

OPERATOR'S MANUAL



426, 436, 456 (TIER 2)

EN - 9811/3400 ISSUE 4 - 06/2017

Dear JCB Customer

Even if you have operated this type of equipment before, it is very important that your new machines operations and functions are explained to you by a JCB Dealer Representative following delivery of your new machine.

Following the installation you will know how to gain maximum productivity and performance from your new product.

Please contact your local JCB dealer if the Installation Form has not yet been completed with you.

Your Local JCB Dealer Is:	

OPERATOR MANUAL

THIS MANUAL SHOULD ALWAYS STAY WITH THE MACHINE 426, 436, 456 (TIER 2)

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Safety Notices

Important Information

T1-042

The Operator Manual

A WARNING

You and others can be killed or seriously injured if you operate or maintain the machine without first studying the Operator Manual. You must understand and follow the instructions in the Operator Manual. If you do not understand anything, ask your employer or JCB dealer to explain it.

INT-1-4-2

Do not operate the machine without an Operator Manual, or if there is anything on the machine you do not understand.

Treat the Operator Manual as part of the machine. Keep it clean and in good condition. Replace the Operator Manual immediately if it is lost, damaged or becomes unreadable.

Safety Warnings



This safety alert system identifies important safety messages in this manual. When you see this symbol, be alert, your safety is involved, carefully read the message that follows, and inform other operators.

In this publication and on the machine, there are safety notices. Each notice starts with a signal word. The signal word meanings are given below.

A DANGER

Denotes an extreme hazard exists. If proper precautions are not taken, it is highly probable that the operator (or others) could be killed or seriously injured.

INT-1-2-1

A WARNING

Denotes a hazard exists. If proper precautions are not taken, the operator (or others) could be killed or seriously injured.

INT-1-2-2

A CAUTION

Denotes a reminder of safety practices. Failure to follow these safety practices could result in injury to the operator (or others) and possible damage to the machine.

INT-1-2-3



Important Information

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About this Manual

Introduction

About this Manual

Machine Model and Serial Number

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

- 426 from SN 1231500
- 436 from SN 1305000
- 456 from SN 1169000.

Using this Manual

T1-044

This manual is arranged to give you a good understanding of the machine and its safe operation. It also contains maintenance information and specification data. Read this manual from front to back before using the machine for the first time. 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 distributor or employer. Do not guess, you or others could be killed or seriously injured.

General warnings in this chapter are repeated throughout the book, as well as specific warnings. 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 differ, the text and or the illustration will specify.

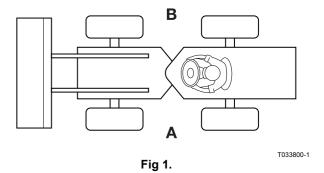
This manual contains original instructions, verified by the manufacturer (or their authorised representative).

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 publication.

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

Left Side, Right Side

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



Cab/Canopy

T1-003

This manual frequently makes references to the cab. For instance, 'do not operate the machine without a manual in the cab'. It should be noted that these statements also apply to canopy build machines.

Cross References

T1-004



Machine Description

Machine Description

The JCB Wheeled Loader

94-1002

Self-propelled wheeled machine with an integral front mounted shovel-supporting structure and linkage, which loads or excavates through forward motion of the machine, and lifts, transports and discharges material.

Intended Use

The machine is intended to be used under normal conditions for the applications described in this manual. If the machine is used for other purposes or in dangerous environments, for example in a flammable atmosphere or in areas with dust containing asbestos, special safety regulations must be followed and the machine must be equipped for use in these environments.

Component Location

Note: The illustration(s) show a typical machine model; your machine may look different from the model shown.

1	Loader arms
2	Shovel
3	ROPS/FOPS cab
4	Engine cover
5	Hydraulic fluid filler point (426/436)
5a	Hydraulic fluid filler point (456)
6	Hydraulic fluid tank sight glass (426/436)
6a	Hydraulic fluid tank sight glass (456)
7	Diesel filler point (426/436)
7a	Diesel filler point (456)
8	Articulation lock
9	Battery
10	Battery isolator switch
11	Toolbox



Machine Description

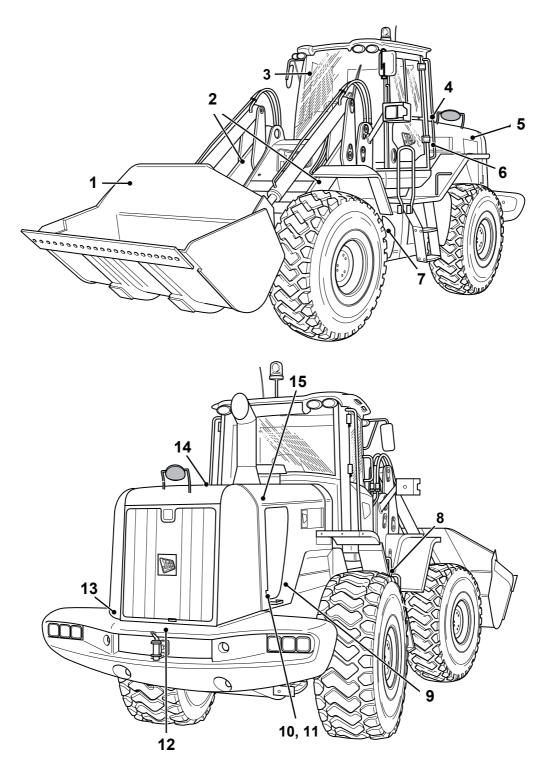


Fig 2. Component locations

812110-2



Safety Check List

P4-1004_3

Safety - Yours and Others

INT-1-3-1 3

All machinery can be hazardous. When a machine is correctly operated and properly maintained, it is a safe machine to work with. But 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. Read and understand them. They tell you of potential hazards and how to avoid them. If you do not fully understand the warning messages, ask your employer or JCB distributor to explain them.

But 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 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 job until you are sure that you and those around you will be safe.

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

Remember

BE CAREFUL BE ALERT BE SAFE

General Safety

T1-043

A WARNING

To operate the machine safely you must know the machine and have the skill to use it. You must abide by all relevant laws, health and safety regulations that apply to the country you are operating in. The Operator Manual instructs you on the machine, its controls and its safe operation; it is not a training manual. If you are a new operator, get yourself trained in the skills of using a machine before trying to work with it. If you don't, you will not do your job well, and you will be a danger to yourself and others.

INT-1-4-1

A WARNING

Care and Alertness

All the time you are working with or on the machine, take care and stay alert. Always be careful. Always be alert for hazards.

INT-1-3-5

A WARNING

Clothing

You can be injured if you do not wear the proper clothing. Loose clothing can get caught in the machinery. Wear protective clothing to suit the job. Examples of protective clothing are: a hard hat, safety shoes, safety glasses, a well fitting overall, earprotectors and industrial gloves. Keep cuffs fastened. Do not wear a necktie or scarf. Keep long hair restrained. Remove rings, watches and personal jewellery.

INT-1-3-6_2

A WARNING

Alcohol and Drugs

It is extremely dangerous to operate machinery when under the influence of alcohol or drugs. Do not consume alcoholic drinks or take drugs before or while operating the machine or attachments. Be aware of medicines which can cause drowsiness.

INT-1-3-9_2



A WARNING

Feeling Unwell

Do not attempt to operate the machine if you are feeling unwell. By doing so you could be a danger to yourself and those you work with.

8-1-2-4

A WARNING

Mobile Phones

Switch off your mobile phone before entering an area with a potentially explosive atmosphere. Sparks in such an area could cause an explosion or fire resulting in death or serious injury.

Switch off and do not use your mobile phone when refuelling the machine.

INT-3-3-9

A WARNING

Lifting Equipment

You can be injured if you use incorrect or faulty lifting equipment. You must identify the weight of the item to be lifted then choose lifting equipment that is strong enough and suitable for the job. Make sure that lifting equipment is in good condition and complies with all local regulations.

INT-1-3-7_2

A WARNING

Raised Equipment

Never walk or work under raised equipment unless it is supported by a mechanical device. Equipment which is supported only by a hydraulic device can drop and injure you if the hydraulic system fails or if the control is operated (even with the engine stopped).

Make sure that no-one goes near the machine while you install or remove the mechanical device.

13-2-3-7_3

A WARNING

Raised Machine

NEVER position yourself or any part of your body under a raised machine which is not properly supported. If the machine moves unexpectedly you could become trapped and suffer serious injury or be killed.

INT-3-3-7 1

A DANGER

Lightning

Lightning can kill you. Do not use the machine if there is lightning in your area.

5-1-1-2

A WARNING

Machine Modifications

This machine is manufactured in compliance with legislative and other requirements. It should not be altered in any way which could affect or invalidate any of these requirements. For advice consult your JCB Distributor.

INT-1-3-10_2



Operating Safety

A WARNING

Machine Condition

A defective machine can injure you or others. Do not operate a machine which is defective or has missing parts. Make sure the maintenance procedures in this manual are completed before using the machine.

INT-2-1-2_2



Machine Limits

Operating the machine beyond its design limits can damage the machine, it can also be dangerous. Do not operate the machine outside its limits. Do not try to upgrade the machine performance with unapproved modifications.

INT-2-1-4



Engine/Steering Failure

If the engine or steering fails, stop the machine as quickly as possible. Do not operate the machine until the fault has been corrected.

INT-2-1-5



Exhaust Gases

Breathing the machine exhaust gases can harm and possibly kill you. Do not operate the machine in closed spaces without making sure there is good ventilation. If possible, fit an exhaust extension. If you begin to feel drowsy, stop the machine at once and get into fresh air.

INT-2-1-10 2

A WARNING

Work Sites

Work sites can be hazardous. Inspect the site before working on it. You could be killed or injured if the ground gives way under your machine or if piled material collapses onto it. Check for potholes and hidden debris, logs, ironwork etc. Any of these could cause you to lose control of your machine. Check for utilities such as electric cables (overhead and underground), gas and water pipes etc. Mark the positions of the underground cables and pipes. Make sure that you have enough clearance beneath overhead cables and structures.

INT-2-2-1_2



Communications

Bad communications can cause accidents. Keep people around you informed of what you will be doing. If you will be working with other people, make sure any hand signals that may be used are understood by everybody. Work sites can be noisy, do not rely on spoken commands.

INT-2-2-3



Parking

An incorrectly parked machine can move without an operator. Follow the instructions in the Operator Manual to park the machine correctly.

INT-2-2-4_2



Banks and Trenches

Banked material and trenches can collapse. Do not work or drive too close to banks and trenches where there is danger of collapse.

INT-2-2-5

A WARNING

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 tyres. Make sure the machine will not foul on the ramp angle. See Static Dimensions in SPECIFICATION section for the minimum ground clearance of your machine.

2-2-7-5 1



A WARNING

Safety Barriers

Unguarded machines in public places can be dangerous. In public places, or where your visibility is reduced, place barriers around the work area to keep people away.

INT-2-2-8



Sparks

Explosions and fire can be caused by sparks from the exhaust or the electrical system. Do not use the machine in closed areas where there is flammable material, vapour or dust.

INT-2-2-10

A WARNING

Hazardous Atmospheres

This machine is designed for use in normal out door atmospheric conditions. It should not be used in an enclosed area without adequate ventilation. Do not use the machine in a potentially explosive atmosphere, i.e. combustible vapours, gas or dust, without first consulting your JCB Distributor.

INT-2-1-14

A CAUTION

Regulations

Obey all laws, work site and local regulations which affect you and your machine.

INT-1-3-3

A WARNING

Practice

You or others can be killed or seriously injured if you do unfamiliar operations without first practising them. Practise away from the work site on a clear area. Keep other people away. Do not perform new operations until you are sure you can do them safely.

INT-2-1-1

A WARNING

Airborne particles of light combustible material such as straw, grass, wood shavings, etc. must not be allowed to accumulate within the engine compartment or in the propshaft guards (when fitted). Inspect these areas frequently and clean at the beginning of each work shift or more often if required. Before opening the engine cover, ensure that the top is clear of debris.

5-3-1-12 3

A WARNING

Keep the machine controls clean and dry. Your hands and feet could slide off slippery controls. If that happens you could lose control of the machine.

2-2-3-6

A WARNING

Visibility

Accidents can be caused by working in poor visibility. Use your lights to improve visibility. Keep the road lights, windows and mirrors clean.

Do not operate the machine if you cannot see clearly.

5-1-4-7

A WARNING

Electrical Power Cables

You could be electrocuted or badly burned if you get the machine or its attachments too close to electrical power cables.

You are strongly advised to make sure that the safety arrangements on site comply with the local laws and regulations concerning work near electric power lines.

Before you start using the machine, check with your electricity supplier if there are any buried power cables on the site.

There is a minimum clearance required for working beneath overhead power cables. You must obtain details from your local electricity supplier.

2-2-5-4



A CAUTION

If you have an attachment which is not covered in the Operator Manual do not install it, use it or remove it until you have obtained, read and understood the pertinent information. Install attachments only on the machines for which they were designed.

5-5-1-1_2

A WARNING

Use only the JCB approved attachments that are specified for your machine. Operating with non-specified attachments can overload the machine, causing possible damage and machine instability which could result in injury to yourself or others.

The use of non-approved attachments could invalidate your warranty.

2-4-5-2_1

A DANGER

Working Platform

Using the machine as a working platform is hazardous; you can fall off and be killed or injured. Never use the machine as a working platform.

5-1-5-9

A WARNING

The engine has exposed rotating parts. Switch OFF the engine before working in the engine compartment. Do not use the machine with the engine cover open.

5-2-6-5

A WARNING

You could be killed or seriously injured if you operate a machine with a damaged or missing ROPS/FOPS. If the Roll Over Protection Structure (ROPS)/Falling Objects Protection Structure (FOPS) has been in an accident, do not use the machine until the structure has been renewed. Modifications and repairs that are not approved by the manufacturer may be dangerous and will invalidate the ROPS/FOPS certification.

INT-2-1-9 6

A WARNING

Travelling at High Speeds

Travelling at high speeds can cause accidents. Do not reverse in a high gear with full throttle. Always travel at a safe speed to suit working conditions.

INT-5-3-3

A WARNING

High Loads

A high load can block your view and reduce the machine's stability. Travel with the load low to the ground. Travel slowly and with caution over rough, muddy or loose surfaces.

5-1-3-2

A WARNING

Slopes

When transporting a load on a slope, drive slowly and keep the load uphill of the machine. This will increase stability.

5-1-4-1

A WARNING

Hillsides

Operating the machine on hillsides can be dangerous if proper precautions are not taken. Ground conditions can be changed by rain, snow, ice etc. Check the site carefully. Operate in first gear on hillsides, when applicable, keep all attachments low to the ground. Never coast down a hill with the engine off or the transmission in neutral.

INT-2-2-7

♠ WARNING

Controls

You or others can be killed or seriously injured if you operate the control levers from outside the machine. Operate the control levers only when you are correctly seated.

0179 2

A CAUTION

Passengers

Passengers in or on the machine can cause accidents. Do not carry passengers.

INT-2-2-2 1



A WARNING

Fires

If your machine is equipped with a fire extinguisher, make sure it is checked regularly. Keep it in the correct machine location until you need to use it.

Do not use water to put out a machine fire, you could spread an oil fire or get a shock from an electrical fire. Use carbon dioxide, dry chemical or foam extinguishers. Contact your nearest fire department as quickly as possible. Firefighters should use self-contained breathing apparatus.

INT-3-2-7_2

A WARNING

Should the machine start to roll over, you can be crushed if you try to leave the cab. If the machine starts to roll over, do not try and jump from the cab. Stay in the cab, with your seat belt fastened.

INT-2-1-12

A WARNING

Entering/Leaving

Entering or leaving the cab or canopy must only be made where steps and handrails are provided. Always face the machine when entering and leaving. Make sure the step(s), handrails and your boot soles are clean and dry. Do not jump from the machine. Do not use the machine controls as handholds, use the handrails.

INT-2-1-7_1

A WARNING

Safe Working Loads

Overloading the machine can damage it and make it unstable. Study the specifications in the Operator Manual before using the machine.

7-1-1-8 2

Maintenance Safety

WARNING

Communications

Bad communications can cause accidents. If two or more people are working on the machine, make sure each is aware of what the others are doing. Before starting the engine make sure the others are clear of the danger areas; examples of danger areas are: the rotating blades and belt on the engine, the attachments and linkages, and anywhere beneath or behind the machine. People can be killed or injured if these precautions are not taken.

INT-3-1-5

A WARNING

Repairs

If your machine does not function correctly in any way, get it repaired straight away. Neglect of necessary repairs could result in an accident or affect your health. Do not try to do repairs or any other type of maintenance work you do not understand. To avoid injury and/or damage get the work done by a specialist engineer.

GEN-1-5 2

A WARNING

Metal Splinters

You can be injured by flying metal splinters when driving metal pins in or out. Use a soft faced hammer or copper pin to remove and fit metal pins. Always wear safety glasses.

INT-3-1-3_2

A WARNING

Electrical Circuits

Understand the electrical circuit before connecting or disconnecting an electrical component. A wrong connection can cause injury and/or damage.

INT-3-1-4



A WARNING

Fluid Under Pressure

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

INT-3-1-10_3

A WARNING

Hydraulic Pressure

Hydraulic fluid at system pressure can injure you. Before connecting or removing any hydraulic hose, residual hydraulic pressure trapped in the service hose line must be vented. Make sure the hose service line has been vented before connecting or removing hoses. Make sure the engine cannot be started while the hoses are open.

INT-3-1-11_2

A WARNING

Fuel

Fuel is flammable; keep naked flames away from the fuel system. Stop the engine immediately if a fuel leak is suspected. Do not smoke while refuelling or working on the fuel system. Do not refuel with the engine running. Completely wipe off any spilt fuel which could cause a fire. There could be a fire and injury if you do not follow these precautions.

INT-3-2-2 3

A WARNING

Oil

Oil is toxic. If you swallow any oil, do not induce vomiting, seek medical advice. Used engine oil contains harmful contaminants which can cause skin cancer. Do not handle used engine oil more than necessary. Always use barrier cream or wear gloves to prevent skin contact. Wash skin contaminated with oil thoroughly in warm soapy water. Do not use petrol, diesel fuel or paraffin to clean your skin.

INT-3-2-3

A CAUTION

It is illegal to pollute drains, sewers or the ground. Clean up all spilt fluids and/or lubricants.

Used fluids and/or lubricants, filters and contaminated materials must be disposed of in accordance with local regulations. Use authorised waste disposal sites.

INT-3-2-14

A WARNING

Soft Ground

A machine can sink into soft ground. Never work under a machine on soft ground.

INT-3-2-4

A WARNING

Always wear safety glasses when dismantling assemblies containing components under pressure from springs. This will protect against eye injury from components accidentally flying out.

GEN-6-2

A CAUTION

Rams

The efficiency of the rams will be affected if they are not kept free of solidified dirt. Clean dirt from around the rams regularly. When leaving or parking the machine, close all rams if possible to reduce the risk of weather corrosion.

INT-3-2-10

A CAUTION

Cleaning

Cleaning metal parts with incorrect solvents can cause corrosion. Use only recommended cleaning agents and solvents.

INT-3-2-11

A WARNING

When using cleaning agents, solvents or other chemicals, you must adhere to the manufacturer's instructions and safety precautions.

GEN-1-9



A CAUTION

'O' rings, Seals and Gaskets

Badly fitted, damaged or rotted 'O' rings, seals and gaskets can cause leakages and possible accidents. Renew whenever disturbed unless otherwise instructed. Do not use Triochloroethane or paint thinners near 'O' rings and seals.

INT-3-2-12

A WARNING

Hydraulic Hoses

Damaged hoses can cause fatal accidents. Inspect the hoses regularly. Do not use the machine if a hose or hose fitting is damaged.

INT-3-3-2_4

A CAUTION

Waxoyl contains turpentine substitute which is flammable. Keep flames away when applying Waxoyl. Waxoyl can take a few weeks to dry completely. Keep flames away during the drying period.

Do not weld near the affected area during the drying period. Take the same precautions as for oil to keep Waxoyl off your skin. Do not breathe the fumes. Apply in a well-ventilated area.

5-3-1-9

A WARNING

Working Under the Machine

Make the machine safe before getting beneath it. Ensure that any fitments on the machine are secure; engage the park brake, remove the starter key, disconnect the battery.

INT-3-3-8 2

A WARNING

Certain seals and gaskets (e.g. crankshaft oil seal) on JCB machines contain fluoroelastomeric materials such as Viton, Fluorel and Technoflon. Fluoroelastomeric materials subjected to high temperatures can produce highly corrosive hydrofluoric acid. THIS ACID CAN SEVERELY BURN.

New fluoroelastomeric components at ambient temperature require no special safety precautions.

Used fluoroelastomeric components whose temperatures have not exceeded 300°C (572°F) require no special safety precautions. If evidence of decomposition (e.g. charring) is found, refer to the next paragraph for safety instructions DO NOT TOUCH COMPONENT OR SURROUNDING AREA.

Used fluoroelastomeric components subjected to temperatures greater than 300°C (572°F) (e.g. engine fire) must be treated using the following safety procedure. Make sure that heavy duty gloves and special safety glasses are worn:

- 1 Thoroughly wash contaminated area with 10% calcium hydroxide or other suitable alkali solution, if necessary use wire wool to remove burnt remains.
- 2 Thoroughly wash contaminated area with detergent and water.
- 3 Contain all removed material, gloves etc. used in this operation in sealed plastic bags and dispose of in accordance with Local Authority Regulations.

DO NOT BURN FLUOROELASTOMERIC MATERIALS.

INT-3-3-5_3

A WARNING

Protect your eyes when grinding metal. Wear safety glasses or goggles. Remove or protect any combustible materials from the area which could be ignited by sparks.

GEN-1-12



A WARNING

To avoid burning, wear protective gloves when handling hot components. To protect your eyes, wear goggles when using a brush to clean components.

HYD-1-3 2

A WARNING

Arc Welding

To prevent the possibility of damage to electronic components, disconnect the battery and the alternator before arc-welding on the machine or attached implements.

If the machine is equipped with sensitive electrical equipment, i.e. amplifier drivers, electronic control units (E.C.U.s), monitor displays, etc., then disconnect them before welding. Failure to disconnect the sensitive electrical equipment could result in irreparable damage to these components.

Parts of the machine are made from cast iron; welds on cast iron can weaken the structure and break. Do not weld cast iron. Do not connect the welder cable or apply any weld to any part of the engine.

Always connect the welder earth (ground) cable to the same component that is being welded, i.e. boom or dipper, to avoid damage to pivot pins, bearings and bushes. Attach the welder earth (ground) cable no more than 0.6 metres (2 feet) from the part being welded.

INT-3-1-15_2

A WARNING

Counterweights

Your machine may be fitted with counterweights. They are extremely heavy. Do not attempt to remove them.

INT-3-2-5

A WARNING

Compressed air is dangerous. Wear suitable eye protection and gloves. Never point a compressed air jet at yourself or others.

0147 1

A WARNING

Accumulators

The accumulators contain hydraulic fluid and gas at high pressure. Prior to any work being carried out on systems incorporating accumulators, the system pressure must be exhausted by a JCB distributor, as the sudden release of the hydraulic fluid or gas may cause injury.

INT-3-1-17

A WARNING

Petrol

Do not use petrol in this machine. Do not mix petrol with the diesel fuel; in storage tanks the petrol will rise to the top and form flammable vapours.

INT-3-1-6

A CAUTION

Do not disconnect the battery while the engine is running, otherwise the electrical circuits may be damaged.

INT-3-1-14

A WARNING

If you try to charge a frozen battery, or jump start and run the engine, the battery could explode. Do not use a battery if its electrolyte is frozen. To prevent the battery electrolyte from freezing, keep the battery at full charge.

0125

A WARNING

Battery Gases

Batteries give off explosive gases. Keep flames and sparks away from the battery. Do not smoke close to the battery. Make sure there is good ventilation in closed areas where batteries are being used or charged. Do not check the battery charge by shorting the terminals with metal; use a hydrometer or voltmeter.

INT-3-1-8



A DANGER

Electrolyte

Battery electrolyte is toxic and corrosive. Do not breathe the gases given off by the battery. Keep the electrolyte away from your clothes, skin, mouth and eyes. Wear safety glasses.

INT-3-2-1_3

A WARNING

Battery Terminals

The machine is negatively earthed. Always connect the negative pole of the battery to earth.

When connecting the battery, connect the earth (-) lead last

When disconnecting the battery, disconnect the earth (-) lead first.

INT-3-1-9

A WARNING

An exploding tyre can kill. Inflated tyres can explode if over-heated or over-inflated. Follow the instructions given when inflating the tyres. Do not cut or weld the rims. Use a tyre/wheel specialist for all repair work.

2-3-2-7 2

A WARNING

Jacking

A machine can roll off jacks and crush you unless the wheels have been blocked. Always block the wheels at the opposite end of the machine that is to be jacked. Do not work underneath a machine supported only by jacks. Always support a jacked-up machine on axle stands before working underneath it.

INT-3-2-8

A WARNING

Under no circumstances must the engine be run with the transmission in gear and only one driving wheel jacked clear of the ground, since the wheel on the ground will move the machine.

INT-3-1-16

A WARNING

Wheels and tyres are heavy. Take care when lifting or moving them.

Store with care to ensure that they cannot fall and cause injury.

13-3-1-7_1

A CAUTION

Never use water or steam to clean inside the cab. The use of water or steam could damage the on-board computer and render the machine inoperable. Remove dirt using a brush or damp cloth.

8-3-4-8

A WARNING

Asbestos

Asbestos dust can damage your lungs. Some engine gaskets contain asbestos. Do not dismantle the engine or exhaust system; get these jobs done by a qualified person who has a copy of the engine service manual.

5-1-6-1

A CAUTION

A combination of water and sulphur will have a corrosive chemical effect on fuel injection equipment. It is essential that water is eradicated from the fuel system when high sulphur fuels are used.

ENG-3-2



Safety Labels

Introduction

T1-014_2

A WARNING

Safety Labels

Safety labels on the machine warn you of particular hazards. You can be injured if you do not obey the safety instructions shown.

INT-1-3-11

Safety labels are strategically placed around the machine to remind you of possible hazards.

If you need eye-glasses for reading, make sure you wear them when reading the safety labels. Do not over-stretch or place yourself in dangerous positions to read the safety labels. If you do not understand the hazard shown on the safety label, then refer to **Safety Label Identification**.

Note: The illustration(s) show a typical machine model. Your machine may look different from the model shown.

Keep all safety labels clean and readable. Replace lost or damaged safety labels. Make sure replacement parts include safety labels where necessary. Each safety label has a part number printed on it, use this number to order a new safety label from your JCB distributor.



Safety Label Identification

The position of the safety labels attached to a typical machine are as shown.

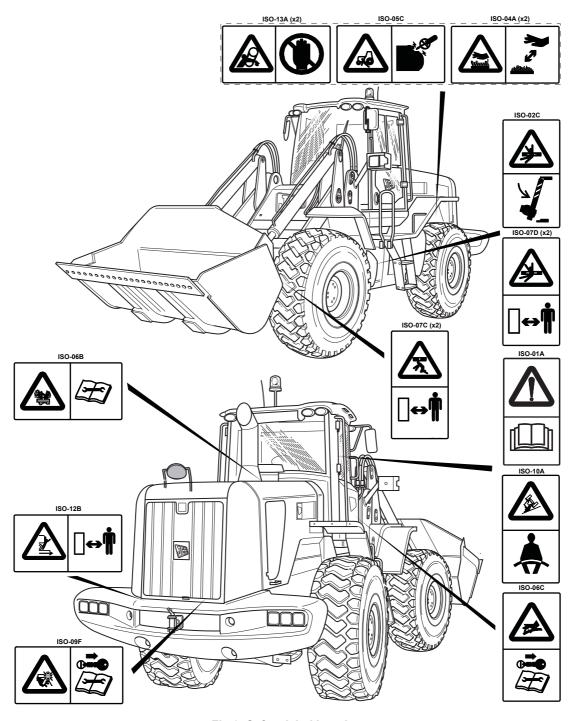


Fig 3. Safety label locations

T010560-8



Part Numbers and Descriptions

ISO-01A

Part Number: 817/70014

Description: Warning. Read the operator manual before you operate

the machine.



ISO-05C

Part Number: 332/P7129

Description: Runover. Start the engine from the operator

seat only. Do not short across the terminals.



332-P7129-1

ISO-02C

Part Number: 332/P7181

Description: Crushing of whole body. Install the articulation lock before you start maintenance work. Refer to **Articulation Lock (Operation**

Section).



ISO-06B

Part Number: 332/P7131

Description: Pressure hazard. Refer to Cooling System

(Routine Maintenance Section).



332-P7131-1

ISO-03B

Part Number: 817/70024

Description: Warning. Do not use as a

step.



ISO-06C

Part Number: 817/70002

Description: Pressure hazard. Stop the engine, remove the starter key and refer to *Releasing the Hydraulic Pressure* (*Routine Maintenance Section*) before you start

maintenance work.



ISO-04A

Part Number: 332/P7128

Description: Burns to fingers and hands. Stay a safe

distance away.



332-P7128-1

ISO-07C

Part Number: 817/70008

Description: Crushing of whole body. Keep a safe distance from the

machine.



18 9811-3400-4 **18**



ISO-07D

Part Number: 817/70027

Description: Crush hazard. Keep a safe distance from the moving parts.



ISO-13A

Part Number: 332/P7134

Description: Entanglement hazard. Do not touch.



332-P7134-1

ISO-09F

Part Number: 332/P7132

Description: Severing of hands or fingers. Keep clear of/ do not reach into the moving parts. Stop the engine and remove the starter key before you start maintenance work. Refer to Making the Machine Safe (Routine Maintenance Section).



332-P7132-1

ISO-010A

Part Number: 817/70029

Description: Crush hazard. Wear the seat belt when you operate the

machine.



ISO-12B

Part Number: 332/W6368

Description: Strike. Keep clear of a reversing machine.



332-W6368



Identifying Your Machine

Identifying Your Machine

Machine Identification Plate

Your machine has an identification plate mounted as shown. The serial numbers of the machine and its major units are stamped on the plate.

Note: The machine model and build specification is indicated by the PIN. Refer to **Typical Product Identification Number (PIN)**.

The serial number of each major unit is also stamped on the unit itself. If a major unit is replaced by a new one, the serial number on the identification plate will be wrong. Either stamp the new number of the unit on the identification plate, or simply stamp out the old number. This will prevent the wrong unit number being quoted when replacement parts are ordered.

The machine and engine serial numbers can help identify exactly the type of equipment you have.

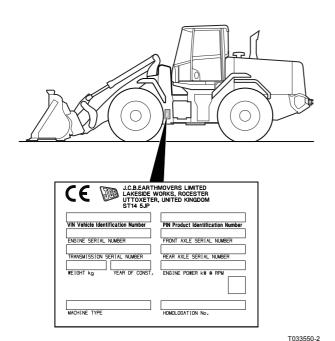
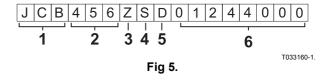


Fig 4.

Typical Product Identification Number



- 1 World Manufacturer Identification (3 Digits)
- 2 Model Number (3 Digits)
- 3 Loader End Type (1 Digit)

O = HT Loader End

Z = ZX Loader End

4 Designation (1 Digit)

S = Farmmaster

O = None Farmmaster

I = India

5 Check Letter (1 Digit)

The Check Letter is used to verify the authenticity of the machine's PIN.

6 Machine Serial Number (8 Digits)

Each machine has a unique serial number.



Identifying Your Machine

Component Identification Plates

FOPS Data Plate

A WARNING

Do not use the machine if the falling objects protection level provided by the structure is not sufficient for the application. Falling objects can cause serious injury.

8-2-8-17

If the machine is used in any application where there is a risk of falling objects then a falling-objects protective structure (FOPS) must be installed. For further information contact your JCB Dealer

The falling objects protection structure (FOPS) is fitted with a dataplate. The dataplate indicates what level protection the structure provides.

There are two levels of FOPS:

- Level I Impact Protection impact strength for protection from small falling objects (e.g. bricks, small concrete blocks, hand tools) encountered in operations such as highway maintenance, landscaping and other construction site services.
- Level II Impact Protection impact strength for protection from heavy falling objects (e.g. trees, rocks) for machines involved in site clearing, overhead demolition or forestry.

ROPS Data Plate

A WARNING

You could be killed or seriously injured if you operate a machine with a damaged or missing ROPS/FOPS. If the Roll Over Protection Structure (ROPS)/Falling Objects Protection Structure (FOPS) has been in an accident, do not use the machine until the structure has been renewed. Modifications and repairs that are not approved by the manufacturer may be dangerous and will invalidate the ROPS/FOPS certification.

INT-2-1-9 6

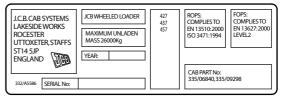
A WARNING

Seat Belts

The ROPS/FOPS is designed to give you protection in an accident. If you do not wear your seat belt, you could be thrown out of the machine and crushed. You must wear a seat belt when using the machine. Fasten the seat belt before starting the engine.

0153

Machines built to the ROPS/FOPS standard have a data plate attached to the inside of the cab.



332-A5586

Fig 6.





Machine Security

Machine Security

Introduction

T1-019

Vandalism and theft of unattended machines is an ever increasing problem and JCB is doing everything possible to help combat this.

Your JCB Distributor or Dealer will be pleased to provide information on any of these sensible precautions. ACT NOW!

JCB Plantguard

JCB PLANTGUARD is a comprehensive package available to help you safeguard your machine. It includes such devices as vandal proof covers, window etching, immobiliser, concealed serial number, battery isolator, Tracker security system and much more.

Remember that the fitting of any one of these security devices will help to minimise not only the damage or loss of your machine but also subsequent lost productivity. It could also result in reduced insurance premiums.

Construction Equipment Security And Registration Scheme (CESAR)

T1-020

JCB are pleased to announce, the availability of CESAR a simple, effective method of machine identification and registration that operates throughout the United Kingdom and Ireland and across the whole spectrum of JCB products.

CESAR is a scheme to help reduce plant theft, and was developed by the Metropolitan Police and the Home Office Plant Theft Action Group.

The key to the scheme is its simplicity and will mean that every police officer in the country will know how to identify construction machinery and verify ownership. This will provide a major leap forward in both protecting machinery, and recovering it.

The Construction Equipment Association is managing the scheme, and Datatag are providing the security material and support. JCB is fully supportive of the CESAR initiative and will offer it as a factory fit option across the range.

The CESAR kit includes 2 Tamper proof triangular ID plates fitted on either side of the machine, a unique

transponder, mini radio frequency identification tags (RFIDs) concealed throughout the machine, Datatag micro dots, and a unique DNA coded chemical painted on the machines major components. Plus a registration certificate logged onto the CESAR or DVLA databases, and a change of keeper form.



Operation

Introduction

T2-006_2

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.

Before you start the machine, you must know how the machine operates. Use your manual to identify each control lever, switch, gauge, button and pedal. Do not guess. If there is anything you do not understand, ask your JCB distributor.

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.

Finally, 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



Before Entering the Cab

Before Entering the Cab

T2-025_4

The following checks should be made each time you return to the machine after leaving it for any period of time. We advise you also to stop the machine occasionally during long work sessions and do the checks again.

All these checks concern the serviceability of the machine. Some concern your safety. Get your service engineer to check and correct any defects.

A WARNING

Walking or working under raised attachments can be hazardous. You could be crushed by the attachments or get caught in the linkages.

Lower the attachments to the ground before doing these checks. If you are new to this machine, get an experienced operator to lower them for you.

If there is nobody to help you, study this manual until you have learned how to lower the attachments. Also make sure that the park brake is engaged before doing these checks.

2-2-1-1

- 1 Check for cleanliness.
 - a Clean the windows, light lenses and rear view mirrors.
 - **b** Remove dirt and debris, especially from around the linkages, rams, pivot points and radiator.
 - **c** Make sure the cab step(s) and handholds are clean and dry.
 - **d** Clean all safety and instructional labels. Replace any that are missing or cannot be read.
- 2 Check for damage.
 - **a** Inspect the machine generally for damaged and missing parts.
 - **b** Make sure that the attachment is secure and in good condition.
 - **c** Make sure that all pivot pins are secured correctly in place.

- **d** Inspect the windows for cracks and damage. Glass splinters can blind.
- e Check for oil, fuel and coolant leakages underneath the machine.

A WARNING

You could be killed or injured if a machine tyre bursts. Do not use the machine with damaged, incorrectly inflated or excessively worn tyres.

2-2-1-2

- 3 Make sure the tyres are correctly inflated.
 - Check for cut rubber and penetration by sharp objects. Do not use a machine with damaged tyres.
- 4 Make sure that all of the filler caps are installed correctly.
- Make sure that all of the access panels are closed and secure.

Note: If the filler caps and access panels are fitted with locks, we recommend that you lock them to prevent theft or tampering.



Entering and Leaving the Cab

Entering and Leaving the Cab

A WARNING

Entering/Leaving

Entering or leaving the cab or canopy must only be made where steps and handrails are provided. Always face the machine when entering and leaving. Make sure the step(s), handrails and your boot soles are clean and dry. Do not jump from the machine. Do not use the machine controls as handholds, use the handrails.

INT-2-1-7_1

Make sure the machine is stopped and correctly parked before entering or leaving the cab. If necessary, refer to **Stopping and Parking the Machine**.

When you get on and off the machine always maintain a three point contact with the handrails and step. Do not use the machine controls or steering wheel as handholds.

Note: The illustration(s) show a typical machine model, your machine may look different to the model shown.

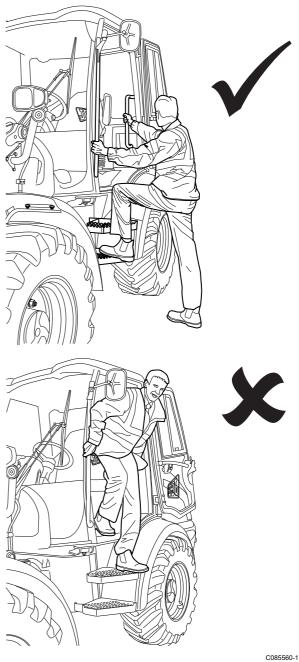


Fig 7.



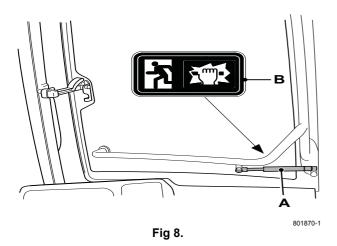
Entering and Leaving the Cab

Emergency Exit

In an emergency if the door cannot be used:

- Open the right side window (emergency exit) as far as the retaining-strut A will allow.
- **2** A hard downward blow to the retaining strut disconnects it and lets the window open fully.

The emergency exit window has a label ${\bf B}$ attached in the position shown.

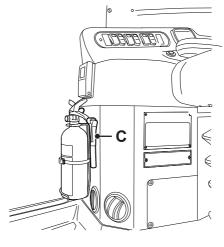


Glazing Breaker (if fitted)

If the machine has a glazing breaker ${\bf C}$, it is possible to use the side window as an emergency exit.

If an emergency occurs:

- 1 Remove the glazing breaker **C** from its stowage position.
- 2 Use the glazing breaker to hit the side window near the corner to shatter the side window.
- 3 Knock the side window out of its frame.



T033730-3

Fig 9.



Doors and Windows

Doors and Windows

Opening and Closing the Door

P4-2001

To open the door from the outside, unlock it with the key provided and press the lock barrel.

Close the door from the inside by pulling it firmly: it will latch itself.

To open the door from the inside, push lever **A** towards the front. The door is opened by a gas strut.

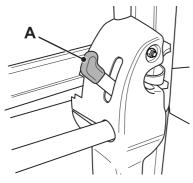
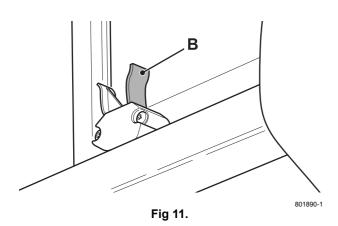


Fig 10.

Opening and Closing the Door Side Window

P4-200

Operate latch ${\bf B}$, slide window until the window locks into the required position.



Opening and Closing the Right Side Window

To open the window:

- 1 Turn the handle **C** 90° clockwise.
- Push the handle outwards until the locating pin D locks the handle. The window can be locked in two positions:

Halfway along the handle.

At the end of the handle.

To close the window, reverse the procedure.

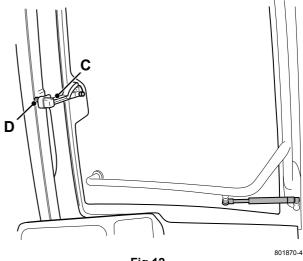


Fig 12.



Seat Controls

Seat Controls

Introduction

T2-007_3

A WARNING

Seat

Position the seat so that you can comfortably reach the machine controls. Do not adjust the seat while the machine is moving. You could have an accident if you operate the machine with the seat in the wrong position.

13-1-1-9_1

The operator's seat can be adjusted for your comfort. A correctly adjusted seat will reduce operator fatigue. Position the seat so that you can comfortably reach the machine controls. For driving the machine, adjust the seat so that you can depress the pedals fully with your back against the seat back.

Suspension Seat (Type 1)

Note: Adjustments should only be made by the operator when sat on the seat.

- 1 Horizontal Adjustment (Slide rails)
- 2 Height Adjustment Lever

Move the height adjustment lever **2** until the ride height indicator **3** shows green (the comfort zone) on the display **3a**. Within the green band there is 75 mm (3 in.) of height adjustment for any driver.

Note: The seat is designed so that it is unnecessary to make any adjustment for the driver weight.

- 3 Ride Height Indicator. See *Height Adjustment*.
- 4 Backrest Angle Adjustment (if fitted).
- 5 Document Pocket

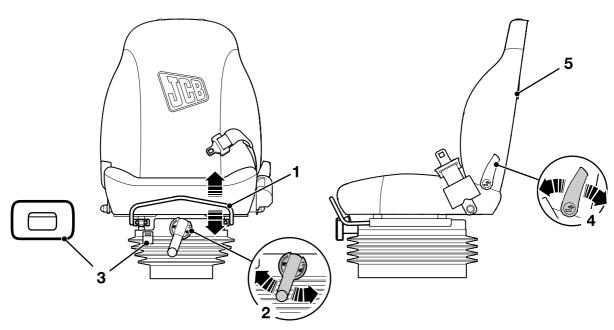


Fig 13.

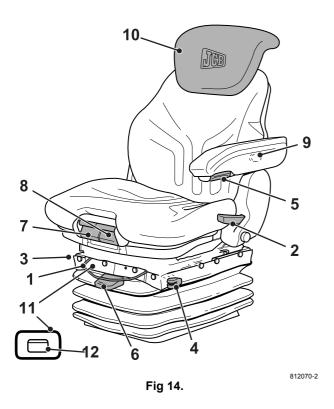


Seat Controls

Air Suspension Seat

P7-2005

Adjustments should only be made by the operator when sat on the seat.



1 Fore/Aft Adjustment:

Lift the handle **1** and move the seat forwards or backwards to the required position.

To lock the seat in position, release the handle 1.

2 Backrest Angle Adjustment:

Lift the lever 2 and adjust the seat to the required angle.

To lock the seat in position, release the lever 2.

3 Damper Adjustment:

Move the damper adjustment lever **3** to get a hard or soft suspension of the seat.

To lock the seat in position, move the lever **3** to the forward position and the lever **4** to the rear position.

4 Fore/Aft Isolator Adjustment:

To enable the fore/aft suspension movement of the seat, move the lever **4** to the forward position. (For example when you move across rough ground or tow a trailer).

To disable the fore/aft suspension movement, move the lever to the rear position.

To lock the seat in position, move the lever **3** to the forward position and the lever **4** to the rear position.

5 Armrest Adjustment:

To change the angle of the armrest when its lowered, turn the hand-wheel **5**. Do not apply pressure to the armrest during this step.

To get access to the seat the armrest can be raised fully.

6 Height/Auto Weight Adjustment (Option):

Lift the lever **6**, then release it to set the automatic weight adjustment.

Move the lever **6** until the ride height indicator **11** shows green (the comfort zone) on its display **12**. In the green band there is 75mm (3 in.) of height adjustment for the operator.

7 Seat Cushion Depth Adjustment (Option):

Lift the lever **7** and move the cushion backwards or forwards to adjust the distance from the base of the backrest to the front of the seat.

To lock the cushion in position, release the lever 7.

8 Seat Cushion Angle Adjustment (Option)

Lift the lever **8** and apply or release pressure to the spring mechanism to adjust the angle of the cushion.

To lock the cushion in position, release the lever 8.



Seat Controls

9 Lumbar Support Adjustment (Option):

Seat Type 1: Operate the two switches **9** until the lower part of your back is comfortably supported.

Seat Type 2: Turn the knob **9** until the lower part of your back is comfortably supported.

10 Backrest Extension Height Adjustment (Option):

Move the backrest extension **10** up or down to adjust its position.

The backrest extension can be removed if necessary.

Console Arm Rest

P4-2030

Introduction

The position of the arm rest can be adjusted to give the operator a comfortable and supportive position to move the loader controls.

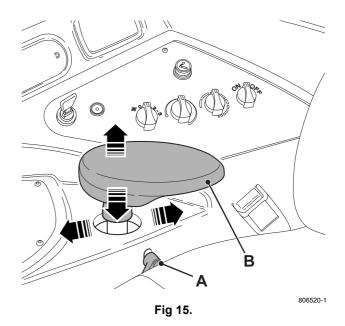
Up/Down Adjustment

 Turn the lever A counter-clockwise to loosen the arm rest.

Note: When the lever **A** is loosened to adjust the height of the arm rest **B**, also move the arm rest forwards and backwards to adjust its angle.

- **2** Adjust the height and angle of the arm rest as necessary.
- 3 To lock the arm rest in position, tighten the lever A.

Note: To change the locked position of the lever **A**, push the centre button and pull the lever out, then move it to the new position.





Seat Belt

Seat Belt

Inertia Reel Seat Belt

T2-001_2

A WARNING

If you do not wear your seat belt you could be thrown about inside the machine, or thrown out of the machine and crushed. You must wear a seat belt when using the machine. Fasten the seat belt before starting the engine.

8-2-9-2 1

A WARNING

When a seat belt is fitted to your machine replace it with a new one if it is damaged, if the fabric is worn, or if the machine has been in an accident. Fit a new seat belt every three years.

2-3-1-7 1

Fasten the Seat Belt

- 1 Sit correctly in the seat. Pull the belt from its reel holder in one continuous movement.
- Push the male fitting A into the buckle B until it latches into position. Make sure the seat belt is not twisted and that it is over your hips not your stomach.

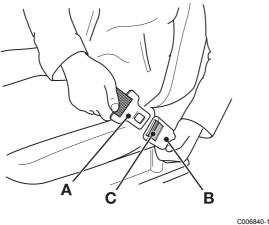


Fig 16.

Note: If the belt 'locks' before the male fitting **A** has been engaged, allow the belt to fully retract in its reel holder and then try again. The inertia mechanism may lock if you pull

the belt too sharply or if the machine is parked on an incline. In such cases, ease the belt gently from its reel holder.

Check the Seat Belt is Operating Correctly

- Sit correctly in the seat and fasten the seat belt as described.
- 2 Hold the middle of the seat belt as shown at D and tug. The seat belt should 'lock'.

A WARNING

If the seat belt does not 'lock' when you check if the seat belt is operating correctly, do not drive the machine. Get the seat belt repaired or replaced immediately.

2-2-2-1

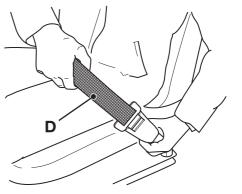


Fig 17.

C006850-1

Release the Seat Belt

A WARNING

Release the seat belt only after switching off the engine.

2-2-1-10

- 1 Press button C and pull the male fitting A from the buckle.
- 2 Let the seat belt retract into its reel holder.



Visibility Aids

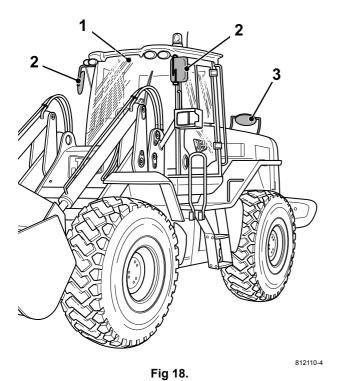
Mirrors

Introduction

When operating the machine the operator must continually survey their field of vision. It is important that the mirrors are securely fitted and give maximum vision around the machine.

When a mirror is provided to supplement the operators direct field of vision, it must be adjusted to serve as an aid to the operator in seeing people or obstacles around the machine. The mirror provides indirect vision to hidden areas and improves the effectiveness of the machines usage.

- 1 Rear View Mirror
- 2 Side Mirrors
- 3 Rear Mirror



Adjusting the Mirror

T2-054

- 1 Adjust the seat to suit the operator.
- 2 Adjust the mirror(s) to suit your specific working requirements before you drive or operate the machine.
- 3 Check that the field of vision A can be seen. Refer to Checking the Field of Vision.

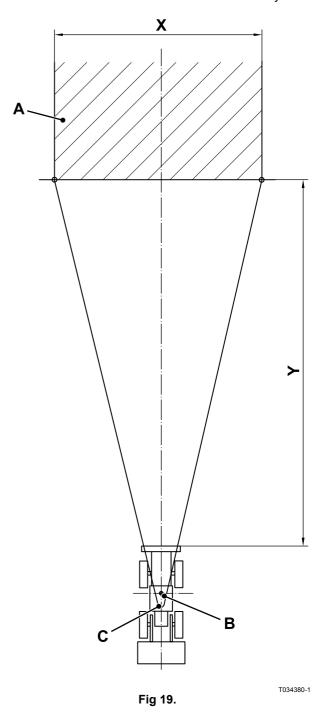


Checking the Field of Vision

Rear View Mirror

Check that the field of vision $\bf A$ at ground level shall be such that you can see, using the mirror(s), at least a 10 metre ($\bf X$) wide flat, horizontal portion of the ground, centred on the vertical longitudinal median plane of the machine, 30 metre ($\bf Y$) behind the rear end of the machine

- A Field of vision
- B Centre point position
- C Rear view mirror

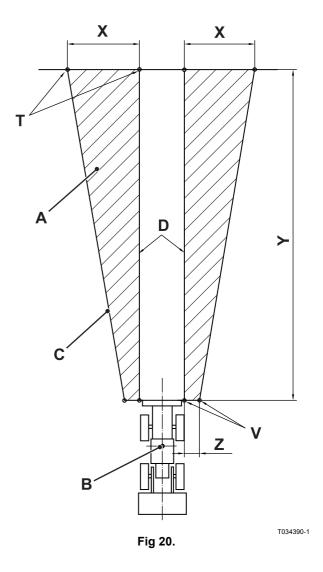




Side Mirrors

Check that the field of vision $\bf A$ is such that you can see, using the mirrors at least a flat portion bounded on the left and right of the machine, starting at the rear end of the machine at a height of 1 metre above ground level and a width of 0.75 metres ($\bf Z$), continuing to a width of 3.5 metres ($\bf X$) at ground level, 30 metres ($\bf Y$) behind the rear end of the machine.

- A Field of vision
- B Centre point position
- C Outer borderline
- **D** Inner borderline
- T Measurement at ground level
- V Measurement at 1 metre above ground level





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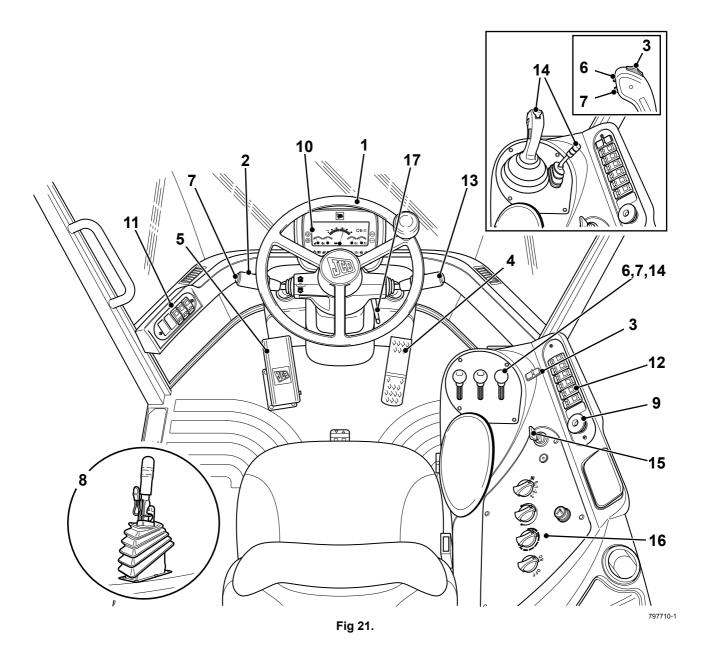


Cab Layout

Cab Layout

Component Key

The cab component layout illustration shows a typical machine. Your machine may look different to the model shown.





Cab Layout

- 1 ⇒ Steering Wheel (36)
- 2 ⇒ Forward/Reverse Lever and Transmission Control (38)
- 3 ⇒ Forward/Reverse Switch (38)
- 4 ⇒ Accelerator Pedal (36)
- 5 ⇒ Foot Brake Pedal (36)
- 6 ⇒ Transmission Kickdown Switch (1 42)
- 7 ⇒ Transmission Dump Switch (1 42)
- 8 ⇒ Park Brake Lever (426, 436 Only) (37)
- 9 ⇒ Park Brake Switch (456 Only) (37)
- 10 ⇒ Instrument Panel (148)
- 11 ⇒ Left Console Switches (43)
- 12 ⇒ Right Console Switches (1 43)
- 13 ⇒ Multi-Purpose Steering Column Switch (1 46)
- 14 ⇒ Operating Levers (56)
- 15 *⇒ Starter Switch (* <u>1</u> 47)
- 16 ⇒ Heater/Air Conditioning Controls (55)
- 17 ⇒ Steering Column Adjustment (1 36)



Drive Controls, Switches and Instruments

Drive Controls

Steering Wheel

T2-048

Turn the steering wheel in the direction you want to go.

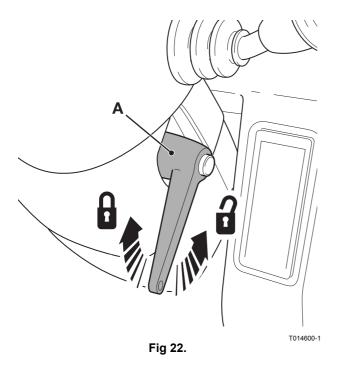
Steering Column Adjustment

A WARNING

Make sure the steering column is locked in position. Do not adjust the steering column while driving.

INT-2-1-16

Use the lever **A** to set the steering column to the correct position for when you sit correctly on the operator seat.



- 1 Hold the steering wheel then turn the lever **A** in a counter clockwise direction to unlock the steering column.
- 2 Adjust the steering wheel to the correct position (lift, lower, tilt forward/backward).

3 Turn the lever **A** in a clockwise direction to lock the steering column in position.

Note: The locked position of lever **A** can be altered - pull the lever out and move to the required position.

Accelerator Pedal

T2-01

Push this pedal down to increase engine speed. Let the pedal up to reduce engine speed. With your foot off the pedal the engine will idle.

Foot Brake Pedal

2-049_2

Push down on the brake pedals to slow or stop the machine. Use the brakes to prevent overspeeding down a slope.

The stop lights should come on when the brakes are applied. Do not drive the machine unless both stop lights work correctly.



Park Brake Lever (426, 436 Only)

A 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

Use this lever to engage the park brake before you leave the machine.

Note: When the park brake is engaged, the transmission is disconnected automatically.

To engage the park brake, pull the lever up as far as it will go (past the vertical position). Make sure that the indicator light on the instrument panel comes on.

When the park brake is engaged and the forward /reverse lever is moved away from the neutral position:

- An audible warning will sound.
- The master warning light comes on.
- The "PARK BRAKE" message is shown.

To release the park brake, squeeze the release-button and lower the lever slowly to the off position. Make sure that the indicator light goes off.

Park Brake Switch (456 Only)

A 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

Use this switch to engage the park brake before you leave the machine.

Note: When the park brake is engaged, the transmission is disconnected automatically.

To engage the park brake, push the button. Make sure that the indicator light on the instrument panel comes on.

When the park brake is engaged and the forward /reverse switch is moved away from the neutral position:

- An audible warning will sound.
- The master warning light comes on.
- The "PARK BRAKE" message is shown.

To release the park brake, turn the button. Make sure that the indicator light goes off.

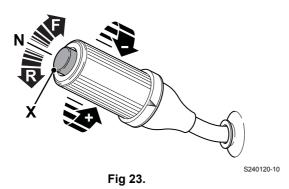
Note: When the ignition is set to the OFF (\mathbf{O}) position, the park brake is engaged automatically. To release the park brake, push the button to engage the park brake, then turn the button to release the park brake.



Transmission

Forward/Reverse Lever and Transmission Control

F ForwardN NeutralR Reverse



+/- Gear selectionF/N/R Drive selection

X ⇒ Transmission Kickdown Switch (42)

To select a gear, turn the barrel (+/-) on the lever so that the arrow marked on the barrel aligns with the required gear.

The gear ratio allocated to each of the positions on the column switch is dependant on the transmission mode that is selected. Refer to *Transmission Modes*.

To select a drive direction move the lever to the required position.

To prevent the accidental operation of the forward/reverse lever, the lever may be locked in the neutral position. ⇒ Neutral Lock (61).

Forward/Reverse Switch

The forward/reverse switch **A** is used to control the direction of the machine as an alternative to the forward/reverse lever.

To select a drive direction move the switch to the required position.

A CAUTION

Do not operate the Forward/Reverse switch when already using the Forward/Reverse lever, otherwise the transmission will select neutral. When using the Forward/Reverse switch, the Forward/Reverse lever MUST be locked in neutral.

4-2-1-6_2

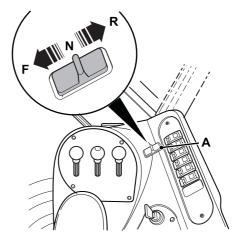


Fig 24. Multi-controls lever

806580-3

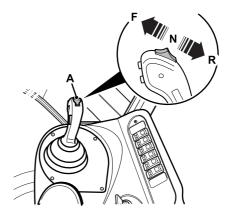


Fig 25. Servo-controls lever

806580-2



Drive Selection

A WARNING

You and others can be killed or injured if you operate the forward/reverse lever while you travel. The machine will immediately reverse direction without warning to others. Follow the recommended procedure for proper use of this selector.

2-2-2-4_2

A WARNING

Travelling at High Speeds

Travelling at high speeds can cause accidents. Do not reverse in a high gear with full throttle. Always travel at a safe speed to suit working conditions.

INT-5-3-3

The machine can be moved off in any gear, dependant on the ground conditions.

When the machine is stationary before a gear is selected, make sure that:

- The forward/reverse lever and switch are in the neutral (N) position. (The engine will only start if the transmission is in neutral).
- The engine is at idle speed.

Stop the machine before the transmission is changed from forward to reverse or reverse to forward drive.

To select forward (\mathbf{F}), reverse (\mathbf{R}) or neutral (\mathbf{N}) drive, move the forward/reverse lever or switch to the required position.

To reverse direction:

- 1 Release the throttle pedal.
- 2 Push the foot brake to stop the machine, keep the foot brake applied.
- **3** Move the move the forward/reverse lever or switch to the new drive direction.
- 4 Release the foot brake and accelerate away.



Transmission Modes

To ensure selection of the most applicable gear ratio and shift points for a given machine application, the operator can select one of two transmission modes. These modes can be selected by means of a cab mounted switch. \Rightarrow Fig 26. ($\uparrow \ 40$).

Use the selector switch to select the transmission mode which is most suitable for the terrain and work you are doing.



Fig 26.

T007210-2

- M Manual Mode (A/M Switch OFF). Allows the operator to manually select and hold 1st, 2nd or 3rd gear. ⇒ Table 1. 4-Speed Manual Mode (A/M Switch OFF) (40).
- A Automatic Mode (A/M Switch ON). Autoshifts from 1st to the gear selected on barrel 4.

 ⇒ Table 2. 4-Speed Automatic Mode (A/M Switch ON) (140).

1st gear will remain selected. If another range or direction is selected or either of the kickdown buttons are pressed, the kickdown will be cancelled and 2nd gear will be selected.

Note: Kickdown only operates with 2nd gear selected.

Note: Reverse has only 3 gears (1st, 2nd and 3rd).

Table 1. 4-Speed Manual Mode (A/M Switch OFF)

Barrel Position	Forward	Reverse	Kickdown
1	1st	1st	None
2	2nd	2nd	F1, R1
3	3rd	3rd	None
4	Auto 2nd - 4th	Auto 2nd - 3rd	F1, R1 from 2nd

Kickdown 2nd to 1st immediately on request.	Yes
Must hold 1st after kickdown pressed (reverts to 2nd on direction change).	Yes
Kick back up 1st to 2nd immediately on request.	Yes
Summary: Autoshifts 2nd to 4th with manual selection of 1st, 2nd and 3rd gears.	

Table 2. 4-Speed Automatic Mode (A/M Switch ON)

Table 2: 4-Opeed Automatic Mode (A/M Owitch ON)			
Barrel Position	Forward	Reverse	Kickdown
1	1st	1st	None
2	Auto 1st - 2nd	Auto 1st - 2nd	F1, R1
3	Auto 1st - 2nd - 3rd	Auto 1st - 2nd - 3rd	F1, R1 from 2nd
4	Auto 1st - 2nd - 3rd - 4th	Auto 1st - 2nd - 3rd	F1, R1 from 2nd

Kickdown 2nd to 1st immediately on request	Yes
Must hold 1st after kickdown pressed (reverts to 2nd on direction change)	Yes
Kick back up 1st to 2nd immediately on request	Speed Dependant
Summary: Autoshifts 1st to 4th (fully automatic). Engine braking and manual downshift.	



Table 3. 6-Speed Manual Mode (A/M Switch OFF)

Barrel Position	Forward	Reverse	Kickdown
1	2nd	2nd	F1, R1
2	3rd only	2nd only	None
3	4th only	3rd only	None
4	Auto 2nd-6th	Auto 2nd-3rd	F1, R1 from 2nd

Kickdown 2nd to 1st immediately on request.	Yes
Must hold 1st after kickdown pressed (reverts to 2nd on direction change).	Yes
Kick back up 1st to 2nd immediately on request.	Yes
Summary: Autoshifts 2nd to 4th with manual selection of 1st, 2nd and 3rd gears.	

Table 4. 6-Speed Automatic Mode (A/M Switch ON)

Barrel Position	Forward	Reverse	Kickdown
1	Auto 1st-2nd	Auto 1st-2nd	F1, R1
2	Auto 1st-2nd- 3rd	Auto 1st-2nd	None
3	Auto 1st-2nd- 3rd-4th	Auto 1st- 2nd-3rd	None
4	Auto 1st-6th	Auto 1st-3rd	F1, R1 from 2nd

Kickdown 2nd to 1st immediately on request.	Yes
Must hold 1st after kickdown pressed (reverts to 2nd on direction change).	Yes
Kick back up 1st to 2nd immediately on request.	Yes
Summary: Autoshifts 1st to 6th (fully automatic). Engine braking and manual downshift.	

Table 5. 4-Speed Clutch Engagement

Barrel Position	Forward	Reverse
1	KV K1	KR K1
2	KV K2	KR K2
3	KV K3	KR K3
4	K4 K3	

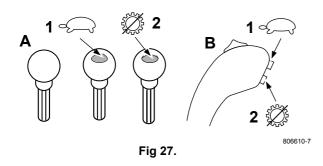
Table 6. 6-Speed Clutch Engagement

Barrel Position	Forward	Reverse
1	KV K1	KR K1
2	K4 K1	KR K2
3	KV K2	KR K3
4	KV K3	
5	K4 K2	
6	K4 K3	



Switches

General



A1 Transmission Kickdown Switch: Multi-Control Lever

A2 Transmission Dump Switch: Mulit-Control Lever

B1 Transmission Kickdown Switch: Servo-Control Lever

B2 Transmission Dump Switch: Servo-Control Lever

Transmission Kickdown Switch

P4-2004

Press the button on the end of the left column lever, top button on loader servo lever or button on top of the left multi lever to operate the transmission kickdown.

When the kickdown switch is pressed once the system shifts to the next lowest gear (dependant on road speed) and autoshifts up and down but only as high as the gear selected after the button was pressed. If button is pressed again, reverts to autoshift.

When the kickdown switch is pressed twice (double press) the system shifts to next lowest gear (dependant on road speed) the system will shift through the gears in sequence to 1st gear if required. If button is pressed once, reverts to autoshift.

Transmission Dump Switch

T2-014

You do not need to depress the switch when changing gear. The dump switch can be used to momentarily dump the transmission pressure to improve the hydraulic performance and reduce engine load.

Console Switches

Introduction

SW-001_2

The installed switches and their positions can change according to the specification of the machine.

Each switch has a graphic symbol **A** to show the function of the switch. Before you operate a switch, make sure that you understand its function.

The rocker switches have two or three positions (as shown).

If the switch has a backlight, then the graphic symbol **A** comes on when the ignition switch or side lights are in the ON position.

The light bar **B** comes on to show that the switch function is active.

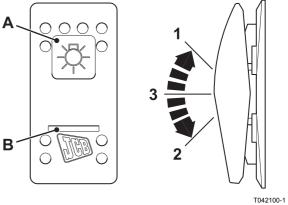


Fig 28.



Left Console Switches

Quickhitch Locking Pin Isolator (if fitted)



Two position rocker switch (spring-loaded). The switch functions operate when the starter switch is in the ON position.

Position 1: ON

802990-1 Position **2**: OFF (Push and hold while you move the locking pins)

Before you operate this switch, refer to **Quickhitch Control** (Attachments Section).

Transmission Dump Enable



Two position rocker switch with backlight. The switch functions operate when the starter switch is in the ON position.

Position 1: OFF (Backlight OFF).

Position 2: ON (Backlight ON).

339770-1

In the transmission dump enable mode, the transmission will `dump' each time the brake pedal is firmly pushed.

Transmission Mode



Two position rocker switch with backlight. The switch functions operate when the starter switch is in the ON position.

Position 1: Manual Mode (Backlight OFF).

A347030-1 Position 2: Auto Mode (Backlight ON).

Before you operate this switch, refer to *Drive Controls, Transmission*.

Automatic Carry Control System (if fitted)



Two position rocker switch with backlight. The switch functions operate when the starter switch is in the ON position.

Position 1: OFF (Backlight OFF).

Position 2: ON (Backlight ON).

A339660-2

Before you operate the switch, refer to **Preparing the Machine for Travel**.

Right Console Switches

Rear Window Wiper (if fitted)



Three position rocker switch. The switch functions operate when the starter switch is in the ON position.

Position 1: OFF

Position 3: ON

³⁴⁰⁰⁷⁰⁻¹ Position 2: Washer ON (if fitted)

Note: The wiper will self-park when switched off.

Rear Fog Light (if fitted)



Two position rocker switch. The switch functions operate when the starter switch is in the ON position.

Position 1: OFF Position 2: ON

340051-1

Side Lights and Headlights



Three position rocker switch with backlight. The switch functions operate when the starter switch is in the ON and OFF positions.

Position 1: OFF (Backlight OFF)

340151-1

Position 3: Side Lights ON (Backlight ON)

Position **2** (starter switch in the ON position): Headlights ON (Backlight ON)

Position 2 (starter switch in the OFF position): Side Lights ON (Backlight ON)

Machines without headlights or side lights are designed for site use. You may be breaking local laws if you travel on the road without headlights or side lights.

Hazard Warning Lights



Two position rocker switch with backlight. The switch functions operate when the starter switch is in the ON and OFF positions.

Position 1: OFF (Backlight OFF).

339861-1

Position 2: ON (Backlight ON). A light on the instrument panel flashes with the outside lights.



Auxiliary Hydraulic Circuit Changeover (if fitted)



Two position rocker switch with backlight. The switch functions operate when the starter switch is in the ON position.

Position 1: AUX I Position 2: AUX II

A339690-1

The switch energises a solenoid valve, which diverts the hydraulic pressure from the default output connections (AUX I) to the secondary output connections (AUX II).

Emergency Steer System (Engine Stopped)



Two position rocker switch, when the switch is released it automatically returns to the OFF position. The switch functions operate when the engine is stopped and the starter switch is in the ON position.

764940-1

Position 1: OFF Position 2: ON

Before you operate this switch, refer to Moving a Disabled Machine.

Shovel/Forks Pre-Set Angle Select (if fitted)



Two position rocker switch with backlight. The switch functions operate when the starter switch is in the ON position.

Position 1: Operate the shovel re-set proximity-switch (Backlight OFF).

766710-1 Position 2: Operate the forks re-set proximity-switch (Backlight ON).

Before you operate the switch, refer to Working with the Machine, Machine Adjustments.

Joystick Isolation (if fitted)



Two position rocker switch with backlight. The switch functions operate when the starter switch is in the ON position.

Position 1: OFF (Backlight OFF)

Position 2: ON (Backlight ON)

Before you operate the switch, refer to Control Lever Locks (if fitted).

Cigar Lighter



Push the knob until it latches, do not hold the knob in the pushed position. The knob releases when its ready to be used.

Note: The cigar lighter must not be used for any other purpose than that for which its intended.

Note: If a 12/24 Volt converter is installed, the lighter socket can be used as a 12 Volt auxiliary power socket.



Roof Panel Switches

A WARNING

Do not drive on the road with the work lights switched on. You can interfere with other drivers visibility and cause an accident.

2-2-2-5_1

Front Work Lights



Three position rocker switch. The switch functions operate when the starter switch is in the ON position.

Position 1: OFF

Position 3: Outer Work Lights ON

Position 2: Inner and Outer Work Lights

ON

Note: The work lights work independently of the main lights circuit.

Note: On Italian and German machines, it is not possible to have the headlights and the front worklights switched on at the same time.

Rear Work Lights



Two position rocker switch. The switch functions operate when the starter switch is in the ON position.

Position 1: OFF

Position 2: ON

340090-1

Note: The work lights work independently of the main lights circuit.

Heated Mirrors (if fitted)



A339880-1

Two position rocker switch with backlight. The switch functions operate when the starter switch is in the ON position.

Position 1: OFF (Backlight OFF).

Position 2: ON (Backlight ON).

Heated Seat (if fitted)



Two position rocker switch with backlight. The switch functions operate when the starter switch is in the ON position.

Position 1: OFF (Backlight OFF).

Position 2: ON (Backlight ON).

Beacon



Two position rocker switch. The switch functions operate when the starter switch is in the ON and OFF positions.

Position 1: OFF Position 2: ON

Before you operate the switch, refer to **Beacon**.



Multi-Purpose Steering Column Switch

1 Turn Signals (Right)

Pull the lever towards you to indicate a right turn. Switch the turn signals off when you have completed the turn. Functions only with the starter switch at position I.

2 Turn Signals (Left)

Push the lever away from you to indicate a left turn. Switch the turn signals off when you have completed the turn. Functions only with the starter switch at position I.

3 Windscreen Wiper

Rotate the lever barrel to switch the windscreen wipers on and off. The following functions are available (only with the starter switch turned on).

Single Speed (Standard)

- 0 Off
- I On

Two Speed (Optional)

- J Intermittent Wipe
- 0 Off
- I Slow
- II Fast

4 Windscreen Washer

Push the button towards the steering wheel to operate the windscreen washer. Functions only with the starter key at position I.

5 Headlights Flash

Lift the lever to flash the headlights. Functions only with the starter switch at position I.

6 Headlight/Main Beam

Push the lever down for main beam. Centre position is low beam. Functions only with the parking/head lights on. Switch the high beams off for on-coming vehicles.

7 Horn

Push the button to operate the horn. It functions only with the starter switch set to on.

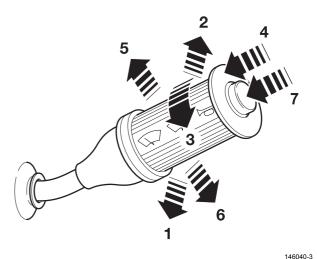


Fig 29.



Starter Switch

T2-0

This is a rotary switch, operated by the starter key. It has four positions. The key can be removed only with the switch set to \mathbf{O} .

- Return the key to this position to stop the engine. Make sure the transmission is in neutral, the attachments have been lowered and the park brake is engaged before stopping the engine.
- **IGN** Putting the switch to this position connects the battery to all the electrical circuits except the lights and hazard warning circuit. (The lights and hazard warning circuits are permanently live.) The starter key will spring back to this position when it is released from positions **H** or **HS**.
- H Heat Position. Holding the key in the heat position switches on a glow plug. The glow plug warms the engine induction manifold for cold weather starting. Do not hold in this position for more than 15 seconds.
- **HS** Start position. Operates the starter motor to turn the engine.

Note: Do not operate the starter motor for more than 20 seconds at one time. Let the starter motor cool for at least two minutes between starts.

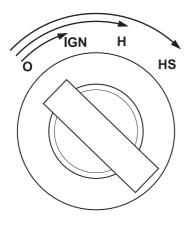


Fig 30.

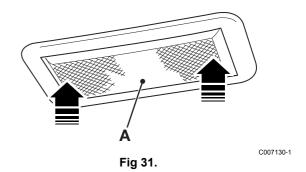
A243230-1

Cab Interior Light

T2-020

Press either end of the light unit **A** to switch on the cab interior light. Pressing the other end will switch the light off.

Make sure the light is turned off when you intend to leave the machine for a long period of time.

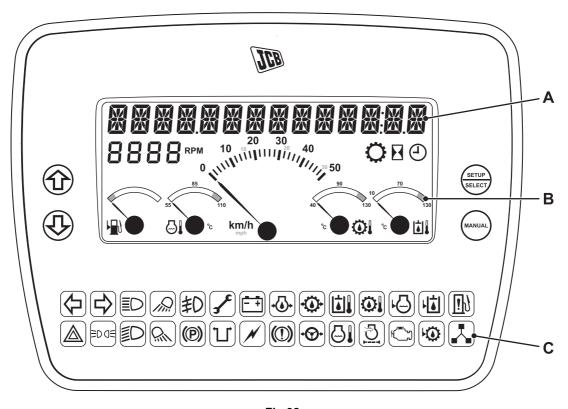




Instrument Panel

Introduction

P4-2019



794940-1

Fig 32.

The instruments and indicator lights are grouped together on an instrument panel. ⇒ Fig 32. (48).

As well as indicator lights for the direction indicators, main beam etc. there are warning lights for various fault conditions. When a warning light comes on an alarm will sound. The only way to cancel the alarm is to set the starter to 'off'.

Do not use the machine if it has a fault condition, or you may damage the engine and/or the transmission.

All instruments and indicators will be turned off when the starter switch is set to off. (But the hazard warning indicator will still operate if the hazard warning lights are switched on.)

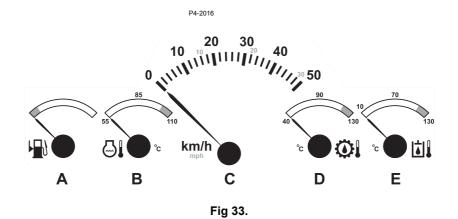
- A Digital Display
- B Instruments
- C Warning and Indicator Lights

794940-2



Drive Controls, Switches and Instruments

Instruments



A Fuel Gauge

Indicates the level of fuel in the tank. Do not let the tank run dry, or air will enter the fuel system.

Note: The message "LOW FUEL" is displayed on the panel when only 10% of fuel is left in the tank.

B Water Temperature

Indicates the working temperature of the engine coolant. Do not let the indicator rise to the red danger zone of the gauge.

C Speedometer

Indicates the road speed. The road speed in miles per hour (mph) is shown in black and kilometres (kph) are shown in red.

D Transmission Oil Temperature

Indicates the working temperature of the transmission oil. Do not let the indicator rise to the red danger zone of the gauge.

E Hydraulic Fluid Temperature

Indicates the working temperature of the hydraulic fluid. Do not let the indicator rise into the red danger zone of the gauge.



Digital Display

P4-2017



Fig 34.

794940-4

Ignition On

A CAUTION

All the warning lights should go out when the engine is started. Rectify any faults immediately.

4-2-1-4

During the first second after switching on, all LCD segments and warning lights are illuminated then the software version is displayed on the top line.

Indications (Engine Off)



Indicates that machine hours are displayed top left of the display.

A339410-1

Indications (Engine Running)



Indicates that Transmission information is displayed top left of the display.

A339420-1



Indicates that time is displayed top right of the display.

The gear in use is indicated top left of the display.

Note: Neutral (N) is displayed until the park brake is disengaged when ranges 1 or 2 are selected.



System Faults (Error Message Only)

Error messages are displayed on the top line of the display panel.

- IN GEAR

If Neutral is not selected, the panel will display the message "IN GEAR" and the buzzer will sound.

- PARK BRAKE

If the park brake is on and the transmission is not in neutral, the message "PARK BRAKE" will also be displayed.

- START INHIBIT

The following warnings will also cause the "START INHIBIT" message to be displayed. The engine will not start until the fault is cleared.

Transmission Oil Temperature High (10)

Water Temperature High (23)

Emergency Steer Pump (19)

"START INHIBIT" can be overridden by pushing the MANUAL button once.

- STEER SW FAULT

If there is a fault with the emergency steering, the message "STEER SW FAULT" will be displayed and the buzzer will sound.

- ZFCB ERROR ??

In the event of the transmission developing a fault, the EMS will display a fault code to aid diagnosis.

A fault code will be displayed on the top line of the display panel. An example of a fault code is shown: "ZFCB ERROR B6".

A list of the fault codes is given in the Service Manual.

Setting Up

- 1 Turn on the power by turning the starter key to IGN.
- 2 Pressing the SETUP/SELECT button while in Pre-Start Mode will allow the display to be set up as follows:

Note: Use the up and down arrows to adjust display as required.

a CLK FORMAT

The clock format (12/24 Hour) is shown in the top right corner.

- **b** HOUR
- c AM/PM

With 12 Hour selected, AM or PM is selected and is displayed in the top left corner.

- d MINUTE
- e YEAR
- f MONTH
- g DATE (Day)
- h LANGUAGE

English is the default language, there is one alternative language. Certain languages are not available.

i Returns the display to Pre-Start Mode.



Warning and Indicator Lights

P4-2018

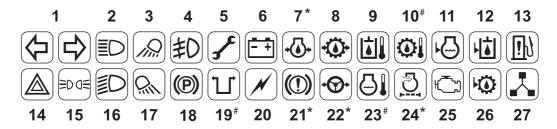


Fig 35.

794940-3

Warning Light Test (Daily)

A CAUTION

Do not use the machine if any of the warning lights do not illuminate. Have the fault rectified immediately.

4-2-1-3

- 1 Turn on the power by turning the starter key to IGN.
- 2 All the fault warning lights should illuminate during the start up cycle.
- 3 If any of the fault warning lights fail to illuminate, contact your JCB Dealer.

Functions

When lit, warning lights shown with an asterisk (*) will initiate the automatic engine shut down system. Refer to *Automatic Engine Shut Down*.

When lit, warning lights shown with an a hash (#) will initiate the automatic engine shut down system and prevent the engine from starting until the fault is cleared. Refer to *Automatic Engine Shut Down* and *Start Inhibit*.

1 Direction Indicators

Visual Only. Left or Right flashes with the direction indicators. Both flash when Hazard Warning Lights are on. Use the indicators to signal before turning.

2 Main Beam On

Visual Only. Lights up when the headlight main beams are switched on. Switch the main beams off for on-coming traffic.

3 Front Work Lights On

Visual Only. Lights up when the front work lights are switched on.

4 Rear Fog Light On

Visual Only. Lights up when the rear fog light is switched on.

5 Service Required

Visual with Message "SERVICE REQD" displayed on the top line of the display panel. If lit, contact your JCB Dealer.

Note: If diagnostic option is fitted, the Service Required warning and message will be displayed at pre-set intervals and also if the diagnostic computer memory is full. The Service Required is reset when data is down loaded by your JCB Dealer.

6 Battery Voltage

Audible/Visual with Message "BATTERY LOW" displayed on the top line of the display panel. Illuminated if the battery voltage is low.

7* Engine Oil Pressure Low

Audible/Visual with Message "ENG OIL PRESS" displayed on the top line of the display panel. Operates if the engine oil pressure drops too far. The light should go out when the engine is started.

8 Not used.



9 Hydraulic Fluid Temperature High

Audible/Visual with Message "HYD OIL TEMP" displayed on the top line of the display panel. Operates if the hydraulic fluid temperature rises too high.

10# Transmission Oil Temperature High

Audible/Visual with Message "TRANS OIL TEMP" displayed on the top line of the display panel. Operates if the transmission oil temperature rises too high.

- 11 Not used.
- 12 Not used.

13 Fuel Level

Visual Only. Flashes when only 10% of fuel is left in tank.

14 Hazard Warning

Visual Only. Flashes with the hazard warning lights (even with the starter switch at O). Switch the flashers on whenever your machine is a possible hazard.

15 Side Lights On

Visual Only. Lights up when the side lights are switched on.

16 Dip Beam On

Visual Only. Lights up when the headlight dipped lights are switched on.

17 Rear Work Lights On

Visual Only. Lights up when the rear work lights are switched on.

18 Park Brake Engaged

Visual Only. Lights up when the park brake is engaged.

19# Emergency Steer Pump

Visual with Message "EM STEER FAULT" displayed on the top line of the display panel. Lights up when the emergency steering system is operating. ie. When the machine is moving. Flashes when system fails to pressurise due to system fault.

20 No Charge

Audible/Visual with Message "ALTERNATOR" displayed on the top line of the display panel. Operates when the battery charging circuit fails while the engine is running. The light should go out a few seconds after the engine is started.

21* Brake System Pressure Low

Audible/Visual with Message "BRAKE FAILURE" displayed on the top line of the display panel. Lights up when the brake system pressure is low.

22* Main Steer System

Audible/Visual with Message "STEERING PRESS" displayed on the top line of the display panel. Lights up if the main hydraulic system pressure fails. Stop the machine as soon as it is safe to do so and rectify the fault.

23# Water Temperature High

Audible/Visual with Message "COOLANT TEMP" displayed on the top line of the display panel. Operates if the engine coolant temperature rises too high.

24* Air Filter Blocked

Audible/Visual with Message "AIR FLTER BLKD" displayed on the top line of the display panel. Operates if the engine air filter clogs up.

- 25 Not used.
- 26 Not used.

27 CAN-Bus Error

Visual Only. Illuminated if EMS receives a CAN-bus error from the ZF Computer.



Automatic Engine Shut Down

The following warnings will also initiate the automatic engine shut down system.

Engine Oil Pressure Low (7)
Transmission Oil Temperature High (10)
Brake System Pressure Low (21)
Main Steer System (22)
Water Temperature High (23)
Air Filter Blocked (24)

A 30 second count down to engine shut down starts as soon as the warning symbol is illuminated.

The count down time is displayed on the top line of the display alternating with the appropriate warning dialogue.

In an emergency, the MANUAL button will reset the counter to 30 seconds; this will allow the machine to be moved if necessary.

Although there is no limit to the number of times the button may be pressed, each press of the MANUAL button is remembered in the diagnostic data logger.

Note: The ignition switch must be switched OFF after a shut down to enable the system to reset.



Heater/Air Conditioning Controls

Fan.

Turn the switch to start the three-speed heater fan. Turn the switch more to get faster fan speeds. The fan operates only with the starter key in the **IGN** position.

2 Temperature.

To increase the temperature, turn the switch to the left

3 Re-circulation.

To re-circulate the air in the cab, turn the switch to the left

To get fresh air from outside of the cab, turn the switch to the right.

Adjust the switch to get a mixture of re-circulated and fresh air.

Note: In dusty conditions, it is recommended to recirculate the air in the cab, if not the filter can become clogged.

4 Air Conditioning.

To start the air conditioning, turn the switch to the left.

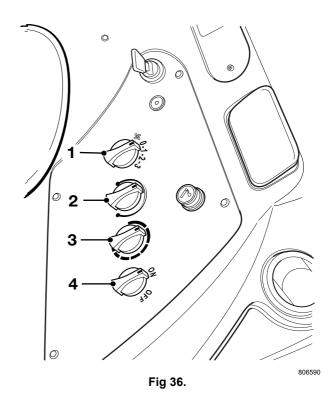
When the air vents are open, hot or cold air flows directly into the cab.

To quickly de-mist the front window, close the air vents and turn the air re-circulation control switch fully to the left.

The circular adjustable air vents are on:

- The front of the side console at foot level (2 off).
- The front console (2 off).
- The top of the rear bulkhead (2 off).
- The top at the rear of the side console (1 off).
- The rear bulkhead (A smaller air vent).

Two rectangular adjustable air vents are found on either side of the front console.



55 9811-3400-4 **55**



Operating Levers

Operating Levers

Introduction

P4-2011_3

A WARNING

Controls

You or others can be killed or seriously injured if you operate the control levers from outside the machine. Operate the control levers only when you are correctly seated.

0179_2

A WARNING

Electrical Power Cables

You could be electrocuted or badly burned if you get the machine or its attachments too close to electrical power cables.

You are strongly advised to make sure that the safety arrangements on site comply with the local laws and regulations concerning work near electric power lines.

Before you start using the machine, check with your electricity supplier if there are any buried power cables on the site.

There is a minimum clearance required for working beneath overhead power cables. You must obtain details from your local electricity supplier.

2-2-5-4

The levers are spring-loaded to their central hold positions. The speed of movement of the associated hydraulic rams depends on how far you move a lever - the further you move the lever, the faster the ram action.

The rams will stay in any position until you move them with the levers or switches.

Control Layouts

A WARNING

Control lever/switch action may vary on machines, decals near the levers/switches show by symbols, which levers/switches cause what actions. Before operating control levers/switches check the decal to make sure you select the desired action.

5-2-2-9

Control levers and switches may vary on machines. The machine may be fitted with any of the following control layouts.

- Loader arm Multi-control levers
- Loader arm Servo-control lever, with auxiliary lever
- Loader arm Servo-control lever, with auxiliary buttons.

A WARNING

If Float is selected with the loader raised, the loader will descend to ground level and 'float' across it as you travel. You will not have control over the rate of fall.

2-2-2-7

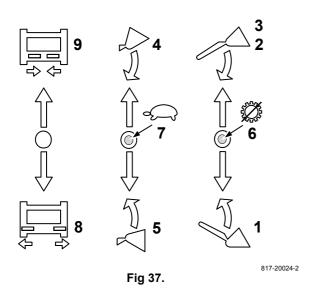


Operating Levers

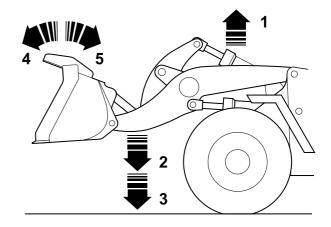
Loader Arm Controls

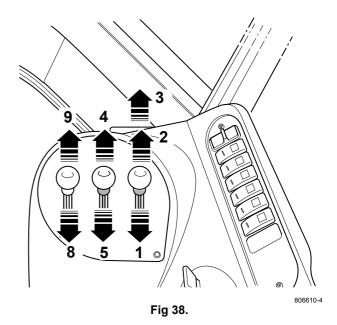
Multi-Control Levers

The information label is adjacent to the multi-controls levers.



- 1 Loader arms raise
- 2 Loader arms lower
- 3 Loader arms float. Push the multi-control lever forward as far as it will go and leave it there
- 4 Shovel dump
- 5 Shovel crowd
- 6 Transmission dump button
- 7 Transmission kickdown button
- 8 Auxiliary: Quickhitch locking-pins engaged
- 9 Auxiliary: Quickhitch locking-pins dis-engaged





For more information on the auxiliary controls, refer to *Attachments, Quickhitch Control*.

806610-1



Operating Levers

Servo-Control Lever with Auxiliary Lever

The information label is adjacent to the servo-control lever.

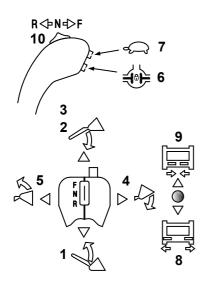
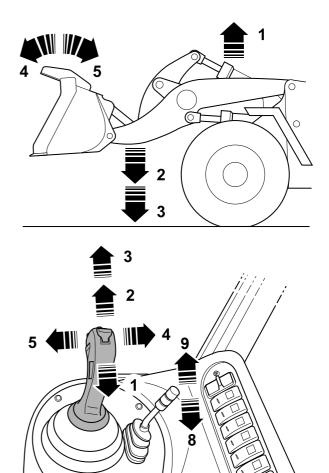


Fig 39.

806610-6

- 1 Loader arms raise
- 2 Loader arms lower
- 3 Loader arms float. Push the servo-control lever forward as far as it will go and leave it there
- 4 Shovel dump
- 5 Shovel crowd
- 6 Transmission dump
- 7 Transmission kickdown
- 8 Auxiliary lever: Quickhitch locking-pins engaged
- 9 Auxiliary lever: Quickhitch locking-pins dis-engaged
- 10 Forward/reverse



For more information on the auxiliary controls, refer to *Attachments, Quickhitch Control*.

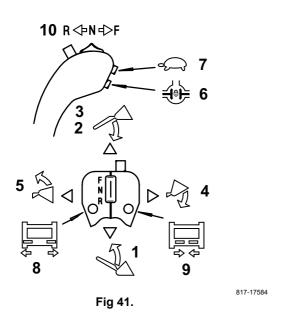
Fig 40.



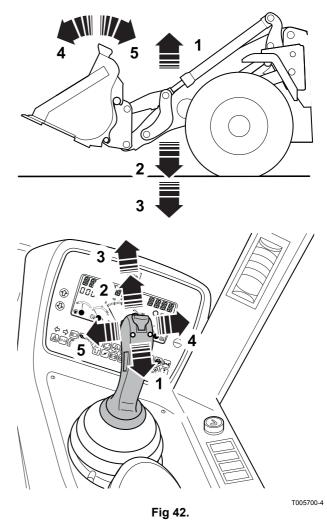
Operating Levers

Servo-Control Lever with Auxiliary Buttons

The information label is adjacent to the servo-control lever.



- 1 Loader arms raise
- 2 Loader arms lower
- 3 Loader arms float. Push the servo-control lever forward as far as it will go and leave it there.
- 4 Shovel dump
- 5 Shovel crowd
- 6 Transmission dump
- 7 Transmission kickdown
- 8 Auxiliary button: Quickhitch locking-pins engaged
- 9 Auxiliary button: Quickhitch locking-pins dis-engaged
- 10 Forward/reverse



For more information on the auxiliary controls, refer to *Attachments, Quickhitch Control*.



Operating Levers

Auxiliary Controls

A WARNING

Before operating the Auxiliary control system make sure that you are aware of all WARNINGS and CAUTIONS that apply to the attachment you are using. Also make sure you have fitted the attachment correctly. (See OPTIONAL ATTACHMENT section).

5-2-2-6

A CAUTION

If you have an optional attachment which is not covered in this manual, do not fit it or use it until you have obtained, read and understood the attachment operating information.

2-4-1-1

All machines are supplied as standard with one auxiliary service. A second auxiliary service can be installed as an option.

The first auxiliary service is operated either:

- Mechanically by an auxiliary lever ⇒ Servo-Control Lever with Auxiliary Lever (58)
- Or electrically by the auxiliary buttons on the loader arm servo-control lever ⇒ Servo-Control Lever with Auxiliary Buttons (59).

If the machine has a second auxiliary service, set the auxiliary (AUX) switch to the auxiliary 2 position to divert the hydraulic power to this function. ⇒ Console Switches (1 42).

Dependant on which auxiliary service is selected, the auxiliary buttons, or the auxiliary lever can operate the:

- Quickhitch locking-pins (first auxiliary service)
- Attachment, (second auxiliary service).

Note: On machines with a power diverter lever, the lever must be in the horizontal position before the auxiliary service can be used to operate an attachment. In the horizontal position the Quickhitch locking-pins are in a locked position. For more information on the power diverter lever, refer to **Attachments, Quickhitch Control**.



Safety Equipment

Safety Equipment

Control Lever Locks

Loader Arm Control Isolator Switch

To prevent the hydraulic loader arm controls from being operated accidentally when the driver is entering or leaving the cab, a joystick isolation switch has been installed ⇒ Right Console Switches (1 43)

Loader Arm Controls

Switch On (Illuminated)

Unlocked or Active Loader Arm Controls

Switch Off

Locked

The loader arm controls must always be locked before the driver leaves the cab.

The loader arm controls must only be unlocked when the driver is correctly seated and there is no danger of accidentally knocking against the loader arm control levers.

Neutral Lock

P4-2008



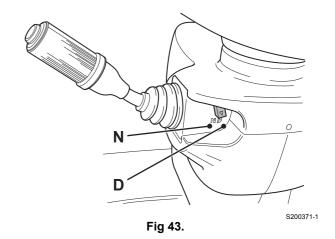
Do not operate the Forward/Reverse switch when already using the Forward/Reverse lever, otherwise the transmission will select neutral. When using the Forward/Reverse switch, the Forward/Reverse lever MUST be locked in neutral.

4-2-1-6_2

To prevent accidental operation of the forward/reverse lever, while entering or leaving the cab, the lever can be locked in the neutral position.

With the selector in the position marked ${\bf N}$, the lever is locked in neutral.

With the selector in the position marked ${\bf D}$, forward or reverse drive may be selected.



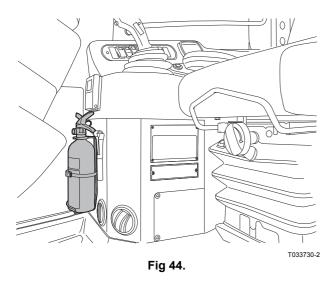


Safety Equipment

Fire Extinguisher (if fitted)

Location

The fire extinguisher is found inside the operator cab and is held in position by a stowage bracket. Keep the fire extinguisher in this position until you need to use it.



Operation

T2-041_3



Do not use the fire extinguisher in a confined space. Make sure that the area is well ventilated during and after using the fire extinguisher.

4-2-3-1

A WARNING

After any use, the extinguisher should be replaced or serviced.

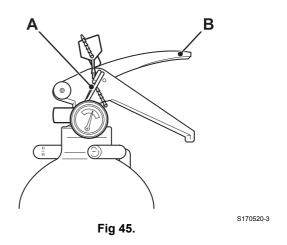
4-2-3-2

Make sure that you understand how to use the fire extinguisher. If necessary, refer to the instructions found on the fire extinguisher.

Only try to extinguish a fire if the circumstances permit and your safety is not endangered. If necessary, contact your nearest fire department.

Using the fire extinguisher:

- 1 If the circumstances permit and your safety is not endangered, move the machine to a safe place to prevent the fire from spreading.
- 2 Remove extinguisher from its stowage bracket.
- 3 Remove safety pin A.
- 4 Aim directly at the fire from an upwind position, if possible.
- **5** Squeeze trigger **B** to operate the extinguisher, release the trigger to stop the flow.



The fire extinguisher should be inspected daily. Refer to Routine Maintenance, Fire Extinguisher (if fitted).

Safety Equipment

Beacon

Note: We recommend that you install a beacon before you travel on public highways. In certain territories you will be breaking the law if you do not install a beacon before you travel on public highways, make sure you are complying with local laws.

Note: The type of beacon is model dependant. The procedure that follows is for a typical machine.

Connect the plug $\boldsymbol{\mathsf{A}}$ from the beacon into the cab roof socket., as shown.

Push its switch on the roof panel to operate the beacon. The indicator light in the switch comes on when the beacon is operating. ⇒ *Roof Panel Switches* (145).

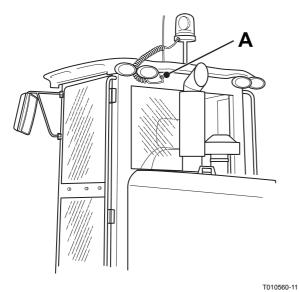


Fig 46.

63 9811-3400-4 **63**



Before Starting the Engine

Before Starting the Engine

P5-2033_4

Note: Read **Operating Environment** in Operation section if you will be using the machine in very cold or very hot climates.

Note: If the fuel tank has been empty or if any part of the fuel system has been drained or disconnected, the fuel system must be primed before attempting to start the engine. See **Bleeding the System**, Maintenance section.

The park brake should have been engaged when the machine was last parked. But if it is not already engaged, engage it now.

A DANGER

Before lowering the attachments to the ground, make sure that the machine and the area around it are clear of other people. Anyone on or close to the machine could fall and be crushed by the attachments, or get caught in the linkages.

2-2-3-4

2 Make sure that the attachment is on the ground.

A CAUTION

On machines fitted with hose burst protection valves the attachments cannot be lowered with the engine stopped. On these machines start the engine and lower the attachments before doing the walk round inspection.

2-2-3-5

- For your own safety (and others) and for a maximum service life of your machine, do a pre-start inspection before starting the engine.
 - a If you haven't already done it, do a walk round inspection of the outside of the machine. See Before Entering the Cab. Also, complete the daily checks as detailed in the Service Schedules.
 - **b** Remove dirt and rubbish from the cab interior, specially around the pedals and control levers.

A WARNING

Keep the machine controls clean and dry. Your hands and feet could slide off slippery controls. If that happens you could lose control of the machine.

2-2-3-6

- **c** Remove oil, grease and mud from the pedals, control levers and the steering wheel.
- **d** Make sure that your hands and shoes are clean and dry.

A WARNING

Loose articles can fall and strike you or roll on the floor. You could be knocked unconscious, or the controls could get jammed. If that happens you could lose control of the machine.

2-2-3-7_1

- e Remove or secure all loose articles in the cabsuch as lunch boxes, tools etc.
- f Inspect the ROPS/FOPS structure for damage. Get your JCB Distributor to repair any damage. Make sure all its securing bolts are fitted and correctly tightened.
- **g** Check around the cab for loose or missing bolts, screws etc. Replace or tighten where necessary.
- **h** Inspect the seat belt and its mountings for damage and excessive wear.

A WARNING

When a seat belt is fitted to your machine replace it with a new one if it is damaged, if the fabric is worn, or if the machine has been in an accident. Fit a new seat belt every three years.

2-3-1-7_1

i Check that the following are in working order:

Lights, Warning Lights, Horn, Indicator Lights, All Switches, Direction Indicators, Hazard Warning Lights, Windscreen Washer and Wipers (if fitted).



Before Starting the Engine

- 4 Adjust the seat so that you can comfortably reach all the driving controls. You should be able to apply full brake pedal travel with your back against the seat back.
- 5 If fitted, adjust the armrest so that you can reach and operate the controls without stretching.
- 6 If possible, adjust the steering column so that you can reach the steering wheel and the steering column switches without stretching.
- 7 If fitted, set the rear view mirror(s) to give you a good view close behind the machine when you are correctly seated.
- 8 Fasten the seat belt.

65 9811-3400-4 **65**



Starting the Engine

Starting the Engine

P4-2009

A WARNING

Exhaust Gases

Breathing the machine exhaust gases can harm and possibly kill you. Do not operate the machine in closed spaces without making sure there is good ventilation. If possible, fit an exhaust extension. If you begin to feel drowsy, stop the machine at once and get into fresh air.

INT-2-1-10_2

- 1 Read and comply with **Before Starting the Engine**.
- The battery isolator key must be fitted and switch on before attempting to start the engine. Refer to Electrical System, Battery Isolator.
- 3 Start the engine
 - a Fully depress the accelerator pedal.
 - b If the outside temperature is low, 0°C (32°F) or below, turn the starter switch key to the 'heat' position for 20 seconds to warm the engine induction manifold.
 - **c** Turn the starter key fully clockwise to **HS** to start the engine.
 - **d** Release the starter key as soon as the engine starts. The switch will return to **IGN**.
 - **e** Ease off on the accelerator pedal to reduce engine speed.

A WARNING

Do not use ether or other starting fluids to assist cold starting. Using these fluids may result in an explosion causing possible injury and/or damage to the engine.

3-2-1-9

Note: If the engine has not started after 20 seconds, release the starter switch. Wait two minutes before attempting another start. This will allow the starter motor to cool down.

4 Once the engine has started, check that all the warning lights have gone off. Do not race the engine

until the *oil pressure low* light has gone out. Check that the audible alarm is silent.

Note: The engine noise and or tone may be louder than usual when cold. This is normal and is due to the fuel injection pump being advanced. The engine will become quieter when the engine reaches normal operating temperature.

Note: If any warning lights fail to go off, or come on while the engine is running, stop the engine as soon as it is safe to do so.

A CAUTION

Do not attempt to operate the machine immediately after starting in cold conditions, i.e. below -5°C (20°F). The machine may not respond properly to control movements. Allow at least 10 minutes warm up time with the engine at half throttle. Operate the arm and bucket services to warm the hydraulic oil.

3-1-1-5_1

Operate the hydraulic services to ensure each function is working correctly and to help warm up the hydraulic system.

Do not operate attachments until the hydraulic oil has reached its normal working temperature.

Note: New engines do not require a running-in period. The engine/machine should be used in a normal work cycle immediately; glazing of the piston cylinder bores resulting in excessive oil consumption, could occur if the engine is gently run-in. Under no circumstances should the engine be allowed to idle for extended periods; (e.g. warming up without load).

Transmission Cold Start Procedure

At temperatures below -12°C (10.4°F) the ZF Computer inhibits gear selection until the transmission has been warmed up.

If the EMS displays " ** ":

Start the engine and warm up the transmission in neutral. When the correct temperature is reached, the EMS will display ${\bf N}$.



Preparing the Machine for Travel

Preparing the Machine for Travel

Introduction

When you travel on the road or on site there are usually local rules and safety regulations for the machine travel position. The *Preparing for Road Travel* and *Preparing for Site Travel* described on the following pages are recommendations that should help you meet the requirements of these regulations; they are not necessarily the applied law.

Please make sure that before you travel on the road or on site, you and your machine comply with all the relevant local laws - it is your responsibility.

Preparing for Road Travel

Important: Make sure that you will be obeying all pertinent laws and regulations before you take the machine on public roads.

Important: Machines without headlights and sidelights are designed for site use, you may be breaking local laws if you travel on the road without headlights or sidelights.

A WARNING

Do not drive on the road with the work lights switched on. You can interfere with other drivers visibility and cause an accident.

2-2-5_1

In the UK, before travelling on public roads, it is your responsibility as a user to comply with the Road Vehicles (Construction and Use) (Amendment) Regulations 1997 (`Bridge Bashing Regulations').

Always assess your route for overhead structures for example bridges which could be damaged by your machine.

Important: While this information is believed to be correct, JCB cannot be aware of all circumstances in which the JCB machine may be operated on a Public Highway and it is the responsibility of the user to ensure compliance with the regulations.

2 Check that all road lights are working correctly.

- 3 The traffic regulations may require you to have a beacon operating on some public roads. Refer to Beacon.
- 4 Lower/raise the shovel to approximately 300mm (12in.) above the ground.
- 5 Operate the controls to fully 'crowd' the shovel.
- 6 Make sure the tooth-guard A is attached to the shovel.

Note: In some territories you may be breaking the law if you do not attach a tooth-guard to the shovel. Make sure that you obey the local laws.

Important: In some countries the law requires that a safety marker plate **B** is attached before you travel on public roads.

7 Start the ACCS (option).

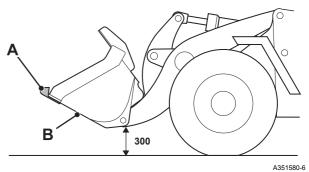


Fig 47.



Preparing the Machine for Travel

Preparing for Site Travel

Read and understand the information given in *Preparing* the *Machine for Travel*.

A WARNING

High Loads

A high load can block your view and reduce the machine's stability. Travel with the load low to the ground. Travel slowly and with caution over rough, muddy or loose surfaces.

5-1-3-2

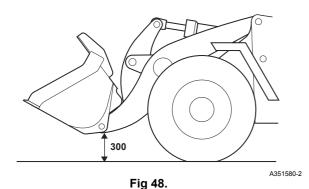
1 Lower/raise the shovel to approximately 300mm (12in) above the ground.

Keep the shovel in this position when you:

- a Travel with a full shovel.
- **b** Reverse up a slope.
- c Travel across a slope.

Note: If you drive or turn the machine with the loader arm in the raised position, the stability of the machine is decreased.

- 2 Operate the control to fully 'crowd' the shovel.
- 3 Start the ACCS (option).



Automatic Carry Control System - (if fitted)

The Automatic Carry Control System (ACCS) is a hydraulic suspension system that is designed to supply a "cushion" effect for the loader arm lift rams, to give a smoother ride when you travel on rough terrain. The system is effective in all load conditions, from a full payload to an empty shovel.

The system operates above 7kph (4.4mph) road speed. When the system starts to operate, the loader arms may lift slightly; the amount will depend on the load being carried.

A manual override stops the system if its not necessary and because the accumulators keep their charge at all times, there is no possibility of a loader arm hydraulic collapse when the system is started.



Getting the Machine Moving

Getting the Machine Moving

Operating Practices

A WARNING

Do not let the machine coast with the transmission in the neutral position, the engine braking function will not operate. This action could cause a loss of machine control and severe damage to the engine.

7-2-5-18

When you drive the machine, keep it under your control at all times. Stay alert for obstructions and possible hazards.

A WARNING

Do not dismount a moving machine.

3-2-3-12

Do not use the brake pedal as a footrest.

Select the correct gear before you drive down a slope. Use the same gear you would use to go up the slope. Do not change gear on a slope.

First gear gives the machine its maximum driving torque and engine braking effect. Use first gear when you:

- Drive through mud.
- Manoeuvre in tight spaces.
- Drive up or down steep slopes.

Approach deep mud with the front wheels straight.

Always stop the machine and let the engine go to idle before you change gear from forward to reverse or from reverse to forward.

Do not let the engine idle in reverse or forward gear for more than five minutes. The engine at idle in these positions can cause overheating and damage to the transmission. Always select neutral when the time at idle will be more than five minutes.

A WARNING

Should the machine start to roll over, you can be crushed if you try to leave the cab. If the machine starts to roll over, do not try and jump from the cab. Stay in the cab, with your seat belt fastened.

INT-2-1-12



Getting the Machine Moving

Operating Procedure

After you have warmed up the engine and tested the park brake, move off as described below.

Note: The location of the drive controls and switches and their operation are shown in this manual, refer to **Cab Layout**.

- Check your seat belt and seat.
 - a Make sure that your seat belt is correctly fastened.
 - **b** Make sure that the seat is correctly adjusted.
- Visually examine the local area to make sure there are no persons adjacent to the machine.

A WARNING

Powershift Transmission

Do not change from a high gear to a low gear (for instance, 4th to 1st) in one sudden movement when the machine is moving. Otherwise the machine will rapidly decelerate, you or others could be killed or seriously injured. When selecting lower gears, allow the engine speed to drop before each gear change.

2-1-1-9 1

A WARNING

You and others can be killed or injured if you operate the forward/reverse lever while you travel. The machine will immediately reverse direction without warning to others. Follow the recommended procedure for proper use of this selector.

2-2-2-4 2

- **3** Make sure the loader arm is in the travel position.
- 4 Push the brake pedal.
- 5 Select forward or reverse drive.

A WARNING

Travelling at High Speeds

Travelling at high speeds can cause accidents. Do not reverse in a high gear with full throttle. Always travel at a safe speed to suit working conditions.

INT-5-3-3

Note: When forward or reverse drive is selected, the 'park brake engaged" warning light comes on.

Note: When reverse drive is selected, an external audible alarm operates as a warning to personnel that the machine is about to move backwards.

A CAUTION

Before moving off, make sure it is safe to do so. Be particularly careful when reversing - get help if needed.

7-2-4-2

- 6 Release the park brake.
- Make sure its safe to move the machine, then release the brake pedal and push the accelerator pedal to move the machine smoothly away.



Engine/Steering Failure

If the engine or steering fails, stop the machine as quickly as possible. Do not operate the machine until the fault has been corrected.

INT-2-1-5

8 Slowly push the accelerator pedal.

The transmission system will initially go to first gear when forward drive is selected. As the machine speed increases the transmission will upshift automatically through each gear.

9 While the machine is travelling slowly, check the steering and brakes. Do not drive the machine unless the steering and brakes operate correctly. If you are not sure, assume that they are defective and contact the nearest JCB Dealer.



Stopping and Parking the Machine

Stopping and Parking the Machine

P4-2012

A WARNING

Parking

An incorrectly parked machine can move without an operator. Follow the instructions in the Operator Manual to park the machine correctly.

INT-2-2-4 2

- 1 Stop the machine on dry and level ground where the machine will not be a hazard or danger.
- 2 Ease up on the accelerator pedal and down on the brake pedal to bring the machine to a smooth stop. Keep the foot brakes on until the park brake has been engaged and the drive disengaged.

A 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

3 Engage the park brake. Make sure that the park brake indicator lights up. Release the foot brake.

Note: An audible alarm will sound and a warning light will show when the parking brake is engaged with the machine in forward (**F**) or reverse (**R**) drive. The alarm will stop when neutral (**N**) drive is selected.

A WARNING

Do not dismount a moving machine.

3-2-3-12

4 Set the transmission to neutral. Make sure the neutral lock is engaged. Refer to **Neutral Lock**.

A DANGER

Before lowering the attachments to the ground, make sure that the machine and the area around it are clear of other people. Anyone on or close to the machine could fall and be crushed by the attachments, or get caught in the linkages.

2-2-3-4

5 Operate the control lever to lower the shovel/ attachments to the ground. Once they are on the ground, operate the controls a little further so that it begins to take the weight of the machine.

Note: Make sure that the shovel/attachments lie flat on the ground to prevent accidental movement.

- 6 Lock the controls. Refer to Loader Control Locks.
- 7 It is recommended that turbocharged engines are run at 1000 RPM (approximately) and reduced load for 2 3 minutes before shut down. This will allow the turbocharger to cool.
- 8 If you are leaving the machine, make sure that all switches are switched off. If necessary, leave the hazard warning and/or sidelights switched on. Remove the starter key.
- 9 Use the handholds and step when you climb down from the machine. If you are leaving the machine, close and latch all windows and lock the door.

A WARNING

Entering/Leaving

Entering or leaving the cab or canopy must only be made where steps and handrails are provided. Always face the machine when entering and leaving. Make sure the step(s), handrails and your boot soles are clean and dry. Do not jump from the machine. Do not use the machine controls as handholds, use the handrails.

INT-2-1-7_1

10 At the end of a working cycle or if the machine is being left unattended, provided the lights are not required remove the battery isolator key (if fitted). Refer to *Electrical System, Battery Isolator*.



Working with the Machine

Operating Practices and Site Safety

T2-057 2

This section explains some techniques and procedures for efficient and safe use of the machine and its attachments. Attention is also drawn to the various safety aspects of operating on site.

Read and understand this section before you start working with the machine.

Make sure that you have had adequate training and that you are confident in your ability to operate the machine safely before you use it. Practice using the machine and its attachments until you are completely familiar with the controls and what they do.

With a careful, well trained and experienced operator, your machine is a safe and efficient machine. With an inexperienced or careless operator, it can be dangerous. Do not put your life, or the lives of others, at risk by using the machine irresponsibly.

Before you start to work, tell your work mates what you will be doing and where you will be working. On a busy site, use a signalman.

Appropriate job site organisation is required in order to minimise hazards that are caused by restricted visibility. Job site organisation is a collection of rules and procedures that coordinates machines and people that work together in the same area. Examples of job site organisation include:

- Restricted areas
- Controlled patterns of machine movement
- A system of communication

You and/or your company could be legally liable for any damage you may cause to public utilities. It is your responsibility to make sure that you know the locations of any public utility cables or pipes on the site which could be damaged by your machine.

Before doing any job not covered in this manual, find out the correct procedure. Your local JCB distributor will be glad to advise you.

There are a wide variety of situations in which your machine may be used. Consequently, in all cases, the applicability of these notes must be determined by the person seeking to apply them, on the basis of his/her own judgement, in the light of the conditions in which use is intended and subject to all relevant statutory requirements.

The information in this section is given in good faith and in light of the best information available, JCB can accept no responsibility for the recommendations, advice, statements, opinions and conclusions expressly or by

implication and gives no warranty or representation of assurance in respect of the accuracy of the same.

Remember that your machine is mobile. Whenever possible, manoeuvre it into a position which combines safety and efficiency. But if you have to choose, always remember that: Safety must come first.

Safety Practices

P2-2019_3

Read *Operating Safety (Introduction Section)*, plus the following information.

A WARNING

Reworking Old Sites

There could be dangerous materials such as asbestos, poisonous chemicals or other harmful substances buried on the site. If you uncover any containers or you see any signs of toxic waste, stop the machine and advise the site manager immediately.

2-2-5-5

A WARNING

Water Supplies and Drains

Before you start using the machine, check with your local public water supplier if there are buried pipes and drains on the site. If there are, obtain a map of their locations and follow the advice given by the water supplier.

You are strongly advised to make sure that the safety arrangements on site comply with the local laws and regulations concerning work near buried pipes and drains.

2-2-5-6

A WARNING

Fibre Optic Cables

If you cut through a fibre optic cable, Do not look into the end of it, your eyes could be permanently damaged.

8-2-9-20



A WARNING

Underground Gas Pipes

Before you start using the machine, check with your local gas company if there are any buried gas pipes on the site.

If there are buried gas pipes we recommend that you ask the gas company for any specific advice regarding the way you should work on the site.

Some modern gas pipes cannot be detected by metal detectors, so it is essential that an accurate map of buried gas pipes is obtained before any excavation work commences.

Hand dig trial holes to obtain precise pipe locations. Any cast iron pipes found should be assumed to be gas pipes until contrary evidence is obtained.

Older gas pipes can be damaged by heavy vehicles driving over the ground above them.

Leaking gas is highly explosive.

If a gas leak is suspected, contact the local gas company immediately and warn all personnel on the site. Ban smoking, ensure that all naked lights are extinguished and switch off any engines which may be running.

You are strongly advised to make sure that the safety arrangements on site comply with the local laws and regulations concerning work near buried gas pipes.

2-2-6-1_1

Danger Zone

T2-046_2

The danger zone means any zone within and/or around machinery in which a person is subject to a risk to his health or safety. During operation of the machine, keep all persons out of the danger zone. Persons in the danger zone could be injured. Refer to **Specifications**.

Before performing maintenance tasks make the machine safe. Refer to *Make the Machine Safe.*

Log Moving/Handling

T2-047

Do not use the machine to move or handle logs unless it has been fitted with adequate log protection. You could

cause serious injury to yourself and damage the machine. Contact your JCB dealer.

Clothing and Safety Equipment

T2-069

Do not wear loose clothing or jewellery that can get caught on controls or moving parts. Wear protective clothing and personal safety equipment issued or called for by the job conditions, local regulations or as specified by your employer.



Working with a Shovel

Filling the Shovel

P4-2015_2



When loading with material from a high bank or pile, remove any overhang first. Watch out for sliding material. If overhanging material falls, you and your machine could be buried.

2-2-6-3



Load and unload on firm, level ground. Always be alert for possible hazards. Take special care when turning or reversing.

5-2-4-7

The following paragraphs are intended to bring some of the relevant considerations to your attention. They are not intended to be comprehensive, nor to be a substitute for adequate training. Make sure you are trained before you use any attachment.

As the shovel enters the pile, select lift then start to roll the shovel back. This will sweep the shovel up the pile, gathering material as it goes.

Pressing the transmission dump switch will give more power to the loader and speed the operation. Try to fill the shovel in one pass. Half full shovels are less productive.

When moving the load, roll the shovel right back to prevent spillage.

When you are loading from a pile of loose material, start at the bottom and follow up the face as shown. Approach the pile with the shovel level and skimming the ground.

In tightly packed material, start at the top and work down.

When removing material from a stockpile, start at a shovel's height from the base. Once the height of the stockpile has been reduced, begin loading from the base.

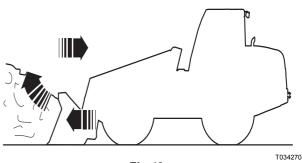


Fig 49.



Loading a Truck

T2-004 2

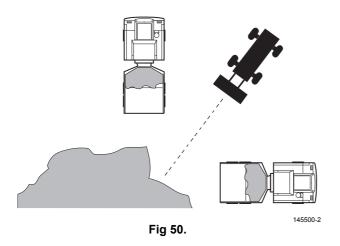
Put the truck(s) at an angle of about 45° to the pile, as shown. This cuts out unnecessary manoeuvring. Allow enough distance for the shovel to reach its unloading height while you are travelling, without slowing down.

Keep the wind on your back. This keeps dust away from you and your machine.

Move your machine as close as possible to the truck before unloading.

If the truck body is about as long as a shovel's width, tip the load into the centre of the truck. If the truck is two shovel-widths long or more, load the front of the truck first.

Do not dump the material in one sudden movement. Roll the shovel forward in stages until it is empty. Use the control lever to rock the shovel back and forth to loosen any sticky material.





Working on Slopes

Introduction

P4-2014

A WARNING

Hillsides

Operating the machine on hillsides can be dangerous if proper precautions are not taken. Ground conditions can be changed by rain, snow, ice etc. Check the site carefully.

Going uphill, reverse when unloaded or travel forwards when loaded. Going downhill, travel forwards when unloaded or reverse when loaded.

Take special care when moving across a slope. If the slope is too steep your machine could roll over. If you must drive across a slope, keep the attachments close to the ground.

3-1-1-4

A WARNING

Ensure that you have been trained and are familiar with the use of machines on gradients, and understand the adverse affects that gradients and site conditions can have on stability. Never use the machine on a gradient if you do not understand the recommended practices for the use of machines in such applications.

0017

A WARNING

Do not operate the front attachment when you travel on a slope.

13-2-4-33

There are a number of factors which can adversely affect the stability of the machine and the safety of the machine and operator when used on a slope. It is essential that a risk assessment of the work to be done is completed, and that the operator complies with any safety precautions that the risk assessment identifies.

Driving Up and Down Slopes

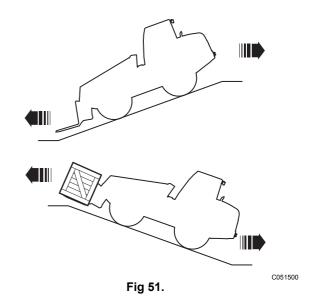
A WARNING

Slopes

When transporting a load on a slope, drive slowly and keep the load uphill of the machine. This will increase stability.

2-1-1-5

For maximum traction drive an unladen machine forward down a slope and in reverse up a slope. Drive a laden machine forward up a slope and in reverse down a slope.



Driving Across Slopes

Read and understand the instructions in this manual before you travel across a slope. Maximum stability is achieved when the machine is operated on firm level ground. Stability will be reduced when the machine is operated on slope. When you travel across a slope, always fully lower the attachment and travel slowly at walking pace.



Lifting Operations on Slopes

A WARNING

Conducting lifting operations on gradients can be dangerous. The machine can become laterally unstable and tip over if the instructions in this section are not followed and understood. You and others can be seriously injured or killed. Ensure you follow and fully understand the guidelines given in this manual.

0019

A WARNING

Stop the machine and apply the park brake before conducting any lifting operations.

0020

Lifting operations should not be undertaken on slopes unless the machine is level across its width (laterally level).

It is recommended that the machine should be operated on firm, level ground wherever possible for maximum machine stability. Where this is not possible a risk assessment must be carried out by the operator before attempting a lifting operation.

Make sure you have taken into account all factors that may affect machine stability before a lifting operation is started when working on a slope.



Machine Adjustments

Introduction

The machines have a loader arms lift re-set proximityswitch and can have an optional shovel re-set proximityswitch.

The loader arms re-set proximity-switch releases the control lever detent at a pre-determined angle when the loader arms are being lifted.

The shovel re-set proximity-switch releases the control lever detent when the shovel is at a pre-determined angle when its being crowded.

The 456 HT has the option of forks (attached on-site) to replace the shovel. With this option, two "shovel re-set" proximity-switches are installed and an additional rocker switch is installed in the cab. ⇒ Right Console Switches (43).

Set the Loader Arms Proximity-Switch

- 1 Park the machine on hard, level ground. Refer to **Stopping and Parking the Machine**.
- 2 Operate the control lever to lift the loader arms to the required height. Refer to *Operating Levers*.
- 3 Loosen the nuts C and D.
- 4 Move the proximity-switch **A** to the required position in-line with the loader arm **B**.
- 5 Tighten the nut **C**, then the nut **D** to lock the proximity-switch in position.
- **6** Make sure that proximity-switch operates automatically at the correct height. If necessary, adjust the position of the proximity-switch again:
 - **a** Operate the control lever to lift the loader arms.
 - **b** Release the control lever when the loader arms start to rise. The loader arms should stop at the pre-set height.

Note: The detent position is only selectable when the proximity-switch is out of range of the sensor bar.

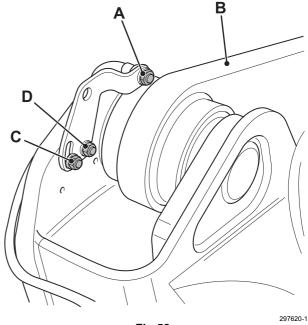


Fig 52.



Set the Attachment Angle Proximity-Switch

HL, HT, SHL Machines

- 1 Park the machine on hard, level ground. Refer to **Stopping and Parking the Machine**.
- 2 Loosen the locknuts F, then adjust the bar D, so that its end is aligned with the proximity-switch X.

456HT machines have two proximity-switches. When the proximity-switch ${\bf X}$ is set, it automatically sets the proximity-switch ${\bf E}$.

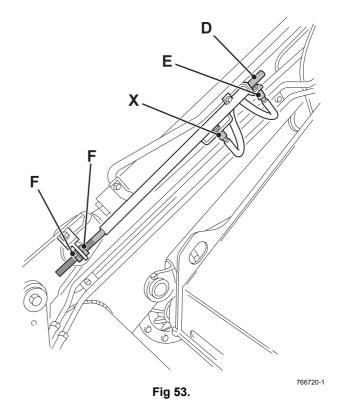
- 3 Tighten the locknuts F.
- **4** Make sure that proximity-switch operates automatically at the correct position. If necessary, adjust the position of the proximity-switch again:
 - a 456HT machines: Select the correct proximityswitch for your attachment.

For forks, select the proximity-switch **E**.

For a shovel, select the proximity-switch **X**.

- **b** Operate the control lever to lift the loader arms sufficiently for the attachment to clear the ground when its dumped.
- **c** Fully dump the attachment.
- **d** Crowd the attachment, release the control lever when the attachment starts to move. The attachment should stop at the pre-set angle.

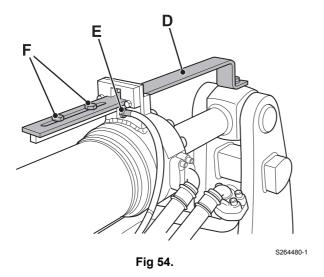
Note: The detent position is only selectable when the proximity-switch is out of range of the sensor bar.



ZX Machines

- 1 Park the machine on hard, level ground. Refer to **Stopping and Parking the Machine**.
- **2** Set the shovel to the angle required, with the shovel on the ground.
- 3 Loosen the bolts **F**, then adjust the bar **D**, so that its end is aligned with the proximity-switch **E**.
- 4 Tighten the bolts F.
- **5** Make sure that proximity-switch operates automatically at the correct position. If necessary, adjust the position of the proximity-switch again:
 - a Operate the control lever to lift the loader arms sufficiently for the shovel to clear the ground when its dumped.
 - **b** Fully dump the shovel.
 - **c** Crowd the shovel. The shovel should stop at the pre-set angle.

Note: The detent position is only selectable when the proximity switch is out of range of the sensor bar.





Object Lifting

Introduction

A WARNING

Before lifting a load read the following:

Always use lifting tackle which is strong enough and in good condition. Check the load weight before choosing the lifting chains.

A bucket should be fitted when lifting. Check that the load is not greater than the safe working load for the bucket.

Use a signalman when lifting. Make sure you both understand and use the recognised signals. Attach a handline to the load. Make sure the person holding the handline stands clear of the load and the machine. Test the load by lifting it 25-50mm (1 or 2 inches) and slowly manoeuvring it across the ground with the controls.

Keep all persons clear of the load and machine while the load is on.

Lower the load to the ground if you feel any instability of the load or the machine.

Failure to take these precautions could result in death or injury.

8-2-6-4

A WARNING

Lifting Equipment

You can be injured if you use incorrect or faulty lifting equipment. You must identify the weight of the item to be lifted then choose lifting equipment that is strong enough and suitable for the job. Make sure that lifting equipment is in good condition and complies with all local regulations.

INT-1-3-7_2

A WARNING

Do not use the machine for object handling unless it is equipped for this purpose. Without the relevant devices the machine can become unstable and tip over. You and others could be seriously injured or killed

8-2-8-19_2

A WARNING

Conducting lifting operations on gradients can be dangerous. The machine can become laterally unstable and tip over. You and others can be seriously injured or killed.

3-1-1-7

A WARNING

Do not travel with a load over uneven ground. If a load is carried over uneven ground the machine and its load could become unstable.

8-2-9-48

A WARNING

Never leave the machine with a suspended load. Before leaving the machine lower the load to the ground.

8-2-9-49

The owner and/or operator must make sure that they fully understands the laws and regulations concerning the use of the machine as an earthmover and for object lifting.

If your machine has not been fitted with an approved lifting device such as a hook or shackle, then it must not be used to lift objects. Use the machine for its intended use only.

Your machine may be used to lift objects if it has been fitted with an approved lifting device such as a hook or shackle, if it has been tested, plated and certified for its safe working load, and if all other regulation requirements have been met.

For more information on this section, consult your local JCB Distributor, also refer to *Fit for Purpose Tests for Lifting Equipment*.

Note: In certain countries Safety Regulations in force call for the application of specific safety factors. Consult your local JCB Distributor for information.



Safe Working Loads

P11-5001_3

A WARNING

The safe working load shown on lifting accessories (for example chains, etc.) is not the safe working load of the machine.

M0002

The maximum load which may be lifted depends on the equipment fitted to the machine and the laws and regulations in force at the time and in the country in which the machine is being used.

If your machine is equipped to be operated under 'Exemption Certificate' rules, your Exemption Certificate will specify the Safe Working Loads.



Operating Environment

Operating Environment

Operating in Low Temperatures

In low temperature situations, take the following precautions. They will make for easier starting and prevent possible damage to your machine.

- 1 Use the correct viscosity engine lubricating oil.
- 2 If available use a low temperature diesel fuel.
- 3 Use the correct coolant mixture.
- 4 Keep the battery at full charge.
- 5 Fill the fuel tank at the end of each work period. This will help to prevent condensation forming on the tank walls.
- 6 Protect the machine when not in use. Park the machine inside a building or cover it with a tarpaulin.
- 7 Install a cold weather starting aid. In very low temperatures, -18°C (0°F) and below, additional starting aids may be needed. Examples are fuel, oil and coolant heaters. Ask your JCB distributor for advice.

Important: Do not connect additional batteries in series to give more than 24V for starting, only connect slave batteries in parallel. This could burn out the induction manifold heater and starter motor.

8 Remove snow from the engine compartment before starting otherwise snow could get into the air filter.

Operating in High Temperatures

T3-070

In high temperature situations, take the following precautions to prevent possible damage to the machine.

- 1 Use the correct viscosity engine lubricating oil.
- 2 Use the correct coolant mixture.
- 3 Check the coolant system regularly, keep the coolant at the correct level. Make sure there are no leaks.

- 4 Keep the radiator/oil cooler clean, regularly remove dirt and debris from the radiator/oil cooler and the engine.
- 5 Check the fan belt regularly.
- 6 Check the air vents. Make sure that the air vents to and from the engine compartment are not blocked.
- 7 Check the engine pre-cleaner regularly (if fitted).
- 8 Check the battery electrolyte level.

Operating in Dusty or Sandy Areas

- 1 Air Cleaner. Frequently check, clean or replace the elements regardless of the inspection interval. (Not the safety element).
- 2 Securely tighten the hydraulic oil tank filler cap to prevent sand and dust from entering the hydraulic system.



Operating Environment

Operating in Coastal Regions

- 1 Check that all the plugs, bolts and fasteners are all tightened correctly.
- 2 After daily operations, clean the machine thoroughly and take special care when cleaning the electrical devices and hydraulic cylinders to prevent salt entry and eventual corrosion.

Operating on Wet or Soft Ground

Clean the machine.

Moisture or mud causes the paint, wiring and metallic parts to deteriorate. When you operate the machine keep it as dry as possible and regularly grease the machine.

Cab Filters

There are three different filters available for the cab heater unit/air-conditioning unit.

Important: The cab is pressurised, in dusty conditions the doors and windows should be closed and ventilation should be supplied through the heater unit. The cab filter is provided for comfort only, it does not give complete protection against the environment in which the machine is used. The applicable personal protective equipment (PPE) must be worn if the machine is used in hazardous environments.

Standard Filter - Solid particle filter for general applications which do not require special filtration.

Carbon Filter - Solid particle, odour filter.

P3 Filter - High level filtration of fine particles, organic vapours, mists and fumes.



Refuelling the Machine

Refuelling the Machine

Low Fuel Levels

If you operate the machine on very low fuel levels, then air can enter the fuel system. To prevent the entry of air, always add more fuel when the fuel gauge shows a low level of fuel.

If air enters the fuel system, the engine speed will vary dramatically and low power will be experienced. The symptoms may be made worse when the machine operates on steep gradients.

Note: If you Increase the engine speed or load while there is air in the fuel system, then subsequent damage to the engine can occur.

If the fuel supply contains air, you must stop the engine, fill the fuel tank then bleed the fuel system to remove the air. Refer to *Routine Maintenance, Fuel System*.

Important: You must bleed the fuel system after a fuel filter change.

Filling the Tank

Important: Before you add the fuel to the machine, refer to Fluids, Lubricants and Capacities, Fuels. If you use the incorrect type of fuel or fuel which is contaminated, then damage to the fuel injection system can occur.

A CAUTION

Consult your fuel supplier or JCB distributor about the suitability of any fuel you are unsure of.

GEN-9-2

WARNING

Fuel

Fuel is flammable; keep naked flames away from the fuel system. Stop the engine immediately if a fuel leak is suspected. Do not smoke while refuelling or working on the fuel system. Do not refuel with the engine running. Completely wipe off any spilt fuel which could cause a fire. There could be a fire and injury if you do not follow these precautions.

INT-3-2-2_3



Petrol

Do not use petrol in this machine. Do not mix petrol with the diesel fuel; in storage tanks the petrol will rise to the top and form flammable vapours.

INT-3-1-6

A WARNING

Mobile Phones

Switch off your mobile phone before entering an area with a potentially explosive atmosphere. Sparks in such an area could cause an explosion or fire resulting in death or serious injury.

Switch off and do not use your mobile phone when refuelling the machine.

INT-3-3-9



Refuelling the Machine

A CAUTION

Spilt fuel may cause skidding and therefore accidents. Clean any spilt fuel immediately.

Do not use fuel to clean the machine.

When filling with fuel, choose a well aired and ventilated area.

INT-2-2-12

At the end of every working day, fill the tank with the correct type of fuel. This will prevent overnight condensation from developing in the fuel.

- 1 Park the machine on hard, level ground. Refer to **Stopping and Parking the Machine**.
- 2 Open the applicable side engine cover. Refer to *Routine Maintenance, Engine Covers*.
- 3 Remove the filler cap. Refer to *Introduction*, *Component Locations*.

The filler cap has a side-mounted barrel lock that is operated by the ignition/door key. When the key is removed, the cap will turn on the filler neck. To remove the cap from the filler neck, put the key in the lock and unlock the cap.

- 4 Fill the tank with the correct fuel. Refer to **Routine Maintenance**, **Fluid**, **Lubricants and Capacities**.
- 5 Install and lock the filler cap.
- 6 Close and lock the engine cover.

86 9811-3400-4 **86**



Moving a Disabled Machine

Moving a Disabled Machine

Introduction

The machine can be lifted onto a trailer for transportation. However, you must contact the nearest JCB Dealer before you try to tow, winch or push the machine. Towing, winching or pushing the machine without following the correct procedure can damage the transmission. If possible, repair the disabled machine where it stands.

It is not recommended to tow a disabled machine. If the machine becomes disabled, the machine must be made safe, lifted onto a transporter and moved to a location where maintenance can be carried out. If towing the machine to a safe location is unavoidable, do the procedure that follows before you try to move the machine.

Lower the Loader Arms in an Emergency

P4-2026

DANGER

Before lowering the attachments to the ground, make sure that the machine and the area around it are clear of other people. Anyone on or close to the machine could fall and be crushed by the attachments, or get caught in the linkages.

2-2-3-4

The machine has an accumulator which stores a small quantity of hydraulic pressure to be used in an emergency (for example engine failure). This hydraulic pressure must be used to lower the loader arms to a safe position.

Do not try to operate the other machine functions as this will decrease the hydraulic pressure in the accumulator and it may then not be possible to lower the loader arms.

Operate all the functions on the loader controls lever to release the remaining pressure.

Preparation for Towing

A CAUTION

Towing a machine too far or too fast can damage the transmission. Do not tow the machine further than 10 Km (6 miles). Use a trailer for greater distances. When towing do not travel faster than 16 km/h (10 mph).

Use a rigid towbar. If you must use towing chains, then use two vehicles, One towing vehicle should be coupled to the front of the disabled machine. The other towing vehicle should be couple to the rear of the disabled machine, to provide braking power.

The towing vehicle(s) must have enough pulling and braking power to move and stop the machine.

4-2-5-4 2

- Disengage the park brake.
- Set the transmission to neutral.
- 3 Prepare the loader arm:
 - a If the engine and hydraulic systems are not damaged, lift the shovel to 900mm (3ft) above the ground, then fully 'crowd' the shovel. The machine in this position can have a straight-pull from the recovery point.
 - **b** If the engine does not work, use the applicable equipment to lift the shovel to 900mm (3ft) above the ground and crowd the shovel. Secure the shovel in position.

Note: The procedure for preparing the loader arm will depend on the condition of the machine and its hydraulic circuits. For this reason you should contact your JCB Dealer for help and advice before you do this task.

- Attach the drawbar (or chain) to the front chassis side plate hole (left or right).
- Attach the chain to the recovery hitch (if chains are used).

Front recovery hitch A.

Rear recovery hitch **B**. (The rear chassis lift points)

T010560-7



Moving a Disabled Machine

The machine is now ready for towing. Make sure you understand what the towing driver will be doing. Obey his instructions and all relevant regulations.

The retrieval points are shown in ⇒ Fig 55. (88).

If the steering wheel has to be turned when the machine is disabled and the engine is stopped, push and hold the Emergency Steer System switch. Refer to **Switches**.

When the steering wheel is turned, the pump is heard running and the articulation of the chassis is felt. Test the switch once a month.

Note: The full operation of the steering system is only achieved when the machine is moving.

The machines retrieval points conform to ISO:10532, refer to this standard to obtain a particular machines permissible forces.

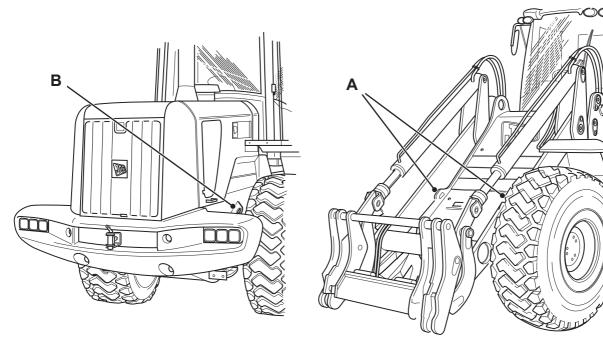


Fig 55.

Important: Only pull the machine in the direction of rotation of the wheels. ⇒ Fig 56. (88).

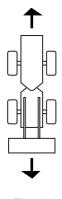


Fig 56.

T033800-2

88 9811-3400-4 **88**



Transporting the Machine

Transporting the Machine

A 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.

5-2-5-9

Note: Before transporting the machine make sure that you will be obeying the rules and laws of all the areas that the machine will be carried through.

Make sure that the transporting machine is suitable. See **Static Dimensions (Specifications Section)** for the dimensions of your machine.

A WARNING

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 tyres. Make sure the machine will not foul on the ramp angle. See Static Dimensions in SPECIFICATION section for the minimum ground clearance of your machine.

2-2-7-5_1

- 1 Put the trailer in position:
 - If the machine is serviceable, use any available position.
 - If the machine is unserviceable, you must align the trailer with the rear of the machine.
- 2 Put chocks 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 loader arm to the road travel position. Refer to Preparing for Road Travel.
- **5** Move the machine onto the trailer:
 - **a** Carefully reverse a serviceable machine onto the trailer.
 - **b** Lift a unserviceable machine into position on the trailer.

Important: Put chocks at the front and rear of all four tyres.

6 Engage the park brake and set the transmission to the neutral position.

- 7 When the machine is safely in position, lower the attachment onto the trailer, then stop the engine.
- Install the articulation lock. Refer to **Articulation Lock**.
- 9 Make sure that the total height of the load is within the regulations, adjust the height if necessary.
- 10 Secure the cab in position.
- 11 Put a cover on the exhaust stack.
- 12 Use the tie-down/lift points A to attach the machine to the trailer with chains.

Note: The tie-down labels identify the correct positions.

13 Measure the maximum height of the machine from the ground. Make sure the driver knows the clearance height before he drives away.

Note: Some machines have an extra set of tie-down points **B**

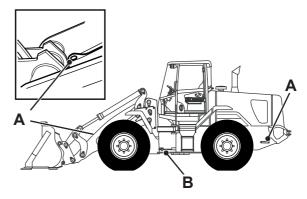


Fig 57.

397160-2

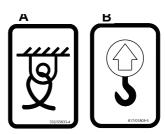


Fig 58. Tie-down/sling point labels

817-01803-6



Transporting the Machine

Articulation Lock

Transport Position

A WARNING

Make sure the articulation lock is in the transport position before you transport the machine. The articulation lock must also be in the transport position if you are carrying out daily checks or doing any maintenance work in the articulation danger zone.

If the articulation lock is not in the transport position you could be crushed between the two parts of the chassis.

4-3-5-7

The articulation lock is stowed in the machines toolbox. The articulation lock must be installed with the machine in the 'straight ahead' position.

- Manoeuvre the machine to put the front and rear wheels in a straight line, then park the machine on hard, level ground. ⇒ Stopping and Parking the Machine (71).
- 2 Remove the articulation lock from the toolbox.
- 3 Put the articulation lock C in position, then install pivot-pin A, then pivot-pin B into the articulation lock as shown.
- When pivot-pin **A** is installed, if pivot-pin **B** will not go through the holes, turn the steering wheel slightly to align the holes for pivot-pin **B**.

Drive Position

A WARNING

Always make sure the articulation lock has been removed before attempting to drive the machine. The machine cannot be steered with the articulation lock fitted.

16-3-1-4_2

- 1 Remove the pivot-pins A and B.
- 2 Put the articulation lock in the toolbox.

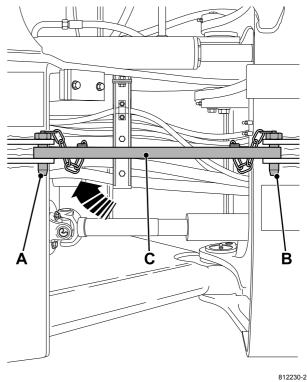


Fig 59.

90 9811-3400-4 90



Lifting the Machine

Lifting the Machine

A WARNING

Communications

Bad communications can cause accidents. Keep people around you informed of what you will be doing. If you will be working with other people, make sure any hand signals that may be used are understood by everybody. Work sites can be noisy, do not rely on spoken commands.

INT-2-2-3

- 1 Lower the loader arms to the ground.
- 2 Remove all the attachments. Refer to *Attachments*.
- 3 Install the articulation lock. Refer to Articulation Lock.
- 4 Remove the starter key and leave the machine.
- 5 Remove all the loose equipment from the exterior of the machine.
- **6** Check the unladen weight of the machine. Refer to **Specifications**.

A WARNING

Lifting Equipment

You can be injured if you use faulty lifting equipment. Make sure that lifting equipment is in good condition. Make sure that lifting tackle complies with all local regulations and is suitable for the job. Make sure that lifting equipment is strong enough for the job.

INT-1-3-7

7 Attach the lifting equipment to the sling points A.

Note: The sling point labels identify the correct positions.

A CAUTION

When lifting the machine, a suitable spreader frame must be used to ensure the pull on each lifting point is vertical and the machine is level.

4-2-5-7

8 Install a spreader frame to prevent damage to the machine.

- **9** Make sure that the lifting eye is directly above the centre of gravity of the machine.
- **10** Lift the machine. Make sure the lifting equipment does not catch the machine.

A DANGER

Do not stand underneath the raised load during the 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.

2-3-5-3

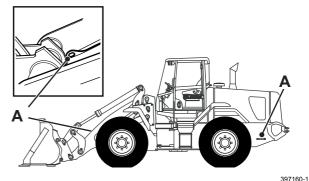


Fig 60.

39/160-

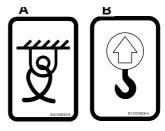


Fig 61. Tie-down/sling point labels

817-01803-6



Storage of the Machine

Storage of the Machine

Introduction

T2-07

If you will not use the machine for an extended period, you must store the machine correctly. If you prepare the machine carefully and apply on-going care you can prevent deterioration and damage to the machine while it is in storage.

Note: JCB Dealers must check stock monthly.

Storage Area

The machine can be stored in a temperature range of:

-40°C to 54°C (-40°F to 129°F).

When possible, you must keep the machine in a dry building or shelter.

If only an outdoor storage area is available, look for a storage area with good drainage.

If the machine is to be out of use for an extended period, careful preparation and on-going care will minimise the possibility of deterioration and damage while in storage.

Prepare the Machine for Storage

T2-076

1 Clean the machine to remove all unwanted material and corrosive products.

Dry the machine to remove solvents and moisture.

- 2 Apply grease to the moving parts. Refer to *Greasing the Machine*.
- **3** Examine the machine for worn or damaged parts. Replace if necessary.
- 4 Fill the fuel tank to prevent a build up of condensation in the tank.
- **5** Examine the coolant condition. Replace if necessary.
- **6** Examine all fluid levels. Top up if necessary.

Put the Machine into Storage

T2-077

1 Park the machine on level, solid ground.

Park the machine in a position where the machine is easy to get access (in case the machine does not start at the end of the storage period).

Place suitable timbers under the machine to eliminate direct contact with the ground.

- 2 Retract all rams and lower the attachments to the ground.
- 3 Vent the hydraulic system.
- 4 Remove the starter key.
- 5 Apply a thin layer of grease or petroleum jelly to all exposed ram piston rods.
- 6 Remove the battery. Charge the battery.

Keep the battery in warm, dry conditions. Charge the battery periodically.

7 If you keep the machine outdoors, cover the machine with tarpaulins or plastic sheets.

During Storage

T2-07

Operate the machine functions each week to prevent a build up of rust in the engine and hydraulic circuits, and to minimise deterioration of the hydraulic seals.

1 Clean the machine to remove all unwanted material and corrosives.

Remove the grease or petroleum jelly from the ram piston rods.

- 2 Install a charged battery.
- 3 Examine all fluid levels. Top up if necessary.
- 4 Start the engine.



Storage of the Machine

- 5 Operate the hydraulic controls.
 - Make sure that the hydraulic functions operate correctly.
- 6 Prepare the machine for storage. Refer to *Put the Machine into Storage*.

Take the Machine Out of Storage

T2-079

- 1 Examine the coolant condition. Replace If necessary
- **2** Examine all fluid levels. Top up if necessary.
- 3 Clean the machine to remove unwanted material and corrosives.

Remove the grease or petroleum jelly from the ram piston rods.

- 4 Install a charged battery.
- 5 Start the engine.
- **6** Operate the hydraulic controls.

Make sure that the hydraulic functions operate correctly.

93 9811-3400-4 **93**



Storage of the Machine

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94 9811-3400-4 **94**



Routine Maintenance

Service Requirements

Introduction

T3-09

Your machine has been designed and built to give maximum performance, economy and ease of use under a wide variety of operating conditions. Prior to delivery, your machine was inspected both at the Factory and by your Distributor to ensure that it reaches you in optimum condition. To maintain this condition and ensure trouble free operation it is important that the routine services, as specified in this Manual, are carried out by an approved JCB Distributor at the recommended intervals.

This section of the Manual gives full details of the service requirements necessary to maintain your JCB machine at peak efficiency.

A Service Manual for your machine is available from your JCB Distributor. The Service Manual contains information on how to repair, dismantle and assemble your machine correctly.

It can be seen from the Service Schedules on the following pages that many essential service checks should only be carried out by a JCB trained specialist. Only JCB Distributor Service Engineers have been trained by JCB to carry out such specialist tasks, and only JCB Distributor Service Engineers are equipped with the necessary special tools and test equipment to perform such tasks, thoroughly, safely, accurately and efficiently.

JCB regularly updates its Distributors advising them of any product developments, changes in specifications and procedures. Therefore only a JCB Distributor is fully able to maintain and service your machine.

A Service Record Sheet or Book is provided which will enable you to plan your service requirements and keep a service history record. It should be dated, signed and stamped by your Distributor each time your machine is serviced.

Remember, if your machine has been correctly maintained, not only will it give you improved reliability but its resale value will be greatly enhanced.

Owner/Operator Support

JCB together with your Distributor wants you to be completely satisfied with your new JCB machine. If you do encounter a problem however, you should contact your Distributor's Service Department who are there to help you!

You will have been given the names of the relevant service contacts at your Distributor when the machine was installed.

To get the most from your Distributor please help them to satisfy you by:

- 1 Giving your name, address and telephone number.
- 2 Quoting your machine model and serial number.
- 3 Date of purchase and hours of work.
- 4 Nature of the problem.

Remember, only your JCB Distributor has access to the vast resources available at JCB to help support you. In addition, your Distributor is able to offer a variety of programmes covering Warranty, Fixed Price Servicing, Safety Inspections, including weight tests, covering both legal and insurance requirements.

Service/Maintenance Agreements

To help plan and spread the costs of maintaining your machine, we strongly recommend you take advantage of the many Service and Maintenance Agreements your Distributor can offer. These can be tailor made to meet your operating conditions, work schedule etc.

Please consult your JCB Distributor for details.

Initial Service and Inspection

T3-005_2

To further protect your machine's performance it is essential your JCB Distributor carries out an initial service and inspection when the machine is one month old or when it has completed 100 hours of operation (whichever



Service Requirements

occurs first). You should notify your Distributor in advance to allow the necessary arrangements to be made.

Fit for Purpose Tests for Lifting Equipment

T3-097

All lifting equipment (for example forks, lifting hooks and shackles) need regular inspection and testing by a competent person to ensure they are fit for purpose.

This may be needed every six months or at least annually in some countries to meet and comply with legislation and for insurance purposes.

Check with your local JCB distributor for further advice.

Obtaining Replacement Parts

T3-096

If you use non-genuine JCB parts or consumables, then you can compromise the health and safety of the operator and cause machine failure

A Parts Book for your machine is available from your JCB Distributor. The Parts Book will help you identify parts and order them from your JCB distributor.

Your dealer will need to know the exact model, build and serial number of your machine. See *Identifying Your Machine (Introduction section)*.

The data plate also shows the serial numbers of the engine, transmission and axle(s), where applicable. But remember if any of these units have been changed, the serial number on the data plate may be wrong. Check on the unit itself.



Health and Safety

Lubricants

T3-060_3

Introduction

It is most important that you read and understand this information and the publications referred to. Make sure all your colleagues who are concerned with lubricants read it too.

Hygiene

JCB lubricants are not a health risk when used properly for their intended purposes.

However, excessive or prolonged skin contact can remove the natural fats from your skin, causing dryness and irritation.

Low viscosity oils are more likely to do this, so take special care when handling used oils, which might be diluted with fuel contamination.

Whenever you are handling oil products you should maintain good standards of care and personal and plant hygiene. For details of these precautions we advise you to read the relevant publications issued by your local health authority, plus the following.

Storage

Always keep lubricants out of the reach of children.

Never store lubricants in open or unlabelled containers.

Waste Disposal



It is illegal to pollute drains, sewers or the ground. Clean up all spilt fluids and/or lubricants.

Used fluids and/or lubricants, filters and contaminated materials must be disposed of in accordance with local regulations. Use authorised waste disposal sites.

INT-3-2-14

All waste products should be disposed of in accordance with all the relevant regulations.

The collection and disposal of used oil should be in accordance with any local regulations. Never pour used engine oil into sewers, drains or on the ground.

Handling



Oil

Oil is toxic. If you swallow any oil, do not induce vomiting, seek medical advice. Used engine oil contains harmful contaminants which can cause skin cancer. Do not handle used engine oil more than necessary. Always use barrier cream or wear gloves to prevent skin contact. Wash skin contaminated with oil thoroughly in warm soapy water. Do not use petrol, diesel fuel or paraffin to clean your skin.

INT-3-2-3

New Oil

There are no special precautions needed for the handling or use of new oil, beside the normal care and hygiene practices.

Used Oil

Used engine crankcase lubricants contain harmful contaminants.

Here are precautions to protect your health when handling used engine oil:

- Avoid prolonged, excessive or repeated skin contact with used oil.
- 2 Apply a barrier cream to the skin before handling used oil. Note the following when removing engine oil from skin:
 - a Wash your skin thoroughly with soap and water.
 - **b** Using a nail brush will help.
 - c Use special hand cleansers to help clean dirty hands.
 - **d** Never use petrol, diesel fuel, or paraffin for washing.



- 3 Avoid skin contact with oil soaked clothing.
- 4 Don't keep oily rags in pockets.
- **5** Wash dirty clothing before re-use.
- 6 Throw away oil-soaked shoes.

First Aid - Oil

Eyes

In the case of eye contact, flush with water for 15 minutes. If irritation persists, get medical attention.

Swallowing

If oil is swallowed do not induce vomiting. Get medical advice.

Skin

In the case of excessive skin contact, wash with soap and water.

Spillage

Absorb with sand or a locally approved brand of absorbent granules. Scrape up and remove to a chemical disposal area.

Fires

A WARNING

Do not use water to put out an oil fire. This will only spread it because oil floats on water.

Extinguish oil and lubricant fires with carbon dioxide, dry chemical or foam. Fire fighters should use self contained breathing apparatus.

7-3-1-3 1



Battery

T3-061

A WARNING

Batteries give off an explosive gas. Do not smoke when handling or working on the battery. Keep the battery away from sparks and flames.

Battery electrolyte contains sulphuric acid. It can burn you if it touches your skin or eyes. Wear goggles. Handle the battery carefully to prevent spillage. Keep metallic items (watches, rings, zips etc) away from the battery terminals. Such items could short the terminals and burn you.

Set all switches to OFF before disconnecting and connecting the battery. When disconnecting the battery, take off the earth (-) lead first.

Re-charge the battery away from the machine, in a well ventilated area. Switch the charging circuit off before connecting or disconnecting the battery. When you have installed the battery in the machine, wait five minutes before connecting it up.

When reconnecting, fit the positive (+) lead first.

5-3-4-12

A CAUTION

Do not disconnect the battery while the engine is running, otherwise the electrical circuits may be damaged.

INT-3-1-14

A WARNING

Electrical Circuits

Understand the electrical circuit before connecting or disconnecting an electrical component. A wrong connection can cause injury and/or damage.

INT-3-1-4

A DANGER

Electrolyte

Battery electrolyte is toxic and corrosive. Do not breathe the gases given off by the battery. Keep the electrolyte away from your clothes, skin, mouth and eyes. Wear safety glasses.

INT-3-2-1 3

A CAUTION

Damaged or spent batteries and any residue from fires or spillage should be put in a closed acid proof receptacle and must be disposed of in accordance with local environmental waste regulations.

INT-3-1-12

A WARNING

Battery Gases

Batteries give off explosive gases. Keep flames and sparks away from the battery. Do not smoke close to the battery. Make sure there is good ventilation in closed areas where batteries are being used or charged. Do not check the battery charge by shorting the terminals with metal; use a hydrometer or voltmeter.

INT-3-1-8





Warning Symbols

The following warning symbols may be found on the battery.

Symbol

Meaning



Keep away from children.





Shield eyes.





No smoking, no naked flames, no sparks.





Explosive Gas.



Battery acid.





Note operating instructions.



First Aid - Electrolyte

Do the following if electrolyte:

Gets into your eyes

Immediately flush with water for 15 minutes, always get medical help.

Is swallowed

Do not induce vomiting. Drink large quantities of water or milk. Then drink milk of magnesia, beaten egg or vegetable oil. Get medical help.

Gets onto your skin

Flush with water, remove affected clothing. Cover burns with a sterile dressing then get medical help.



Service Schedules

Introduction

T3-036_3

A WARNING

Maintenance must be done only by suitably qualified and competent persons.

Before doing any maintenance make sure the machine is safe, it should be correctly parked on level ground.

To prevent anyone starting the engine, remove the starter key. Disconnect the battery when you are not using electrical power. If you do not take these precautions you could be killed or injured.

8-3-1-1

A badly maintained machine is a danger to the operator and the people working around him. Make sure that the regular maintenance and lubrication jobs listed in the service schedules are done to keep the machine in a safe and efficient working condition.

Apart from the daily jobs, the schedules are based on machine running hours. Keep a regular check on the hourmeter readings to correctly gauge service intervals. When there is no hourmeter fitted, use the calendar equivalents to determine the service intervals. Refer to *Calendar Equivalents*. Do not use a machine which is due for a service. Make sure any defects found during the regular maintenance checks are rectified immediately.

How to Use the Service Schedules

T3-012_4

In the example shown, **A** shows all service requirements to be carried out every 10 hours and **B** shows the requirements to be carried out every 500 hours.

Important: Services should be carried out at either the hourly interval or calendar interval, whichever occurs first. Refer to **Calendar Equivalents**.

Important: The intervals given in the schedules must not be exceeded. If the machine is operated under severe conditions (high temperature, dust, water, etc.), shorten the intervals.

			Ä			'n		
Pre-start Cold Checks, Servic and Fluid Levels	e Points	/	/		,	/		
	Operation	10	50	100(1)	500	1000	2000	800
ENGINE					1			
Coolant Quality and Level	- Check				口			
Cooling System	- Drain and Refill				Г			
Oil level	- Check	\Box			┢			_
Oil and Filter(2)(3)(4)	- Change				口			
Air Cleaner Dust Valve(5)	- Change	_			一			
Air Cleaner Outer Element(5)	- Change	_			┢			
Air Cleaner Inner Element	- Change	_			一			
Pre-Cleaner (if fitted)	- Check	_			┢			
Water Seperator	- Check for contamination and Drain				┌			
Engine Fuel Filter	- Change				\Box			
Front End Accessory Drive (FEAD) Belt Condition	- Check				╚			
Front End Accessory Drive (FEAD) Belt	- Change				┢			
Engine Mounting Bolts for Tightness	- Check	_			口			
All Hoses - Condition	- Check	_			一			
Radiator ⁽⁵⁾	- Clean	_			一			
Crankcase Ventilation Filter	- Change	-	_		┢			

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Calendar Equivalents

Every 10 Hours = Daily

Every 50 Hours = Weekly

Every 500 Hours = Six Months

Every 1000 Hours = Yearly

Every 2000 Hours = 2 Years

Every 8000 Hours = 8 Years

T3-037



Pre-start Cold Checks, Service Points and Fluid Levels

Table 7. Engine

	·		7. Eligili		400		1000	2222
	Operation	10	50	100(1)	100	500	1000	2000
Oil Level and Condition	Check							
Oil and Filter	Change ⁽²⁾							
Coolant	Change							
Coolant Level	Check							
Coolant Strength and Condition	Check							
Air Cleaner Dust Valve	Clean ⁽³⁾							
Air Cleaner Outer Element	Change ⁽⁴⁾							
Air Cleaner Inner Element	Change							
Fuel System For Leaks and Contamination	Check							
Fuel Filter	Drain							
Fuel Filter	Change							
Fuel Sedimenter	Check							
Drive Belt Condition (5)	Check							
Valve Clearances	Check/Adjust							
External Oil Leaks	Check							

- (1) First 100 Hours Service only, to be completed by your JCB Distributor.
- (2) In arduous conditions change the oil and filter after every 250 hours or three months (whichever comes first).
- (3) Clean more often when working in dusty operating environments
- (4) Change outer element more frequently in dusty operating environments.
- (5) Change if necessary.



Table 8. Transmission and Axles

	Operation	10	50	100(1)	100	500	1000	2000
Transmission Oil Level	Check							
Transmission Oil and Filter	Change							
Transmission Strainer/Filter	Change							
Differential Oil Level	Check							
Differential Oil	Change							
Hub Oil Level	Check							
Hub Oil	Change							
Hub Oil (ZF Axle Standard Brake Pads ⁽²⁾)	Change							
Hub Oil (ZF Axle Sintered Brake Pads)	Change							
Axle Breathers	Clean							
Tyre Pressures/Condition	Check							
Wheel Nut Security	Check							
Axle Mount Security	Check							
Driveshaft Security	Check							
Bevel Ring Gear Deflection Plunger	Check							
Driveshaft and Universal Joints	Grease ⁽³⁾							

- (1) First 100 Hours Service only, to be completed by your JCB Distributor.
- (2) Change the oil every 1500 hours.
- (3) Grease more frequently when operating in arduous conditions.

Table 9. Hydraulics

	Operation	10	50	100(1)	100	500	1000	2000
Oil Level	Check							
Oil Filter	Change							
Oil	Change and Sample							
Servo-Filter	Check							
Tank Filler Cap	Change							
Tank Suction Strainers (2 off)	Clean							
Hoses, Rams and Pipe-Work for Damage or Leaks	Check							

(1) First 100 Hours Service only, to be completed by your JCB Distributor.



Routine Maintenance

Service Schedules

Table 10. Electrics

	Operation	10	50	100(1)	100	500	1000	2000
Battery Electrolyte Level (if applicable)	Check							
Instrument Panel Operation	Check							
Battery Charge and Condition	Check							
Battery Terminals for Condition and Tightness	Check							
Wiring for Chaffing and Routing	Check							

(1) First 100 Hours Service only, to be completed by your JCB Distributor.

Table 11. Bodywork and Cab

	Operation	10	50	100(1)	100	500	1000	2000
Machine Condition General	Check							
Wing Mirrors Condition and Security	Check							
Autolube Reservoir Level (if fitted)(2)	Check							
Autolube Reservoir Filler Filter (if fitted)	Change							
Hinges	Lubricate							
All Pivot Pins ⁽³⁾	Grease							
Window Washer Fluid Level	Check							
Cab Heater Intake Filter(s)	Clean ⁽⁴⁾							
Seat/Seat Belt Condition and Security	Check							
ROPS/FOPS Structure	Check							
Paintwork Condition	Check							
Check for Fluid Leaks (For Example Engine Oil, Hydraulic Oil)	Check							

- (1) First 100 Hours Service only, to be completed by your JCB Distributor.
- (2) Top-up as necessary.
- (3) Grease every 10 hours when operating in arduous conditions(4) Clean more frequently in dusty operating environments.



Routine Maintenance

Service Schedules

Table 12. Brakes

	Operation	10	50	100(1)	100	500	1000	2000
Park Brake Operation	Check							
Foot Brake Operation	Check							

(1) First 100 Hours Service only, to be completed by your JCB Distributor.

Table 13. Lifting Equipment

	Operation	10	50	100(1)	100	500	1000	2000
Fit for Purpose Test ⁽²⁾	Complete							

- (1) First 100 Hours Service only, to be completed by your JCB Distributor.
- (2) This may be required every six months or at least annually in some countries to meet and comply with legislation and for insurance purposes.

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Functional Test and Final Inspection

Table 14. Engine

	Operation	10	50	100(1)	100	500	1000	2000
Idle Speed	Check							
Torque Converter Stall Speed	Check							
Combined Stall Speed	Check							
Maximum No Load Speed	Check							
Throttle System	Check							
Exhaust Smoke	Check							
Exhaust System Security	Check							
Air Inlet System Security	Check							
Coolant System for Leaks	Check							

(1) First 100 Hours Service only, to be completed by your JCB Distributor.

Table 15. Transmission, Axles and Steering

	Operation	10	50	100(1)	100	500	1000	2000
Transmission Operation	Check							
Forward/Reverse/Speed Range Operation	Check							
Neutral Start Operation	Check							
Oil Cooler and Pipe-Work	Check							
Steering Operation	Check							

(1) First 100 Hours Service only, to be completed by your JCB Distributor.

Table 16. Hydraulics

	Operation	10	50	100(1)	100	500	1000	2000
Hoses for Damage and Leaks	Check							
Pipe-Work for Damage and Leaks	Check							
Piston Rods and Gland Seals	Check							

(1) First 100 Hours Service only, to be completed by your JCB Distributor.



Routine Maintenance

Service Schedules

Table 17. Electrics

	Operation	10	50	100(1)	100	500	1000	2000
Gauges and Warning Lights	Check							
Wiper Motors	Check							
Cab Switches Operation	Check							
Horn	Check							
Heater (If Fitted)	Check							
Reverse Alarm (If Fitted)	Check							
Lights and Indicators (If Fitted)	Check							
Starter Motor Connections	Check							
Alternator Connections	Check							
Proximity Sensor Function	Check							

(1) First 100 Hours Service only, to be completed by your JCB Distributor.

Table 18. Bodywork and Cab

	Operation	10	50	100(1)	100	500	1000	2000
Glazing for Correct Fit	Check							
Doors and Hinges	Check							
Toolkit and Handbook	Check							
Locks and Keys	Check							
Air Conditioning (If Fitted)	Check							
Generally for Damage, Leaks and Wear (Include the ROPS/FOPS)	Check							
Paintwork Condition	Check							
Check for Fluid Leaks (For Example Engine Oil, Hydraulic Oil)	Check							

(1) First 100 Hours Service only, to be completed by your JCB Distributor.

Table 19. Attachments

	Operation	10	50	100(1)	100	500	1000	2000
Attachment Condition and Operation	Check							

(1) First 100 Hours Service only, to be completed by your JCB Distributor.



Fluids, Lubricants and Capacities

Specifications

JCB recommend that you use the JCB lubricants shown as they have been verified by JCB for use on JCB machines. However, you could use other lubricants that are equivalent to the JCB standards and quality or offer the same machine component protection.

Table 20.

Item	Capaci	ity	Fluid/Lubricant	JCB Pat Number	Container Size ⁽¹⁾
	Litres	Gal			
Fuel System			Diesel		
- 426, 436	230	50.6			
- 456	320	70.4			
Engine (Oil)			JCB Engine Oil EP 15/W40	4001/1805	20 Litres
- 426, 436	14	3.1	(-10 to 50°C) ⁽²⁾ Caution: Do not		
- 456	18.9	4.2	use ordinary engine oil		
Engine (Coolant)			JCB HP Antifreeze HP/Coolant	4006/1120	20 Litres
- 426, 436	35	7.7			
- 456	40	8.8			
Gearbox ⁽³⁾			JCB HP Universal ATF	4000/2305	20 Litres
- 426	27	5.9			
- 436	32.5	7.1			
- 456	34	7.5			
Axles			JCB Gear Oil LS Plus	4000/3905(4)	20 Litres
- 426 (Front)	39	8.6			
- 426 (Rear)	37	8.1			
- 436 (Both)	39	8.6			
- 456E HT (Rear), 456E ZX (Both)	51	11.2			
- 456E HT (Front)	69	15.2			
Axles MT-I 3065, 3075, 3085 and 3095			JCB Gear Oil HP Plus	4000/2205	20 litres
- 426E (Both), 434S and 436 (Rear)	23	5.1			
- 434S, 436 (Front) 456 (ZF)	35	7.7			
Hydraulic System ⁽⁵⁾			JCB Hydraulic Fluid EP 46	4002/1605	20 Litres
- 426, 436	210	46.2			
- 456	215	47.3			
Grease Points			JCB Special HP Grease ⁽⁶⁾	4003/2017	400g x24
Auto Greasing System (if fitted)			JCB Special MPL EP Grease	4003/1501	400g x24

- (1) For information about the different container sizes that are available (and their part numbers), contact your JCB Dealer.
- (2) If the quoted engine oil is not available, then the engine oil must be changed every 250 hours.
- (3) The figure quoted is total system capacity. Use the 'MAX' and 'MIN' marks on the dipstick when filling the system.
- (4) Must be suitable for use with oil immersed brakes and Limited Slip Differentials (LSD).
- (5) The total hydraulic system capacity depends on the equipment being used. Fill the system with all rams closed and watch the level indicator.
- (6) If JCB Special MPL EP Grease is used for normal greasing, all 100 hour greasing operations must be carried out at ten (10) hour intervals.



Coolant Mixtures

T3-009 3

Check the strength of the coolant mixture at least once a year, preferably at the start of the cold period.

Replace the coolant mixture according to the intervals shown in the machine's Service Schedule.

A WARNING

Antifreeze can be harmful. Obey the manufacturer's instructions when handling full strength or diluted antifreeze.

7-3-4-4 1

You must dilute full strength antifreeze with clean water before use. Use clean water of no more than a moderate hardness (pH value 8.5). If this cannot be obtained, use de-ionized water. For further information advice on water hardness, contact your local water authority.

The correct concentration of antifreeze protects the engine against frost damage in winter and provides year round protection against corrosion.

The protection provided by JCB High Performance Antifreeze and Inhibitor is shown below.

50% Concentration (Standard)

Protects against damage down to -40 °C (-39 °F)

60% Concentration (Extreme Conditions Only)

Protects against damage down to -56 °C (-68 °F)

Important: Do not exceed a 60% concentration, as the freezing protection provided reduces beyond this point.

If you use any other brand of antifreeze:

- Ensure that the antifreeze complies with International Specification ASTM D6210.
- Always read and understand the manufacturer's instructions.
- Ensure that a corrosion inhibitor is included. Serious damage to the cooling system can occur if corrosion inhibitors are not used.
- Ensure that the antifreeze is ethylene glycol based and does not use Organic Acid Technology (OAT).

Anti-Corrosion Additives

WARNING

Antifreeze can be harmful. Obey the manufacturer's instructions when handling full strength or diluted antifreeze.

7-3-4-4_1

To provide sufficient corrosion protection, Supplemental Coolant Additive (SCA) must be added to the coolant mixture. The coolant filter provides the required amount of SCA, provided the filter is replaced at regular intervals.



Types of Fuel

A CAUTION

Acceptable and Unacceptable Fuels

Consult your fuel supplier or JCB distributor about the

suitability of any fuel you are unsure of.

Important: No warranty liability whatsoever will be accepted for failure of fuel injection equipment where the failure is attributed to the quality and grade of the fuel used.

GEN-9-2

Table 21.

Fuel Specification	Applicable Engines	Service Requirements				
EN590 Diesel fuel types - Auto/C0/C1/C2/C3/C4	All	Obey the usual routine maintenance schedules and				
BS2869 Class A2		procedures.				
ASTM D975-076 2-D, US DF1, US DF2, US DFA						
JIS K2204 Grades 1, 2, 3 and Special Grade 3						
ASTM D975-076 1-D	All	Obey the usual routine				
MIL T38219 JP7	Important: Engines operated with	1 3				
NATO F63	these fuels may have a reduced					
French EN590 (RME5) with 5% maximum	service life.					
AVTURFSII, NATO F34, JP8, MIL T83133, DERD 2463, DEF STAN 91-87	All	Obey the usual routin maintenance schedules ar				
AVCAT FSII, NATO F44, JP5, MIL T5624, DERD 2452, AVTOR	Important: Engines operated with these fuels may have a reduced service life.					
NATO F35, JET A1, DEF STAN 91-91, DERD 2494, XF63	service ille.					
AVCAT, NATO F43 (obsolete), JP5 without additives						
JET A (ASTM D1655)						
ASTM D3699 Kerosene						
B5 Biodiesel - RME content blended with mineral derived diesel (5% maximum) - ASTM D6751, DIN 51606, ISO 14214	Tier 3 only ⁽²⁾ .	You must obey special routine maintenance schedules and procedures. → Warranty (111).				
AVTAG (obsolete)	These fuels are not acceptable with					
AVTAG FSII (obsolete), NATO F40, JP4, DERD 2454	or without additives. Engines must not be operated with these fuels.					
JET B (ASTM D1655)						
BS MA100						
JIS K2203 No.2						
Unmodified vegetable oils						

⁽¹⁾ Use a fuel additive (where instructed) to make sure that the fuel meets the minimum lubricity requirement.

⁽²⁾ Refer to Typical Engine Identification Number.





Additives

The additives listed below are advertised as being suitable for bringing the lubricity levels of kerosene/low sulphur fuels up to those of diesel fuels. They must be used as specified by your fuel supplier who will understand the concentration level necessary.

Important: The lubricity wear scar diameter must not be more than 460 microns, as tested on a high frequency reciprocating rig at 60°C (140°F). Refer to **ISO 12156-1**.

- Elf 2S 1750. Dosage 1000-1500 ppm (0.1 0.15%), specifically for Indian Superior Kerosene (SKO) but may be applicable to other fuels.
- Lubrizol 539N. Dosage (on Swedish low sulphur fuel) 250 ppm.
- Paradyne 7505 (from Infineum). Dosage 500 ppm (0.05%).

Note: These products are given as examples only. The information is derived from the manufacturers data. The products are not recommended or endorsed by JCB.

Service Requirements for use of B5 Biodiesel

- The engine oil must be a grade CH4 as minimum specification.
- Do not leave unused B5 biodiesel in the fuel tank for extended periods (top up each day).
- Make sure that 1 in 5 fuel tank fills use standard diesel to EN590 specification, this will help to prevent 'gumming'.
- Make sure regular oil sampling is completed (look for excessive unburnt fuel content, water or wear particles.
- Change the engine oil and filter more frequently (as a minimum half the recommended intervals), or as indicated by oil sampling.
- Change the fuel filters more frequently (as a minimum half the recommended intervals), or if there are engine performance related issues.
- Make sure the fuel is stored correctly, care must be taken to make sure no water enters the machine fuel

tank (or the storage tank). Water will encourage micobacterial growth.

- Make sure that the fuel pre-filter is drained daily.
- Only Tier 3 engines (factory filled with CH4 oil) this is not approved with other manufacturers.
- Use heater kits in low ambient temperature territories.
- The biodiesel must meet the following standards: ASTM D6751, DIN 51606, ISO 14214

Note: If necessary use a test kit to confirm the fuel specification. Testing kits are available (not from JCB currently), use the internet as a source for the kits.

Note: If performance related issues are to be reported to JCB Service, and the engine has been run on biodiesel, then the fuel system must be filled with standard diesel (at least 2 x tank fills) to EN590 specification and relevant stall speeds recorded prior to making the report.

Warranty

JCB have shown a commitment to support the environment by approving the use of biodiesel blended fuels.

Using a B5 blend of biodiesel requires caution and additional servicing of the engine is required. ⇒ Service Requirements for use of B5 Biodiesel (111).

Failure to follow the additional recommended service requirements may lead to a warranty claim being declined.

Failures resulting by the incorrect use of biodiesels or other fuel additives are not defects of the engine workmanship and therefore will not be supported by JCB Warranty.



Sulphur Content

T3-0

High sulphur content can cause engine wear. (High sulphur fuel is not normally found in North America, Europe or Australia.) If you have to use high sulphur fuel you must change the engine oil more frequently.

⇒ Table 22. Sulphur Content (112).

Low sulphur fuels must have the appropriate fuel lubricity additives, these lubricity improvers must not create residual deposits that block the fuel system, e.g. injectors, filters etc. Contact your fuel Supplier.

A CAUTION

A combination of water and sulphur will have a corrosive chemical effect on fuel injection equipment. It is essential that water is eradicated from the fuel system when high sulphur fuels are used.

ENG-3-2

Table 22. Sulphur Content

Percentage of sulphur in the fuel (%)	Oil Change Interval				
Less than 0.5	Normal				
0.5 to 1.0	0.75 of normal				
More than 1.0	0.50 of normal				

Effects of Fuel Contaminates

T3-033

The effect of dirt, water and other contaminants in diesel can be disastrous for injection equipment:

- Dirt A severely damaging contaminant. Finely machined and mated surfaces such as delivery valves and distributor rotors are susceptible to the abrasive nature of dirt particles - increased wear will almost inevitably lead to greater leakage, uneven running and poor fuel delivery.
- Water Water can enter fuel through poor storage or careless handling, and will almost inevitably condense in fuel tanks. The smallest amounts of water can result in effects that are just as disastrous to the fuel injection pump as dirt, causing rapid wear, corrosion and in severe cases, even seizure. It is vitally important that water is prevented from reaching the fuel injection equipment. The filter/water trap must be drained regularly.
- Wax Wax is precipitated from diesel when the ambient temperature falls below that of the fuel's cloud point, causing a restriction in fuel flow resulting in rough engine running. Special winter fuels may be available for engine operation at temperatures below 0°C (32°F). These fuels have a lower viscosity and limit wax formation.



Tools

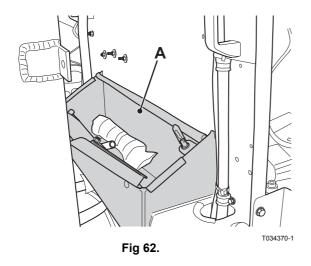
Tools

Toolbox

Keep the tools in the toolbox $\boldsymbol{\mathsf{A}}$ unless you need to use them.

To get access to the toolbox, open an engine cover. Refer to *Access Panels, Engine Covers*.

We recommend that you lock the toolbox to prevent theft or tampering.



Carrying Tools onto the Machine

When you carry tools onto the machine you must maintain three points of contact with the machine at all times. Lift tools onto the machine in intervals if necessary. Place the tools down before you adjust your grips on the machine. Do not try to adjust your grips on the machine while holding tools.



Prepare the Machine for Maintenance

Introduction

A WARNING

Maintenance must be done only by suitably qualified and competent persons.

Before doing any maintenance make sure the machine is safe, it should be correctly parked on level ground.

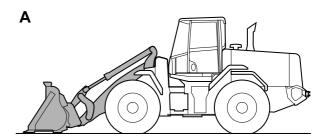
To prevent anyone starting the engine, remove the starter key. Disconnect the battery when you are not using electrical power. If you do not take these precautions you could be killed or injured.

8-3-1-1

Make the machine safe before you start a maintenance procedure.

You can complete the maintenance procedures shown in this manual with the loader arm lowered (Position A). Unless a maintenance procedure instructs you differently, you must lower the loader arm. Refer to *How to Make the Machine Safe (Loader Arm Lowered)*.

If you lift the loader arm to get access for maintenance (Position B), you must install a suitable mechanical device (for example, a maintenance strut on the loader arm). Refer to *How to Make the Machine Safe (Loader Arm Lifted)*.



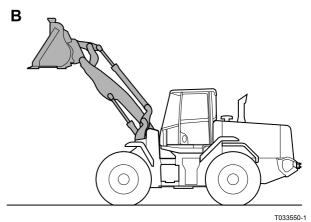


Fig 63.

114 9811-3400-4 **114**



How to Make the Machine Safe (Loader Arm Lowered)

P4-3016

- If necessary, empty the shovel.
- Make sure that the machine is parked correctly in the straight-ahead position on hard, level ground. Refer to Stopping and Parking the Machine (Operation Section).
- Lower the loader arm. 3
- 4 Put the attachment flat on the ground.
- 5 Remove the starter key.
- Put chocks on both sides of all the wheels.
- Remove the battery isolation key. Refer to Battery Isolation Switch.
- Install the articulation lock. Refer to Articulation 8 Lock (Operation Section).
- Operate the controls to release the residual pressure. 9
- 10 If you are working on an area that you can not reach when standing on the ground, you must use a suitable, safe work-platform.

How to Make the Machine Safe (Loader Arms Raised)

WARNING

Raised Equipment

Never walk or work under raised equipment unless it is supported by a mechanical device. Equipment which is supported only by a hydraulic device can drop and injure you if the hydraulic system fails or if the control is operated (even with the engine stopped).

Make sure that no-one goes near the machine while you install or remove the mechanical device.

13-2-3-7 3

If you must lift the loader arms to get access to do a maintenance procedure, you must install a suitable safety mechanism. Refer to Safety Mechanism.



Safety Mechanism

Install the Maintenance Strut

- 1 If necessary, empty the shovel.
- 2 Make sure that the machine is parked correctly in the straight-ahead position on hard, level ground. Refer to Stopping and Parking the Machine (Operation Section).
- 3 Lift the loader arms sufficiently to install the maintenance strut A.
- 4 If applicable, run the engine at idle for 2 3 minutes to let the turbo-charger cool.
- 5 Stop the engine and remove the starter key.
- 6 Put chocks on both sides of all the wheels.
- 7 Install the articulation lock. Refer to **Articulation Lock** (Operation Section).
- **8** Remove the maintenance strut **A** from its stowage position.
- **9** Put the maintenance strut in position around the ram.
- 10 Lock the maintenance strut in position with the strap B.
- 11 Start the engine.
- 12 Slowly lower the loader arm onto the maintenance strut. Stop the movement immediately the maintenance strut supports the weight of the loader arm.
- 13 Stop the engine and remove the starter key.
- 14 Remove the battery isolation key. Refer to **Battery Isolation Switch**.

Note: Be careful when you lower the loader arm onto the maintenance strut. 'Feather' the control lever to lower the loader arm slowly.

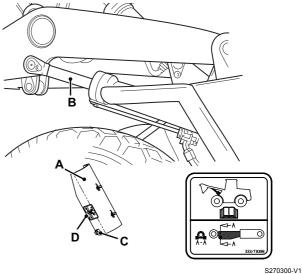


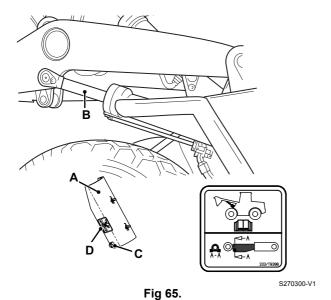
Fig 64.

116 9811-3400-4 **116**



Stow the Maintenance Strut

- 1 Make sure the park brake is engaged and the transmission is in neutral.
- 2 Install the battery isolation key. Refer to Battery Isolator Switch.
- 3 Start the engine.
- 4 Lift the loader arm sufficiently to remove the weight from the maintenance strut **A**.
- 5 Stop the engine.
- 6 Remove the strap B.
- 7 Remove the maintenance strut.
- 8 Put the maintenance strut in its stowage position
- 9 Remove the articulation lock. Refer to **Articulation Lock (Operation Section)**.
- 10 Remove the chocks.





Cleaning the Machine

Cleaning the Machine

Introduction

T3-062 3

Clean the machine using water and or steam. Do not allow mud, debris etc. to build upon the machine.

Before carrying out any service procedures that require components to be removed:

- Cleaning must be carried out either in the area of components to be removed or, in the case of major work, or work on the fuel system, the whole engine and surrounding machine must be cleaned.
- When cleaning is complete move the machine away from the wash area, or alternatively, clean away the material washed from the machine.

Important: When removing components be aware of any dirt or debris that may be exposed. Cover any open ports and clean away the deposits before proceeding.

Detergents

Avoid using full strength detergent - always dilute detergents as per the manufacturer's recommendations, otherwise damage to the paint finish may occur.

Always adhere to local regulations regarding the disposal of debris created from machine cleaning.

Pressure Washing and Steam Cleaning



When using a steam cleaner, wear safety glasses or a face shield as well as protective clothing. Steam can cause serious personal injury.

13-3-2-10_2

A CAUTION

The engine or certain components could be damaged by high pressure washing systems; special precautions must be taken if the engine is to be washed using a high pressure system.

Ensure that the engine air intake, alternator, starter motor and any other electrical components are shielded and not directly cleaned by the high pressure cleaning system.

ENG-3-3_2

Important: Do not aim the water jet directly at bearings, oil seals, the engine air intake or electrical and electronic components such as the engine electronic control unit (ECU), alternator or fuel injectors.

Use a low pressure water jet and brush to soak off caked mud or dirt.

Use a pressure washer to remove soft dirt and oil.

Note: The machine must always be greased after pressure washing or steam cleaning.



Cleaning the Machine

Cleaning the Machine

WARNING

To avoid burning wear personal protective equipment (PPE) when handling hot components. To protect your eyes, wear personal protective equipment (PPE) when using a brush to clean components.

HYD-1-3 3

A WARNING

Airborne particles of light combustible material such as straw, grass, wood shavings, etc. must not be allowed to accumulate within the engine compartment or in the propshaft guards (when fitted). Inspect these areas frequently and clean at the beginning of each work shift or more often if required. Before opening the engine cover, ensure that the top is clear of debris.

5-3-1-12_3

A CAUTION

Never use water or steam to clean inside the cab. The use of water or steam could damage the on-board computer and render the machine inoperable. Remove dirt using a brush or damp cloth.

8-3-4-8

Make the machine safe with the loader arms lowered. Refer to *Prepare the Machine for Maintenance*.

Important: Let the engine cool for a minimum of one hour. Do not try to clean any part of the engine while it is running.

- 2 Make sure that all the electrical connectors are connected correctly. If the connectors are open, attach the correct caps or seal with waterproof tape.
- **3** Put covers on the electrical/electronic components. (For example the alternator, starter motor, governor and solenoid).
- 4 Make sure that the underneath of the machine is clean
- 5 Do not let mud build-up on the engine or transmission system. If necessary, steam clean.
- 6 Examine the radiator and make sure the grille is not blocked. Use compressed air to blow out any dirt and debris.



Checking for Damage

Checking for Damage

Check the Machine Body and Structure

T3-063_5

Make sure that all guards and protective devices are in place, attached by their locking devices and free from damage.

Inspect all steelwork for damage. Pay particular attention to the following:

- Inspect all lifting point welds.
- Inspect all pivot point welds.
- Inspect the condition of all pivot pins.
- Check pivot pins are correctly in place and secured by their locking devices.

Check steps and handrails are undamaged and secure.

Check for broken, cracked or crazed window glass and mirrors. Replace damaged items.

Check all lamp lenses for damage.

Check all attachment teeth are undamaged and secure.

Check all safety and instructional labels are in place and undamaged. Fit new labels where necessary.

Note damaged paintwork for future repair.

Check the Seat and Seat Belt

T3-008_2



When a seat belt is fitted to your machine replace it with a new one if it is damaged, if the fabric is worn, or if the machine has been in an accident. Fit a new seat belt every three years.

2-3-1-7 1

Inspect the seat belt for signs of fraying and stretching. Check that the stitching is not loose or damaged. Check that the buckle assembly is undamaged and works correctly.

Check that the belt mounting bolts are undamaged, correctly fitted and tightened.

Check seats are undamaged and secure. Check seat adjustments for correct operation.

Check the Tyres

T3-065 2

A WARNING

You could be killed or injured if a machine tyre bursts. Do not use the machine with damaged, incorrectly inflated or excessively worn tyres. Recognise the speed limitation of the tyres fitted and do not operate at more than their recommended maximum speed.

13-2-1-2

Always drive with consideration for the condition of the tyres. Incorrect tyre pressures will affect the stability of the machine. Check the tyres daily for the correct tyre pressure and signs of damage. For example:

- Signs of distortion (bulges)
- Cuts or wear
- Embedded objects (nails, etc.)

Install the valve caps firmly to prevent dirt from entering the valve. Inspect for leaks when you check the tyre pressures.

Inspect the tyre valve for leaks, when you check the tyre pressures.

Check the Hydraulic Hoses and Fittings

T3_072

WARNING

Hydraulic Hoses

Damaged hoses can cause fatal accidents. Inspect the hoses regularly. Do not use the machine if a hose or hose fitting is damaged.

INT-3-3-2_4

Inspect the hoses regularly for:

- Damaged hose ends
- Chafed outer covers
- Ballooned outer covers
- Kinked or crushed hoses
- Embedded armouring in outer covers
- Displaced end fittings



Checking for Damage

Do not use the machine if a hose or hose fitting is damaged. Replace damaged hoses before you use the machine again.

Replacement hoses must be of the same size and standard.

Checking the ROPS/FOPS Structure

A WARNING

You could be killed or seriously injured if you operate a machine with a damaged or missing ROPS/FOPS. If the Roll Over Protection Structure (ROPS)/Falling Objects Protection Structure (FOPS) has been in an accident, do not use the machine until the structure has been renewed. Modifications and repairs that are not approved by the manufacturer may be dangerous and will invalidate the ROPS/FOPS certification.

INT-2-1-9_6

For assistance, contact your JCB distributor. Failure to take these precautions could result in death or injury to the operator.

- 1 Check the structure for damage.
- 2 Make sure that all the ROPS/FOPS mounting bolts **A** are in place and are undamaged.
- 3 Make sure that the ROPS/FOPS mounting bolts **A** are tightened to the correct torque setting.

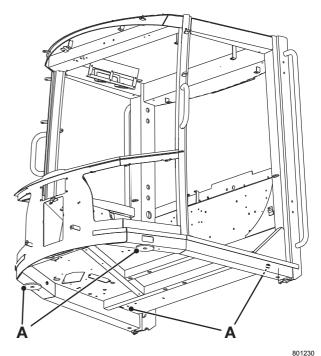


Fig 66.

8012

Table 23. Torque Setting

Bolts	Nm	lbf ft
Α	330	243



Greasing

Introduction

3-028 2

You must grease the machine regularly to keep it working efficiently. Regular greasing will also lengthen the machine's working life. Refer to the **Service Schedule** for the correct intervals.

Note: The machine must always be greased after pressure washing or steam cleaning.

Greasing should be done with a grease gun. Normally, two strokes of the gun should be sufficient. Stop greasing when fresh grease appears at the joint. Use only the recommended type of grease. Do not mix different types of grease, keep them separate.

In the following illustrations, the grease points are numbered. Count off the grease points as you grease each one. Refit the dust caps after greasing.

Note: Where applicable, refer to the manufacturers manual for instructions on the maintenance of optional attachments.

A CAUTION

Waxoyl contains turpentine substitute which is flammable. Keep flames away when applying Waxoyl. Waxoyl can take a few weeks to dry completely. Keep flames away during the drying period.

Do not weld near the affected area during the drying period. Take the same precautions as for oil to keep Waxoyl off your skin. Do not breathe the fumes. Apply in a well-ventilated area.

5-3-1-9

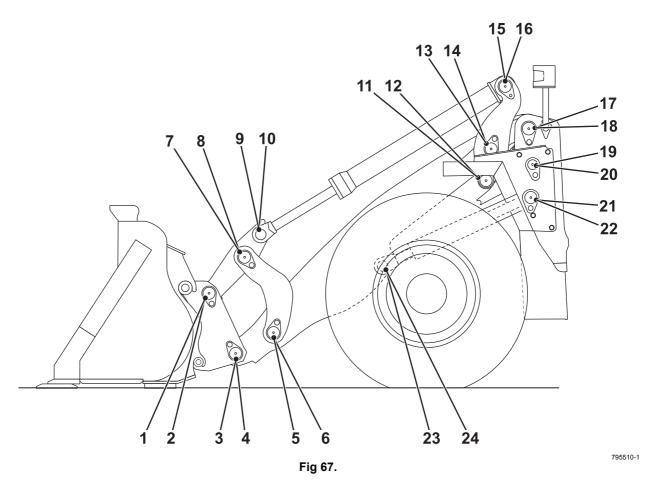
Preparing the Machine for Greasing

Make the machine safe before you start a greasing procedure. Refer to **Prepare the Machine for Maintenance**.

Important: You can complete most of the greasing procedures with the loader arm lowered. If you lift the loader arm to get access for greasing, you must install the maintenance strut on the loader arm.

Loader Arms and Shovel

HT Machines



Shovel and Link Pivot-Pins:

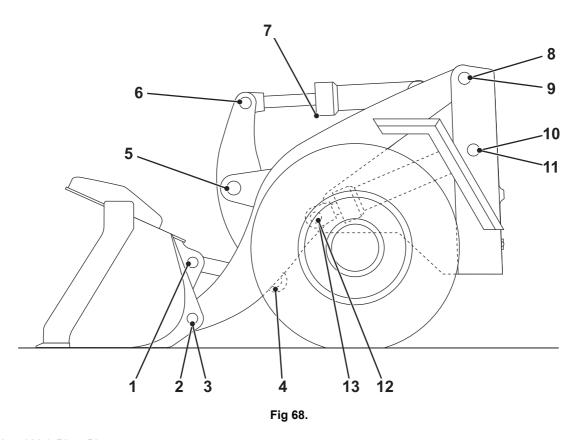
Total of 10 grease points. (1 to 10).

Loader Arm Pivot-Points:

Total of 14 grease points (11 to 24)

795520-1

ZX Machines



Shovel and Link Pivot-Pins:

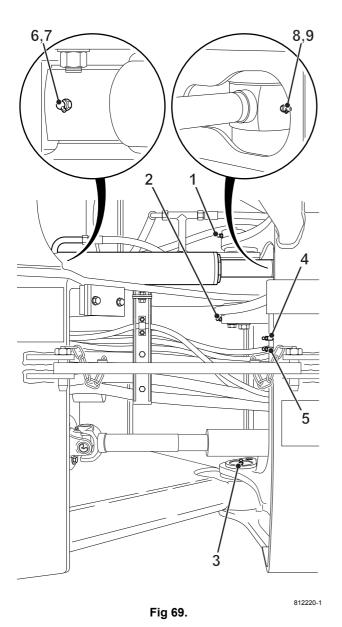
Total of 4 grease points (1 to 4).

Loader Arm Pivot-Points:

Total of 9 grease points (5 to 13).



Centre Pivot, Rear Axle Pivots and Steer Rams



Cab Door Hinges



When you grease the cab door hinges, open the door and stand as shown.

Centre Pivot: Total of 3 grease points (1 to 3).

Rear Axle Pivots: Total of 2 grease points (4 and 5).

Steer Rams: Total of 4 grease points (6 to 9).



Driveshafts

Total of 7 grease points

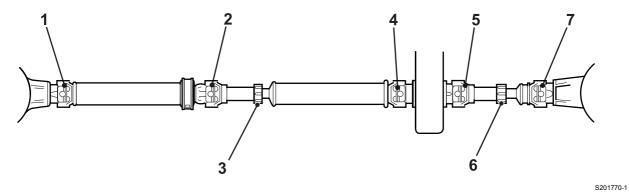


Fig 71.



Automatic Greasing System (if fitted)

Introduction

P4-3004

The following points are greased by the automatic greasing system (when fitted):

- Shovel Pivot Pins
- Loader Arm Pivot Points
- Centre Pivot and Steering Rams

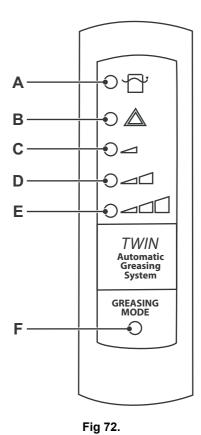
Note: All other grease points must continue to be greased as per the Service Schedules

When the ignition is ON, the greasing system performs all operations automatically.

When switched on, the system will default to Normal Duty Mode. For normal operation, this is the required mode. When working in arduous conditions, Heavy Duty Mode should be selected. ⇒ System Controls (127)

System Controls

- A Low Level Lamp (Yellow)
 Reservoir requires replenishing.
- B Error Lamp (Red)System not operating due to insufficient grease.
- Light Duty Greasing Mode (Green)
 Long interval between grease cycles.
- Normal Duty Greasing Mode (Green)
 Standard interval between grease cycles.
- Heavy Duty Greasing Cycle (Green)
 Short interval between grease cycles.
- F Greasing Mode Selection Switch
 Press the mode switch repeatedly until the desired mode lamp (C, D or E) illuminates.



C086280

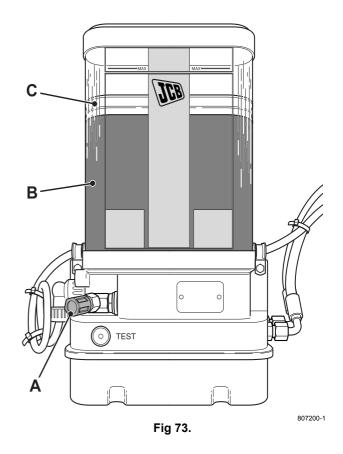


Filling the Reservoir

It is essential that the correct grease is used in this system. Refer to *Fluid, Lubricants and Capacities*.

- 1 Remove the dust cap from the filler coupling A.
- 2 Carefully clean the area around the filler coupling and the coupling on the filler hose.
- **3** Attach the filler hose to the coupling **A**.
- Fill the reservoir B until the top of the follower plate C (the plate on top of the grease) is level with the maximum level mark.
- **5** Remove the filler hose, clean the coupling and refit the dust cap.

Note: Any air introduced during filling will exit via the reservoir vent. If large amounts of air are present, carry out a continuous greasing cycle for one minute.





Testing the System

In order to test the correct operation of the system, carry out a single greasing cycle.

- 1 Turn starter switch to IGN.
- Press test button **D** for 3 to 5 seconds. 2
- The system will perform a single cycle test. 3

In order to prime the system after cleaning the machine or to vent the system; a continuous greasing cycle should be carried out.

- Turn starter switch to IGN. 1
- 2 Press test button **D** for more than 6 seconds.
- 3 The system will perform a continuous cycle run.

Note: The continuous greasing cycle will continue to run until the starter switch is turned to OFF.

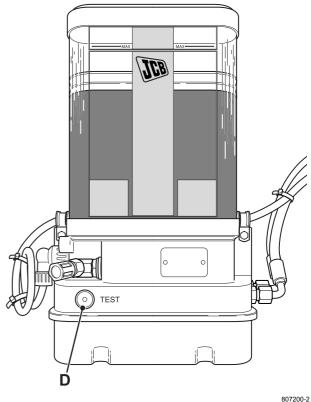


Fig 74.



Replacing the Fill Point Filter

- 1 Clean the area around the filler coupling **E**.
- 2 Remove the filler coupling **E** from the filter **G**.
- 3 Loosen locknut F.
- 4 Remove filter G.

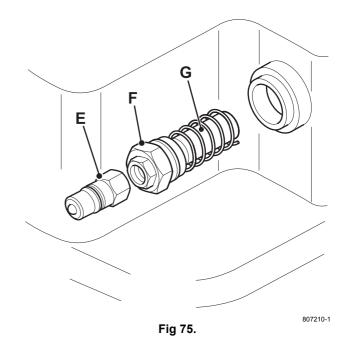
Note: Grease may flow from the housing when the filter is removed.

A CAUTION

Pressurised grease may flow from the filter housing as the filter is loosened.

4-3-5-6

- **5** Screw the new filter into the filter housing, hand-tight only, until the O ring contacts the filter housing.
- 6 Tighten locknut **F** to 15Nm (133lbf in).
- 7 Refit the filler coupling.





Access Panels

Access Panels

Rear Grille

Opening and Closing

To open the rear grille:

- Make the machine safe with the loader arms lowered. Refer to *Prepare the Machine for Maintenance*.
- 2 Open the right side engine cover. Refer to Engine Covers
- 3 Release the rear grille at A.
- 4 Pull the bottom of the grille out and up to open the rear grille, the gas struts will help to lift the grille.

To close the rear grille:

- Pull the bottom of the grille down against the pressure of the gas struts to close the rear grille. Keep a firm hold on the grille.
- 2 Make sure the rear grille is locked.
- 3 Close and lock the engine cover.

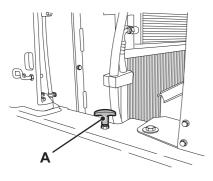


Fig 76.

812250-1

Heater Door

P4-3006

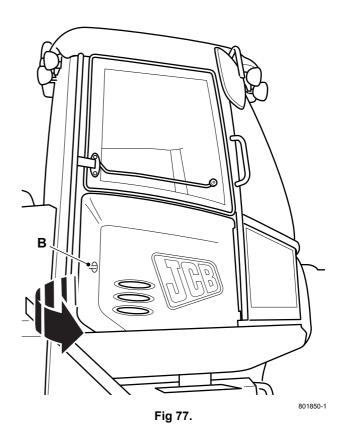
Opening and Closing

To open the heater door:

- 1 Make the machine safe with the loader arm lowered. Refer to **Prepare the Machine for Maintenance**.
- 2 Unlock and press catch B.

To close the heater door:

- 1 Close the heater door by pushing on the area surrounding the catch.
- **2** Make sure the heater door is latched. It is recommended that the door is kept locked.





Access Panels

Engine Covers

Opening and Closing

A WARNING

The engine has exposed rotating parts. Switch OFF the engine before working in the engine compartment. Do not use the machine with the engine cover open.

5-2-6-5

A WARNING

Touching hot surfaces can burn skin. The engine and machine components will be hot after the unit has been running. Allow the engine and components to cool before servicing the unit.

10-1-1-40

Important: Before you stop the engine, you must allow the engine to operate at low idle for four minutes. The delay allows the coolant temperatures to stabilise before you open the engine cover.

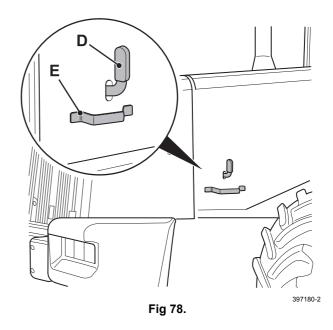
To open an engine cover:

- 1 Make the machine safe with the loader arm lowered. Refer to **Prepare the Machine for Maintenance**.
- 2 Pull handle D.
- 3 Pull handle **E** out and up, allow the gas-strut to open the panel.

To close an engine cover:

- 1 Pull handle **E** down and inwards.
- 2 Make sure the panel is latched. It is recommended that the panels are kept locked.

Note: To lock the panel, fit a padlock through the hole in the handle **D**.





Heater and Air Conditioning

Heater and Air Conditioning

P4-3008

Cleaning the Air Intake Filter

A CAUTION

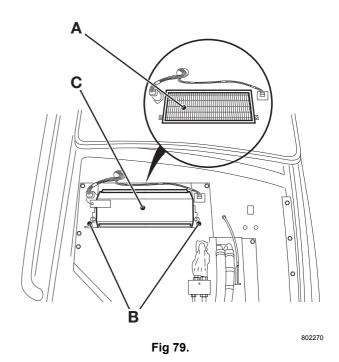
The filter may be filled with dust. Wear goggles and a face mask when removing the filter.

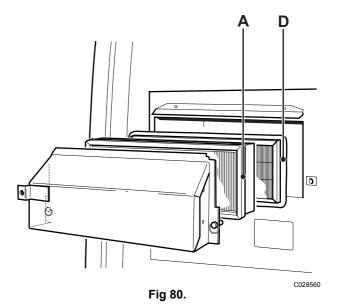
2-3-3-6

- 1 Make the machine safe with the loader arm lowered. Refer to **Prepare the Machine for Maintenance**.
- 2 To gain access to the cab heater air filter **A**, open heater door. Refer to **Access Panels**, **Heater Door**.
- 3 Open fasteners at B, remove cover C.
- 4 Remove filter **A** and shake out the loose dust and clean using low pressure compressed air. Renew the filter if damaged.

Note: An additional filter **D** may be fitted behind filter **A**, if applicable, remove filter **D** by pulling tag provided. Magnetic strips hold the filter in place. Refit the filter making sure it is located correctly. Renew the filter if damaged.

5 Refit filter A, close heater door.







Heater and Air Conditioning

Cleaning the Re-Circulation Filter (if fitted)

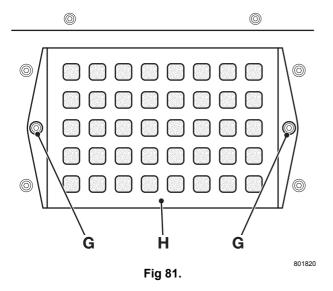
P4-3019



The filter may be filled with dust. Wear goggles and a face mask when removing the filter.

2-3-3-6

- Make the machine safe with the loader arm lowered.
 Refer to *Prepare the Machine for Maintenance*.
- 2 Remove the screws G, then the grille H.
- 3 Remove the re-circulation filter.
- 4 Shake the filter to remove the loose dust. Clean the filter with a low pressure jet of compressed air.
- 5 Put the filter and grille H in position, then install the screws G.
- 6 Make sure that the grille is secure.





Heater and Air Conditioning

Adjusting the Compressor Belt

A WARNING

Make sure the engine cannot be started. Disconnect the battery before doing this job.

2-3-3-5

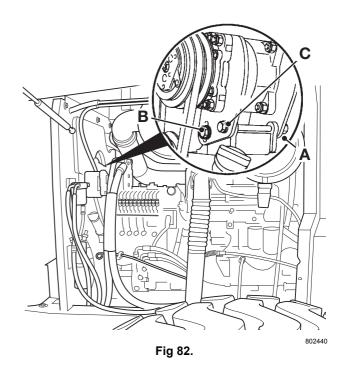
Note: The engine shown is the type installed to the early machines. The engines on later machines can look different but the procedure does not change.

- Make the machine safe with the loader arms lowered.
 Refer to *Prepare the Machine for Maintenance*.
- 2 Open the right side engine panel. ⇒ Engine Covers (132).
- 3 Remove the battery isolator key. ⇒ Battery Isolator Switch (140).
- 4 Loosen the pivot-bolt A (Not shown), then the bolts B and C.
- 5 Adjust the belt by positioning the compressor to give 5 mm (3/16 in) slack at the mid point of the longest run.
- 6 Tighten the bolts **B** and **C**, then the pivot-bolt **A**.
- 7 Close and lock the engine panel.

A WARNING

The air conditioning system is a closed loop system and contains pressurised refrigerant. No part of the system should be disconnected until the system has been discharged by a refrigeration engineer or a suitably trained person. You can be severely frostbitten or injured by escaping refrigerant.

4-3-4-1_2





Brakes

Brakes

Park Brake

Introduction

T3-071

A WARNING

Do not use a machine with a faulty park brake.

3-2-3-10_2

A WARNING

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

3-2-3-11

Make sure that you obey all health and safety precautions before you test or adjust the park brake.

If you have any queries concerning the park brake test or adjustment procedures, consult your local JCB distributor.

Testing the Park Brake

P4-2005 3

A WARNING

Do not use a machine with a faulty park brake.

3-2-3-10_2

A WARNING

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

3-2-3-11

Important: Ensure all routine health and safety precautions are observed before operating machines.

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

WARNING

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

2-2-4-5

Note: Test the brake on a level, dry surface. Make sure your seat belt is securely fastened.

- **1** The attachment should be in the travelling position.
- 2 Make sure the park brake is fully engaged.
- 3 Switch off transmission dump.
- 4 Switch off Auto/Manual switch.
- 5 Select third gear/range (barrel position 3) but remain in neutral
- 6 On the EMS Panel.
 - **a** Press the two arrow keys and the SETUP key at the same time to select the AEB setup menu.
 - **b** Use the UP and DOWN arrows to select the park brake test menu.
 - c Press SETUP key to select park brake test on.
- 7 Push down hard on the brake pedal and select forward drive

Note: An audible alarm will sound and a warning light will show when the park brake is engaged with the machine in forward (**F**) drive. The alarm will stop when neutral (**N**) drive is selected.

A WARNING

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

2-2-5-1

- 8 Release the brake pedal.
 - a If the machine has not moved, use the accelerator pedal to gradually increase the engine speed to the full-throttle position. The machine should not move.
 - **b** Reduce the engine speed to idle and set the forward/reverse lever (or switch) to neutral.

Note: Do not do this test for more than 20 seconds.



Brakes

- 9 Press SETUP key again to select park brake test off.
- 10 Lower attachments and stop the engine.
- 11 If the machine moved during this test, adjust the park brake and repeat the test. Refer to Park Brake Adjustment. Do not use the machine with faulty brakes.

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

Park Brake Adjustment

A WARNING

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

001

This adjustment is only for the 426 and 436 machines. The 456 has a push button park brake, this adjustment must be done by a service engineer.

The park brake must be fully engaged when the lever is vertical. When the park brake is engaged and the forward/ reverse lever is moved from the neutral (N) position:

- An audible alarm operates.
- The master warning light comes on.
- The "PARK BRAKE" message is shown.
- 1 Disengage the park brake (the lever is horizontal).

Note: A failure to disengage the park brake fully causes excessive wear of the park brake mechanism.

- 2 Pull and turn the handle grip A clockwise, one turn.
- 3 Test the park brake. ⇒ Testing the Park Brake (136).
- 4 If the brake fails the test, do the steps 1, 2 and 3 again. If there is no more adjustment and the pin B is at the end of its travel get the brake checked by your JCB Dealer.

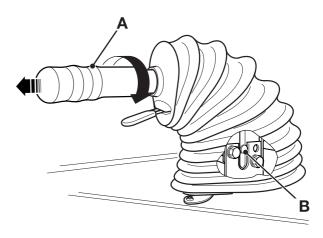


Fig 83.

Park Brake Disconnect

When fully engaged the park brake electrically disconnects the transmission drive, this prevents the machine from being driven with the park brake on.



Brakes

Service Brake

Testing the Service Brake

P4-2006_2

A CAUTION

Do not use a machine with faulty brakes.

009

The service brakes on this machine are backed up by accumulators. In the event of accumulator failure, the foot brakes would be inoperative with the engine stopped.

It is essential that the operation of the accumulators is checked regularly, using the following procedure:

- Park the machine on firm level ground, lower the attachments to the ground, apply the park brake, stop the engine and exhaust the brake system by operating the foot brake repeatedly.
- 2 Start the engine and run at high rpm for 1 minute.
- 3 Stop the engine, apply the foot brake, count the number of operations of the brake pedal until the system is exhausted.

If less than 6 or the brake failure warning light illuminates immediately then one or more of the accumulators may have failed and need immediate replacement.



Electrical System

Battery

Battery Disconnection/Connection

T3-019_4

A WARNING

Keep metal watch straps and any metal fasteners on your clothes, clear of the positive (+) battery terminal. Such items can short between the terminal and nearby metal work. If it happens you can get burned.

5-2-2-4

Disconnection

- 1 Get access to the battery. See Access Panels.
- 2 If the machine has a battery isolator, move the switch to the OFF position then remove the key.
- 3 Remove the leads. Disconnect the earth (-) terminal first.

Connection

- 1 Check the battery.
 - a If the terminal is dirty, clean the post.

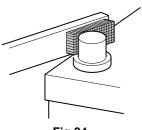


Fig 84.

- **b** If the terminal post is corroded and generates white powder wash the terminal with hot water. If considerable corrosion is detected, clean with a wire brush or abrasive paper.
- c After cleaning, apply a thin coat of petroleum jelly to the terminal.
- 2 Re-connect the leads. Connect the earth (-) terminal last.
- 3 If the machine has a battery isolator, move the switch to the ON position.
- 4 Close and lock the access panels.

Checking the Electrolyte Level

T3-020_3

Low maintenance batteries used in normal temperate climate applications should not need topping up. However, in certain conditions (such as prolonged operation at tropical temperatures or if the alternator overcharges) the electrolyte level should be checked as described below.

- 1 Get access to the battery. See Access Panels.
- 2 Disconnect and remove battery. See Battery Disconnection/Connection.

A WARNING

Do not top the battery up with acid. The electrolyte could boil out and burn you.

2-3-4-6

3 Remove covers A. Look at the level in each cell. The electrolyte should be 6 mm (1/4 in) above the plates. Top up if necessary with distilled water or de-ionized water.

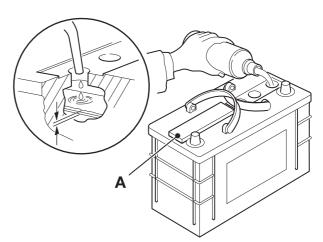


Fig 85. Typical Battery

- 4 Refit battery.
- **5** Close and lock the access panels.



Battery Isolator Switch

To disconnect the battery from the machine electrics a battery isolator has been fitted.

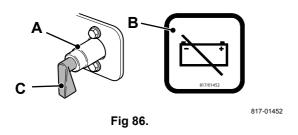
A CAUTION

Before carrying out arc welding on the machine, disconnect the battery and alternator to protect the circuits and components. The battery must still be disconnected even if a battery isolator is fitted.

INT-3-1-13

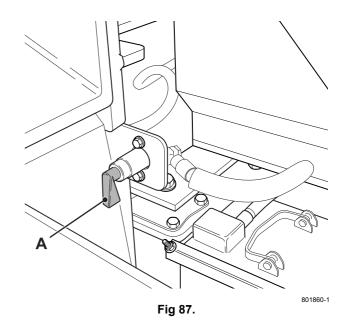
At the end of a working cycle or if the machine is being left unattended, provided the lights are not required, the battery must be isolated. Before attempting to start the engine or use the machine electrics the battery isolator key must be fitted and switched on.

The battery isolator switch is located on the left side in the battery compartment behind the rear grille. The battery isolator identification label is near the switch. ⇒ Fig 86. (10 140).



Turn the isolator key **A** counter-clockwise to isolate the machine electrical system from the batteries. When the key is in the off position, it is not secure, it should be removed. The key should be removed when the machine is not in use, as a security precaution. *⇒ Fig 87.* (140).

When the engine is running, the engine will not stop if the key is removed.





Jump Starting The Engine

T3-053

A WARNING

Do not use a battery if its electrolyte is frozen. To prevent the battery electrolyte from freezing, keep the battery fully charged.

Do not try to charge a frozen battery or jump-start and run the engine, the battery could explode.

Batteries produce a flammable gas, which is explosive; do not smoke when checking the electrolyte levels.

When jump-starting from another vehicle, make sure that the two vehicles do not touch each other. This prevents any chance of sparks near the battery.

Set all the machine switches to their OFF positions before connecting the external power supply. Even with the starter switch set to off some circuits will be energised when the external power supply is connected.

Do not connect the booster (slave) supply directly across the starter motor. Doing this by-passes the neutral gear safety switch. If the machine is in gear, it may 'runaway' and kill or injure bystanders.

Use only sound jump leads with securely attached connectors. Connect one jump lead at a time.

The machine has a negative earth electrical system. Check which battery terminal is positive (+) before making any connections.

Keep metal watch straps and jewellery away from the jump lead connectors and the battery terminals - an accidental short could cause serious burns and damage equipment.

Make sure you know the voltage of the machine. The booster (slave) supply must not be higher than that of the machine. Using a higher voltage supply will damage your machine's electrical system.

If you do not know the voltage 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.

4-2-2-3_1

- Electrical System
- 1 The park brake should have been engaged when the machine was last parked. If it is not engaged, engage it now.
- 2 Set all switches in the cab to off.

A DANGER

Before lowering the attachments to the ground, make sure that the machine and the area around it are clear of other people. Anyone on or close to the machine could fall and be crushed by the attachments, or get caught in the linkages.

2-2-3-4

- 3 Lower the loader shovel to the ground, if it is not already there. It will lower itself under its own weight when you operate the lever. Operate the lever carefully to control the rate of descent. If your machine is fitted with hose burst protection valves you will not be able to lower the shovel. In this case install the safety strut.
- 4 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** Connect the negative (-) booster cable to a suitable point on the engine.
- 6 Start the engine.

A WARNING

When the engine is running, there are rotating parts in the engine compartment. Before disconnecting the cables, make sure that you have no loose clothing (cuffs, ties etc.) which could get caught in rotating parts.

2-2-4-3

- 7 Disconnect the negative booster cable from the engine. Then disconnect it from the booster supply.
- 8 Disconnect the positive booster cable from the positive (+) terminal on the battery. Then disconnect it from the booster supply.



Fuses

Introduction



Fuses

Always replace fuses with ones of correct ampere rating to avoid electrical system damage.

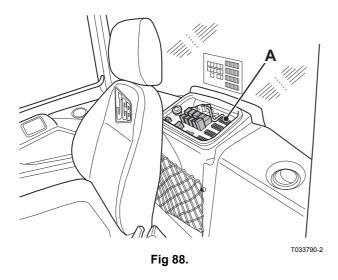
8-3-3-5

The electrical circuits are protected by fuses **A**. The fuses are located in a fuse box (shown with the cover removed) behind the operators seat.

If a fuse breaks, find the cause and correct the fault before a new fuse is installed.

To get access to the fuses:

- 1 Make the machine safe with the loader arms lowered. Refer to **Prepare the Machine for Maintenance**.
- 2 Remove the cover (not shown).



Note: The primary fuses are located in the engine compartment. ⇒ **Primary Fuses** (142).

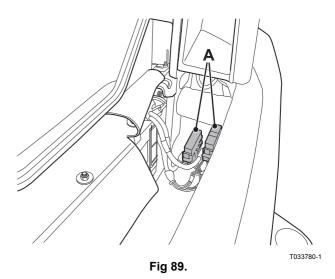
Primary Fuses

The primary fuses **A** are located in two fuse boxes, which are mounted at the right side of the battery bay inside the rear grille.

If a fuse breaks, find the cause and correct the fault before a new fuse is installed.

To get access to the fuses:

- Make the machine safe with the loader arms lowered. Refer to *Prepare the Machine for Maintenance*.
- 2 Open the rear grille. ⇒ Rear Grille (131).





Fuse	Circuit(s) Protected	Rating	PF4	PF1
PF1	Front Work Lights	60A	24/13V W.C.1	
	Ignition 1		24	
	EMS (Ignition Feed)		120 120 110 110 110	SOA COO ME ME
	ZF Computer (Ignition Feed)			
	ACCS		PF3	PF2
	Reversing Camera			
	Emergency Steer System		PF8	PF5
	ESOS and Immobiliser			
	Reverse Alarm and Lights			
	Blank			·OA
PF2	Hazard Indicators	40A	>D□ < \$\frac{\frac{1}{2}}{30A} \qu	56 ★
	Beacon and Interior Light		PF7	PF6
	Radio (24V)			T034230-1
	Headlight Flash		Fig 90.	
PF3	Ignition	60A		
	Roadlight Illumination			
PF4	Cigar Lighter	60A		
	Loader Auxiliaries, Quickhitch and Servo Isolator			
	Rear Wash/Wipe			
	Front Wash/Wipe and Horn			
	24/12V Dropper (Radio, Cigar Lighter and Auxiliary.)			
	Reverse Fan			
	Brake Lights and Tow Hitch Solenoids			
	Shovel and Arm Reset			
PF5	Rear Work Lights	40A		
	Roadlight Switch (Headlights)			
PF6	Heater Motor	60A		
	Air Conditioning Compressor			
PF7	Right Hand Sidelights	30A		
	Left Hand Sidelights			
	Heated Rear Screen			
	EMS (Battery Feed)			
	ZF Computer (Battery Feed)			
PF8	Engine ECU	30A		

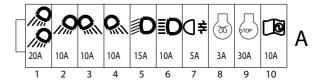


Secondary Fuses

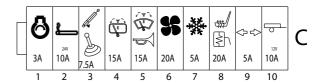
All the fuses are shown (including optional equipment fuses). Your machine may not be equipped with all the fuses shown.

Fuse	Circuit(s) Protected	Rating
A 1	Front Work Lights Relay, Ign 1 Relay	20A
A2	Additional Front Work Lights (x2)	10A
A3	Rear Work Lights (x2)	10A
A4	Additional Rear Work Lights (x2)	10A
A5	Roadlight Switch (Headlights)	15A
A6	Main Beam	10A
A7	Rear Fog Light	5A
A8	Grid Heater Relay	3A
A9	Shutdown Relay	30A
A10	Blank	-
B1	Right Hand Sidelights	3A
B2	Left Hand Sidelights	3A
B 3	Blank	15A
B4	EMS Battery Feed	3A
B5	ZF Computer Battery Feed	7.5A
B6	Hazard Indicators	10A
B7	Beacon/Interior Light	7.5A
B8	Radio	10A
B9	Headlight Flash	15A
B10	Ignition Relays/Roadlight Illumination	5A
C1	Starter Relay	3A
C2	Cigar Lighter (24V)	10A
C3	Loader Auxiliaries, Quickhitch, Servo Isolator	7.5A
C4	Rear Wash/Wipe	7.5A
C5	Front Wash/Wipe, Horn	10A
C6	Heater Motor	20A
C7	Air Conditioning Compressor	5A
C8	Heated Mirrors/Seat, Suspension Seat	20A
C9	Direction Indicators	5A
C10	Trailer Electrics (12V)	10A
D1	EMS Ignition Feed	3A
D2	ZF Computer Ignition Feed, ACCS Solenoid	7.5A

Fuse	Circuit(s) Protected	Rating
D3	Reversing Camera	5A
D4	Emergency Steer System	1A
D5	Shutdown Relay, Immobiliser	5A
D6	Reverse Alarm and Lights	5A
D7	24/12V Dropper (Radio, Cigar /Lighter, Auxiliary)	10A
D8	Reverse Fan	5A
D9	Brakelights, Tow Hitch Solenoids	7.5A
D10	Shovel and Arm Reset	7.5A







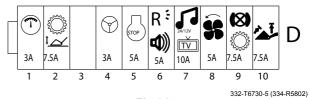


Fig 91.

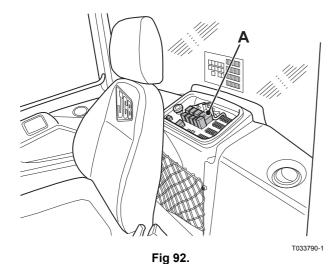


Relays

The relays ${\bf A}$ are located in a fuse box (shown with the cover removed) behind the operators seat. They are separated into banks. Each relay position in each bank is numbered.

To get access to the relays:

- Make the machine safe with the loader arms lowered. Refer to Prepare the Machine for Maintenance.
- 2 Remove the cover (not shown).



Relay Circuit 1 Ignition 1

2 Ignition 2

3 Brake Lights

4 Reverse Fan

5 Engine Shutdown

6 Reverse Alarm

7 **Emergency Steer**

8 Air Conditioning

9 Heater

10 Ignition 3

11 Front Work Lights

12 Lights

13 Flasher Unit

14 Park Brake

15 Rear Fog Lights

16 **Neutral Start**

17 Auxiliary

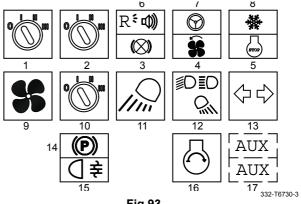


Fig 93.

Engine

Oil and Filter

Checking the Oil Level

A WARNING

Do not exceed the correct level of engine oil in the sump. If there is too much engine oil, the excess must be drained to the correct level. An excess of engine oil could cause the engine speed to increase rapidly without control.

GEN-1-18

Note: The engine must be level when you check the oil level to make sure the measurement is correct.

Make the machine safe. Refer to Prepare the Machine for Maintenance.

Note: Wait at least 15 minutes after the engine is stopped before you check the oil level. This gives time for the oil to drain into the oil pan.

- 2 Open the engine cover. Refer to Access Panels, Engine Cover.
- 3 Remove the dipstick A and make sure that the oil level is between the two marks on the dipstick.

Note: Never operate the engine with the oil level below the low mark or above the high mark. Poor engine performance or damage can occur.

- If necessary, to add the engine oil:
 - a Remove the filler cap B.
 - **b** Add the recommended oil through the filler point until its at the correct level on the dipstick.
- 5 Replace the dipstick.
- Attach the filler cap and make sure its secure. 6
- 7 Close and 'latch' the engine cover.

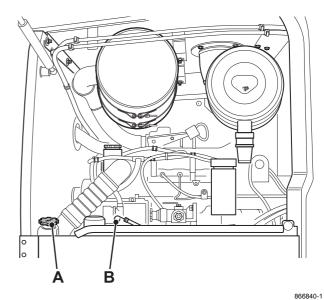
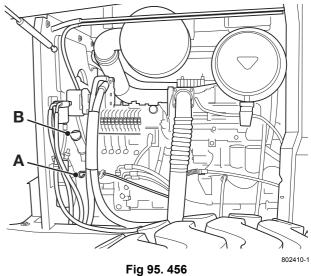


Fig 94. 426, 436



Changing the Oil and Filter

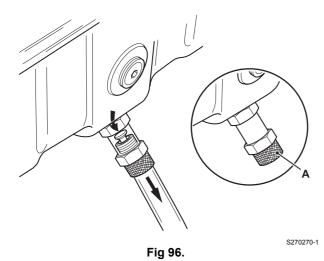
A CAUTION

Oil will gush from the hole when the drain plug is removed. Hot oil and engine components can burn you. Keep to one side when you remove the plug.

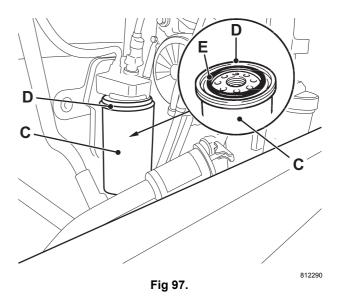
13-3-1-15

Drain the oil when the engine is warm to:

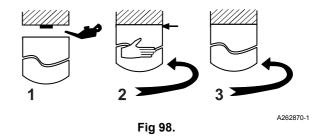
- Maximise the quantity of oil drained.
- Remove the contaminants held in suspension in the oil
- Make the machine safe with the loader arms lowered. Refer to *Prepare the Machine for Maintenance*.
- 2 Open the left side engine panel.
- 3 Place a suitable container beneath the drain plug A (to catch the oil).



- 4 Remove drain plug and its O-ring and drain the oil from the sump. Renew the O-ring.
- 5 Clean and refit the drain plug and its O-ring and tighten the drain plug to 34 Nm (25 lbf ft). Do not overtighten.
- **6** Clean the area around the filter head. Unscrew the filter canister **C**. Remember that it will be full of oil.
- 7 Clean filter head D. Make sure that the O-ring is removed.



- Add clean engine oil to the new filter canister. Allow time for the oil to pass through the filter element.
- 9 Smear the seal **E** on the new filter canister with clean engine oil.
- Screw in the new filter canister until it just contacts the filter head.



- 11 Turn the filter a further 3/4 of a turn.
- 12 Fill the engine with the recommended oil, to the MAX mark on the dipstick, through the filler point. Wipe off any spilt oil, refit the filler cap and make sure it is secure. Close the engine covers.
- 13 Make sure the engine will not start and turn the engine using the starter key until the oil pressure warning light is extinguished.

Note: To make sure the engine will not start, remove the engine shut-off solenoid fuse. ⇒ Fuses (142).

14 Refit the engine shut-off solenoid fuse and start the engine. Check for leaks. When the engine has cooled, check the oil level.

Cooling System

A WARNING

The cooling system is pressurised when the coolant is hot. When you remove the cap, hot coolant can spray out and burn you. Make sure that the engine is cool before you work on the cooling system.

9-3-3-1 2

Checking the Coolant Level

- Make the machine safe with the loader arms lowered. Refer to *Prepare the Machine for Maintenance*.
- 2 Open the right side engine panel.
- 3 Check that the coolant is visible in the header tank **A**. The level should be at the cold MIN mark. If not, continue with steps 4 to 6.
- 4 Close the engine cover. Top up the coolant system through the filler cap. Access to the filler cap is through a hole in the engine cover above the filler cap.
- 5 Refit the filler cap and make sure it is tight.
- **6** Run the engine for a while to raise the coolant to working temperature and pressure. Stop the engine and check for leaks.

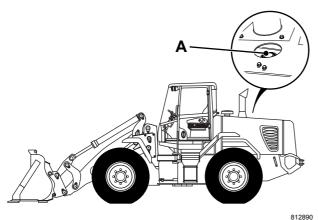


Fig 99.



Changing the Coolant

- 1 Make the machine safe with the loader arms lowered. Refer to *Prepare the Machine for Maintenance*.
- 2 Open the left side engine panel.

A WARNING

The cooling system is pressurised when the coolant is hot. When you remove the cap, hot coolant can spray out and burn you. Make sure that the engine is cool before you work on the cooling system.

9-3-3-1_2

3 Access to the filler cap is through a hole in the engine cover above the filler cap. Slowly loosen cap. Let any pressure escape. Remove the cap.

A CAUTION

Keep your face away from the drain hole when removing the drain plug.

2-3-3-4

- 4 Remove drain plug from the radiator drain extension and drain the coolant.
- 5 Flush the system using clean water.
- 6 Refit drain plug.
- **7** Prepare a mixture of water and sodium carbonate.

Note: Use 0.5 kg (1.0 lb) of sodium carbonate for every 23 litre (5.0 UK Gal).

- 8 Fill the system slowly with the mixture to prevent air locks. Wait 2 to 3 minutes to allow air to be vented and top up the header tank to 1/3 full. Do not fit the filler cap at this stage.
- **9** Run the engine for 5 minutes at the normal running temperature. Stop the engine and allow to cool.
- 10 Drain the cooling system, checking that the coolant is not dirty. If it is, repeat the flushing process (steps 7 to 10).
- 11 Fill the system as described at step 8 but using premixed water/antifreeze solution. Refer to Coolant Mixtures.

12 Do not overfill. Fit the filler cap.

Note: A 50% antifreeze mixture must be used even if frost protection is not needed. This gives protection against corrosion and raises the coolant's boiling point.

13 Run the engine for a while to raise the coolant to working temperature and pressure. Stop the engine and check for leaks.

Note: Make sure the heater control is in the hot position before running the engine. This will ensure that the coolant mixture circulates through the entire cooling system.



Changing the Coolant Filter (456)

Make the machine safe with the loader arms lowered. Refer to Prepare the Machine for Maintenance.

A WARNING

The cooling system is pressurised when the coolant is hot. When you remove the cap, hot coolant can spray out and burn you. Make sure that the engine is cool before you work on the cooling system.

9-3-3-1_2

- 2 Open the left side engine panel.
- 3 Carefully loosen filler cap. Let any pressure escape. Remove the cap.
- Close taps A on either side of the filter to prevent loss 4 of coolant.
- Remove the coolant filter by unscrewing anti-5 clockwise.
- 6 Clean the filter head area.
- 7 Smear clean oil on the new coolant filter seal.
- Screw on the filter until it just contacts the filter head. 8
- 9 Turn the filter a minimum further 3/4 of a turn.
- 10 Open both taps A and replace filler cap.

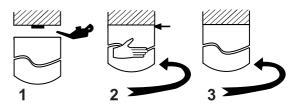


Fig 100.



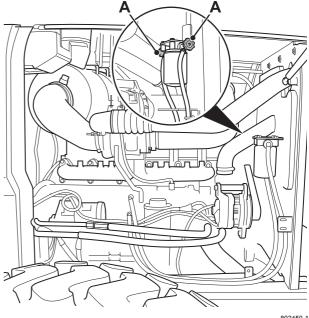


Fig 101.

802450-1

Drive Belt

Check the Drive Belt

- 1 Make the machine safe. Refer to Prepare the Machine for Maintenance.
- Open the engine cover. Refer to Access Panels, Engine Cover.
- 3 Examine the drive belt for damage:

A crack across the width of the drive belt $\boldsymbol{\mathsf{A}}$ is permitted.

Replace the drive belt if there is a crack across the drive belt, which crosses a crack in the drive belt length ${\bf B}.$

Replace a drive belt that is frayed.

Replace a drive belt that has missing pieces C.

4 Check the tension of the drive belt:

The maximum movement at the longest run of the drive belt **D** must be 9.5 to 12.7 mm (0.375 to 0.5 in).

If there is too much movement, get your JCB Dealer to replace the drive belt.

5 Close and 'latch' the engine cover.

151

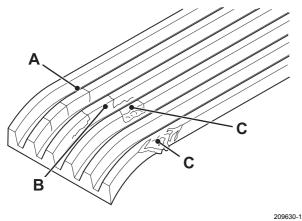


Fig 102.

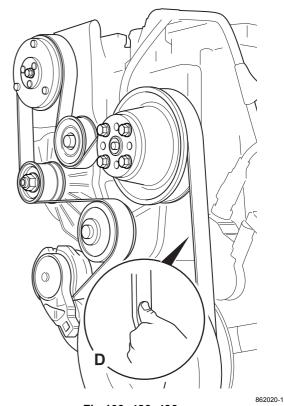


Fig 103. 426, 436

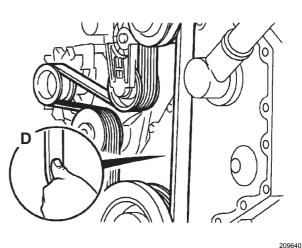


Fig 104. 456

9811-3400-4 **151**



Air Filter

Cleaning the Air Filter Dust Valve

Important: Do not run the engine with the dust valve K removed. ⇒ Fig 105. (152).

- 1 Check the dust valve **K** is not blocked.
- Inspect the rubber flaps for cuts and nicks and check that the rubber is not perished. Renew if necessary.

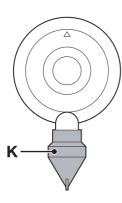


Fig 105.

Changing the Elements

A CAUTION

The outer element must be renewed immediately if the warning light on the instrument panel illuminates.

2-3-3-1

T3-034

332260-1

A CAUTION

Do not run the engine when the outer element has been removed.

16-3-3-1

Note: Do not attempt to wash or clean elements - they must be renewed.

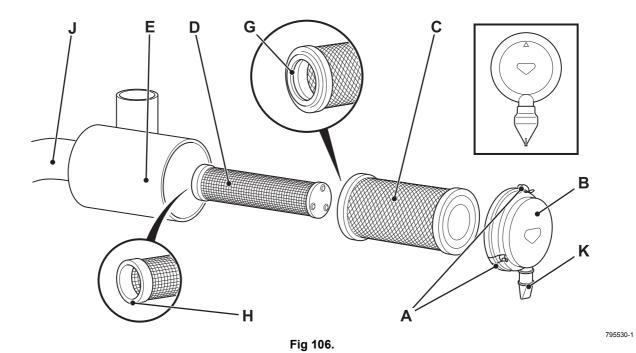
Note: Do not run the engine with the dust valve **K** removed.

Note: In a dusty working environment, the outer element may have to be renewed more frequently than the service schedule recommendation. A new inner element must be fitted at latest every other time the outer element is changed. As a reminder, mark the inner element with a felt tip pen each time you change only the outer element.

- Make the machine safe with the loader arms lowered.
 Refer to *Prepare the Machine for Maintenance*.
- 2 Open the right side engine panel.
- 3 If changing the inner element, disconnect the filter induction hose J to prevent dust getting into the engine. Cover the hose to prevent rain and dirt getting into the engine.
- 4 Release latches **A** and remove cover **B**. Gently remove the outer element **C** by moving the end up and down or by twisting to disengage the seal. Take care not to tap or knock the element as you remove it. If necessary, remove the inner element **D**.
- 5 Clean inside canister E, particularly the outlet tube on which the elements seal. Clean dust valve K.
- 6 Check the new elements before fitting, discard if damaged. Smear the seals **G** and **H** with engine oil or preferably, silicone oil then carefully install the elements into the outlet tube. Apply firm pressure to the outer ring of the element, not the soft centre.



- 7 Refit cover B making sure it is properly located then secure latches A. Make sure that the dust valve K is at the bottom.
- 8 Connect the induction hose J. Make sure the air filter blocked switch connector is fitted. Check all hoses for condition and tightness.



153 9811-3400-4 **153**



Fuel System

Fuel Filter

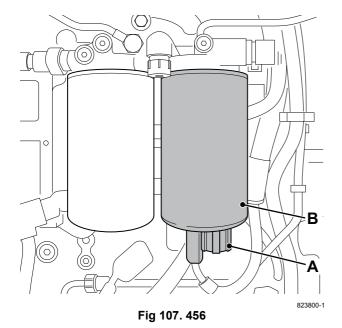
Draining the Fuel Filter

- Make the machine safe with the loader arms lowered. Refer to *Prepare the Machine for Maintenance*.
- 2 Open the right side engine panel. Refer to *Access Panels Engine Covers*.
- Drain off any water in the bowl B by turning valve A 4 turns counter-clockwise until the valve drops down 25 mm (1.0 in).
- 4 Push up valve and turn clockwise until closed. Do not over tighten.
- 5 Close and lock the engine cover.

A CAUTION

Running the engine with air in the system could damage the fuel injection pump. After maintenance, the system must be bled to remove any air.

2-3-3-11



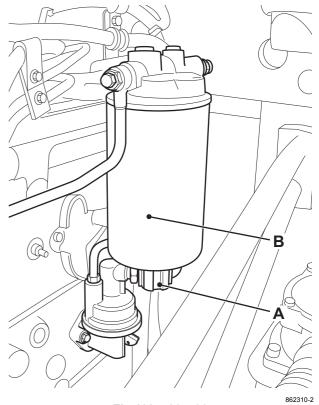


Fig 108. 426, 436

Changing the Fuel Filter Element

- 1 Make the machine safe with the loader arm lowered. Refer to *Prepare the Machine for Maintenance*.
- 2 Open the right side engine panel. Refer to **Access Panels Engine Covers**.
- **3** Unscrew the filter element **B**, the element is hand tight but may require a strap wrench to remove. The filter will be full of fuel.
- To assist with bleeding, fill the filter element with fuel before fitting. Install filter element, hand tight only. Check for leaks.
- 5 Bleed the fuel system. ⇒ Bleeding the System (157).
- 6 Close and lock the engine cover.

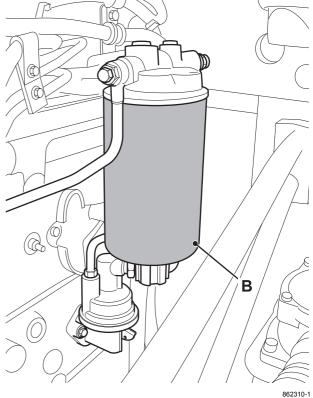
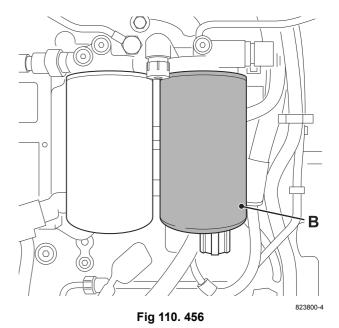


Fig 109. 426, 436



155 9811-3400-4 **155**



Sedimentor Bowl

Draining the Sedimentor Bowl

- Make the machine safe with the loader arm lowered. Refer to *Prepare the Machine for Maintenance*.
- 2 Open the rear grille. Refer to Access Panels Rear Grille.
- 3 Drain off any water in the bowl by turning tap **A** and slacken screw **E**.
- 4 Make sure tap A is turned off and secure. Tighten screw E.
- 5 Close and lock the rear grille.

A CAUTION

Running the engine with air in the system could damage the fuel injection pump. After maintenance, the system must be bled to remove any air.

2-3-3-11

Cleaning the Sedimentor Bowl

If bowl B contains sediment carry out the following:

- 1 Hold the bowl **B** and unscrew domed nut **C**.
- 2 Remove the bowl, and wash in clean fuel.
- 3 Clean strainer D.
- 4 Refit the bowl. Make sure the gasket is in good condition and positioned correctly.
- **5** Re-tighten nut **C**, taking care not to over-tighten.
- 6 Bleed the fuel system. ⇒ Bleeding the System (157).

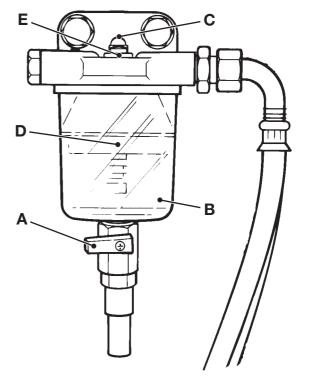


Fig 111.

S261720



Bleeding the System

A CAUTION

Running the engine with air in the system could damage the fuel injection pump. After maintenance, the system must be bled to remove any air.

2-3-3-1

If the engine fails to start, misfires or if any part of the fuel system has been disconnected or emptied, bleed the system as follows:

Note: Small amounts of air will be vented automatically at the injection pump. Manual bleeding should not be required after changing the filters if they are filled with fuel before fitting.

- 1 Make the machine safe with the loader arm lowered. Refer to **Prepare the Machine for Maintenance**.
- 2 Make sure that there is enough fuel in the fuel tank.
- 3 Open the right side engine panel. Refer to Access Panels - Engine Covers.

A WARNING

Hot oil and engine components can burn you. Make sure the engine is cool before doing this job. Bleeding a hot engine could cause fuel to spill on to a hot exhaust manifold creating a danger of fire.

13-3-1-16

- 4 Open bleed screw A.
- 5 Operate the priming plunger B until air free fuel flows from the bleed screw. Tighten the bleed screw.

A WARNING

To bleed the injectors you must turn the engine. When the engine is turning, there are parts rotating in the engine compartment.

Before starting this job make sure that you have no loose clothing (cuffs, ties etc) which could get caught in rotating parts.

When the engine is turning, keep clear of rotating parts.

2-3-3-8

- 6 Bleed the injectors
 - a Slacken one of the injector feed pipe nuts C.
 - b Crank the engine, when air free fuel flows from the connection, tighten the nut.
 - **c** Repeat steps 6a and b at each injector in turn until the engine runs smoothly.
- 7 Close and lock the engine cover.

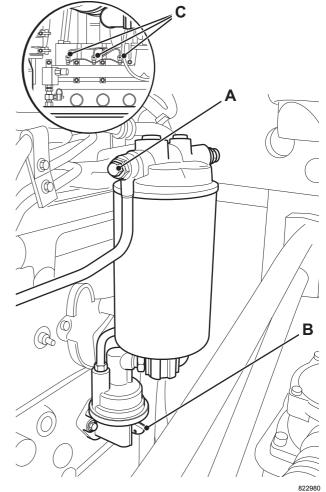


Fig 112.



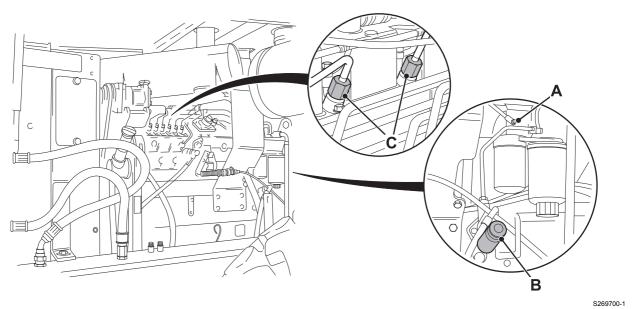


Fig 113.



Hydraulic System

Introduction

A WARNING

The temperature of the hydraulic oil will be high soon after stopping the engine. Wait until it cools (less than 40°C) before beginning maintenance.

8-3-4-10

A WARNING

Fluid Under Pressure

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

INT-3-1-10 3

A WARNING

Hydraulic Pressure

Hydraulic fluid at system pressure can injure you. Before connecting or removing any hydraulic hose, residual hydraulic pressure trapped in the service hose line must be vented. Make sure the hose service line has been vented before connecting or removing hoses. Make sure the engine cannot be started while the hoses are open.

INT-3-1-11_2

A CAUTION

Using incorrect fluid could damage the system. See Fluids, Capacities and Lubricants for the correct fluid. The fluid can harm your skin. Wear rubber gloves. Cover cuts or grazes.

2-3-5-1_2

A CAUTION

Do not allow dirt to enter the system. Before disconnecting any part of the system, thoroughly clean around the connection. When a component has been disconnected, always fit protective caps and plugs to prevent dirt ingress.

Failure to follow these instructions will lead to dirt entering the system. Dirt in the system will seriously damage the systems components and could be expensive to repair.

INT-3-3-12

Release the Hydraulic Pressure

A WARNING

Hydraulic Hoses

Damaged hoses can cause fatal accidents. Inspect the hoses regularly. Do not use the machine if a hose or hose fitting is damaged.

INT-3-3-2_4

- Park the machine on hard, level ground. Lower the attachment to the ground or fully support the attachment.
- 2 Engage the park brake and set the transmission to neutral.
- 3 Set the starter key to the OFF position.
- 4 Set the starter key to the ON position, but do not start the engine.
- 5 To release the hydraulic pressure in a particular service, operate the related controls, including the auxiliary.

For example, to release the hydraulic pressure in the loader arms, unlock the loader controls, then operate the loader controls lever repeatedly.

6 Set the starter key to the OFF position.



Oil and Filter

Checking the Fluid Level

426, 436

1 Make the machine safe with the loader arm lowered. Refer to **Prepare the Machine for Maintenance**.

A CAUTION

If the fluid is cloudy, then water or air has contaminated the system. This could damage the hydraulic pump. Contact your JCB Distributor immediately.

12-5-1-4

- 2 The level should be visible in the sight glass A.
- 3 If necessary, top up with hydraulic fluid.
- 4 Open the right side engine panel. Refer to *Access Panels Engine Covers*.
- 5 Open filler cap B.
- 6 Top up the system with hydraulic fluid. ⇒ Fluids, Lubricants and Capacities (108).
- 7 Refit filler cap **B**. Make sure it is secure.
- 8 Close the engine cover.

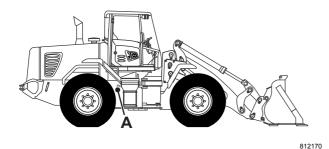


Fig 114.

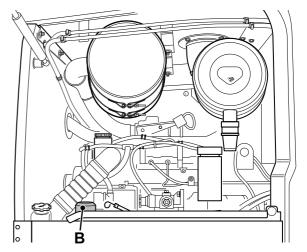


Fig 115. 426, 436

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456

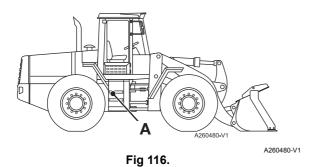
Make the machine safe with the loader arm lowered. Refer to *Prepare the Machine for Maintenance*.

A CAUTION

If the fluid is cloudy, then water or air has contaminated the system. This could damage the hydraulic pump. Contact your JCB Distributor immediately.

12-5-1-4

- **2** The level should be visible in the sight glass **A**.
- 3 If necessary, top up with hydraulic fluid.
- 4 Open the right side top step.
- 5 Open the filler cap B. Use the key to unlock the filler cap on the 456.
- 6 Top up the system with hydraulic fluid. ⇒ Fluids, Lubricants and Capacities (108).
- 7 Refit filler cap **B**. Make sure it is secure.
- 8 Close the engine cover.



C

Fig 117.

Hydraulic Tank Filler Cap (456)

The hydraulic tank breather (and filter) forms an integral part of the hydraulic tank cap **B**. Replace the cap (and breather filter) with a new one at the recommended interval.

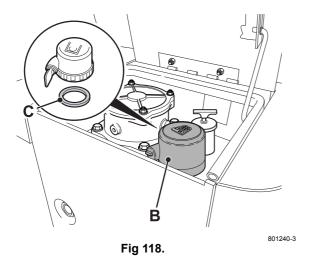
The cap incorporates a side mounted barrel lock that is operated by the ignition/door key. It is important to note that seal **C** must be in good condition and correctly installed in the cap.

Screw the cap onto the filler neck until hand tight. Use the ignition/door key to lock the cap.

Note: The key can only be removed when in the `locked' position.

Once the key has been removed, the cap will simply rotate on the thread.

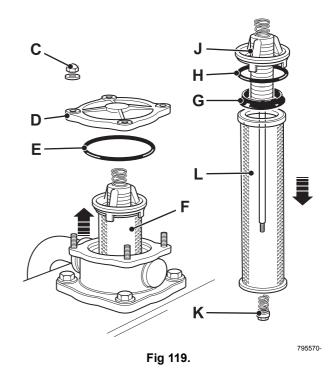
To remove the cap, the key must be re-inserted and the cap unlocked.





Changing the Filter Element

- 1 Make the machine safe with the loader arm lowered. Refer to **Prepare the Machine for Maintenance**.
- **2** 426, 436: Open the right side engine cover.
 - 456: Open the right hand side top step.
- 3 Remove hydraulic tank cap.
- 4 Unscrew and remove nuts C, cover plate D and seal F
- 5 Pull out the complete element assembly **F** and the seal
- **6** Remove the nut and spring **K**. Remove the filter element **L** from the spindle and clean magnets **J**.
- 7 Fit the new element L and the new seals G and H.
- 8 Replace the cover plate **D** and tighten nuts **C** to 7 Nm (5 lbf ft).
- 9 Top up the system with hydraulic fluid. ⇒ Fluids, Lubricants and Capacities (108).
- 10 Refit filler cap. Make sure it is secure.
- 11 Close the right hand side top step/engine cover.



Transmission

Gearbox

Checking the Oil Level (Engine Running)

Important: Before you open the engine cover, you must allow the engine to operate at low idle for four minutes. The delay allows the coolant temperature to stablise before you open the engine cover.

Note: The transmission oil level should be checked only when the oil is at the correct working temperature.

1 Make the machine safe with the loader arm lowered. Refer to **Prepare the Machine for Maintenance**.

Do not stop the engine.

2 426, 436: Open the left side engine cover.

456: Open the right side top step.

3 Remove, wipe and replace the dipstick A.

Note: Turn 'T' handle **D**, two full turns counter-clockwise to release the dipstick. Turn 'T' handle **D**, two full turns clockwise to fasten in position. Check that the dipstick is secure.

- 4 Make sure the oil is at the correct mark on the dipstick.
- 5 If necessary, add recommended oil at dipstick/filler point A.

Note: The transmission may overheat if the oil level is above the HOT mark.

6 Close and lock the engine cover.

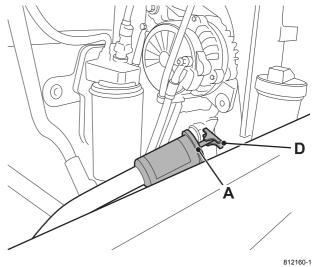


Fig 120. 426, 436

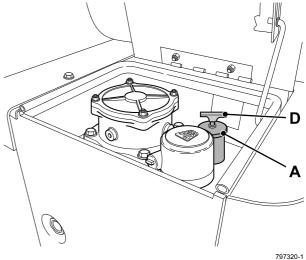


Fig 121. 456



Changing the Oil and Filter

WARNING

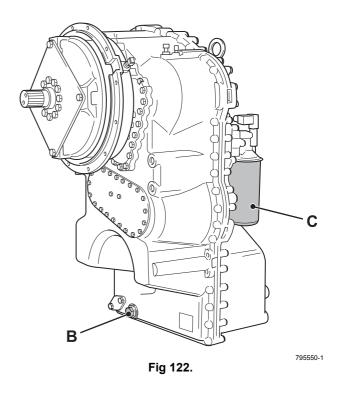
Make the machine safe before working underneath it. Park the machine on level ground, lower the attachments to the ground. Apply the park brake, put the transmission in neutral and stop the engine. Block both sides of all four wheels.

Disconnect the battery, to prevent the engine being started while you are beneath the machine.

GEN-4-1_1

- 1 Make the machine safe with the loader arm lowered. Refer to **Prepare the Machine for Maintenance**.
- 2 Place a suitable container beneath the transmission. (To catch the oil).
- 3 Remove the dipstick A. Refer to Checking the Oil Level (Engine Running).
- 4 Remove the drain plug B.
- 5 Drain the oil. Clean and refit drain plug **B**.
- 6 Unscrew and discard old filter **C**. Clean the mounting face and lubricate the seal on the new filter with clean torque converter fluid.
- 7 Fit the new filter C hand tight only.
- 8 Fill the system with new oil at dipstick/filler point A.

Note: Do not fill past the top mark on the dipstick.





Front and Rear Axles

Checking the Oil Level

A CAUTION

The axle oil level must be checked with the machine level, otherwise a false indication of the amount of oil in the axle will be given.

16-3-5-3

A CAUTION

It is not recommended that the machine be driven with the axle partially filled with oil.

2-3-4-7

- Make the machine safe with the loader arm lowered. Refer to Prepare the Machine for Maintenance.
- 2 Clean the area around the fill/level plug A.
- 3 Remove the fill/level plug A and its seal, the oil should be level with the bottom of the hole.
- 4 If necessary, add the recommended oil to the system through the fill/level plug hole.
- 5 Clean then install the fill/level plug A and its seal.
- Tighten the fill/level plug A to 85 Nm (60 lbf ft). 6

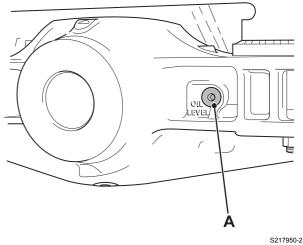


Fig 123.



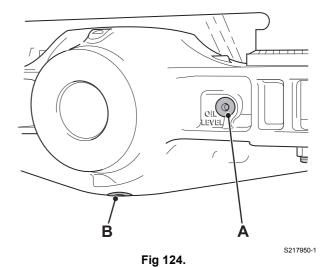
Changing the Oil

- 1 Make the machine safe with the loader arm lowere. Refer to *Prepare the Machine for Maintenance*.
- 2 Clean the area around the fill/level plug A.
- 3 Remove the fill/level plug A and its seal.
- 4 Put a suitable container below the drain plug **B** (to catch the oil).
- 5 Remove the drain plug B and let the oil drain fully into the container.

A CAUTION

Oil will gush from the hole when the drain plug is removed. Keep to one side when you remove the plug. $\overline{\mbox{2-3-4-2}}$

- 6 Clean then install the drain plug B and its seal. The drain plug B is magnetic, make sure all unwanted material is removed.
- 7 Tighten the drain plug **B** to 85 Nm (60 lbf ft).
- 8 Fill the axle with the recommended oil through fill/ level plug A.
- 9 Clean then install the fill/level plug A and its seal.
- 10 Tighten the fill/level plug A to 85 Nm (60 lbf ft).



Checking the Hub Oil Level

P4-3014

Note: You must do the hubs separately.

Make the machine safe with the loader arm lowered. Refer to Prepare the Machine for Maintenance.

Make sure the OIL LEVEL mark on the hub is in the horizontal position, as shown. ⇒ Fig 125. (168).

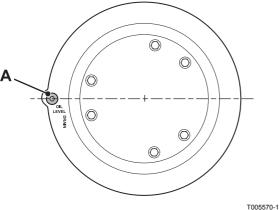


Fig 125.

- 2 Clean the area around the fill/drain plug ${\bf A}.$
- Remove the fill/drain plug A and its seal, the oil must 3 be level with the bottom of the hole.
- 4 If necessary, add the recommended oil to the system through the fill/drain plug hole.
- 5 Clean then install the fill/drain plug **A** and its seal.
- 6 Tighten the fill/drain plug A to 85 Nm (60 lbf ft).

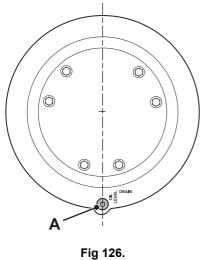


Changing the Hub Oil

Note: You must do the hubs separately.

Make the machine safe with the loader arm lowered. Refer to Prepare the Machine for Maintenance.

Make sure the fill/drain plug A is at the bottom, as shown. ⇒ Fig 126. (169).



T005570-2

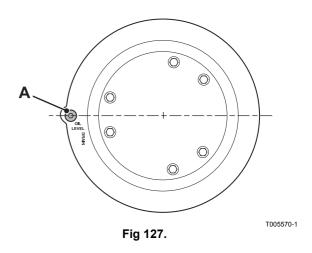
- 2 Clean the area around the fill/drain plug A.
- Put a suitable container below the fill/drain plug ${\bf A}.$ (to 3 catch the oil).
- Remove the fill/drain plug A and its seal and let the oil drain fully into the container.

A CAUTION

There will be no oil in the hub when the machine is driven forward. Only drive the machine forward one quarter revolution of the wheel. Do not drive the machine more than is necessary.

4-3-5-1

5 Drive the machine slowly forward to put the OIL LEVEL mark on the hubs into the horizontal position, as shown. ⇒ Fig 127. (169).



- Fill the hub with the recommended oil through the fill/ drain plug A until oil starts to come out.
- Clean then install the fill/drain plug A and its seal. 7
- Tighten the fill/drain plug A to 85 Nm (60 lbf ft). 8



ZF Axles

Introduction

The 426 has MT-L 3075 II - front axles and MT-L 3065 II - rear axles.

The 434S and the 436 have MT-L 3085 II - front axles and MT-L 3075 II - rear axles.

The 456 has MT-L 3095 II front axles and rear axles.

Note: The 434S must have sintered brake pads. Also machines used in waste applications should have sintered pads because of the duty cycle.

3065 and 3075 Axles

Checking the Oil Level



The oil level must be checked with the machine level, otherwise a false indication of the amount of oil will be given.

16-3-5-3 2

A CAUTION

It is not recommended that the machine be driven with the axle partially filled with oil.

2-3-4-7

- 1 Stop the machine on hard, level ground.
- 2 Make the machine safe with the loader arm lowered. Refer to *Prepare the Machine for Maintenance*.
- 3 Wait for a few minutes for the oil to settle.
- 4 Clean the area around the dipstick and screw plugs 1.
- 5 Remove, then clean the dipstick and screw plugs 1.
- 6 Insert the dipstick 1 until you touch the thread.
- 7 Remove the dipstick 1 and check the oil level, it must be between the MIN and MAX marks.
- 8 If necessary, add the recommended oil to the system through the screw plug hole. Make sure the oil level is correct.

- 9 Clean, then install the dipstick and screw plug 1 Replace the O-ring, if necessary.
- 10 Tighten the screw plug to 50 Nm.

Changing the Oil

- 1 Stop the machine on hard, level ground.
- 2 Make the machine safe with the loader arm lowered. Refer to *Prepare the Machine for Maintenance*.

A CAUTION

Oil will gush from the hole when the drain plug is removed. Keep to one side when you remove the plug.

2-3-4-2

- 3 Wait for a few minutes for the oil to settle.
- 4 Clean the area around the dipstick and screw plugs 1, drain plugs 2 and 3 and the breather 4.
- 5 Remove the oil dipstick and screw plugs 1.
- **6** Put suitable containers below the drain plugs (to catch the oil).
- 7 Remove the drain plugs 2 and 3 and their O-rings, then let the oil drain fully into the containers.
- 8 Clean, then install the drain plugs and new O-rings.
- **9** Tighten the drain plugs to 50 Nm.
- 10 Fill the axle with the recommended oil through the dipstick and screw plug holes 1. Make sure the oil level is correct.
- 11 Clean, then install the dipsticks, screw plugs and new O-rings.
- 12 Tighten the screw plugs to 50 Nm.
- 13 Clean and check the breather 4.

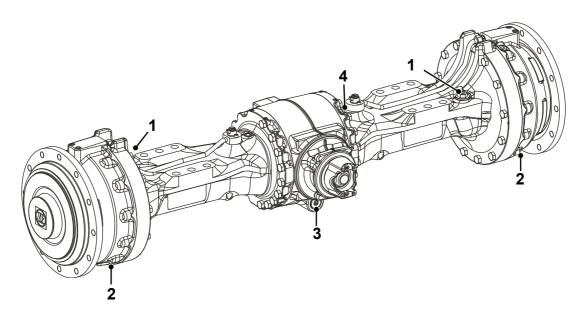


Fig 128. 3065/3075

333-T3830-1-1

- 1 Dipstick and screw plug
- 2 Drain plug
- 3 Drain plug
- 4 Breather



3085 Axles

Checking the Oil Level

A CAUTION

The oil level must be checked with the machine level, otherwise a false indication of the amount of oil will be given.

16-3-5-3_2

A CAUTION

It is not recommended that the machine be driven with the axle partially filled with oil.

2-3-4-7

- 1 Stop the machine on hard, level ground.
- 2 Make the machine safe with the loader arm lowered. Refer to *Prepare the Machine for Maintenance*.
- 3 Wait for a few minutes for the oil to settle.
- 4 Clean the area around the oil fill and check plug 3.
- 5 Remove, then clean the oil fill and check plug.
- 6 Check the oil level, it should be just below the level of the hole.
- 7 If necessary, add the recommended oil to the system through the hole.
- 8 Make sure the oil level is correct.
- **9** Clean then install the oil fill and check plug. Replace the O-ring, if necessary.
- 10 Tighten the plug to 50 Nm.

Changing the Oil

- 1 Stop the machine on hard, level ground.
- 2 Make the machine safe with the loader arm lowered. Refer to **Prepare the Machine for Maintenance**.

A CAUTION

Oil will gush from the hole when the drain plug is removed. Keep to one side when you remove the plug.

2-3-4-2

- 3 Clean the area around the oil fill and check plug 3, drain plugs 1 and 2 and the breather 4.
- 4 Remove the oil fill and check plug 3.
- 5 Put a suitable container below the drain plugs (to catch the oil).
- 6 Remove the drain plugs and their O-rings and let the oil drain fully into the container.
- 7 Clean, then install the drain plugs and new O-rings.
- 8 Tighten the drain plugs to 50 Nm.
- 9 Fill the axle with the recommended oil through the oil fill and check hole 3. Make sure the oil level is correct.
- 10 Clean then install the oil fill and check plug 3. Replace the O-ring.
- 11 Tighten the screw plug to 50 Nm.
- 12 Clean and check the breather 4.



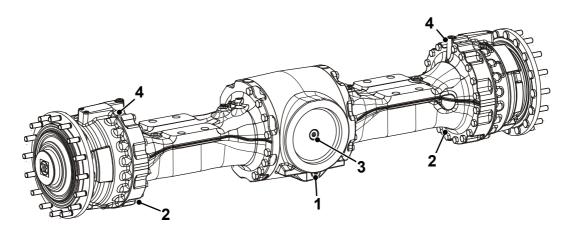


Fig 129. 3085

333-T3829-1-1

- Drain plug
- 2 Drain plug

1

- 3 Oil fill and check plug
- 4 Breather



3095 Axles

Checking the Oil Level

A CAUTION

The oil level must be checked with the machine level, otherwise a false indication of the amount of oil will be given.

16-3-5-3_2

A CAUTION

It is not recommended that the machine be driven with the axle partially filled with oil.

2-3-4-7

- 1 Stop the machine on hard, level ground.
- 2 Make the machine safe with the loader arm lowered. Refer to *Prepare the Machine for Maintenance*.
- 3 Wait for a few minutes for the oil to settle.
- 4 Clean the area around the oil fill and check plug 3.
- 5 Remove, then clean the oil fill and check plug.
- 6 Check the oil level, it should be just below the level of the hole.
- 7 If necessary, add the recommended oil to the system through the hole.
- 8 Make sure the oil level is correct.
- **9** Clean then install the oil fill and check plug. Replace the O-ring, if necessary.
- 10 Tighten the plug to 50 Nm.

Changing the Oil

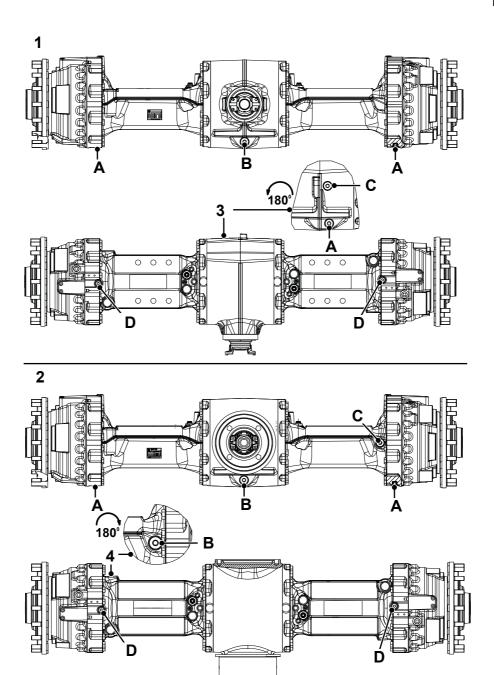
- 1 Stop the machine on hard, level ground.
- 2 Make the machine safe with the loader arm lowered. Refer to **Prepare the Machine for Maintenance**.

A CAUTION

Oil will gush from the hole when the drain plug is removed. Keep to one side when you remove the plug.

2-3-4-2

- 3 Clean the area around the oil fill and check plug 3, drain plugs 1 and 2 and the breather 4.
- 4 Remove the oil fill and check plug 3.
- 5 Put a suitable container below the drain plugs (to catch the oil).
- 6 Remove the drain plugs and their O-rings and let the oil drain fully into the container.
- 7 Clean, then install the drain plugs and new O-rings.
- 8 Tighten the drain plugs to 50 Nm.
- 9 Fill the axle with the recommended oil through the oil fill and check hole 3. Make sure the oil level is correct.
- 10 Clean then install the oil fill and check plug 3. Replace the O-ring.
- 11 Tighten the screw plug to 50 Nm.
- 12 Clean and check the breathers 4.



333-T66239-1-1

- A Front axle
- B Rear axle
- C View point
- D View point

- 1 Drain plug
- 2 Drain plug
- 3 Oil fill and check plug
- 4 Breather

Fig 130. 3095



Tyres and Wheels

Tyres and Wheels

Tyre Inflation

Introduction

T3-066

A WARNING

An exploding tyre can kill. Inflated tyres can explode if over-heated or over-inflated. Follow the instructions given when inflating the tyres. Do not cut or weld the rims. Use a tyre/wheel specialist for all repair work.

2-3-2-7 2

A WARNING

Wheels and tyres are heavy. Take care when lifting or moving them.

Store with care to ensure that they cannot fall and cause injury.

13-3-1-7 1

Always try to maintain your tyre pressure to the recommended settings. Using your machine with under-inflated tyres means:

- Decreasing the machines stability
- Higher tyre temperatures
- Excessive strain of the tyre fabric
- More bulging of the sidewalls
- Shortens the tyres life.

Using the machine with over inflated tyres is dangerous:

 It causes excessive tensile loads in the fabric: this makes a tyre more susceptible to cuts and punctures.

Do not cut or weld on the rim of an inflated tyre.

After checking or amending the tyre pressure always replace and secure the valve cap.

Always deflate the tyre before removing foreign obstacles from the tread.

Procedure

T3-067_2

These instructions are for adding air to a tyre which is already inflated. If the tyre has lost all its air pressure, call

in a qualified tyre mechanic. The tyre mechanic should use a tyre inflation cage and the correct equipment to do the job.

1 Prepare the wheel.

Before you add air to the tyre, make sure it is correctly fitted on the machine or installed in a tyre inflation cage. ⇒ *Fig 131.* (176).

- 2 Prepare the equipment.
 - a 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. For recommended tyres and pressures for your machine, see Specifications, Tyre Sizes and Pressures.
 - **b** Use an air hose fitted with a self-locking air chuck and remote shut-off valve.
- 3 Add the air.
 - a 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.
 - b Inflate the tyre to the recommended pressure. Do not over-inflate.

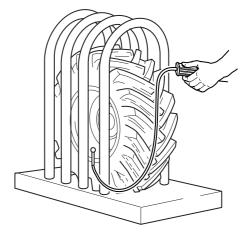


Fig 131.

A089570-1



Tyres and Wheels

Checking the Wheel Nut Torques

A WARNING

If, for whatever reason, a wheel stud is renewed, all the studs for that wheel must be changed as a set, since the remaining studs may have been damaged.

2-3-2-8

On new machines, and whenever a wheel has been removed, check the wheel nut torques every two hours until they stay correct.

Every day, before starting work, check that the wheel nuts are tight.

The correct torque are shown.

Table 24. Torque Settings

Front		Re	ear	
Nm	lbf ft	Nm	lbf ft	
600	443	600	443	



Windscreen Washers

Windscreen Washers

- 1 Make the machine safe with the loader arm lowered. Refer to **Prepare the Machine for Maintenance**.
- 2 To gain access to the washer bottle A, open the heater compartment door. Refer to Access Panels -Heater Door.

The washer bottle is located inside.

- 3 Fill the windscreen washer bottle with a suitable liquid. The liquid should contain a de-icing fluid to prevent it freezing. Do not use engine coolant antifreeze.
- 4 On completion, close and lock the access cover.

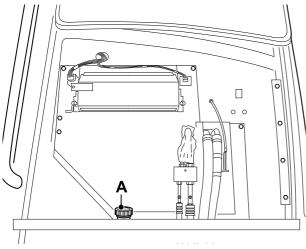


Fig 132.

802370-1



Fire Extinguisher (if fitted)

Fire Extinguisher (if fitted)

T3-022

Checking the Fire Extinguisher

Check the fire extinguisher for damage, security and signs of leaking.

Check that the gauge **A** indicates that the extinguisher is charged i.e. the needle is in the GREEN segment.

Note: If the needle is in or very near the RED segment at either end of the gauge, the extinguisher must be serviced or replaced.

Make sure the safety pin **B** is fitted and secure.

The extinguisher should be serviced every 12 months by a suitably qualified person.

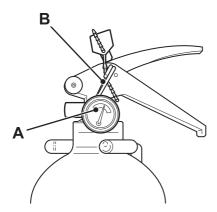


Fig 133.



Fire Extinguisher (if fitted)

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Optional Attachments

Introduction

T4-002_3

A WARNING

Use only the JCB approved attachments that are specified for your machine. Operating with non-specified attachments can overload the machine, causing possible damage and machine instability which could result in injury to yourself or others.

The use of non-approved attachments could invalidate your warranty.

2-4-5-2 1

A CAUTION

If you have an attachment which is not covered in the Operator Manual do not install it, use it or remove it until you have obtained, read and understood the pertinent information. Install attachments only on the machines for which they were designed.

5-5-1-1_2

A wide range of optional attachments are available to increase the versatility of your machine. Only JCB approved attachments are recommended for use with your machine. Consult your JCB Distributor for the full list of approved attachments available.

This part of the manual includes general information on attachment operation and instructions for installation and removal of attachments.

Some attachments are supplied complete with instructions on safety, installing and removing, operation and maintenance. Read and fully understand the information before fitting, using and servicing the attachment. If there is anything you do not understand, ask your JCB Distributor.

Before using any attachment, read again *Working With The Machine* in the Operation section and consider how the attachment is going to affect operational safety. With the attachment fitted, there may be changes in the machine's centre of gravity or overall dimensions. This could have an effect on, for example, machine stability, the gradients on which it is safe to operate or the safe distance from power lines.

Practice using attachments off the job before working with them for the first time.

JCB attachments are designed and manufactured specifically to suit the machine's hydraulic system, mounting arrangements and safe load requirements. Attachments which are not designed for use with this machine may cause damage and create safety hazards for which JCB cannot be held responsible. In addition the machine's warranty and any other legislative compliance may be affected by the use of non JCB approved attachments.

If your machine needs the hydraulic system adapting to facilitate the use of auxiliary attachments, you must consult your distributor. Only suitably qualified personnel must reroute hydraulic hoses.

All optional attachments will have limits on their operation. i.e. lifting capacity, speeds, hydraulic flow rates, etc. Always check in the literature supplied with the attachment or in the Specification section of this manual. Some specification limits may also be displayed on the attachments Data/Rating Plate.

A CAUTION

Some attachments may contact parts of the machine when in the fully folded position. Take extra care to avoid damage to the machine.

3-4-1-4



Attachments for your Machine

Attachments for your Machine

A CAUTION

If you have an attachment which is not covered in the Operator Manual do not install it, use it or remove it until you have obtained, read and understood the pertinent information. Install attachments only on the machines for which they were designed.

5-5-1-1_2

An attachment helps to increase the productivity of your machine, for more information contact your JCB Dealer.

These attachments are designed to be used with the Quickhitch:

- Standard Shovel
- Fork Frame and Pallet Forks
- Muck Fork and Grab.

Do not operate an attachment until you have read and fully understand its operating instructions. Refer to the manufacturers manual for the attachment (if supplied).

The standard installation and removal procedures for the attachments are included in this section.

Important: Do not operate the attachment until the hydraulic oil is at its normal working temperature.



Connecting/Disconnecting Hydraulic Hoses

Connecting/Disconnecting Hydraulic Hoses

T4-004_2

Introduction

A WARNING

Fluid Under Pressure

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

INT-3-1-10_3

A WARNING

Hydraulic Pressure

Hydraulic fluid at system pressure can injure you. Before connecting or removing any hydraulic hose, residual hydraulic pressure trapped in the service hose line must be vented. Make sure the hose service line has been vented before connecting or removing hoses. Make sure the engine cannot be started while the hoses are open.

INT-3-1-11 2

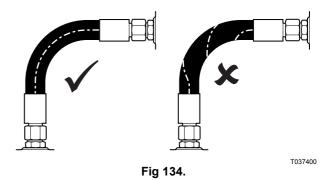
Some attachments are hydraulically powered. The following procedures show how to connect and disconnect the hydraulic hoses safely.

Connecting the Hydraulic Hoses

- 1 Make the machine safe. Refer to **Routine Maintenance**, **Prepare** the **Machine** for **Maintenance**.
- 2 Vent the hydraulic system. Refer to Routine Maintenance, Releasing the Hydraulic Pressure.
- If necessary, remove the blanking caps.
- 4 Check the hoses and adaptors for damage. Refer to Routine Maintenance, Checking for Damage.
- 5 Connect the hoses.

If the hoses have quick releases couplings, refer to **Quick Release Couplings**.

a Make sure that the hose is not twisted. Pressure applied to a twisted hose can cause the hose to fail or the connections to loosen.



- **b** Make sure that the hose does not touch hot parts. High ambient temperatures can cause the hose to
- c Make sure that the hose does not touch parts

which can rub or cause abrasion.

d Use the hose clamps (where possible) to support long hose runs and keep the hoses away from moving parts, etc.



Connecting/Disconnecting Hydraulic Hoses

Fig 135.

To allow for length changes when the hose is pressurised, do not clamp at the bend. The curve absorbs the change.

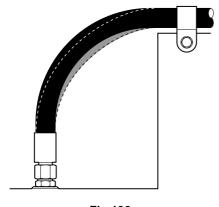


Fig 136.

- 6 Check for leaks.
 - a Start the engine.
 - **b** Operate the related control to increase the pressure in the hydraulic system.
 - **c** Stop the engine then remove the starter key.
 - **d** Check for indications of leakage at the hose connections. Correct, as necessary.

Disconnecting the Hydraulic Hoses

- 1 Make the machine safe. Refer to Routine Maintenance, Prepare the Machine for Maintenance.
- 2 Vent the hydraulic system. Refer to Routine Maintenance, Releasing the Hydraulic Pressure.
- 3 Disconnect the hoses.

T037420

T037410

If the hoses have quick releases couplings, then refer to *Quick Release Couplings*.

- 4 Check the hoses and adaptors for damage. Refer to Routine Maintenance, Checking for Damage.
- 5 If necessary, install the blanking caps
- 6 Check for leaks.
 - a Start the engine.
 - **b** Operate the related control to increase the pressure in the hydraulic system.
 - **c** Stop the engine then remove the starter key.
 - **d** Check for indications of leakage at the hose connections. Correct, as necessary.



Quick Release Couplings

A WARNING

The external surfaces of the couplings must be clean before connecting or disconnecting. Ingress of dirt will cause fluid leaks and difficulty in connecting or disconnecting. You could be killed or seriously injured by faulty Quick Release Couplings.

2-4-1-15

Flat face quick release couplings allow the operator to remove and install attachments swiftly and efficiently. Generally, your machine pipework will be fitted with a female coupling **A** and a male coupling **B**. The optional attachment hoses will also be fitted with a female coupling **A** and a male coupling **B**. ⇒ Fig 137. (186).

The quick release couplings should be trouble free and relatively easy to connect and disconnect, provided they are kept clean and used correctly. The recommendations listed below should always apply when using flat face quick release couplings.

Finally, please read the correct fitting and releasing procedures before you install or remove any optional attachment fitted with quick release couplings.

Essential Do's

- Before connecting or removing any hydraulic hose, residual hydraulic pressure trapped in the service hose line must be vented. Make sure the hose service line has been vented before connecting or removing hoses.
- Always wipe the two mating faces clean before connecting.
- Use caps and plugs when the couplings are disconnected.
- Always align the external locking ball (if used) with the notch in the locking sleeve and then pull the locking sleeve back fully to disconnect.
- If a coupling sticks, first check that pressure has been released. Ensure the locking ball and notch in the locking sleeve are aligned, pull back the sleeve and twist the couplings apart. Sticking is normally caused

Connecting/Disconnecting Hydraulic Hoses

- by dirt in the coupling or physical damage due to abuse.
- Connect and disconnect new couplings two or three times to work the PTFE seals. Sometimes a new coupling will stick if the seal has not been worked.
- When fitting couplings, only apply the spanner or grips to the hexagon and nowhere else.
- Avoid damage to the coupling faces. Burrs and scratches cause damage to the seals and cause leaks. They can also impede connection and disconnection of the couplings.
- Periodically lubricate the internal locking balls on the female half of the coupling with silicone grease.

Essential Don'ts

- Never attempt to reconnect using a damaged half coupling as this will destroy the seals in the mating half and necessitate replacement of both halves.
- Do not leave the coupling where it may be run over by a vehicle or otherwise crushed - this will distort the sleeve and prevent connection and disconnection.
- Never try to turn the sleeve when the coupling is disconnected since this will cause the locking ball to jam under the locking sleeve and damage the coupling.
- Never try to strip the coupling down, there are no user serviceable parts. If the coupling is damaged it should be replaced with a new one. See coupling guides for a reference.
- Never hit the centre poppet of the coupling to try and release locked in pressure. This can cause irreparable damage to the coupling and serious injury.
- When fitting couplings, never clamp on the sleeve of the female or nose of the male - this will cause distortion and/or damage.
- Never subject the couplings to external forces, especially side load. This can reduce the life of the coupling or cause failure.
- Never allow the torsional forces transmitted from hoses to unscrew/screw together couplings.
- Never use a coupling as a plug.
- Do not connect and disconnect with pressure in the line unless the coupling type is specifically designed to do so.

185 9811-3400-4 **185**



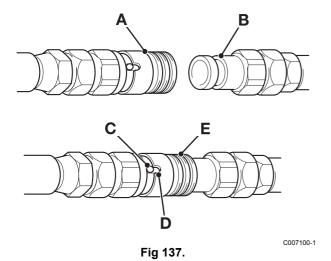
Connecting/Disconnecting Hydraulic Hoses

Connecting Quick Release Couplings

- 1 Remove any residual hydraulic pressure trapped in the service line hose.
- 2 Wipe the two faces of the male and female couplings and make sure they are clean.
- 3 Make sure that ball C in the female coupling is located in one of its slots.
- 4 Fit the male coupling into the female coupling.
- Where applicable, rotate sleeve E half a turn and make sure that the locking ball C does not align with the slot D.

Disconnecting Quick Release Couplings

- 1 Remove any residual hydraulic pressure trapped in the service line hose.
- Where applicable, align the slot **D** with ball **C**.
- 3 Pull back sleeve **E** to release the coupling.





Quickhitch Control

Introduction

A WARNING

If two people are doing this job make sure that the person working the controls is a competent operator. If the wrong control lever is moved, or if the controls are moved violently, the other person could be killed or injured.

B-2-1-8

A DANGER

Do not retract the locking pins when the loader arm is raised, the shovel could fall and kill or seriously injure someone. Retract the locking pins only after the shovel has been placed on the ground.

4-2-2-1 1

Note: For more information on the loader arm control lever, refer to **Operation, Control Levers**.

All machines are supplied as standard with one auxiliary hydraulic service, referred to as the first auxiliary service. There is the option to have a second auxiliary hydraulic service installed.

A Quickhitch isolator valve is fitted to all machines. This valve can be operated, either:

- Manually by the red power diverter lever A. (Turn the lever to the unlocked position). ⇒ Fig 138. (187).
- By an optional Quickhitch Isolator Switch, located in the cab. Refer to *Operation, Switches*.

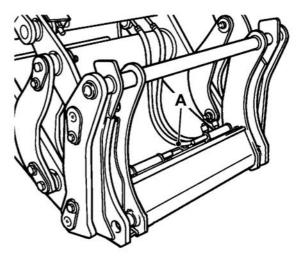


Fig 138.

S269020-3

The Quickhitch red locking-pins are operated hydraulically and are used to lock an attachment onto the Quickhitch system.

When the power diverter lever/Quickhitch isolator switch is operated at the same time as the auxiliary buttons/lever, hydraulic pressure is diverted to the Quickhitch red locking-pins.

- When the red locking-pins are fully out, they are disengaged.
- When the red locking-pins are partially out, they are part-engaged.
- When the red locking-pins are fully in, they are fullyengaged.



Disengage the Attachments

In this procedure to disengage the attachment, the Quickhitch isolator switch is used to divert the hydraulic power. If your machine has a power diverter lever substitute this in the procedure for the Quickhitch Isolator Switch

- Park the machine on hard, level ground, then lower the attachment.
- 2 Apply the park brake and put the transmission in neutral.

Note: If necessary, disconnect the hydraulic hoses. ⇒ Quick Release Couplings (185).

- 3 Push and hold the Quickhitch isolator switch. (If fitted).
- 4 Disengage the locking-pins A:

Servo-controls lever with an auxiliary lever: Push the lever **B** until the locking-pins are retracted.

Servo-controls lever with an auxiliary button: Push the button **C** until the locking-pins are retracted.

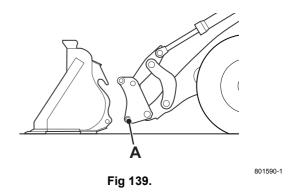
Multi-controls lever: Push the lever ${\bf Z}$ until the locking-pins are retracted.

- 5 Release the Quickhitch isolator switch.
- 6 Disengage the attachment:

Servo-controls lever: Move the lever **D** to the right and tilt the Quickhitch forward and lower the loader arms.

Multi-controls lever: Move the lever **X** forward and tilt the Quickhitch forward and lower the loader arms.

7 When the pivot shaft E has disengaged from the hooks F, reverse the machine clear.



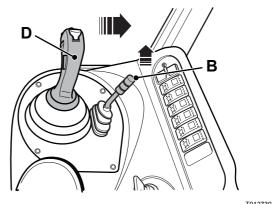


Fig 140. Servo-controls lever with auxiliary lever

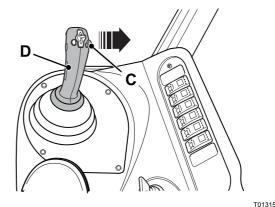


Fig 141. Servo-controls lever with auxiliary button



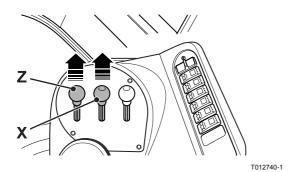


Fig 142. Multi-controls lever

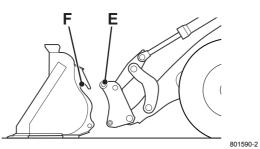


Fig 143.

Engage the Attachments

In this procedure to engage the attachment, the Quickhitch isolator switch is used to divert the hydraulic power. If your machine has a power diverter lever substitute this in the procedure for the Quickhitch Isolator Switch.

- **1** Align the machine square with the attachment.
- 2 Lower the loader arms to move pivot shaft E below the level of the hooks F on the attachment.
- 3 Drive the machine slowly forward, stop when the pivot shaft E just touches the attachment.
- 4 Apply the park brake and put the transmission in neutral.
- 5 Lift the loader arms and engage the pivot shaft into the hooks. Stop the movement as soon as the pivot shaft is engaged.
- 6 Engage the attachment:

Servo-controls lever: Move the lever ${\bf D}$ to the left and tilt the Quickhitch fully back.

Multi-controls lever: Move the lever **X** to the rear and tilt the Quickhitch fully back.

- 7 Push and hold the Quickhitch isolator switch. (If fitted).
- 8 Engage the locking-pins:

Servo-controls lever with an auxiliary lever: Pull the lever **B** until the locking-pins **A** are engaged.

Servo-controls lever with an auxiliary button: Push the button **C** until the locking-pins are engaged.

Multi-controls lever: Pull the lever **Z** until the lockingpins **A** are engaged.

- **9** Make sure the locking-pins in the base of the Quickhitch are fully engaged.
- 10 Release the Quickhitch isolator switch.
- 11 if necessary, connect the hydraulic hoses. ⇒ Quick Release Couplings (185).

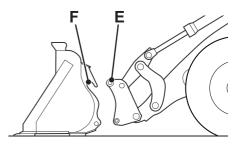


Fig 144.

801590-2

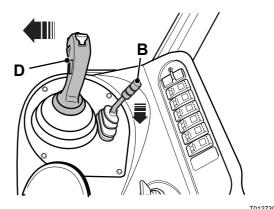


Fig 145. Servo-controls lever with auxiliary lever

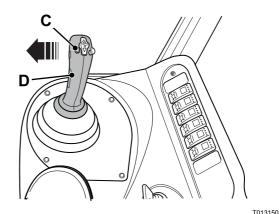


Fig 146. Servo-controls lever with auxiliary button



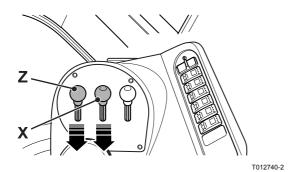


Fig 147. Multi-controls lever

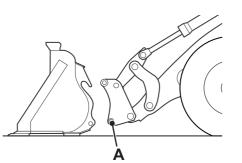


Fig 148.



Work Platforms

Work Platforms

P5-4006_3

A DANGER

Forks/Working Platform

Using the forks alone as a working platform is hazardous; you can fall off and be killed or injured. Never use the forks as a working platform.

5-1-5-3

The use of work platforms with this machine is subject to legislation which varies from territory to territory. It is the responsibility of the owner/operator and supplier of the work platform to ensure compliance with the relevant legislation in the relevant territory. In the case of uncertainty, guidance should be sought from the relevant local or government authority.

JCB supply integrated work platforms solely for use in Europe which comply with the requirements of European Directive 2006/42/EC. Contact your dealer for further details. Health and safety legislation also varies from territory to territory. Customers should check the latest health and safety legislation for the territory in which the work platform is to be used prior to operation.



Specifications

Static Dimensions

Turning Circles

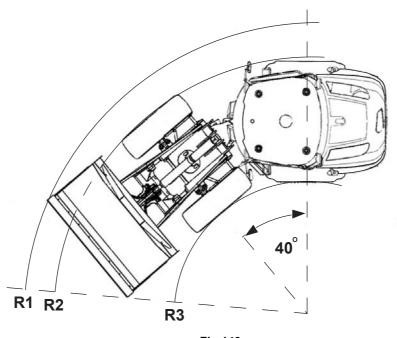


Fig 149.

T034500

Note: Your machine may look different from the model shown.

Machine	Tyre	Shovel	R1 (Outer Shovel Radius)	R2 (Outer Tyre Radius)	R3 (Inner Tyre Radius)
		m³	mm (ft-in)	mm (ft-in)	mm (ft-in)
426	20.5R25 XHA L3	1.9	5985 (19-7)	5422 (17-9)	2825 (9-3)
436	20.5R25 XHA L3	2.4	6196 (20-4)	5422 (17-9)	2825 (9-3)
456	23.5R25 XHA L3	3.5	7121 (23-4)	5884 (19-3)	3182 (10-5)

193 9811-3400-4 **193**

426

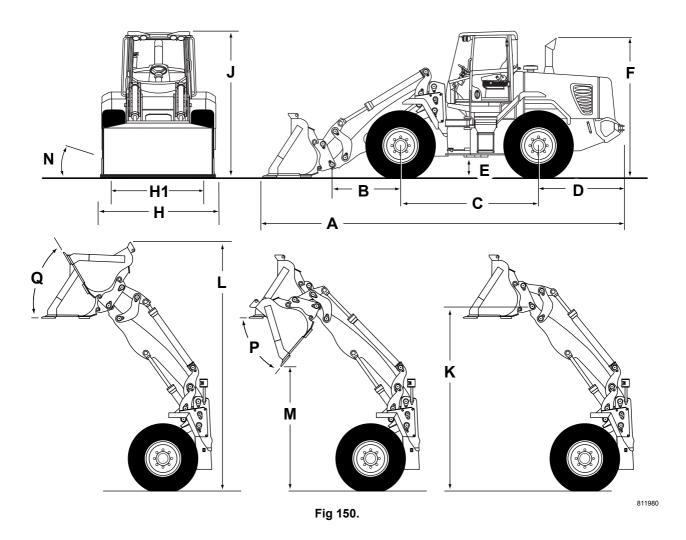




Table 25.

		HT	ZX
		mm (ft-in)	mm (ft-in)
Α	Overall length (includes standard shovel)	6831 (22-5)	6831 (22-5)
В	Axle to pivot pin	1096 (3-7)	1096 (3-7)
С	Wheelbase	3000 (9-10)	3000 (9-10)
D	Axle to counterweight face	1816 (5-11)	1816 (5-11)
E	Minimum ground clearance	442 (1-5)	442 (1-5)
F	Height over exhaust	3192 (10-6)	3192 (10-6)
G	Width over cab	1400 (4-7)	1400 (4-7)
Н	Width over tyres	2482 (9-4)	2482 (9-4)
H1	Wheel track	1955 (6-5)	1955 (6-5)
J	Height over cab	3335 (10-11)	3335 (10-11)
K	Pivot pin height (maximum)	3906 (12-10)	3906 (12-10)
L	Maximum operating height	5095 (16-9)	5095 (16-9)
М	Shovel dump height	2848 (9-4)	2841 (9-4)

		Degrees	Degrees
N	Axle oscillation	10.5	10.5
Р	Shovel dump angle at full height	49	45
Q	Shovel crowd angle at full height	58	52
	Articulation angle	40	40

	kg (lb)	kg (lb)
Unladen weight	12700 (27999)	12850 (28321)

Note: Dimensions based on a machine equipped with the standard 1.9m³ shovel and 20.5R25 tyres.

436

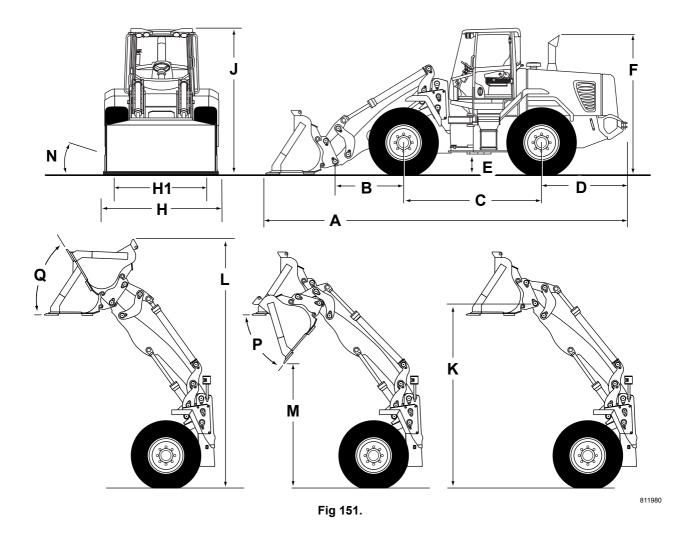




Table 26.

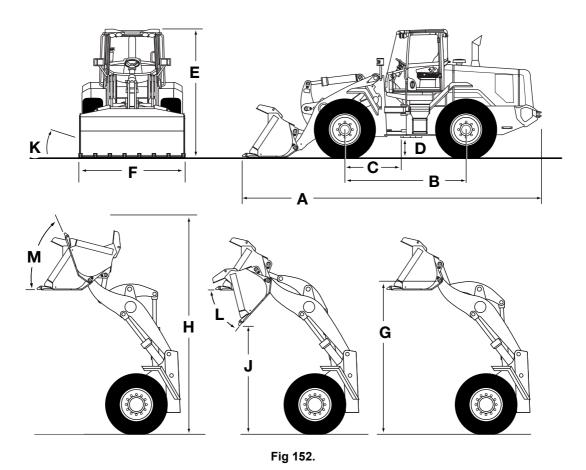
		НТ	ZX
		mm (ft-in)	mm (ft-in)
Α	Overall length (includes standard shovel)	6926 (22-9)	7169 (23-6)
В	Axle to pivot pin	1143 (3-9)	1143 (3-9)
С	Wheelbase	3000 (9-10)	3000 (9-10)
D	Axle to counterweight face	1816 (5-11)	1816 (5-11)
Е	Minimum ground clearance	459 (1-6)	459 (1-6)
F	Height over exhaust	3192 (10-6)	3192 (10-6)
G	Width over cab	1400 (4-7)	1400 (4-7)
Н	Width over tyres	2597 (8-6)	2597 (8-6)
H1	Wheel track	2070 (6-9)	2070 (6-9)
J	Height over cab	3335 (10-11)	3335 (10-11)
K	Pivot pin height (maximum)	3996 (13-1)	3996 (13-1)
L	Maximum operating height	5305 (17-5)	5305 (17-5)
М	Shovel dump height	2974 (9-8)	2965 (9-9)

		Degrees	Degrees
N	Axle oscillation	10.5	10.5
Р	Shovel dump angle at full height	50	47
Q	Shovel crowd angle at full height	58	58
	Articulation angle	40	40

		kg (lb)	kg (lb)
Ī	Unladen weight	14503 (31974)	14922 (32900)

Note: Dimensions based on a machine equipped with the standard 2.4m³ shovel and 20.5R25 tyres.

456



795100



Table 27.

		HT	ZX
		mm (ft-in)	mm (ft-in)
Α	Overall length (includes standard shovel)	8520 (27-11)	8520 (27-11)
В	Axle to pivot pin	1713 (5-7)	2182 (7-2)
С	Wheelbase	3300 (10-10)	3300 (10-10)
D	Axle to counterweight face	1970 (6-5)	1988 (6-6)
E	Minimum ground clearance	470 (1-6)	470 (1-6)
F	Height over exhaust	3260 (10-8)	3260 (10-8)
G	Width over cab	1400 (4-7)	1400 (4-7)
Н	Width over tyres	2702 (8-10)	2702 (8-10)
H1	Wheel track	2100 (6-10)	2100 (6-10)
J	Height over cab	3370 (11-1)	3370 (11-1)
K	Pivot pin height (maximum)	4304 (14-1)	4677 (15-4)
L	Maximum operating height	5768 (18-9)	6140 (20-2)
M	Shovel dump height	3027 (9-11)	3416 (11-2)

		Degrees	Degrees
N	Axle oscillation	12.5	12.5
Р	Shovel dump angle at full height	45	45
Q	Shovel crowd angle at full height	57	53
	Articulation angle	40	40

	kg (lb)	kg (lb)
Unladen weight	20371 (44910)	19281 (42507)

Note: Dimensions based on a machine equipped with the standard 3.5m³ shovel and 23.5R25 L3 tyres.



Working Capacity

Introduction

All rated capacities are based on the criteria of the machine being level and on a firm supporting ground.

When the machine is operated in conditions that deviate from these criteria (for example on soft or uneven ground, on a slope or when subject to side loads), these conditions shall be taken into account by the operator.

Note: These are not tables for the safe working loads for object lifting.

426

Table 28. General Purpose Shovel (with Reversible Toe-Plate)

			Direct Mount	•	Quickhitch Mount		
	Shovel Shovel Full Turn Tip Size Weight Load ⁽²⁾		Payload ⁽³⁾	Shovel Weight	Full Turn Tip Load ⁽²⁾	Payload ⁽³⁾	
Model ⁽¹⁾	m³	kg (lb)	kg (lb)	kg (lb)	kg (lb)	kg (lb)	kg (lb)
HT	1.9	810 (1785)	8396 (18505)	4198 (9252)	800 (1763)	7650 (16860)	3825 (8430)
	2.1	850 (1873)	8271 (18229)	4136 (9116)	850 (1873)	7537 (16612)	3768 (8305)
ZX	1.9	925 (2039)	8370 (18447)	4185 (9224)	800 (1763)	7748 (17077)	3874 (8538)
	2.1	1040 (2292)	8273 (18234)	4136 (9116)	850 (1873)	7659 (16880)	3829 (8439)

- (1) Machines fitted with 20.5 tyres.
- (2) For optional bolt-on counterweight add 598kg (1318lb).
- (3) Payload is 50% of full turn tip load.

Note: Shovels shown have reversible toe-plates. If shovels with teeth are fitted, the sizes are reduced to 1.8 and 2.0.

Table 29. General Purpose Shovel (with Teeth)

			Direct Mount			Quickhitch Mount		
	Shovel Size	Shovel Weight	Full Turn Tip Load ⁽²⁾	Payload ⁽³⁾	Shovel Weight	Full Turn Tip Load ⁽²⁾	Payload ⁽³⁾	
Model ⁽¹⁾	m³	kg (lb)	kg (lb)	kg (lb)	kg (lb)	kg (lb)	kg (lb)	
HT	1.8	810 (1785)	8396 (18505)	4198 (9252)	800 (1763)	7650 (16860)	3825 (8430)	
	2.0	850 (1873)	8271 (18229)	4136 (9116)	850 (1873)	7537 (16612)	3768 (8305)	
ZX	1.8	925 (2039)	8370 (18447)	4185 (9224)	800 (1763)	7748 (17077)	3874 (8538)	
	2.0	1040 (2292)	8273 (18234)	4136 (9116)	850 (1873)	7659 (16880)	3829 (8439)	

- (1) Machines fitted with 20.5 tyres.
- (2) For optional bolt-on counterweight add 598kg (1318lb).
- (3) Payload is 50% of full turn tip load.

Table 30. Pallet Forks (Quickhitch Mount)

	Weight	Full Turn Tip Load	Payload ⁽¹⁾
Model	kg (lb)	kg (lb)	kg (lb)
НТ	440 (970)	6492 (14308)	5000 (11020)
ZX	440 (970)	6575 (14491)	5000 (11020)

(1) The payload is 80% of full turn tip load at 500mm (19.6in.) load centre.

436

Table 31. General Purpose Shovel (with Reversible Toe-Plate)

			Direct Mount	ect Mount		Quickhitch Mount		
	Shovel Size	Shovel Weight	Full Turn Tip Load ⁽²⁾	Payload ⁽³⁾	Shovel Weight	Full Turn Tip Load ⁽²⁾	Payload ⁽³⁾	
Model ⁽¹⁾	m³	kg (lb)	kg (lb)	kg (lb)	kg (lb)	kg (lb)	kg (lb)	
HT	2.4	1163 (2563)	9578 (21110)	4789 (10555)	1136 (2504)	9009 (19856)	4504 (9927)	
	2.7	1236 (2724)	9436 (20797)	4718 (10398)	1211 (2669)	8870 (19549)	4435 (9775)	
ZX	2.4	1262 (2781)	9185 (20244)	4592 (10121)	1136 (2504)	8694(19162)	4347 (9581)	
	2.7	1329 (2929)	9055 (19957)	4527 (9978)	1211 (2669)	8643 (19049)	4321 (9523)	

- (1) Machines fitted with 20.5 tyres.
- (2) For optional bolt-on counterweight add 570kg (1256lb).
- (3) Payload is 50% of full turn tip load.

Note: Shovels shown have reversible toe-plates. If shovels with teeth are fitted, the sizes are reduced to 2.3 and 2.6.

Table 32. General Purpose Shovel (with Teeth)

			Direct Mount		Quickhitch Mo	ount	
	Shovel Size	Shovel Weight	Full Turn Tip Load ⁽²⁾	Payload ⁽³⁾	Shovel Weight	Full Turn Tip Load ⁽²⁾	Payload ⁽³⁾
Model ⁽¹⁾	m³	kg (lb)	kg (lb)	kg (lb)	kg (lb)	kg (lb)	kg (lb)
HT	2.3	1151 (2537)	9578 (21110)	4789 (10555)	1124 (2477)	9009 (19856)	4504 (9927)
	2.6	1224 (2698)	9436 (20797)	4718 (10398)	1199 (2643)	8870 (19549)	4435 (9775)
ZX	2.3	1250 (2755)	9199 (20275)	4599 (10136)	1124 (2477)	8778 (19347)	4389 (9673)
	2.6	1317 (2903)	9069 (19988)	4535 (9995)	1199 (2643)	8656 (19078)	4328 (9539)

- Machines fitted with 20.5 tyres.
 For optional bolt-on counterweight add 570kg (1256lb).
 Payload is 50% of full turn tip load.

Table 33. Pallet Forks (Quickhitch Mount)

	Weight	Full Turn Tip Load	Payload ⁽¹⁾
Model	kg (lb)	kg (lb)	kg (lb)
HT	482 (1062)	7267 (16016)	5000 (11020)
ZX	482 (1062)	7013 (15457)	5000 (11020)

(1) The payload is 80% of full turn tip load at 500mm (19.6in.) load centre.



456

Table 34.

Shovel Type	Shovel Size	Shovel Weight	Full Turn Tip Load
	Cubic Metre	kg (lb)	kg (lb)
General purpose	3.0	1644 (3624)	11600 (25573)
General purpose	3.3	1717 (3785)	11527 (25412)
General purpose	3.5	1760 (3880)	11484 (25318)
Penetration (with tipped teeth)	3.1	1652 (3642)	11592 (25556)



Maximum Travel Speeds

Maximum Travel Speeds

426				
	Forward	Reverse		
	kph (mph)	kph (mph)		
1st gear	7.4 (4.6)	7.4 (4.6)		
2nd gear	14.5 (9.0)	14.5 (9.0)		
3rd gear	25.2 (15.6)	25.2 (15.6)		
4th gear	38.0 (23.6)			

434\$				
	Forward	Reverse		
	kph (mph)	kph (mph)		
1st gear	5.9 (5.1)	5.9 (5.1)		
2nd gear	9.0 (5.6)	9.0 (5.6)		
3rd gear	14.5 (9.0)	14.5 (9.0)		
4th gear	21.6 (13.4)			
5th gear	32.8 (20.4)			
6th gear	40.0 (24.9)			

436				
	Forward	Reverse		
	kph (mph)	kph (mph)		
1st gear	8.2 (3.7)	8.2 (3.7)		
2nd gear	14.5 (9.0)	14.5 (9.0)		
3rd gear	27.0 (16.8)	27.0 (16.8)		
4th gear	38.0 (23.6)			

456			
	Forward	Reverse	
	kph (mph)	kph (mph)	
1st gear	7.0 (4.3)	7.0 (4.3)	
2nd gear	12.3 (7.7)	12.3 (7.7)	
3rd gear	24.4 (15.3)	24.4 (15.3)	
4th gear	37.4 (23.4)		

Machines with ZF Axles

426				
Forward Reverse				
	kph (mph)	kph (mph)		
1st gear	7.7 (4.8)	7.9 (4.9)		
2nd gear	14.5 (9.0)	16.0 (9.9)		
3rd gear	27.0 (16.8)	28.8 (17.9)		
4th gear	40.0 (24.9)			

434S				
	Forward	Reverse		
	kph (mph)	kph (mph)		
1st gear	5.9 (5.1)	5.9 (5.1)		
2nd gear	9.0 (5.6)	9.0 (5.6)		
3rd gear	14.5 (9.0)	14.5 (9.0)		
4th gear	21.6 (13.4)			
5th gear	32.8 (20.4)			
6th gear	40.0 (24.9)			

436			
	Forward	Reverse	
	kph (mph)	kph (mph)	
1st gear	7.4 (4.6)	7.9 (4.9)	
2nd gear	13.8 (8.6)	14.4 (8.9)	
3rd gear	25.9 (16.1)	26.3 (16.3)	
4th gear	38.0 (23.6)		



Tyre Sizes and Pressures

Tyre Sizes and Pressures

Introduction

The maximum pressure marked on the tyre may be different from the pressure shown below. Inflate the tyres to the pressures shown below. These pressure are agreed with the tyre manufacturer/s in accordance with the European Tyre and Rim Organisation (ETRTO) standards to satisfy machine stability performance.

Note: If the tyres fitted to your machine are not shown, then contact your JCB Dealer for advice, Do not guess the tyre pressures.

Always check the tyre pressures with the machine in an unladen condition.

In special conditions (for example on sand) the air pressure in the tyre may be reduced, refer to your JCB Dealer or tyre manufacturer.

Specifications

The pressures are based on a standard specification machine with:

- A maximum towing speed of 25mph (40kph), a different countries legislation can specify a lower speed.
- An average loading cycle speed of 6mph (10kph).

Refer to the tyre manufacturer for:

- The pressures for non-standard machine specifications or work applications.
- Earthmover tyres, the maximum distance the machine can move in one hour without overheating the tyre.
- Pressures with non-factory installed tyres.

		Tyre Pressure - Bar (psi)		Rear Tyre Pressure When Towing - Bar (psi)	
Machine	Tyre	Front	Rear	Recovery Hitch	
426	20.5-25	2.75 (39.9)	2.5 (36.3)	2.5 (36.3)	
	20.5R25	2.75 (39.9)	2 (29.0)	2 (29.0)	
	550/65R25	3.75 (54.4)	2.25 (32.6)	2.25 (32.6)	
	620/75R26	2.4 (34.8)	2.4 (34.8)	2.4 (34.8)	
434S	750/65R26	2.7 (39.2)	1.8 (26.1)	1.8 (26.1)	
	620/75R26	2.6 (37.7)	2.4 (34.8)	2.4 (34.8)	
436	20.5-25	3.25 (47.1)	2.5 (36.3)	2.5 (36.3)	
	20.5R25	3.25 (47.1)	2 (29.0)	2 (29.0)	
	550/65R25	3.75 (54.4)	2.4 (34.8)	2.4 (34.8)	
	620/75R26	3.2 (46.4)	2.5 (36.3)	2.5 (36.3)	
456	23.5-25	3.5 (50.8)	2 (29.0)	2 (29.0)	
	23.5R25	3.5 (50.8)	2 (29.0)	2 (29.0)	
	650/65R25	3.75 (54.4)	2.4 (34.8)	2.4 (34.8)	
	750/65R25	3.5 (50.8)	2 (29.0)	2 (29.0)	



Noise Data

Noise Data

Introduction

T5-008 2

To assist in compliance with European Directives 2000/14/ EC and 2005/88/EC, the noise data values for this type of machine have been provided on the following page(s) and may be used for the assessment of risks to exposure from noise.

The noise data values shown only apply to CE marked machines.

For information relating to this machine when used with other JCB approved attachments, please refer to the literature accompanying the attachments.

Definition of terms:

- **LpA** A-weighted sound pressure level measured at the operator's station.⁽¹⁾
- **LwA** Equivalent A-weighted sound power level emitted by the machine.⁽²⁾
- Determined in accordance with the test method defined in ISO 6396 and the dynamic test conditions defined on 2000/14/EC.
- (2) Guaranteed equivalent sound power (external noise) determined in accordance with the dynamic test conditions defined in 2000/14/EC.

All Machines

The values shown for LpA do not apply to the canopy cabs, ear protection must be worn.

Table 35.

	1	T	
Model	Engine Net Power	LpA	LwA
426	113 kW	73	105
436	123 kW	73	105
456	154 kW	72	109



Vibration Data

Introduction

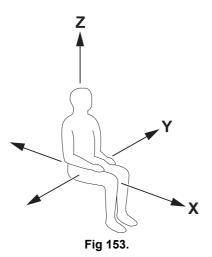
T5-00°

To assist in compliance with European Directive 2002/44/ EC, duty specific vibration emission values for this machine type have been provided on the following page(s) and may be used for the assessment of risks to exposure from vibration.

Unless otherwise indicated for a specific operating condition, vibration values are determined with the machine equipped with standard attachments (i.e. bucket, shovel, fork, etc.) for the respective operating condition.

Vibration values are determined from measurements in three perpendicular axes (X, Y and Z). ⇒ Fig 153. (207). The highest weighted (rms) value is used to specify the vibration emission.

Note: The axis upon which the highest weighted (rms) value occurs is stated on the vibration chart for each of the Machine Operating Duties, see **Dominant Axis (X, Y or Z)**.



Minimising Exposure to Vibration

Exposure to vibration can be minimised through:

- Selection of the correct size and capacity of machine, equipment and attachments for a particular application.
- Use of a machine equipped with an appropriate seat, keeping the seat maintained and adjusted.
- Checks to ensure that the machine is properly maintained, reporting and correcting any faults.
- Steering, braking, accelerating, shifting gears, moving the attachments and load smoothly.
- Adjusting the machine speed and travel path to minimize the vibration level.
- Keeping the terrain on worksites where the machine is working and travelling in good condition, removing any large rocks or obstacles and filling in any ditches and holes.
- Choosing routes that avoid rough surfaces and, if this is not possible, drive more slowly to avoid bumping and jolting.
- Travelling over longer distances at an adjusted (medium) speed.
- Avoiding bad postures, i.e. slumping in your seat, constantly leaning forward or sideways or driving with your back twisted.

Specifications

Operator Seat Specification

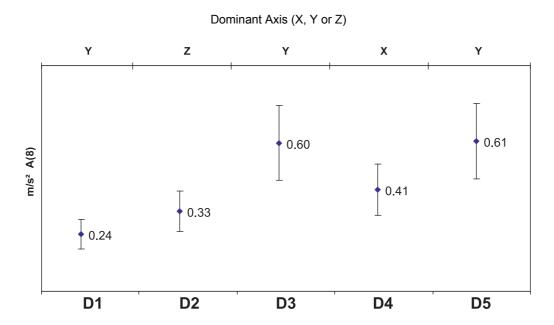
T5-003

This machine has an operator seat which meets the criteria of EN ISO 7096:2000 (representing vertical vibration input under severe but typical operating conditions). The input spectral class which relates to this machine and seat combination is:

EM3 - Wheel Loader (Operating capacity > 4500 kg).

426, 436

Table 36. Whole-Body Vibration Emission Under Representative Operating Conditions (According to the intended use)



Machine Operating Duties

810560-1

Whole-body vibration emission determined in accordance with ISO 2631 - 1: 1997 for this machine type is 0.4 m/s² normalised to an 8 hour reference period [A(8)] and based upon a test cycle "defined in SAE J1166".

Hand-arm vibration determined in accordance with dynamic test conditions defined in ISO 5349-2:2001 does not exceed 2.5 m/s².

Note: Error bars are due to variations in vibration emissions due to measurement uncertainty (50% in accordance with EN 12096: 1997).

Machine Operating Duties

D1 Low Idle

D2 Roading (Tarmac)

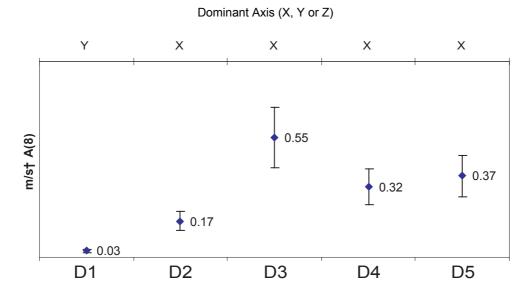
D3 Roading (Rough Terrain)

D4 Loader Work (Soil)

D5 Loader Work (Stone)

456

Table 37. Whole-Body Vibration Emission Under Representative Operating Conditions (According to the intended use)



T001260

Machine Operating Duties

Whole-body vibration emission determined in accordance with ISO 2631 - 1: 1997 for this machine type is $0.32~\text{m/s}^2$ normalised to an 8 hour reference period [A(8)] and based upon a test cycle "defined in SAE J1166".

Hand-arm vibration determined in accordance with dynamic test conditions defined in ISO 5349-2:2001 does not exceed 2.5 m/s².

Note: Error bars are due to variations in vibration emissions due to measurement uncertainty (50% in accordance with EN 12096: 1997).

Machine Operating Duties

D1 Low Idle

D2 Roading (Tarmac)

D3 Roading (Rough Terrain)

D4 Loader Work (Soil)

D5 Loader Work (Stone)



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Machine Service Record Sheet

Warranty Information

Machine Service Record Sheet

	16-005
Installation Checklist	3000 Hrs./18 Month
Date:	Date:
	Hour reading:
1st 100 Hrs./2 Weeks	3500 Hrs./21 Month
Date:	Date:
Hour reading:	Hour reading:
Troubles to the second	Troui rodding.
500 Hrs./3 Month	4000 Hrs./24 Month
	Annual insurance
Date:	Date:
Hour reading:	Hour reading:
<u> </u>	
1000 Hrs./6 Month	4500 Hrs./27 Month
Data	Deter
Date:	Date:
Hour reading:	Hour reading:
1500 Hrs./9 Month	5000 Hrs./30 Month
Date:	Date:
Hour reading:	Hour reading:
•	
2000 Hrs./12 Month	5500 Hrs./33 Month
Annual insurance	
5.4	
Date:	Date:
Hour reading:	Hour reading:
2500 Hrs./15 Month	6000 Hrs./36 Month
2000 1.103 10 1001111	Annual insurance
Date:	Date:
Hour reading:	Hour reading:



Warranty Information

Machine Service Record Sheet

<u></u>	, <u> </u>
6500 Hrs./39 Month	9500 Hrs./57 Month
Date:	Date:
Hour reading:	Hour reading:
7000 Hrs./42 Month	10000 Hrs./60 Month
7000 THS:/42 WORLD	
	Annual insurance
Date:	Date:
Hour reading:	Hour reading:
	_
7500 Hrs./45 Month	
Date:	
Hour reading:	
The state of the s	
8000 Hrs./48 Month	1
Annual insurance	
Aimai insurance	
Date:	
Hour reading:	
·	1
8500 Hrs./51 Month	
Date:	
Hour reading:	
	J
9000 Hrs./54 Month	
Data	
Date:	
Hour reading:	





Registration Information

Registration Information

Customer Copy	Dealer Copy
Dealer	Dealer
JCB Model	JCB Model
P.I.N./Machine Serial Number	P.I.N./Machine Serial Number
V.I.N.	V.I.N.
Vehicle Registration Number	Vehicle Registration Number
Engine Serial Number	Engine Serial Number
Registration Date	Registration Date
Installing Engineer	Installing Engineer
	Customer's Name
Dealer Copy (U.K. and Eire only) - Do not send back	
to JCB Service. A copy of the registration details to be sent direct to:	Address
The Equipment Register Ltd. (T.E.R.)	
Bath and West Buildings	P.D.I. Date
Lower Bristol Road	
Bath, BA2 3EG	Owner's Plant Reference No.
Tel: 01225 464599 (24 Hour)	
Fax: 01225 317698	Alpha Dot Security System Yes/No
Customer Copy - Do not remove this portion from the Operator Manual.	Please send details of: 'JCB Assetcare Machinery Protection Plan' Yes/No





Registration Information

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