# OPERATOR'S MANUAL



BACKHOE LOADER

**3CX, 4CX, 5CX**

EN - 9831/0400 ISSUE 8 - 03/2018

THIS MANUAL SHOULD ALWAYS STAY WITH THE MACHINE

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# Safety

## Safety - Yours and Others

All machinery can be hazardous. When a machine is correctly operated and maintained, it is a safe machine to work with. When it is carelessly operated or poorly maintained it can become a danger to you (the operator) and others.

In this manual and on the machine you will find warning messages, you must read and understand them. They inform you of potential hazards and how to avoid them. If you do not fully understand the warning messages, ask your employer or JCB dealer to explain them.

Safety is not just a matter of responding to the warnings. All the time you are working on or with the machine you must be thinking of what hazards there might be and how to avoid them.

Do not work with the machine until you are sure that you can control it.

Do not start any work until you are sure that you and those around you will be safe.

If you are not sure of anything, about the machine or the work, ask someone who knows. Do not assume anything.

Remember:

- Be careful
- Be alert
- Be safe.

## Safety Warnings

In this manual there are safety notices. Each notice starts with a signal word. The signal word meanings are given below.

The signal word 'DANGER' indicates a hazardous situation which, if not avoided, will result in death or serious injury.

The signal word 'WARNING' indicates a hazardous situation which, if not avoided, could result in death or serious injury.

The signal word 'CAUTION' indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

The signal word 'Notice' indicates a hazardous situation which, if not avoided, could result in machine damage.

The safety alert system symbol (shown) also helps to identify important safety messages in this manual. When you see this symbol your safety is involved, carefully read the message that follows.

**Figure 3. The safety alert system symbol**



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# Introduction
## About this Manual

### Model and Serial Number

This manual provides information for the following model(s) in the JCB machine range:

| Model | From: | To: |
|---|---|---|
| 3CX | 2254521 | 2274521 |
| | 2442701 | 2451000 |
| | 2509500 | |
| 4CX | 2254521 | 2274521 |
| | 2442701 | 2451000 |
| | 2509500 | |
| 5CX | 2442701 | 2451000 |
| | 2509500 | |

### Using the Manual

This operator's manual is arranged to give you a good understanding of the machine and its safe operation. It also contains maintenance and technical data.

Read this manual from the front to the back before you use the machine for the first time, even if you have used machines of a similar/same type before as the technical specification, systems and controls of the machine may have changed. Particular attention must be given to all the safety aspects of operating and maintaining the machine.

If there is anything you are not sure about, ask your JCB dealer or employer. Do not guess, you or others could be killed or seriously injured.

The general and specific warnings in this section are repeated throughout the manual. Read all the safety statements regularly, so you do not forget them. Remember that the best operators are the safest operators.

The illustrations in this manual are for guidance only. Where the machines are different, the text and or the illustration will specify.

The manufacturer's policy is one of continuous improvement. The right to change the specification of the machine without notice is reserved. No responsibility will be accepted for discrepancies which may occur between specifications of the machine and the descriptions contained in this manual.

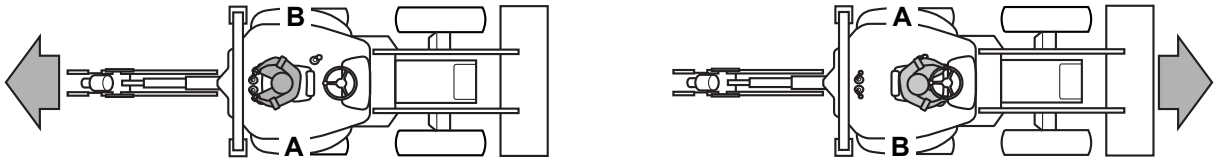
All of the optional equipment included in this manual may not be available in all territories

### Left-Hand Side, Right-Hand Side

In this manual, 'left' and 'right' mean your left and right when you are seated correctly in the machine.

This is so whether you are facing the loader (front) or the backhoe (rear).

**Figure 1.**




**A** Left

**B** Right

### Cab/Canopy



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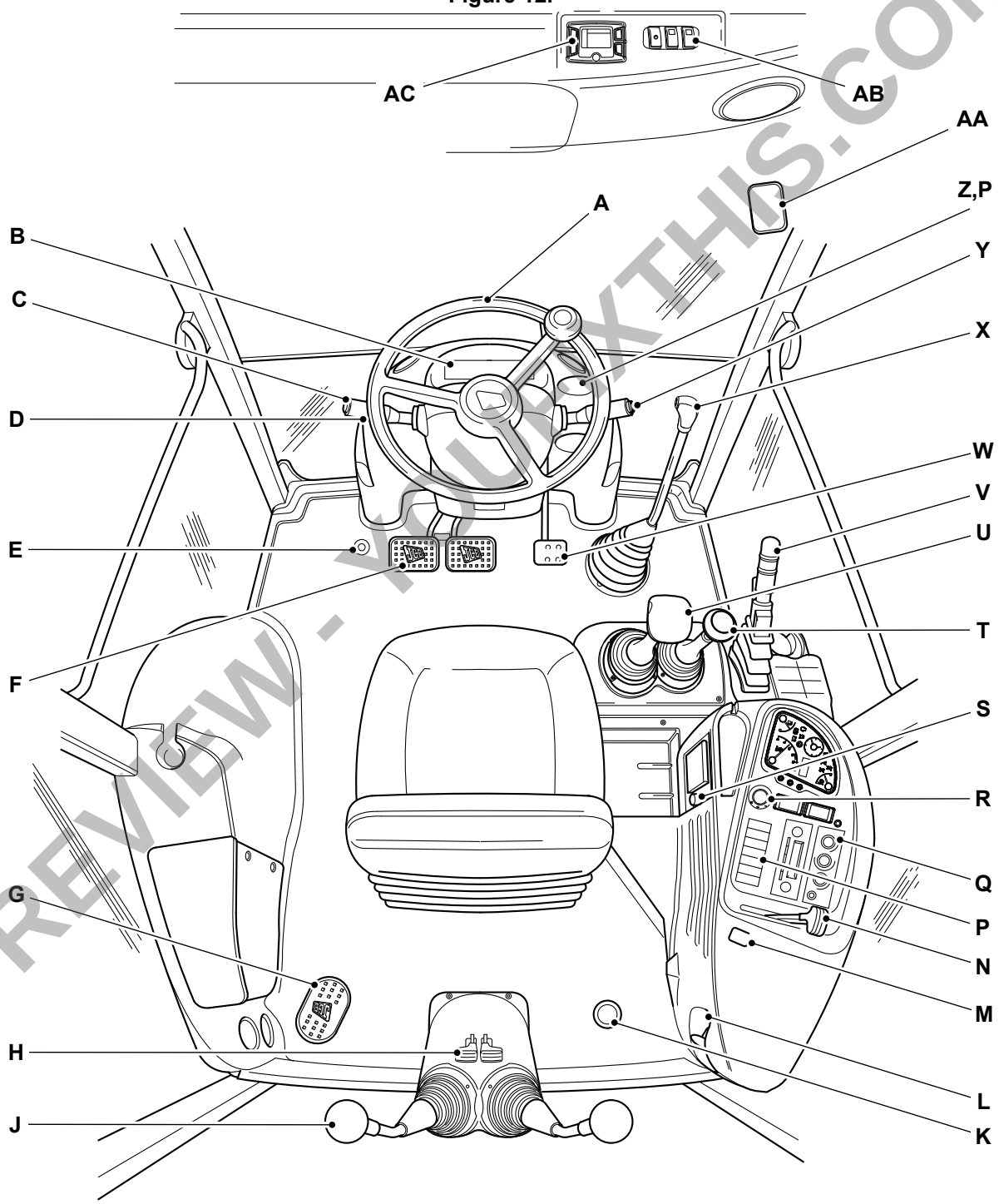
# Operator Station

## Component Locations

For: Manual Controls ..... Page 17
For: Easy Controls ..... Page 19
For: Advanced Easy Controls ..... Page 21

(For: Manual Controls)

**Figure 12.**




**A** Steering wheel Refer to: Steering Wheel (Page 70).

**B** Instrument panel Refer to: Instruments (Page 80).



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# Operation
## Introduction

### General

The aim of this part of the manual is to guide the operator step-by-step through the task of learning how to operate the machine efficiently and safely. Read the Operation section through from beginning to end.

The operator must always be aware of events happening in or around the machine. Safety must always be the most important factor when you operate the machine.

When you understand the operating controls, gauges and switches, practice using them. Drive the machine in an open space, clear of people. Get to know the 'feel' of the machine and its driving controls.

Do not rush the job of learning, make sure you fully understand everything in the Operation section. Take your time and work efficiently and safely.

Remember:

- Be careful.
- Be alert.
- Be safe.

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| Engine Speed | High/Low Switch Position | Flow to Breaker | Return Line Back |
|---|---|---|---|
| 2200 RPM | Low | 69 –77 L/min | 11.6 bar ( 168 psi) |
| 2340 RPM (flight) | Low | 73 –82 L/min | 12.7 bar ( 184 psi) |

Manual and easy control machines with variable displacement pumps do not have a flow control switch on the hammer circuits, instead flow is dependent on both engine speed and load sense pressure. These machines are factory set to deliver a maximum flow of 90 L/min to the hammer circuit, the maximum flow rate can be adjusted ( if required) Please contact your JCB dealer.

**Table 19. Variable Pump Machines**

| Engine Speed | Flow to Breaker | Return Line Back Pressure |
|---|---|---|
| 850 RPM | 65 L/min | 9 bar ( 130 psi) |
| 1000 RPM | Up to 74 L/min | 10 bar ( 145 psi) |
| 1500 RPM | Up to 100 L/min | 13 bar ( 188 psi) |
| 2200 RPM | Up to 150 L/min | 20 bar ( 290 psi) |

Do not exceed the maximum back pressure limit specified in the hammer manual.

Advanced Easy Control machines use a variable pump system in which flow is dependent on both engine speed and load sense pressure. With switch the flow switch in the low position the system will generate a maximum flow of 80 L/min and a return line back pressure of 10 bar ( 145 psi). With flow switch in the high position the system will generate a maximum flow of 130 L/min and a return line pressure of 20 bar ( 290 psi).

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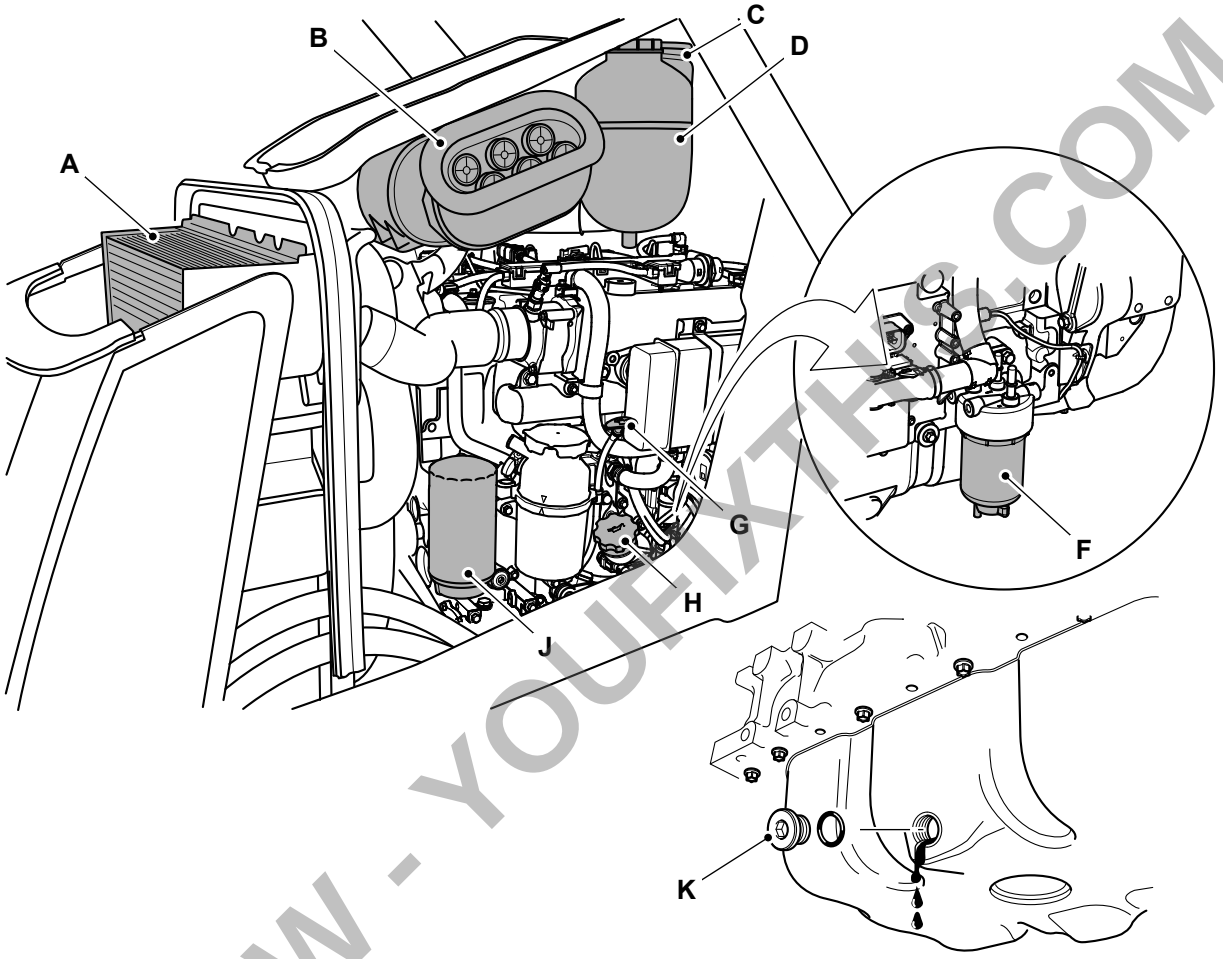
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# Service Points

## General

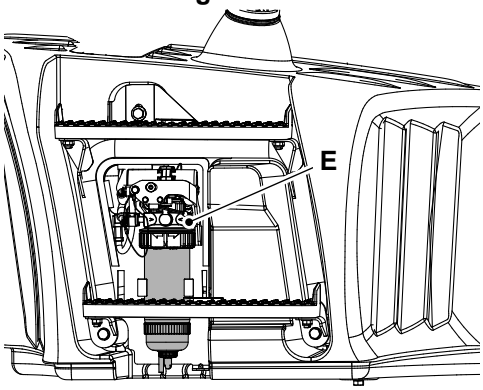
### Engine Compartment

**Figure 261.**




**A** Cooling pack
**B** Air filter assembly
**C** Window washer fluid bottle
**D** Coolant expansion bottle
**F** Engine fuel filter
**G** Engine oil dipstick
**H** Engine oil filler point
**J** Engine oil filter
**K** Drain plug and o-ring.

**Figure 262.**




**E** Fuel filter/water separator with shut-off tap.

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**Table 6. Safety Labels**

| Item | Part No. | Description | Qty. |
|---|---|---|---|
| A | 332/P7131 | Pressure hazard. Read the Service Manual. | 1 |
| B | 332/P4679 | Warning. Severing of hands and fingers. Keep clear of/do not reach into rotating parts. Read the Service Manual. | 1 |
| C | 817/70104 | Crushing of whole body. Insert the boom support device before you complete any service or maintenance work underneath the boom. | 1 |
| D | 817/70012 | Run over hazard. Start the engine from the operator's seat only. Do not short across the terminals. | 1 |
| E | 817/70014 | Warning. Read the Operator’s Manual before you operate the machine. | 1 |
| F | 817/70029 | Warning. Crush hazard. Wear seat belt. | 1 |
| G | 817/70021 | Noise warning. Wear ear protection. | 1 |
| H | 332/F5855 | Warning. Pressure hazard. Read the Operator’s Manual. | 1 |
| J | 817/70042 | Explosion hazard. Remove sources of ignition. | 1 |
| K | 817/70108 | Fall from raised attachment. Do not stand or ride on the bucket or forks. | 1 |
| L | 332/P7135 | Crush hazard (to feet). Keep a safe distance. The attachment may roll forward when released. | 1 |
| M | 817/70018 | Warning. Crushing of whole body. Do not operate the controls from outside of the machine. | 2 |
| N | 817/70112 | Warning. Crushing of whole body. Keep a safe distance. | 1 |
| P | 332/D6029 | Stability hazard. Make sure that the load is within the capability of the machine. Refer to the operator's manual. | 1 |
| Q | 332/B2045 | Warning. Do not use as a step. | 2 |

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it is safe to do so. Do not use the machine until the fault is put right These lamps will flash to indicate less critical faults are present.

**DEF Level Warnings**

At 20 % indicated DEF level the DEF level gauge flashes.

At 15 % indicated DEF level the amber after treatment light and DEF level gauge flashes.

At 0 % indicated DEF level the amber after treatment light is solid and the DEF gauge flashes

If the DEF level is continued to be ignored the red after treatment light and DEF level gauge flashes

If the DEF level is continued to be ignored further the red after treatment light is illuminated solid and the DEF level gauge flashes

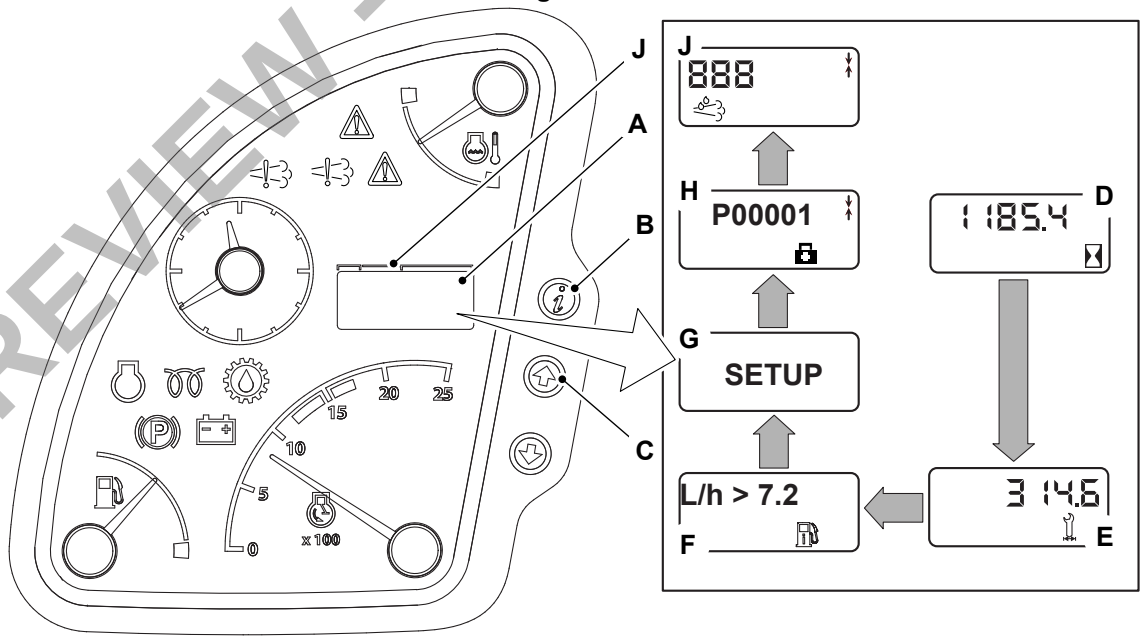
If the DEF level is continued to be ignored further still a STOP message is shown, the red after treatment light is illuminated solid and the DEF level gauge flashes.

## Digital Display

The digital display is located on the side console. The digital display contains the following information screens: Refer to Figure 59.

1. Total vehicle hours.
2. DEF level bar graph
3. Time until next service.
4. Fuel computer.
5. Set up
6. Fault code list (only when faults are active).

**Figure 59.**




**A** Digital display
**B** Information switch
**C** Arrow buttons
**D** Vehicle hours
**E** Hours to service
**F** Fuel computer
**G** Set up
**H** Fault code list



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The green LED (Light Emitting Diode) will illuminate every time that a keypad button is fully depressed. Do not operate buttons with sharp objects, they may damage and disable the keypad.

If you make an error entering your PIN code and you realise this before pressing the ENT button then pressing the MD button cancels inputs and allows you to re-commence.

If the PIN code is incorrectly entered five times the immobiliser will lock for 15 min. In this event it is recommended that you contact the machine owner for confirmation of the PIN code.

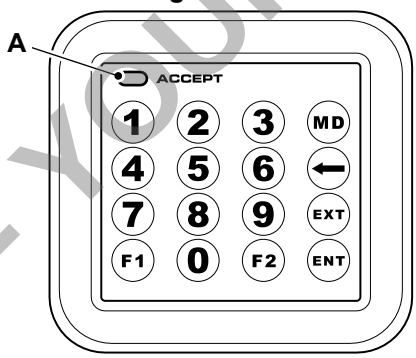
The PIN code will have to be entered every time that the ignition is switched off for longer than two minutes.

## To Disarm the Immobiliser to Allow the Machine to be Used

1. Put the ignition key in the ignition switch. Turn the ignition key to position 1.
2. Enter your four digit PIN code using the keypad.
3. Push the 'ENT' button. The LED will come on for three seconds if the PIN code is correct and the machine can be started.
4. If an incorrect PIN code is entered the unit will lock. The LED will flash twice quickly, pause and then flash twice again and will continue this pattern until the ignition key is turned to the off position. In this event return to step 1 to try again.

   4.1. After five failed tries the system will lock.
   Duration: 15 min

**Figure 32.**




**A** LED

## To Arm the Immobiliser

1. Stop the engine. Remove the ignition key.
2. The immobiliser arms automatically after two minutes. The green LED flashes for 60 seconds, then goes off.
3. If you restart the engine within two minutes, the system disarms automatically.

## To Add a New or Additional PIN Code

Before you try to add a new or additional PIN code, make sure that the machine is ready to start and that you have your six digit master code and your new four digit PIN code available.

If you are unsure of the master code or your new PIN code, then do not start this procedure.

The keypad immobiliser can be programmed to accept up to 14 different four digit PIN codes, any of which will let the machine be started.

1. Put the ignition key in the ignition switch. Turn the ignition key to position 1
2. Enter your six digit master code using the keypad. Push the 'ENT' button.



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# Torque Values

## General

### ROPS/FOPS

**Table 75.**

| | |
|---|---|
| Mounting bolts torque | 205 N·m |

### Engine

**Table 76.**

| Sump Drain Plug | Filter Housing Drain Plug | Engine Fuel Filter |
|---|---|---|
| 40 –60 N·m | 40 –60 N·m | 30 N·m |

### Hydraulic System

**Table 77.**

| Hydraulic Tank Filter Cover Plate | Suction Strainer Filter | Drain Plug |
|---|---|---|
| 24 N·m | 15 –20 N·m | 100 N·m |

### Transmission/Axles

**Table 78.**

| Transmission Suction Strainer | Axle Drain Plug |
|---|---|
| 10 N·m | 79 N·m |

### Wheels

**Table 79.**

| | |
|---|---|
| Wheel nuts | 680 N·m |

### Body and Framework

**Table 80.**

| Extending Dipper Top Wear Pads | Extending Dipper Bottom Wear Pads |
|---|---|
| 49 N·m | 100 N·m |

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# Hydraulic System

## General

### Discharge

#### Discharge the Hydraulic Pressure

1. Make the machine safe with the loader arm lowered.
   Refer to: Maintenance Positions (Page 263).
2. Operate the controls to remove the hydraulic pressure from the service hose lines. To release the hydraulic pressure from the electrical and servo operated services the battery must be connected while you operate the controls.
   2.1. For manually operated services, operate the controls (several times) of the service(s) to be disconnected.
   2.2. For electrical and servo operated services, turn the starter key to the on position.
   2.3. Press the relevant console switch (to make the relevant service active).
   Refer to: Console Switches (Page 25).
   2.4. For AEC hammer only option, turn the starter key to the on position, set the hammer switch to off position, operate the foot button several times to vent the auxiliary lines, then set the hammer switch to the on position, operate the foot button several times to vent the auxiliary lines.
3. Carefully remove the hydraulic tank filler cap to vent residual tank hydraulic pressure.
   Refer to: Check (Level) (Page 316).
4. Install the hydraulic tank filler cap.

### Check (Condition)

#### Hydraulic Hoses

⚠ **WARNING** Damaged hoses can cause fatal accidents. Examine the hoses regularly. Do not use the machine if a hose or hose fixture is damaged.

**WARNING** Fine jets of fluid at high pressure can penetrate the skin. Keep face and hands well clear of fluid under pressure and wear personal protective equipment. Hold a piece of cardboard close to suspected leaks and then examine the cardboard for signs of fluid. If fluid penetrates your skin, get medical help immediately.

Examine the hoses for:

- Damaged hose ends
- Worn outer covers
- Ballooned outer covers
- Kinked or crushed hoses
- Exposed armouring in the outer covers
- Displaced hose end fittings.
- Worn cover sheathing or hose burst protection covering

Replace a damaged hose before you use the machine again.

The replacement hoses must be of the same size, standard and pressure rating. If necessary, for more information contact your JCB dealer.

### Check (Leaks)

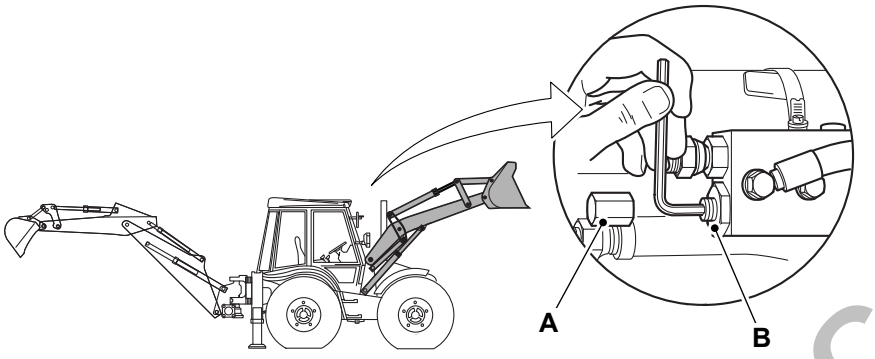
⚠ **Notice:** If the fluid is cloudy, then water or air has contaminated the system. This could damage the hydraulic pump. Contact your JCB dealer immediately.

1. Make the machine safe.



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Figure 197.




**A** Cap - loader arm HBCV

**B** Screw - loader arm HBCV

## Loader Arms Without Hose Burst Check Valves

### Manual Control Machines

1. Sit in driving position and apply parkbrake.
2. Make sure the area around the machine is clear of people.
   Refer to: Danger Zone (Page 8).
3. Carefully select loader control down and allow loader arms to slowly fall to the ground.

### Advanced Easy Control Servo Machines

1. Sit in driving position and apply parkbrake.
2. Make sure the area around the machine is clear of people.
   Refer to: Danger Zone (Page 8).
3. Turn starter key to on position.
4. Select the excavator/loader control switch to the loader position.
   Refer to: Excavator/Loader Control Selector (Page 29).
5. Energise the joystick controls.
6. Carefully select loader control down and allow loader arms to slowly fall to the ground.

## Excavator End (Emergency Operation)

⚠ **DANGER** Do not stand underneath the raised load during the lifting/lowering procedure. Stand clear and to one side until the load has been safely lowered. Make sure that the area is clear of other people before lowering the load. If you do not follow these precautions you or others could be killed or seriously injured.

During normal operation, the engine must be running before a load can be lowered.

The following information describes how to safely and correctly lower a load in the event of engine failure or a hose burst; we recommend that only a competent maintenance engineer perform the procedures.

After lowering a load do not use the machine until a new end cap and valve assembly has been installed by a qualified engineer, otherwise the valve will not operate as intended.

1. Remove the cap and pierce the warning label.
2. If a hose has burst, position a suitable container to catch the oil.



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# Radio

## General

A radio (if installed) is located on the right console in the cab. Refer to: Operator Station (Page 17).

If your machine has a radio installed we suggest that you remove the radio from its carrier at the end of each working day.

To remove the radio:

1. Gently pull the radio carrier handle.

To install the radio:

1. Make sure that the radio is positioned the correct way up otherwise it may damage the connecting pins.
2. Gently push the radio into position.

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# Fuel System

## General

### Bleed

⚠ **WARNING** Do not open the high pressure fuel system with the engine running. Engine operation causes high fuel pressure. High pressure fuel spray can cause serious injury or death.

The engine installation features an electrically operated fuel lift pump.

The system is designed to bleed automatically when the lift pump is operated.

Make sure that as much air is removed from the fuel system as possible before starting the engine.

Bleed the system as follows:

1. Make the machine safe.
2. Turn the ignition key to position I (this will start the fuel lift pump).
3. Do not start the engine.
4. Allow the fuel lift pump to run for a short period of time.
   Duration: 30 s
5. Turn the ignition key to the off position to stop the fuel lift pump. Wait for a short period of time and then turn the starter switch to start the pump.
   Duration: 10 s
6. Start the engine and make sure it runs smoothly.
7. If the engine fails to start or does not run smoothly contact your JCB dealer.

### Check (Leaks)

1. Make the machine safe.
2. Get access to the engine compartment (if applicable).
3. Check the engine compartment (if applicable), fuel lines and the area below for leaks.
4. If necessary, contact your JCB dealer.

## Fuel Filter

### Replace

1. Make the machine safe.
   Refer to: Maintenance Positions (Page 263).
2. Get access to the filter.
   Refer to: Access Apertures (Page 268).
3. Turn the fuel feed tap off (to stop back syphoning)
4. Drain and remove the separator bowl.
   Refer to: Water Separator (Page 299).
5. Replace the fuel filter.
6. Install the separator bowl.

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| | | Standard(1) | Sitemaster(2) | Sitemaster(3) |
|---|---|---|---|---|
| C | Reach - ground level to slew centre | 5.4 m | 6.54 m | 5.4 m |
| D | Reach - at full height to slew centre | 2.82 m | 3.75 m | 2.82 m |
| E | Side reach - to centre line of machine | 6.02 m | 7.16 m | 6.02 m |
| F | SAE operating height | 5.45 m | 6.26 m | 5.45 m |
| G | Maximum loadover height | 3.84 m | 4.73 m | 3.84 m |
| | SAE loadover height | 3.39 m | 4.28 m | 3.39 m |
| H | Total kingpost travel | 1.16 m | 1.16 m | 1.16 m |
| J | Bucket rotation | 201 ° | 201 ° | 201 ° |

*(1) Standard dipper - Dipper retracted*
*(2) Extending dipper - Dipper extended*
*(3) Extending dipper - Dipper retracted*

**Table 43.**

| | | Super, Super Sitemaster(1) | Super, Super Sitemaster(2) |
|---|---|---|---|
| A | SAE maximum digging depth | 6.14 m | 4.98 m |
| | SAE 2ft flat bottom | 6.11 m | 4.93 m |
| | Maximum digging depth with deep profile bucket | 6.51 m | 5.35 m |
| B | Reach - ground level to rear wheel centre | 8.44 m | 7.35 m |
| C | Reach - ground level to slew centre | 7.1 m | 6.01 m |
| D | Reach - at full height to slew centre | 4.47 m | 3.43 m |
| E | Side reach - to centre line of machine | 7.71 m | 6.69 m |
| F | SAE operating height | 6.52 m | 5.89 m |
| G | Maximum loadover height | 5.03 m | 4.06 m |
| | SAE loadover height | 4.55 m | 3.58 m |
| H | Total kingpost travel | 1.16 m | 1.16 m |
| J | Bucket rotation | 201 ° | 201 ° |

*(1) Extending dipper - Dipper extended*
*(2) Extending dipper - Dipper retracted*

# Excavator End Quickhitch Dimensions and Performance

## Excavator Arm Quickhitch

**Figure 336.**

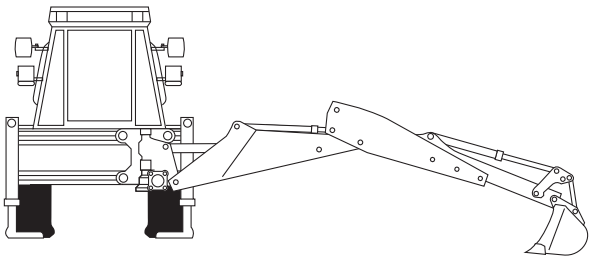


**Table 44.**

| Type | SWL (Safe Working Load) | Weight |
|---|---|---|
| Mechanical | Lift eye 1,000 kg | 95 kg |

# Driving Performance



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# Steering System

## General

### Calibrate

⚠ **CAUTION** Failure to phase 4-wheel steer at least once per day may mean a reduction in steering effectiveness

**CAUTION** Failure to align the steering before selecting the required steer mode will cause the machine to steer incorrectly.

The steering must be re-phased:

1. At least once per day
2. If having difficulty in steering
3. After travelling for specified distance or more on the road (in 2-wheel steer).

   Length/Dimension/Distance: 24 km ( 15 mi)

#### Electronic Steer Mode Selector

1. Stop the machine. Select the neutral position on the forward/reverse lever.
2. Use the steer mode switch to select 2-wheel steer. Sensors on the axles prevent the steer mode from changing until the wheels pass through the 'straight ahead' position. Because of this, there will be a short period when the indicator lights do not agree with the switch position. The indicator lights will still show 4-wheel steer.

   Refer to: Steer Mode Control (Page 76).
3. Operate the machine until the rear wheels straighten up. When the rear wheels straighten up the machine will go into 2-wheel steer. The indicator lights will show when 2-wheel steer has engaged.
4. Use the switch to select 4-wheel steer. Turn the steering wheel left then right until the indicator light shows that 4-wheel steer has engaged. The front and rear wheels are now back in phase.

### Check (Operation)

#### Emergency Steer System

1. Park the machine on hard level ground. Engage the park brake. Set the transmission to neutral.
2. Use the stabilisers and loader shovel to raise the machine so that the wheels are not touching the ground.
3. On AWS (All Wheel Steer) machines, Select 2WS (Two Wheel Steer) mode (make sure the 2WS warning light is lit on the instrument panel) and turn the steering wheel until the rear wheels lock. With the engine running, turn the steering wheel so that the front wheels are fully locked.
4. On 2WS machines, With engine turn the steering wheel so that front wheels are fully locked.
5. Switch the engine off. Use both hands to turn the steering wheel so that the front wheels lock, turn the steering wheel until the wheels lock in the opposite direction.

Full movement of the front wheels, from lock to lock in both directions confirms correct emergency steering function.

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