

# Service Manual

## JS 210 LC

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OF JCB SERVICE :

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## Introduction

This publication is designed for the benefit of JCB Distributor Service Engineers who are receiving, or have received, training by JCB Technical Training Department.

These personnel should have a sound knowledge of workshop practice, safety procedures, and general techniques associated with the maintenance and repair of hydraulic earthmoving equipment.

Renewal of oil seals, gaskets, etc., and any component showing obvious signs of wear or damage is expected as a matter of course. It is expected that components will be cleaned and lubricated where appropriate, and that any opened hose or pipe connections will be blanked to prevent excessive loss of hydraulic fluid and ingress of dirt. Finally, please remember above all else **SAFETY MUST COME FIRST!**

The manual is compiled in sections, the first three are numbered and contain information as follows:

- |          |   |                                                                                                            |
|----------|---|------------------------------------------------------------------------------------------------------------|
| <b>1</b> | = | <b>General Information</b> - includes torque settings and service tools.                                   |
| <b>2</b> | = | <b>Care &amp; Safety</b> - includes warnings and cautions pertinent to aspects of workshop procedures etc. |
| <b>3</b> | = | <b>Routine Maintenance</b> - includes service schedules and recommended lubricants for all the machine.    |

The remaining sections are alphabetically coded and deal with Dismantling, Overhaul etc. of specific components, for example:

- |          |   |                                     |
|----------|---|-------------------------------------|
| <b>A</b> | = | <b>Attachments</b>                  |
| <b>B</b> | = | <b>Body &amp; Framework ...etc.</b> |

The page numbering in each alphabetically coded section is not continuous. This allows for the insertion of new items in later issues of the manual.

Section contents, technical data, circuit descriptions, operation descriptions etc are inserted at the beginning of each alphabetically coded section.

All sections are listed on the front cover; tabbed divider cards align directly with individual sections on the front cover for rapid reference.

Where a torque setting is given as a single figure it may be varied by plus or minus 3%. Torque figures indicated are for dry threads, hence for lubricated threads may be reduced by one third.

### Colour Coding

The following colour coding, used on illustrations to denote various conditions of oil pressure and flow, is standardised throughout JCB Service publications.

~ Red - Full Pressure

Pressure generated from operation of a service. Depending on application this may be anything between neutral circuit pressure and M.R.V. operating pressure.

~ Pink - Pressure

Pressure that is above neutral circuit pressure but lower than that denoted by red.

~ Orange - Servo

Oil pressure used in controlling a device (servo).

~ Blue - Neutral

Neutral circuit pressure.

~ Green - Exhaust

. Light - Cavitation

Green Oil subjected to a partial vacuum due to a drop in pressure (cavitation).

. Yellow - Lock Up

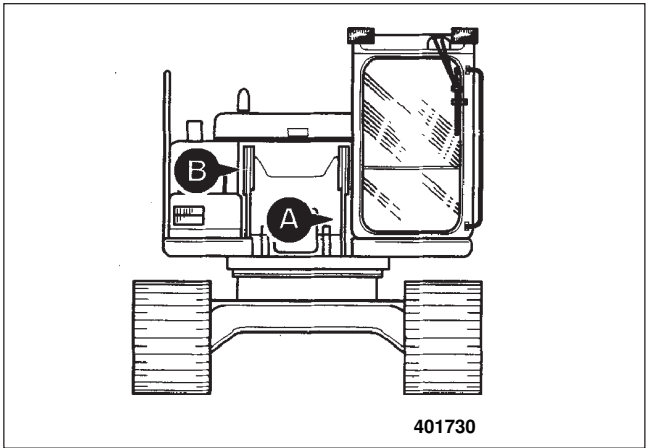
Oil trapped within a chamber or line, preventing movement of components (lock up).



A390940

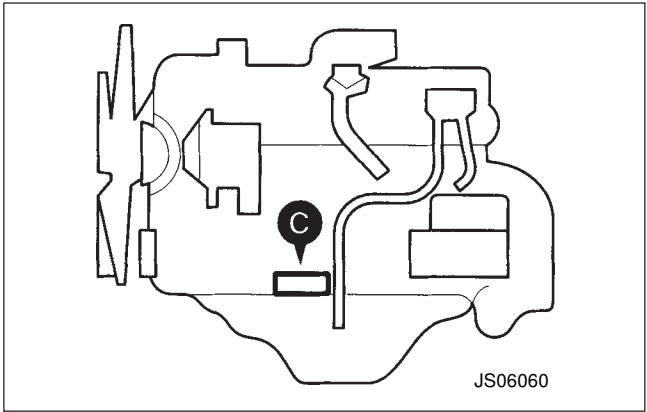
Machine Identification Plate

Your machine has an identification plate mounted outside the cab at **A**. The serial numbers of the machine and its major units are stamped on the plate.

The machine serial number is inscribed at **B** which is the base plate of the rear frame and the engine number is at **C**.



		JCB HEAVY PRODUCTS LTD UTTOXETER, STAFFS ST14 8TL, ENGLAND			
<input type="text"/>					
VIN      Vehicle Identification Number					
Product Identification Number	<input type="text"/>				
MACHINE WEIGHT kg	<input type="text"/>				
ENGINE SERIAL No.	<input type="text"/>				
ENGINE POWER kW RPM	<input type="text"/>				
CONSTRUCTION YEAR	<input type="text"/>				



Typical Vehicle  
Identification Number (VIN)

SLP      JS915      3      E      0 930000  
**A**      **B**      **C**      **D**      **E**

- A** World Manufacturer Identification
- B** Machine Model Code
- C** Year of Manufacture:
  - 2 = 2002
  - 3 = 2003
  - 4 = 2004
  - 5 = 2005
  - 6 = 2006
  - 7 = 2007
  - 8 = 2008
- D** Manufacturer Location (E = England)
- E** Product Identification Number (PIN)

Typical Engine  
Identification Number

6      BGI      145941  
**A**      **B**      **C**

- A** Engine Type "6 Cylinder"
- B** Build code
- C** Engine Identification Number

## Torque Settings

Use only where no torque setting is specified in the test. Values are for dry threads and may be within three per cent of the figures stated. For lubricated threads the values should be REDUCED by one third.

### UNF Grade 'S' Bolts

Bolt Size In	(mm)	Hexagon (A/F) In	Torque Settings		
			Nm	kgf m	lbf ft
1/4	(6.3)	7/16	14	1.4	10
5/18	(7.9)	1/2	28	2.8	20
3/8	(9.5)	9/16	49	5.0	36
7/16	(11.1)	5/8	78	8.0	58
1/2	(12.7)	3/4	117	12.0	87
9/16	(14.3)	13/16	170	17.3	125
5/8	(15.9)	15/16	238	24.3	175
3/4	(19.0)	11/8	407	41.5	300
7/8	(22.2)	15/8	650	66.3	480
1	(25.4)	11/2	970	99.0	715
1 1/4	(31.7)	1 7/8	1940	198.0	1430
1 1/2	(38.1)	2 1/4	3390	345.0	2500

### Metric Grade 8.8 Bolts

Bolt Size	(mm)	Hexagon (A/F) mm	Torque Settings		
			Nm	kgf m	lbf ft
M5	(5)	8	7	0.7	5
M6	(8)	10	12	1.2	9
M8	(8)	13	28	3.0	21
M10	(10)	17	56	5.7	42
M12	(12)	19	98	10	72
M16	(16)	24	244	25	180
M20	(20)	30	476	48	352
M24	(24)	36	822	84	607
M30	(30)	46	1633	166	1205
M36	(36)	55	2854	291	2105

### Rivet Nut Bolts/Screws

Bolt Size	(mm)	Torque Settings (for steel rivet nuts)		
		Nm	kgf m	lbf ft
M3	(3)	1.2	0.12	0.9
M4	(4)	3.0	0.3	2.0
M5	(5)	6.0	0.6	4.5
M6	(6)	10.0	1.0	7.5
M8	(8)	24.0	2.5	18.0
M10	(10)	48.0	4.9	35.5
M12	(12)	82.0	8.4	60.5

**Note :** All bolts used on JCB machines are high tensile and must not be replaced by bolts of a lesser tensile specification.

CONTENTS	PAGE NO.
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Safety Decals	1 - 7

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

### **DANGER**

**Denotes an extreme hazard exists. If proper precautions are not taken, it is highly probable that the operator (or others) could be killed or seriously injured.**  
INT-1-2-1

### **WARNING**

**Denotes a hazard exists. If proper precautions are not taken, the operator (or others) could be killed or seriously injured.**  
INT-1-2-2

### **CAUTION**

**Denotes a reminder of safety practices. Failure to follow these safety practices could result in injury to the operator (or others) and possible damage to the machine.**  
INT-1-2-3

All construction and agricultural equipment can be hazardous. When a JCB Excavator is correctly operated and properly maintained, it is a safe machine to work with. But when it is carelessly operated or poorly maintained it can become a danger to you (the operator) and others.

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

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

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

### **Remember**

BE CAREFUL  
BE ALERT  
BE SAFE

GEN-1-6

As well as the warnings in the following pages, specific warnings are given throughout the book. This section is designed to give a safety code for use of the machine generally and for operation and maintenance practices.

Note: This section includes a certain amount of operating safety information. But remember that whenever you drive the machine or operate its controls, you are in effect a machine operator. Therefore you should read and understand the information given in the Operator Handbook before driving the machine or operating its controls.

## **General Safety**

### **⚠ WARNING**

#### **Handbook**

You and others can be injured if you operate or maintain the machine without first studying this handbook. Read the safety instructions before operating the machine. If you do not understand anything, ask your employer or JCB distributor to explain it. Keep this handbook clean and in good condition. Do not operate the machine without a handbook in the cab, or if there is anything on the machine you do not understand.

INT-1-3-2

### **⚠ WARNING**

#### **Decals**

You can be injured if you do not obey the decal safety instructions. Keep decals clean. Replace unreadable or missing decals with new ones before operating the machine. Make sure replacement parts include warning decals where necessary.

INT-1-3-4

### **⚠ WARNING**

#### **Care and Alertness**

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

INT-1-3-5

### **⚠ WARNING**

#### **Alcohol and Drugs**

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

INT-1-3-9

### **⚠ WARNING**

#### **Clothing**

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

INT.1.3.6

### **⚠ WARNING**

#### **Lifting Equipment**

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

INT.1.3.7

### **⚠ WARNING**

#### **Raised Equipment**

Raised equipment can fall and injure you. Do not walk or work under raised equipment unless safely supported.

13-1.1-6

### **⚠ DANGER**

Before removing the boom from the machine, ensure that the counterweight is adequately supported as in certain ground conditions the machine could tip backwards. Never travel or transport the machine with the boom removed.

BF6-3

## Operating Safety

### WARNING

#### Practice

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

INT-2-1-1

### WARNING

#### Machine Condition

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

INT-2-1-2

### CAUTION

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

5-5-1-1

### WARNING

#### Entering/Leaving

Always face the machine when entering and leaving the cab. Use the step(s) and handrails. Make sure the step(s), handrails and your boot soles are clean and dry. Do not jump from the machine. Do not use the machine controls as handholds, use the handrails.

INT-2-1-7

### WARNING

#### Controls

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

INT-2-1-3

### WARNING

#### Visibility

Accidents can be caused by working in poor visibility. Keep windows clean and use your lights to improve visibility. Do not operate the machine if you cannot see properly.

INT-2-1-11

### WARNING

#### Machine Limits

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

INT-2-1-4

### WARNING

#### Exhaust Gases

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

INT-2-1-10

### DANGER

#### Sparks

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

INT -2-2-10

### WARNING

#### Engine

The engine has exposed rotating parts. Do not open the engine cover while the engine is running. Do not use the machine with the cover open.

INT-2-1-6/1

### WARNING

#### Passengers

Passengers in or on the machine can cause accidents. The JCB Excavator is a one man machine. Do not carry passengers.

INT -2-2-2

### WARNING

#### Safe Working Loads

Overloading the machine can damage it and make it unstable. Study the lifting and/or digging specifications in this handbook before using the attachment.

INT-2-2-11/1

### WARNING

The Long Reach is larger and higher than a normal excavating rig. You must take extra care when you are working in dangerous or restricted height locations such as under power lines, bridges, etc.

8-2-8-10

## Operating Safety (cont'd)

### CAUTION

Because of the extra length and height of the Long Reach boom and dipper, you must be very careful when slewing. Do not slew quickly and strike the dipper against any obstacle. You may cause severe damage to the rig structure.

8-2-8-11

### WARNING

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

5-3-1-12/2

### WARNING

#### Electrical Power Cables

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

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

#### Buried Electric Power Cables

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

#### Overhead Electric Power Cables

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

2-2-5-4

### CAUTION

With certain combinations of bucket or attachment and boom/dipper configuration, it is possible for the bucket teeth or attachment extremities to contact and cause damage to the structure of the machine. Check the limit of free movement as the dipper is brought in towards the machine.

8-2-5-2

### WARNING

#### Hazardous Atmospheres

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

INT-2-1-14

## Maintenance Safety

### WARNING

#### Modifications and Welding

Non-approved modifications can cause injury and damage. Parts of the machine are made from cast iron; welds on cast iron can weaken the structure and break. Do not weld cast iron. Contact your JCB distributor for advice before modifying the machine.

INT-3-1-2/1

### WARNING

#### Electrical Circuits

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

INT-3-1-4

### WARNING

#### Diesel Fuel

Diesel fuel is flammable; keep naked flames away from the machine. Do not smoke while refuelling the machine or working on the engine. Do not refuel with the engine running. There could be a fire or injury if you do not follow these precautions.

INT-3-2-2

### WARNING

#### Oil

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

NT-3-2-3

### WARNING

#### Hydraulic Fluid

Fine jets of hydraulic fluid at high pressure can penetrate the skin. Do not use your fingers to check for hydraulic fluid leaks. Do not place your face close to suspected leaks. Hold a piece of cardboard close to suspected leaks and then inspect the cardboard for signs of hydraulic fluid. If hydraulic fluid penetrates the skin, get medical help immediately.

INT-3-1-10/1

### WARNING

#### Hydraulic Pressure

Hydraulic fluid at system pressure can injure you. Before disconnecting or connecting hydraulic hoses, stop the engine and operate the controls to release pressure trapped in the hoses. Make sure the engine cannot be started while the hoses are open.

INT-3-1-11/1

### WARNING

#### Fires

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

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

INT-3-2-7/1

### WARNING

#### Hot Coolant

The cooling system is pressurised when the engine is hot. Hot coolant can spray out when you remove the filler cap. Let the system cool before removing the filler cap. To remove the cap; turn it to the first notch and let the steam pressure escape, then remove the cap.

INT-3-2-9/1

### CAUTION

#### Cleaning

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

INT-3-2-11

### WARNING

#### Soft Ground

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

INT-3-2-4

### CAUTION

#### Rams

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

INT-3-2-10

### WARNING

#### Hydraulic Hoses

Damaged hoses can cause fatal accidents.

Inspect the hoses regularly for:

Damaged end fittings

Chafed outer covers

Ballooned outer covers

Kinked or crushed hoses

Embedded armouring in outer covers

Displaced end fittings.

INT-3-3-2

**Maintenance Safety (cont'd)****⚠ CAUTION****'O' rings, Seals and Gaskets**

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

INT-3-2-12

**⚠ WARNING****Battery**

A battery with frozen electrolyte can explode if it is used or charged. Do not use a machine with a frozen battery. To help prevent the battery from freezing, keep the battery fully charged.

INT-3-1-7

**⚠ WARNING****Battery Gases**

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

INT-3-1-8

**⚠ WARNING****Battery Terminals**

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

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

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

INT-3-1-9

**⚠ CAUTION**

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

8-3-4-8

**⚠ WARNING****Petrol**

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

INT-3-1-6

**⚠ WARNING****Arc Welding**

Before carrying out any arc welding on the machine, completely remove the Control Computer and The Display Monitor to avoid damage to the circuits; also disconnect the alternator and battery leads.

When welding items to the mainframe make sure that the earth clamp is positioned on the mainframe and when welding to the undercarriage make sure that the earth clamp is positioned on the undercarriage. If you earth one and weld the other, you may cause severe damage to the slew ring.

Always connect the earth clamp to any other component being welded, i.e. boom or dipper, to avoid damage to pivot pins and bushes.

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**⚠ WARNING****Repairs**

Do not try to do repairs or any other type of maintenance work you do not understand. Get a Service Manual from your JCB distributor, or get the work done by a specialist engineer.

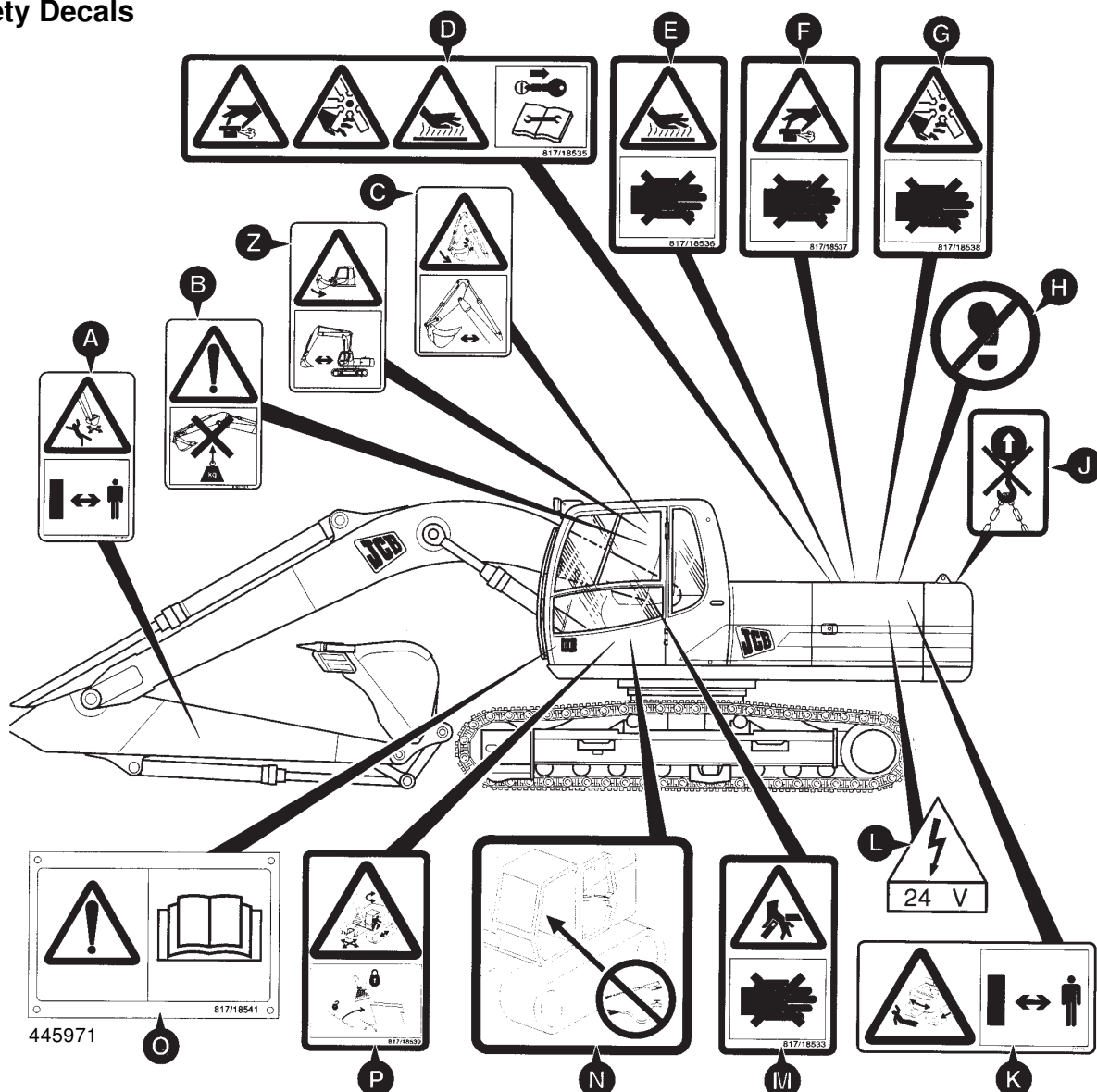
INT-3-1-1

**⚠ WARNING****Metal Splinters**

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

INT-3-1-3

## Safety Decals



LABEL	PART No.	DEFINITION
A	817/18542	Warning, Arm or bucket may move; Keep clear.
B	JLP0283	Warning, Do not use excavator for lifting loads.
C	JRP0142	Warning, Bucket can foul the boom when dipper is swinging inwards. 'Supershort' booms only.
D	817/18535	1-Warning, Coolant under pressure. 2-Warning, Risk of severing hands/fingers in rotating parts.
E	817/18536	3-Warning, Hot surfaces. 4-Remove ignition key and refer to operator handbook and maintenance manual.
F	817/18537	Warning, Hot surfaces; Keep hands away.
G	817/18538	Warning, High pressure and hot coolant system; Keep hands away.
H	817/18566	Warning, Risk of severing finger/hand in rotating parts; Keep hands away.
J	JHP0121	Do not walk or place any body weight on this part.
K	817/18528	Warning, Do not lift machine here.
L	817/02370	Warning, 24V.
M	817/18533	Warning, Risk of trapping fingers/hand in door; Keep hands away.
N	JHP0111	Warning, No hosing or jet washing in cab.
P	817/18539	Warning, Unexpected movement of part or whole machine; Move lock lever to the lock position.
Q	817/18541	Warning, Read the operation and maintenance manual.



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