# OPERATOR'S MANUAL



LOADER

**411HT, 413S, 417HT**

EN - 9831/1850 ISSUE 4 - 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: |
|---|---|---|
| 411HT | 2420001 | 2420200 |
| 413S | 2420201 | 2420400 |
| 417HT | 2420401 | 2420600 |
| | 2702321 | |

### 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.

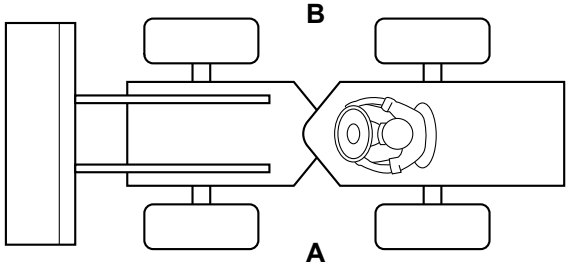
The manufacturer's policy is one of continuous improvement. The right to change the specification of the machine without notice is reserved. No responsibility will be accepted for discrepancies which may occur between specifications of the machine and the descriptions contained in this manual.

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.

**Figure 1.**




**A** Left **B** Right

### Cab/Canopy

This manual frequently makes references to the cab. For example, 'do not operate the machine without an operator's manual in the cab'. These statements also apply to canopy build machines.



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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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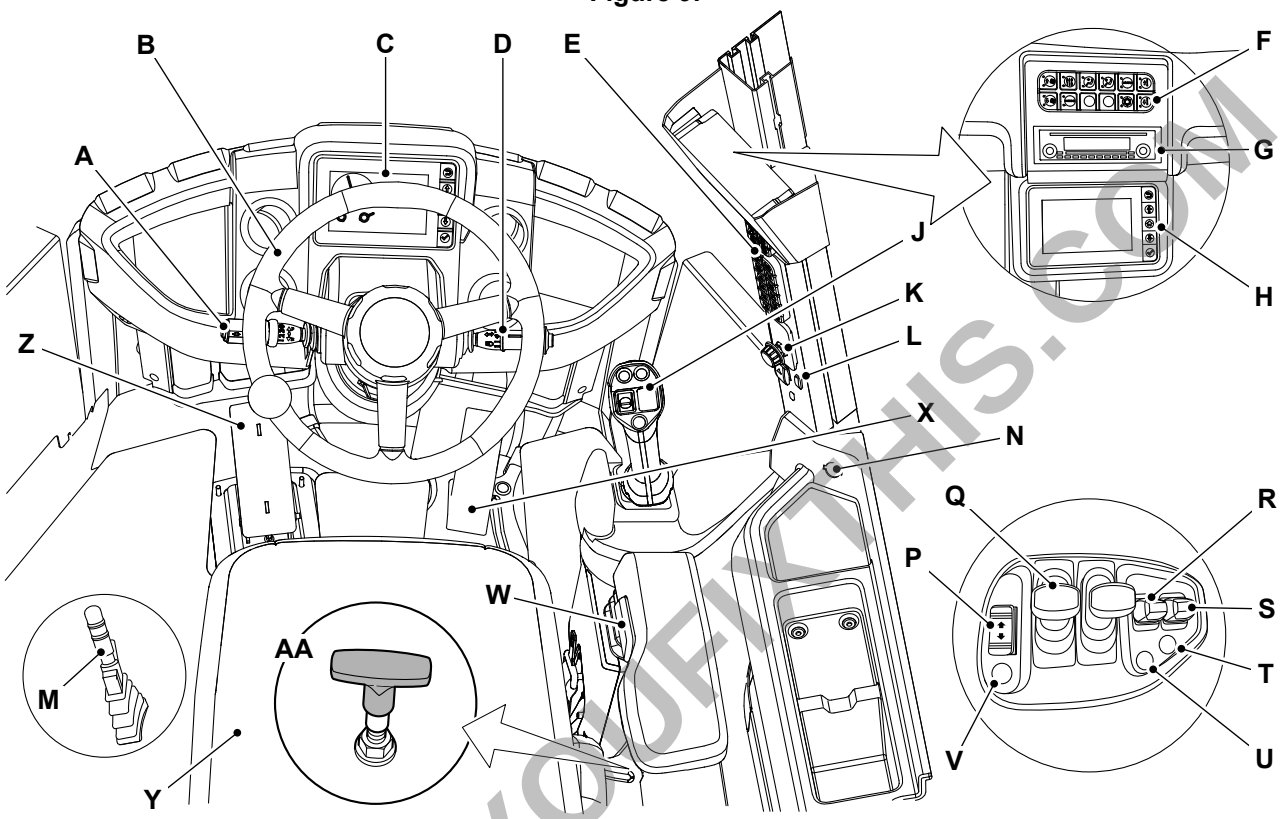


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# Operator Station

## Component Locations

Figure 9.




**A** Transmission Refer to: Drive Controls (Page 60).
**B** Steering wheel Refer to: Steering Wheel (Page 65).
**C** Front display panel Refer to: Instruments (Page 70).
**D** Multi purpose steering column switch Refer to: Multi-Purpose Switch (Page 17).
**E** Console switches Refer to: Console Switches (Page 20).
**F** ATC (Automatic Temperature Control) panel or optional manual HVAC (Heating Ventilation Air Conditioning) controls Refer to: Air-Conditioning Controls (Page 92).
**G** Radio
**H** Secondary display panel (option) Refer to: Instruments (Page 70).
**J** Proportional lever controls Refer to: Operating Levers/Pedals (Page 82).
**K** Rotary switch panel Refer to: Instruments (Page 70).
**L** Park brake switch Refer to: Park Brake (Page 67).
**M** Park brake lever Refer to: Park Brake (Page 67).
**N** Starter switch Refer to: Ignition Switch (Page 17).
**P** Forward reverse switch Refer to: Forward, Neutral and Reverse Switch (Page 66).
**Q** Multi lever controls Refer to: Drive Controls (Page 60).
**R** Primary auxiliary controller (option)Refer to: Auxiliary Circuit Controls (Page 83).
**S** Secondary auxiliary controller (option)
**T** Transmission disconnect
**U** Horn
**V** Transmission kickdown switch Refer to: Transmission Kickdown Switch (Page 68).
**W** Armrest Refer to: Armrest (Page 40).
**X** Accelerator pedal Refer to: Accelerator Pedal (Page 65).
**Y** Seat Refer to: Operator Seat (Page 37).
**Z** Service brake pedal Refer to: Service Brake Pedal (Page 67).

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of your booster (slave) supply, then contact your JCB dealer for advice. Do not attempt to jump-start the engine until you are sure of the voltage of the booster (slave) supply. The negative (-) terminal on the battery is connected to frame earth.

1. The park brake should have been engaged when the machine was last parked. If it is not engaged, engage it now. Make sure machine is in neutral. If necessary block the machine to prevent it moving.
2. Depending on your type of machine, lower the lift arms / forks or attachments (if fitted) to the ground, if they are not already there. They may lower under their own weight when you operate the controls. Operate the controls carefully to control the rate of descent. If your machine is fitted with hose burst protection valves, you may not be able to lower lift arms. In this case make sure you install the safety strut(s).
3. Set all switches in the cab to their off positions.
4. Get access to the battery.

   Refer to: Access Apertures (Page 150).
5. Connect the booster cables:
   - 5.1. Connect the positive booster cable to the positive (+) terminal on the machine battery. Connect the other end of this cable to the positive (+) terminal of the booster supply.
   - 5.2. Connect the negative (-) booster cable to a good frame earth on the machine, away from and below the battery. A good frame earth is a part of the machine frame, free from paint and dirt. Do not use a pivot pin for an earth.
   - 5.3. Connect the other end of this cable to the negative (-) terminal on the booster supply.
6. Do the pre-start checks.
7. Start the engine.
8. Disconnect the booster cables:
   - 8.1. Disconnect the negative booster cable from the machine frame earth. Then disconnect if from the booster supply.
   - 8.2. Disconnect the positive booster cable from the positive (+) terminal on the battery. Then disconnect it from the booster supply.

## Retrieval

Towing a machine too far or too fast can damage the transmission. The towing vehicle(s) must have enough pulling and braking power to move and stop the machine.

Operator recovery of a disabled machine is only possible over a short distance, if there is sufficient residual pressure in the braking system

1. Make sure the park brake is engaged, the transmission is in neutral and the engine is off. If necessary, block the wheels of the machine.
2. Prepare the lift arms (if engine and hydraulics are working):

   Refer to: Lift Arm Controls (Page 82).
   - 2.1. If the engine and hydraulic systems are not damaged, lift the shovel above the ground by

     Distance: 900 mm
   - 2.2. Fully crowd the shovel. The machine in this position can have a straight pull from the recovery point.
3. Prepare the lift arms (if the engine and hydraulics are not working):
   - 3.1. Use the applicable equipment to lift the shovel and secure it above the ground by

     Distance: 900 mm



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# Transporting the Machine

## General

⚠ **WARNING** The safe transit of the load is the responsibility of the transport contractor and driver. Any machine, attachments or parts that may move during transit must be adequately secured.

**WARNING** Make sure that the ramp incline does not exceed the machine's operational limits.

**CAUTION** Before moving the machine onto the trailer, make sure that the trailer and ramp are free from oil, grease and ice. Remove oil, grease and ice from the machine tracks. Make sure the machine will not foul on the ramp angle.

Make sure that the transporting machine is suitable for the dimensions of your machine. Refer to: Static Dimensions (Page 197).

1. Put the trailer in position:
   1.1. If the machine is serviceable, use any available position.
   1.2. If the machine is unserviceable, you must align the trailer with the rear of the machine.
2. Put blocks at the front and rear of the trailer wheels.
3. Make sure the ramps onto the trailer are in the correct position and are attached securely.
4. Set the lift arms to the road travel position
5. Move the machine onto the trailer:
   5.1. Carefully reverse a serviceable machine onto the trailer.
   5.2. Lift an unserviceable machine into position on the trailer.
6. Engage the park brake and set the transmission to the neutral position. Put blocks at the front and rear of all four tyres.
7. Put blocks at the front and rear of all four tyres of the machine.
8. When the machine is safely in position, lower the attachment onto the trailer, then stop the engine.
9. Install the articulation lock
10. Make sure the total height of the load is within regulations, adjust the height if necessary.
11. Put a cover on the exhaust stack
12. Use the tie-down points to secure the machine to the trailer with suitable chains or restraints. The chains or restraints used must have a work load limit equal to or higher than the requirement and a factor of safety equal to or greater than 2. The requirement is

    Weight/Force: 100,000 N

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| Interval ( h) | Calendar Equivalent |
|---|---|
| 2000 | 2 Years |
| 8000 | 8 Years |

## Pre-start Cold Checks, Service Points and Fluid Levels

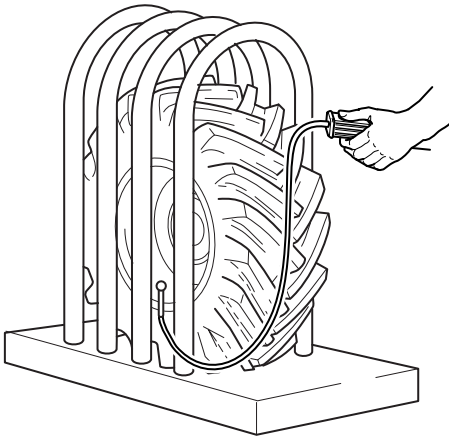
**Table 31.**

| | Operation | 10 | 50 | 100 (1) | 100 | 500 | 1,000 | 2,000 |
|---|---|---|---|---|---|---|---|---|
| Attachments | | | | | | | | |
| Hydraulic tow hitch | Check (operation) | O | O | □ | O | □ | □ | □ |
| Hydraulic tow hitch | Check (condition) | O | O | □ | O | □ | □ | □ |
| Hydraulic tow hitch | Grease | O | O | □ | O | □ | □ | □ |
| Engine | | | | | | | | |
| Oil level | Check | O | O | □ | O | □ | □ | □ |
| Oil and filter(2) | Change | | | | | □ | □ | □ |
| Coolant | Change | | | | | | | □ |
| Coolant Level(13) | Check | O | O | □ | O | □ | □ | □ |
| Coolant strength and condition | Check | | | | | □ | □ | □ |
| CCV (Crankcase Ventilation) filter (if installed)(3) | Change | | | | | | | |
| Air cleaner outer element(4) | Change | | | | | □ | □ | □ |
| Air cleaner cover/duct(4) | Clear | | | □ | O | □ | □ | □ |
| Air cleaner scavange hose(4) | Clear | | | | | □ | □ | □ |
| Air cleaner inner element | Change | | | | | | | □ |
| Fuel system for leaks and contamination | Check | O | O | □ | O | □ | □ | □ |
| Fuel filter | Change | | | | | □ | □ | □ |
| Fuel sedimenter/water separator | Drain | | O | □ | O | □ | □ | □ |
| Fuel sedimenter/water separater | Change | | | | | □ | □ | □ |
| Fan belt condition(5) | Check | | | □ | | □ | □ | □ |
| Valve clearances | Check/adjust | | | | | | | □ |
| External oil leaks | Check | O | O | □ | O | □ | □ | □ |
| Radiator | Clean | | | | | □ | □ | □ |
| All hoses for condition and security | Check | | | □ | | □ | □ | □ |
| Rocker cover and injector seals(6) | Check | | | | | | | □ |
| High pressure fuel lines(7) | Check | | | | | | | |
| Transmission and Axles | | | | | | | | |
| Transmission oil level | Check | O | O | □ | O | □ | □ | □ |
| Differential oil level | Check | | | □ | | □ | □ | □ |
| Differential oil(8) | Change | | | | | □ | □ | □ |



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**Figure 130.**



2. Prepare the equipment.
   2.1. Use only an air supply system which includes a pressure regulator. Set the regulator no higher than 1.38 bar (20 psi) above the recommended tyre pressure.
   Refer to: Wheels and Tyres (Page 226).
   2.2. Use an air hose fitted with a self-locking air chuck and remote shut-off valve.
3. Add the air.
   3.1. Make sure that the air hose is correctly connected to the tyre valve. Clear other people from the area. Stand behind the tread of the tyre while adding the air.
   3.2. Inflate the tyre to the recommended pressure. Do not over-inflate.

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machine is running normally. This is automatic and seamless to the operator and the machine can continue to be operated normally while this is happening.

Should the duty cycle continue to be very light the operator will be warned. If this occurs the operator has a choice to either operate the machine at a higher duty or complete the refresh cycle with the machine stationary. This again is a fully automatic process once initiated by the operator.

If the operator ignores the warnings and does not complete a stationary refresh then the SCR will cease to be compliant and the engine will derate in accordance with the legislative requirements until a stationary refresh has been completed.

The system has been designed such that the majority of customers should not have to invoke a stationary refresh, however the mode exists to ensure all products remain compliant. Typically the earliest a refresh would be required is around 700 –1,000 h.

### Stationary Refresh

- The engine is equipped with a setting that will automatically run the exhaust system hot enough while the machine is stationary. The operator will need to park the machine in a safe position and acknowledge that the machine can run a stationary refresh by initiating the procedure. Refer to the machine operator manual stationary refresh initiation procedure. Refer to: Instruments (Page 70).

## DEF Levels

The engine or SCR will not be damaged when you run out of DEF. To protect itself the machine performance will be reduced. Refill the DEF tank to restore performance.

The engine will not shut down if you run out of DEF, however it will:

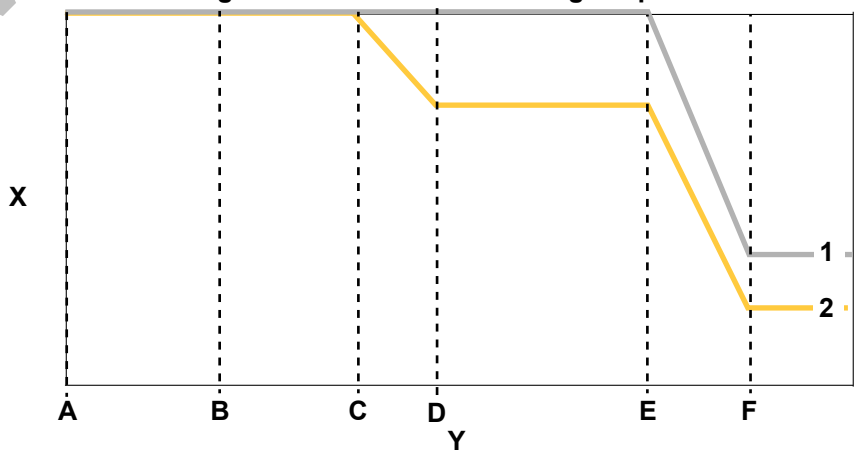
- Give the driver a warning when the remaining level falls low, which if continually ignored will progressively automatically reduce engine torque and reduce engine speed to tick over, preventing effective working activity.
- Allow only enough power for ‘limp home’ i.e to move the machine to a safe area or onto a trailer.
- Restore power when the DEF tank is refilled.

Attempting to operate the machine without DEF is a Federal Offence in the United States of America, operators may be prosecuted under the Clean Air Act.

DEF is required for type approval, operators attempting to operate the machine without DEF may be liable for civil and criminal prosecution in the European Union.

If there are no other engine or emission system faults, the information below explains when the engine power and speed de-ratings occur, according to DEF tank level.

**Figure 149. DEF Level Warning Graph**




**A** DEF level Low. Early warning to operator - Fill up this shift

**B** DEF level indicated critical low. Last warning to operator - Fill up now

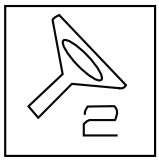
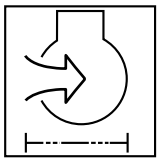
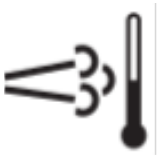
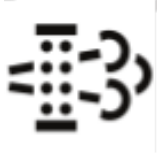


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## Drivetrain Icons

The drivetrain icons frame shows any currently enabled symbols from the current list.

**Table 25.**

| Source Data | Symbol | Symbol on Condition | Symbol off Condition |
|---|---|---|---|
| Secondary steering system active (if fitted) |  | Secondary steering pressure equal or greater than 10 bar ( 144.9 psi) | Secondary steering pressure less than 10 bar ( 144.9 psi) or 0xFF 0xFF |
| Engine air filter blocked |  | Input has been TRUE for 2 s (remain on until key cycle) | NA |
| DEF (Diesel Exhaust Fluid) |  | Refer to lamp status signal | Refer to lamp status signal |
| Amber warning lamp |  | Malfunction, rectify by next shift | N/A |
| Stop engine lamp |  | Master warning, stop the machine immediately | N/A |
| Service |  | Service due < 20 h, Flashing means service due < 0 h | > 20 h until next service |
| High exhaust system temperature |  | High exhaust gas temperature detected | N/A |
| SCR (Selective Catalytic Reduction) refresh |  | Running refresh available | N/A |
| SCR refresh inhibit |  | Running refresh inhibited | N/A |

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