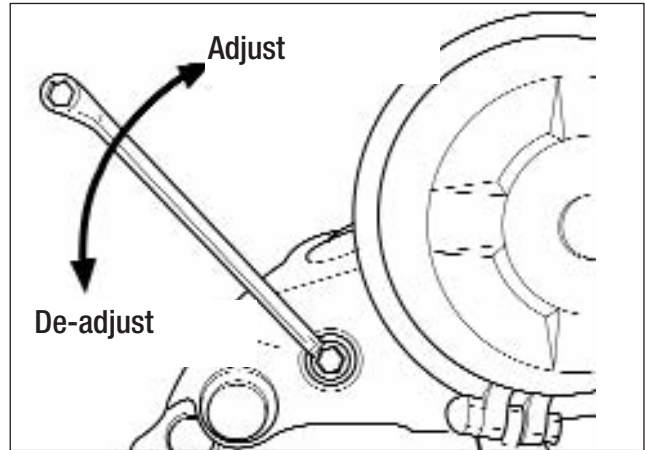


Fig. 2.4

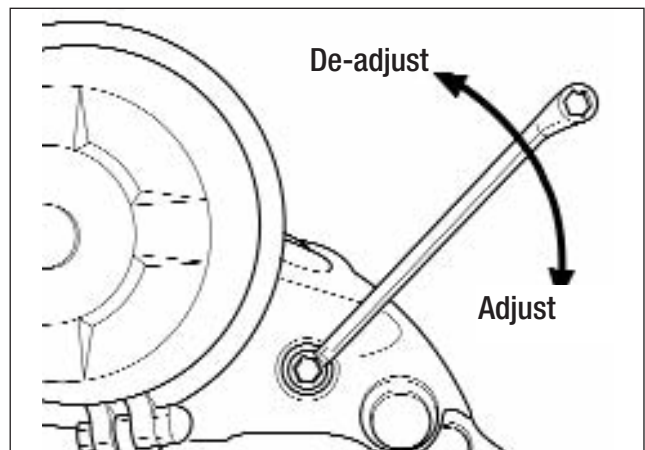


Fig. 2.5

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.

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



CAUTION:

Take care not to trap fingers whilst sliding the brake.

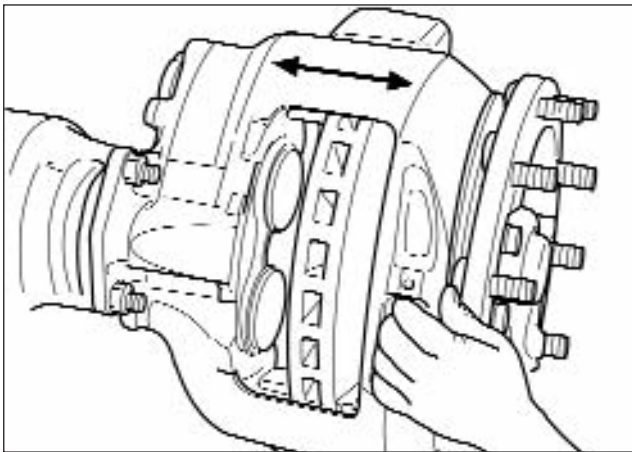


Fig. 2.6

Checking Slide Pin Bush Wear

Radial Test

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

Fit the Meritor CVA service tool MST 1017 (Fig. 2.7) to the pad retaining plate screw hole in the correct position (Fig. 2.8). The slot in the tool must be parallel to the rotor.

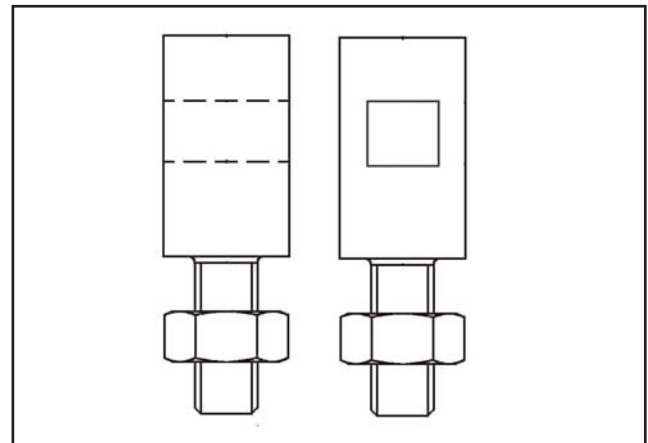


Fig 2.7

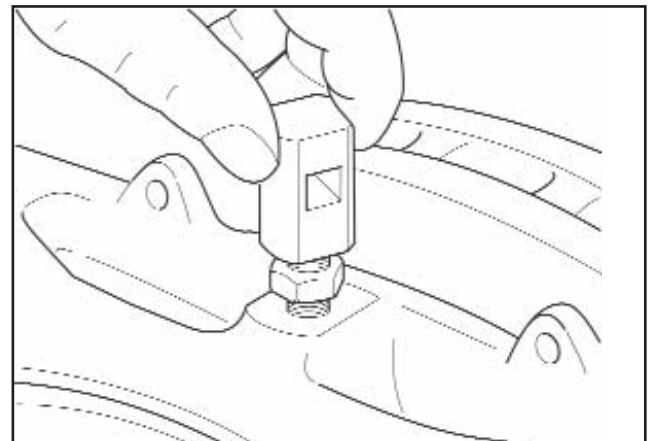


Fig 2.8

2 Operational Checks

Lock the tool in position with the locknut as shown in Fig 2.9.

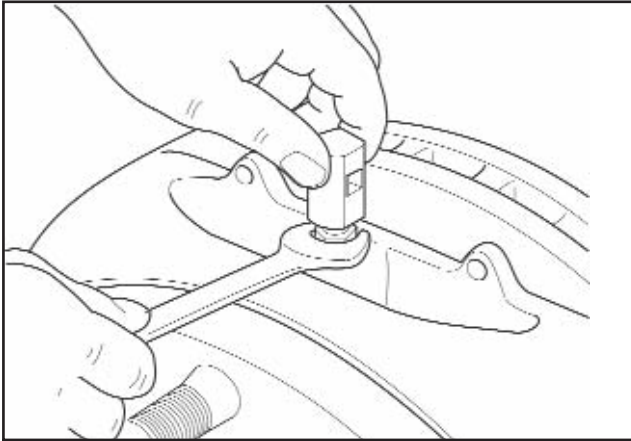


Fig 2.9

Position the brake in the new pad condition. This is achieved by sliding the brake housing fully in the direction of arrow A (Fig. 2.10) (Towards the wheel hub)

CAUTION:

Take care not to trap fingers whilst sliding the brake.

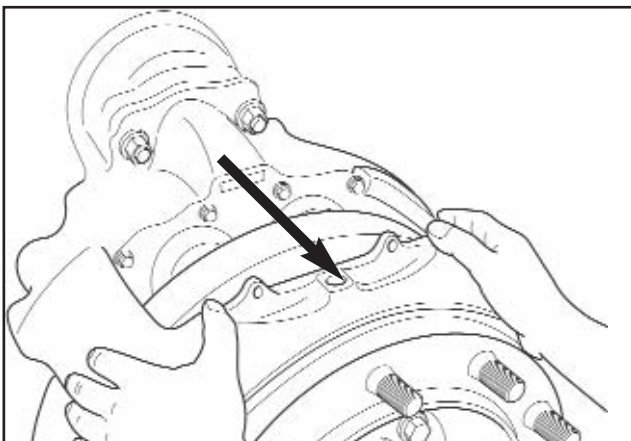


Fig 2.10

Mount a dial gauge in a suitable position on the vehicle hub and set against the service tool as shown in Fig. 2.11. Ensure the hub cannot rotate

Set the dial gauge to zero.

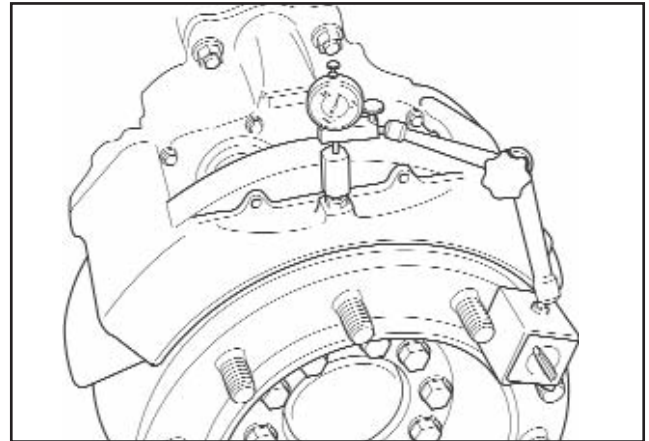



Fig 2.11

Fit a torque wrench to the tool in the position as shown in Fig. 2.12.

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

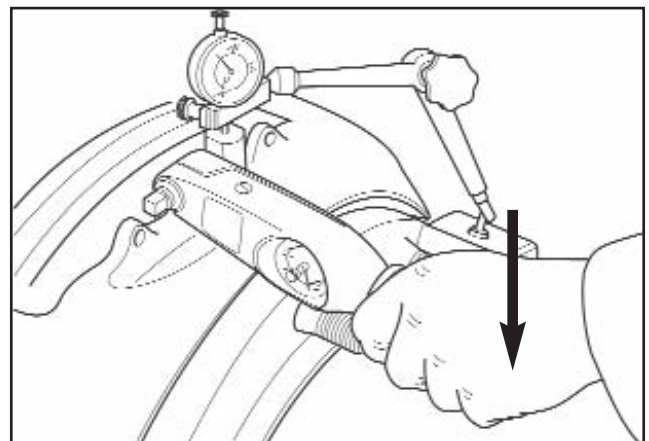


Fig 2.12

2 Operational Checks

Remove the torque wrench and fit to the opposite side socket in the service tool (Fig. 2.13).

NOTE: DO NOT RESET THE DIAL GAUGE.

T Apply the torque wrench in the correct direction (Fig 2.13) up to 25Nm 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 11.**

Remove the service tool MST 1017

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

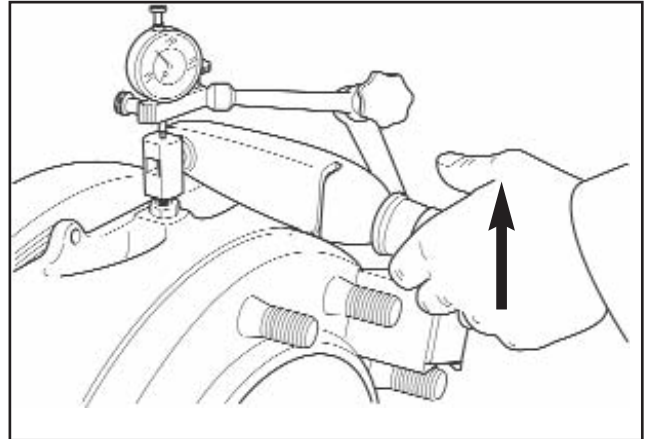


Fig 2.13

2 Operational Checks

Pad Wear Check

The ELSA 2 Air Disc Brake can incorporate a variety of devices to monitor pad wear.

These can include either, or a combination of;

- PWWI (Pad Wear Warning Indicator) which is fitted to the pad/s (Fig 2.14 shows a typical arrangement).
- An electronic CWS - continuous wear sensor (Fig 2.15a) or switch (Fig 2.15b) within the brake.
- A visual wear indicator (Fig 2.16).

Both options a & b above 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.

Where a visual pad wear indicator is incorporated into the brake it provides a quick and simple method of assessing the pad life remaining.

In a new pad condition the end of the indicator stem will extend past the edge of the housing casting (Fig 2.16). When the amount protruding from the casting reduces to a measurement of 4 mm (Fig 2.17) then detailed examination of the pad material remaining is required.



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.

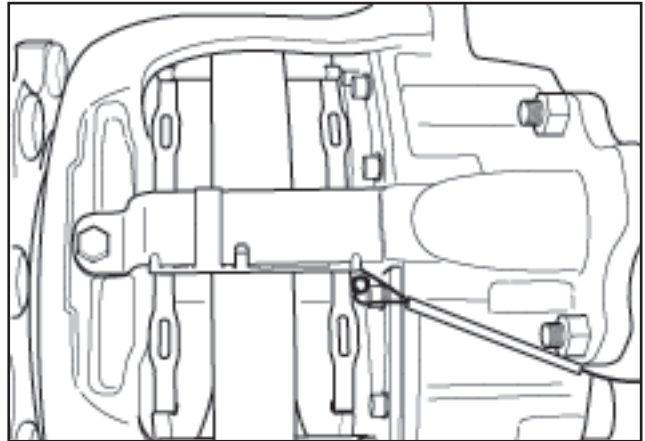


Fig 2.14

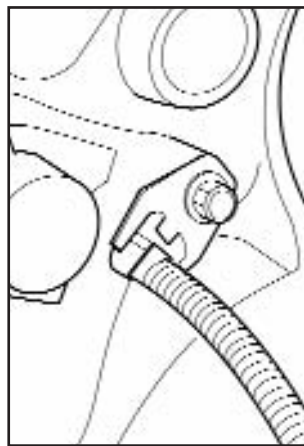


Fig 2.15a

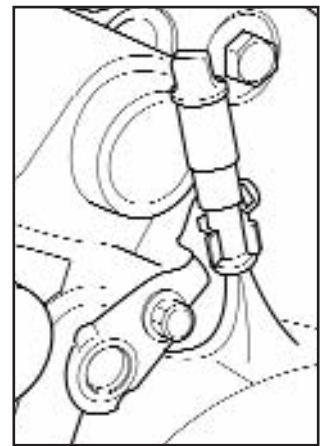


Fig 2.15b

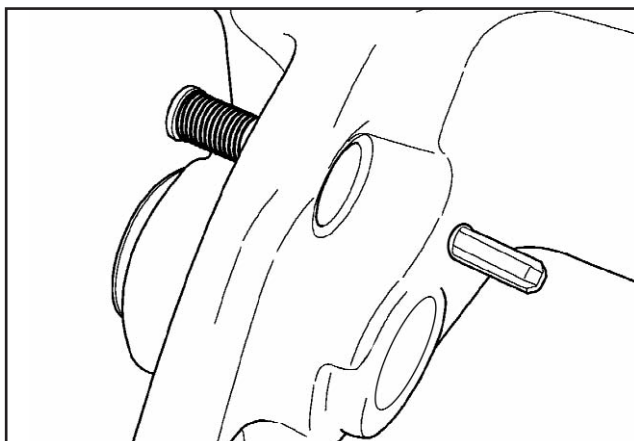


Fig 2.16

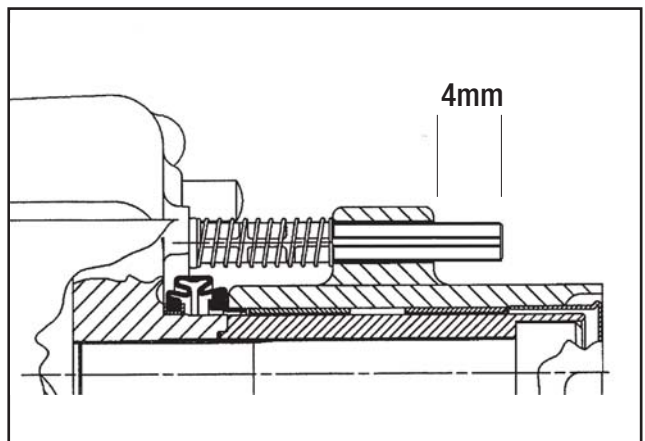


Fig 2.17

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.

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

Rotor

Check that the rotor's thickness dimension meets the manufacturer's specification and those detailed in the Rotor Wear Conditions, **Section 12**. 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 2.18)

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.

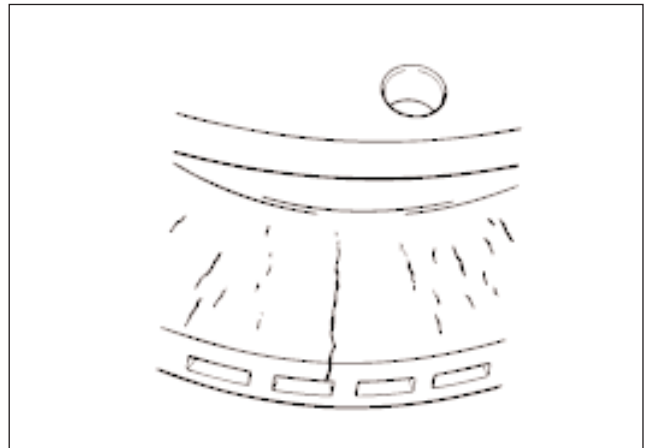


Fig 2.18

Heat Crazing

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 2.19)

Light heat crazing is fine, tight cracks in the rotor's surface. Continue to use a rotor with light heat crazing.

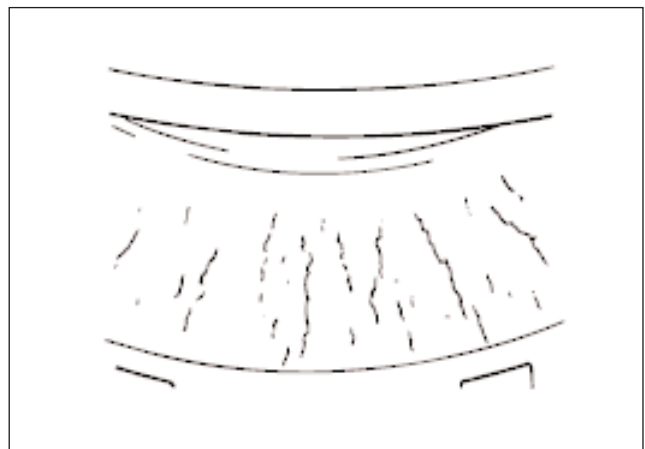


Fig 2.19

2 Operational Checks

Heavy Heat Cracking (Fig 2.20)

Heavy heat cracking 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 cracking.

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.

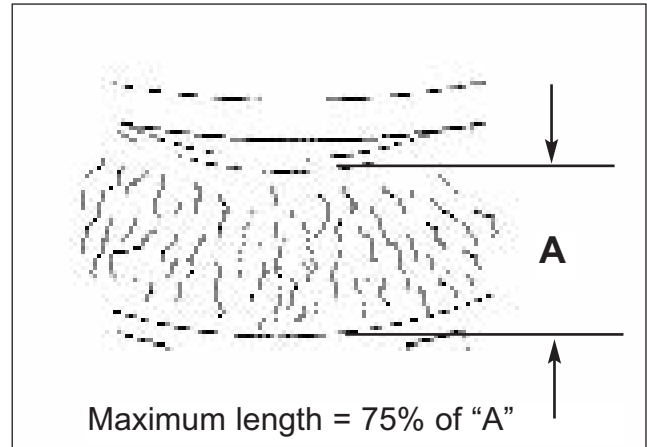


Fig 2.20

Scoring (Fig 2.21)

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.

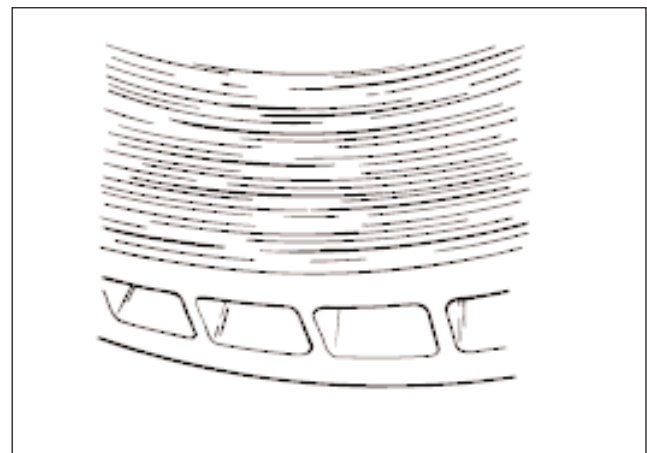


Fig 2.21

"Blue" Rotor (Fig 2.22)

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.

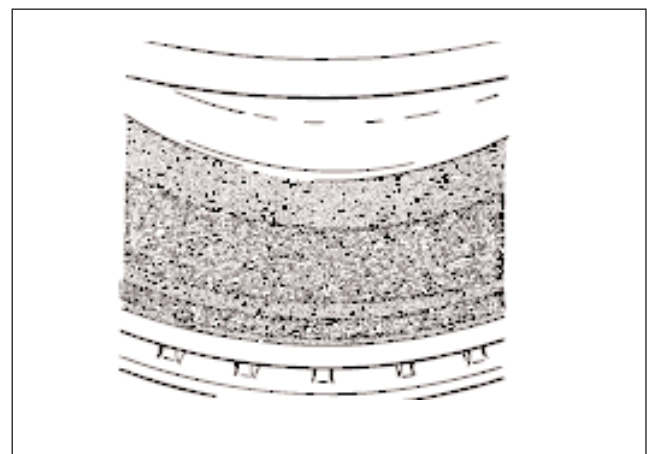


Fig 2.22

2 Operational Checks

Pad Replacement

3

- 28 Pad wear indicators
- 30 PWVI removal
- 31 Pad removal
- 31 Cleaning & Inspection
- 31 Pad Fitting
- 32 PWVI fitment

3 Pad Replacement

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.

The Elsa 2 Air Disc Brake uses a number of devices to monitor pad wear. These fall into 2 categories:

1. Device fitted to the body of the brake
2. Device fitted in the pad area.

The variations depend on the vehicle specification. Listed below are the variations that will be encountered when servicing the brake.

Category 1

A. Continuous wear sensor

This device is used in conjunction with electronic braking system. Its function is to continuously monitor the pad and rotor wear and feed this information to the electronic system. Fig. 3.1 identifies a brake fitted with a continuous wear sensor.

B. Wear switch

The wear switch is fitted in place of a continuous wear sensor. The wear switch will indicate a fully worn pad via a light within the cab. Fig.3.2 shows a brake fitted with a wear switch.

C. Pad wear out indicator (visual indication)

This is a simple device which indicates the amount of pad material remaining with reference to a plunger which protrudes from the housing. Fig. 3.3 shows a brake fitted with a pad wear out indicator.

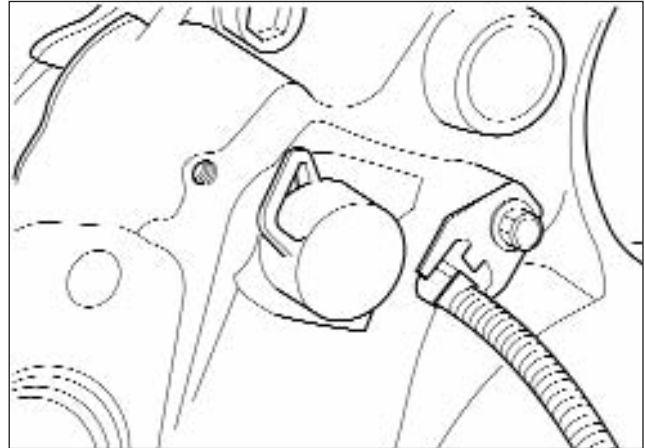


Fig. 3.1

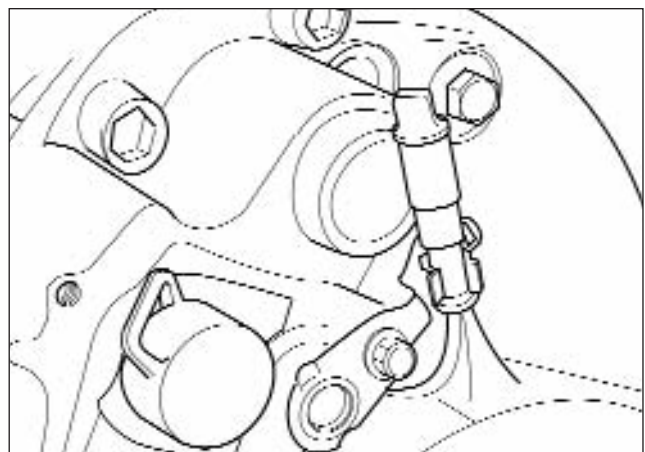


Fig. 3.2

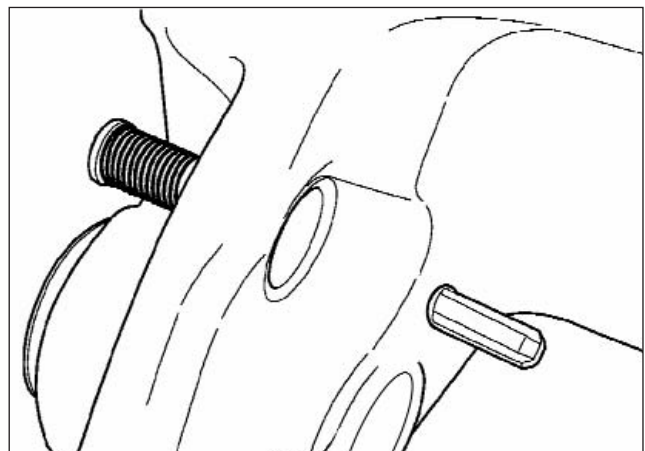


Fig. 3.3

3 Pad Replacement

Category 2

PWWI Early version (two types)

This device will light a warning lamp in the cab to indicate that a pad change is required (Fig. 3.4)

NOTE: The later version is interchangeable with the above version and should be used as a replacement whenever possible.

Pad wear indicator

Fig. 3.5 shows an alternative assembly. Both these earlier versions are replaced by the one later version.

Pad wear indicator - later version

This version is a direct replacement for the earlier version. Fig. 3.6 When replacement of a PWWI is required the later level should be used. It is interchangeable with the old level.


Pad replacement

Brake pad should be replaced when the lining thickness has worn to 3 mm. Always replace brake pads in axle sets.

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. 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. Ensure the rubber dust excluders fitted to the tappet heads and guide sleeves are not damaged.

CAUTION:

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.

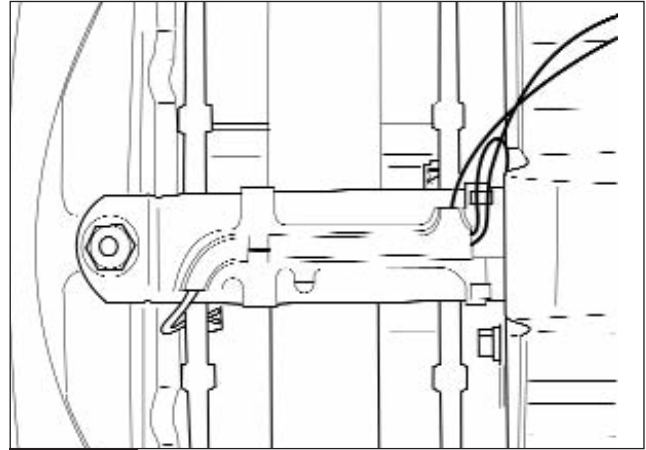


Fig. 3.4

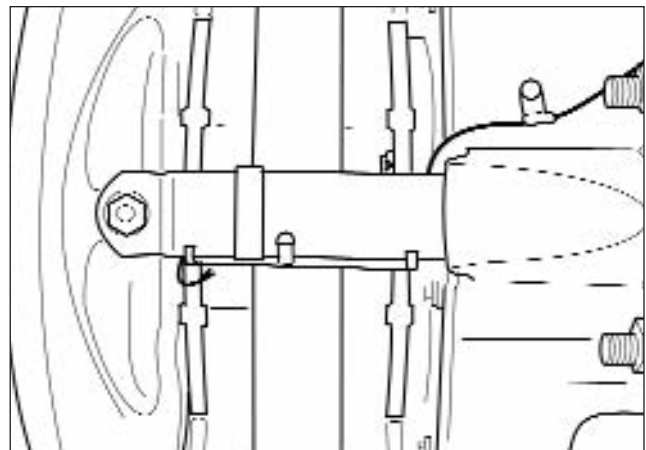


Fig. 3.5

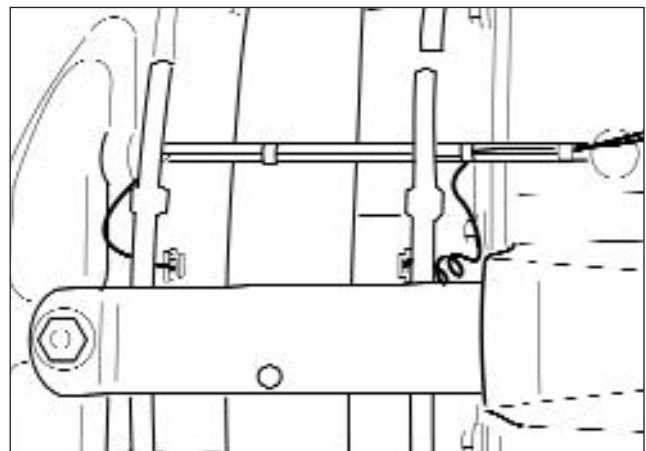


Fig. 3.6

3 Pad Replacement

Removal of early level PWWI

Remove the pad retaining plate screw (Fig. 3.7)

Remove the pad strap from the slot in the brake casting but do not attempt to remove it further at this stage (Fig 3.8).

Remove pad springs. Carefully remove both plastic blocks from their location in the pads. Do not use excessive force as this may result in damage. (Fig. 3.10)

It is now possible to remove the pad strap and PWWI assembly as far as the connecting cable will allow. Ensure that this cable is not stretched.

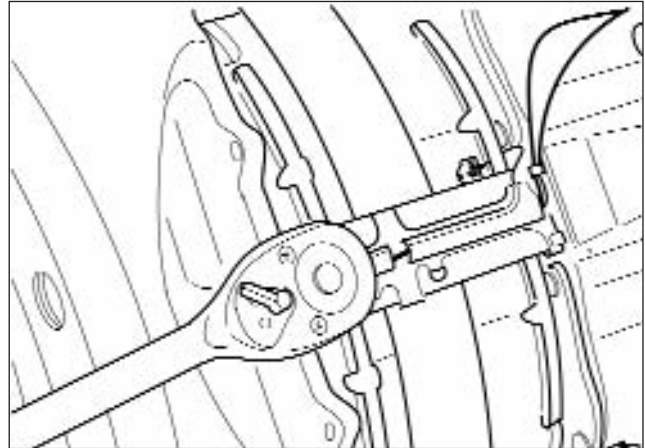


Fig. 3.7

Removal of later level PWWI

NOTE : With this version the PWWI is separate from the pad strap.

Remove the pad strap by removing the pad retaining screw as described in the previous section. Remove both pad springs. Carefully remove both plastic blocks from their location in the pads. Do not use excessive force as this may result in damage. (Fig. 3.10)

Carefully lever out the plastic rivet holding the PWWI assembly to the brake body. (Fig. 3.9) - The complete PWWI assembly can now be placed aside ensuring that the connecting cable is not stretched.

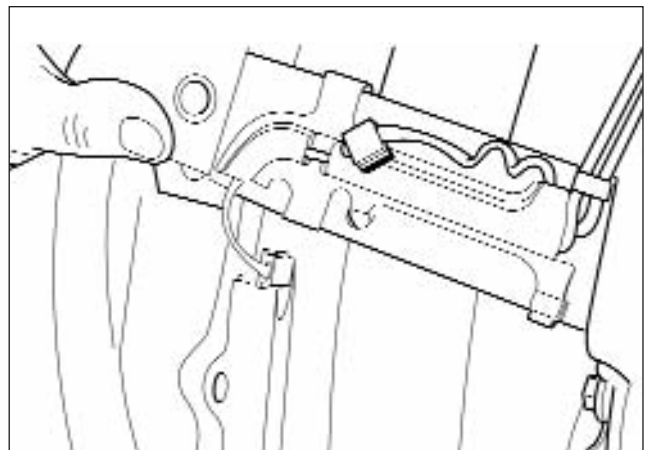


Fig. 3.8

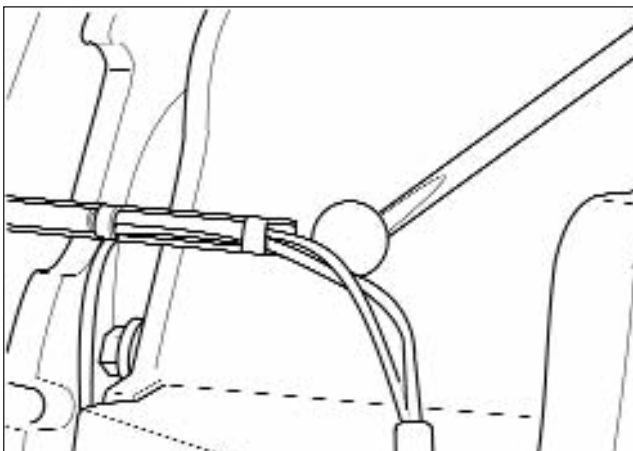


Fig. 3.9

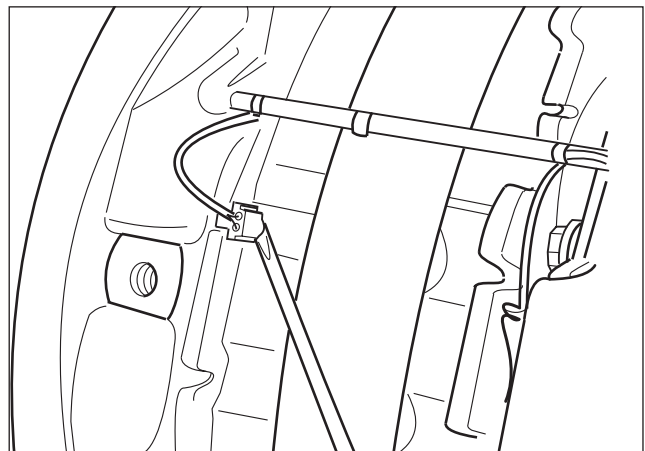


Fig. 3.10

3 Pad Replacement

Pad removal


It may be necessary to de-adjust the brake initially to remove the worn brake pads. Remove the adjuster stem protecting cap. Locate a suitable 10 mm socket wrench on the adjuster stem and rotate the wrench in an anticlockwise direction as viewed from the air chamber side. (Fig. 3.11)

WARNING


Always de-adjust/adjust the brake carefully by hand with a suitable wrench. Never exceed a maximum torque of 40 Nm in either direction and NEVER use power tools.

Remove the brake pads.

Cleaning and inspection

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

With the brake pads removed check the integrity of the guide sleeve and tappet excluders. They should be secure and free from any signs of damage. If damaged they should be replaced by following the procedures laid out in **Sections 10 and 11**. Check that the brake housing assembly slides freely on the guide sleeves.

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

Examine the brake rotor for corrosion, grooving and signs of deep cracks and also wear dimensions as detailed in the Rotor Wear Conditions **Section 12**. 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 pad apertures and abutment faces that may restrict the movement of the pads and, therefore, prevent sufficient adjustment of the brake.

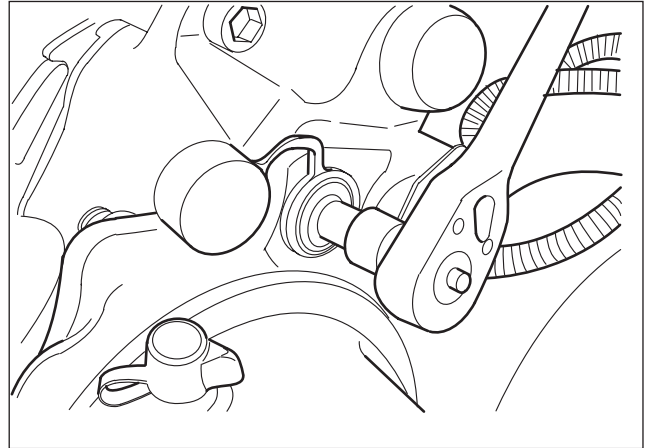


Fig. 3.11

Fitting New Pads

De-adjust the brake until with the housing pulled across there is a sufficient aperture to fit the outboard pad.

Fit the new outboard pad. (Fig. 3.12)

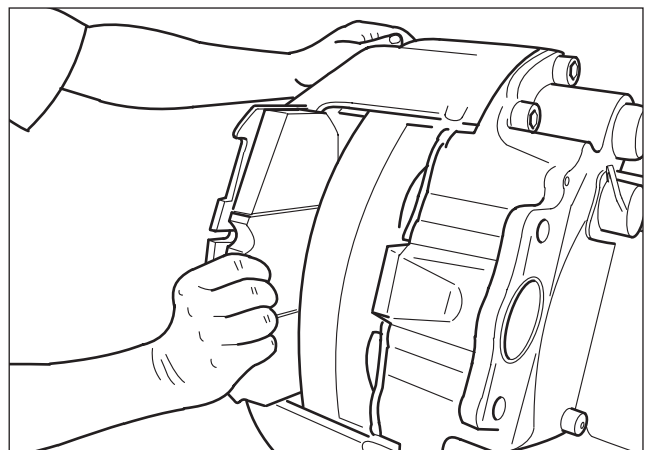


Fig. 3.12

3 Pad Replacement

Push the housing back towards the rotor until the new pad contacts the rotor face. Continue to de-adjust the brake until the aperture gap between the tappet heads and the rotor face is large enough to accept the new inboard pad. With the brake fully de-adjusted it may be necessary to lift the tappet excluders to release any trapped air which may be inflating the dust excluder (Fig. 3.13)

Fit the inboard pad.

To adjust the brake locate a 10mm socket on the adjuster stem and turn it clockwise viewed from the back of the brake. Continue to adjust the brake until an increase in resistance is felt. Check both pads touch the rotor. De-adjust the brake by 1/2 a turn of the wrench. Ensure the rotor is free to turn.

WARNING

Do not exceed 40Nm torque on the adjuster stem.

Refit PWWI and Pad Strap - Old Level.

NOTE: Old levels are no longer available and should only be re-used if there is no damage or wear to the wires or plastic blocks.

Carefully hold the pad retaining plate complete with PWWI in its location to allow fitment of the plugs. (Fig. 3.14)

Fit the plastic blocks of the PWWI into the pads. Do not use excessive force but ensure they are pushed to the bottom of the slot. (Fig. 3.15)

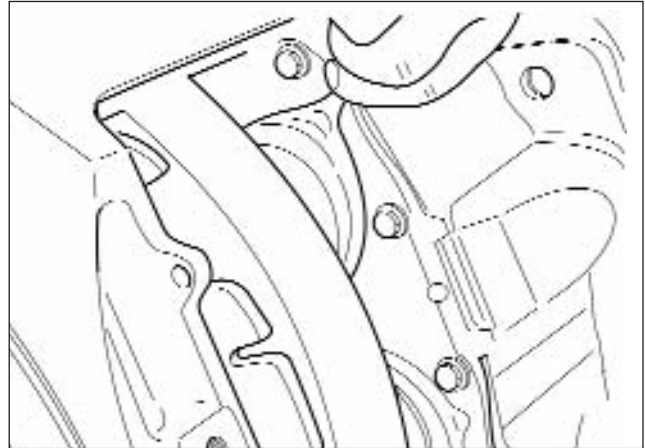


Fig. 3.13

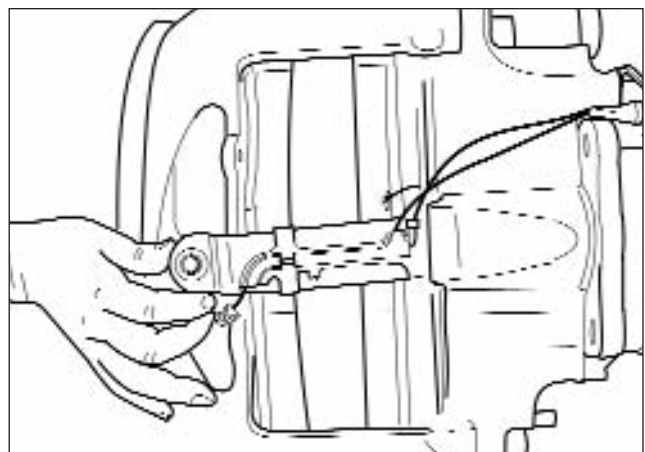


Fig. 3.14

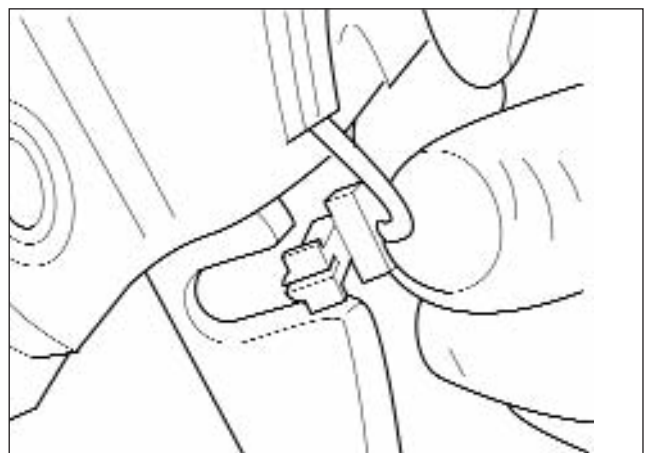


Fig. 3.15

3 Pad Replacement

Refit both pad springs ensuring that they are correctly located in the pads back plates. (Fig. 3.16)

Ensure that the wires exit to the back of the pad.

Insert the pad retaining plate together with the PWWI assembly into the slot in the brake housing .

T Refit the pad retaining screw and torque to 33-40Nm. (Fig.3.17)

Refit PWWI and Pad Strap - New Level.

⚠ WARNING

Where a new level PWWI replaces the old level,lever out the 5mm rivet and cable clip on the top of brake housing. Use a small screwdriver for this task.

Insert the PWWI assembly into the hole in the brake frame. (Fig. 3.18)

Push in the plastic rivet which holds the PWWI assembly to the brake housing. (Fig. 3.19)

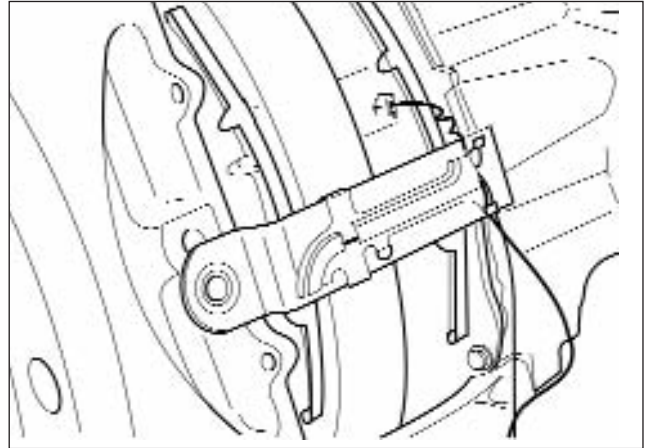


Fig. 3.16

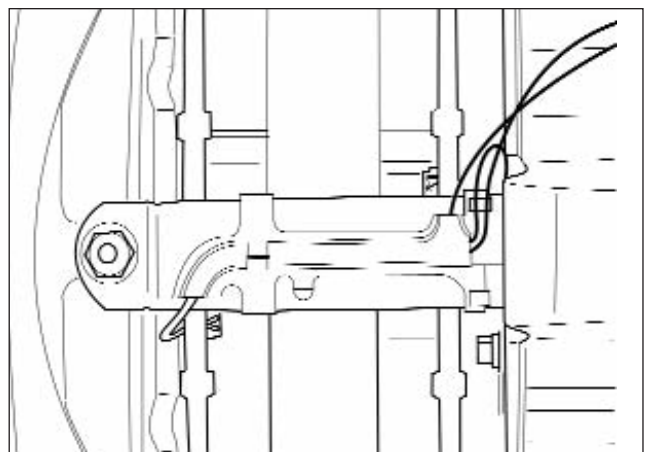


Fig. 3.17

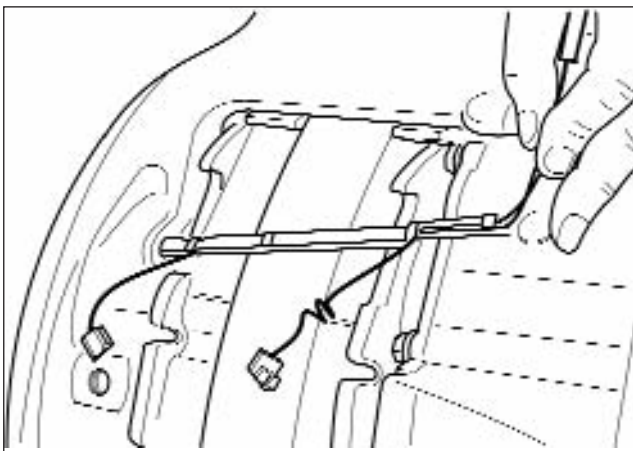


Fig. 3.18



Fig. 3.19

3 Pad Replacement

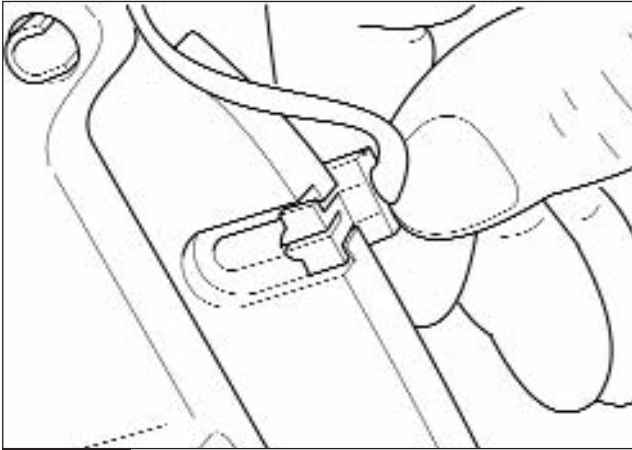


Fig. 3.20

Fit the plastic blocks of the PWWI into the pads.

Do not use excessive force. (Fig. 3.20)

Refit both pad springs ensuring that they are located correctly in the pads. (Fig. 3.21)

The PWWI is not a handed assembly and as such the routing of the wires is different LH to RH.

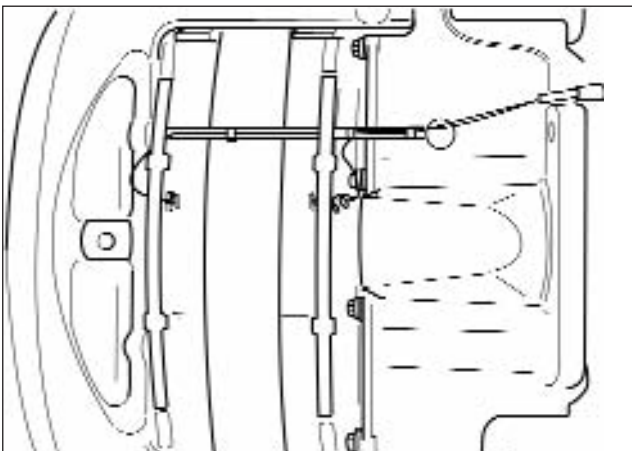


Fig. 3.21

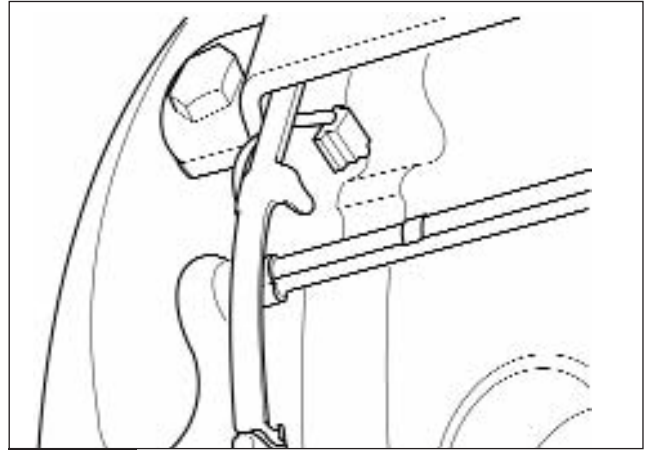


Fig. 3.22

Fig. 3.22 shows a PWWI on a LH brake.

T Fit the pad retaining strap and torque to 33-40Nm. (Fig. 3.23)

T Reconnect the PWWI to vehicle wiring. Insert wear sensor or wear switch as appropriate and torque retaining screw to 33-40 Nm.

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.

Check that the rotor is free to rotate.

Fit the wheels and tighten the nuts to the vehicle manufacturers torque. Jack the vehicle down to the ground and road test.

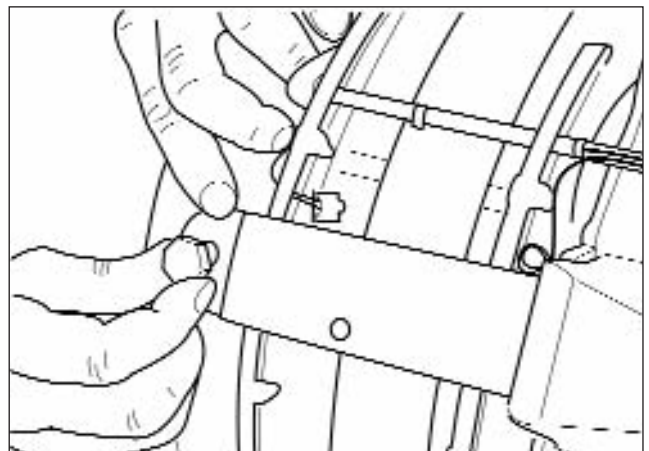


Fig. 3.23

Pad Retaining Plate Replacement

4

pg. 36 Pad retaining plate removal

37 Pad retaining plate fitment

4 Pad Retaining Plate Replacement

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.

Wind off the spring brake retraction screw (where appropriate). Jack up the axle and fit suitable axle stands securely. Remove the road wheels and it is advisable to exhaust all air from the system.

Remove any dirt from the brake assembly. Ensure the rubber dust excluders fitted to the tappet heads and guide sleeves are not damaged.

⚠ CAUTION: 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.

Pad Retaining Plate Removal - Separate PWWI

Remove the pad retaining plate screw and pad retaining plate from the brake and discard (Fig 4.1).

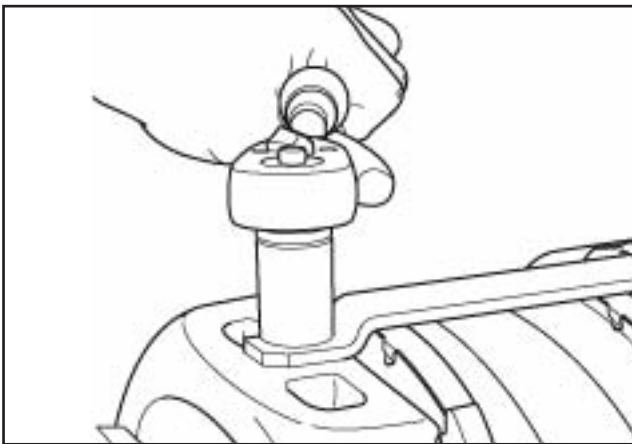


Fig 4.1

Pad Retaining Plate Removal - Attached PWWI

Remove the pad retaining plate screw. Note the position / run of the pad wear cable. Carefully un-clip the pad wear warning cable retainer from the pad retaining plate. A typical version is shown in Fig 4.2.

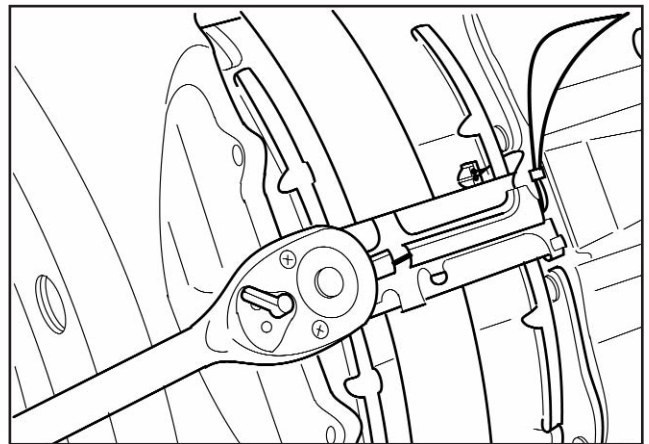


Fig 4.2

4 Pad Retaining Plate Replacement

All Types

Clean loose debris from around the pad springs and check correct positioning. Fig. 4.3 shows the inboard pad spring location and Fig 4.4 the outboard pad spring location.

Clean loose debris from around the location slot **A** for the retaining plate on the brake housing (Fig 4.5)

Important: take care to avoid damage to the pad wear warning sensor cables or heads.

If there is any doubt in the serviceability of the pad springs, replace with new or refer to the vehicle manufacturer for corrective action.

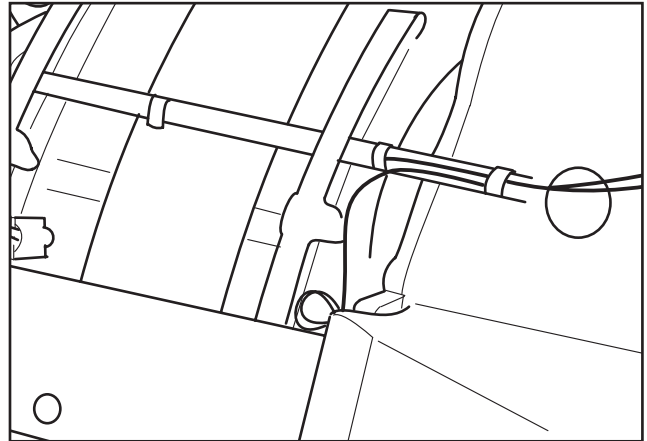


Fig 4.3

Pad Retaining Plate Fitment

Carefully clip the pad wear warning cable retainer to the pad retaining plate where fitted.

T Fit the new pad retaining plate and fixing screw, carefully positioning the pad wear cables where fitted. Tighten the fixing screw to a torque of 34 - 40Nm.

Charge the system with air. Wind in the spring brake retraction screw (where applicable).

Apply the brakes 5 times to settle the pads. Check that the rotor is free to rotate.

Fit the road wheels and tighten the retaining nuts to the vehicle manufacturers' specifications. Jack the vehicle down to the ground and road test.

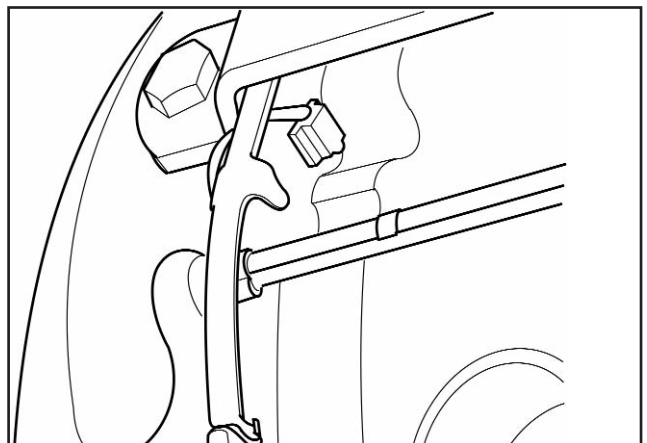


Fig 4.4

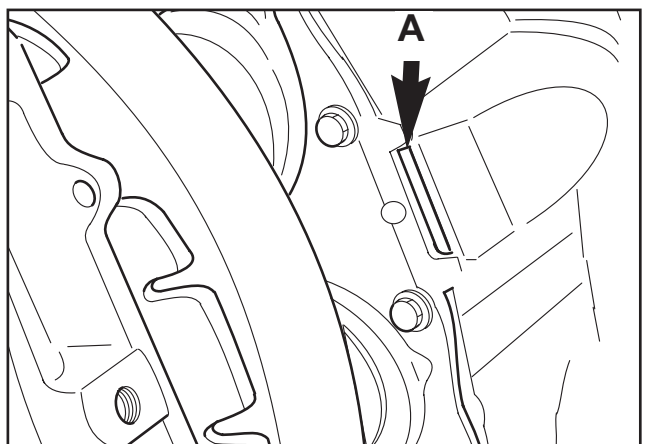


Fig 4.5

4 Pad Retaining Plate Replacement

CWS (Sensor/Switch) Replacement

5

- 40 CWS removal
- 40 CWS fitment

5 CWS (Sensor/Switch) 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, ensure the rubber dust covers are not damaged.

⚠ CAUTION: 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. When ever 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.

Sensor/Switch Removal

Where applicable, remove the electronic pad wear sensor (Fig 5.1) or switch (Fig 5.2) retaining screw. Carefully lever out the sensor/switch assembly (Fig 5.3) and discard.

Sensor/Switch Fitment

Clean the sensor/switch access hole and mounting face on the housing and ensure no debris is allowed to fall into the exposed aperture into the housing.

Fit the new electronic pad wear sensor/switch into the housing, ensuring, where applicable, that the sensor stem locates correctly onto the sensor gearbox in the housing.

NOTE: Ensure the adjuster dust cover retaining strap is not trapped under the sensor.

T Fit the new retaining screw (Figs 5.1 & 5.2) and tighten to 33 - 40Nm as specified in **Section 13** Servicing & Specification.

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

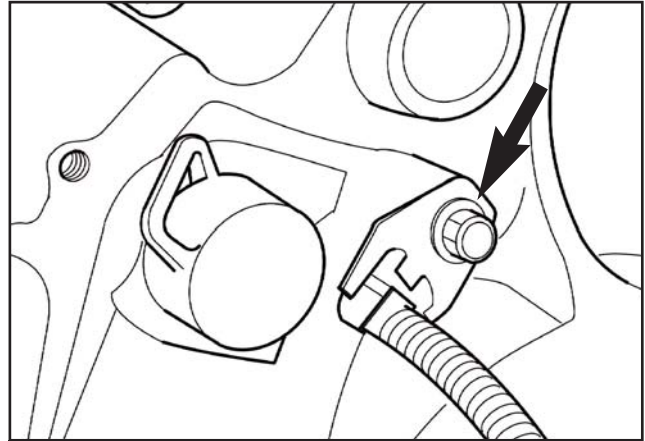


Fig 5.1

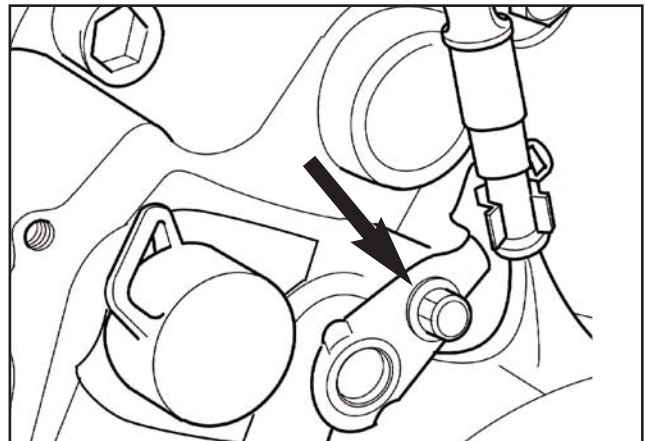


Fig 5.2

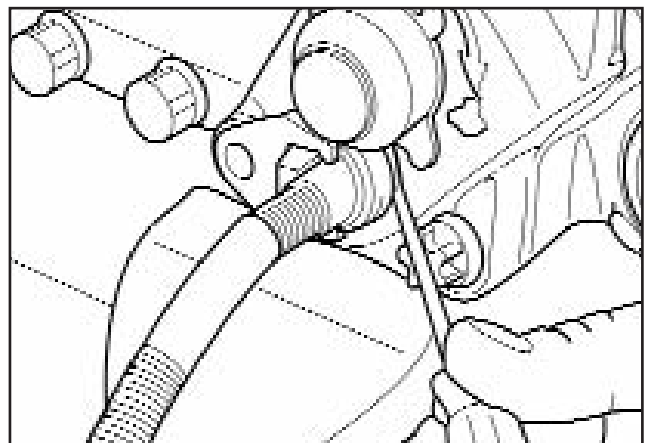


Fig 5.3

Brake Replacement

6

- 42 Brake removal
- 43 Brake fitment

6 Brake Replacement

Brake Removal

Park the vehicle on level hard ground and chock the road wheels. Apply air pressure to release the park brake and wind off the spring actuator 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, ensure the rubber dust excluders are not damaged.



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. When ever 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 airline.



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

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

The brake assembly may be fitted with either of the following wear indicators, which needs to be disconnected before removing the Brake.

PWWI (Pad Wear Warning Indicator).

Disconnect the PWWI plug where fitted.

CWS (Continuous Wear Sensor/Switch).

Disconnect the sensor cable and remove the sensor/switch as detailed in **Section 5 CWS replacement**. If refitting the original brake assembly, blank off the CWS mounting hole to prevent any dirt ingress into the housing internals.

Remove the air actuator from the Brake housing by removing the 2 nuts. (Fig. 6.1). Cover the exposed air actuator mounting aperture with adhesive tape to prevent debris etc. entering the housing. (Fig. 6.2).

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.

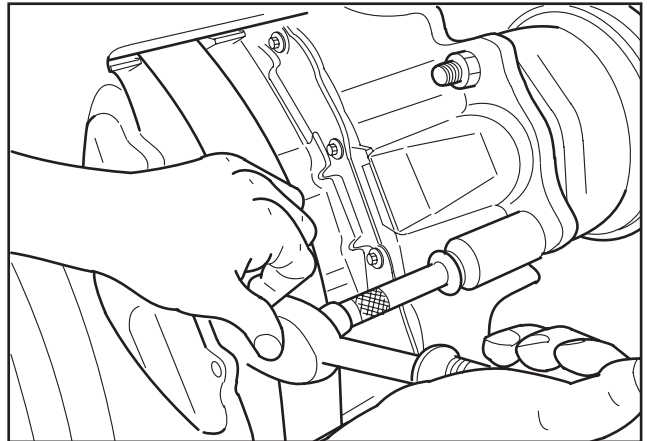


Fig 6.1

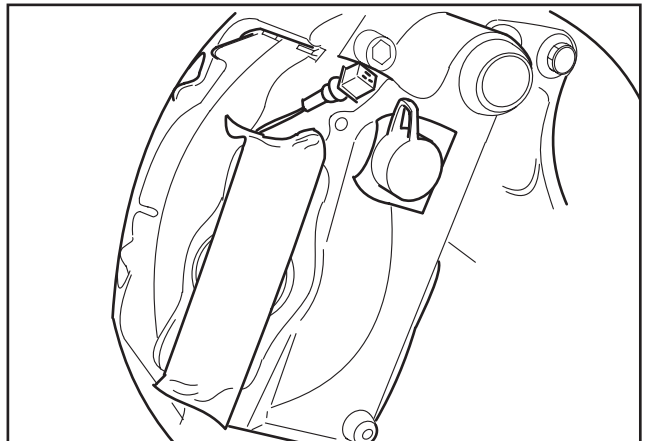


Fig 6.2

Remove the pads and, where applicable, the PWWI as described in **Section 3 Pad replacement**. The Brake can now be removed from the axle by removing the carrier mounting screws following the vehicle manufacturers instructions.

NOTE: The Brake assembly is heavy, up to approximately 50kg (110lbs). Ensure you have the help of an assistant and the weight of the Brake is supported when removing the fixing screws to avoid possible damage to the threads.

6 Brake Replacement



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.

Brake fitment

Ensure all mounting faces are clean and free from corrosion. With the help of an assistant, carefully lower the Brake assembly into position on the axle mounting. Avoid excessive movement of the Brake during location and do not allow the Brake to drop into position on the axle, either action could result in damaged to the slide pin dust excluders. Fit new fixing screws and torque to the vehicle manufacturers recommendations.

New Brake Assemblies

NOTE: if fitting a new brake assembly, the central tear out portion must be removed from the Actuator seal (Fig 6.3) before fitting the Air Actuator.

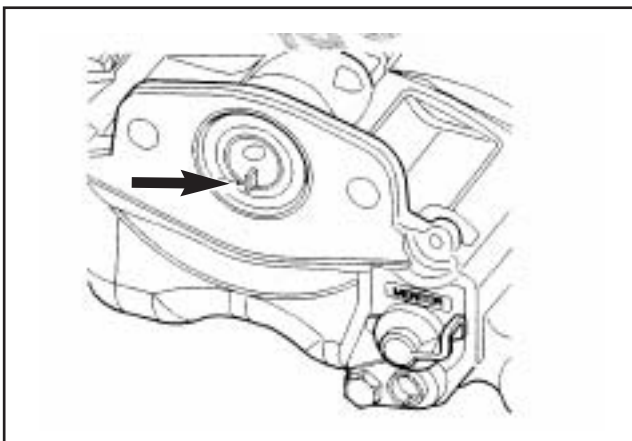


Fig 6.3

Original Brake Assemblies

NOTE: if replacing the original brake assembly, remove the adhesive tape from the air actuator mounting aperture.

Check the condition of the actuator seal in the housing. If there is any doubt in the suitability for further service replace the seal following the procedure detailed below;

Actuator Seal Replacement

Using a suitable screwdriver carefully lever out the actuator seal (Fig 6.4).

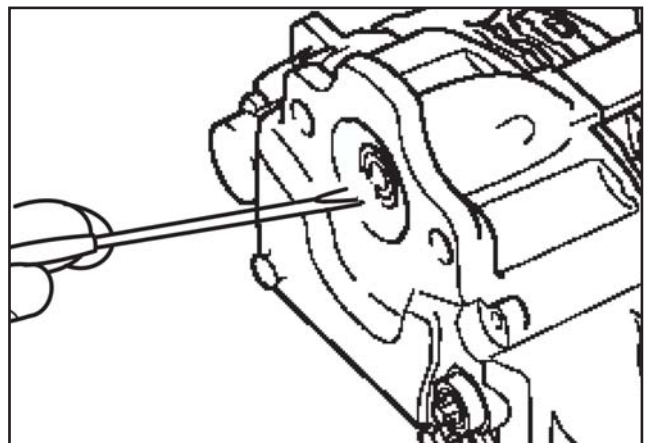


Fig 6.4

Clean the exposed seal location in the housing assembly with a suitable Brake Cleaner and examine for damage or excessive wear.

Locate the new actuator seal in position in the housing assembly (Fig. 6.5).

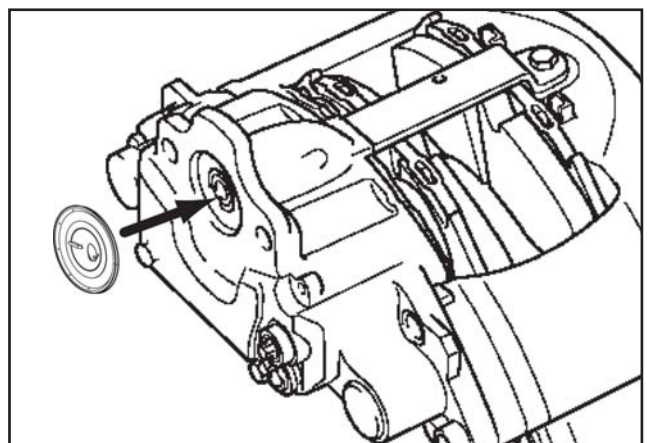


Fig 6.5

6 Brake Replacement

NOTE: Ensure the seal is fitted the correct way round when pressing into the housing assembly (Fig 6.6).

Using a suitable size socket carefully tap the seal into position (Fig 6.7).

NOTE: The transit peel out gasket must be removed from the new Actuator seal (Fig 6.3) before fitting the Air Actuator.

All Brakes

Lightly grease the operating shaft pocket with the appropriate grease. (Fig. 6.8)

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.

Offer the air actuator to the housing assembly ensuring the mounting faces and push rod are clean and the push rod is correctly located in the operating shaft pocket.

T Secure the air chamber to the housing assembly and torque to the vehicle manufacturers recommendations.

OR

Initially tighten the 2 nuts to a pre-torque of 80 -100Nm, this ensures the actuator seals and does not distort.

Apply a final torque of 180 - 210 Nm to each nut.

Where applicable remove the blanking protection from the CWS aperture and refit the CWS as described in **Section 5 CWS replacement**.

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

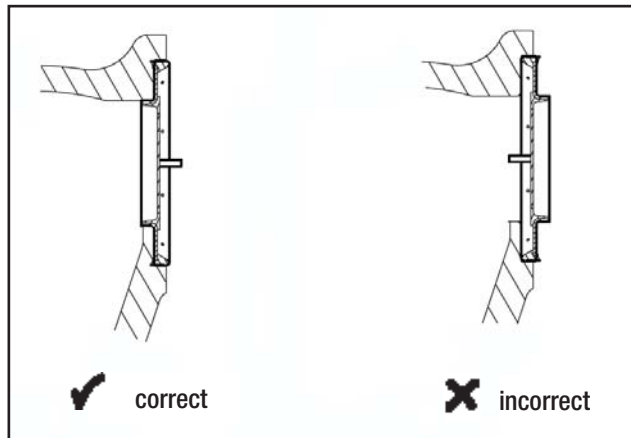


Fig 6.6

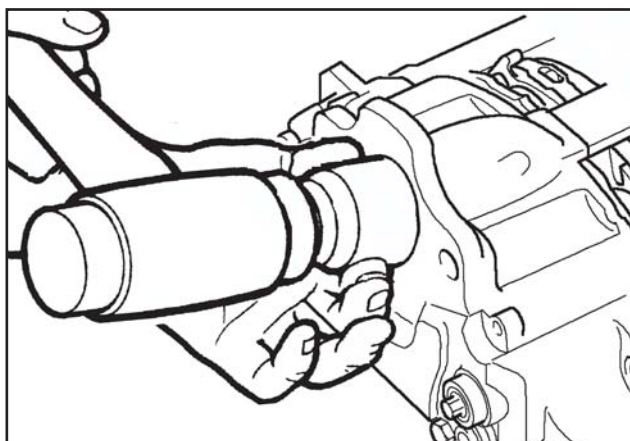


Fig 6.7

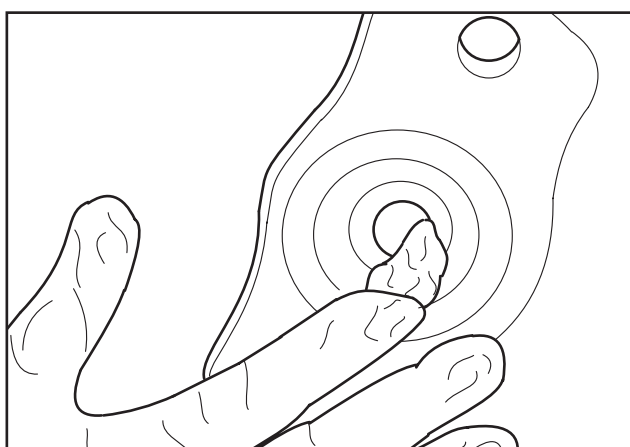


Fig 6.8

Bridge Replacement

7

- 46 Bridge removal
- 46 Bridge fitment

7 Bridge Replacement

Removing the Bridge

Remove the pads and PWWI where fitted as described in **Section 3 Pad Replacement**. Support the bridge by hand and loosen the 4 bridge screws. (Fig. 7.1)

Remove and discard these screws (they are not reusable).
Remove the bridge.(Fig. 7.2)

NOTE: Ensure the housing does not slide off the guide sleeves.

Ensure that the mating surface of the housing is clean. Check the guide sleeve excluders for signs of damage and secure location. (Fig. 7.3)

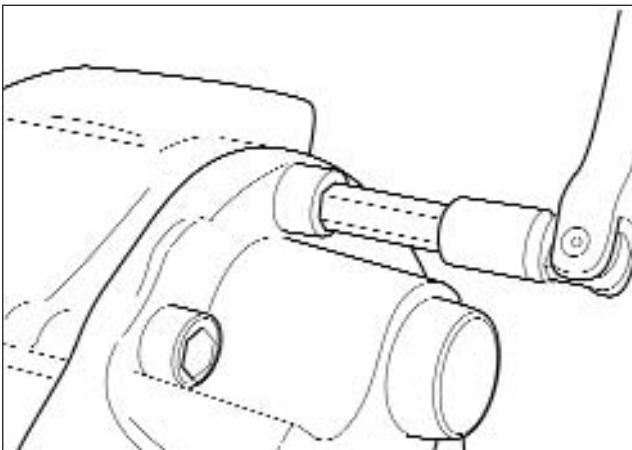


Fig. 7.1

Replace if in any doubt, following procedure laid out in **Section 8**.

Pay special attention for correct location (arrow A) and any excluder damage, such as splits or tears (arrow B). (Fig. 7.4)

Fitting the Bridge.

Locate the bridge in position against the brake housing.

Whilst supporting the weight of the bridge fit the 4 new retaining screws. Tighten all screws to the torque specified in **Section 13 Servicing schedules**.

Fit the brake pads following the procedure detailed in **Section 3 Pad replacement**.

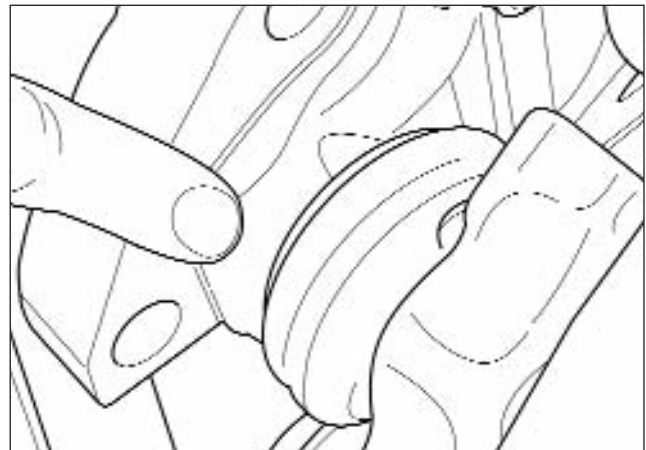


Fig. 7.3

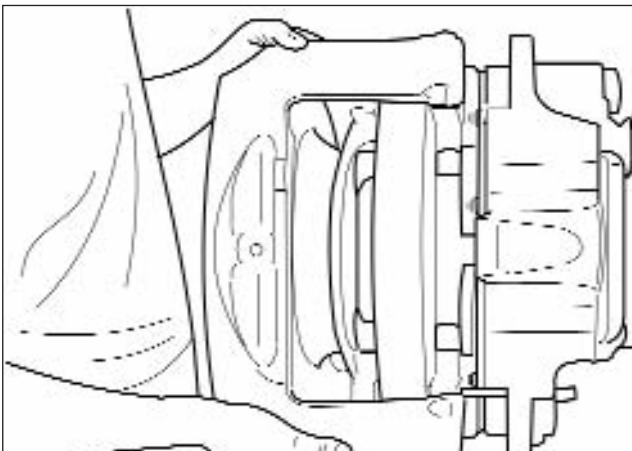


Fig. 7.2

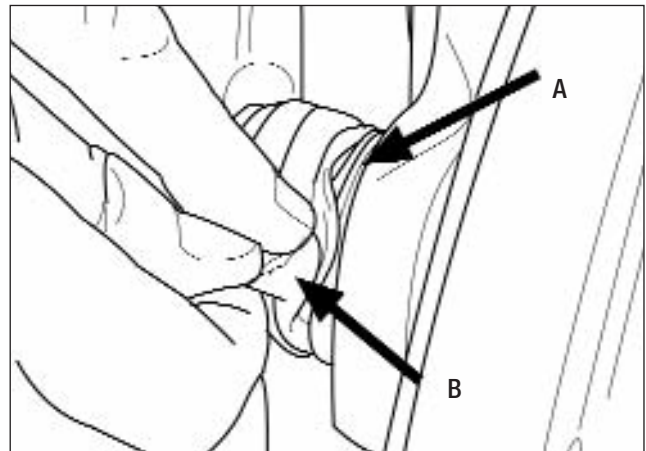


Fig. 7.4

Housing & Visual Wear Indicator Replacement

8

- 48 Housing removal & Visual Wear Indicator Replacement
- 49 Housing fitment

8 Housing & Visual Wear Indicator Replacement

Removing the Housing assembly

NOTE: The exploded and section views contained in this manual are for reference only. The internal components are not serviceable. The screws which secure the piston housing to the brakes assembly housing **MUST NOT** be removed.

Support the vehicle and remove the air actuator as described in **Section 6 Brake replacement**.

Where applicable, remove the CWS as described in **Section 5 CWS replacement**.

If refitting the original housing assembly, blank off the CWS mounting hole to prevent any dirt ingress into the housing internals. Remove the pads as described in **Section 3 Pad replacement**. Remove the bridge as described in **Section 7 Bridge replacement**.

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

Carefully slide the housing off the guide sleeves which are secured to the carrier. (Fig. 8.1). It is advisable to retain the visual wear indicator and spring, where applicable, in position before removing the housing (Fig 8.2). This prevents the spring load from ejecting the indicator as the housing is removed. Ensure the visual wear indicator is not damaged.

Clean and inspect the carrier for signs of damage or wear paying particular attention to the pad abutment areas and guide sleeves (Fig. 8.3).

If any doubt exists as to the suitability for further service replace with new guide sleeves and if necessary a new carrier.

Clean and inspect the brake rotor as described in **Section 2 Operational checks**.

Visual Wear Indicator Replacement

Release the retention on the visual wear indicator shaft and slide the shaft out of the housing with the spring. Fit the new spring to the new indicator shaft. Slide the indicator shaft into the housing and retain as before.

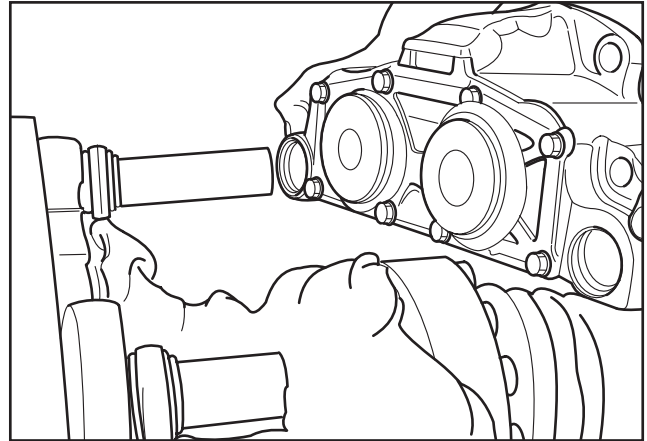


Fig 8.1

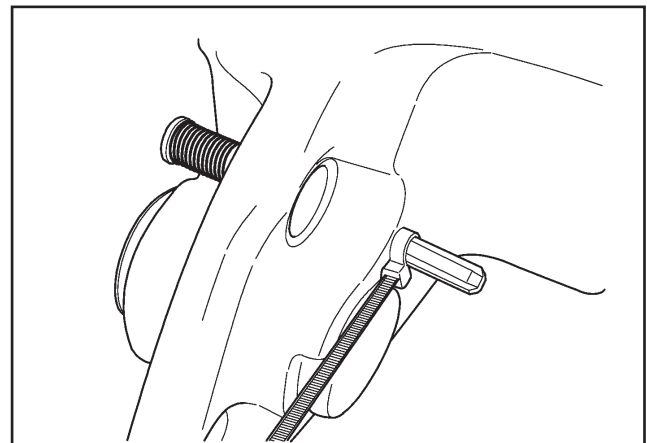


Fig 8.2

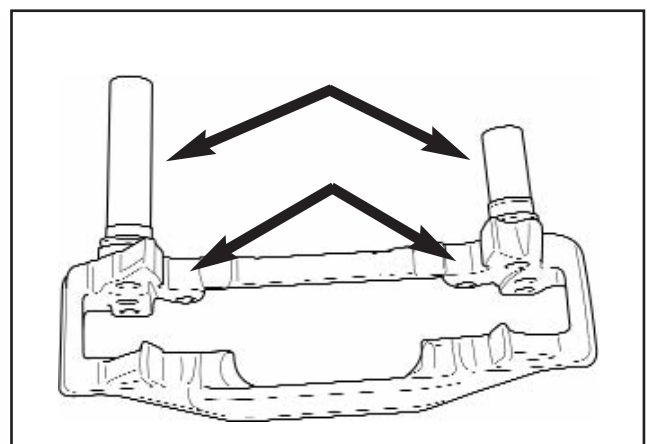


Fig 8.3

8 Housing & Visual Wear Indicator Replacement

Fitting Housing assembly

Lightly lubricate the inner surface of the new guide sleeve dust excluders and fit over the guide sleeves. Ensure that the dust excluder bead is correctly located on the retainer fitted to the carrier. (Fig. 8.4)

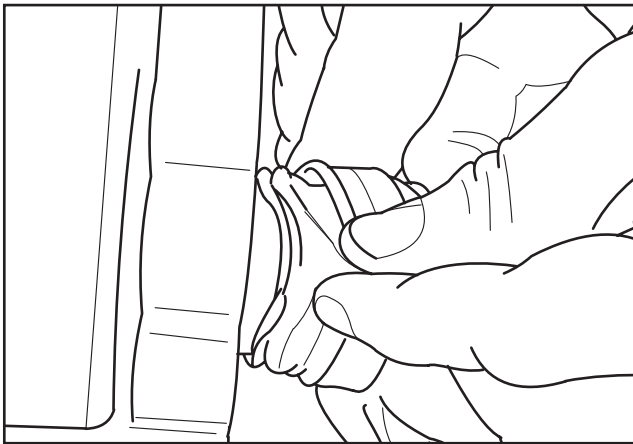


Fig 8.4

Apply grease to the guide sleeve and housing guide sleeve bores. (Fig. 8.5)

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.

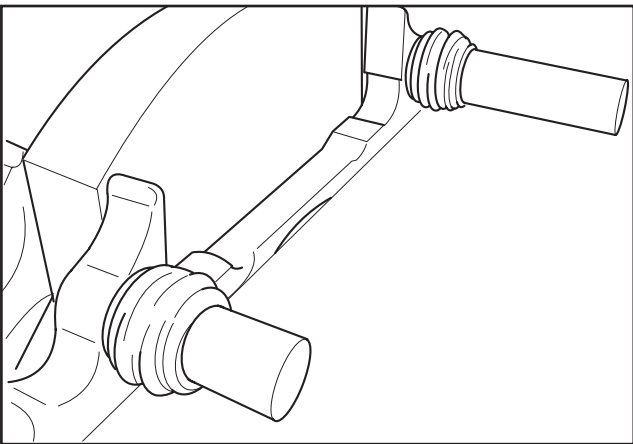


Fig 8.5

Carefully slide the housing assembly into position on the guide sleeves secured to the carrier (Fig. 8.6)



WARNING: Take care not to damage the guide sleeve dust excluder when locating the Housing assembly onto the carrier.

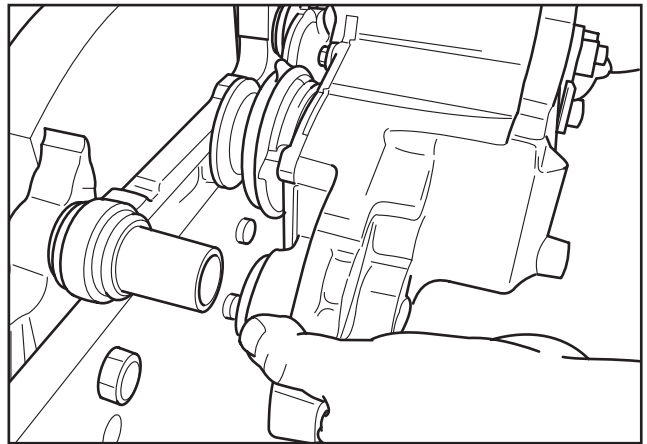


Fig 8.6

Locate the guide sleeve dust excluders onto the housing retainers. (Fig. 8.7)

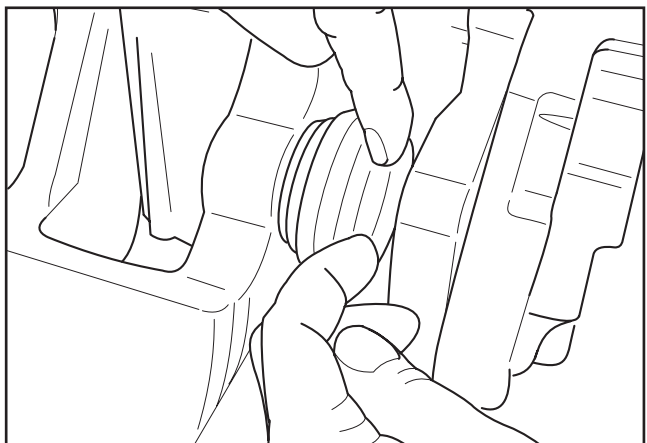


Fig 8.7

8 Housing & Visual Wear Indicator Replacement

Ensure the dust excluders are located correctly on both carrier and housing retainers. (Fig. 8.8)

Slide the housing backwards and forwards several times to check the smooth movement of the housing on the guide sleeves.

NOTE: Care must be taken when sliding the housing on the guide pins by hand. Too much force could result in damage to the guide pin dust excluders



Fig 8.8

Fitting new End Caps

Using a suitable sized flat faced tool tap the end cap in until they stop at the end of their bores in the housing. (Fig. 8.9) Repeat for the second end cap.

The end caps long and short pins will be fitted to a different dimension as shown in Figs. 8.10 & 8.11

Long guide sleeve cap 18mm Max
Short guide sleeve cap 12mm Max

The dimensions must be checked to ensure that they do not exceed the stated max figures.

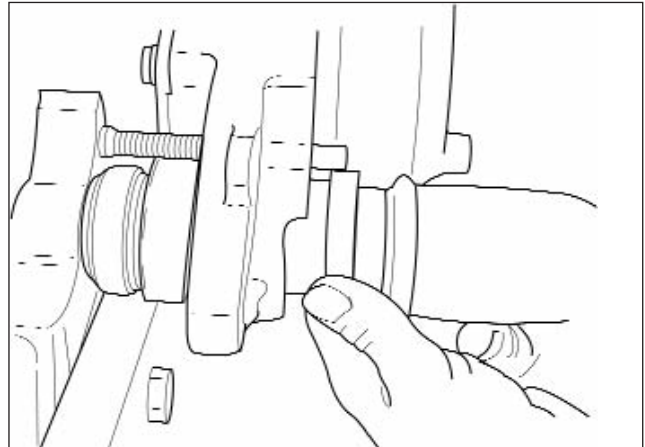


Fig. 8.9

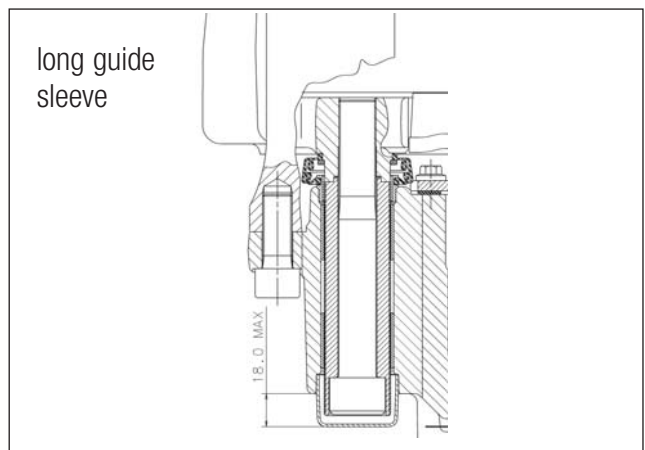


Fig 8.10

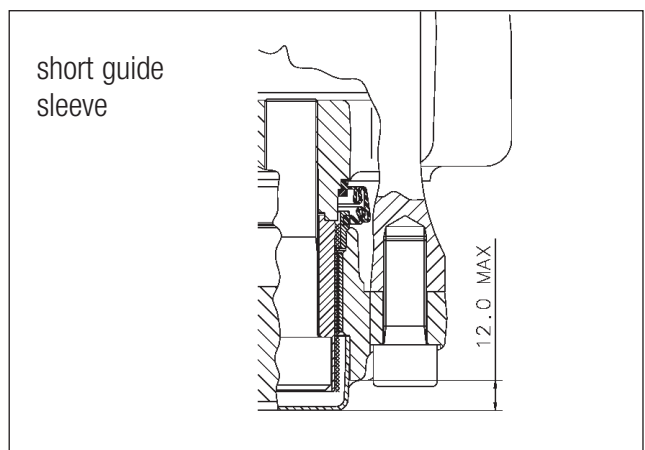


Fig 8.11

8 Housing & Visual Wear Indicator Replacement

When the end caps have been correctly fitted, check again the free movement of the housing assembly on the guide sleeves. Slide the housing backwards and forwards several times to check the smooth movement of the housing on the guide sleeves. Slide the housing to check the location of the dust excluders (Fig. 8.12).

This can be identified by the excluder collapsing due to pressure change within the slide pin mechanism.

NOTE: Care must be taken when sliding the housing on the guide pins by hand. Too much force could result in damage to the guide pin dust excluders

Refit the Bridge as described in **Section 7 Bridge replacement.**



WARNING:

Always use new bridge bolts/screws. Once removed bridge bolts/screws should not be re-used.

Remove the clip/retainer from the visual wear indicator (Fig 8.13).where applicable

Where applicable remove the blanking protection from the CWS aperture and refit the CWS as described in **Section 5 CWS replacement.**

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

Refit the pads and where applicable the PWWI, set the initial running clearance and test as described in **Section 3 Pad replacement.**

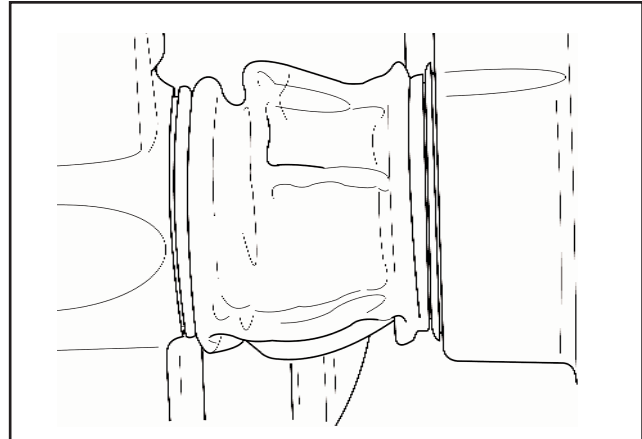


Fig 8.12

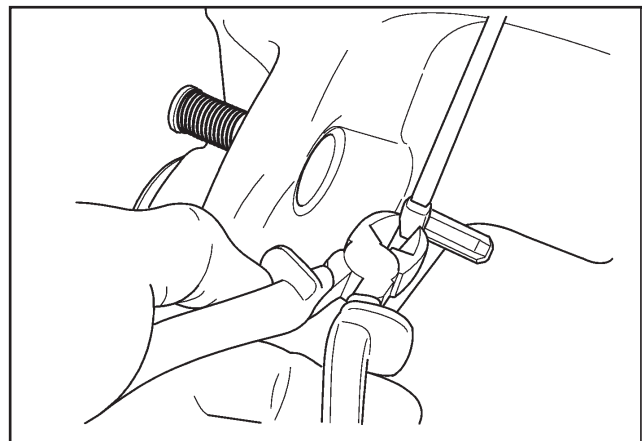


Fig 8.13

8 Housing & Visual Wear Indicator Replacement

Carrier Replacement

9

- 54 Carrier removal
- 55 Reassembly

9 Carrier Replacement

Removing the Carrier

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

Remove the pads as described in **Section 3** Pad Replacement. Remove the bridge as described in **Section 7** Bridge Replacement.

Carefully slide the housing off the guide sleeves, which are secured to the carrier, as described in **Section 8** Housing replacement.

Carefully detach the guide sleeve excluders from their location on the carrier and slide off the guide sleeves and discard. (Fig. 9.1).

NOTE: It is advisable to record the position of the SHORT & LONG guide pins on the original carrier before removal. This will ensure the guide pins are fitted in the correct position on the new carrier

Remove and discard the guide sleeve screws retaining the guide sleeves to the carrier. (Fig. 9.2) - If necessary carefully release the guide sleeves from their location on the carrier using a rubber or soft metal hammer.

Remove the screws securing the carrier to the vehicle axle and lift the carrier from the vehicle.

Cleaning & Inspection

Clean and inspect the guide sleeves removed from the carrier. If there is evidence of damage, wear or corrosion replace with new items as described in **Section 11**.

Remove existing grease from the guide sleeve bores in the housing and inspect the bushes and dust cover retainers. If there is evidence of damage, wear or corrosion replace the bushes and retainers as described in **Section 11** or housing assembly as described in **Section 8**.

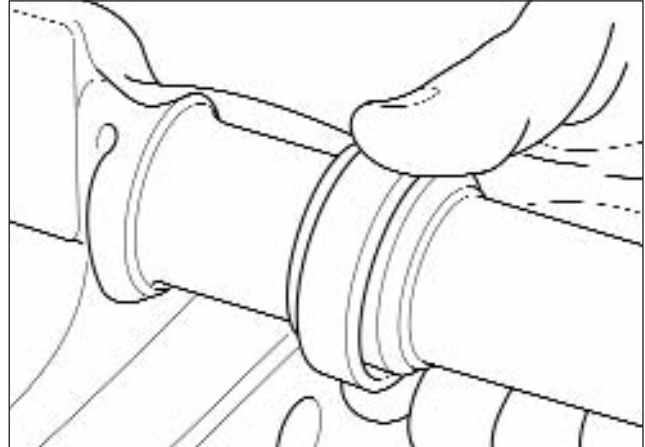


Fig. 9.1

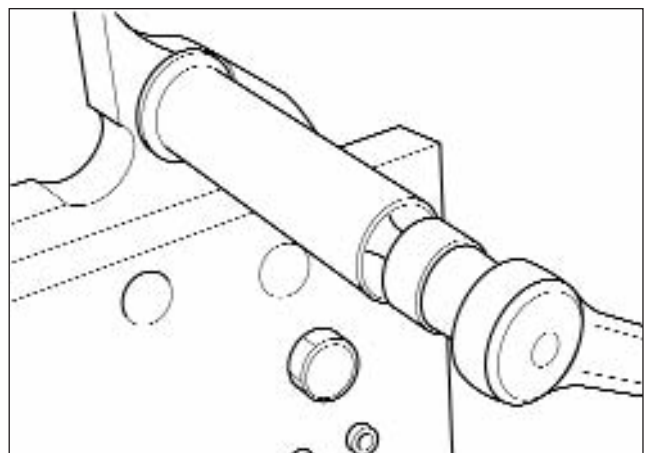


Fig. 9.2

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

9 Carrier Replacement

Reassembly

IMPORTANT: There are alternative guide sleeve and carrier designs currently in service.

Type 1 - Short guide sleeve with ROUND profile. Guide sleeves have integral dust excluder retainers (Fig 9.3).

Type 2 - Short guide sleeve with OVAL profile (Fig 9.4). Dust excluder retainers are separate components pressed onto the carrier (Fig 9.5)

Follow the appropriate instructions below.

Type 2 only

Fit the excluder retaining ring onto the carrier guide pin boss by pressing with MST 1024 or a suitable drift up to the shoulder (Fig. 9.6) do not press beyond the shoulder.

Type 1 & 2

Locate the new carrier correctly on the vehicle axle and secure with new retaining screws. Tighten the screws to the torque specified by the vehicle manufacturer.

Lightly lubricate the guide sleeves.

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

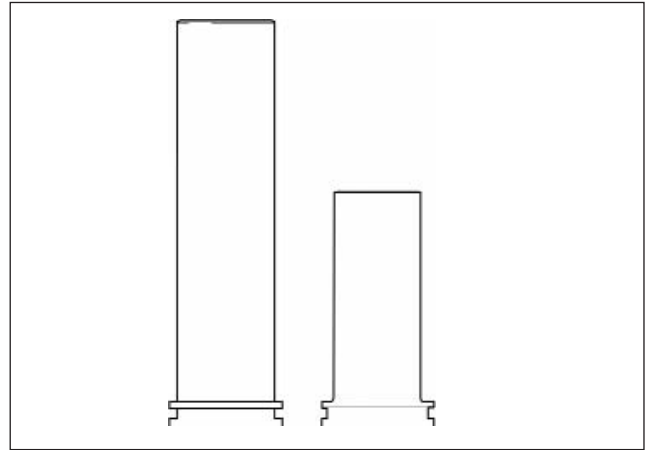


Fig. 9.3

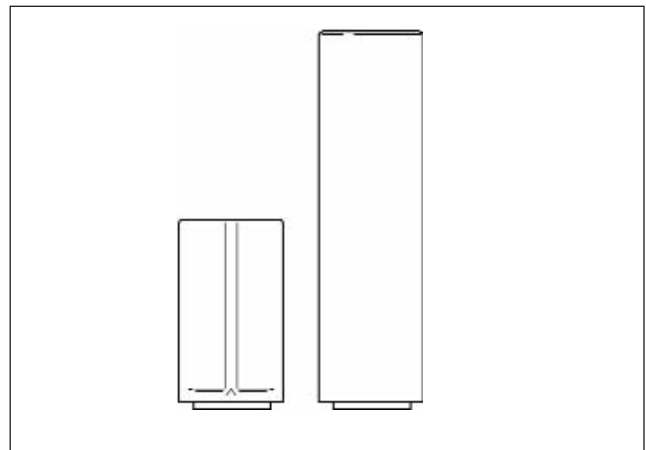


Fig. 9.4

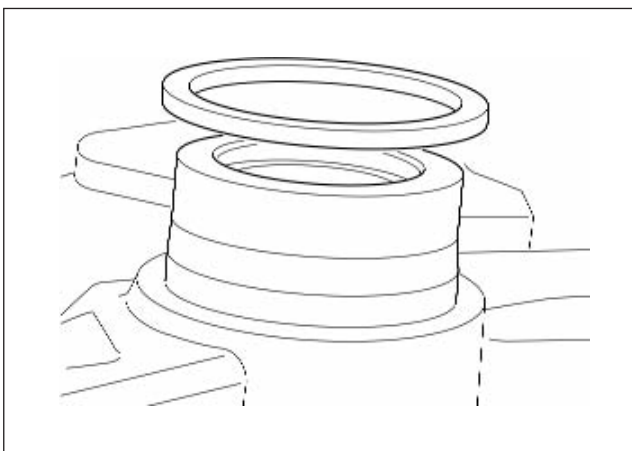


Fig. 9.5

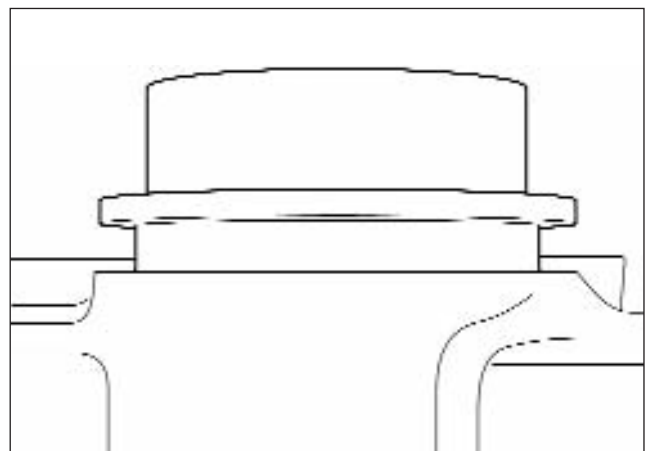


Fig. 9.6

9 Carrier Replacement

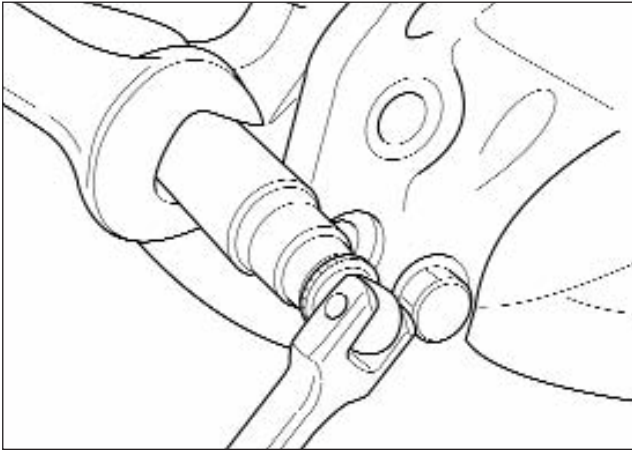


Fig. 9.7

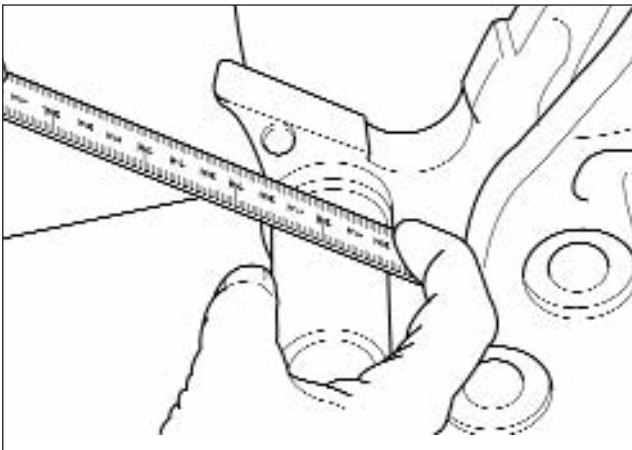


Fig. 9.8

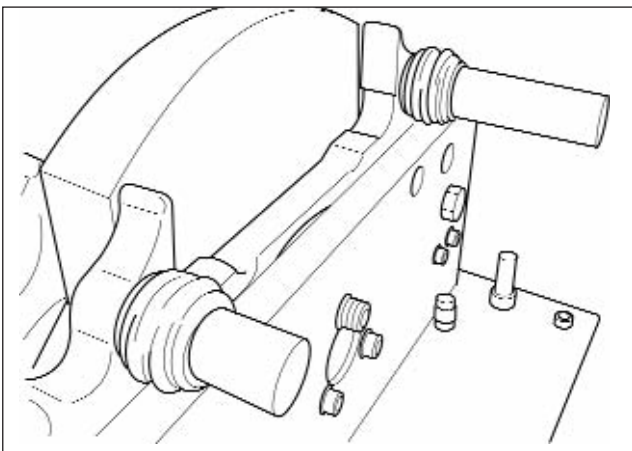


Fig. 9.9

Type 1 Short Guide Sleeve - ROUND profile.

Locate the guide sleeve in the correct position on the new carrier and loosely retain with the new guide sleeve screw provided.

T Tighten the screw to a torque of 430-440Nm.

Type 2 Short Guide Sleeve - OVAL profile

For the short guide sleeve which has an oval profile it is important that it is secured to the carrier in the correct position.

Locate the guide sleeve in the correct position on the new carrier and loosely retain with the new guide sleeve screw provided. Turn the guide sleeve until the flat sides are in a vertical plane in line with the carrier abutment. Use a suitable open ended wrench to hold the pin in its correct orientation. (Fig. 9.7). Placing a straight edge across the guide sleeve 'flat' and aligning it with the pad abutment shoulder will aid positioning, (Fig. 9.8).

T With the guide sleeve correctly aligned, tighten the guide sleeve screw to a torque of 495-585Nm.

Type 1 & 2 Long Guide Sleeve

Locate the guide sleeve in the correct position on the new carrier and loosely retain with the new guide sleeve screw provided.

T Tighten the screw to a torque of:

M20 495-585Nm.

M18 430-440Nm.

Lightly lubricate the inner surfaces of the new guide sleeve excluders with grease and ensure they are located correctly on the carrier (Figs. 9.9). Apply grease to the guide sleeve and housing guide sleeve bores (Fig. 9.10)

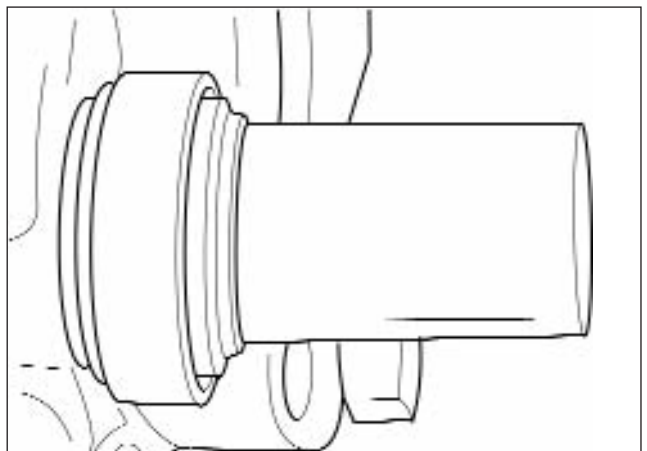


Fig. 9.10

9 Carrier Replacement

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

Carefully slide the housing assembly into position on the guide sleeves secured to the carrier. Locate the guide sleeve excluders onto the housing retainers (Fig 9.11).

NOTE: Take care not to damage the guide sleeve excluders when locating the housing on to the carrier.

Ensure the dust excluders are located correctly on both carrier and housing retainers (Fig 9.12). Hold the housing in position for a short time to allow any trapped air to bleed from the dust excluders.

Slide the housing backwards and forwards several times to check the smooth movement of the guide sleeves.

Slide the housing to check the location of the dust excluders (Fig 9.13)

Refit the bridge as described in **Section 7 Bridge Replacement**.

CAUTION: Always use new bridge screws. Once removed bridge screws should no be re-used.

Where applicable refit the CWS as described in **Section 5 CWS replacement**.

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

Refit the pads and where applicable the PWWI, set the initial running clearance and test as described in **Section 3 Pad replacement**.

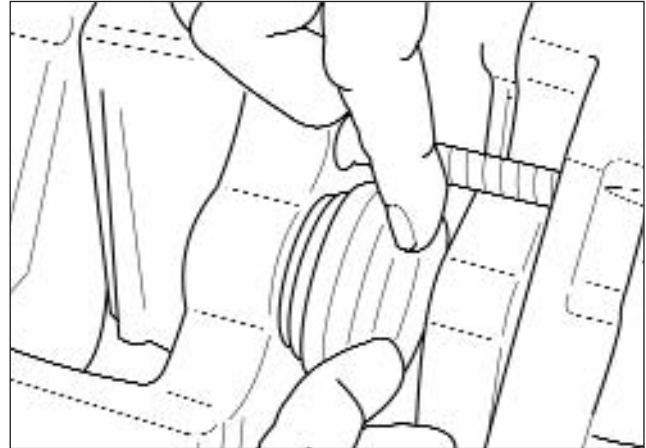


Fig. 9.11



Fig. 9.12

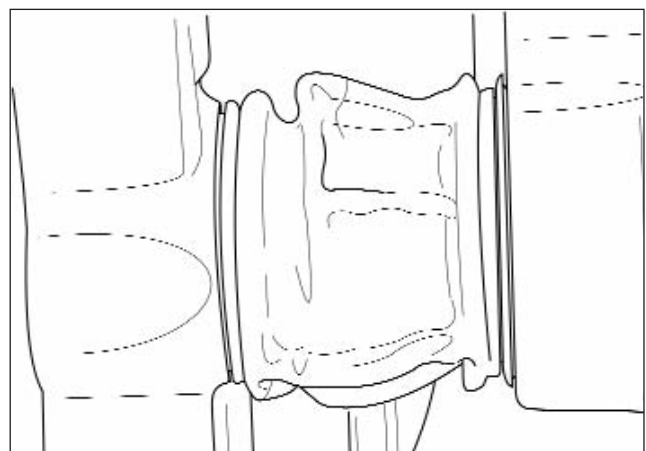


Fig. 9.13

9 Carrier Replacement

Piston Dust Excluder Removal & Replacement

10

- 60 Piston dust excluder removal
- 61 Piston dust excluder fitment

10 Piston Dust Excluder Removal & Replacement

Piston dust excluder removal

Remove the brake pads as described in **Section 3** Pad replacement. Using the manual override stem adjust out the piston assemblies approximately 40mm (Fig. 10.1).

⚠ WARNING: Always de-adjust/adjust the brake carefully by hand with a suitable wrench. Never exceed a maximum torque of 40 Nm in either direction and NEVER use power tools.

Adjusting out the brake aids removal of the piston excluders. (Fig. 10.2)

Remove the piston excluder dust excluders and discard.

Check for damage to both areas. Check condition of piston shafts. If excessive corrosion or wear is present, the housing assembly or brake assembly should be replaced as described in **Section 8 Housing Replacement** or **Section 6 Brake replacement**.

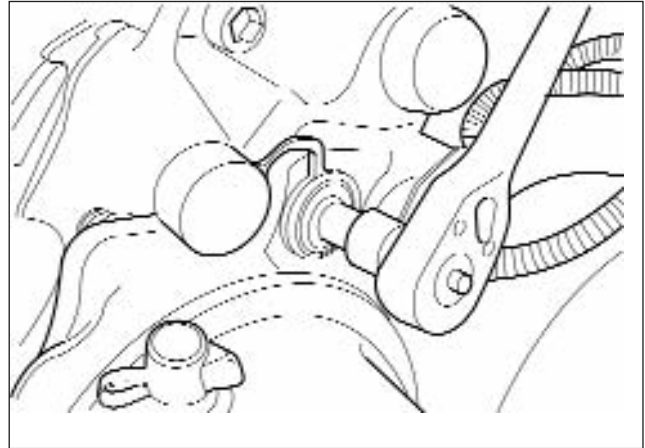


Fig. 10.1

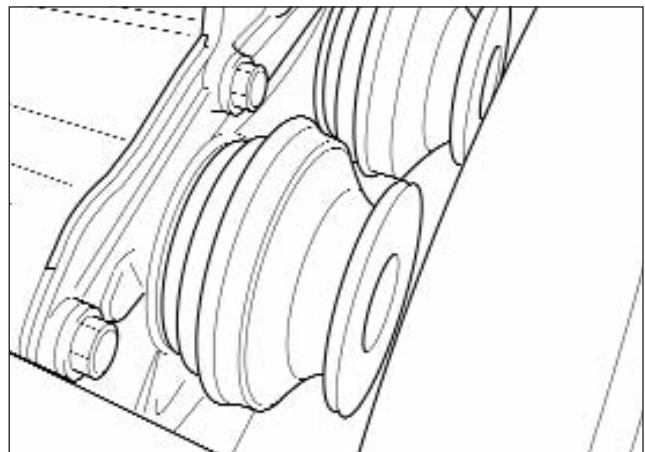


Fig. 10.2

10 Piston Dust Excluder Removal & Replacement

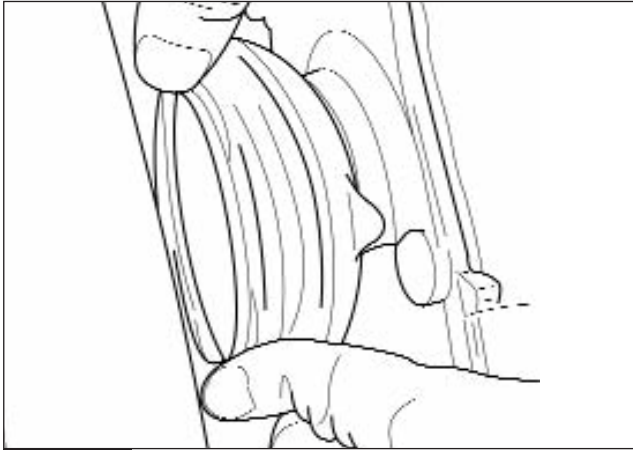


Fig. 10.3

Fitting new piston dust excluders

Lightly lubricate the piston shafts with the grease supplied in the kit.

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

⚠ WARNING: When fitting new Piston 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 piston excluders.

Carefully feed one of the new dust excluders over a piston head. (Fig. 10.3) Do not at this stage fit the excluder into the groove in the brake housing.

Carefully fit dust excluder into groove on Piston Head. Ensure the excluder is correctly seated in the bead groove. (Fig. 10.4)

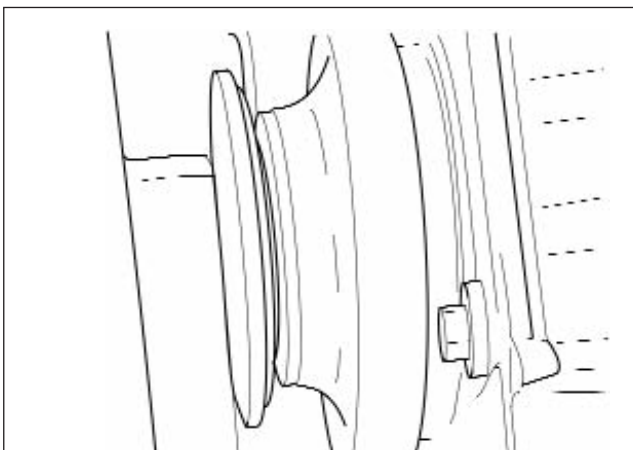


Fig. 10.4

10 Piston Dust Excluder Removal & Replacement

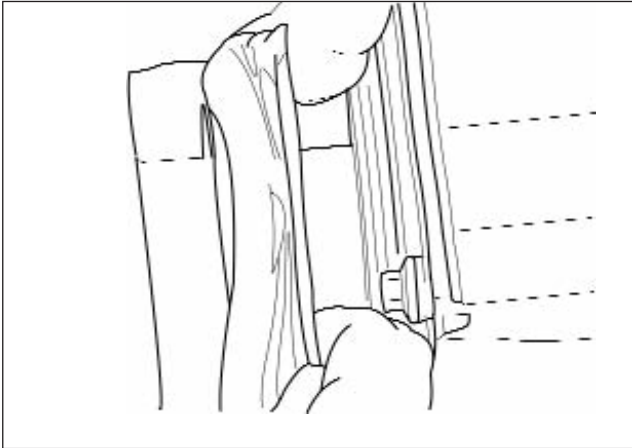


Fig. 10.5

The next stage is to stretch the excluder using 2 fingers. (Fig. 10.5)

With the excluder stretched it is then pulled over and fitted to the groove in the brake housing. (Fig. 10.6)

It is essential that the excluder is fitted correctly.

This is best achieved by rotating the excluder and checking for uniform bead fitment into the grooves. (Fig. 10.7)

Figure 10.8 shows an incorrectly fitted excluder.

Repeat the operation for the second piston excluder.

De-adjust the brake and refit the pads, and where applicable PWWI, set the initial running clearance and test as described in **Section 3 Pad replacement**.

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

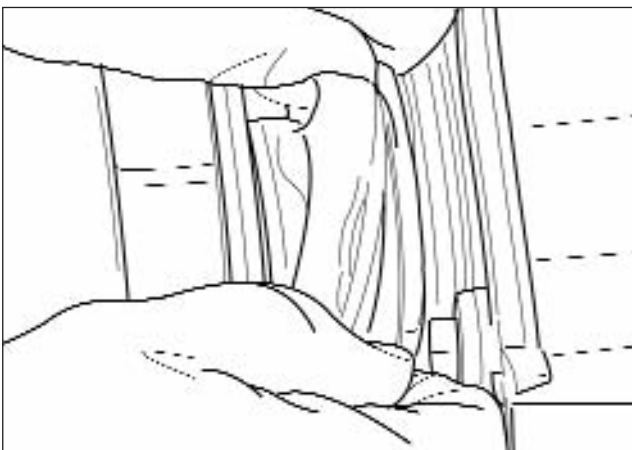


Fig. 10.6

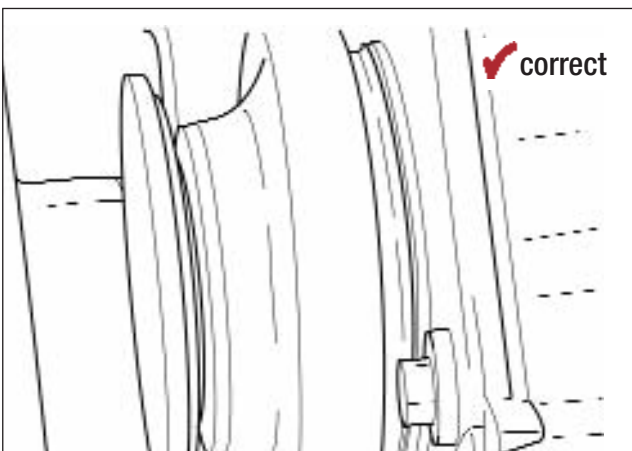


Fig. 10.7

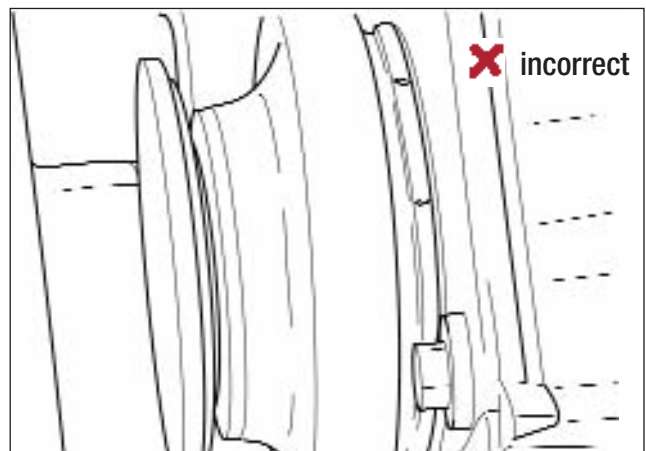


Fig. 10.8

Guide Sleeve, Dust Excluder, Retainer & Bush Replacement

11

- 64 Guide sleeve bushes & retainer removal
- 66 Guide sleeve bushes & retainer fitment
- 68 Guide sleeve excluder retainer fitment
- 69 Guide sleeve & dust excluder removal
- 71 Guide sleeve & dust excluder fitment

11 Guide Sleeve, Dust Excluder, Retainer & Bush Replacement

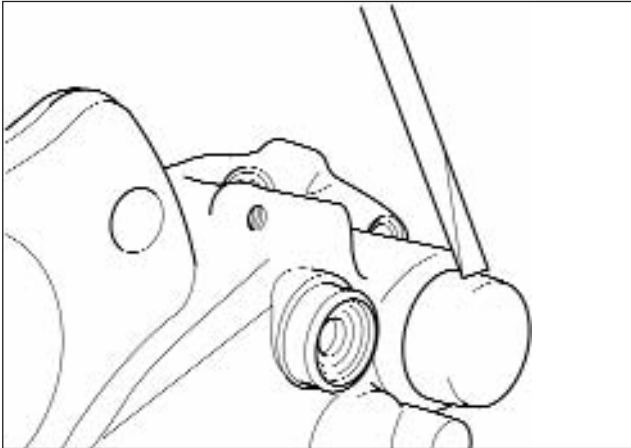


Fig. 11.1

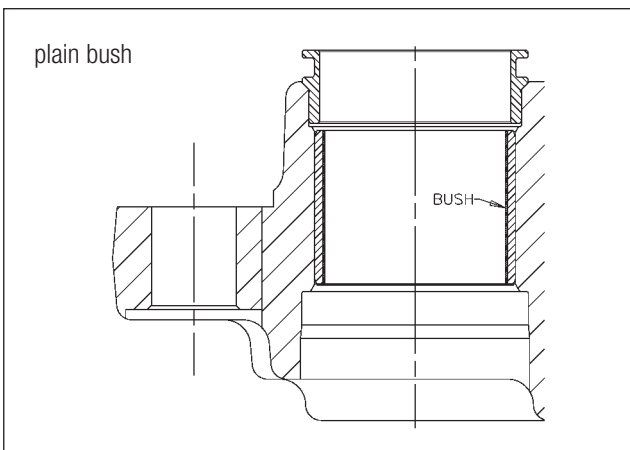


Fig. 11.2

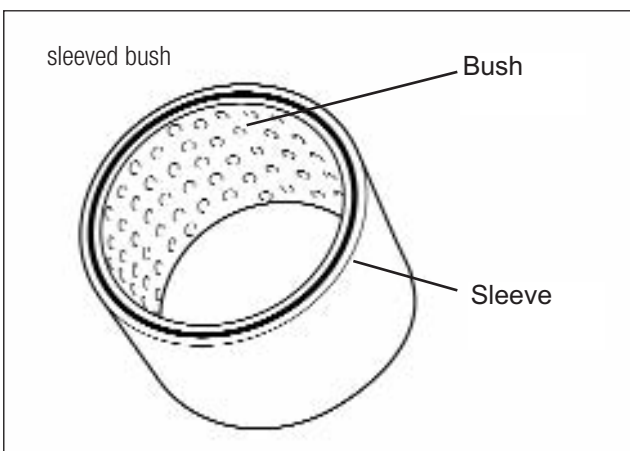


Fig. 12.3

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

Remove the brake pads as described in **Section 3 Pad Replacement**. Where applicable, remove the CWS as described in **Section 5 CWS replacement**. Blank off the CWS mounting hole to prevent any dirt ingress into the housing internals.

Remove the Bridge as described in **Section 7 Bridge Replacement**.

Remove the housing assembly as detailed in **Section 8 Housing Replacement**.

Transfer the brake housing to a suitable workbench.

Inspect the integrity of the piston excluders. They should be secure and free from any signs of damage. If damaged they should be replaced as described in **Section 10 Piston dust excluder replacement**.

Remove the guide sleeve end caps. (Fig. 11.1)

NOTE : 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 housing guide sleeve bores.

Guide Sleeve Bush & Retainer removal.

Description

There are four types of short Guide Sleeve/bush combination that can be found on the Elsa 2 Disc Brake.

1. An oval guide sleeve with a plain bush and separate dust excluder retainer (Fig. 11.2).
2. An oval guide sleeve with a plain sleeved bush, for housings with a larger bore, and separate dust excluder retainer (Fig. 11.3).

11 Guide Sleeve, Dust Excluder, Retainer & Bush Replacement

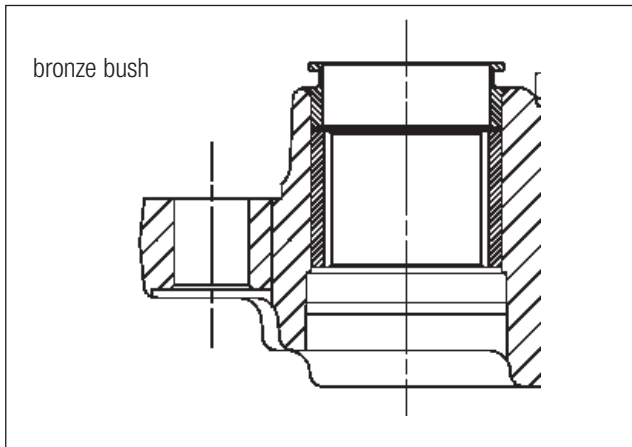


Fig. 11.4

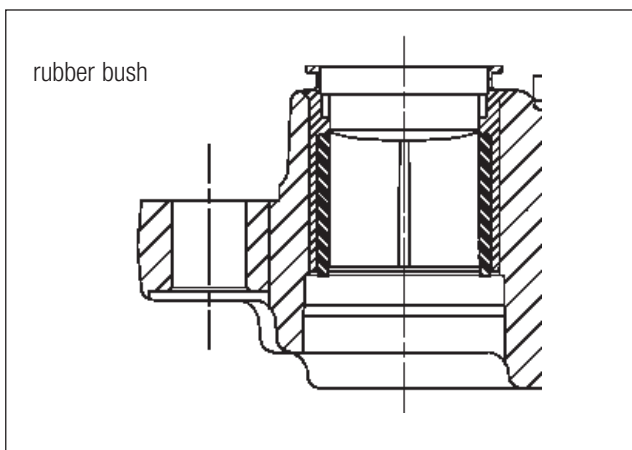


Fig. 11.5

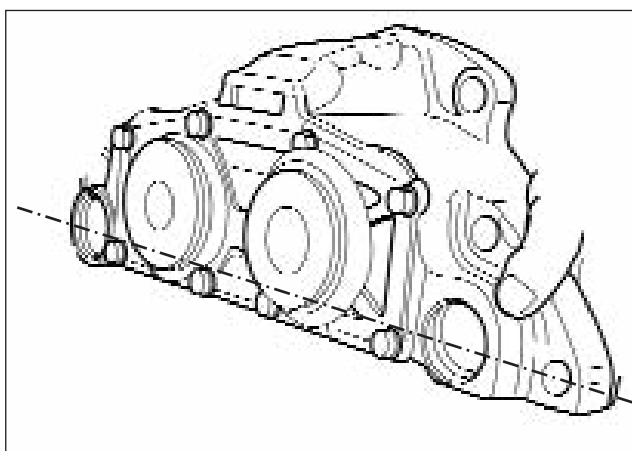


Fig. 11.6

3. A plain guide sleeve with an oval bronze bush and separate dust excluder retainer (Fig. 11.4).

4. A plain guide sleeve with an oval rubber bush and integral dust excluder retainer (Fig. 11.5).

NOTE: Type 1 and 2 are not interchangeable with types 3 and 4, although the procedure for fitting the dust excluder retainer in types 1, 2 and 3 is the same.

NOTE: For types 3 and 4 it is important to ensure correct alignment of the new bush/bushes. The notches in the bush are aligned in the horizontal plane between the two guide sleeve bores (Fig. 11.6)

11 Guide Sleeve, Dust Excluder, Retainer & Bush Replacement

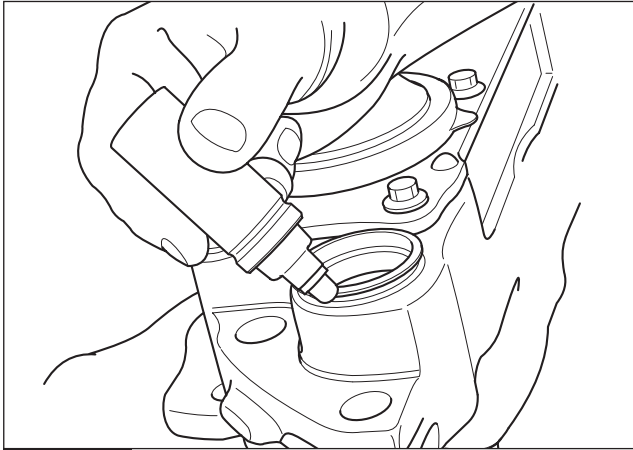


Fig. 11.7

Before pressing the bushes out check the alignment of the oval bush and then mark the housing so that the new bush can be correctly aligned before fitment (Fig.11.7).

Using suitable drift tools, detailed below, press or drift out the bushes from both housing guide sleeve bores together with the dust excluder retainers. (Fig. 11.8)

MST 1000 - Type 1 short bore and all long bore bushes

MST 1025 - Type 2 short bore (sleeved bush)

MST 1023 - Type 3 Short bore (bronze oval bush)

MST 1022 - Type 4 Short bore (rubber oval bush)

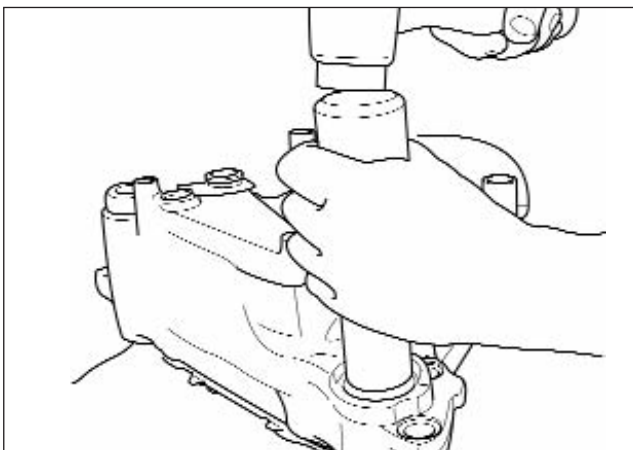


Fig. 11.8

NOTE: Clean the guide sleeve bores with a suitable brake 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.

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

Fitting guide sleeve bush - Short bore Type 1 & 2

CAUTION: Do not apply excessive force when pulling the bush/s into the housing as this may result in damage to the bush/s.

Type 1

(plain bush) place the new bush onto a suitable arbor from the Meritor CVA Service Tool MST 1000. Insert into the housing bore from the guide sleeve excluder retainer end.

Type 2

(Sleeved bush) place the new bush onto a suitable arbor from the Meritor CVA Service Tool MST 1025. Insert into the housing bore from the guide sleeve excluder retainer end.

Type 1 & 2

Pull the bush into the guide sleeve bore to a depth of 10mm using remaining parts of Meritor CVA Service Tool MST1000(Fig.11.9)

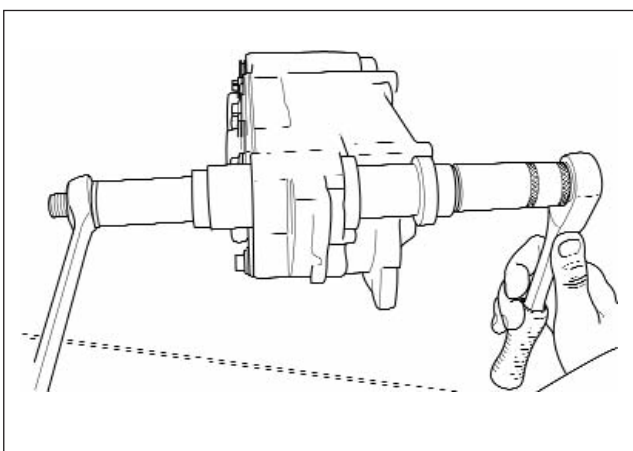


Fig. 11.9

11 Guide Sleeve, Dust Excluder, Retainer & Bush Replacement

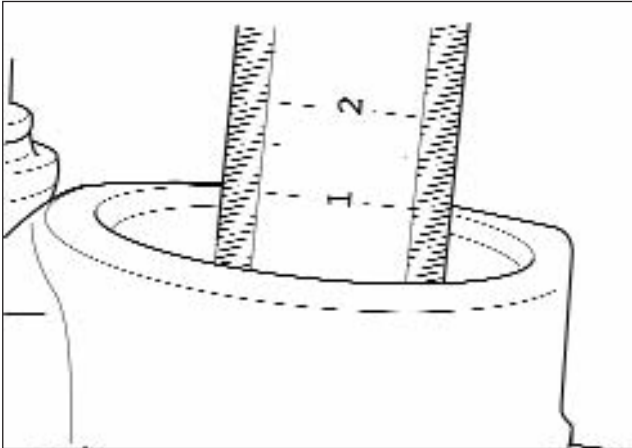


Fig. 11.10

The correct position of the bush can be confirmed by measuring the distance from the top edge of the bush to the edge of the machined chamfer in the guide sleeve bore. This should be 10 mm. (Fig. 11.10)

Fitting guide sleeve bush - Short bore type 3 & 4

⚠ CAUTION: Do not apply excessive force when pulling the bush/s into the housing as this may result in damage to the bush/s.

Align new bush with markings on housing, bronze bush (fig.11.11) and rubber bush (fig. 11.12).

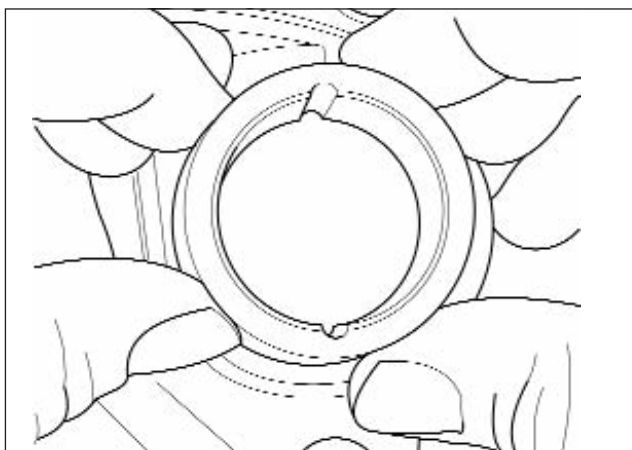


Fig. 11.11

Type 3 (Bronze bush)

Place the bush onto Meritor CVA Service Tool MST 1023 and insert into the housing bore. Pull the bronze bush into the guide sleeve bore to a depth of 10mm from the guide sleeve excluder retainer end using remaining parts of Meritor CVA Service Tool MST 1000.

Type 4 (Rubber bush)

Place the bush onto Meritor CVA Service Tool MST 1011 and insert into the housing bore. Pull the bush into the guide sleeve bore until the chamfer on the steel case contacts the housing. (Fig. 11.13) using remaining parts of Meritor CVA Service Tool MST 1000.

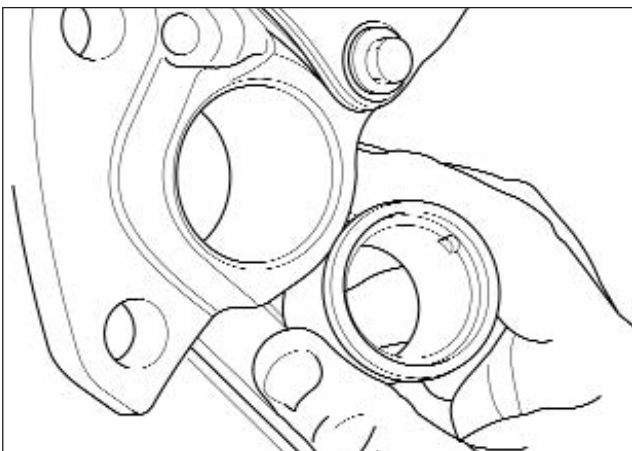


Fig. 11.12

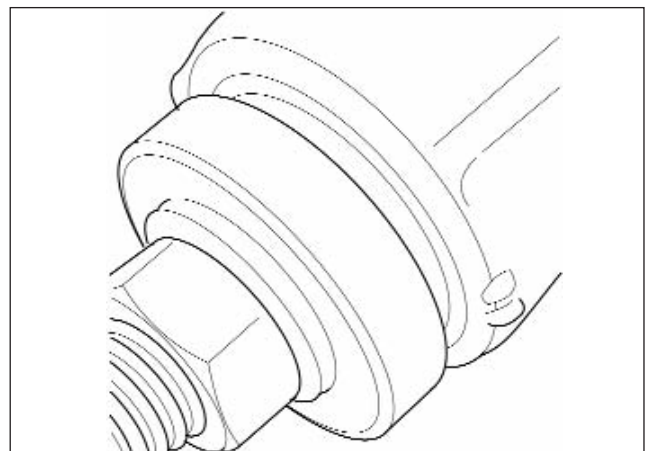


Fig. 11.13

11 Guide Sleeve, Dust Excluder, Retainer & Bush Replacement

Fitting guide sleeve bushes - Long bore

Place one of the new bushes onto a suitable arbor from the Meritor CVA service tool MST 1000. Insert into the housing bore from the guide sleeve excluder retainer end of the bore. Pull the bush into the guide sleeve bore to a depth of 10mm from the end of the bore (Fig 11.14).

For the second bush Insert into the housing bore from the end cap end.

Pull the bush into the guide sleeve bore until it is a 1mm from the end cap seating counterbore. (Fig. 11.14)

⚠ CAUTION: Do not apply excessive force when pulling the bush/s into the housing as this may result in damage to the bush/s.

Fitting Dust Excluder Retainers for types 1, 2 & 3.

Using service tool MST1000, place retainer onto suitable arbor (Fig. 11.15) Place retainer onto housing and with remaining applicable parts of the service tool draw the retainer into the guide sleeve bore until chamfered face contacts housing (Figs 11.16 & 11.17)

⚠ CAUTION: Do not apply excessive force when pulling the retainer into the bore as this may result in damage to the bush or retainer.

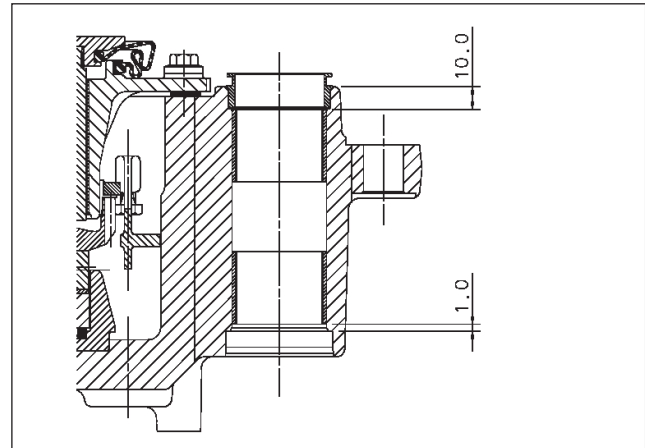


Fig. 11.14

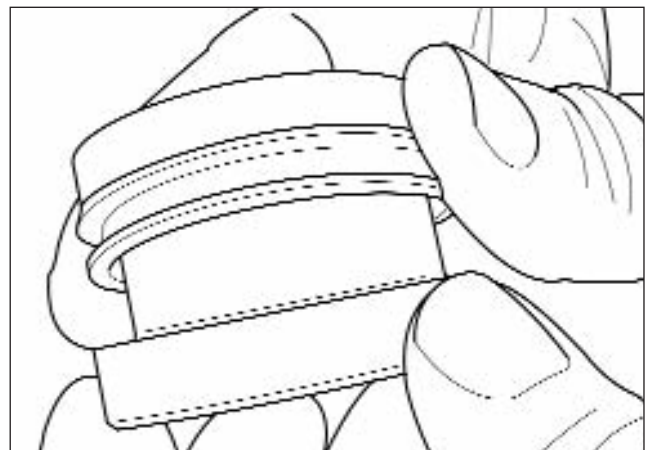


Fig. 11.15

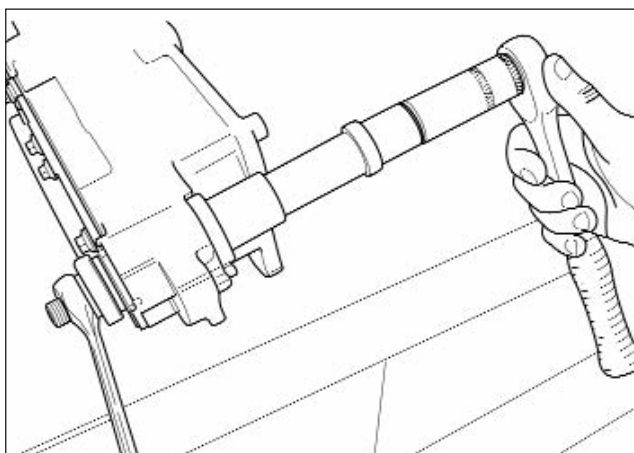


Fig. 11.16

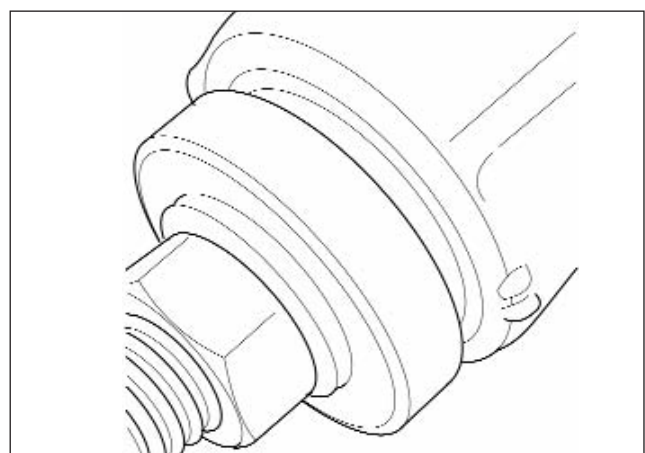


Fig. 11.17

11 Guide Sleeve, Dust Excluder, Retainer & Bush Replacement

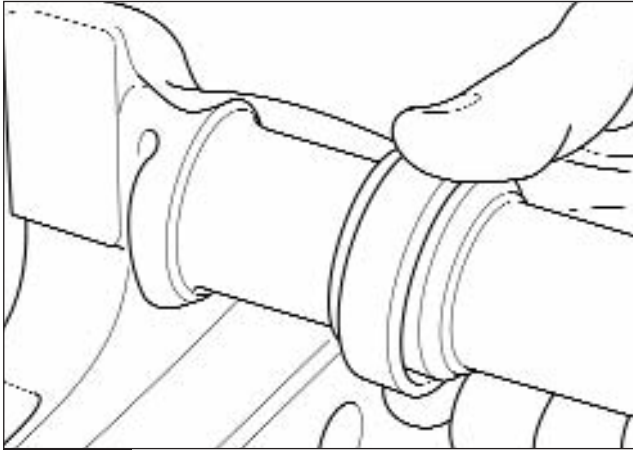


Fig. 11.18

Guide sleeve & dust excluder removal.

Carefully detach the guide sleeve excluders from their location on the carrier and slide off the guide sleeves. (Fig. 11.18).

NOTE: It is possible that the guide sleeve excluders remain attached to the brake housing retainers and are therefore removed with the housing.

Record the position of the SHORT and LONG guide sleeves on the carrier to ensure they are located correctly on reassembly. Remove the guide sleeve screws retaining the guide sleeves to the carrier. (Fig. 11.19) - If necessary carefully release the guide sleeves using a rubber or soft metal hammer from their location on the carrier.

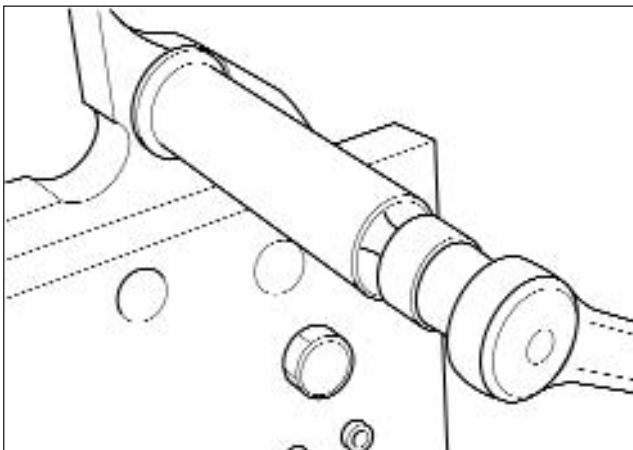


Fig. 11.19

Where applicable carefully remove the dust excluder retainer from the carrier guide sleeve boss (Fig 11.20).

Clean the guide sleeve contact areas and threaded holes in the carrier. Check for damage or wear. If the carrier requires replacement refer to **Section 9** Carrier replacement..

Fitting new guide sleeves & dust excluders

Where applicable fit new dust excluder retainers to the carrier guide sleeve boss (Fig 11.21) using Meritor CVA service tool MST 1024 or suitable drift as described in **Section 9** carrier replacement.

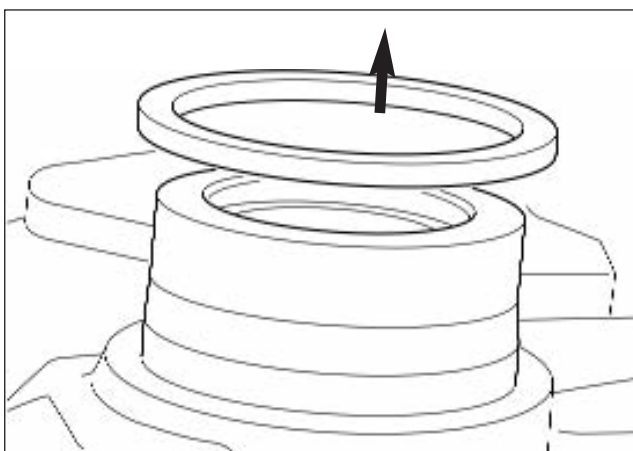


Fig. 11.20

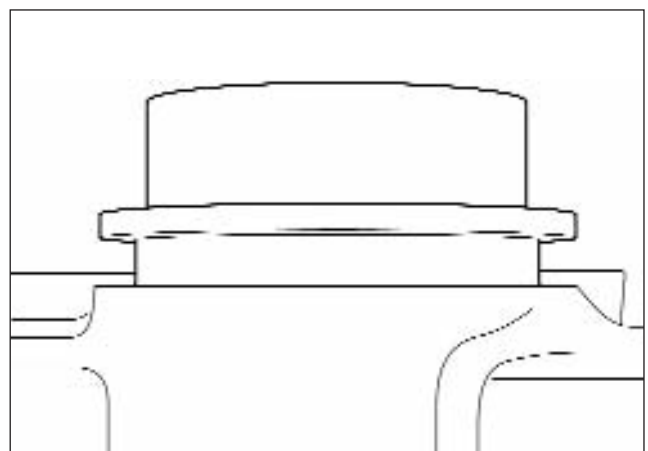


Fig. 11.21

11 Guide Sleeve, Dust Excluder, Retainer & Bush Replacement



Fig. 11.22

Locate the new guide sleeves on the carrier in the correct position and loosely retain with guide sleeve screws.

Type 1 & 2 The SHORT guide sleeve has an oval profile and it is important that it is secured to the carrier in the correct orientation.

Turn the guide sleeve until the flat sides are in a vertical plane in line with the carrier abutment. Use a suitable open ended wrench to hold the pin in its correct orientation. (Fig. 11.22)

T Placing a straight edge across the guide sleeve 'flat' and aligning it with the pad abutment shoulder will aid positioning, (Fig. 11.23). With the guide sleeve correctly aligned, tighten the guide sleeve screw to a torque of 495 - 585Nm.

T The LONG guide sleeve needs no alignment tighten the guide sleeve screw to a torque of 495 - 585Nm.

T **Type 3 & 4** SHORT and LONG guide sleeves need no alignment, tighten the guide sleeve screws to a torque of 430 - 440Nm.

Lightly lubricate the inner surfaces of the guide sleeve excluders with grease and ensure they are located correctly on the carrier. (Figs. 11.24 & 11.25)

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

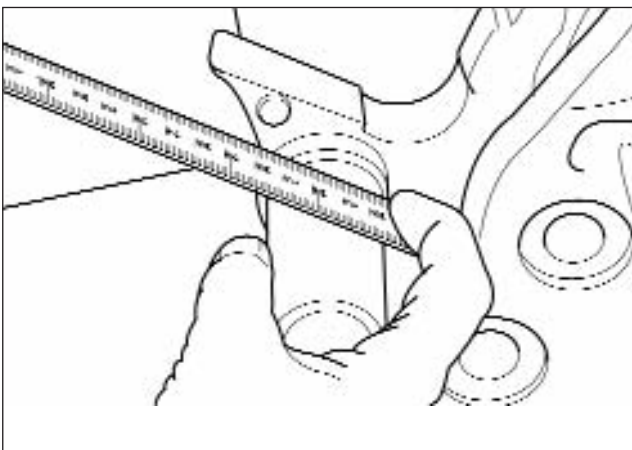


Fig. 11.23

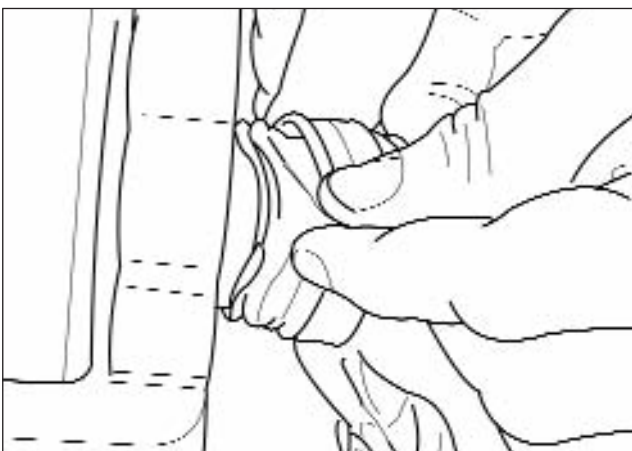


Fig. 11.24

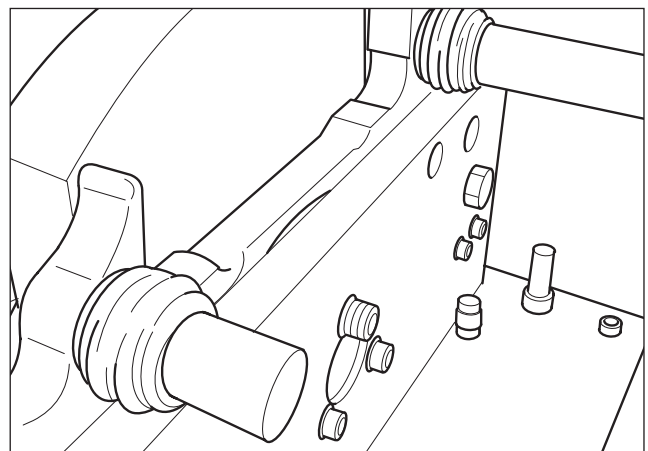


Fig. 11.25

11 Guide Sleeve, Dust Excluder, Retainer & Bush Replacement

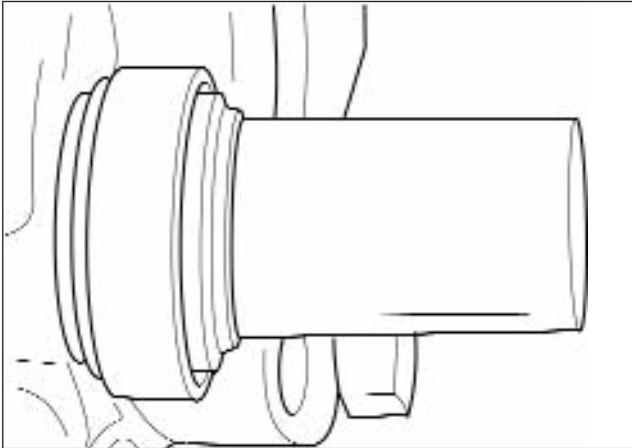


Fig. 11.26

Reassembly

Apply grease to the guide sleeve and housing guide sleeve bores. (Fig. 11.26)

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

Carefully slide the housing assembly into position on the guide sleeves secured to the carrier. (Fig. 11.27)

Do not forget the visual wear indicator and spring if fitted. Locate the guide sleeve excluders onto the housing retainers. (Fig. 11.28)

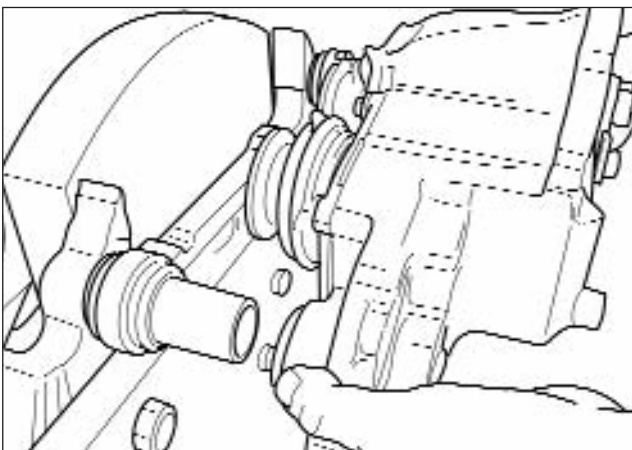


Fig. 11.27

NOTE: Take care not to damage the guide sleeve excluders when locating the housing on to the carrier.

Ensure the dust excluders are located correctly on both carrier and housing retainers. (Fig. 11.29)

Slide the housing backwards and forwards several times to check the smooth movement of the guide sleeves. Using a copper faced mallet, carefully tap one of the new end caps into the housing until it retains itself.

CAUTION: Take care not to trap fingers whilst checking the smooth movement of the guide sleeves.

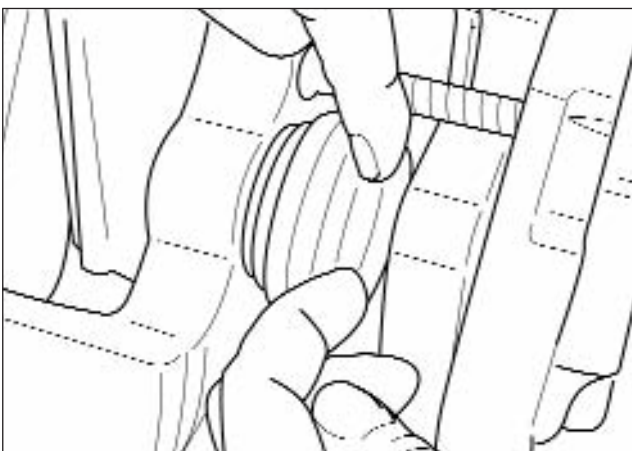


Fig. 11.28



Fig. 11.29

11 Guide Sleeve, Dust Excluder, Retainer & Bush Replacement

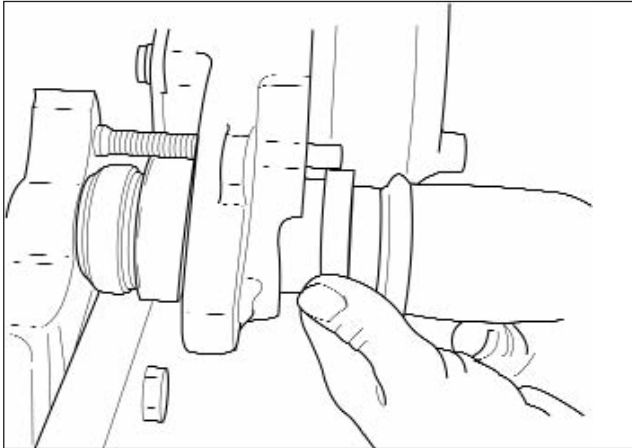


Fig. 11.30

Using a suitable sized flat faced tool tap the end cap in until they stop at the end of their bores in the housing. (Fig. 11.30) Repeat for the second end cap.

The end caps long and short pins will be fitted to a different dimension as shown in Figs. 11.31 & 11.32

Long guide sleeve cap 18mm Max
Short guide sleeve cap 12mm Max

The dimensions must be checked to ensure that they do not exceed the stated max figures.

Slide the housing backwards and forwards several times to check the smooth movement of the housing on the guide sleeves.

Slide the housing to check the location of the dust excluders. (Fig. 11.33)

Refit the bridge as described in the **Section 7** Bridge replacement

CAUTION: Always use new bridge screws. Once removed bridge screws should not be re-used.

Refit the air chamber as described in **Section 6**

Brake replacement.

Refit the pads, and where applicable PWWI, set the initial running clearance and test as described in **Section 3 Pad replacement.**

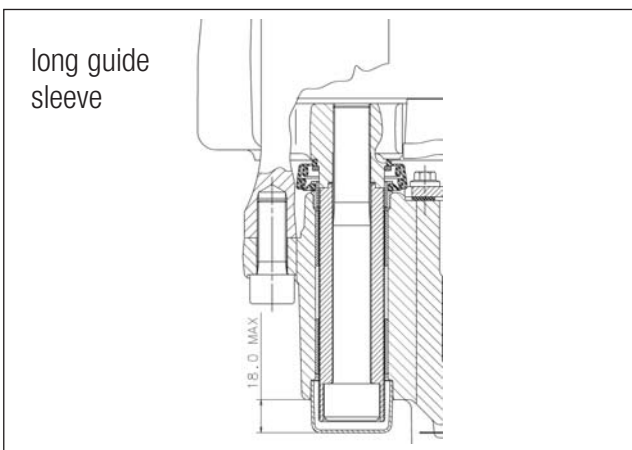


Fig. 11.31

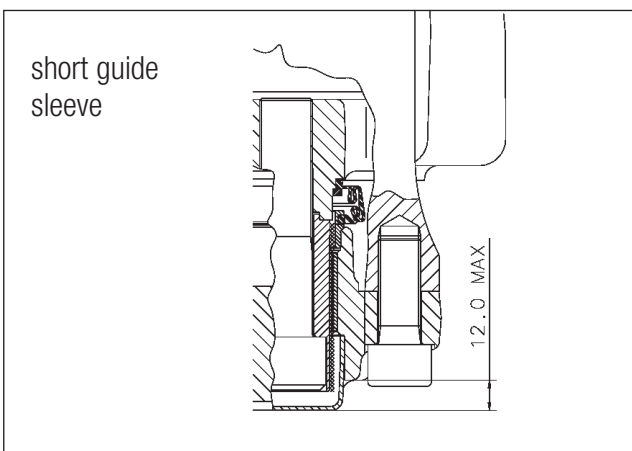


Fig. 11.32

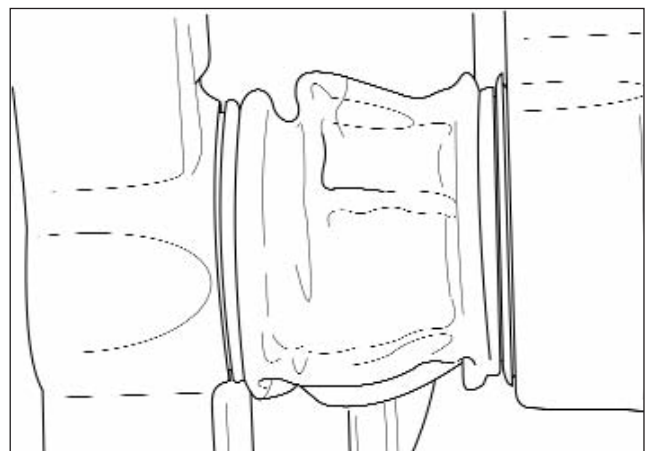


Fig. 11.33

Rotor Rework & Replacement

12

74 Rotor wear conditions for Rework or Replacement

12 Rotor Wear Conditions for Rework or Replacement

This document explains safe working practices for the limitations of a rotor life for the D-ELSA 2 Meritor CVS 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	49
Minimum Friction Material Thickness	3

New Rotor Condition - Fig 12.1

The rotor nominal maximum thickness (new condition) is 45mm. The rotor gap between the carrier abutments of the brake assembly is 49mm nominally. Therefore, if the rotor is central to the carrier abutments an equal clearance of 2mm 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 12.2

The rotor is permitted to wear to a minimum thickness of 39mm provided that there 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 12.3

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 5mm.

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 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 negated any warranty claim and Meritor CVS cannot be held responsible for operator neglect.

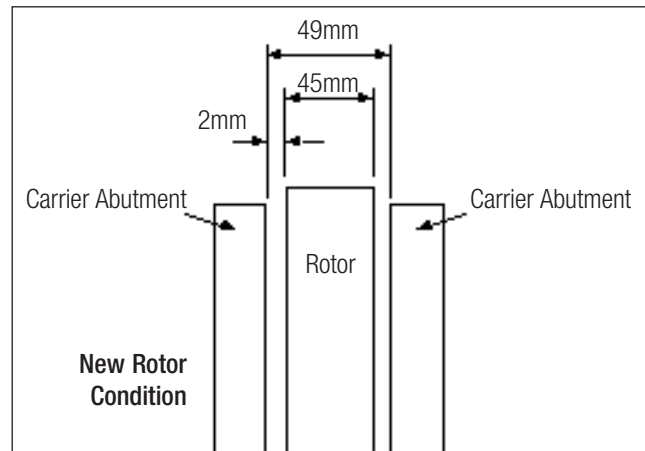


Fig. 12.1

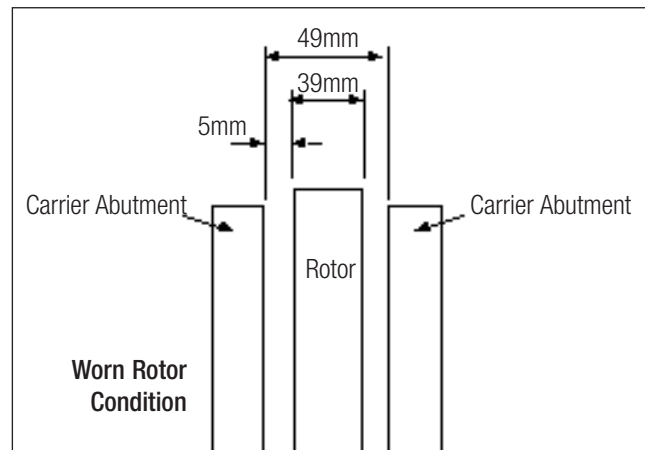


Fig. 12.2

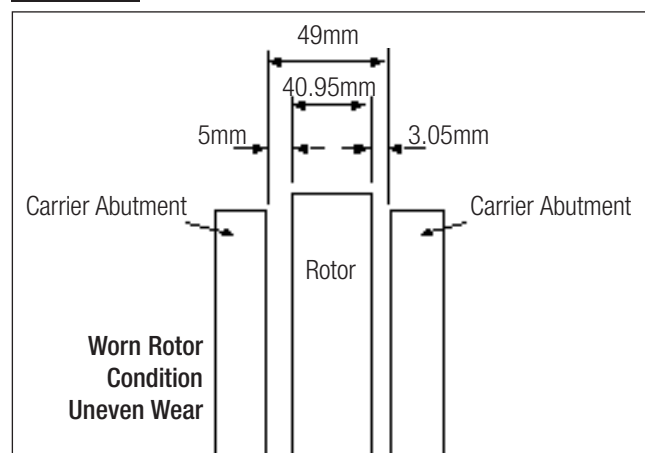


Fig. 12.3

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

Servicing & Specifications

13

76 Servicing schedules, Grease specification
& Tightening Torque's.

13 Servicing and Specifications

Servicing

Although there is no routine maintenance of the Brake required it is important the following inspections are carried out at the periods specified, or those described in the vehicle manufacturers manual.

Every 3 months or 20,000 Km.

A visual assessment of pad life remaining should be made. Where a visual pad wear indicator is incorporated into the brake it provides a quick and simple method of assessing the pad life remaining. Brake pads should be replaced when the lining thickness has worn to 3.0 mm.

Visually inspect the general condition of the brake assembly for damage or corrosion, pay particular attention to the guide pin and piston dust excluders. If there is any doubt in the suitability for further service replace/rectify in accordance with the vehicle manufacturers recommendations.


Every 12 months


Remove the road wheels and brake pads as described in the **Section 3 Pad Replacement Section**. Inspect the guide sleeve and piston excluders and ensure they are undamaged and securely located. If any of the dust excluders are detached or damaged 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 12**, or the vehicle manufacturers recommendations. Replace as necessary.

 **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:** 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.

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

Grease Specification

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

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

Tightening Torques

Component	Torque
M20 Guide Sleeve Screw (long & short)	495 - 585 Nm
M18 Guide Sleeve Screw (long & short)	430 - 440 Nm
Adjuster Stem	40 Nm Maximum
Pad Retaining Plate Screw	33 - 40 Nm
M10 Wear Sensor/Switch Retaining Screw	33 - 40 Nm
Bridge Screws	300 - 350 Nm
Air Actuator Retaining Nut	
Pre Torque	80 - 100 Nm
Final Torque	180 - 210 Nm

Service Diagnosis

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14 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	

14 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

14 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
Brake noise/ Rattle	Pad spring damaged or not installed	Broken pad springs and correct pad spring installation	Install the pad springs or replace broken springs
	Worn guide sleeves	Follow the procedure detailed in Operation Checks to check for excessive wear	Replace the guide sleeves and bushes
			Replace the brake assembly
	Worn guide sleeve bushes	Follow the procedure detailed in Operation Checks to check for excessive wear	Replace the guide sleeves and bushes
Replace the brake assembly			

Service Tools

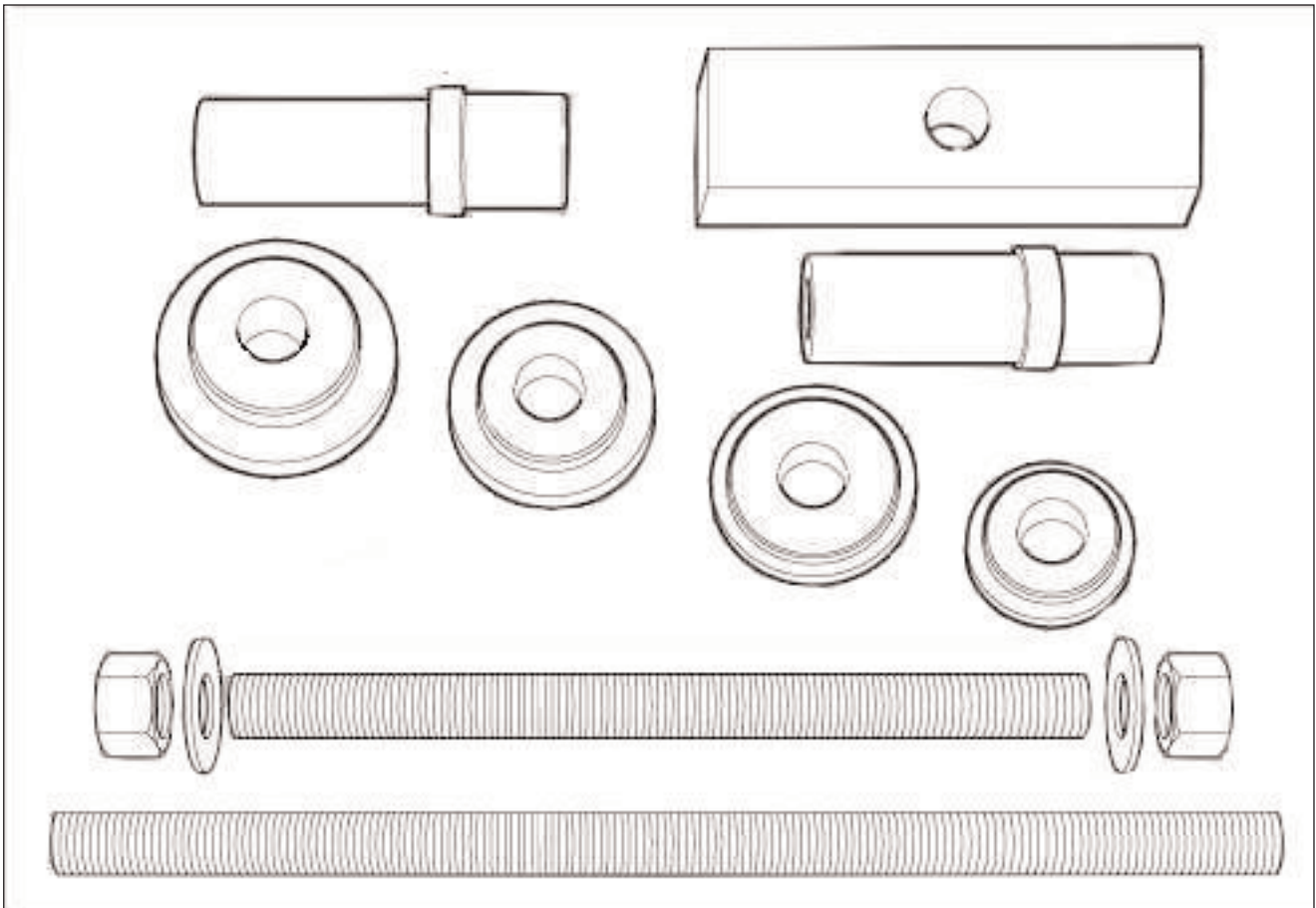
15

- 82 MST 1000 Bush fitting tool
- 83 MST 1011 Rubber bush fitting tool
- 83 MST 1017 Slide pin wear tool
- 84 MST 1022 Rubber bush removal tool
- 84 MST 1023 Oval guide bush tool
- 85 MST 1024 Retaining ring fitting tool
- 85 MST 1025 Sleeved bush fitting tool

15 Service Tools

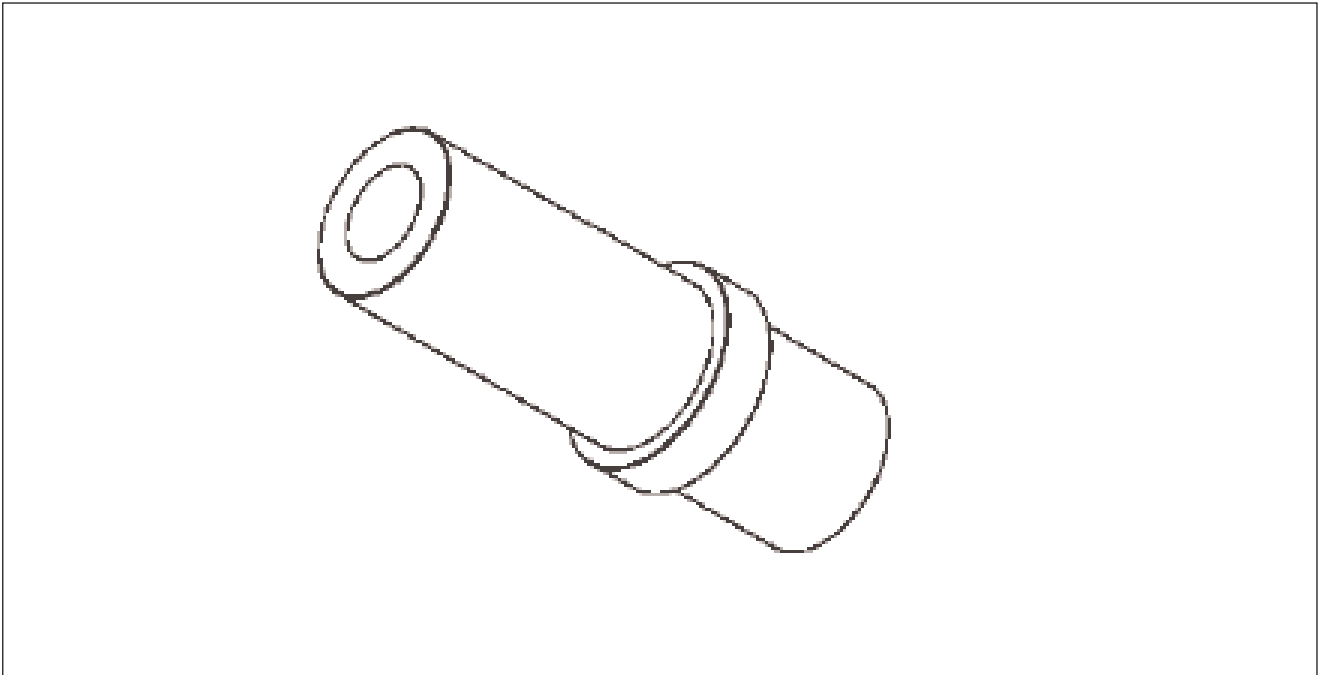
The following tools can be purchased from Meritor CVA

MST 1000 Bush Fitting Tool

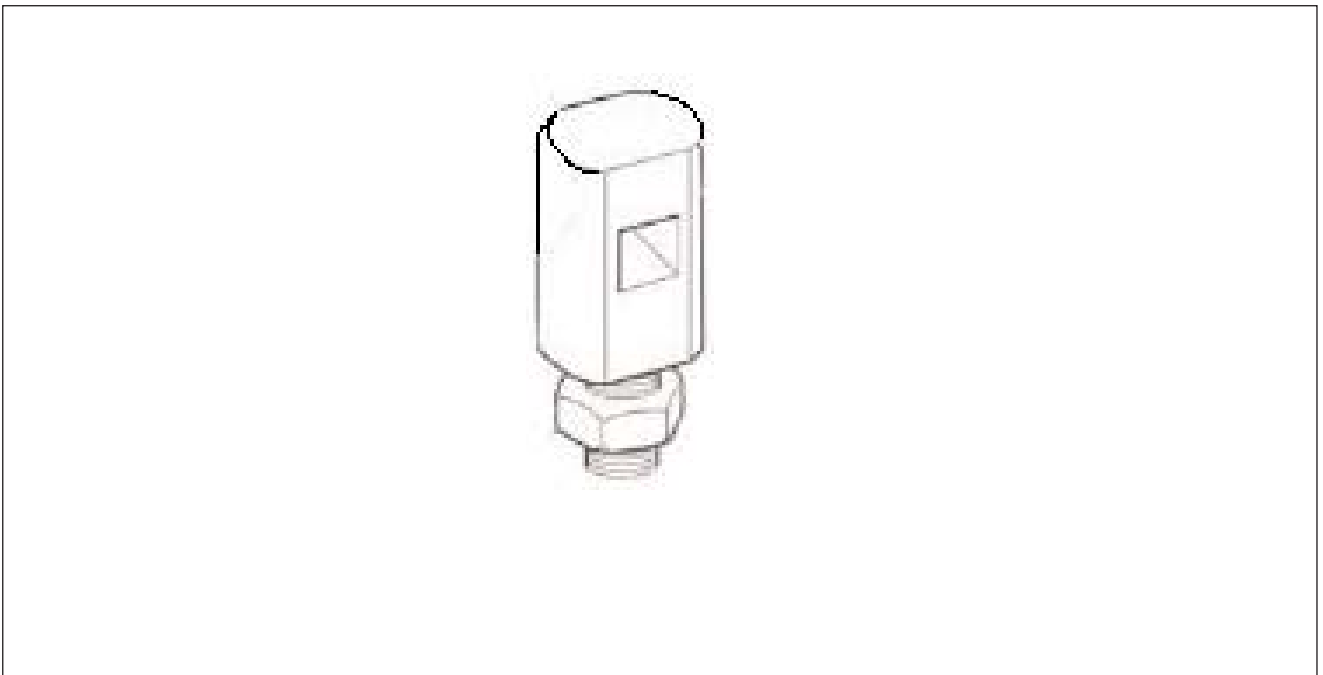


15 Service Tools

MST 1011 Rubber Bush Fitting Tool

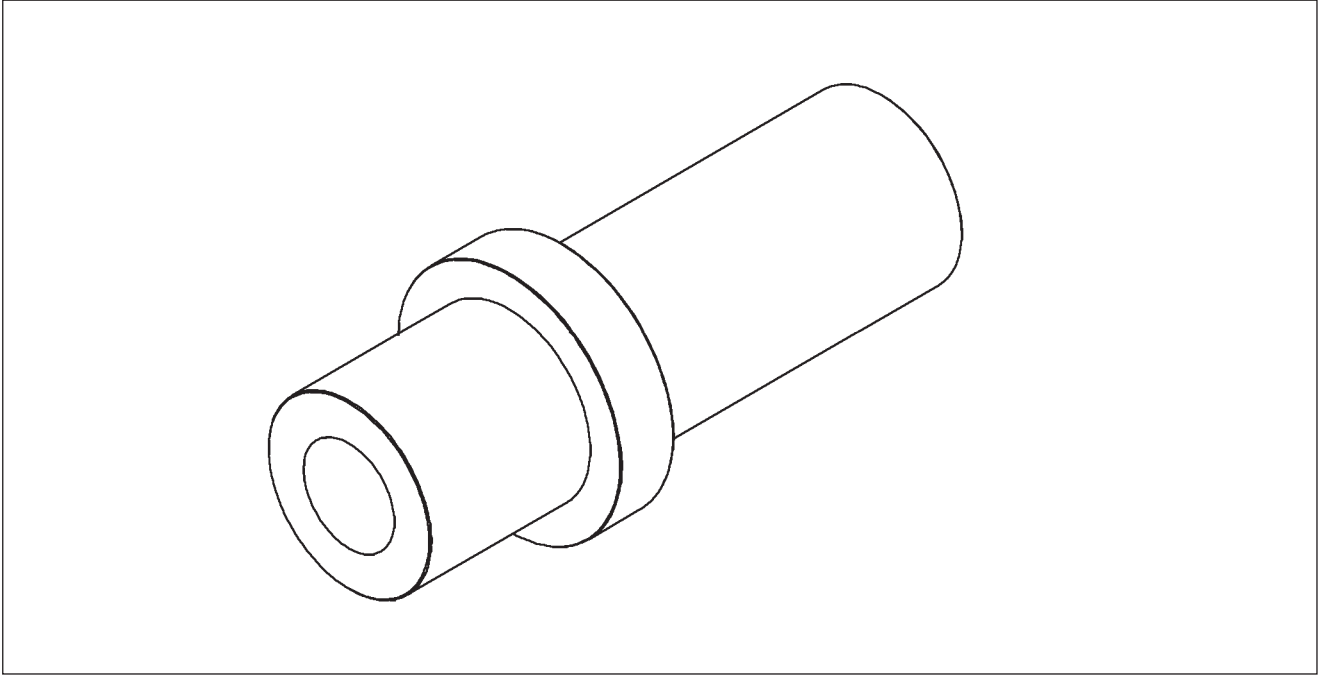


MST 1017 Pin Wear Tool

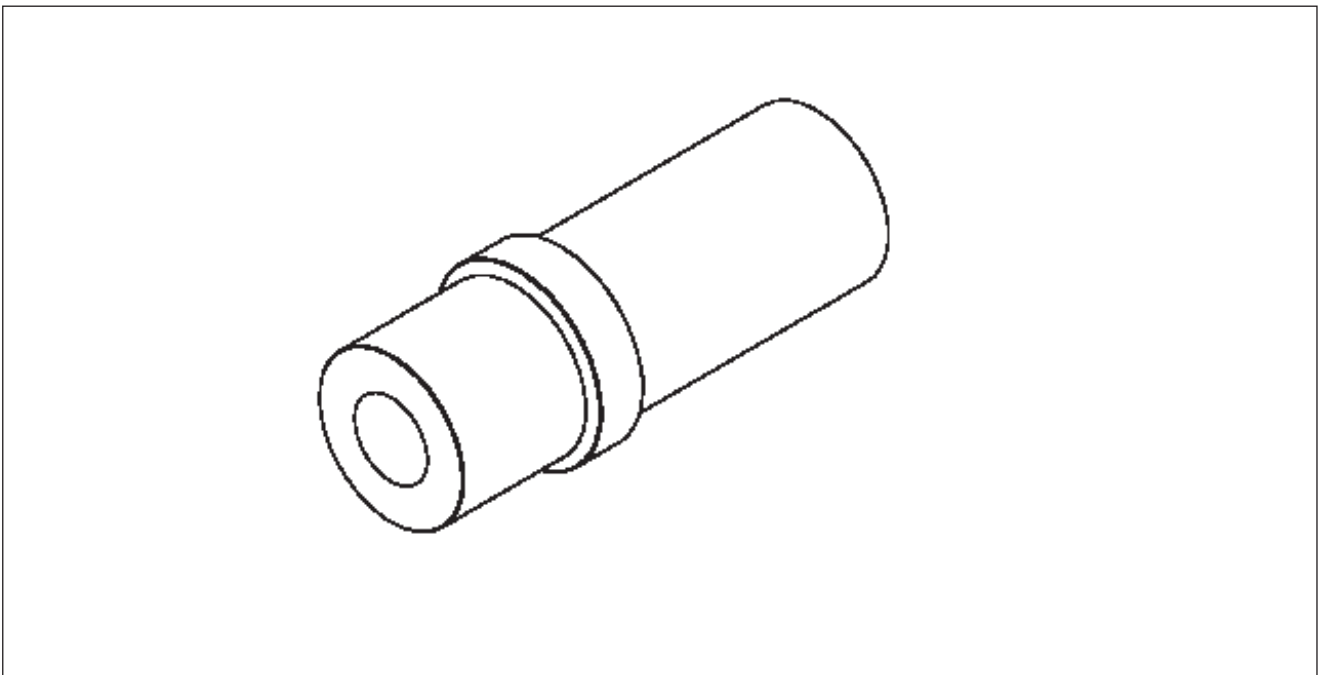


15 Service Tools

MST 1022 Rubber Bush Removal Tool

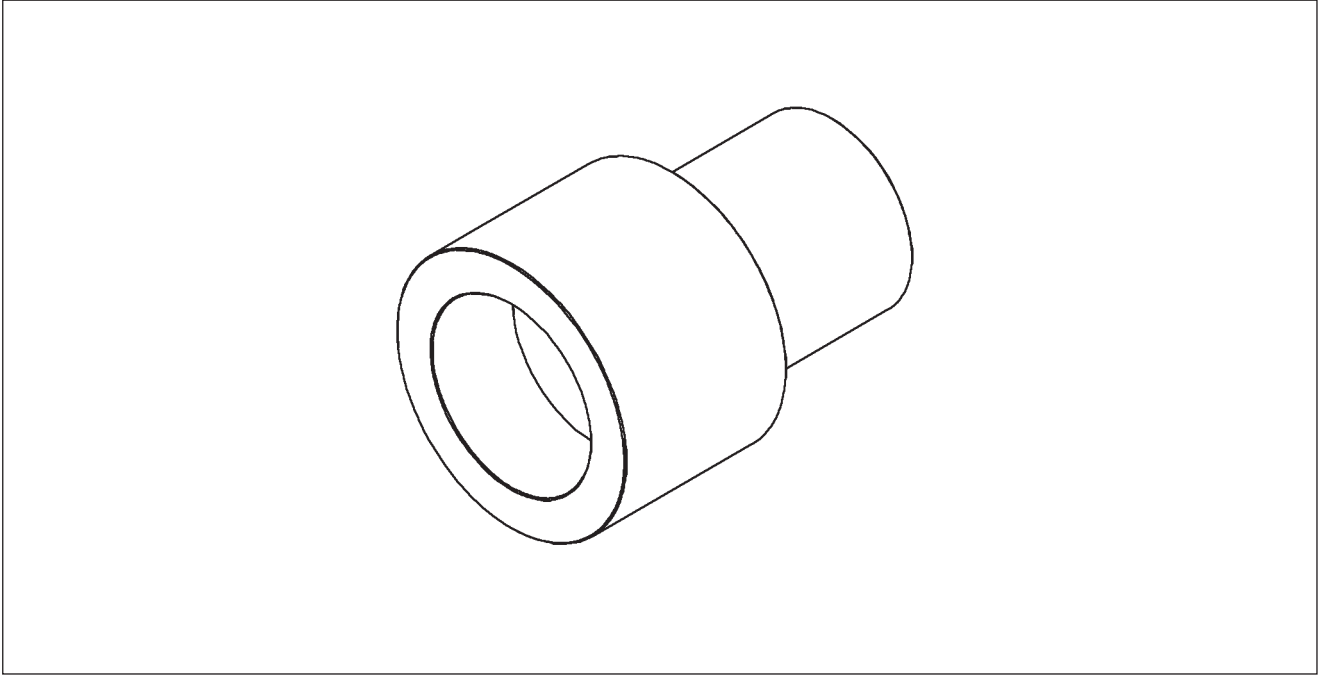


MST 1023 Oval Guide Bush Tool

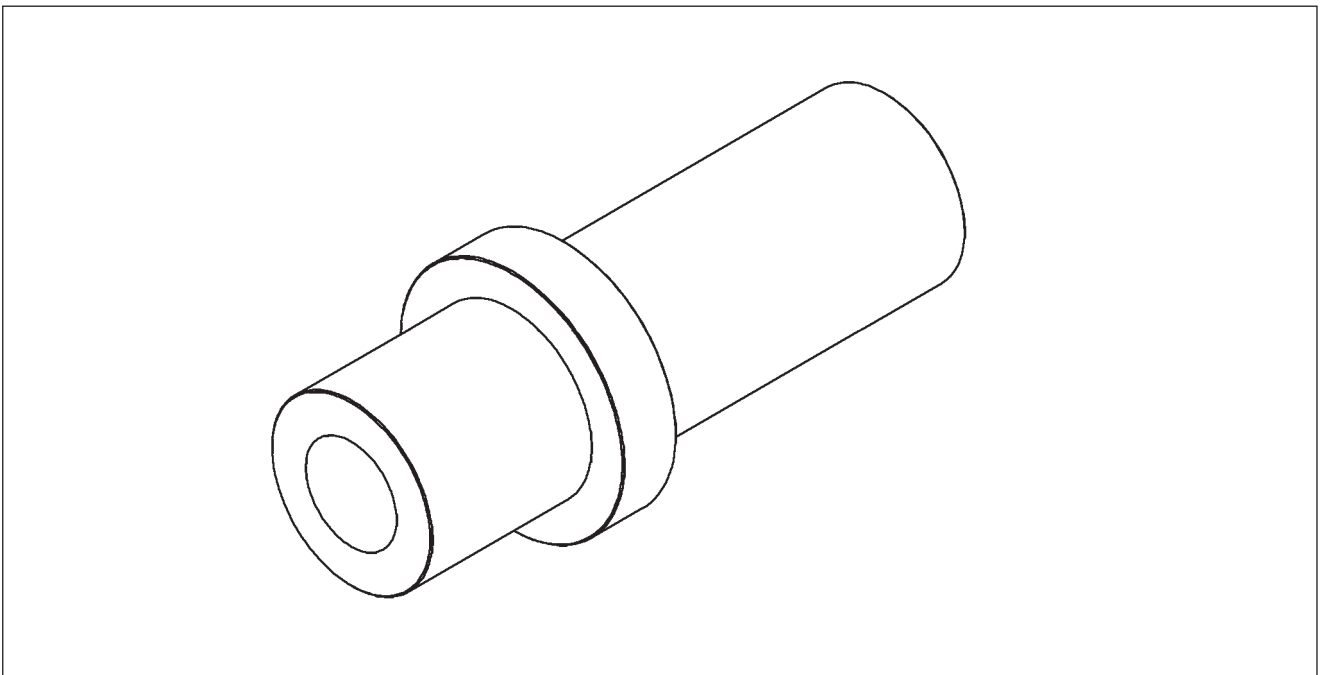


15 Service Tools

MST 1024 Retaining Ring Fitting Tool



MST 1025 Sleeved Bush Fitting Tool



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