



OPERATOR'S MANUAL



LOADALL (ROUGH TERRAIN VARIABLE REACH TRUCK)
506-36, 507-42, 509-42, 510-42, 510-56, 512-56, 514-56

EN - 9831/0067 ISSUE 9 - 04/2022

THIS MANUAL SHOULD ALWAYS STAY WITH THE MACHINE



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

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Foreword

The Operator's Manual



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

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

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

California Proposition 65

▲ WARNING Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

Machine Delivery and Installation

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 (included in this manual) has not yet been completed with you.

Your local JCB Dealer is



Notes:

A series of 12 horizontal lines for taking notes, starting below the 'Notes:' label and extending across the width of the page.



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Acronyms Glossary

CCV	Crankcase Ventilation
DEF	Diesel Exhaust Fluid
ECU	Electronic Control Unit
EGR	Exhaust Gas Recirculation
ESOS	Engine Shut-Off Solenoid
FEAD	Front End Accessory Drive
FOPS	Falling Object Protective Structure
HVAC	Heating Ventilation Air Conditioning
ISO	International Organization for Standardization
LCD	Liquid Crystal Display
LLMI	Longitudinal Load Moment Indicator
LSD	Limited Slip Differential
MAF	Mass Air Flow
MIL	Malfunction Indicator Lamp
NOx	Nitrogen Oxide
PIN	Product Identification Number
RAS	Rear Axle Stabilization
ROPS	Roll-Over Protective Structure
RPM	Revolutions Per Minute
SCR	Selective Catalytic Reduction
SRS	Smooth Ride System
SWL	Safe Working Load

Introduction

About this Manual

Model and Serial Number

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

Model	From:	To:
506-36		
507-42		
509-42		
510-42		
510-56		
512-56		
514-56		

Using the Manual

The quick start guide (if supplied) with the machine does not replace the operator's manual. You must read all the disclaimers and safety instructions in the operator's manual before initially operating the machine.

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

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

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

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

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

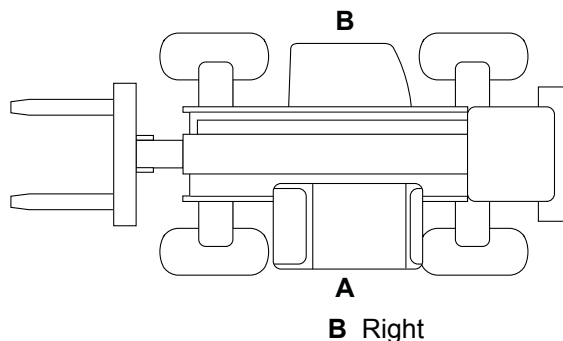
The manufacturer's policy is one of continuous improvement. The right to change the specification of the machine without notice is reserved. No responsibility will be accepted for discrepancies which may occur between specifications of the machine and the descriptions contained in this manual.

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

Left-Hand Side, Right-Hand Side

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

Figure 1.



A Left

B Right

Cab/Canopy

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

Cross References

In this manual, cross references are made by presenting the subject title in blue (electronic copy only). The number of the page upon which the subject begins is indicated within the brackets. For example: [Refer to: Cross References \(Page 2\)](#).

Safety

Safety - Yours and Others

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

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

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

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

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

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

Remember:

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

Safety Warnings

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

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

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

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

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

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

Figure 2. The safety alert system symbol



General Safety

Training

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's manual instructs you on the machine, its controls and its safe operation; it is not a training manual. Ensure that you receive the correct training before operating any machinery. Failing to do so will result in incorrect operation of the machine and you will be putting yourself and others at risk. In some markets, and for work on certain jobsites, you may be required to have been trained and assessed in accordance with an operator competence scheme. Make sure that you and your machine comply with relevant local laws and jobsite requirements – it is your responsibility.

Clothing

You can be injured if you do not wear the correct clothing. Loose clothing can get caught in the machinery. Keep cuffs fastened. Do not wear a necktie or scarf. Keep long hair restrained. Remove rings, watches and personal jewelry.

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.

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.

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.

Cell Phones

Switch off your cell 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 cell phone when refueling the machine.

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.

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.

Raised Machine

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

Lightning

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

Machine Modifications

This machine is manufactured in compliance with prevailing legislative requirements. It must not be altered in any way which could affect or invalidate its compliance. For advice consult your JCB dealer.

Clothing and Personal Protective Equipment (PPE)

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.

[illegible]

About the Product

Introduction

General

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

Name and Address of the Manufacturer

JCB Excavators Limited, Lakeside Works, Rocester, Uttoxeter, United Kingdom, ST145JP.

Product Compliance

Your JCB product was designed to comply with the laws and regulations applicable at the time of its manufacture for the market in which it was first sold. In many markets, laws and regulations exist that require the owner to maintain the product at a level of compliance relevant to the product when first produced. Even in the absence of defined requirements for the product owner, JCB recommend that the product compliance be maintained to ensure safety of the operator and exposed persons and to ensure the correct environmental performance. Your product must not be altered in any way which could affect or invalidate any of these requirements. For advice consult your JCB dealer.

For its compliance as a new product, your JCB and some of its components may bear approval numbers and markings, and may have been supplied with a Declaration/Certificate of Conformity. These markings and documents are relevant only for the country/region in which the product was first sold to the extent that the laws and regulations required them.

Re-sales and import/export of products across territories with different laws and regulations can cause new requirements to become relevant for which the product was not originally designed or specified. In some cases, pre owned products irrespective of their age are considered new for the purposes of compliance and may be required to meet the latest requirements which could present an insurmountable barrier to their sale/use.

Despite the presence of any compliance related markings on the product and components, you should not assume that compliance in a new market will be possible. In many cases it is the person responsible for import of a pre-owned product into a market that becomes responsible for compliance and who is also considered the manufacturer.

JCB may be unable to support any product compliance related enquiry for a product which has been moved out of the legislative country/region where it was first sold, and in particular where a product specification change or additional certification would have been required in order for the product to be in compliance.

Description

General

The JCB Loadall is a self propelled, seated operator, wheeled machine for operation on unimproved natural terrain and disturbed terrain.

A main structural support is designed to carry an extending boom with a carriage mounted on the front to which forks or an approved attachment can be fitted.

When used normally the machine lifts and places loads by extending/retracting, raising/lowering the boom.

Intended Use

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

Make sure you follow the instructions outlined in the operator's manual of the mounted or trailed machinery or trailer. Do not operate the combination tractor-machine or tractor-trailer unless all instructions have been followed.

Log Moving/Object Handling

Do not use the machine to move or handle logs unless sufficient log protection is installed. You could cause serious injury to yourself and damage to the machine. For more information, contact your JCB dealer.

Optional Equipment and Attachments

A wide range of optional attachments are available to increase the versatility of your machine. Only the JCB approved attachments are recommended for use with your machine. Contact your JCB dealer for the full list of approved attachments available.

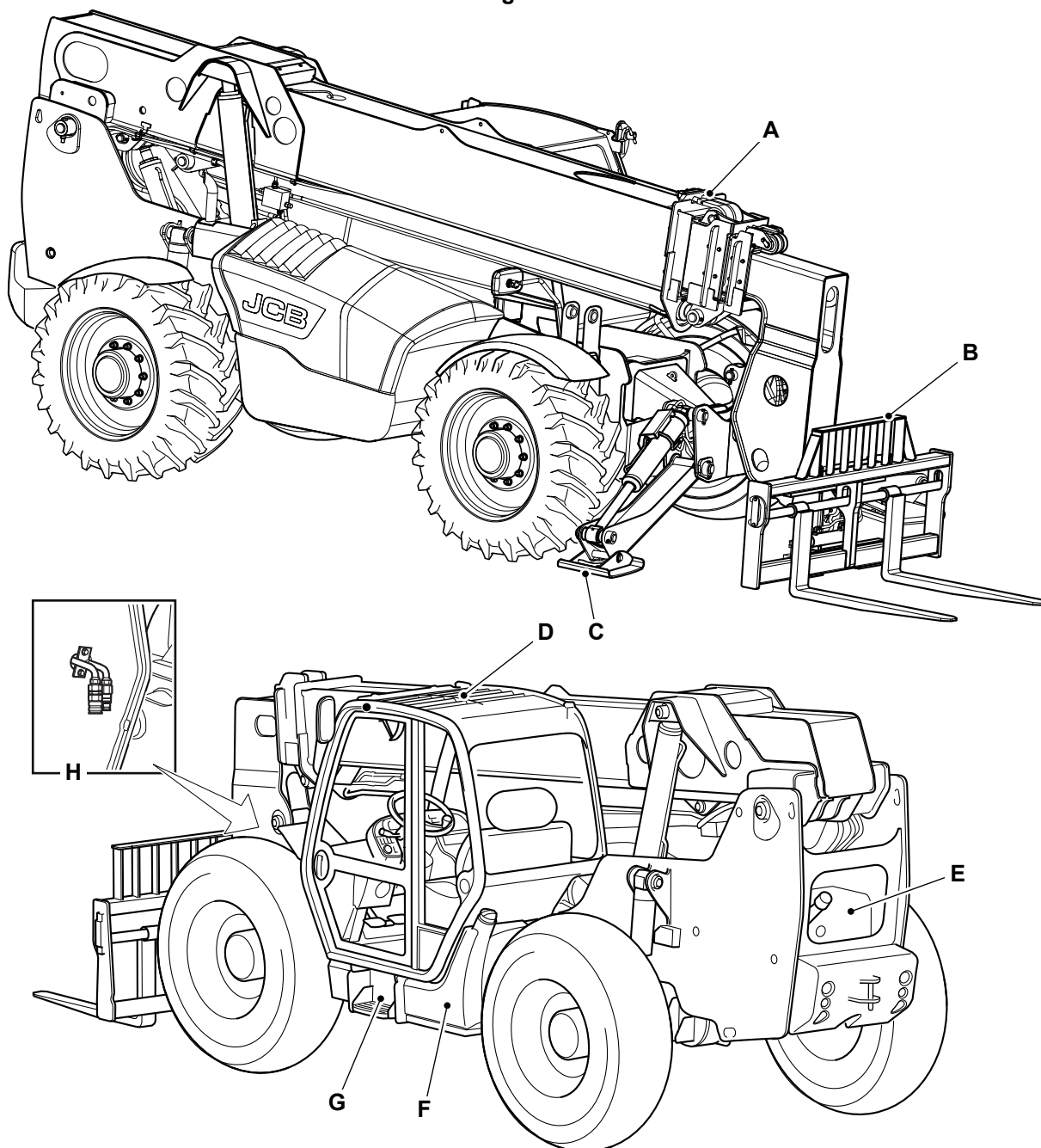
Danger Zone

The danger zone is any zone within and/or around the machinery in which a person is subject to a risk to their health or safety. The danger zone includes the area in immediate proximity to any hazardous moving parts, areas into which working equipment and attachments can be moved to quickly, the machine normal stopping distances and also areas into which the machine can quickly turn under normal conditions of use. Depending on the application at the time, the danger zone could also include the area into which debris, from use of an attachment or working tool, could be projected and any area into which debris could fall from the machine. During the operation of the machine, keep all persons out of the danger zone. Persons in the danger zone could be injured.

Before you do a maintenance task, make the product safe, stopping operation, isolating the controls and turning off the engine.

Main Component Locations

Figure 3.



A Lift arm
C Stabilizer

E Hydraulic tank
G Battery

B Carriage
D ROPS (Roll-Over Protective Structure)/FOPS
(Falling Object Protective Structure) cab
F Fuel tank
H Quick release couplings



Product and Component Identification

Machine

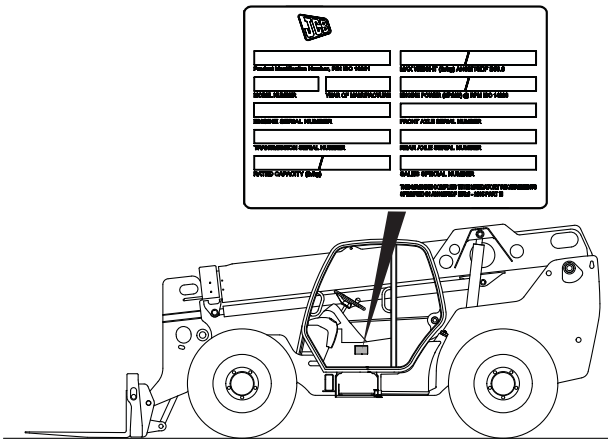
Machine Identification Plate

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

The machine model and build specification is indicated by the PIN (Product Identification Number)

The serial number of each major unit is also shown 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 get a replacement identification plate from your JCB dealer or simply remove 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.

Figure 4.



Typical Product Identification Number

The machine model and build specification are indicated by the PIN. The PIN has 17 digits and must be read from left to right.

Table 1. Typical PIN

JCB	5AA	J	E	C	12345678
-----	-----	---	---	---	----------

Table 2.

Digit 1 to 3	World Manufacturer Identification
JCB	United Kingdom
GEO	Georgia, US
HAR	Haryana, India
SOR	Sorocaba, Brazil
GET	Gatersleben, Germany
PUN	Pune, India
SHA	Shanghai, China
JBP	JCB Branded Products

Table 3.

Digit 4 to 6	Machine Model
5CD	506-36
5CE	507-42
5CF	509-42



Digit 4 to 6	Machine Model
5CL	510-42
5CG	510-56
5CH	512-56
5CJ	514-56
5C6	509-45
5C7	508-66
5C8	510-44
5C9	510-55

Table 4.

Digit 7	Engine Type
JCB Dieselmax (Tier 4):	
W - (T4i)	55kW (73.7hp)
7 - (T4F)	
X - (T4i)	81kW (108.6hp)
2 - (T4F)	
3 - (T4F)	93kW (124.7hp)
A - (T4F)	55kW (73.7hp) 3L SEF Engine

Table 5.

Digit 8	Gearbox Model
G	4 Speed (PS750)

Table 6.

Digit 9
Random check letter. The check letter is used to verify the authenticity of a machine's PIN

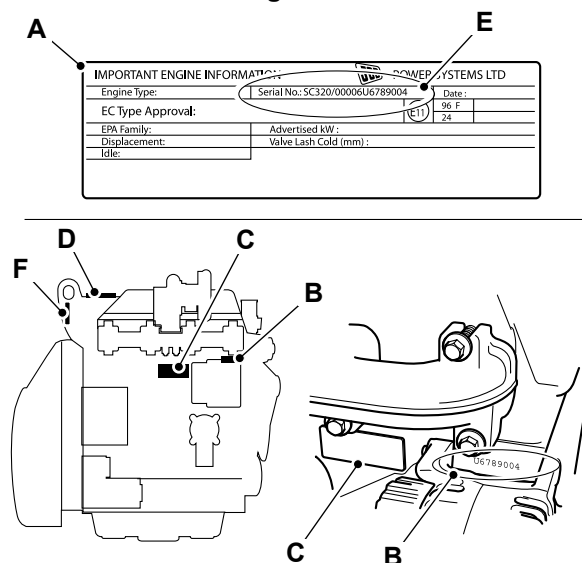
Table 7.

Digit 10 to 17
Machine serial number. Each machine has a unique serial number.

Engine

Engine data labels are located on the cylinder block and rocker cover (if fitted). The data label contains important engine information and includes the engine identification number. Injector codes are on a label on the rocker cover.

Figure 5.



- A** Engine data label
C Engine data label - cylinder block
E Engine identification number
B Stamp - cylinder block
D Engine data label - rocker cover
F Injector codes label - rocker cover

The data label includes the engine identification number.

Table 8. Example of the engine identification number

	SJ	320/40001	U	00001	04
Digit	1-2	3-10	11	12-16	17-18

Table 9.

Digit 1-2	Engine Type
SJ	4.4L (1UKgal) turbocharged and aftercooled electronic common rail fuel injection (Tier 4F) > 55kW (73.7hp)
DJ	4.8L (1UKgal) turbocharged and aftercooled electronic common rail fuel injection (Tier 4F)
SL	4.4L (1UKgal) turbocharged and aftercooled electronic common rail fuel injection (Tier 4F) 55kW (73.7hp)
FL	3L (1/2UKgal) turbocharged and aftercooled electronic common rail fuel injection (Tier 4F)
SM	4.4L (1UKgal) turbocharged and aftercooled electronic common rail fuel injection (T3 High Sulfur UN3/GB3) > 55kW (73.7hp)
DM	4.8L (1UKgal) turbocharged and aftercooled electronic common rail fuel injection (T3 High Sulfur UN3/GB3) > 55kW (73.7hp)

Table 10. Explanation of the engine identification number

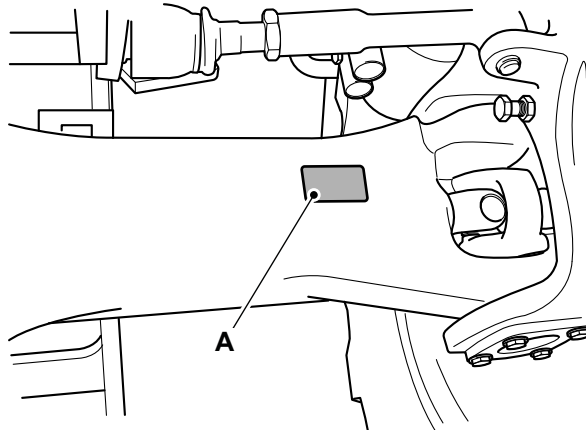
Digit	Explanation
3-10	Engine part number
11	Country of manufacture. U = United Kingdom
12-16	Engine serial number
17-18	Year of manufacture

The country of manufacturer, engine serial number and year of manufacture of the engine are also stamped on the cylinder block. Refer to Figure 5.

Axle(s)

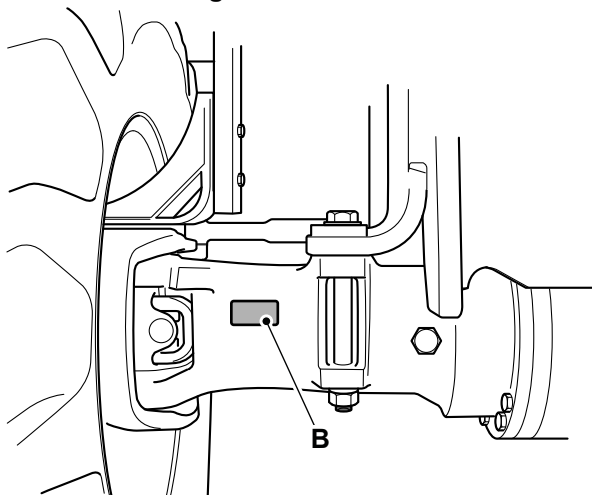
The axles have a serial number stamped on a data plate as shown.

Figure 6. Front axle



A Data plate - front axle

Figure 7. Rear axle

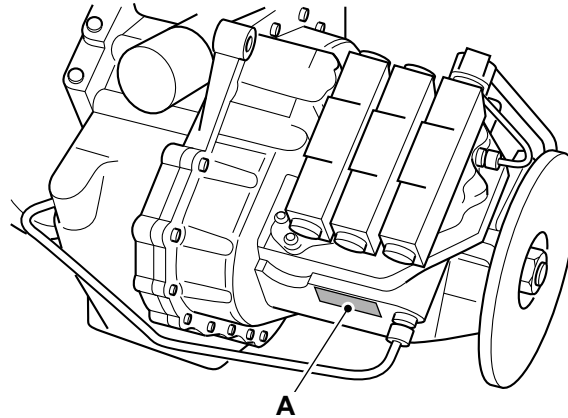


B Data plate - rear axle

Gearbox

The gearbox has a serial number stamped on a data plate as shown.

Figure 8. Power-shift Transmission



A Data plate

Operator Protective Structure

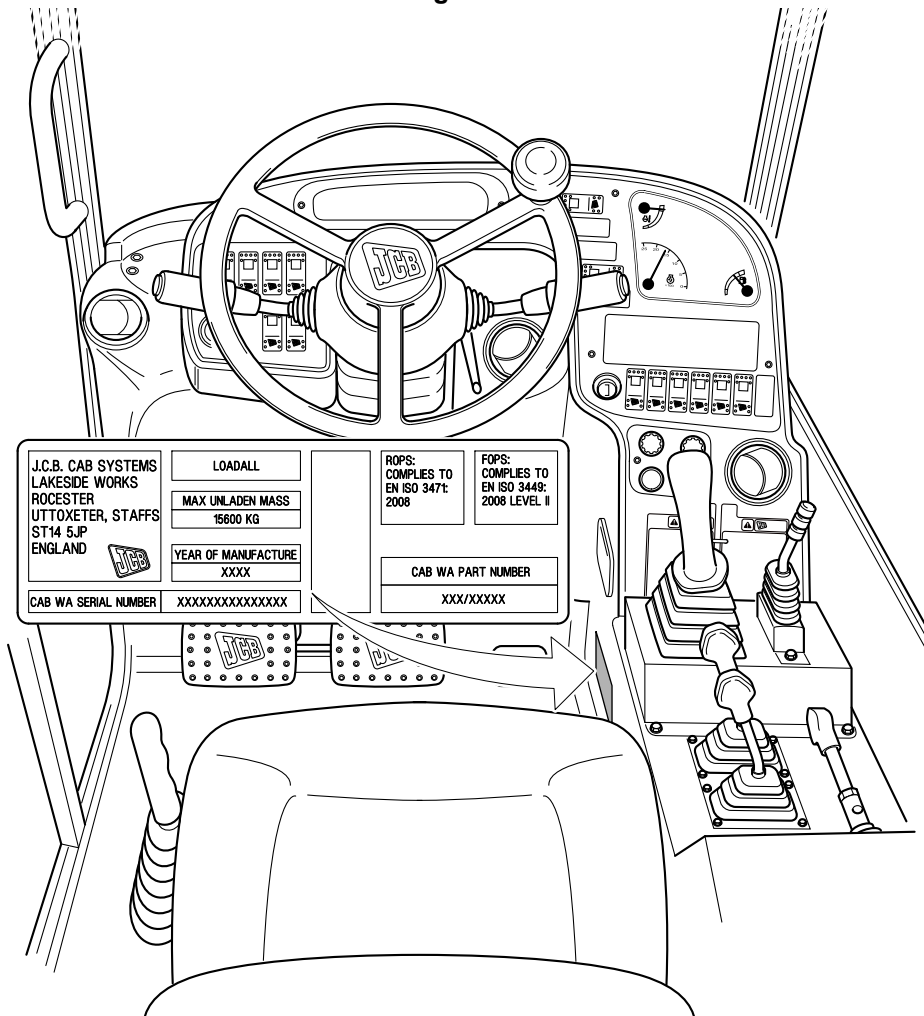
⚠ WARNING You could be killed or seriously injured if you operate a machine with a damaged or missing ROPS/FOPS. If the ROPS/FOPS has been in an accident, do not use the machine until the structure has been renewed. Modifications and repairs that are not approved by the manufacturer may be dangerous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

Machines built to ROPS (Roll-Over Protective Structure)/FOPS (Falling Object Protective Structure) standards have identification label A fitted to the inside of the cab.

The FOPS structure provides Level II Impact Protection against falling objects (as defined in ISO 3449:2005).



Figure 9.



Data plate - ROPS/FOPS standards

Safety Labels

General

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

The 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 put 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.

Keep all of the safety labels clean and readable. Replace a lost or damaged safety label. Make sure the replacement parts include the 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 dealer.

Safety Label Identification

Figure 10.

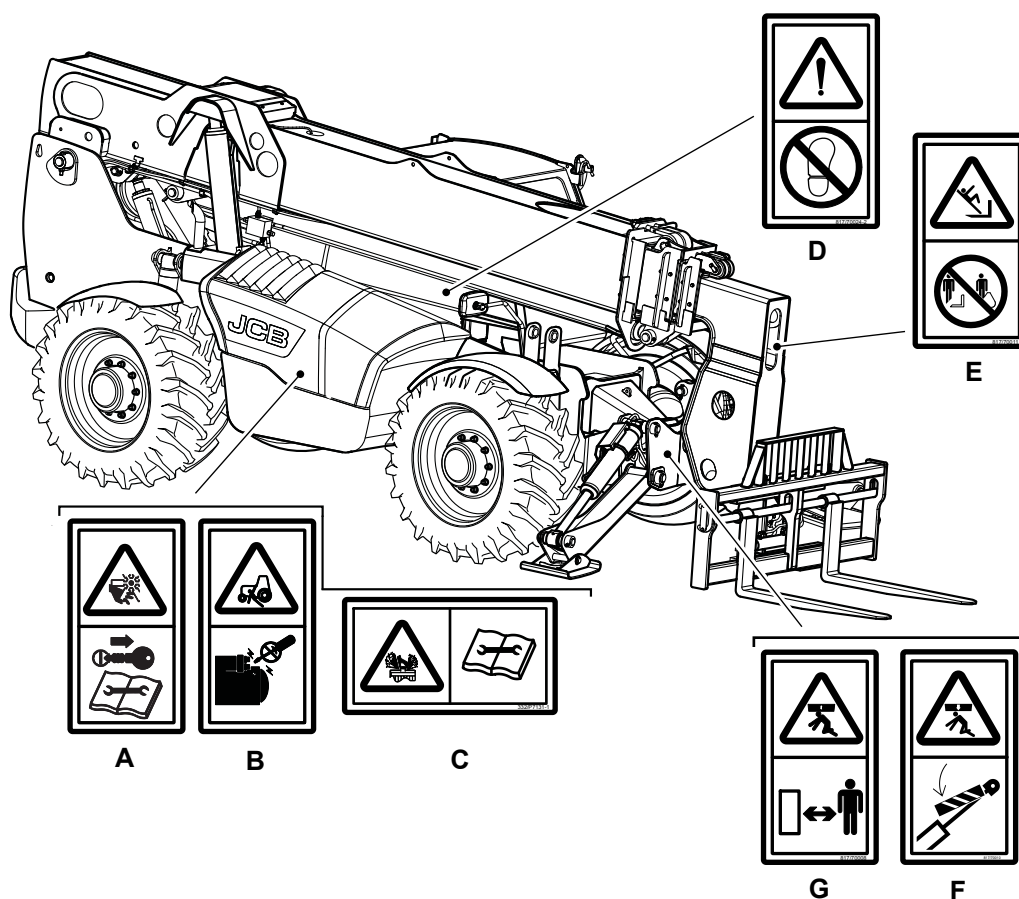


Figure 11.

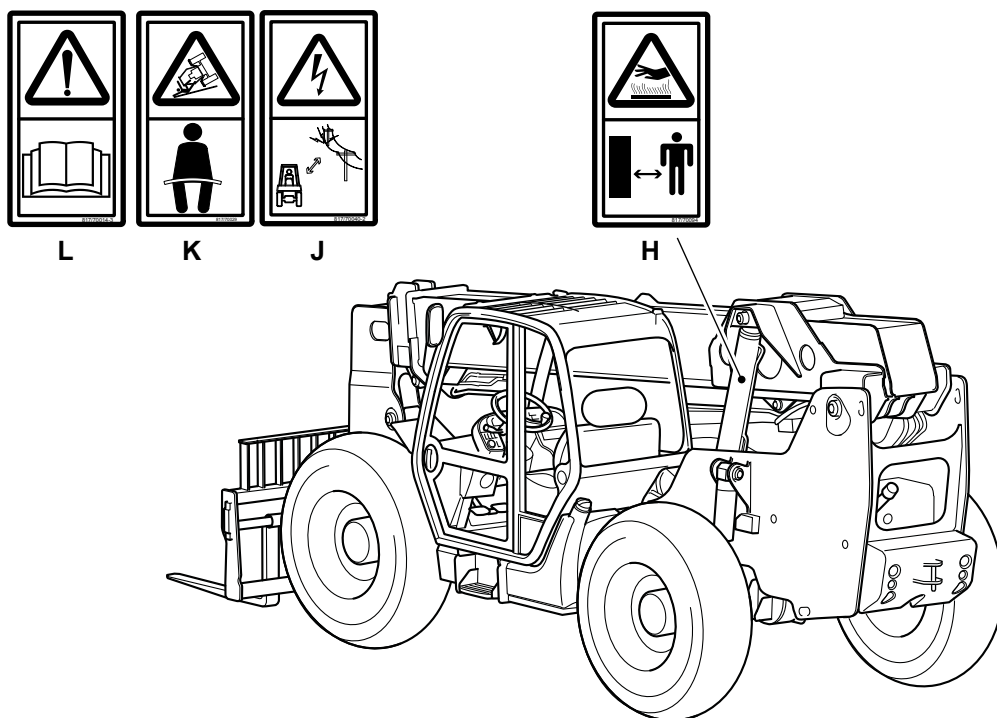


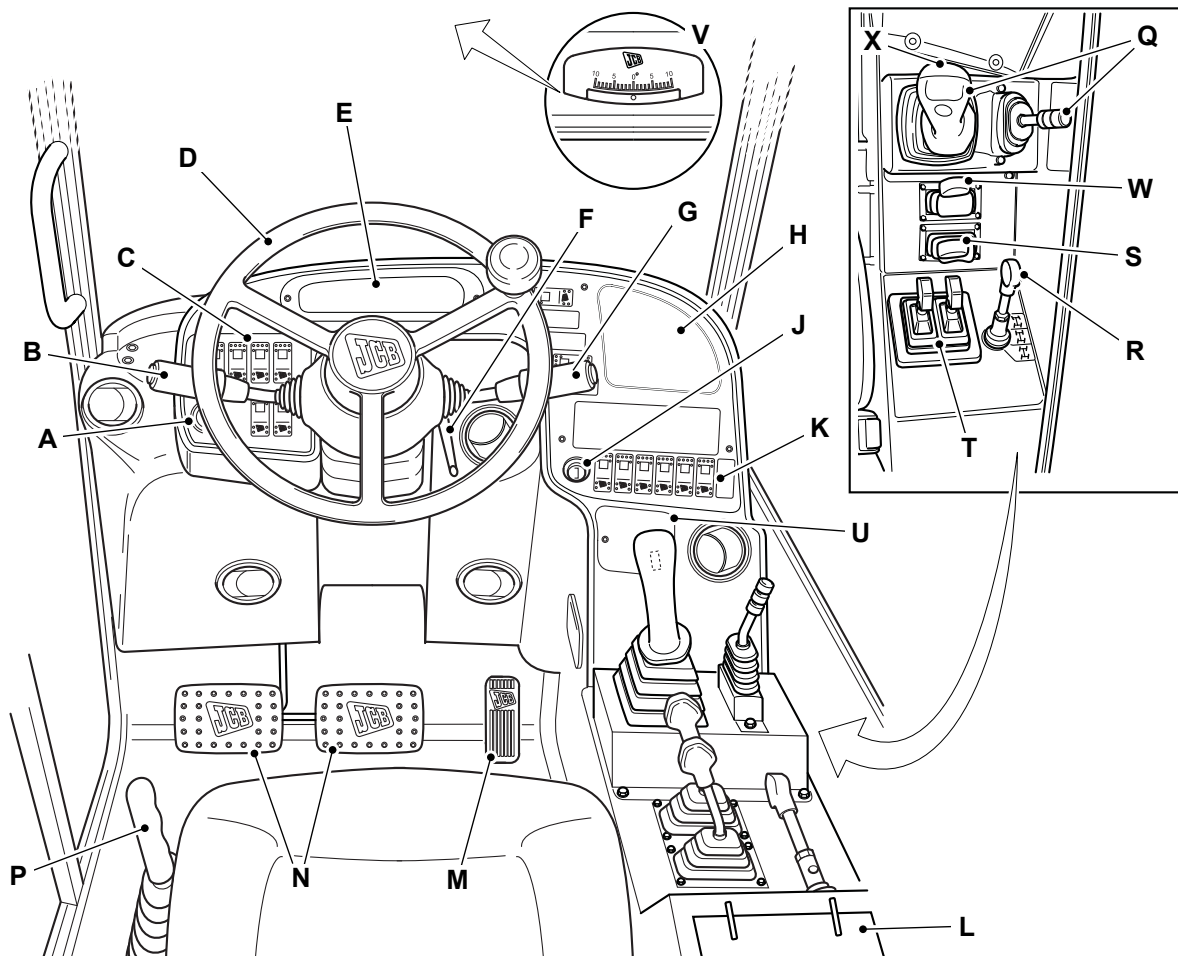
Table 11. Safety Labels

Item	Part No.	Description	Qty.
A	333/D0526	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 Maintenance Section in the Operator's Manual.	1
B	332/C9978	Run over hazard. Start the engine from the operator's seat only. Do not short across the terminals.	1
C	332/P7131	Pressure hazard. Read the Service Manual.	1
D	817/70024	Warning. Do not use as a step.	1
E	817/70011	Fall from raised attachment. Do not stand or ride on the bucket or forks.	1
F	817/70010	Crushing of whole body. Insert the boom support device before you complete any service or maintenance work underneath the boom.	1
G	817/70008	Crushing of whole body. Keep a safe distance from machine.	1
H	817/70094	Burns to fingers and hands. Stay a safe distance away.	1
J	817/70040	Electrical hazard. Stay a safe distance away from power lines.	1
K	817/70029	Warning. Crush hazard. Wear seat belt.	1
L	332/G4040	Warning. Read the Operator's Manual before you operate the machine. Electrical hazard. Keep a safe distance away from power lines. Crush hazard. Wear the seatbelt when you operate the machine.	1

Operator Station

Component Locations

Figure 12.



- | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>A HourmeterRefer to: Instrument Panel (Page 55).</p> <p>C Console switchesRefer to: Console Switches (Page 21).</p> <p>E Instrument PanelRefer to: Instrument Panel (Page 55).</p> <p>G Multi-Purpose SwitchRefer to: Multi-Purpose Switch (Page 19).</p> <p>J Ignition switchRefer to: Ignition Switch (Page 19).</p> <p>L Load ChartsRefer to: Load Charts (Page 90).</p> <p>N Brake pedalsRefer to: Service Brake Pedal (Page 51).</p> <p>Q Boom and carriage controlsRefer to: Operating Levers/Pedals (Page 84).</p> <p>S Chassis Leveling ControlsRefer to: Operating Levers/Pedals (Page 84).</p> <p>U HVAC (Heating Ventilation Air Conditioning)Refer to: Heating, Ventilating and Air-Conditioning (HVAC) (Page 109).</p> <p>W Auxiliary controlsRefer to: Auxiliary Circuit Controls (Page 88).</p> | <p>B Drive leverRefer to: Gear Lever (Page 53).</p> <p>D Steering WheelRefer to: Steering Wheel (Page 51).</p> <p>F Steering column adjustmentRefer to: Steering Column (Page 51).</p> <p>H Instrument PanelRefer to: Instrument Panel (Page 55).</p> <p>K Console switchesRefer to: Console Switches (Page 21).</p> <p>M Accelerator PedalRefer to: Accelerator Pedal (Page 51).</p> <p>P Park BrakeRefer to: Park Brake (Page 52).</p> <p>R Steer mode selectorRefer to: Steer Mode Control (Page 54).</p> <p>T Stabilizer controlsRefer to: Operating Levers/Pedals (Page 84).</p> <p>V InclinometerRefer to: Inclinometers (Page 96).</p> <p>X Transmission Dump SwitchRefer to: Transmission Dump Switch (Page 53).</p> |
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Interior Switches

Ignition Switch

The ignition key operates the four-position ignition switch. The ignition key can only be inserted or removed in position 0.

If the engine fails to start, the ignition key must be returned to position 0 before the starter motor is re-engaged.

Do not operate the starter motor for more than 10s without the engine firing. If the engine fires but does not fully start, do not operate the starter motor for more than 40s seconds. Let the starter motor cool for at least 2min between starts.

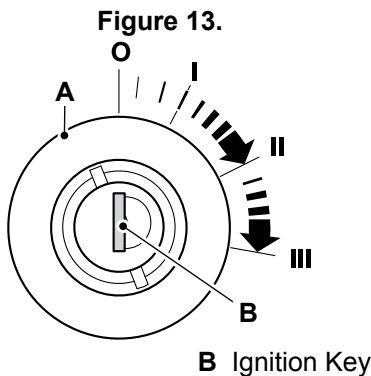


Table 12. Switch Positions

Position	Function
0	Turn 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.
I	Putting the switch to this position connects the battery to all the electrical circuits except the lights and the hazard warning lights circuit (the lights and hazard warning lights circuits are permanently live). The starter key will spring back to this position when it is released from II or III. At -6°C (21.2°F), the cold start warning light will illuminate to indicate the cold start inlet manifold heater has come on.
II	This position is not used in this application.
III	Operates the starter motor to turn the engine.

Multi-Purpose Switch

Direction Indicators

Push the stalk forwards to indicate a left turn. Pull the stalk backwards to indicate a right turn. Place in central position to cancel.

Windscreen Wiper

Rotate the switch barrel to activate and cancel the windscreen wipers. The wiper speed can vary dependant on machine specification.

Single Speed

0 = Off

I = On

Windscreen Washer

Push the button to activate the windscreen washer. Allow the stalk to spring back to central position when finished.

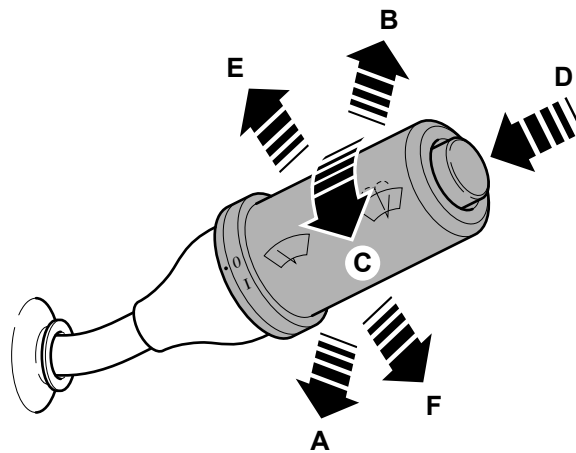
Headlights Flash

Lift the stalk upwards to flash the headlights. Allow the stalk to spring back to central position when finished.

Main Beam

When the road lights are switched on via the switch on console, push the stalk downwards to turn on the main beam. Pull the stalk upwards to the central position to turn off main beam. Switch off main beam for oncoming vehicles.

Figure 14.



- A** Backwards - Right turn
- C** Rotate - Wiper on and off
- E** Upwards - Headlights flash

- B** Forwards - Left Turn
- D** Push - Washer on
- F** Downwards - Main beam

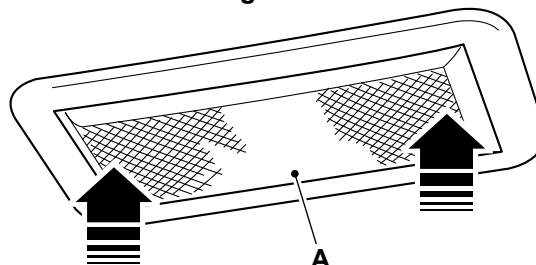
Cab Interior Light

Press either end of the light unit to turn on the cab interior light.

Press the other end of the light unit to turn off the cab interior light.

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

Figure 15.



- A** Cab interior light

Console Switches

General

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

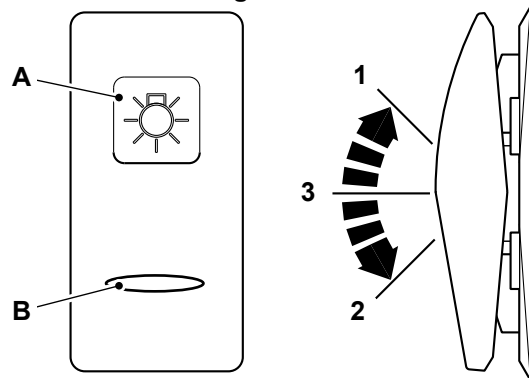
Each switch has a graphic symbol to show the function of the switch. Before you operate a switch, make sure that you understand its function.

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

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

The light bar illuminates to show that the switch function is active.

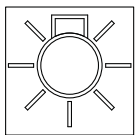
Figure 16.



A Graphic symbol

B Light bar

Road Lights



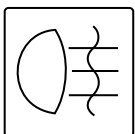
Three position rocker switch. The switch functions operate sidelights and headlights. Position 2 operates when the ignition is in the on and off positions. Position 3 operates when the ignition is in the on position. Machines without road lights are designed for site use. You may be breaking local laws if you travel on the road without road lights.

Position 1: Off.

Position 2: Sidelights on.

Position 3: Sidelights and headlights on.

Rear Fog Lights



Two position rocker switch. The switch functions operate when the ignition switch is in the on position and the headlights are on.

Position 1: Off

Position 2: Rear fog light on

Hazard Warning Lights



Two position rocker switch. The switch functions operate when the ignition switch is in the on and off positions.

Position : 1 = Off

Position : 2 = On. A light on the instrument panel flashes with the outside lights.

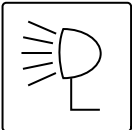
Work Lights



Two position rocker switch. The switch functions operate when the engine is running.
Position 1: Off.
Position 2: Work lights on.

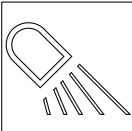
WARNING! Do not drive on the road with the work lights switched on. You can interfere with other drivers' visibility and cause an accident.

Boom Work Light



(option) Two position rocker switch. The switch functions operate when the ignition switch is in the on position and the engine is running.
Position 1: Off
Position 2: Boom worklight on

Right-Hand-Side Work Lights



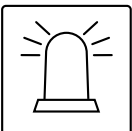
(option) Two position rocker switch. The switch functions operate when the ignition switch is in the on and the engine is running.
Position 1: Off
Position 2: Right-hand-side work lights on

Information



Two position rocker switch. The switch functions operate when the ignition switch is in the on position.
Position 1: Off
Position 2: On (Push then release to move to the next screen)

Beacon



Two position rocker switch. The switch functions operate when the ignition switch is in the on and off positions.
Position : 1 = Off
Position : 2 = On.

Controls Isolation



Two position rocker switch with backlight. The switch functions operate when the ignition switch is in the on position. Before you operate the switch, make sure you release the control lever locks.
Position 1: Off
Position 2: On

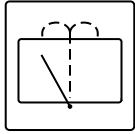
Stabilizer Isolation



Applied to machines with stabilizers only. Two position rocker switch with backlight. The switch functions operate when the ignition switch is in the on position.
Position 1: Off (Backlight off)
Position 2: Stabilizer isolation on (Backlight on)

Refer to: Control Lock (Page 50).

Rear Window Wiper



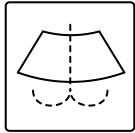
Three position rocker switch. The switch functions operate when the ignition switch is in the on position. The wiper will self park when switched off.

Position 1: Wiper off.

Position 3: Wiper on.

Position 2: Washer on (push and hold).

Roof Window Wiper



Three position rocker switch. The switch functions operate when the ignition switch is in the on position.

Position 1: Wiper off

Position 3: Wiper on

Position 2: Washer on (Push and hold)

Auxiliary Hydraulic Circuit



Two position rocker switch with backlight. The switch functions operate when the ignition switch is in the on position.

Position 1: Rear auxiliary circuit (backlight off)

Position 2: Front auxiliary circuit (backlight on)



Notes:

Operation

Introduction

General

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

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

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

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

Remember:

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

Operating Safety

General

Training

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. Where applicable you may be required to show competency to a national certification scheme. Ensure you comply with local legislation and jobsite rules. 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 colleagues what you will be doing and where you will be working. On a busy site, use a signalman.

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

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 refueling 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.

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.

Machine Limits

Operating the machine beyond its design limits can damage the machine, it can also be dangerous and increase the risk of the machine overturning. Do not operate the machine outside its limits. Do not try to upgrade the machine performance with unapproved modifications or additional equipment. Other factors may contribute to an increased risk of overturning, if in doubt stop immediately and request advice from your local JCB distributor.

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.

Exhaust Gases

Machine exhaust gases can harm and possibly kill you or bystanders if they are inhaled. Do not operate the machine in closed spaces without making sure there is good ventilation. If possible, install an exhaust extractor. If you begin to feel drowsy, stop the machine at once and get into fresh air.

Worksites

Worksites can be hazardous. Examine 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.

If the machine is used in coordination with other machines, vehicles and/or people on the jobsite the operator must follow jobsite organization rules.

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. Worksites can be noisy, do not rely on spoken commands.

You must stop the machine operation, isolate the controls and turn off the machine when persons are required to interact with it.

Parking

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

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.

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.

Lighting

Ensure adequate lighting of the worksite during operation; where necessary additional lighting may be required to improve visibility of hazards around the machine.

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, vapor or dust.

Hazardous Atmospheres

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

Regulations

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

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.

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 unless with approved man-basket or man-crate (if applicable).

Machine Safety

Stop work at once if a fault develops. Abnormal sounds and smells can be signs of trouble. Examine and repair before resuming work.

Hot Components

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.

Traveling at High Speeds

Traveling at high speeds can cause accidents. Always travel at a safe speed to suit working conditions.

Hillsides

Operating the machine on hillsides can be dangerous if the correct precautions are not taken. Ground conditions can be changed by rain, snow, ice etc. Check the site carefully. When applicable, keep all attachments low to the ground.

Visibility

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

Do not operate the machine if you cannot see clearly.

Modification of the machine's configuration by the user (e.g. the fitting of large and non-approved attachments) may result in a restriction of the machine visibility.

Hands and Feet

Keep your hands and feet inside the machine.

When using the machine, keep your hands and feet clear of moving parts. Keep your hands and feet within the operator compartment while the vehicle is in motion.

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.

Passengers

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

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.

Roll Over Protection

If the machine starts 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.

Confined Areas

Pay extra attention to proximity hazards when operating in confined areas. Proximity hazards include buildings, traffic and bystanders.

Safe Working Loads

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

Lightning

If you are inside the machine during a lightning storm stay in the machine until the storm has passed. If you are outside of the machine during a lightning storm stay away from the machine until the storm has passed. Do not attempt to mount or enter the machine.

If the machine is struck by lightning do not use the machine until it has been checked for damage and malfunction by trained personnel.

Overturning

Fast cornering, operating on slopes, high winds and unsecured loads increase the risk of the machine overturning. This list is not exhaustive, other factors may contribute to an increased risk of overturning. If in doubt stop immediately and consult your JCB dealer.

Worksite Safety

⚠ WARNING You or others can be killed or seriously injured if you do unfamiliar operations without first practicing them. Practice away from the worksite on a clear area. Keep other people away. Do not perform new operations until you are sure you can do them safely.

WARNING 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.

WARNING 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 must 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 must 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, make sure 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.

CAUTION 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.

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

An applicable worksite organization is required in order to minimize hazards that are caused by restricted visibility. The worksite organization is a collection of rules and procedures that coordinates the machines and people that work together in the same area. Examples of worksite organization 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 worksite which could be damaged by your machine.

Risk Assessment

▲ DANGER Factors affecting machine stability include size and type of load, angle of elevation, the distance the boom is extended, ground condition and wind speed and direction.

It is the responsibility of the operator to assess the wind conditions and size of load before operating the machine.

It is the responsibility of the operator to assess the terrain, surface roughness, firmness of ground (remember that when wet, the ground will not support the same loads as when dry) before operating the machine.

It is the responsibility of the competent people that plan the work and operate the machine to make a judgement about the safe use of the machine, they must take into account the specific application and conditions of use at the time.

It is essential that a risk assessment of the work to be done is completed and that the operator obeys any safety precautions that the assessment identifies.

If you are unsure of the suitability of the machine for a specific task, contact your JCB dealer who will be pleased to advise you.

The following considerations are intended as suggestions of some of the factors to be taken into account when a risk assessment is made. Other factors may need to be considered.

A good risk assessment depends on the training and experience of the operator. Do not put your life or the lives of others at risk.

Personnel

- Are all persons who will take part in the operation sufficiently trained, experienced and competent? Are they fit and sufficiently rested? A sick or tired operator is a dangerous operator.
- Is supervision needed? Is the supervisor sufficiently trained and experienced?
- As well as the machine operator, are any assistants or lookouts needed?

The Machine

- Is it in good working order?
- Have any reported defects been corrected?
- Have the daily checks been carried out?
- Are the tires still at the correct pressure and in good condition and is there sufficient fuel to complete the job (if applicable)?

The Load

- How heavy is it? Is it within the capabilities of the machine?
- How bulky is it? The greater the surface area, the more affected it will be by wind speeds.
- Is it an awkward shape? How is the weight distributed? Uneven loads are more difficult to handle.
- Is there a possibility of the load shifting while being moved?

General

An area selected as a loading/unloading area should be large enough to accommodate all the wheels of the machine and stabilizers (if fitted). It should not be necessary for the machine to make tight turns with an elevated load.

The area should be of consolidated firm ground, capable of accepting the weight of the machine and its load without significant deformation. Ideally, it should be substantially level in both planes, that is no gradient of more than 2.5% (1 in 40) in either plane.

However, your machine may safely be used for loading/ unloading operations in areas which are not substantially level provided that its design capabilities are not exceeded and that the operator is satisfied that no part of the operation is outside the scope of his/her training and experience.

The capabilities of your machine are extended if stabilizers or sway control are fitted.

Traffic routes should be of consolidated firm ground with no gradient more severe than the following:

- Maximum up slope: 15% (1 in 7)
- Maximum down slope: 15% (1 in 7)
- Maximum lateral slope: 15% (1 in 7)

These figures apply only to the machine in it's normal traveling mode, that is with boom retracted and with the upper surface of the heels of the fork arms not more than 500mm (19.7 in) above mean ground level, and traveling no faster than walking pace. Particularly in the case of a lateral slope, some form of restraint on the load may be necessary.

Observe the maximum wading depth of this machine. Water can enter the engine and axles, and the cooling fan can be damaged if the machine is operated in deeper water.

Loading/Unloading Area

- Is it level? Any slope of more than 2.5% (1 in 40) must be carefully considered.
- Is more than one direction of approach to the load possible? Approaching across the slope must be avoided, if possible.
- Is the ground solid? Will it support the weight of the machine when loaded?
- How rough is the ground? Are there any sharp projections which could cause damage, particularly to the tires?
- Are there any obstacles or hazards in the area, for example, debris, excavations, manhole covers, power lines?
- Is the space sufficient for safe maneuvering?

- Are any other machines or persons likely to be in or to enter the area while operations are in progress?

The Route to be Traveled

- How solid is the ground, will it provide sufficient traction and braking?
- How steep are any slopes, up/down/across? A cross slope is particularly hazardous, is it possible to detour to avoid them?

Weather

- How windy is it? High wind will adversely affect the stability of a loaded machine, particularly if the load is bulky.
- Is it raining or is rain likely? The ground that was solid and smooth when dry will become uneven and slippery when wet, and it will not give the same conditions for traction, steering or braking.

Walk-Around Inspection

General

▲ 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. Also make sure that the park brake is engaged before doing these checks.

The following checks must 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.

1. Check for cleanliness.
 - 1.1. Clean the windows, light lenses and the rear view mirrors (where applicable).
 - 1.2. Remove dirt and debris, especially from around the linkages, rams, pivot points and radiator.
 - 1.3. Make sure the operator station steps and handrails are clean and dry.
 - 1.4. Clean all of the safety and instructional labels. Replace any label that is missing or cannot be read.
2. Check for damage.
 - 2.1. Examine the machine generally for damaged and missing parts.
 - 2.2. Make sure that the attachment is correctly attached and in good condition.
 - 2.3. Make sure that all of the pivot pins are correctly installed.
 - 2.4. Examine the windows for cracks and damage. Glass splinters can blind.
 - 2.5. Check for oil, fuel and coolant leakages below the machine.

WARNING! You could be killed or injured if a machine tire bursts. Do not use the machine with damaged, incorrectly inflated or excessively worn tires.
3. Check the tires.
4. Make sure that all of the filler caps are installed correctly.
5. Make sure that all of the access panels are closed correctly.
6. If the filler caps and access panels are installed with locks, we recommend that you lock them to prevent theft or tampering.

Entering and Leaving the Operator Station

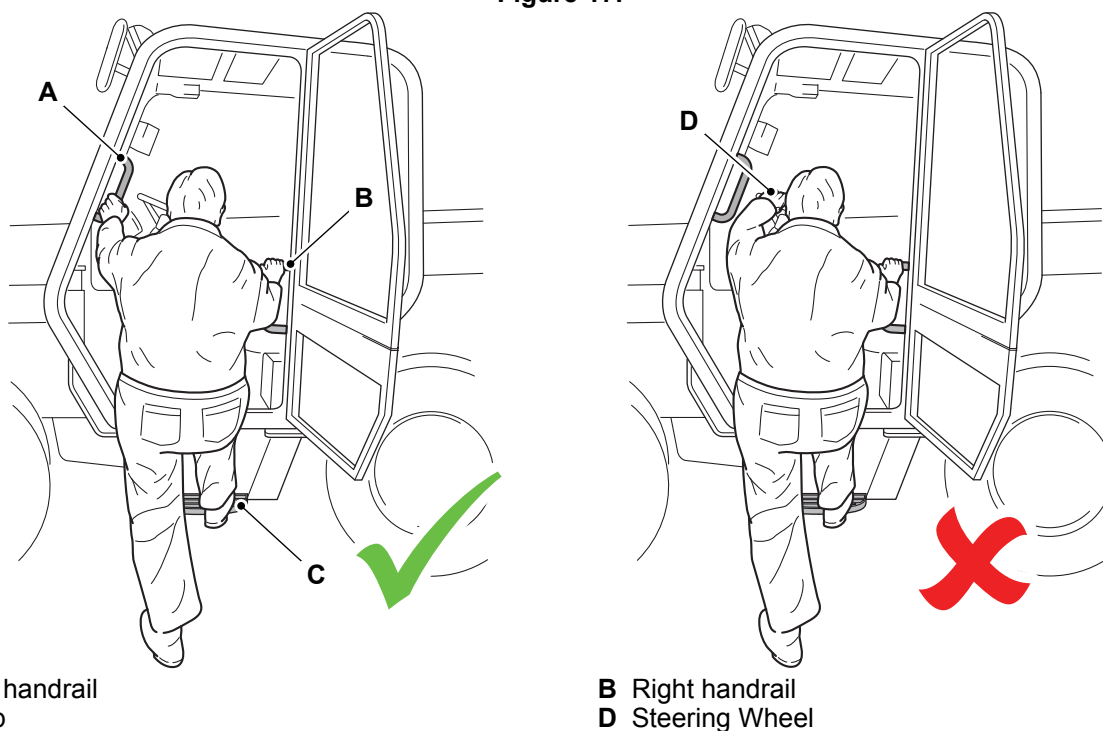
General

▲ **CAUTION** Entering or leaving the operator station must only be made where steps and handrails are provided. Always face the machine when entering and leaving. Make sure the steps, handrails and your boot soles are clean and dry. Do not jump from the machine. Do not use the machine controls as handholds, only use the handrails.

Make sure the machine is stopped and correctly parked before entering or leaving the cab. [Refer to: General \(Page 45\).](#)

When you get 'on' and 'off' the machine always maintain a three point contact with the handrails and step(s). Do not use the machine controls as handholds.

Figure 17.

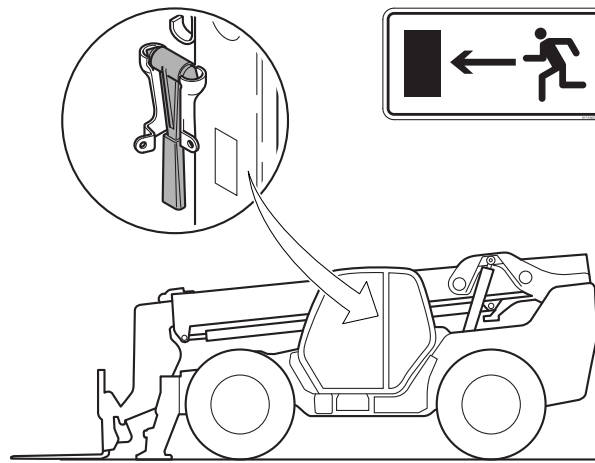


Emergency Exit

▲ **WARNING** Do not obstruct the rear cab window, this is an emergency exit.

If the machine is fitted with a glazing breaker, it is possible to use the rear cab window as an emergency exit.

Figure 18.

**A Glazing Breaker**

In the event of an emergency:

1. Remove the glazing breaker from its stowage position.
2. Strike the rear cab window near the corner. This will shatter the screen, which can then be knocked out.

Doors

Operator Door

▲ **Notice:** Do not drive the machine with the door unlatched.

Door

To open the door from the outside: Refer to Figure 19.

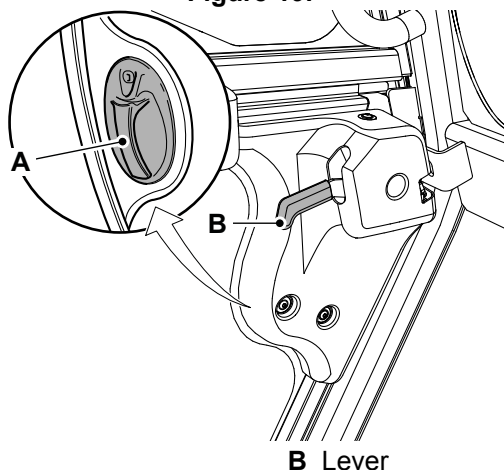
1. Unlock the door with the ignition key.
2. Pull the handle to release the latch.

To close the door:

Close the door from the inside by pulling the closing bar firmly; it will latch itself. Refer to Figure 19.

To open the door from the inside, pull lever to release the latch. Refer to Figure 19.

Figure 19.



A Handle

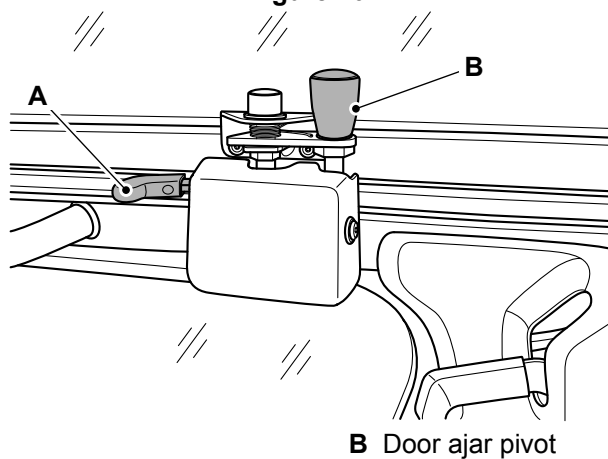
B Lever

Upper Door Section

To open the upper door section: Refer to Figure 20.

1. With the cab door closed, push the lever to release the upper door section.
2. Swing the door fully open until it latches.
3. To set the door slightly open, operate the lever. Rotate the door ajar pivot and locate in the latch position.

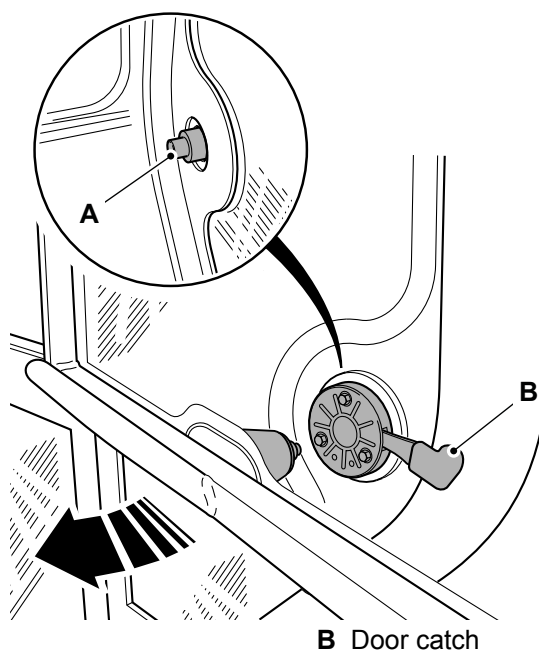
Figure 20.

**A** Lever**B** Door ajar pivot

To close the upper door section:

1. Press the button (if inside the cab) or release the catch (if outside the cab).
2. Swing the door closed until it latches into position.

Figure 21.

**A** Button**B** Door catch

Battery Isolator

General

▲ **Notice:** 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 installed.

Notice: Do not isolate the machine electrics when the engine is running, this may cause damage to the machine electrics.

To allow the engine ECU (Electronic Control Unit) to shut down correctly, you must wait 85s before you isolate the battery. The 85s period starts when you turn the ignition off. If a radio is fitted, you may lose any settings.

Additionally on machines using DEF (Diesel Exhaust Fluid) there is a 85s delay after isolating the machine electrics. A ticking noise will be heard from the purge pump during this time.

The hazards lights can be switched on before isolating the battery and once they extinguish this confirms that the ECU has fully shut down.

Disconnect the Machine Electrics:

1. Turn the ignition key to the off position.
2. Switch on the hazard lights.
3. Wait for the engine ECU to shutdown correctly. When the hazard lights go off this indicates the machine ECU is fully shutdown.

Duration: 85s

4. Get access to the battery isolator.
[Refer to: Service Points \(Page 160\).](#)
5. Turn the battery isolator key in a counter-clockwise direction and remove.

Connect the Machine Electrics:

1. Make sure the ignition is switched off.
2. Insert the battery isolator key and turn in a clockwise direction.

Before Starting the Engine

General

▲ 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.

WARNING Secure all loose articles. 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.

CAUTION Machines installed with hose burst protection valves cannot have their attachments lowered with the engine stopped. Start the engine and lower the attachments before doing the walk-around inspection.

CAUTION 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.

1. The park brake should have been engaged when the machine was last parked. If it is not already engaged, engage it now.
2. Read the Operating in Low Temperatures or Operating in High Temperatures procedures in the Operation section if you will be using the machine in very cold or very hot climates.

[Refer to: Operating Environment \(Page 119\).](#)

3. If the fuel tank was empty or if any part of the fuel system has been drained or disconnected, the fuel system must be primed before you try to start the engine.
4. For your own safety (and others) and for the maximum service life of your machine, do a pre-start inspection before you start the engine.

- 4.1. If you have not done it, do a walk-around inspection of the outside of the machine.

[Refer to: Walk-Around Inspection \(Page 32\).](#)

- 4.2. Remove any dirt and rubbish from the cab interior, especially around the pedals and control levers.
- 4.3. Remove any oil, grease and mud from the pedals and control levers.
- 4.4. Make sure that your hands and shoes are clean and dry.
- 4.5. Remove or stow all loose articles in the cab, for example tools.
- 4.6. Examine the ROPS (Roll-Over Protective Structure) and/or FOPS (Falling Object Protective Structure) for damage. Get your JCB dealer to repair any damage. Make sure all its securing bolts are installed and correctly tightened.
- 4.7. Check around the cab for loose or missing bolts, screws etc. Replace or tighten where necessary.
- 4.8. Examine the seat belt and its mountings for damage and excessive wear.

[Refer to: Seat Belt \(Page 179\).](#)

- 4.9. Make sure that the following operate correctly: lights, horn, all switches, front window washer and wipers (if installed).
5. Adjust the seat so that you can comfortably reach all the driving controls. You must be able to operate the control pedal with your back against the seat back. Make sure the seat locking lever has fully engaged.

[Refer to: Operator Seat \(Page 39\).](#)

6. Adjust the rear view mirrors (where applicable) to give you a good view close behind the machine, when you are correctly seated.
7. Fasten the seat belt.

Operator Seat

General

▲ **CAUTION** 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.

CAUTION The operator seat contributes to the operators comfort and the level of vibration felt by the operator. Ensure seat is maintained and replace if damaged with a JCB approved option.

The operator's seat can be adjusted for your comfort. A correctly adjusted seat will lower the operator fatigue.

Adjust the seat so that you can comfortably reach the machine controls.

For driving the machine, adjust the seat so that you can push the pedals fully down when your back is against the seat back.

Operator Presence Switch

All seat options have been installed with an operator presence switch and has the following effects (dependant on software revision):

- If there is no operator in the seat it is not possible to engage drive.
- If the operator leaves the seat, with the transmission engaged and the handbrake disengaged, then the machine will remain in drive with an audible and visual warning on the dash.
- Alternatively neutral will be automatically selected.
- If there is no operator in the seat then the hand throttle will not function and all hydraulic functions are disabled including constant auxiliary, excluding auxiliary venting.

Suspension Seat

Suspension Seat (KAB 100 Series - Mechanical)

Horizontal Adjustment

Lift the lever and slide the seat into the required position. Release the lever.

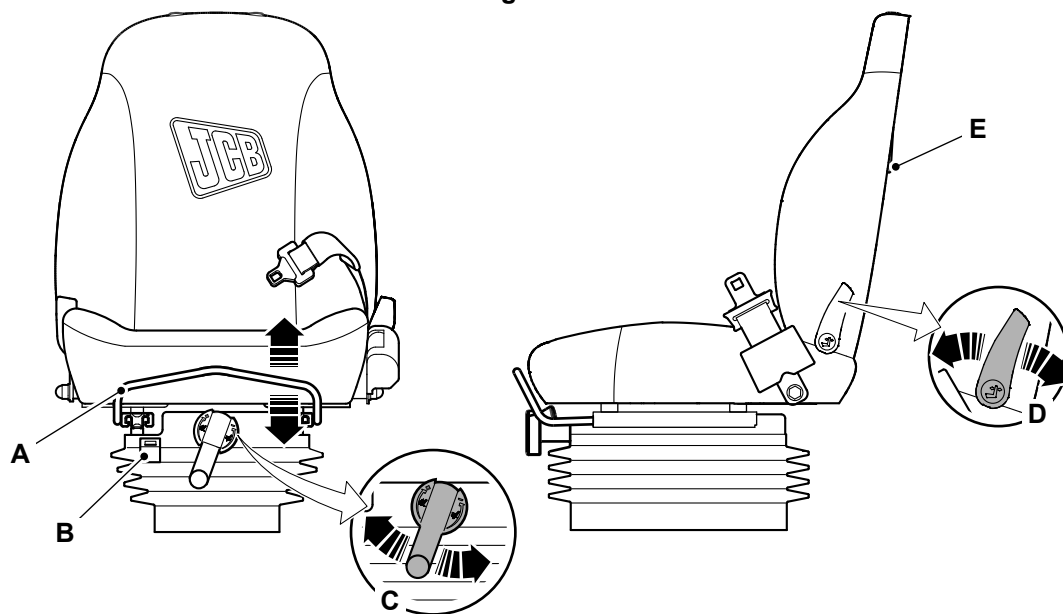
Height

Turn the adjuster lever until the ride height indicator is in the green 'comfort' zone.

Backrest

Lift the backrest lever and move the backrest to the required angle. Release the lever.

Figure 22.



- A Horizontal adjustment lever
- C Height adjustment lever
- E Document cover

- B Ride height indicator
- D Backrest lever

Seat Belt

General

▲ **WARNING** Operating the machine without a seat belt can be dangerous. Before starting the engine, make sure your seat belt is fastened. Check the tightness and condition of the seat belt securing bolts regularly.

WARNING When a seat belt is checked for condition replace it with a new one if it is damaged, if the fabric is worn, or if the machine has been in an accident.

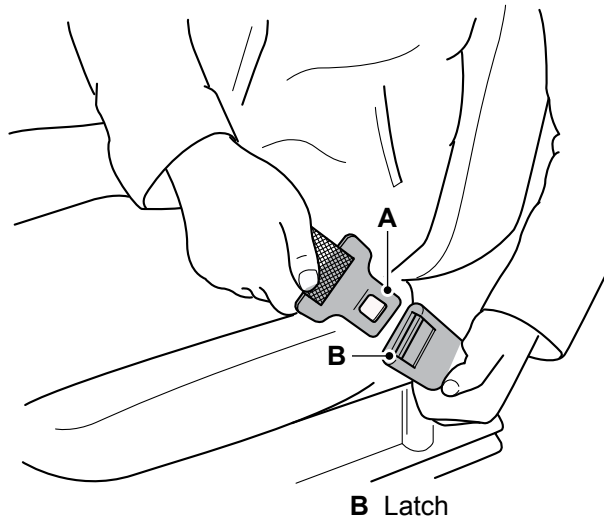
Inertia Reel Seat Belt

Fasten the Seat Belt

▲ **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 machine.

1. Sit correctly in the seat.
2. Pull the seat belt and the tongue from the inertia reel holder in one continuous movement.
3. Push the tongue into the latch. Make sure the seat belt worn is snug and properly located on the body. Make sure the seat belt is not twisted and that it is over your hips not your stomach.
 - 3.1. If the seat belt 'locks' before the tongue is engaged, let the seat belt retract into the inertia reel holder then try again. The inertia mechanism can lock if you pull the seat belt too quickly or if the machine is parked on a slope.

Figure 23.



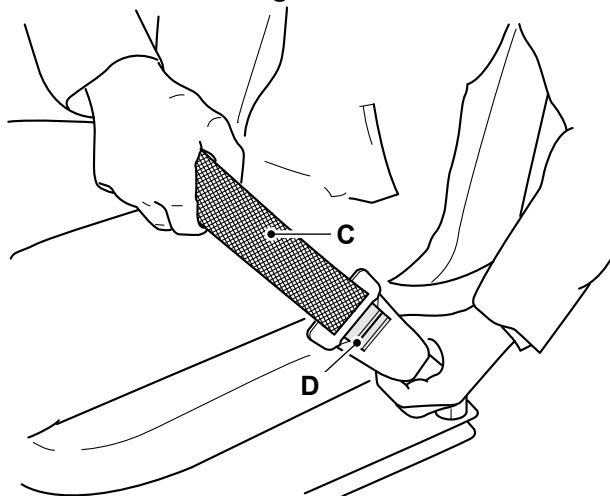
A Tongue

B Latch

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.

4. To make sure the seat belt operates correctly, hold the middle of the seat belt and pull quickly. The seat belt should 'lock'. Refer to Figure 24.

Figure 24.



C Seat belt

D Button

Release the Seat Belt

▲ WARNING Release the seat belt only after safely stopping the machine, switching off the engine and engaging the park brake (if applicable).

1. Push the button and pull the tongue from the latch.
2. Carefully let the seat belt retract into the inertia reel holder.

Starting the Engine

General

▲ Notice: 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.

Under certain conditions condensate (steam) can be seen emitting from the exhaust tail pipe. This is normal and should not be considered a fault.

Engines with SCR (Selective Catalytic Reduction) after-treatment: If the engine has been run low on DEF (Diesel Exhaust Fluid) and the engine has entered a de-rate state due to low DEF you must fill the machine with DEF and cycle the ignition twice to remove the fault.

1. Make sure that the machine is ready to start.
[Refer to: Before Starting the Engine \(Page 38\).](#)
2. Put the forward/reverse lever in neutral.
[Refer to: Operating Levers/Pedals \(Page 84\).](#)
 - 2.1. The engine will not start unless the forward/reverse lever is in neutral.
3. Make sure the battery isolator key is installed and switched on.
[Refer to: General \(Page 37\).](#)
4. Start the engine at normal engine start:
 - 4.1. Turn the ignition key to the start position (position III) and hold it there until the engine starts.
5. Start the engine at cold climate engine start: -12°C to 0°C
 - 5.1. Turn the ignition key to the on position (position I), the cold start inlet manifold heater icon shows on the dash.
[Refer to: Instrument Panel \(Page 55\).](#)
 - 5.2. When the icon is extinguished, turn the ignition key to the start position (position III) and hold it there until the engine starts.
 - 5.3. There is an intentional delay prior to starting the engine to assist the priming of the engine lubrication system.
Duration: 3s
 - 5.4. After you start the machine there is an intentional delay at idle during which time the throttle control is overridden to assist priming of the lubrication system.
Duration: 11s
6. Start the engine at cold climate engine start: -12°C to -20°C
 - 6.1. When you start the machine at these ambient temperatures, a grid heater must be installed in to the inlet manifold of the engine.
 - 6.2. Turn the ignition key to the on position (position I), the cold start inlet manifold heater icon shows on the dash.
[Refer to: Instruments \(Page 55\).](#)
 - 6.3. When the icon is extinguished, turn the ignition key to the start position (position III) and hold it there until the engine starts.
 - 6.4. There is an intentional delay prior to starting the engine to assist the priming of the engine lubrication system.
Duration: 4s
 - 6.5. After you start the machine there is an intentional delay at idle during which time the throttle control is overridden to assist priming of the lubrication system.
Duration: 21s

7. Start the engine at cold climate engine start: below -20°C
 - 7.1. When you start the machine at these ambient temperatures, a grid heater must be installed in to the inlet manifold of the engine and block heaters must be installed in to the engine block coolant jacket.
 - 7.2. There is no detriment if the block heater is used in ambient temperatures of -12°C to -20°C
 - 7.3. Do not use the block heater in ambient temperatures of above 0°C
 - 7.4. Regularly check the ambient temperature to determine if the block heater is necessary.
 - 7.5. Turn the ignition key to the on position (position I), the cold start inlet manifold heater icon shows on the dash.
[Refer to: Instruments \(Page 55\).](#)
 - 7.6. When the icon is extinguished, turn the ignition key to the start position (position III) and hold it there until the engine starts.
 - 7.7. After you start the machine there is an intentional delay at idle during which time the throttle control is overridden to assist priming of the lubrication system.
Duration: 33s
8. Release the ignition key when the engine starts.
 - 8.1. The ignition key will go back to the on position (position I).
9. When the engine has started, make sure that all the warning lights have gone off and that the audible alarm is silent.
[Refer to: Instrument Panel \(Page 55\).](#)
 - 9.1. Do not race the engine until the oil pressure low light has gone off.
 - 9.2. Racing the engine too soon could damage the turbo-charger due to under lubrication.
10. 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.
11. 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.
12. Operate the hydraulic services to make sure that each function is working correctly and to help warm up the hydraulic system.
 - 12.1. Do not operate the attachments until the hydraulic oil has reached its normal working temperature.

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).

Stopping and Parking

General

▲ 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.

WARNING You or others can be killed or injured if you suddenly change from forward to reverse, or vice versa, when traveling. The machine will immediately reverse direction without warning to others. Always follow the recommended procedure for changing between forward and reverse drive.

WARNING Do not dismount a moving machine.

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

WARNING The park brake must not be used to slow the machine from traveling speed, except in an emergency, otherwise the efficiency of the brake will be reduced. Whenever the park brake has been used in an emergency the brake pack must be checked. Contact your JCB dealer.

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 press down on the brake pedal to bring the machine to a smooth stop. Keep the foot brake on until the park brake has been applied and the drive disengaged.
3. Activate the park brake by pulling up the lever.
4. Set the transmission to neutral. Make sure the lever is in its detent position. 506-36 machines only: make sure that the park brake indicator light is extinguished.
5. Retract and lower the boom, rest the forks flat on the ground.
6. Lock the controls.
[Refer to: Control Lock \(Page 50\).](#)
7. It is recommended that turbocharged engines are run at 1000 RPM (approximately) and reduced load for a short of time before shut down to let the turbocharger to cool.
Duration: 2–3min
7.1. Engines with SCR (Selective Catalytic Reduction) after-treatment: A ticking noise will be heard from the purge pump for a short time after stopping the engine.
8. If you are leaving the machine, make sure that all switches are set to off. If necessary, leave the hazard warning and/or side lights switched on. Remove the ignition 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 both doors. Make sure that the diesel fuel and DEF (Diesel Exhaust Fluid) (if applicable) filler caps are locked on.
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 installed).

[Refer to: Battery Isolator \(Page 213\).](#)

Preparing for Travel

General

When you travel on the road or on site there are usually local rules and safety regulations for the machine travel position.

This publication contains recommendations that may help you meet the requirements of these regulations, they are not necessarily the applied law.

If your machine is installed with a travel height label make sure you adhere to it.

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

This publication does not contain the rules and laws of the areas that the machine will be traveling. Contact your local authorities before you travel on public roads.

Preparing for Road Travel

▲ WARNING In low visibility or at night, we recommend removing the forks before traveling on public roads. Transport the forks on a suitable vehicle.

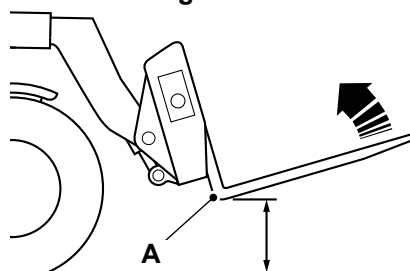
CAUTION Do not travel on public roads with the machine loaded.

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

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

1. In certain countries, legislation requires the front windshield guard (if fitted) is removed before traveling on public roads.
2. Use the chassis leveling (sway) control to set the body of the machine square to the axles.
[Refer to: Chassis Leveling Controls \(Page 86\).](#)
3. Ensure both stabilizer legs, (if fitted) are fully raised and isolated.
[Refer to: Stabilizer Controls \(Page 86\).](#)
4. Fully retract the boom. Lower the boom fully then raise it slightly. Tilt the carriage back, to keep the heel of the forks above the ground. 300mm (11.8in)

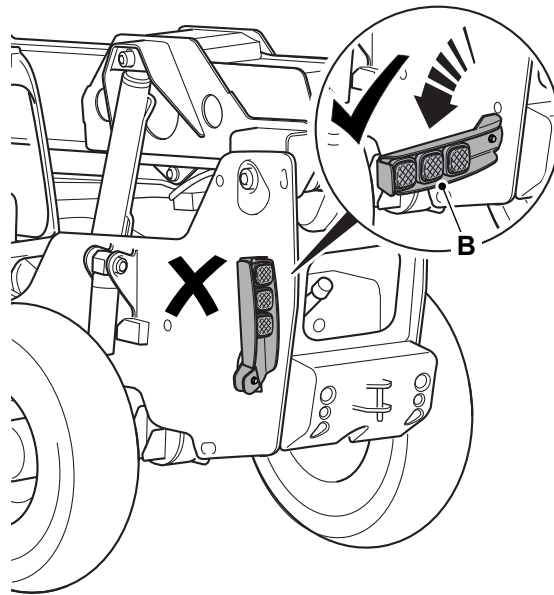
Figure 25.



A Fork

5. If pivoting lights are fitted, move the rear light cluster to the horizontal position. The cluster is spring loaded by its rubber mounting bush. To swing it up or down, whichever is applicable to your machine, pull the cluster slightly rearward to disengage, then swing it to the new position.

Figure 26.



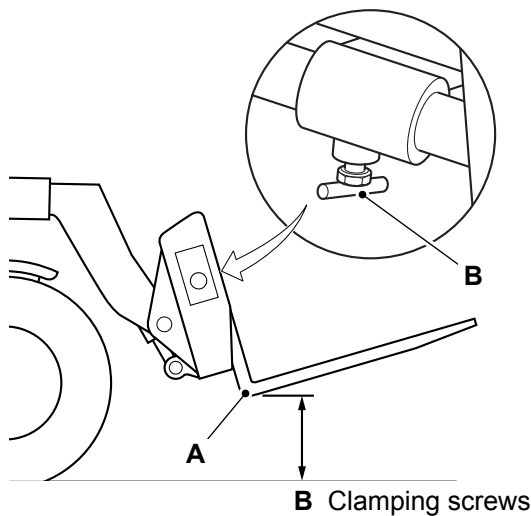
B Rear light cluster

6. If any optional attachments are fitted, make them safe.
7. Lock the controls (as required).
8. Align the road wheels.
[Refer to: Steer Modes \(Page 79\).](#)
9. Select 2-wheel steer, do not use crab steer or 4-wheel steer on public roads.
10. Check that all road lights are working correctly.
11. The traffic regulations may require you to have a rotating beacon operating on some public roads.

Preparing for Worksite Travel

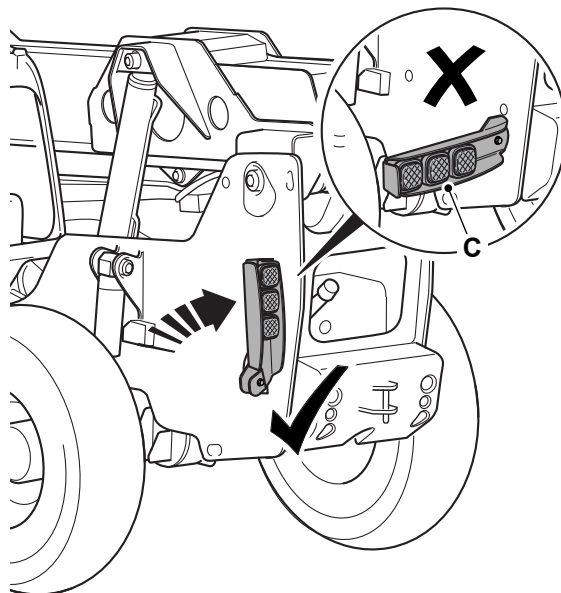
1. Use the chassis leveling (sway) switch, (if installed) to set the body of the machine square to the axles.
[Refer to: Chassis Leveling Controls \(Page 86\).](#)
2. Make sure that both the stabilizer legs (if installed) are fully raised and isolated.
[Refer to: Stabilizer Controls \(Page 86\).](#)
3. Fully retract the boom.
4. Lower the boom fully then raise it until the carrier is above the ground. 300mm (11.8in)
5. Tilt the carriage back, to keep the heel of the forks above the ground. 300mm (11.8in)

Figure 27.



6. When attachments are fitted, position the boom in the 'low carry' position so that the right hand mirror is not hidden from the operator's view.
7. Tighten the clamping screws to prevent side movement of the forks (if installed).
8. Move the rear light cluster to the vertical position. The cluster is spring loaded by its rubber mounting bush. To swing it up or down, whichever is applicable to your machine, pull the cluster slightly rearward to disengage, then swing it to the new position as shown.

Figure 28.



9. Select the steer mode required.
10. If any optional attachments are installed, make them safe.

[Refer to: Attachments \(Page 127\).](#)

Beacon

In certain territories you will break the law if you do not install a beacon before you travel on site/public highways, make sure you comply with the local laws.

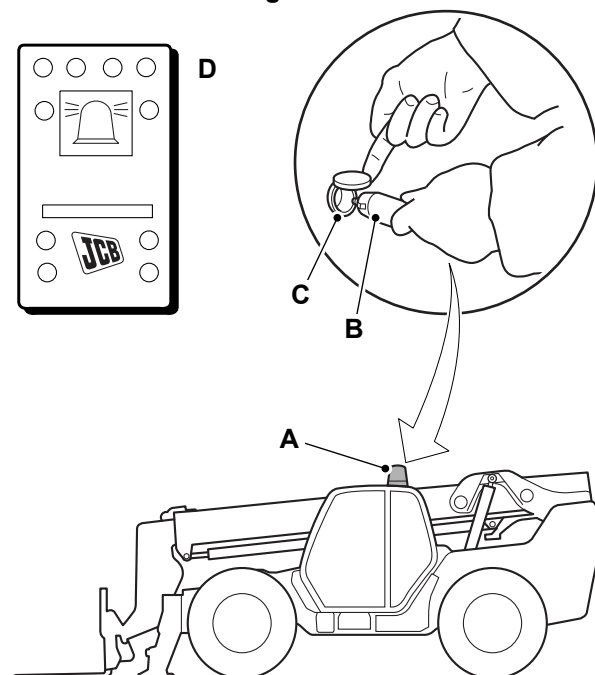
Be careful when you operate the machine with a beacon. The total height of the machine is increased when the beacon is in the operating position.

1. Put the beacon on the cab roof. A magnetic base keeps the beacon in position.
2. Put the plug into the cab roof socket.
3. Use the beacon switch in the cab to operate the beacon. The indicator light in the switch illuminates when the beacon is operating.

[Refer to: Console Switches \(Page 21\).](#)

The beacon shown is permanently installed on the machine. When in use it must be raised in position. When not in use it must be lowered in position. Refer to Figure 29.

Figure 29.



A Beacon
C Socket

B Plug
D Switch

Safety Equipment

Control Lock

▲ WARNING Operating the boom while you travel can cause accidents. You will not have total control of the machine. Never operate the boom when you travel.

The requirement for control lever lock/isolation varies according to local legislation. You must comply with local legislation at all times. Control locks are designed to lock or isolate the control(s) in the neutral position.

Dual Lever Control

All Lever Lock

Isolate the boom and carriage controls before you travel on public roads.

To isolate the controls, move the joystick isolation switch to position 2. [Refer to: Controls Isolation \(Page 22\).](#)

To enable the controls, move the joystick isolation switch to position 1. [Refer to: Controls Isolation \(Page 22\).](#)

Drive Controls

Steering Wheel

Turn the steering wheel in the direction you want to go. [Refer to: Component Locations \(Page 18\).](#)

The steering wheel incorporates an assister knob for single handed operation.

This machine is a 4-wheel steer machine. Before you drive the machine, understand how the three steer modes change the operation of your machine (for example, the machines turning circle). [Refer to: Steer Mode Control \(Page 54\).](#)

Steering Column

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

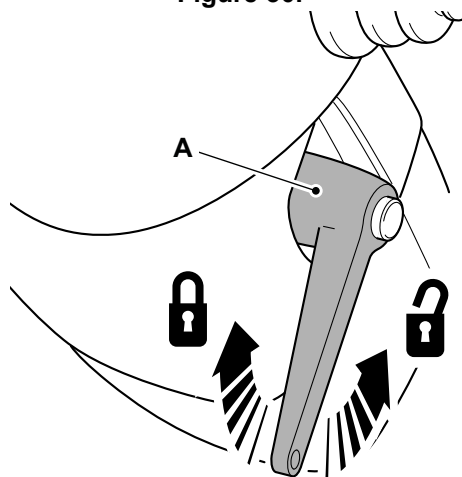
The steering column angle can be adjusted to suit the operator and to allow easier access for entering and leaving the cab.

To adjust the steering column:

1. Hold the steering wheel, complete turn the lever in a counter clockwise direction to unlock the steering column.
2. Adjust the steering column to the required position.
3. Turn the lever in a clockwise direction to lock the steering column.

To adjust the position of the lock lever, pull the lever and move to the required position.

Figure 30.



A Lever

Accelerator Pedal

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.

Service Brake Pedal

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

The brake pedal is in two parts so that you can use either foot to operate the brakes. Note that the two parts are linked together, depressing either side applies all brakes and they do not operate independently.

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

Park Brake

▲ WARNING Be careful, if the park brake is not functioning and the drive controls are in neutral the machine will roll down the slope. To stop the machine engage drive controls.

WARNING The park brake must not be used to slow the machine from traveling speed, except in an emergency, otherwise the efficiency of the brake will be reduced. Whenever the park brake has been used in an emergency the brake pack must be checked. Contact your JCB dealer.

Use this lever to engage the park brake before leaving the machine.

The park brake lever is located on the floor of the cab, to the left of the operator seat.

The transmission drive is automatically disconnected when the park brake is engaged.

Pull the lever up to apply the park brake.

506-36 machines only: If the park brake is engaged when forward/reverse is selected, the park brake engaged indicator will come on.

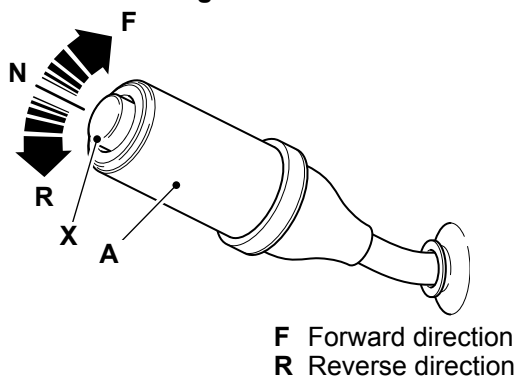
All other machines: The indicator will be illuminated when the park brake is applied.

Squeeze the release lever and lower the lever to release the park brake. [Refer to: Component Locations \(Page 18\).](#)

Transmission Drive Lever

▲ WARNING You and others can be 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 below for proper use of this selector.

Figure 31.



A hand operated drive lever controls the direction of the machine.

The drive lever has three positions, forward (F), reverse (R) and neutral (N).

Stop the machine before moving the lever. To select forward (F), reverse (R) or neutral (N), 'lift' and move the lever to the required position. All four gears are available in forward and reverse. When reverse is selected an alarm will sound. The engine will only start if the lever is at neutral.

The lever has detent positions in forward, reverse and neutral. Pull the lever towards you to move the lever from the detent position.

If the park brake is engaged when forward/reverse is selected, the park brake indicator will illuminate and the warning buzzer will sound.

Drive Selection

To select the drive:

1. Stop the machine.
2. Apply the service brake.
3. Let the engine speed drop to idle.
4. Select the required direction.
5. Release the service brake and accelerate.

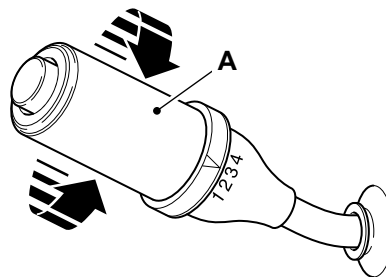
Horn

The horn button is at the end of the forward/reverse lever. Push the button to operate the horn. It functions only with the starter switch set to on.

Gear Lever

▲ CAUTION Gear or direction changes on this machine will only occur at a predetermined speed, this may result in gear/direction change delays. To prevent unexpected gear changes only select gears or direction as they are required.

Figure 32.



A Switch barrel

When the machine is stationary, before you select a gear, make sure the drive lever is set to the neutral position and engine is at idle speed.

To select a gear on the move, rotate the switch barrel so that the arrow marked on it aligns with the required gear.

You do not need to press the transmission dump switch.

The machine can be moved in any gear depending on the ground conditions.

Transmission Dump Switch

The transmission dump allows you to disconnect the transmission to improve the hydraulic performance by reducing the engine load. There are two options depending on machine type and control lever(s).

Transmission Dump Switch

The transmission dump switch can be found on the control lever. [Refer to: Component Locations \(Page 18\).](#)

Steer Mode Control

▲ **CAUTION** With 4-wheel steer, the back end of the machine will swing out when you make a turn. Check for clearance before making a turn.

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

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

The steer mode selector is used to select the most suitable steer mode for the terrain and type of work you do.

This machine is a 4-wheel steer machine. Before you drive the machine, understand how the steer modes change the operation of your machine. [Refer to: Steer Modes \(Page 79\)](#).

For effective steering response you must re-phase the steering:

- At least once per day.
- If difficulty in steering.
- After traveling for 24km (15mi) or more on the road (in 2-wheel steer).

Instruments

Instrument Panel

For: 506-36 [T4F] Page 55

For: 507-42 [T4F], 509-42 [T4F], 510-42 [T4F], 510-56 [T4F], 512-56 [T4F], 514-56 [T4F] Page 58

(For: 506-36 [T4F])

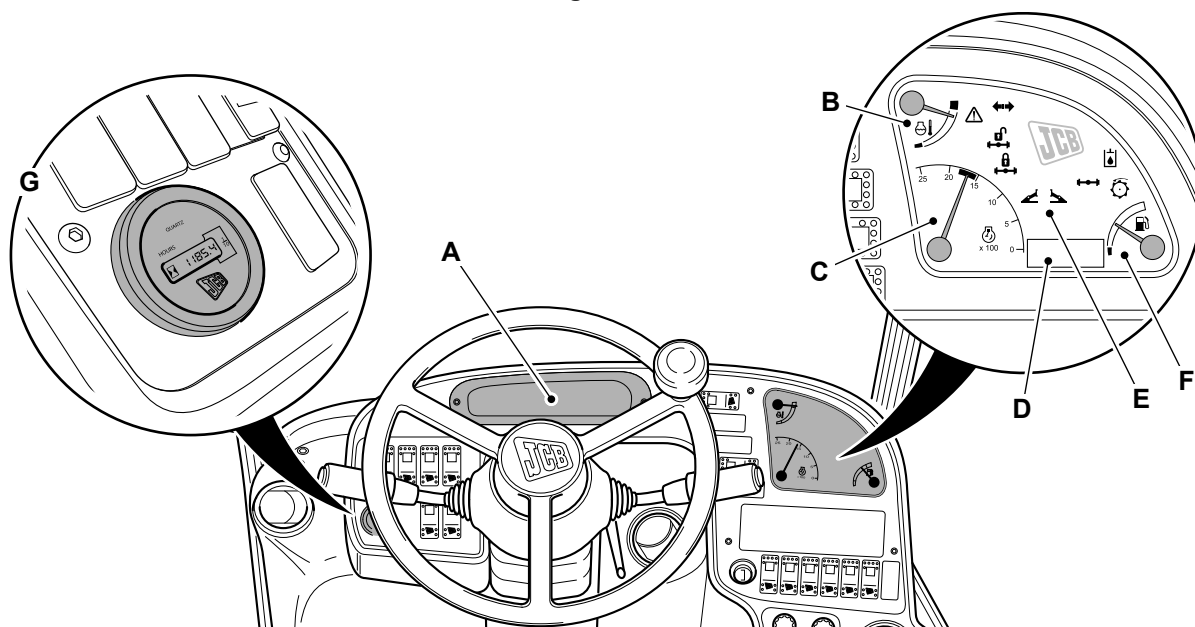
The instruments and indicator lights are grouped together on an instrument panel.

As well as indicator lights for the turn signals, high 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 (the four-way flasher indicator will still operate if the four-way flashers are switched on.)

Figure 33.



A Warning cluster
C Tachometer
E Warning lights
G Hourmeter

B Coolant temperature gauge
D Digital display
F Fuel Level Gage

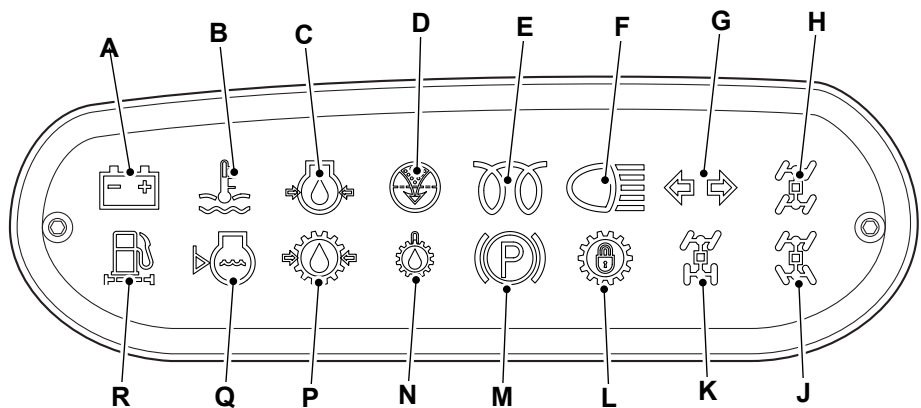
Warning cluster

⚠ CAUTION If any of the audible/visual warnings operate while the engine is running, stop the engine as soon as it is safe to do so and rectify the fault.

When the starter switch is set to position I:

- An audible alarm will sound. The alarm should stop when the engine is started.
- All the warning cluster lights should illuminate briefly as a bulb and system check.

Figure 34.



- A** No Charge - Audible/Visual. Lights if the battery charging circuit fails while the engine is running. The light should go out a few seconds after the engine is started.
- B** Not used.
- C** Engine Oil Pressure Low - Audible/Visual. Operates if the engine oil pressure drops too far. The light should go out when the engine is started.
- D** Air Filter Blocked- Audible/Visual. Lights if the engine air filter blocks up.
- E** Cold Start - Visual Only.
- F** High Beam On - Visual only. Lights up when the headlight high beams are switched on.
- G** Turn Signals - Visual only. Flashes with the turn signals.
- H** Not used.
- J** Not used.
- K** Not used.
- L** Not used.
- M** Park Brake Engaged - Visual only.
- N** Transmission Oil Temperature High - Audible/Visual. Lights if the transmission oil temperature rises too far.
- P** Transmission Oil Pressure Low - Audible/Visual. Lights if the transmission oil pressure drops too far. The light should go out when the engine is started.
- Q** Low Level Coolant Indicator - Audible/Visual. Lights up when the coolant level is low, top up as soon as it safe to do so.
- R** Water in Fuel Indicator - Audible/Visual. Lights up when there is water in the fuel system. Drain the water separator and engine filter.

Coolant Temperature Gauge

Indicates the temperature of the engine coolant. The gauge pointer will gradually swing upwards as the coolant temperature increases. When the coolant temperature enters the red zone, an alarm will sound and the MIL (Malfunction Indicator Lamp) will illuminate. These warnings will remain active until the temperature drops below the red zone. Stop the machine as soon as safety permits and switch off the engine. This will allow the temperature to reduce.

Tachometer

Indicates the engine speed in RPM (Revolutions Per Minute). The RPM is shown on the outer ring. Each division is 100 RPM. A green band on the scale indicates the RPM which gives best fuel economy. Operate within that band whenever possible.

Digital Display

System faults are displayed as messages on the LCD (Liquid Crystal Display). Each message consists of two parts. For example:

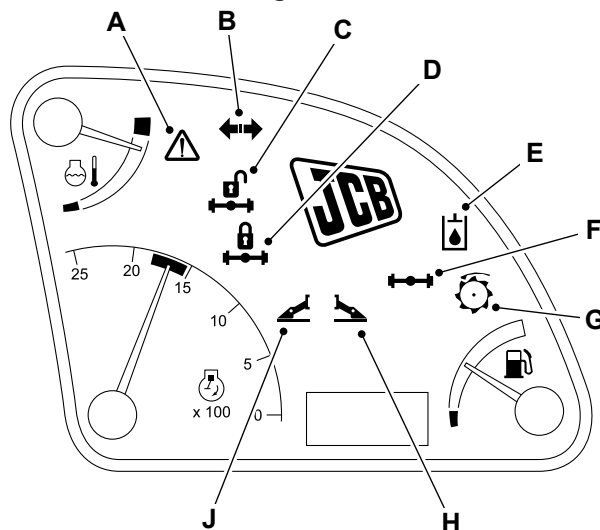
Table 13.

SERVICE	D001
1	2

1. The level of severity, either Critical or Warning.
 - 1.1. Critical Fault (stop now) - Indicates that the machine will be damaged unless it is stopped. Critical faults can not be acknowledged. When a critical fault is detected, the red MIL comes on (and an audible alarm sounds) to indicate that the machine will be damaged unless it is stopped. Stop and park the machine as soon as safety permits. Switch off the engine. Contact your JCB distributor.
 - 1.2. Warning Fault (service) - Indicates that the machine function will be impaired until the error is rectified. Press the Information switch for 3 seconds to acknowledge a service error. Press the information button again to scroll through existing fault codes. If a new warning occurs or a warning clears and re-occurs then the service message is displayed again. When warning faults occur, the amber MIL comes on and an audible alarm sounds for 1 second to indicate that the machine function will be impaired until the error is rectified. Take the machine for maintenance/repair as soon as convenient.
2. The fault code. This code is specific to the active fault and can be used to aid fault diagnosis.

Warning Lights

Figure 35.



- | | |
|-----------------------------------------------------------------------------------|------------------------------------------------------|
| A MIL | B Not used. |
| C RAS (Rear Axle Stabilization) System - Cushioned Mode Indicator (option) | D RAS System - Locked Mode Indicator (option) |
| E Hydraulic Isolation - Fault Indicator (option) | F RAS System - Fault Indicator (option) |
| G Not used. | H Right-Hand Stabilizer Indicator (option) |
| J Left-Hand Stabilizer Indicator (option) | |

Malfunction Indicator Lamp (MIL)

Amber/Red light. The MIL light comes on to show that a system error has been detected.

- Red Light. The light comes on (and an audible alarm sounds) to indicate that the machine will be damaged unless it is stopped. Stop and park the machine as soon as safety permits. Switch off the engine. Contact your JCB distributor.
- Amber light. The light comes on (and an audible alarm sounds) to indicate that the machine function will be impaired until the error is rectified. Take the machine for maintenance/ repair as soon as convenient.

Rear Axle Stabilization (RAS) System - Cushioned Mode Indicator

Green Light. The light comes on when the RAS system operates in cushioned mode.

Rear Axle Stabilization (RAS) System - Locked Mode Indicator

Green Light. The light comes on when the RAS system operates in locked mode.

Hydraulic Isolation - Fault Indicator

Red Light. When the light comes on sway and stabilizers will not operate. Set the sway and stabilizer controls to the neutral (central) position. The light should go out.

Rear Axle Stabilization (RAS) System - Fault Indicator

Green Light. When the light comes on the red or amber MIL will also come on. Follow the standard procedures when the amber or red MIL light comes on.

Right-Hand Stabilizer Indicator

Green Light. The light comes on when the righthand stabilizer is in the down position and the weight of the machine is supported.

Left-Hand Stabilizer Indicator

Green Light. The light comes on when the left-hand stabilizer is in the down position and the weight of the machine is supported.

Fuel Level Gage

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

Hourmeter

Records the total running time of the engine. The total running time of the engine is shown in increments of 0.1 hours (i.e. 1185.4 hours).

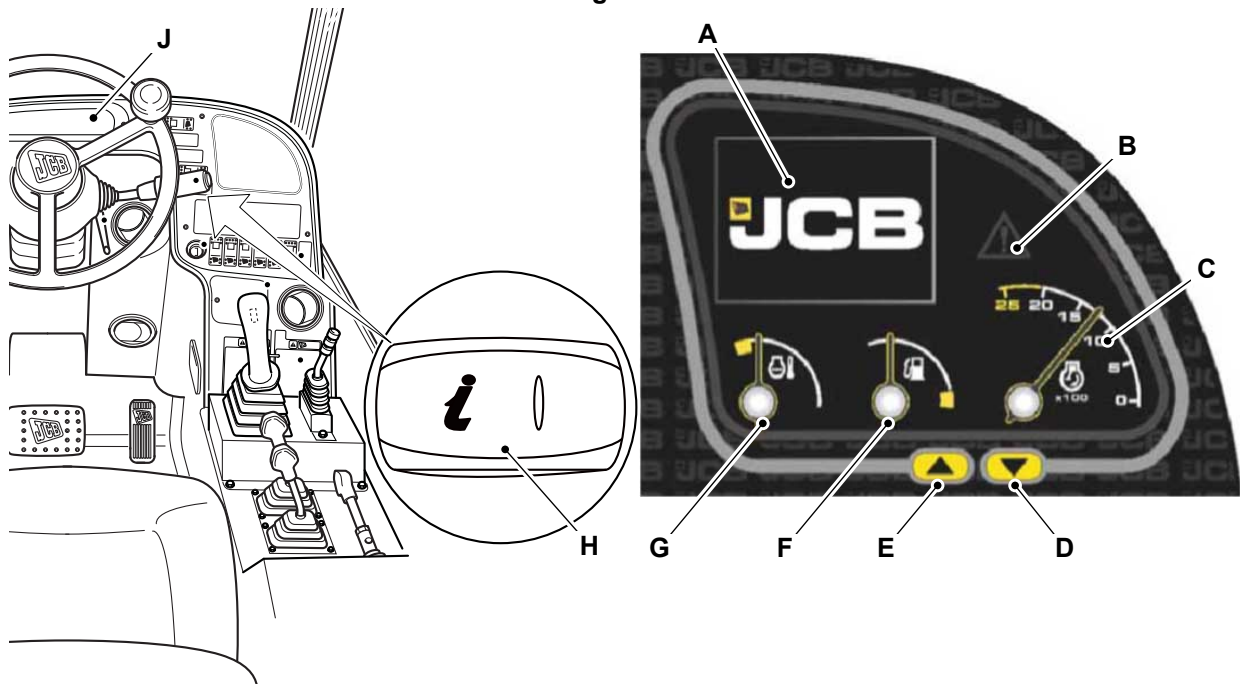
(For: 507-42 [T4F], 509-42 [T4F], 510-42 [T4F], 510-56 [T4F], 512-56 [T4F], 514-56 [T4F])

The instrument panel, warning indicator and warning lights are located in the dash panel at the front of the cab in the line of sight from the operator's seat.

It provides the interface with the machines electronic system.

You can navigate through different screens shown on the LCD display screen using the up and down navigation buttons and information switch.

Figure 36.



- A Display screen
- C Tachometer
- E Navigation button - up
- G Coolant temperature gage
- J Warning lights

- B Warning indicator (amber/red)
- D Navigation button - down
- F Fuel level gage
- H Information switch

Display screen

The LCD screen displays information such as current machine status, machine setup, service information and fault logs. Refer to Figure 36.

Warning indicator

The warning indicator will light up amber whenever there is a warning error. A buzzer will sound for 1s when there is a service fault. This fault can be acknowledged via the fault log screen. Refer to Figure 36.

The warning indicator will light up red whenever there is a critical error. A buzzer will sound when there is a critical fault. Some critical errors are acknowledgeable some are not.

Tachometer

Indicates the engine speed in revolutions per minute. Refer to Figure 36.

Navigation button (Down)

Used to navigate through the various options on the LCD screen. Refer to Figure 36.

Navigation button (Up)

Used to navigate through the various options on the LCD screen. Refer to Figure 36.

Fuel level gage

Indicates the level of diesel fuel in the tank. Do not let the tank run dry, or air will enter the fuel system. When the fuel level enters the red zone, an alarm will sound and the warning indicator lamp will illuminate. Refer to Figure 36.



Coolant temperature gage

Indicates the temperature of the engine coolant. The gage pointer will gradually swing upwards as the coolant temperature increases. When the coolant temperature enters the red zone, an alarm will sound and the warning indicator lamp will illuminate. Refer to Figure 36.

Information switch

The information switch is used to perform different actions: Refer to Figure 36.

- Short Press - Pressing the information button for less than 2s allows the operator to cycle through the main screens.
- Long Press - Pressing the information button longer than 2s allows the operator to enter the displayed screen.

Main Display Screens

Start-Up Screen

When the ignition switch is switched on the JCB logo is displayed. After 3s the display will show the default operating screen.

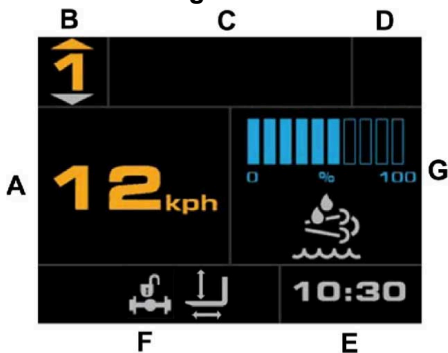
Figure 37.



Default Operating Screen (Home Screen)

Displays the DEF (Diesel Exhaust Fluid) level, machine travel speed, transmission and gear information, steer mode, clock and machine status.

Figure 38.



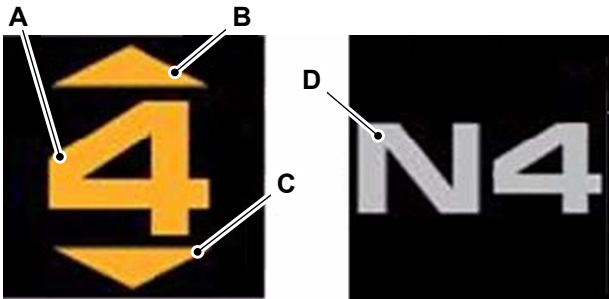
- | | |
|----------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| A Travel speed | B Transmission FNR and gear information |
| C Transmission status and SCR (Selective Catalytic Reduction) status tray | D Not used |
| E Clock/machine hours | F Machine status tray (stabilizers, RAS, joystick configuration) |
| G DEF level | |

Travel Speed

Normally displays the speed of the machine. This section is also used when a notification is activated.

Transmission FNR and gear information

Figure 39.



- A Active gear information
- C Reverse arrow icon

- B Forward arrow icon
- D Neutral

Displays the gear and direction of the machine.

The current selected gear will be displayed in solid yellow.

When a gear change request is acknowledged by the transmission, but has not yet been carried out, the requested gear will be displayed in flashing yellow until the shift takes place. Requested shifts can be canceled by shifting in the opposite direction. Both multiple changes and downshift protection can delay shifts.

The forward arrow will be shown if a forward gear is selected.

The reverse arrow will be shown if a reverse gear is selected.

If neutral is selected the icon N and the previously selected forward gear will be shown.

Transmission Status Symbols

Displays the current transmission status. There are more icons than space in the transmission icons tray, you will always have a notification when a status changes, however only the most important status icons will be displayed.

Table 14.




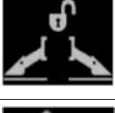

	Park brake active
--	-------------------

Machine Status Symbols

Displays the status of various hydraulic systems of the machine. There are more icons than space in the machine status tray. You will always have a notification when a status changes, however only the most important status icons will be displayed.

Table 15.

	Left stabilizer deployed
	Right stabilizer deployed

	Rear axle stabilization status - unlocked
	Rear axle stabilization status - locked
	Stabilizer locked status - unlocked
	Stabilizer locked status - locked
	Joystick configuration - placing pattern




Notification Screens

The notification screen displays temporary operator messages such as operator requested mode changes, user input screens, etc.




When a request becomes active, the primary information is displayed on the left half of the main display screen and the notification is displayed on the right side of the main display screen. A buzzer may sound to notify the operator that a request has been acknowledged.

If multiple operator notifications become active, only the latest active notification is displayed.

Table 16.

Icon	Event	Buzzer
	Audible/Visual. Cab heater fan speed setting. Number of yellow bars corresponds to current fan speed setting.	No
	Audible/Visual. Air conditioning system active.	No
	Audible/Visual. Air conditioning system canceled.	No



Icon	Event	Buzzer
	Audible/Visual. Grid heater active.	No
	Audible/Visual. Stabilizer isolation active.	No
	Audible/Visual. Stabilizer isolation canceled.	No

Secondary Level Display Screens

Pressing the information switch and navigation arrows will take the operator to the secondary level display screens.

Press the information switch for less than 2s to cycle through the main screens.

Figure 40.



Machine status screen

Figure 41.



Service information screen

Figure 42.



Machine setup screen

Figure 43.



Fault log screen

Press the information switch for longer than 2s to enter the displayed screen.

Press the arrows to navigate up and down within the main screens.

Machine Status

To see the machine status information:

Go to the machine status screen.

Press the information switch for more than 2s to see the machine status.

Figure 44.



A Battery voltage
C Not used

B Coolant temperature
D Engine RPM

Figure 45.



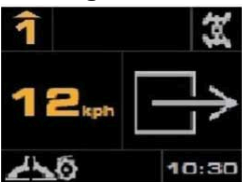
E Not used

F Engine air intake temperature

Press the navigation arrows to switch between the screens.

Press the information switch again for less than 2s to the exit screen.

Figure 46.



Exit screen

Press the information switch again for more than 2s to return to the default operating screen (home screen).

Service Information

To see the service information:

Go to the service information screen.



Press the information switch for 20s to see the service information.

Press the navigation arrows to switch between the screens.

Figure 47.



- A Engine hours
- B Machine type
- C Machine serial number
- D Next service interval

Figure 48.



- E Time to next service
- F Right hand cluster hardware version number
- G Right hand cluster software version number
- H Tire diameter

Figure 49.



- J Axle ratio

The machine option screens allow the dealer to identify the options installed and the status of each option.

Figure 50.



- K Machine options screen 1

Figure 51.



- L Machine options screen 2

Press the information switch again for less than 2s to display the last screen.



Figure 52.



Exit screen

Press the information switch again for more than 2s to return to the default operating screen (home screen).

Machine Setup

The machine setup screen allows the operator to configure the time, date, brightness, etc.

Press the information switch for less than 2s to display the main screen.

Press the navigation arrows to scroll down to the machine setup screen.

Press the information switch for more than 2s to active the machine setup screen.

Press the navigation arrows to switch between the available options on the screen.

Figure 53.



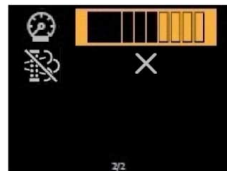
A Clock

C Units of measure

B Date

D Display screen brightness

Figure 54.



E Gage backlight brightness

F Automatic refresh inhibit

Press the information switch again for less than 2s to display the last screen.

Figure 55.



Exit screen

Press the information switch again for more than 2s to return to the default operating screen (home screen).

Time Setup

To setup/adjust the time:

1. Go to the machine setup screen.

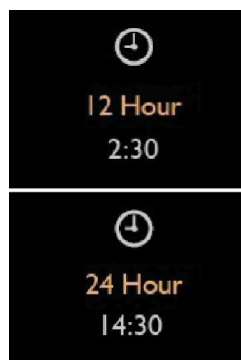
2. Press the navigation arrows to select the clock.

Figure 56.



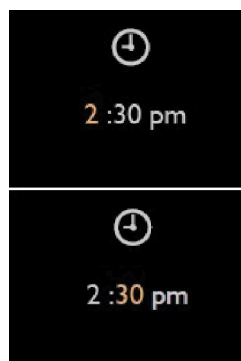
3. Press the information switch for more than 2 seconds.
4. Press the navigation arrows to select the time format.

Figure 57.



5. Press the information switch for 2 seconds to adjust the clock.
6. Press the information switch for 2 seconds to switch between the hours and minutes. Use the arrows to adjust the values.

Figure 58.



7. Press the information switch for more than 2 seconds to confirm the setup.

Date Setup

To setup the date:

1. Go to the machine setup screen.
2. Press the navigation arrows to select the date.

Figure 59.



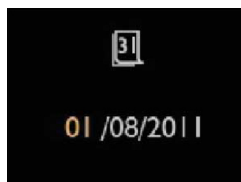
3. Press the information switch for more than 2 seconds.
4. Press the navigation arrows to select the date format.

Figure 60.



5. Press the information switch for 2 seconds to adjust the date.
6. Press the information switch for 2 seconds to switch between the day, month and year values. Use the arrows to adjust the values.

Figure 61.



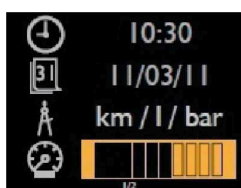
7. Press the information switch for more than 2 seconds to confirm the setup.

Brightness

To adjust the brightness of gage backlight or display screen:

1. Go to the machine setup screen.
2. Press the navigation arrows to select the brightness band.

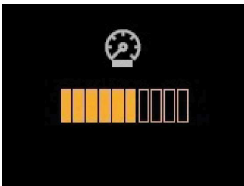
Figure 62.



3. Press the information switch for more than 2 seconds.

- Press the navigation arrows to increase or decrease the brightness.

Figure 63.



- Press the information switch for more than 2 seconds to confirm the setup.

Automatic refresh inhibit

Use this menu item enable/disable the automatic refresh.

- Go to the machine setup screen.
- Press the navigation arrows to select the inhibit feature.
- Auto refresh inhibit active (tick mark), auto refresh inhibit not active (X mark).
- Press the information switch for more than 2 seconds to confirm the setup.

Fault Log

The fault log screen provides information on the active and previously active faults on the machine. The fault log display screen shows the fault code, time, date, engine hours and number of times that the fault has been active. By default, the fault log display shall only show the active faults. It shall be possible to view active and historical faults by going to the diagnostic menu. Faults shall be displayed in the color of their severity (critical = red, warning = yellow, trivial = gray).

Figure 64.

<div> <div>🔧</div> <div>🕒</div> <div>📅</div> <div>⌚</div> <div>#</div> </div>					
E301	10:30	11/01/11	10000.5	999	
E302	10:30	11/01/11	10000.5	999	
E303	10:30	11/01/11	10000.5	999	
E304	10:30	11/01/11	10000.5	999	
E305	10:30	11/01/11	10000.5	999	
E306	10:30	11/01/11	10000.5	999	
1/2					

If a service fault or critical acknowledgable fault is recognized by the machine electronic system a fault icon and fault code is displayed on the right side of the home screen. The fault indicator is illuminated amber or red. The buzzer sounds for a very short time when a fault is active. The code will remain until it is acknowledged by pressing the information button.

Figure 65.



When a critical non-acknowledgable fault is active, the left area of the main screen will show the fault icon and right area of the main screen will show the fault code. The fault indicator is illuminated red. The buzzer sounds when a critical fault is active. It sounds until the critical fault is no longer active.

Figure 66.



Figure 67.



Figure 68.



Warning/Fault Icons

There are three levels of warnings each is represented by a different color. Depending on the level of severity it may or may not be acknowledged by the operator. Some icons are available at all three levels but are not shown below:

- Yellow - acknowledged
- Critical red - not acknowledged
- Critical red (50% screen size) - acknowledged

Table 17.

	Transmission		Stabilizer		Transmission pressure
	Exhaust treatment		Joystick		
	Telematics		Immobilizer		Brake
	Adblue level		Engine		Engine oil pressure
	Coolant temperature				Steer
	RAS		Hydraulics		Exhaust treatment refresh
	Transmission temperature		CAN		Foot brake press

	Fuel level		Indicator lamp		Reverse alarm
	Water in Fuel				Ground speed
	Sway		Air filter		Battery
	Coolant level		Engine oil level		
	HVAC		Brake light		

Warning Lights

⚠ CAUTION If any of the audible/visual warnings operate while the engine is running, stop the engine as soon as it is safe to do so and rectify the fault.

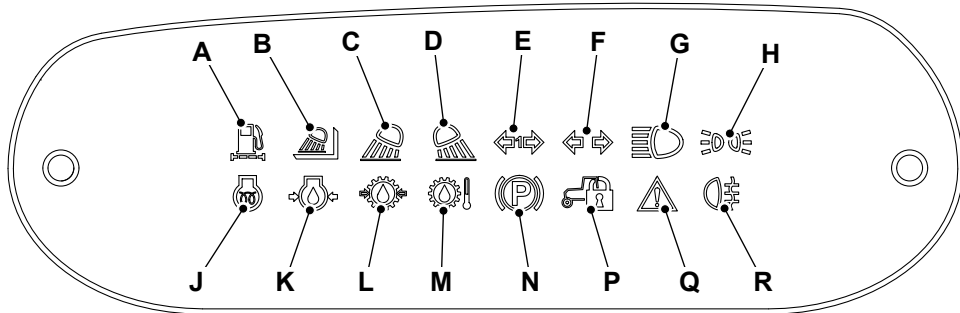
The warning lights are grouped together on a panel located on the dash board.

When a warning light comes on an alarm will sound (depending on security of the condition). The only way to cancel the alarm is to set the ignition switch to position '0'. The problem can then be rectified.

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 ignition switch is set to off (the hazard warning indicator will still operate if the hazard warning lights are switched on).

Figure 69.



- A** Low fuel indicator - Not used. Information displayed on instrument panel.

C Front work light - Visual (Amber Light). Illuminates when the front work lights are switched on.

E Trailer indicator - Visual Only (Green Light). Flashes with the trailer indicators.

G Main beam - Visual only (Blue light). Illuminates when the headlight main beams are switched on.

J Grid heater - Not used. Information displayed on instrument panel.

L Transmission oil pressure - Visual (Red light). Illuminates if the oil pressure drops below the normal working pressure.
- B** Boom work light - Visual (Amber Light). Illuminates when the boom work lights are switched on.

D Rear work light - Visual (Amber Light). Illuminates when the rear work lights are switched on.

F Direction indicators - Visual only (Green light). Flashes with the direction indicators.

H Side lights - Visual only (Green light). Illuminates when the side lights are switched on.

K Engine oil pressure - Visual only (Red light). Operates if the engine oil pressure drops below the normal working pressure.

M Transmission oil temperature - Not used. Information displayed on instrument panel.



- N** Park brake engaged - Visual (Red light).
Illuminates when the park brake is engaged.



Q Master warning - Not used. Information
displayed on instrument panel.
- P** Not used.

R Fog lights - Visual only (Amber light). Illuminates
when the fog lights are switched on.

SCR Exhaust After Treatment

Notification Symbols

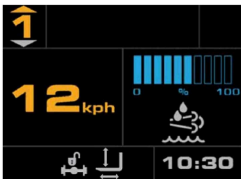
Table 18.

	Low DEF, derate warning - flashing/solid - amber icon.
	Low DEF derate warning - flashing/solid - red icon.

DEF Level

The LCD permanently displays the DEF level bargraph. Each bar represents approximately 10% of tank volume.

Figure 70.



As the DEF level depletes to low, warning icons and notification symbols and warning icons are displayed. The intensity of the warnings symbols and indicator changes as follows as the DEF level depletes further:

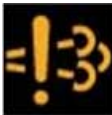
- Amber warning icon. Operator warning, fill up this shift.

Figure 71.



- Flashing amber notification symbol. Operator warning, fill up now.

Figure 72.



- Red warning icon. 0% DEF, fill up now. Initial derate starts.

Figure 73.



- Solid amber icon. Derate condition, fill up now.

Figure 74.



- Flashing red notification symbol. Second stage derate condition, fill up now.

Figure 75.



- Solid red notification symbol. Forced idle, machine unusable, fill up now.

Figure 76.



Getting the Machine Moving

General

▲ **WARNING** 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 forward when loaded. Going downhill, travel forward 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.

WARNING Do not dismount a moving machine.

WARNING Always drive a loaded machine forward uphill and in reverse downhill. Always drive an unloaded machine in reverse uphill and forward downhill.

The machine can be put in motion in any gear. But do not over work the engine unnecessarily by using too high a gear for example, on a hill. Operating in too high a gear will overheat the torque converter fluid. When moving the machine, keep it under control at all times. Stay alert for obstructions and possible hazards.

Do not use the pedals as footrests. Do not coast the machine in neutral, you will not have full control. Also, coasting the machine will damage the transmission.

Do not turn on or drive across a slope. Select the necessary gear before starting down a slope. Use the same gear you would use to go up the slope. Do not change gear on the slope.

If the load will be pushing the machine on a downslope, select first gear (1) before starting downhill. Use the brake pedal to prevent overspeeding down a slope.

Approach deep mud in first gear (1) with the front wheels straight.

Take particular care when reversing. If the machine has mirrors, make sure your view of the mirrors is not obstructed. Ensure that the way behind is clear before reversing. Ensure that the reverse alarm is functioning correctly and can be heard clearly by people around the machine.

Various types of reverse alarm can be installed on your machine, to suit different operating environments. There may be local regulations which control the type of reverse alarm which may be used in particular areas. Make sure the correct type of reverse alarm is installed on your machine.

LSD (Limited Slip Differential) is an option which can be specified on some machines to enhance traction in difficult conditions. This is achieved by transferring a high proportion of the available driving torque from the spinning wheel to the gripping wheel. The limited slip differential operates automatically and should not be confused with differential locks. Wheel slip is an indication that the limited slip limit has been reached. On high traction surfaces (concrete etc.) noise and judder may be experienced when the LSD is operating, particularly on full steering lock. The level of noise depends on the weight of the machine, the ground conditions and steering angles. Noise in the LSD is not an indication of axle damage. is not an indication of axle damage.

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

All machines maximum laden travel speed first gear 10km/h (6.2mph). Also for the 512-56 and 514-56 machines do not exceed 5km/h (3.1mph) (first gear) if traveling with more than 4536kg (10000lb) on the forks

1. Check your seat belt and seat.
 - 1.1. Make sure that your seat belt is correctly fastened.
 - 1.2. Make sure that the seat is correctly adjusted.

CAUTION! *With 4-wheel steer, the back end of the machine will swing out when you make a turn. Check for clearance before making a turn.*

2. Select the required steer mode. Remember that the steering may temporarily remain in the last selected mode until the rear wheels pass through the 'straight ahead' position.

WARNING! *You or others can be killed or injured if you suddenly change from forward to reverse, or vice versa, when traveling. Exaggerated and unnecessary movements of the lever(s) may rapidly reverse the*

travel direction of the machine without warning to others. Always follow the recommended procedure for changing between forward and reverse drive.

WARNING! *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.*

3. Engage a gear. Select the required gear using gear select switch.
4. Check the boom is in the travel position.
5. Push the brake pedal(s) hard down.
6. Select forward or reverse. If the park brake is engaged when forward/reverse is selected, the Park Brake Engaged Indicator will come on and an audible alarm will sound.
7. Release the park brake.
8. Make sure it is safe to move off, then release the brake pedals and push down on the accelerator pedal. The machine will move smoothly away.

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

9. While the machine is traveling slowly, check the steering and brakes. Do not drive the machine unless the steering and brakes are working correctly. If you are not sure, assume they are faulty.

Slopes

General

- ▲ **WARNING** Make sure that you have been trained and are familiar with the use of machines on slopes, and understand the adverse effects that slopes and site conditions can have on stability. Never use the machine on a slope if you do not understand the recommended practices for the use of machines in such applications.

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 assessment identifies.

Driving on Slopes

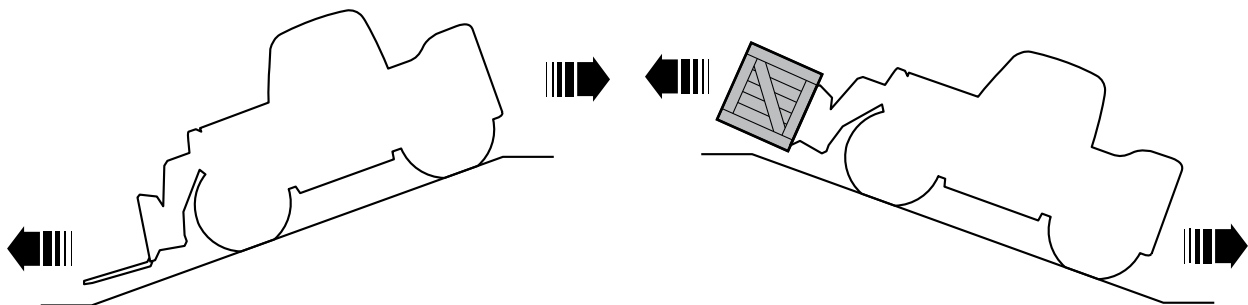
Driving Up and Down Slopes

- ▲ **WARNING** 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 forward when loaded. Going downhill, travel forward 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.

To get the maximum traction when you drive on a slope:

- 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.

Figure 77.



Driving Across Slopes

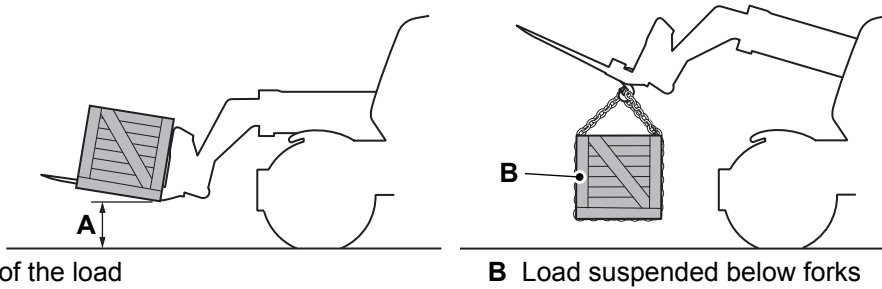
To get the maximum stability, operate the machine on solid, level ground. The stability of the machine is decreased when it is driven across a slope.

When you drive across a slope, fully retract the boom and drive slowly at walking pace.

Do not lift the carriage more than necessary. This is normally when the lowest point of the load is not more than 500mm (19.7in) above the ground, with a load which is carried on top of the forks. Some loads may be carried suspended below the forks, as shown. In this case, assess the risk involved before raising the carriage sufficiently to achieve ground clearance.

Remember, be careful and be safe. Your life or the lives of others can be in danger if you take unnecessary risks.

Figure 78.



A Lowest point of the load

B Load suspended below forks

Working on Slopes

Lifting Operations on Slopes

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

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

It is recommended that the machine is operated on solid, level ground where possible for the maximum machine stability.

A lifting operation should not be done on a slope, unless the machine is level across its width (laterally level).

The longitudinal and lateral stability are the two important safety factors that must be considered if the boom is to be extended, or raised by more than 500mm (19½in) above the ground with the machine on a slope.

Longitudinal Stability

Always operate the machine within the longitudinal stability limits indicated by the load chart.

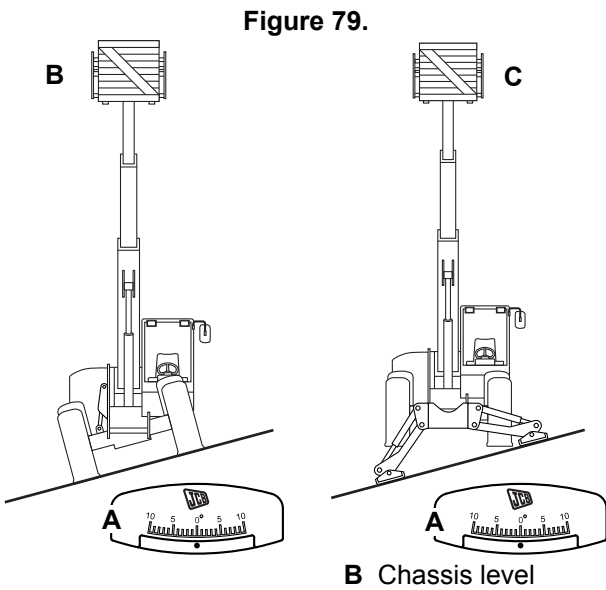
Lateral Stability

Make sure the machine is level across its width to maintain lateral (sideways) stability.

An inclinometer can be used to check if the machine is level.

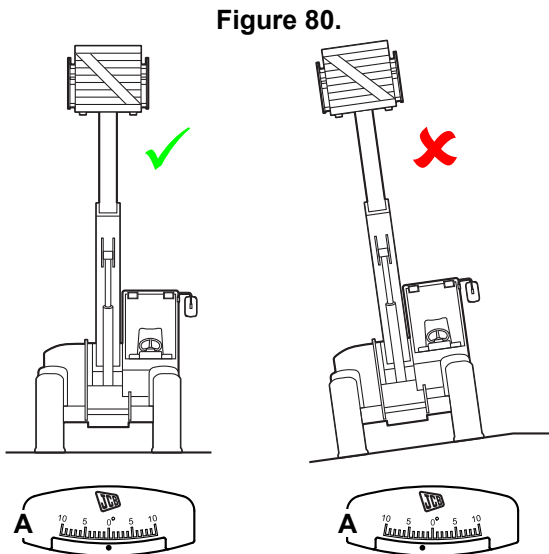
Machines with chassis leveling (sway) option can be made level across their width using the sway control facility.

Machines with stabilizers can be made level across their width using the stabilizers.



It is recommended that the machine should be operated on firm, level ground wherever possible for maximum machine stability.

If the machine cannot be made level across its width, the operator must complete a risk assessment before attempting a lifting operation.



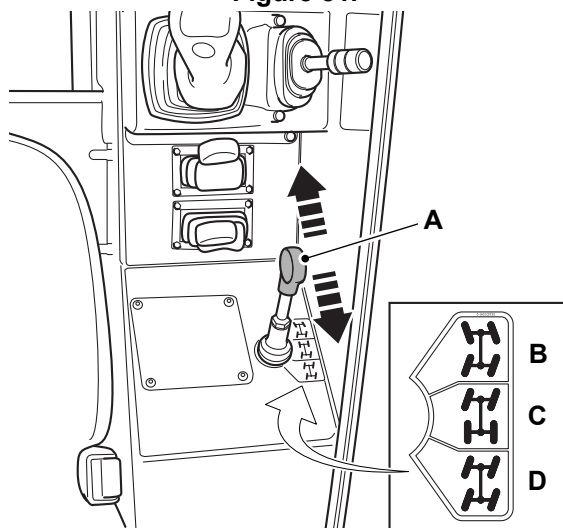
Driving the Machine

Steer Modes

To change the steer mode:

1. Stop the machine. Select the neutral position on the forward/reverse lever.
2. Turn the steering wheel until all the wheels are pointing in the straight ahead position.
3. Use the steer mode selector lever to select the steer mode required.

Figure 81.



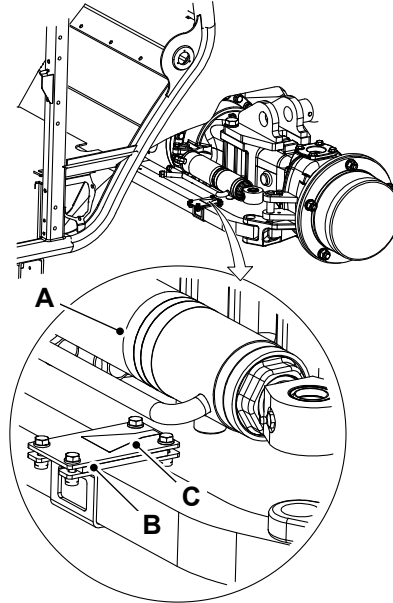
A Steer mode selector lever
C 2-wheel steer

B 4-wheel steer
D Crab steer

To align the wheels:

1. Stop the machine. Select the neutral position on the forward/reverse lever.
2. Use the steer mode selector lever to select 4-wheel steer.
3. Turn the steering wheel until the rear wheels are pointing in the straight ahead position and the steer alignment decals are aligned (if fitted).

Figure 82.

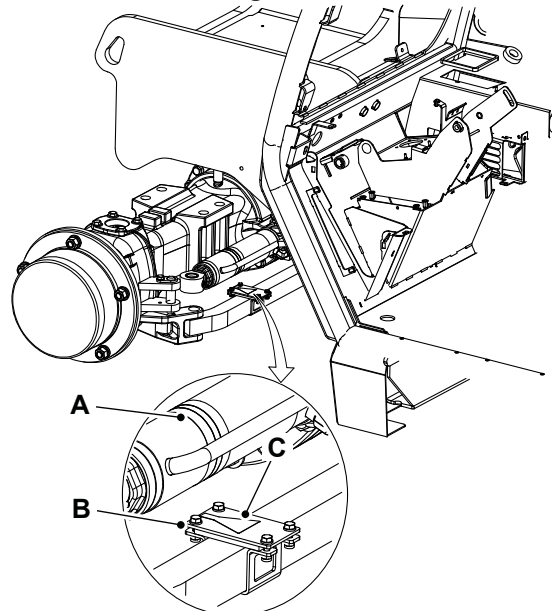


- A** Strap decal - Steer ram
- C** Arrow decal - Rear axle

B Bracket

4. Use the steer mode selector lever to select 2-wheel steer.
5. Turn the steering wheel until the front wheels are pointing in the straight ahead position and the steer alignment decals are aligned (if fitted).

Figure 83.

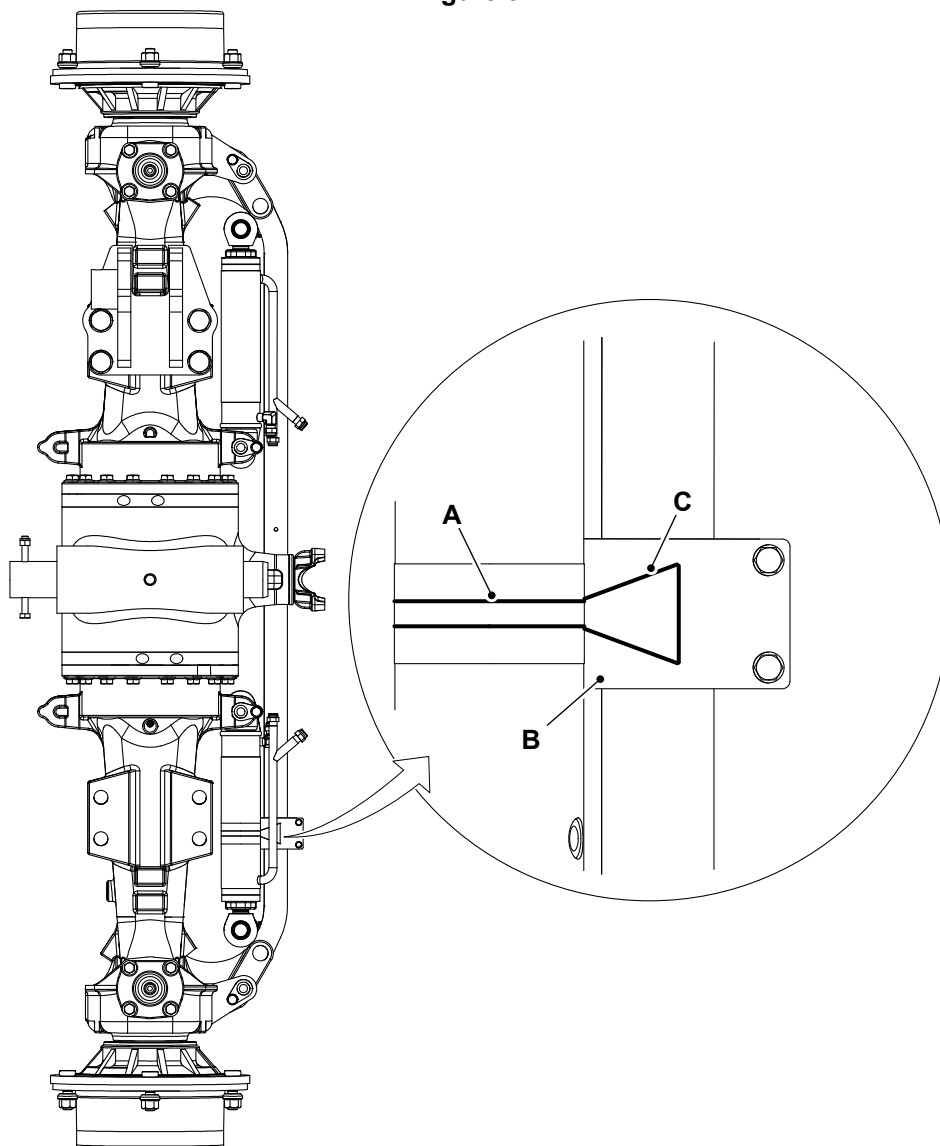


- A** Strap decal - Steer ram
- C** Arrow decal - Front axle

B Bracket

6. When the wheels are in the straight ahead position the arrow decal will line up with the strap decal (if fitted).

Figure 84.



A Strap decal - Steer ram
C Arrow decal

B Bracket

7. All wheels are now pointing straight ahead, select the steer mode required and continue in the normal manner.

Limited Slip Differential (LSD)

This is an option which can be specified on some machines to improve the traction in difficult conditions. This is achieved by transferring a high proportion of the available driving torque from the spinning wheel to the gripping wheel. The LSD (Limited Slip Differential) operates automatically and should not be confused with differential locks.

Wheel slip is an indication that the limited slip limit has been reached. On high traction surfaces (concrete etc.) noise and judder may be experienced when the LSD is operating, particularly on full steering lock. The level of noise depends on the weight of the machine, the ground conditions and steering angles. Noise in the LSD is not an indication of axle damage.

Towing Other Equipment

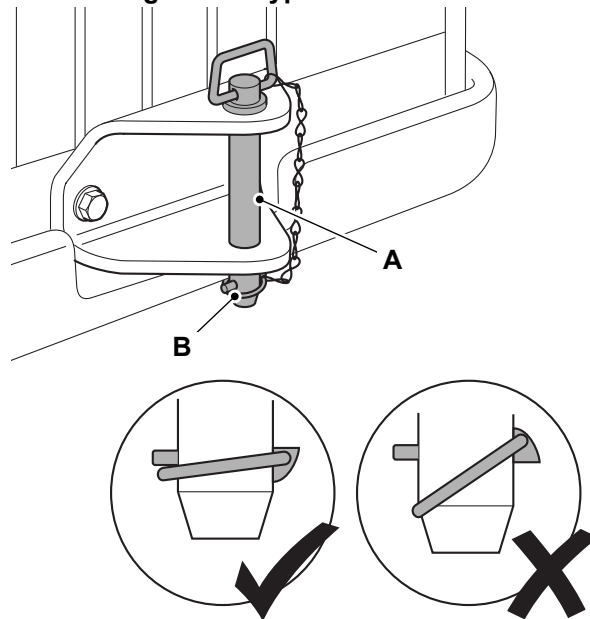
▲ WARNING Using the recovery hitch for towing may exceed the capability of the recovery hitch. This could damage or weaken the recovery hitch or pin which can result in the trailer becoming detached from the machine.

The recovery hitch is only suitable for occasional off-highway towing with a maximum gross trailer weight of 1000kg (2204lb). It is not approved as a permanent towing hitch.

Make sure that before you tow with the machine, you and your machine obey with all the pertinent laws and regulations.

Fit pin and secure in position with locking ring.

Figure 85. Typical Installation



A Pin

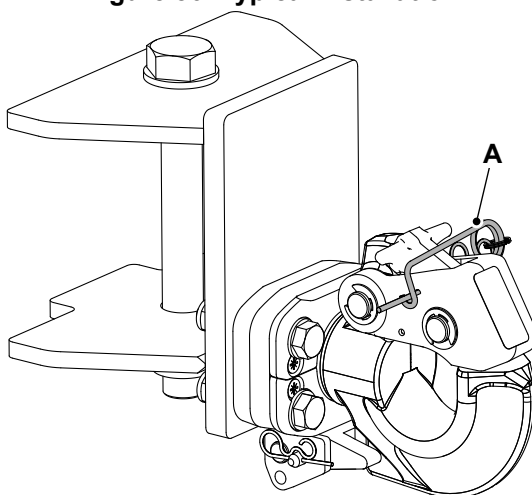
B Locking ring

Pintle Tow Hitch (option)

This recovery hitch is only suitable for occasional off-highway towing with a maximum gross trailer weight of 2722kg (6000lb) and maximum vertical load of 150kg (331lb). It is not approved as a permanent towing hitch. Make sure you will be obeying all pertinent laws and regulations before towing.

Secure in position with locking pin.

Figure 86. Typical Installation



A Locking pin

Operating Levers/Pedals

General

▲ **WARNING** Make sure it is clear overhead before raising the boom. Keep an adequate safe distance from all electrical power lines. Contact your local power company for safety procedures.

CAUTION 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.

Never operate a machine with a broken side window. If the side window is broken stop using the machine until it is replaced. Your machine may be fitted with a safety device which will prevent the boom controls from operating if the side window is broken. In this instance it is possible to use the LLMI (Longitudinal Load Moment Indicator) override function to lower the boom for recovery purposes only.

Control Layouts

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

Some control levers and/or switches may or may not be fitted to your machine depending on machine specification.

Boom Controls

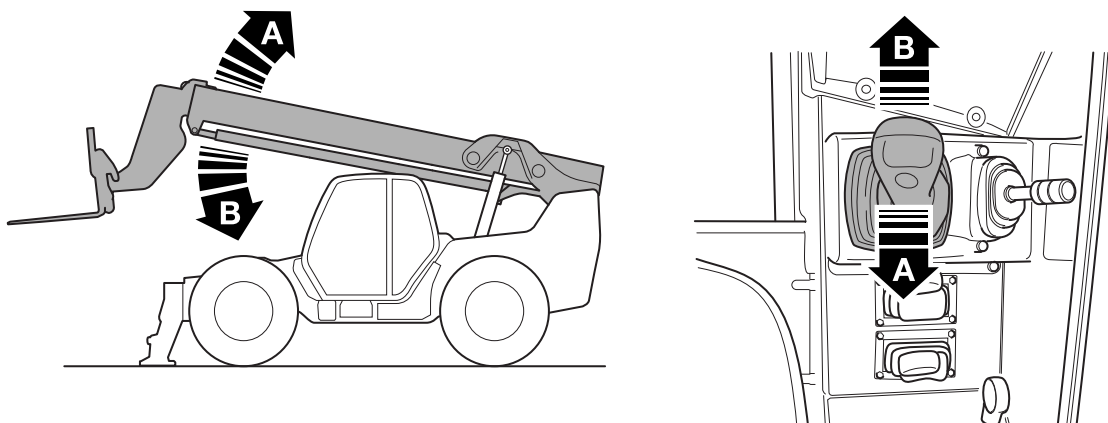
▲ **WARNING** Release the boom raise lever as soon as the boom is fully raised. Holding the control in the lift position can result in carriage slowly crowding back.

Dual Lever Control

Raise Boom/Lower Boom

510-56, 512-56 and 514-56 machines use a system of interlocks to prevent the operation of the machine beyond pre-set limits. In some conditions, this system limits the boom angle to a maximum of 60°. [Refer to: Interlocks \(Page 97\).](#)

Figure 87.

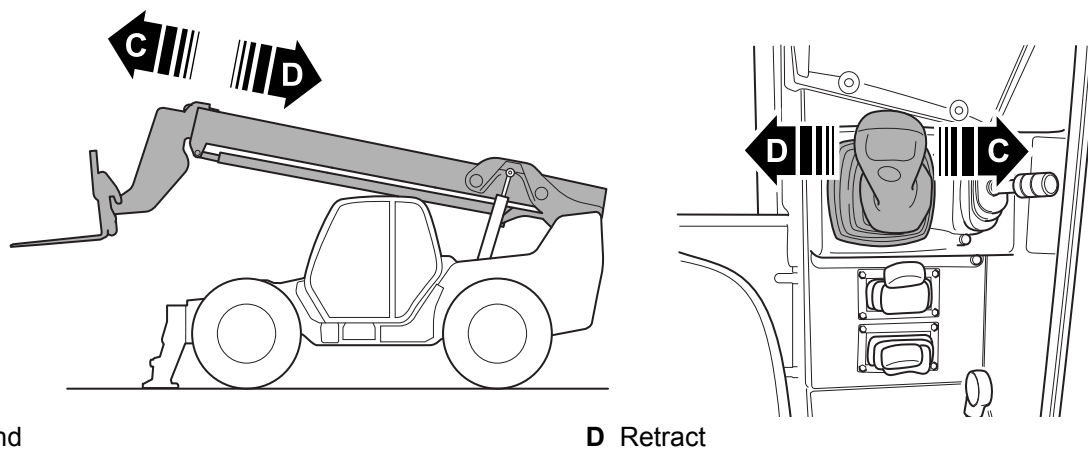


A Raise

B Lower

Extend Boom/Retract Boom

Figure 88.

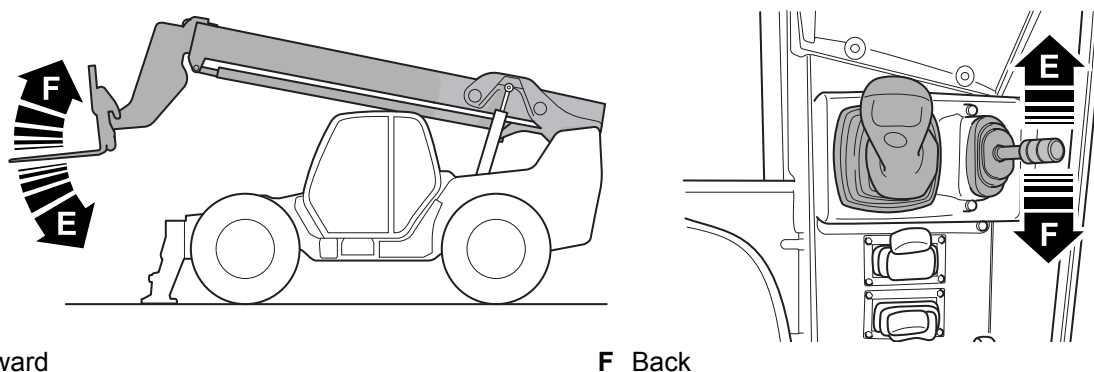


C Extend

D Retract

Tilt Carriage Forward/Back

Figure 89.

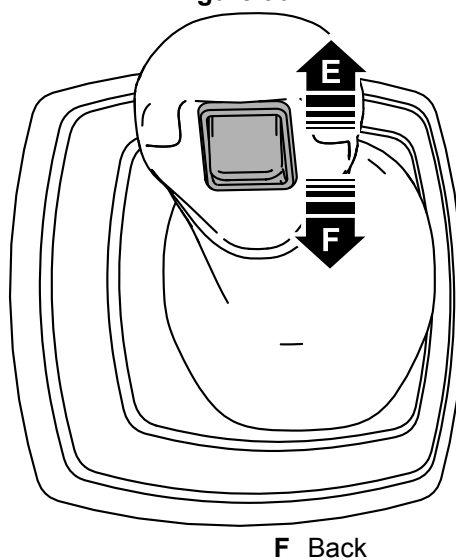


E Forward

F Back

Joystick Roller (Option)

Figure 90.



E Forward

F Back

Chassis Leveling Controls

▲ WARNING Never operate the chassis leveling (sway) control when the boom is above the horizontal position. Never operate the boom if the machine is not level.

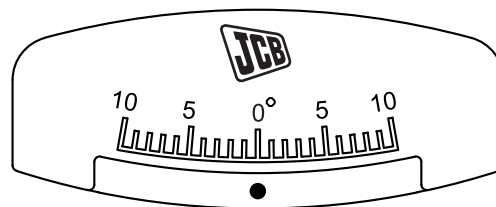
Use the chassis leveling (sway) control to level the machine before operating the boom. Reposition the machine if a level position cannot be achieved.

Never operate chassis leveling (sway) when the machine is moving.

The machine could tip over if you do not obey these safety rules.

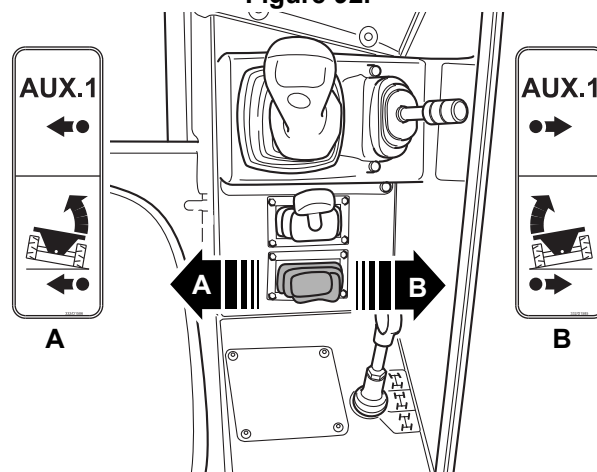
The chassis leveling (sway) control lever allows the machine to be leveled from side to side before loading and unloading. The lever must also be used to level the machine from side to side before traveling. The cylinder will stay in any position until you move it with the control lever. Use the lateral inclinometer to check that the machine is level from side to side before operating the boom. The machine is level when the inclinometer shows 0°.

Figure 91. Inclinometer



Sway Left/Sway Right

Figure 92.



A Sway left

B Sway right

510-56, 512-56 and 514-56 machines have a system of interlocks to prevent the operation of the machine beyond pre-set limits. In some conditions, this system isolates the sway controls. [Refer to: Interlocks \(Page 97\)](#).

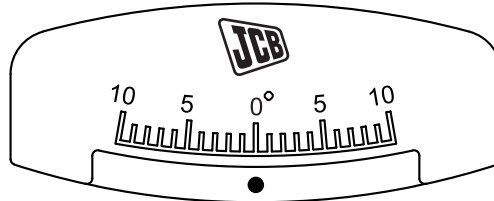
During operation of the sway controls, machines with the RAS (Rear Axle Stabilization) system automatically go into 'cushioned mode' and an intermittent audible alarm sounds.

Stabilizer Controls

▲ WARNING Do not allow debris to accumulate in the cavity between the ram and the stabilizer leg. Remove and clean away all debris that may have built-up.

The use of stabilizers increases the stability of the machine when lifting. The lateral position of the machine is indicated by an inclinometer fitted in the cab. Use inclinometer to check that the machine is level before operating the boom. The machine is level when the inclinometer shows 0°

Figure 93. Inclinometer



Reposition the machine if a level position cannot be achieved. Ensure the stabilizer legs are in the down position and the weight of the machine is supported.

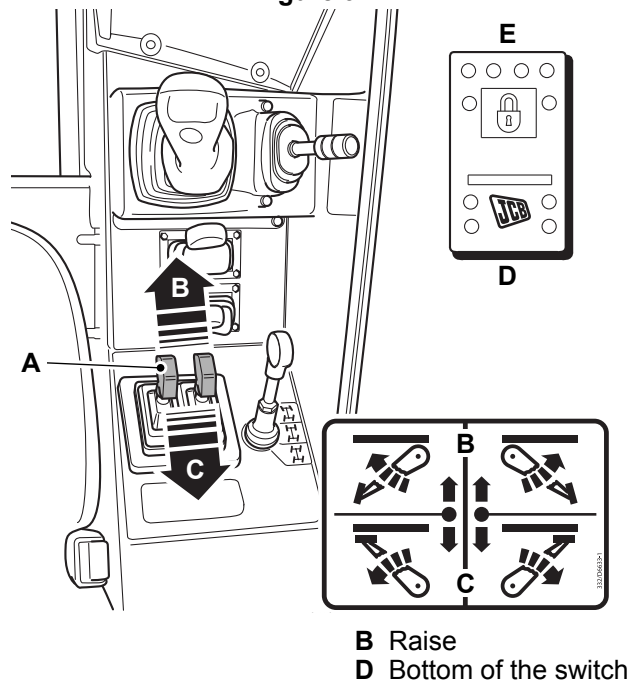
Do not extend the boom more than necessary.

Isolate the stabilizer control levers before operating the machine.

Lower and Raise Stabilizers

To isolate the control levers press the bottom of the switch. To make the control levers operable press the top of switch. Before traveling on the public highway, fully raise both stabilizer legs and isolate the control levers. When working with the stabilizers lowered isolate the control levers before operating the boom controls.

Figure 94.



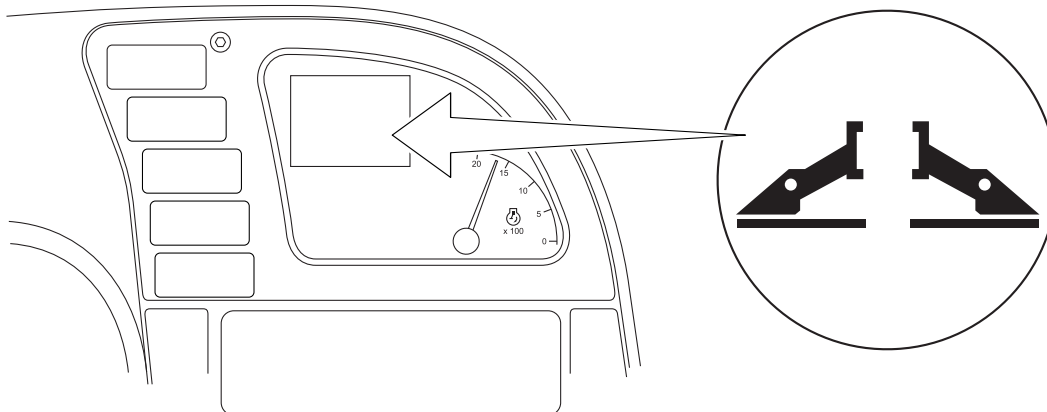
510-56, 512-56 and 514-56 machines have a system of interlocks to prevent the operation of the machine beyond pre-set limits. In some conditions, this system isolates the stabilizer controls. [Refer to: Interlocks \(Page 97\).](#)

During operation of the stabilizer controls, machines with the RAS (Rear Axle Stabilization) automatically go into 'cushioned mode' and an intermittent audible alarm sounds.

Stabilizer Indicator Lights

510-56, 512-56 and 514-56 machines are fitted with stabilizer indicator lights. The lights will illuminate when both stabilizer legs are in the down position and the weight of the machine is supported. Ensure both indicator lights illuminate when the stabilizer legs are in the down position. If the lights do not illuminate do not use the machine until the fault is investigated and corrected.

Figure 95. Stabilizer Indicator Lights



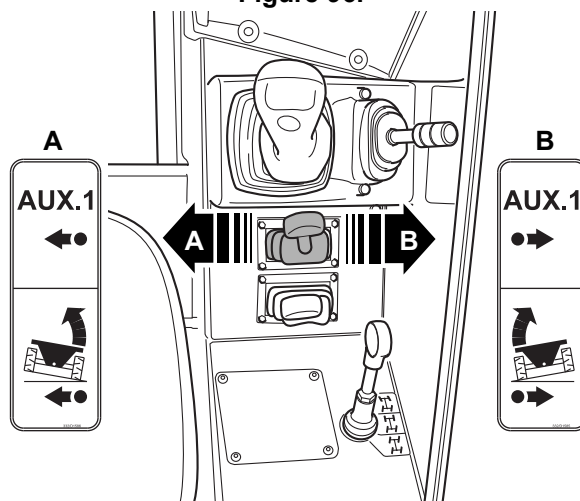
Auxiliary Circuit Controls

⚠ WARNING Before operating the auxiliary control system make sure that you are aware of all safety notices that apply to the attachment you are using. Also make sure you have installed the attachment correctly and have read its operator's manual.

Refer to: [Attachments \(Page 127\)](#).

Push the lever to the left or the right depending on the attachment fitted and the function required.

Figure 96.

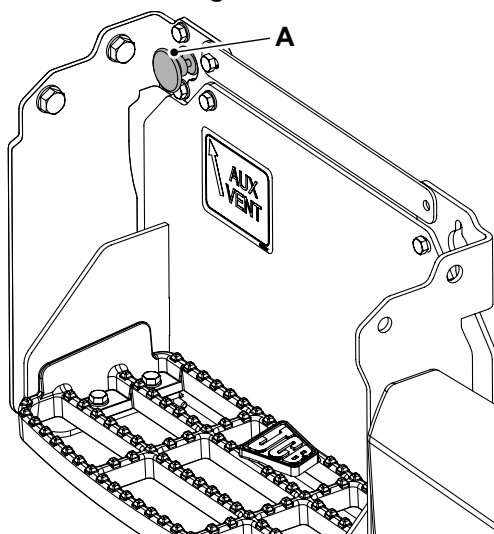


A Left

B Right

Auxiliary Vent Switch (option)

Figure 97.



A Auxiliary vent switch

WARNING! You must lower the attachments to the ground before venting the auxiliary system, otherwise bystanders could be crushed by the attachments or get caught in the linkages.

With the boom lowered and the engine off pull the external auxiliary vent switch to vent the auxiliary hydraulics and enable attachments to be fitted to the quick release couplings.

Lifting and Loading

General

▲ WARNING 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.

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

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.

WARNING Before you lift a load with the machine, you must read and understand this section. Failure to take the precautions shown can result in death or injury.

If your machine is not installed with a lifting point (for example a hook or shackle) and load charts then it must not be used for object handling.

Lifting (Object Handling) Regulations

The owner and/or operator must make sure that they fully understand the laws and regulations concerning the use of the JCB machine as an earthmover and for lifting. Consult your JCB dealer for more information.

In certain countries safety regulations in force call for the application of specific safety factors. Consult your JCB dealer for more information.

All figures and lift capacities (if applicable) in this publication are based on the machine being on level, solid ground.

Safe Working Loads

The maximum load which may be lifted depends on the equipment attached 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.

Fit for Purpose Tests for Lifting Equipment

All lifting equipment (for example forks, lifting hooks and shackles) needs regular inspections and testing by a competent person to make sure they are fit for purpose. These may be needed every six months or at least annually in some countries to meet and comply with legislation and for insurance purposes. [Refer to: Functional Tests and Final Inspection \(Page 153\)](#). Check with your local JCB dealer for further advice.

Load Charts

▲ WARNING The limits shown on the load charts are for a stationary level machine. Do not raise or extend the boom while the machine is moving. Retract the boom fully and lower it as far as possible before you travel with a load.

CAUTION The load chart shown is only an example. Do not use it to find the loading limits on your machine. Before lifting or placing loads, refer to the load charts in the cab of your machine.

The SWL (Safe Working Load) of the machine depends on how far the boom is extended and the angle it is raised to.

The SWL at different boom positions is shown on the load charts in the cab.

The limits shown on the load chart only apply to a machine installed with JCB approved tires. To obtain the limits shown the tires must be in good condition and inflated to the correct pressure. If you are in doubt, contact your JCB dealer.

Check the relevant load chart is available for any alternative carriage or attachment. Where appropriate, the load chart shows the part number of the carriage or attachment it refers to. If you are not sure of the correct load chart to use, contact your JCB distributor for advice.

Renew any damaged or missing charts.

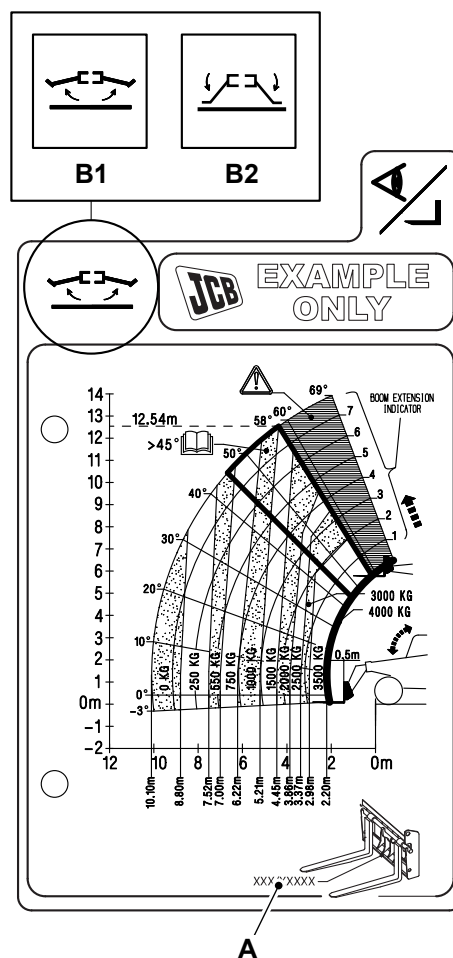
Load Charts for Fixed Loads

A fixed load is defined as any object that is lifted in such a way that it is fully supported by the lifting attachment and cannot swing freely (e.g. palletized load or a shovel load.)

As a result load charts for fixed loads are related to forks, side-shift carriages fitted with forks and fork positioner attachments.

Load charts for these attachments show how far you can raise and extend a load without exceeding the safe working load. Each machine model has its own load chart for a standard fork carriage, and alternative charts for use when stabilizers or chassis leveling (sway) are used.

Figure 98.



A Attachment part number

B1 Stabilizer up

B2 Stabilizer down

Machines are shipped from the factory with the boom angle interlock set to 45°. Some applications may require the boom to be raised beyond the 45° without the stabilizers being deployed. Contact your dealer for assistance.

Load Charts for Suspended Loads

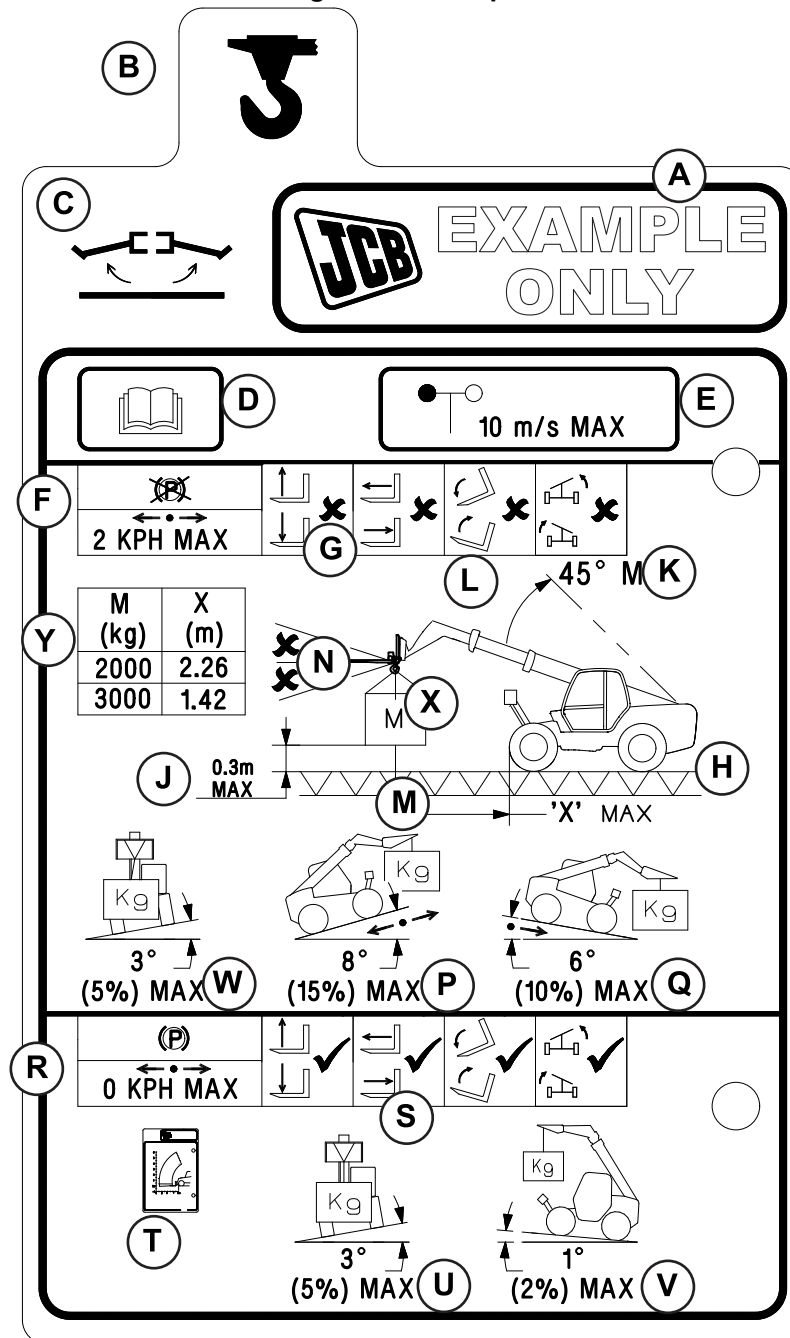
A suspended load is defined as any object that is lifted in such a way that it can swing freely, whilst it is being hoisted lowered and horizontally moved.(e.g. a load attached to a hook or shackle.)

As a result load charts for suspended loads are related to fork mounted hook, extension jib or carriage mounted shackle attachments.

Load charts for these attachments show how far you can raise and extend a load without exceeding the safe working load. A separate load chart for each attachment shows details of the general operation limitations when the machine is in a traveling and static condition.

As per the fixed load charts alternative charts are used to illustrate limitations when the stabilizers or chassis leveling (sway) are used.

Figure 99. Example



- A** Machine designation
- C** Stabilizers condition
- E** Maximum in service wind speed
- F** Parkbrake released, maximum travel speed
- G** Boom controls- Do not operate when traveling
- H** Operate on hard standing
- J** Keep the load within 0.3m (1/2yd) from the ground
- K** Keep the boom below 45°
- L** Do not extend the boom
- M** Keep the load at the minimum reach
- N** Keep the attachment horizontal or crowded back
- P** Do not travel on slopes exceeding the specified angle with the load up the slope.
- Q** Do not travel on slopes exceeding the specified angle with the load down the slope.
- R** Parkbrake applied, zero travel speed.
- S** Boom controls, can be operated when stationary.
- T** Max load as specified by the loadchart for the attachment.
- B** Attachment
- D** Read operator's manual

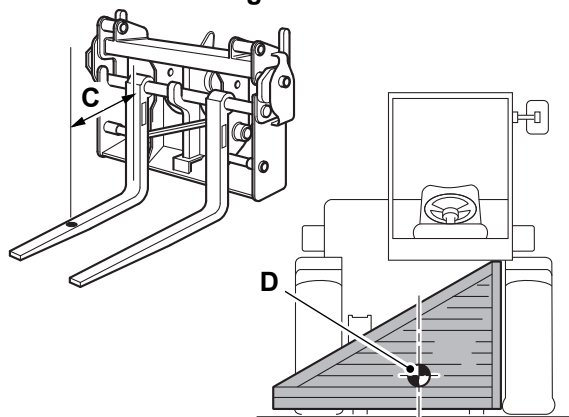


- | | |
|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| U Do not place a load on side slope exceeding the angle specified. | V Do not place a load on longitudinal slope exceeding the angle specified. |
| W Do not travel on sides slope exceeding the angle specified | X Maximum load specified in the load chart for the attachment. |
| Y Load/reach table | |

Using the Load Charts

1. Check what boom attachment is installed on your machine, then refer to the correct load chart in the cab.
2. You must know the weight of a load before picking or placing it.
3. Check that the loads center of gravity in front of the fork uprights will not be more than. 500mm (19.7in)
 - 3.1. The loads center of gravity may not be in the middle of the load. You will have to find out where it is.

Figure 100.

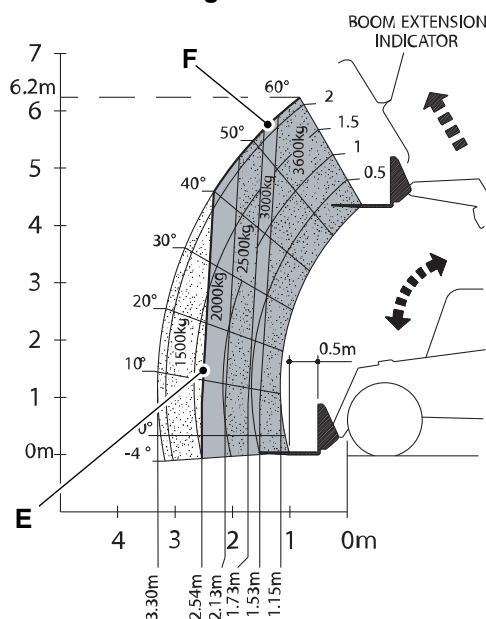


C Length =500mm (19.7in)

D Center of gravity

4. When you know the weight of the load, look on the load chart and find the colored segment with the next highest weight.
 - 4.1. For example, if your load weight is 1800kg (3968lb), find the 2000kg (4409lb) segment. This is the maximum load segment for your load.
 - 4.2. The left hand edge and the upper edge of this segment show the machine stability limits for your load. You must not angle or extend the boom beyond these limits.

Figure 101.



E Left hand edge

F Upper edge

5. After installing the forks beneath the load, and before lifting the load, check the readings on the boom angle and extension indicators. Find the same readings on the load chart.

- 5.1. You will see on the chart that lines run from the boom angle and extension scales, through the colored area of the chart. Find where the lines for your readings cross. If they cross inside your maximum load segment or to the right of it the load is within safe limits.
- 5.2. If the lines cross above or on the left of the segment, do not try to pick up the load. Withdraw the forks, retract the boom and try again. If even with the boom fully retracted, the boom angle and extension readings still cross outside your maximum load segment do not try to lift the load.
6. When the load is on the forks, retract the boom before raising or lowering it. This will reduce the risk of getting the machine unstable. While moving the boom, watch the boom angle and extension indicators. Keep inside the limits for your load.
 - 6.1. When the load is high up (say on a scaffolding) you will have to get it clear before fully retracting the boom.
7. Before you place a load, use the load chart to find how close you should get the machine to the unload point. You must be able to place the load without crossing the left hand or upper boundaries of your maximum load segment.

Boom Indicators

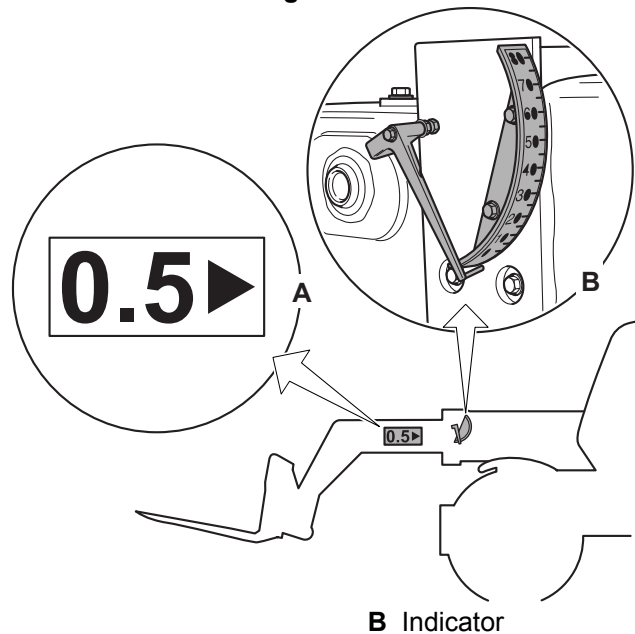
The SWL (Safe Working Load) at different boom positions shown on the load charts in the cab. Refer to the charts in the cab before lifting or placing a load. [Refer to: Load Charts \(Page 90\)](#).

The boom angle and extension indicators are installed on the boom itself. It is indicated by numbered labels, the numbers represent boom extension in meters.

The boom angle is indicated by an indicator. It has a scale marked in degrees.

Always refer to the charts in the cab before lifting or placing a load. [Refer to: Load Charts \(Page 90\)](#).

Figure 102.



A Label

B Indicator

Inclinometers

The lateral position of the machine is indicated by an inclinometer installed in the cab.

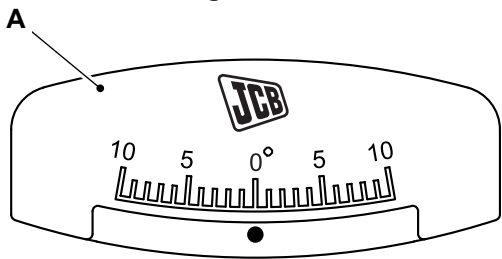
Use the inclinometer to check that the machine is level before operating the boom. The machine is level when the inclinometer shows 0°.



Reposition the machine if a level position cannot be achieved.

Refer to: Slopes (Page 76).

Figure 103.



A Inclinometer

Interlocks

510-56, 512-56 and 514-56 machines use a system of interlocks to prevent the operation of the machine (beyond pre-set limits) unless the boom and stabilizer legs are moved to the correct position. The interlock logic is shown in the table and on a decal found in the cab.

The interlock system prevents the operation of the sway and stabilizer functions at the same time.

Figure 104.

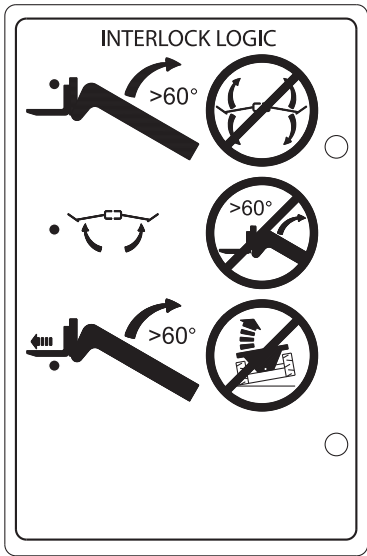


Table 19.

Interlock	Machine Status	Active Interlock	To Deactivate Interlock
A	Boom angle more than 60°	Stabilizer isolation.	Lower the boom to less than 60°
B	Stabilizers retracted.	Boom angle limited to a maximum 60°	Lower the stabilizers. The stabilizer indicator lights must come ON). Refer to: Stabilizer Controls (Page 86).
C	Boom angle more than 60° and extended more than 6.5m (7yd)	Sway isolation.	Retract the boom to less than 6.5m (21ft 4in) or lower the boom to less than 60°.

Rear Axle Stabilization (RAS) System

Introduction

507-42, 509-42, 510-42, 510-56, 512-56 and 514-56 machines have a RAS (Rear Axle Stabilization) system.

The patented JCB RAS system is fully automatic and controls the oscillation of the rear axle. Two hydraulic actuators lock or unlock the rear axle as required.

In addition to the lock and unlock modes the system also has a cushioned mode for controlled oscillation of the rear axle.

Cushioned mode allows the rear axle to adjust slowly to changes in terrain as the machine moves. It also allows the rear axle to adjust if the lateral angle of the machine is changed when the sway and stabilizer functions operate.

RAS Modes

The RAS system has three modes. It is important to know which mode is active so that you understand how the machine operates. The Indicator lights on the instrument panel show the active RAS mode.

Locked mode

The RAS system selects locked mode when the machine is stationary.

Figure 105.



Cushioned Mode

The RAS system selects cushioned mode when the machine ground speed is more than zero but less than 4km/h (2.5mph) or the machine is stationary and the sway or stabilizers are operated.

Figure 106.



Unlocked Mode

The RAS system selects Unlocked mode when the machine ground speed is more than 4km/h (2.5mph).

Figure 107.



System Fault

The RAS fault icon comes on if there is a RAS system fault. Refer to the Warning/Fault Icons. [Refer to: Instrument Panel \(Page 55\).](#)

Follow the standard procedures when the warning light comes on. Refer to the Warning/Fault Icons. [Refer to: Instrument Panel \(Page 55\)](#).

Machine Recovery

The RAS system can affect how the machine operates during recovery.

- If possible, start the engine. When the machine is towed, the RAS system enters a freewheel mode and the axle unlocks.
- If the engine is disabled, the RAS system remains in locked mode. Take care when you tow the machine across uneven ground.

Before you try to move a disabled machine, you must prepare the machine correctly. [Refer to: Moving a Disabled Machine \(Page 113\)](#).

Working with the Boom

General

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

WARNING Under no circumstances should personnel be lifted into the air without using an approved and properly secured platform. Failure to follow this warning could result in death or serious injury.

WARNING Maintain correct tire pressures to avoid upsetting the lateral stability of the machine. Inspect tires daily for signs of damage, cuts or embedded objects which could cause loss of pressure.

WARNING Loading and unloading on soft or uneven ground can be hazardous. The machine could tip over and you could be killed or injured. Make sure that the ground is level and firm before loading and unloading. Whenever possible, avoid soft or uneven ground when carrying a load.

WARNING Overloaded scaffolding can collapse. Never load scaffolding beyond the regulation capacity.

WARNING Operating the boom while you travel can cause accidents. You will not have total control of the machine. Never operate the boom when you travel.

WARNING 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.

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

WARNING Keep yourself and all others away from the lifting mechanism. Never allow persons to walk below a raised boom at any time. Do not carry passengers.

CAUTION Make sure you know the weight of the load before trying to lift it. Raise the load only a few centimeters at first, to check that the machine is stable. Lower the load straight away if the machine begins to feel unstable. Do not exceed the loading limits shown on the Load Charts.

CAUTION Traveling too fast or with the load too high can make the machine tip over. Keep the load close to the ground when traveling. Do not go faster than walking pace when the machine is carrying a load. Drive carefully over bumps and curbs. Do not operate the boom/carriage controls while the machine is moving.

CAUTION Loads stacked on uneven ground can topple. Never stack loads on uneven ground.

CAUTION A raised boom can strike overhead objects. Always check for overhead clearance before raising the boom.

Practice with palletted loads first. Do not handle awkward loads until you can handle palletted loads safely and confidently.

Make sure that any location where a load is to be placed is strong enough to hold the weight of the load.

Look in the direction of travel and keep a clear view of the way ahead. Seek assistance if forward vision is obscured by a bulky load. Particular care is required when driving off level ground. [Refer to: Slopes \(Page 76\)](#).

Do not carry stacked loads that are higher than the fork carriage.

Drive at a speed consistent with conditions. Slow down when traveling on wet, slippery or loose surfaces.

Drive with care to minimize bouncing over rough surfaces. This can result in loss of load.

Lifting and Loading Operations

Ensure that all local and national legislation governing operations such as lifting and loading are fully satisfied before operating the machine. This should include the selection of the correct model of machine for the operation, and the planning of the lifting operation itself.

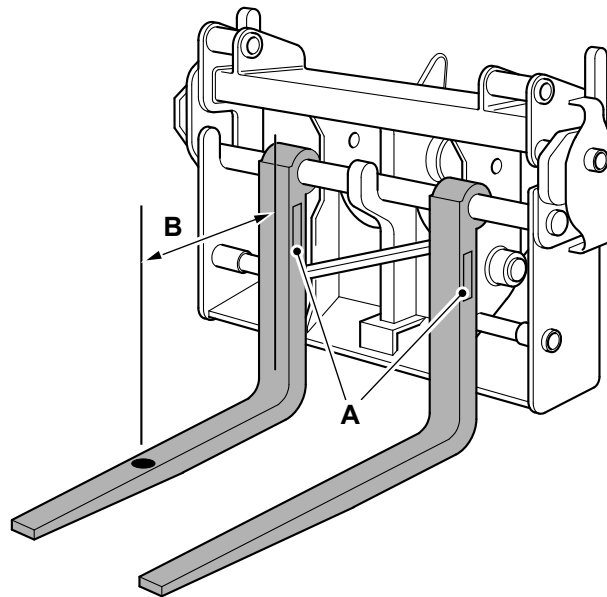
Other countries and territories have their own legislation similar to the above. Be sure that you are aware of all local and national legislation governing lifting and loading operations where you are operating.

Fork Ratings

▲ **CAUTION** Do not exceed the total rated load capacity of the forks being used. Forks can break resulting in a loss of load and possible injury.

The JCB approved forks for this machine have a plate which shows their maximum load capacity rating. The rating shows the maximum load capacity in kilograms that the forks can carry safely at the maximum load center of 610mm (24in).

Figure 108.



A Plate

B Maximum load center

The total load rating for two forks will be the addition of their single rated capacity.

The forks must be used in matched pairs.

To get the maximum rated load capacity of the machine, [Refer to: Performance Dimensions \(Page 228\)](#).

The forks used on this machine must have a total load rating which is equal to, or exceeds the rated load capacity of the machine.

If the load rating of the machine is different to the load capacity of the forks, the lower value must be used as the overall load capacity.

All lifting equipment, including the forks and their mountings, need regular inspections and testing by a competent person to make sure they are fit for purpose. For more information, contact your JCB dealer.

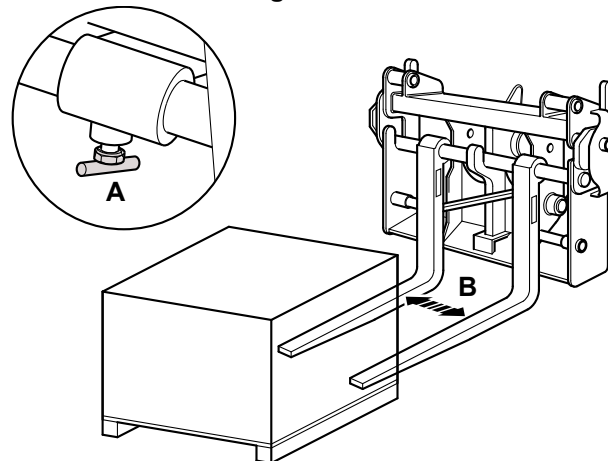
Repositioning the Forks

▲ WARNING Loads can fall off incorrectly spaced forks. Always space the forks correctly for the load. Make sure the forks are completely under the load before lifting.

CAUTION The forks are heavy. Make sure suitable lifting equipment is used to support and transport them.

1. Loosen the fork clamping screws.
2. Space the forks as wide as possible to suit the load.
3. Tighten the fork clamping screws.

Figure 109.



A Clamping screws

B Fork space adjustment

Working with Pallets

Loading

▲ WARNING If the machine starts to feel unstable when you begin lifting the load, lower the load immediately.

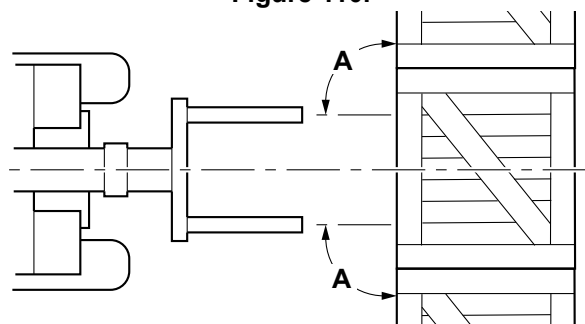
WARNING Load and unload on firm, level ground. Always be alert for possible hazards. Take special care when turning or reversing.

CAUTION A load lifted on one fork can slip off. Never lift a load with one fork.

When carrying a palletized load, the height above the ground to the underside of the load should not be more than 300mm (12in) (11.81 in).

1. Put the forks in the horizontal position.
[Refer to: Boom Controls \(Page 84\).](#)
2. Retract the boom.
3. Approach the load straight-on, with all wheels straight.
4. Stop the machine and leave enough room to maneuver the boom.

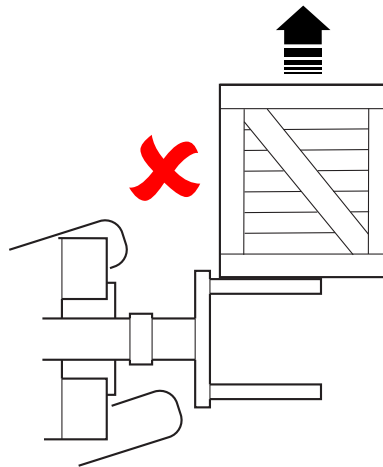
Figure 110.



A Angle = 90°

5. Engage the park brake and put the transmission in neutral.
6. Do not use the side of the forks or carriage to move the load, this can cause damage to the forks.

Figure 111.

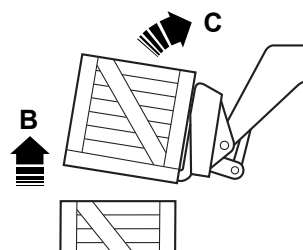


7. If the load is on a high platform you may have to raise the boom to allow you to get the machine close enough to the load.
8. Extend the boom or drive the machine, to insert the forks under the load.
9. Stop the machine, when the carriage touches the load.
10. Check the boom extension/angle(s) are in limits.

WARNING! If the machine starts to feel unstable when you begin lifting the load, lower the load immediately.

11. Raise the load slightly, then tilt the carriage back.

Figure 112.



B Load raise

C Carriage tilt

12. Retract the boom, then lower it into the travel position.
13. Carefully drive the machine to the unloading point.

Unloading

▲ CAUTION Never unload the forks by stopping the machine suddenly. Follow the procedures in the Operator Manual for unloading.

1. Approach the unload straight-on, with all wheels straight.
2. Stop the machine and leave enough room to maneuver the boom.
3. Make sure the loading should not exceed the limits.
[Refer to: Load Charts \(Page 90\).](#)
4. Engage the park brake and put the transmission in neutral.
5. Move the load above its required position.

6. Lower the load into position. Make sure the load is level.
7. Carefully withdraw the forks. Depending on the height of the load, you may have to raise or lower the boom as the forks come out.
8. When the forks are clear of the load, fully retract the boom.
9. Lower the boom into the travel position.

Working with Bales

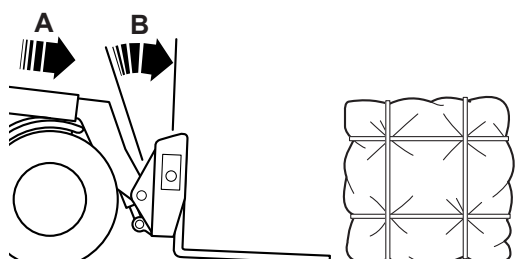
▲ WARNING The bale may have to be manhandled off the forks. If so, stop the engine before allowing anyone to approach the forks.

Lifting Bales

1. Lower the boom and tilt the carriage forward.

[Refer to: Boom Controls \(Page 84\).](#)

Figure 113.

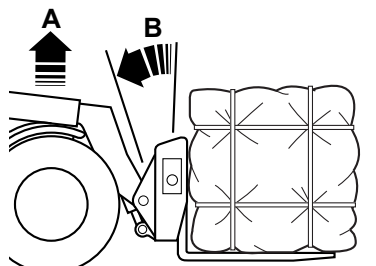


A Boom extend

B Carriage lower

2. Extend and raise the boom to insert the forks under the load.
3. Tilt the carriage back and put the boom in the travel position.

Figure 114.



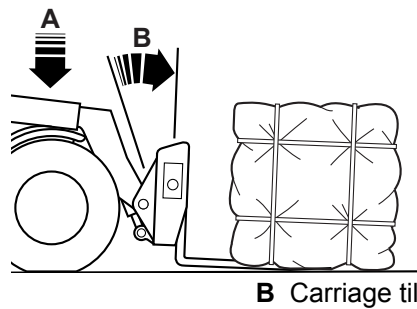
A Boom raise

B Carriage retract

Lowering Bales

1. Move the boom so that the bale is directly above its required position.
2. Lower the boom and tilt the carriage forward, so that the forward edge of the bale rests on the ground.

Figure 115.

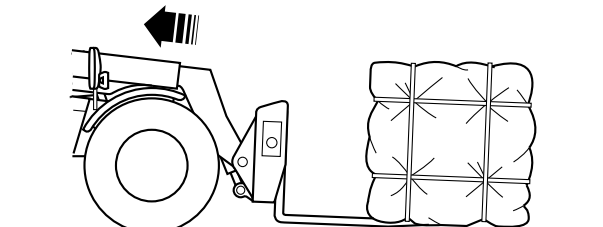


A Boom lower

B Carriage tilt

3. Retract the boom and withdraw the forks from under the bale.
4. When the forks are clear, return the boom and carriage to the road travel position.

Figure 116.

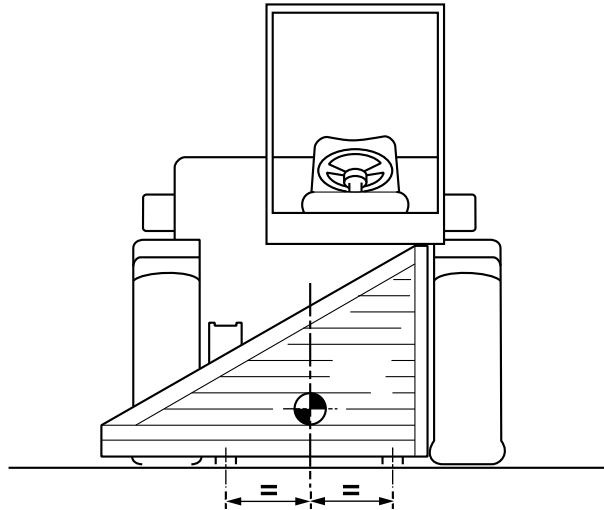


Working with Irregular Loads

Be careful when you operate the boom and carriage with an uneven load.

1. Find the load's center of gravity. On packaged loads it may be marked on the box. If you cannot find out the load's center of gravity:
 - 1.1. Do trial lifts at different positions until you are sure the load is stable on the forks.
 - 1.2. Do not raise the load more than a few centimeters when you do a trial lift.
2. Move the machine so that the load's center of gravity is halfway between the forks.
3. Pick/place the load, this will depend on the type of load.
 - 3.1. If it is palletized, follow the procedure for palletized loads.
 - 3.2. If it is not palletized, it may be necessary to secure the load to the forks using suitable chains.
4. Stop the engine before allowing anyone to approach the forks.

Figure 117.

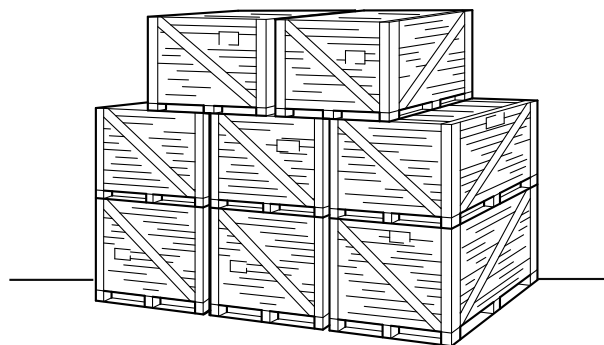


Stacking Loads

Box Pallets

Stack the box pallets straight and square. For extra stability, stagger the top row as shown.

Figure 118.

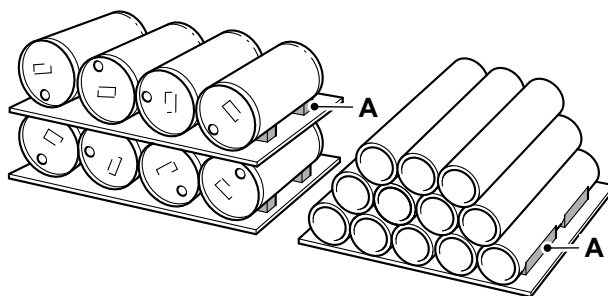


Cylindrical Loads

Stack the cylindrical loads tightly together and level. Put wedges at both ends of each row.

If you are building a pyramid stack, put wedges at both ends of the bottom row.

Figure 119.



A Wedge

Suspended Loads

▲ WARNING Working with suspended loads can be dangerous; you or others can be killed or seriously injured if you do not follow the guidance within the operator's manual. Refer to the Lifting and Loading section of this manual before commencing the task. Understand and comply with all local, state and federal safety regulations and standards. In the USA refer to ANSI/ITSDF B56.6 and OSHA. For Canada refer to CSA B335-15.

A suspended load is any object that is lifted in such a way that it can swing freely, while you hoist, lower and horizontally move it.

Approved Attachments

The following table shows the approved attachments that can be used for handling suspended loads. The actual lifting capacity is provided on the machine's load chart:

Table 20.

Part No.	Attachment	Machines Approved for use with Approved Attachments						
		506-36	507-42	509-42	510-42	510-56	512-56	514-56
334/E4062	Boom Mounted Hook		✓	✓	✓			
334/E4118	Boom Mounted Hook					✓	✓	✓
334/D5171	Fork Mounted Hook	✓	✓	✓	✓	✓	✓	✓
N/A	Star Industries Extendable Truss Boom model 1360B ⁽¹⁾	✓	✓	✓	✓	✓	✓	✓

(1) Refer to Technical Data section for approval letter and flip charts.

Never use straps, cables or chains around bare forks. The hook is intended to lift loads vertically. Never use the hook to drag a load horizontally.

Environment

Make sure that haul roads and loading areas are on the firm ground capable of accepting the mass of the loaded machine without significant deformation. Be careful of overhead obstructions and power lines. Do not lift loads when wind speeds are high enough to cause the load to swing. Before moving, make sure that a visibility assessment is carried out, to tell both operator and banks-man of blind spots caused by the load or rigging.

Rigging of the Load

Make sure that approved person adjusts the suspended load, using correct sized equipment with valid inspection certification. Add the lifting equipment mass to the mass of the load, to find out the total load to be lifted by the machine and attachment. Specify this total load on the appropriate load chart, and obey the limit of operation at all times.

Lifting a Suspended Load

Take the slack up slowly to make sure that there is no snatching of the load, when you lift a suspended load. Use the controls carefully to minimize any load swing. Make sure that the lift is directly over the center of gravity of the load to minimize side loads on the machine and attachment. Make sure that all bystanders, riggers and banks man are clear of the raised load and machine at all times.

Moving with a Suspended Load

Make sure that all machine movements are smooth and slow, when you move with a suspended load. Keep the travel speed to below walking pace (1.6km/h (1.0mph)) to prevent the load from swinging. Grades, sudden starts / stops and turns can cause the load to swing. Retract the boom as far as practical to make sure that the load does not contact the chassis. Isolate the boom controls while the machine is moving. Do not use sway control to adjust the load swing. Carry the load no higher than 300 -0/+100mm (12 -0/+4in) from the ground, and adjust it to make sure that the boom is not elevated above 45°. Use guy lines to make sure that the load is externally stabilized. Make sure that all bystanders, riggers and banks man are clear of the raised load and machine at all times.

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Heating, Ventilating and Air-Conditioning (HVAC)

General

The operator must set the controls to obtain the best working environment in the operator station.

Close doors and windows for best HVAC (Heating Ventilation Air Conditioning) performance and in dusty conditions.

Poorly ventilated air can cause tiredness. Do not operate the machine for long periods without ventilation or with the operator station fully closed and the fan turned off.

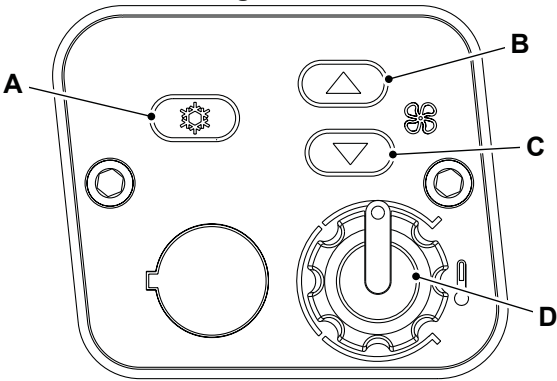
Air-Conditioning Controls

For: 507-42 [T4F], 509-42 [T4F], 510-42 [T4F], 510-56 [T4F], 512-56 [T4F], 514-56 [T4F] Page 109

For: 506-36 [T4F] Page 110

(For: 507-42 [T4F], 509-42 [T4F], 510-42 [T4F], 510-56 [T4F], 512-56 [T4F], 514-56 [T4F])

Figure 120.



- A Air conditioning on/off switch
- B Fan speed increase button
- C Fan speed decrease button
- D Temperature control switch

Air-conditioning reduces moisture from the air and can be used to demist windows quickly in damp weather. Used in conjunction with the heater, it also makes the interior of the cab warm and dry.

The air conditioning control panel is installed on the right console.

The temperature is adjusted by the control switch and the heater fan controls.

Adjust the air vents to direct the hot air flow to the front window (for demisting) and/or the cab floor.

To obtain the best results from the air conditioning system make sure that all doors and windows are closed.

Before starting the engine make sure the air conditioning is switched off. Press the air conditioning switch to turn on/off the air conditioning system.

Heat Control

Turn the temperature control switch clockwise to increase the temperature.

Turn the temperature control switch anticlockwise to decrease the temperature.

Fan Speed Control

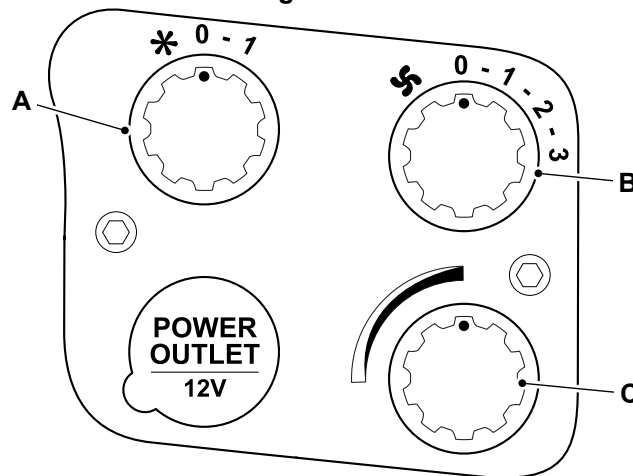
Press the up arrow button to increase the fan speed.

Press the down arrow button to decrease the fan speed. This functions only when the ignition key is in position I.

The current fan speed will be displayed on the LCD screen.

(For: 506-36 [T4F])

Figure 121.



A Air conditioning on/off switch
C Temperature control switch

B Fan speed switch

Air-conditioning reduces moisture from the air and can be used to demist windows quickly in damp weather. Used in conjunction with the heater, it also makes the interior of the cab warm and dry.

The air conditioning control panel is installed on the right console.

The temperature is adjusted by the control switch and the heater fan controls.

Adjust the air vents to direct the hot air flow to the front window (for demisting) and/or the cab floor.

To obtain the best results from the air conditioning system make sure that all doors and windows are closed.

Before starting the engine make sure the air conditioning is switched off. Press the air conditioning switch to turn on/off the air conditioning system.

Heat Control

Turn the temperature control switch clockwise to increase the temperature.

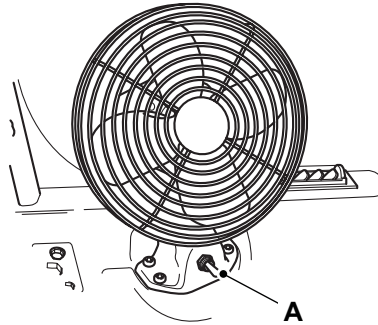
Turn the temperature control switch anticlockwise to decrease the temperature.

Fan Speed Control

Turn the fan speed control switch clockwise to position 1 to turn the fan on. Turn further to positions 2 or 3 increase speed. Functions only with the starter switch set to on.

Face Level Fan

Figure 122.



A Switch - fan on/off

The face level fan is installed on the left side dash.

Press the switch to turn on/off the face level fan. This functions only when the ignition key is in position I.

Fire Extinguisher

General

Location

The fire extinguisher is stowed in a bracket behind the seat or on the outside of the machine at the rear (option). Keep the fire extinguisher in the bracket until you need to use it.

Operation

▲ WARNING 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.

WARNING After any use, the extinguisher must be replaced or serviced.

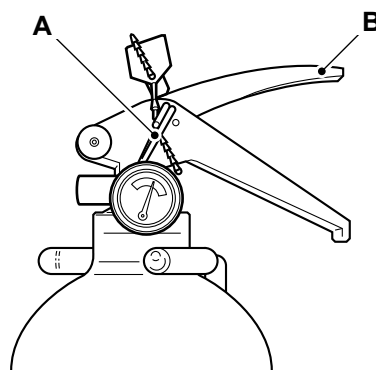
Make sure that you understand how to use the fire extinguisher. If necessary, refer to the instructions found on the fire extinguisher.

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. Move the machine to a safe area to prevent the fire from spreading.
2. Remove the fire extinguisher from its bracket.
3. Remove the safety pin.
4. Aim directly at the fire from an upwind position, if possible.
5. Squeeze the trigger to operate the fire extinguisher, release the trigger to stop the flow.

Figure 123.



A Safety pin

B Trigger



Moving a Disabled Machine

General

For: 506-36 [T4F], 507-42 [T4F]	Page 113
For: 509-42 [T4F], 510-42 [T4F], 510-56 [T4F], 512-56 [T4F], 514-56 [T4F]	Page 113

(For: 506-36 [T4F], 507-42 [T4F])

Do not tow a machine unless there is no alternative. Remember that damage might be caused to the machine by towing it. If at all possible repair the machine where it stands. If the machine must be towed read the following cautions and warnings and use the procedure given here.

(For: 509-42 [T4F], 510-42 [T4F], 510-56 [T4F], 512-56 [T4F], 514-56 [T4F])

At the second stage of the engine inducement strategy the engine will be in forced idle, however it is possible to drive the machine up shallow ramps onto a transporting vehicle in first gear.

Do not tow a machine unless there is no alternative. Remember that damage might be caused to the machine by towing it. If at all possible repair the machine where it stands. If the machine must be towed read the following cautions and warnings and use the procedure given here.

Jump-Starting the Engine

▲ WARNING In temperatures below freezing, the battery electrolyte may freeze if the battery is discharged or poorly charged. Do not use a battery if its electrolyte is frozen. To prevent the battery electrolyte from freezing, keep the battery at full charge.

If you 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.

Switch off all circuits which are not controlled by the ignition key.

Do not connect the booster (slave) supply directly across the starter motor.

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 jewelry 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. The negative (-) terminal on the battery is connected to frame earth.

CAUTION 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.

1. Set all switches in the cab to their off positions.
2. Get access to the battery.
[Refer to: Access Apertures \(Page 164\).](#)
3. Connect the booster cables:
 - 3.1. Connect the positive booster cable to the positive (+) terminal on the machine battery. Connect the other end of this cable to the positive (+) terminal of the booster supply.
 - 3.2. Connect the negative (-) booster cable to a good frame earth on the machine, away from and below the battery. A good frame earth is a part of the machine frame, free from paint and dirt. Do not use a pivot pin for an earth.

- 3.3. Connect the other end of this cable to the negative (-) terminal on the booster supply.
4. Do the pre-start checks.
5. Start the Engine.
6. Disconnect the booster cables:
 - 6.1. Disconnect the negative booster cable from the machine frame earth. Then disconnect it from the booster supply.
 - 6.2. Disconnect the positive booster cable from the positive (+) terminal on the battery. Then disconnect it from the booster supply.

Recovery

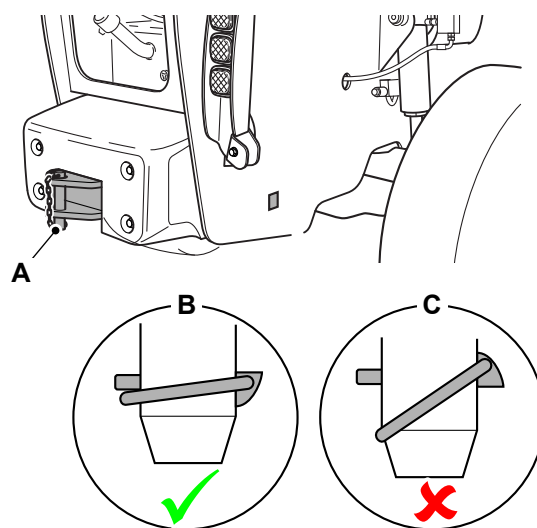
▲ WARNING Using the recovery hitch for towing may exceed the capability of the recovery hitch. This could damage or weaken the recovery hitch or pin which can result in the trailer becoming detached from the machine.

Notice: Towing a machine too far or too fast can damage the transmission. Do not tow the machine further than 1.6 km (1 mi). Use a trailer for greater distances. When towing do not travel faster than 10 km/h (6 mph). Use a rigid draw-bar. If a towing chain must be used, then use two towing vehicles. One towing vehicle should be coupled to the front of the disabled machine. The other towing vehicle should be coupled 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.

To install the recovery hitch lock pin:

1. Install the lock pin at the rear of the machine as shown.
2. Use the lock ring to secure the pin in position.

Figure 124.



A Recovery Hitch

C Lock pin - incorrectly secured

B Lock pin - correctly secured

Preparing the Machine for Towing

The RAS (Rear Axle Stabilization) system can affect how the machine operates during recovery. [Refer to: Rear Axle Stabilization \(RAS\) System \(Page 98\).](#)

1. Make the machine safe.
2. Set the transmission to the neutral position.

3. Prepare the machine for travel.
 - 3.1. If the engine cannot be run, the boom may have to be hoisted into the transport position and secured. The procedure for doing this will depend on the machine's condition and its hydraulic circuits. For assistance, contact your JCB dealer.
4. Attach the drawbar to a suitable location.
5. 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.
6. If the engine cannot be started, the effort required to steer the machine is greatly increased.

Lifting the Machine

General

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

CAUTION 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.

Safe Lifting Procedure

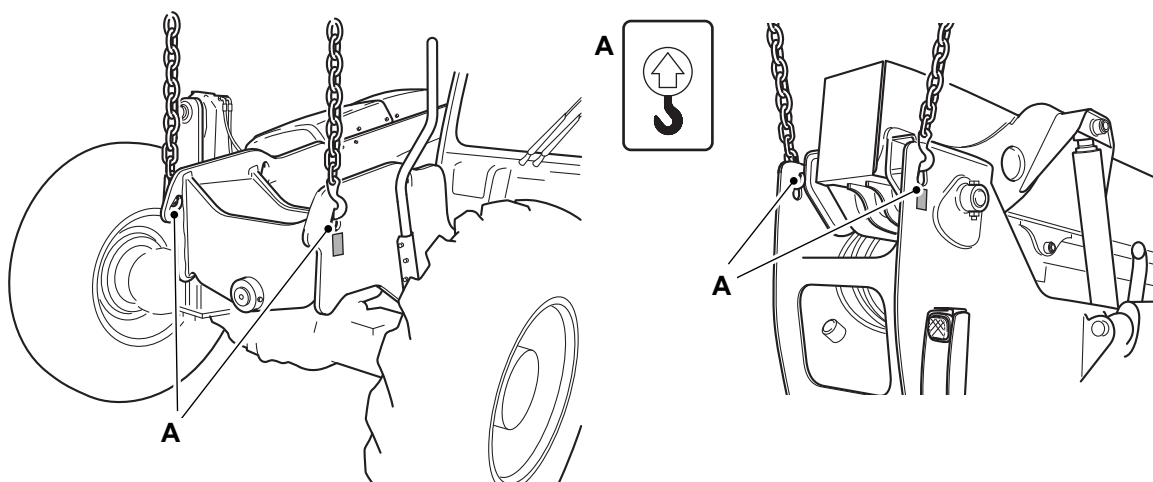
Provided a hoist of adequate capacity is available, it is permissible to lift a machine directly onto a suitable transporting vehicle.

For machine weight and dimensions. [Refer to: Static Dimensions \(Page 219\).](#)

Make sure that the cab door is closed before lifting the machine. [Refer to: Doors \(Page 35\).](#)

1. Remove all attachments.
2. Make the machine safe with the boom lowered.
[Refer to: Maintenance Position - Boom Lowered \(Page 156\).](#)
3. Remove all loose equipment from machine exterior.
4. Check the unladen weight of the machine.
[Refer to: Static Dimensions \(Page 219\).](#)
5. Attach lifting equipment to lifting points.
 - 5.1. The correct lift-point positions are identified on the machine by a label.
6. Take the weight of the machine. If the lifting equipment is fouling on the machine use spreader bars to prevent damage.
7. Check that the lifting eye is positioned directly above the machine's center of gravity.

Figure 125.



A Lifting points

Transporting the Machine

General

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

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

Check the condition of the transport vehicle before the machine is loaded on to its trailer.

Make sure that the transport trailer is suitable for the dimensions and weight of your machine. [Refer to: Static Dimensions \(Page 219\)](#).

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

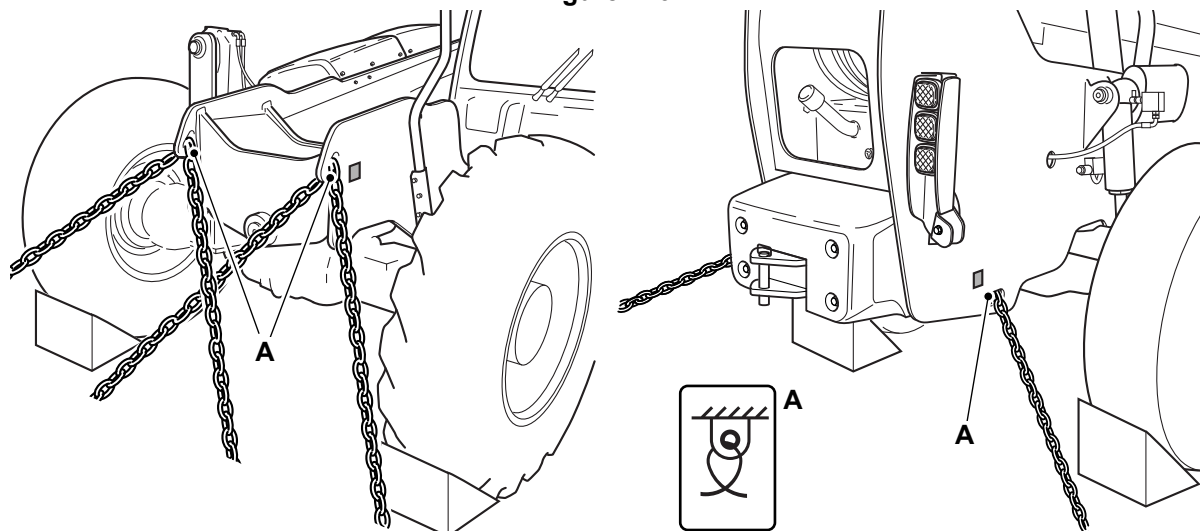
Loading the Machine onto the Transporting Vehicle/Trailer

▲ **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.

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

1. Stop the transport vehicle on solid, level ground.
2. Put blocks at the front and rear of the wheels on the transport trailer.
3. Move the machine onto the transport vehicle.
 - 3.1. Make sure the ramps are in their correct positions, then secure them.
 - 3.2. Set the boom.
 - 3.3. Slowly and carefully drive the machine onto the transport trailer.
 - 3.4. Make the machine safe with the boom lowered.
[Refer to: Maintenance Position - Boom Lowered \(Page 156\)](#).
 - 3.5. Put blocks at the front and rear of all four tires.
 - 3.6. Check that the overall height of the load is within regulations. Adjust if necessary.
 - 3.7. Secure the cab.
 - 3.8. Cover the exhaust stack.
4. Anchor the machine to the trailer with chains.

Figure 126.



A Anchor point

5. The correct tie down positions are identified on the machine by their labels.
6. Measure the maximum height of the machine from the ground. Make sure that the transporter driver knows the maximum height before he drives away.
7. Check the steer alignment while unloading the machine from the trailer.

[Refer to: Steer Modes \(Page 79\).](#)

Operating Environment

General

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.
3. Remove debris accumulation below the engine. Remove debris accumulation trapped underneath heat shields and exhaust jackets.

Operating in Coastal Regions

1. Check that all the plugs, bolts and fasteners are all tightened properly.
2. After daily operations, wash 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

1. Clean the Machine. Moisture or mud will cause the paint, wiring and metallic parts to deteriorate. When operating the machine keep it as dry as possible and regularly grease the machine.
2. Check for debris accumulation below the engine.

Operating in Low Temperatures

▲ Notice: Do not connect two batteries in series to give 24 V for starting as this can cause damage to the electrical circuits.

1. Use the correct viscosity engine lubricating oil.
[Refer to: Fluids, Lubricants and Capacities \(Page 235\).](#)
2. Use the correct viscosity hydraulic oil.
3. If available, use a low temperature diesel fuel.
4. Use the correct coolant mixture.
5. Keep the battery at full charge.
6. Fill the fuel tank and DEF (Diesel Exhaust Fluid) tank (if applicable) at the end of each work period, this will help to prevent condensation forming on the tank walls. Do not brim the tank in low temperatures, use the DEF level gauge on the instrument panel (ignition on).
7. Protect the machine when its not in use. Park the machine inside a building or cover it with a tarpaulin.
8. Install a cold weather starting aid. In very low temperatures (less than the value shown) additional starting aids may be needed. For example are fuel, oil and coolant heaters. Ask your JCB dealer for advice.
Temperature: -18°C (-0.4°F)
9. Remove snow from the engine compartment before starting otherwise snow could get into the air filter.
10. Always follow the starting procedure applicable to the current ambient temperature.
[Refer to: Starting the Engine \(Page 43\).](#)

For the machine hydraulic system to work efficiently, the machine hydraulic oil temperature should be a minimum of 10°C (50.0°F). If the air temperature is below freezing, do as follows:

1. Park the machine on solid, level ground with the engine running.
2. Apply the park brake and place the forward/reverse lever in the neutral position.

3. For every degree below 0 degrees Celsius the engine should be left at low idle for one minute.
4. With the engine at approximately 1500 rpm:
 - 4.1. Raise and lower the lift arm five times.
 - 4.2. Extend and retract the lift arm five times.
 - 4.3. Dump and crowd the carriage five times.

Operating in High Temperatures

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 cooling pack and engine clean, regularly remove dirt and debris from the cooling pack and the engine.
5. Check the air vents. Make sure that the air vents to and from the engine compartment are not blocked.
6. Check the engine pre-cleaner regularly (if installed).
7. Check the battery electrolyte level.

Arctic Kit

Extreme Cold Weather Operation

1. Locate the two yellow extension cords stored in the stowage cabinet.
2. Connect one end of both extension cords to the control panel located on the front cab side of the machine. Connect each extension cord to the separate A/C power supplies with a minimum rating of specified value.
Current: 15A
3. Start the power supply and make sure that both indicator lamps on the control panel are lit.
4. Allow the heating components to operate a minimum of specified duration prior to machine operation.
Duration: 12h
5. Find the two recirculation hoses stored in the stowage cabinet.
6. Connect one recirculation hose to the tilt hydraulic circuit quick disconnects and one hose to the auxiliary hydraulic quick disconnects.
7. Start the engine. Turn the starter switch to position III and hold it there until the engine starts.
 - 7.1. Do not operate the starter motor for more than a specified duration without the engine firing.
Duration: 10s
 - 7.2. Do not operate the starter motor for more than a specified duration if the engine fires but does not fully start.
Duration: 40s
 - 7.3. Let the starter motor cool for at least a specified duration between starts.
Duration: 2min
8. Turn the cab heater to full heat and full fan position.
9. Disconnect the extension leads.
10. Keep the extension leads in the stowage cabinet.

11. Allow the engine to idle for a specified duration.
Duration: 20min
12. Increase the engine speed to 1500 RPM (Revolutions Per Minute).
 - 12.1. Select auxiliaries for a specified duration.
Duration: 5min
 - 12.2. Select tilt for a specified duration.
Duration: 5min
 - 12.3. Sway full left to full right 5 times.
 - 12.4. Fully lower and fully raise both stabilizers 5 times.
 - 12.5. Level the machine.
 - 12.6. Operate the boom, lift /lower and extend/retract 5 times.
 - 12.7. Steer fully left and fully right 5 times.
13. Stop the machine.
14. Disconnect recirculation hoses.
15. Keep the recirculation hoses in the stowage cabinet.
16. Re-start the machine.
17. Apply the brakes two times when stationary.
18. Drive in a safe direction and check the brakes.
19. The machine is ready for operation.



Refueling

General

- ▲ **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.
Notice: Consult your fuel supplier or JCB dealer about the suitability of any fuel you are unsure of.

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 gage 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 slopes.
- If you increase the engine speed or load when there is air in the fuel system, then 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: Bleed \(Page 192\)](#).
- You must bleed the fuel system after changing the fuel filter(s).

Filling the Tank

- For: 509-42 [T4F], 510-42 [T4F], 510-56 [T4F], 512-56 [T4F], 514-56 [T4F] Page 122
- For: 506-36 [T4F], 507-42 [T4F] Page 124

(For: 509-42 [T4F], 510-42 [T4F], 510-56 [T4F], 512-56 [T4F], 514-56 [T4F])

- ▲ **WARNING** Do not use gas in this machine. Do not mix gas with the diesel fuel. In storage tanks the gas will form flammable vapors.
Notice: 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.
Notice: No warranty liability whatsoever will be accepted for failure of the emissions control system where the failure is attributed to contamination of the diesel exhaust fluid (DEF).
Notice: No warranty liability whatsoever will be accepted for failure of the emissions control system where the failure is attributed to contamination of the diesel fuel.
Notice: No warranty liability whatsoever will be accepted for failure of the emissions control system where the failure is attributed to the quality and grade of the diesel exhaust fluid (DEF) used.

[Refer to: Fluids, Lubricants and Capacities \(Page 235\)](#). If you use the incorrect type of fuel or fuel which is contaminated, then damage to the fuel injection system can occur.

- Fill the fuel tank and DEF (Diesel Exhaust Fluid) tank (if applicable) at the end of each work period, this will help to prevent condensation forming on the tank walls.
- Always replenish the DEF tank at the same as you refill the diesel tank. It is recommended that the DEF tank is not continually run down to the minimum, as this may drag contamination into the system and reduces the likelihood of an engine de-rate due to DEF level.
- DEF has a totally separate tank of its own. You can recognizyour DEF tank by its blue cap or an AdBlue® label.

Filling the Diesel Tank

- ▲ **Notice:** Make sure that you use the fuel filler and not the DEF filler. Even small amounts of fuel in the DEF tank may damage the system. If there is any possibility that the DEF system has been contaminated with fuel, the engine must not be started before cleaning the system. Contact your JCB dealer.

1. Make the machine safe.
[Refer to: Maintenance Positions \(Page 156\).](#)
2. If the machine has a protective flap, you must move the flap to get access to the filler cap. Lift the corner of the protective flap then attach to the hook.
3. Remove all unwanted material around the diesel fuel cap.
4. Remove the diesel fuel tank cap. Refer to Figure 127.
5. Add the fuel through the filler neck as necessary.
6. Install the diesel fuel tank cap.
7. Lock the diesel fuel tank cap to prevent theft and tampering.
8. Lower the protective flap.

Filling the Diesel Exhaust Fluid Tank

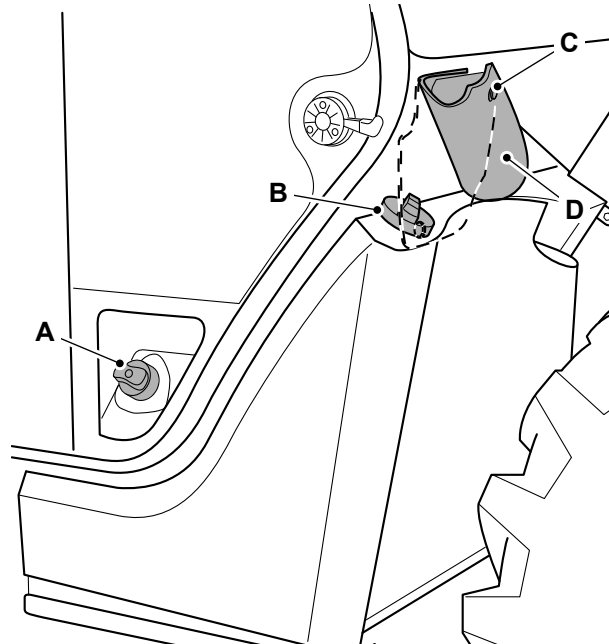
▲ Notice: Make sure that you use the DEF filler and not the fuel filler. Even small amounts of DEF in the fuel tank may damage the system. If there is any possibility that the fuel system has been contaminated with DEF, the engine must not be started before cleaning the system. Contact your JCB dealer.

Engines with SCR (Selective Catalytic Reduction) after-treatment: If the engine and has been run low on DEF and the engine has entered a de-rate state due to low DEF you must fill the machine with DEF and cycle the ignition twice to remove the fault.

With the ignition on and the engine off it is possible to monitor the DEF level on the instrument panel as you fill the tank.

1. Make the machine safe.
[Refer to: Maintenance Positions \(Page 156\).](#)
2. Remove all unwanted material around the DEF cap.
3. Remove the DEF cap. Refer to Figure 127.
4. Add the DEF through the filler neck as necessary.
5. Install the DEF cap.
6. Lock the DEF cap to prevent theft and tampering.

Figure 127.



A DEF tank cap (blue)
C Hook

B Diesel fuel tank cap (green)
D Protective flap

(For: 506-36 [T4F], 507-42 [T4F])

Before you add the fuel to the machine, [Refer to: Fluids, Lubricants and Capacities \(Page 235\)](#). If you use the incorrect type of fuel or fuel which is contaminated, then damage to the fuel injection system can occur.

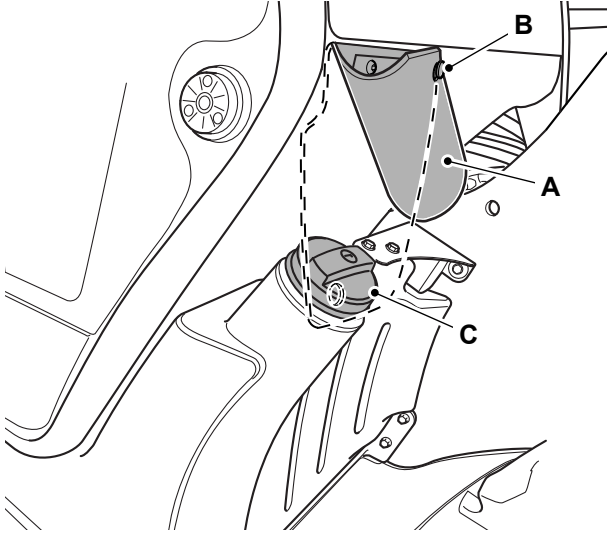
WARNING! Do not use gas in this machine. Do not mix gas with the diesel fuel. In storage tanks the gas will form flammable vapors.

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. Make the machine safe.
[Refer to: Maintenance Positions \(Page 156\)](#).
2. If the machine has a protective flap, you must move the flap to get access to the filler cap. Lift the corner of the protective flap then attach to the hook.
3. Remove all unwanted material around the fuel cap.
4. Remove the fuel cap. Refer to Figure 128.
5. Add the fuel through the filler neck as necessary.
6. Install the fuel cap.
7. Lock the fuel cap to prevent theft and tampering.
8. Lower the protective flap.



Figure 128.



A Protective flap
C Cap

B Hook

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Attachments

Working with Attachments

Introduction

Attachments

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 and cause damage to both machine and attachments.

Metal Splinters

You can be injured by flying metal splinters when driving metal pins in or out. Use a soft faced hammer or copper drift to remove and install metal pins. Always wear personal protective equipment.

Attachments

If you have an attachment which is not covered in the Operator's 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.

Some attachments are supplied with instructions on the safety, installation, removal, operation and maintenance procedures. Read and fully understand these procedures before the attachment is installed, used and serviced. If there is anything you do not understand, ask your JCB dealer.

Before you use an attachment, make sure you understand how the attachment will affect the operational safety.

When an attachment is installed, there may be changes in the machine's center of gravity or overall dimensions. These changes can effect for example, the machine stability, the gradients on which it is safe to operate or the safe distance from power lines.

Practice with an attachment off the job before you work with it for the first time.

A JCB attachment is designed and manufactured specifically to suit the machines hydraulic system, mounting components and safe load requirements.

An attachment which is not designed for use with the machine can cause damage and create a safety hazard for which JCB cannot be held responsible. Also the machine's warranty and any other legislative compliance can be affected by the use of non JCB approved attachments.

If your machine needs the hydraulic system adapting to use an auxiliary attachment, you must consult your JCB dealer. Only suitably qualified personnel must re-route the hydraulic hoses.

All optional attachments must be used within the limits for the machine and will have limits on their operation, for example, the lifting capacity, speeds, hydraulic flow rates. Always check the instruction supplied with the attachment, or if in doubt check with a JCB Dealer for advice. Some specification limits may also be shown on the data/rating plate on the attachment.

This section of the Operator's Manual includes general information on the operation of the attachment and the procedures for the installation and removal of the attachment.

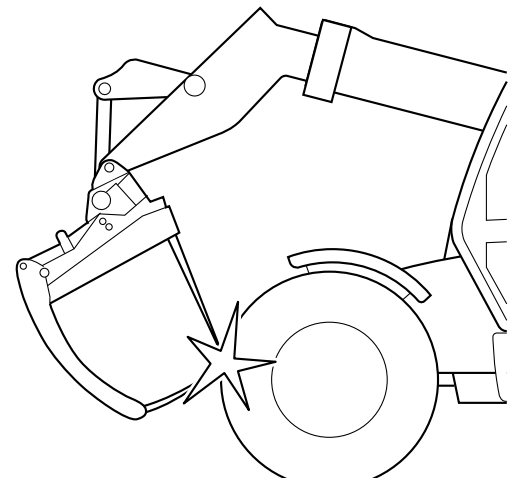
Attachments for your Machine

⚠ DANGER 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.

WARNING The forks project in front of the machine. Make sure there is enough clearance for the forks when making turns.

Notice: Some attachments (e.g. muck fork/push-off) can cause damage to the front tires when the lift arm is lowered and the carriage is tilted forward. Exercise caution when lowering the lift arm with the carriage tilted forward when a muck fork/push-off type attachment is installed.

Figure 129.



Notice: Some attachments may contact parts of the machine when in the fully folded position. Take extra care to avoid damage to the machine.

Approved attachments will help increase the productivity of your machine, for more information contact your JCB dealer.

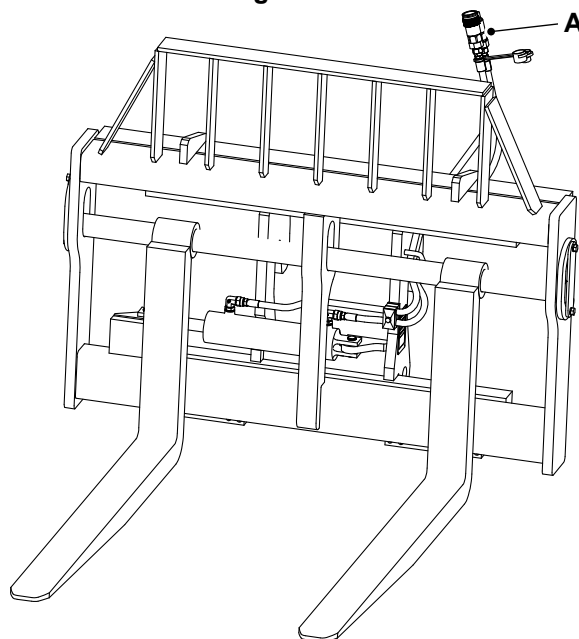
Remember, do not operate attachments until you have read and fully understand the attachment operating instructions.

Do not operate or work with attachments until the machine hydraulic oil has reached its normal working temperature.

Side Shift Carriage

Fix the attachment to the machine. Connect to the auxiliary hydraulics. [Refer to: Attachments \(Page 127\).](#)

Figure 130.



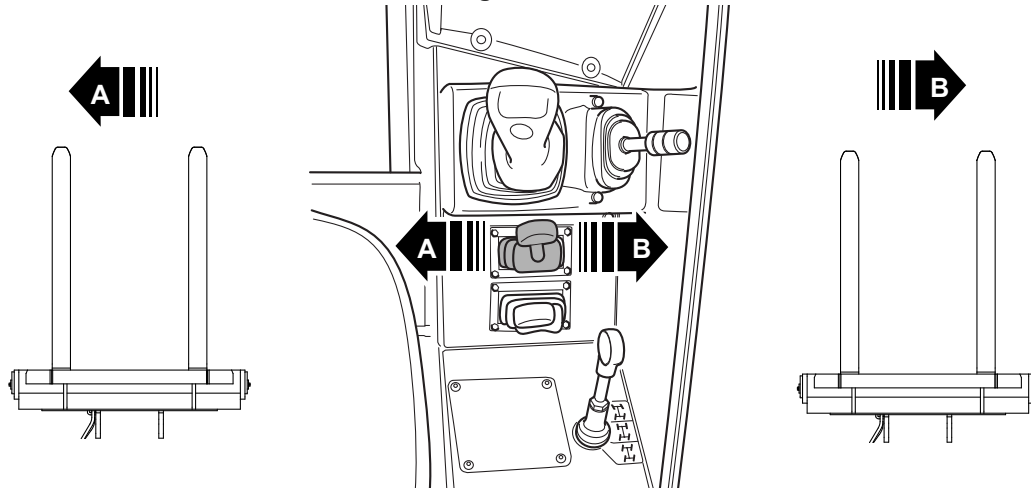
A Auxiliary hydraulics

To operate shift carriage:

Move the auxiliary 1 lever to the left to shift the carriage to the left.

Move the auxiliary 1 lever to the right to shift the carriage to the right.

Figure 131.



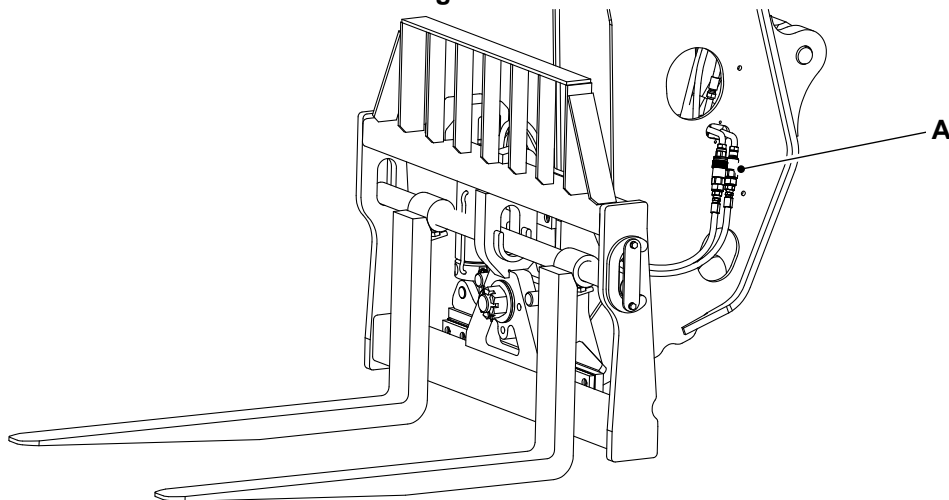
A Shift the carriage to the left

B Shift the carriage to the right

Side Tilt Carriage

Fix the attachment to the machine. Connect to the auxiliary hydraulics [Refer to: Attachments \(Page 127\)](#).

Figure 132.



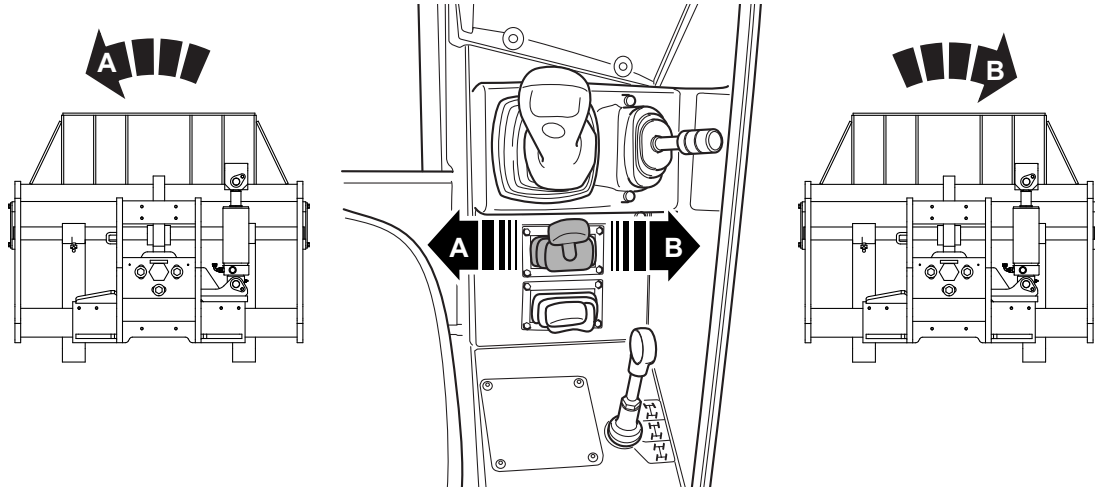
A Auxiliary hydraulics

To operate side tilt carriage:

Move the auxiliary 1 lever to the left to tilt the carriage to the left.

Move the auxiliary 1 lever to the right to tilt the carriage to the right.

Figure 133.



A Tilt the carriage to the left

B Tilt the carriage to the right

Connecting/Disconnecting Hydraulic Hoses

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

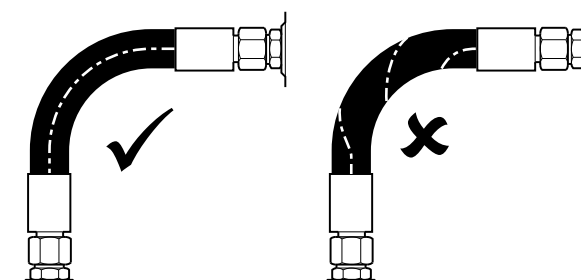
WARNING Hydraulic fluid at system pressure can injure you. Before connecting or removing any hydraulic hose, residual hydraulic pressure trapped in the service hose line must be vented. Make sure the hose service line has been vented before connecting or removing hoses. Do not start the engine with loose or open hose connections.

Some attachments are hydraulically powered. The following procedures show how to connect and disconnect the hydraulic hoses safely.

Connecting the Hydraulic Hoses

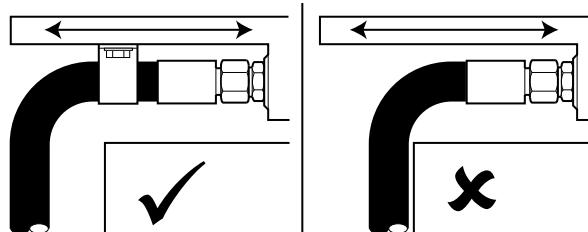
1. Make the machine safe.
[Refer to: Maintenance Positions \(Page 156\).](#)
2. Vent the hydraulic system.
[Refer to: Discharge \(Page 208\).](#)
3. Check the hoses and adaptors for damage.
[Refer to: General \(Page 208\).](#)
4. Connect the hoses:
 - 4.1. Make sure that the hose is not twisted. Pressure applied to a twisted hose can cause the hose to fail or the connections to loosen.

Figure 134.



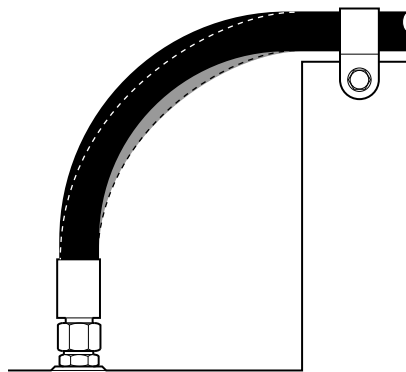
- 4.2. Make sure that the hose does not touch hot parts. High ambient temperatures can cause the hose to fail.
- 4.3. Make sure that the hose does not touch parts which can rub or cause abrasion.
- 4.4. Use the hose clamps (where possible) to support long hose runs and keep the hoses away from moving parts, etc.

Figure 135.



- 4.5. To allow for length changes when the hose is pressurized, do not clamp at the bend. The curve absorbs the change.

Figure 136.



5. Check for leaks:
 - 5.1. Start the engine.
 - 5.2. Operate the related controls to increase the pressure in the hydraulic system.
 - 5.3. Stop the engine then remove the ignition key.
 - 5.4. Check for indications of leakage at the hose connections. Correct, as necessary.

Disconnecting the Hydraulic Hoses

1. Make the machine safe.
[Refer to: Maintenance Positions \(Page 156\).](#)
2. Vent the hydraulic system.
[Refer to: Discharge \(Page 208\).](#)
3. Disconnect the hoses.
4. Check the hoses and adaptors for damage.
5. If necessary, install the blanking caps.
6. Check for leaks:
 - 6.1. Start the engine.

- 6.2. Operate the related controls to increase the pressure in the hydraulic system.
- 6.3. Stop the engine then remove the ignition key.
- 6.4. Check for indications of leakage at the hose connections. Correct, as necessary.

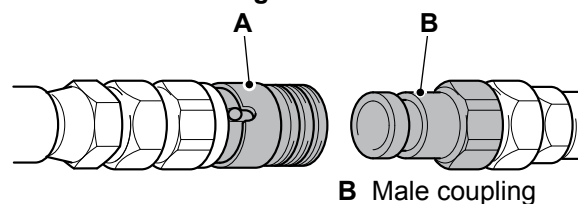
Quick Release Couplings

▲ 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.

The flat face quick release couplings allow the operator to remove and install attachments swiftly and efficiently.

Generally, your machine pipework will be installed with a female coupling and a male coupling. The optional attachment hoses will also be installed with a female coupling and a male coupling.

Figure 137.



A Female coupling

B Male coupling

The quick release couplings will be trouble free and relatively easy to connect and disconnect, if they are kept clean and used correctly. The recommendations listed below must always apply when using flat face quick release couplings.

Read the correct connecting and releasing procedures before you install or remove any optional attachment connected with quick release couplings.

Essential do's:

- Before connecting or removing any hydraulic hose, the 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 the 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. Make sure the locking ball and notch in the locking sleeve are aligned, pull back the sleeve and twist the couplings apart. Sticking is normally caused by dirt in the coupling or physical damage due to abuse.
- Connect and disconnect the 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 connecting the 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:

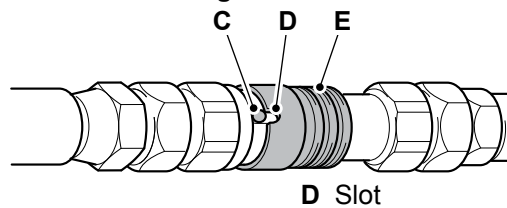
- Never try to reconnect using a damaged half coupling as this will destroy the seals in the mating half and necessitate replacement of both halves.
- Do not leave the coupling where it may be run over by a machine or otherwise crushed, this will distort the sleeve and prevent connection and disconnection.
- Never try to turn the sleeve when the coupling is disconnected as 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 must be replaced with a new one.

- Never hit the center poppet of the coupling to try and release the locked in pressure. This can cause irreparable damage to the coupling and serious injury.
- When connecting the 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 decrease the life of the coupling or cause failure.
- Never allow the torsional forces transmitted from the hoses to unscrew/screw together the 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.

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 the ball in the female coupling is located in one of its slots.
4. Connect the male coupling into the female coupling.
5. Where applicable, rotate the sleeve half a turn and make sure that the locking ball does not align with the slot.

Figure 138.



- C** Ball
E Sleeve

D Slot

Disconnecting Quick Release Couplings

1. Remove any residual hydraulic pressure trapped in the service line hose.
2. Where applicable, align the slot with the ball.
3. Pull back the sleeve to release the coupling.

Quick-fit Carriage

General

▲ WARNING Keep other people clear of the area while you engage the attachment. If a second person is to be involved in this procedure, make sure that they keep clear of the machine and attachment until signaled by you to proceed. The machine loading limits at different boom positions are shown on the load charts in the cab.

WARNING Keep other people clear of the area while you disengage the attachment. If a second person is to be involved in this procedure, ensure that they keep clear of the machine and attachment until signaled by you to proceed.

Mechanical Pin Locking

Installing Attachments

1. Study the attachment information. Pay particular attention to the safety notices and any specific notes about handling and installing.
2. Position the attachment.
 - 2.1. Make sure that the attachment is on firm, level ground.
 - 2.2. Make sure that the attachment will not tip over.
3. Engage the attachment. Refer to Figure 139.
 - 3.1. Make sure that the carrier lock pin is withdrawn.
 - 3.2. Use the loadall controls to line up the carrier with the attachment and just below the attachment hook plates.
 - 3.3. Apply the park brake, set the gearshift lever and forward/reverse lever to neutral.
 - 3.4. Using the boom controls, engage the support bar on the carrier into the hook plates on the attachment. Make sure that the both hook plates are engaged equally.
 - 3.5. Lift and tilt the carrier back, to line up the locking holes in the carrier with those in the attachment.
4. Insert the lock pin: Refer to Figure 139.
 - 4.1. Insert the lock pin into the locking holes in the attachment and boom. Secure with the linch pin.
 - 4.2. If a second person is to do this job keep your hands and feet away from the controls until he is clear of the machine.
5. If the attachment is hydraulically operated then connect the hose(s).
[Refer to: Connecting/Disconnecting Hydraulic Hoses \(Page 130\).](#)

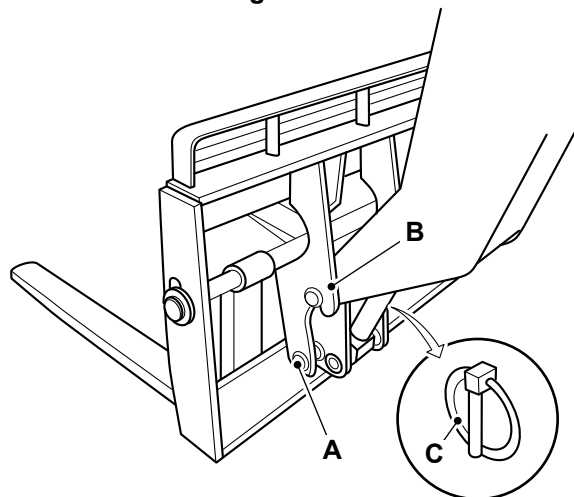
Removing Attachments

Deposit Q-Fit attachments on firm, level ground whenever possible. This will make later refitting easy and safe.

1. Lower the attachment to the ground.
2. Study the attachment information. Pay particular attention to the safety notices and any specific notes about removing the attachment.
3. If the attachment is hydraulically operated then disconnect the hose(s).
[Refer to: Connecting/Disconnecting Hydraulic Hoses \(Page 130\).](#)
4. Remove the locking pin: Refer to Figure 139.
 - 4.1. Remove the linch pin and withdraw the locking pin.
 - 4.2. Start the Engine.

- 4.3. Tilt the carrier forward slowly to withdraw the lower end of the carrier from the attachment. Then lower the boom slowly to withdraw the carrier from the attachment hook plates. Carefully reverse the load all away from the attachment (or retract the boom).

Figure 139.



- A** Lock pin
C Lynch pin

- B** Hook plates

Preservation and Storage Cleaning

General

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

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 installed). Examine these areas frequently and clean at the beginning of each work shift or more often if required. Before opening the engine cover, make sure that the top is clear of debris.

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

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

Notice: 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.

Notice: Never use water or steam to clean inside the operator station. The use of water or steam could damage the machine electrics and render the machine inoperable. Remove dirt using a brush or damp cloth.

Clean the machine with water and/or steam. Do not allow mud, debris etc. to collect on the machine.

Before you do any service procedures that require components to be removed:

- The cleaning must be done 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 the surrounding machine must be cleaned.
- When cleaning is complete, move the machine away from the wash area or alternatively, remove the material washed from the machine.

When you remove components, be aware of exposure to dirt and debris. Cover any open ports and remove the deposits before proceeding.

Refer to the individual clean procedures throughout the Maintenance section. [Refer to: Maintenance Schedules \(Page 150\).](#)

Detergents

Do not use a full strength detergent. Always dilute the detergents as per the manufacturer's recommendations, or damage to the paint finish can occur.

Always obey the local regulations regarding the disposal of debris created from cleaning the machine.

Pressure Washing and Steam Cleaning

▲ **CAUTION** When using a steam cleaner, wear safety glasses or a face shield as well as protective clothing. Steam can cause personal injury.

Notice: The batteries and other electrical components could be damaged by high pressure washing systems. Special precautions must be taken if the machine is to be washed using a high pressure system.

Use a low pressure washer and brush to remove dried mud or dirt.

Use a steam cleaner to remove soft dirt and oil.

When cleaning around decals:

- Ensure the water pressure is kept below 138bar (2,000.0psi).
- Keep water temperature below 80°C (176°F).

- Use a spray nozzle with a 40° wide angle spray pattern.
- Keep the nozzle at least 300mm (11.81 in) away from and perpendicular (at 90° degrees) to the decal.

The machine must always be greased (if appropriate) after pressure washing or steam cleaning.

Preparation

1. Make the machine safe.
[Refer to: Maintenance Positions \(Page 156\).](#)
2. Stop the engine and let it cool for at least one hour. Do not try to clean any part of the engine while it is running.
3. Make sure that all of the electrical connectors are correctly coupled. If the connectors are open, attach the correct caps or seal with water proof tape.



Checking For Damage

General

Refer to the individual condition checks throughout the Maintenance section. [Refer to: Maintenance Schedules \(Page 150\).](#)

Storage

General

If the machine will not be used for an extended period (greater than two months), 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.

It is recommended the engine is operated and reaches operating temperature at least every three months.

Storage Area

The machine can be stored in a temperature range of: -40°C (-40°F) to 30°C (86°F).

If the machine uses DEF (Diesel Exhaust Fluid) and is to be stored with DEF (or other fluids present), check the relevant fluid storage requirements as they may affect the applicable storage temperature range. [Refer to: During Storage \(Page 140\).](#)

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.

Prepare the Machine for Storage

1. Clean the machine to remove all unwanted material and corrosive products.
2. Dry the machine to remove solvents and moisture.
3. Touch-up any damaged paint. Treat exposed parts with anti-rust agent. Apply grease to unpainted surfaces.
4. Apply grease to the moving parts.
5. Examine the machine for worn or damaged parts. Replace if necessary.
6. Fill the diesel fuel and DEF tanks to prevent a build up of condensation in the tank.
7. Examine the coolant condition. Replace if necessary.
8. Examine all fluid levels. Top up if necessary.
9. Inflate the tires to the correct pressure (if applicable).

Put into Storage

1. Park the machine on solid, level ground.
 - 1.1. Park the machine in an area where it is easy to access. (In case the machine does not start at the end of the storage period).
 - 1.2. Put suitable timbers under the machine to eliminate direct contact with the ground.
2. Retract all of the rams and lower the attachment to the ground.
3. Vent the hydraulic system.
4. Remove the ignition key.
5. Apply a thin layer of grease or petroleum jelly to all of the exposed ram piston rods.
6. Remove the battery.
 - 6.1. Keep the battery in warm, dry conditions.
 - 6.2. Charge the battery periodically.
7. If you keep the machine outdoors, cover the machine with tarpaulins or plastic sheets.

During Storage

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

1. Remove the grease or petroleum jelly from the cylinder piston rods.
2. Examine all fluid levels. If necessary, add more fuel and DEF (Diesel Exhaust Fluid).
3. Install a charged battery.
4. Start the engine.
5. Operate the hydraulic controls. Make sure that the hydraulic functions operate correctly.
6. Prepare the machine for storage.

Effects of Storage on the DEF System (if applicable)

If the engine has been shutdown correctly and there are no faults with the DEF system, the DEF system and engine can remain in a deactivated state under the following conditions:

Table 21.

Storage Period	Storage Actions
Up to 9 months	Fill DEF tank to maximum level with fresh DEF. Do not disconnect any electrical or hydraulic connections. Make sure the ambient temperature is between the values shown. -40°C (-40°F) to 30°C (86°F).
Longer than 9 months	Carry out recommissioning process

Take out of Storage

1. Examine the coolant condition. Replace if necessary.
2. Examine all fluid levels. If necessary, add more fluid.
3. Clean the machine to remove all unwanted material and corrosive products. Dry the machine to remove solvents and moisture.
4. Remove the grease or petroleum jelly from the ram piston rods.
5. Install a charged battery.
6. Start the engine.
7. Operate the hydraulic controls. Make sure that the hydraulic functions operate correctly.

DEF Recommissioning Process (if applicable)

1. Drain the DEF (Diesel Exhaust Fluid) tank.
2. Refill DEF tank with fresh fluid.
3. If a DEF system failure is detected, contact your JCB dealer for advice.



Security

General

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

Your JCB dealer will be pleased to provide information on any of these sensible precautions. Act now!

LiveLink

Your JCB machine may be installed with LiveLink, JCB's advanced machine monitoring system. LiveLink monitors a range of information about your machine and sends it through cellular and satellite communication back to JCB's secure monitoring center.

The machine owners and JCB dealers can then view that information through the LiveLink website, by email and even through text message. If you want to know how LiveLink can help manage your JCB machines, contact your local dealer for more information.



Notes:

Maintenance

Introduction

General

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 dealer to make sure that it reaches you in optimum condition. To maintain this condition and trouble free operation it is important that the routine services and maintenance, as specified in this manual, are done at the recommended specified intervals and it is recommended that this is done by an approved JCB dealer using genuine JCB parts. Servicing/repairs carried out by unauthorized personnel or the use of non-genuine inferior quality parts could limit machine warranty.

After completing any routine servicing, maintenance or repairs you must complete the functional checks according to the maintenance schedule.

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

It can be seen from the service schedules on the following pages that many essential service checks must only be done by a JCB trained specialist competent person. JCB dealer service engineers have been trained by JCB to do such specialist tasks, and are equipped with the necessary special tools and test equipment to do such tasks, thoroughly, safely, accurately and efficiently.

JCB regularly updates its dealers to advise them of any machine developments, changes in specifications and procedures. Therefore only a JCB dealer is fully able to safely service the machine to the latest requirements, which makes them best placed to maintain and service your machine.

A service record sheet or book is provided at the back of this publication which will enable you to plan your service requirements and keep a service history record. It must be dated, signed and stamped by your dealer 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.

When the machine is removed from service, local regulations for machine decommissioning and disposal will vary. Contact your nearest JCB dealer for further information.

Owner/Operator Support

JCB together with your dealer wants you to be completely satisfied with your new JCB machine. However, if you do have a problem, you can contact your dealers service department who are there to help you!

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

To get the most from your dealer please help them to satisfy you by providing them with:

1. Your name, address and telephone number.
2. Your product model and serial number.
3. The date of purchase and hours of work.
4. The nature of the problem.

Remember, only your JCB dealer has access to the vast resources available at JCB to help support you. In addition, your dealer is able to offer a variety of programs covering warranty, fixed price servicing, safety inspections, including weight tests, covering both legal and insurance requirements.

Environmental Protection Agency and California Air Resources Board

The original owner and all subsequent owners of this machine are free to elect a suitable competent repair shop or person of the owners choosing to conduct maintenance, replacement or repair of engine parts/systems.

JCB strongly recommend the use of genuine JCB Service approved parts when conducting maintenance, replacement or repair of any engine component in order to assure the performance and safety of the machine. If replacement parts other than genuine JCB Service approved parts are used, only manufacturer warranted parts of equivalent performance should be used. In this case, the remaining emissions component warranties remain in effect; unless damage is caused to such components by the non-JCB Service approved parts.

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 dealer can offer. These can be tailor made to meet your operating conditions, work schedule etc.

Please consult your JCB dealer for details.

Initial Service and Inspection

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 100h of operation (whichever occurs first). You should notify your distributor in advance to allow the necessary arrangements to be made.

Obtaining Spare Parts

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 dealer. The parts book will help you identify parts and order them from your JCB dealer.

Your dealer will need to know the exact model, build and serial number of your machine. [Refer to: Product and Component Identification \(Page 10\)](#).

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

Maintenance Safety

General

Raised Machine

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

Air Conditioning Maintenance

The air conditioning system is a closed loop system and contains pressurized 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.

Compressed Air

Compressed air is dangerous. Wear personal protective equipment. Never point a compressed air jet at yourself or others.

Air Tanks

The air tank contains air at high pressure. Prior to any work being carried out the Air Trailer Brake System, the system pressure must be discharged by a JCB dealer, as the sudden release of the air may cause serious injury or death.

Springs

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

Metal Splinters

You can be injured by flying metal splinters when driving metal pins in or out. Use a soft faced hammer or copper drift to remove and install metal pins. Always wear personal protective equipment.

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.

You must stop the machine operation, isolate the controls and turn off the engine when persons are required to interact with the machine.

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.

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.

'O' rings, Seals and Gaskets

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

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 (ECUs), 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 to avoid damage to pivot pins, bearings and bushes. Attach the welder earth (ground) cable a distance from the part being welded no more than 0.6 m (½ yd).

Counterweights

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

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 discharged by a JCB dealer, as the sudden release of the hydraulic fluid or gas may cause serious injury or death.

Hot Components

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.

Soft Ground

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

Working Under the Machine

Make the machine safe before getting beneath it. Make sure that any attachments on the machine are correctly attached. Engage the park brake, remove the ignition key, disconnect the battery. If the machine has wheels use blocks to prevent unintentional movement.

Lifting the Machine

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.

Chemicals

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: Thoroughly wash contaminated area with 10% calcium hydroxide or other suitable alkali solution, if necessary use wire wool to remove burnt remains. Thoroughly wash contaminated area with detergent and water. 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.

Hydraulic Hoses

Never re-use hydraulic hose end crimps or use reusable hose end crimps.

Personal Protective Equipment

Use the appropriate personal protective equipment before performing maintenance on the machine, otherwise you could be injured.

Working at Height

Use appropriate access equipment such as ladders or a working platform if it is necessary to work at height to perform maintenance tasks on the machine. If you do not use suitable access equipment there is a risk of falling, resulting in personal injury or death.

Fluids and Lubricants

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 gas, diesel fuel or paraffin to clean your skin.

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 personal protective equipment. Hold a piece of cardboard close to suspected leaks and then examine the cardboard for signs of fluid. If fluid penetrates your skin, get medical help immediately.

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 refueling 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.

Hygiene

JCB lubricants are not a health risk when used correctly 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 must 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 unlabeled containers.

Waste Disposal

▲ 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 authorized waste disposal sites.

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

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

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

Handling

▲ CAUTION The temperature of the hydraulic oil will be high soon after stopping the machine. Wait until it cools before beginning maintenance.

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
- Apply a barrier cream to the skin before handling used oil. Note the following when removing engine oil from skin:
 - Wash your skin thoroughly with soap and water
 - Using a nail brush will help
 - Use special hand cleansers to help clean dirty hands
 - Never use gas, diesel fuel, or paraffin for washing
- Avoid skin contact with oil soaked clothing
- Don't keep oily rags in pockets
- Wash dirty clothing before re-use
- Throw away oil-soaked shoes

Battery

Warning Symbols

The following warning symbols may be found on the battery.

Figure 140.



A Keep away from children

C No smoking, no naked flames, no sparks

E Battery acid

B Shield eyes

D Explosive gas

F Note operating instructions

First Aid - Oil

Eyes

In the case of eye contact, flush with water for 15min. 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

▲ 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.

First Aid - Electrolyte

Eyes

In the case of eye contact, flush with water for 15min. always get medical attention.

Swallowing

Do not induce vomiting. Drink large quantities of water or milk. Then drink milk of magnesia, beaten egg or vegetable oil. Get medical help.

Skin

Flush with water, remove affected clothing. Cover burns with a sterile dressing then get medical help.

First Aid - DEF (if applicable)

Do not drink or inhale DEF (Diesel Exhaust Fluid). If large quantities of DEF have been swallowed a doctor should be called immediately. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person.

Avoid prolonged or repeated skin contact. After contact with skin wash thoroughly with plenty of soap and water. If irritation develops seek medical advice.

Avoid contact with eyes, skin and clothing. Wear chemical resistant gloves, overalls and safety goggles complying with an approved standard. If in contact with eyes, rinse immediately with plenty of clean water. If irritation occurs seek medical attention. Always wash hands and arms thoroughly after handling before eating, drinking, smoking or using the lavatory.



Maintenance Schedules

General

- ▲ WARNING** Maintenance must be done only by suitably qualified and competent persons.
Before doing any maintenance make sure the machine is safe, it must be correctly parked on firm, level ground.
To prevent anyone starting the engine, remove the ignition key. Disconnect the battery (by means of the battery isolator if installed) when you are not using electrical power. If you do not take these precautions you could be killed or injured.
WARNING All scheduled and routine maintenance/daily tasks should be conducted with the machine cool. Checking or servicing a hot machine could lead to injury.

A badly maintained machine is a danger to the operator and the people working around the operator. Make sure that the regular maintenance and lubrication tasks listed in the service schedules are done to keep the machine in a safe and efficient working condition.

To ensure the correct functioning of the engine and emissions control system all operation and maintenance must be conducted in accordance with the instructions in this manual. Incorrect operation, maintenance or repair of the engine and emissions control system may lead to reduced product life, loss of performance or malfunctions. It is the machine owner's responsibility to ensure maintenance is conducted properly in accordance with the requirements in this manual.

Apart from the daily tasks, the schedules are based on the machine running hours. Keep a regular check on the hourmeter readings to correctly gage the service intervals. When there is no hourmeter installed, use the calendar equivalents to determine the service intervals.

Do not use a machine which is due for a service. Make sure any defects found during the regular maintenance checks are corrected immediately.

More frequent checks of engine components than the engine manufacturer recommends do not invalidate emissions warranty.

How to Use the Maintenance Schedules

The schedules show the service tasks which must be done and their intervals.

The services must be done at either the hourly interval or the calendar equivalent, whichever occurs first.

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 service intervals.

Table 22.

○	Service task can be completed by a competent operator. Details of how to complete the service task are given in the Operator's Manual.
□	We recommend that a Service Engineer completes the service task. Details of how to complete the service task are given in the Service Manual.

Maintenance Intervals

Table 23.

Interval (h)	Calendar Equivalent
10	Daily
50	Weekly
500	Six months
1000	Yearly
2000	Two Years
5000	Five Years

Pre-start Cold Checks, Service Points and Fluid Levels

Table 24.

Component	Task	10	50	100 ⁽¹⁾	500	1,000	1,500	2,000
ENGINE								
Oil level	Check	○	○	□	□	□	□	□
Coolant Quality and Level	Check	○	○	□	□	□	□	□
Coolant or Oil Leaks	Check	○	○	□	□	□	□	□
Water Sedimentor	Clean		○	□	□	□	□	□
Fuel Filter (machine mounted)	Change				□	□	□	□
Oil and Filter ^(2, 3, 4)	Change				□	□	□	□
All Hoses - Condition	Check			□	□	□	□	□
Radiator ⁽⁴⁾	Clean				□	□	□	□
Front End Accessory Drive (FEAD) Belt Condition	Check				□	□	□	□
Engine Fuel Filter	Change					□		□
Air Cleaner Outer Element ⁽⁴⁾	Change					□		□
DEF (Diesel Exhaust Fluid) Filter ⁽¹¹⁾	Change					□		□
Crankcase Ventilation Filter	Change						□	
Air Cleaner Inner Element	Change							□
Valve clearances ⁽⁵⁾	Check and adjust							□
Oil Filler and Dipstick Seals	Change							□
Cooling System	Drain and Refill							□
Front End Accessory Drive (FEAD) Belt ⁽¹⁰⁾	Change							
Injectors ^(5, 10)	Change							
Injector(s) Leak Off Rail ^(5, 10)	Replace							
High Pressure Fuel Lines ^(5, 10)	Change							
TRANSMISSION, AXLES AND STEERING								
Transmission Mount Security	Check			□	□	□	□	□
Transmission Oil Level	Check	○	○	□	□	□	□	□
Transmission Oil ⁽⁶⁾	Change					□		□
Transmission Oil Filter	Change			□	□	□	□	□
Axle Mount Security	Check			□	□	□	□	□
Axle(s) Oil Level	Check		○	□	□	□	□	□
Axle(s) Oil	Change				□	□	□	□
Hub Oil Level (Without Oil Immersed Brakes)	Check			□	□	□	□	□
Hub Oil (Other Machines Without Oil Immersed Brakes) ⁽⁷⁾	Change					□		□
Hub Oil (Other Machines With Oil Immersed Brakes) ⁽⁷⁾	Change			□	□	□	□	□
Axle Breather(s)	Check			□	□	□	□	□
Steering Stops (if fitted)	Security			□	□	□	□	□



Component	Task	10	50	100 ⁽¹⁾	500	1,000	1,500	2,000
Wheel Nut Security	Check	○	○	□	□	□	□	□
Tire Pressures/Condition	Check	○	○	□	□	□	□	□
Wheel Alignment	Check	○	○	□	□	□	□	□
Transmission Strainer	Clean					□		□
Drive Shafts and Universal Joints ⁽⁹⁾	Security and grease			□	□	□	□	□
Axle Pivots and Linkages ⁽⁹⁾	Grease		○	□	□	□	□	□
HYDRAULICS								
Oil Level	Check (Level)		○	□	□	□	□	□
Oil ⁽⁵⁾	Sample, Change							□
Oil Filter	Change			□	□	□	□	□
Suction Strainer	Clean							□
Pilot Filter (if fitted)	Change			□	□	□	□	□
BRAKES								
Brake System Fluid Level	Check (Condition)	○	○	□	□	□	□	□
Brake System Fluid	Change							□
ELECTRICS								
Battery electrolyte level (if applicable)	Check				□	□	□	□
Battery Terminals for Condition and Tightness	Check			□	□	□	□	□
BODYWORK AND CAB								
Lift/Displacement/Tilt/Steer Cylinder Pivot Pins	Grease		○	□	□	□	□	□
Extension Ram Piston Rod Pivot Pin	Grease					□		□
All Other Pivot Pins	Grease		○	□	□	□	□	□
Fire Extinguisher (if fitted)	Check	○	○	□	□	□	□	□
Wing Mirrors Condition and Security	Check	○	○	□	□	□	□	□
ROPS/FOPS Structure	Check	○	○	□	□	□	□	□
Doors and Hinges	Lubricate			□	□	□	□	□
Control Lever Linkages	Lubricate			□	□	□	□	□
Windshield Washer Fluid Level	Check	○	○	□	□	□	□	□
Cab Heater Fresh Air Filter (if fitted)	Change				□	□	□	□
Boom Wear Pad Runways	Waxoyl				□	□	□	□
Inner Boom Hoses	Grease				□	□	□	□
Boom Wear Pad Clearance ⁽⁹⁾	Check/Adjust				□	□	□	□
Boom Wear Pad Condition and Security (Replace if required) ⁽⁹⁾	Check/Adjust			□	□	□	□	□
ATTACHMENTS								
Carriage Lock Pins	Grease		○	□	□	□	□	□

Component	Task	10	50	100 ⁽¹⁾	500	1,000	1,500	2,000
REGISTRATION/CERTIFICATION								
SWL Stickers (UK) and Flip Chart	Renew as required	○	○	□	□	□	□	□

- (1) First 100 Hours Service only, to be completed by your JCB Distributor.
 (2) If operating under arduous conditions, do an engine oil flush (use the normal recommended engine oil) every 250 hours. Change the engine oil and filter every 250 hours.
 (3) When the engine is operated with 20% biodiesel change the engine oil and filter every 250 hours. Refer to Technical Data, Fuel System Data, for more information about operating the engine with biodiesel.
 (4) If operating in dusty adverse working environments, do these jobs more frequently.
 (5) These jobs must be done by a qualified engineer.
 (6) After a major transmission repair, the new oil should be run to operating temperature and changed again to remove any contamination which entered during the repair. Change the oil and filter after a further 100 hours if the oil was heavily contaminated because of, or from the failure (e.g. water contamination).
 (7) After a hub repair, the new oil should be run to operating temperature and changed again to remove any contamination which entered during the repair. Change the oil after a further 100 hours to remove any bedding-in wear. This is particularly important if new brake plates have been fitted.
 (8) The axles and driveshafts are factory greased with a high performance grease, if during service a standard grease is used, then the interval must be reduced to every 50 hours, contact your JCB Distributor for advice.
 (9) If operating under arduous conditions, check the boom wear pads every 250 hours.
 (10) hours
 (11) If operating under arduous conditions, change the DEF filter more frequently.

Functional Tests and Final Inspection

Table 25.

Component	Task	10	50	100 ⁽¹⁾	500	1,000	2,000
ENGINE							
Idle speed ⁽²⁾	Check and adjust			□	□	□	□
Torque converter stall speed ⁽²⁾	Check			□	□	□	□
Max. no load speed ⁽²⁾	Check and adjust			□	□	□	□
Exhaust system security ⁽²⁾	Check			□	□	□	□
Air inlet system security	Check			□	□	□	□
TRANSMISSION, AXLES AND STEERING							
Steering - Operation/Phasing	Check	○	○	□	□	□	□
2WD/4WD Selection (if fitted)	Check			□	□	□	□
Transmission Operation	Check	○	○	□	□	□	□
Forward/Reverse/Gear - Selection/ Operation	Check			□	□	□	□
Torque Converter Main Line Pressure ⁽²⁾	Check			□	□	□	□
Neutral Start Operation	Check			□	□	□	□
Transmission Disconnect brake pedal operation ⁽²⁾	Check			□	□	□	□
Clutch Disconnect/Dump Button	Check			□	□	□	□
HYDRAULICS							
MRV Pressure at Max RPM ⁽²⁾	Check and adjust			□	□	□	□
Operation of All Services	Check	○	○	□	□	□	□
Hose Burst Protection Valves (if fitted)	Check			□	□	□	□

Component	Task	10	50	100 ⁽¹⁾	500	1,000	2,000
ARV Pressure at 750 RPM ⁽²⁾	Check and adjust			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Steer Circuit MRV Pressure ⁽²⁾	Check and adjust			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fan Motor Speed (If fitted) ⁽²⁾	Check			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Attachment Operation/Remote Servo (if fitted)	Check			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Piston Rods Chrome	Check			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Parallel Lift/Lower	Check			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stabilizer Leg Cut-out (if fitted) ⁽²⁾	Check			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chassis Leveling (Sway) Cut-out (if fitted)	Check			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Boom Raise Cut-out (if fitted) ⁽²⁾	Check			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BRAKES							
Foot Brake - Operation	Check	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Park Brake	Check and adjust	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ELECTRICS							
Alternator - Output ⁽²⁾	Check			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
All Electrical Equipment Operation, (warning lights, beacon, alarms, horn, wipers etc.)	Check	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stabilizer Indicators	Check	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BODYWORK AND CAB							
Inclinometer (if fitted) ⁽²⁾	Check			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Glazing for Correct Fit/Leaks	Check			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Seat/Seat Belts	Check	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Air Conditioning (if fitted)	Check			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Forks ⁽²⁾	Fit and Check security	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Generally for damage, leaks and wear	Check	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BOOM CHAIN SERVICING							
Boom Chains	Oil		<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Boom Chains - Tension	Check/Adjust		<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Boom Chains - Wear and Defects ^(2, 3)	Check					<input type="checkbox"/>	<input type="checkbox"/>
Boom Roller - Wear	Check		<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Boom Roller Pivot Pin (with Grease Point)	Grease				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RAS SYSTEM							
Operation ⁽²⁾	Check			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ELECTRONIC DATA LOG							
Fault code log ⁽²⁾	Check			<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Service log ⁽²⁾	Record			<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>



Component	Task	10	50	100 ⁽¹⁾	500	1,000	2,000
LIFTING EQUIPMENT							
Fit for purpose test ⁽⁴⁾	Check			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

(1) First 100 Hours Service only, to be completed by your JCB Distributor.

(2) Jobs which should only be done by a specialist.

(3) If operating under arduous conditions, complete this operation every 250 hours.

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

Maintenance Positions

General

▲ WARNING Maintenance must be done only by suitably qualified and competent persons.

Before doing any maintenance make sure the machine is safe, it must be correctly parked on firm, level ground.

To prevent anyone starting the engine, remove the ignition key. Disconnect the battery (by means of the battery isolator if installed) when you are not using electrical power. If you do not take these precautions you could be killed or injured.

WARNING Make the machine safe before getting beneath it. Make sure that any attachments on the machine are correctly attached. Engage the park brake, remove the ignition key, isolate the battery.

WARNING 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.

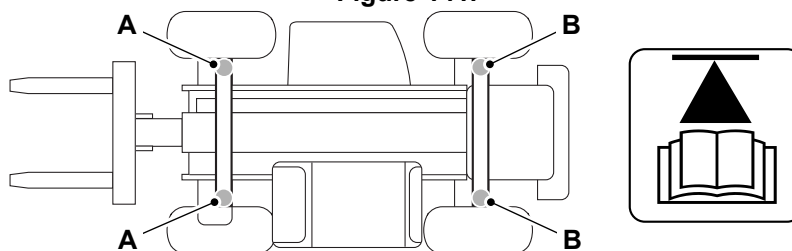
Make the machine safe before you start a maintenance procedure. You can complete most of the maintenance procedures with the boom lowered. Unless a maintenance procedure instructs you differently, you must lower the boom.

When lifting a machine make sure the jack is positioned on the correct point. The jacks are on the front and rear axle casings on the machine.

Before you jack the rear axle make sure the axle has wedges added between the axle and the chassis oscillation stop to stop the axle from oscillating.

Make sure the jack is placed on a firm and level surface and that the jack is of a suitable capacity for the load. Only jack one point at a time.

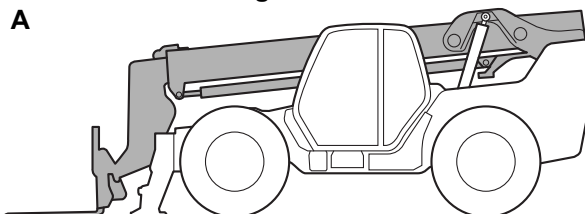
Figure 141.



A Jack point

Maintenance Position - Boom Lowered

Figure 142.



A Boom lowered

1. Park the machine on level, solid ground.
[Refer to: Stopping and Parking \(Page 45\).](#)
2. Retract then lower the boom.
3. Put the attachment flat on the ground.
4. Stop the engine and remove the starter key.

5. Disconnect the battery to prevent accidental operation of the engine.
6. If necessary, put chocks against the two sides of the wheels before you get below the machine.

Maintenance Position - Boom Raised

▲ CAUTION You will have to climb onto the machine to install or remove the strut. Take care, especially if the machine is wet. Remove mud and oil before climbing onto the machine. Do not use the exhaust as a handhold. It can burn you.

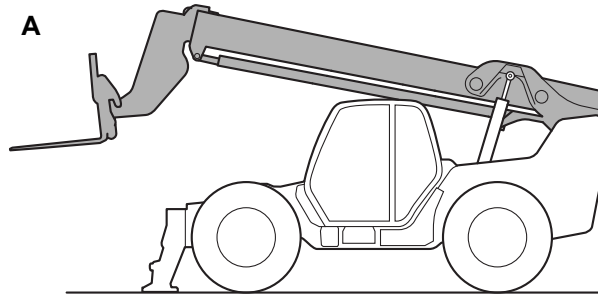
WARNING You could be killed or injured if the boom drops while you are working under it. Install the boom maintenance strut as instructed before doing any maintenance work with the boom raised. Keep people away from the machine while you install or remove the boom maintenance strut.

WARNING Make sure that you use the correct JCB maintenance strut for the machine. Make sure that the safety strut is only used with the correct JCB retaining bolt or securing device. Never substitute this bolt or securing device, always use the correct JCB part.

Make sure that the strut and bolt/securing device is installed correctly. Never use a strut intended for another machine. If in doubt, consult your JCB dealer.

If you raise the boom to get access for maintenance, you must install the maintenance strut on the boom. Before you install the maintenance strut remove any load on the forks and empty buckets or attachments.

Figure 143.

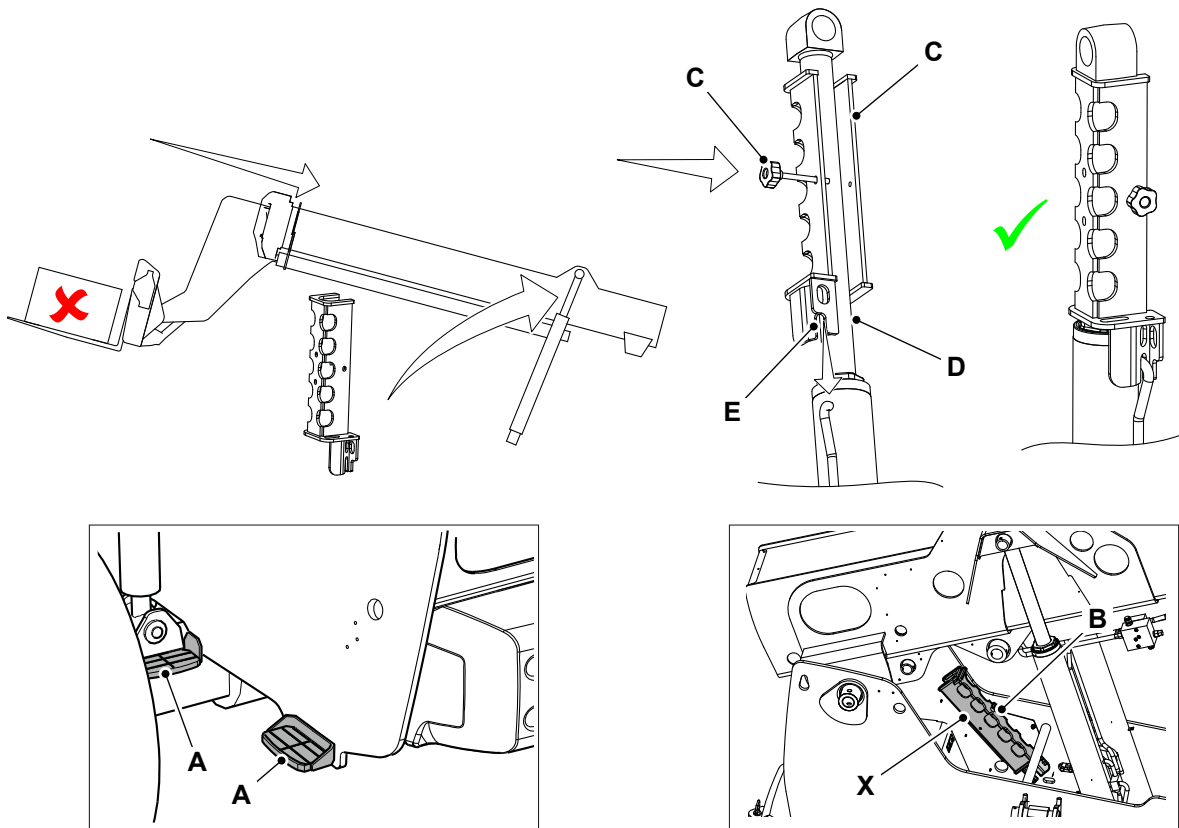


A Boom raised

Installing the Maintenance Strut

1. Park the machine on level, solid ground with the wheels in the straight ahead position.
2. Fully retract the boom.
3. Raise the boom just far enough to install the strut.
4. Stop the engine and remove the ignition key.
5. Use the steps for access to the strut. Undo the hand bolt and remove the strut from its stowage position. Some machines have two steps on the chassis and no steps on the axle.
6. Lower the strut so that the cut out locates with the pipe on the lift ram. Place the strut around the lift cylinder piston rod. Secure the strut in position with hand bolt.
7. Lower the boom carefully onto the strut. Stop as soon as the weight of the boom is on the strut.

Figure 144.



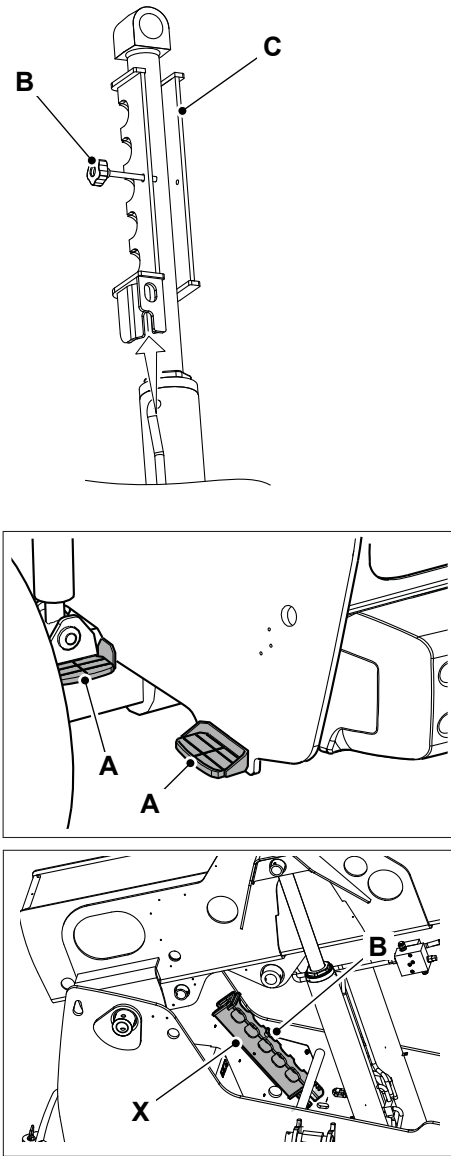
A Steps
C Strut
E Cut out

B Bolt
D Lift cylinder piston rod
X Stowage position

Removing the Maintenance Strut

1. Park the machine on level, solid ground with the wheels in the straight ahead position.
2. Raise the boom just enough to allow the strut to be removed.
3. Stop the engine and remove the ignition key.
4. Use the steps for access and support the strut. Undo the hand bolt and lift the strut clear of the steel pipe on the lift ram. Some machines have two steps on the chassis and no step on the axle.
5. Secure the strut with hand bolt in its stowage position.

Figure 145.



- A** Steps

C Strut
- B** Bolt

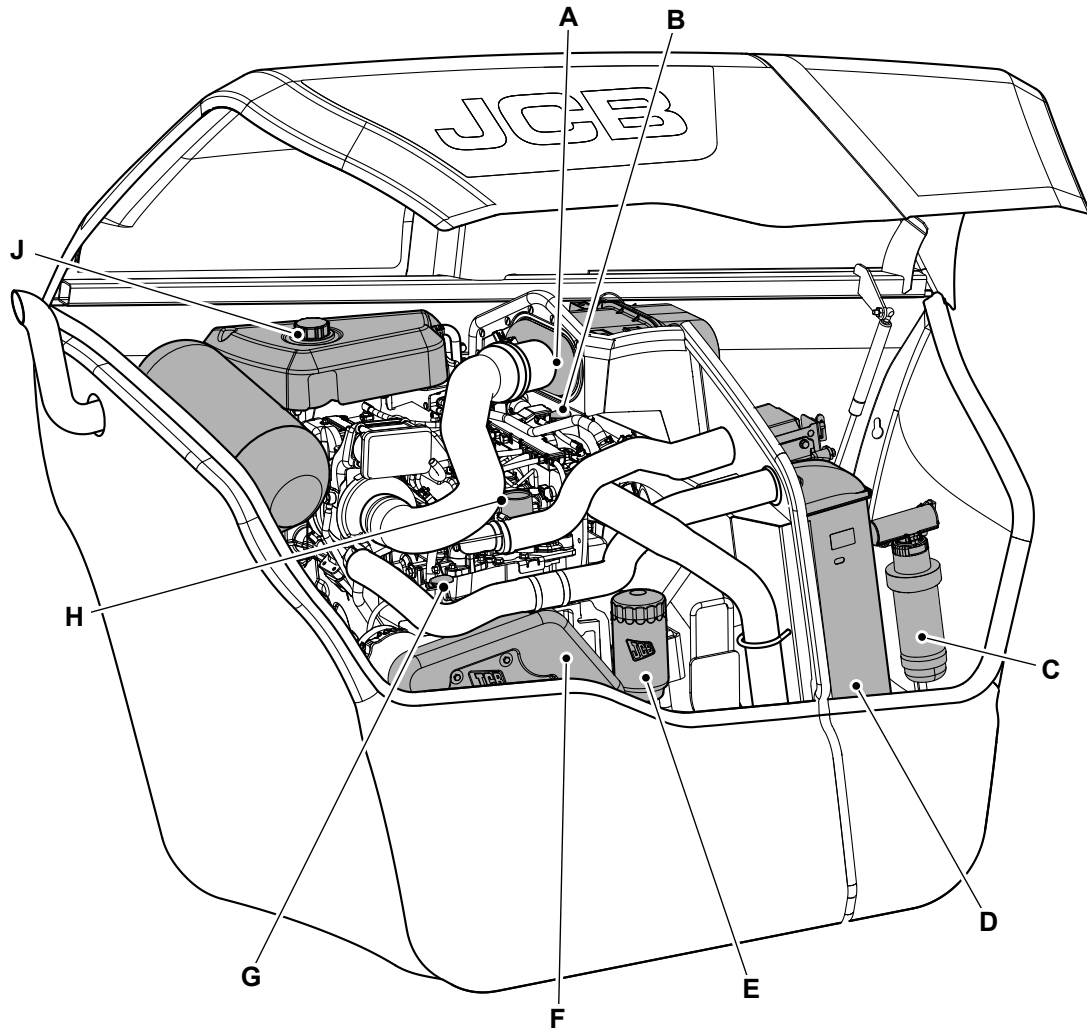
X Stowage position

Service Points

General

Engine Compartment

Figure 146.

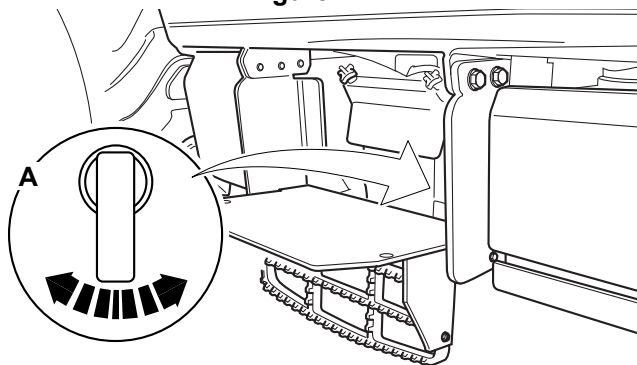


- A Air filter
- C Water Separator
- E Engine oil filter
- G Engine oil dipstick
- J Coolant expansion tank

- B Transmission oil dipstick
- D Radiator
- F Drive Belt Guard
- H Engine oil filler cap

Battery Isolator

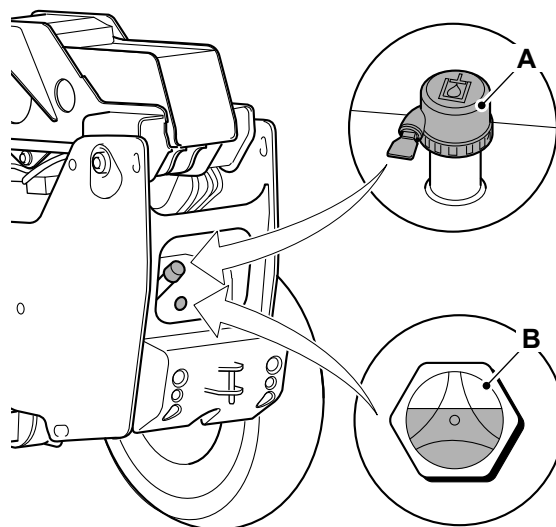
Figure 147.



A Battery isolator

Hydraulics

Figure 148.



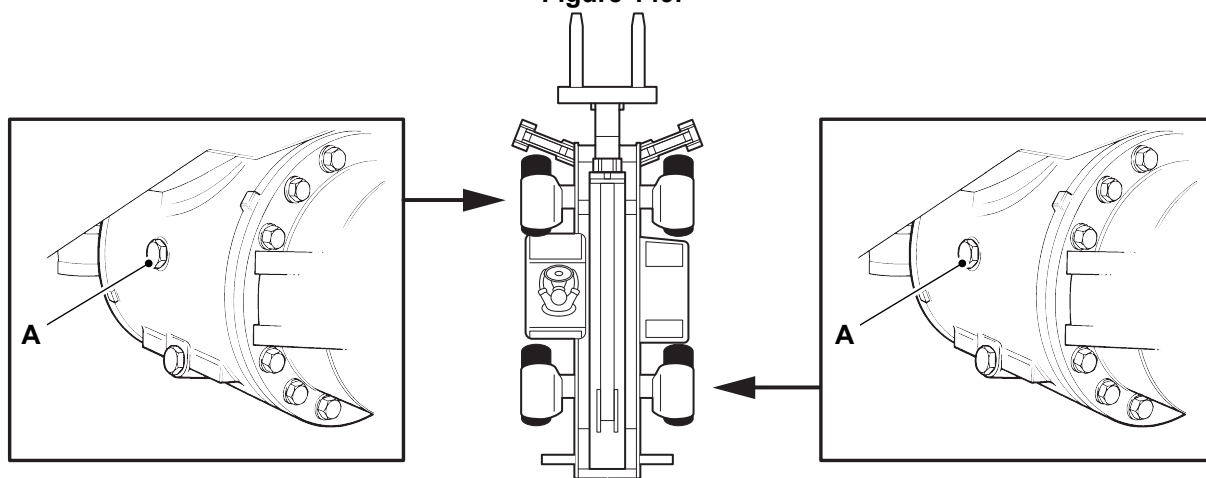
A Hydraulic tank filler cap

B Hydraulic oil level indicator

Axles

For: 507-42, 509-42, 510-42, 510-56, 512-56, 514-56, 516-42

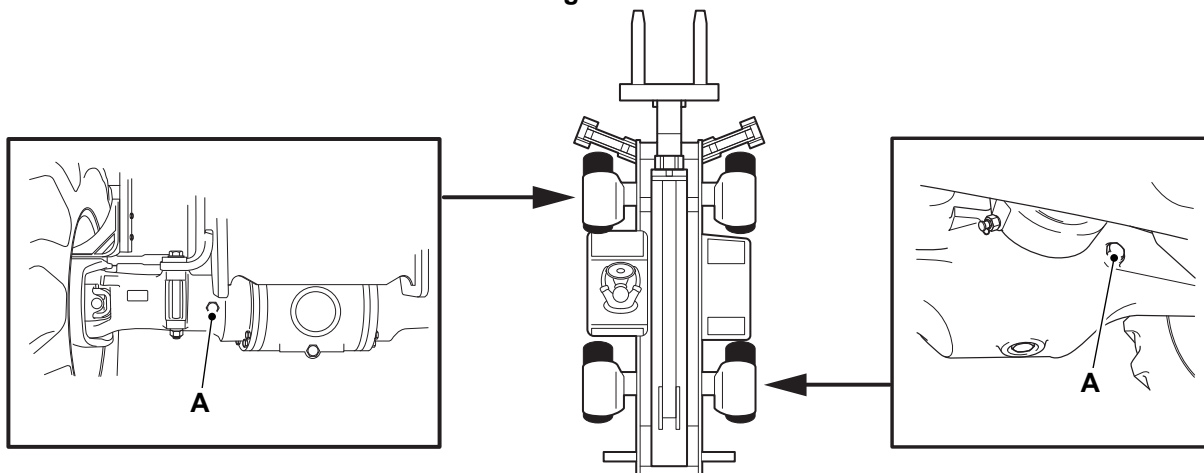
Figure 149.



A Axle fill/level plug

For: 506-36

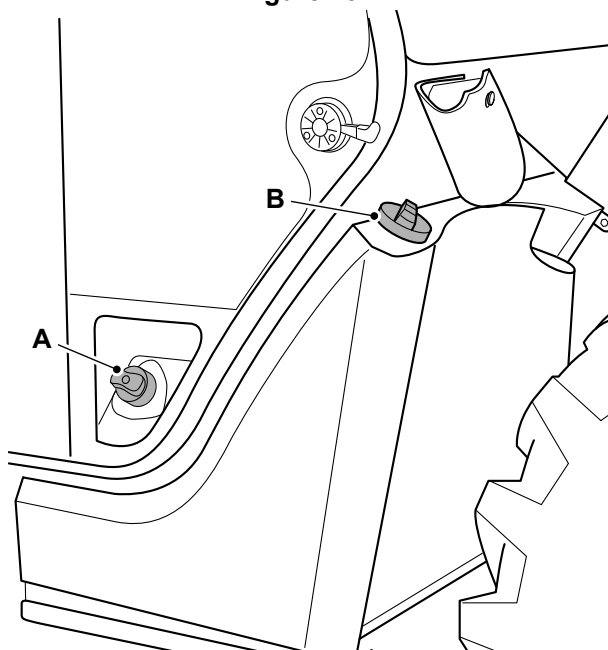
Figure 150.



A Axle fill/level plug

Diesel and Diesel Exhaust Fluid

Figure 151.



A Diesel exhaust fluid tank cap (blue)

B Diesel fuel tank cap (green)

Access Apertures

General

When moved to their maintenance position, the access panels give you access to parts or areas of the machine that are not required during machine operation.

Before you operate the machine, make sure that all of the access panels are correctly in their closed or installed positions.

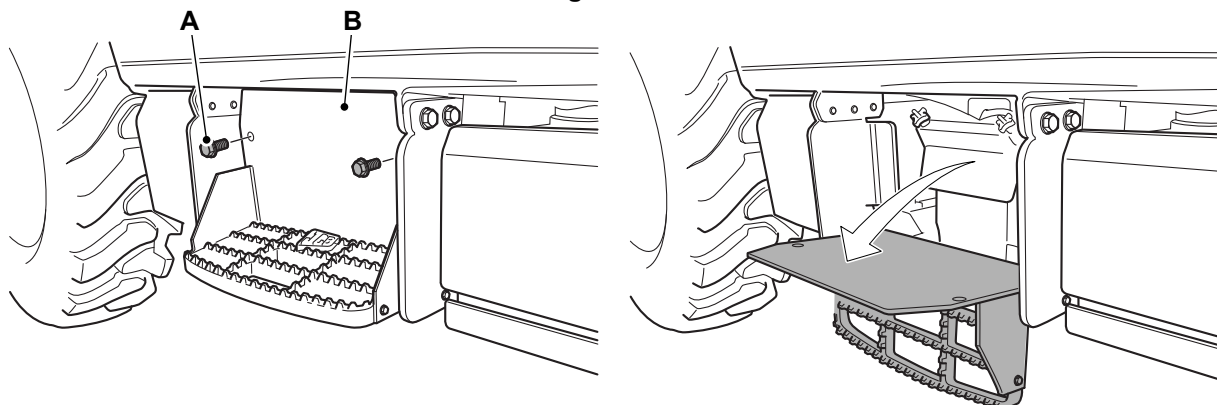
Battery Cover

▲ Notice: Do not stand on the battery cover.

Open

1. Make the machine safe. Refer to (PIL 01-03).
2. Hold the battery cover, then remove the bolts.
3. Lower the cover.

Figure 152.



A Bolts

B Battery cover

Close

1. Close the battery compartment cover.
2. Hold the battery cover closed, then install the bolts.
3. Tighten the bolts to the correct torque value.

Engine Compartment Cover

Open

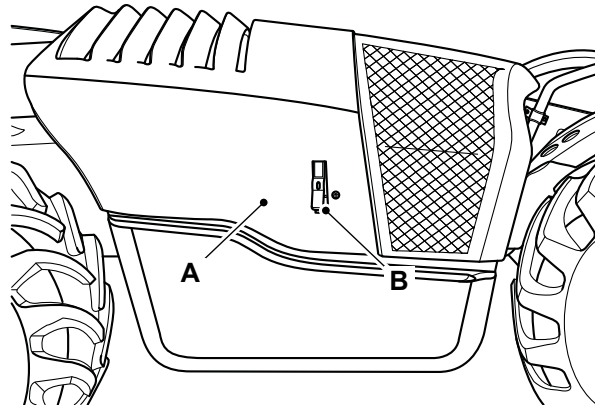
▲ WARNING The engine has exposed rotating parts. Switch off the engine before working in the engine compartment. Do not use the machine with the engine cover open.

Access to the engine compartment is provided by opening the engine cover.

Before you stop the engine, you must let the engine run at low idle for 4min. The delay lets the coolant temperature to stabilise before you open the engine cover.

1. Make the machine safe.
2. Unlock and release the latch. Allow the cover to raise on its gas strut. Keep hold of the cover while it rises.

Figure 153.



A Engine cover

B Latch

Close

1. Push the cover down.
2. Make sure that the cover is correctly latched.
3. Make sure to lock the engine cover.

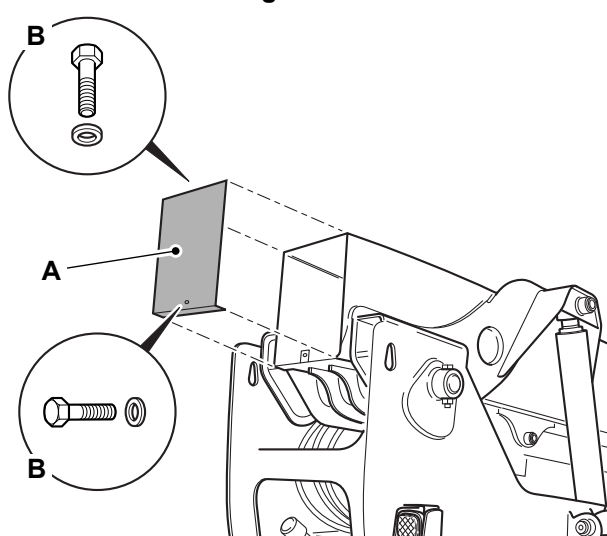
Boom Rear Cover

Remove

Remove the rear lift arm cover to get access to the wear pad runways and lift arm chains.

1. Make the machine safe. Refer to (PIL 01-03).
2. Hold the lift arm cover, then remove the bolts.
3. Lower the cover.

Figure 154.



A Cover

B Bolts

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following step.

- 1.1. Tighten all fastenings to the correct torque value.

Undershield

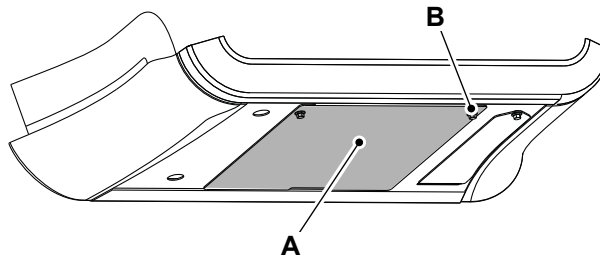
Removal

▲ WARNING You will be working close into the machine for these jobs. Lower the attachments. Remove ignition key and isolate service disconnect. This will prevent the engine being started.

When you clean around the engine and radiator, debris will be released more easily if the undershield is removed.

1. Make the machine safe.
[Refer to: Maintenance Positions \(Page 156\).](#)
2. Working under the engine compartment, support the undershield and remove the bolts.
3. Lower the undershield to the ground.

Figure 155.



A Undershield

B Bolts

Install

1. Use the bolts to attach the undershield to the machine.



Tools

General

All tools must be kept in the toolbox (if installed) when not in use.

Lubrication

General

▲ **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.

You must grease the machine regularly to keep it working efficiently. Regular greasing will also lengthen the machine's working life.

Refer to the individual condition checks throughout the Maintenance section.

The machine must always be greased after pressure washing or steam cleaning.

Use only the recommended type of grease. Do not mix different types of grease, keep them separate.

Attach the dust caps after greasing (if installed).

Preparation

▲ **WARNING** You will be working close into the machine for these jobs. Lower the attachments. Remove ignition key and isolate service disconnect. This will prevent the engine being started.

Make the machine safe before you start a greasing procedure.

You can complete most of the greasing procedures with the boom lowered. If you raise the boom to get access for greasing, you must install the maintenance strut on the boom.



Attachments

General

Lubricate

Where applicable, refer to the specific manufacturer's manual for instructions on the lubrication of optional attachments.

Check (Condition)

Where applicable, refer to the specific manufacturers manual for instructions on the maintenance of optional attachments.

Body and Framework

General

Clean

Keep all intakes and grilles clear from snow, ice and debris.

Debris can collect under the boom. Remove all debris from under the boom.

Thoroughly dry the piston rams and protect them with clean transmission or hydraulic oil if necessary.

Check (Condition)

1. Make sure that all of the guards and protective devices are in position, secured by their locking devices and free from damage.
2. Inspect all of the steelwork for damage. Include the following:
 - 2.1. Examine all of the lifting point welds.
 - 2.2. Examine all of the pivot point welds.
 - 2.3. Examine the condition of all the pivot pins.
 - 2.4. Check that the pivot pins are correctly in position and secured by their locking devices.
3. Check the steps and handrails are undamaged and correctly attached.
4. Check for broken, cracked or crazed window glass and mirrors. Replace the damaged items.
 - 4.1. The right hand side cab glass is installed for the operators protection. If the cab glass becomes damaged, the machine should not be operated until it has been replaced.
5. Check that the lamp lenses are undamaged.
6. Check that all of the attachment teeth are undamaged and correctly attached.
7. Check that all of the safety and instructional labels are undamaged and in position. Install new labels where necessary.
8. Note any damaged paintwork for future repair.
9. Inspect the machine for broken or loose fasteners.

Pivot Pins

Lubricate

Front axle drive shafts may be fitted with 'sealed for life' bearings that do not need greasing, therefore points 18, 19, 20 and 21 may not be fitted.

Figure 156.

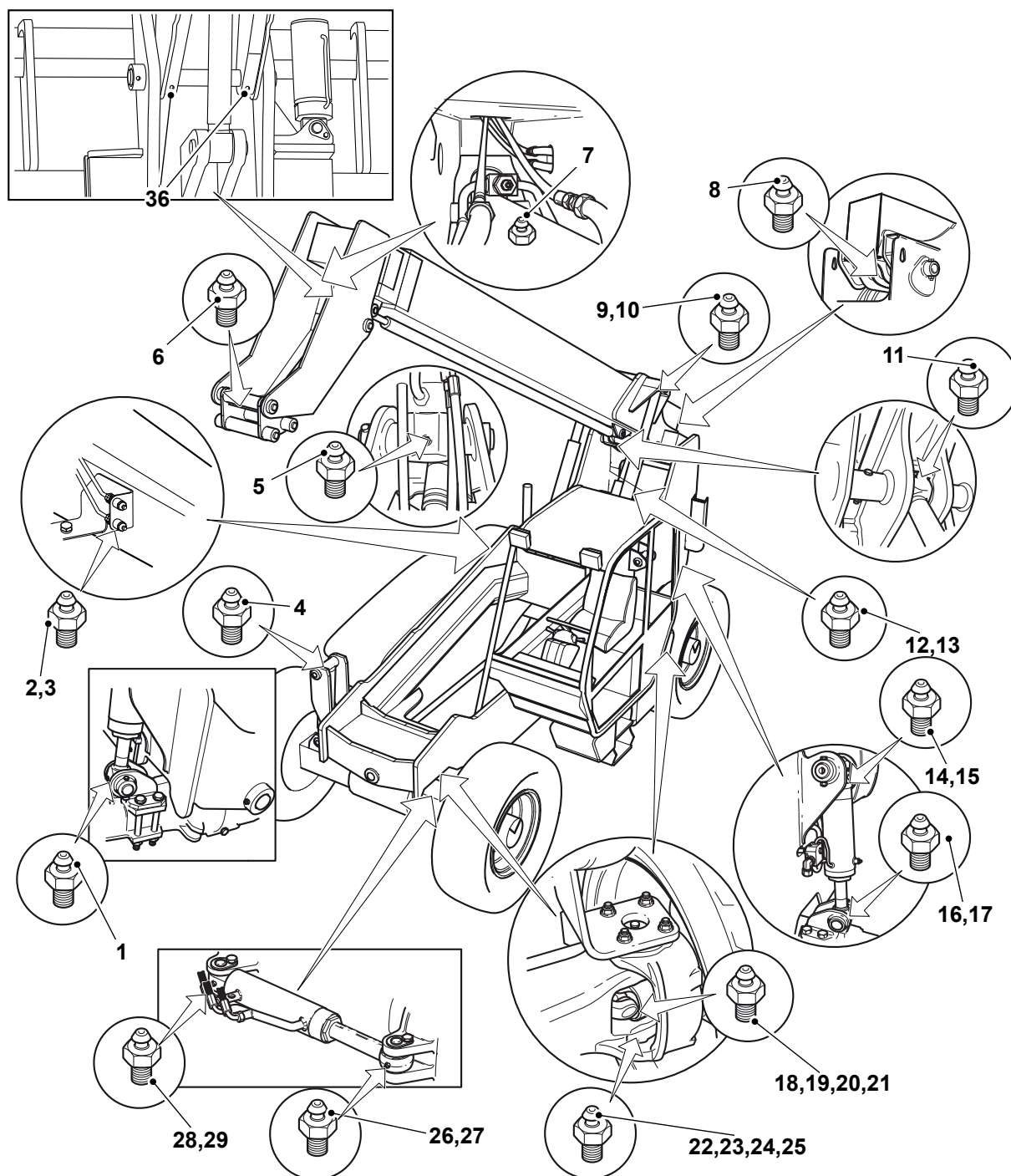
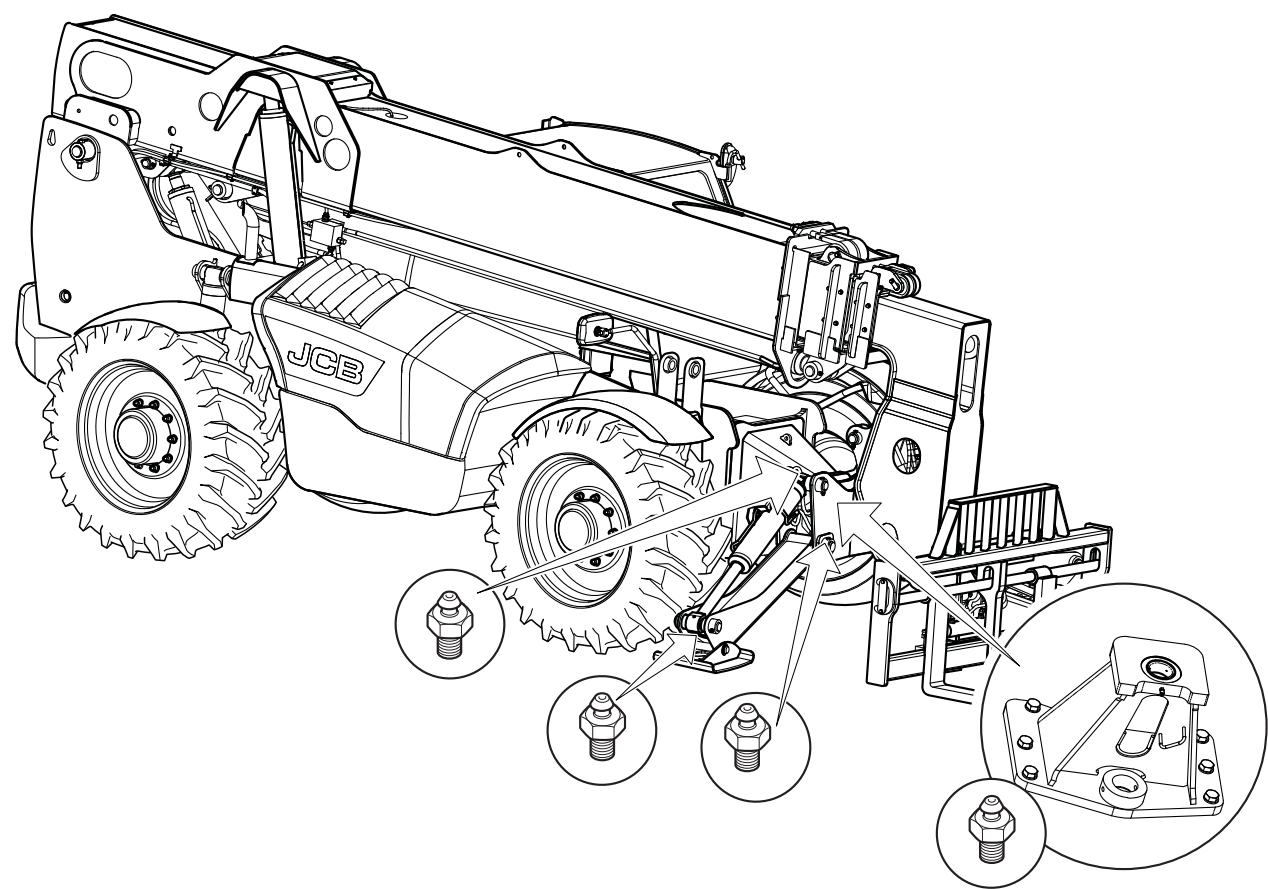


Figure 157. Additional grease points for 510-56, 512-56 and 514-56 machines only



Boom

General

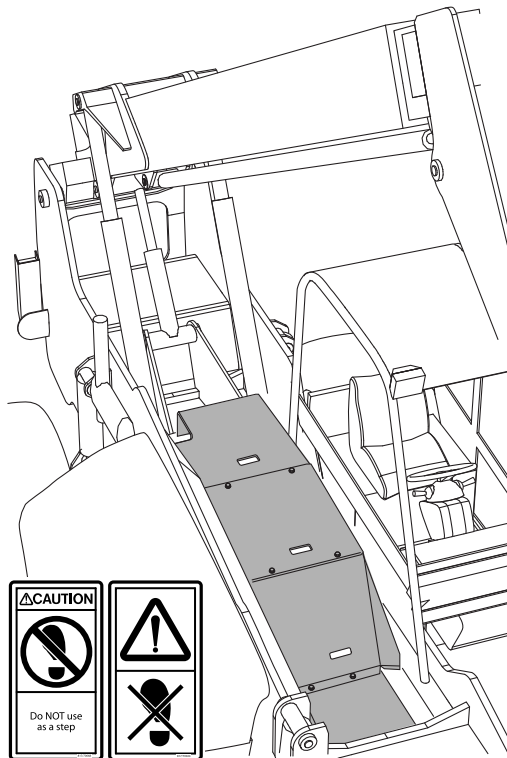
Clean

▲ **CAUTION** You must climb on the machine to install or remove the central access panels. Take care, especially if the machine is wet. Remove mud and oil before you climb on the machine. Do not put your body weight on the central access panels.

CAUTION Make sure the steps, handrails, and your footwear soles are clean and dry before climbing onto the machine. Always face the machine when climbing on and off it.

1. Make the machine safe with the boom raised.
[Refer to: Maintenance Positions \(Page 156\).](#)
2. Debris can collect under the boom. Remove all combustible material.
3. Do not aim the jet wash directly at the boom chains.

Figure 158.



Boom Chains

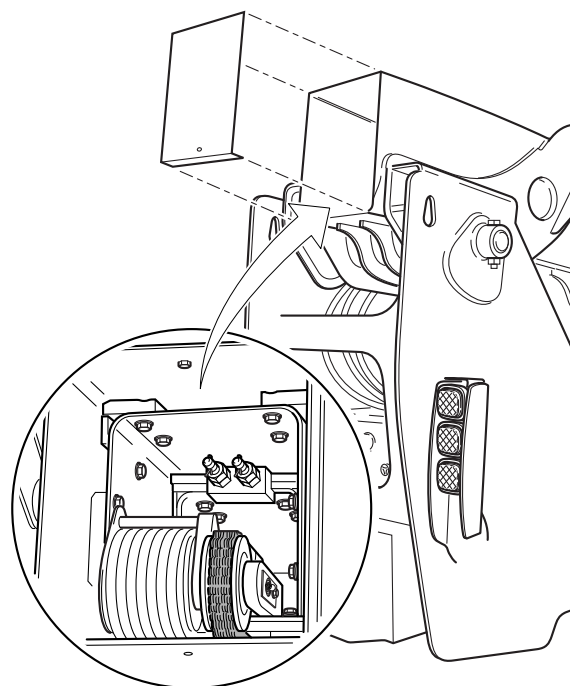
Lubricate

The boom drive chains should be sprayed with JCB Chain Lubricant at the periods stated in the Service Schedules.

Spray the chain with an even coating, avoid over-oiling.

1. Remove the boom rear cover.
2. Spray the drive chains with JCB Chain Lubricant while the boom is being extended.

Figure 159.

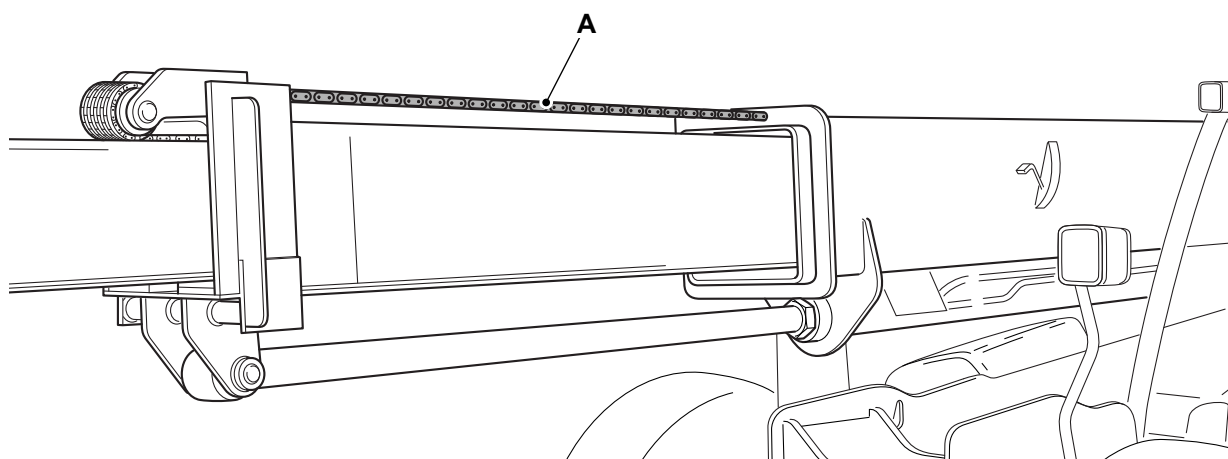


A Boom Rear Cover

B Drive Chains (boom extending)

3. With the boom extended spray the drive chains with JCB Chain Lubricant.

Figure 160.



A Drive Chains (boom extended)

4. Install the boom rear cover.

Adjust

3-Stage Boom

Table 26.

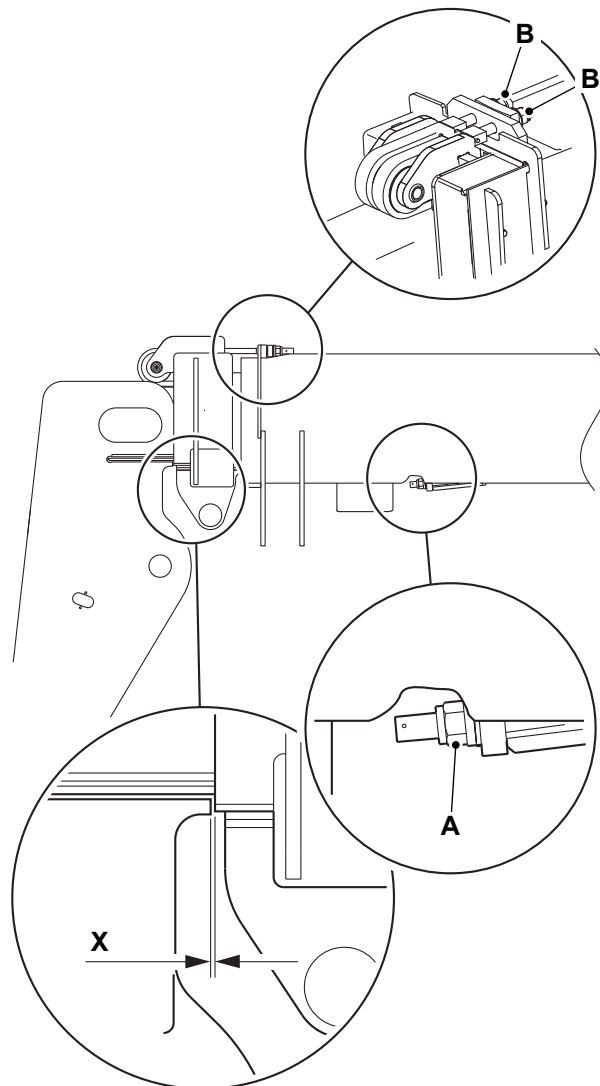
Adjustment Screw	Description	Dimension
A (Extend Chain)	Upper	24mm (1in)
B (Retract Chain)	Lower	20mm (1in)

Table 27. Initial Dimensions

Length	Dimension (506-36)	Dimension (507-42, 509-42, 510-42)
X	3–15mm (0– $\frac{1}{2}$ in)	10–20mm ($\frac{1}{2}$ –1in)

1. Position the machine on firm level ground, apply the park brake. Raise the boom to the horizontal position and fully retract the boom.
2. If any of the chains have been replaced, you must set the adjustment screws to the dimensions shown. Refer to Table 26.
3. With the boom fully retracted, measure the dimension 'X'.
 - 3.1. If necessary, adjust the chains to obtain the initial setting dimension. Refer to Table 27.
 - 3.2. If dimension is too great, shorten the retract chain with the lower adjustment nut.
 - 3.3. If the dimension is too small, shorten the extend chain with the upper adjustment nuts.
 - 3.4. Tighten the extend chains equally to maintain the same tension in both chains.
4. Extend the boom.
5. Spray the chains with JCB Chain Lubricant.
6. Retract the boom and recheck the dimension. If necessary, repeat step 3.
7. Fully extend the boom and then retract by the amount specified.
Length/Dimension/Distance: 50mm (2in)

Figure 161.

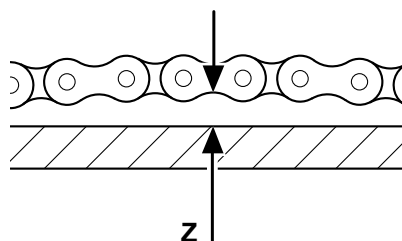


A Front adjustment nut-retract chain

B Front adjustment nut-extend chain

8. Measure the gap between the under side of the extend chain and the top of the intermediate boom at the mid-point of the span. Refer to Figure 162.
9. 506-36 If necessary, adjust extend chains equally to obtain the dimension shown.
Length/Dimension/Distance: 56–66mm (2–2½in)
10. 507-42, 509-42, 510-42 If necessary, adjust extend chains equally to obtain the dimension shown.
Length/Dimension/Distance: 35–45mm (1½–2in)
11. If the end link threads or the nuts are damaged the complete end link must be replaced.

Figure 162.



Z Gap

12. After the correct measurement has been obtained extend and retract the boom several times and recheck the gap. Adjust the extend chains as necessary.
13. On completion fit new split pins if the old split pins have been removed.

4-Stage Boom

Table 28.

Adjustment Screw	Description	Dimension
A (Extend Chain)	Upper	24mm (1in) (except 'W' = 40mm (1½in))
B (Retract Chain)	Lower	20mm (1in) (except rear of 2nd intermediate. Refer to Figure 163. (65mm (2½in) setting dimension))

Table 29. Initial Dimensions

Length	Dimension
X	560–572mm (22–22½in)
Y	26–38mm (1–1½in)

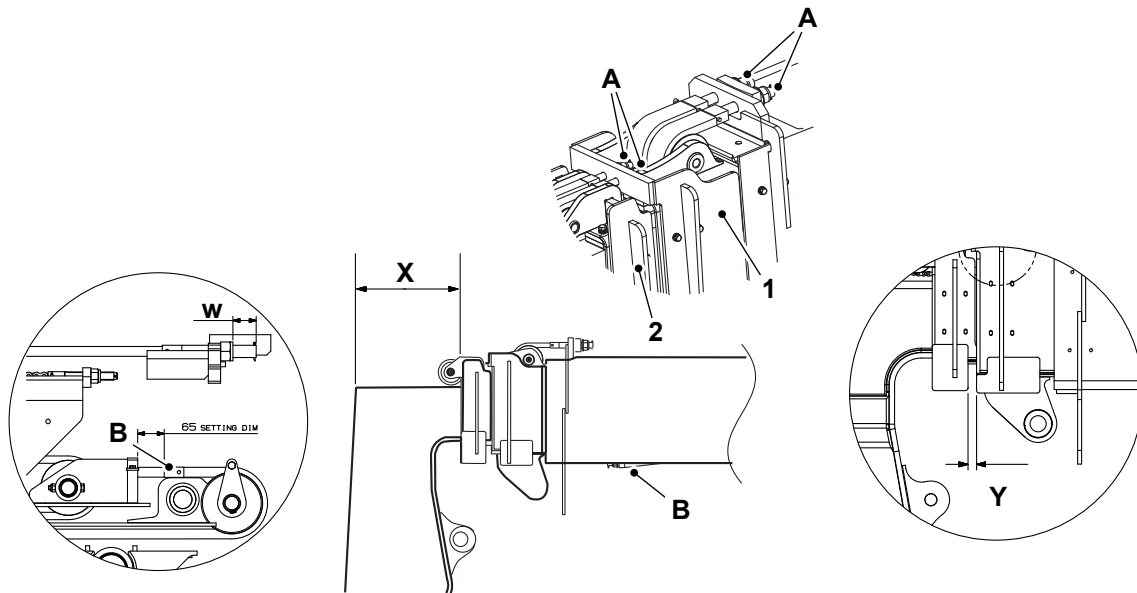
Table 30. Extend Chain Gap Dimensions

Item	Dimension
1st Intermediate boom	83–93mm (3½–3½in)
2nd Intermediate boom	58–68mm (2½–2½in)

1. Position the machine on firm level ground, apply the park brake. Raise the boom to the horizontal position and fully retract the boom.
2. If any of the chains have been replaced, you must set the adjustment screws to the dimensions shown. Refer to Table 28.
3. With the boom fully retracted, measure the dimensions 'X' and 'Y'.
 - 3.1. If necessary, adjust the chains to obtain the initial setting dimensions Refer to Table 29.
 - 3.2. If dimension is too great, shorten the retract chain with the lower adjustment nut. Remove the rear boom cover to get access to the adjustment nuts
 - 3.3. If the dimension is too small, shorten the extend chain with the upper adjustment nuts.
 - 3.4. Each boom section has two extend chains. Tighten the extend chain adjusters equally to maintain the same tension in both chains.
4. Extend the boom.
5. Spray the chains with JCB Chain Lubricant.
6. Retract the boom and recheck the dimensions. If necessary, repeat step. 3

7. Fully extend the boom and then retract by the amount specified.
Length/Dimension/Distance: 50mm (2in)
8. Measure the gap between the under side of the extend chains and the top of the intermediate booms at the mid-point of the span.

Figure 163.

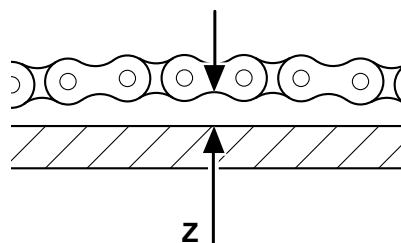


1 1st Intermediate

2 2nd Intermediate

9. If necessary, adjust extend chains equally. The correct gap dimensions are shown. Refer to Table 30.
10. If the end link threads or the nuts are damaged the complete end link must be replaced.

Figure 164.



Z Gap

11. After the correct measurement has been obtained extend and retract the boom several times and recheck the gap. Adjust the extend chains as necessary.
12. On completion fit new split pins if the old split pins have been removed.

Operator Station

General

Clean

- ▲ **Notice:** Never use water or steam to clean inside the operator station. The use of water or steam could damage the machine electrics and render the machine inoperable. Remove dirt using a brush or damp cloth.

Remove debris and loose articles from inside the operator station.

Operator Protective Structure

Check (Condition)

- ▲ **WARNING** You could be killed or seriously injured if you operate a machine with a damaged or missing ROPS/FOPS. If the ROPS/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.

A failure to adhere to these precautions can cause death or injury to the operator. For assistance, contact your JCB dealer.

1. Make the machine safe.
[Refer to: Maintenance Positions \(Page 156\).](#)
2. Check the structure for damage.
3. Make sure that all of the ROPS/FOPS mounting bolts are undamaged and in position.
4. Make sure that the ROPS/FOPS mounting bolts are tightened to the correct torque setting.
[Refer to: Torque Values \(Page 242\).](#)

Seat

Check (Condition)

1. Check that the seat adjustments operate correctly.
2. Check the seat is undamaged.
3. Check the seat mounting bolts are undamaged, correctly installed and tight.
4. Make sure the seat is clear from unwanted materials and hazards at all times.

Seat Belt

Check (Condition)

- ▲ **WARNING** When a seat belt is checked for condition replace it with a new one if it is damaged, if the fabric is worn, or if the machine has been in an accident.

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.

1. Make sure the seat belt can be adjusted.
2. Examine the seat belt for signs of fraying and stretching.
3. Check that the stitching is not loose or damaged.
4. Check that the belt mounting bolts are undamaged, correctly installed and tight.

5. Check that the buckle assembly is undamaged and operates correctly.

Controls

Check (Operation)

Check the operation of the non-hydraulic and non-electrical operator station controls.

Engine

General

Clean

▲ 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 installed). Examine these areas frequently and clean at the beginning of each work shift or more often if required. Before opening the engine cover, make sure that the top is clear of debris.

Notice: 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.

Notice: Clean the engine before you start engine maintenance. Obey the correct procedures. Contamination of the fuel system will cause damage and possible failure of the engine.

Stop the engine and allow it to cool for at least one hour. Do not attempt to clean any part of the engine while it is running.

Do not aim the water jet directly at oil seals or electrical and electronic components such as the ECU (Electronic Control Unit), alternator or fuel injectors.

Before carrying out any service procedures that require components to be removed, the engine must be properly cleaned.

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.

1. Remove the undershield.
[Refer to: Access Apertures \(Page 164\).](#)
2. Make sure that the electrical system is isolated.
3. Make sure that all electrical connectors are correctly coupled. If connectors are open fit the correct caps or seal with water proof tape.
4. Cover the alternator with a plastic bag to prevent water ingress.
5. Seal the engine air intake, exhaust and breather system.
6. Make sure that the oil filler caps and dipstick are correctly installed.
7. Use a low pressure water jet and brush to soak off caked mud or dirt.
8. Apply an approved cleaning and degreasing agent with a brush. Obey the manufacturers instructions.
9. Use a pressure washer to remove the soft dirt and oil. Do not place the jet nozzle closer to any part of the engine than the distance specified. 600mm (1 ft 11 in)
10. When the pressure washing is complete move the machine away from the wash area, or alternatively, clean away the material washed from the machine.
11. Before working on specific areas of the engine use a compressed air jet to dry off any moisture. When the area is dry use a soft clean brush to remove any sand or grit particles that remain.
12. 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.

Check (Condition)

Start the engine and check for:

- Excessive smoke

- Excessive vibration
- Excessive noise
- Overheating
- Performance
- Unusual smells.

Oil

Check (Leaks)

Before you start the machine, do a check for oil leaks:

1. Make the machine safe.
[Refer to: Maintenance Positions \(Page 156\).](#)
2. Get access to the engine compartment (if applicable).
[Refer to: Access Apertures \(Page 164\).](#)
3. Check the engine and the area below for oil leaks.
4. Close the engine cover (if applicable).
5. If necessary, contact your JCB dealer.

Check (Level)

▲ WARNING Never check the oil level or add oil with the engine running. Be careful of hot lubricating oil. Danger of scalding.

Notice: Do not exceed the maximum level of engine oil in the sump. If the maximum is exceeded, the excess must be drained to the correct level. An excess of engine oil could cause the engine speed to increase rapidly without control.

1. Make the product safe.
[Refer to: Maintenance Positions \(Page 156\).](#)
2. Wait for the oil to drain back into the engine sump before you take a reading. If not, a false low reading may be recorded which can cause the engine to be overfilled.
3. Get access to the engine compartment (if applicable).
[Refer to: Access Apertures \(Page 164\).](#)
4. Remove and clean the dipstick.
[Refer to: Service Points \(Page 160\).](#)
5. Replace the dipstick.
6. Remove the dipstick.
7. Check the oil level. The oil should be between the two marks on the dipstick.
8. If necessary, add more oil:
 - 8.1. Remove the filler cap.
[Refer to: Service Points \(Page 160\).](#)
 - 8.2. Add the recommended oil slowly through the filler point
[Refer to: Fluids, Lubricants and Capacities \(Page 235\).](#)
 - 8.3. Replace the dipstick.
 - 8.4. Remove the dipstick.

8.5. Check the oil level, if necessary add more oil.

8.6. Replace the dipstick

8.7. Replace the filler cap.

9. Close and secure the engine cover (if applicable).

Replace

▲ CAUTION Oil will gush from the hole when the drain plug is removed. Keep to one side when you remove the plug.

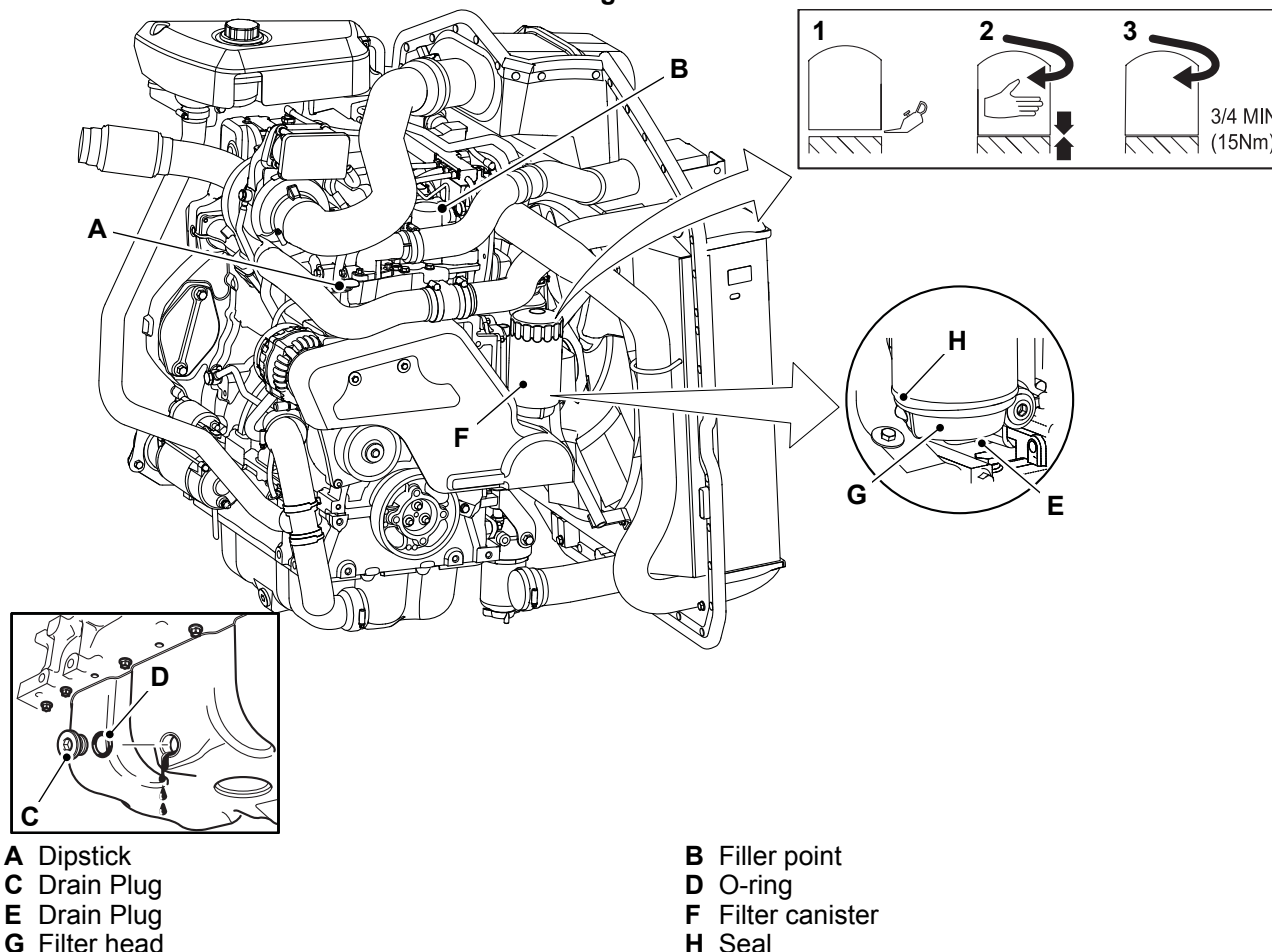
CAUTION It is illegal to pollute drains, sewers or the ground. Clean up all spilt fluids and/or lubricants.

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

Your machine may be installed with a oil evacuation/fill system. A quick release connection is used for purging, evacuating, and refilling the engine oil. Refer to Oil Evacuation/Fill System in this section.

Drain the oil when the engine is warm as contaminants held in suspension will then be drained with the oil.

Figure 165.



1. Make the machine safe.

[Refer to: Maintenance Positions \(Page 156\).](#)

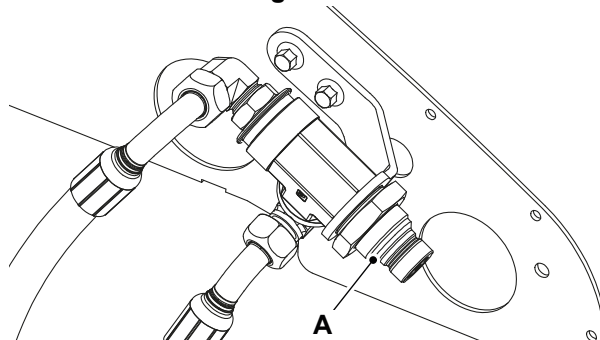
2. Get access to the engine compartment.

[Refer to: Access Apertures \(Page 164\).](#)

3. Place a suitable container below the sump drain plug.
4. Remove the sump drain plug and O-ring. Drain the oil in to a suitable container.
5. Clean the sump drain plug. Install the sump drain plug with a new O-ring. Tighten the sump drain plug to the correct torque value.
Torque: 40–60N·m (29.5–44.2lb.ft)
6. Loosen and remove the filter housing drain plug. Drain the oil.
7. Install the filter housing drain plug. Tighten the filter housing drain plug to the correct torque value.
Torque: 40–60N·m (29.5–44.2lb.ft)
8. Remove the filter canister.
 - 8.1. Use a chain wrench if necessary.
9. Clean the seal face of the filter head.
10. Fit a seal on the new filter canister with clean engine oil.
11. Install and tighten the new filter canister with your hand.
12. Add the correct specification and quantity of oil through one of the filler points to the maximum mark on the dipstick.
 - 12.1. Clean the spilt oil.
13. Fit the filler cap and make sure to secure the filler cap.
14. Operate the engine at idle speed until the oil pressure low warning light has extinguished and the new filter primed before the engine speed is increased above idle speed.
15. Check for leaks.
16. Check the oil level when the oil has cooled.
 - 16.1. Fill with clean engine oil, if necessary.

Oil Evacuation/Fill System

Figure 166.



A Oil evacuation/fill quick release connection

Oil Purge

- The engine should be run at idle for a minimum of 5 minutes prior to commencing an oil purge/evacuation to ensure the oil is warm.
- Connect a compressed air line to the quick release connection. Maximum compressed air pressure must not exceed 9bar (130psi) on the compressor tank feed gage. This gage must be within calibration.
- Compressed air must not be applied to the oil evacuation/fill system for a period greater than 10 seconds. A period of 10 seconds must elapse before any subsequent application of compressed air. Subsequent applications of compressed air must not exceed the previously prescribed pressure and time limit. This

process must be repeated until all of the oil has been purged from the lubrication system and resides in the oil pan.

- The compressed air system used must be fitted with a condensate filtration system to prevent the ingress of moisture into the engine.

Oil Evacuation

- Disconnect the compressed air line and connect the oil evacuation line to the quick release connection.
- Evacuate the engine oil from the sump.
- Once all the oil has been removed from the engine, remove the oil filter and replace with a new one.

Oil Fill

- Disconnect the oil evacuation line and connect the oil fill line.
- Fill the engine with the correct specification and volume of engine oil. Maximum oil fill pressure must not exceed 6bar (87psi)

Oil level

- Disconnect the oil fill line.
- Ensure the fill, evacuation or compressed air line is not fitted to the quick connection. Then complete the normal oil level check process utilizing the engine oil dipstick.

Front End Accessory Drive (FEAD) Belt

Check (Condition)

▲ WARNING Do not try to turn the engine by pulling the fan or fan belt. This could cause injury or premature component failure.

CAUTION Make sure the engine cannot be started. Disconnect the battery before doing this job, otherwise you could be injured.

The FEAD (Front End Accessory Drive) belt drives the alternator, water pump and the air conditioning compressor (if fitted).

The belt is automatically kept in tension so will not need to be adjusted.

At the recommended service interval, visually inspect the belt for damage:

1. Make the machine safe.
[Refer to: Maintenance Positions \(Page 156\).](#)
2. Open the engine cover.
[Refer to: Engine Compartment Cover \(Page 164\).](#)
3. Remove the FEAD belt cover.
4. Inspect the belt for cracks, fraying or missing pieces. If necessary contact your JCB dealer for service requirements.
5. When maintenance is complete, make sure that the guard is installed. Do not operate the machine unless the guard is installed correctly.

[Refer to: Service Points \(Page 160\).](#)

Emissions Control System

General

(For: 509-42 [T4F], 510-42 [T4F], 510-56 [T4F], 512-56 [T4F], 514-56 [T4F])

Stationary Refresh

Before starting the SCR (Selective Catalytic Reduction) stationary refresh procedure the following conditions must be met:

- Clean under the bonnet to ensure there is no flammable material on hot surfaces (eg turbo, exhaust manifold).
- The diesel and AdBlue / DEF (Diesel Exhaust Fluid) tanks should be full.
- Stop the machine on flat level ground where the machine will not be a hazard or danger.
- Ease up on the accelerator pedal and down on the brake pedal to bring the machine to a smooth stop.
- Keep the foot brake on until the park brake has been applied and the drive disengaged.
- Activate the park brake.
- Set the transmission to neutral. Make sure the lever is in its detent position.
- Retract and lower the boom, rest the forks flat on the ground.
- Hand throttle (if fitted) should be set to minimum.

Activation

- Neutral must be selected.
- Park brake must be applied.
- The engine coolant must be 70°C (157.9°F) or higher.
- If necessary warm the engine by running at high revs and activating the auxiliary hydraulics (where fitted ensure any powered attachments are disconnected) or boom retract and fork crowd functions.
- When a stationary refresh is available the display will show an icon.

Figure 167.



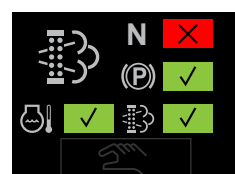
- Press the info button (less than 2s) to access the following screen.

Figure 168.



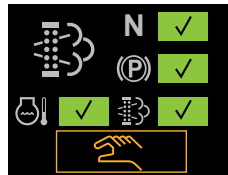
- Press the info button (more than 3s) again to access the following screen.

Figure 169.



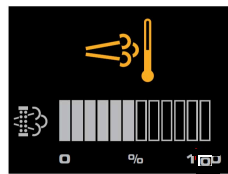
- Once all requirements are met the screen will look like the following.

Figure 170.



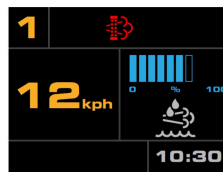
- The engine coolant must be at 70°C (157.9°F) at this point.
- Press the info button (more than 3s) to activate stationary refresh.
- A progress indicator is displayed.

Figure 171.



- If the refresh is interrupted or unsuccessful the display will show a red icon.

Figure 172.



What to Expect and Do While a Stationary Refresh is Running

- During refresh the following screen will be displayed.

Figure 173.



- The engine revs will increase from idle to 1500RPM (Revolutions Per Minute). After 3min the revs will increase to 2000RPM and remain at this speed for approximately 30min. After this time the revs will drop to 1200RPM for 2min to cool the exhaust system.
- Do not operate the throttle, park brake or transmission control - it will stop the process immediately.
- Do not operate the hydraulic functions.
- The process can be interrupted at any time but will then have to be repeated to clear the fault.
- It is advised that the operator should stay with the machine during the procedure.
- In the unlikely event that the exhaust temperature reaches 465°C (868.3°F) this icon will be displayed.

Figure 174.



Completion

- After a successful refresh the display will return to its default setting.

Figure 175.



- The machine can now return to normal operation.
- If the refresh has not been successful then the following icon will remain on the display. Repeat the process to clear the icon.

Figure 176.



Air Filter

General

Check (Condition)

▲ **Notice:** Do not modify or install non JCB approved components to the engine induction system, otherwise the engine emissions will be compromised.

1. Make the machine safe.
2. Get access to induction system.
3. Check the system hoses for:
 - 3.1. Condition.
 - 3.2. Damage.
 - 3.3. Security.
4. Replace the system hoses if necessary.

Outer Element

Replace

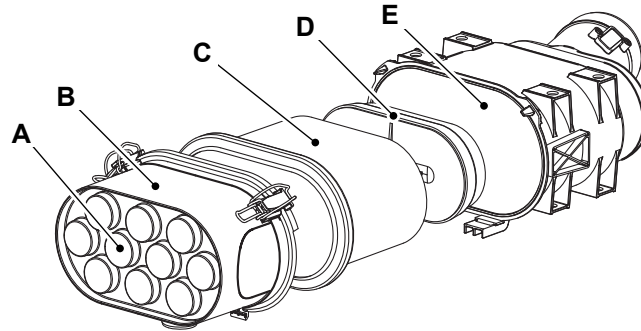
▲ **Notice:** The outer element must be renewed immediately if the warning light on the instrument panel illuminates.

Do not attempt to clean or wash the elements - they must only be renewed.

A new inner element must be installed at least every other time the outer element is changed. As a reminder, mark the inner element with a felt tipped pen each time the outer element is changed.

1. Get access to the engine.
[Refer to: Service Points \(Page 160\).](#)
2. Unclip and remove the prefilter element.
3. Remove the main element. Take care not to tap or knock the element.
4. If the safety element is to be changed, lift up pulls and remove the safety element.
5. Clean the prefilter element housing and main element housing. Make sure that the air holes on the prefilter housing are clear.
6. Make sure that the aspirator hose is securely installed and is in good condition.
7. Put the new safety element and main element into the housing. Push them firmly in so that they seated correctly.
8. Install the prefilter element. Make sure that the aspirator hose mates with the spigot.

Figure 177.



- A Air holes
- B Prefilter element
- C Main element
- D Safety element
- E Main housing

Dust Valve

Check (Condition)

- Check the dust valve for rips/tears.
- Check there are no obstructions.
- Check that the dust valve is free of dirt and dust.
- Check that the dust valve securely attached to the air filter housing.

Restriction Indicator

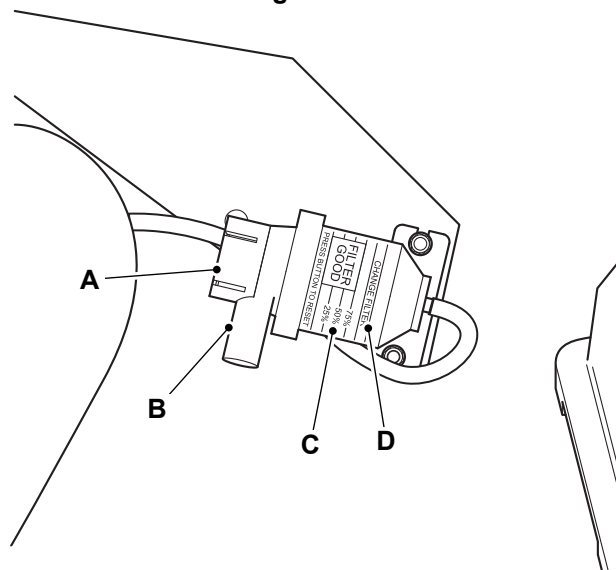
Check (Condition)

The vacuum indicator (found in the engine compartment) monitors the flow of air through the air filter. The position indicator progressively fills the window as the level of restriction increases.

You must complete a check of the air filter when the position indicator moves into the red zone. Remove all unwanted material from the filter elements, the dust valve and the air filter hoses.

If the air filter becomes blocked during machine operation, the air filter blocked light comes on. To reset the vacuum indicator, push the (yellow) button. [Refer to: Instrument Panel \(Page 55\).](#)

Figure 178.



- A Yellow button
- B Vacuum indicator



C Window

D Red zone

Fuel System

General

Bleed

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

The engine installation features an electrically operated fuel lift pump. The system is designed to bleed automatically when the lift pump is operated. Make sure that as much air is removed from the fuel as possible before starting the engine.

Do not attempt to bleed the high pressure fuel system by loosening high pressure pipe connections even when the engine is not running. To bleed the fuel system follow the correct procedure.

1. Turn on the starter switch to start the fuel lift pump. Do not start the engine. Allow the pump to run for the duration specified.
Duration: 30s
2. Turn off the starter switch to stop the fuel lift pump.
3. Wait
Duration: 10s
4. Turn the starter switch to start the pump. Do not start the engine. Allow the pump to run for the duration specified.
Duration: 30s
5. Repeat steps 2-4 twice more before starting the engine.
6. Start the engine and make sure it runs smoothly.

Check (Leaks)

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

Tank

Drain

Draining Fuel Tank Impurities

1. Make the machine safe.
[Refer to: Maintenance Positions \(Page 156\).](#)
2. Remove the cover plate from below the fuel tank.
3. Put a suitable container below the self sealing drain plug.
4. Remove the outer threaded cover from the self sealing drain plug.
5. Connect the self sealing drain kit threaded union with attached pipe. Drain the water and deposits until there is clean diesel.
6. Remove the self seal drain kit.
7. Clean and install the outer threaded cover. Do not over tighten the cover.

8. Install the cover plate.

Clean the Filler Cap

1. Make the machine safe.
[Refer to: Maintenance Positions \(Page 156\).](#)
2. Get access to the fuel filler cap.
[Refer to: Service Points \(Page 160\).](#)
3. Clean the exterior of the cap with a clean cloth.
4. Remove the fuel filler cap.
5. Clean the interior of the fuel filler cap with a clean cloth.
6. Install the fuel filler cap.

Fuel Filter

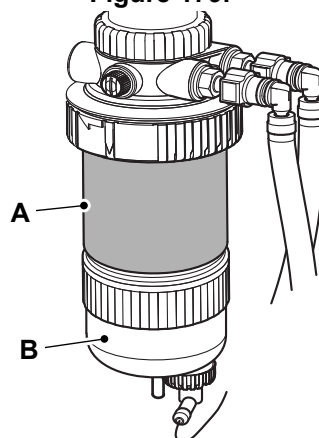
Replace

▲ Notice: Do not allow dirt to enter the fuel system. Before disconnecting any part of the fuel system, thoroughly clean around the connection. When a component has been disconnected, for example a fuel pipe, always install protective caps and plugs to prevent dirt ingress. Failure to follow these instructions will lead to dirt entering the fuel system. Dirt in the fuel system will seriously damage the fuel injection equipment and could be expensive to repair.

Notice: 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.

1. Make the machine safe. Refer to Maintenance, Maintenance positions.
2. Get access to the filter. Refer to Maintenance, Access Apertures
3. Drain and remove the separator bowl. Refer to Maintenance, Fuel System, Water separator.
4. Replace the fuel filter.
5. Install the separator bowl.
6. Bleed the fuel system. Refer to Maintenance, Fuel System, General, Bleed.

Figure 179.



A Filter

B Bowl

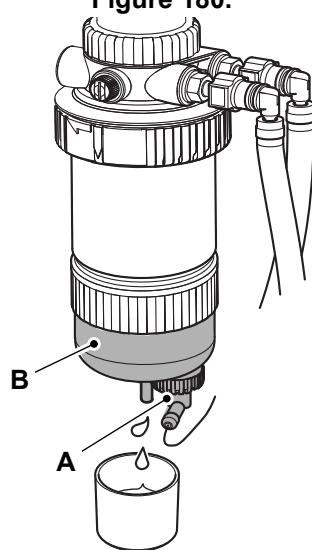
Water Separator

Clean

Draining the Water Separator

1. Make the machine safe.
2. Get access to the filter.
3. If there is water but no sediment, open the tap to drain the water. If there is any sediment in the bowl replace the fuel filter element. Do not disconnect the electrical connector (if installed).
4. Tighten the drain tap when all the water is drained.

Figure 180.



A Tap

B Bowl

Cooling System

General

Check (Leaks)

Before you start the machine, inspect the system for leaks:

1. Make the machine safe.
[Refer to: Maintenance Positions \(Page 156\).](#)
2. Get access to the cooling pack.
[Refer to: Access Apertures \(Page 164\).](#)
3. Check the cooling system for leaks.
4. If necessary, contact your JCB dealer.

Coolant

Check (Condition)

[Refer to: Coolant \(Page 241\).](#)

Check (Level)

▲ CAUTION The cooling system is pressurized 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.

1. Make the machine safe.
2. Let the engine cool.
3. Get access to the coolant expansion tank.
[Refer to: Service Points \(Page 160\).](#)
4. Check the coolant level in the expansion tank.
 - 4.1. Carefully loosen the cap on the expansion tank and let the pressure release from the system.
[Refer to: Service Points \(Page 160\).](#)
 - 4.2. Remove the cap from the expansion tank.
 - 4.3. Add the recommended coolant up to the maximum mark.
[Refer to: Fluids, Lubricants and Capacities \(Page 235\).](#)
 - 4.4. Replace the cap.
5. Start the engine and run the engine up to operating temperature.
6. Stop the engine.
7. Remove the ignition key.
8. Check for leaks.

Cooling Pack

Clean

If the radiator tubes/fins get clogged the radiator will be less efficient.

1. Make the machine safe.

[Refer to: Maintenance Positions \(Page 156\).](#)

2. Open the engine cover.
[Refer to: Engine Compartment Cover \(Page 164\).](#)
3. Remove the undershield.
[Refer to: Undershield \(Page 166\).](#)
4. Use a soft bristle brush to remove all unwanted material from the rear of radiator.
5. Release fastener and pull the condenser away from the radiator. Use the soft bristle brush to remove all unwanted material from the two sides of condenser and the front of the radiator. Then push back the condenser and lock in position with fastener.
6. Remove the loosened material is out of the engine compartment

Check (Condition)

1. Make the machine safe.
[Refer to: Maintenance Positions \(Page 156\).](#)
2. Let the engine cool.
3. Get access to the cooling pack.
[Refer to: Access Apertures \(Page 164\).](#)
4. Check the condition of the hoses, radiator and fan for:
 - 4.1. Condition.
 - 4.2. Damage.
 - 4.3. Security.
5. Replace the system hoses/radiator if necessary.

Brakes

General

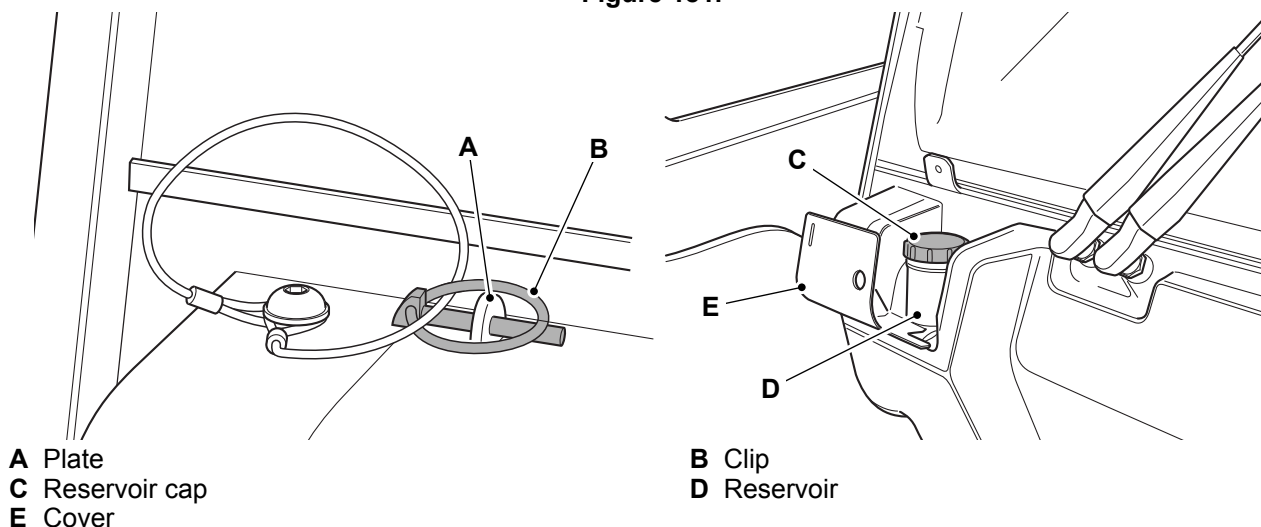
Check (Level)

▲ **WARNING** Faulty brakes can kill. If you have to top up the brake oil reservoir frequently, get the brake system checked by your JCB Dealer. Do not use the machine until the fault has been rectified.

Notice: 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.

1. Make the machine safe with the boom lowered.
[Refer to: Maintenance Positions \(Page 156\).](#)
2. Remove the clip from the plate.
3. Open the cover to get access to the brake fluid reservoir.
4. The correct fluid level is marked on the reservoir. If necessary, add fluid.
 - 4.1. Remove the reservoir cap. Do not use ordinary brake fluid. Carefully pour in the fluid until it reaches the fluid level mark. Avoid spilling it. Wipe up any spillage.
 - 4.2. Install the reservoir cap.
5. Close then lock the cover with the clip.

Figure 181.



Park Brake

Check (Operation)

▲ **WARNING** Do not use a machine with a faulty park brake.

WARNING Non approved modifications to drive ratios, machine weight or wheel and tire sizes may adversely affect the performance of the park brake.

WARNING Before testing the park brake make sure the area around the machine is clear of people.

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.

The park brake must be fully engaged when the lever is vertical. The park brake warning light must come on when the park brake is engaged and forward or reverse is selected (starter switch at position I).

1. Enter the machine. Fasten your seat belt (if fitted) and park the machine on a level dry surface.
2. Fully apply park brake.
3. Start the engine and raise the attachments to the appropriate travel position.
4. Select third gear.
5. Push down hard on foot brake pedal.
6. Select forward drive. The park brake warning light must illuminate.

WARNING! *If the machine starts to move during the park brake test, immediately apply the foot brake and reduce the engine speed.*

7. Test the park brake as follows:
 - 7.1. Move the park brake lever fractionally forward until the park brake warning light is just extinguished.
 - 7.2. Slowly release the foot brake pedal.
 - 7.3. If the machine has not moved, use the accelerator to gradually increase the engine speed to 1500RPM (Revolutions Per Minute). The machine should not move. Do not do this test for longer than the time specified.
Duration: 20s
 - 7.4. Reduce engine speed to idle and select neutral.
 - 7.5. Return the park brake lever to the fully on position.
 - 7.6. Lower attachments and stop the engine.
8. If the machine moved during the test, adjust the park brake or contact your JCB dealer. Do not use the machine until the park brake has been successfully adjusted or repaired.

[Refer to: Adjust \(Page 198\).](#)

Adjust

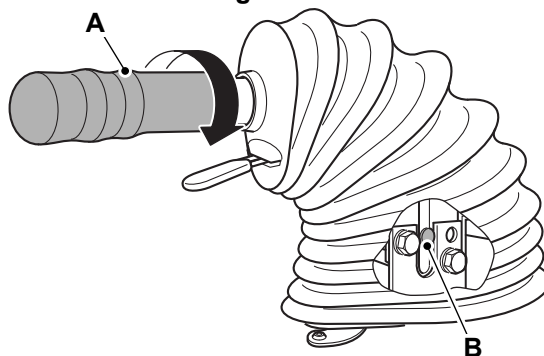
- ▲ **Notice:** Over adjustment or failure to disengage the park brake properly will cause excessive wear of the park brake mechanism.

1. Disengage the park brake (lever horizontal).
2. Turn handle grip clockwise, half a turn.
3. Test the park brake.

[Refer to: Check \(Operation\) \(Page 197\).](#)

If the brake fails the test repeat the above steps. If there is no more adjustment and the pin is at the end of its travel get the brake checked by your JCB dealer.

Figure 182.



A Handle grip

B Pin

Service Brake

Check (Operation)

1. Before you start the machine, check the brake system hydraulic hoses for any signs of damage or leaks.
2. Start the engine.
3. Wait for the brake accumulator amber warning symbol to extinguish from the main display screen.
4. If the brake accumulator red warning symbol illuminates do not use the machine. Contact your JCB dealer for any service requirements.

Gearbox

Oil

Check (Level)

1. Make the machine safe with the boom lowered.
2. Start the engine and operate at low idle for few minutes. This allows the oil to fill the filter, pump, torque converter, oil cooler and hoses.
Duration: 4min
3. Stop the engine.
4. Remove the ignition key.
5. Open the engine compartment cover.
6. Before you complete a check of the oil level, you must wait for the time specified.
Duration: 60s
7. Check the gearbox oil level on the dipstick. The oil level must be between the end of the dipstick and maximum mark on the dipstick.
8. If necessary add oil through the dipstick tube.

Axles

Oil

Check (Level)

▲ **Notice:** The oil level must be checked with the machine level, otherwise a false indication of the amount of oil will be given.

Notice: It is not recommended that the machine be driven with the axle partially filled with oil.

1. Make the machine safe.
2. Get access to the axle fill/level plug.
[Refer to: Service Points \(Page 160\).](#)
3. Clean the area around the fill/level plug.
4. Remove the plug with its sealing washer.
5. Make sure the oil is level with the bottom of the hole.
6. If necessary add oil.
[Refer to: Fluids, Lubricants and Capacities \(Page 235\).](#)
7. Clean the fill/level plug.
8. Install the plug with its sealing washer.
9. Tighten the plug to the correct torque value.
[Refer to: Torque Values \(Page 242\).](#)

Wheels

General

Check (Condition)

▲ WARNING A raised and badly supported machine can fall on you. Position the machine on a firm, level surface before raising one end. Ensure the other end is securely chocked. Do not rely solely on the machine hydraulics or jacks to support the machine when working under it. Disconnect the battery, to prevent the machine being started while you are beneath it.

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. Also make sure that the park brake is engaged before doing these checks.

WARNING Whenever a wheel has been changed, check the nut torques every two hours. When the nuts stay tight for 8 h, the interval for checking can revert to the period stated in the servicing schedule.

WARNING 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.

WARNING Wheels and tires are heavy. Take care when lifting or moving them. Store with care to ensure that they cannot fall and cause injury. Use suitable lifting equipment if necessary.

Changing a Wheel

If for whatever reason a wheel bolt is renewed, all the bolts for that wheel must be replaced as a set, since the remaining bolts may have been damaged.

Where a wheel has been replaced, ensure that the offset of the central nave plate of the wheel rim is as specified for the tire by JCB. If in doubt request additional information from your JCB Dealer.

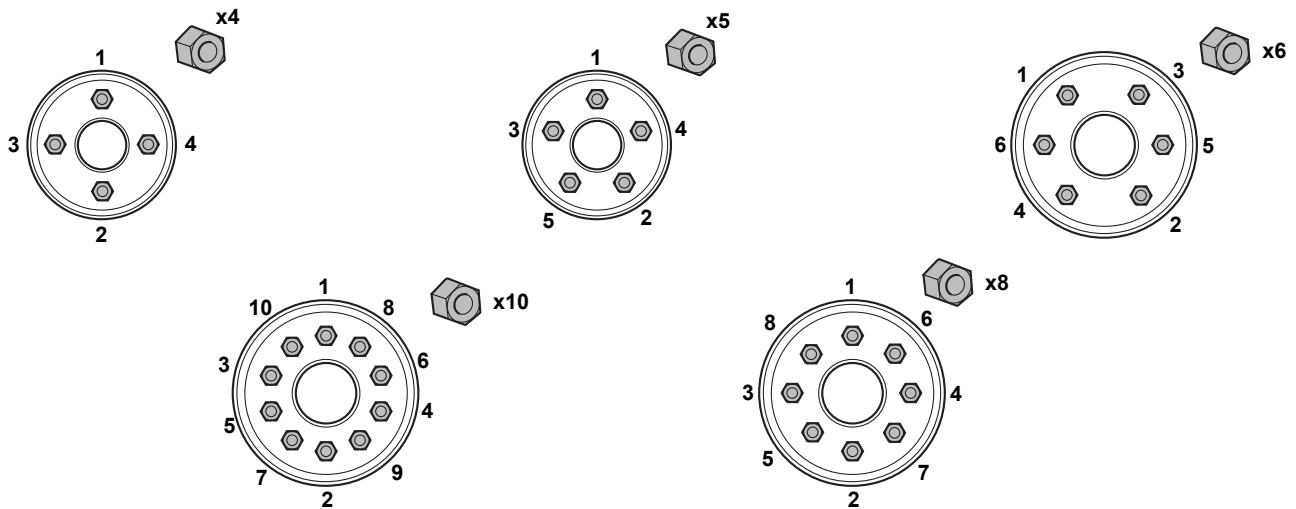
Remove

1. Make the machine safe.
[Refer to: Maintenance Positions \(Page 156\).](#)
2. Jack up the machine to gain access to whichever wheel you wish to change.
3. Remove the nuts then remove the wheel

Replace

1. Inspect the wheel for any damage, i.e. elongated holes.
2. Clean the hub, wheel mounting face and nut cones thoroughly if they are contaminated with paint, rust or debris.
3. Ensure the wheel stud thread surface is maintained dry and is free from all lubricants.
4. Position the wheel on the hub.
5. Lightly tighten the nuts to ensure the wheel is correctly seated onto the hub.
6. Tighten the nuts in the sequence shown.

Figure 183.



7. Lower the machine to the ground.
8. Torque tighten the nuts in the sequence shown.

[Refer to: Torque Values \(Page 242\).](#)

Checking the Wheel Nut Torques

⚠ 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.

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.

[Refer to: Torque Values \(Page 242\).](#)



Tires

General

Check (Condition)

- ⚠ **WARNING** Do not use the machine with damaged, incorrectly installed, incorrectly inflated or excessively worn tires. Recognize the speed limitation of the tires installed and do not operate at more than their recommended maximum speed.
- WARNING** Wheels and tires are heavy. Take care when lifting or moving them. Store with care to ensure that they cannot fall and cause injury. Use suitable lifting equipment if necessary.

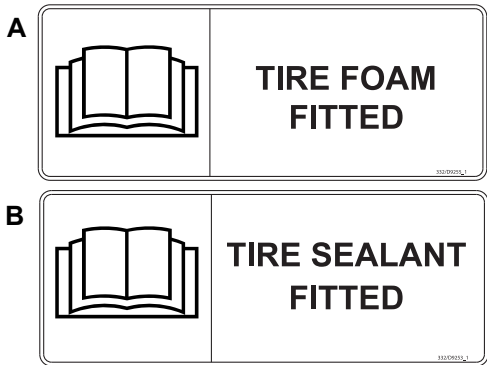
Tire Ballast

- ⚠ **CAUTION** Installing tire ballast requires special equipment and training. Have the job done by your JCB dealer or a tire specialist.
- CAUTION** Installing and removing a wheel with tire ballast requires special equipment and training. Have the job done by your JCB dealer or a tire specialist.
- Notice:** Non-approved tire ballast can cause damage to the machine's drive train and structures. It will also affect manufacturer's warranty. For advice consult your JCB dealer.

Before you start a maintenance procedure on a tire or a wheel assembly, you must identify if tire ballast is installed. If the tire contains ballast, you must obey the following warnings.

A decal is used to show if tire ballast or tire sealant is installed.

Figure 184.



A Tire ballast decal

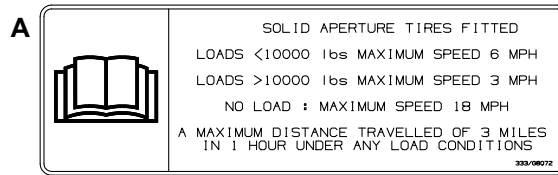
B Tire sealant decal

Semi Solid Tires

- ⚠ **WARNING** Wheels installed with semi-solid tires are heavy. Removing and installing them requires special equipment and training. Have the work carried out by your JCB dealer or a tire specialist.
- WARNING** Do not install pneumatic tires on a wheel made for a solid tire. Do not install a solid tire on a wheel made for a pneumatic tire. If you are unsure of the correct specification for your machine, contact your local JCB dealer or a trained specialist.

Some machines are fitted with optional semi solid wheels and tires. For service or maintenance please refer to your JCB dealer. Semi solid tires are subject to load, speed and distance limitations. A decal is used to show if semi solid tires are fitted.

Figure 185.



A Semi solid tire decal

Checking the Tire Condition

Always drive with consideration for the condition of the tires. Incorrect tire pressures will affect the stability of the machine. Check the tires daily for the correct tire 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 tire pressures.

Inspect the tire valve for leaks, when you check the tire pressures.

Tire Inflation

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

Always try to maintain your tire pressure to the recommended settings. Using your machine with under-inflated tires means:

- Decreasing the machines stability
- Higher tire temperatures
- Excessive strain of the tire fabric
- More bulging of the sidewalls
- Shortens the tires life.

Using the machine with over-inflated tires is dangerous:

- It causes excessive tensile loads in the fabric: this makes a tire more susceptible to cuts and punctures.

Do not cut or weld on the rim of an inflated tire.

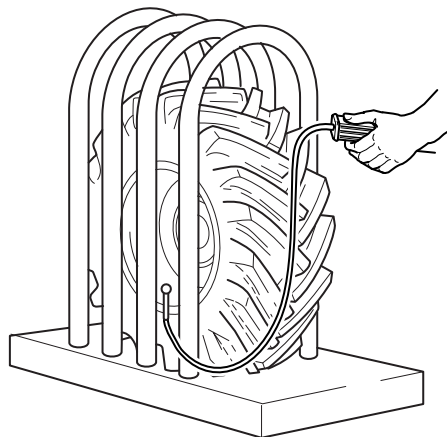
After checking or amending the tire pressure always replace and secure the valve cap.

Always deflate the tire before removing foreign obstacles from the tread.

Procedure

These instructions are for adding air to a tire which is already inflated. If the tire has lost all its air pressure, call in a qualified tire mechanic. The tire mechanic should use a tire inflation cage and the correct equipment to do the job.

1. Prepare the wheel. Before you add air to the tire, make sure it is correctly fitted on the machine or installed in a tire inflation cage.

Figure 186.

2. Prepare the equipment.
 - 2.1. Use only an air supply system which includes a pressure regulator. Set the regulator no higher than 1.38 bar (20 psi) above the recommended tire pressure.
[Refer to: Wheels and Tires \(Page 259\).](#)
 - 2.2. Use an air hose fitted with a self-locking air chuck and remote shut-off valve.
3. Add the air.
 - 3.1. Make sure that the air hose is correctly connected to the tire valve. Clear other people from the area. Stand behind the tread of the tire while adding the air.
 - 3.2. Inflate the tire to the recommended pressure. Do not over-inflate.

Propshafts

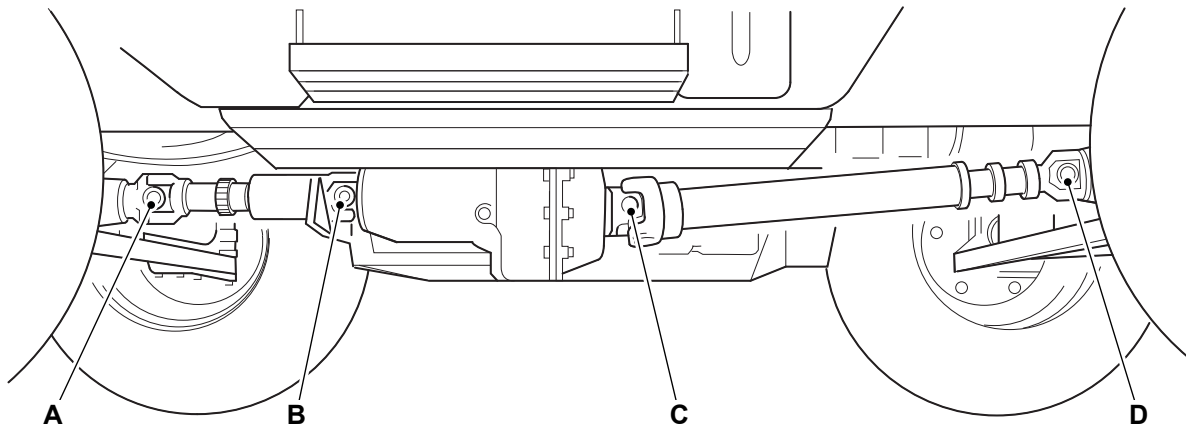
General

Lubricate

Make the machine safe.

Apply grease to all the points and linkages shown. Refer to Figure 187.

Figure 187.



Hydraulic System

General

Discharge

▲ CAUTION Allow the hydraulic fluid temperature to cool before removing the hydraulic tank filler cap. Open the cap slowly to prevent oil being forced out of the filler neck.

CAUTION Do not run the machine with the hydraulic tank filler cap removed.

1. Make the machine safe.
2. Operate the controls to remove the hydraulic pressure from the service hose lines
 - 2.1. For manually operated services, operate the controls of the service(s) to be disconnected.
 - 2.2. For electrical and servo operated hydraulic services, turn the ignition key to the on position. Operate the controls (several times) of the service(s) to be disconnected. To release the hydraulic pressure from the electrical and servo operated services the battery must be connected while you operate the controls.
3. Clean the top of the tank around the filler cap.
4. Slowly remove filler cap to allow the system to vent fully and prevent oil being forced out of the filler neck.
 - 4.1. On some machines the filler cap includes a side mounted barrel lock that is operated by the starter key.
5. Install the hydraulic tank filler cap. Check that the seal is in good condition and correctly installed in the cap. Replace if necessary.

Check (Condition)

Hydraulic Hoses

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

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

Examine the hoses for:

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

Replace a damaged hose before you use the machine again.

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

Check (Leaks)

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

1. Make the machine safe.
2. Open the access covers.
3. Check the hydraulic hoses for damage.

4. Close the access covers.
5. If necessary, contact your JCB dealer.

Services

Check (Operation)

Check the operation of all the hydraulic services. Check for:

- Speed of operation
- Strength of operation
- Juddering
- Abnormal noises.

Do not use the machine if one or more of these faults are found. You must make sure that the hydraulic service is repaired immediately.

Oil

Check (Level)

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

External Sight Gauge

1. Make the machine safe with the boom lowered.
2. Get access to the hydraulic oil level indicator and hydraulic oil filler cap.
3. Check the hydraulic oil level indicator. The hydraulic oil level must be visible in the level indicator.
4. Top up oil level if necessary:
 - 4.1. Vent the hydraulic system.
 - 4.2. Remove the hydraulic oil filler cap.
 - 4.3. Add hydraulic oil.
 - 4.4. Install the filler cap.

Cylinders / Rams

Check (Condition)

Extend each ram fully, one at a time and visually examine for score marks, dents, leaks or similar defects. Make the machine safe before inspecting each ram.

If a ram piston appears defective, contact your service engineer or JCB dealer.

Hose Burst Check Valves

Check (Operation)

▲ WARNING Keep people clear of the machine while you do these checks.

The hose burst check valves 'lock' to prevent the uncontrolled movement of the ram pistons if the hydraulic pressure fails or a hose bursts. The valves are installed directly on the rams.

Keep people clear of the machine while you do these checks.

The machine must have an attachment installed for the test to operate correctly.

1. Park the machine is on solid, level ground.
2. Raise and extend the boom to its maximum position, then move the attachment to a horizontal position.
3. Stop the machine.
4. Turn the ignition key to the on position.
5. Use the control lever to try to lower the boom and tip the attachment. If there is any movement, get the hydraulic system checked by your JCB dealer.
6. Use the extend/retract function to try to retract the boom. If there is any movement, get the hydraulic system checked by your JCB dealer.

Electrical System

General

Check (Operation)

Make sure all of the electrical equipment operates correctly, for example:

- Switches
- Warning lights
- Beacon
- Alarms
- Horn
- Wipers
- Hourmeter/display
- Battery
- Lights

All defective equipment must be repaired before the machine is used.

Check (Condition)

Examine the electrical circuits regularly for:

- Damaged connectors
- Loose connections
- Chafing on the wiring harnesses
- Corrosion
- Missing insulation
- Incorrect routeing of the wiring harnesses.

Do not use the machine if one or more of these faults are found. You must make sure that the electrical circuit is repaired immediately.

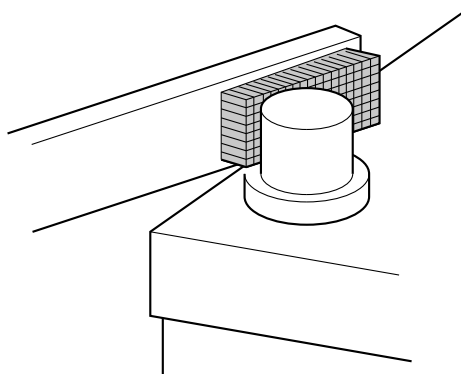
Battery

Clean

▲ 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.

1. Make the machine safe.
[Refer to: Maintenance Positions \(Page 156\).](#)
2. Get access to the battery.
[Refer to: Access Apertures \(Page 164\).](#)
3. If the terminal posts are corroded and covered with white powder wash them with hot water. If there is considerable corrosion, clean the terminal posts with a wire brush or abrasive paper. Refer to Figure 188.

Figure 188.



4. Apply a thin layer of petroleum jelly to the terminal posts.

Connect

▲ **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.

CAUTION 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.

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

1. Make the machine safe.
[Refer to: Maintenance Positions \(Page 156\).](#)
2. Get access to the batteries.
[Refer to: Disconnect \(Page 212\).](#)
3. Connect the battery leads. Connect the earth (-) terminal last.
4. If the machine has a battery isolator, move the switch to the on position.

Disconnect

▲ **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.

CAUTION 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.

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

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

1. Make the machine safe.
[Refer to: Maintenance Positions \(Page 156\).](#)
2. Get access to the batteries.
[Refer to: Access Apertures \(Page 164\).](#)

3. If the machine has a battery isolator, switch off the battery isolator and remove the key.

[Refer to: Battery Isolator \(Page 37\).](#)

4. Disconnect the battery leads. Disconnect the earth (-) terminal first.

Battery Isolator

Check (Operation)

▲ Notice: Do not isolate the machine electrics when the engine is running, this may cause damage to the machine electrics.

1. Isolate the machine electrics.
2. Make sure that the machine electrics are isolated.

A defective isolator must be repaired before the machine is used. For more information, contact your JCB dealer.

Fuses

Replace

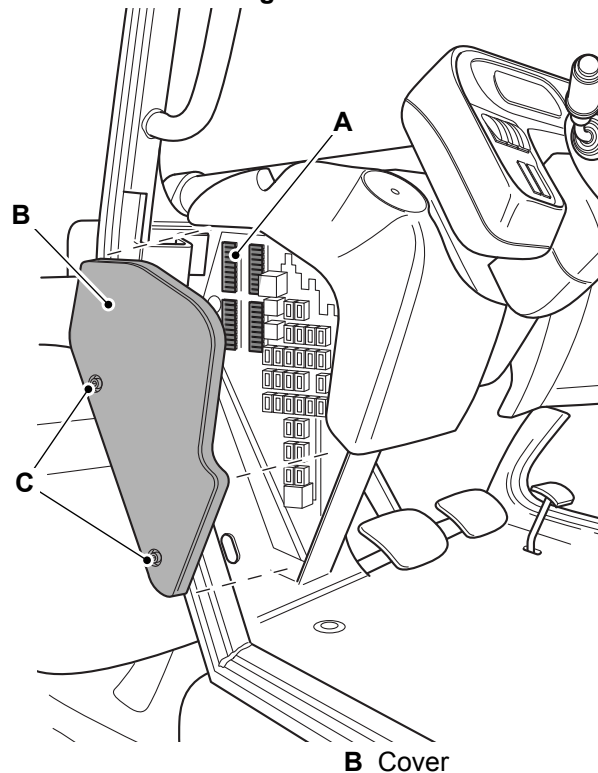
▲ Notice: Always replace fuses with ones of correct ampere rating to avoid electrical system damage.

The electrical circuits are protected by fuses. The fuses are located in a fuse box inside the door. They are in four banks. Each fuse position in each bank is numbered to aid identification. If a fuse ruptures, find out why and rectify the fault before fitting a new one. [Refer to: Fuses \(Page 243\).](#)

Additional fuse links are fitted at the battery positive terminal and within the engine compartment. [Refer to: Fuses \(Page 243\).](#)

1. Make the machine safe with the boom lowered.
[Refer to: Maintenance Position - Boom Lowered \(Page 156\).](#)
2. Open the cab door.
3. Hold the cover and remove the screws.
4. Remove the cover.

Figure 189.



A Fuses
C Screws (x2)

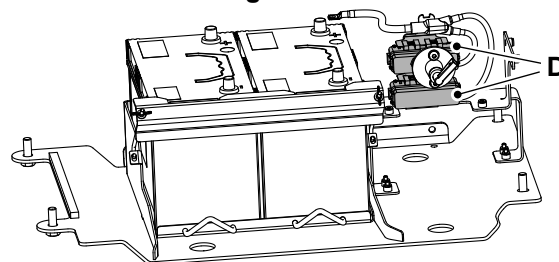
B Cover

Primary Fuses

To further protect the machine wiring harnesses and electrical circuits, a fuse link box is fitted as shown. Remember to check the main circuit fuses as well as the primary fuses shown on this page.

Your machine may not be equipped with all the fuses shown.

Figure 190.



D Primary Fuses

Relays

Replace

The relays are situated in a fuse box inside the door.

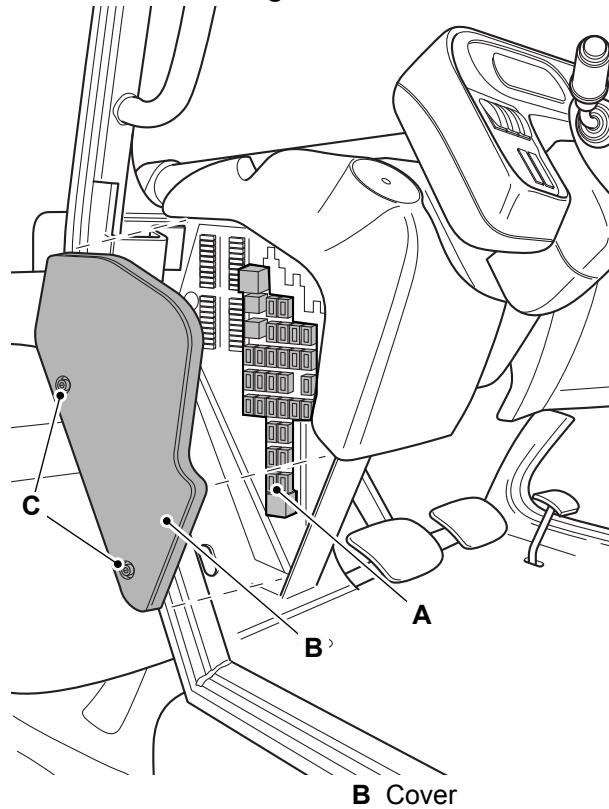
The relays are separated into banks. Each relay position in each bank is numbered to aid identification. [Refer to: Relays \(Page 251\).](#)

1. Make the machine safe.

[Refer to: Stopping and Parking \(Page 45\).](#)

2. Open the cab door.
3. Hold the cover and remove the screws.
4. Remove the cover.

Figure 191.



- A** Relays
C Screws (x2)

B Cover

Window Washer

Check (Level)

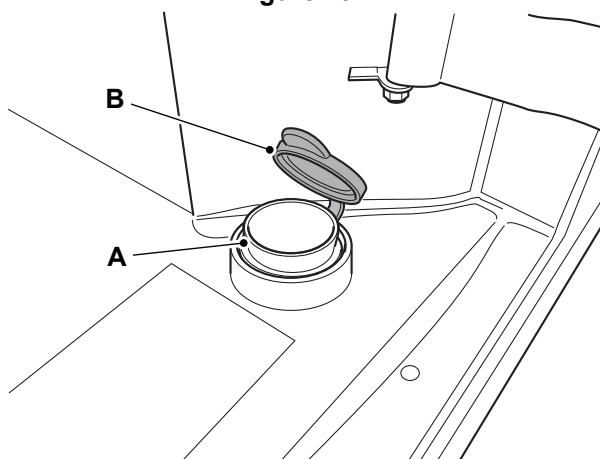
The washer bottle is found to the left of the operator seat.

1. Make the machine safe with the boom lowered.
[Refer to: Maintenance Positions \(Page 156\).](#)
2. Get access to the washer bottle.
3. Remove the washer bottle cap.
4. Check the water level. If necessary, fill in the washer bottle with clean water. Add de-icing fluid to prevent it freezing.
5. Install the washer bottle cap.

Do not use engine coolant antifreeze.

Do not use the window washer when there is no liquid in the washer bottle as it will cause damage to the motor.

Figure 192.



A Bottle cap (yellow)

B Washer bottle

Miscellaneous

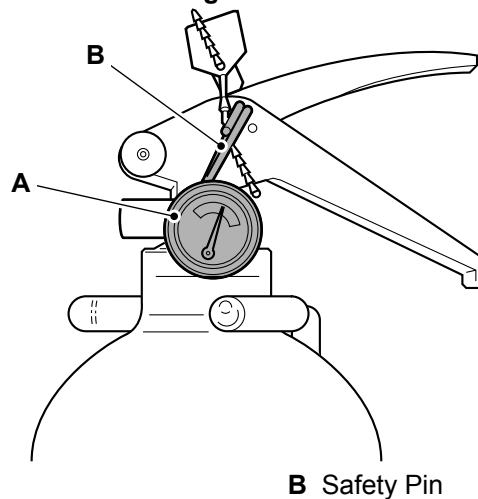
Fire Extinguisher

Check (Condition)

In addition to the operator check the extinguisher must be serviced every 12 months by a suitably qualified person.

1. Examine the fire extinguisher for damage and leaks.
2. Make sure the fire extinguisher is correctly attached.
3. Make sure that the gage indicates that the extinguisher is charged i.e. the needle is in the green segment
 - 3.1. If the needle is in or very near the red segment at either end of the gage, the extinguisher must be serviced or replaced.
4. Make sure the safety pin is correctly installed.

Figure 193.



A Gage

B Safety Pin



Notes:



Technical Data

Static Dimensions

Dimensions

For: 506-36 [T4F]	Page 220
For: 507-42 [T4F]	Page 221
For: 509-42 [T4F]	Page 222
For: 510-56 [T4F]	Page 223
For: 512-56 [T4F]	Page 224
For: 514-56 [T4F]	Page 225
For: 510-42 [T4F]	Page 226



(For: 506-36 [T4F])

Figure 194.

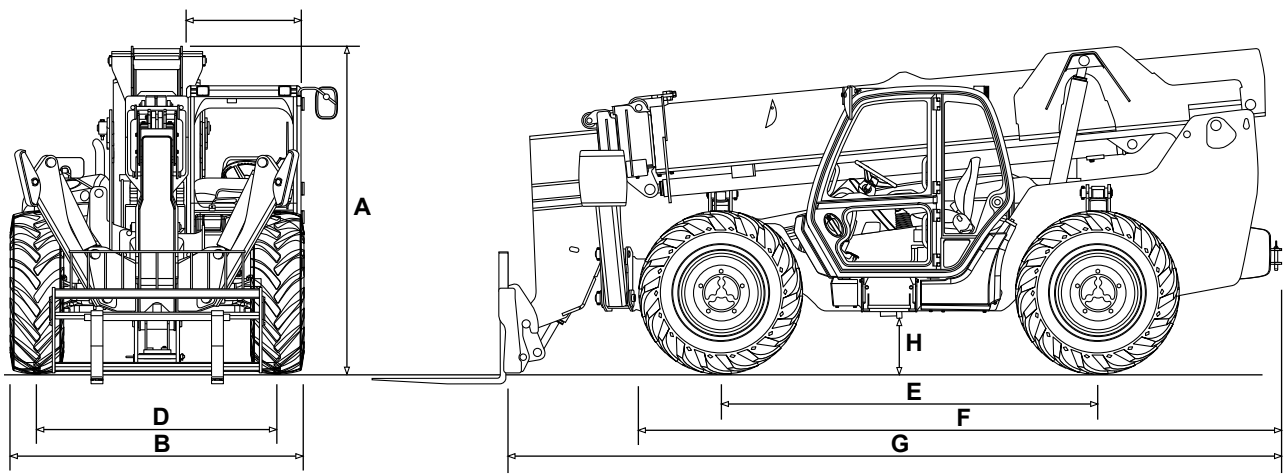


Table 31.

Item	Description	Dimension ⁽¹⁾
A	Overall height	2510mm (8ft 3in)
B	Overall width	2388mm (7ft 10in) ⁽²⁾
C	Inside width of cab	940mm (3ft 1in)
D	Front track	1936mm (6ft 4in)
E	Wheelbase	3048mm (10ft)
F	Overall length to front tires	5211mm (17ft 1in)
G	Overall length to front of carriage	5918mm (19ft 5in)
H	Ground clearance	396mm (1ft 4in)

(1) Dimensions are based on a machine with 13.0024 14PR tires fitted.
(2) Measured over tires to step.



(For: 507-42 [T4F])

Figure 195.

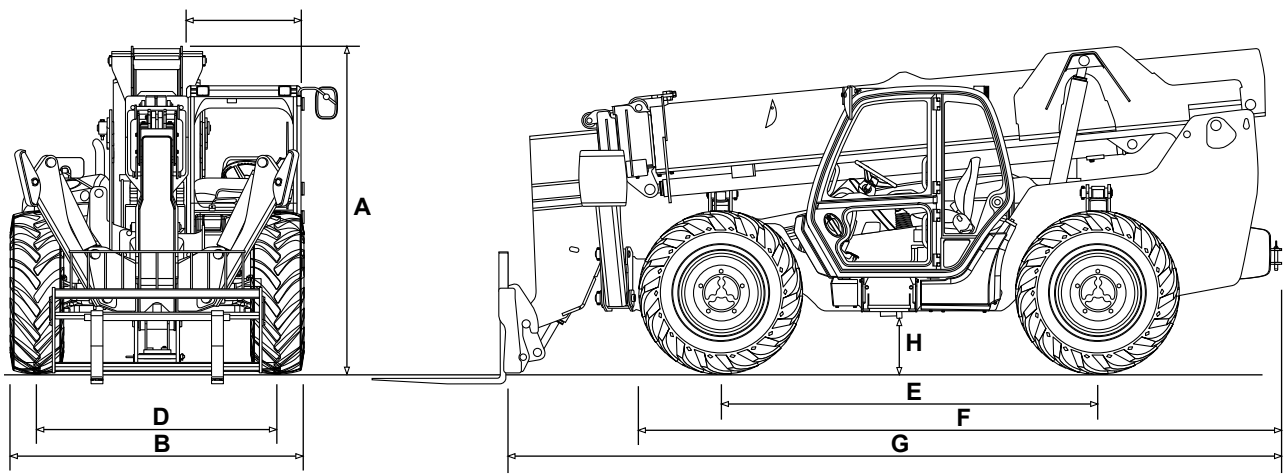


Table 32.

Item	Description	Dimension ⁽¹⁾
A	Overall height	2525mm (8ft 3in)
B	Overall width	2388mm (7ft 10in) ⁽²⁾
C	Inside width of cab	940mm (3ft 1in)
D	Front track	2008mm (6ft 7in)
E	Wheelbase	3150mm (10ft 4in)
F	Overall length to front tires	5386 (17ft 8in)
G	Overall length to front of carriage	6477mm (21ft 3in)
H	Ground clearance	396mm (1ft 4in)

(1) Dimensions are based on a machine with 14.0024 16PR tires fitted.

(2) Measured over tires to step.

(For: 509-42 [T4F])

Figure 196.

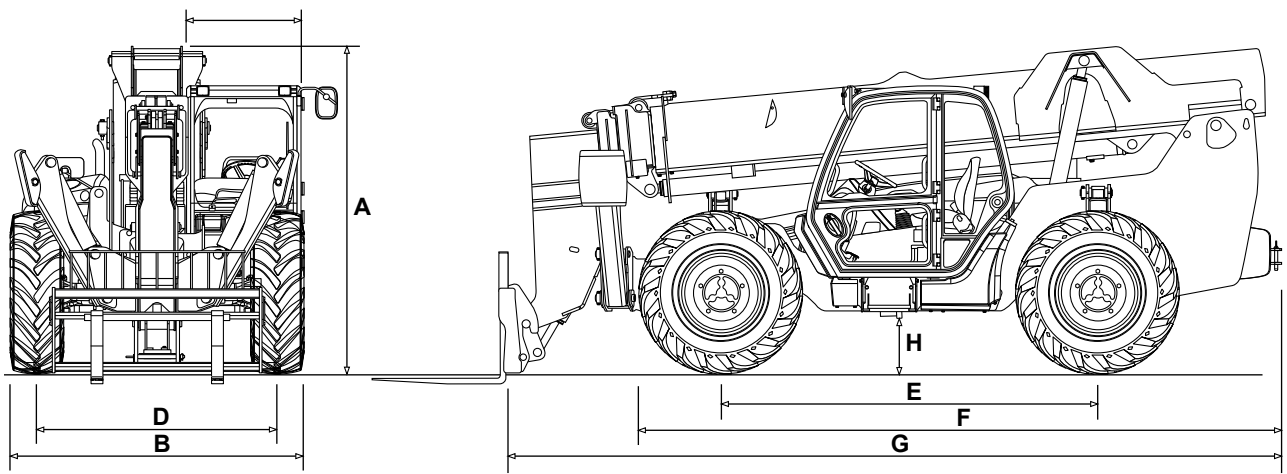


Table 33.

Item	Description	Dimension ⁽¹⁾
A	Overall height	2525mm (8ft 4in)
B	Overall width	2388mm (7ft 10in) ⁽²⁾
C	Inside width of cab	940mm (3ft 1in)
D	Front track	2008mm (6ft 7in)
E	Wheelbase	3150mm (10ft 4in)
F	Overall length to front tires	5183mm (17ft)
G	Overall length to front of carriage	6274mm (20ft 7in)
H	Ground clearance	396mm (1ft 4in)

(1) Dimensions are based on a machine with 14.00-24 16PR tires fitted.

(2) Measured over tires to step.



(For: 510-56 [T4F])

Figure 197.

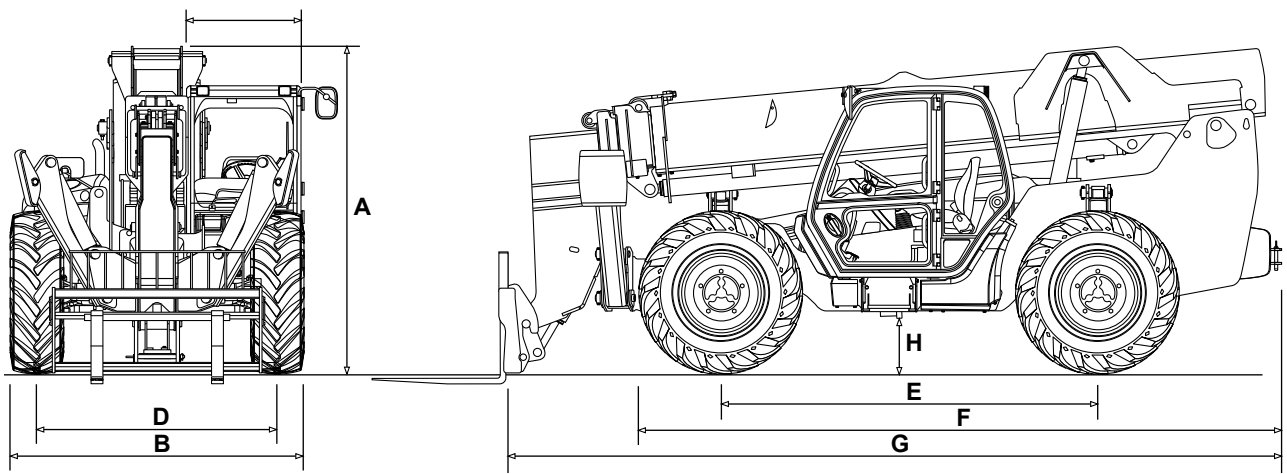


Table 34.

Item	Description	Dimension ⁽¹⁾
A	Overall height	2692mm (8ft 10in)
B	Overall width	2471mm (8ft 1in) ⁽²⁾
C	Inside width of cab	940mm (3ft 1in)
D	Front track	2008mm (6ft 7in)
E	Wheelbase	3150mm (10ft 4in)
F	Overall length to front tires	5406mm (17ft 9in)
G	Overall length to front of carriage	6579mm (21ft 7in)
H	Ground clearance	444mm (1ft 6in)

(1) Dimensions are based on a machine with 17.5-25 tires fitted.

(2) Measured over tires.

(For: 512-56 [T4F])

Figure 198.

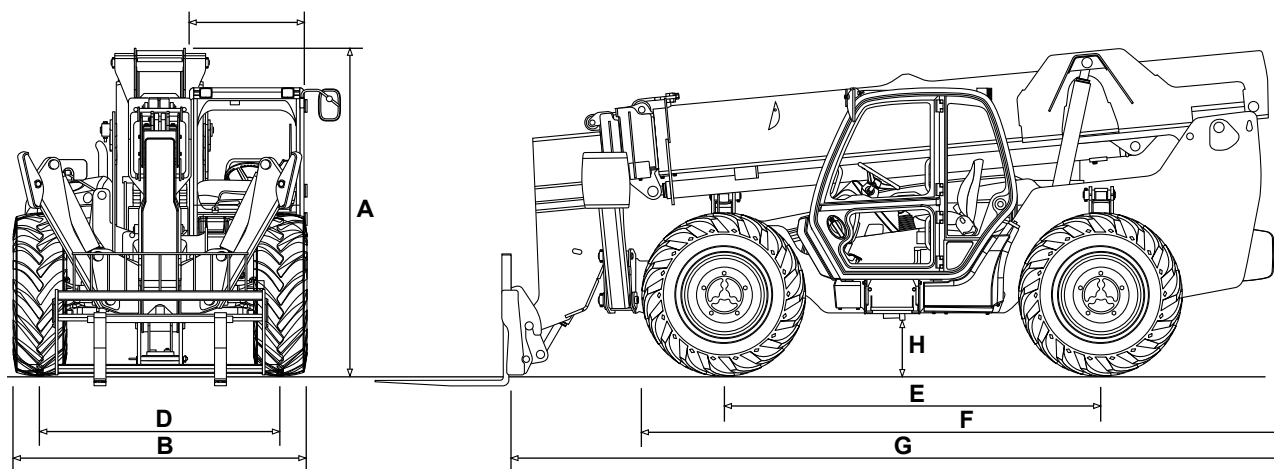


Table 35.

Item	Description	Dimension ⁽¹⁾
A	Overall height	2692mm (8ft 10in)
B	Overall width	2471mm (8ft 1in) ⁽²⁾
C	Inside width of cab	940mm (3ft 1in)
D	Front track	2008mm (6ft 7in)
E	Wheelbase	3150mm (10ft 4in)
F	Overall length to front tires	5406mm (17ft 9in)
G	Overall length to front of carriage	6579mm (21ft 7in)
H	Ground clearance	444mm (1ft 6in)

(1) Dimensions are based on a machine with 17.5-25 tires fitted.

(2) Measured over tires.



(For: 514-56 [T4F])

Figure 199.

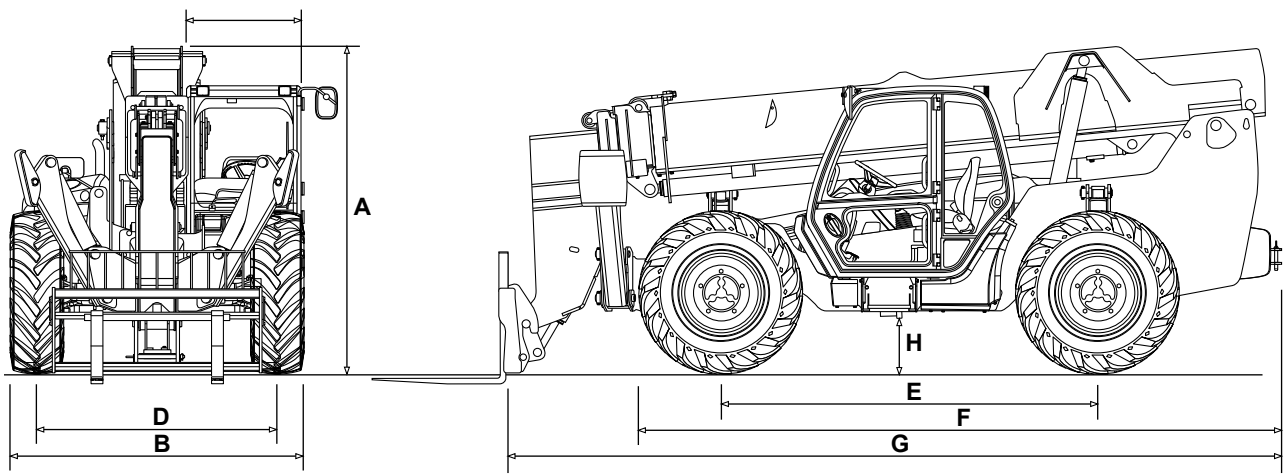


Table 36.

Item	Description	Dimension ⁽¹⁾
A	Overall height	2681mm (8ft 9in)
B	Overall width	2475mm (8ft 1in) ⁽²⁾
C	Inside width of cab	940mm (3ft 1in)
D	Front track	2008 (6ft 7in)
E	Wheelbase	3150 (10ft 4in)
F	Overall length to front tires	5596 (18ft 4in)
G	Overall length to front of carriage	6493 (21ft 4in)
H	Ground clearance	407 (1ft 4in)

(1) Dimensions are based on a machine with 17.5-25 tires fitted.

(2) Measured over tires.



(For: 510-42 [T4F])

Figure 200.

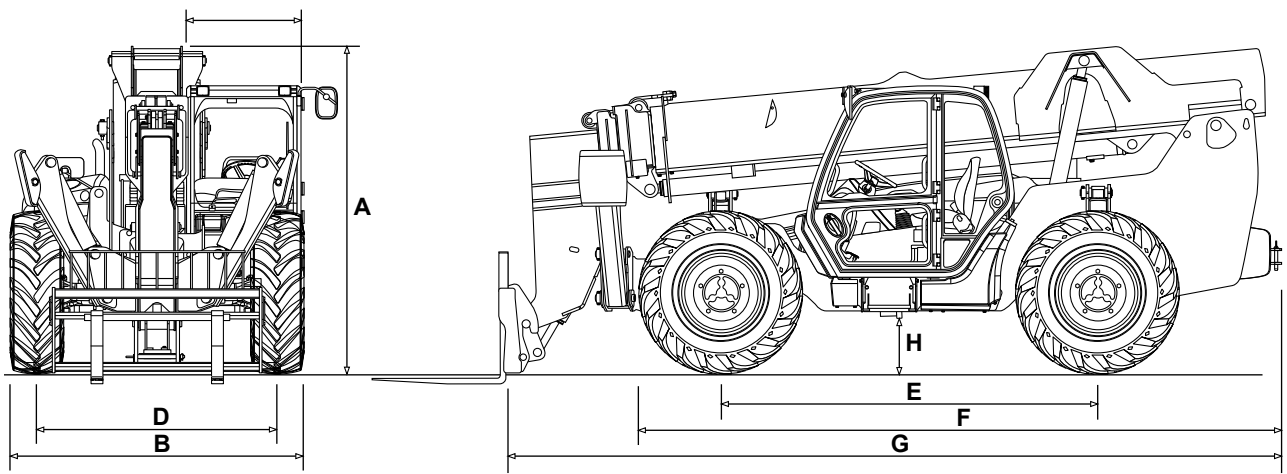


Table 37.

Item	Description	Dimension ⁽¹⁾
A	Overall height	2525mm (8ft 4in)
B	Overall width	2388mm (7ft 10in) ⁽²⁾
C	Inside width of cab	940mm (3ft 1in)
D	Front track	2008mm (6ft 7in)
E	Wheelbase	3150mm (10ft 4in)
F	Overall length to front tires	5385mm (17ft 8in)
G	Overall length to front of carriage	6477mm (21ft 3in)
H	Ground clearance	396mm (1ft 4in)

(1) Dimensions are based on a machine with 14.00-24 16PR tires fitted.
(2) Measured over tires to step.

Weights

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(For: 506-36 [T4F])

Table 38.

Weight (unladen)	
Without tire ballast	8740kg (19268lb)
With tire ballast	9660kg (21297lb)

(For: 507-42 [T4F])

Table 39.

Weight (unladen)	
Without tire ballast	9570kg (21098lb)
With tire ballast	10690kg (23567lb)

(For: 509-42 [T4F])

Table 40.

Weight (unladen)	
Without tire ballast	10010kg (22068lb)
With tire ballast	11130kg (24537lb)

(For: 510-56 [T4F])

Table 41.

Weight (unladen)	
Without tire ballast	13350kg (29432lb)
With tire ballast	14850kg (32739lb)

(For: 512-56 [T4F])

Table 42.

Weight (unladen)	
Without tire ballast	13900kg (30644lb)
With tire ballast	15336kg (33810lb)

(For: 514-56 [T4F])

Table 43.

Weight (unladen)	
Without tire ballast	14665kg (32331lb)
With tire ballast	16041kg (35364lb)

(For: 510-42 [T4F])

Table 44.

Weight (unladen)	
Without tire ballast	10660kg (23501lb)
With tire ballast	11780kg (25970lb)



Performance Dimensions

Boom Dimensions and Performance

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(For: 506-36 [T4F])

The values shown are based on a 610mm (2ft) load center and comply with ANSI/ITSDF B56.6.

Table 45. Lift Performance

Description	Dimension
Maximum lift capacity	2722kg (6001lb)
Lift capacity to full height (on tires)	2722kg (6001lb)
Lift capacity to full height (on stabilizers)	-
Lift capacity at full reach (on tires)	816kg (1799lb)
Lift capacity at full reach (on stabilizers)	-
Maximum lift height	11074mm (36ft 4in)
Reach at maximum lift height	1930mm (6ft 4in)
Maximum forward reach ⁽¹⁾	7315mm (23ft 12in)
Placing height	10363mm (33ft 12in)

(1) Front of tire to 610mm (2ft) load center.

The maximum wading depth of these machines is 400mm (1ft 4in). Water can enter the engine and axles and the cooling fan can be damaged if the machine is operated in deeper water.

(For: 507-42 [T4F])

The values shown are based on a 610mm (2ft) load center and comply with ANSI/ITSDF B56.6.

Table 46. Lift Performance

Description	Dimension
Maximum lift capacity	3176kg (7002lb)
Lift capacity to full height (on tires)	2722kg (6001lb)
Lift capacity to full height (on stabilizers)	-
Lift capacity at full reach (on tires)	725kg (1598lb)
Lift capacity at full reach (on stabilizers)	-
Maximum lift height	12802mm (42ft)
Reach at maximum lift height	149mm (4ft 11in)
Maximum forward reach ⁽¹⁾	8534mm (27ft 12in)
Placing height	11811mm (38ft 9in)

(1) Front of tire to 610mm (2ft) load center.

The maximum wading depth of these machines is 400mm (1ft 4in). Water can enter the engine and axles and the cooling fan can be damaged if the machine is operated in deeper water.

(For: 509-42 [T4F], 510-42 [T4F])

The values shown are based on a 610mm (2ft) load center and comply with ANSI/ITSDF B56.6.

Table 47. Lift Performance

Description	Dimension
Maximum lift capacity	4084kg (9004lb)
Lift capacity to full height (on tires)	2722kg (6001lb)
Lift capacity to full height (on stabilizers)	-
Lift capacity at full reach (on tires)	816kg (1799lb)
Lift capacity at full reach (on stabilizers)	-
Maximum lift height	12802mm (42ft)
Reach at maximum lift height	1499mm (4ft 11in)
Maximum forward reach ⁽¹⁾	8534mm (27ft 12in)
Placing height	11811mm (38ft 9in)

(1) Front of tire to 610mm (2ft) load center.

The maximum wading depth of these machines is 400mm (1ft 4in). Water can enter the engine and axles and the cooling fan can be damaged if the machine is operated in deeper water.



(For: 510-56 [T4F])

The values shown are based on a 610mm (2ft) load center and comply with ANSI/ITSDF B56.6.

Table 48. Lift Performance

Description	Dimension
Maximum lift capacity	4537kg (10002lb)
Lift capacity to full height (on tires)	1361kg (3000lb) ⁽²⁾
Lift capacity to full height (on stabilizers)	1814kg (3999lb)
Lift capacity at full reach (on tires)	136kg (300lb)
Lift capacity at full reach (on stabilizers)	1360kg (2998lb)
Maximum lift height	17069mm (56ft)
Reach at maximum lift height	2489mm (8ft 2in)
Maximum forward reach ⁽¹⁾	12801mm (41ft 12in)
Placing height	15697mm (51ft 6in)

(1) Front of tire to 610mm (2ft) load center.

(2) Lift capacity at 52 feet, not full height.

The maximum wading depth of these machines is 400mm (1ft 4in). Water can enter the engine and axles and the cooling fan can be damaged if the machine is operated in deeper water.



(For: 512-56 [T4F])

The values shown are based on a 610mm (2ft) load center and comply with ANSI/ITSDF B56.6.

Table 49. Lift Performance

Description	Dimension
Maximum lift capacity	5444kg (12002lb)
Lift capacity to full height (on tires)	1814kg (3999lb)
Lift capacity to full height (on stabilizers)	2268kg (5000lb)
Lift capacity at full reach (on tires)	0kg (0lb)
Lift capacity at full reach (on stabilizers)	1588kg (3501lb)
Maximum lift height	17069mm (56ft)
Reach at maximum lift height	2489mm (8ft 2in)
Maximum forward reach ⁽¹⁾	12801mm (41ft 12in)
Placing height	15697mm (51ft 6in)

(1) Front of tire to 610mm (2ft) load center.

The maximum wading depth of these machines is 400mm (1ft 4in). Water can enter the engine and axles and the cooling fan can be damaged if the machine is operated in deeper water.



(For: 514-56 [T4F])

The values shown are based on a 610mm (2ft) load center and comply with ANSI/ITSDF B56.6.

Table 50. Lift Performance

Description	Dimension
Maximum lift capacity	6350kg (13999lb)
Lift capacity to full height (on tires)	1814kg (3999lb)
Lift capacity to full height (on stabilizers)	2268kg (5000lb)
Lift capacity at full reach (on tires)	0kg (0lb)
Lift capacity at full reach (on stabilizers)	1588kg (3501lb)
Maximum lift height	17069mm (56ft)
Reach at maximum lift height	2489mm (8ft 2in)
Maximum forward reach ⁽¹⁾	12801mm (41ft 12in)
Placing height	15697mm (51ft 6in)

(1) Front of tire to 610mm (2ft) load center.

The maximum wading depth of these machines is 400mm (1ft 4in). Water can enter the engine and axles and the cooling fan can be damaged if the machine is operated in deeper water.

Fluids, Lubricants and Capacities

General

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.

No warranty liability will be accepted for engine failures where unacceptable fuel grades (or their equivalent) have been used at any stage.

Every JCB Tier 4 Final machine fitted with a SCR (Selective Catalytic Reduction) system should be fitted only with the correct CJ grade oil available from all JCB dealers. Failure to do this can result in permanent damage to the SCR catalyst in such a way that it cannot be recovered.

Table 51.

Item	Capacity	Fluid/Lubricant	JCB Part Number	Container Size ⁽¹⁾	Specification
Diesel Fuel Tank	132L (34.9 US gal)	Diesel Oil (Winter Additive)	4005/1200		See Technical Data, Fluids, Lubricants and Capacities, Fuel.
DEF (Diesel Exhaust Fluid) Tank (minimum to maximum)	9L (2.4US gal)	DEF			See Technical Data, Fluids, Lubricants and Capacities, Diesel Exhaust Fluid.
Engine (Oil) ⁽²⁾	Min 12.5L (3.3US gal) - Max 15L (3.9US gal)	JCB EP 5W40-30°C (-22.0°F) to 50°C (121.9°F) (DEF and non-DEF machines in USA)	4001/3405U	5 US Gallons	API CJ-4
Engine (Coolant) ⁽³⁾	20L (5.3US gal)	JCB Antifreeze HP/Coolant + Water	4006/1110U	5 US Gallons	ASTM D6210
Gearbox	19L (5US gal)	JCB Transmission Fluid EP 10W, -32°C (-26°F) to 40°C (104°F) ⁽⁴⁾	4000/2505U	5 US Gallons	
Gearbox (arctic kit)	19L (5US gal)	JCB HP Universal ATF, -48°C (-54°F) to 40°C (104°F) ⁽⁴⁾	4000/2305U	5 US Gallons	
Front axle housing	18L (4.8US gal)	JCB Gear oil HP plus	4000/2205U ⁽⁵⁾	5 US Gallons	
Front Hubs	2L (0.5US gal)	JCB Gear oil HP plus	4000/2205U ⁽⁵⁾	5 US Gallons	
Rear axle housing	13L (3.4US gal)	JCB Gear oil HP plus	4000/2205U ⁽⁵⁾	5 US Gallons	
Rear Hubs	2L (0.5US gal)	JCB Gear oil HP plus	4000/2205U ⁽⁵⁾	5 US Gallons	
Brake System		JCB Hydraulic fluid HP 15 ⁽⁶⁾	4002/0503U	1 US Gallons	
Hydraulic tank ⁽⁷⁾	128L (33.8US gal)	JCB Optimum Performance Hydraulic Fluid 46	4002/2005U	5 US Gallons	
Hydraulic tank (arctic kit) ⁽⁷⁾	128L (33.8US gal)	JCB Ultra Performance Multi-grade Hydraulic Fluid 32 -42°C (-44°F) to 40°C (104°F)	4002/2905U	5 US Gallons	
Grease points		JCB Special HP Grease (Blue) ⁽⁸⁾	4003/2017	0.4kg x 24	

Item	Capacity	Fluid/Lubricant	JCB Part Number	Container Size ⁽¹⁾	Specification
Wear pad run-ways		JCB Waxoyl	4004/0502	1 US Gal- lons	
Boom hoses		JCB Special HP Grease (Blue)	4003/2017	0.4kg x 24	
Boom Chains		JCB Chain Lubricant	4004/0237A	0.8 US Gal- lons	

(1) For information about the different container sizes that are available (and their part numbers), contact your JCB dealer.

(2) Do not use ordinary engine oil.

(3) It is recommended that the cooling system be filled at a maximum rate of 6L (1.6gal) per minute. If the fill rate is any higher than this then there is a possibility of air becoming trapped in the system.

(4) Friction modified oils must not be used (eg Dexron ATF type).

(5) Must be suitable for use with oil immersed brakes and limited slip differentials (LSD).

(6) Do not use ordinary brake fluid.

(7) This is nominal tank capacity. The total hydraulic system capacity depends on the equipment being used. Fill with all cylinders closed. Watch level sight glass when filling.

(8) JCB Special HP Grease is the recommended specification grease. If JCB Special MPL-EP Grease is used, all 50h greasing operations must be carried out at 10h intervals; all 500h greasing operations must be carried out at 50h intervals.

Fuel

Acceptable and Unacceptable Fuels

▲ WARNING Do not use gas in this machine. Do not mix gas with the diesel fuel. In storage tanks the gas will form flammable vapors.

Notice: 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.

Notice: Sulfur can be detrimental to the emissions performance of your engine and it is in your interest to ensure Ultra Low Sulfur Diesel (ULSD) is used. Failure to adhere to local emissions regulations will result in no support and no warranty liability being accepted on any engine.

Fuel Groups

The major world fuels standards are divided into four categories. Those that are fully accepted as suitable fuels, those that are acceptable from a "warranty" point of view, but may have undesirable affects on the expected life of the engine performance, those that will reduce the expected life, and lastly those that are viewed as unacceptable for use (fuels shown on the same line as each other are considered equivalents).

The lists below are not exhaustive of all diesel fuel standards encountered in the marketplace. If comment is required on the suitability of fuel standards not on the list, requests with, if possible, specification details showing at least the key characteristics described above should be forwarded to JCB Service for assessment and comment.

Table 52. Group 1

Fuel	Advice	Service Requirements
EN590 Diesel fuel types - Auto/C0/C1/C2/C3/C4 Sulfur < 10ppm.	Preferred and may be used with no restrictions or conditions.	For fuel with unspecified parameters, EN590 values apply. Fuel grades within each standard must be appropriate to the ambient temperature. The appropriate level of fuel cleanliness at the FIE inlet after filtration has to be ensured by the customer.
BS2869 Class A2 Sulfur < 10ppm		
ASTM D975-076 2-D, US DF1, US DF2, US DFA Sulfur < 15ppm		
JIS K2204 Grades 1, 2, 3 and Special Grade 3 Sulfur < 10ppm		

Table 53. Group 2

Fuel	Advice	Service Requirements
Group1 fuels with HFFR WSD in the range 460 (18,110) to 520 (20,472½)	Not preferred and may be used but may lead to reduced FIE life and / or loss of performance.	
ASTM D975-91 Class 1-1DA		

(1) See your JCB dealer for advice on service requirements.

Table 54. Group 3

Fuel	Advice
AVTUR FS11 (NATO F34, JP8, MIL T83133, DEF STAN 91-87, DERD 2463)	Not preferred and may be used only with appropriate additives and will lead to reduced FIE life and / or loss of performance.
AVCAT FS11 (NATO F44, JP5, MIL T5624, DERD 2452, AVTOR))	
JET A1 (NATO F35, DEF STAN 91-91, DERD 2494)	
AVCAT (NATO F43, JP5 without additives)	
JET A (ASTM D1655)	
ASTM D3699 Kerosene	
JP7 (MIL T38219 XF63)	
NATO F63	

Table 55. Group 4

Fuel	Advice
Unmodified Vegetable Oils and Biodiesels over 20% concentration	Unacceptable

Additives

The additives listed below are advertized as being suitable for bringing the lubricity levels of kerosene/low sulfur fuels up to those of diesel fuels.

These products are given as examples only. The information is derived from the manufacturer's data. The products are not recommended or endorsed by JCB. Contact your JCB dealer for further advice.

- Elf 2S 1750. Dosage 1000-1500 ppm (0.1% to 0.15%), specifically for Indian Superior Kerosene (SKO) but may be applicable to other fuels.
- Lubrizol 539N. Dosage (on Swedish low sulfur fuel) 250 ppm.
- Paradyne 7505 (from Infineum). Dosage 500 ppm (0.05%).

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.

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.

Usage and Effects of Fuels

The information that follows indicates types of fuel that are acceptable or unacceptable.

Acceptable Fuels

Ultra Low Sulfur Diesel (EN590)

Available throughout the UK, Europe and North America since March 1999. This fuel has a maximum sulfur content of 0.001% (0.0015% in North America) by weight and a further reduction in the natural lubricity and aromatic content than experienced with low sulfur diesel. Major oil producers will add lubrication improvers and also maintain the total aromatic content to an acceptable level.

Unacceptable Fuels

B20 Biodiesel

Biodiesel refers to pure fuel before it is blended with diesel fuel. When biodiesel is blended with diesel fuel it is referred to as B5, B20 etc., where the number indicates the percentage of biodiesel in the fuel, for example B5 contains 5% biodiesel.

Biodiesel has different characteristics than mineral based fuels, this could lead to seals swelling, fuel system corrosion and seal damage.

Using B20 biodiesel can result in poisoning of the SCR (Selective Catalytic Reduction) system.

The natural properties of biodiesel make it a good medium for micro bacterial growth, these microbes can cause fuel system corrosion and early fuel filter blocking.

B100 - Chemically Modified Vegetable Oils (FAME/ VOME)

These fuels have been derived from a wide range of vegetable oils and animal fats, resulting in better stability, viscosity and cetane number than those produced from unmodified vegetable oils, but it is recognized that there are potential problems associated with the finished fuel characteristics. These oils are less stable than mineral oil derived fuels when stored and they will readily degrade producing fatty acids, methanol and water, none of which are desirable in the FIE. These effects are known to be accelerated when the fuel is stored in the presence of air and water together.

An extract 'common statement' from the FIE manufactures specifies that "The fuel injection equipment manufacturers can accept no liability whatsoever for failure attributable to operating their products with fuels for which the products were not designed, and no warranties or representations are made as to the possible effects of running these products with such fuels".

Unmodified Vegetable Oils

Burned in diesel engines neat or used as an extender to mineral derived fuel. When these are subjected to heat in the fuel injection system they form sticky deposits that can be found inside the fuel pump and a hard lacquer in the injectors where exposure to even higher temperatures takes place.

Sulfur content

▲ Notice: A combination of water and sulfur will have a corrosive chemical effect on fuel injection equipment. Use of high Sulfur fuels will poison the Selective Catalytic Reduction (SCR) catalyst (if fitted) and must not be used. Ultra Low Sulfur Diesel (ULSD) should always be used. Ultra Low Sulfur Diesel (ULSD) has a Sulfur content of less than 10 ppm (US 15ppm).

Effects of Fuel Contaminates

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.

Chemical Contamination

It should be noted that exposure of fuel to surfaces containing Copper (Cu), Zinc (Zn) or Lead (Pb) can adversely affect fuel quality and should be minimized.

JCB Power Systems - Use of HVO Fuels

Following market requests from JCB power systems customers to approve the use of HVO (hydro-treated vegetable oil) fuel as a diesel fuel alternative in JCB engines. JCB power systems have carried out extensive testing to make sure that this has no detrimental effect on the performance and reliability of the JCB engine.

JCB power systems confirm that HVO has been tested and approved for use with JCB 444 and 448, stage IIIB and stage IV engines. The testing has been conducted by JCB power systems and this approval does not constitute any recertification of any engine model by any third party notified body.

The JCB 444/448 engines can be operated on HVO or 'synthetic' fuels as long as these fuels meet EN15940 and any other local emissions legislation. Customers should note that engine performance may be lower than regular diesel due to the characteristics of HVO fuel. Customers make sure that any additional maintenance requirements, including but not limited to servicing periods, are identified to users.

Diesel Exhaust Fluid (DEF)

(For: 509-42 [T4F], 510-42 [T4F], 510-56 [T4F], 512-56 [T4F], 514-56 [T4F])

▲ Notice: No warranty liability whatsoever will be accepted for failure of the emissions control system where the failure is attributed to the quality and grade of the diesel exhaust fluid (DEF) used.

Notice: No warranty liability whatsoever will be accepted for failure of the emissions control system where the failure is attributed to contamination of the diesel exhaust fluid (DEF).

This engine has exhaust gas treatment using selective catalytic reduction technology. In SCR (Selective Catalytic Reduction) technology, a liquid called diesel exhaust fluid is injected into the exhaust gasses. DEF (Diesel Exhaust Fluid) is used within SCR systems on diesel engines to reduce harmful exhaust gas emissions known as NOx (Nitrogen Oxide). When the DEF is injected into the exhaust stream it turns into ammonia and water, this ammonia enters the catalyst and reacts with the NOx molecules to form nitrogen and water. Naturally occurring and harmless, they are then released into the atmosphere.

The DEF consumption depends on the duty cycle of the engine.

DEF is a highly purified, colorless liquid containing demineralized water 67.5% and Urea 32.5%. DEF is specified under ISO 22241 and is marketed under various names such as AdBlue®, ARLA 32 or AUS 32.

Make sure that genuine DEF is used. Do not dilute DEF or mix it with other substances, it may damage the catalyst.

The DEF tanks and pipes are heated if there is any danger of freezing, the freezing point of DEF at 32.5% is -11°C (12°F). The DEF storage tank on the machine will be heated from the engine cooling system automatically.

If a problem is detected within the DEF system for any problem including contamination, engine power will be reduced.

Storage

Always use polyethylene, polypropylene, stainless steel or plastic containers for storing DEF, as DEF can be corrosive to most metals (eg steel, copper, and aluminum). This applies to any funnels, jugs, pipes, pumps and other handling equipment

Avoid decanting wherever possible to prevent contamination from dirt or trace amounts of metals that can occur when metal containers are used. Even the use of apparently clean items such as jugs or funnels may introduce damaging contaminants if they have ever been used for other purposes.

Always ensure any caps on DEF storage containers are screwed tight to prevent evaporation and crystallization.

DEF can be stored for up to 12 months in a sealed container, and must be kept between -6°C (21°F) and 25°C (77°F) in a shaded area out of direct sunlight and ultraviolet radiation.

Spillages

A small DEF spill can be diluted with water. It is best to mop up the spillage and avoid flushing it down a drain or waterway

In case of a large spill, try to prevent the spillage from entering drains or waterways. Contain the spill with sand, earth or your spill kit and dispose of it properly

The surface on which you spill DEF may become slippery. Make sure that you clean up the spill as quickly as possible to prevent slips and falls.

If a spill occurs on the machine, wash away with water as white crystals will form and these will eventually become corrosive to paintwork and, in turn, metal work

DEF should never be spilled onto electrical connectors as it will destroy terminals quickly. It can also travel easily by capillary action between the insulation and copper wires in harnesses.

Preventing Contamination of the DEF tank

In order to prevent damage to the SCR system, DEF used must be compliant to the ISO 22241-1 standard. ISO 22241-1 DEF is available from all JCB dealers

Every machine equipped with a JCB SCR system is fitted with a quality sensor in the DEF tank to help prevent problems caused by cross contamination with other fluids

DEF needs to be kept free from dirt and other particle contaminants at all times to prevent damage to the SCR system. There is a mesh strainer fitted in the JCB DEF filler.

DEF needs to be kept free from liquid contaminants such as diesel, oil, antifreeze, screenwash and other fluids at all times. Even one drop of diesel or oil can pollute 20L (4UKgal) of DEF.

If diesel is poured into the DEF tank this can damage the after treatment system, do not start the engine, please contact your local JCB dealer immediately so they can correctly flush the system to avoid an expensive repair.

A range of special tools and fluid analysis services are available at your local JCB dealer to check DEF quality via simple hydrocarbon test paper strips, or a more comprehensive laboratory service. Digital and optical concentration measuring devices are also available.

If any cross contamination is detected JCB will not be liable for any further diagnosis or repairs to the SCR system.

Preventing Cross Contamination of Diesel Fuel and DEF

The opening for your DEF tank is narrower than the opening for a diesel tank, so you should not be able to put diesel in the wrong tank (as the nozzle does not fit)

The DEF cap on every JCB machine is blue and clearly marked with AdBlue®, DEF and the ISO (International Organization for Standardization) symbol in white lettering. There are warning decals next to the DEF filling point

The diesel cap is also clearly marked with lettering.

Every JCB DEF cap is lockable with a special key with a blue key fob, which can be given to a site supervisor or other person of responsibility.

There is a special magnet fitted in the DEF filler neck which will allow some DEF electric dispensing pumps to start if it has the matching ISO feature, as all forecourt dispensing systems have, thus preventing DEF being dispensed if nozzle is not in the DEF tank.

If contamination occurs do not start the engine. Please contact your local JCB dealer immediately so they can correctly flush the system to avoid an expensive repair.

Coolant

▲ CAUTION Antifreeze can be harmful. Obey the manufacturer's instructions when handling full strength or diluted antifreeze.

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.

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.

Table 56.

Concentration	Level of protection
50% (Standard)	Protects against damage down to -40°C (-40°F)
60% (Extreme Conditions Only)	Protects against damage down to -56°C (-69°F)

Do not exceed a 60% concentration, as the freezing protection provided reduces beyond this point.

If you use any other brand of antifreeze:

- Make sure that the antifreeze complies with International Specification ASTM D6210.
- Always read and understand the manufacturer's instructions.
- Make sure that a corrosion inhibitor is included. Serious damage to the cooling system can occur if corrosion inhibitors are not used.
- Make sure that the antifreeze is ethylene glycol based and does not use Organic Acid Technology (OAT).
- Care should be taken to not mix coolant types. Mixing coolant will have a detrimental effect on the performance of the coolant.

Torque Values

General

ROPS/FOPS

Table 57.

Mounting bolts torque	205Nm (151lbf ft)
-----------------------	-------------------

Wheels

Table 58.

Front Wheel Nut Torque	Rear Wheel Nut Torque
680Nm (502lbf ft)	680Nm (502lbf ft)

Step/Battery Compartment Cover

Table 59.

Mounting bolt torque	25Nm (18lbf ft)
----------------------	-----------------

Engine

Table 60.

Sump Drain Plug	Filter Housing Drain Plug
40-60Nm (29- 44lbf ft)	40-60Nm (29- 44lbf ft)

Axles

Table 61.

Fill/level plug torque	79Nm (58lbf ft)
------------------------	-----------------

Electrical System

General

Table 62.

Item	Specification
Battery voltage/system voltage	12V

Fuses

For: 507-42 [T4F], 509-42 [T4F], 510-42 [T4F], 510-56 [T4F], 512-56 [T4F], 514-56 [T4F] Page 243

For: 506-36 [T4F] Page 247

(For: 507-42 [T4F], 509-42 [T4F], 510-42 [T4F], 510-56 [T4F], 512-56 [T4F], 514-56 [T4F])

Primary Fuses

Figure 201.

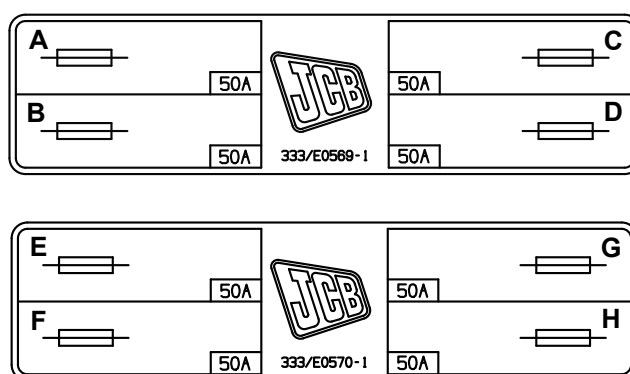


Table 63.

Fuse	Circuit(s) Protected	Rating
A	Starting circuit	50A
B	Engine/DEF (Diesel Exhaust Fluid) ECU (Electronic Control Unit), Heater blower, Directional Indicators	50A
C	Wipers, A/C Fluid Levels	50A
D	Fluid Levels, Work Lights, Beacon, Radio, Interior Light	50A
E	Reverse Lights/Alarm, DEF System, DEF Heated Lines	50A
F	Road Lights, Worklights, Horn	50A
G	Machine ECU, Hazards/DIR, RH Instruments	50A
H	Engine	50A

Secondary Fuses

Figure 202.

A		B	
1	5A	11	
2	30A	12	20A
3	AUX 5A	13	15A
4	10A	14	20A A/C
5	5A	15	15A
6	3A	16	5A
7	30A	17	25A
8	10A	18	7.5A
9		19	10A
10	3A	20	10A
C		D	
21	10A	31	20A
22	5A	32	3A
23	3A	33	10A NOx
24	10A	34	3A
25	5A	35	15A
26	5A	36	10A
27	25A	37	5A
28	10A	38	3A
29	20A	39	3A
30	25A	40	5A
E			
41	15A		
42	20A		
43	7.5A		
44	5A		
45	3A		
46	5A		
47	20A		
48	20A		
49	20A		
50			

400/6603
334/6627

Table 64.

Fuse	Circuit(s) Protected	Rating
1A	Ignition	5A
2	Crank	30A
3	Auxiliary Connector	5A
4	Hydraulic Isolation	10A
5	Ignition After Treatment	5A
6	Engine ECU	3A
7	Heater Blower	30A
8	Brake Lights	30A
9	SPARE	-
10	Directional Indicators	3A
11B	SPARE	-
12	Rear wiper	20A
13	Front wiper	15A
14	Air Conditioning	20A
15	12V Power Connection Auxiliary	15A
16	Daily Checks	5A
17	Front Work lights	25A
18	Beacon	7.5A
19	Interior Light	10A
20	Right Side Worklight	10A
21C	Reverse Alarm	10A
22	Daily Checks	5A
23	Washer Fluid Level	3A
24	Radio	10A
25	Ignition	5A
26	Live Link	5A
27	Rear Work Lights	25A
28	Head Lights	10A
29	Head Lights	20A
30	Horn and Main Beam	25A
31D	Machine ECU	20A
32	Power Meter Engine Hours	3A
33	NOx Sensor	10A
34	Hazard Lights	3A
35	Instruments RHC V Bat	15A
36	Lift Arm Worklight	10A
37	Live Link	5A
38	Ignition	3A
39	Ignition Line	3A
40	ECU Ignition	5A
41E	Head Lights	15A
42	Head Lights Main Beam	20A
43	Side Lights	7.5A
44	Side Lights	5A
45	Fog lights	3A
46	Live Link	5A
47	Seat Heater and Face Fan	20A

Fuse	Circuit(s) Protected	Rating
48	DEF ECU	20A
49	DEF Heated Hoses	20A
50	SPARE	-

Engine Fuses

Figure 203.

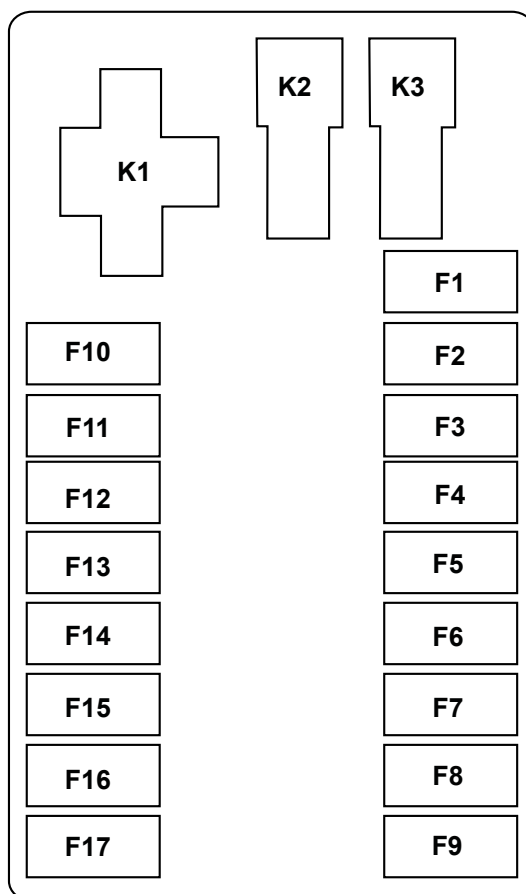


Table 65.

Fuse	Circuit(s)	Rating
F1	Power hold relay	3A
F2	Fuel pump	10A
F3	Starter Solenoid	3A
F4	Fuel Pump ECU- 40	3A
F5	Spare	10A
F6	Spare	10A
F7	Spare	10A
F8	ECU- 49	10A
F9	ECU- 53	10A
F10	HC-doser /spare	5A
F11	Machine Isolation	5A
F12	WF sensor	3A
F13	Empty/spare	5A
F14	Engine power supply	10A



Fuse	Circuit(s)	Rating
F15	Engine power supply	10A
F16	ECU- 60	10A
F17	ECU- 57	10A

(For: 506-36 [T4F])

Primary Fuses

Figure 204.

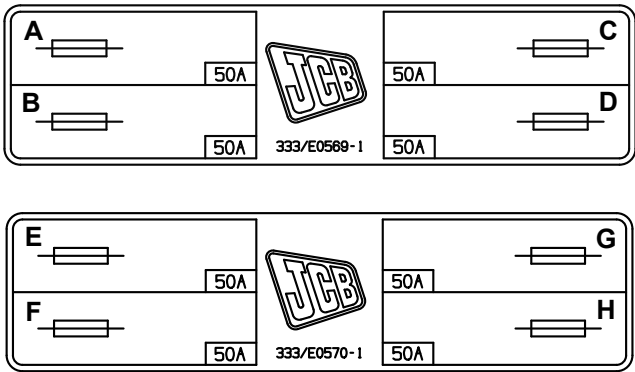


Table 66.

Fuse	Circuit(s) Protected	Rating
A	Horn, Sidelights, Hazard warning lights, Beacon, Interior light	50A
B	Road lights, Working lights, Boom light	80A
C	Sway, Auxiliary, Heater	60A
D	SRS (Smooth Ride System), Starting circuit, Transmission, Brake lights	70A
E	LLMI (Longitudinal Load Moment Indicator), Heater, Wipers, Radio, Instruments	60A
F	Seat, Electric mirrors, Heated glass	60A
G	Engine	30A
H	Hydraulic control ECU	10A

Figure 205.

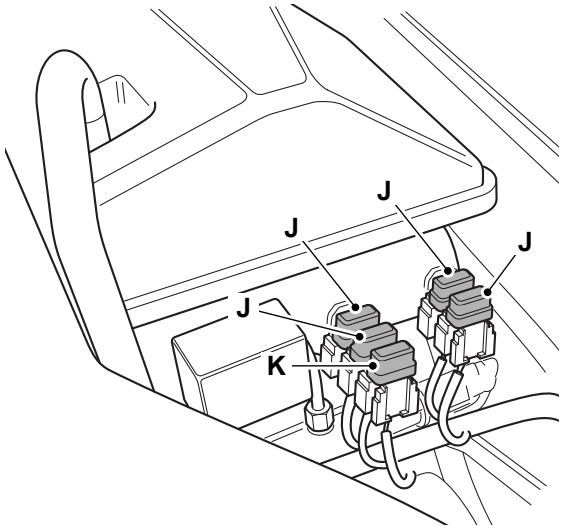


Table 67.

Fuse	Circuit(s) Protected	Rating
J	Engine ECU power-up	20A
K	Fuel pump	5A

Secondary Fuses

Figure 206.





































A		B	
1	 10A	1	 20A
2	 10A	2	 15A
3	 10A	3	 3A
4	 10A	4	 15A
5	 30A	5	 20A
6	 10A	6	 7.5A
7	 3A	7	 5A
8	 7.5A	8	 15A
9	 10A	9	SPARE 10A
10	 R 10A	10	SPARE 5A
11	 3A	11	 30A
12	 10A	12	SPARE 5A
13	 5A	13	 10A
14	 20A	14	 20A
15	 10A	15	 25A
16	 10A	16	 15A
17	 25A	17	 10A
18	 7.5A	18	 20A
19	 10A	19	 10A
20	 20A	20	SPARE 5A

Table 68.

Fuse	Circuit(s) Protected	Rating
A1	Sway hydraulics	10A
A2	Transmission Speed Sensor	10A
A3	RAS (Rear Axle Stabilization) (if installed)	10A
A4	Stabilizer transducer supply (if installed)	10A
A5	Cab heater	30A

Fuse	Circuit(s) Protected	Rating
A6	Turn signals	10A
A7	Spare	3A
A8	Instruments	7.5A
A9	Hydraulic Isolation	10A
A10	Reversing alarm/lights	10A
A11	Rear/roof wiper	30A
A12	Front wiper	15A
A13	Fog light	3A
A14	Dipped beam	15A
A15	High beam	20A
A16	Left hand sidelights	7.5A
A17	Right hand sidelights	5A
A18	Cell phone/cigarette lighter	15A
A19	Spare	10A
A20	Spare	5A
B1	Starter relay	3A
B2	ESOS (Engine Shut-Off Solenoid)	10A
B3	Transmission	5A
B4	Transmission dump	20A
B5	Brake lights	10A
B6	Parking lights	10A
B7	Headlight flasher, horn	25A
B8	Beacon	7.5A
B9	Interior light, radio	10A
B10	Four-way flashers	20A
B11	Neutral start	30A
B12	Spare	10A
B13	RAS	25A
B14	Roadlights	20A
B15	Front worklamps	25A
B16	Rear worklamps	15A
B17	Stabilizer isolation (if installed)	10A
B18	Heated seat, Face fan	20A
B19	Radio	10A
B20	Spare	5A

Engine Fuses

Figure 207.

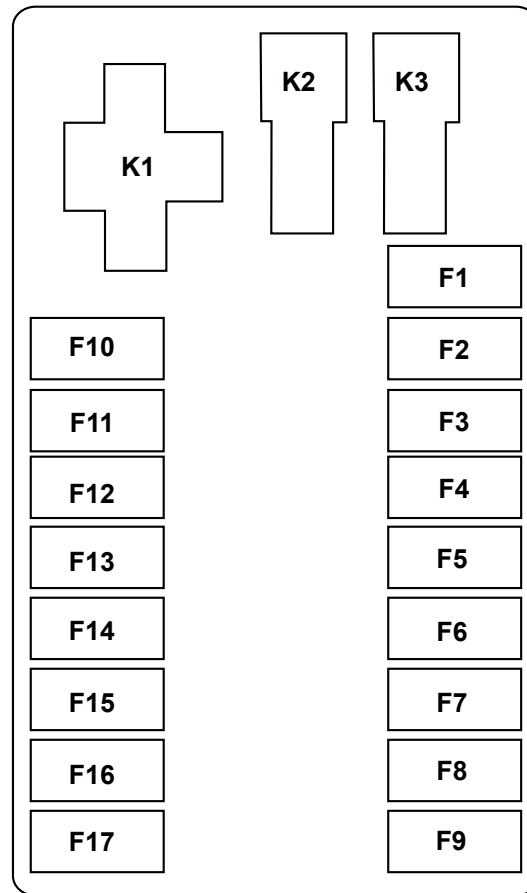


Table 69.

Fuse	Circuit(s)
F1	Power hold relay
F2	Fuel pump
F3	Starter Solenoid
F4	Fuel Pump ECU- 40
F5	Spare
F6	Spare
F7	Spare
F8	ECU- 49
F9	ECU- 53
F10	HC-doser /spare
F11	Lambda sensor/spare
F12	WF sensor
F13	Empty/spare
F14	Engine power supply
F15	Engine power supply
F16	ECU- 60
F17	ECU- 57

Relays

For: 507-42 [T4F], 509-42 [T4F], 510-42 [T4F], 510-56 [T4F], 512-56 [T4F], 514-56 [T4F] Page 251
For: 506-36 [T4F] Page 254

(For: 507-42 [T4F], 509-42 [T4F], 510-42 [T4F], 510-56 [T4F], 512-56 [T4F], 514-56 [T4F])

Figure 208.

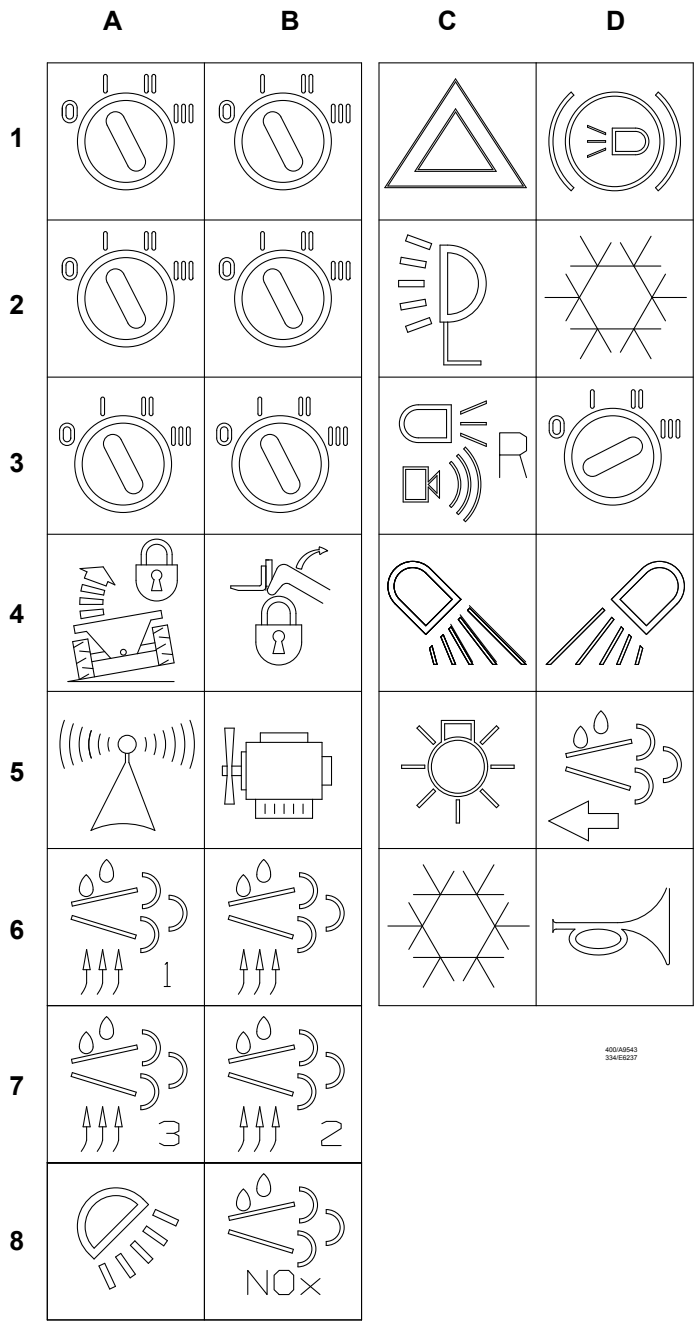


Table 70.

Relay	Circuit(s)
A1	Ignition
A2	Ignition
A3	Ignition

Relay	Circuit(s)
A4	Sway / Stabilizer Isolation
A5	Live Link
A6	DEF (Diesel Exhaust Fluid) Heated Line 1
A7	DEF Heated Line 3
A8	Right Worklight
B1	Ignition
B2	Ignition
B3	Ignition
B4	Lift Arm Raise
B5	Engine
B6	DEF Heated Line All
B7	DEF Heated Line 2
B8	NOx (Nitrogen Oxide) Sensor
C1	Hazard Lights
C2	Lift Arm Worklight
C3	Reverse Alarm
C4	Rear Work Lights
C5	Head Lights
C6	Air Conditioning
D1	Brake Lights
D2	Air Conditioning
D3	Crank
D4	Front Work Lights
D5	Machine Isolation
D6	Horn Relay



Engine Relays

Figure 209.

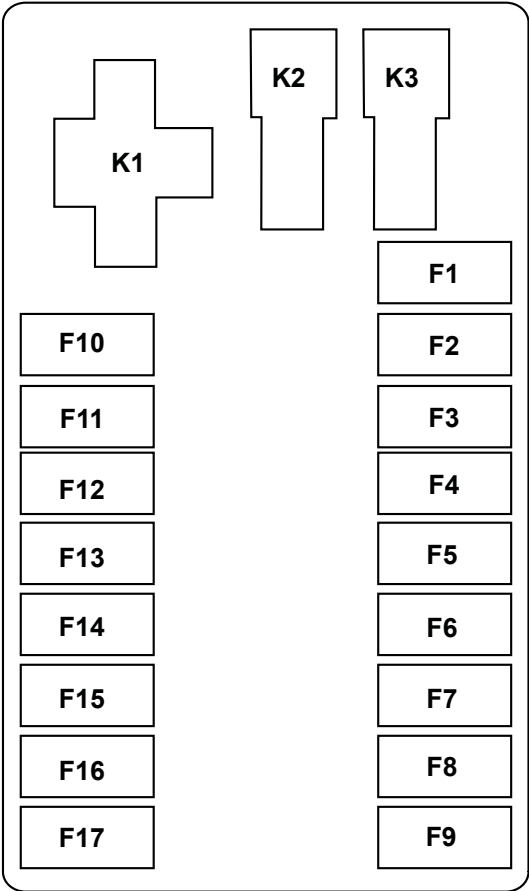


Table 71.

Relay	Circuit(s)
K1	Power hold relay
K2	Starter inhibit
K3	Fuel pump

(For: 506-36 [T4F])

Figure 210.

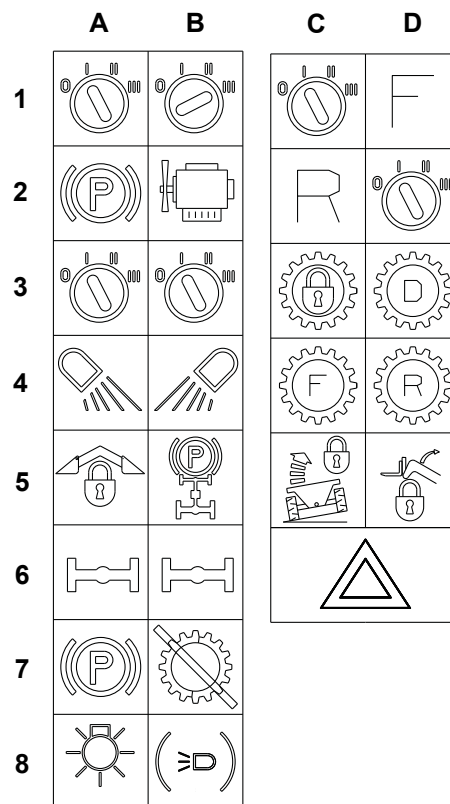


Table 72.

Relay	Circuit(s)
A1	Neutral start
A2	Parkbrake lamp
A3	Ignition 3
A4	Rear worklight
A5	Stabilizer isolation
A6	RAS (Rear Axle Stabilization) solenoid return isolation control (if installed)
A7	Parkbrake lamp
A8	Roadlights
B1	Neutral start
B2	Engine running
B3	Ignition 4
B4	Front worklight
B5	2WD Brake
B6	RAS solenoid return isolation control (if installed)
B7	Transmission dump
B8	Brake lights
C1	Ignition 1
C2	Reverse
C3	Drive
C4	Forward high/low
C5	Sway isolation (if Installed)
D1	Forward

Relay	Circuit(s)
D2	Ignition 2
D3	Driveshaft
D4	Reverse high/low
D5	Lift isolation (if Installed)
C/D6	Flasher unit

Engine Relays

Figure 211.

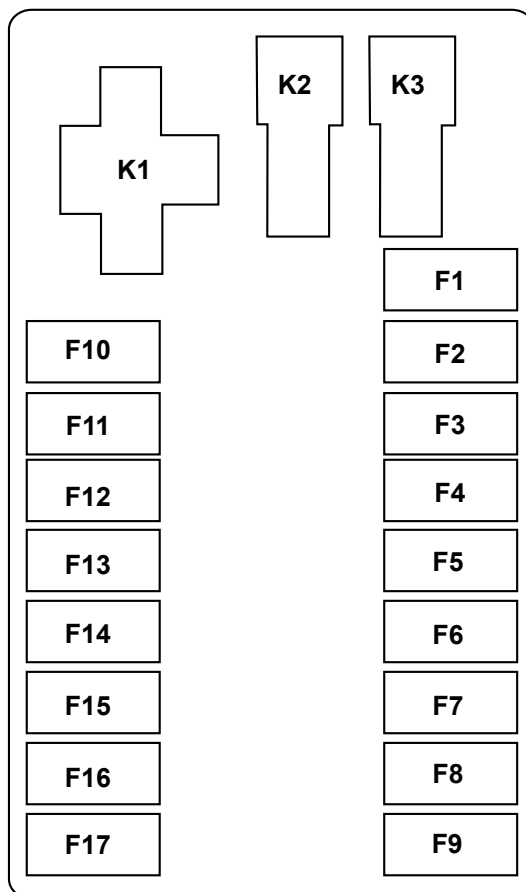


Table 73.

Relay	Circuit(s)
K1	Power hold relay
K2	Starter inhibit
K3	Fuel pump

Batteries

California Proposition 65

▲ WARNING Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Engine

Engine Emissions

California Proposition 65

▲ WARNING Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

Exhaust After Treatment (EAT)

(For: 509-42 [T4F], 510-42 [T4F], 510-56 [T4F], 512-56 [T4F], 514-56 [T4F])

Introduction

Your engine is equipped with an SCR (Selective Catalytic Reduction) after-treatment system. This is a fully automated system in which DEF (Diesel Exhaust Fluid) is fed into the exhaust to remove nitrogen oxides. It has a sophisticated system of self-monitoring and fault detection to ensure it is both reliable and compliant to applicable emissions legislation.

In order that the machine can be compliant across all duty cycles the performance of the SCR must be maintained. If a machine is used for a prolonged period (100s of hours) in light duties the SCR can become less efficient. Therefore the engine is equipped with a mode which runs the after-treatment system at typical operating temperatures whilst the machine is being lightly used. In this way the SCR is refreshed while the machine is running normally. This is automatic and seamless to the operator and the machine can continue to be operated normally while this is happening.

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

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

The system has been designed such that the majority of customers should not have to invoke a stationary refresh, however the mode exists to ensure all products remain compliant. Typically the earliest a refresh would be required is around 700-1000 hours.

Stationary Refresh

- The engine is equipped with a setting that will automatically run the exhaust system hot enough while the machine is stationary. The operator will need to park the machine in a safe position and acknowledge that the machine can run a stationary refresh by initiating the procedure. Refer to the machine operator manual stationary refresh initiation procedure. [Refer to: Instrument Panel \(Page 55\)](#).

DEF Levels

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

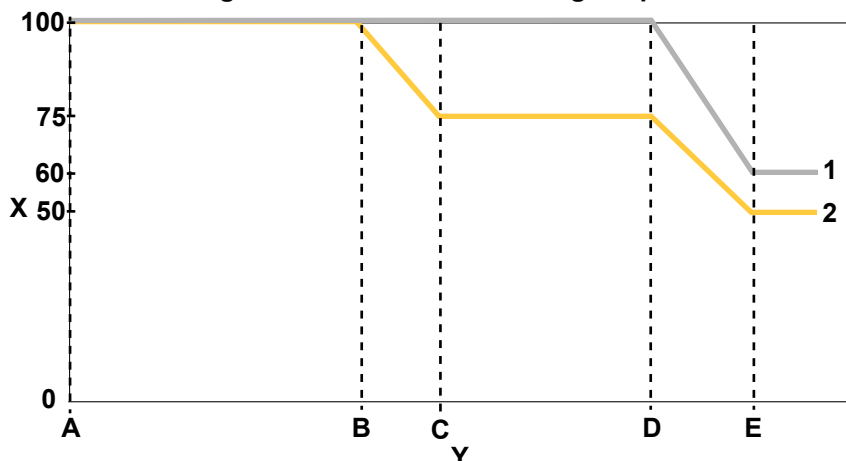
The engine will not shut down if you run out of DEF, however it will:

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

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

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

Figure 212. DEF Level Warning Graph



A 15% DEF level warning - Fill up this shift

C Machine derated to 75% torque - Fill up now

E Engine derated and will remain at derated levels until filled up- Fill up now

2 Engine torque

Y Time

B 5% DEF level - Machine starts to derate.

Torque derates to 75% over 25min fill up now.

D 0% DEF level - Engine torque derates to 50% and engine speed to 60% over 30min- Fill up now

1 Engine speed

X Percentage

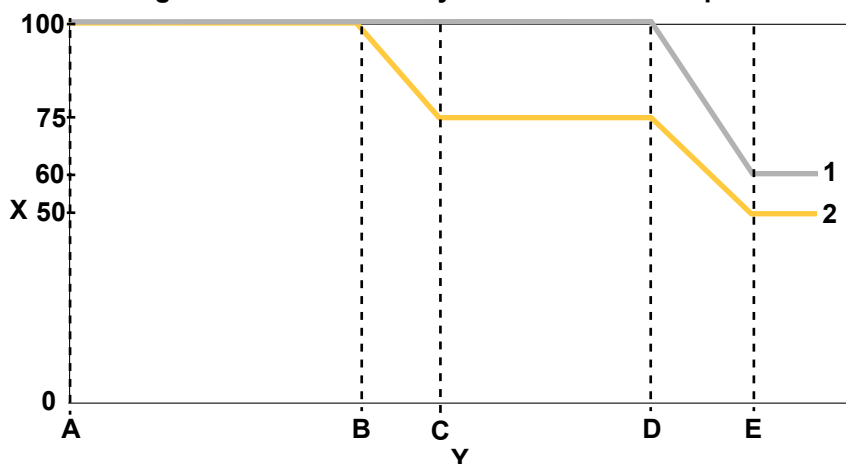
Emissions System- First Fault

The presence of emissions system related faults will result in (initially) warnings given and engine power reduction. If the warnings continue to be ignored, it will lead to the engine being only able to idle, and then only at reduced idle power.

If the engine is shut down by the operator during these steps, unless the fault is repaired, the duration of the step will resume from the point at which it was left.

If the fault is still detected again when the engine is restarted, the engine will continue at reduced power and torque.

Figure 213. Emissions System First Fault Graph



A Fault detected

C Engine torque derated to 75%

B If fault is not rectified engine torque derates after 10h. Torque derates to 75% in 25min

D Fault still not rectified. After another 10h engine speed derates to 60% and torque to 50% in 25min



- E Engine torque will remain at 50% and engine speed 60% until fault is rectified

2 Engine torque

Y Time
- 1 Engine speed

X Percentage

Emissions Systems Faults - Additional Faults Within 40 Hours of The First Fault

If the emissions system detects a second fault within 40 engine hours of a previous fault occurring, the system will reduce power immediately to protect the engine, this is usually indicative of a more serious fault with the system. The system will return to normal operation when the fault(s) are repaired.

Table 74. Emissions system-Faults occurring in less than 40 hours

Parameter	Subsequent Fault Effects
Engine power output	Initial full power further reduces to limited power at reduced speed only over time.
Engine RPM limit	Reducing to reduced speed only over time
Driver/operator action needed	If appropriate to the application, park the machine in a safe place. Contact your JCB engines dealer immediately

DEF DO's and DON'Ts

DO's

- Before engine start up, locate and identify both separate diesel and DEF tanks, they do not share the same tank. Do not allow cross contamination between diesel and DEF.
- Act on machine warnings that DEF is running low.
- Ensure that there is sufficient DEF in the machine at all times.
- Use only high quality DEF to ISO 22241-1 from a reputable source.
- Keep all DEF, tanks, tank necks, drums and dispensing equipment clean to prevent contamination.

DON'Ts

- Don't allow contamination of your DEF by dirt or fluid as it will damage the SCR system.
- Don't mix DEF with your diesel; it is not a fuel additive.
- Don't put DEF in your diesel tank – if you do, do not start the engine, call your JCB dealer immediately.
- Don't add chemicals to your DEF to prevent freezing.
- Don't dilute DEF with water or any other fluids or the machine may stop or be permanently damaged.



Wheels and Tires

General

Before you operate the machine, make sure that the correct tires are installed and they are inflated to the correct pressure.

You must refer to the chart in the machine for correct tire and pressure rating. Do not use the maximum pressure marked on the tire.

If the chart does not show the tires installed on your machine, then contact your JCB dealer for instruction. Do not guess the tire pressures.

Non-approved tire ballast can cause damage to the machine's drive train and structures. It will also affect manufacturer's warranty. Contact your JCB dealer for more details.



Tire Sizes and Pressures

For: 506-36 [T4F] Page 261

For: 507-42 [T4F] Page 262

For: 509-42 [T4F] Page 265

For: 510-56 [T4F] Page 268

For: 512-56 [T4F] Page 271

For: 514-56 [T4F] Page 274

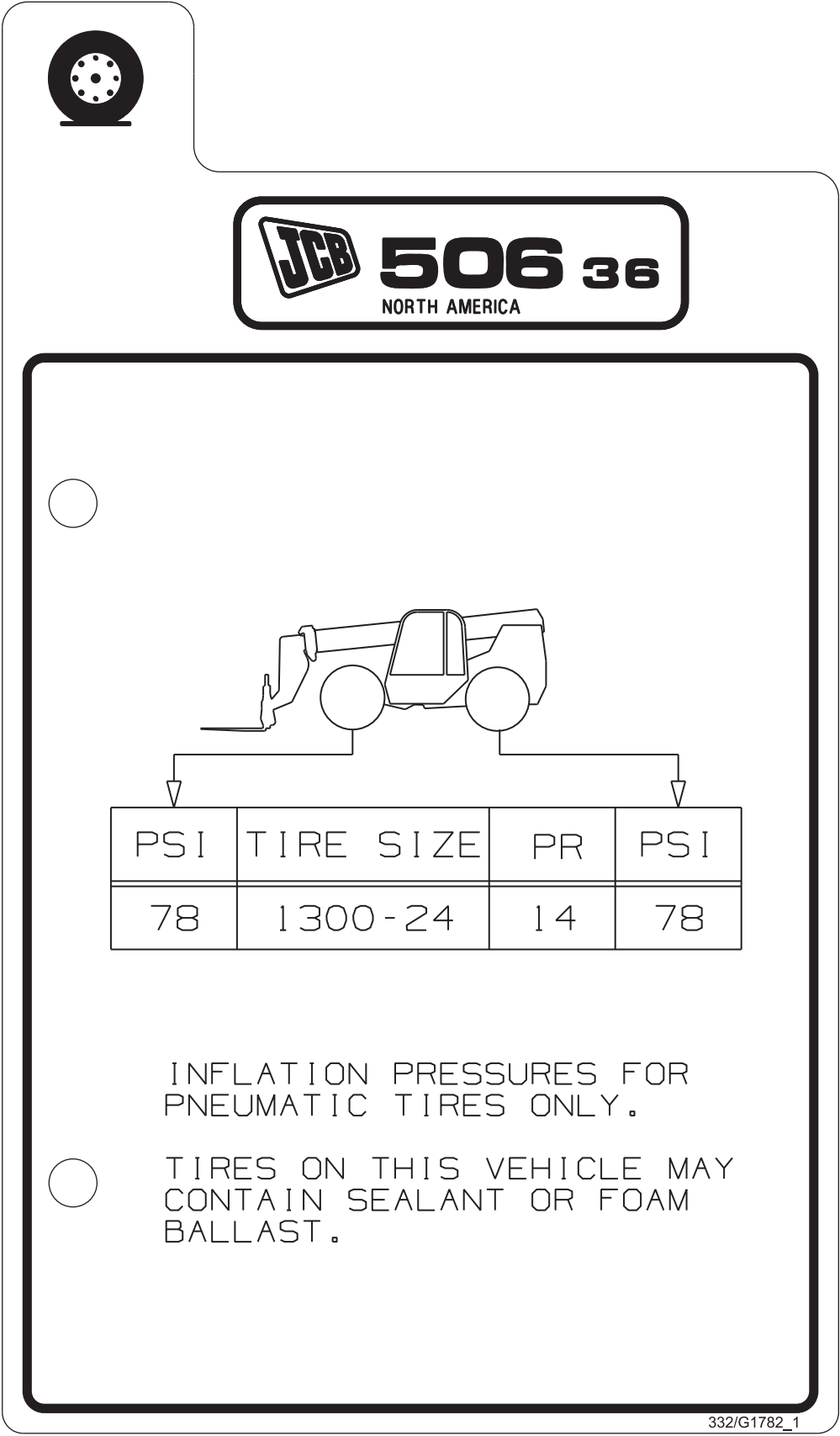
For: 510-42 [T4F] Page 277

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(For: 506-36 [T4F])

Figure 214.





(For: 507-42 [T4F])

Figure 215.

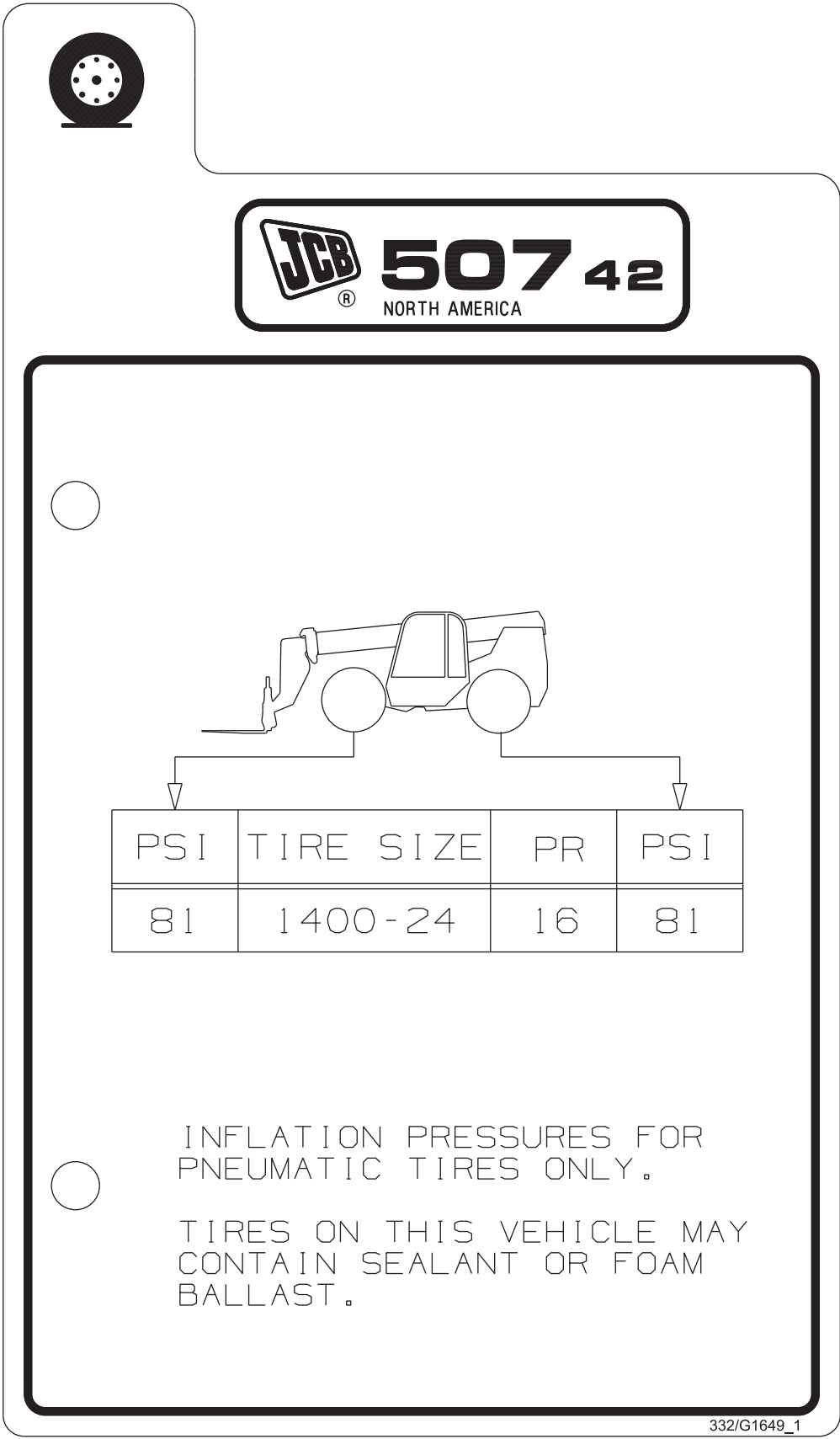
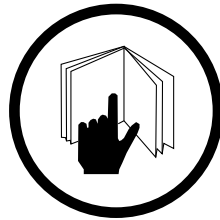


Figure 216.



**SOLIDEAL SOLIDAIR
1400 - 24
SOLID APERTURE TYRES
177 A2**

LOADS<10000 lbs MAXIMUM SPEED 6 MPH
LOADS>10000 lbs MAXIMUM SPEED 3 MPH
NO : MAXIMUM SPEED 18MPH

A MAXIMUM DISTANCE TRAVELLED
OF 3 MILES IN 1 HOUR
UNDER ANY LOAD CONDITIONS.

333/H1242



Semi solid Tires are an optional fitment. Only JCB approved wheels and semi solid tires are approved. If in doubt contact your JCB dealer.

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(For: 509-42 [T4F])

Figure 217.

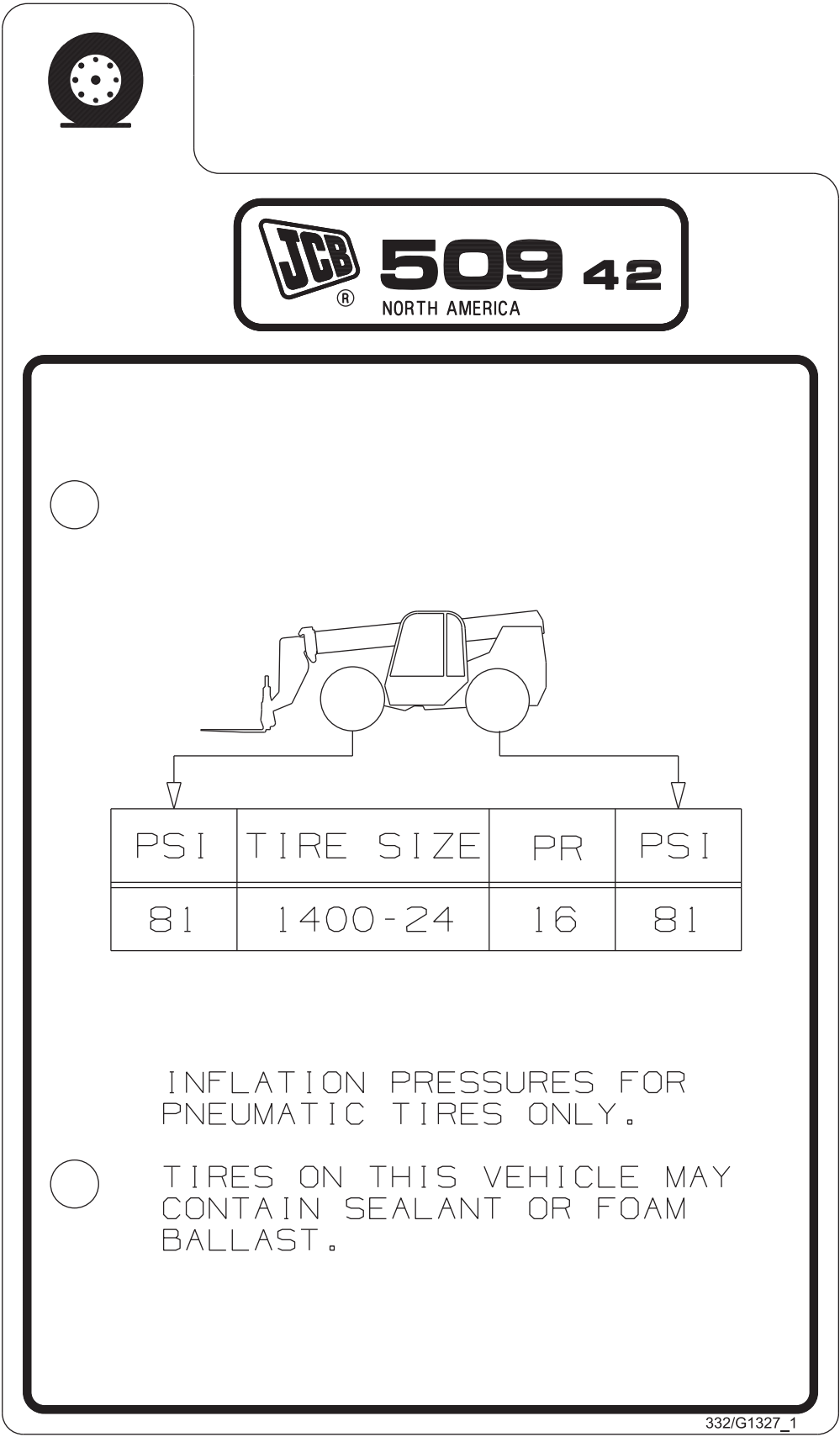
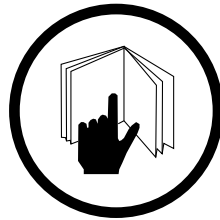


Figure 218.



**SOLIDEAL SOLIDAIR
1400 - 24
SOLID APERTURE TYRES
177 A2**

LOADS<10000 lbs MAXIMUM SPEED 6 MPH
LOADS>10000 lbs MAXIMUM SPEED 3 MPH
NO : MAXIMUM SPEED 18MPH

A MAXIMUM DISTANCE TRAVELLED
OF 3 MILES IN 1 HOUR
UNDER ANY LOAD CONDITIONS.

333/H1242



Semi solid Tires are an optional fitment. Only JCB approved wheels and semi solid tires are approved. If in doubt contact your JCB dealer.



(For: 510-56 [T4F])

Figure 219.

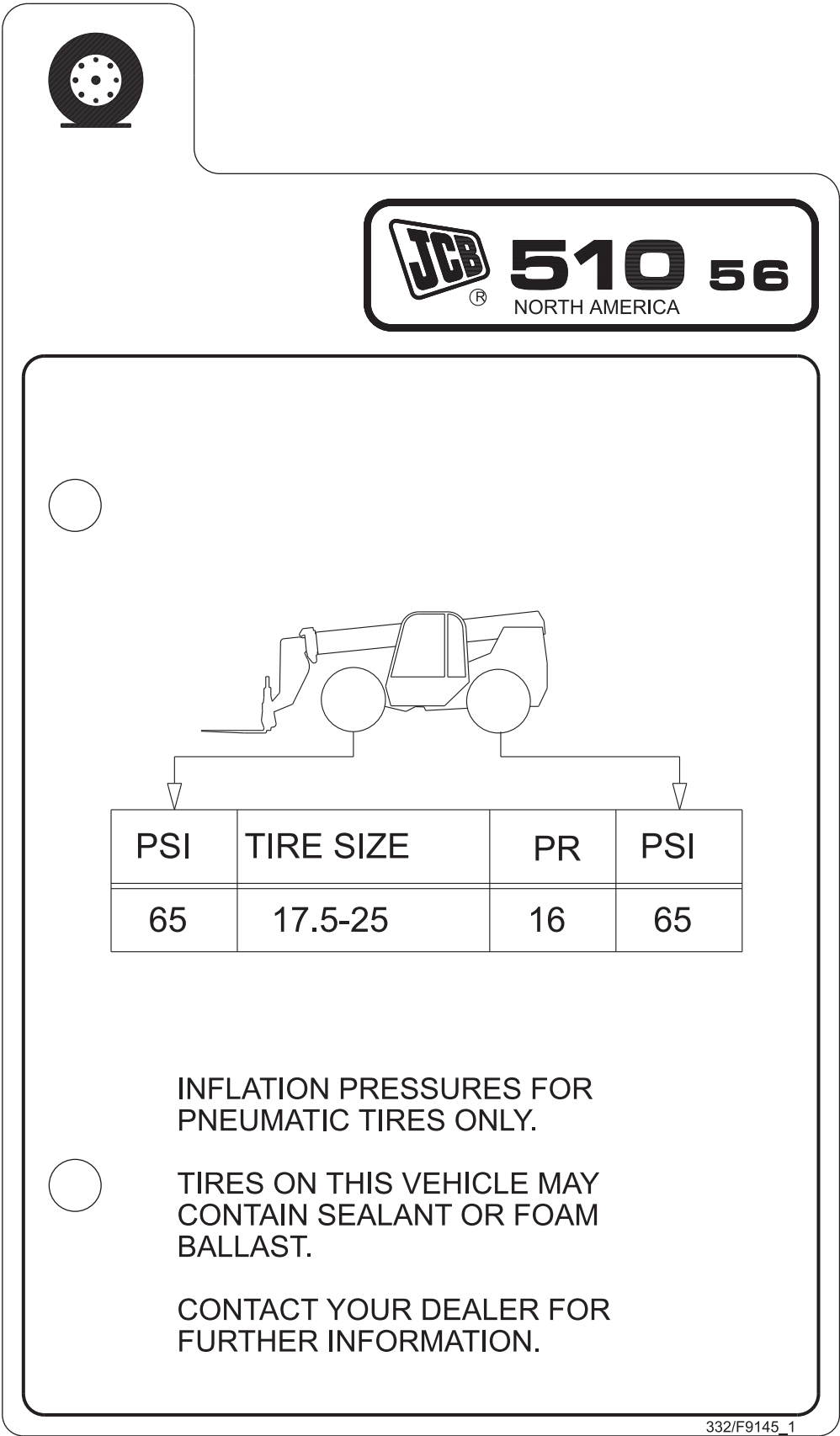
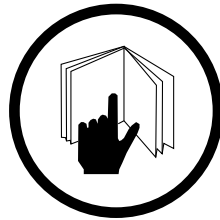


Figure 220.



**SOLIDEAL SOLIDAIR
1400 - 24
SOLID APERTURE TYRES
177 A2**

LOADS<10000 lbs MAXIMUM SPEED 6 MPH
LOADS>10000 lbs MAXIMUM SPEED 3 MPH
NO : MAXIMUM SPEED 18MPH

A MAXIMUM DISTANCE TRAVELLED
OF 3 MILES IN 1 HOUR
UNDER ANY LOAD CONDITIONS.

333/H1242



Semi solid Tires are an optional fitment. Only JCB approved wheels and semi solid tires are approved. If in doubt contact your JCB dealer.



(For: 512-56 [T4F])

Figure 221.

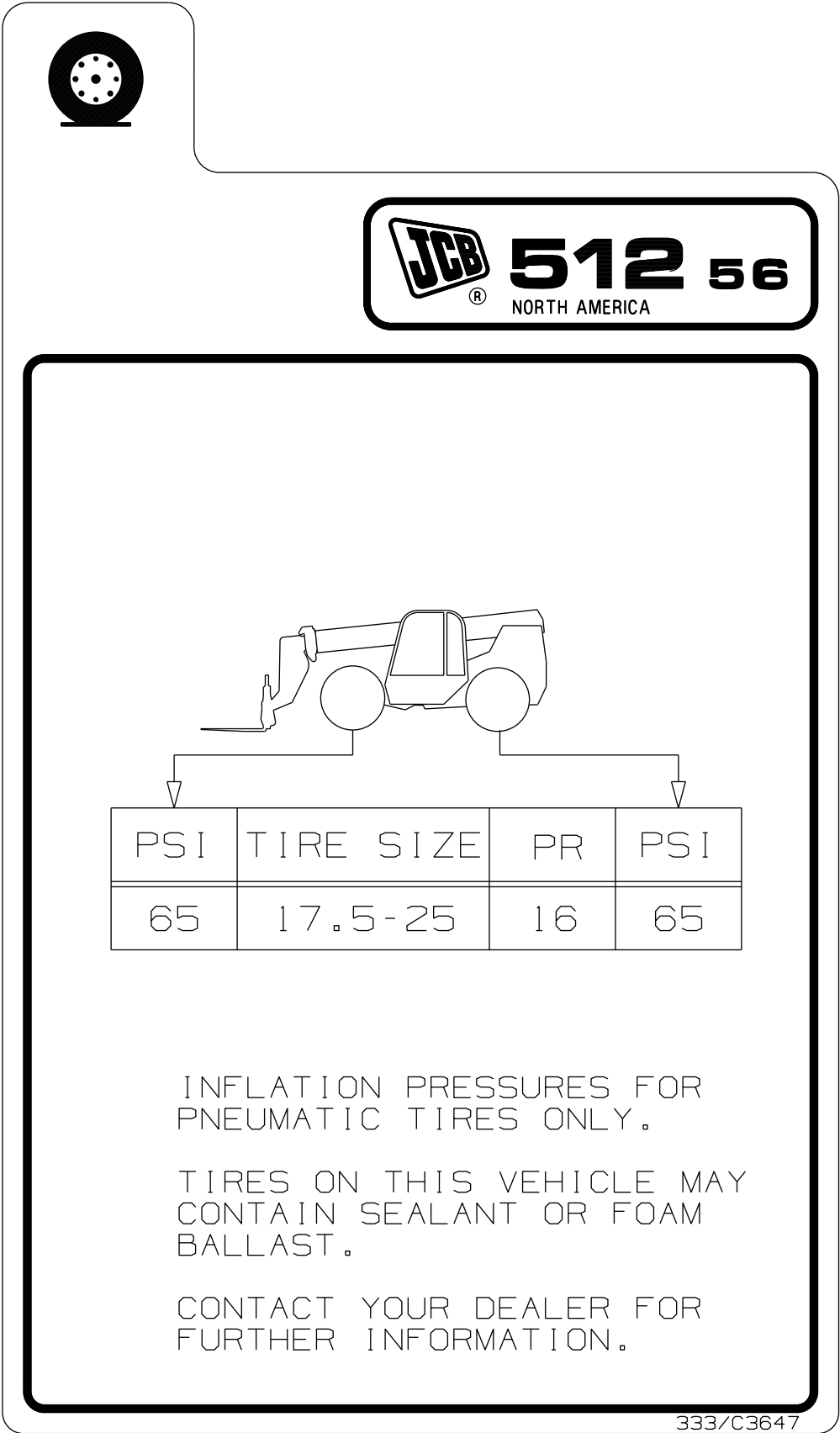
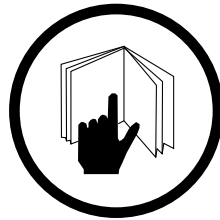


Figure 222.



**SOLIDEAL SOLIDAIR
1400 - 24
SOLID APERTURE TYRES
177 A2**

LOADS<10000 lbs MAXIMUM SPEED 6 MPH
LOADS>10000 lbs MAXIMUM SPEED 3 MPH
NO : MAXIMUM SPEED 18MPH

A MAXIMUM DISTANCE TRAVELLED
OF 3 MILES IN 1 HOUR
UNDER ANY LOAD CONDITIONS.

333/H1242





Semi solid Tires are an optional fitment. Only JCB approved wheels and semi solid tires are approved. If in doubt contact your JCB dealer.

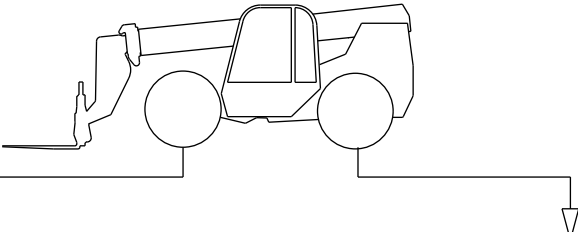


(For: 514-56 [T4F])

Figure 223.







PSI	TIRE SIZE	PR	PSI
83	17.5-25	20	83

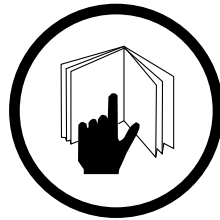
INFLATION PRESSURES FOR
PNEUMATIC TIRES ONLY.

TIRES ON THIS VEHICLE MAY
CONTAIN SEALANT OR FOAM
BALLAST.

CONTACT YOUR DEALER FOR
FURTHER INFORMATION.

333/F0407

Figure 224.



**SOLIDEAL SOLIDAIR
1400 - 24
SOLID APERTURE TYRES
177 A2**

LOADS<10000 lbs MAXIMUM SPEED 6 MPH
LOADS>10000 lbs MAXIMUM SPEED 3 MPH
NO : MAXIMUM SPEED 18MPH

A MAXIMUM DISTANCE TRAVELLED
OF 3 MILES IN 1 HOUR
UNDER ANY LOAD CONDITIONS.

333/H1242



Semi solid Tires are an optional fitment. Only JCB approved wheels and semi solid tires are approved. If in doubt contact your JCB dealer.



(For: 510-42 [T4F])

Figure 225.

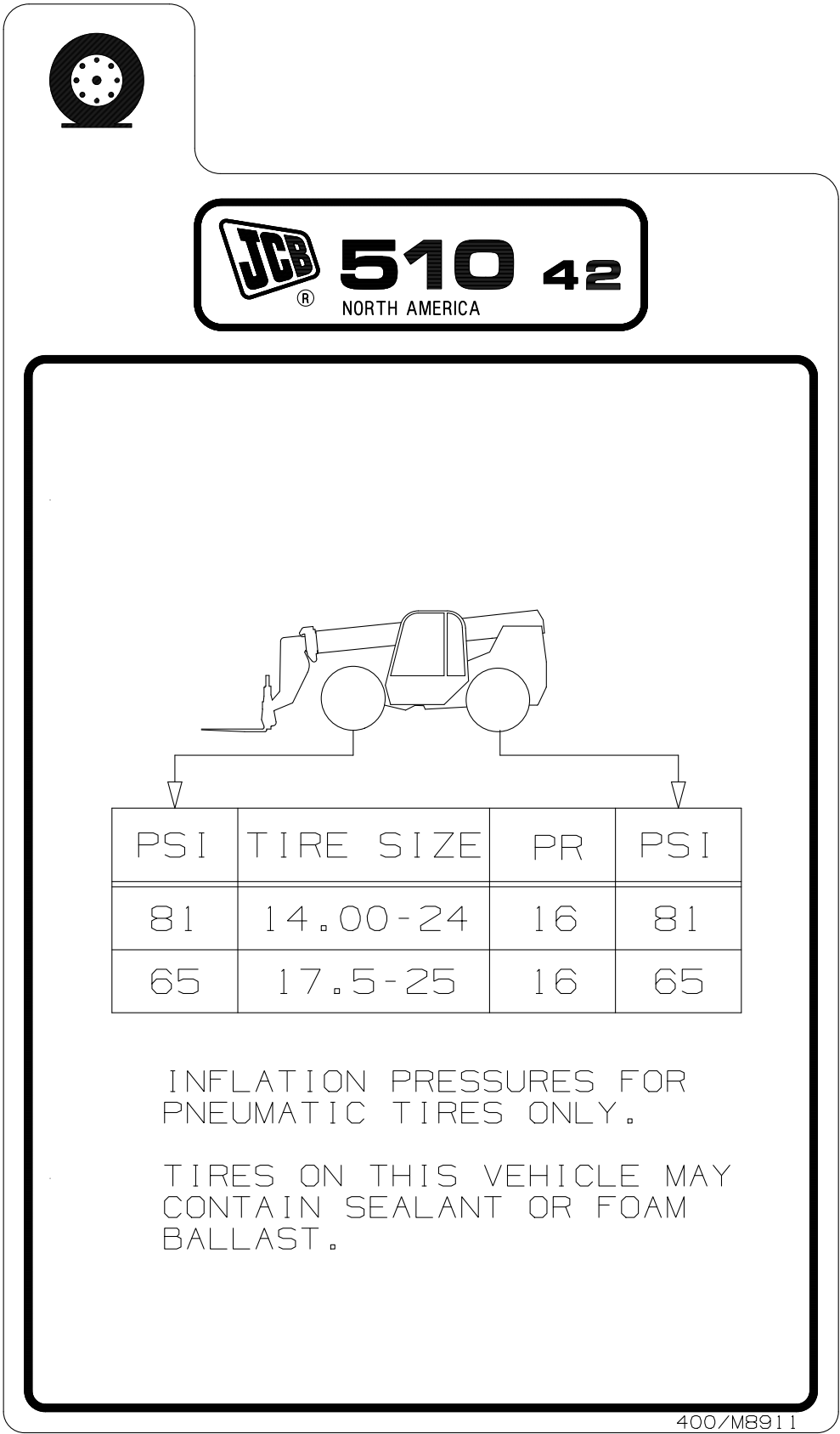
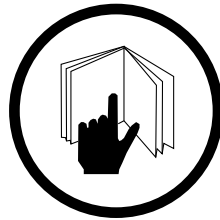


Figure 226.



**SOLIDEAL SOLIDAIR
1400 - 24
SOLID APERTURE TYRES
177 A2**

LOADS<10000 lbs MAXIMUM SPEED 6 MPH
LOADS>10000 lbs MAXIMUM SPEED 3 MPH
NO : MAXIMUM SPEED 18MPH

A MAXIMUM DISTANCE TRAVELLED
OF 3 MILES IN 1 HOUR
UNDER ANY LOAD CONDITIONS.

333/H1242



Semi solid Tires are an optional fitment. Only JCB approved wheels and semi solid tires are approved. If in doubt contact your JCB dealer.



Star Industries Truss Boom

General

1360B Truss Boom Approval Letter - 22/6/2015

Subject: The use of a Star Industries Extendable Truss Boom Model 1360B 2015 Model on the following JCB Loadall models: 506-36, 507-42, 509-42, 510-42, 510-56, 512-56, 514-56 and 550-170.

Subject to the requirements of this letter, JCB authorizes the owner of all JCB telescopic handlers listed above to use the Star Industries Extendable Truss Boom Model 1360B (maximum reach 144 inches and weight of 570 lbs) based on the requirements hereinafter.

WARNING! Failure to comply with all restrictions, instructions and warnings contained in this letter and in all Operator Manuals could result in death or serious injury. A suspended load has a dynamic, and therefore unpredictable, effect on machine stability, so extreme caution should always be exercised when operating with suspended loads including but not limited to 29 CFR 1926 Subpart CC.

Owner/Employer/Operator Requirements

1. A copy of this letter and the Star Industries Extendable Boom operator's manual must accompany the operator and safety manuals at all times in the weather resistant storage compartment located on the equipment.
 - 1.1. Read, understand and follow the proper installation and operating instructions of the Star Industries Extendable Boom.
2. Operators must be trained and qualified how to safely operate the equipment and be familiar with the specific model of telescopic handler as follows:
 - 2.1. Operators must be trained and qualified how to safely operate the equipment and be familiar with the specific model of telescopic handler as follows:
 - 2.2. Understand all control functions, decals and warnings.
 - 2.3. Be aware of and understand all safety devices specific to the equipment being used.
 - 2.4. Be instructed regarding the specific hazards associated with using the JCB telescopic handler with a suspended load, and utilize all means, including those provided by the employer, to avoid them.
 - 2.5. Using the JCB telescopic handler with a suspended load, the operator must only use a telescopic handler fork carriage.
3. The employer and operator shall identify the specific hazards associated with operating the equipment with a suspended load and utilize all means to prevent surrounding personnel and traffic from being exposed to these hazards. Do not allow personnel under a suspended load.
4. The owner, employer and the operator shall comply with all applicable jobsite, local, state, provincial, or federal rules, regulations and standards related to the use of the equipment with the Star Industries Extendable Boom and a suspended load.
5. The operator must use the telescopic handler load chart for the Star Industries Extendable Boom supplied with this letter and corresponding to the specific telescopic handler model, if one is not already supplied with the telescopic handler. It is the responsibility of the employer and/or operator to place the appropriate load chart in the JCB telescopic handler in a clearly visible location for the operator in their normal operating position.

Lamination of the load chart may help minimize potential damage.

Specific Training

1. The employer shall provide any additional training to the operator, and other personnel, that is deemed necessary to safely operate the JCB telescopic handler with a suspended load, which may include but not be limited to the following:



Setup

1. If the telescopic handler has a hydraulically powered fork carriage:
 - 1.1. Verify that the fork carriage is reset to 0 degrees rotation on its pivot axis.
 - 1.2. Turn off the telescopic handler and disable the hydraulic power to the attachment by disconnecting the hydraulic couplings to the attachment.
2. Position both forks equally from the fork carriage such that the load center of the attachment is on center with the fork carriage and boom. centerline
3. Secure the attachment to the forks and fork carriage according to the manufacturer's instructions.

Rigging

1. A qualified rigger shall determine the most appropriate rigging equipment, and methods, to properly secure the load such that unintentional unhooking or displacement of the load or rigging is avoided.
2. All rigging shall be approved, and in proper working condition, by the employer prior to lifting.
3. Suspend the load in a position to help minimize potential swinging; any ropes or chains used should be as short as practicable.
4. If possible, position the load in a manner that will help minimize the exposed surface area to wind.

Signal person

1. A signal person must be provided in each of the following situations
 - 1.1. The point of operation, meaning the load travel or the area near or at the load placement point, is not in full view of the operator.
 - 1.2. The point of operation, meaning the load travel or the area near or at the load placement point, is not in full view of the operator.
 - 1.3. Due to site specific safety concerns, either the operator or the person handling the load determines that it is necessary.
2. The signals used (hand, voice or audible), and means of transmitting the signals to the operator (such as direct line of sight, video, radio, etc.), must be appropriate for the site conditions.
3. When using hand signals, the Standard Method must be used (see Appendix A of 1926 Subpart CC). Exception: Where use of the Standard Method for hand signals is not feasible, or where an operation or use of an attachment is not covered in the Standard Method, nonstandard hand signals may be used in accordance with paragraph (c)(2) of 1926.1419.

Lifting

1. Do not leave the controls while the load is suspended except when a competent person determines it is safe to do so.
 - 1.1. Competent person means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.
2. Only lift the load when the telescopic handler is on firm level ground.
3. Do not operate the machine while people are under a suspended load. If people are approaching an elevated load, immediately inform them to evacuate the area.
4. All movements of the load must be accomplished at lowest possible speed.
5. Do not lift loads in windy conditions that will result in the movement of the load away from the boom's centerline.
6. Level the telescopic handler with sway before lifting the load.



7. Deploy stabilizers, if equipped, prior to picking or placing the suspended load.
8. Do not tilt the forks forward from the tilted back position with a suspended load.
9. Use guide ropes or tag lines by qualified personnel to help control the load and prevent it from swinging.
10. Do not attempt to use the telescopic handler frame leveling to compensate for a swinging load.
11. Never drag the load.
12. Do not try to move fixed or obstructed loads.
13. Only lift a load vertically; do not pull a load horizontally as it could cause excessive swinging of the load.
14. Always operate within the load capacities of the load chart.

Visibility

1. When visibility is or could be obstructed, the operator shall use alternative/additional means to safely transport the load.
 - 1.1. Use of additional personnel to direct the operator in his movements as well as the surrounding ground traffic.

Travel

1. A competent person shall supervise the operation, and determine if it is necessary to reduce rated capacity, and make a determination regarding load position, boom location, ground support, travel route, overhead obstructions, and speed of movement necessary to ensure safety.
2. Speed shall be limited by any conditions that could cause any unexpected movement of the load, or jeopardize the safe transport of the load.
3. The telescopic handler boom shall be retracted and lowered as much as possible.
4. The load shall be transported as low to the ground as practical.
5. Only travel on solid surfaces.
6. Start, travel, turn and stop slowly to prevent the load from becoming unstable or swinging.
7. Do not exceed walking speed.
8. Do not use any controls to re#position the load when traveling. Come to a gradual and complete stop before attempting to re#position the load.

Use Requirements/Considerations

1. This approval only applies for the primary intended purpose and use of the telescopic handler, as defined by ANSI/ITSDF B56.6.
2. Rigging shall comply with applicable ASME rigging standards (ex: B31.9, B30.26)
3. The combined load center shall be located approximately on the center line of the telescopic handler boom.
4. Rated lift capacities, of the telescopic handler, are with the machine on a firm level surface with undamaged, properly configured tires.
5. The additional weight of the rigging, the load, and the position of the combined load center, shall be taken into consideration and be deducted from the load chart capacity allowance prior to lifting.
6. The maximum load capacities referenced on the telescopic handler load charts shall not be exceeded.

In consideration for JCB's authorization herein, the equipment owner hereby agrees to indemnify and hold harmless JCB and its affiliated companies against any and all liability, claims, suits, losses, costs and legal fees arising out of or resulting from the modification to the JCB equipment; the failure to comply with the criteria



set forth in this letter related to the modification; the design, manufacture and installation of the modification; the safety rules and operating instructions in the Operator's Manual; the design and placement of any safety decals; the operation of the equipment by the owner, user and/or operator; and any negligent act or omission related to the equipment, its use or its modification.

BY PROCEEDING WITH THE MODIFICATION AUTHORIZED HEREIN, YOU AGREE TO THE CONTENTS OF THIS LETTER AND ITS CONDITIONS. IF YOU DO NOT AGREE, DO NOT PROCEED WITH THE PROPOSED MODIFICATION.

Licensed to TOM DEGEEST Order Number 51297 Purchased 09/02/2023 14:56. Single user license only.



Load Charts

Figure 227.

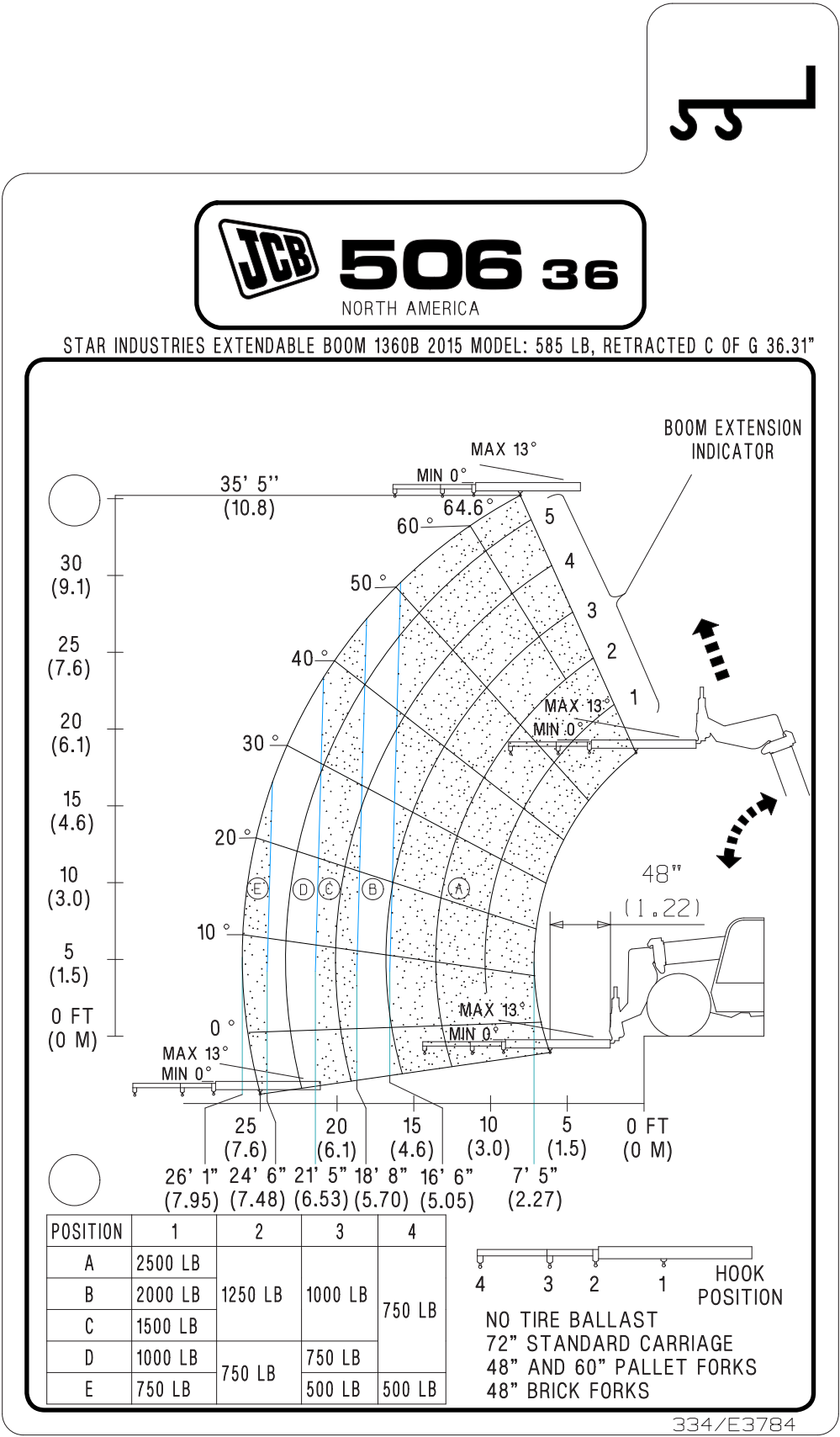




Figure 228.

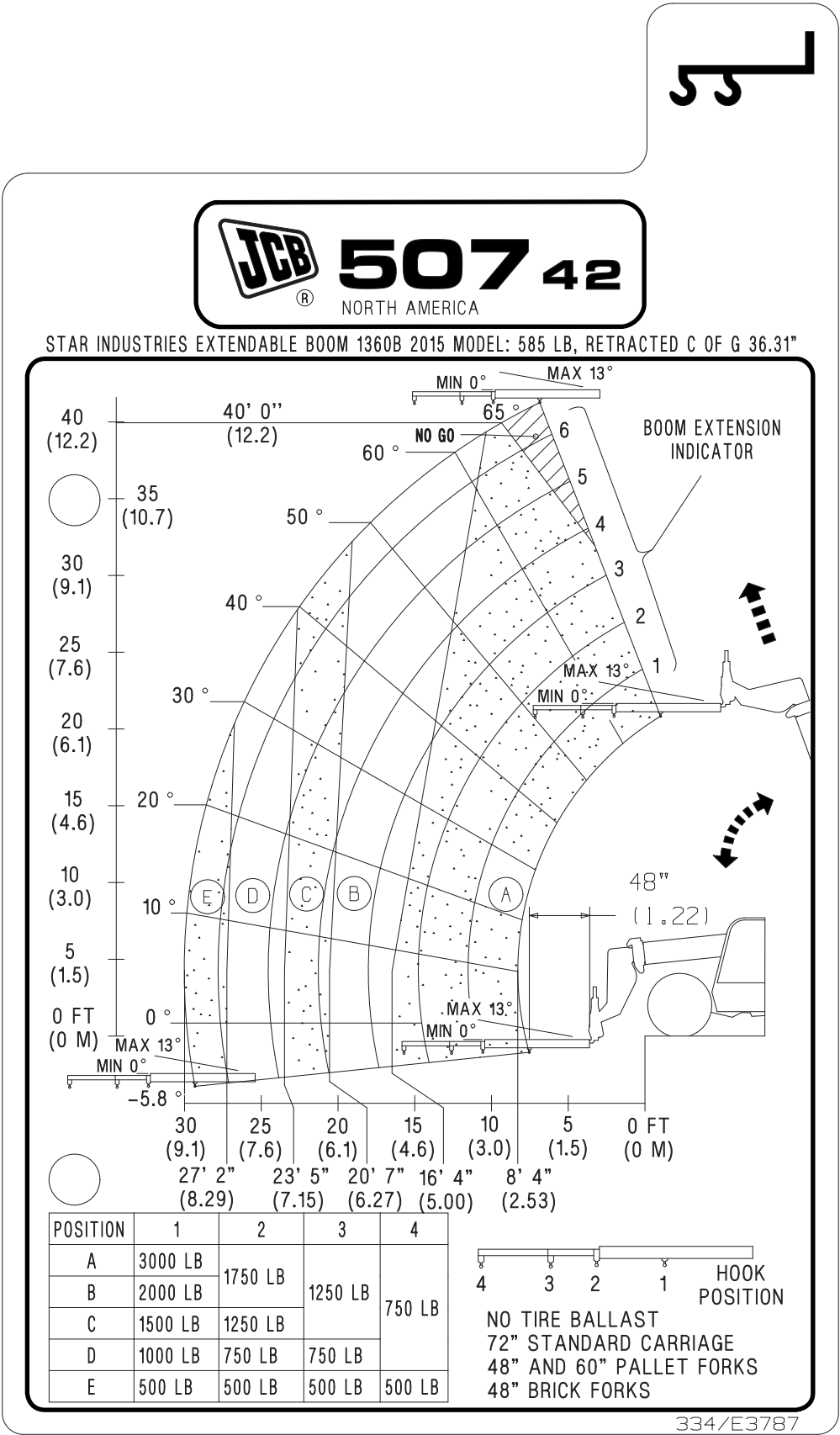


Figure 229.

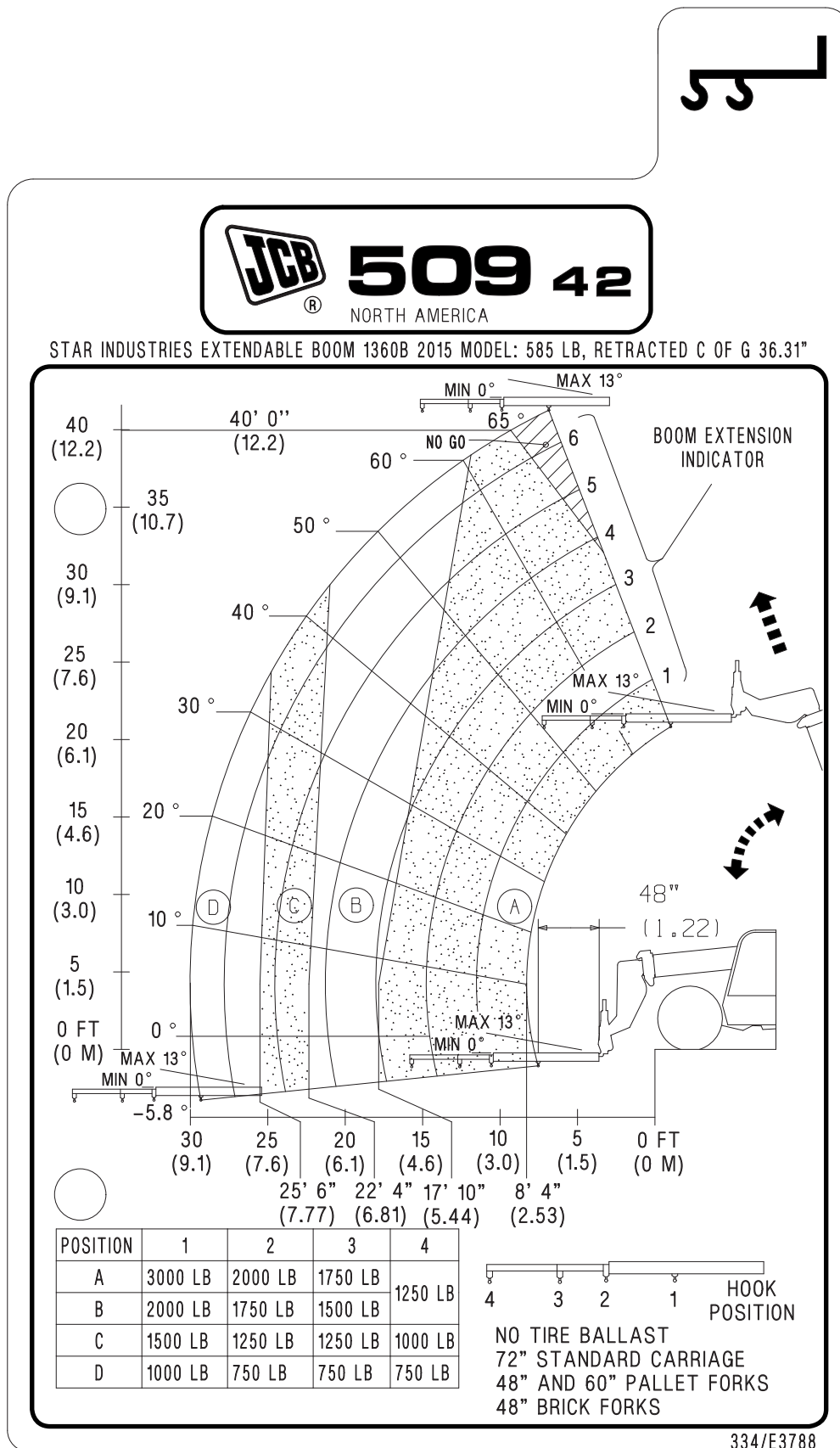
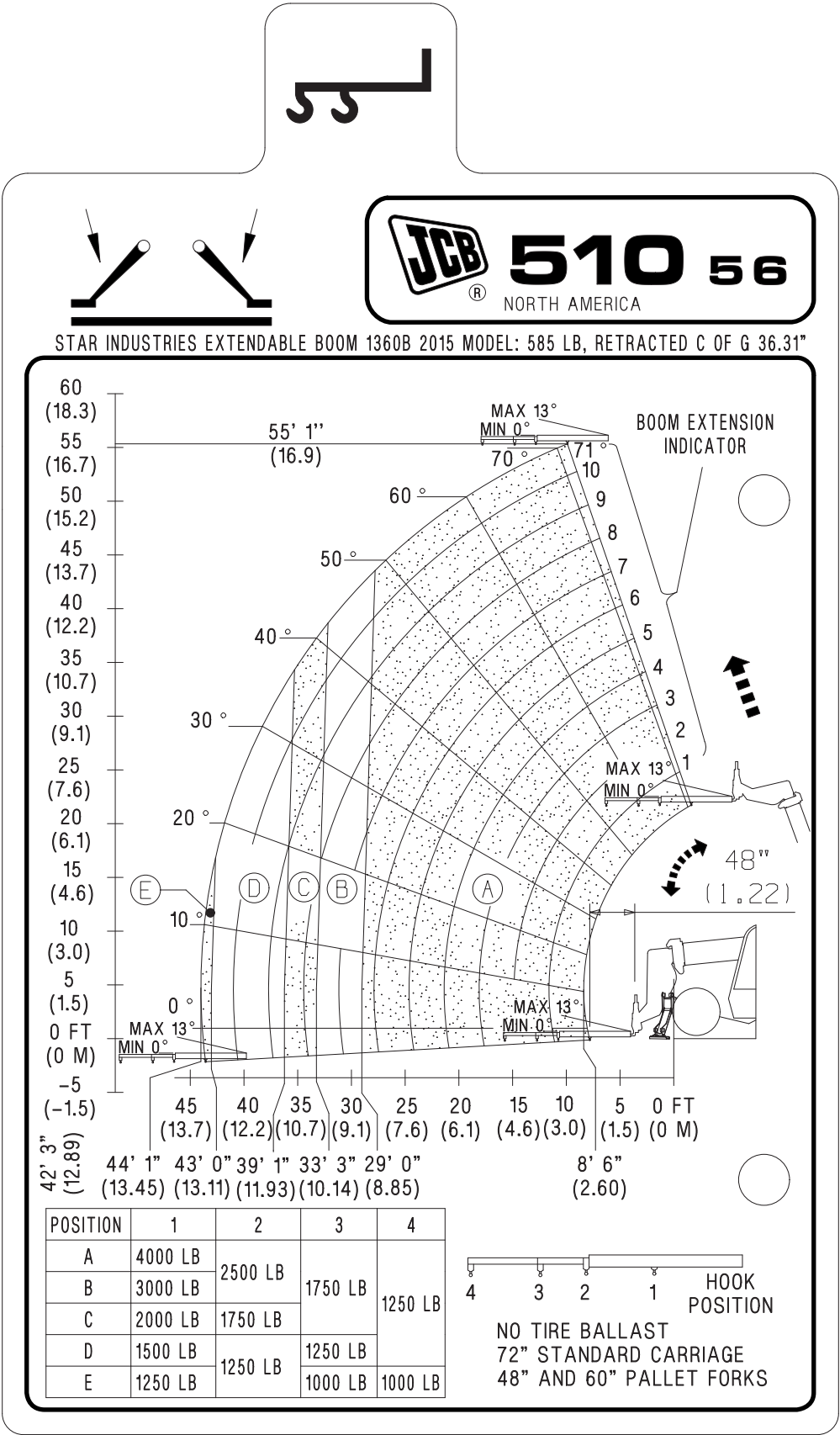




Figure 230.








Figure 232.

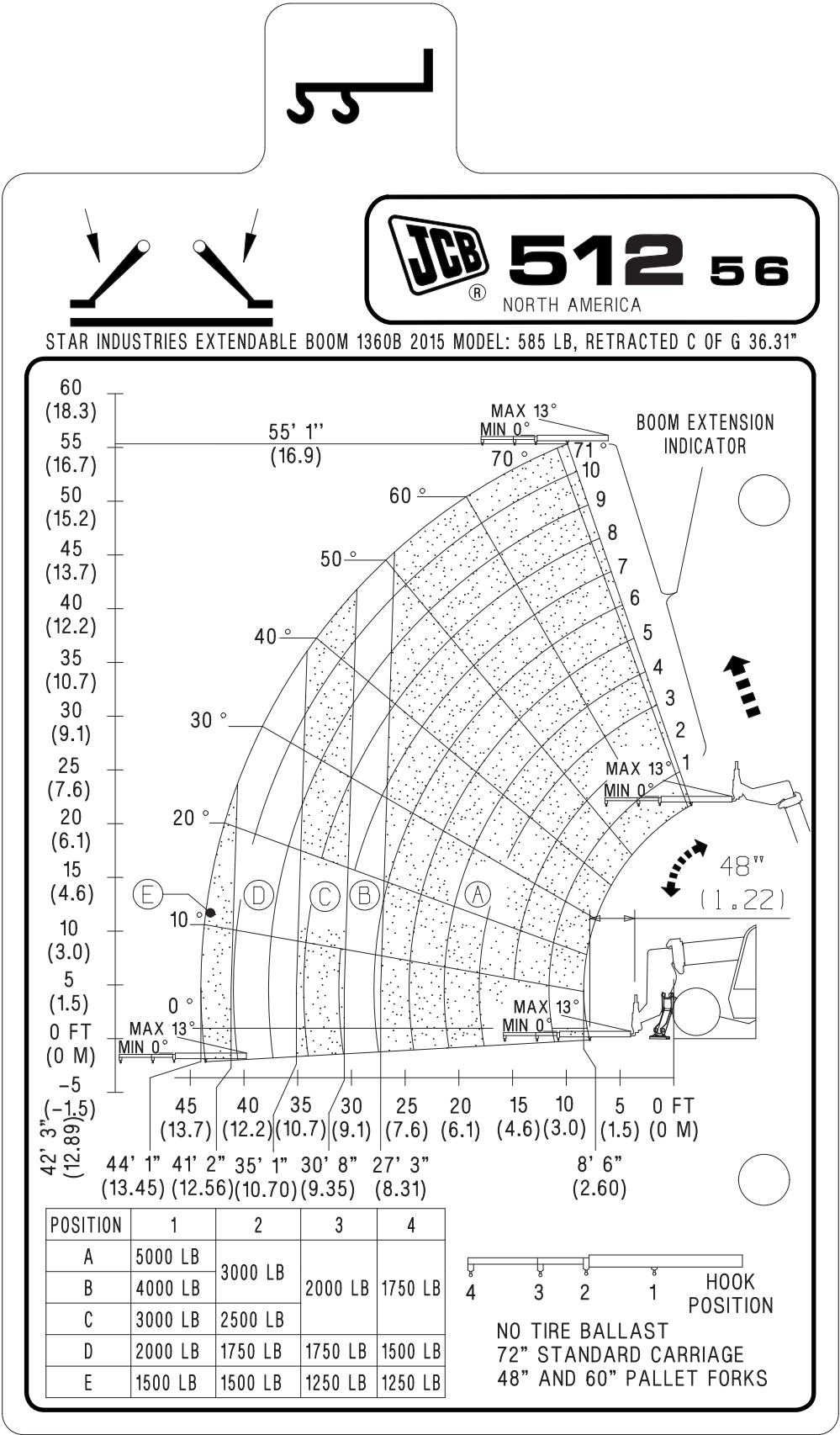


Figure 233.

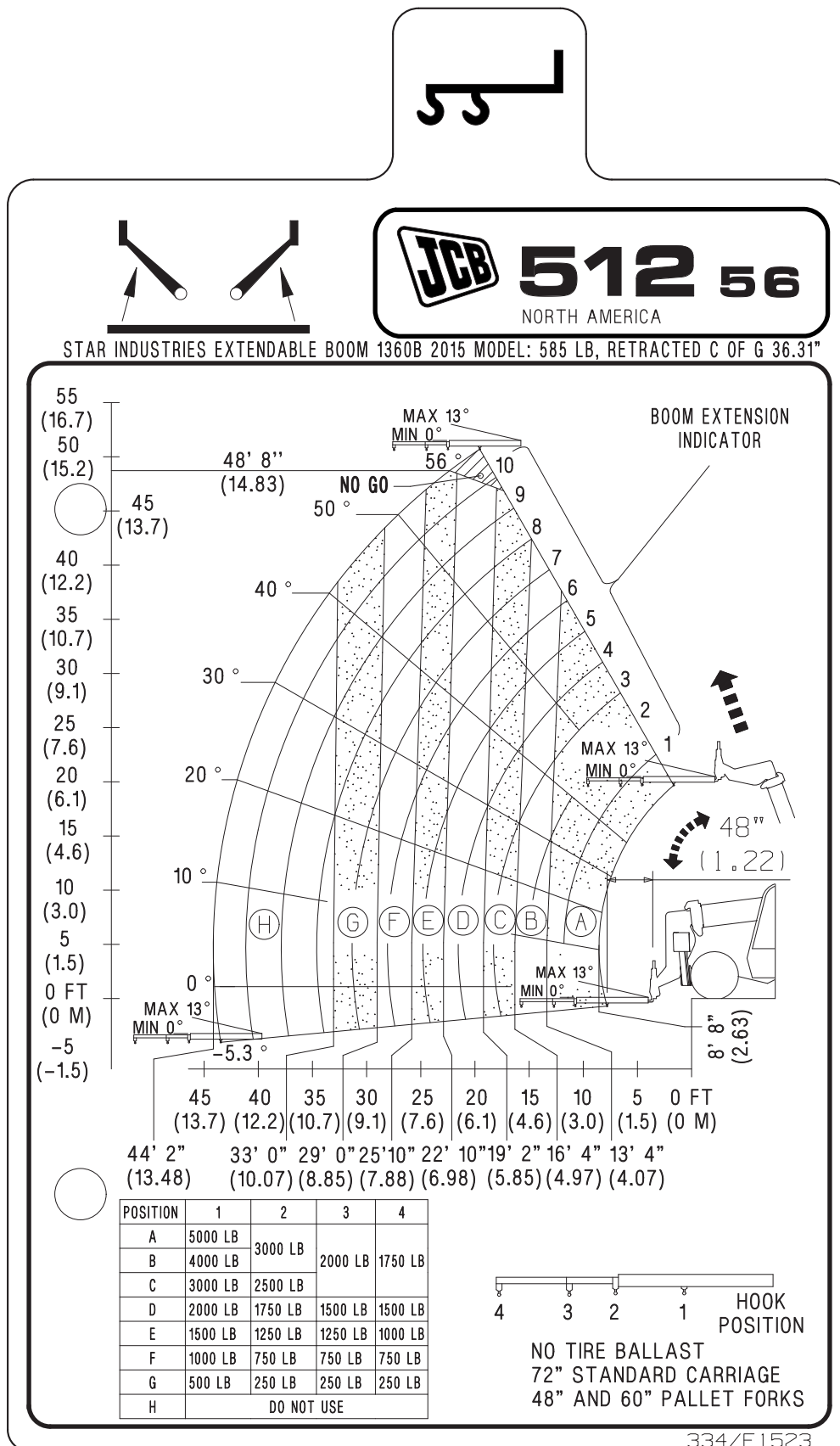
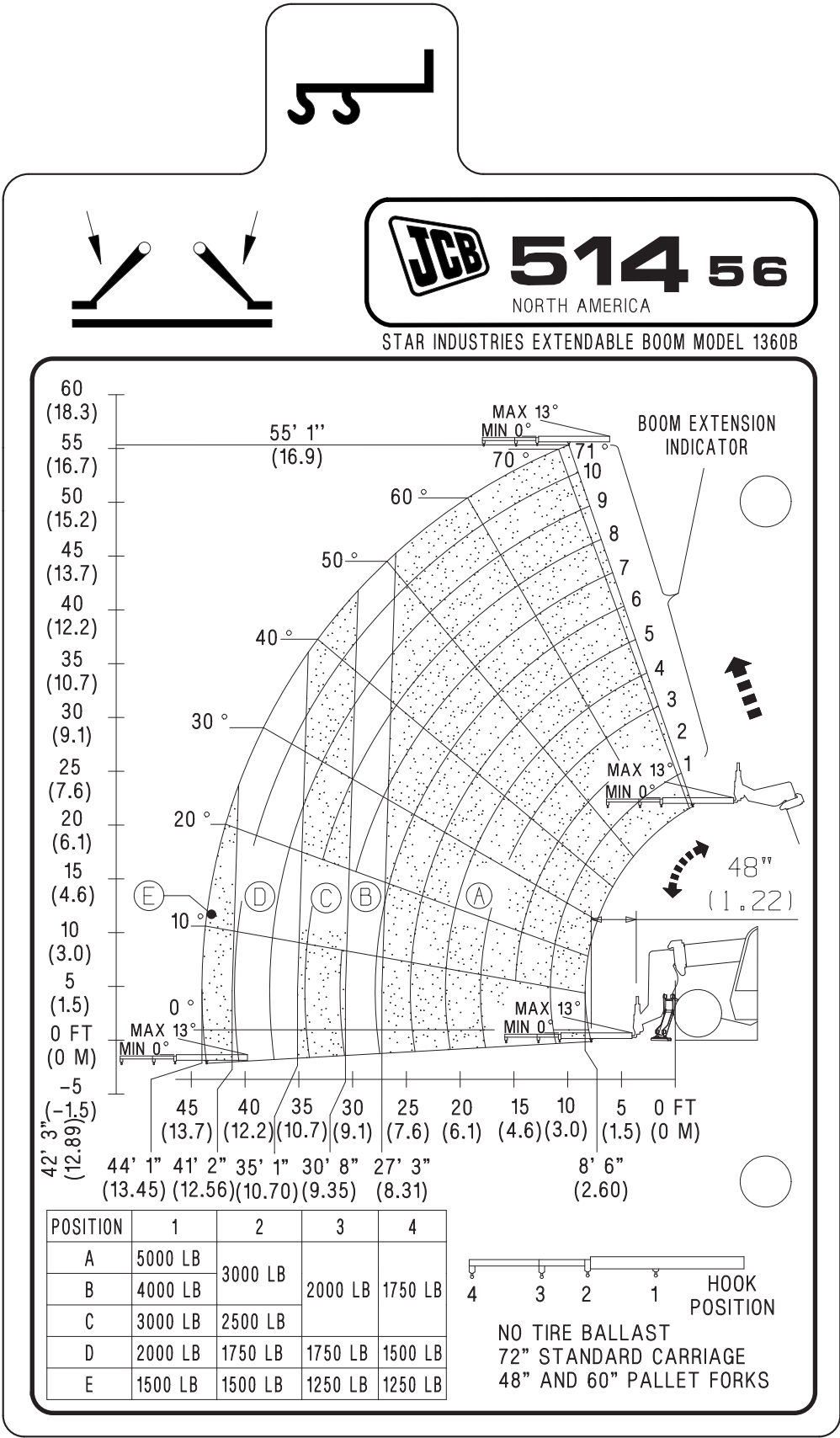




Figure 234.



55





Warranty Information

Service Record Sheet

Table 75.





	Signature and stamp		Date
	Annual Insurance (Yes)		Hours

Figure 236. Installation Checklist





			/	/		h

Figure 237. 1st 100h/1 Month





			/	/		h

Figure 238. 500h/6 Month





			/	/		h



Figure 239. 1000h/12 Month





	 1 / /		h
			

Figure 240. 1500h/18 Month




	 1 / /		h

Figure 241. 2000h/24 Month





	 1 / /		h
			

Figure 242. 2500h/30 Month




	 1 / /		h



Figure 243. 3000h/36 Month





	 1 / /  h
	

Figure 244. 3500h/42 Month




	 1 / /  h

Figure 245. 4000h/48 Month





	 1 / /  h
	

Figure 246. 4500h/54 Month




	 1 / /  h



Figure 247. 5000h/60Month





	 1 / /		h
			

Figure 248. 5500h/66 Month




	 1 / /		h

Figure 249. 6000h/72 Month





	 1 / /		h
			

Figure 250. 6500h/78 Month




	 1 / /		h



Figure 251. 7000h/84 Month






		 1	/	/			h
							

Figure 252. 7500h/90 Month





		 1	/	/			h

Figure 253. 8000h/96 Month






		 1	/	/			h
							

Figure 254. 8500h/102 Month





		 1	/	/			h



Figure 255. 9000h/108 Month






		 1	/	/			h
							

Figure 256. 9500h/114 Month





		 1	/	/			h

Figure 257. 10000h/120 Month










		 1	/	/			h
							

Figure 258. 10500h/126 Month

		 1	/	/			h

Engine Emissions

General Introduction

The JCB engine has been designed and built in compliance with the latest emissions regulations enforced by the EPA and CARB. In these territories JCB are legally obliged to provide warranty on any component deemed by these organizations to be related to the emissions control function of the engine.

This document provides a definition of this emissions control system warranty:

- The terms of warranty
- Items contained under warranty
- The responsibilities of the engine original owner and all subsequent owners
- The responsibilities of JCB
- Customer assistance contact information

This document is supplied as a supplement to the operator manual provided with the machine. If any apparent conflict is observed between this supplement and any authorized JCB documentation supplied with the machine this supplement will take precedent.

This document is only applicable to emissions related components. Components outside the scope of this document are subject to the standard engine/machine warranty provisions.

If you have any questions regarding your warranty rights and responsibilities, you should contact JCB at 912-447-2000.

Emission Control System Maintenance and Warranty Statement (all EPA and CARB Regulated Territories)

Emissions Control System Warranty

JCB warrant the ultimate purchaser and each subsequent purchaser that the emissions control system of the purchased engine is:

- Designed, built, and equipped so as to conform to all applicable regulations adopted by the EPA and CARB.
- Free from defects in materials and workmanship which would cause the failure of a warranted part for a period of 5 years or 3000 hours of operation, whichever occurs first.

The warranty period shall begin on the date the machine is first delivered to the original retail purchaser. If the machine has been placed in service for demonstration purposes prior to first delivery to the original retail customer, the warranty period shall begin from the date the machine is first placed in demonstration service.

Maintenance, Replacement And Repair Of Emission Control System Warrantied Components

The original owner and all subsequent owners of this machine are free to elect a suitable competent repair shop or person of the owners choosing to conduct maintenance, replacement or repair of engine parts / systems.

JCB strongly recommend the use of genuine JCB Service approved parts when conducting maintenance, replacement or repair of any JCB engine component in order to assure the performance and safety of the machine. If replacement parts other than genuine JCB Service approved parts are used, only manufacturer warranted parts of equivalent performance shall be used. In this case, the remaining emissions component warranties remain in effect; unless damage is caused to such components by the non-JCB Service approved parts.

Warranty service conducted by an approved JCB Service representative will be free of charge to the owner (including parts, labor and any fault diagnostic activity). If service is conducted by a party other than an approved JCB Service representative JCB hold no responsibility to cover the cost under warranty.

Any parts repaired or replaced under the emissions control system warranty shall be warranted for the remainder of the emissions control system warranty period or until component first scheduled service as identified in machine operator manual (whichever is sooner).

Terms Of Emission Control System Warranty

The original owner and all subsequent owners of the machine are responsible for performance of the required maintenance listed in the operator manual.

JCB cannot deny emissions control system warranty solely for lack of documentation evidence of scheduled maintenance or for failure to ensure the performance of all scheduled maintenance unrelated to claim.

In order to ensure any warranty claims are handled in an efficient manner JCB recommends that you retain all receipts covering maintenance, replacement and repair of engine emissions control system related components, and that such documentation is transferred with the machine from original owners to all subsequent owners.

JCB may deny warranty if the warranted part has failed due to abuse, neglect, improper maintenance or unapproved modifications (including tampering of machine hourmeter).

JCB accept no warranty liability for failure of emission control system equipment where the failure is attributed to use of a non-preferred grade of fuel as described in the machine operator manual supplied with this supplement.

JCB may refuse warranty if failure is attributed to accident damage, act of God or any event outside of JCB control. JCB may additionally refuse any warranty claim if the machine has under any owner operated outside the United States.

JCB is not to be held responsible for any loss of time, inconvenience or commercial loss attributable to any emissions control system warranty issue.

It is a violation of the EPA Clean Air Act to disable any emission control system certified by the US Environmental Protection Agency. Disabling of any emission control system will invalidate any emission control system warranty and may invalidate any further engine or machine warranties.

Replacement items which are not genuine JCB Service approved parts or authorized by JCB are excluded from the emission control system warranty.

Emission Control System Maintenance And Warranty Statement (EPA Regulated Territories Only)

Items Covered By Emissions System Warranty

Materials covered under the emissions control system warranty (where installed) are defined by the EPA:

1. Fuel Injection System (High Pressure)
2. Air Induction System
 - 2.1. Inlet tract
 - 2.2. Turbocharger
 - 2.3. Charge air cooling system
3. Exhaust System
 - 3.1. Exhaust manifold
 - 3.2. EGR (Exhaust Gas Recirculation) valve and EGR cooler
4. 4. Crankcase Ventilation System
 - 4.1. PCV valve (closed loop system)
 - 4.2. Oil filler cap

- 4.3. CCV (Crankcase Ventilation) filter
5. Advanced Oxides of Nitrogen (NOX) controls
 - 5.1. Selective catalyst reduction
 - 5.2. Reagent containers and dispensing systems
6. Electronic Control System
 - 6.1. Engine control unit (ECU)
 - 6.2. Sensors associated with emissions control
7. Miscellaneous Items Used in Above Systems
 - 7.1. Gaskets, pipework, hoses and fasteners associated with the above systems
 - 7.2. Emissions control information label

Emission Control System Maintenance And Warranty Statement (CARB)

California Emission Control Warranty Statement

Your Warranty Rights And Obligations

The California Air Resources Board and JCB Power Systems are pleased to explain the emission control system warranty on your 2020 model year engine. In California, new heavy-duty off-road engines must be designed, built and equipped to meet the State's stringent anti-smog standards. JCB Power Systems must warrant the emission control system on your engine for the periods of time listed below provided there has been no abuse, neglect or improper maintenance of your engine.

Your emission control system may include parts such as the fuel injection system and the air induction system. Also included may be hoses, belts, connectors and other emission-related assemblies.

Where a warrantable condition exists, JCB will repair your heavy-duty off-road engine at no cost to you including diagnosis, parts and labor.

Manufacturers Warranty Coverage

The 2020 model year heavy-duty off-road engines are warranted for 5 years or 3000 hours of operation. If any emission related part on your engine is defective, the part will be repaired or replaced by JCB.

Owner's Responsibilities:

- As the heavy-duty off-road engine owner, you are responsible for the performance of the required maintenance listed in your owner's manual. JCB recommends that you retain all receipts covering maintenance on your heavy-duty off-road engine, but cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance.
- As the heavy-duty off-road engine owner, you should however be aware that JCB may deny you warranty coverage if your heavy-duty off-road engine or a part has failed due to abuse, neglect, improper maintenance or unapproved modifications.
- Your engine is designed to operate on ultra-low sulfur diesel fuel only. Use of any other fuel may result in your engine no longer operating in compliance with California's emission requirements.
- You are responsible for initiating the warranty process. The CARB suggests that you present your heavy-duty off-road to a JCB dealer as soon as a problem exists. The warranty repairs should be completed by the dealer as expeditiously as possible.

If you have any questions regarding your warranty rights and responsibilities, you should contact JCB at 912-447-2000.

Items Covered By Emissions System Warranty

Materials covered under the emissions control system warranty (where installed) are defined by the CARB:

1. Fuel Injection System, comprising:
 - 1.1. High pressure fuel injection pump, including boost control device (smoke puff limiter)
 - 1.2. High pressure pipes
 - 1.3. Injectors
 - 1.4. Common rail assembly
2. Air Induction System
 - 2.1. Inlet manifold, gaskets and fasteners
 - 2.2. Turbocharger
 - 2.3. Charge air cooling system
3. Exhaust System
 - 3.1. Exhaust manifold, gaskets and fasteners
 - 3.2. EGR valve and coolers
4. 4. Advanced Oxides of Nitrogen (NOx) controls
 - 4.1. SCR (Selective Catalytic Reduction) components
 - 4.2. Reagent containers and dispensing systems
5. Positive Crankcase Ventilation System
 - 5.1. PCV valve
 - 5.2. Oil filler cap
6. Electronic Control System
 - 6.1. Engine control unit (ECU)
 - 6.2. Crank and camshaft position sensors
 - 6.3. Coolant and lubricant temperature sensors
 - 6.4. Inlet/exhaust manifold temperature/pressure sensor
 - 6.5. MAF (Mass Air Flow) sensor
 - 6.6. Sensor/injector wiring harness
7. Miscellaneous Items Used in Above Systems
 - 7.1. Block temperature sensor
 - 7.2. Breather and hose clips – closed loop systems
 - 7.3. Emission control information label