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Section G

Brakes

Service Manual - 527-58

Section 1 - General Information

Section 2 - Care and Safety

Section 3 - Routine Maintenance

Section B - Body and Framework

Section C - Electrics

Section E - Hydraulics

Section F - Transmission

Section G - Brakes

Section H - Steering

Section K - Engine

Section M - Electronic Data Systems



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Notes:

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Contents **Page No.**

Non Boosted Single Axle Service Brakes SYSTEM
Introduction G1-1
Related Topics G1-2
Specifications G1-3
Operation Overview G1-4
Fault Finding G1-5
Test Procedures G1-8
Axle Breather (Braked Axles) - Inspection G1-10
Bleeding G1-11
Dismantling and Assembly G1-12
Brake Light Switch G1-13

Boosted Single Axle Service Brakes SYSTEM
Introduction G2-1
Related Topics G2-2
Specifications G2-3
Operation Overview G2-4
Hydraulic Operation and Schematics G2-5
Fault Finding G2-6
Test Procedures G2-7
Axle Breather (Braked Axles) - Inspection G2-8
Bleeding G2-9
Dismantling and Assembly G2-11
Brake Light Switch G2-12

External Park Brake SYSTEM
Introduction G3-1
Related Topics G3-2
Specifications G3-3
Operation Overview G3-4
Test Procedures G3-5
Adjustment G3-6
Switch Adjustment G3-8
Renewing the Brake Pads G3-9
Renewing the Parkbrake Cable G3-11

Park Brake Calliper
Introduction G4-1
Related Topics G4-2
Removal and Replacement G4-3

Park Brake Disc
Introduction G5-1
Related Topics G5-2
Removal and Replacement G5-3

Park Brake Switch
Introduction G6-1
Related Topics G6-2
Removal and Replacement G6-3

Master Cylinder
Introduction G7-1
Related Topics G7-2
Removal and Replacement G7-3

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G-i

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Section G - Brakes

Contents **Page No.**

Fluid Reservoir
Introduction G8-1
Related Topics G8-2
Removal and Replacement G8-3

Brake Manifold
Introduction G9-1
Related Topics G9-2
Removal and Replacement G9-3

G-ii
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Non Boosted Single Axle Service Brakes SYSTEM

Introduction

This topic contains information about a machine SYSTEM. The system has some devices that connect either mechanically, hydraulically or electrically. Make sure you are referring to the correct system. Refer to the applications table.

Descriptions and procedures relate to the system and not the individual devices. For information about the devices refer to the relevant topics.

This topic is intended to help you understand what the system does and how it works. Where applicable it also includes fault finding, test and service procedures.

⇨ *Related Topics (G1-2)*
⇨ *Specifications (G1-3)*
⇨ *Operation Overview (G1-4)*
⇨ *Fault Finding (G1-5)*
⇨ *Test Procedures (G1-8)*
⇨ *Brake Piston Seal Leakage (G1-8)*
⇨ *Axle Breather (Braked Axles) - Inspection (G1-10)*
⇨ *Bleeding (G1-11)*
⇨ *Dismantling and Assembly (G1-12)*
⇨ *Brake Light Switch (G1-13)*

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Related Topics

Table 1. Related Topics in This Publication

The table lists other topics in the manual that contain information related to this topic. Refer to the applicable topics to complete your procedures. Where applicable the text in this section contains cross references to this page to help you find the correct information. Some machines have different systems and devices. Make sure you refer to the correct topic, refer to *Section 1 - Applications*.		
Sections	**Topic Titles**	**Sub Titles**
1	Applications	ALL
1	***Service Tools***	ALL
2	ALL (Care and Safety)(1)	ALL
3	***Routine Maintenance***	***Checking the Foot Brake Fluid Level***
3	***Routine Maintenance***	***Transmission***
F	***Hydrostatic Transmission System***	ALL
G	***⇨ Master Cylinder (G7-1)***	ALL
G	***⇨ Fluid Reservoir (G8-1)***	ALL
G	***⇨ External Park Brake SYSTEM (G3-1)***	ALL

(1) You must obey all of the relevant care and safety procedures.

Table 2. Related Topics in Publication 9803/8610, Transmissions

The table lists topics in another manual that contain information related to this topic. Refer to the applicable topics to complete your procedures. Where applicable the text in this section contains cross references to this page to help you find the correct information. Some machines have different systems and devices. Make sure you refer to the correct topics.		
Sections	**Section Titles**	**Topic Titles**
C	Axle Integral Brakes	***70 Series Integral Brakes (3 Piece Axles)***

Table 3. Service Tools

The table lists the service tools you will need to do some of the procedures in this topic. Make sure you have the correct service tools BEFORE you start the procedures	
Tool Part Number	**Description**
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892/00253(1)	Hydraulic Pressure Test Kit and Relevant Adaptors
	Vacuum Gauge
	‘T’ Adaptor
	Vacuum Hoses

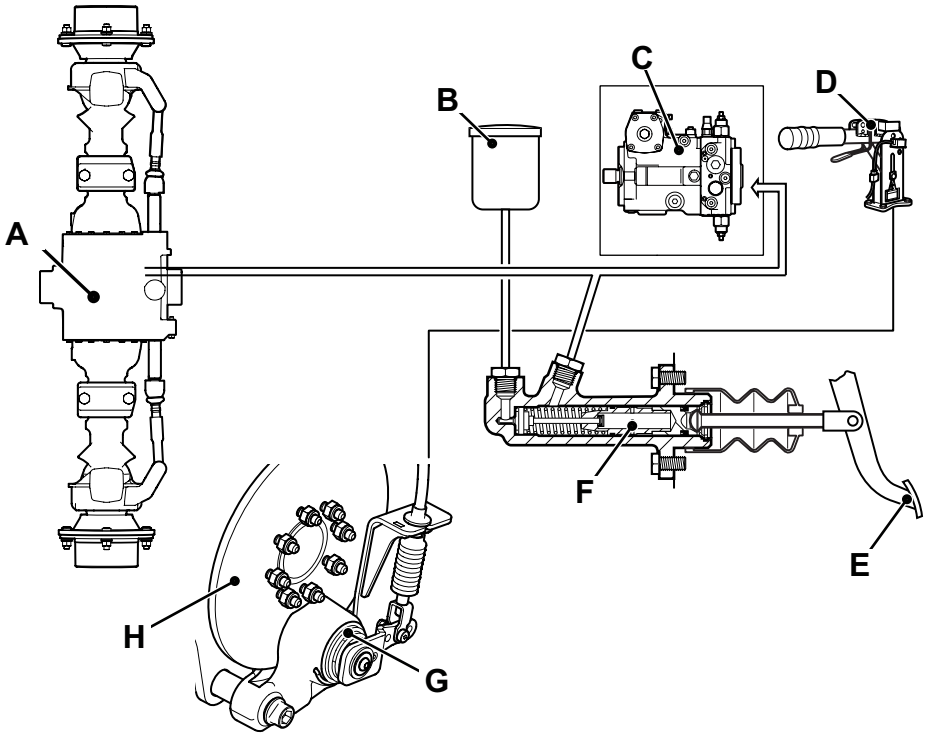
(1) Tool available from JCB Service, refer to Section 1 - Service Tools

Specifications

Table 4.

Service Brakes:	
Type	Single circuit, oil-immersed multi-plate disc.
Actuation	Hydraulic
Location	Front axle, centre mounted (2 brake packs).
Master Cylinder:	
Type	Master cylinder - Single
No. of Cylinders	1
Stroke	35 mm (1.3 in)
Diameter	25.4 mm (1 in)

Operation Overview



C095260

Fig 1.

The service brake acts on the brake pack **A** of the front axle half shafts of the machine. The brakes are oil immersed, multi-disc types which are operated hydraulically by a single pedal **E** and master cylinder **F** arrangement.

The brake cylinder reservoir **B** is situated outside of the cab, below the front windscreen.

`**Inching' Control:** This feature prevents the hydrostatic transmission from driving against the service brakes.

An electronic inching control uses the electrical signal when the brake pedal is pressed to send a signal is to the transmission ECU. The transmission ECU reduces the current to the pump solenoids to reduce the machine speed.

The brake pedal also acts as a hydraulic inching control to reduce the pump displacement.

A detailed description of inching operation is in the transmission topic. ⇨ *Related Topics (🗋 G1-2)*

Parking Brake: The parking brake **D** uses a cable to operate the parking brake calliper **G**. This acts on the parking brake disc **H**. For more information on the parking brake system refer to the correct topic. ⇨ *Related Topics (🗋 G1-2)*

Fault Finding

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 5. One or more brakes do not apply. (Brake travel not excessive, brakes not pulling to one side) (G1-5)*
⇨ *Table 6. Pedal travel excessive (but not touching floor) (G1-5)*
⇨ *Table 7. Pedal hard to operate (G1-5)*
⇨ *Table 8. Pedal touches floor under constant pressure - no fluid loss (G1-6)*
⇨ *Table 9. Pedal touches floor under constant pressure and fluid loss (G1-6)*
⇨ *Table 10. Poor braking (not pulling to one side) (G1-6)*
⇨ *Table 11. Brakes not releasing (G1-6)*
⇨ *Table 12. Poor braking when hot (G1-7)*
⇨ *Table 13. Excessive brake noise in operation (G1-7)*
⇨ *Table 14. Fluid loss when machine standing for instance - overnight (G1-7)*

Table 5. 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 6. 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 7. 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 8. 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 9. 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.	⇨ *Brake Piston Seal Leakage (G-11)*

Table 10. 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 11. 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.
22 Brake pedal free travel incorrect.	Adjust pedal free travel.
23 Fluid contamination/seal damage.	Flush system and renew hydraulic seals. Refill with clean fluid and bleed the brake system.
24 Annular brake piston(s) binding in axle.	– Check that correct brake fluid has been used (incorrect fluid could swell the annular brake piston seals). – Check if annular brake piston seals in good condition. – Check that annular brake piston rotates freely in its housing with no seals fitted. – Check that the annular brake piston seal retracts the piston approximately 0.5 mm (0.020 in).
25 Kinked or crushed brake pipes.	Check and renew pipes as required.
26 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 12. Poor braking when hot

Possible Cause	Action
27 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 13. Excessive brake noise in operation

Possible Cause(1)	Action
28 Deterioration of axle oil or wrong type of axle oil.	Change axle oil.
29 Axle oil loss.	Refill axle with correct oil and check for leaks.
30 Friction plates worn beyond limits.	Renew friction/counter plates - Both sides of relevant axle.
31 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 14. Fluid loss when machine standing for instance - overnight

Possible Cause(1)	Action
32 Severe damage or slight cut/nick in the brake piston seal.	Test the brake piston seals for leakage. If necessary, strip axle and renew seal(s). ⇨ ***Brake Piston Seal Leakage (G-11)***
33 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.

Test Procedures

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 or hub:

- 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.

Front Axles

⚠ WARNING

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

BRAK-1-4

⚠ WARNING

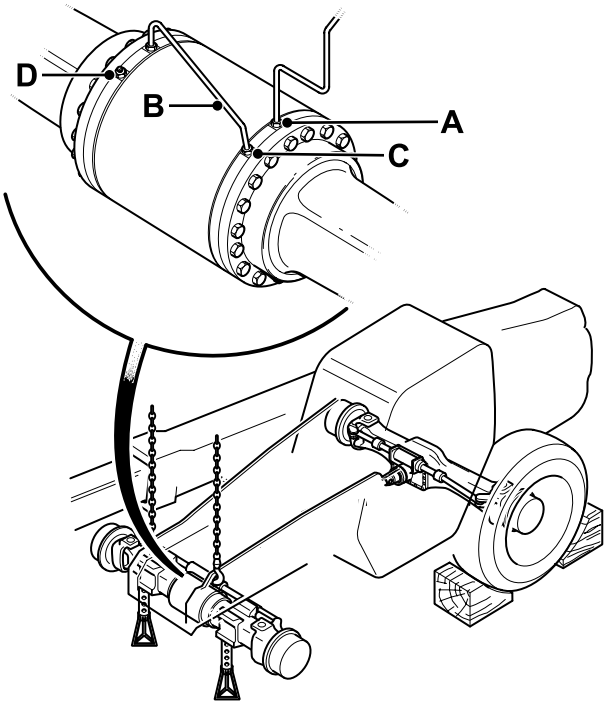
Do not drive the machine with any part of its brake system disconnected. When the following test has been completed reconnect all brake pipes and bleed the brake system using the recommended procedure.

BRAK-2-1

1 Disconnect and cap the brake piston feed pipe (or hose, as applicable) at port **A**.

2 Completely remove pipe **B** and plug port **C**.

3 Fill both brake piston housings with JCB Light Hydraulic Fluid through ports **A** and **D**.



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Fig 2.

4 Test for a Low Pressure Leak:

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

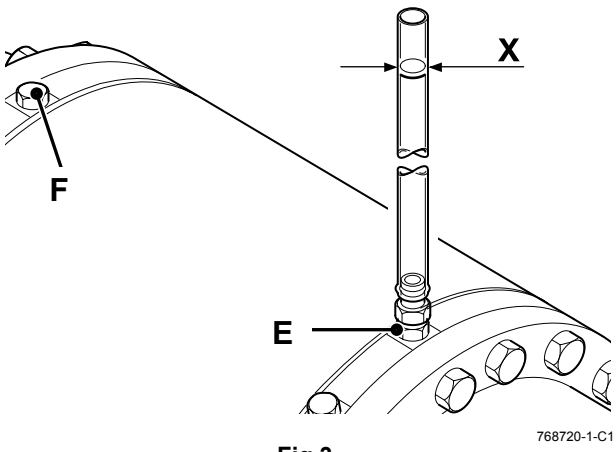


Fig 3.

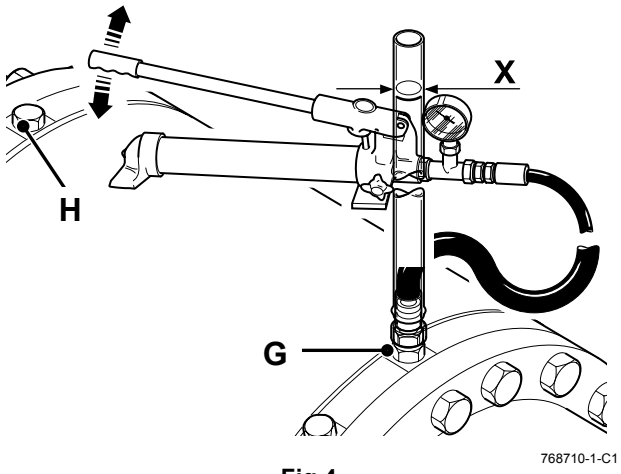


Fig 4.

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 **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 **F**.

5 Test for a High Pressure Leak:

a Install a hand pump fitted with a 0 - 40 bar (0 - 600 lbf/in^2) pressure gauge to brake piston port **G**.

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

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 **H**.

6 Re-instate the brake system:

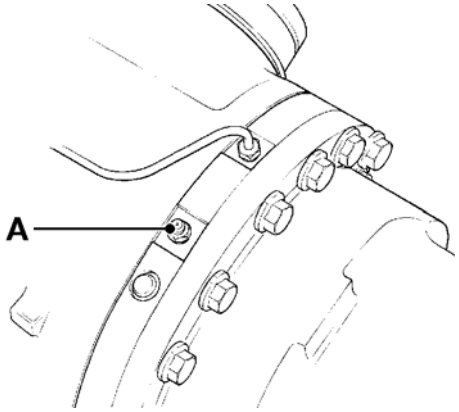
Reconnect all brake pipes and bleed the brake system. ⇨ ***Bleeding (🗋 G1-11)***

Alternately, proceed to rear axle, if applicable.

Axle Breather (Braked Axles) - Inspection

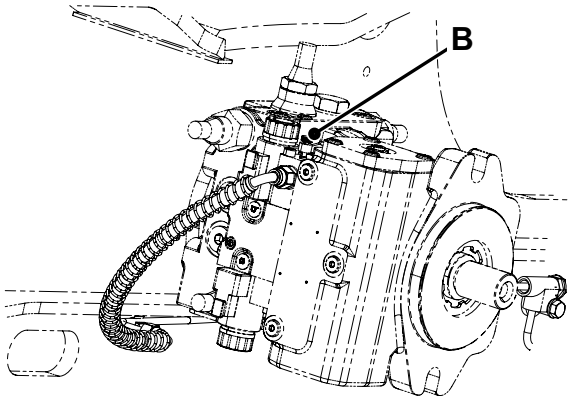
For this procedure refer to **Section 3 - Transmission**.
⇨ *Related Topics (G1-2)*

Bleeding



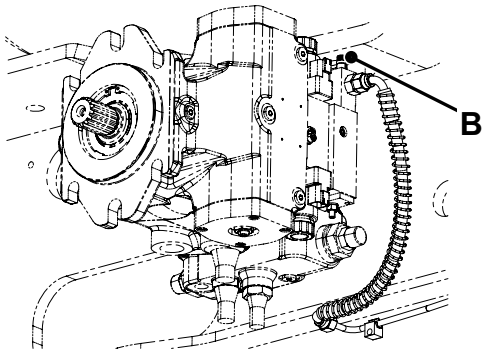
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Fig 5. Front Axle



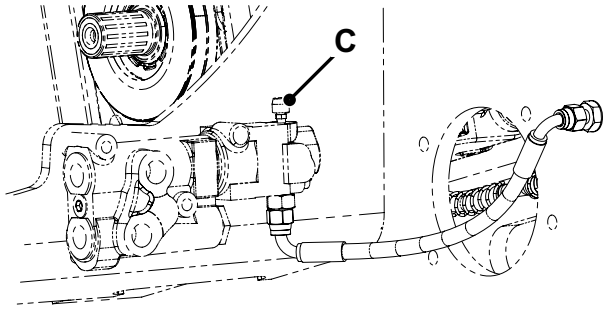
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Fig 6. Pump Bleed Nipple - 25 kph Machines



C095370

Fig 7. Pump Bleed Nipple - 20, 34 and 40 kph Machines



C095370-C4

Fig 8. Trailer Brake Valve Bleed Nipple

⚠ 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 and ensure that throughout the bleeding procedure the level is not allowed to fall below the MINIMUM mark. Refer to ***Section 3 - Fluids and Lubricants***. ⇨ *Related Topics (G1-2)*

⚠ 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 appropriate bleed screw, 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 Bleed the brake system, in the appropriate sequence:

Bleed in turn at point **B** on the transmission pump and point **A** on the front axle.

Bleed at point **C** on the trailer brake valve if fitted.

6 Top up reservoir to the full mark.

Dismantling and Assembly

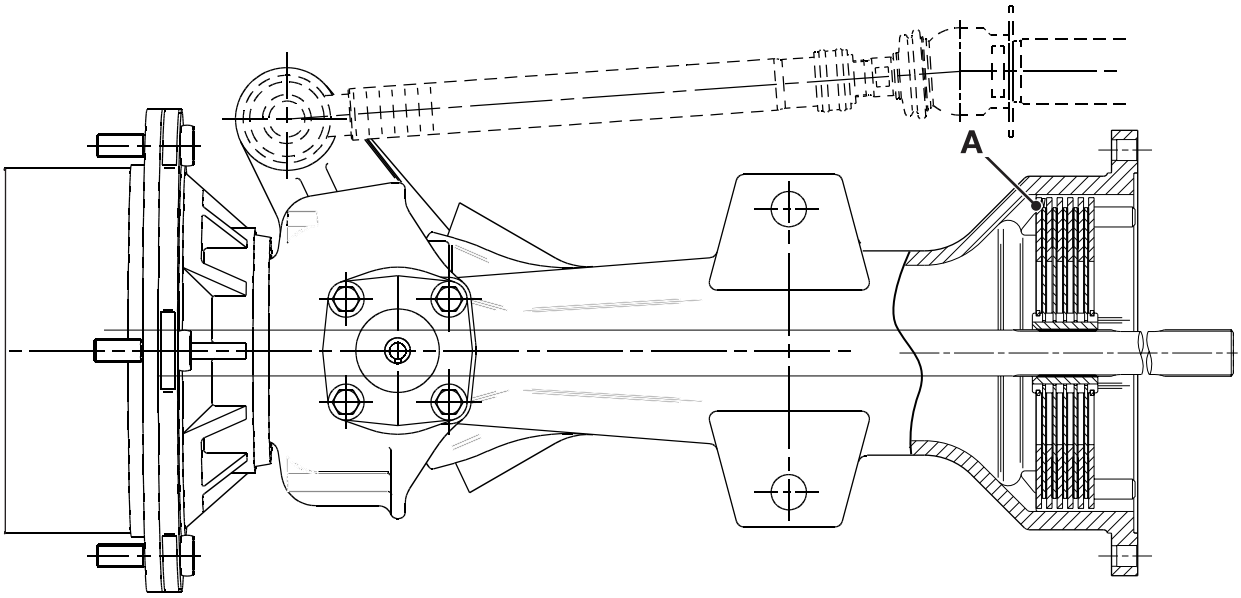


Fig 9.

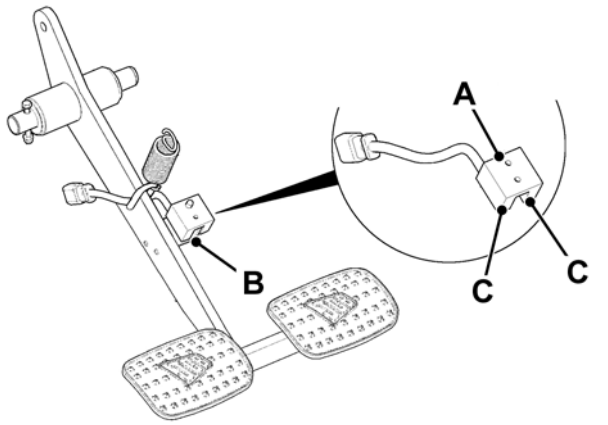
The service brakes are located in the front axle, as shown at **A**. The procedures for dismantling and assembly are described in a separate publication, see ***Transmissions Service Manual*** (Publication No. 9803-8610) which includes procedures for the axle sub-assemblies.
⇨ *Related Topics (G1-2)*

Brake Light Switch

Operation

The brake light switch **A** is a reed type. It operates when the metal vane **B** moves between the switch faces **C**. The switch is not adjustable.

If switch failure is suspected check all the associated wires and connectors for damage. Ensure that the vane **B** moves between the switch faces **C** when the brake pedal is pressed. If the switch has failed it must be renewed.



C089500

Fig 10.

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Boosted Single Axle Service Brakes SYSTEM

Introduction

This topic contains information about a machine SYSTEM. The system has some devices that connect either mechanically, hydraulically or electrically. Make sure you are referring to the correct system. Refer to the applications table.

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⇨ *Related Topics (G2-2)*
⇨ *Specifications (G2-3)*
⇨ *Operation Overview (G2-4)*
⇨ *Hydraulic Operation and Schematics (G2-5)*
⇨ *Fault Finding (G2-6)*
⇨ *Test Procedures (G2-7)*
⇨ *Axle Breather (Braked Axles) - Inspection (G2-8)*
⇨ *Bleeding (G2-9)*
⇨ *Dismantling and Assembly (G2-11)*
⇨ *Brake Light Switch (G2-12)*

Related Topics

Table 1. Related Topics in This Publication

The table lists other topics in the manual that contain information related to this topic. Refer to the applicable topics to complete your procedures. Where applicable the text in this section contains cross references to this page to help you find the correct information. Some machines have different systems and devices. Make sure you refer to the correct topic, refer to *Section 1 - Applications*.		
Sections	**Topic Titles**	**Sub Titles**
1	Applications	ALL
1	***Service Tools***	ALL
2	ALL (Care and Safety)(1)	ALL
3	***Routine Maintenance***	***Checking the Foot Brake Fluid Level***
3	***Routine Maintenance***	***Transmission***
F	***Hydrostatic Transmission System***	ALL
G	***⇨ Master Cylinder (G7-1)***	ALL
G	***⇨ Brake Manifold (G9-1)***	ALL
G	***⇨ External Park Brake SYSTEM (G3-1)***	ALL

(1) You must obey all of the relevant care and safety procedures.

Table 2. Related Topics in Publication 9803/8610, Transmissions

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Table 3. Service Tools

The table lists the service tools you will need to do some of the procedures in this topic. Make sure you have the correct service tools BEFORE you start the procedures	
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	Vacuum Gauge
	‘T’ Adaptor
	Vacuum Hoses

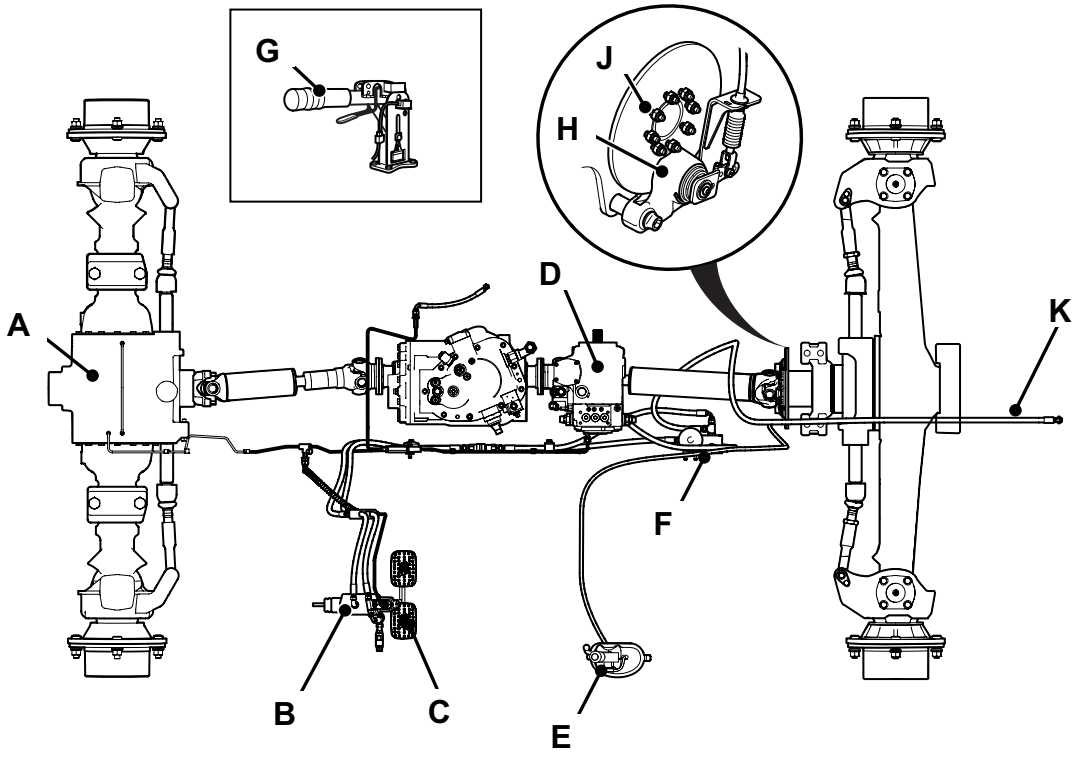
(1) Tool available from JCB Service, refer to Section 1 - Service Tools

Specifications

Table 4.

Service Brakes:	
Type	Single circuit, oil-immersed multi-plate disc.
Actuation	Hydraulic - supplied from transmission pump
Location	Front axle, centre mounted (2 brake packs).
Master Cylinder:	
Type	Master cylinder - Single
No. of Cylinders	1
Stroke	35 mm (1.3 in)
Diameter	31.75 mm (1.25 in)
Boost Ratio	2.6:1

Operation Overview



C105820-C1

Fig 1.

The service brake acts on the brake pack **A** of the front axle half shafts of the machine. The brakes are oil immersed, multi-disc types which are operated hydraulically by a single pedal **C** and master cylinder **B** arrangement.

The transmission motor **D** supplies hydraulic fluid under pressure to the manifold **F**. An accumulator on the manifold stores the pressure.

The fluid flows from the manifold to the master cylinder **B**. Excess flow returns to the tank via hose **K**.

When the brake pedal **C** is applied the fluid flows to the brake pack **A** and trailer brake valve **E** (if fitted).

`Inching' Control: This feature prevents the hydrostatic transmission from driving against the service brakes.

An electronic inching control uses the electrical signal when the brake pedal is pressed to send a signal is to the transmission ECU. The transmission ECU reduces the current to the pump solenoids to reduce the machine speed.

The brake pedal also acts as a hydraulic inching control to reduce the pump displacement. The pressure from the braking system enters the inching valve of the pump at port **Z** and the transmission pump reduces the flow to the transmission system.

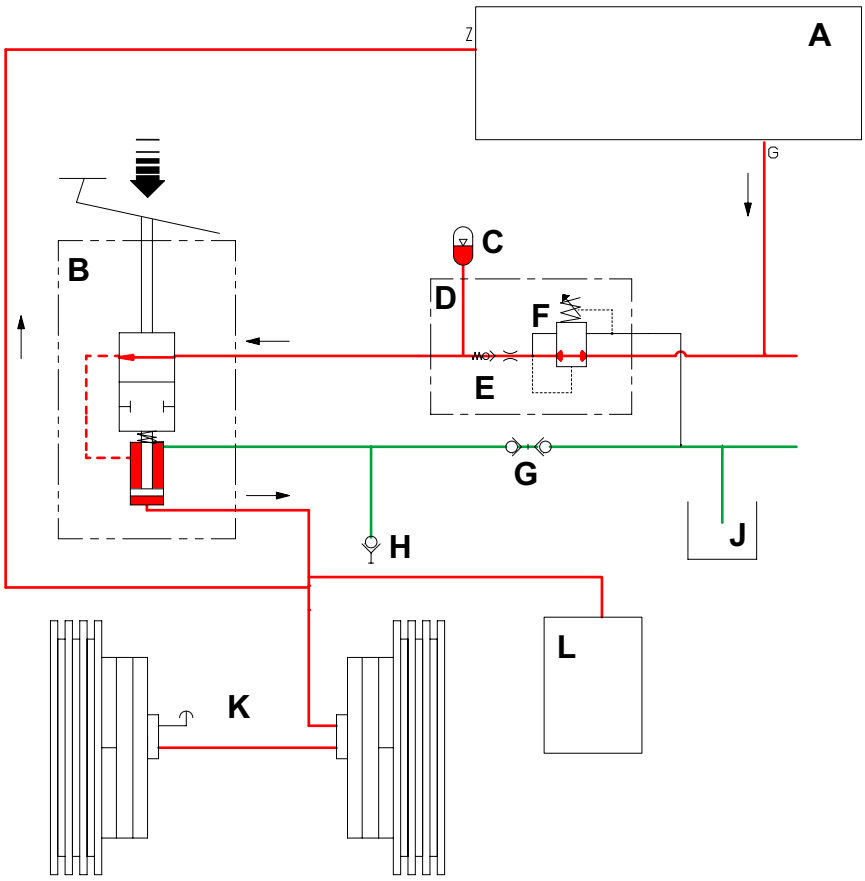
A detailed description of inching operation is in the transmission topic. ⇨ *Related Topics (G2-2)*

Parking Brake: When the parking brake lever **G** is applied, a cable operates the parking brake calliper **H**. This acts on the parking brake disc **J**. For more information on the parking brake system refer to the correct topic. ⇨ *Related Topics (G2-2)*

Hydraulic Operation and Schematics

Item	Description
A	Transmission Motor
B	Master Cylinder
C	Accumulator
D	Manifold
E	Check Valve and Restrictor
F	Pressure Relief Valve

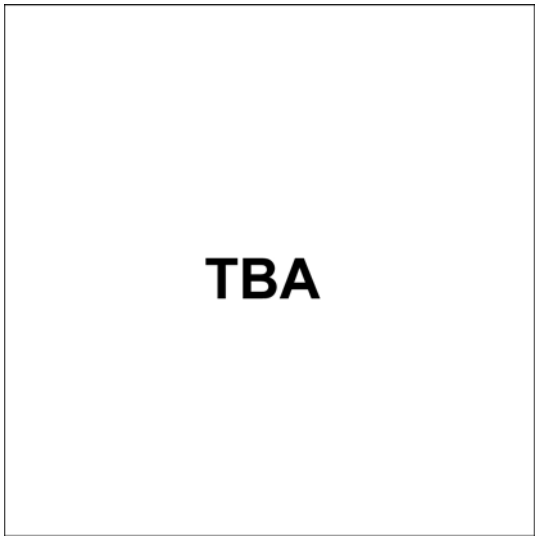
Item	Description
G	Quick Release Couplings
H	Bleed Point Quick Release Coupling
J	Tank
K	Front Axle
L	Trailer Brake Valve (if fitted)



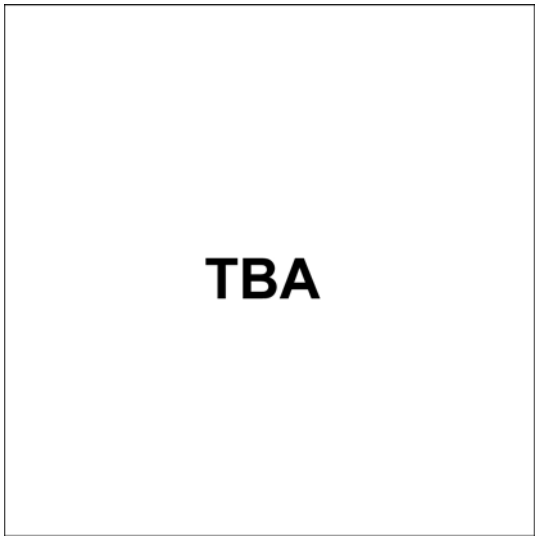
C105810-C1

Fig 2. Brake Pedal Applied

Fault Finding



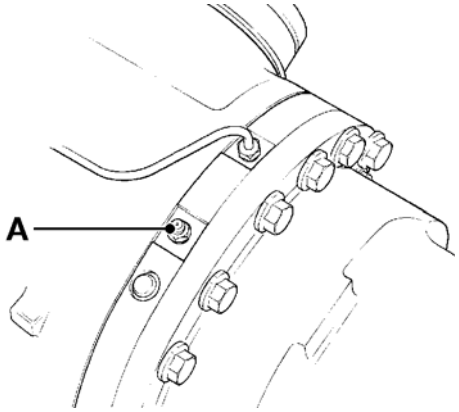
Test Procedures



Axle Breather (Braked Axles) - Inspection

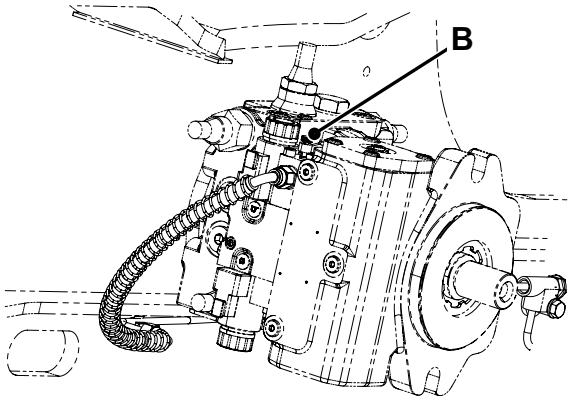
For this procedure refer to **Section 3 - Transmission**.
⇨ *Related Topics (G2-2)*

Bleeding



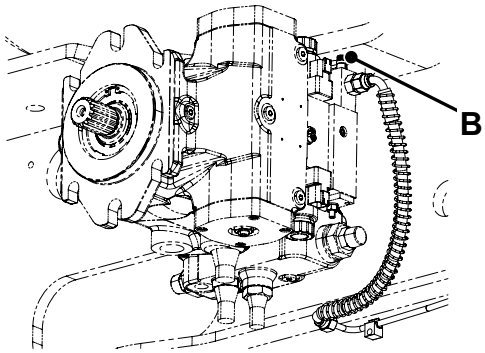
S107710-1

Fig 3. Front Axle



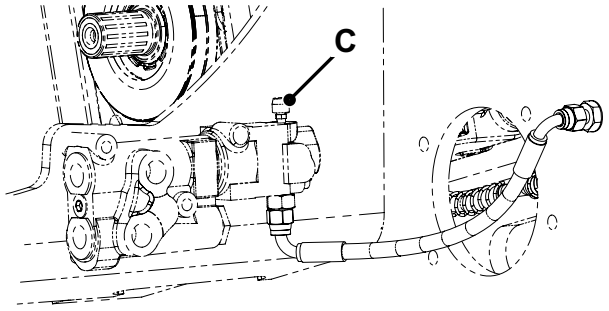
C095370-C2

Fig 4. Pump Bleed Nipple - 25 kph Machines



C095370

Fig 5. Pump Bleed Nipple - 20, 34 and 40 kph Machines



C095370-C4

Fig 6. Trailer Brake Valve Bleed Nipple

⚠ 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

⚠ WARNING

When working close to the machine with the engine running, protective clothing must be worn, ie. Safety glasses, ear protection, gloves etc.

GEN-4-3

1 Start the engine.

Note: *The engine must be running during the bleeding procedure.*

2 Do a check of the hydraulic fluid level in the tank. Refer to ***Section 3 - Maintenance***.

Note: *Make sure that the hydraulic fluid level does not fall below the minimum level.*

3 Attach a tube to the appropriate bleed screw, ensuring that the free end of the tube is immersed in fluid in a suitable container.

4 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.

5 Continue bleeding normally until all air is dispelled, closing the bleed screw with the pedal fully depressed.

6 Bleed the brake system, in the appropriate sequence:

Bleed in turn at point **B** on the transmission pump and point **A** on the front axle.

Bleed at point **C** on the trailer brake valve if fitted.

7 Switch off the engine.

8 Do a check of the hydraulic fluid level in the tank. Refer to ***Section 3 - Maintenance***.

Dismantling and Assembly

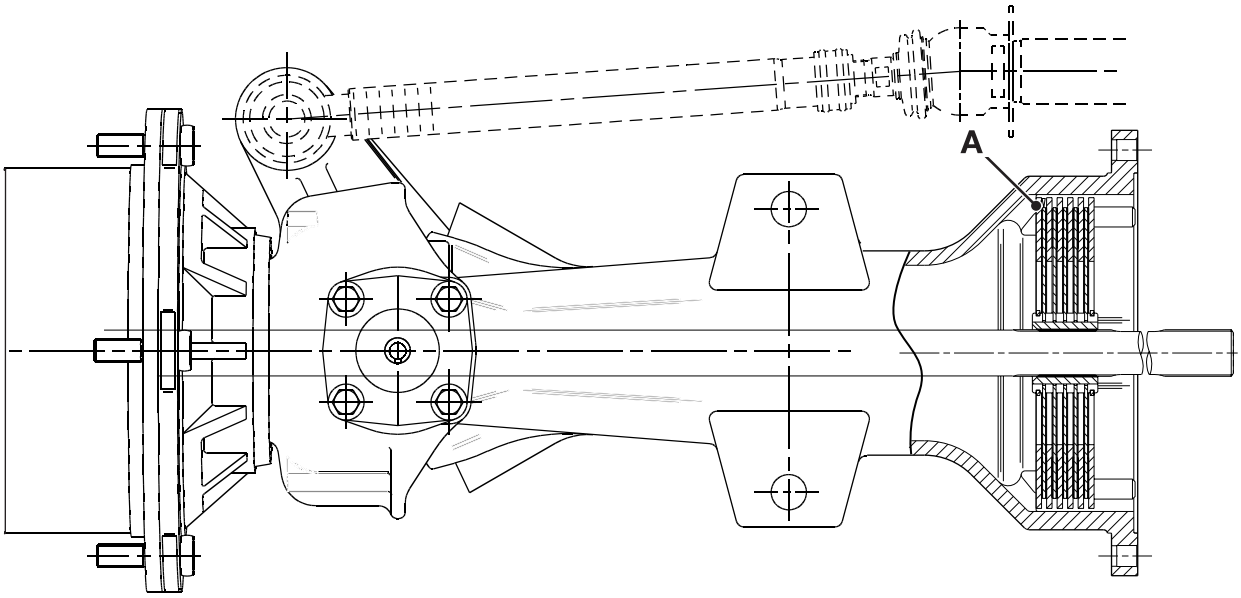


Fig 7.

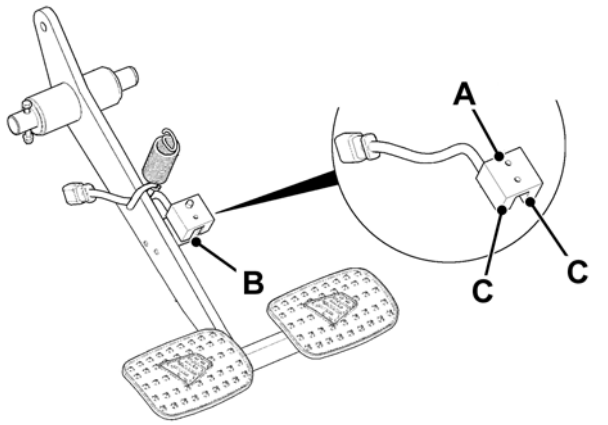
The service brakes are located in the front axle, as shown at **A**. The procedures for dismantling and assembly are described in a separate publication, see ***Transmissions Service Manual*** (Publication No. 9803-8610) which includes procedures for the axle sub-assemblies.
⇨ *Related Topics (G2-2)*

Brake Light Switch

Operation

The brake light switch **A** is a reed type. It operates when the metal vane **B** moves between the switch faces **C**. The switch is not adjustable.

If switch failure is suspected check all the associated wires and connectors for damage. Ensure that the vane **B** moves between the switch faces **C** when the brake pedal is pressed. If the switch has failed it must be renewed.



C089500

Fig 8.

External Park Brake SYSTEM

Introduction

This topic contains information about a machine SYSTEM. The system has some devices that connect either mechanically, hydraulically or electrically. Make sure you are referring to the correct system. Refer to the applications table.

Descriptions and procedures relate to the system and not the individual devices. For information about the devices refer to the relevant topics.

This topic is intended to help you understand what the system does and how it works. Where applicable it also includes fault finding, test and service procedures.

⇨ *Related Topics (G3-2)*
⇨ *Specifications (G3-3)*
⇨ *Operation Overview (G3-4)*
⇨ *Test Procedures (G3-5)*
⇨ *Adjustment (G3-6)*
⇨ *Switch Adjustment (G3-8)*
⇨ *Renewing the Brake Pads (G3-9)*
⇨ *Renewing the Parkbrake Cable (G3-11)*

Related Topics

Table 1. Related Topics in This Publication

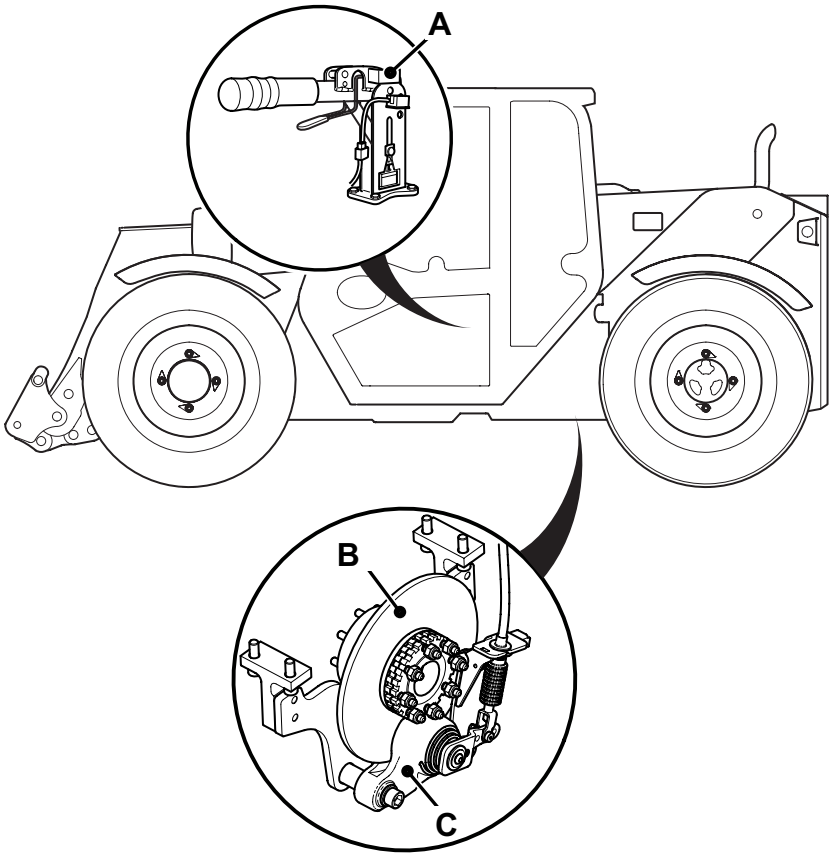
The table lists other topics in the manual that contain information related to this topic. Refer to the applicable topics to complete your procedures. Where applicable the text in this section contains cross references to this page to help you find the correct information. Some machines have different systems and devices. Make sure you refer to the correct topic, refer to *Section 1 - Applications*.		
Sections	**Topic Titles**	**Sub Titles**
1	***Applications***	ALL
2	ALL (Care and Safety)(1)	ALL
3	***Routine Maintenance***	***Brakes***
G	***⇨ Park Brake Calliper (G4-1)***	ALL
G	***⇨ Park Brake Disc (G5-1)***	ALL

(1) You must obey all of the relevant care and safety procedures.

Specifications

Park Brake: Independent cable operated parking brake in the drive to the front axle.	
Type	Disc brake, manually adjusted calliper.
Actuation	Cable operated.
Location	Rear Axle Drive Flange
Disc diameter	270 mm
Minimum Pad Thickness	3.18 mm (0.12 in)
Minimum Disc Thickness	8.89 mm (0.35 in)

Operation Overview



C095260-C2

Fig 1.

The park brake is independent of the service brakes. It operates on the drive to the rear axle by means of a disc **B** mounted on the pump output shaft.

When the operator moves the park brake lever **A** to the vertical position, the cable causes the brake pads mounted in the calliper **C** to hold the brake disc **B**.

The lever has a simple system for adjustment of the cable when necessary.

An electrical switch senses if the park brake lever is set to the brake ON or brake OFF position. The switch controls operator warnings and transmission interlocks.

Test Procedures

For the parkbrake test procedure refer to ***Section 3 - Brakes***. ⇨ *Related Topics (G3-2)*

Adjustment

⚠ CAUTION

The park 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 park brake has been used in an emergency, always renew both brake pads.

4-2-1-1_2

⚠ WARNING

Before adjusting the park brake, make sure that the machine is on level ground. Put blocks 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 park brake could result in the park brake not fully releasing.

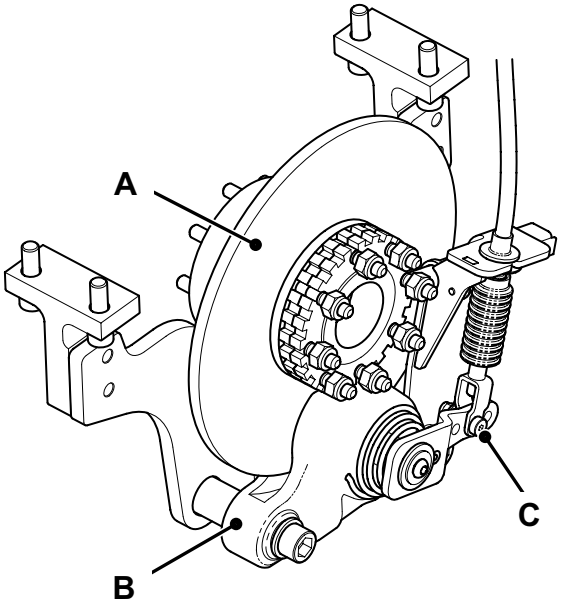
0011

Note: *Before attempting to adjust the park brake after an emergency stop remove and inspect the brake friction components. Renew components if necessary.*

Lever Adjustment

For the parkbrake lever adjustment refer to ***Section 3 - Brakes***. ⇨ *Related Topics (🗋 G3-2)*

Cable Adjustment



C107090

Fig 2.

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

If there is no adjustment at the lever or the calliper, change the brake pads. ⇨ *Renewing the Brake Pads (G3-9)*

Always renew a worn or damaged cable.

1 Disengage the parking brake (lever horizontal).

2 Turn hand grip **E** anti-clockwise to move the pin **F** to the lowest position in its slot.

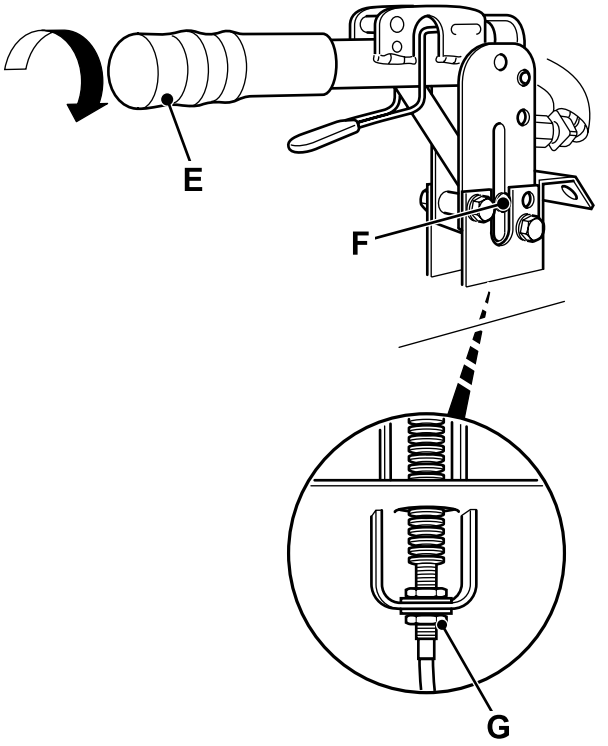
3 Release the two locknuts at **G** and adjust the cable length until the brake pads **B** are almost touching the disc **A**.

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* ***G****.*

4 Make sure there is adequate freedom of movement of operating lever **A** to ensure a positive brake application, and that the lever returns to the rest position when the parking brake is released.

5 Test the parking brake. ⇨ *Test Procedures (G3-5)*

Make final adjustments at the park brake lever if the brake fails the test. ⇨ *Adjustment (G3-6)*



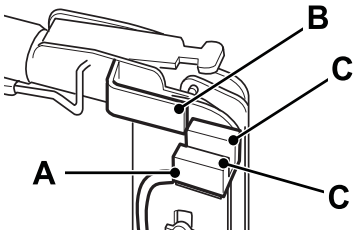
C022470

Fig 3.

Switch Adjustment

The park brake switch **A** is a reed type. It operates when the metal vane **B** moves between the switch faces **C**. The switch is not adjustable.

If switch failure is suspected check all the associated wires and connectors for damage. Ensure that the vane **B** moves between the switch faces **C** when the park brake is operated. If the switch has failed it must be renewed.



C030040

Fig 4.

Renewing the Brake Pads

⇨ *Fig 5. (G3-10)*

⚠ 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 park 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 park brake, park on level ground and put blocks 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 calliper from the axle mounting bracket. ⇨ *Removal and Replacement (G4-3)*

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 calliper).

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 stated in the specifications section. ⇨ *Specifications (G3-3)*

Note: It is recommended new pads are fitted when pads worn to the limit as adjustment may not be possible.

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 calliper. 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 calliper. 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 calliper. ⇨ *Removal and Replacement (G4-3)*

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

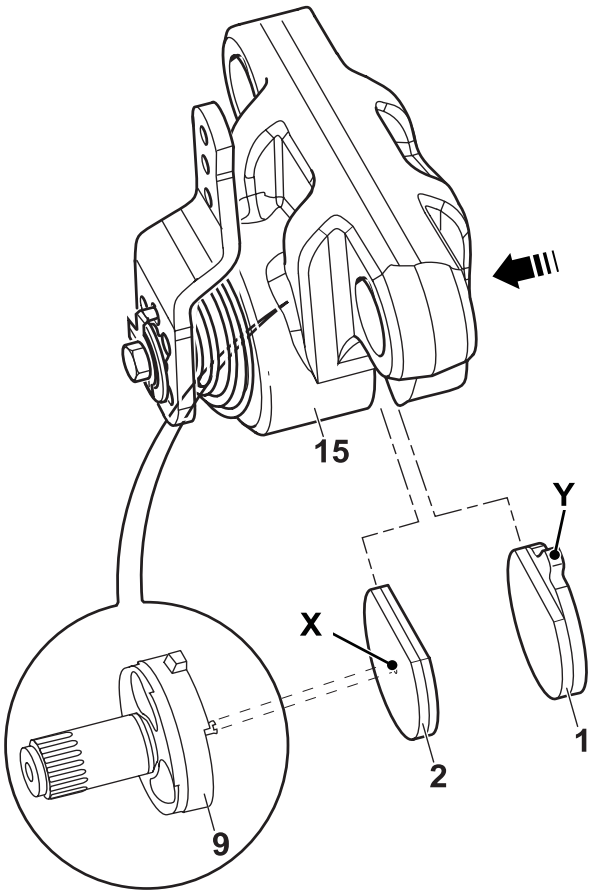


Fig 5. Brake Pads

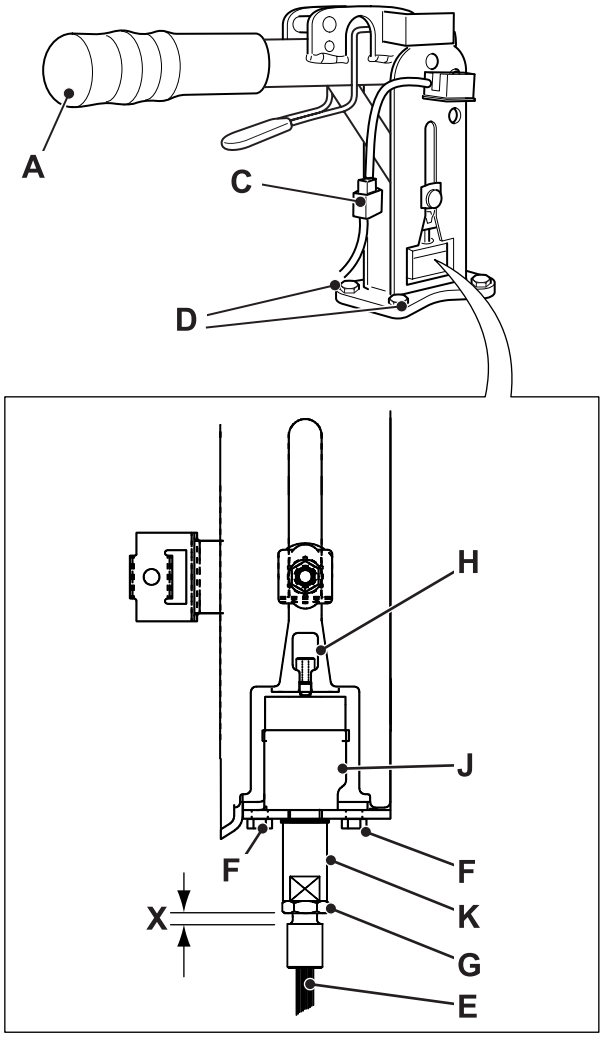
Renewing the Parkbrake Cable

⚠ WARNING

Before working on the park brake, park on level ground and put blocks 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.

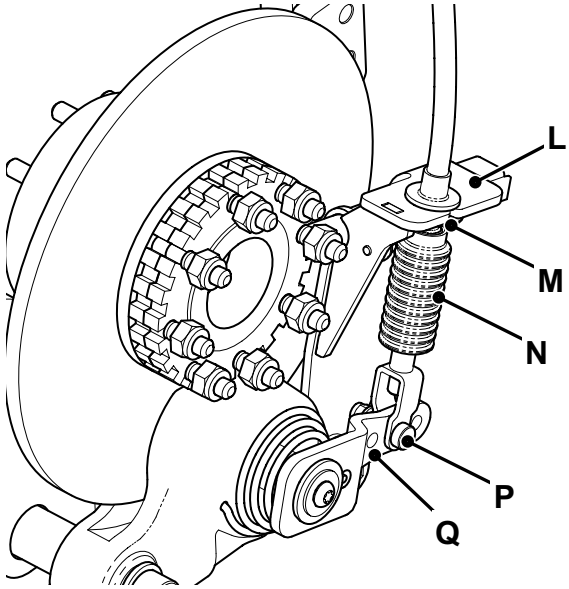
BRAK-8-8

Removal



C053140

Fig 6.



C107090-C1

Fig 7.

1 Release the parking brake lever **A** (lever horizontal).

2 Working at the park brake caliper, disconnect clevis **P**, note which of the three holes on the actuating lever **Q** is used.

3 Remove clip or loosen locknut **M** as applicable. Disconnect the cable **N** from the bracket **L**. Note the cable routing to the underside of the cab.

4 Working at the park brake lever, undo the gaiter fixings and pull up the gaiter (not shown).

5 Uncouple the park brake switch electrical connector **C**.

6 Undo the lever fixing bolts **D** and withdraw the lever assembly together with the cable **E**.

7 Measure and record dimension **X**.

8 Undo the 2 buffer bracket fixing bolts **F**.

9 Withdraw the cable sideways from the lever, disengaging the cable nipple from the clevis **H**. Remove the buffer assembly **J** from the cable.

Replacement

Replacement is the opposite of the removal procedure.

During the replacement procedure do this work also:

- Be sure to route the cable correctly.
- Ensure that the locknut **G** is screwed fully down. Adjust sleeve **K** to allow cable location to the lever assembly.
- Apply JCB Threadlocker to the buffer bracket fixing bolts **F**.
- Ensure that the buffer bracket assembly **J** is located correctly. Torque tighten the bolts **F**.
- Adjust the sleeve **K** and locknut **G** until dimension **X** is achieved (recorded during removal). Tighten the locknut.
- Ensure that the cable clevis **P** is connected at the correct hole in the caliper actuating lever **Q**.
- Ensure that the actuating lever **Q** is not being pulled by the cable when the parking brake lever is in the OFF (horizontal) position. If necessary adjust sleeve **K** until the actuating lever is allowed to return fully to its OFF position.
- Adjust the cable. ⇨ *Adjustment (🗋 G3-6)*

Table 2. Torque Settings

Item	Nm	kgf m	lbf ft
F	3	0.3	2.2

Park Brake Calliper

Introduction

This topic contains information about a machine DEVICE. Make sure you are referring to the correct device. Refer to the applications table.

Descriptions and procedures relate to the device and not related systems. For information about the systems refer to the relevant topics.

This topic is intended to help you understand what the device does and how it works. Where applicable it also includes procedures such as removal and replacement and dismantle and assemble.

⇨ *Related Topics (G4-2)*

⇨ *Removal and Replacement (G4-3)*

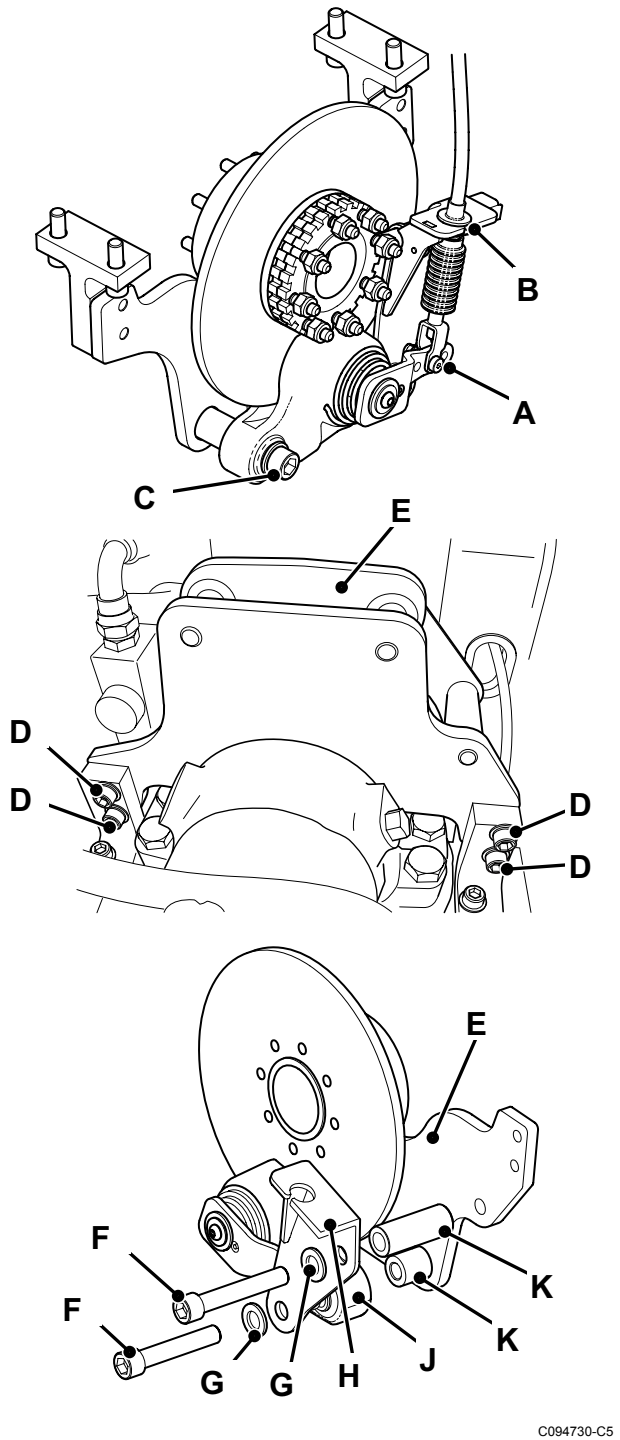
Related Topics

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The table lists other topics in the manual that contain information related to this topic. Refer to the applicable topics to complete your procedures. Where applicable the text in this section contains cross references to this page to help you find the correct information. Some machines have different systems and devices. Make sure you refer to the correct topic, refer to *Section 1 - Applications*.		
Sections	**Topic Titles**	**Sub Titles**
1	***Applications***	ALL
2	ALL (Care and Safety)(1)	ALL

(1) You must obey all of the relevant care and safety procedures.

Removal and Replacement



C094730-C5

Fig 1.

⚠ 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 park 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 park brake, park on level ground and put blocks 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

Park the machine and make it safe. Vent the hydraulic pressure. Obey the care and safety procedures. ⇨ *Removal and Replacement (G4-3)*

1 Release the parking brake lever (lever horizontal).

2 Disconnect clevis **A**, note which of the three holes on the lever is used.

3 Remove clip **B** and disconnect the cable from the bracket.

4 Support the calliper and mounting plate assembly **E**.

5 Use an allen key to remove the securing bolts **D**.

6 Remove the calliper and mounting plate assembly **E** from the machine.

7 Remove the parkbrake cable mounting bracket bolts **F** and washers **G**.

Note: *Make sure to retain the spacers **K**.*

8 Remove the parkbrake cable mounting bracket H.

9 Remove the mounting bolt **C** and washers.

10 Remove the calliper **J** from the mounting plate **E**.

Replacement

1 Locate the calliper **J** and parkbrake cable mounting bracket **H** on the mounting plate **E**.

2 Fit new mounting bolt **C** with hardened washer and torque tighten. ⇨ *Table 2. Torque Settings (G4-4)*.

3 Install the calliper and mounting plate assembly onto the machine.

4 Torque tighten the bolts **G**

5 Attach the cable to the mounting bracket **H** and secure in place with clip **B**.

6 Refit the clevis **A** into the relevant hole in the operating lever.

7 Apply the parkbrake.

8 With the parkbrake applied, torque tighten the bolts **D**. ⇨ *Table 2. Torque Settings (G4-4)*.

9 Make sure there is adequate freedom of movement of operating lever to ensure a positive brake application, and that the lever returns to the rest position when the parking brake is released.

10 Adjust the park brake cable. ⇨ *Renewing the Parkbrake Cable (G3-11)*. Never unscrew the clevis to adjust the cable.

11 Check parkbrake operation.

Table 2. Torque Settings

Item	Nm	kgf m	lbf ft
D	125	12.7	92.2
C and **F**	311	31.7	229.4

Park Brake Disc

Introduction

This topic contains information about a machine DEVICE. Make sure you are referring to the correct device. Refer to the applications table.

Descriptions and procedures relate to the device and not related systems. For information about the systems refer to the relevant topics.

This topic is intended to help you understand what the device does and how it works. Where applicable it also includes procedures such as removal and replacement and dismantle and assemble.

⇨ *Related Topics (G5-2)*

⇨ *Removal and Replacement (G5-3)*

Related Topics

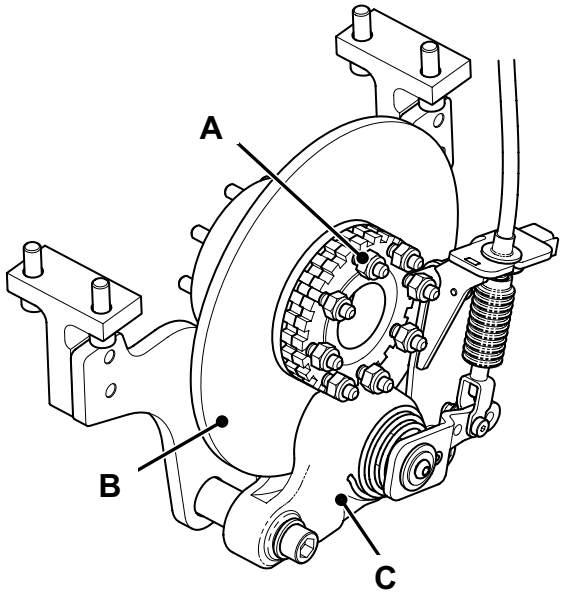
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Sections	**Topic Titles**	**Sub Titles**
1	***Applications***	ALL
2	ALL (Care and Safety)(1)	ALL
F	***Rear Axle***	***Removal and Replacement***
G	***⇒ Park Brake Calliper (G4-1)***	***⇒ Removal and Replacement (G4-3)***

(1) You must obey all of the relevant care and safety procedures.

Removal and Replacement

Removal



C107090-C2

Fig 1.

1 Remove the rear axle from the machine. Refer to ***Section F - Rear Axle***. ⇨ ***Related Topics (G5-2)***

2 Remove the park brake calliper **C**. ⇨ ***Park Brake Calliper (G4-1)***

3 Lift off the brake disc **B**. If necessary use a soft face hammer to help remove the disc.

Replacement

Replacement is the opposite of the removal procedure.

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Park Brake Switch

Introduction

This topic contains information about a machine DEVICE. Make sure you are referring to the correct device. Refer to the applications table.

Descriptions and procedures relate to the device and not related systems. For information about the systems refer to the relevant topics.

This topic is intended to help you understand what the device does and how it works. Where applicable it also includes procedures such as removal and replacement and dismantle and assemble.

⇨ *Related Topics (G6-2)*

⇨ *Removal and Replacement (G6-3)*

Related Topics

Table 1. Related Topics in This Publication

The table lists other topics in the manual that contain information related to this topic. Refer to the applicable topics to complete your procedures. Where applicable the text in this section contains cross references to this page to help you find the correct information. Some machines have different systems and devices. Make sure you refer to the correct topic, refer to *Section 1 - Applications*.		
Sections	**Topic Titles**	**Sub Titles**
1	Applications	ALL
2	ALL (Care and Safety)(1)	ALL

(1) You must obey all of the relevant care and safety procedures.

Removal and Replacement

Removal

1 Park the machine and make it safe. Obey the care and safety procedures. ⇨ *Related Topics (G6-2)*

2 Put chocks under the wheels. Release the park brake.

3 Remove the rubber gaiter **A**.

4 Disconnect the electrical connector from the switch **C**.

5 Remove the electrical connector **D** from the park brake assembly.

6 Hold the switch **B** and remove screw **E**.

7 Remove the switch **B**.

Replacement

Replacement is the opposite of the removal procedure. During the replacement procedure do this work also:

– To align the switch correctly, engage the switch location dowel **F** with hole in the mounting bracket **G**.

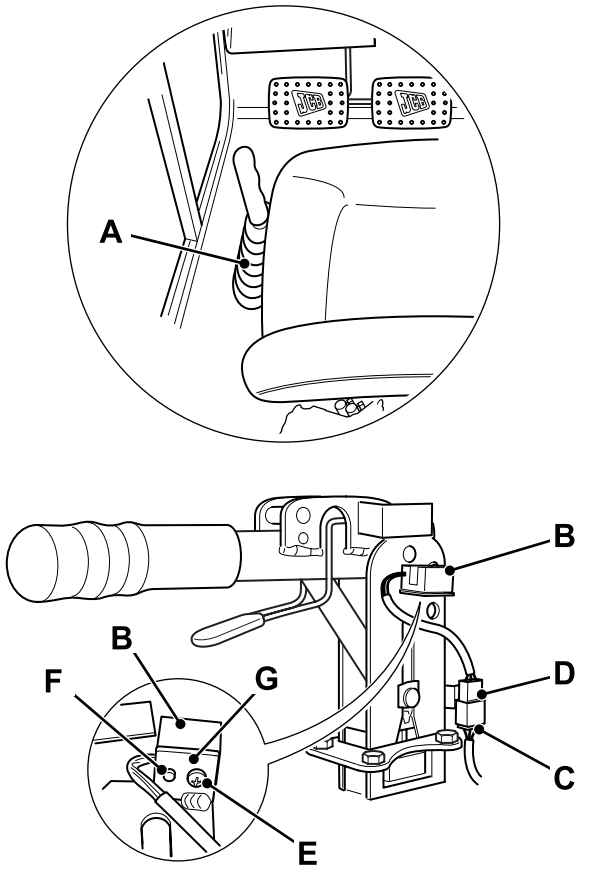


Fig 1.

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Master Cylinder

Introduction

This topic contains information about a machine DEVICE. Make sure you are referring to the correct device. Refer to the applications table.

Descriptions and procedures relate to the device and not related systems. For information about the systems refer to the relevant topics.

This topic is intended to help you understand what the device does and how it works. Where applicable it also includes procedures such as removal and replacement and dismantle and assemble.

⇨ *Related Topics (G7-2)*

⇨ *Removal and Replacement (G7-3)*

Related Topics

Table 1. Related Topics in This Publication

The table lists other topics in the manual that contain information related to this topic. Refer to the applicable topics to complete your procedures. Where applicable the text in this section contains cross references to this page to help you find the correct information. Some machines have different systems and devices. Make sure you refer to the correct topic, refer to *Section 1 - Applications*.		
Sections	**Topic Titles**	**Sub Titles**
1	***Applications***	ALL
2	ALL (Care and Safety)(1)	ALL
3	***Routine Maintenance***	***Checking the Foot Brake Fluid Level***
3	***Routine Maintenance***	***Checking the Hydraulic Fluid Level***
G	***⇨ Non Boosted Single Axle Service Brakes SYSTEM (🗋 G1-1)***	ALL
G	***⇨ Boosted Single Axle Service Brakes SYSTEM (🗋 G2-1)***	ALL

(1) You must obey all of the relevant care and safety procedures.

Removal and Replacement

Non Boosted Braking System

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

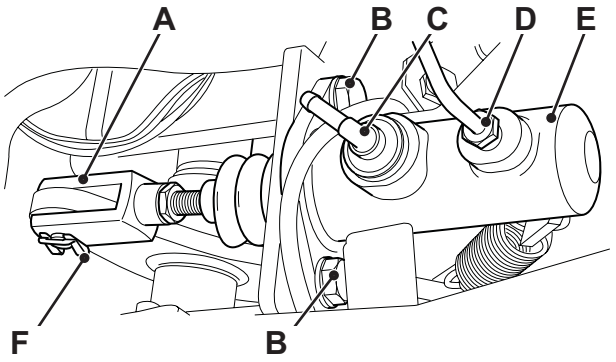


Fig 1.

1 Remove the instrument panel. Refer to ***Section B - Cab***.

2 Remove clip **F** and clevis pin to disconnect the master cylinder operating rod clevis **A** from the brake pedal mechanism.

3 Disconnect plastic feed pipe **C** from the brake fluid reservoir and either blank off the pipe or drain the reservoir.

4 Disconnect the master cylinder output pipe **D**. Plug the cylinder port and blank off the hose (or pipe) to prevent ingress of dirt.

5 Remove screws **B** and lift the master cylinder **E** clear of the machine.

Replacement

Replacement is the opposite of the removal procedure.

During the replacement procedure do this work also:

– Once the master cylinder is installed and the pipework connected check the brake fluid reservoir (see ***Section 3 - Brakes***) and then bleed the brake system. Refer to the system topic. ⇨ ***Related Topics (G7-2)***

– Check the operation of the brake light switch. Adjust if necessary. Refer to the system topic. ⇨ ***Related Topics (G7-2)***

Boosted Braking System

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

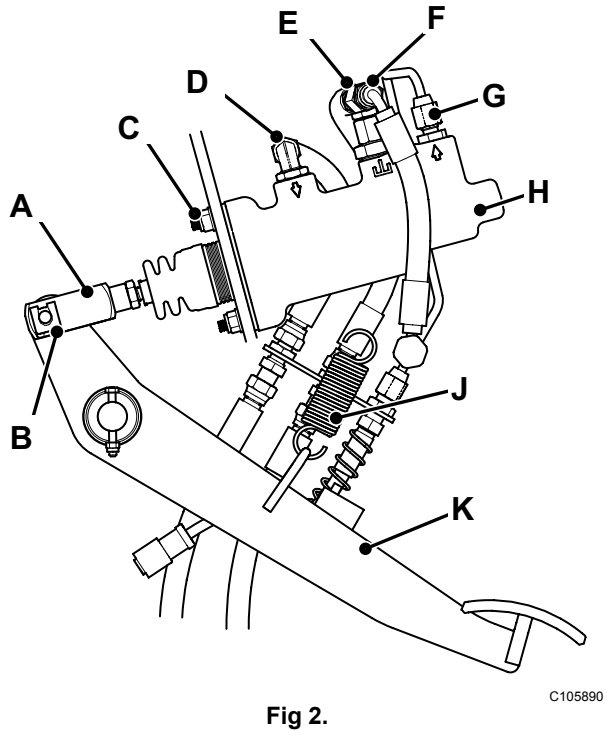


Fig 2.

1 Remove the instrument panel. Refer to ***Section B - Cab***.

2 Disconnect the spring **J** from the brake pedal lever **K**.

3 Remove clip **B** and clevis pin to disconnect the master cylinder operating rod clevis **A** from the brake pedal lever **K**.

4 Put a label on the hydraulic hoses to aid identification when replacing.

5 Disconnect the hoses **D**, **E** and **F** from the master cylinder. Plug the cylinder ports and blank off the hoses to prevent ingress of dirt.

6 Disconnect the master cylinder output pipe **G**. Plug the cylinder port and blank off the pipe to prevent ingress of dirt.

7 Remove screws **C** and lift the master cylinder **H** clear of the machine.

Replacement

Replacement is the opposite of the removal procedure.

During the replacement procedure do this work also:

- Once the master cylinder is installed and the pipework connected check the hydraulic tank level (refer to **Section 3 - Hydraulics**) and then bleed the brake system. Refer to the system topic. ⇨ ***Related Topics (G7-2)***
- Torque tighten the securing nuts **C** and hose connectors **D**, **E**, **F** and **G**. ⇨ ***Table 2. Torque Settings (G7-4)***
- Check the operation of the brake light switch. Adjust if necessary. Refer to the system topic. ⇨ ***Related Topics (G7-2)***

Table 2. Torque Settings

Item	Nm	kgf m	lbf ft
C	22	2.2	16.2
D	24-27	2.4-2.7	17.7-19.9
E	24-27	2.4-2.7	17.7-19.9
F	34	3.4	25
G	18-22	1.8-2.2	13.2-16.2

Fluid Reservoir

Introduction

This topic contains information about a machine DEVICE. Make sure you are referring to the correct device. Refer to the applications table.

Descriptions and procedures relate to the device and not related systems. For information about the systems refer to the relevant topics.

This topic is intended to help you understand what the device does and how it works. Where applicable it also includes procedures such as removal and replacement and dismantle and assemble.

⇨ *Related Topics (G8-2)*

⇨ *Removal and Replacement (G8-3)*

Related Topics

Table 1. Related Topics in This Publication

The table lists other topics in the manual that contain information related to this topic. Refer to the applicable topics to complete your procedures. Where applicable the text in this section contains cross references to this page to help you find the correct information. Some machines have different systems and devices. Make sure you refer to the correct topic, refer to *Section 1 - Applications*.		
Sections	**Topic Titles**	**Sub Titles**
1	***Applications***	ALL
2	ALL (Care and Safety)(1)	ALL
3	***Routine Maintenance***	***Checking the Foot Brake Fluid Level***
G	***⇨ Non Boosted Single Axle Service Brakes SYSTEM (G1-1)***	ALL

(1) You must obey all of the relevant care and safety procedures.

Removal and Replacement

Removal

1 Make sure that the engine cannot be started.

2 Remove the cover at the front of the cab. Refer to ***Section 3 - Brakes***. ⇨ *Related Topics (G8-2)*

3 Clean the reservoir **A** and tube **B**.

4 Seal off tube **B** with a clamp.

5 Remove and discard the clip **C**.

Note: *When tube **B** is removed from the reservoir there will be brake fluid leakage. Be prepared.*

6 Remove tube **B** from the reservoir. Put a cap on the pipe on the bottom of the reservoir.

7 Hold the reservoir and remove the nut **D** and bolt **E**.

8 Remove the reservoir. Keep the reservoir vertical.

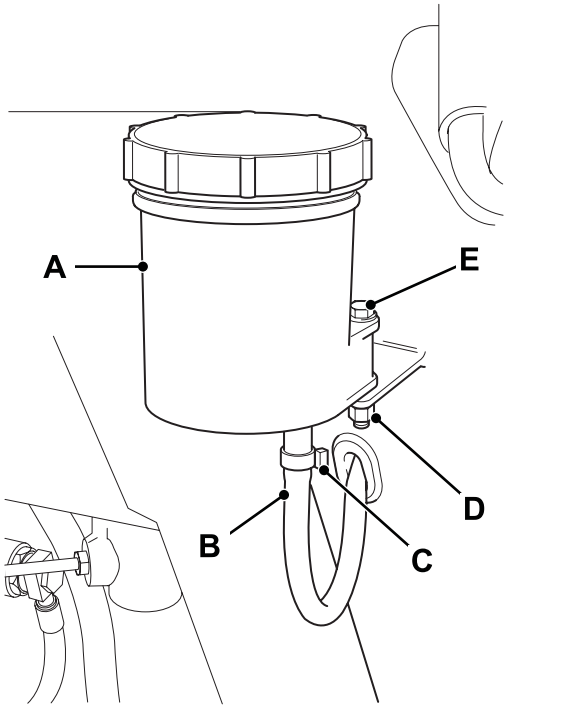


Fig 1.

Replacement

Replacement is the opposite of the removal procedure.

During the replacement procedure do this work also:

- Examine the tube **B**. If it is defective replace it with a new one.
- Use a new clip **C**.
- Bleed the brakes. ⇨ *Bleeding (G1-11)*

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Brake Manifold

Introduction

This topic contains information about a machine DEVICE. Make sure you are referring to the correct device. Refer to the applications table.

Descriptions and procedures relate to the device and not related systems. For information about the systems refer to the relevant topics.

This topic is intended to help you understand what the device does and how it works. Where applicable it also includes procedures such as removal and replacement and dismantle and assemble.

⇨ *Related Topics (G9-2)*

⇨ *Removal and Replacement (G9-3)*

Related Topics

Table 1. Related Topics in This Publication

The table lists other topics in the manual that contain information related to this topic. Refer to the applicable topics to complete your procedures. Where applicable the text in this section contains cross references to this page to help you find the correct information. Some machines have different systems and devices. Make sure you refer to the correct topic, refer to *Section 1 - Applications*.		
Sections	**Topic Titles**	**Sub Titles**
1	***Applications***	ALL
2	ALL (Care and Safety)(1)	ALL
3	***Routine Maintenance***	***Checking the Foot Brake Fluid Level***
G	***⇨ Boosted Single Axle Service Brakes SYSTEM (G2-1)***	ALL

(1) You must obey all of the relevant care and safety procedures.

Removal and Replacement

⚠ WARNING

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

BRAK-1-4

Removal

1 Switch off the engine.

2 Operate the brake pedal a minimum of 6 times to release the stored pressure in the brake system.

3 Remove the rear and centre undershields. Refer to ***Section 3 - Access Panels***.

4 Put a label on the hoses **B** to aid identification during replacement.

5 Disconnect the hoses **B** from the manifold **C**.

6 Remove the nuts and bolts **A** and the manifold **C** from the machine.

Note: *There are washers between the chassis and the manifold make sure to retrieve these.*

Replacement

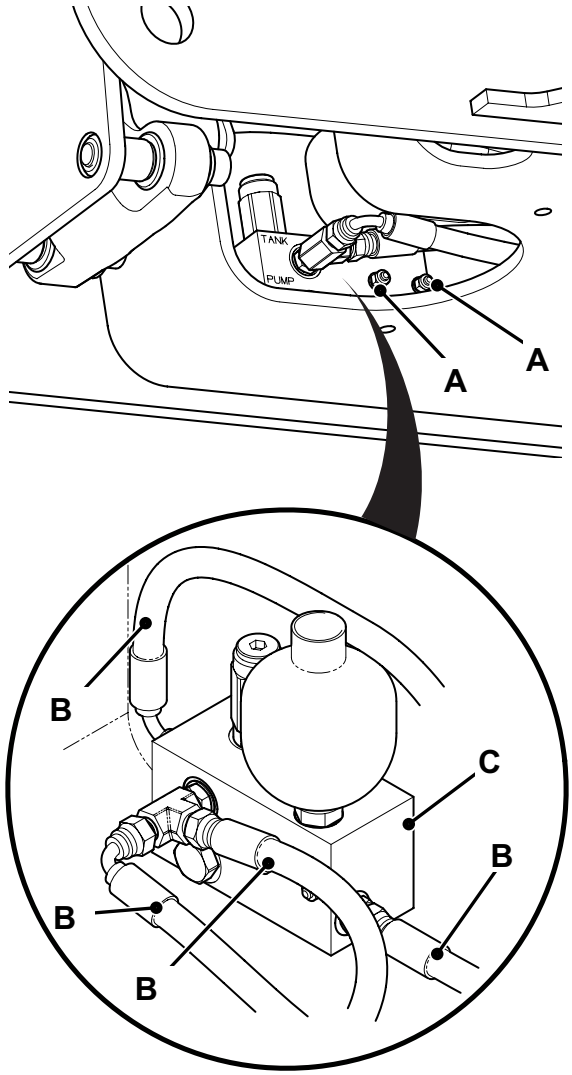
Replacement is the opposite of the removal procedure.

During the replacement procedure do this work also:

- Make sure to install 1 washer on each bolt **A** between the manifold **C** and chassis.
- Make sure to phase the hoses as shown.
- Torque tighten the securing nuts **A**. ⇨ ***Table 2. Torque Settings (G9-3)***
- Bleed the brake system.

Table 2. Torque Settings

Item	Nm	kgf m	lbf ft
A	10	1.0	7.3



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Fig 1.

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