



## Section G

# Brakes

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# Section G - Brakes

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# Technical Data

## Service Brakes

⇒ [Table 1.](#) [\(G-1\)](#). Hydraulically operated service brakes in front axle only.

**Table 1.**

<b>Service Brakes:</b>	
Type	Single circuit, oil-immersed multi-plate disc.
Actuation	Hydraulic
Location	Front axle, centre mounted (2 brake packs).
<b>Master Cylinder:</b>	
Type	Master cylinder
No. of Cylinders	1
Stroke	35 mm (1.38 in)

## Park Brake

⇒ [Table 2.](#) ([PDF G-2](#)). Independent cable operated parking brake in the drive to the front axle.

**Table 2.**

<b>Park Brake:</b>	
Type	Disc brake, manually adjusted caliper.
Actuation	Cable operated.
Location	Mounted on the gearbox.
Disc diameter	279.4 mm (11 in)

# Basic Operation

## General Description

**Service Brakes:** The service brakes act on the front axle half shafts of all machines. The brakes are oil immersed, multi-disc types which are operated hydraulically by a single pedal and master cylinder arrangement.

The brake cylinder reservoir is situated in front of the instrument panel inside the cab.

Although the machines only have brakes in the front axle (2-wheel braking), 4-wheel braking is achieved because the transmission is permanently in 4-wheel drive. In this way all 4 wheels are effectively braked via the machine transmission.

**Park Brake:** The cable operated parking brake acts on a disc which is mounted on the gearbox output shaft to the front axle.

# Fault Finding

## Brake System

**Note:** The brakes generate a high temperature when operating, this means that the casing will be hot to touch, this condition is normal.

### Fault(s)

⇒ [Table 3. One or more brakes do not apply. \(Brake travel not excessive, brakes not pulling to one side\) \(□ G-4\)](#)

⇒ [Table 4. Pedal travel excessive \(but not touching floor\) \(□ G-4\)](#)

⇒ [Table 5. Pedal hard to operate. \(□ G-5\)](#)

⇒ [Table 6. Pedal touches floor under constant pressure - no fluid loss. \(□ G-5\)](#)

⇒ [Table 7. Pedal touches floor under constant pressure and fluid loss. \(□ G-5\)](#)

⇒ [Table 8. Poor braking \(not pulling to one side\). \(□ G-5\)](#)

⇒ [Table 9. Brakes not releasing \(□ G-5\)](#)

⇒ [Table 10. Poor braking when hot \(□ G-6\)](#)

⇒ [Table 11. Excessive brake noise in operation \(□ G-6\)](#)

⇒ [Table 12. Fluid loss when machine standing for instance - overnight \(□ G-7\)](#)

**Table 3. One or more brakes do not apply. (Brake travel not excessive, brakes not pulling to one side)**

Possible Cause	Action
1 Master cylinder fault.	Check master cylinder to identify fault area, service as required.
2 Friction/counter plate distortion.	Renew friction/counter plates - Both sides of relevant axle.

**Table 4. Pedal travel excessive (but not touching floor)**

Possible Cause	Action
3 Air in hydraulic system.	Check fluid reservoir level. Check for fluid/air leaks, rectify as required. Bleed the brake system.
4 Leak in hydraulic system.	Check for fluid loss at master cylinder and brake piston, all pipes and fittings for loose connections. Rectify as required. Top up brake reservoir and bleed the brake system.
5 Friction/counter plate distortion.	See Item 2.

**Table 5. Pedal hard to operate.**

Possible Cause	Action
6 Tightness at pedal pivot.	Inspect pedal pivot. Free-off/lubricate.
7 Fluid contamination/seal damage.	Flush system and renew all hydraulic seals. Bleed the brake system.
8 Misaligned push rod/pedal.	Check and rectify as required.
9 Kinked or crushed brake pipes.	Check/renew brake pipework.

**Table 6. Pedal touches floor under constant pressure - no fluid loss.**

Possible Cause	Action
10 Master cylinder fault.	See Item 1.
11 Friction/counter plate distortion.	See Item 2.
12 Air in hydraulic system.	See Item 3.

**Table 7. Pedal touches floor under constant pressure and fluid loss.**

Possible Cause	Action
13 External fluid leaks.	Visually check brake circuit for fluid loss, service as required. Top up brake reservoir and bleed the brake system.
14 Internal fluid leaks.	⇒ <a href="#">Brake Piston Seal Leakage ( G-10)</a> .

**Table 8. Poor braking (not pulling to one side).**

Possible Cause	Action
15 Friction plates worn beyond limits or distorted.	Renew friction/counter plates - Both sides of relevant axle.
16 Master cylinder fault.	See Item 1.
17 Annular piston fault.	See Item 24.
18 Incorrect/low axle oil.	Fill axle with correct type of oil.

**Table 9. Brakes not releasing**

Possible Cause	Action
19 Brake pedal spring fault.	Fit a new spring.
20 Master cylinder fault (plunger stuck in bore).	See Item 1.
21 Blocked hole in master cylinder reservoir cap.	Fit a new reservoir cap.

Possible Cause	Action
<b>22</b> Brake pedal free travel incorrect.	Adjust pedal free travel.
<b>23</b> Fluid contamination/seal damage.	Flush system and renew hydraulic seals. Refill with clean fluid and bleed the brake system.
<b>24</b> Annular brake piston(s) binding in axle.	<ul style="list-style-type: none"> <li>– Check that correct brake fluid has been used (incorrect fluid could swell the annular brake piston seals).</li> <li>– Check if annular brake piston seals in good condition.</li> <li>– Check that annular brake piston rotates freely in its housing with no seals fitted.</li> <li>– Check that the annular brake piston seal retracts the piston approximately 0.5 mm (0.020 in).</li> </ul>
<b>25</b> Kinked or crushed brake pipes.	Check and renew pipes as required.
<b>26</b> Friction/counter plates not free on splines and/or dowels.	Check friction/counter plates for free movement, renew if required - Both sides of relevant axle.

**Table 10. Poor braking when hot**

Possible Cause	Action
<b>27</b> Moisture in system vaporising when axle is hot.	Strip axle and clean annular piston to remove moisture. Remove master cylinder and check for corrosion, service as required. Flush system refill with clean fluid. Bleed the brake system.

**Table 11. Excessive brake noise in operation**

Possible Cause <sup>(1)</sup>	Action
<b>28</b> Deterioration of axle oil or wrong type of axle oil.	Change axle oil.
<b>29</b> Axle oil loss.	Refill axle with correct oil and check for leaks.
<b>30</b> Friction plates worn beyond limits.	Renew friction/counter plates - Both sides of relevant axle.
<b>31</b> Friction/counter plates in poor condition.	Check for distortion or surface pitting and/or roughness of friction/counter plates (annular grooving of counter plates is acceptable).

(1) *Due to the metal to metal contact of oil immersed brakes, limited noise can be heard which is consistent with this type of design - this is normal.*

**Table 12. Fluid loss when machine standing for instance - overnight**

Possible Cause <sup>(1)</sup>	Action
<b>32</b> Severe damage or slight cut/nick in the brake piston seal.	Check as described. → <a href="#">Brake Piston Seal Leakage (□ G-10)</a> . If necessary, strip axle and renew seal(s).
<b>33</b> External leakage through brake pipe connections, etc.	Check for and repair leaking connections.

(1) Confirm fault is as indicated by checking that the brake pedal does not touch the floor under constant pressure.

# Service Procedures

## Service Brakes

### Brake Light Switch - Adjustment

- 1 Select the starter key switch to the ON position, do not start the engine.
- 2 With the brake pedal in the return position, screw the switch **1-A** in fully until the body touches the brake lever **1-B**. Then screw out one full turn to ensure the brake pedal lever can only engage the switch plunger and not foul the body.
- 3 Torque tighten the locknuts **1-C** to 29 Nm (21 lbf ft).
- 4 Check that the brake lights come on when the brake pedal is depressed.

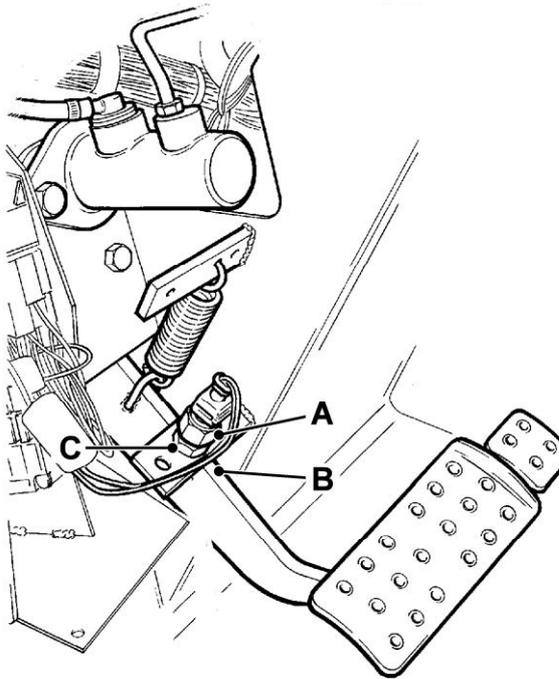


Fig 1.

### Bleeding

#### WARNING

Before proceeding with the bleeding procedure it is important to ensure that the park brake is engaged and that one pair of wheels is blocked on both sides.

BRAK-1-2

- 1 Fill the reservoir with correct fluid (see *Lubricants and Capacities*, Section 3) and ensure that throughout the bleeding procedure the level is not allowed to fall below the MINIMUM mark.

#### WARNING

Use of incorrect fluid will cause serious damage to the seals which could in turn cause brake failure.

BRAK-1-1

- 2 Attach a tube to the bleed screw **2-A**, ensuring that the free end of the tube is immersed in fluid in a suitable container.
- 3 Open the bleed screw and apply one rapid full stroke of the brake pedal followed by three rapid short strokes from the halfway pedal position. After the third short stroke, allow the pedal to return quickly to its stop.
- 4 Continue bleeding normally until all air is dispelled, closing the bleed screw with the pedal fully depressed.
- 5 Top up reservoir to the full mark.

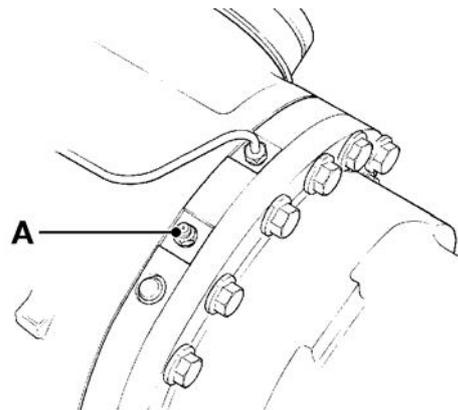


Fig 2. Front Axle

## Brake Piston Seal Leakage

The most common reason for internal piston seal leakage is a build-up of axle contamination as a result of excessive brake wear caused by extended service periods.

Two types of internal leakage can occur within the axle:

- Low Pressure Leaks - Seal damage, or scoring to seal component surfaces, caused by a build-up of metal particles.
- High Pressure Leaks - Mechanical leakage past a badly damaged or perished seal.

**Note:** The low pressure leak test should be performed first. Low pressure leaks are difficult to find using a high pressure test - seals and other components can distort and form a seal under pressure.

The following procedures explain how to check for low or high pressure leaks without the need to dismantle the axle first. The test must only be done when the axle is COLD.

### WARNING

**Before working on the brake system make sure the machine is on level ground and chock all four wheels.**

BRAK-1-4

### WARNING

**Do not drive the machine with any part of its brake system disconnected. When the following test has been completed reconnect all brake pipes and bleed the brake system using the recommended procedure.**

BRAK-2-1

- 1 Disconnect and cap the brake piston feed pipe at port **3-A**.
- 2 Completely remove pipe **3-B** and plug port **3-C**.
- 3 Fill both brake piston housings with JCB Light Hydraulic Fluid through ports **3-A** and **3-D**.

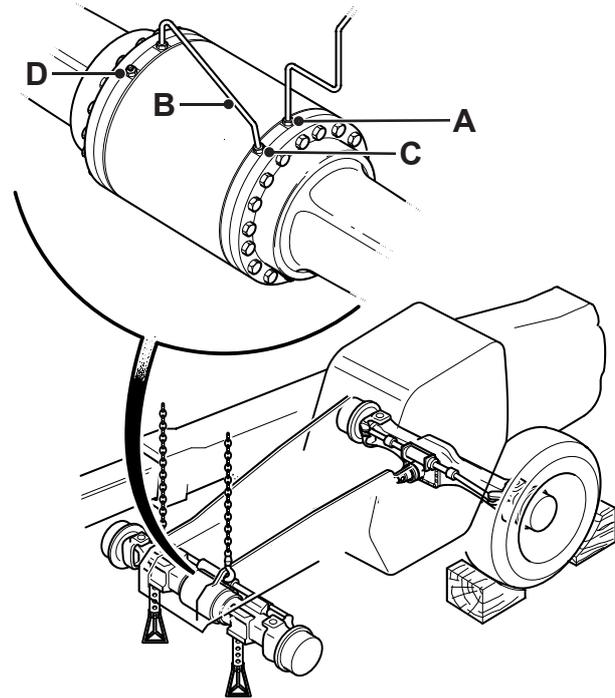


Fig 3.

#### 4 Test for a Low Pressure Leak:

- a Install an adaptor fitted with a piece of clear tube to the brake piston port **4-A**.

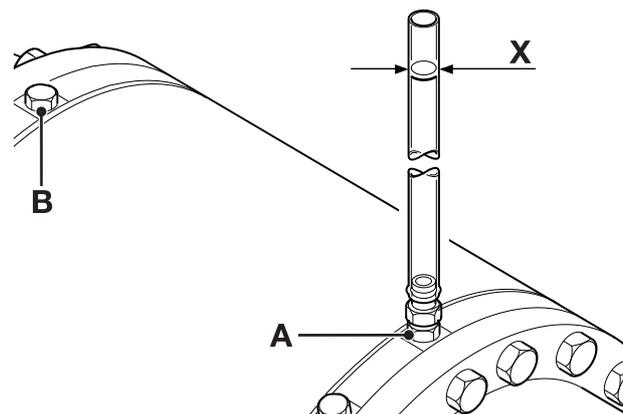


Fig 4.

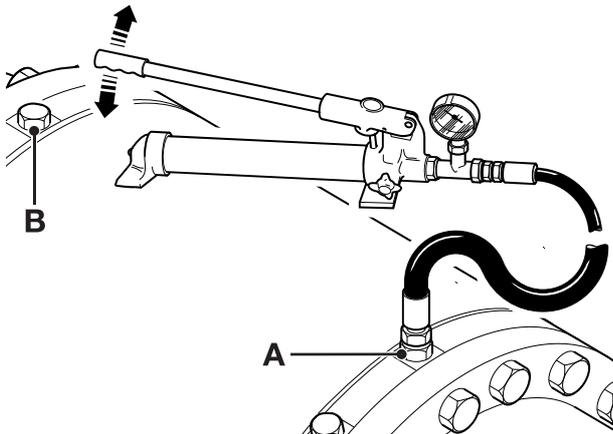
**Note:** The tube must be kept vertical during the test, use tape to attach the tube to the side of the machine.

- b** Fill the tube until approximately three quarters full with JCB Light Hydraulic Fluid.
- c** Using a suitable pen, mark the level line of the brake fluid **4-X** on the tube.
- d** After approximately 1/2 hour, check if the level has dropped below the original marked line. If it has, check the brake piston seal for slight nicks, cuts or generally for wear.
- e** Repeat steps a to d at port **4-B**.

**5** Test for a High Pressure Leak:

- a** Install a hand pump fitted with a 0 - 40 bar (0 - 600 lbf/in<sup>2</sup>) pressure gauge to brake piston port **5-A**.

**Note:** The hand pump must be filled with JCB Light Hydraulic Fluid. Do not exceed 69 bar (1000 lbf/in<sup>2</sup>).



**Fig 5.**

- b** Use the hand pump to generate a pressure in the brake piston housing.
- c** If the pressure falls off rapidly, or if no pressure reading can be obtained, the seal is severely damaged and needs replacing with a new one.
- d** Repeat steps a to c at port **5-B**.

**6** Re-instate the brake system:

Reconnect all brake pipes and bleed the brake system. → [Bleeding \(□ G-9\)](#).

## Axle Breather (Braked Axles) - Inspection

Breathers are fitted to axles to relieve pressure build up, due to braking and prolonged roading.

If breathers are not kept clear, seal leakage and brake problems can result due to pressure build up. Most axles are fitted with long stem breather type **6-A**.

Ensure there is adequate clearance around the breather and if it should be dislodged or removed, ensure it is refitted with hole **6-C** pointing outwards towards the wheel.

The breather is always fitted on the opposite side to the crownwheel (in less turbulent oil) avoiding oil seepage.

Plug **6-B** is fitted in the crownwheel side.

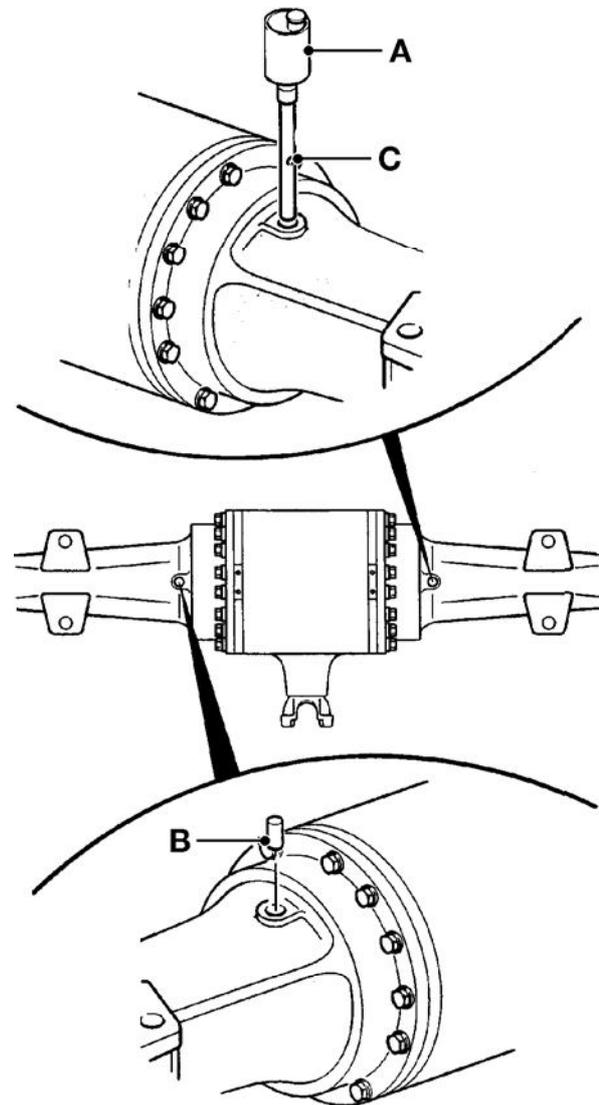


Fig 6.

## Park Brake

### Testing

**SAFETY NOTICE:** Ensure all routine health and safety precautions are observed before operating machines.

#### WARNING

Before testing the parking brake make sure the area around the machine is clear of people.

2-2-4-5

- 1 Enter the machine. Fasten your seat belt and park the machine on a level dry surface.
- 2 Fully apply the parking brake 7-A.
- 3 Start the engine and raise the attachments to the appropriate travelling position.
- 4 Select fourth gear, 7-B for synchro shuttle machines or 7-C for powershift machines.
- 5 Push down hard on foot brake pedal 7-D.
- 6 Select forward drive 7-E.

#### WARNING

If the machine starts to move during the following test, immediately apply the foot brake and reduce the engine speed.

2-2-5-1

Test the parking brake as follows:

- 7 Move the parking brake lever fractionally forward until the warning light 7-F is just extinguished.
- 8 Slowly release the foot brake pedal 7-D.
- 9 If the machine has not moved, use the accelerator pedal to gradually increase the engine speed to 1500 RPM. The machine should not move.
- 10 Do not do this test for longer than 20 seconds.
- 11 Reduce the engine speed to idle and select neutral 7-E.

- 12 Return the park brake lever 7-A to the fully on position from its partially applied position.
- 13 Lower attachments and stop the engine.
- 14 If the machine moved during this test, adjust the parking brake and repeat the test. See [Adjustment \(G-14\)](#).

If you have any queries concerning this test procedure or parking brake adjustment, consult your local JCB distributor.

#### WARNING

Do not use a machine with a faulty parking brake.

3-2-3-10

#### WARNING

Non approved modifications to drive ratios, machine weight or wheel and tyre sizes may adversely affect the performance of the parking brake.

3-2-3-11

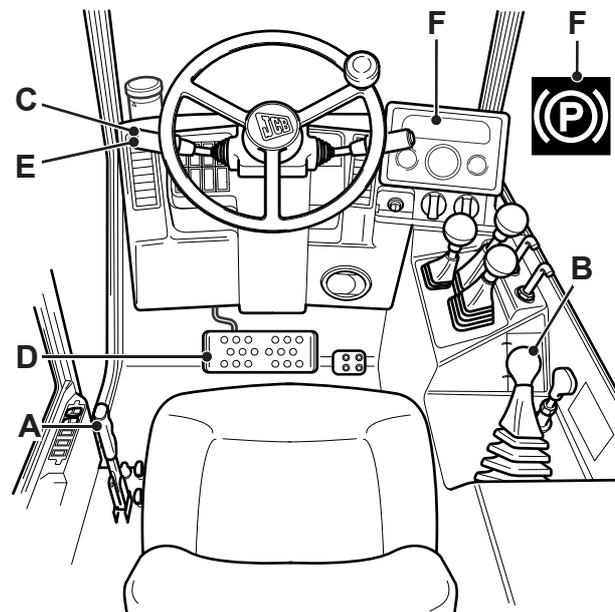


Fig 7.

### Adjustment

#### CAUTION

The parking brake must not be used to slow the machine from travelling speed, except in an emergency, otherwise the efficiency of the brake will be reduced. Whenever the parking brake has been used in an emergency, always renew both brake pads.

4-2-1-1\_2

#### WARNING

Before adjusting the parking brake, make sure that the machine is on level ground. Put chocks each side of all four wheels. Disconnect the battery so that the engine cannot be started. If you do not take these precautions the machine could run over you.

2-3-2-4

#### WARNING

Over adjustment of the parking brake could result in the parking brake not fully releasing.

0011

### Lever Adjustment

The parking brake should be fully engaged when the lever is vertical. The parking brake indicator light should illuminate when the brake is engaged with the forward and reverse lever away from neutral (starter switch at IGN).

- 1 Disengage the parking brake (lever horizontal).
- 2 Turn handle grip **8-E** clockwise, half a turn.
- 3 Test the parking brake, ⇒ [Testing \(□ G-13\)](#).

If the brake fails the test, repeat steps 1, 2 and 3. If there is no more adjustment and pin **8-F** is at the end of its travel adjust the cable at the caliper. ⇒ [Cable Adjustment \(□ G-15\)](#).

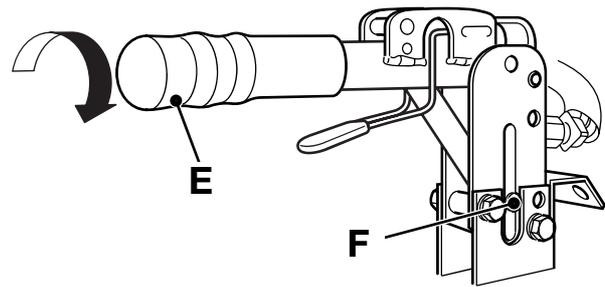


Fig 8.

#### Cable Adjustment

Adjust the cable at the caliper if there is insufficient adjustment at the parking brake lever.

If there is no adjustment at the lever or the caliper, change the brake pads. → [Renewing the Brake Pads \(□ G-17\)](#).

Always renew a worn or damaged cable.

- 1 Disengage the parking brake (lever horizontal).
- 2 Turn hand grip **9-E** anti-clockwise to centre the pin **9-F** in its slot.
- 3 Release the two locknuts at **9-G** and adjust the cable length as required.

**Note:** If a new cable is being fitted, position the threaded section of the cable with approximately four threads visible below the bottom adjusting nut.

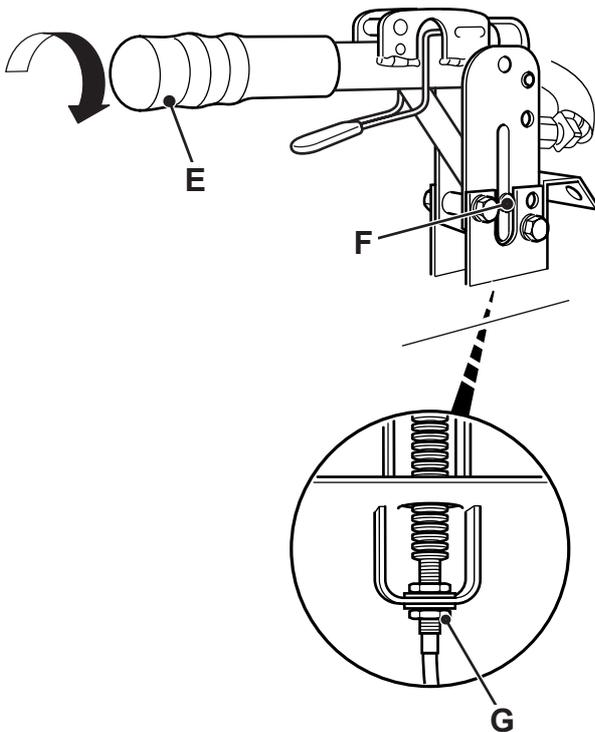


Fig 9.

- 4 Make sure there is adequate freedom of movement of operating lever **10-A** to ensure a positive brake

application, and that the lever returns to the rest position when the parking brake is released. The total clearance between the brake pad to brake disc should be 0.5 to 0.75 mm (0.02 to 0.3 in).

- 5 Test the parking brake. → [Testing \(□ G-13\)](#).

Make final adjustments at the park brake lever if the brake fails the test. → [Lever Adjustment \(□ G-14\)](#).

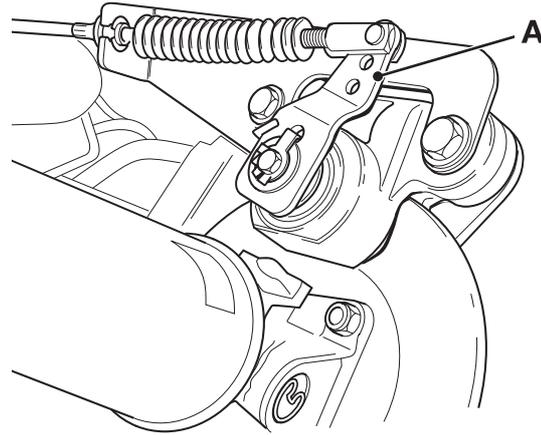


Fig 10.

## Switch Adjustment

- 1 Select the starter key switch to the ON position, do not start the engine.
- 2 Select either forward or reverse.
- 3 Raise the handbrake to the ON position.
- 4 Screw the switch **11-A** in a clockwise direction until the audible alarm sounds and the warning light is illuminated.
- 5 Screw the switch a further half turn and tighten locknuts **11-B**.
- 6 Release the parking brake, the audible alarm should cease and the warning light extinguish.
- 7 For adjustment of the parking brake, [→ Adjustment \(□ G-14\)](#).

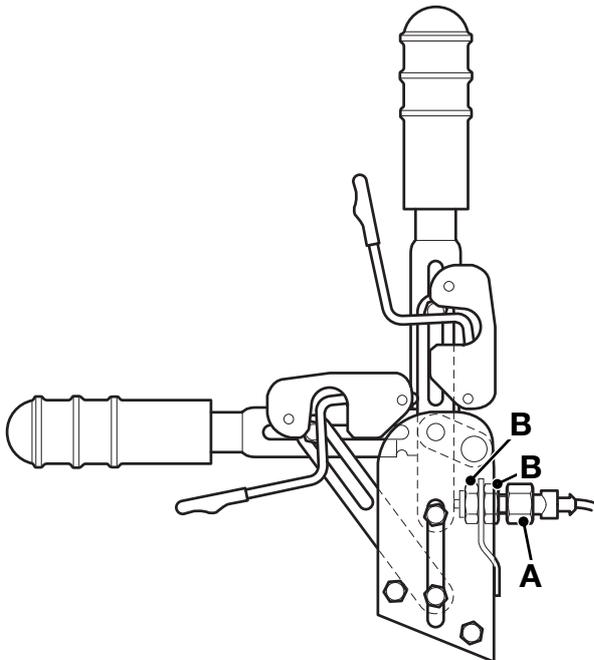


Fig 11.

Table 13. Torque Settings

Item	Nm	kgf m	lbf ft
11-B	29	3.0	21

### Renewing the Brake Pads

⇒ [Fig 12.](#) ( [□ G-18](#)).

#### WARNING

This is a safety critical installation. Do not attempt to do this procedure unless you are skilled and competent to do so.

Installation and mounting of the parking brake caliper requires tightening of the mounting bolts to a specific torque figure. Do not attempt to do this job unless you have the correct tools available.

0010

#### WARNING

Before working on the parking brake, park on level ground and put chocks on each side of all four wheels. Stop the engine and disconnect the battery so that the engine cannot be started. If you do not take these precautions the machine could run over you.

BRAK-8-8

#### WARNING

Brake pads generate dust which if inhaled, may endanger health. Wash off the caliper assemblies before commencing work. Clean hands thoroughly after work.

13-3-1-3

### Pad Removal

- 1 Remove the parking brake caliper from the transmission mounting bracket. ⇒ [Caliper - Removal and Replacement \(□ G-22\)](#).
- 2 Press carrier side pad **1** into housing **15** and remove. Ensure any residual silicone used for pad retention during assembly is removed.
- 3 Carefully lever pad **2** from the rotor inside the housing using a flat blade screwdriver. Take care to prevent damage to the plastic clip in the centre of the rotor **9** (there is no need to remove the rotor from the caliper).

### Pad Inspection

#### WARNING

Oil on the brake disc will reduce brake effectiveness. Keep oil away from the brake disc. Remove any oil from the disc with a suitable solvent. Read and understand the solvent manufacturer's safety instructions. If the pads are oily, new ones must be fitted.

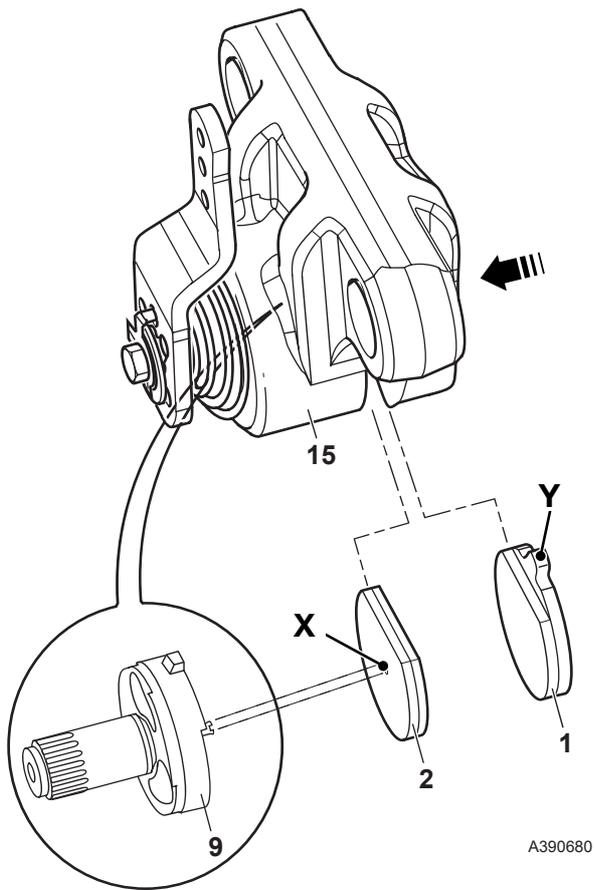
2-3-2-3\_3

- 1 The minimum thickness of the friction material on either pad is 1mm (0.04 in), but it is recommended new pads are fitted as pads worn to this limit may not be able to be adjusted.
- 2 Check the condition of the disc surface. Renew the disc if badly warped, pitted or worn.
- 3 Renew the cable if worn or damaged.

### Pad Replacement

- 1 Fit the pad **2** to the lever side of the caliper. Position the pad inside housing **15**. Locate the plastic clip in the centre of the rotor **9** into the hole **X**, and press the pad into place.
- 2 Make sure the plastic anti-rattle pad **Y** is correctly located. Fit the pad **1** to the carrier side of the caliper. Add a small amount of silicone sealant to the back outer edge of the backing plate to hold the pad in place within the housing.
- 3 Replace the caliper. ⇒ [Caliper - Removal and Replacement \(□ G-22\)](#).

**Note:** If there is insufficient adjustment after fitting new pads change the brake cable.



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**Fig 12. Brake Pads**

# Master Cylinder

## Removal and Replacement

### Removal

**Note:** The master cylinder is not serviceable and must be renewed if faulty.

### WARNING

Before working on the brake system make sure the machine is on level ground and chock all four wheels.

BRAK-1-4

⇒ Fig 13. (□ G-19).

- 1 Remove clevis pin 1 to disconnect the master cylinder operating rod from the brake pedal lever 5.
- 2 Disconnect plastic feed pipe from the brake fluid reservoir and either blank off the pipe or drain the reservoir.
- 3 Disconnect the master cylinder output pipe. Plug the cylinder port and blank off the pipe to prevent ingress of dirt.
- 4 Remove bolts 2 and lift the master cylinder 3 clear of the machine.

### Replacement

- 1 Fit master cylinder 3, secure with bolts 2.
- 2 With the brake pedal against the back stop and the master cylinder push rod fully extended, check that the hole in the clevis 4 aligns with the hole in the brake lever 5.

Adjust the clevis as necessary to give a free play of 3mm (0.12 in), between the back stop and brake lever A.

- 3 Fit clevis pin 1 and tighten the locknut 6.

Once the master cylinder is installed and the pipework connected check the brake fluid reservoir (see **Checking the Brake Fluid Level**, Section 3) and then bleed the brake system. ⇒ **Bleeding** (□ G-9).

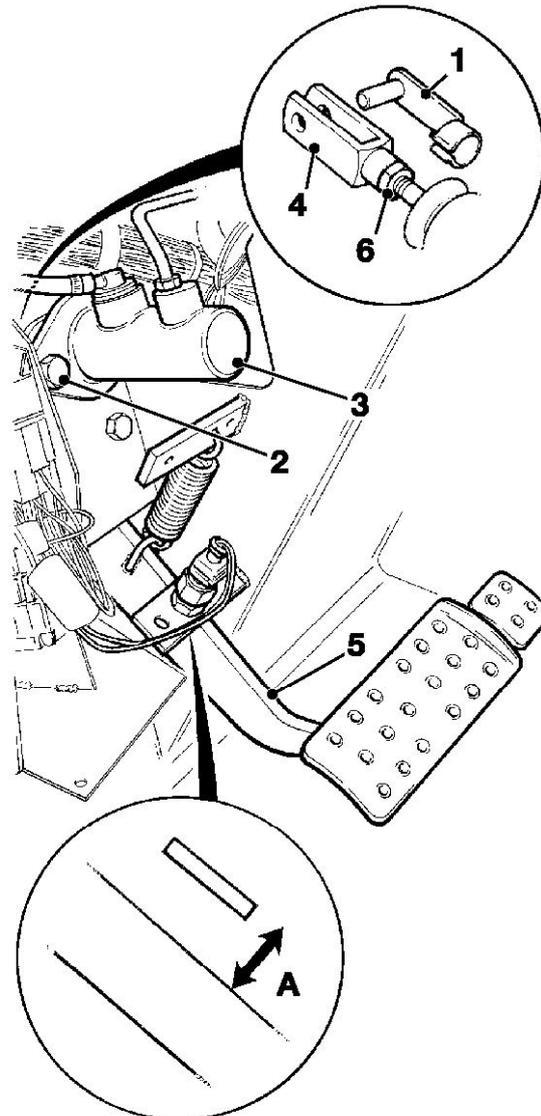


Fig 13.

# Service Brakes

## Dismantling and Assembly

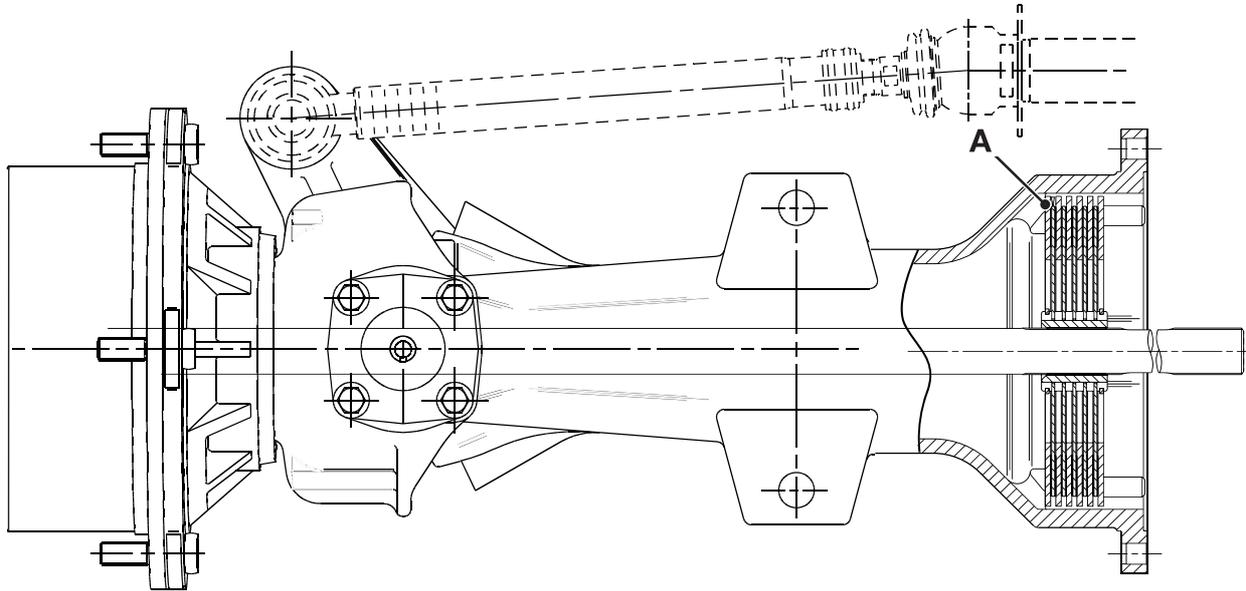


Fig 14.

The service brakes are located in the front axle, as shown at **14-A**. The procedures for dismantling and assembly are described in a separate publication, see **Transmissions Service Manual** (Publication No. 9803-8610) which includes procedures for the axle sub-assemblies.

# Park Brake

## Synchro Shuttle and Powershift Machines

### Torque Figures

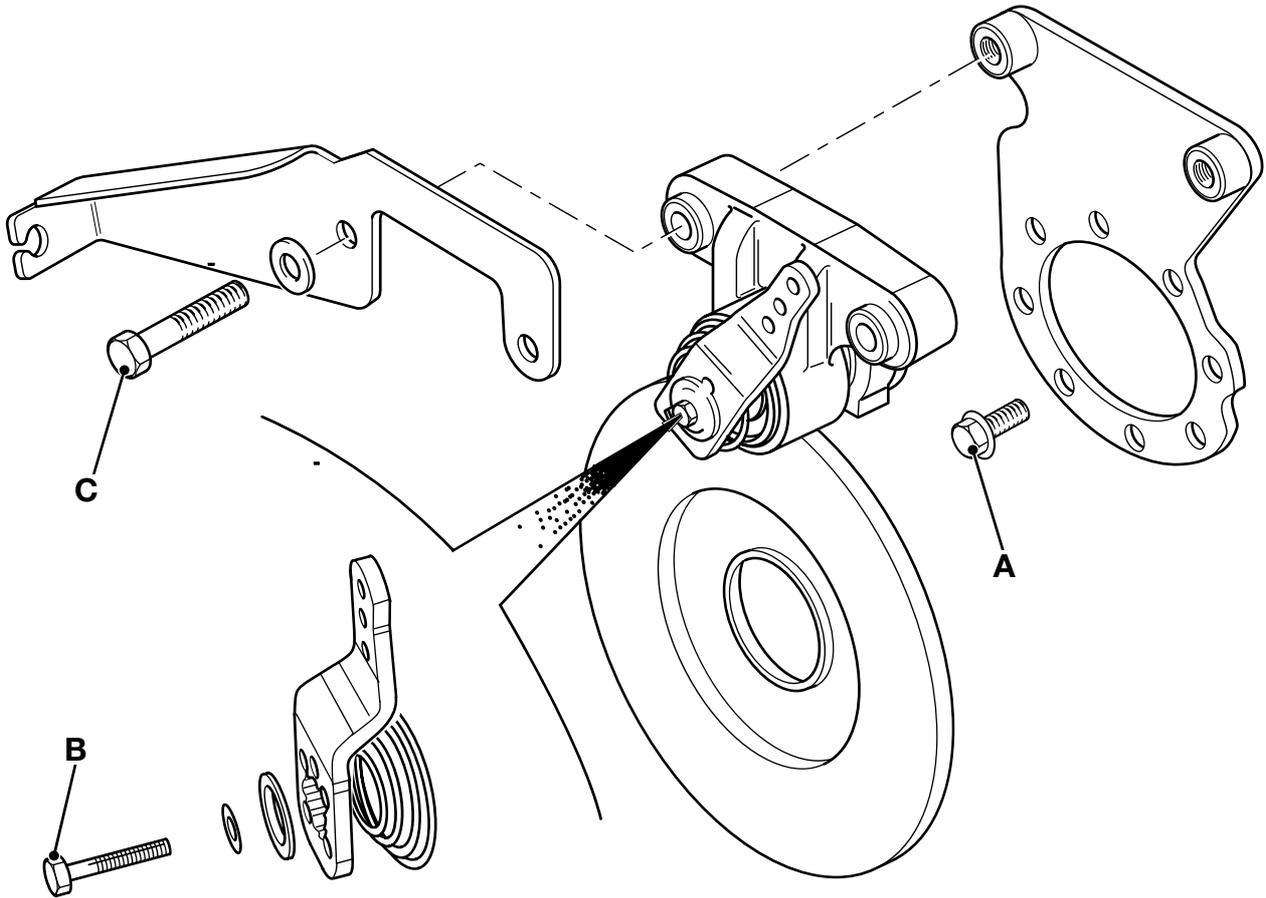


Fig 15.

Where appropriate, the grade of bolt is indicated in parenthesis e.g. (10.9). Refer also to relevant dismantling and assembly procedures.

(1) Always use new bolts.

Table 14. Torque Settings

Item	Nm	Kgf m	lbf ft
A <sup>(1)</sup>	166	17	122 (grade 12.9)
B	13 - 16	1.3 - 1.6	9 - 12
C	255	26	188 (grade 10.9)

### Caliper - Removal and Replacement

#### WARNING

This is a safety critical installation. Do not attempt to do this procedure unless you are skilled and competent to do so.

Installation and mounting of the parking brake caliper requires tightening of the mounting bolts to a specific torque figure. Do not attempt to do this job unless you have the correct tools available.

0010

#### WARNING

Before working on the parking brake, park on level ground and put chocks on each side of all four wheels. Stop the engine and disconnect the battery so that the engine cannot be started. If you do not take these precautions the machine could run over you.

BRAK-8-8

#### WARNING

Brake pads generate dust which if inhaled, may endanger health. Wash off the caliper assemblies before commencing work. Clean hands thoroughly after work.

13-3-1-3

#### Removal

- 1 Release the parking brake lever (lever horizontal).
- 2 Disconnect clevis **16-A**, note which of the three holes on the lever is used.
- 3 Remove clip **16-B** and disconnect the cable from the bracket.
- 4 Support the caliper and remove the two mounting bolts and hardened washers **16-C**. Lift the caliper clear of the brake disc.

**Note:** Do not remove transmission mounting bracket **16-D** unless it needs to be renewed.

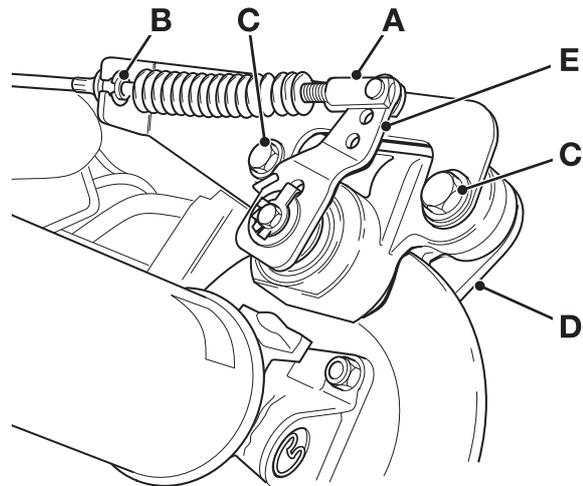


Fig 16.

#### Replacement

Replacement is the reverse of the removal sequence.

- 1 Locate the caliper on the brake disc. Fit new mounting bolts **16-C** with hardened washers and torque tighten. [⇒ Table 15. Torque Settings \( G-22\)](#).
- 2 Attach the cable to the mounting bracket and secure in place with clip **16-B**.
- 3 Refit the clevis **16-A** into the relevant hole in the operating lever **16-E**.
- 4 Make sure there is adequate freedom of movement of operating lever **16-E** to ensure a positive brake application, and that the lever returns to the rest position when the parking brake is released.
- 5 Adjust the parking brake. [⇒ Adjustment \( G-14\)](#). Never unscrew the clevis to adjust the cable.

Table 15. Torque Settings

Item	Nm	kgf m	lbf ft
<b>16-C</b>	255	26	188

### Caliper - Dismantle, Inspection and Assemble

#### **WARNING**

This is a safety critical installation. Do not attempt to do this procedure unless you are skilled and competent to do so.

Installation and mounting of the parking brake caliper requires tightening of the mounting bolts to a specific torque figure. Do not attempt to do this job unless you have the correct tools available.

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#### **WARNING**

Before working on the parking brake, park on level ground and put chocks on each side of all four wheels. Stop the engine and disconnect the battery so that the engine cannot be started. If you do not take these precautions the machine could run over you.

BRAK-8-8

#### **WARNING**

Brake pads generate dust which if inhaled, may endanger health. Wash off the caliper assemblies before commencing work. Clean hands thoroughly after work.

13-3-1-3

### Dismantle

⇒ [Fig 17. \(□ G-24\)](#). The numerical sequence shown on the illustration is intended as a guide to dismantling.

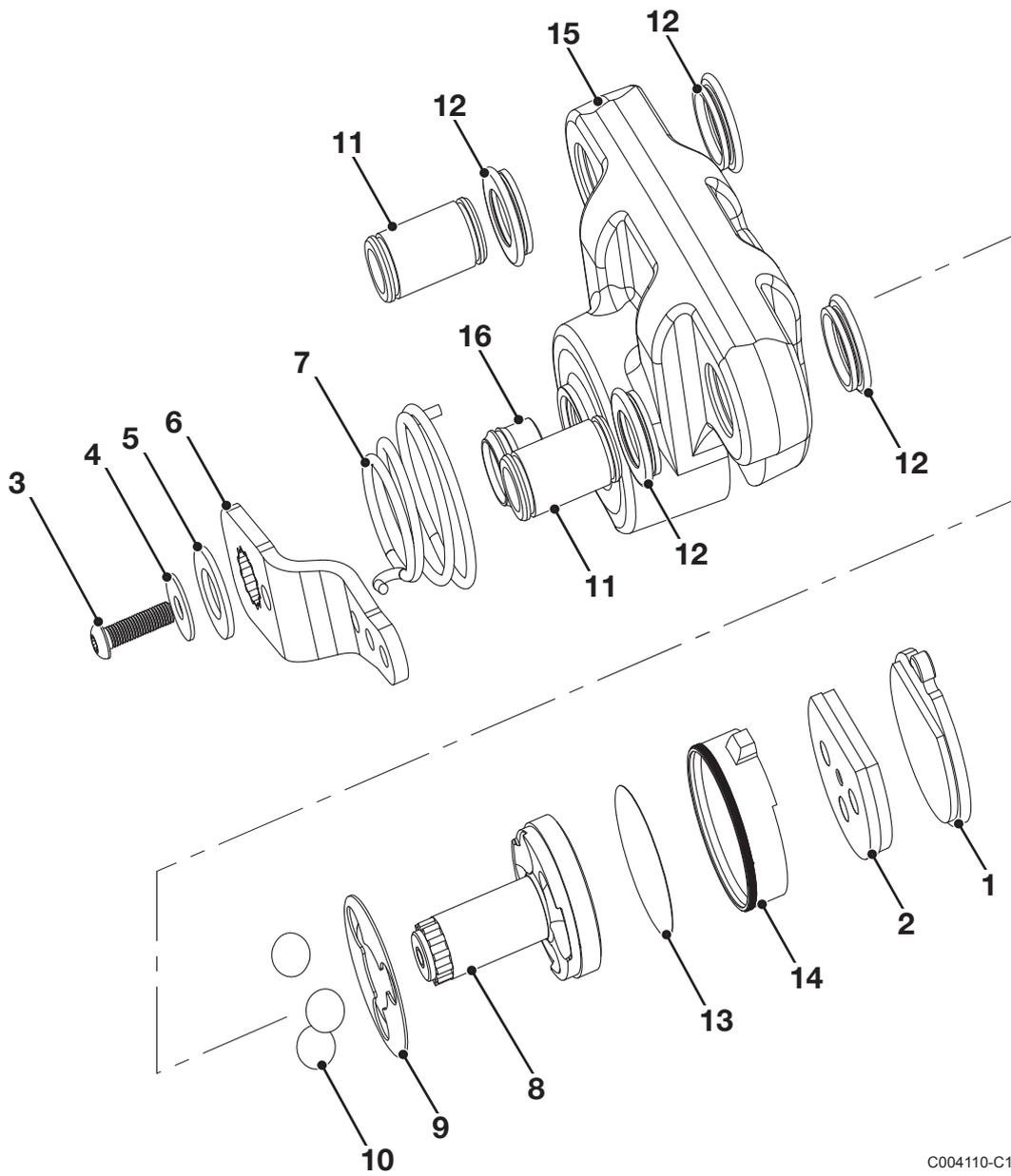
- 1 Remove the caliper and brake pads. ⇒ [Caliper - Removal and Replacement \(□ G-22\)](#).
- 2 Remove the screw **3**, and washers **4** and **5**. Hold lever **6** against the tension of the spring as the screw is removed.
- 3 Note the position of lever **6** relative to the splines of the rotor shaft **8**. Mark the end of the shaft and lever **6** to aid assembly. Remove lever **6** and spring **7**.
- 4 Push out rotor **8** and remove ball spacer **9** and ball bearings **10**. Take care not to lose the ball bearings.

- 5 Push out mounting bushes **11** and remove dust seals **12**.
- 6 Remove the rotor seal **13** followed by bearing ring **14**. Note that the rotor seal may be located on the rotor shaft or may have been left in the calliper housing **15**.

*Note: Shaft seal **16** will not need to be renewed unless excessively worn or damaged. If removal is necessary, press the seal out from inside the housing using a suitable spacer block and bench press. Clean out any remains of the seal after removal.*

#### Component Key ⇒ [Fig 17. \(□ G-24\)](#)

- |    |                  |
|----|------------------|
| 1  | Carrier side pad |
| 2  | Lever side pad   |
| 3  | Screw            |
| 4  | Washer           |
| 5  | Washer           |
| 6  | Lever            |
| 7  | Spring           |
| 8  | Rotor            |
| 9  | Ball spacer      |
| 10 | Ball bearings    |
| 11 | Mounting bushes  |
| 12 | Dust seals       |
| 13 | Rotor Seal       |
| 14 | Bearing ring     |
| 15 | Housing          |
| 16 | Shaft seal       |



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**Fig 17. Park Brake Caliper**

### Inspection

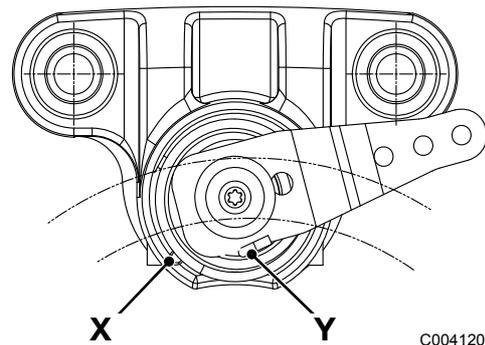
- 1 Clean and dry all parts. Check all parts are free from excessive wear, damage or corrosion. Light scores or stains should be removed. Renew corroded or deeply scored parts.
- 2 Check rotor **8** for damage or distortion. Renew if necessary. Always renew both brake pads if the parking brake has been used in an emergency. Check the ball pockets in housing **15** for signs of scoring, pitting, damage or corrosion. Renew the housing if damaged. Check spring **7** is not broken or distorted. Check the condition of the disc surface. Renew the disc if badly warped, pitted or worn.

### Assemble

⇒ [Fig 17.](#) ([□ G-24](#)). The numerical sequence shown on the illustration is intended as a guide to assembling.

Before assembly make sure all parts are clean and serviceable.

- 1 Fit a new shaft seal **16** if removed. Install the seal as shown. Press the seal into the housing using a suitable spacer block and bench press.
- 2 Coat the shaft, outer diameter and ball pockets of rotor **8** and the ball pockets of housing **15** with silicone grease.
- 3 Insert the three ball bearings **10** into the pockets in the housing **15**. Insert ball spacer **9**.
- 4 Coat the bearing ring **14** with silicone grease and fit the ring to the inner diameter on rotor seal **13**. Assemble the rotor seal to the rotor **8**.
- 5 Slide rotor **8** through the casting and seat the ball pockets against the bearings.
- 6 Position spring **7** over the shaft of rotor **8**. Insert the large diameter end of the spring into hole **18-X** in the face of the housing.
- 7 Locate the small diameter end of spring **7** around the outside edge of lever **6** as shown at **18-Y**.



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**Fig 18.**

- 8 Fit lever **6**. Align the lever to the mark made during dismantling.
- 9 Hold the lever against the tension of the spring and fit washers **4** and **5** Fit screw **3** and torque tighten. ⇒ [Table 16. Torque Settings](#) ([□ G-25](#)).
- 10 Fit the new brake pads. ⇒ [Renewing the Brake Pads](#) ([□ G-17](#)).
- 11 Lubricate the dust seals **12** and bushes **11** with silicone grease. Fit the dust seals to the housing and insert mounting bushes. Make sure that the dust seals locate in their location grooves on the bushes **11** and housing **15**. Wipe off any excess grease.
- 12 Before fitting the caliper, ensure the lever rotates smoothly and that the lever side pad **2** returns to the off position when the lever is released.
- 13 Refit the brake caliper. ⇒ [Caliper - Removal and Replacement](#) ([□ G-22](#)).
- 14 Adjust the parking brake, refer to **Service Procedures, Park Brake - Adjustment**.

**Table 16. Torque Settings**

Item	Nm	kgf m	lbf ft
<b>3</b>	13 - 16	1.3 - 1.6	9 - 12



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