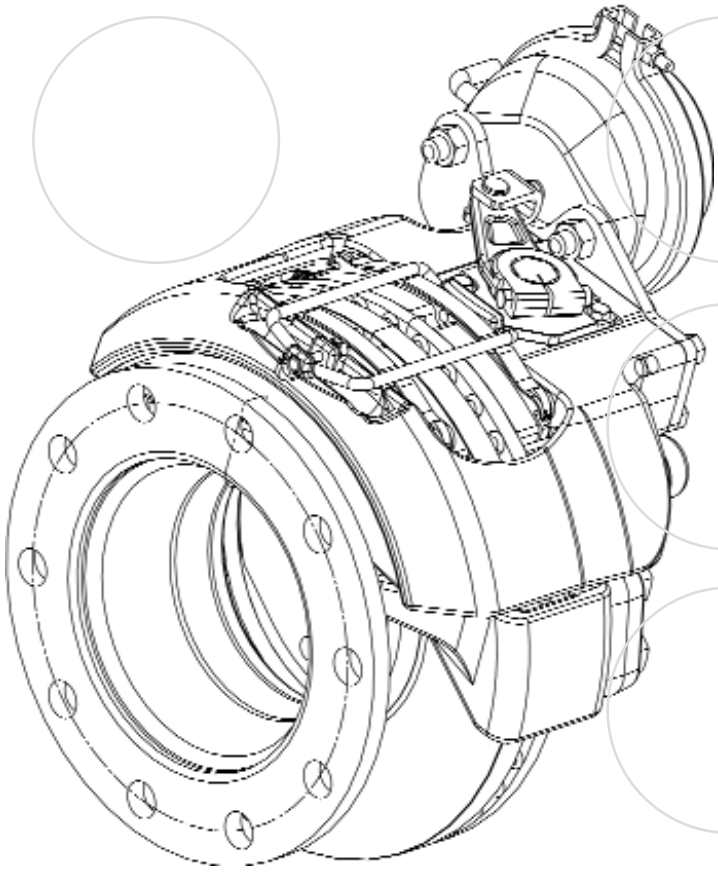
ArvinMeritor

Maintenance manual no. MM-1147

DX Air Disc Brake

DX195, DX225 & DX225/21 Air Disc Brake

Issue March 2008



Service Notes

Document No. MM-1147
Edition: March 2008

Before You Begin

This publication provides installation and maintenance procedures for the DX 195 & DX 225 range of Air Disc Brakes.

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

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

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

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

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

WARNING

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

CAUTION

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

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

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

Safety Instructions

- Observe the manufacturers safety instructions for jacking up and securing the vehicle
- Only use original ArvinMeritor parts
- Use only the tools recommended
- Observe the following service instructions and notes
- When working on the brake you must ensure that it cannot be activated inadvertently
- 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 ArvinMeritor brake cleaner for cleaning the brake.
- When removing or fitting a complete brake, you should remember it has a dead weight of up to 117lbs (53kg). Use a lifting system, taking care not to damage the brake.
- When the servicing has been completed, it is essential that you road test the vehicle and try out the brakes.

CAUTION You must always renew the brake pads on both wheels of an axle.Only use 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.

Access Information on ArvinMeritor's Web Site

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

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

Service Notes

Terms used in this manual

Manufacturer:
ARVINMERITOR

Manual:
Maintenance manual no. MM-1147

Device:
DX189, DX225, DX225/21 Air Disc Brake.

Technician:
Qualified personnel working on brake maintenance and servicing.

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

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

Warranty

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

- Improper use of the vehicle on which the air disc brake is installed (usage conditions, overloading etc.)
- Tampering with vehicle components that may affect brake performance.
- Use of non-original spare parts.
- 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 ArvinMeritor web site www.meritorhvs.com

Contents

Introduction

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Exploded view

DX air disc brake - Pre March 2001 production

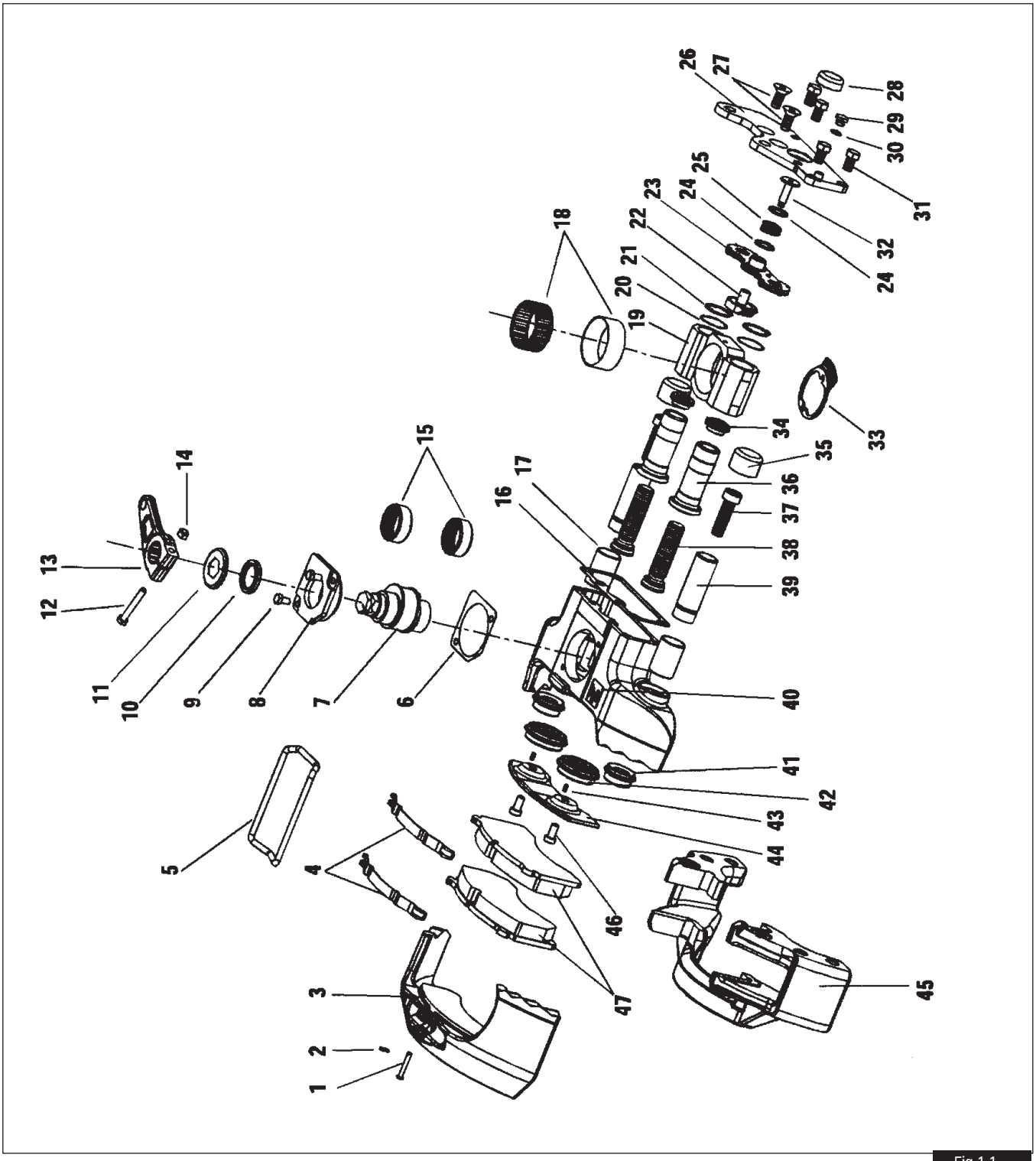

Fig 1.1

Parts list

DX air disc brake - Pre March 2001 production

Ref	Description	Qty
1	Stabiliser bar retaining pin	1
2	Pin clip	1
3	Housing	1
4	Anti-rattle spring	2
5	Stabiliser bar	1
6	Cover plate gasket	1
7	Eccentric shaft	1
8	Cover plate	1
9	Cover plate screws	2
10	Eccentric shaft seal	1
11	Eccentric shaft seal excluder	1
12	Clamp screw (lever)	1
13	Lever	1
14	Clamp screw nut (lever)	1
15	Eccentric shaft bearing unit	2
16	End plate gasket	1
17	Slide pin bushes	2
18	Eccentric shaft support bearing	1
19	Actuation block	1
20	Damping spring	2
21	Snap ring	2
22	Bevel gear / torque limiter	1
23	Adjustment box ** (pre-installed unidirectional bearing)	1

Ref	Description	Qty
24	Damping ring	2
25	Compression spring	1
26	End plate and Air actuator bracket	1
27	Socket head screw (end plate)	2
28	End plate cap	1
29	Plug screw (of adjuster port)	1
30	Copper washer	1
31	Hexagonal head screw (end plate screw)	4
32	Adjuster device screw	1
33	Adjuster gear segment	1
34	Adjuster sleeve gear *	2
35	Slide pin protective cap	2
36	Adjuster sleeve **	2
37	Slide pin locking screw	2
38	Actuating piston **	2
39	Slide pin	2
40	Identification label	1
41	Slide pin seal excluder	2
42	Actuating piston seal excluder	2
43	Roll pin	2
44	Thrust plate	1
45	Saddle	1
46	Actuating piston screw	2
47	Brake pads	2
48	Brake pad wear indicator (if fitted)	1

* Gear is shown separately although it is an integral part with adjuster sleeve.

** These components are different according to actuation direction (clockwise or counter - clockwise) (Fig. 2-2).

Exploded view

DX air disc brake - Post March 2001 production

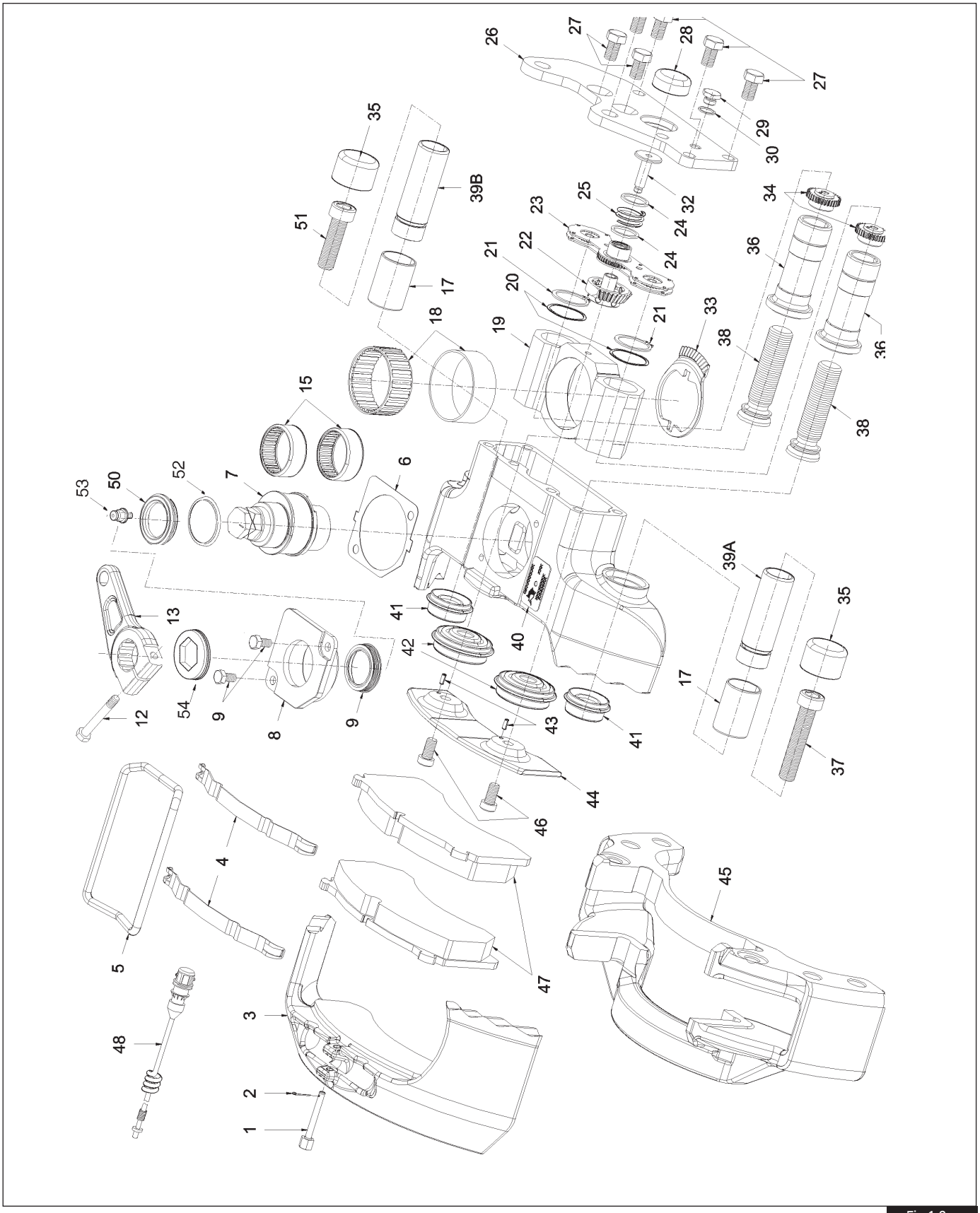

Fig 1.2

Parts list

DX air disc brake - Post March 2001 production

Ref:	Description	Qty
1	Stabiliser bar retaining pin	1
2	Pin clip	1
3	Housing	1
4	Anti-rattle spring	2
5	Stabiliser bar	1
6	Cover plate gasket	1
7	Eccentric shaft	1
8	Cover plate housing	1
9	Cover plate screws	2
12	Clamp screw (lever)	1
13	Lever	1
15	Eccentric shaft bearing unit	2
17	Slide pin bushing	2
18	Eccentric shaft support bearing	1
19	Actuation block	1
20	Damping spring	2
21	Snap ring	2
22	Bevel gear / torque limiter	1
23	Adjustment box ** (pre-installed unidirectional bearing)	1
24	Damping ring	2
25	Compression spring	1
26	Air actuator end plate and bracket (shape may vary due to brake part number)	1
27	End plate screws (style may vary due to brake part number)	6

Ref	Description	Qty
28	End plate cap	1
29	Plug screw (of adjuster port)	1
30	Copper washer	1
32	Adjuster device screw	1
33	Adjuster gear segment	1
34	Adjuster sleeve gear *	2
35	Slide pin protective cap	2
36	Adjuster sleeve **	2
37	Slide pin locking screw (long)	1
38	Actuating piston **	2
39a	Slide pin (to suit long locking screw)	1
39b	Slide pin (to suit short locking screw)	1
40	Identification label	1
41	Slide pin seal excluder	2
42	Actuating piston seal excluder	2
43	Roll pin	2
44	Thrust plate	1
45	Saddle	1
46	Actuating piston screw	2
47	Brake pads	2
48	Brake pad wear indicator (if fitted)	1
49	Cover plate eccentric shaft seal	1
50	Eccentric shaft seal	1
51	Slide pin locking screw (short)	1
52	Washer, grease barrier	1
53	Grease Nipple	1
54	Dirt Shield	1

* Gear is shown separately although it is an integral part with adjuster sleeve.

** These components are different according to actuation direction (clockwise or counter - clockwise) (Fig. 2-2).

Automatic Adjuster Assembly

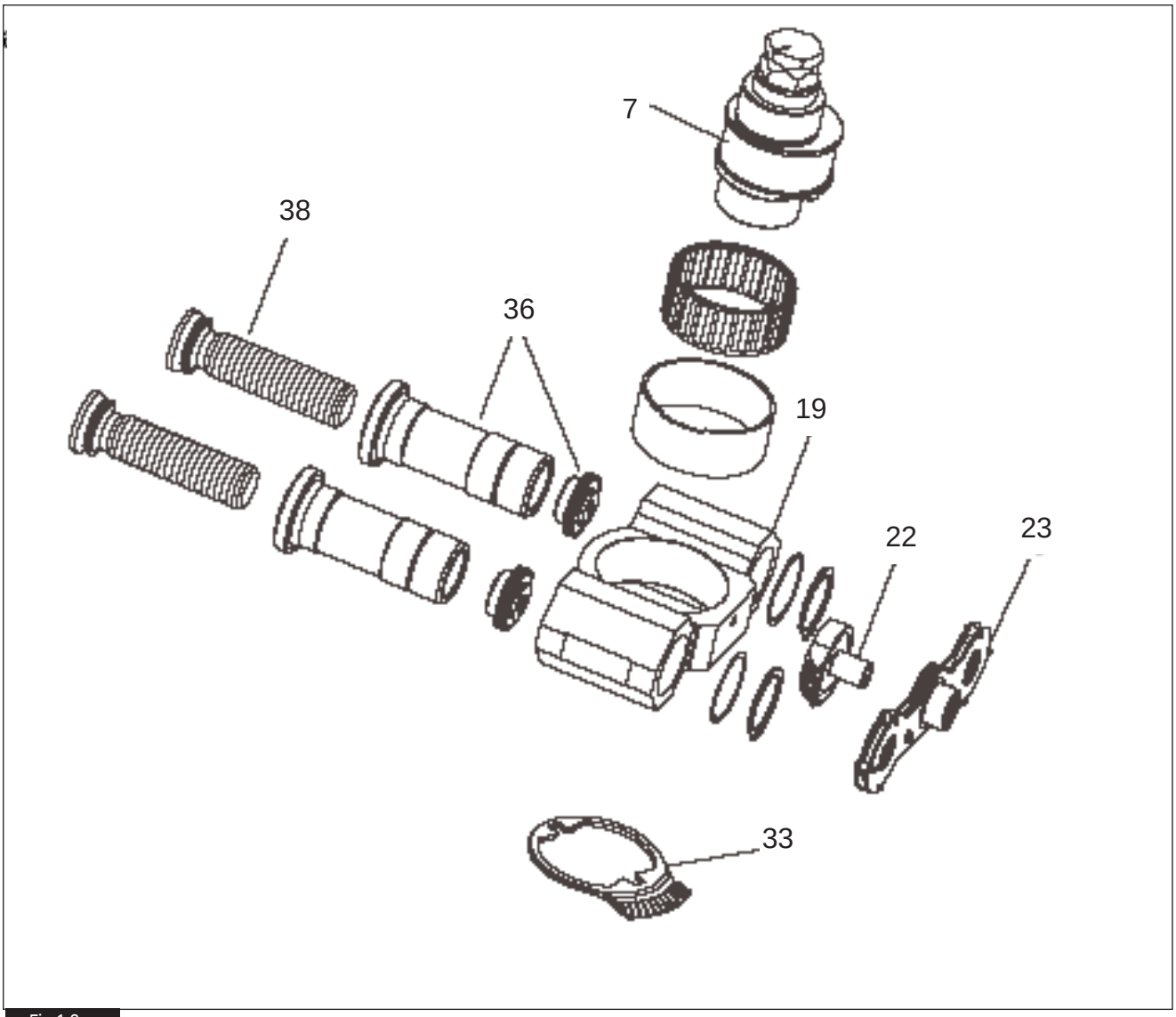

Fig 1.3

Ref	Description
38	Actuating piston
36	Adjuster sleeve and gear
7	Eccentric shaft
19	Actuation block
22	Bevel gear
23	Box (adjuster gear train)
33	Adjuster gear segment

1 Introduction

General description

The ArvinMeritor CVS DX series of air disc brakes is a family of high performance, low weight, high efficiency brakes designed for trucks, coaches, buses and other commercial vehicles requiring between 10,000 and 23,000 Nm of braking torque at each wheel.

Clamping force is produced by a globular (SG) cast iron brake (3) located above the rotor and housing two lining pads (47). The pads are pushed against the rotor by a dual piston actuating block (19) connected to an eccentric shaft (7), which is in turn driven by a lever (13) operated by a standard air actuator (air chamber).

The brake is carried on a saddle (45) which is a fixed support screwed to the axle flange. Equalised clamping action both on the inner and outer pads is generated by allowing the brake to float on the two slide pins (39) fixed to the saddle.

Clamping force generated by the primary actuation is applied to the inner pad, which forces it into contact with the rotor. Reactive force through the brake body applies equal clamping force to the outer pad applying a balanced clamping force to the rotor. The slide pins also allow the brake to freely position itself on the saddle to compensate for the reduction in lining pad thickness due to wear.

An automatic self-adjuster mechanism is incorporated in order to maintain constant clearance between pads and rotor. The automatic adjuster (23) operates on each adjuster sleeve (36) and actuating piston (38) to sense excessive pad-rotor clearance, and reduces excessive clearance by a fixed proportion with each actuation.

For brake adjustment and new lining installation, the brake incorporates provision for manual adjustment located under the plug of the adjuster port (29), easily performed by using a standard hexagonal wrench.

Brake actuation can be either clockwise or counter clockwise, depending on how the air actuator has been installed on brake unit. Regardless of which side the brake unit is installed on vehicle, the brake is referred to as:

RIGHT when actuation is clockwise - Fig. 1.4 a) and b)

LEFT when actuation is counter clockwise - Fig. 1.4 c) and d)

Clockwise actuation - Fig. 1.4 a) and b) - will always require left-hand threaded adjuster sleeves and pistons (actuation pistons marked on the bottom with the letter L) and its related right housing (R.H.).

The opposite applies for brakes with counter clockwise actuation

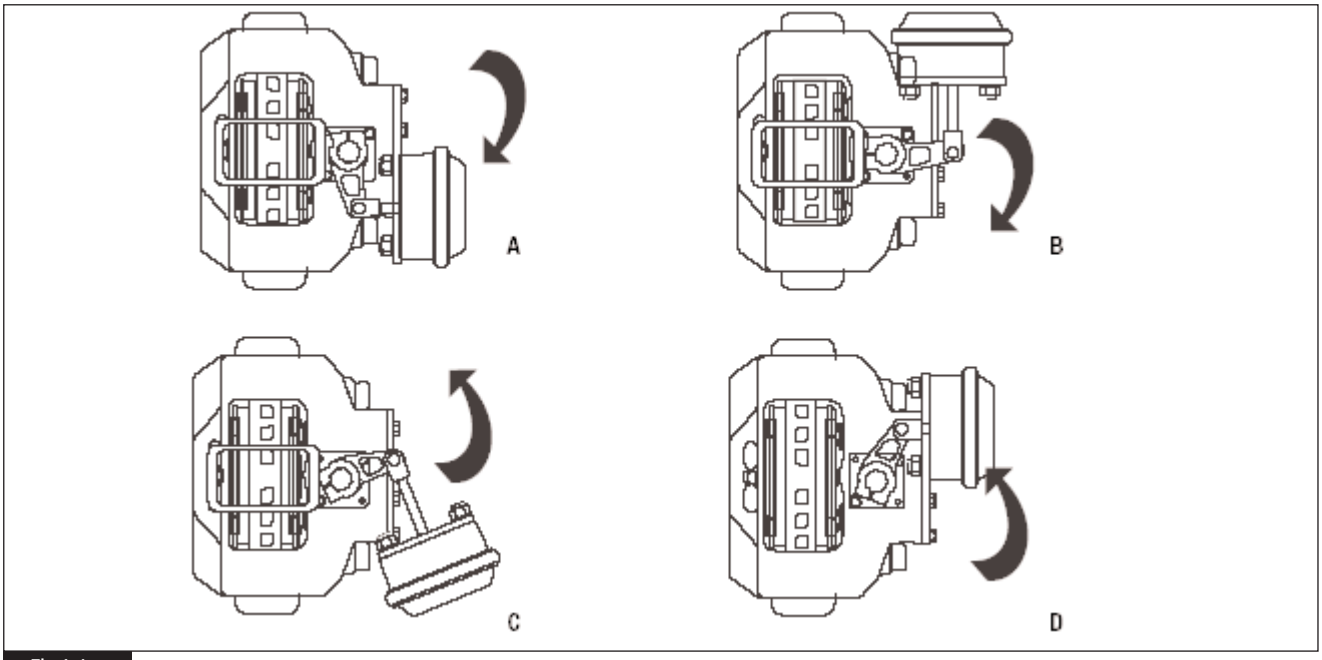

Fig 1.4

1 Introduction

Brake pad wear warning indicator

Brakes can have different types of pad wear warning indicators (PWWI) according to vehicle manufacturer's requirements. Follow vehicle manufacturer's instructions for proper installation and connecting procedures.

NOTE: Parts shown refer to standard configuration and may differ according to brake version and model. Use data on identification label (40) to order proper spare parts.

Identification label (Fig 1.5)

See the identification label attached on brake for suitable spare part and note down all spare part data indicated.

Ref.	Description
1	Brake Identification Number (ArvinMeritor)
2	Manufacturing Date
3	Brake Identification Number (Customer)
4	Brake Serial Number
5	ArvinMeritor Logo

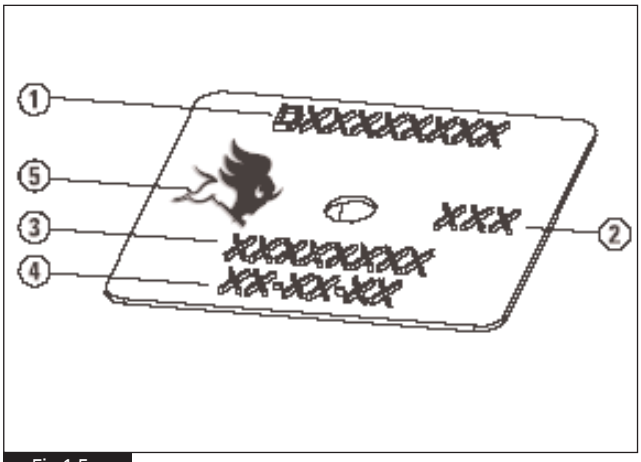

Fig 1.5

Operating principles

Actuation

Linear force from the air actuator (air chamber) is converted by lever action to rotary torque on the main eccentric shaft.

Rotation of the shaft (7),operated through a roller bearing (18), causes the block (19) to move towards the inside of the brake. The ratio between the air actuator force and force on rotor is between 12,5 and 16,2 depending on brake model. All radial loads in the eccentric shaft are absorbed by two supporting roller bearings (15) maintaining an efficiency of around 95% because of total absence of sliding friction in the system.

Clamping

The brake assembly is free to float on the slide pins (39) attached to the saddle. This exerts clamping force on the inner pad and determines a reaction through the brake body, ensuring that both pads are loaded onto the rotor by an equal force.

Automatic adjuster mechanism (clearance compensation)

This mechanism, located inside the brake, allows control of clearance caused by continuous wear of the brake pads. The action is automatic and occurs during normal brake application.

Clearance compensation is performed as indicated in the following four steps.

Step 1 (actuation of eccentric shaft)

a) Actuating lever moves and eccentric shaft rotates.

b) Block lifts and begins to move forward, carrying the adjuster sleeves and pistons with it (Fig. 1.6).

c) Eccentric shaft A begins turning within the gear plate segment, eliminating clearance “h” between the adjuster gear section slot B and the shaft integral tab sides (Fig. 1.7).

Step 2 (clearance compensation device)

d) Adjuster gear segment begins to turn causing the rotation of bevel gear adjuster C (Fig. 1.7).

e) Bevel gear rotation causes the adjuster shaft to rotate by means of the ball torque limiter and the rotation is transmitted to the box central gear through the unidirectional bearing.

f) Central gear rotation, through the box gear train, causes the 2 adjuster sleeves to rotate.

At this stage, depending on the amount of wear of the brake pads, one of the following two conditions will occur:

Condition A: No adjustment is required as clearance between pads and rotor is correct.

Condition B: Adjustment is required as clearance between pads and rotor is excessive.

Step 3 (Condition A)

g) At this point, when the adjusters begin to turn, the pads contact the rotor before the sleeves begin to turn and clamping force F (braking) begins to build up.

h) Clamping force generates friction in the screw threads between the adjuster sleeves B and pistons A, and friction under the flanged head of the adjuster sleeves (Fig. 1.8).

i) The friction build-up prevents rotation of the adjuster sleeves whilst the torque limiter allows the adjuster shaft to rotate with respect to the bevel gear. The adjuster drive train is locked by the friction in the system and no adjustment takes place. The main gear turns but does not transmit motion due to the torque limiter slipping.

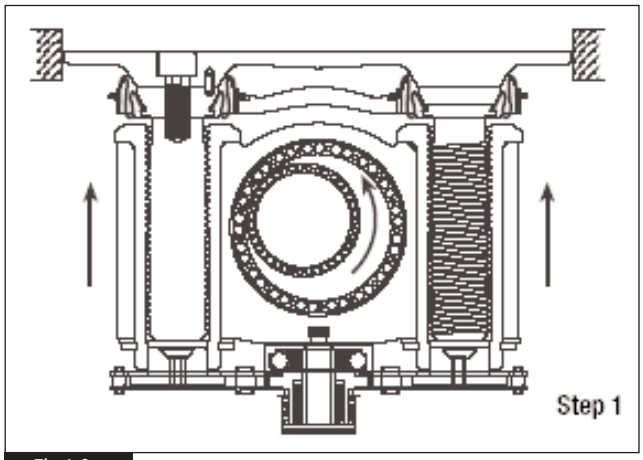

Fig 1.6

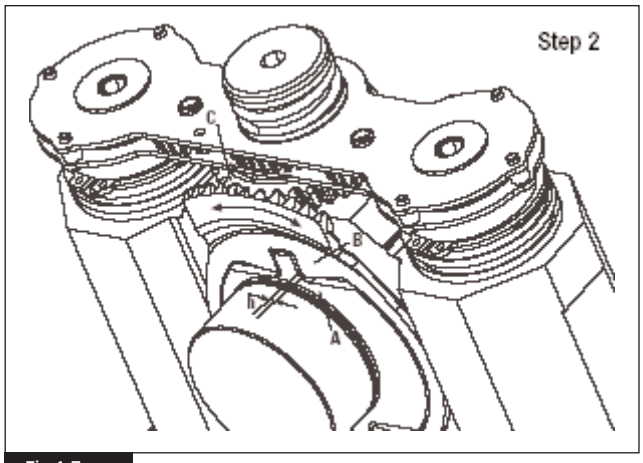

Fig 1.7

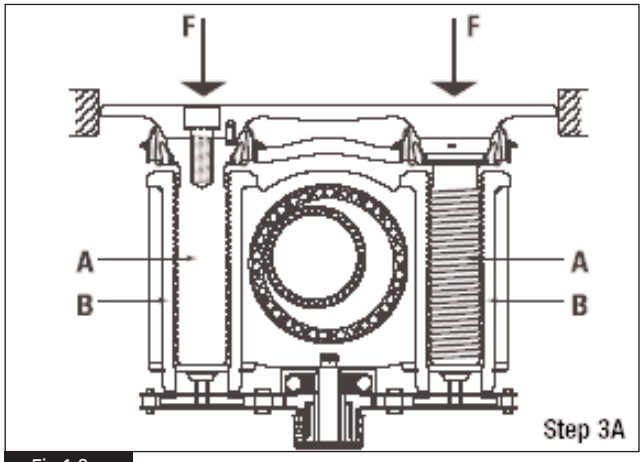

Fig 1.8

Step 3 (Condition B)

j) During the first stroke stage, before the pads come into contact with the rotor, the adjuster sleeves are turned by the gear box.

k) Sleeve rotation unscrews the piston. This increases the length 'L' between the piston and the sleeve which reduces the stroke towards the rotor to bring the pads into contact. (Fig. 1.9).

i) When the pads come into contact with the rotor the conditions mentioned above in step 3 A (g-i) are repeated, thus halting the movement.

Step 4 (Brakes released)

l) When the brake pedal is released, pressure is discharged from the air actuator and the brake actuating lever returns to its rest position pulled by the returning action of the internal air actuator spring. The eccentric shaft and the adjuster gear segment rotate in reverse direction together with the bevel gear.

m) The unidirectional bearing free-wheels without transmitting motion to the gear housing, thus avoiding brake adjustment. The relative piston / sleeve adjustment position does not vary. Therefore, clearance compensation of pre-existing rotor and pads remains unchanged. (Fig. 1.10).

Damping

Compression springs are mounted in front of and behind the gearbox in order to dampen vibration caused by vehicle movement. This prevents induced vibrations from occurring, which could modify the clearance setting between rotor and pads (Fig. 1.11).

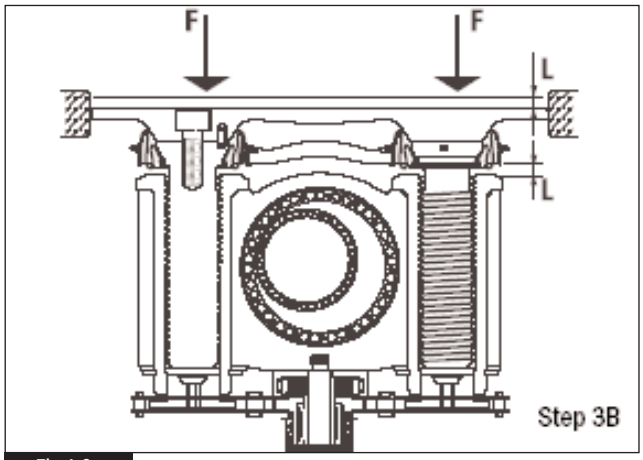

Fig 1.9

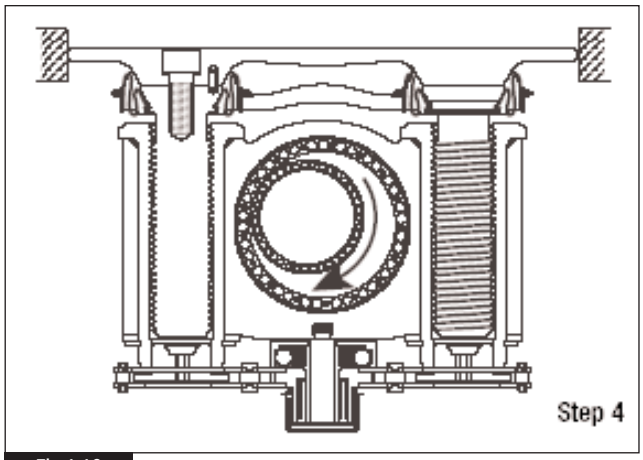

Fig 1.10

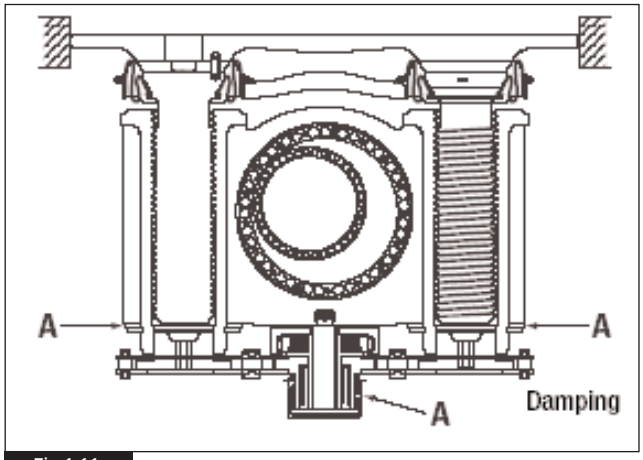

Fig 1.11

Thrust plate

An important feature of the DX family of brakes is the setting of the thrust plate within the saddle abutments. Although this is factory set and provided the 2 locking screws are not removed from the thrust plate, no resetting should be necessary.

However should the screws become disturbed a procedure for resetting should be followed: see Section 10 Piston Dust Excluder Replacement.

Manual adjustment

It is possible to manually adjust pad to rotor clearance. Under the following conditions it will be necessary to manually adjust brake:

a) During inspection of pad to rotor clearance.

b) During fitting of new pads.

To manually adjust the brake first remove the manual adjustment port plug and then rotate the mechanism using a 6 mm Hexagonal wrench (Fig 1.12). The gear train will ensure that the adjuster sleeves will be turned equally.

The operation which allows pistons to be extended, thus reducing pad to rotor clearance is called adjustment. The opposite operation is called de-adjustment.

De-adjustment direction depends on eccentric rotation direction. Wrench should be turned counter clockwise on brakes with clockwise lever actuation (de-adjustment rotation direction is indicated with an arrow on end plate near the manual adjuster plug hole). (Fig. 1.12)

In general, de-adjustment or back adjustment is achieved when the wrench is turned in the direction which produces clicking feel. (This indicates that the torque limiter is slipping).

Turning the wrench in the opposite direction will result in a much smoother and quieter action, which will give positive adjustment and reduce pad to rotor clearance.

During brake de-adjustment, stop turning the wrench if resistance is felt. This indicates that the adjuster pistons are fully retracted.

Further turning of the wrench could lock the adjuster pistons in the sleeves, thus preventing auto-adjustment operation or cause damage to the adjuster mechanism.

WARNING: Always adjust/de-adjust the brake carefully by hand with a suitable wrench. Do not exceed adjustment torque of 10 Nm. Do not exceed a de-adjustment torque of 25 Nm. NEVER use power tools.

Rotate the adjustment mechanism in the direction in which clicking is not heard or felt. Continue rotation until both pads come into contact with rotor. Then in the opposite direction, turn the hexagonal until 7 torque limiter notches are heard or felt, this will set the initial pad to rotor clearance.

Remove the hexagonal wrench, replace the port plug and washer and tighten to 14 Nm.

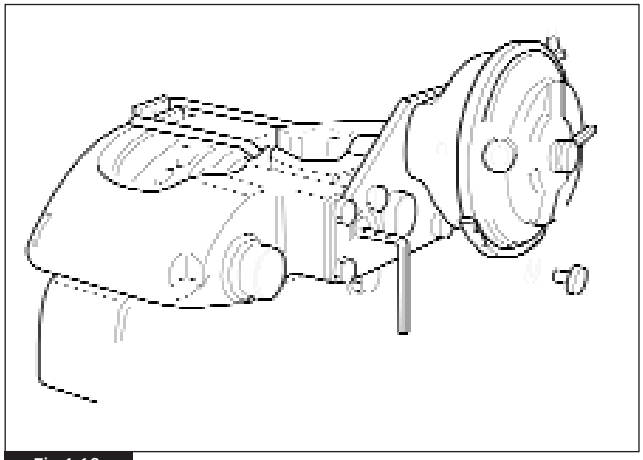

Fig 1.12

Operational Checks

2

2 Operational Checks

Automatic Adjuster Function Test

This procedure will check function of Automatic adjuster mechanism.

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.

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.

WARNING: Always de-adjust/adjust the brake carefully by hand with a suitable wrench. NEVER use power tools. Do not exceed adjustment torque of 10 Nm or de-adjustment torque of 25Nm. Exceeding these torque levels can result in damage to the adjuster gearbox.

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

Set the pad to rotor clearance using the manual adjuster mechanism as described in Section 1 Manual Adjustment/De-adjustment until a clearance of 2 mm between outer pad and rotor is achieved (for rotors without wear ridge).
The clearance should be set with a feeler gauge inserted between the outer pad and rotor.
Once the inner pad touches the rotor pull the gauge out. Should the rotor have a wear ridge, 2mm clearance could be achieved as follows:

Manually adjust the brake so that both pads are in contact with rotor. Rotate the hexagonal wrench 360° in the opposite direction, i.e. 12 torque limiter notches. (Fig. 2.1)
Leave the hexagonal wrench in the adjuster port, this will allow the adjuster operation to be observed during the test.

NOTE: Ensure that the wrench is free to rotate through 360º and is not obstructed by any brake component (reverse the wrench if necessary. (Fig 2.2)

Actuate the brakes 50 times via the brake actuator.

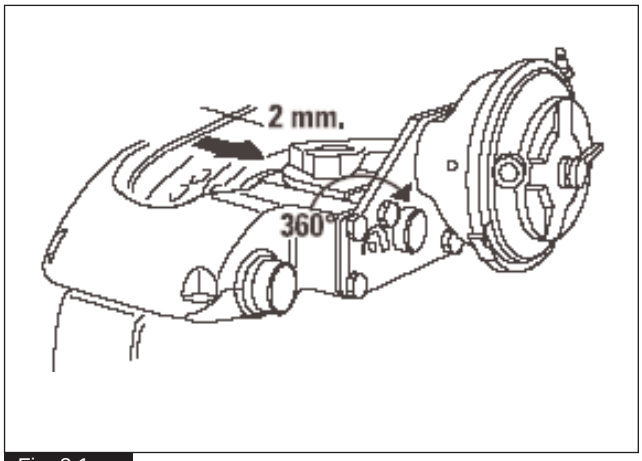

Fig. 2.1

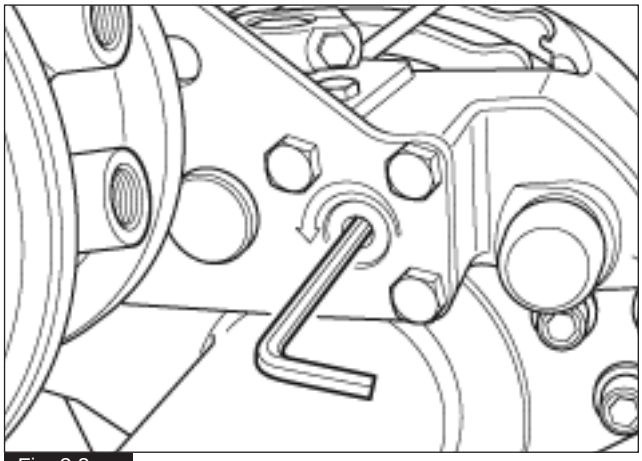
Fig. 2.2

2 Operational Checks

At the end of this operation it should have rotated between 180° & 270° from starting point in normal conditions (Fig. 2.3): If this is so the automatic adjuster is working correctly.
If the rotation is less than the stated value, Measure the pad to rotor clearance using feeler gauge.

The automatic adjuster device is operating correctly if clearance measured with a feeler gauge is between 0.6 and 1.0 mm, or if Hexagonal wrench rotation needed to adjust both pads to contact the rotor is between 90° and 180°.

NOTE: if this latter operation is carried out it should be remembered that the brake should be de-adjusted by the same rotation angle as in the above step.

The complete brake assembly must be replaced if the clearance is not within these limits.

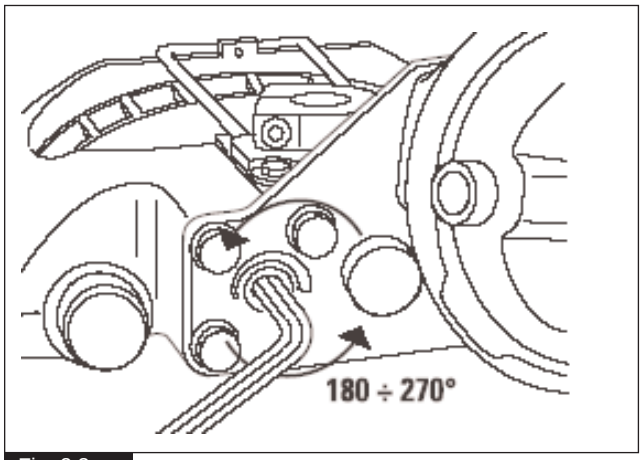

Fig. 2.3

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. 2.4. It must be possible to push/pull the housing easily by hand.

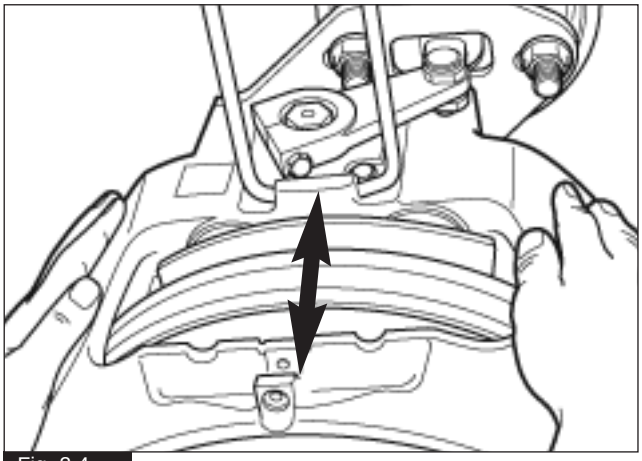
Fig. 2.4

CAUTION Take care not to trap fingers whilst sliding the housing.

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

2 Operational Checks

Checking the Slide Pin Bush Wear

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

Remove the pads as described in Section 3 Pad Replacement.

Securely clamp the ArvinMeritor service tool MST 1018 (Fig. 2.5) to the lug with the retaining hole for the pad wear warning assembly in the correct position (Fig. 2.6) with a 6mm screw, nut and washers. The slot in the tool must be parallel to the rotor.

Position the brake in the new pad position. This is set by sliding the housing fully in the direction of arrow A in Fig. 2.7. (Towards the wheel hub)

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

NOTE: Whilst sliding the housing, ensure that the Thrust plate does not become jammed within the saddle abutments.

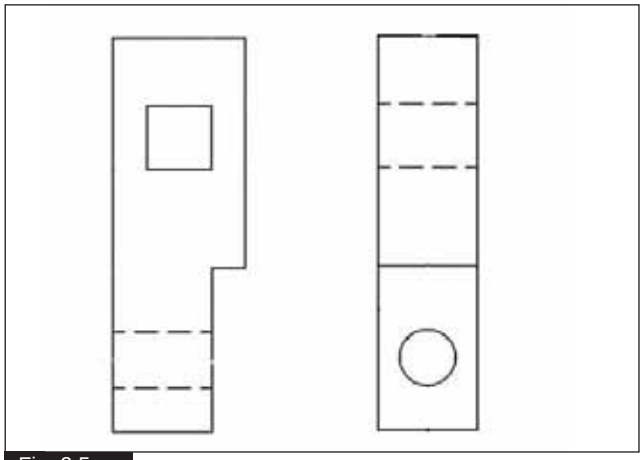

Fig. 2.5

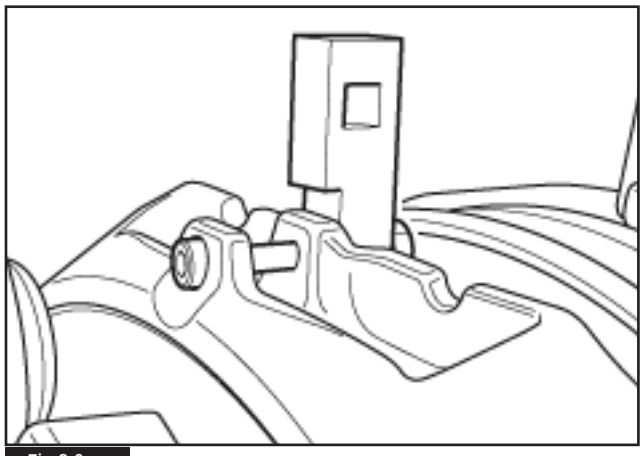

Fig 2.6

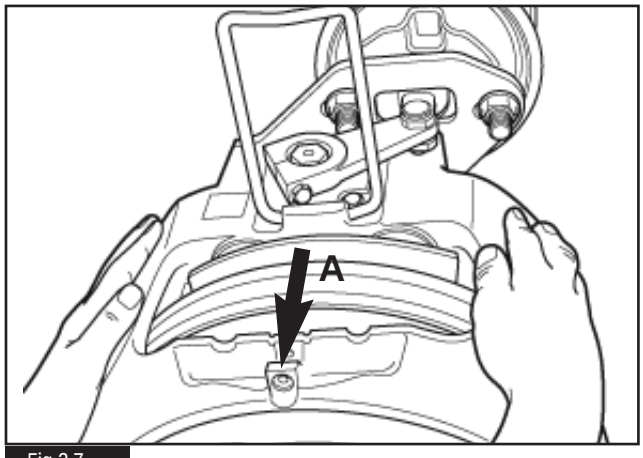

Fig 2.7

2 Operational Checks

Mount a dial gauge in position on the vehicle hub and set against the adaptor as shown in Fig. 2.8. Ensure hub will not rotate

Set the dial gauge to zero.

Fit a torque wrench to the adaptor in the position as shown in Fig. 2.9.

Apply the torque wrench in the correct direction up to the 25 Nm set without allowing the housing to slide and note the dial gauge reading.

Remove and fit the torque wrench to the opposite side socket in the adaptor as Fig 2.10.

NOTE: DO NOT RESET THE DIAL GAUGE.

Apply the torque wrench in the correct direction up to the 25 Nm set without allowing the housing 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.

The maximum movement of the housing, depending on the brake size, is a listed in the table below:

Maximum movement

DX195	2.5 mm
DX225/21	2.5 mm
DX225	4.0 mm

If movement of the housing exceeds the above figure, then the guide sleeve pins and bushes require attention.

Using the correct service kits overhaul the slide pins as described in Section 16 Slide Pin, Bush & Seal Replacement.

Replace the pads as described in Section 3 Pad Replacement.

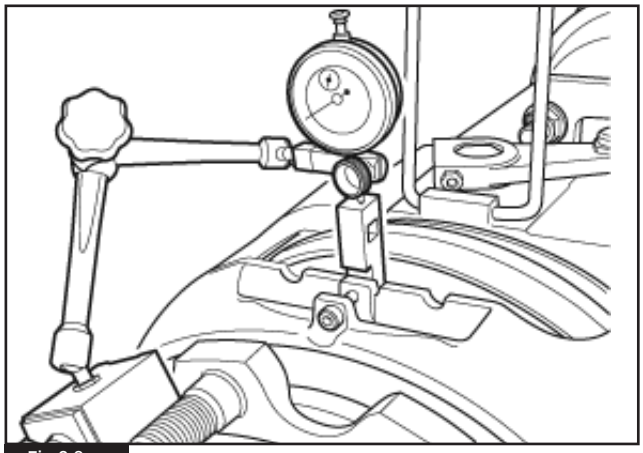

Fig 2.8

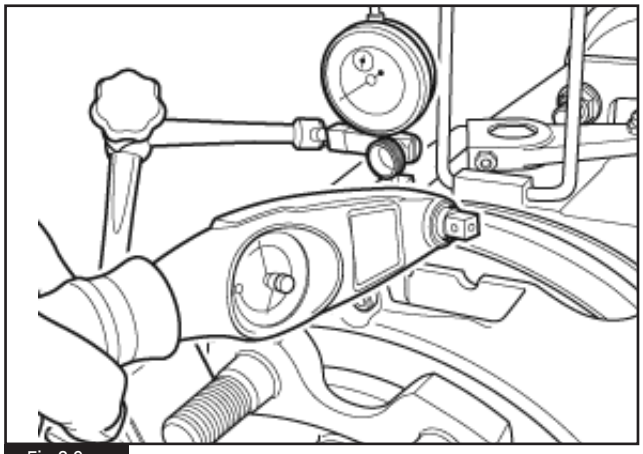

Fig 2.9

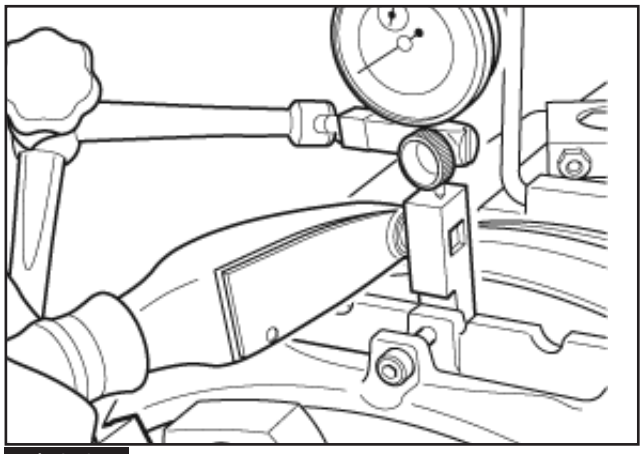

Fig 2.10

2 Operational Checks

Pad Wear

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.

Rotor Inspection and Maintenance

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

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

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

Rotor

Check that the rotor's thickness dimension meets the manufacturer's specification and those detailed in the Rotor Wear Conditions, Section 17. 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 2.11)

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.

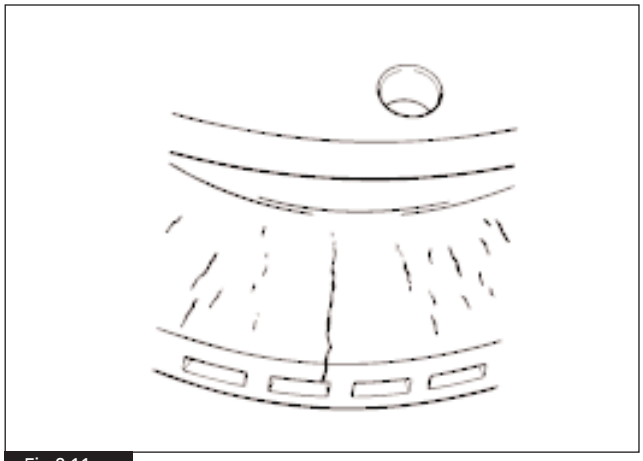

Fig 2.11

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Heat Crazing (Fig 2.12)

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 2.12)

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

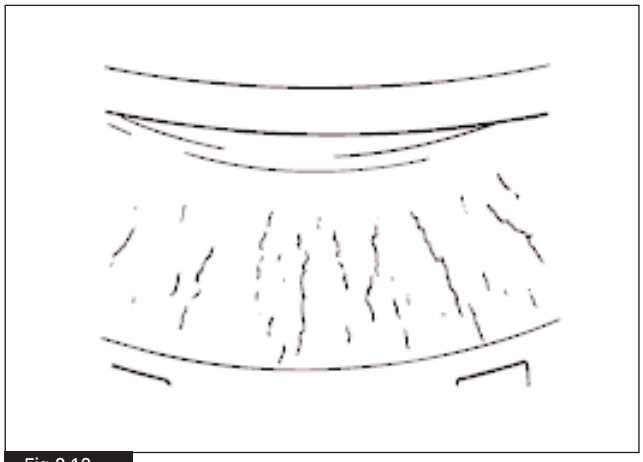

Fig 2.12

Heavy Heat Crazing (Fig 2.13)
Heavy heat crazing is cracks in the rotor's surface that extend radially and have an individual length of up to 75%brake path width.
Refinish or replace a rotor that has heavy heat crazing.

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

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

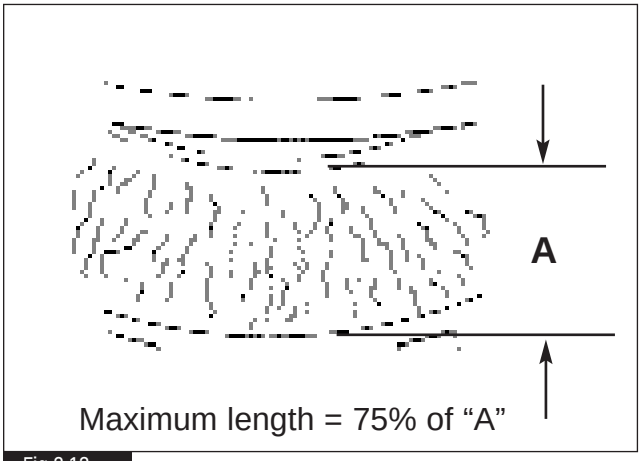

Fig 2.13

Scoring (Fig 2.14)
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.

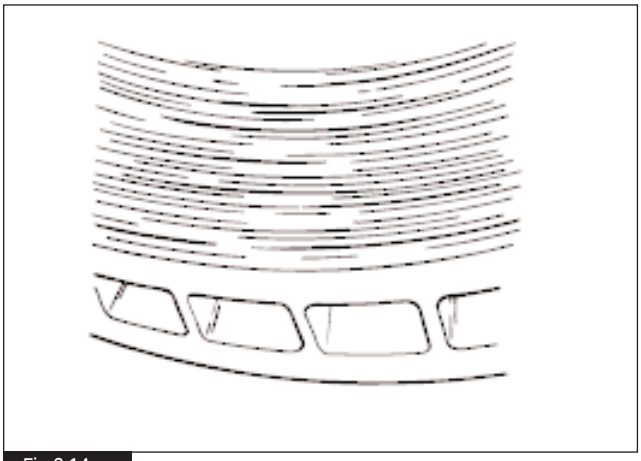
Fig 2.14

"Blue" Rotor (Fig 2.15)
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.

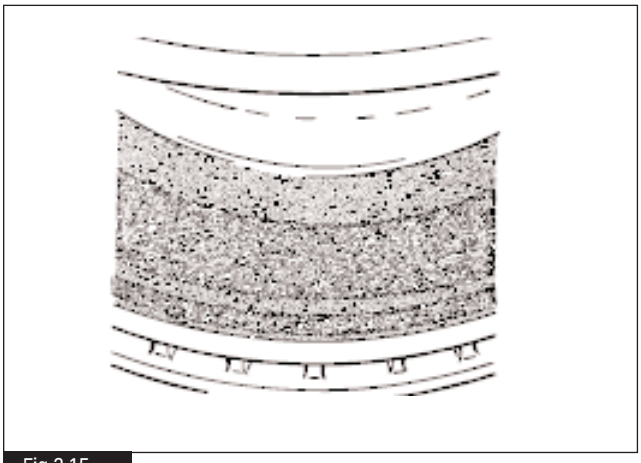
Fig 2.15

Excessive run out may be due to incorrect rotor assembly on the hub, excessive tightening torques or incorrectly adjusted wheel bearings.
Ensure that these conditions are avoided when reassembling. Use a dial test indicator (DTI) to check both axial and radial run-out as illustrated in Fig. 2.16.

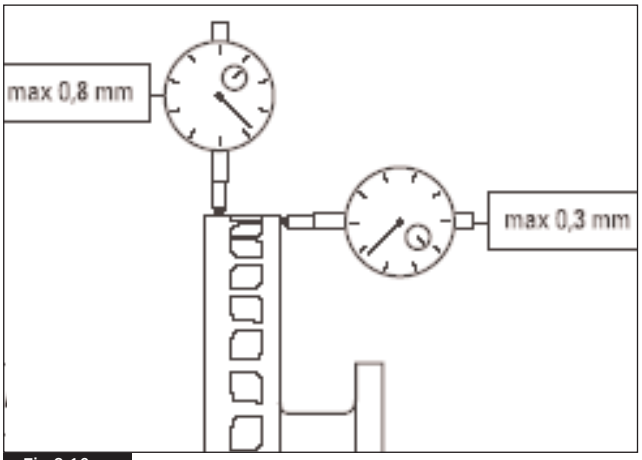

Fig 2.16

Rotor resurfacing

Remove rotor as described in vehicle's service manual. Position rotor on grinder. Eliminate all traces of defects found on rotor. Resurfacing must be done on both sides of rotor.

Wear Summary

See detailed dimensions in Rotor Wear Conditions, Section 17.
Wear limits for rotor are visually indicated by the bevel corner 3 x 30° on each outer diameter of both braking surfaces. A maximum limit of 2 mm per each side is allowed for machining.
Minimal total thickness allowed for the worn rotor is indicated on rotor outer edge (minimum thickness XY mm).

Rotors may be resurfaced up to the minimal thickness allowed (41 mm for DX225, DX225/21 and DX195 after resurfacing).
During resurfacing move the grinding wheel gradually until all grinding swarf is removed.
Surface finish after machining should be max. 5 microns.
In order to guarantee total braking efficiency and safety, it is recommended, when replacing one rotor, to replace the other rotor on the same axle.

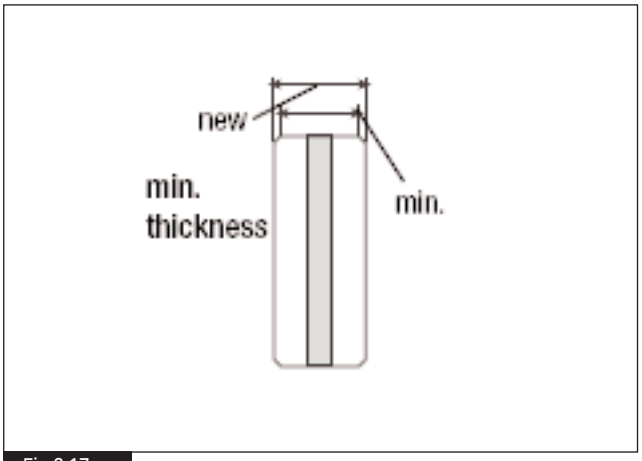

Fig 2.17

Minimal total thickness allowed for the worn rotor (Fig 2.17).
- 39 mm for DX225, DX225/21 and DX195

Pad Replacement

3

3 Pad Replacement

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

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.

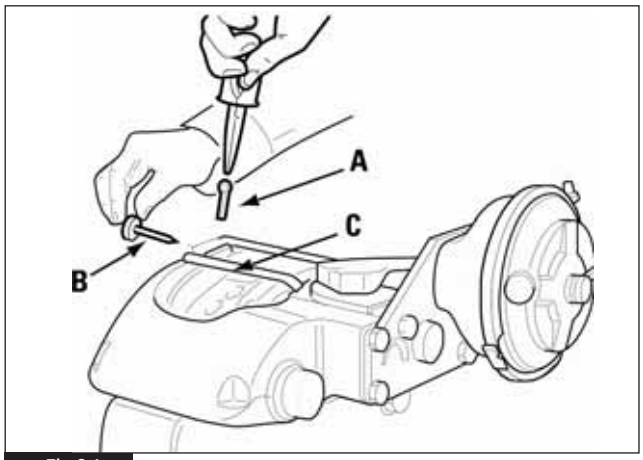

Fig 3.1

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

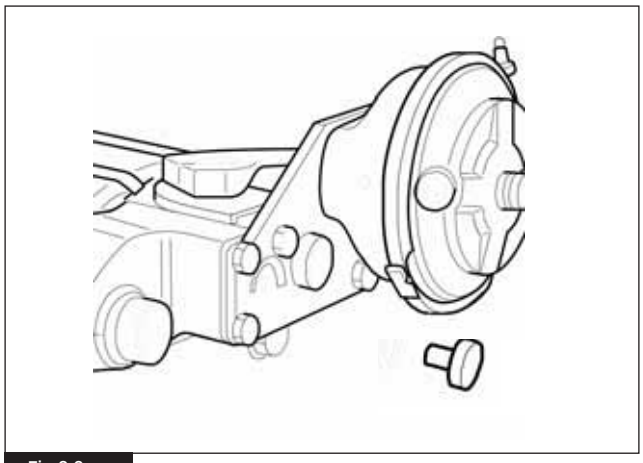
Fig 3.2

⚠ 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.

Always replace brake pads in axle sets.

Pad Removal

Remove the pin clip A and the pin B allowing the stabiliser bar C to rotate and be hinged to the brake on the lever's side. (Fig.3.1)

Remove the pad springs.

Where applicable remove the PWWI (pad wear warning indicator) as described in Section 4 Pad Wear Warning Indicator Replacement.

It may be necessary to de-adjust the brake initially to remove the worn brake pads. Remove the adjuster stem port plug and washer (Fig 3.2). Locate a suitable hexagon wrench in the adjuster stem (Fig 3.3) and rotate the wrench as detailed in the manual adjustment/de-adjustment section below.

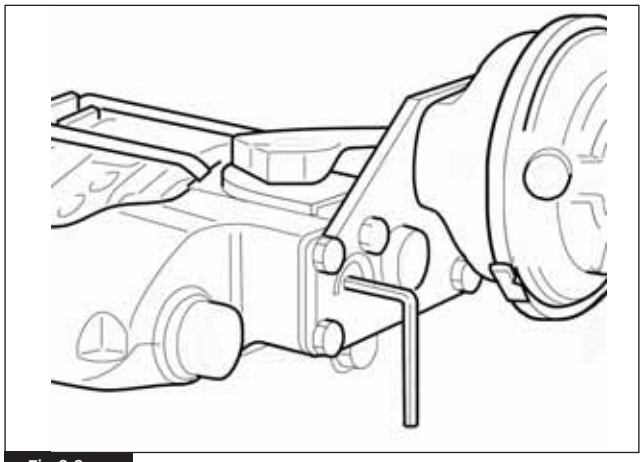
Fig 3.3

3 Pad Replacement

⚠ WARNING Always de-adjust/adjust the brake carefully by hand with a suitable wrench. NEVER use power tools. Do not exceed adjustment torque of 10 Nm or de-adjustment torque of 25Nm. Exceeding these torque levels can result in damage to the adjuster gearbox.

Manual adjustment/de-adjustment

De-adjustment direction depends on lever rotation direction. The wrench should be turned anti-clockwise on brakes with clockwise lever actuation and clockwise on brakes with anti-clockwise lever rotation., De-adjustment rotation direction is also indicated with an arrow on end plate near the manual adjuster plug hole (Fig. 3.4).

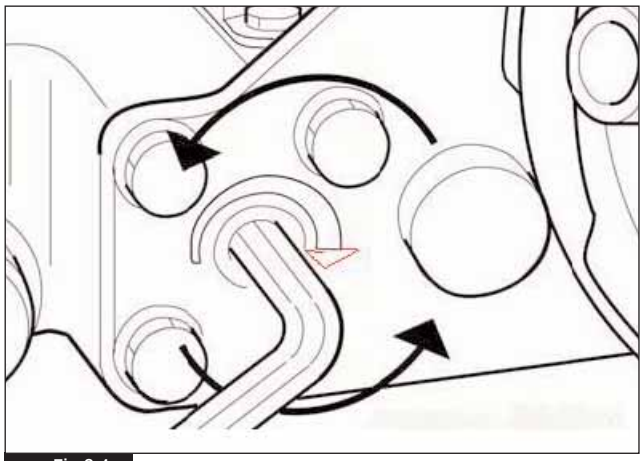

Fig 3.4

NOTE: In general, de-adjustment is achieved when the wrench is turned in the direction which produces a clicking feel. (This indicates that the torque limiter is slipping).

⚠ CAUTION: During brake de-adjustment, stop turning the wrench if resistance is felt. This indicates that the adjuster pistons are fully retracted. Further turning of the wrench could lock the adjuster pistons in the sleeves, thus preventing auto-adjustment operation or cause damage to the adjuster mechanism.

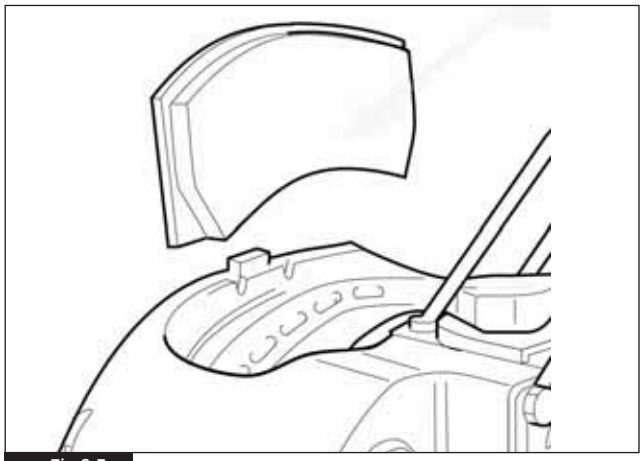

Fig 3.5

Turning the wrench in the opposite direction will result in a much smoother and quieter action, which will give positive adjustment and reduce pad to rotor clearance.

Remove the brake pads (Fig 3.5).

3 Pad Replacement

Cleaning and inspection

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. 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 as described in Section 2 Operational Checks / Rotor inspection an Maintenance. 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. Clean the 8 pad support plates in the saddle with a wire brush (Fig 3.6) removing any build-up of debris or rust. This allows the new pads to be correctly seated in position Inspect the stabiliser bar for signs of damage, distortion, wear or corrosion. If in doubt of bar integrity, replace it.

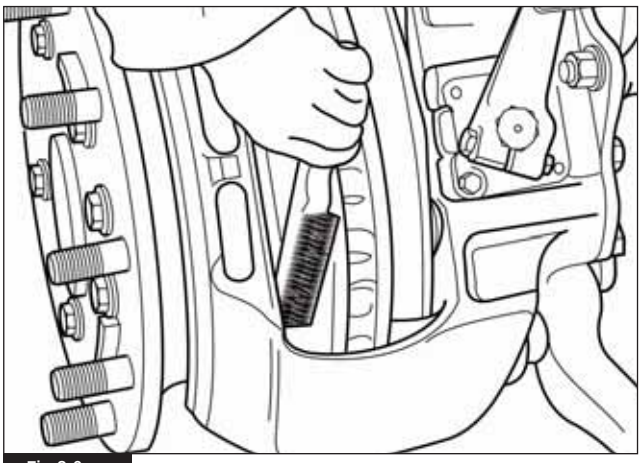

Fig 3.6

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 and spring (Fig 3.7). 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 thrust plate and rotor face is large enough to accept the new inboard pad.

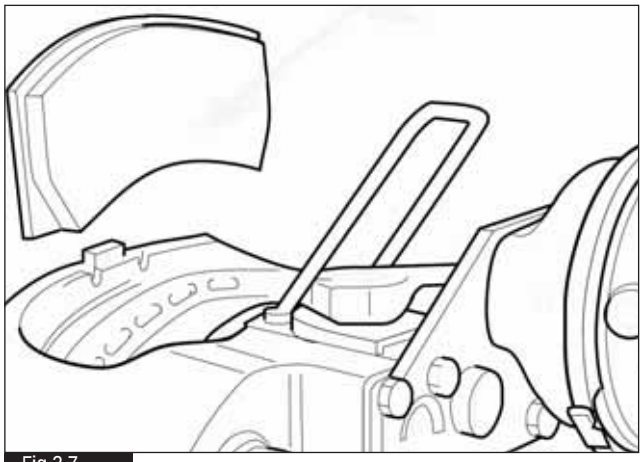

Fig 3.7

Fit the new inboard pad and spring.

Where applicable fit the PWWI (pad wear warning indicator) as described in Section 4 Pad Wear Warning Indicator Replacement.

3 Pad Replacement

Hinge down the stabiliser bar C onto the springs and retain in position with pin B and new pin clip A (Fig 3.8).

Manually adjust the brakes, as described in Section 1 Manual Adjustment, until the new pads contact the brake rotor then turn the adjuster back until 7 torque limiter notches are heard or felt, this will set the initial pad to rotor clearance.

Remove the hexagon wrench, replace the port plug and washer (Fig 3.9) and tighten to 14 Nm.

Charge the air system and wind in the spring brake retraction screw (where applicable). Apply the brakes 10 times to settle the pads and allow the auto adjuster to set the correct running clearance. Check that the rotor is free to rotate.

Refit the road wheels, remove the axle stands and lower the vehicle to the ground.

Road test.

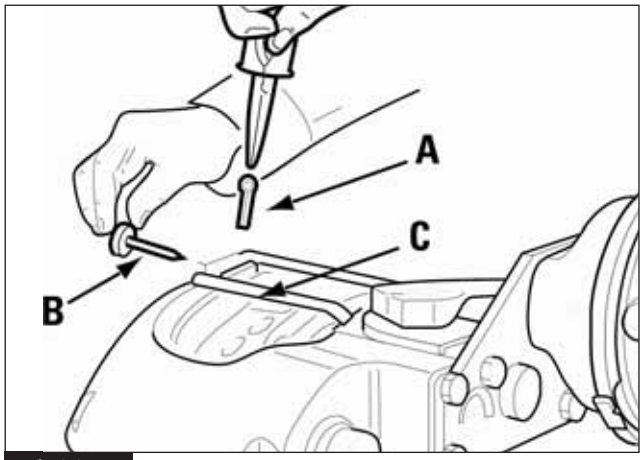

Fig 3.8

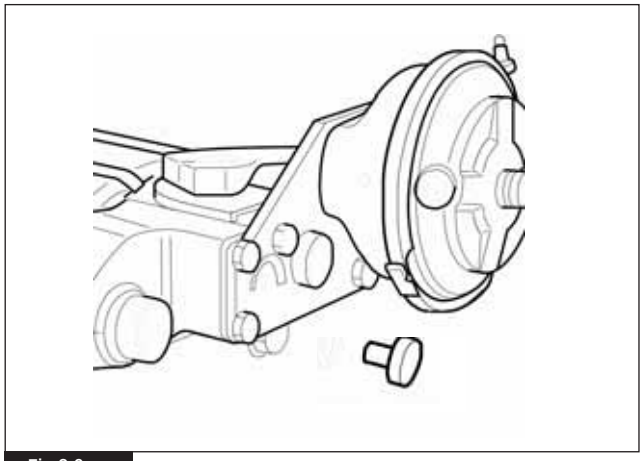
Fig 3.9

Pad Wear Warning Indicator (PWWI) Replacement

4

4 Pad Wear Warning Indicator (PWWI) 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 excluders 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.

Pad Wear Warning Indicator Removal

Remove the pin clip A and the pin B allowing the stabiliser bar C to rotate and be hinged to the brake on the lever's side. (Fig.4.1)

Remove pad spring from inner pad adjacent to thrust plate (Fig 4.2).

Lever off clip that holds indicator head into pad back plate (Fig. 4.3)

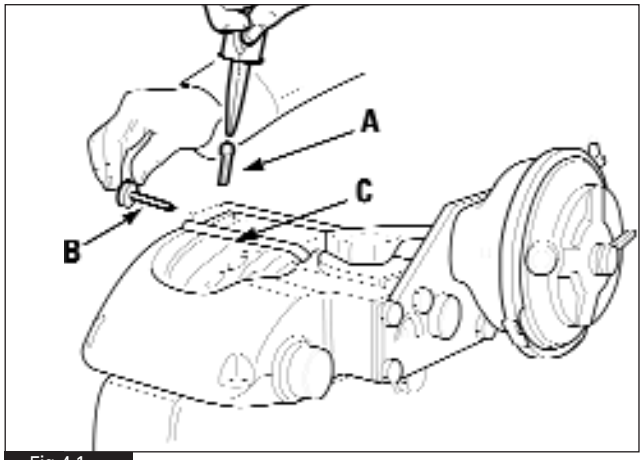

Fig 4.1

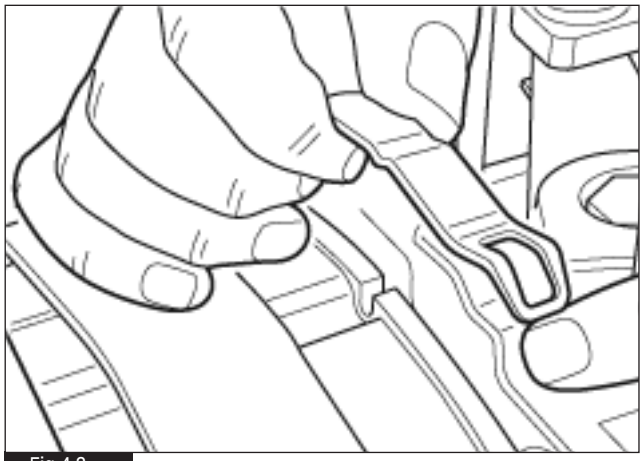
Fig 4.2

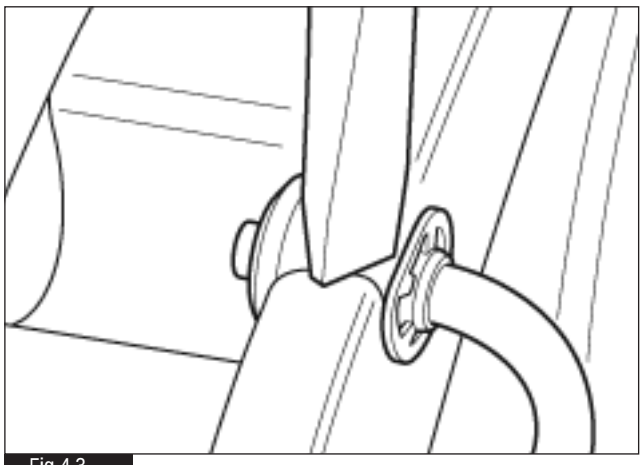
Fig 4.3

4 Pad Wear Warning Indicator (PWWI) Replacement

Push or lever sensor head out of the pad back-plate, towards the brake rotor, until the connecting wire and head can be lifted out of the pad slot (Fig 4.4 & Fig 4.5).

NOTE: it may be necessary to de-adjust the brake to give sufficient space between pad and rotor to position the sensor head so that the wire will pass through the pad slot. Refer to Section 1- Introduction: Manual Adjustment.

Clean out any dirt/debris from around the pad slot

Release the connector to the vehicle system from the bracket on the brake (Fig 4.6).

Carefully squeeze the tangs on the connector and pull it apart to disconnect.

Check the vehicle connector is clean and free from corrosion.

Pad Wear Warning Indicator Fitment

Insert the new PWWI connector into the vehicle connector. Ensure the connector is fully inserted and the locking tags have engaged.

Refit the connector to the bracket on the brake (Fig. 4.7).

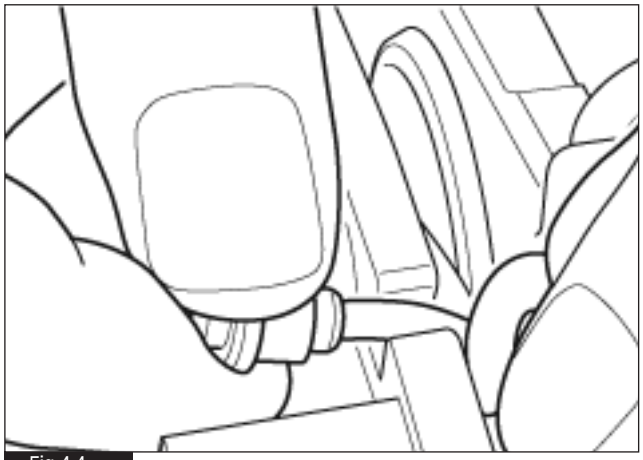

Fig 4.4

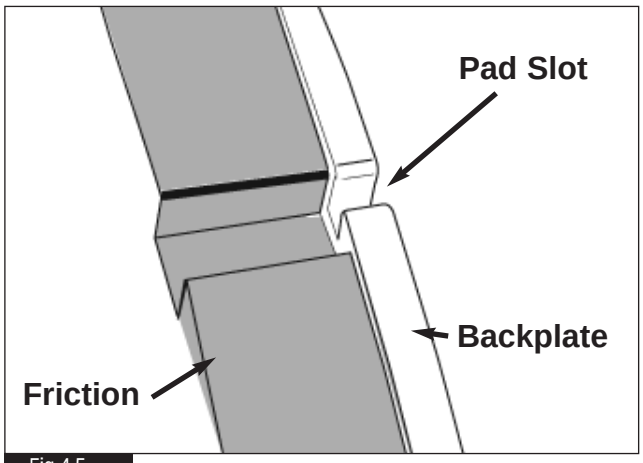

Fig 4.5

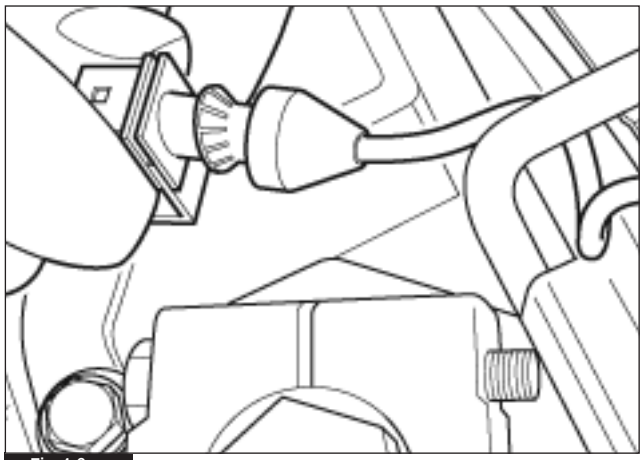

Fig 4.6

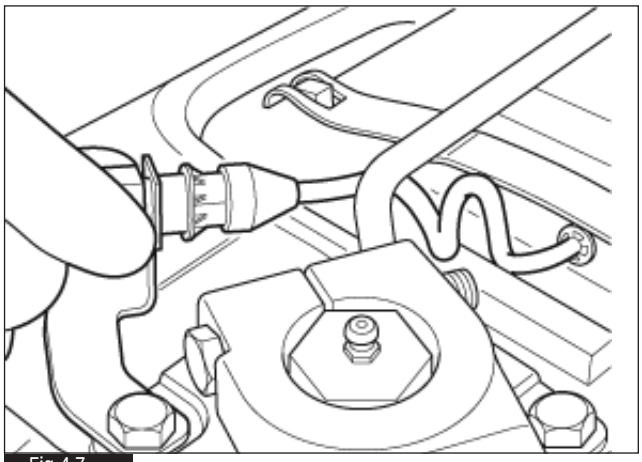

Fig 4.7

4 Pad Wear Warning Indicator (PWWI) Replacement

Lay the sensor wire over the brake in approximately the correct route to the pad mounting slot. Insert the sensor wire into the pad slot with the head A on the lining side and the circular retaining clip B on the blank side of the pad backplate (Fig 4.8).

Press the sensor head firmly into the plate. Using two long nose pliers press the clip onto location diameter on the head with moderate force (Fig 4.9).

⚠ WARNING: Avoid pressing on the plastic centre piece of the sensor head. Excessive force on the clip will distort.

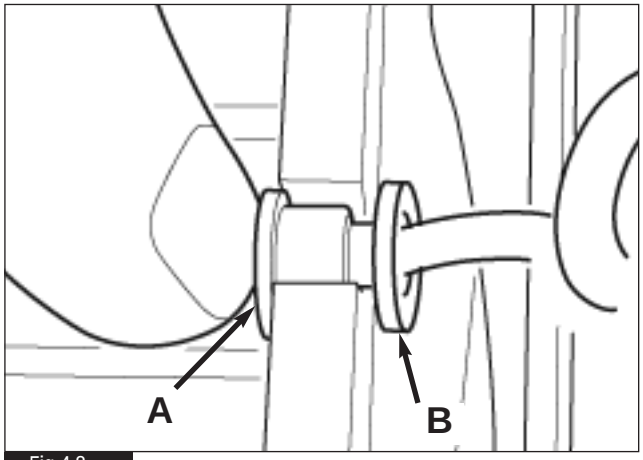

Fig 4.8

If applicable carry out a functional check to make sure the sensor is operating. Refer to vehicle manufacturers manual.

Refit the pad spring (Fig. 4.10), swing the pad stabiliser bar C into position and insert the retaining pin B. Fit the locking clip or new split pin A (Fig 4.11).

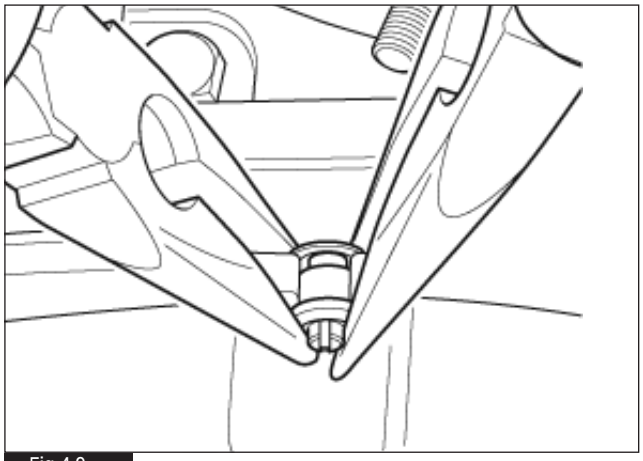
Fig 4.9

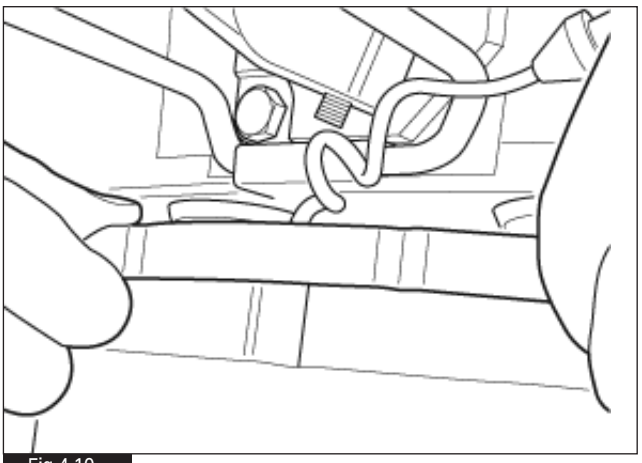
Fig 4.10

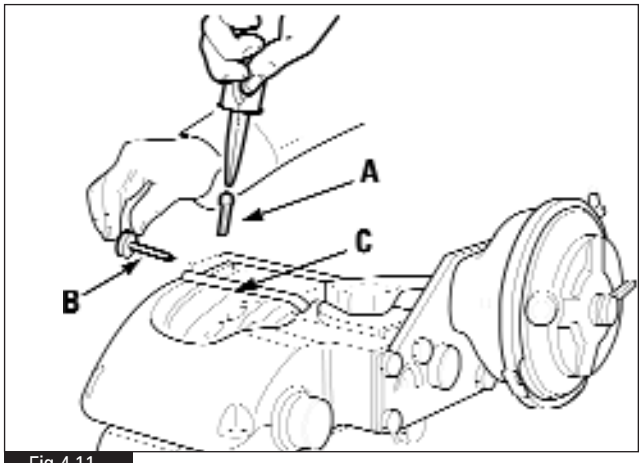

Fig 4.11

4 Pad Wear Warning Indicator (PWWI) Replacement

If the pad / rotor clearance has been altered reset as follows: manually adjust the brakes, as described in Section 1 Manual Adjustment, until the new pads contact the brake rotor then turn the adjuster back until 7 torque limiter notches are heard or felt, this will set the initial pad to rotor clearance.

Remove the hexagon wrench, replace the port plug and washer (Fig 4.12) and tighten to 14 Nm.

Charge the air system and wind in the spring brake retraction screw (where applicable). Apply the brakes 10 times to settle the pads and allow the auto adjuster to set the correct running clearance. Check that the rotor is free to rotate.

Refit the road wheels, remove the axle stands and lower the vehicle to the ground.

Road test.

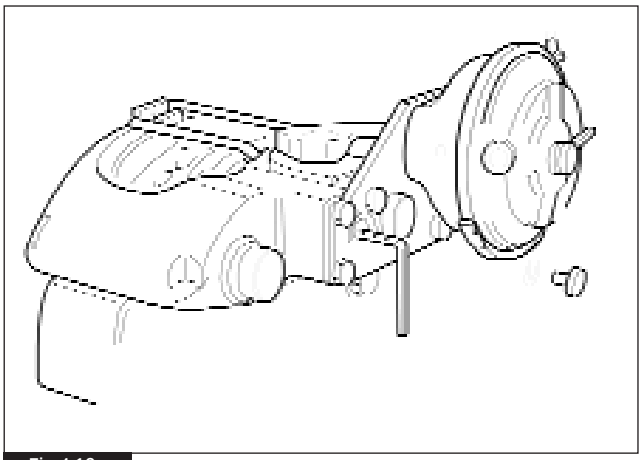

Fig 4.12

Brake Replacement

5

5 Brake Replacement

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

Remove the road wheels and exhaust all air from the system.
Remove any dirt from the brake assembly, ensure the rubber dust excluders 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.

Brake Removal

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

Remove split pin and clevis pin connecting the air actuator pushrod to the brake actuating lever (Fig 5.1).

Note or mark the relative position of the air actuator with respect to the mounting flange on the brake. This will ensure correct reassembly.

Remove the the two retaining nuts securing the air chamber to the brake mounting flange (Fig 5.2). Remove the air chamber from the brake. (Fig 5.3)

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.

Remove the pads as described in Pad Replacement Section 3.

The brake can now be removed from the axle by removing the saddle mounting screws following the vehicle manufacturers instructions.

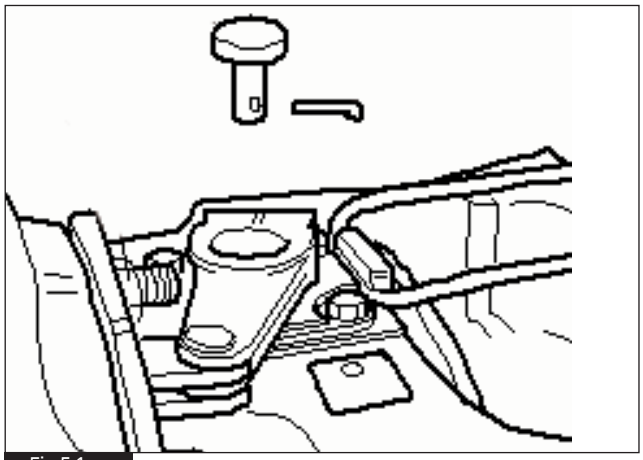

Fig 5.1

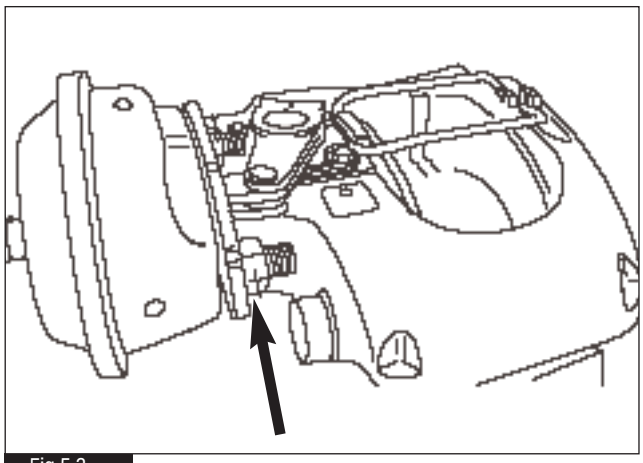

Fig 5.2

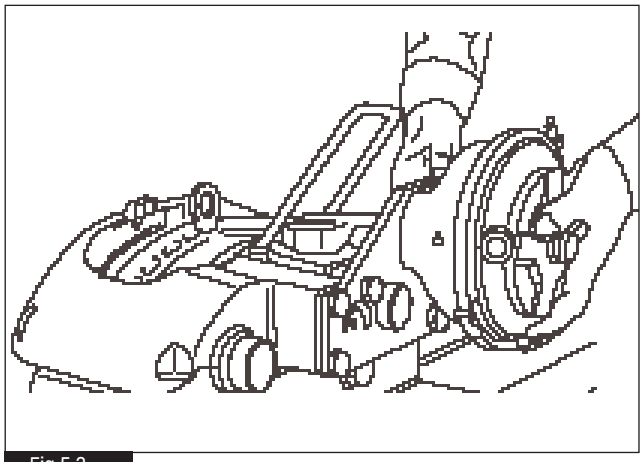

Fig 5.3

5 Brake Replacement

CAUTION The brake assembly is heavy, approximately 37kg (82lbs) . 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.

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 stub axle mounting.

Avoid excessive movement of the brake during location and do not allow the brake to drop into position on the stub axle, either action could result in damaged dust excluders. Fit new retaining screws Tighten the screws to the specified torque below (values refer to standard ArvinMeritor brake configuration):

DX225 - 600 Nm (M20x1.5)

DX195 DX225/21 - 290 Nm (M16x2.0)

For any other brake / axle configurations follow manufacturer's instructions.

Offer the air actuator to the housing assembly ensuring the mounting faces are clean. Initially tighten the 2 nuts to a pre-torque of 80 -100 Nm, (this ensures the actuator does not distort). Apply a final torque of 180 - 210 Nm

Align the air chamber clevis onto the lever and fit a new clevis pin and split pin to retain

Refit, or fit new pads as detailed in the Section 3 Pad Replacement.

Charge the air system and wind in the spring brake retraction screw (where applicable). Apply the brakes 10 times to settle the pads and allow the auto adjuster to set the correct running clearance. Check that the rotor is free to rotate.

Refit the road wheels, remove the axle stands and lower the vehicle to the ground and road test.

Housing Replacement

6

6 Housing 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 excluders 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.

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

Housing Removal

Remove the pads as detailed in Pad Replacement Section 3
Remove the brake assembly as detailed in Brake Replacement Section 5

To remove the saddle, it will be necessary to remove the slide pin screws. These are at a very high torque. Therefore remove from vehicle and secure it to a bench mounted bracket using the same fixings as on the vehicle. Service tool (DXT 17). With the help of a hammer and suitable drift, knock out and discard the 2 Slide Pin Covers. (Fig. 6.1)

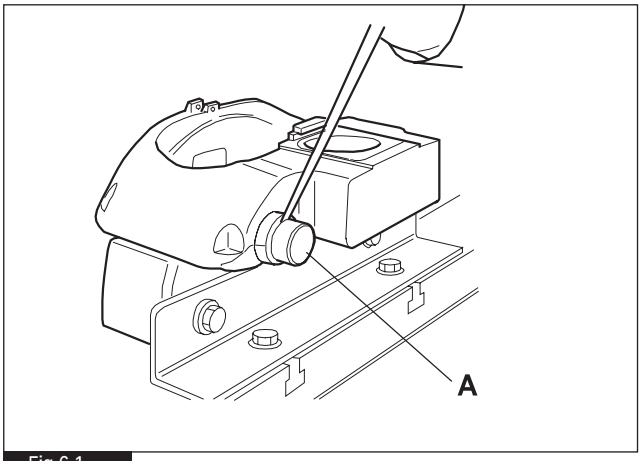

Fig 6.1

Remove and discard the 2 Slide Pins and locking screws. Due to the high tightening torque, use wrench with required adaptor or extension. (Fig. 6.2)

NOTE: Slide Pin Locking Screws may be different in length.

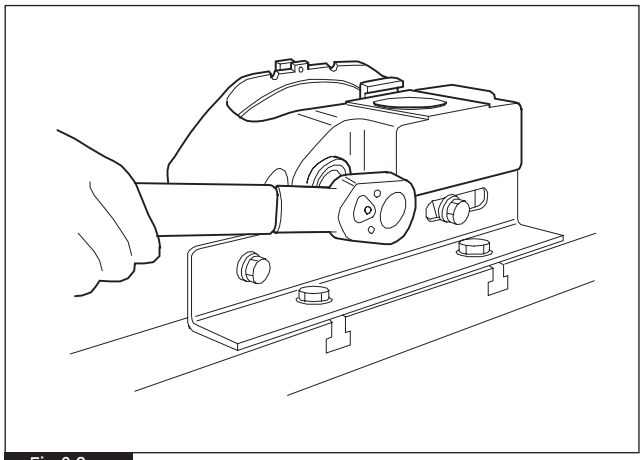

Fig 6.2

Make a note or mark the saddle in order to identify the screw positions. (Fig. 6.3)

The Slide Pins are also different (slight difference on the outside diameter) and counter bore different depth to accommodate the different length screws.

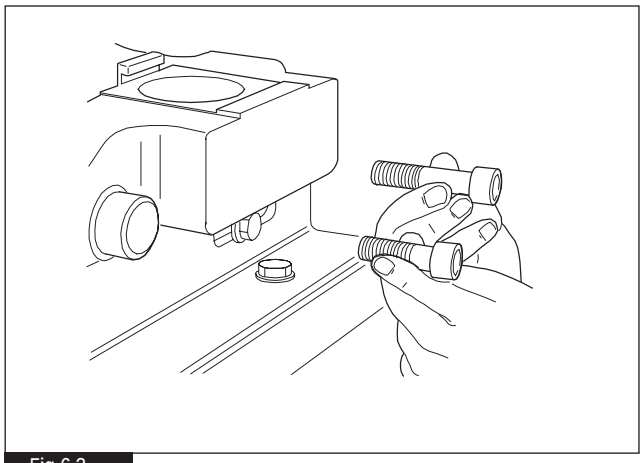

Fig 6.3

6 Housing Replacement

Remove the housing from the saddle.

Clean and inspect the carrier for signs of damage or wear paying particular attention to the pad abutment areas and guide sleeve location points. If any doubt exists as to the suitability for further service replace with a new carrier.

Housing Fitment

Fit new Slide Pins into the new housing bushes, applying lubricant (MBG 1004) on to the outside surface on the pins and within the bush in the housing.

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

NOTE: the Slide Pin with the short screw (and outer diameter slightly oversized) should be installed on the right side (looking at the brake from the end plate) on brakes with clockwise lever actuation, the opposite applies for brakes with counter clockwise lever actuation.

Position the collar of the rubber seal in the appropriate slot on the slide pin and ensure the excluder is correctly located. (Fig. 6.4) Clean all 8 saddle pads mounting surfaces using a metal brush and a suitable vacuum cleaner. These should be clean and smooth without any major 'grooves' or ridges. If in doubt replace saddle.

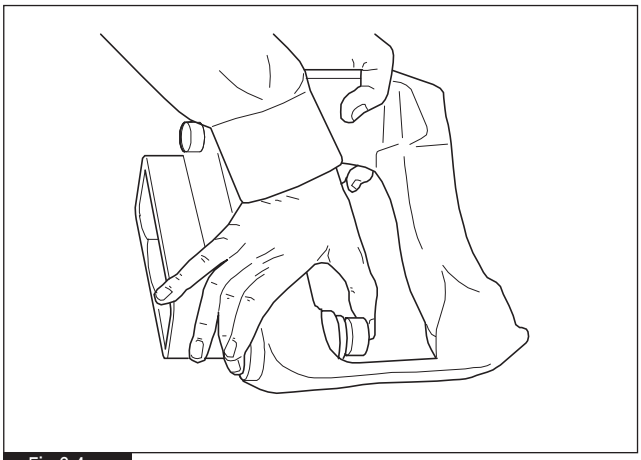

Fig 6.4

WARNING: Clean any traces of thread tightening compound from all inner threads of brake components. Use only new screws during maintenance. The use of old screws is very dangerous and can seriously affect brake performance.

For ease of assembly remove the saddle from the bench fixture and offer it to the new housing assembly. Align the slide pins with the corresponding location seats in the saddle. Install the new slide pin locking screws, with the pre-applied thread locking compound and hand tighten. Refit assembly to the bench mounting device and finally tighten the screws to the specified torque: as per table below. (Fig. 6.5)

DX 195	340 Nm +/- 20 Nm
DX 225	500 Nm +/- 25 Nm
DX 225/21	340 Nm +/- 20 Nm

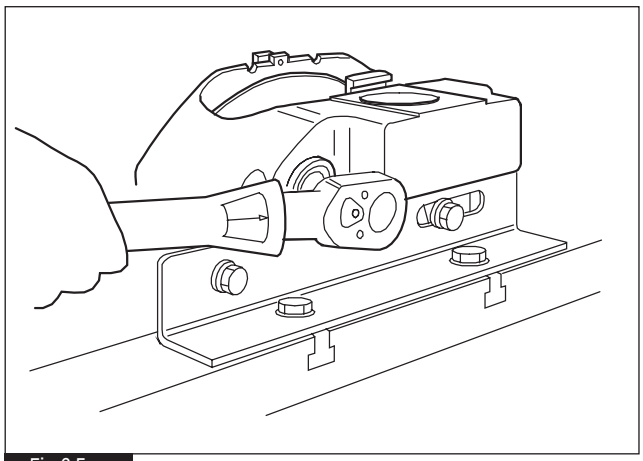

Fig 6.5

6 Housing Replacement

After torque tightening the locking screws, ensure that the housing slides freely on the slide pins. Install new Slide Pin Caps. Before reassemble, apply a small bead of sealant (MBG 1002) to the edge of the new Slide Pin Cap. Push or knock end caps into position using service tool (Fig. 6.6)

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

Brake type	Service Tool
DX195	DXT 12
DX225	DXT 12
DX225/21	DXT 12

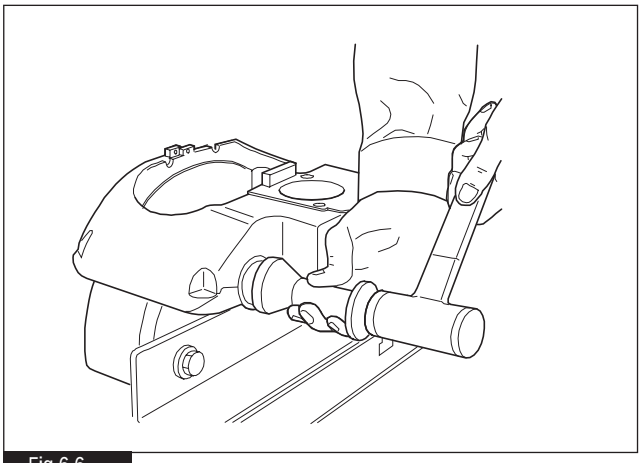

Fig 6.6

Ensure that the caps are fully located.

Clean and inspect the brake rotor as detailed in the Operational Checks Section 2 Rotor Inspection and Maintenance.

Refit brake to the axle as detailed in Brake Replacement Section 5.

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

Saddle Replacement

7

7 Saddle 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 excluders 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.

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

Remove the brake assembly as described in Section 5 Brake Replacement.

Saddle Removal

To replace the saddle, it will be necessary to remove the slide pin screws. These are at a very high torque. Therefore, with the brake removed from the vehicle secure it to a bench mounted bracket (Fig. 7.1) using the same fixings as on the vehicle, Service tool (DXT 17).

Knock out and discard the two Slide Pin Covers. (Fig.7.2)

Remove and discard the two Slide Pin screws. Due to the high tightening torque, use a wrench with a suitable adaptor or extension. (Fig. 7.3)

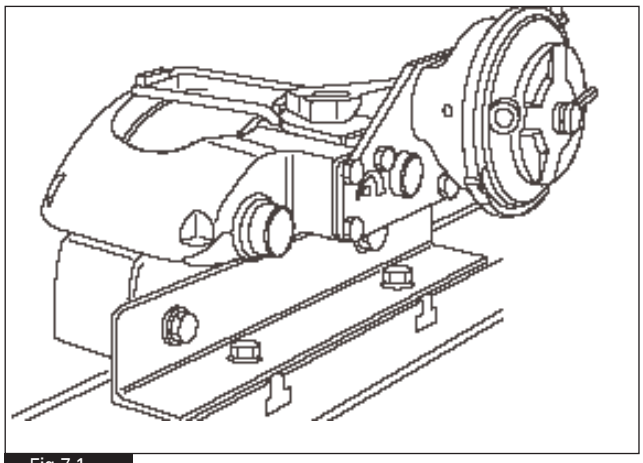

Fig 7.1

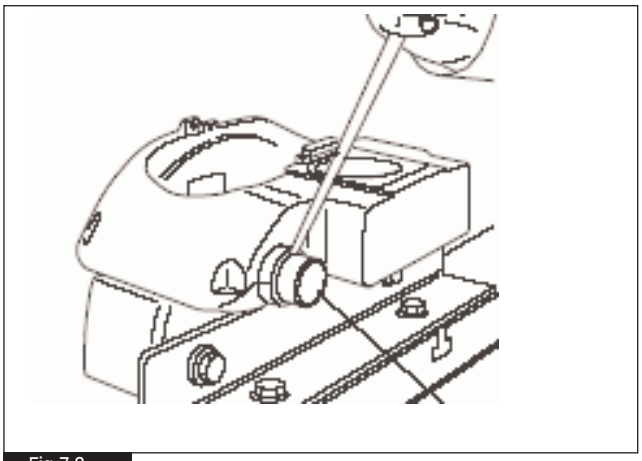

Fig 7.2

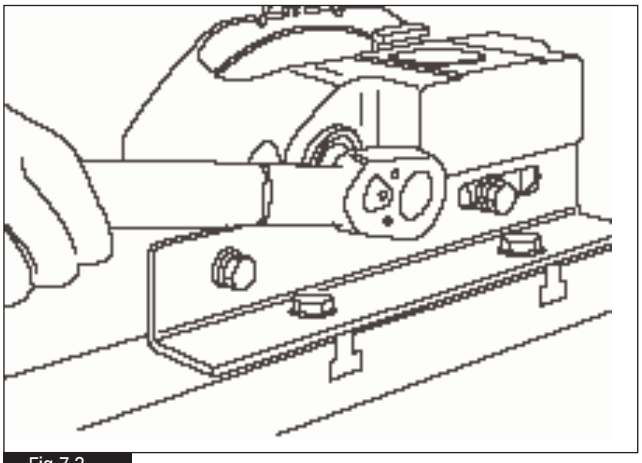

Fig 7.3

7 Saddle Replacement

NOTE: Slide Pin screws may be different in length. Make a note or mark the brake body in order to identify the screw positions for correct reassembly. (Fig. 7.4)

Remove the brake body from the saddle.

NOTE: At this time it may be appropriate to inspect the slide pins and excluders. If damaged replace. If satisfactory it may be appropriate to re -lubricate the slide pins using MBG 1004. Only use the grease supplied with replacement components/kits, that is specified above or by the vehicle manufacturer. Under no circumstance should any other type of grease be used.

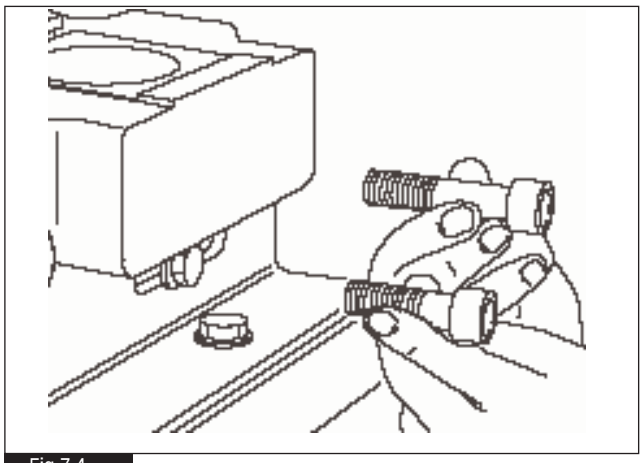

Fig 7.4

Saddle Fitment

NOTE: the Slide Pin with the short screw (and outer diameter slightly oversized) should be installed on the right side (looking at the brake from the end plate) on brakes with clockwise lever actuation, the opposite applies for brakes with counter clockwise lever actuation.

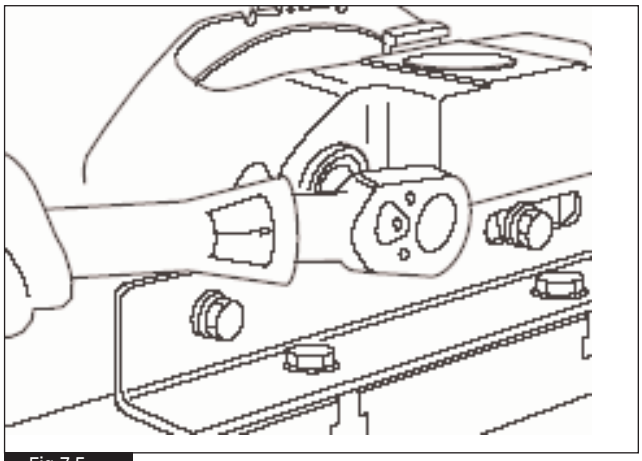

Fig 7.5

WARNING Use only new screws during maintenance. The use of old screws is dangerous and can seriously affect brake performance.

For ease of assembly, offer the new saddle to the brake body and align the slide pins with the corresponding location seats in the saddle. Install the new slide pin retaining screws, with the pre-applied thread locking compound and hand tighten at this stage.

Refit the assembly to the bench mounting bracket and tighten the screws to the specified torque (Fig 7.5) : as detailed below.
DX 195 - 340 Nm +/- 20 Nm
DX 225 - 500 Nm +/- 25 Nm
DX 225/21 - 340 Nm +/- 20 Nm

7 Saddle Replacement

After torque tightening the locking screws, ensure that the calliper slides freely on the slide pins.

Install new slide pin caps. Before assembly apply a small bead of sealant (MBG 1002) to the edge of the new Slide Pin Caps. Push or knock the end caps into position (Fig. 7.6) using service tool detailed below

Service Tool

DX195 - DXT 12

DX225 - DXT 12

DX225/21 - DXT 12

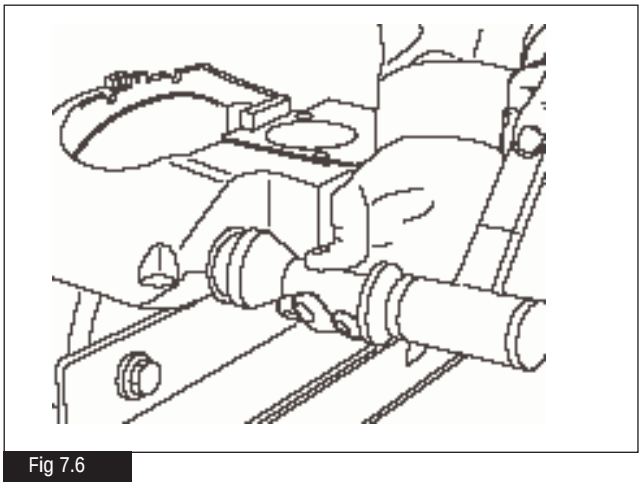

Fig 7.6

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

Ensure that the caps are fully located.

Clean and inspect the rotor as described in Section 2 Operational Checks - Rotor Inspection and Maintenance.

Refit the brake assembly to the vehicle as described in Section 5 Brake Replacement.

Re-Fit or fit new axle set of brake pads, set the initial running clearance and test as described in Section 3 Pad Replacement.

Charge the air system and wind in the spring brake retraction screw (where applicable). Apply the brakes 10 times to settle the pads and allow the auto adjuster to set the correct running clearance.

Check that the rotor is free to rotate.

Refit the road wheels, remove the axle stands and lower the vehicle to the ground.

Road test.

Lever Replacement

8

8 Lever 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 excluders fitted to the tappet heads, guide sleeves, and where applicable eccentric shaft, 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.

Lever Removal

Remove split pin and clevis pin connecting the air actuator pushrod to the brake actuating lever (Fig 8.1).
Clean the cover plate, pay particular attention to the area around the lever.

NOTE: If the working area of the brake is not easily accessible, Remove the air chamber from the brake. Support under the vehicle wheel arch in a position which does not cause undue strain on the connected air pipe.

Remove the lever clamp screw (Fig 8.2). Should the lever prove difficult to remove from the eccentric shaft, carefully insert an appropriate wedge (screwdriver blade) in the groove in order to assist removal (Fig. 8.3)

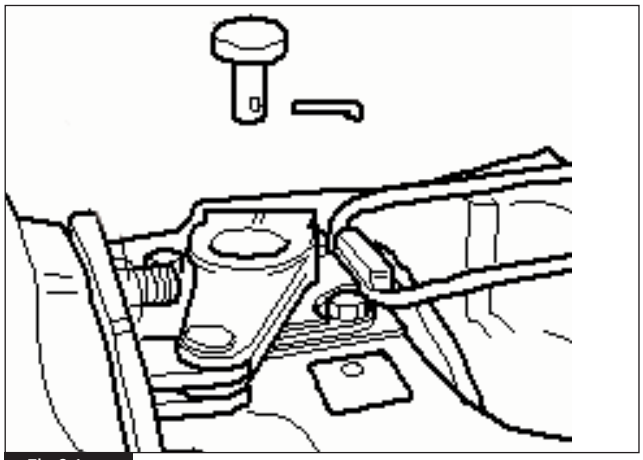

Fig 8.1

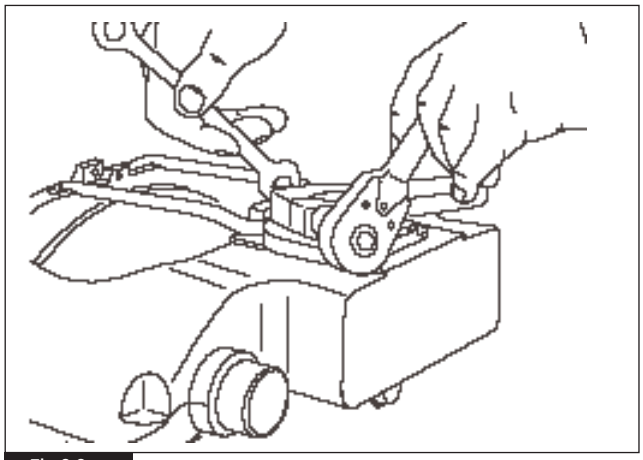

Fig 8.2

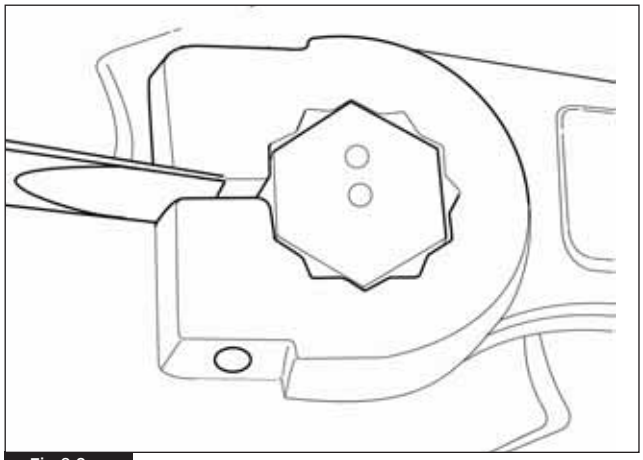

Fig 8.3

8 Lever Replacement

Lever Fitment

Ensure the mark on the lever and eccentric shaft are aligned, thus ensure correct positioning of the lever on the eccentric shaft. (Fig. 8.4). Press the lever onto the eccentric shaft until the dust shield A is trapped on the shoulder of the shaft (Fig 8.5).
Fit a new clamp screw and tighten to a torque of 30 Nm.

Where applicable offer the air actuator to the housing assembly ensuring the mounting faces are clean .
Initially tighten the 2 nuts to a pre-torque of 80 -100 Nm,
(this ensures the actuator does not distort).
Apply a final torque of 180 - 210 Nm

Align the air chamber clevis on the new lever and fit a new clevis pin and split pin to retain.

Charge the air system and wind in the spring brake retraction screw (where applicable). Apply the brakes 10 times to settle the pads and allow the auto adjuster to set the correct running clearance. Check that the rotor is free to rotate.

Refit the road wheels, remove the axle stands and lower the vehicle to the ground.

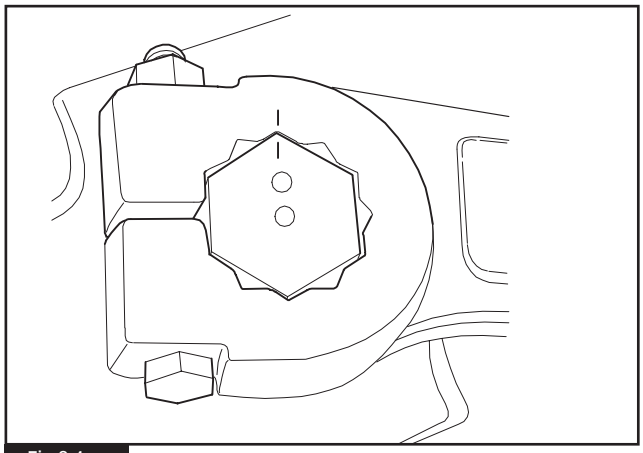

Fig 8.4

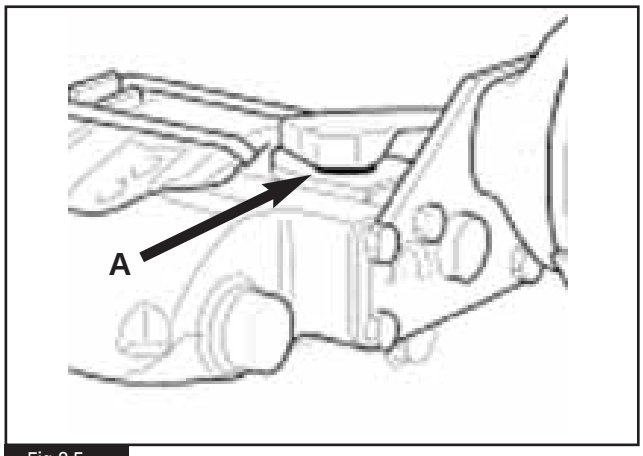

Fig 8.5

Stabiliser Bar Replacement

9

9 Stabiliser Bar 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 excluders fitted to the tappet heads, guide sleeves and where applicable, eccentric shaft 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.

Dismantling

The stabiliser bar can be replaced on the vehicle although removal of the brake will facilitate easier working conditions.

Remove the pin clip A and the pin B allowing the stabiliser bar C to rotate and be hinged to the brake on the lever's side. (Fig.9.1) Remove Clevis Pin connecting the air actuator pushrod to the brake actuating lever Fig.9.2).

NOTE: If the working area of the brake is not easily accessible, remove the air chamber from the brake as described in Section 5 Brake Replacement. Support under the vehicle wheel arch in a position which does not cause undue strain on the connected air pipe.

Remove the lever clamp screw and discard. Remove the lever as described in Section 8 Lever Replacement, and retain.

Thoroughly clean the area around the cover plate and eccentric shaft.
It is advisable at this stage to remove the brake pads and carry out cleaning and examination of the brake and rotor as described in section 2 Operational checks.

Remove the brake pads as described in Section 3 Pad Replacement.

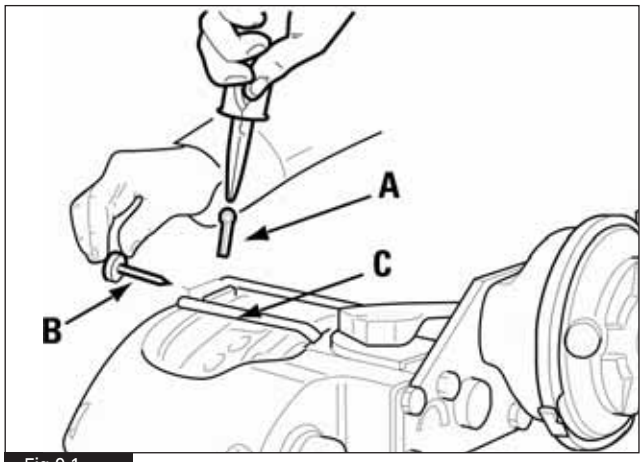

Fig 9.1

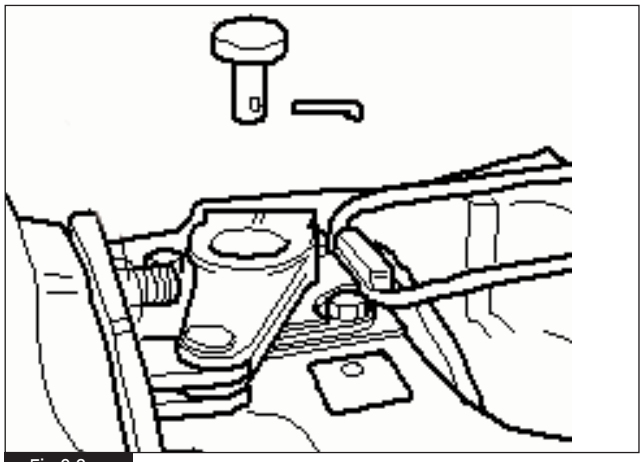
Fig 9.2

Remove the Eccentric Shaft Seal Excluder if fitted.

Remove the 2 Cover Plate Screws and discard.
Remove the Cover Plate assembly in which the Eccentric Shaft upper bearing unit is positioned. Whilst removing the cover plate, hold the eccentric shaft in place to ensure the shaft is not pulled out simultaneously with the cover plate.

NOTE: Care should be taken when removing the cover plate assembly, that none of the rollers are allowed to become dislodged from the cover plate bearing. The bearing assembly is an uncaged needle roller bearing.

Remove the cover plate gasket and discard. Remove the stabiliser bar from housing.

9 Stabiliser Bar Replacement

Cleaning and inspection

Thoroughly clean the cover plate mounting surface on the brake housing (Fig. 9.3).

Ensure no debris is allowed to enter the eccentric bore. Clean the old thread locking compound from cover plate screw holes.

WARNING Clean any traces of thread tightening compound from all inner threads of brake components. Use only new screws during maintenance. The use of old screws is very dangerous and can seriously affect brake performance.

Reassembly

Fit the new stabiliser bar ensuring correct location in the brake.

Apply grease (MBG 1003) to all bearing surfaces of the cover plate assembly, and thoroughly lubricate the rollers.

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

Apply a small bead of sealant (MBG 1002) on both sides of the new gasket. Position gasket on the cover plate and install the cover plate into the housing, ensure that the lugs on the gasket are positioned parallel with the rotor as shown in Fig 9.4. Fit the sensor bracket, if required and secure with 2 new screws (with thread locking compound previously applied) and tighten to a torque of 35 Nm

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

Refit the lever as described in Section 8 Lever Replacement.

Where applicable refit the air chamber as described in Section 5 Brake Replacement.

Refit the brake pads as described in Section 3 Pad Replacement.

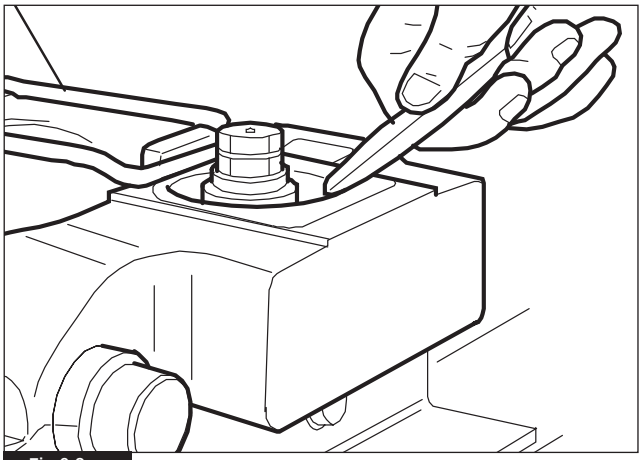

Fig 9.3

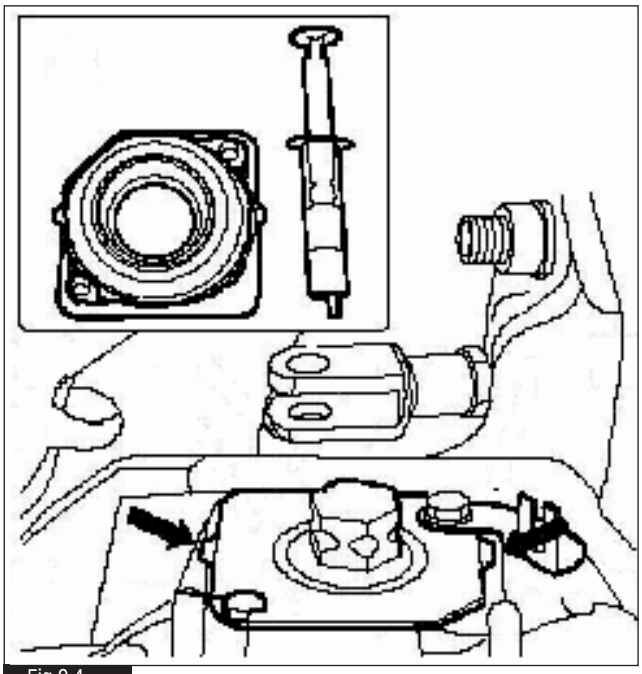

Fig 9.4

Charge the air system and wind in the spring brake retraction screw (where applicable). Apply the brakes 10 times to settle the pads and allow the auto adjuster to set the correct running clearance. Check that the rotor is free to rotate.

Refit the road wheels, remove the axle stands and lower the vehicle to the ground.

Road test.

Piston Dust Excluder Replacement

10

10 Piston Dust Excluder 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 excluders fitted to the guide sleeves and where applicable, eccentric shaft 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.

Dismantling

Remove Clevis Pin connecting the air actuator pushrod to the brake actuating lever. Remove the air chamber from the brake. Support under the vehicle wheel arch in a position which does not cause undue strain on the connected air pipe.

Remove the pin clip A and the pin B allowing the stabiliser bar C to rotate and be hinged to the brake on the lever's side. (Fig.10.1)

Remove the brake pads and pad springs as described in Section 3 Pad Replacement.

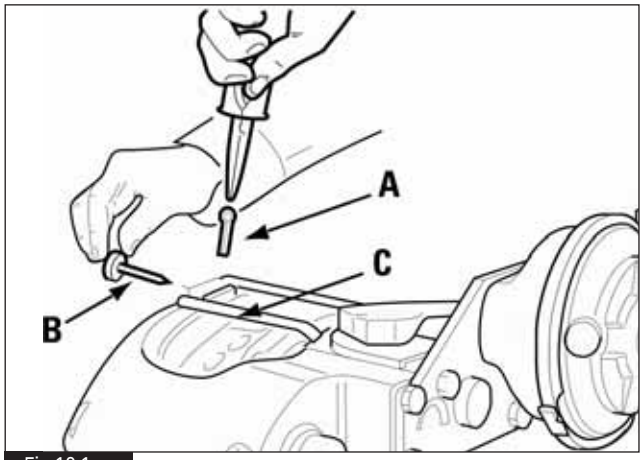

Fig 10.1

Cleaning and inspection

Worn brake pads must be replaced if the friction material level has worn to 3mm.
It is advisable at this stage to carry out cleaning and examination of the brake and rotor as described in Section 2 Operational checks.

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. Clean the 8 pad support plates in the saddle with a wire brush (Fig10.2) removing any build-up of debris or rust. This allows the pads to be correctly seated in position

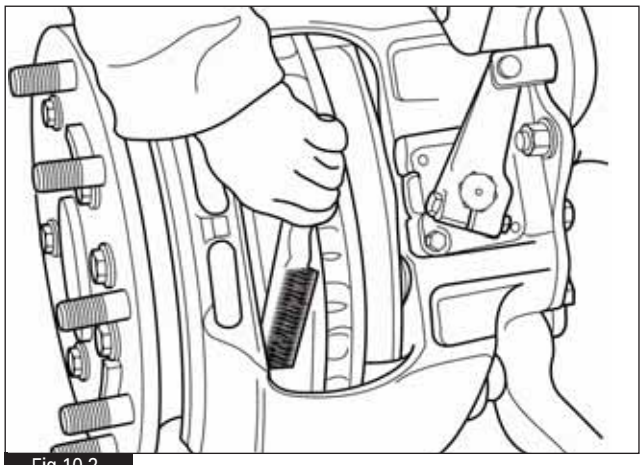
Fig 10.2

10 Piston Dust Excluder Replacement

Remove the saddle to axle flange retaining screws. Remove the brake from vehicle as described in Section 5 Brake Replacement and secure it to a bench mounted bracket using the same fixings as on the vehicle. (DXT 17) (Fig. 10.3)

Using the manual adjuster device, carefully wind out both actuating pistons fully until they disengage from the adjuster sleeves within the brake housing. Both actuation pistons must remain attached to the thrust plate. (Fig. 10.4)

Remove and discard both piston seal excluders from the brake body using a suitably size drift. (Fig.10.5)

Remove all traces of sealant from around seal excluder location in the calliper body and ensure the excluder location is clean.

NOTE: Ensure that no debris is allowed to enter the brake body.

Clean the seal excluder location groove on the actuating pistons and piston threads with suitable cleaning fluid, ensure they are clean and dry before re-assembly.

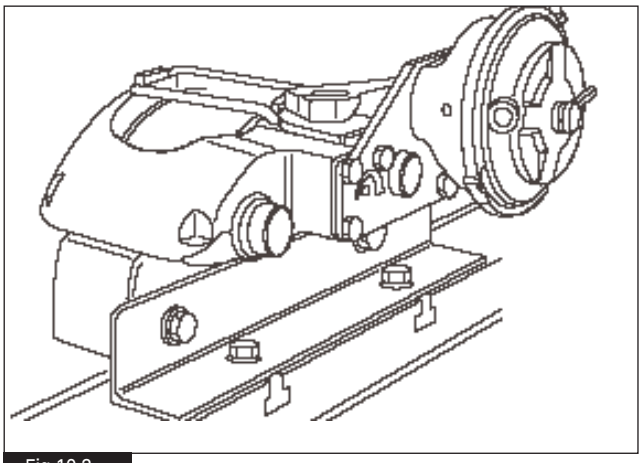

Fig 10.3

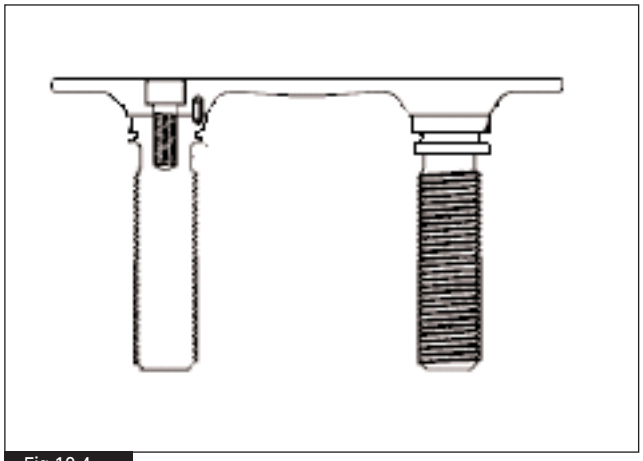

Fig 10.4

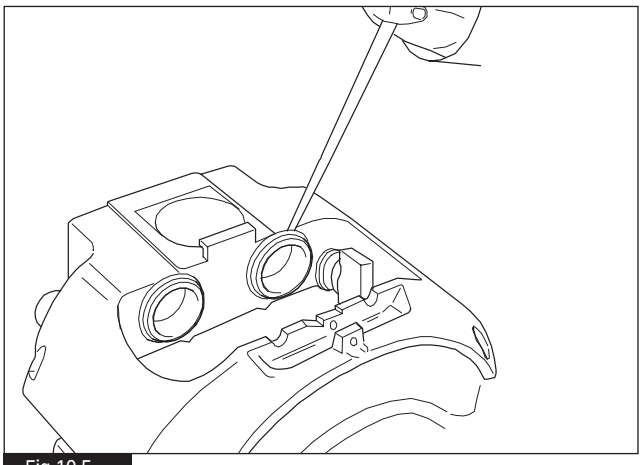

Fig 10.5

10 Piston Dust Excluder Replacement

Re-Assembly

Before reassembly, apply sealant MBG 1002 on the outside of the metal ring of the piston seal excluder.

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

Fit the new actuator piston seal excluders into the housing, pushing them into position with the ArvinMeritor Service Tool detailed below

Ref. No.	Application
DXT07	DX195, DX225, DX225/21

CAUTION: Ensure the tool locates on the metal part of the excluder only, contact with the rubber component can seriously damage the excluder and will require replacement.

Apply grease (MBG 1003) to each of the piston threads.

Position the thrust plate together with the actuating pistons within the saddle. Using the manual adjuster device, engage both pistons within the thread of the adjuster sleeves. Turn the manual adjuster device to wind both pistons in to housing, do not use excessive force to carry out this operation.

NOTE: If a torque in excess of 6 Nm is required, disengage threads and start process again.

Wind in both pistons until the thrust plate is protruding from the brake body by approximately 30 mm, this should give sufficient access to fit the new excluders onto the actuating pistons.

Fit the new piston seal excluders onto the actuating pistons. Check carefully for correct location in the groove on the piston head.

NOTE: do not use any grease to aid assembly. The use of grease could cause the excluders to prematurely pull-off the piston location grove.

Gently extend each excluder to ensure they are securely located on the piston. The excluder should not pull-off when applying a reasonable force.

Refit the brake assembly as described in Section 5 Brake Replacement.

Where applicable refit the air chamber as described in Section 5 Brake Replacement.

Refit the pads as detailed in Section 3 Pad Replacement

End Plate Replacement

11

11 End Plate Replacement

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

Remove any dirt from the brake assembly. Ensure the rubber dust excluders 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.

Dismantling

Remove the brake pads and pad springs as described in Section 3 Pad Replacement.

Remove the brake from vehicle as described in Section 5 Brake Replacement and secure it to a bench mounted bracket using the same fixings as on the vehicle. (DXT 17) (Fig. 11.1)

Remove the 6 end plate screws A, (Fig. 11. 2) then remove plate from housing.
Remove and discard gasket, if fitted, and clean any possible debris from metal surfaces.

WARNING Clean any traces of thread tightening compound from all inner threads of brake components. Use only new screws during maintenance. The use of old screws is very dangerous and can seriously affect brake performance.

Reassembly

NOTE: Follow line B (Fig. 11. 3) when applying sealant (MBG 1002) to the end section of housing (with or without seal). Only use the sealant supplied with replacement components/kits, that is specified above or by the vehicle manufacturer. Under no circumstance should any other type of sealant be used.

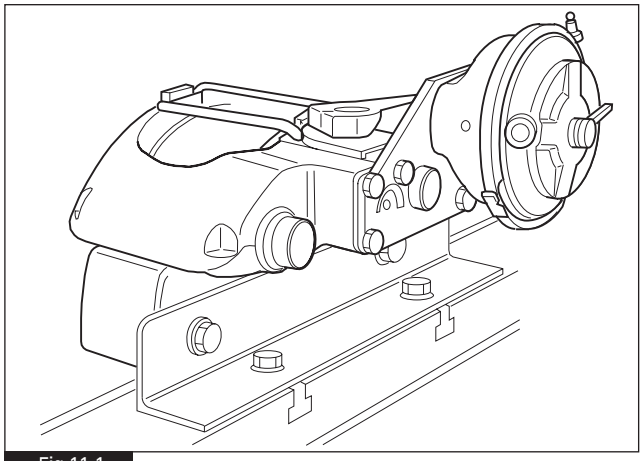

Fig 11.1

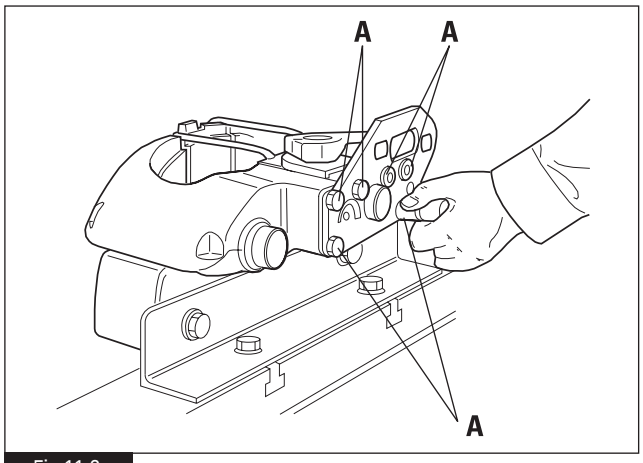

Fig 11.2

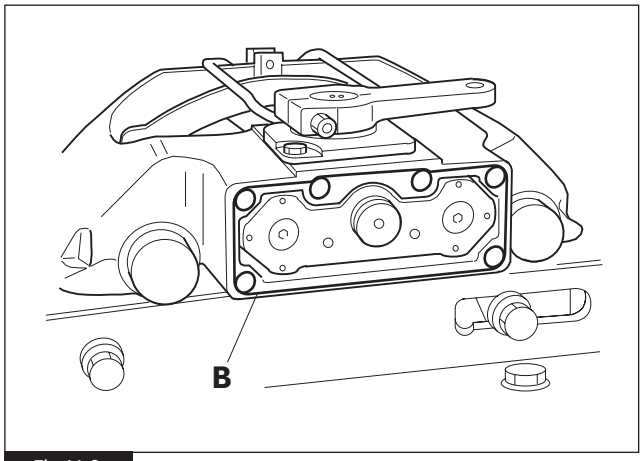

Fig 11.3

11 End Plate Replacement

Apply sealant (MBG 1002) on both sides of end plate's new seal. Position seal and install on end plate. Secure end plate using a set of new screws (with thread locking compound pre-applied) and using a cross diagonal sequence, tighten gradually to a final torque of:

Model	Torque (Nm)
DX225 DX195 DX225/21 (Hex Head Screw)	130 +/- 10
DX225 DX195 DX225/21 (Skt Head Screw)	100 +/- 5

Refit the brake assembly and air chamber as described in Section 5 Brake Replacement.

Reconnect the air line to the air chamber as described in manufacturers instructions.

Refit the brake pads as described in Section 3 Pad Replacement.

Charge the air system and wind in the spring brake retraction screw (where applicable). Apply the brakes 10 times to settle the pads and allow the auto adjuster to set the correct running clearance. Check that the rotor is free to rotate.

Refit the road wheels, remove the axle stands and lower the vehicle to the ground.

Road test.

Thrust Plate Replacement

12

12 Thrust Plate Replacement

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

Remove the road wheels and exhaust all air from the system. Remove any dirt from the brake assembly. Ensure the rubber dust excluders 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.

Dismantling

Remove the pads as detailed in Pad Replacement Section 3

Remove the air line from the air chamber.

Remove the brake assembly with air chamber as detailed in Brake Replacement Section 5 and secure it to a bench mounted bracket using the same fixings as on the vehicle (DXT17) (Fig. 12.1).

Remove the two socket head screws A and then remove the inner pad thrust plate B. (Fig 12.2)

During above steps avoid rotating pistons, which would change pin seat locations and modify the length of the pistons.

WARNING Clean any traces of thread tightening compound from all inner threads of brake components. Use only new screws during maintenance. The use of old screws is very dangerous and can seriously affect brake performance.

NOTE: A high starting torque will be required due to thread locking compound applied to screws.

Reassembly

Position thrust plate with its two pins and insert them in their seats on end of actuator pistons.

Apply thread locking compound Loctite 648 on the two new socket head screws. Lightly screw the screws into the pistons supporting the thrust plate against them. Specified torque tightening shall be carried out after thrust plate has been aligned.

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

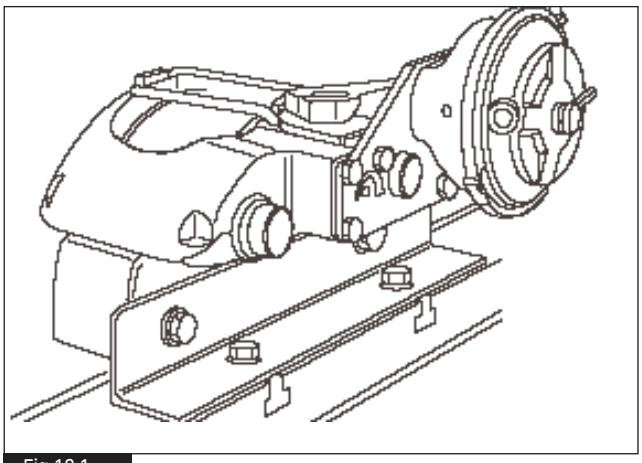

Fig 12.1

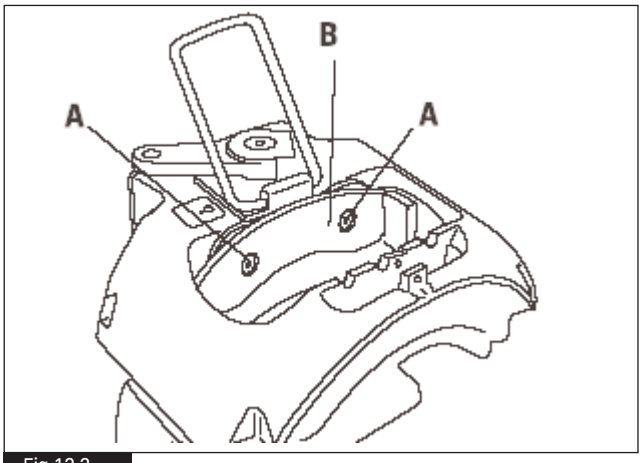

Fig 12.2

12 Thrust Plate Replacement

Thrust Plate Centering in the Saddle

Install metal block (Fig 12.3) to check parallelism between thrust plate and opposite housing reaction surface. Push the thrust plate against metal parallelism block by manually rotating adjusting system. Use 6 mm Hex wrench through adjusting hole on end plate.

Model	Tool
DX195	DXT14
DX225	DXT13
DX225/21	DXT16

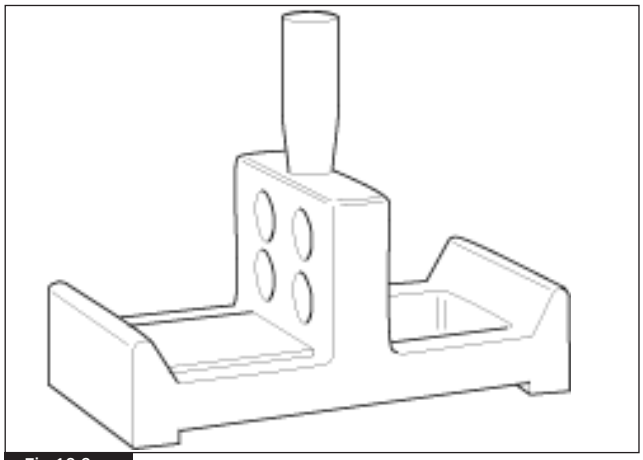

Fig 12.3

Due to the eccentric actuating system the thrust plate should be positioned on a longitudinal axis with respect to the two saddle vertical axes which support the inner pad during braking. Positioning is carried out with the lever in rest position and air chamber mounted. A 0.1 mm feeler gauge should be placed between the saddle's vertical support face and the thrust plate rim in order to manually support it against the shim.

The 0.1 mm shim should be placed on the left, looking from air actuator to brake, if actuation is counterclockwise or on the right if actuation is clockwise. As a further check insert a 0.5 mm shim at the opposite end in order to check correct thrust plate positioning. (Fig 12.4)

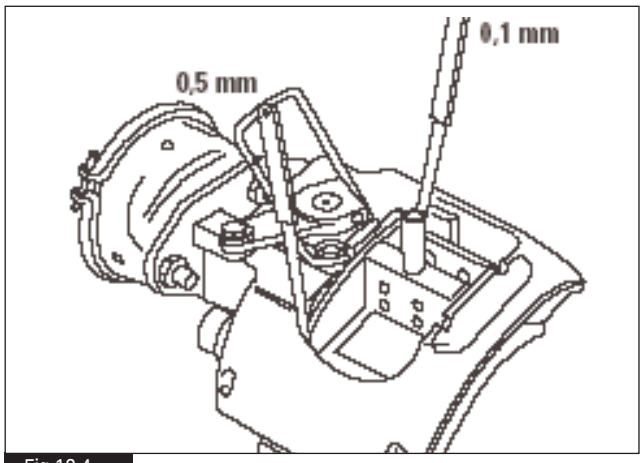

Fig 12.4

Tighten one of two piston screws just enough to keep thrust plate in the calibrated position.

Remove feeler gauges and parallelism block, de-adjusting the brake slightly.

Tighten piston screws to a final torque of 85 Nm (Fig. 12.5).

Model	Torque (Nm)
DX225 DX195 DX225/21	85

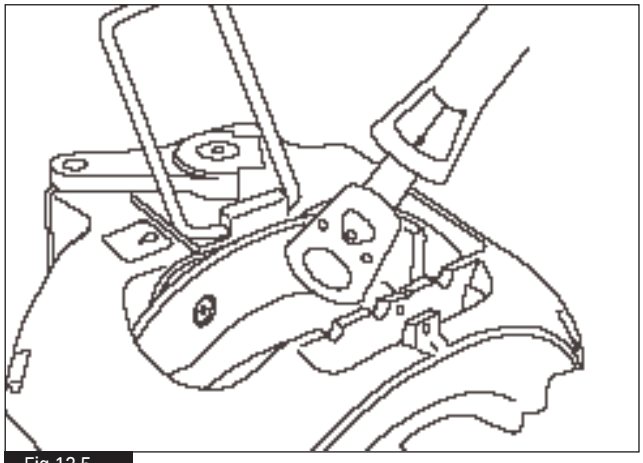

Fig 12.5

12 Thrust Plate Replacement

Refit the brake assembly as described in Section 5 Brake Replacement.

Reconnect the air line to the air chamber as described in manufacturers instructions.

Refit the brake pads as described in Section 3 Pad Replacement.

Charge the air system and wind in the spring brake retraction screw (where applicable). Apply the brakes 10 times to settle the pads and allow the auto adjuster to set the correct running clearance. Check that the rotor is free to rotate.

Refit the road wheels, remove the axle stands and lower the vehicle to the ground.

Road test.

Eccentric Shaft Replacement

13

13 Eccentric Shaft Replacement

This procedure covers the replacement of the early level eccentric shaft with a latest type of eccentric shaft assembly incorporating a grease nipple.

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

NOTE: The service kit contains alternative components. This provides the ability to service all models of the DX 195/225 brake range. Where appropriate, discard those parts which are not required.

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 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.

Dismantling

The operation can be performed on the vehicle although removal will facilitate easier working conditions.

Depending on brake model, either remove the pin clip A and the pin B, or retaining screw and plate, allowing the stabiliser bar C to rotate and be hinged to the brake on the lever's side. (Fig.13.1)

Remove Clevis Pin connecting the air actuator (rotation chamber) pushrod to the brake actuating lever (Fig. 13.2).

Thoroughly clean the area around the cover plate and eccentric shaft.

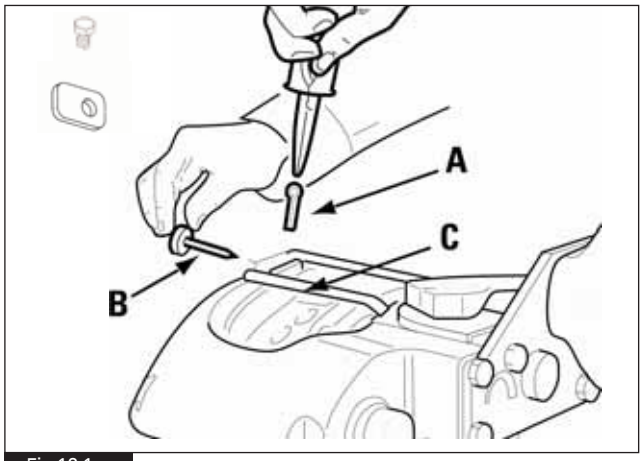

Fig 13.1

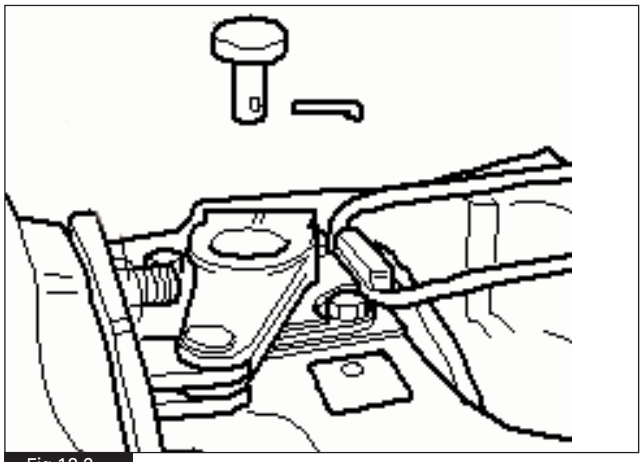
Fig 13.2

13 Eccentric Shaft Replacement

NOTE: If the working area of the brake is not easily accessible, Remove the air chamber from the brake as described in Section 5 Brake Replacement. Support under the vehicle wheel arch in a position which does not cause undue strain on the connected air pipe.

Remove the lever clamp screw and discard Fig 13.3).

Remove the lever as described in Section 8 Lever Replacement. and retain.

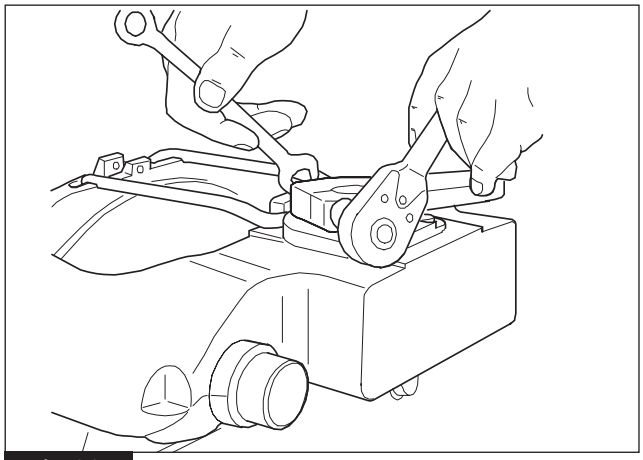

Fig 13.3

It is advisable at this stage to remove the brake pads to allow cleaning and examination of the brake.

Fully de-adjust the brake. This will allow for easier removal and replacement of parts and help keep internal components in the correct position.

Remove the adjuster stem port plug and washer (Fig 13.4). Locate a suitable hexagon wrench in the adjuster stem (Fig 13.5) and rotate the wrench as detailed in Section 1 Manual Adjustment/De-adjustment.

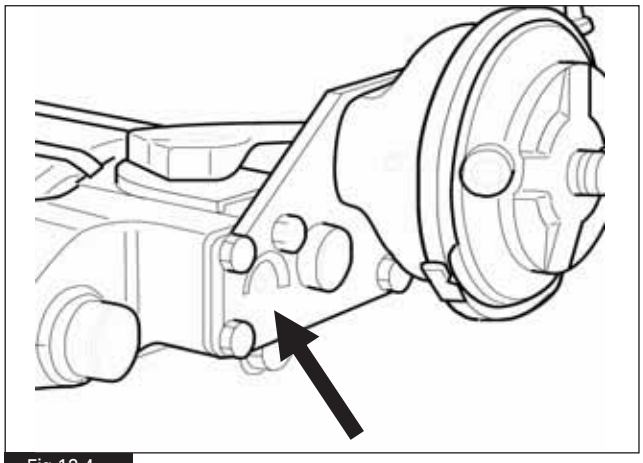

Fig 13.4

WARNING Always de-adjust/adjust the brake carefully by hand with a suitable wrench. NEVER use power tools. Do not exceed adjustment torque of 10 Nm or de-adjustment torque of 25Nm. Exceeding these torque levels can result in damage to the adjuster gearbox.

CAUTION: During brake de-adjustment, stop turning the wrench if resistance is felt. This indicates that the adjuster pistons are fully retracted. Further turning of the wrench could lock the adjuster pistons in the sleeves, thus preventing auto-adjustment operation or cause damage to the adjuster mechanism.

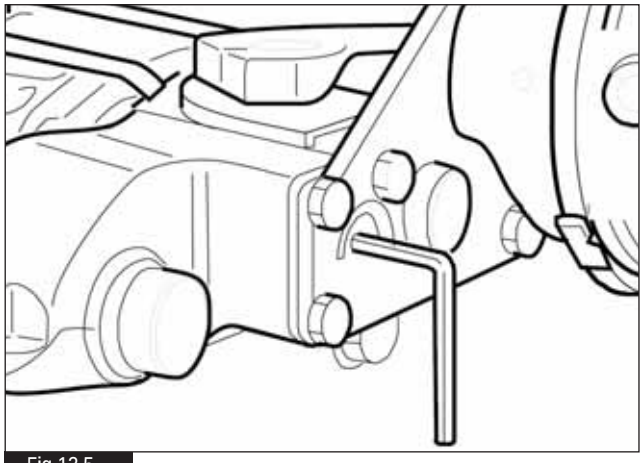

Fig 13.5

Remove the brake pads and pad springs as described in Section 3 Pad Replacement.

13 Eccentric Shaft Replacement

Cleaning and inspection

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. 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. If there is any doubt in the serviceability of any component refer to the vehicle manufacturer for corrective action.

It is advisable at this stage to carry out cleaning and examination of the brake and rotor as described in Section 2 Operational checks.

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. Clean the 8 pad support plates in the saddle with a wire brush (Fig 13.6) removing any build-up of debris or rust. This allows the pads to be correctly seated in position

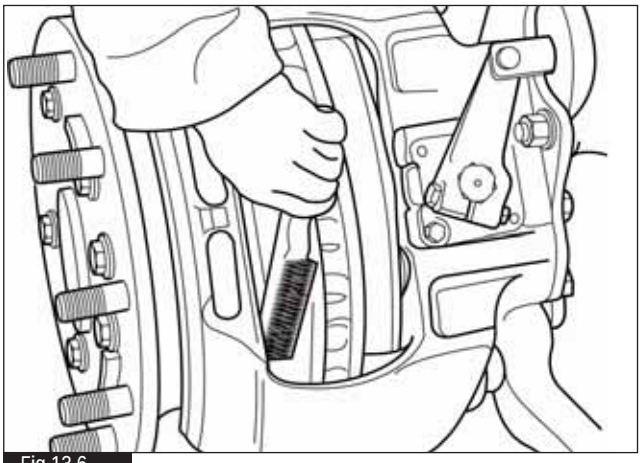

Fig 13.6

Eccentric shaft removal

Where applicable, remove the dust shield A from the hexagonal section of the eccentric shaft (Fig.13.7). Ensure the area under the shield is cl;ean. Remove the 2 Cover Plate Screws and discard. Remove the Cover Plate assembly in which the Eccentric Shaft upper bearing unit is positioned. Whilst removing the cover plate, hold the eccentric shaft in place to ensure the shaft is not pulled out simultaneously with the cover plate.

NOTE: Care should be taken when removing the cover plate assembly, that none of the rollers are allowed to become dislodged from the cover plate bearing. The bearing assembly is an uncaged needle roller bearing.

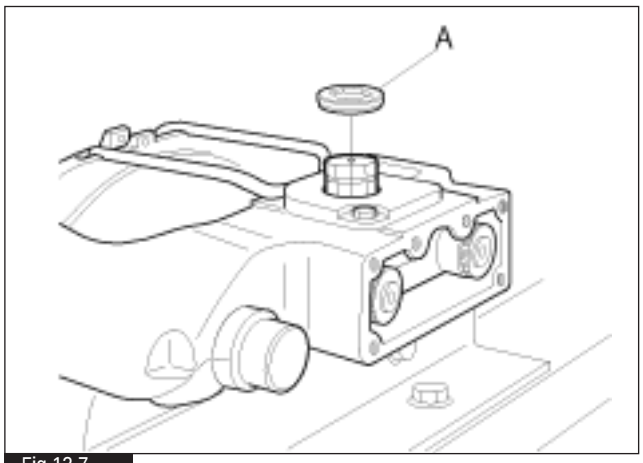

Fig 13.7

13 Eccentric Shaft Replacement

Remove the cover plate gasket and discard. Remove the stabiliser bar from housing. Thoroughly clean the cover plate mounting surface on the brake housing. Ensure no debris is allowed to enter the eccentric bore (Fig.13.8). Clean the old thread locking compound from cover plate screw holes.

Rotate the Eccentric shaft in the direction of the brake application (this can be done using the lever) until 3 clicks are felt, or sufficient rotation has taken place to align the eccentric high point with the elliptical area D in the upper brake opening to allow removal of Eccentric shaft (Fig 13.9).

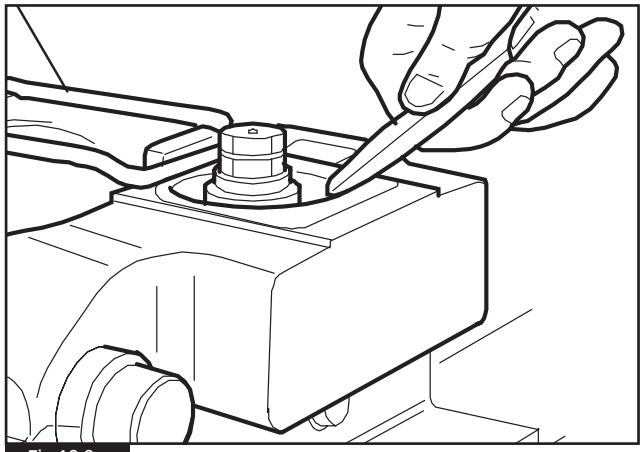

Fig 13.8

NOTE: Rotating the Eccentric Shaft slightly allows the shaft and Eccentric Shaft Support Bearing to pass through the upper brake opening. The opening is machined elliptical to allow this operation to take place.

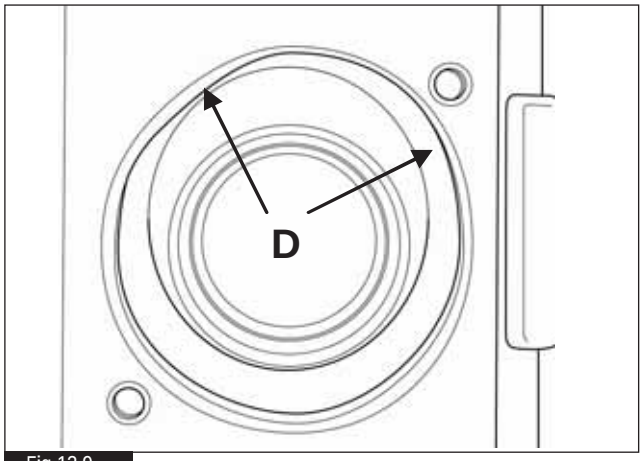

Fig 13.9

Pull out Eccentric Shaft together with the Eccentric Shaft Support Bearing and discard. (Fig. 13.10)

NOTE: Care should be taken with the eccentric shaft removed that no rollers are dislodged from the Lower Eccentric Shaft Bearing, as this is an uncaged needle roller bearing assembly which is not replaced during this procedure.

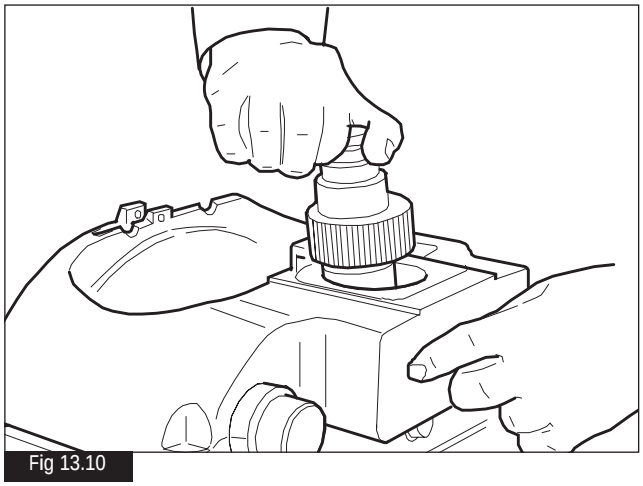

Fig 13.10

⚠ CAUTION: Do not move the manual adjuster stem with the Eccentric shaft removed as this could cause the Adjuster Gear segment to become displaced. The consequence of this would be to make reassembly more difficult.

13 Eccentric Shaft Replacement

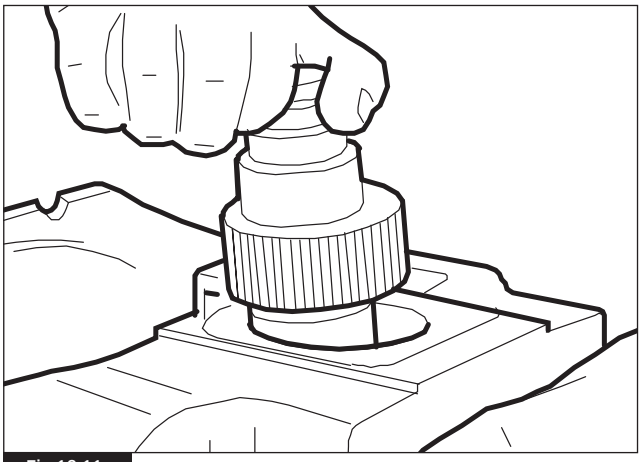

Fig 13.11

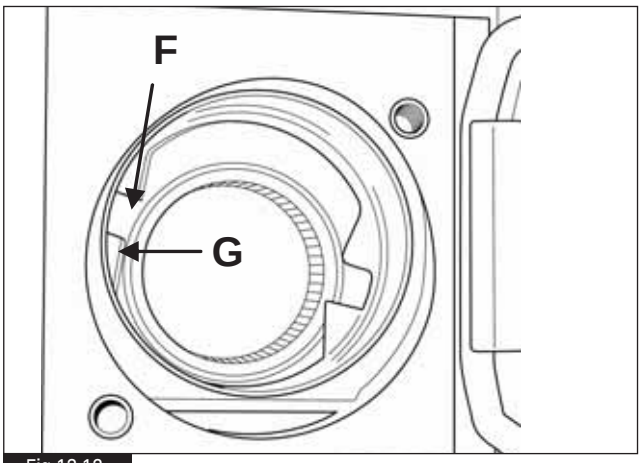

Fig 13.12

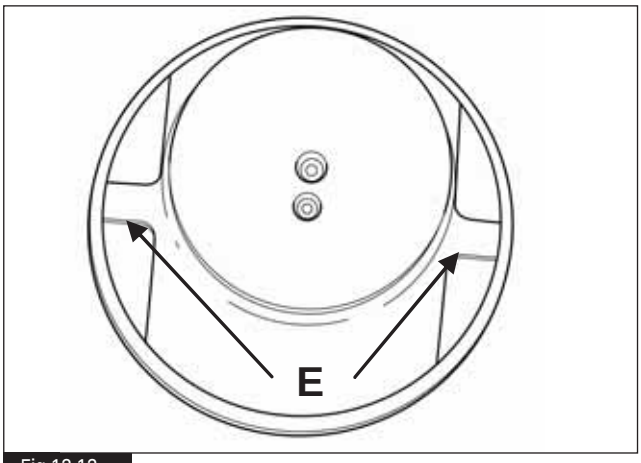

Fig 13.13

Reassembly

Apply lubricating grease (MBG 1003) to the Lower Eccentric Shaft Bearing within the housing, taking care not to allow the loose needle rollers to become displaced.

Apply lubricant grease (MBG 1003) to all bearing surfaces of new Eccentric Shaft. Position the new Eccentric Shaft Support Bearing in the seat on the eccentric shaft, and thoroughly lubricate the rollers.

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

Insert the new Eccentric Shaft by passing it through the upper brake housing, align the eccentric high point with the machined elliptical section of the housing. Pass through the Actuation Block and the Adjuster Gear Segment. (Fig. 13.11)

NOTE: it may be necessary to very slightly rotate the eccentric shaft to ensure correct engagement of the eccentric shaft 'tongues' E into the adjuster gear segment "cut outs" F (Figs 13.12 & 13.13).

NOTE: If the Adjuster Gear Segment has been disturbed and before assembly ensure that the Adjuster Gear Segment G is correctly aligned, only the "cut out" segments F should be visible, the remainder of the segment should be concentric with the large diameter in the Actuation Block.

Assembly is correct when the Eccentric Shaft is fully engaged in the Adjuster Gear Segment "cut outs" F. (Figs. 13.12 & 13.13)

Failure to fully engage may be due to a displaced needle roller in the lower shaft bearing.

13 Eccentric Shaft Replacement

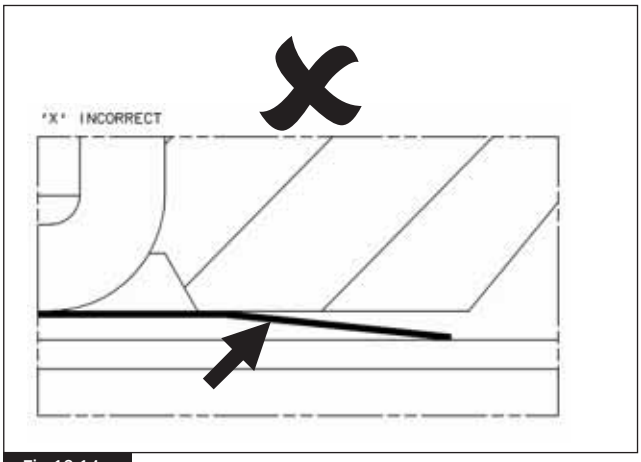

Fig 13.14

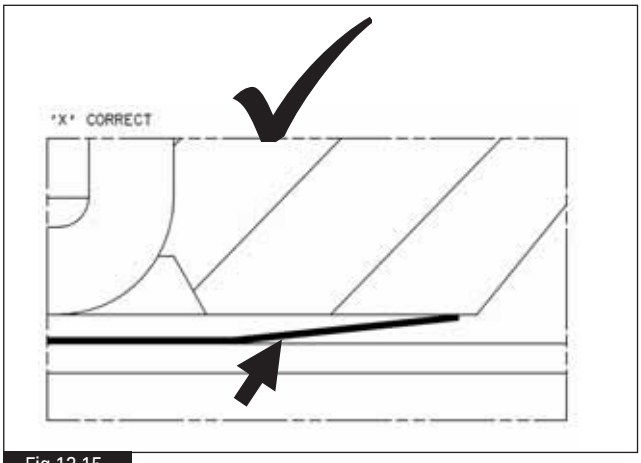

Fig 13.15

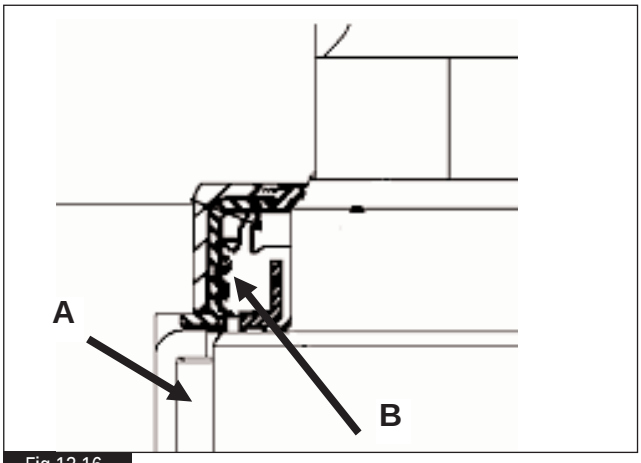

Fig 13.16

Check that rollers are correctly located, or if the Adjuster gear segment has become displaced, before repeating the assembly procedure.

At this point and before fitting the Cover Plate assembly, manually rotate the eccentric shaft several times, using the lever temporarily fitted, in order to check the function of the automatic adjustment mechanism thus ensuring all components are assembled correctly.

To check the function of the adjuster insert a hexagonal tool into the manual adjuster port.

NOTE: The hexagonal drive should rotate in one direction only in response to the rotation of the eccentric shaft. Failure to do so indicates that the 'eccentric shaft tongues' are not correctly engaged, therefore the assembly process should be repeated. It may be necessary to release the internal mechanism in the ADJUST direction if the components were 'locked' back during initial de-adjustment.

Fit the new Washer (grease barrier) (A) onto top surface of the eccentric shaft.

NOTE: is important that the washer is fitted in the correct orientation,with the flat surface of the washer in contact with the eccentric shaft (Fig 13.14 & Fig 13.15)

Thoroughly apply lubricant grease (MBG 1003) to the needle roller bearing A in the new Cover Plate assembly, taking care not to allow needle rollers to become displaced. At the same time, smear a thin film of grease (MBG 1003) to the inside diameter of the Cover Plate seal B (Fig. 13.16)

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

13 Eccentric Shaft Replacement

Refit the stabiliser bar ensuring correct location in the brake.

Apply a small bead of sealant (MBG 1002) on both sides of the new gasket. Position gasket on the cover plate and install the cover plate into the housing, ensure that the lugs on the gasket are positioned parallel with the rotor as shown in Fig 13.16. Fit the sensor bracket, if required and secure with 2 new screws (with thread locking compound previously applied) and tighten to a torque of 35 Nm.

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

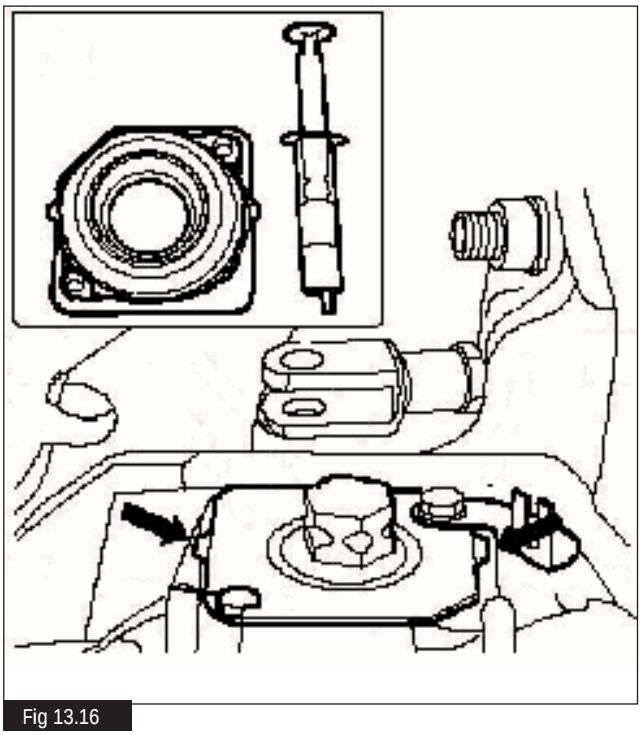

Fig 13.16

Where applicable, position a new dust shield A onto the hexagonal section of the eccentric shaft (Fig. 13.17)

Refit the lever as described in Section 8 Lever Replacement.

Fit the new lever clamping screw and, where applicable, nut. Tighten to a torque of 30 Nm.

Manually actuate the lever several times in order to check for free movement of the eccentric shaft.

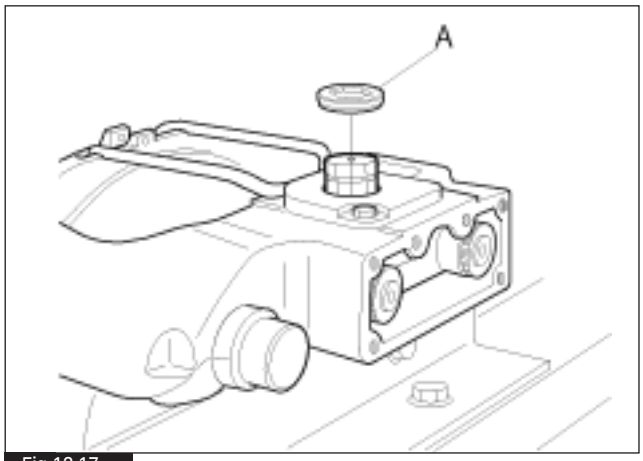

Fig 13.17

13 Eccentric Shaft Replacement

Before refitting brake to axle (if removed) or refitting the actuator, using a suitable hand grease gun containing grease from MBG 1006 (tin), pump grease into the grease nipple (Fig. 13.18) until grease appears around the dust shield/lever area.

CAUTION: If there is no sign of grease emerging after 12 applications of the grease gun, STOP. Dismantle the lever and eccentric shaft coverplate to check that all parts are fitted correctly.

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

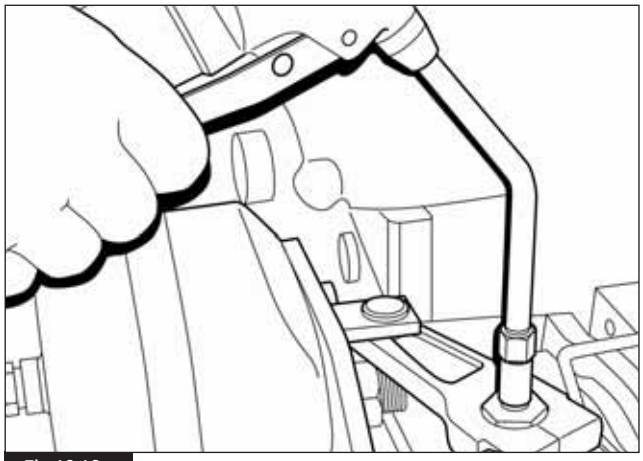

Fig 13.18

Refit brake to the axle (if removed) as described in Section 5 Brake Replacement..

Where applicable refit the air chamber as described in Section 5 Brake Replacement.

Fit the brake pads as described in Section 3 Pad Replacement.

Align the air chamber clevis on the lever, fit the clevis pin and split pin to retain.

Charge the air system and wind in the spring brake retraction screw (where applicable).

Apply the brakes 10 times to settle the pads and allow the auto adjuster to set the correct running clearance. Check that the rotor is free to rotate.

Refit the road wheels, remove the axle stands and lower the vehicle to the ground and road test.

Preventive Maintenance

NOTE: it is recommended that every 3 months, or at an interval deemed appropriate by the operator, the eccentric shaft is greased with 3 applications of grease (MBG 1006) from a standard hand held grease gun..

It is NOT recommended that an automatic lubrication system if fitted to the grease nipple.

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

Adjuster Gear Train Replacement

14

14 Adjuster Gear Train 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 excluders 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.

Remove the brake pads and pad springs as described in Section 3 Pad Replacement.

Remove the brake from vehicle as described in Section 5 Brake Replacement and secure it to a bench mounted bracket using the same fixings as on the vehicle. (DXT 17) (Fig. 14.1)

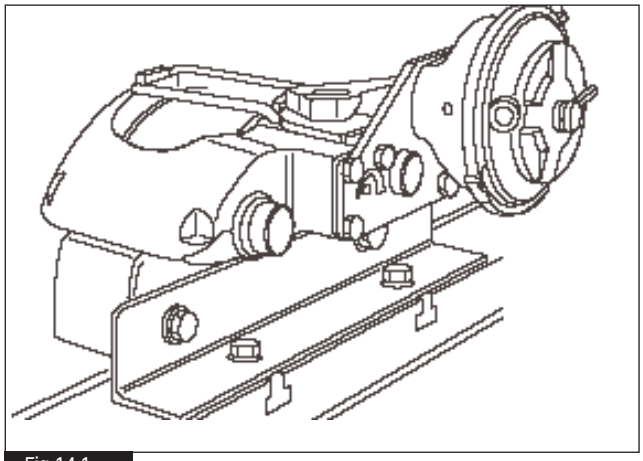

Fig 14.1

Dismantling

Remove the 6 end plate screws A, then remove plate from housing (Fig 14.2).

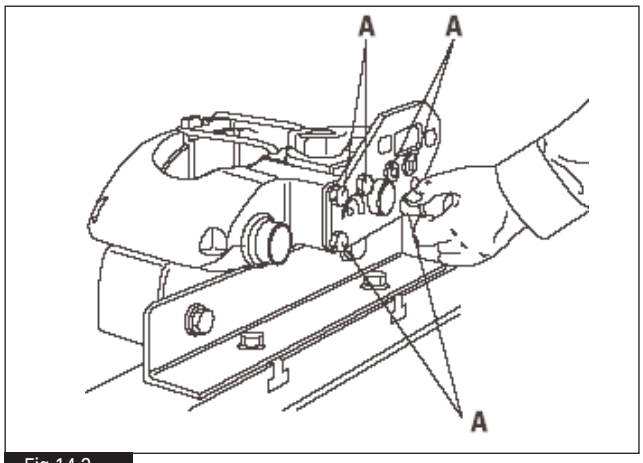

Fig 14.2

Remove and discard gasket, if fitted, and clean any remaining debris from metal surfaces.

WARNING Clean any traces of thread tightening compound from all inner threads of brake components. Use only new screws during maintenance. The use of old screws is very dangerous and can seriously affect brake performance.

Remove and discard central screw B from automatic adjuster device and remove compression spring C and damping rings D (Fig 14.3).

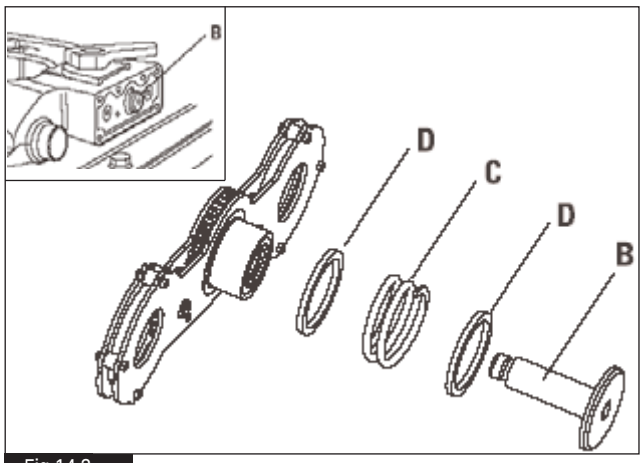

Fig 14.3

14 Adjuster Gear Train Replacement

Remove gear train box and clutch assembly together with bevel gear(Fig 14.4). Inspect all gears for any signs of damage or wear, if in any doubt in the suitability for further service replace with new components.

Reassembly

Apply grease MBG1003 to the flat face and bevel gear teeth of the clutch.

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

Position the clutch on the adjuster block (the grease will hold it) so that the mark at the base of the two central teeth of the bevel gear on the clutch aligns with the notch on the middle tooth of the gear segment. (Fig 14.5).

Apply grease MBG 1003 to box gear train and fit bevel gear and torque limiter assembly into the gear train and fit it to the clutch shaft so that the straight edge of the box is adjacent to the segment gear (Fig 14.5).

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

If necessary, engaging the intermediate gears of the gearbox to the adjuster sleeve gears is achieved by minimum rotation of sleeve gear clockwise or counterclockwise using a hexagonal wrench.

Insert first damping ring D (Fig 14.6) and compression spring C on box central gear collar. Position second damping ring D on the new screw B of the adjusting device. Align and tighten to 10 Nm torque.

WARNING The rubber damping rings must not come into contact with grease as this will impair efficiency.

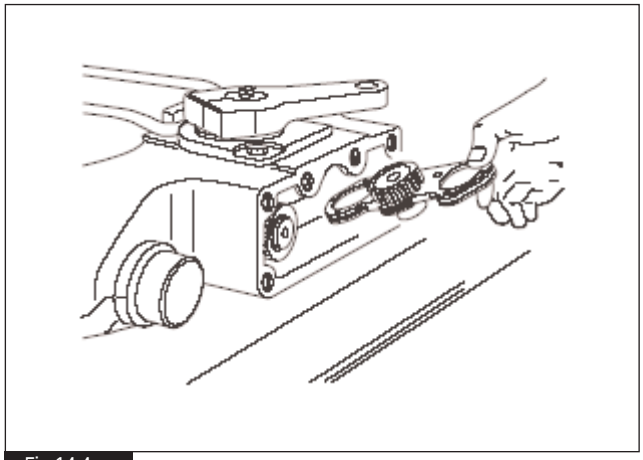

Fig 14.4

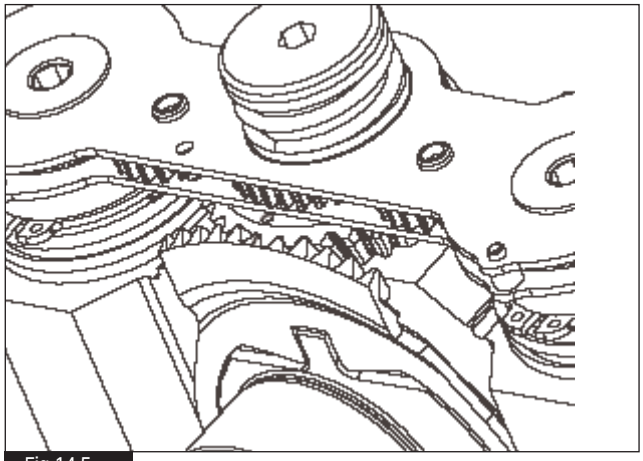

Fig 14.5

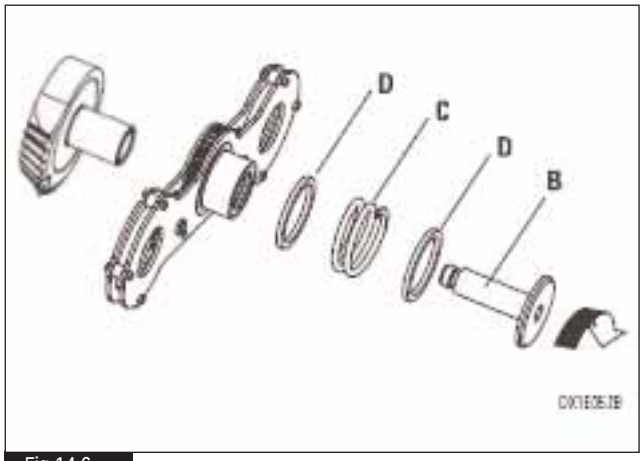

Fig 14.6

14 Adjuster Gear Train Replacement

Manually operate the lever several times in order to check adjustment and actuating device operation. The block should move back and forth and the gear train should turn in one direction only.

Actuating pistons should not be fully retracted. Check that adjusting unit components are appropriate for the brake's actuating direction.

Follow diagram B when applying sealant MBG 1002 to the end section of housing (with or without seal). (Fig. 14.7)

Apply sealant MBG 1002 on both sides of end plate's new seal., if fitted. Position seal and install on end plate. Secure end plate using a set of new screws (with thread locking compound pre-applied) and using a cross diagonal sequence (Fig 14.8), tighten gradually to a final torque of:

Model	Torque (Nm)
DX225 DX195 DX225/21	
M12 Hex. head screws	130±10
M12 socket head screws	100±5

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

Refit the brake assembly as described in Section 5 Brake Replacement.

Refit the brake pads as described in Section 3 Pad Replacement.

Charge the air system and wind in the spring brake retraction screw (where applicable). Apply the brakes 10 times to settle the pads and allow the auto adjuster to set the correct running clearance.

Check that the rotor is free to rotate. Refit the road wheels, remove the axle stands and lower the vehicle to the ground.

Road test.

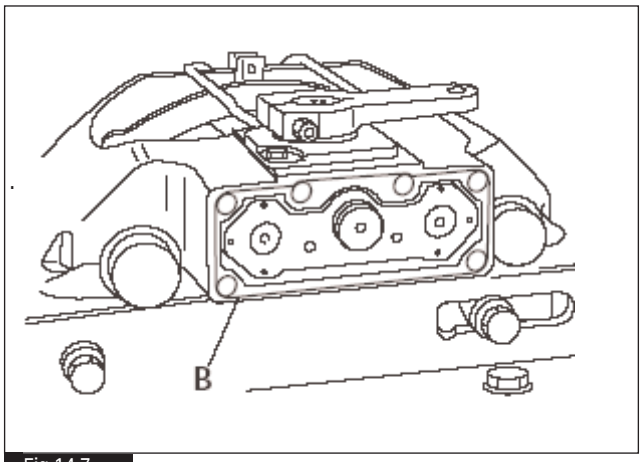

Fig 14.7

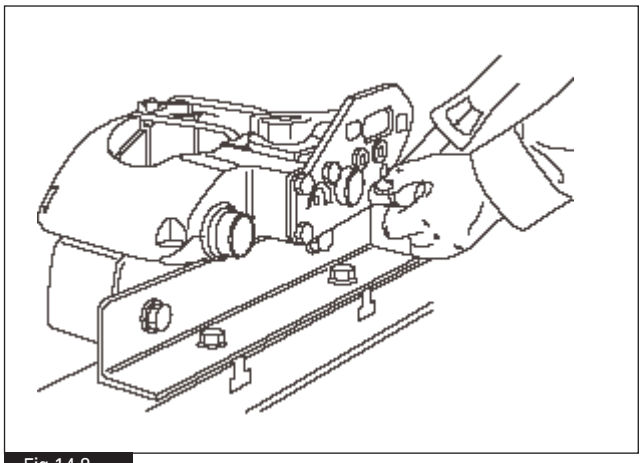

Fig 14.8

Actuator Block Assembly & Thrust Plate Replacement

15

15 Actuator Block Assembly & Thrust Plate Replacement

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

Remove any dirt from the brake assembly. Ensure the rubber dust excluders 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.

Dismantling

Remove the brake pads and pad springs as described in Section 3 Pad Replacement.

Discinnect the air line from the air chamber

Remove the brake assembly with air chamber as detailed in Brake Replacement Section 5 and secure it to a bench mounted bracket using the same fixings as on the vehicle (DXT17) (Fig. 15.1)

At this stage the caliper is free to slide on the saddle. Care should be taken to avoid inadvertently trapping fingers.

For a correct reassembly, note or mark relative rotation chamber position with respect to end flange. Remove pin clip A and clevis pin B connecting the air actuator (air chamber) pushrod to the brake actuating lever Fig 15.2).

Remove the two retaining nuts C attaching the air actuator (air chamber) to the end plate. (Fig. 15.2)

Remove air actuator. (Fig. 15.3)

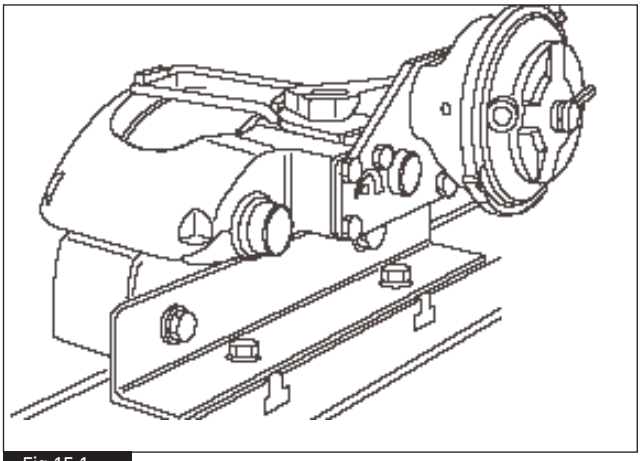

Fig 15.1

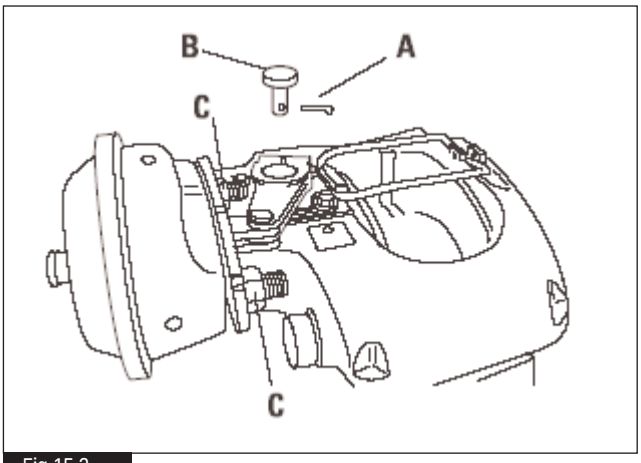

Fig 15.2

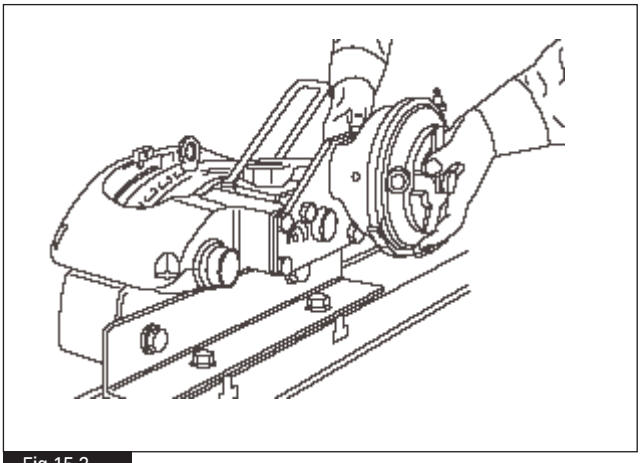

Fig 15.3

15 Actuator Block Assembly & Thrust Plate Replacement

Remove the two socket head screws A and discard. Remove the pad thrust plate B (Fig 15.4).

Attention should be paid since a high starting torque will be required due to thread locking compound applied to screws.

Remove the 6 end plate screws A, then remove plate from caliper (Fig 15.5).

Remove and discard gasket, if fitted, and clean any possible debris from metal surfaces.

Remove and discard central screw B from automatic adjuster device and remove compression spring C and damping rings D (Fig 15.6.

Remove gear train box and torque limiter assembly together with bevel gear (Fig 15.7).

NOTE: For a correct reassembly note or mark relative lever position with respect to eccentric shaft.

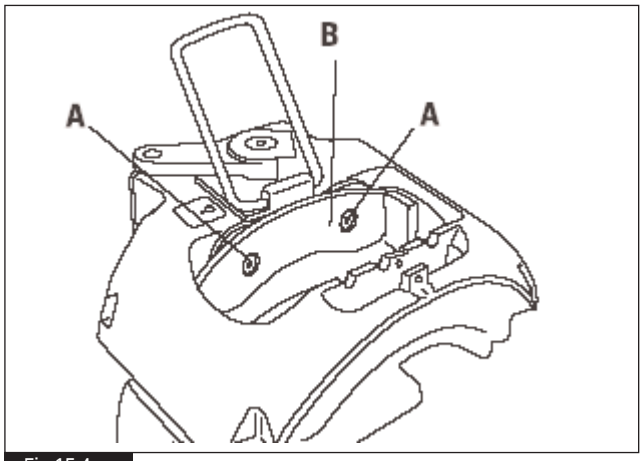

Fig 15.4

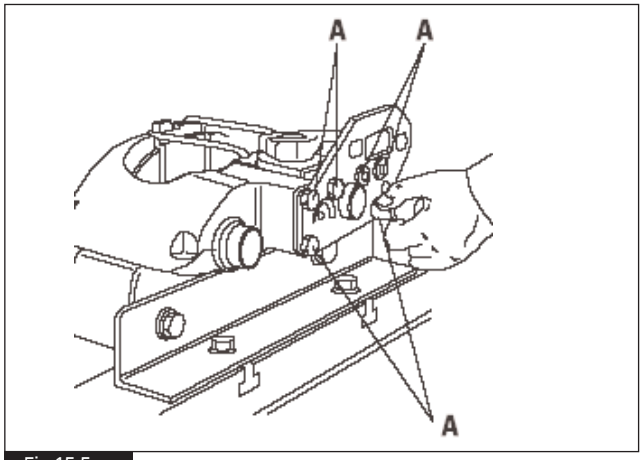

Fig 15.5

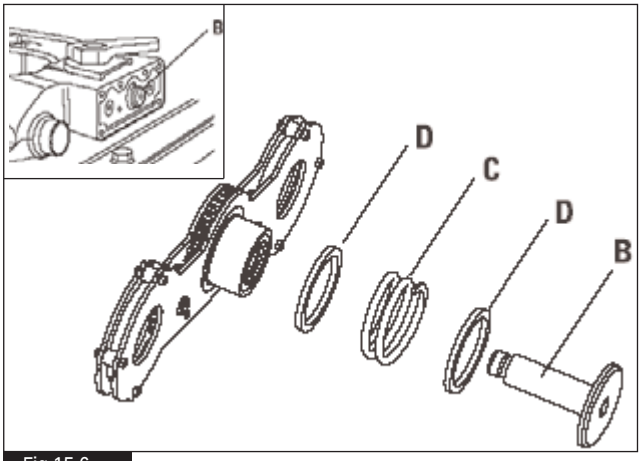

Fig 15.6

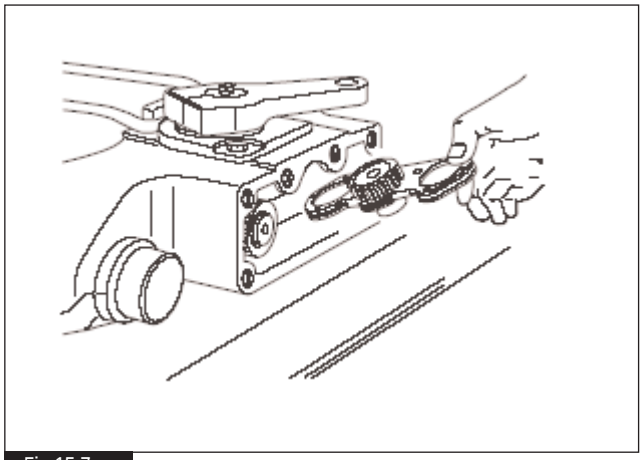
Fig 15.7

15 Actuator Block Assembly & Thrust Plate Replacement

Remove lever clamp screw (Fig 15.8). Should the lever interfere with the eccentric shaft, insert an appropriate wedge (screwdriver's blade) in the groove in order to facilitate disassembly and remove lever.

Where applicable, remove the dust shield from the hexagonal section of the eccentric shaft. Ensure the area under the shield is clean. Remove and discard the two cover plate screws A (Fig 15.9).

WARNING: Clean any traces of thread tightening compound from all inner threads of brake components. Use only new screws during maintenance. The use of old screws is very dangerous and can seriously affect brake performance.

Pull out the cover plate which contains the eccentric shaft upper bearing and seal.

CAUTION: The bearing is an uncaged, needle roller bearing assembly. Care must be taken not to drop or jar the cover plate in order to avoid displacement or loss of rollers.

Remove and discard cover plate gasket.
Thoroughly clean contact surfaces between plate and housing (Fig 15.10). Remove the stabiliser bar A secured in position by the cover plate (Fig 15.10). Remove eccentric shaft B from upper housing opening (Fig. 15.11). Rotate the shaft slightly to disengage the adjuster gear segment.

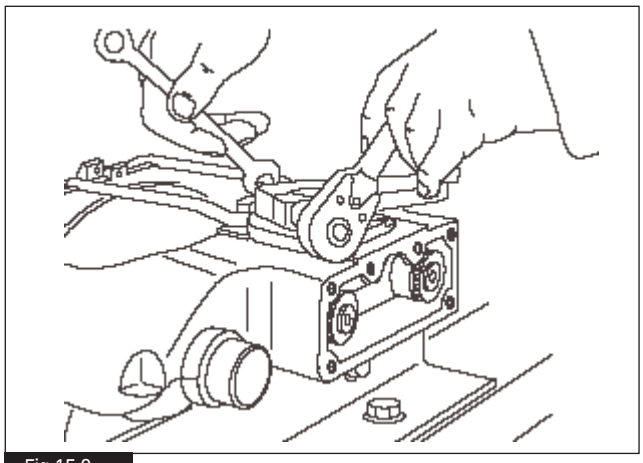

Fig 15.8

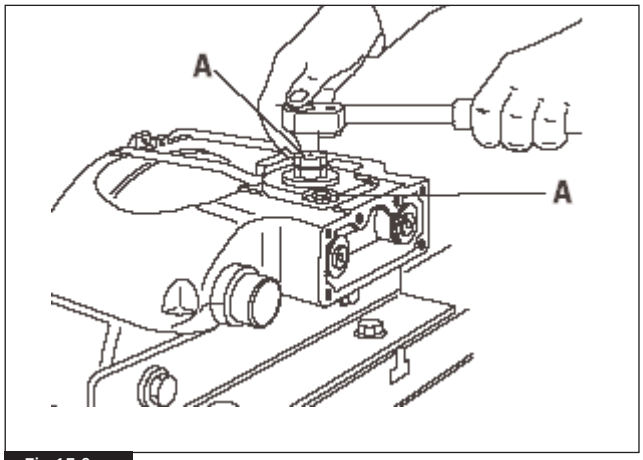

Fig 15.9

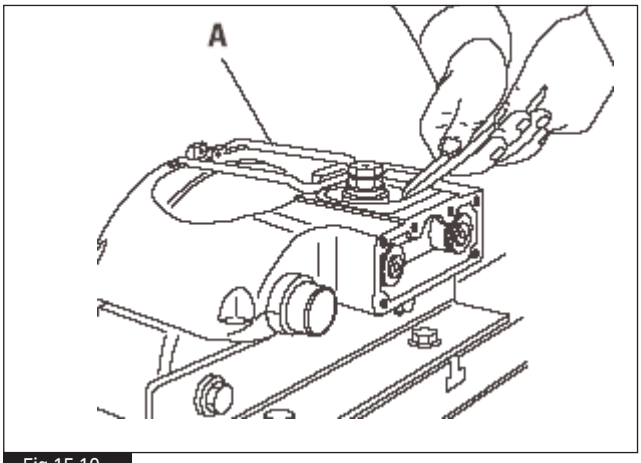

Fig 15.10

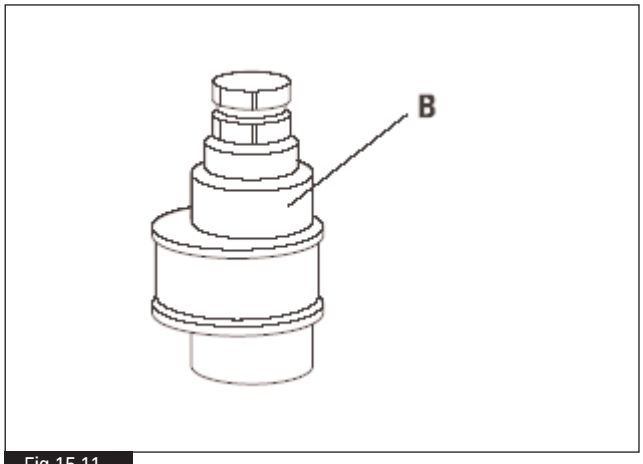

Fig 15.11

15 Actuator Block Assembly & Thrust Plate Replacement

Remove adjuster gear segment (Fig 15.12).

Pull out the block from caliper body, disengaging the two pistons from the excluder seals C (Fig 15.13).

Remove and discard both piston seal excluders from the brake body using a suitably size drift. (Fig. 15.14)

Inspect the lower eccentric shaft bearing . If there is any doubt about the condition of the bearing, replace it as follows:

Remove the needle rollers from the bearing housing. Using a suitable bearing puller engage the upper lip of the bearing housing and pull it from the housing (Fig 15.15).

Reassembly

Where necessary carefully fit the new lower eccentric shaft bearing, after thoroughly lubricating with grease MBG 1003, pressing in with tool DXT 23.

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

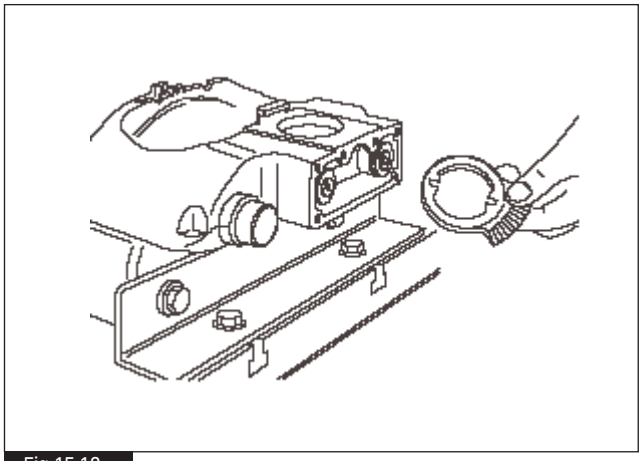

Fig 15.12

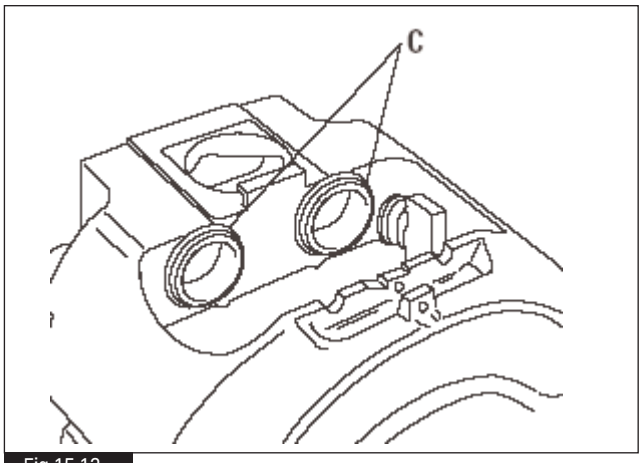

Fig 15.13

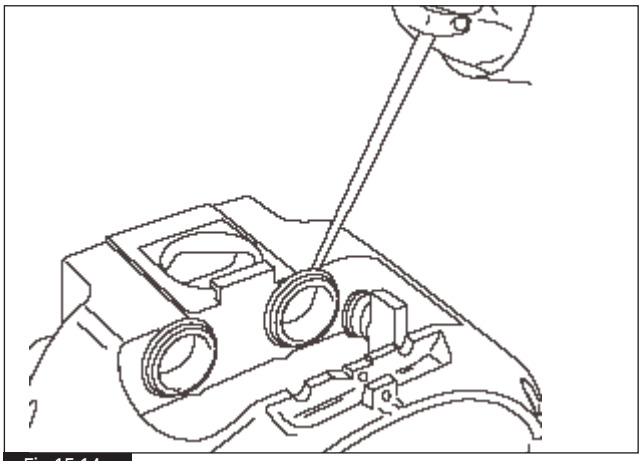

Fig 15.14

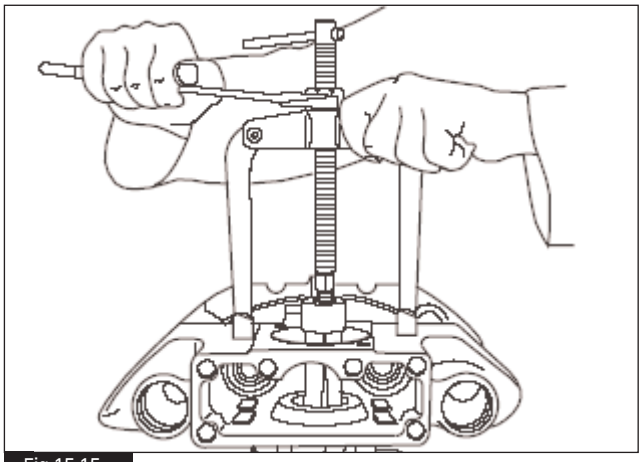

Fig 15.15

15 Actuator Block Assembly & Thrust Plate Replacement

Fit new actuation piston seals, pushing them into position on the housing with special tool:

Code	Model
DXT07	DX225 DX195 DX225/21

Before reassembly, apply sealant MBG 1002 on the outside of metal ring.

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

Using a suitable length gauge ensure that both sleeve / piston assemblies are equal length. Rotate the piston inside the sleeve in order to modify the length (Fig 15.16).

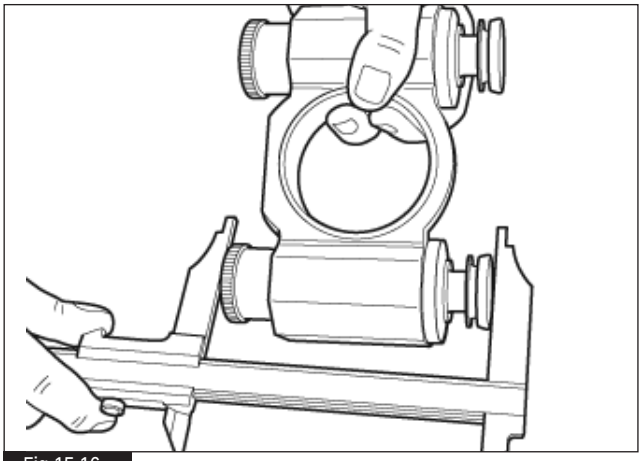

Fig 15.16

Manually rotate the sleeves via the gear end, without touching the pistons, to align the hole on the two piston heads (thrust plate location pin seat) to the left and on the actuation block centerline (as seen from piston head end).

Apply lubricant grease MBG 1003 to all external surfaces of actuation block. Apply lubricant grease MBG 1003 to all 8 block mounting surfaces within the housing (Fig 15.17).

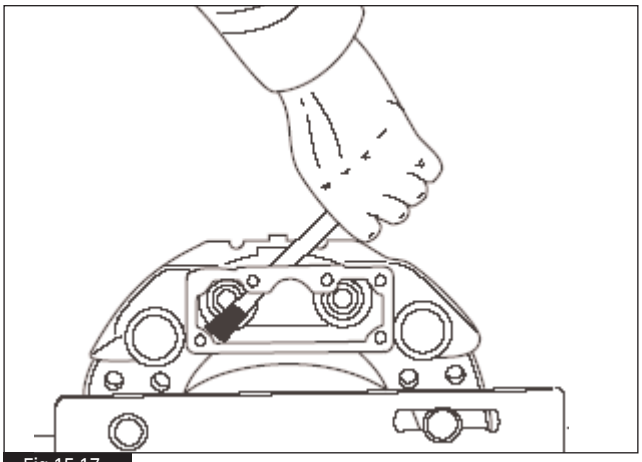

Fig 15.17

Apply lubricant grease to the lower needle roller bearing, taking care not to allow the loose needle rollers to become displaced.

Thoroughly apply lubricant grease MBG 1003 to all surfaces of the adjuster gear segment and position it within the housing, supporting it against the upper edge of the roller bearing seat.

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

15 Actuator Block Assembly & Thrust Plate Replacement

Install adjuster block within caliper body, making sure that threaded hole (for adjuster gear assembly fixing screw) is uppermost. At this stage carefully slide the excluders over the piston heads without rotating the pistons (Fig 15.18). Make sure that the collar of each excluder seal is seated in the groove at the end of each piston.

NOTE: During above steps avoid rotating pistons,which would change pin seat locations and modify previously set length.

Position thrust plate with its two pins and insert them in their seats on end of actuator pistons (Fig 15.19).

Apply thread locking compound Loctite 648 to the threads of the two new socket head screws. Screw the screws into the pistons until the thrust plate is lightly held against them. Specified torque tightening shall be carried out after thrust plate has been aligned.

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

Apply lubricant grease MBG 1003 to all surfaces of eccentric shaft. Open up and position roller bearing in seat on eccentric shaft and thoroughly lubricate rollers. If the eccentric shaft has a grease nipple follow the reassembly instructions detailed in Section 13 Eccentric Shaft Replacement.

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

Insert the eccentric by passing it through the block and the adjuster gear segment (Fig 15.20).

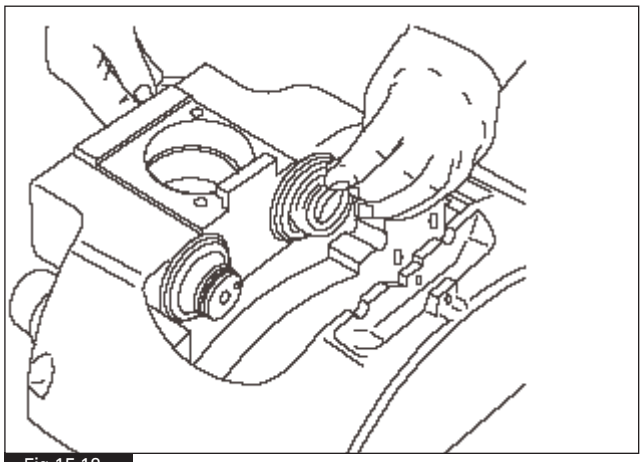

Fig 15.18

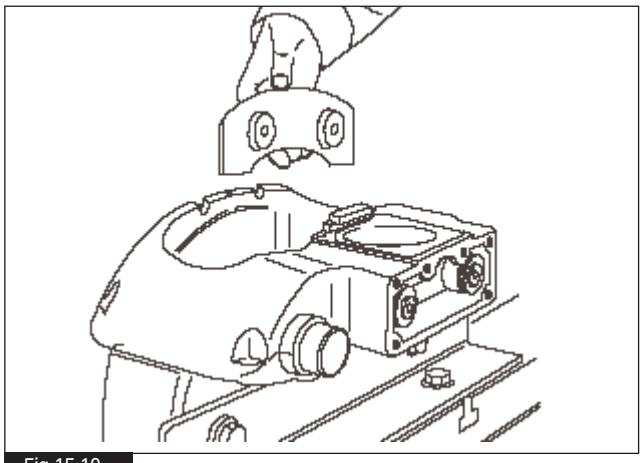

Fig 15.19

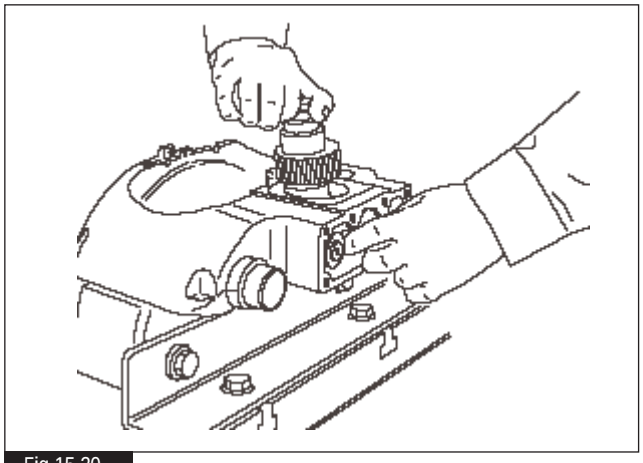

Fig 15.20

15 Actuator Block Assembly & Thrust Plate Replacement

Assembly is correct when the Eccentric Shaft tongues E are fully engaged in the Adjuster Gear Segment "cut outs" F. (Figs. 15.21 & 15.22)

Failure to fully engage may be due to a displaced needle roller in the lower shaft bearing. Check that parts are correctly engaged by ensuring that the adjuster gear segment rotates together with the eccentric shaft.

Position the stabiliser bar on the caliper.

Thoroughly apply lubricant grease MBG 1003 to needle roller bearing in the cover plate, taking care not to allow needle rollers to become displaced.

Fill grooves between cover plate seal lips with grease.

Apply sealant MBG 1002 on both sides of new seal (Fig 15.23). Position seal and install cover plate securing it with two new screws (with thread locking compound previously applied) and tighten to a torque of 35 Nm.

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

Refit adjuster components and end plate as described in Section 14 Adjuster Gear Train Replacement.

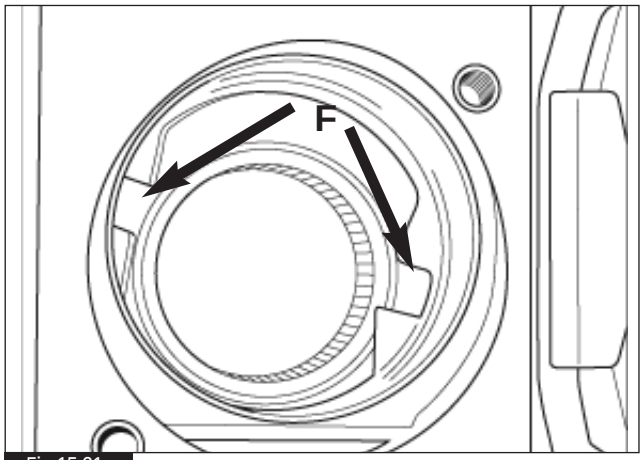

Fig 15.21

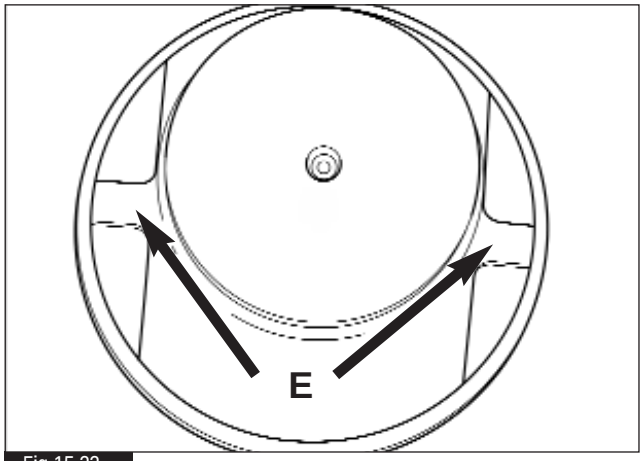

Fig 15.22

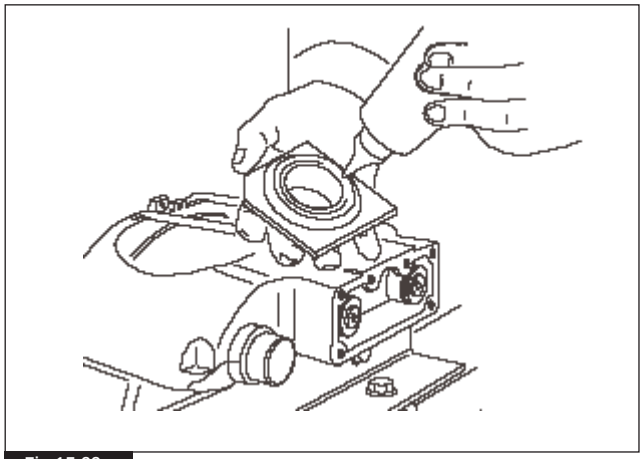
Fig 15.23

15 Actuator Block Assembly & Thrust Plate Replacement

Where applicable, position a new dust shield A onto the hexagonal section of the eccentric shaft (Fig. 15.24)

Refit the lever. Ensure the marks on the lever and eccentric shaft are aligned, thus ensuring correct positioning of the lever on the eccentric shaft (Fig 15.25). Press the lever onto the eccentric shaft until the dust shield is trapped on the shoulder of the shaft.

Fit the new lever clamping screw and, where applicable, nut. Tighten to a torque of 30 Nm.

Offer the air actuator to the housing assembly ensuring correct port orientation and the mounting faces are clean (Fig 15.26). Initially tighten the 2 nuts to a pre-torque of 80 -100 Nm, (this ensures the actuator does not distort). Apply a final torque of 180 - 210 Nm

Install clevis pin in the push rod and lever, and lock with new split pin.

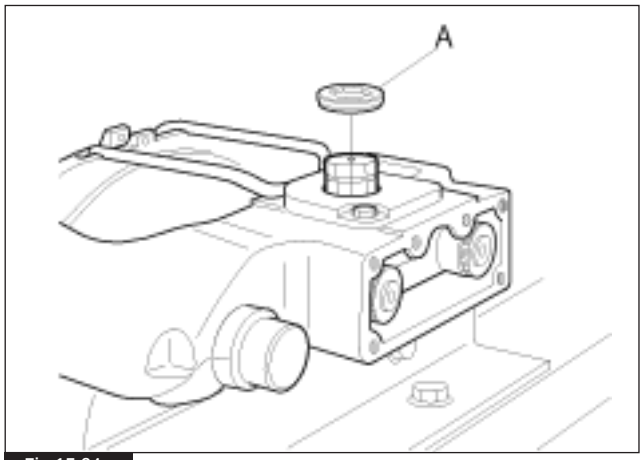

Fig 15.24

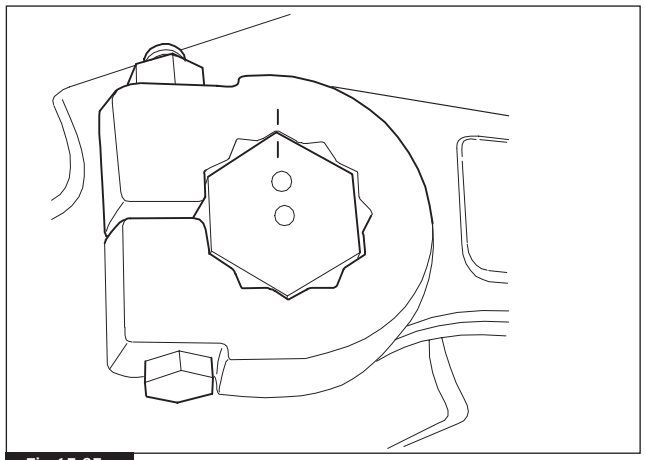
Fig 15.25

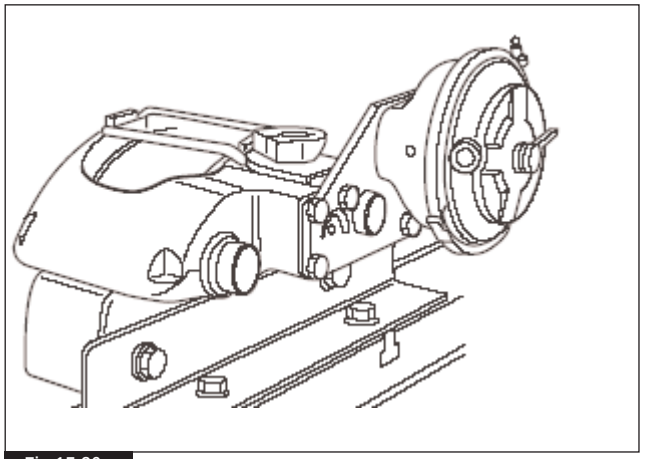
Fig 15.26

15 Actuator Block Assembly & Thrust Plate Replacement

Thrust Plate Centering in the Saddle

Install metal block (Fig 15.27) to check parallelism between thrust plate and opposite housing reaction surface. Push the thrust plate against metal parallelism block by manually rotating adjusting system. Use 6 mm Hex wrench through adjusting hole on end plate.

Model	Tool
DX195	DXT14
DX225	DXT13
DX225/21	DXT16

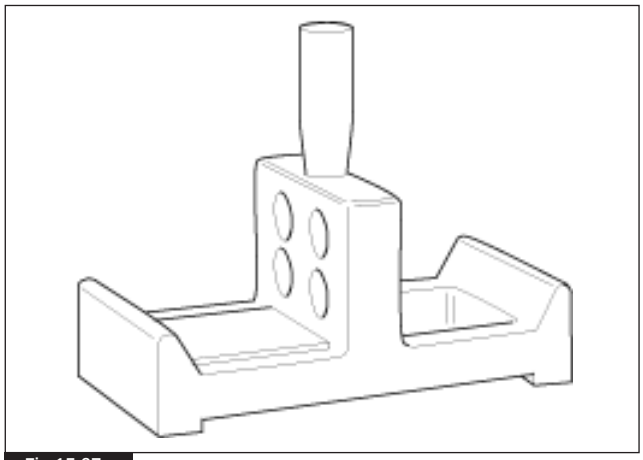

Fig 15.27

Due to the eccentric actuating system the thrust plate should be positioned on a longitudinal axis with respect to the two saddle vertical axes which support the inner pad during braking.

Positioning is carried out with the lever in rest position and air chamber mounted. A 0.1mm feeler gauge should be placed between the saddle's vertical support face and the thrust plate rim in order to manually support it against the shim (Fig 15.28).

NOTE: The 0.1 mm shim should be placed on the left, looking from air actuator to brake, if actuation is counterclockwise or on the right if actuation is clockwise. As a further check insert a 0.5 mm shim at the opposite end in order to check correct thrust plate positioning.

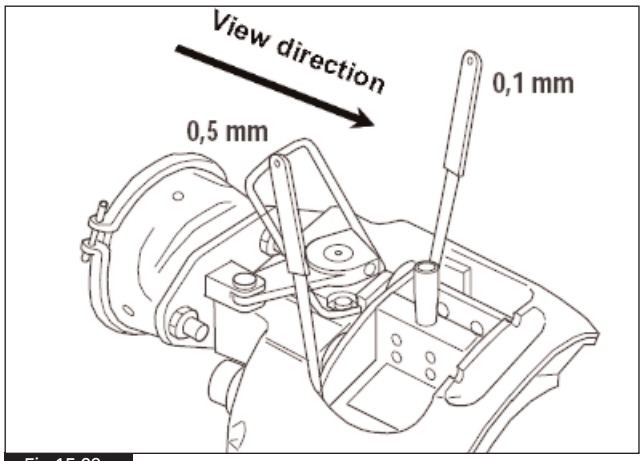

Fig 15.28

Tighten one of two piston screws just enough to keep thrust plate in the calibrated position (Fig 15.29).

Remove feeler gauges and parallelism block, de-adjusting the brake slightly.

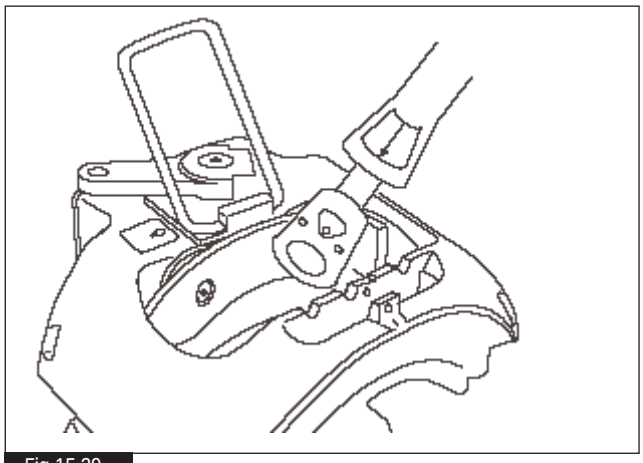

Fig 15.29

Tighten piston screws to a final torque of 85 Nm

Model	Torque (Nm)
DX225 DX195 DX225/21	85

Refit the brake assembly as described in Section 5 Brake Replacement.

Reconnect the air line to the air chamber as described in manufacturers instructions.

Refit the brake pads as described in Section 3 Pad Replacement.

Charge the air system and wind in the spring brake retraction screw (where applicable). Apply the brakes 10 times to settle the pads and allow the auto adjuster to set the correct running clearance.

Check that the rotor is free to rotate.

Refit the road wheels, remove the axle stands and lower the vehicle to the ground.

Road test.

Slide Pin, Bush & Seal Replacement

16

16 Slide Pin, Bush & Seal 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 excluders fitted to the tappet heads, and where applicable, eccentric shaft 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.

Dismantling

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

Remove Clevis Pin connecting the air actuator (rotation chamber) pushrod to the brake actuating lever.

Remove the air chamber from the brake as described in Section 5 Brake Replacement. Support under the vehicle wheel arch in a position which does not cause undue strain on the connected air pipe.

Remove the brake pads as described in Section 3 Pad Replacement.

Cleaning and inspection

Worn brake pads must be replaced if the friction material level has worn to 3mm

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

It is advisable at this stage to carry out cleaning and examination of the brake and rotor as described in Section 2 Operational checks.

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. Clean the 8 pad support plates in the saddle with a wire brush removing any build-up of debris or rust. This allows the new pads to be correctly seated in position

Remove the brake assembly as described in Section 5 Brake Replacement.

To replace the slide pin arrangement, it will be necessary to remove the slide pin screws. As there are at a very high torques used, the mounting device should be clamped onto a sturdy workbench. (Service Tool DXT 17)

Using a hammer and suitable drift, knock out and discard the 2 Slide Pin Covers A (Fig. 16.1)

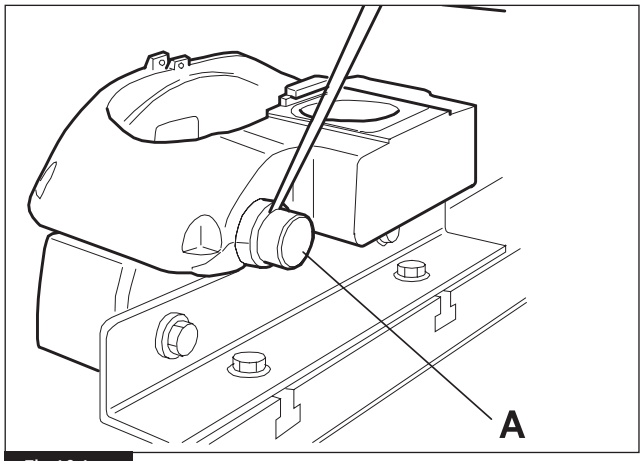

Fig 16.1

16 Slide Pin, Bush & Seal Replacement

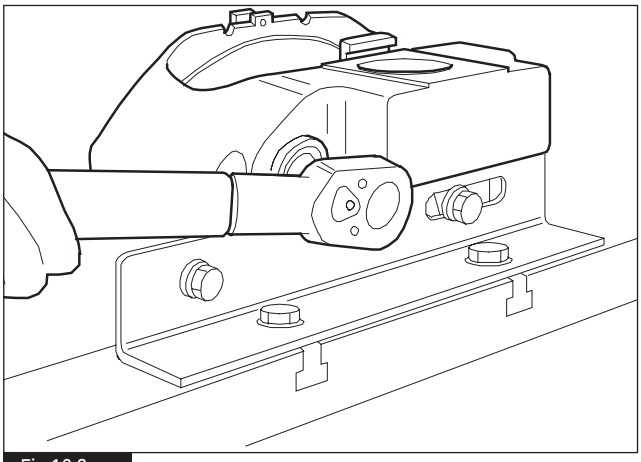

Fig 16.2

Remove and discard the 2 Slide Pin Screws. Due to the high tightening torque, use wrench with a suitable adaptor or extension. (Fig. 16.2)

NOTE: Slide Pin Screws may be different in length. Make a note or mark the brake body in order to identify the correct screw positions. The Slide Pins are also different (slight difference on the outside diameter) and counter bore different depth to accommodate the different length screws. (Fig. 16.3)

Remove the brake body from the saddle.

Remove the 2 Slide Pins from the brake and discard.

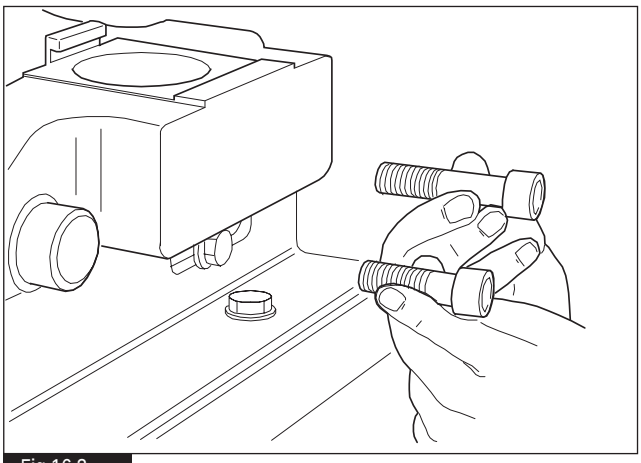

Fig 16.3

NOTE :Ensure to MARK the respective positions of the 2 slide pins and screws i.e. Long and short

Remove and discard the two Slide Pin Excluder seals from the brake. (Fig. 16.4)

Press or tap out the old bushes using the correct ArvinMeritor service tool detailed below. (Fig. 16.5)

Brake type	Service Tool
DX195	DXT 02
DX225	DXT 01
DX225/21	DXT 02

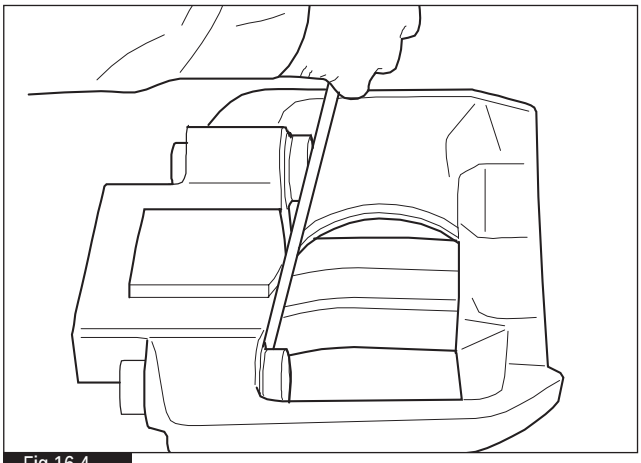

Fig 16.4

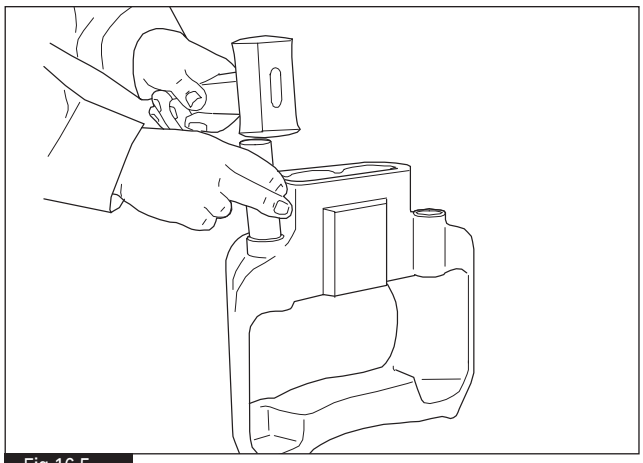

Fig 16.5

16 Slide Pin, Bush & Seal Replacement

Re-assembly

Clean the housing and remove all traces of old sealant from both ends of the slide pin bush bores. Fit the new Slide Pin Bush onto the correct ArvinMeritor service tool listed below and carefully locate in the mouth of the bore of the housing. Use a press to press the bush in until the shoulder of the tool contacts the housing.
Repeat above for the other housing slide pin bore.

Brake Type	Service Tools
DX195	DXT 05
DX225	DXT 04
DX225/21	DXT 05

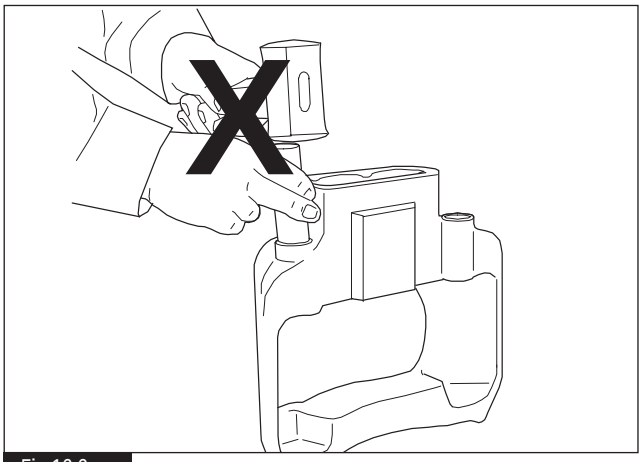

Fig 16.6

CAUTION Do not try to hammer in bushes as this could damage the edge of the bush and prevent the fitment of the new slide pin (fig 16.6).

Check the dimension (1.70mm) as shown in Fig 16.7. The bush must be above the inner shoulder of bore by the dimension indicated.

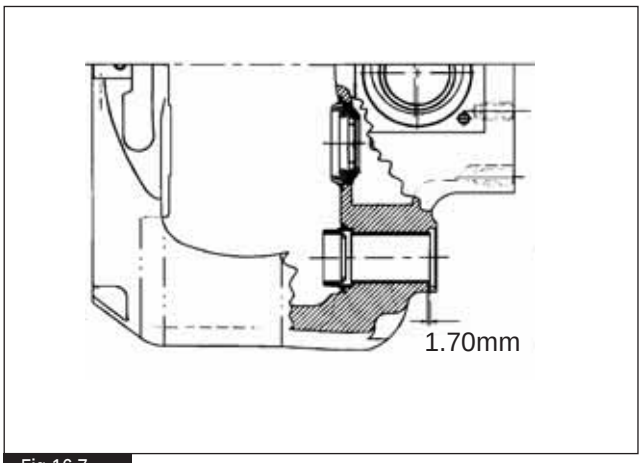

Fig 16.7

Fit new Slide Pin Excluders seals. Before re-assembly, apply a sealant (MBG 1002) on the outside diameter of the metal ring insert. (Fig. 16.8)

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

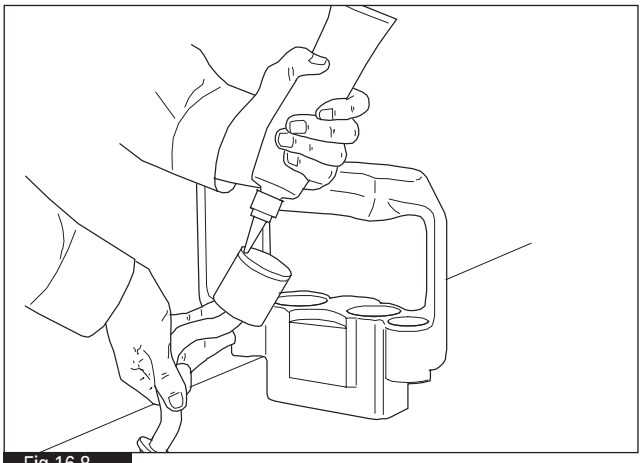

Fig 16.8

16 Slide Pin, Bush & Seal Replacement

Tap into position with the correct service tool detailed below (Fig. 16.9).

Brake Type	Service Tool
DX195	DXT 10
DX225	DXT 09
DX225/21	DXT 10

NOTE: it may be necessary to wind out (adjust) brake in order to gain access with the service tool behind the "thrust plate". With the brake adjusted, it is possible to move the thrust plate to gain access with the tool.

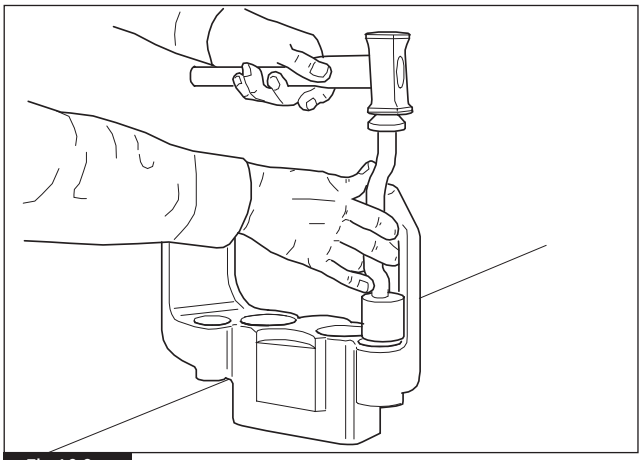
Fig 16.9

WARNING do not release thrust plate fixing screws to gain access.

When inserted ensure that the excluder metal ring is fully home and flush with the housing.

Fit new Slide Pins into the bushes, applying lubricant (MBG 1004) on to the outside surface on the pins and within the bush in the brake body.

NOTE: The Slide Pin with the short screw (and outer diameter slightly oversized) should be installed on the right hand side (looking at the brake from the end plate) on brakes with clockwise lever actuation, the opposite applies for brakes with counter clockwise lever actuation.

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

Position the collar of the rubber seal in the appropriate slot on the slide pin and ensure the excluder is correctly located. (Fig. 16.10)

WARNING Clean any traces of thread tightening compound from all inner threads of brake components. Use only new screws during maintenance. The use of old screws is very dangerous and can seriously affect brake performance.

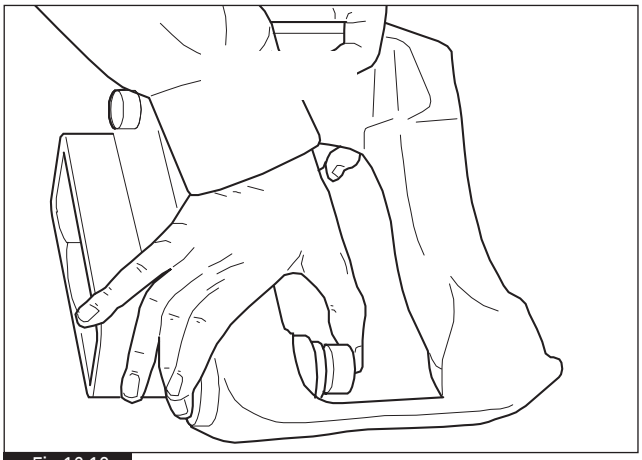
Fig 16.10

16 Slide Pin, Bush & Seal Replacement

For ease of assembly, remove saddle from the bench mounting device, offer the saddle to the brake body and align the slide pins with the corresponding seats in the saddle. Insert the new Slide Pin Screws, with the pre-applied thread locking compound and hand tighten. Refit assembly to the bench mounting device and finally tighten the screws to the specified torque - (Fig. 16.11)

see table below.

DX 195 - 340 Nm +/- 20 Nm

DX 225 - 500 Nm +/- 25 Nm

DX 225/21 - 340 Nm +/- 20 Nm

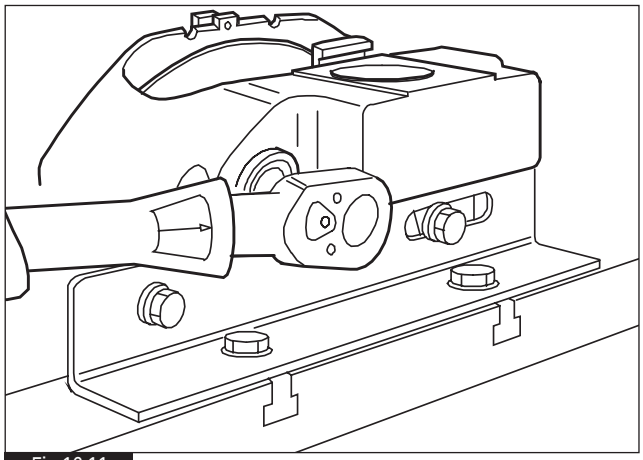

Fig 16.11

After torque tightening the locking screws, ensure that the brake slides freely on the slide pins. Install new slide pin caps. Before reassemble, apply a small bead of sealant (MBG 1002) to the edge of the new Slide Pin Cap. Press or tap the end caps into position using the ArvinMeritor service tool detailed below (Fig. 16.12)

Brake Type	Service Tool
DX195	DXT 12
DX225	DXT 12
DX225/21	DXT 12

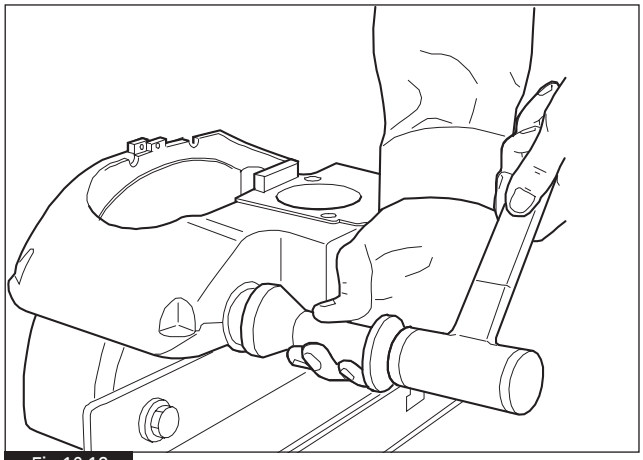

Fig 16.12

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

Ensure that the caps are fully located. Refit brake to the axle as described in Section 5 Brake Replacement.

Refit the air chambers described in Section 5 Brake Replacement.

Refit the brake pads as described in Section 3 Pad Replacement.

Charge the air system and wind in the spring brake retraction screw (where applicable).

Apply the brakes 10 times to settle the pads and allow the auto adjuster to set the correct running clearance. Check that the rotor is free to rotate.

Refit the road wheels, remove the axle stands and lower the vehicle to the ground.

Road test.

Rotor Wear Conditions for Rework or Replacement

17

17 Rotor Wear Conditions for Rework or Replacement

This document explains safe working practices for the limitations of a rotor life for the Meritor DX 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	7
Carrier Rotor Gap	49.5
Minimum Friction Material Thickness	3

New Rotor Condition - Fig 17.1

The rotor nominal maximum thickness (new condition) is 45mm.

The rotor gap between the carrier abutments of the brake assembly is 49.5mm nominally. Therefore, if the rotor is central to the carrier abutments an equal clearance of 2.25mm 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.

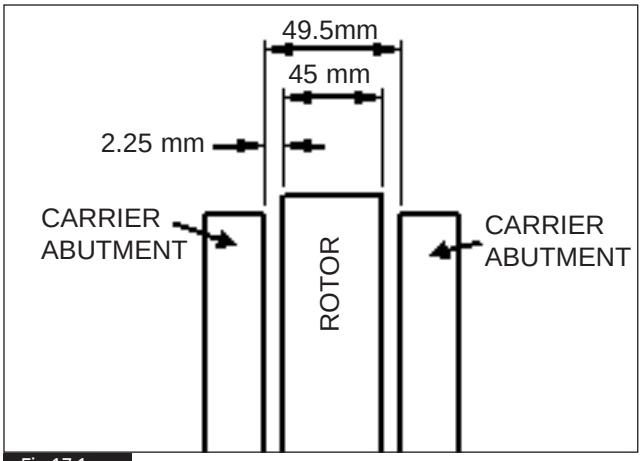

Fig 17.1

Maximum permissible Rotor Wear - Fig 17.2

The rotor is permitted to wear to a minimum thickness of 39mm provided that there a maximum wear of no more than 5.25mm off any one rotor face. When equal wear is achieved on both sides of the rotor, the rotor maintains a central position in the carrier abutments.

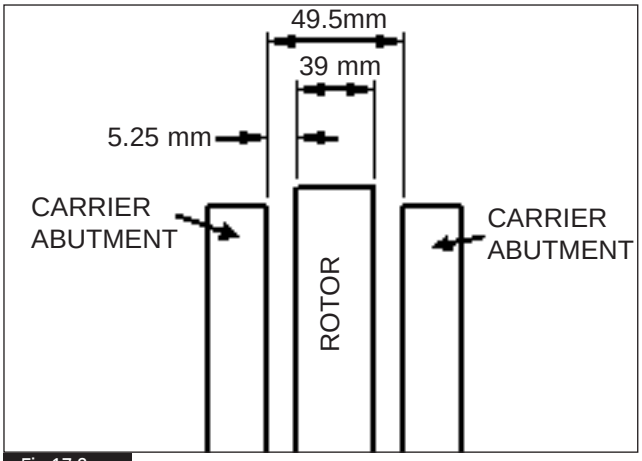

Fig 17.2

Uneven Rotor Wear - Fig 17.3

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 5.25mm.

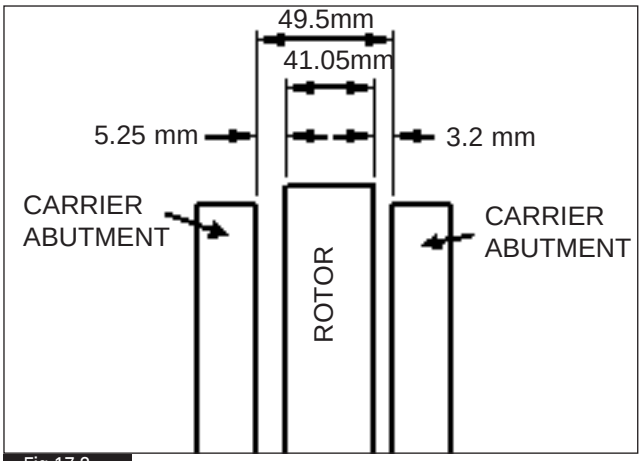

Fig 17.3

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.

17 Rotor Wear Conditions for Rework or Replacement

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 ArvinMeritor cannot be held responsible for operator neglect.

Servicing & Maintenance

18

18 Servicing & Maintenance

Maintenance Intervals

Although there is no routine maintenance of the brake assembly required, it is important the following inspections are carried out at the periods specified, or those detailed in the vehicle or trailer manufacturer's manual.

Service intervals

Every 3 months or 20000 km.
It is recommended at this interval, or at an interval deemed appropriate by the operator, the eccentric shaft is regreased with 3 applications of recommended ArvinMeritor Grease MBG 1006 grease from a standard hand held grease gun.

It not recommended that an automatic lubrication system if fitted to the grease nipple.

A visual inspection of pad life should be made. 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.

Inspect the slide pin and actuating piston seal excluders and ensure they are undamaged and securely located. If any of the excluders are detached or damaged the relevant part of the brake should be dismantled and the components examined for corrosion and damage. If there is any doubt in the suitability for further service, replace/rectify in accordance with the instructions of this manual or the vehicle/trailer manufacturer's instructions.

Every 12 months or at the vehicle / trailer manufacturer's recommendations.
Remove brake pads as described in Section 3 Pad Replacement. Inspect the slide pin and actuating piston seal excluders and ensure they are undamaged and securely located. If any of the excluders are detached or damaged the relevant part of the brake should be dismantled and the components examined for corrosion and damage. Replace/rectify in accordance with the vehicle /trailer manufacturer's instructions.

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.

Check the housing assembly slides easily on the slide pins secured to the saddle. If the housing does not slide easily, remove from the saddle as described in Section 16 Slide Pin & Bushing Replacement.

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

Check the slide pin bush for wear in line with instructions in Section 2 Operational checks.

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

Check the brake rotor for signs of heavy grooving; cracking or corrosion as described in Section 2 Operational checks, and the thickness dimension are in accordance with Section 17 Rotor Wear Conditions, or the recommendations of the manual of the vehicle/trailer manufacturer's recommendations.

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.

NOTE: These service intervals are meant as a guide, the frequency should be tailored to suit the environmental conditions of the brake assembly and hence to the vehicle/trailer operating conditions, so therefore it is up to the operator to determine the most appropriate service intervals with technical support from ArvinMeritor if necessary.

These service intervals are the maximum recommended times under normal operating conditions. Extreme temperatures or adverse conditions (e.g. dusty or severe environments, frequent uphill driving, very low temperatures) will require more frequent servicing. It is the responsibility of the vehicle operator to schedule these intervals, with technical support from ArvinMeritor if necessary.
In some cases, it is possible to carry out operations with brake unit mounted on vehicle. However, ArvinMeritor recommends that all operations (with the exception of pad replacement and operating tests) be carried out with the brake unit removed from vehicle and installed on bench. This promotes safer working conditions and better results.

18 Servicing & Maintenance

Maintenance operations

In order to ensure reliable and efficient brake operation, recommended maintenance intervals, lubricants and correct procedures should be followed carefully.

Recommended lubricants

ArvinMeritor recommends the use of two lubricating greases (available as spare parts).

Code Use

MBG 1003 (sachet of grease) or MBT 1006 (tin of grease) Use on all actuation and adjustment system components

MBG 1004 (lubricating oil) Use only for slide pin plain bearings (bushings)

WARNING: Only original ArvinMeritor spare parts should be used. Use of non-recommended lubricants shall adversely affect performance and service life. Use of non-original parts could seriously affect brake performance.

Tightening Torques (Nm)

Part Ref (Figs 1.1 & 1.2)	Description	DX 195	DX 225	DX 225/21
32	Adjuster device screw	10	10	10
27	End plate screws (M12 Socket head)	100	100	100
31	End plate screws (M12 Hex head)	130	130	130
46	Piston screws	85	85	85
12-14	Lever clamp screw	30	30	30
37	Slide pin locking screws	340	500	340
9	Cover plate screws	35	35	35

Service Diagnosis

19

19 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

19 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

19 Service Diagnosis

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

Service Tools

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20 Service Tools

DXT 01 Bush Removal Tool (DX225)

DXT 02 Bush Removal Tool (DX195) (DX225/21)

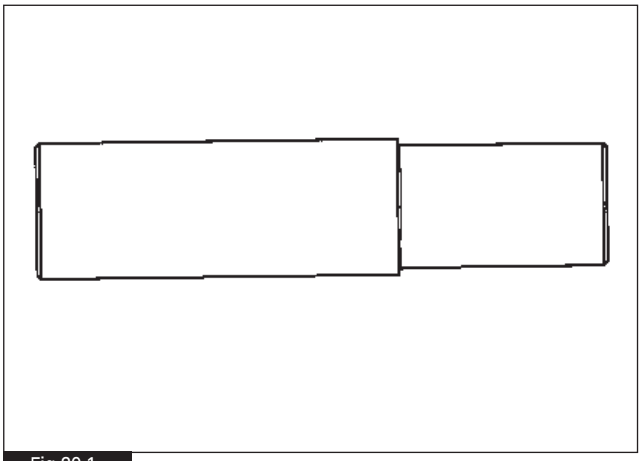

Fig 20.1

DXT 04 Bush Insertion Tool (DX225)

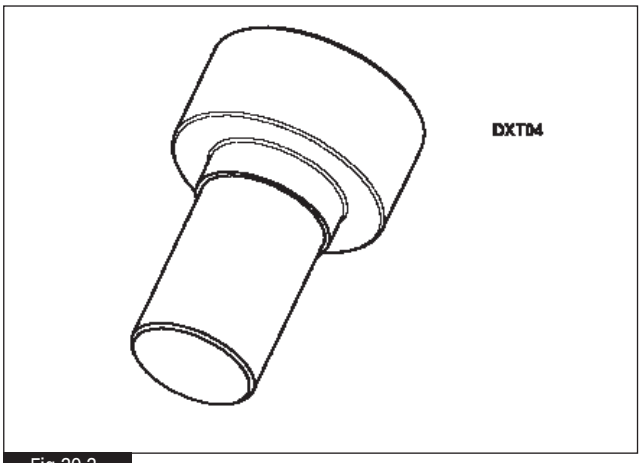

Fig 20.2

DXT 05 Bush Insertion Tool (DX195) (DX225/21)

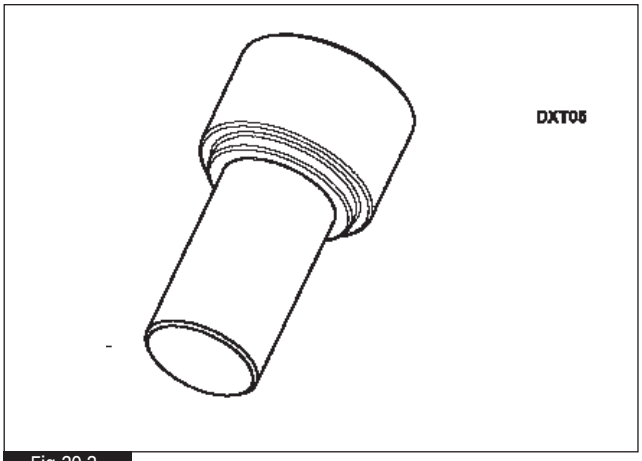

Fig 20.3

DXT 07 Piston Excluder Insertion Tool (DX225) (DX195) DX225/21)

DXT 09 Slide Pin Excluder Insertion Tool (DX225)

DXT 10 Slide Pin Excluder Insertion Tool (DX195) (DX225/21)

DXT 12 Slide Pin Cover Insertion Tool (DX 225) (DX195) (DX225/21)

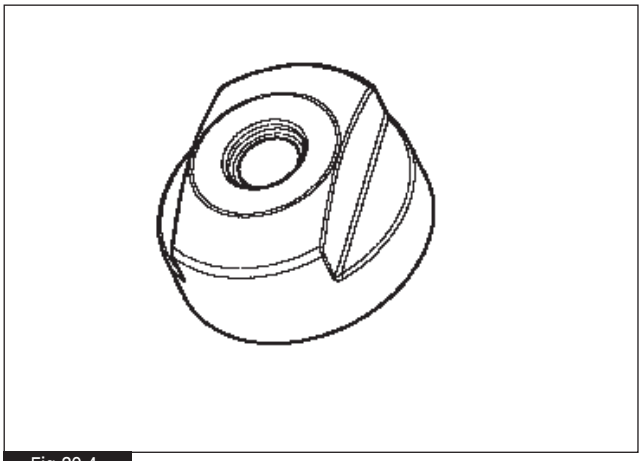

Fig 20.4

20 Service Tools

DXT 13 Metal Parallelism Block (DX225)

DXT 14 Metal Parallelism Block (DX195)

DXT 16 Metal Parallelism Block (DX225/21)

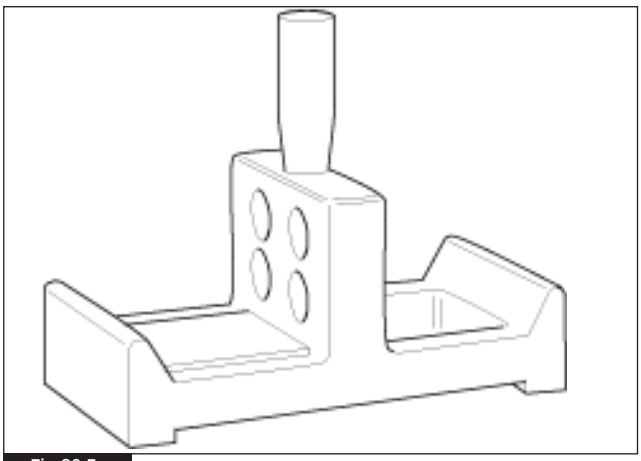

Fig 20.5

DXT 17 Brake Support [universal - All DX)

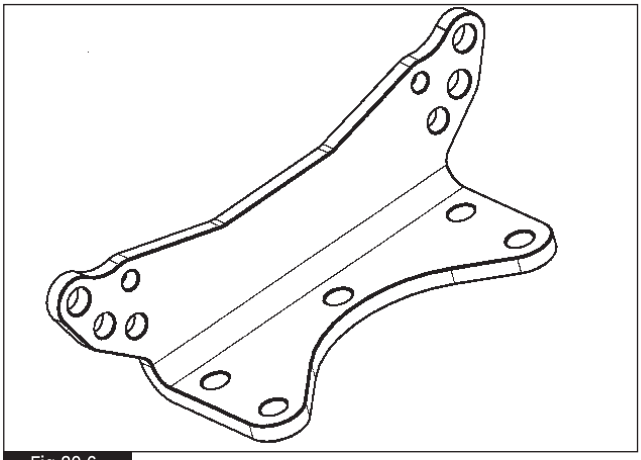

Fig 20.6

DXT 19 Universal Handle Tool (All DX)

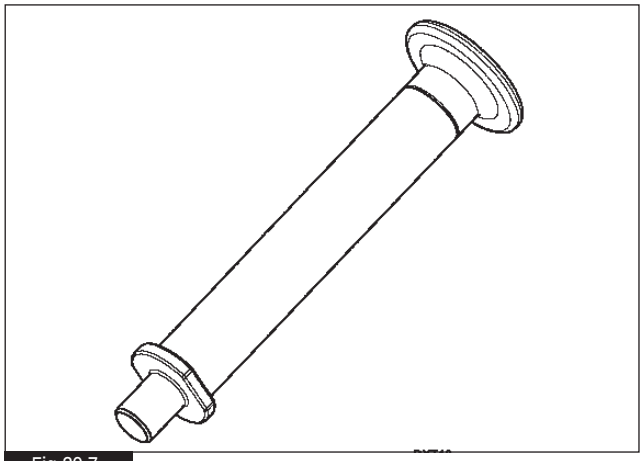

Fig 20.7

DXT 20 Universal Shaped Handle Tool (All DX)

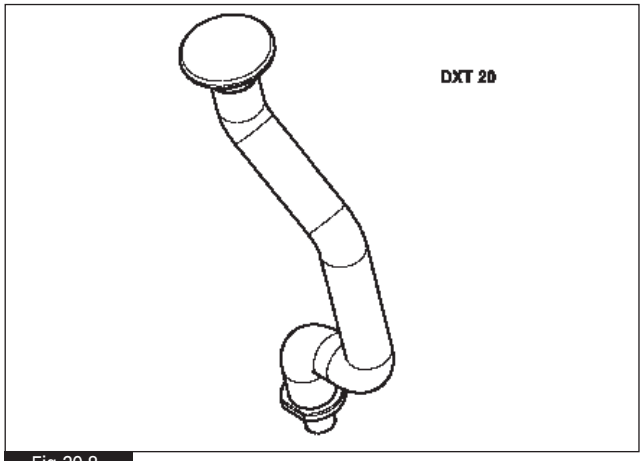

Fig 20.8

20 Service Tools

DXT 23 Needle bearing insertion Tool

(DX 225) (DX195) (DX225/21)

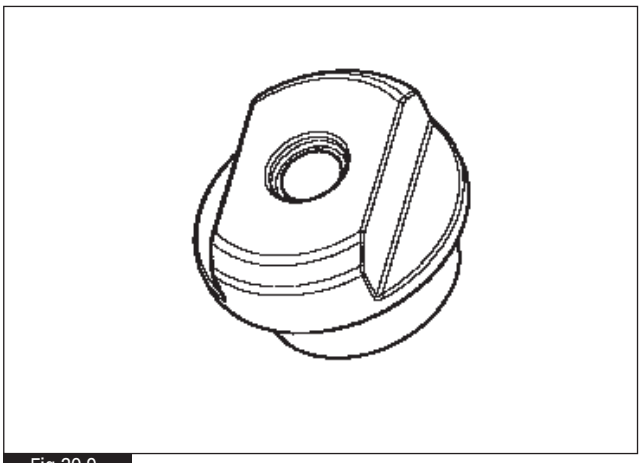

Fig 20.9

MST 1018 Frame Lift Adaptor (All DX)

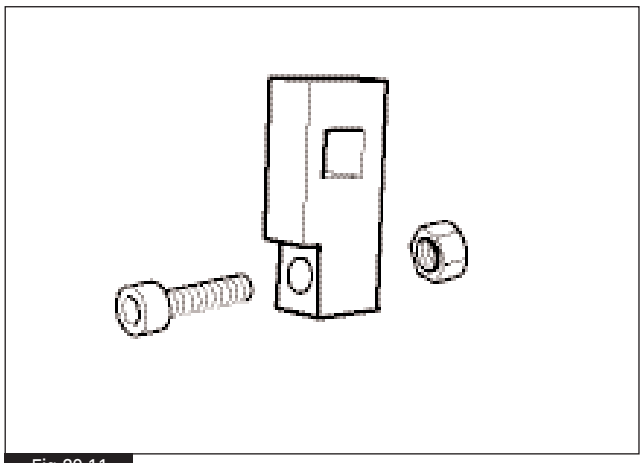

Fig 20.11

Insert - Universal Tool (All DX)

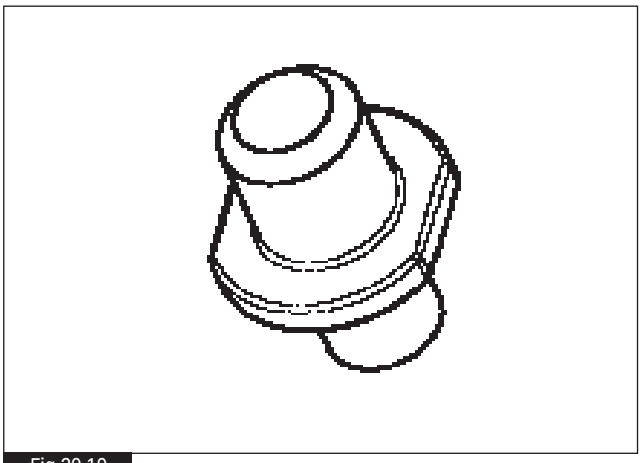

Fig 20.10

ArvinMeritor Heavy Vehicle Braking Systems
Grange Road, Cwmbran
South Wales NP44 3XU - U.K.
Tel.: +44 (0) 1633 834238
Fax: +44 (0) 1633 834191
www.arvinmeritor.com

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