



## Section S

# Suspension

Service Manual - JCB 7000 Series Fastrac

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# Technical Data

## Front and Rear Suspension

**Table 1. Pressures**

|   | bar | kgf/cm <sup>2</sup> | lbf/in <sup>2</sup> |
|---|-----|---------------------|---------------------|
| Pressure Maintenance Valve                    |     |                     |                     |
| Cut-out Pressure                              | 200 | 204                 | 2900                |
| Cut-in Pressure                               | 180 | 184                 | 2610                |
| Accumulator Charge Pressure                   | 75  | 76.5                | 1087                |
| Gas Spring Charge (Low Pressure Gas Springs)  | 26  | 26.5                | 377                 |
| Gas Spring Charge (High Pressure Gas Springs) | 35  | 36.6                | 508                 |

**Note:** There are two gas springs per wheel, one low pressure and one high pressure. The pressure in bar is stamped on the body. → [Accumulator and Gas Spring \(□ S-8\)](#)

**Table 2. Flow Rate**

|              |  |
|--------------|--|
| Maximum flow | 36.5 litres/min (8 UK gal/min, 9.6 US gal/min) |
|--------------|--|

# Descriptions

## Front and Rear Suspension Control

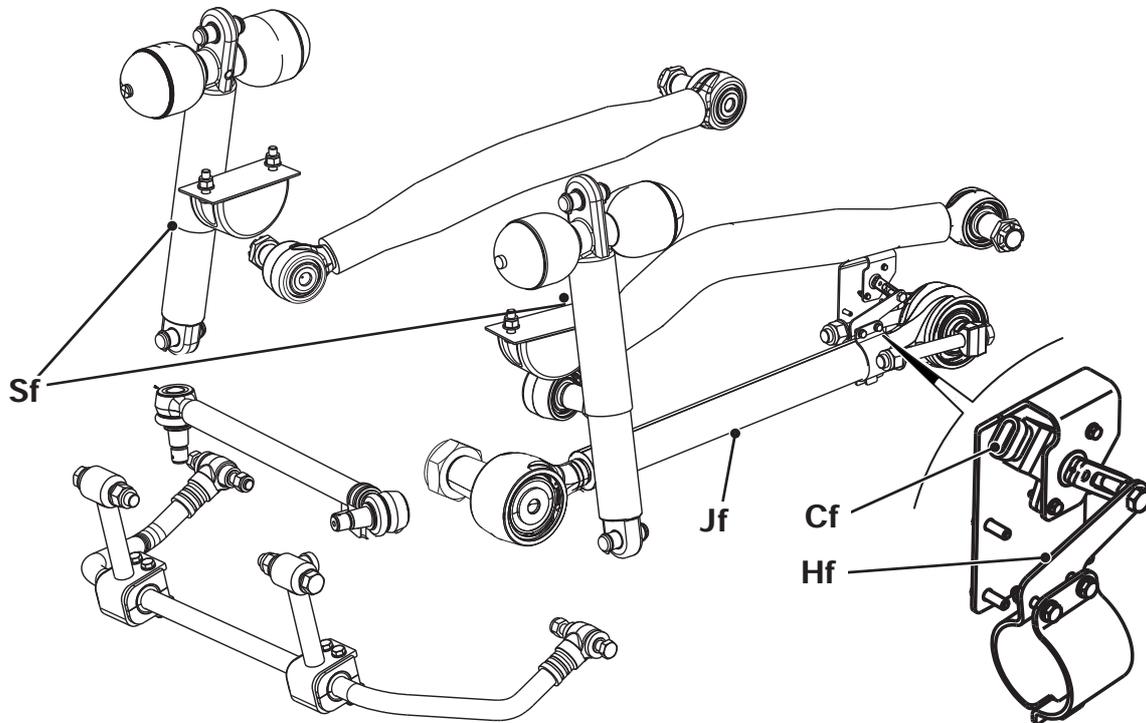


Fig 1.

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The front and rear suspension system is controlled by an electronic control unit (ECU1) in the cab.

The front and rear suspension linkages are shown on separate illustrations:

Front → [Fig 1. \(□ 2\)](#)

Rear → [Fig 2. \(□ 3\)](#)

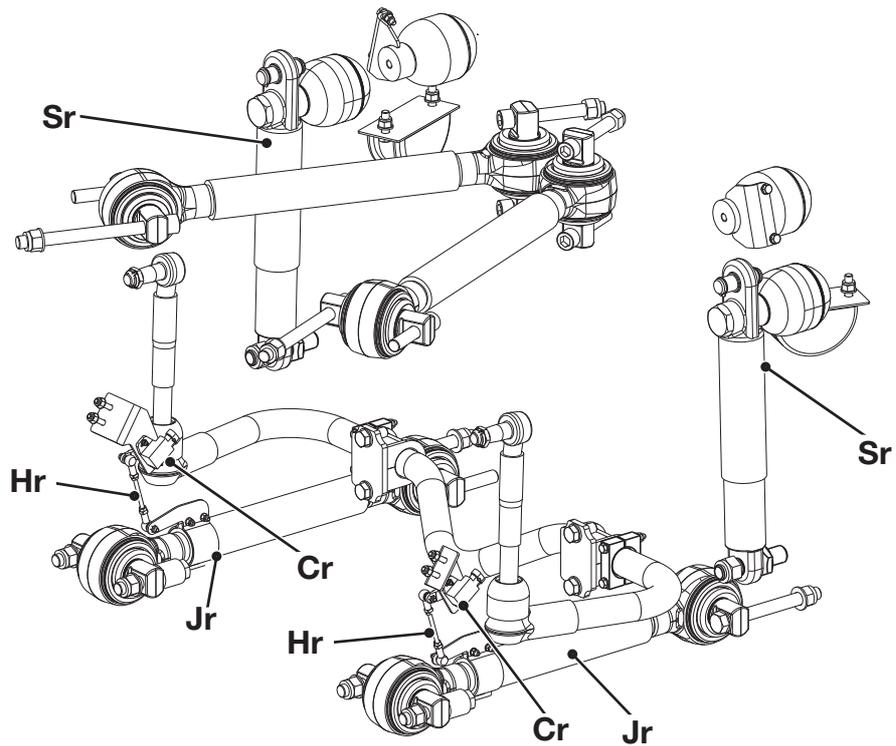


Fig 2.

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The front suspension cylinders **Sf** and the rear suspension cylinders **Sr** are fed via the six solenoid valves **CT7** to **CT12** which are located in valve block **V** and detailed in the table. Valve block **V** is located in the brake pannier.

⇒ Fig 3. (□ 3)

Table 3.

| Cylinder             | Raise Solenoid Valve | Lower Solenoid Valve |
|----------------------|----------------------|----------------------|
| Rear Left Hand       | CT7                  | CT8                  |
| Rear Right Hand      | CT9                  | CT10                 |
| Front Left and Right | CT11                 | CT12                 |

**Note:** Solenoid valves **CT7**, **CT9** and **CT11** are not shown but are located on the far side of the valve block **V** opposite solenoid valves **CT8**, **CT10** and **CT12**. Solenoid valve **CT4** controls the differential lock.

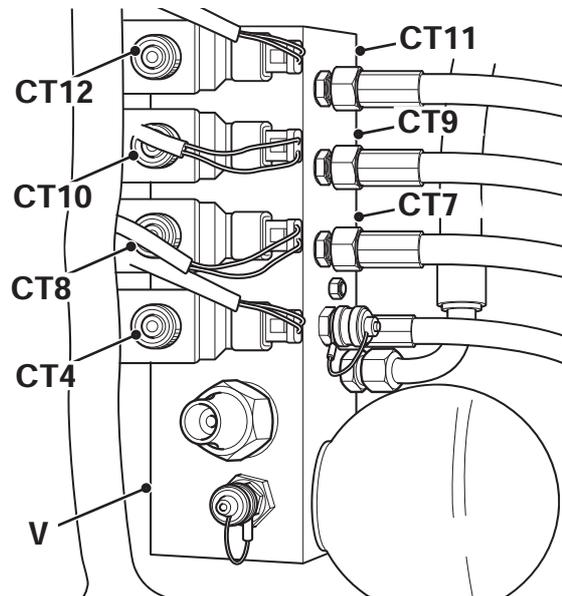


Fig 3.

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## Front and Rear Suspension Control

The front suspension solenoid valves are controlled by one potentiometer **Cf** which is connected by operating link **Hf** to the control arm **Jf**. → [Fig 1. \(□ 2\)](#)

The rear suspension solenoid valves are controlled by two potentiometers **Cr** which are connected by operating links **Hr** to the control arms **Jr**. → [Fig 2. \(□ 3\)](#)

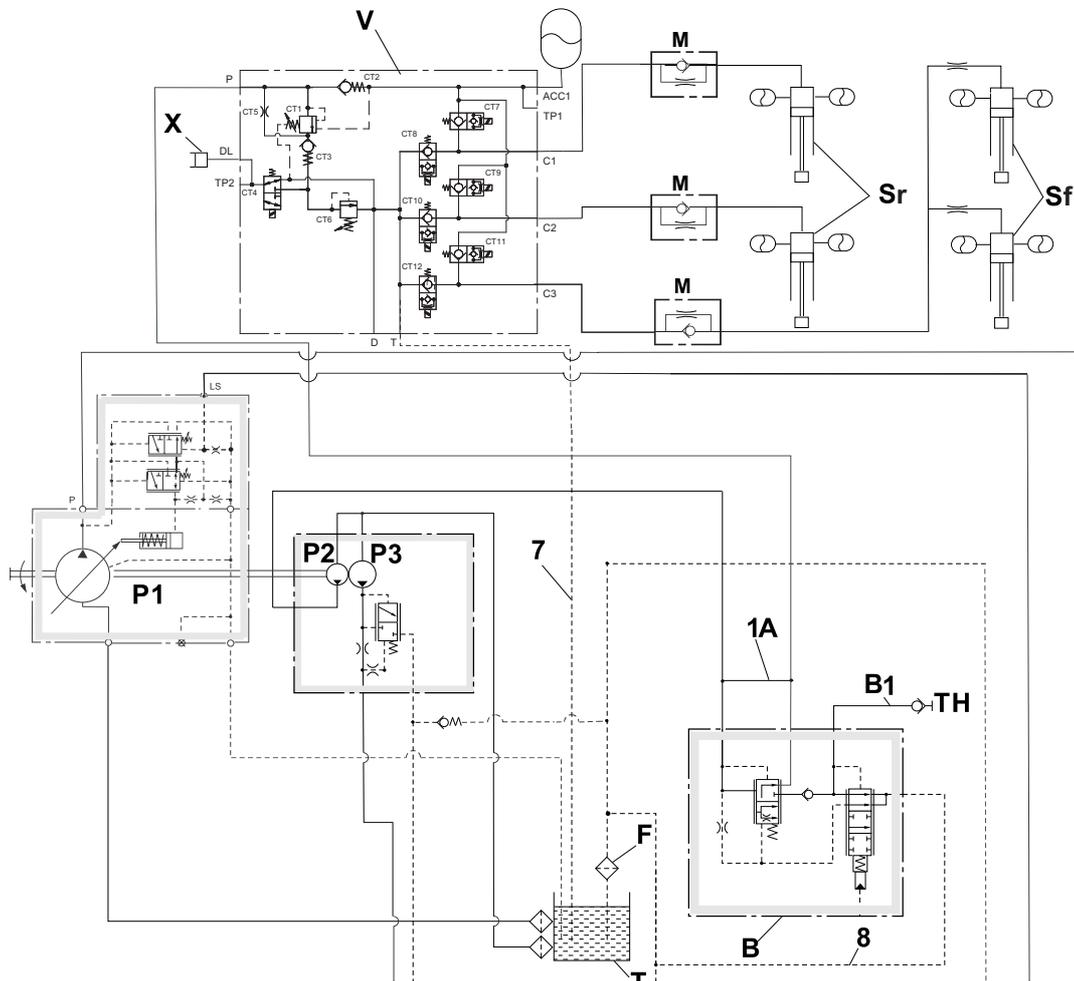
The solenoid valves open or close in response to axle vertical travel in order to regulate the flow to and from the suspension cylinders.

In operation, as increasing loads cause the chassis to lower in relation to the axles, the potentiometers **Cf/Cr** are displaced by the operating links **Hf/Hr**. The positions of the potentiometers control the solenoid valves which then

open to allow oil flow into the system, pressurising the gas springs and restoring the pre-set ride height by means of cylinders **Sf/Sr**. At this point the solenoid valves close, trapping oil within the system. The extra pressure in the gas springs increases suspension stiffness, thereby maintaining vehicle pitching control.

As the load is taken off the chassis, it is lifted by the pressure retained in the system. This action once again displaces the potentiometers, but in the opposite direction, opening the solenoid valves to tank.

The reducing pressure allows the chassis to settle until the solenoid valves close, retaining the new volume of oil in the system and again restoring the ride height to the pre-set level.



**Fig 4. Complete Suspension Circuit**

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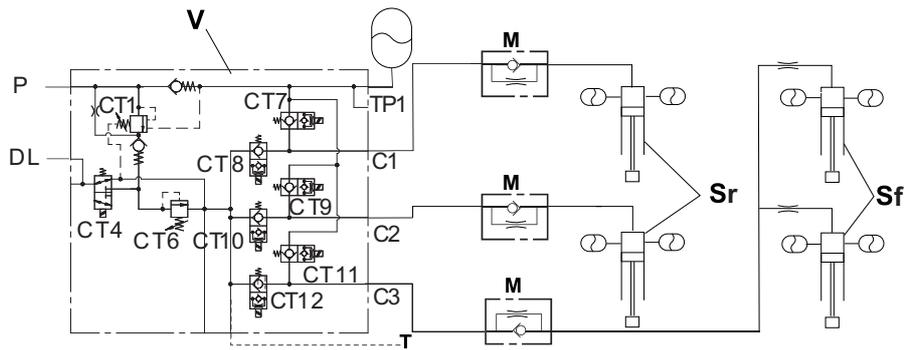


Fig 5. Suspension Valve and Cylinders Detail

C071690

# Pressure Testing

## Front and Rear Suspension

### Pressure Maintenance Valve

#### WARNING

The procedure below must be carried out with the engine running. Apply the park brake, block the wheels and ensure that no-one enters the cab.

SUS-1-1

Connect a 0-400 bar (0 - 6000 lbf/in<sup>2</sup>) gauge to test point TP1. → [Fig 6. \(□ S-7\)](#)

With engine running, push up one of the potentiometer operating links and check the gauge reading which should be between the cut-in and cut-out pressures. → [Technical Data \(□ S-1\)](#)

If the reading is incorrect, adjust the valve at CT1.

**Note:** *If this is the first time the valve has been adjusted, the adjusting screw will be covered by a plastic cap which should be removed and discarded.*

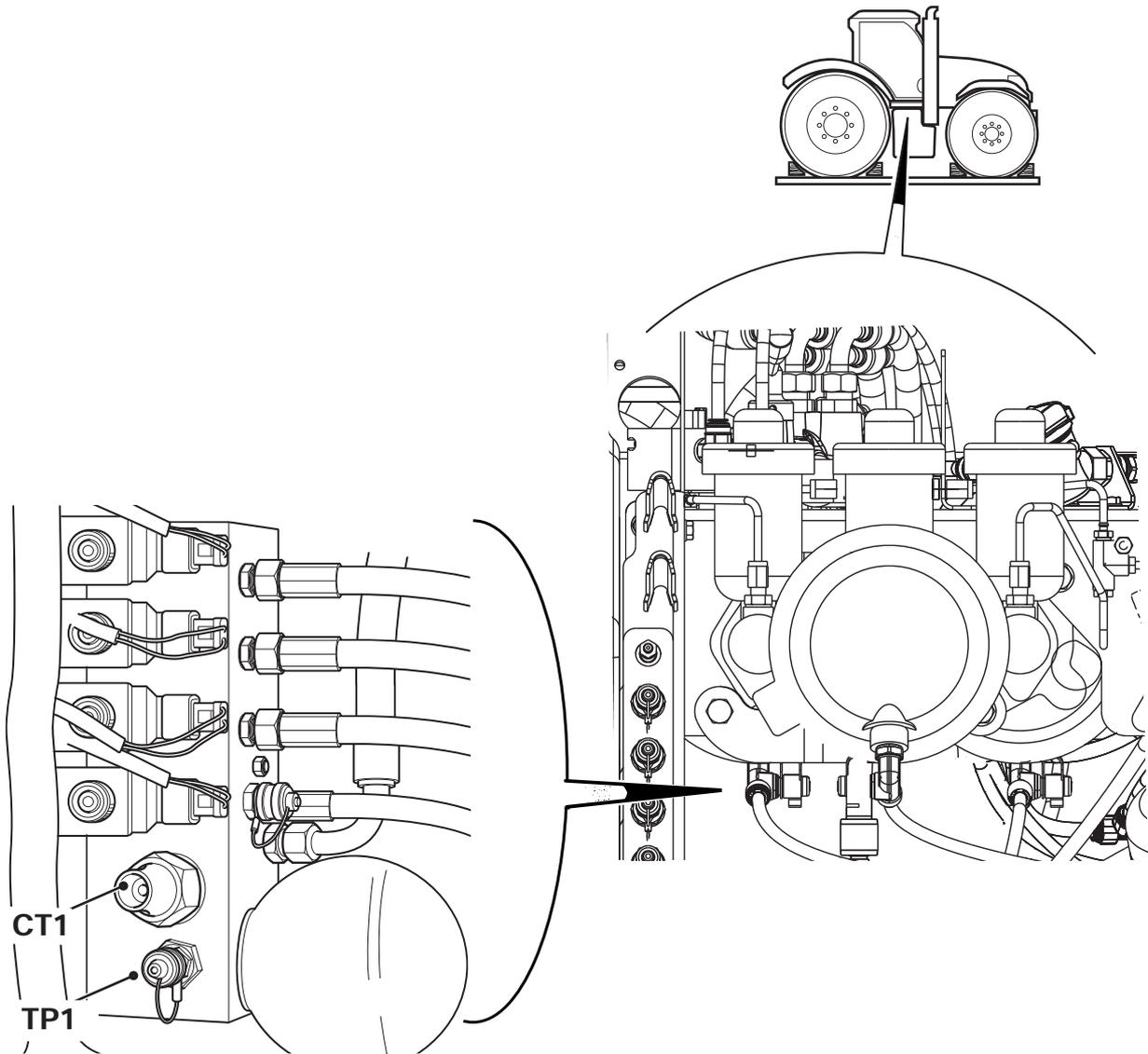


Fig 6.

C070570-B7

### Accumulator and Gas Spring

**Note:** Gas spring and accumulator are similar in appearance but can be positively identified by the nominal pressure (bar) stamped on the body near boss **B**:

- 26 or 35      Indicates gas spring → [Technical Data \(S-1\)](#)
- 75             Indicates accumulator

Remove the gas spring **G** or accumulator **A** from the machine and screw it into adapter block **X**, part number 892/00314.

Connect a hand pump and a 0 to 400 bar (0 to 6000 lbf/in<sup>2</sup>) pressure gauge.

Operate the hand pump and watch the reading on the gauge.

If the gas spring or accumulator is in good condition, the pressure should rise steadily to the charge pressure, see Technical Data) and then rise much more slowly for a period before climbing again.

If the pressure continues to rise steadily to well past the charge pressure, the diaphragm is ruptured and the unit must be renewed.

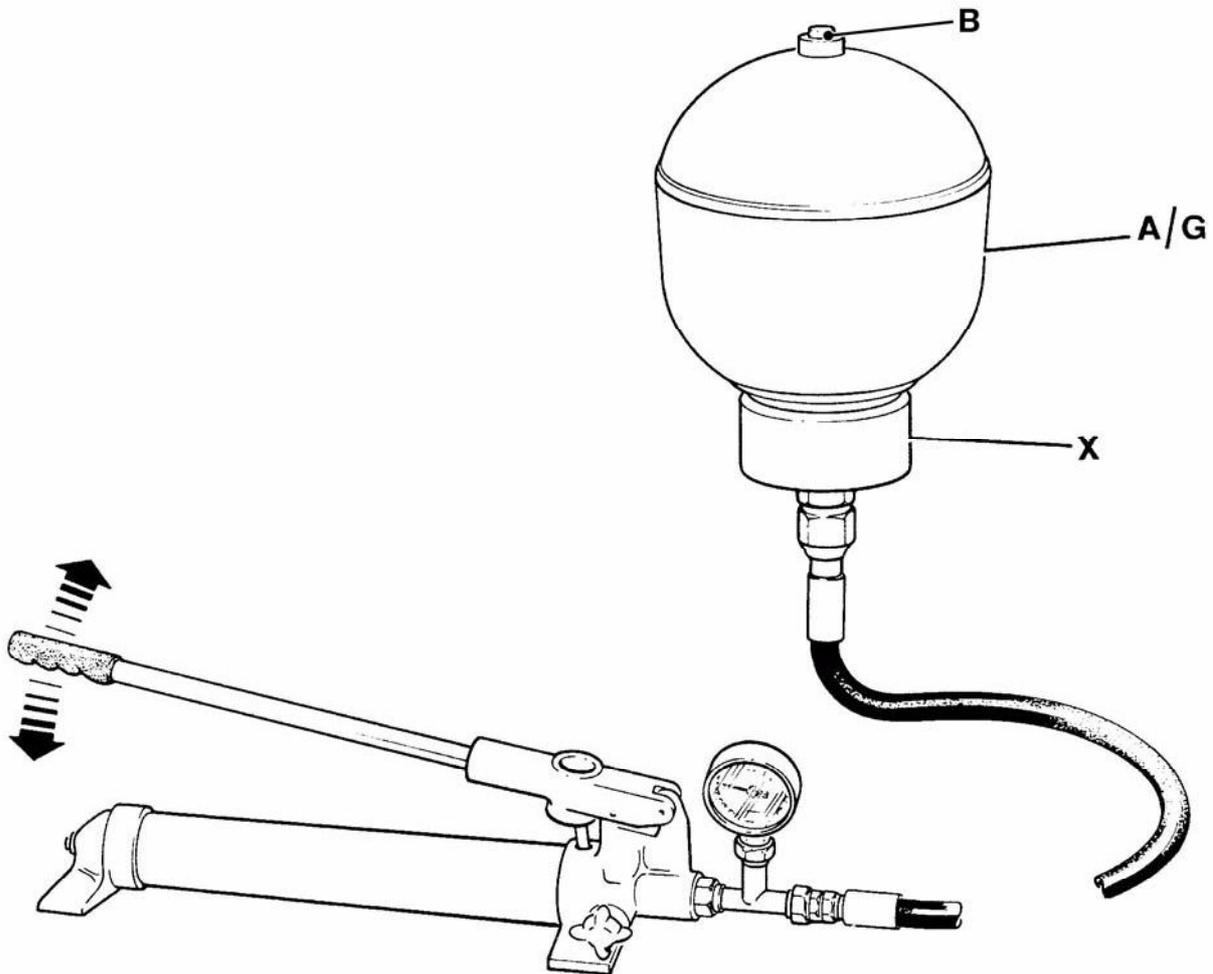


Fig 7.

162220-B1

# Suspension Calibration

## Introduction

The following calibration procedure is for both front and rear suspension.

Calibration is necessary after replacement of any of the following:

- Suspension potentiometer (angle sensor).
- Suspension potentiometer operating link
- Lower suspension link (control arm)
- ECU1 (Fastrac Central Controller)

The 7000 series uses a different procedure from other Fastracs. On a 7000 series the distance between the underside of the chassis rail and the axle casing is saved during calibration as 110 mm (4.3 inches).

Special calibration tools are needed to support the chassis. These will need to be made as detailed on the drawings in **Special Tools (Section 1)**. Use these new tools due to the axle trumpet design and to avoid variations in bump stop compression.

### To Access the Suspension Calibration Mode

**Important:** Be aware that this process is time critical - read the following steps before you start.

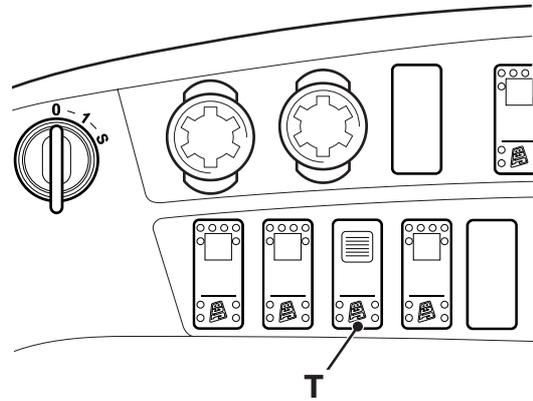


Fig 8.

C039340-B12

- 1 Apply the park brake.
- 2 Make sure the transport switch **T** is not engaged.
- 3 Switch the Ignition 'On'.
- 4 As the first instrument panel buzzer has finished sounding and within 10 seconds after you have switched on the ignition, cycle the transport switch on and off twice.

The instrument panel will display 'SUSP CAL' for a short time. Now start Calibration → [Calibration Mode \(S-10\)](#):

## Calibration Mode

**Note:** If at any point during calibration, the instrument panel displays 'FAILED', note which stage it was at, exit from calibration and use the Service Master Datalog tool to retrieve the error codes from the error log.

- 1 Access the Calibration Mode → [To Access the Suspension Calibration Mode \(S-9\)](#)

### WARNING

The procedure below must be carried out with the engine running. Apply the park brake, block the wheels and ensure that no-one enters the cab.

SUS-1-1

- 2 Start the engine when the instrument panel displays 'START'.

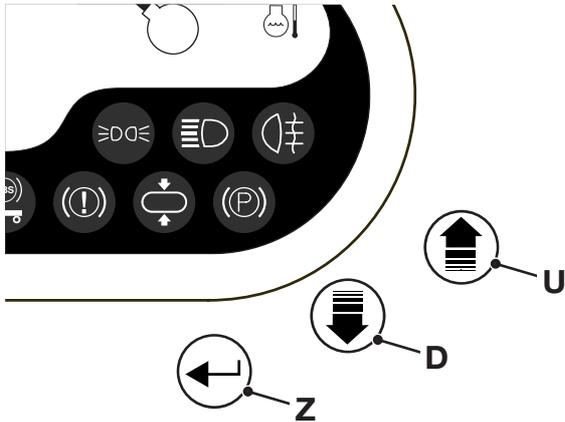


Fig 9.

C039350-B6

- 3 When 'RS RAISE' is displayed, press and hold in button **C** and the rear suspension will raise. (Both rear solenoids are energised to raise the rear suspension.) Keep button **C** depressed until the rear suspension is fully raised.

**Note:** If the suspension is fully down on the bump stops, there may be a delay before the suspension starts to raise.

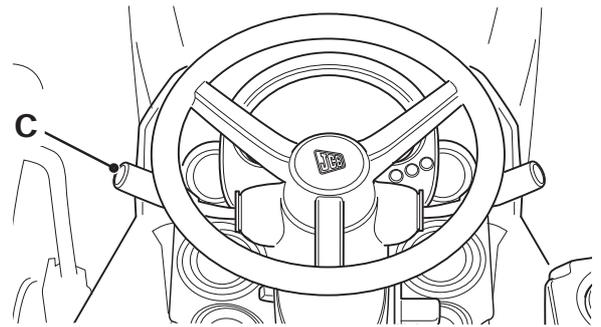


Fig 10.

C039510

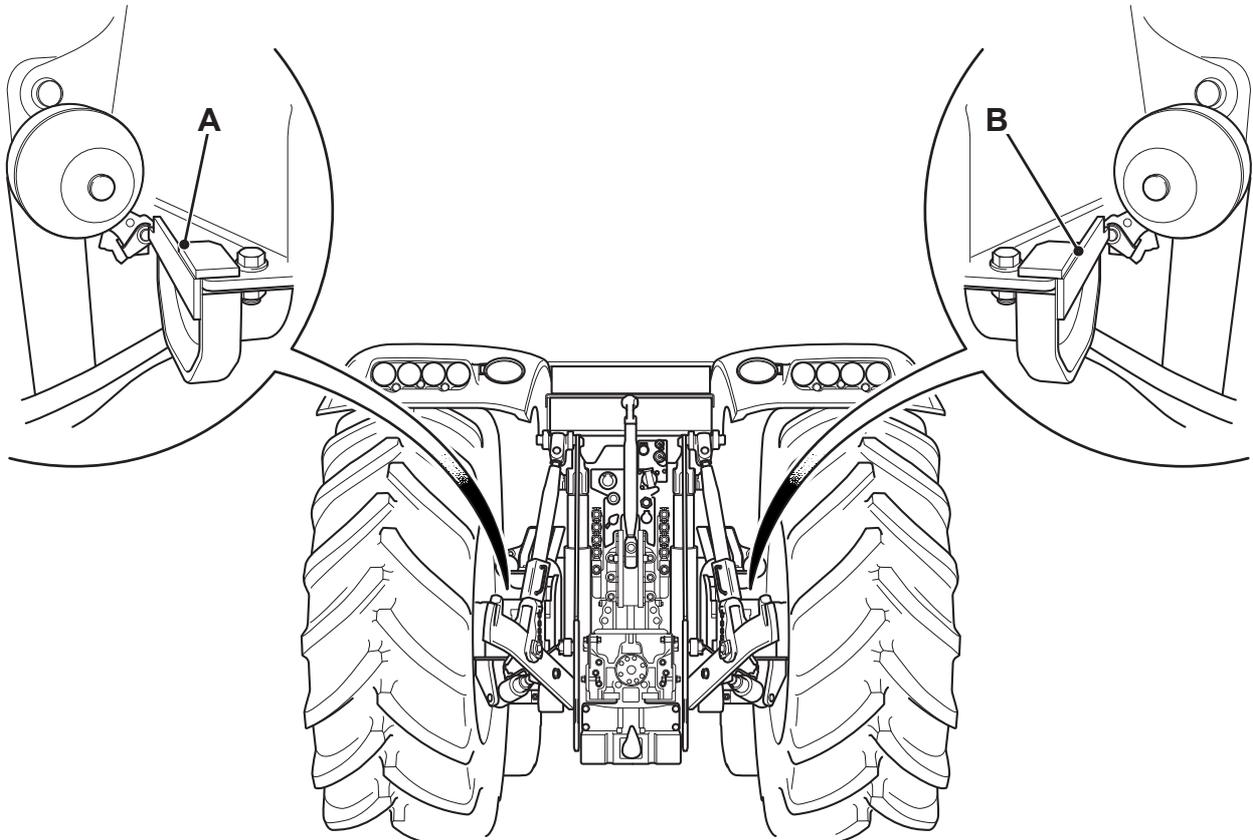


Fig 11.

C088500-B1

- 4 Place the special calibration tools **A** and **B** between the rear axle and the chassis as shown. → [Fig 11.](#) ([□ S-11](#)) These tools will need to be made as detailed on the drawings in **Special Tools (Section 1)**.

**CAUTION**

Keep clear of the chassis members as they are lowering otherwise you could be trapped between them and the axle casing.

SUS-1-6

- 5 Use down arrow **D** to scroll down to 'RS LOWER'.
- 6 Press button **C** once and release. The suspension will lower on to the calibration tools.

- 7 The instrument panel will display the position of the rear suspension in the following format:

'LxxxRyyy'

The actual figures 'xxx' indicate the left hand suspension height signal.

The actual figures 'yyy' indicate the right hand suspension height signal. These can also be monitored in JCB Service Master.

- 8 Let the rear suspension settle fully onto the calibration tools. When the suspension appears to have stopped moving, leave it 30 seconds more to make sure it has fully settled.

- 9 Press button **C** once to store the values. (These should be between 350 and 575 each.)

The instrument panel will display 'OK' if the calibration values are acceptable.

If the instrument panel displays 'FAILED', a fault code will appear on the touch screen.

- 10 Use arrow **D** to scroll down to 'RS REL'.
- 11 Press and hold in button **C** and the rear suspension will raise.

- 12 Remove the calibration tools from between the rear axle and the chassis.

- 13 Use arrow **D** to scroll down to 'FS RAISE'.

- 14 When 'FS RAISE' is displayed, press and hold in button **C** and the front suspension will raise. Keep button **C** depressed until the front suspension is raised enough to allow you to fit the calibration tools.

**Note:** If the suspension is fully down on the bump stops, there may be a delay before the suspension starts to raise.

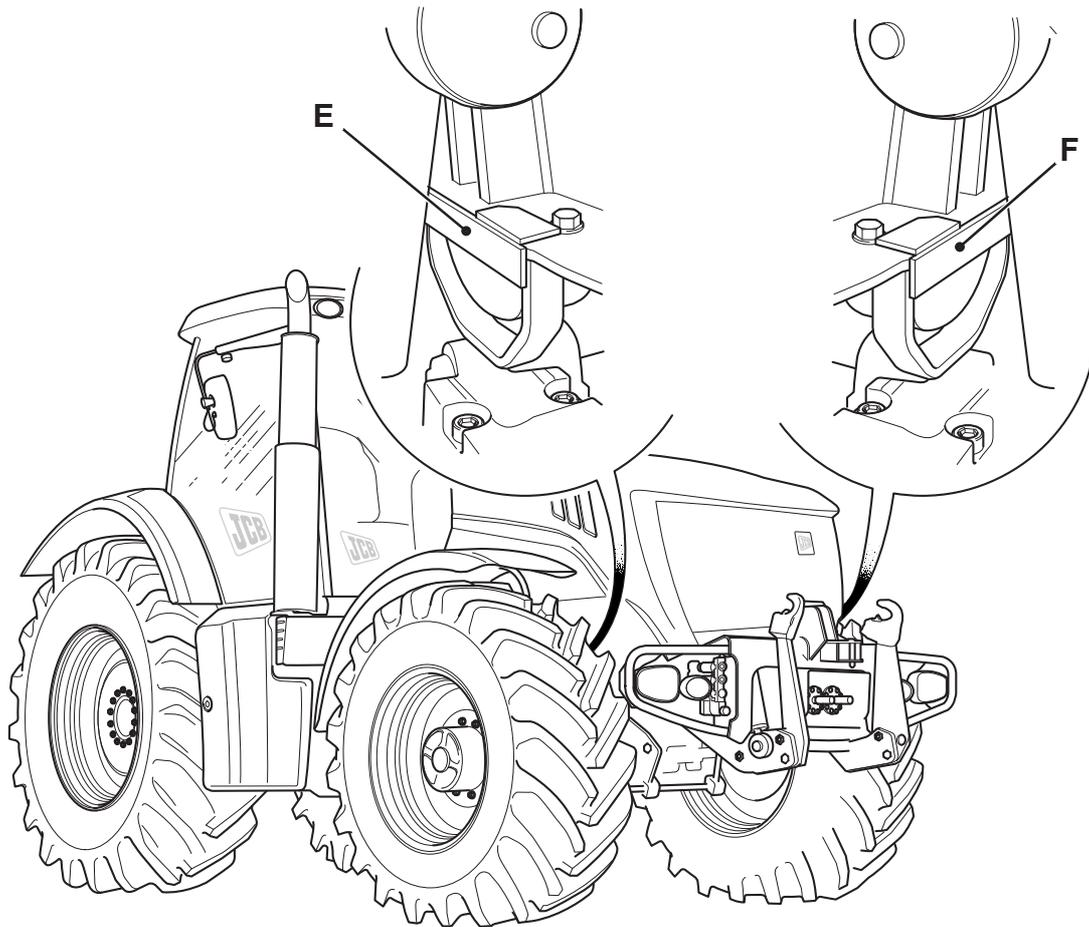


Fig 12.

C088510-B1

- 15 Place the special calibration tools **E** and **F** between the front axle and the chassis as shown. → [Fig 12.](#) ([□ S-12](#)) These tools will need to be made

as detailed on the drawings in **Special Tools (Section 1)**.

- 16 Use down arrow **D** to scroll down to 'FS LOWER'.

### CAUTION

**Keep clear of the chassis members as they are lowering otherwise you could be trapped between them and the axle casing.**

SUS-1-6

- 17 Press button **C** once and release. The suspension will lower on to the calibration tools.
- 18 The instrument panel will display the position of the front suspension.
- 19 Let the front suspension settle fully onto the calibration tools.
- 20 Press button **C** once to store the values.
- The instrument panel will display 'OK' if the front suspension height values are acceptable.
- If the instrument panel displays 'FAILED' a fault code will appear on the touch screen.
- 21 Scroll down to 'FS REL'.
- 22 Press and hold in button **C** and the suspension will raise.
- 23 Remove the calibration tools from between the front axle and the chassis.
- 24 Scroll down to 'SAVE'.
- 25 Press button **C** once to save the calibration.
- 26 The system will now exit calibration mode.

**Note:** After calibration the rear suspension should return to normal but the front suspension should stay up until the park brake is released.

- 27 For safety, the front suspension is locked out when the park brake is applied. Release the park brake to allow the front suspension to adjust to its new ride height value.

The machine may not return to the exact sensor values saved due to deadband and may initially look different from the ride height saved. After driving the tractor the suspension will even out.



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# Discharging Hydraulic Pressure

## Rear Suspension

The chassis is supported by suspension components which are charged with pressurised hydraulic fluid when the engine is running. When the engine is stopped, pressure is trapped in components downstream of the check valve.

Before disconnecting pipework or removing hydraulic components, the chassis must be lowered to discharge the pressure.

**Important:** Be aware that this process is time critical - read the following steps before you start.

- 1 Make sure the transport switch T is not engaged.

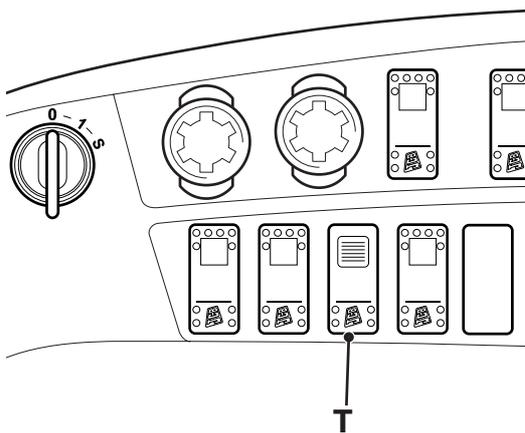


Fig 13.

C039340-B2

- 2 Apply the park brake.
- 3 Switch the Ignition 'On'.
- 4 As the first instrument panel buzzer has finished sounding and within 10 seconds after you have switched on the ignition, cycle the transport switch on and off twice.

The instrument panel will display 'SUSP CAL' for a short time.

- 5 When the instrument panel displays 'START', **DO NOT START THE ENGINE.**
- 6 Press down arrow D. When 'RS RAISE' is displayed, hold in button C and the suspension may raise slightly.
- 7 Use down arrow D to scroll down to 'RS LOWER'.

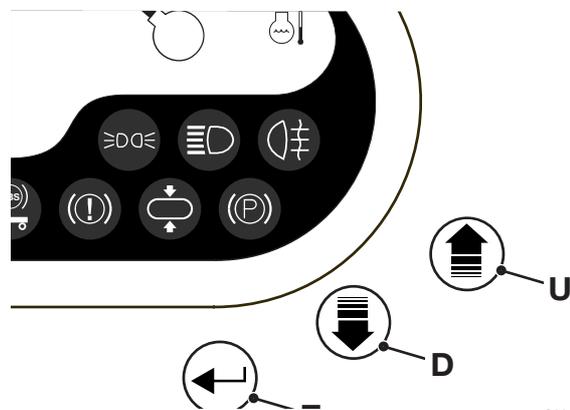


Fig 14.

C039350-B6

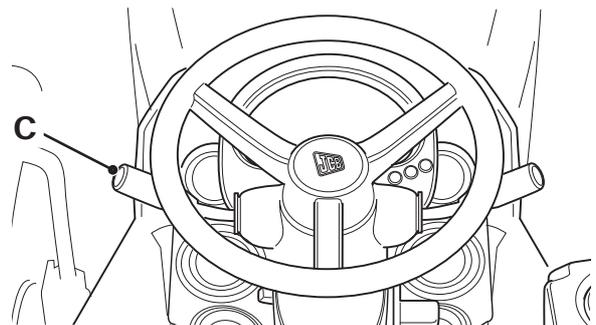


Fig 15.

C039510

### CAUTION

**Keep clear of the chassis members as they are lowering otherwise you could be trapped between them and the axle casing.**

SUS-1-6

- 8 Press button **C** and the suspension will lower.
- 9 When the suspension has lowered fully, press button **U** to scroll back until 'RS RAISE' is displayed.
- 10 Hold in button **C** and the suspension may raise slightly.
- 11 Use down arrow **D** to scroll down to 'RS LOWER'.
- 12 Press button **C** and the suspension will lower.
- 13 When the suspension has lowered fully, press button **U** to scroll back until 'RS RAISE' is displayed.
- 14 Hold in button **C** and the suspension may raise slightly.
- 15 Use down arrow **D** to scroll down to 'RS LOWER'.
- 16 Press button **C** and the suspension will lower.
- 17 When the suspension has lowered fully, switch off the ignition.

### Front Suspension

The chassis is supported by suspension components which are charged with pressurised hydraulic fluid when the engine is running. When the engine is stopped, pressure is trapped in components downstream of the check valve.

Before disconnecting pipework or removing hydraulic components, the chassis must be lowered to discharge the pressure.

**Important:** Be aware that this process is time critical - read the following steps before you start.

- 1 Make sure the transport switch **T** is not engaged.

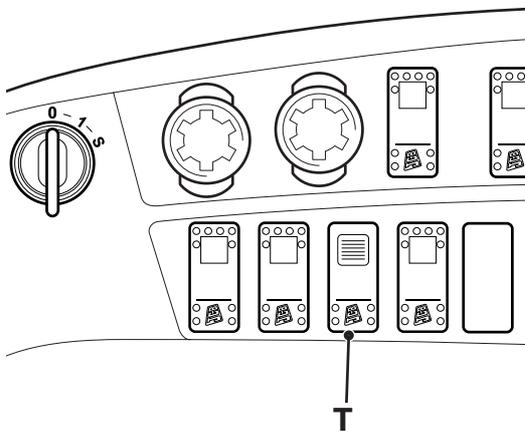


Fig 16.

C039340-B2

- 2 Apply the park brake.
- 3 Switch the Ignition 'On'.
- 4 As the first instrument panel buzzer has finished sounding and within 10 seconds after you have switched on the ignition, cycle the transport switch on and off twice.

The instrument panel will display 'SUSP CAL' for a short time.

- 5 When the instrument panel displays 'START', **DO NOT START THE ENGINE.**

- 6 Press down arrow **D** repeatedly. When 'FS RAISE' is displayed, hold in button **C** and the suspension may raise slightly.
- 7 Use down arrow **D** to scroll down to 'FS LOWER'.

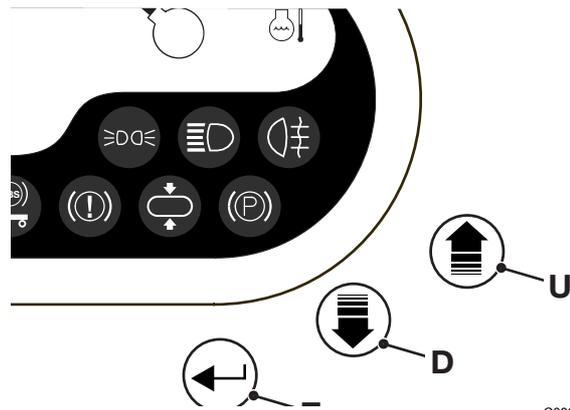


Fig 17.

C039350-B6

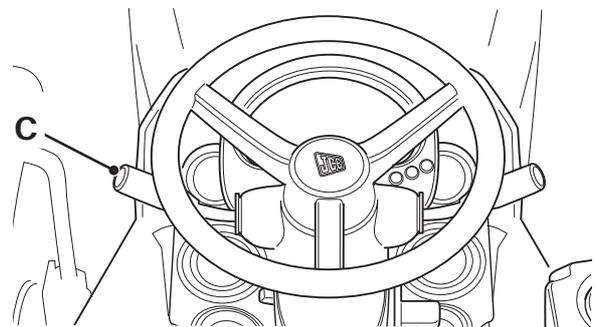


Fig 18.

C039510

### CAUTION

Keep clear of the chassis members as they are lowering otherwise you could be trapped between them and the axle casing.

SUS-1-6

- 8 Press button **C** and the suspension will lower.



- 9 When the suspension has lowered fully, press button **U** to scroll back until 'FS RAISE' is displayed.
- 10 Hold in button **C** and the suspension may raise slightly.
- 11 Use down arrow **D** to scroll down to 'FS LOWER'.
- 12 Press button **C** and the suspension will lower.
- 13 When the suspension has lowered fully, press button **U** to scroll back until 'FS RAISE' is displayed.
- 14 Hold in button **C** and the suspension may raise slightly.
- 15 Use down arrow **D** to scroll down to 'FS LOWER'.
- 16 Press button **C** and the suspension will lower.
- 17 When the suspension has lowered fully, switch off the ignition.