Service Manual

JS200, JS210, JS220, JS240, JS260

Section 1 - General Information

Section 2 - Care and Safety

Section 3 - Routine Maintenance

Section B - Body & Framework

Section C - Electrics

Section E - Hydraulics

Section F - Transmission

Section J - Track and Running Gear

Section K - Engine



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Contents **Page No.**

Introduction
About this Publication ..... 1 - 1
Schematic Codes ..... 1 - 2
Colour Codes ..... 1 - 2

Identifying your Machine
Identifying Your Machine ..... 1 - 3
Data Plate ..... 1 - 3
Typical Product Identification Number (PIN) ..... 1 - 3
Typical Engine Identification Number ..... 1 - 4

Torque Settings
Zinc Plated Fasteners and Dacromet Fasteners ..... 1 - 5
Introduction ..... 1 - 5
Bolts and Screws ..... 1 - 5
Hydraulic Connections ..... 1 - 9
'O' Ring Face Seal System ..... 1 - 9
'Torque Stop' Hose System ..... 1 - 12

Service Tools
Numerical List Section B - Body and Framework ..... 1 - 13
Tool Detail Reference Section B - Body and Framework ..... 1 - 14
Numerical List Section C - Electrics ..... 1 - 17
Tool Detail Reference Section C - Electrics ..... 1 - 18
Numerical List Section E- Hydraulics ..... 1 - 20
Tool Detail Reference Section E- Hydraulics ..... 1 - 22
Inserting seal ring and correction jig ..... 1 - 29
Jig for pulling out, press-fitting bushing ..... 1 - 30
Jig for press-fitting wiper ring ..... 1 - 30
Jig for inserting cylinder head ..... 1 - 30
Seal Ring and Connector Jig ..... 1 - 30
Bush Removal Jig ..... 1 - 30
Bush Fitting Jig ..... 1 - 31
Wiper Ring Fitting Jig ..... 1 - 31
Wiper Ring Fitting Jig ..... 1 - 31
Numerical List Section F - Transmission ..... 1 - 32
Tool Detail Reference Section F - Transmission ..... 1 - 33

Service Consumables
Sealing and Retaining Compounds ..... 1 - 36

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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 dealer 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

Decals on the machine warn you of particular hazards. You can be injured if you do not obey the decal safety instructions.

Each decal is attached close to a part of the machine where there is a possible hazard. Make sure replacement parts include warning decals where necessary.

Keep all decals clean and readable. Replace lost or damaged decals. Each decal has a part number printed on it, use this number to order a new decal from your JCB distributor.

INT-3-3-3_1

⚠ 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.

BF-6-3

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Pre Start Cold Checks, Service Points and Fluid Levels

	Operation	10	50	250	500	1000	2000	4000	5000
ENGINE									
Oil level	- Check	☐	☐	☐	☐	☐	☐	☐	☐
Oil and Filter	- Change				☐	☐	☐	☐	☐
Oil Bypass Filter (if fitted)	- Change				☐	☐	☐	☐	☐
Oil	- Sample					☐	☐	☐	☐
Pre Cleaner (if fitted)	- Clean			☐	☐	☐	☐	☐	☐
Air Cleaner Outer Element	- Change					☐	☐	☐	☐
Air Cleaner Inner Element	- Change						☐	☐	
Air Cleaner Dust Valve	- Check and Clean			☐	☐	☐	☐	☐	☐
Fuel Level	- Check	☐	☐	☐	☐	☐	☐	☐	☐
Fuel Filter Element	- Change				☐	☐	☐	☐	☐
Fuel Tank - Water and Sediment	- Drain		☐	☐	☐	☐	☐	☐	☐
Lift Pump Strainer (1)	- Clean				☐	☐	☐	☐	☐
Coolant Quality/Level	- Check	☐	☐	☐	☐	☐	☐	☐	☐
Coolant	- Change							☐	
Fuel Sedimenter	- Drain		☐	☐	☐	☐	☐	☐	☐
Fuel Sedimenter	- Clean		☐	☐	☐	☐	☐	☐	☐
Fuel Sedimenter - filter	- Change				☐	☐	☐	☐	☐
Fuel Filler Cap	- Check and Clean			☐	☐	☐	☐	☐	☐
Fuel Filler Cap (Dusty conditions)	- Check and Clean		☐	☐	☐	☐	☐	☐	☐
Fan Belt Tension/Condition	- Check			☐	☐	☐	☐	☐	☐
Valve Clearances	- Check and Adjust					☐	☐	☐	☐
Engine Mounting Bolts for Tightness	- Check				☐	☐	☐	☐	☐
Exhaust System Security	- Check				☐	☐	☐	☐	☐
Air Inlet System Security	- Check			☐	☐	☐	☐	☐	☐
Radiator	- Clean and Check			☐	☐	☐	☐	☐	☐
TRANSMISSION									
Security of Mounting Bolts and Nuts	- Check				☐	☐	☐	☐	☐
Track Gearbox Oil Level	- Check			☐	☐	☐	☐	☐	☐
Slew Gearbox Oil Level	- Check			☐	☐	☐	☐	☐	☐

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Identifying your Machine

Identifying Your Machine

Data Plate

Your machine has a Data Plate, located on the outside of the cab as shown at **A**. The machine serial number is inscribed at **B** which is the baseplate of the rear frame and the engine number is at **C**.

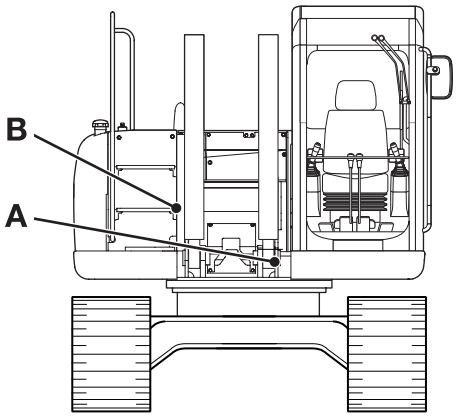


Fig 1.

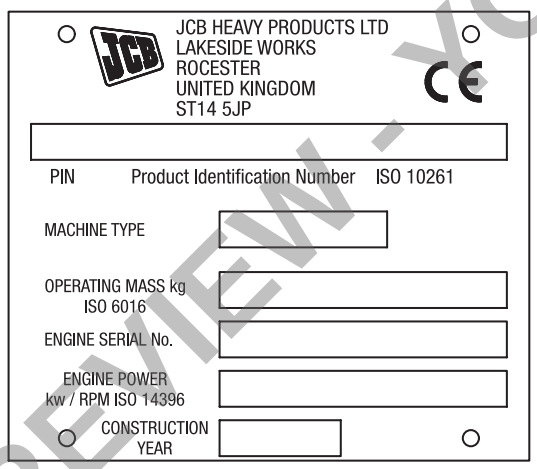


Fig 2.

Typical Product Identification Number (PIN)

1	2	3	4	5
JCB	JS13C	C	6	1018354

1 World Manufacturer Identification (JCB)

2 Machine Type and Model (JS13C = JS130 Tracked)

3 Randomly generated check letter.

4 Year of Manufacture (1 = 2001, 2 = 2002, 3 = 2003, 4 = 2004, 5 = 2005, 6 = 2006)

5 Machine Serial Number (1018354)

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Torque Settings

Zinc Plated Fasteners and Dacromet Fasteners

T11-002

Introduction

Some external fasteners on JCB machines are manufactured using an improved type of corrosion resistant finish. This type of finish is called Dacromet and replaces the original Zinc and Yellow Plating used on earlier machines.

The two types of fasteners can be readily identified by colour and part number suffix. ⇨ *Table 1. Fastener Types (1-5)*.

Table 1. Fastener Types

Fastener Type	Colour	Part No. Suffix
Zinc and Yellow	Golden finish	'Z' (e.g. 1315/3712Z)
Dacromet	Mottled silver finish	'D' (e.g. 1315/3712D)

Note: *As the Dacromet fasteners have a lower torque setting than the Zinc and Yellow fasteners, the torque figures used must be relevant to the type of fastener.*

Note: *A Dacromet bolt should not be used in conjunction with a Zinc or Yellow plated nut, as this could change the torque characteristics of the torque setting further. For the same reason, a Dacromet nut should not be used with a Zinc or Yellow plated bolt.*

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

Note: *Dacromet bolts, due to their high corrosion resistance are used in areas where rust could occur. Dacromet bolts are only used for external applications. They are not used in applications such as gearbox or engine joint seams or internal applications.*

Bolts and Screws

Use the following torque setting tables only where no torque setting is specified in the text.

Note: *Dacromet fasteners are lubricated as part of the plating process, do not lubricate.*

Torque settings are given for the following conditions:

Condition 1

- Un-lubricated fasteners
- Zinc fasteners
- Yellow plated fasteners

Condition 2

- Zinc flake (Dacromet) fasteners
- Lubricated zinc and yellow plated fasteners
- Where there is a natural lubrication. For example, cast iron components

Verbus Ripp Bolts

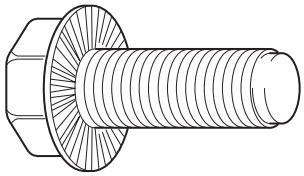


Fig 4.

Torque settings for these bolts are determined by the application. Refer to the relevant procedure for the required settings.

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JS200/210/220/235HD and Variants

Item	Lubricant	International Specification	Capacity
ENGINE	⇨ *Engine Lubrication Chart (3-19)*		21.5 litres (4.7 UK gal) (5.6 US gal)
TRACK GEARBOX	JCB HD90 Gear Oil	API-GL-5, MIL-L-2105	2 x 4.7 litres (2 x 1 UK gal) (2 x 1.2 US gal)
SLEW GEARBOX	JCB HD90 Gear Oil	API-GL-5, MIL-L-2105	5 litres (1.1 UK gal) (1.3 US gal))
TRACK ROLLERS AND IDLER WHEEL	JCB HD90 Gear Oil	API-GL-5, MIL-L-2105	
RECOIL SPRING CYLINDER	JCB Special HP Grease	Lithium complex (NLGI) inc.extreme pressure additives	
HYDRAULIC SYSTEM	JCB Hydraulic Fluid 46	ISO VG46	200 litres (44 UK gal) (52.8 US gal)
SLEW RING - BEARING - GEAR TEETH	 JCB Special HP Grease JCB Special HP Grease	 Lithium complex (NLGI) inc. extreme pressure additives Lithium complex (NLGI) inc. extreme pressure additives	 -- 17 kg (37.5 lb)
ALL OTHER GREASE POINTS	JCB Special HP Grease	Lithium complex (NLGI) inc. extreme pressure additives	--
COOLING SYSTEM	JCB HP Coolant ⇨ *Coolant Mixtures (3-45)*	ASTM D - 6210	25.5 litres (5.6 UK gal) (6.7 US gal)
FUEL TANK	⇨ *Types of Fuel (3-46)*		343 litres (75.5 UK gal) (90.6 US gal)

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11 Accumulator - Check charge

a Extend dipper and raise boom.

b Apply emergency stop.

c Operate boom down function.

d Ensure boom lowers to the ground under its own weight.

12 Bucket and Linkage.

a Check the bucket teeth and side cutter for looseness, wear and breakage.

b Check the lubrication of the linkage **K** and surrounding parts. Check to see if the bucket side play is within allowable range. (Refer to the Bucket Section for side play adjustment.)

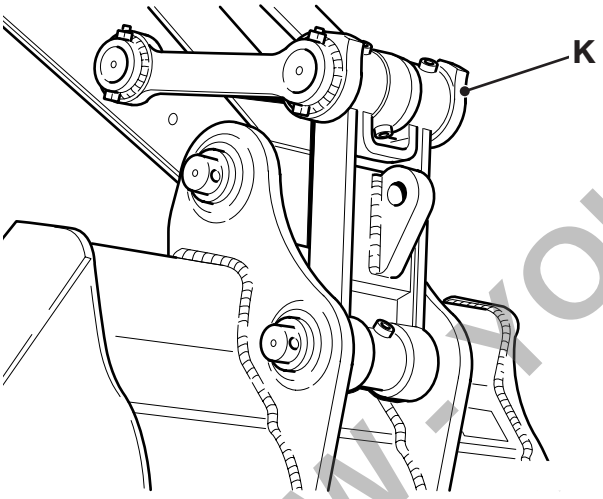


Fig 5.

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Bush Fitting Jig

WDB 2166	Bush press fitting jig
WDB 2166-1	Retainer
Note: *The above Part no. is applicable to a rod diameter of 80mm*	

Wiper Ring Fitting Jig

WDB 2166-1	Wiper Ring fitting
Note: *The above Part no. is applicable to a rod diameter of 80mm*	

Wiper Ring Fitting Jig

WDB 2174	Cylinder Head insertion guide jig
Note: *The above Part no. is applicable to a rod diameter of 80mm*	

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Table 14. Exhaust gas from engine is white or blue

Cause	Remedy
Excessive oil consumption	Disassemble and repair, replace parts(1)
Excessively low oil viscosity	Replace with correct oil
Excessive cooling by radiator	Adjust
Improper fuel injection timing	Adjust or replace if necessary(1)
Low compression	Disassemble and repair, replace parts(1)

Table 15. Exhaust gas from engine is black or dark grey

Cause	Remedy
Improper fuel	Replace with correct fuel
Improper valve clearance	Adjust
Defective fuel injection pump	Adjust or replace if necessary(1)
Low compression	Disassemble and repair, replace parts(1)
Insufficient air intake (air cleaner clogged)	Clean or replace the element

Table 16. Excessive fuel consumption

Cause	Remedy
Defective fuel injection pump	Adjust or replace if necessary(1)
Improper spray from fuel injection nozzle	Adjust or replace if necessary(1)
Improper fuel injection timing	Adjust or replace if necessary(1)
Improper fuel	Replace with correct fuel
Low compression	Disassemble and repair, replace parts(1)
Insufficient air intake	Clean or replace element

Table 17. Excessive engine oil consumption

Cause	Remedy
Excessive oil	Drain oil to proper level
Low oil viscosity	Replace with oil of viscosity matching temperature
Oil leakage	Retighten and replace parts if necessary
Worn cylinder piston rings	Disassemble and repair, replace parts(1)

Table 18. Abnormal noise (fuel or mechanical)

Cause	Remedy
Bad fuel	Replace
Damage inside muffler	Replace

Table 19. Engine overheating (water temperature reads too high)

Cause	Remedy
Low coolant	Refill
Water leakage	Repair

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Engine

Checking the Oil Level

1 Open the engine compartment.

2 Check the oil level.

a Locate the dipstick **A** and remove. Oil should be between the two marks. Add oil if necessary through filler **B**. Use only the recommended oil ⇨ *Lubricants and Capacities (3-16)*. Re-check the oil level about 10-15 minutes after refilling.

b Make sure that the dipstick and filler cap are secure.

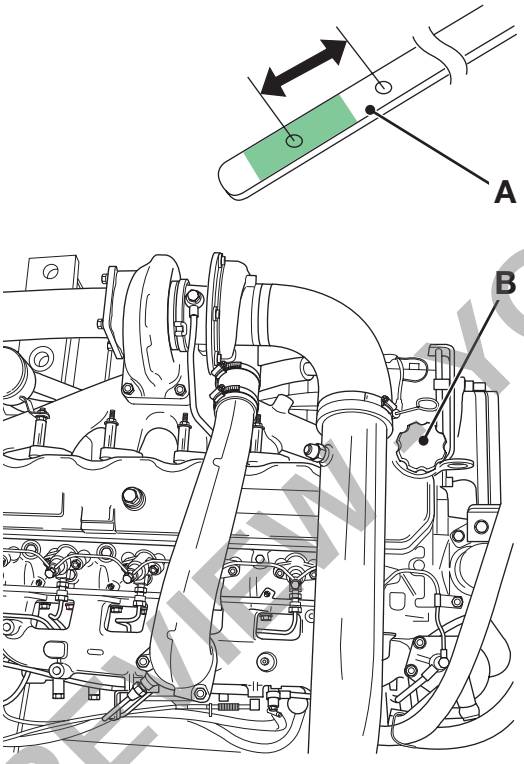


Fig 24.

Changing the Oil and Filter

⚠ CAUTION

Hot oil and engine components can burn you. Make sure the engine is cool before doing this job.

2-3-3-2

1 Prepare the machine. Park the machine on level ground. Lower the bucket to the ground.

2 Stop the engine.

a Remove the starter key.

b Let the engine stand until it is warm. Do not check the oil straight after the engine has stopped, the oil level indicated will actually be lower than it is.

3 Drain the oil

a Remove the belly plate

b Place an oil collecting container of suitable size beneath the engine sump drain point.

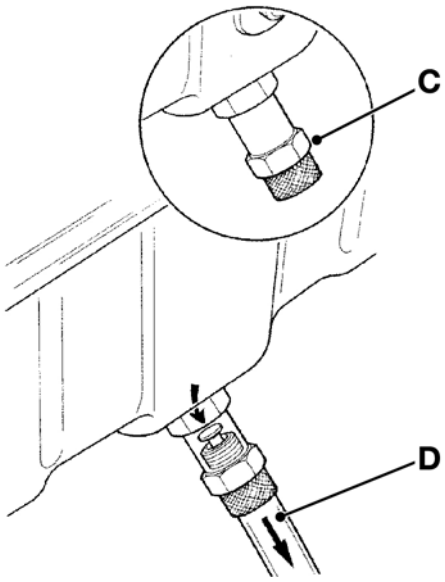


Fig 25.

c Remove the self sealing drain plug outer cover **C**.

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Bucket and Dipper Installation

Equipment Name. For Location, ⇒ *Location (B-17)*.	Part Name	Code	Standard Value (mm)		Service limit (mm)	
			JS200-JS220	JS240 - JS260	JS200-JS220	JS240 - JS260
L. Bucket and Dipper installation	Bucket	a	307	326	313	323
	Dipper	b	306	325	304	323
	Clearance	c	1.0-3.5	1.0-3.5	Shim for Adjustment	
					KRV1159	KBV0713
	Bushing (Bucket)	d	16	16	8	8
	Pin	e	ø80	ø90	ø79	ø89
	Bushing (Bucket)	f	ø80	ø90	ø81.5	ø91.5
	Bushing (Bucket)	g	ø80	ø90	ø81.5	ø91.5

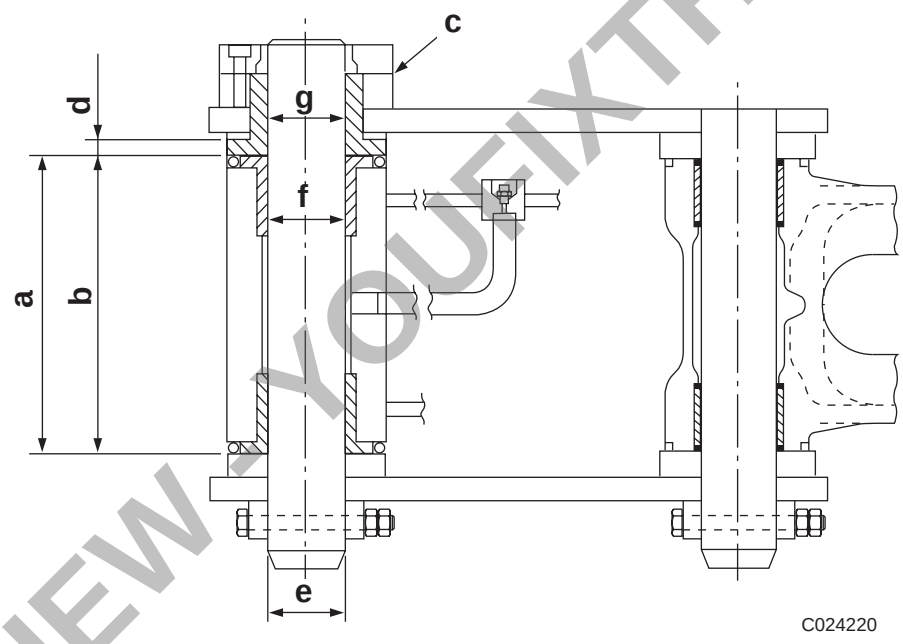


Fig 12.

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Troubleshooting

To extend the service life and improve the operation of the machine, daily inspection and lubrication are necessary as well as immediately isolating any problem found and dealing with it. If the machine is operated with the problem uncorrected, it may lead to larger trouble and possibly to a big accident.

If trouble occurs, search for the cause in the items below and make adjustments, repairs, etc. as necessary. If the cause cannot be isolated, contact your JCB distributor.

Engine and Related Area

Table 11. Engine does not start

Cause	Remedy
Defective starter switch	Connect, repair connection
Defective rotation of starter (Starter rotates slowly)	Discharged battery, starter problems, contaminated or loose wiring connection
Improper viscosity of engine oil	Inspect and replace as necessary
Excessive cooling of engine (Cold weather)	Preheat with air heater. Warm up the coolant (add hot water)
Possible seizure in engine	Repair(1)
Incomplete air bleeding of fuel system	Completely bleed air
No fuel in fuel tank	Refill
Fuel quality unsuitable	Inspect and replace as necessary
Fuel filter clogged	Clean or replace
Low compression	Repair(1)
Defective fuel injection pump	Repair(1)

Table 12. Engine stops during operation

Cause	Remedy
No fuel in fuel tank	Refill
Fuel filter clogged	Clean and replace
Air is mixed in the fuel system	Retighten fuel pipe connections and bleed system

Table 13. Low oil pressure

Cause	Remedy
Low oil	Refill
Defective oil pressure switch	Replace(1)
Oil filter clogged	Replace element
Low oil viscosity	Replace with oil of viscosity matching temperature
Improper operation of oil pump	Replace parts(1)
Oil leakage at connections	Tighten connections

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Contents **Page No.**

Safety Check List
Safety Notices ..... 2 - 1
Safety - Yours and Others ..... 2 - 2
General Safety ..... 2 - 3
Operating Safety ..... 2 - 4
Maintenance Safety ..... 2 - 6
Safety Decals ..... 2 - 9
Safety Decal Recognition ..... 2 - 10
Chart Definitions ..... 2 - 12

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Seat Belt

Checking the Seat Belt Condition and Security

WARNING

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

2-3-1-7_1

Inspect the seat belt for signs of fraying and stretching. Check that the stitching is not loose or damaged. Check that the buckle assembly is undamaged and works correctly.

Check that the belt mounting bolts are undamaged, correctly fitted and tightened.

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Key

1	Bucket	20	Lower Roller
2	Bucket Link	21	Upper Roller
3	Dipper Link	22	Recoil Spring
4	Bucket Ram	23	Idler Wheel
5	Dipper	24	Front Attachment Pin
6	Dipper Ram	25	Engine Oil Pan
7	Boom	26	Servo (Pilot Line) Filter
8	Boom Ram	27	Fuel Filter
9	Operator’s Cab	28	Engine Oil Filter
10	Slew Gearbox	29	Return Filter
11	Fuel Tank	30	Suction Strainer
12	Hydraulic Oil Tank	31	Drain Line Filter
13	Battery	32	Air Filter
14	Air Cleaner	33	Air Breather
15	Engine and Radiator	34	Plexus Filter
16	Counterweight	35	Breaker Filter
17	Slew Ring	36	Hydraulic Pump
18	Track Plate	37	Main Valve block
19	Track Gearbox		

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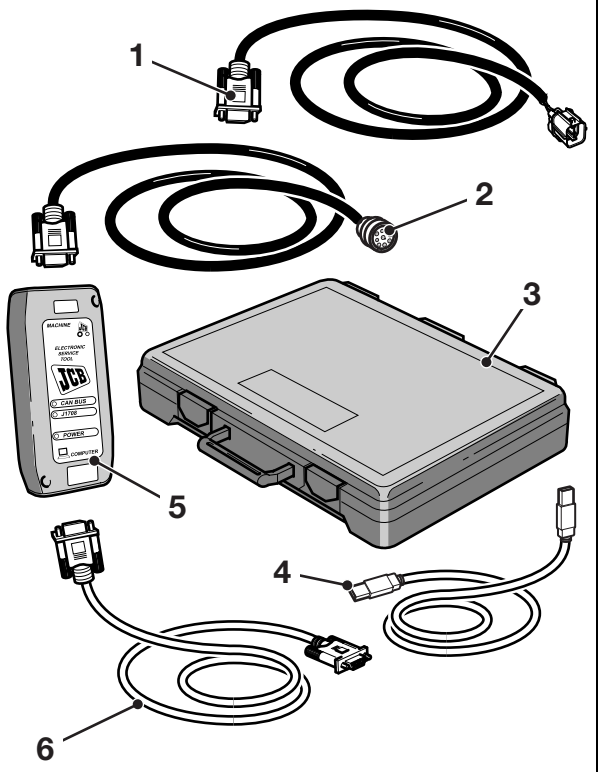


Fig 24. 892/01174

1	Interconnecting cable, DLA to machine ECU diagnostics socket.
2	Interconnecting cable, DLA to machine ECU diagnostics socket.
3	Kit carrying case.
4	Interconnecting cable, DLA to laptop PC.
5	Data Link Adaptor (DLA), enables data exchange between the machine ECU (Electronic Control Unit) and a laptop PC loaded with the applicable diagnostics software.
6	Interconnecting cable, DLA to laptop PC.

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Servo Isolator

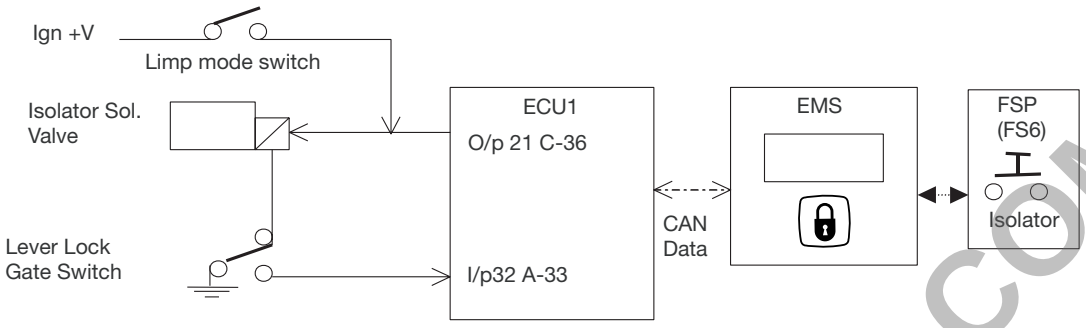


Fig 73.

Operation

The operator has the ability to isolate the excavator controls by pressing the isolator switch on the facia switch panel.

When the Isolator switch is pressed both the warning Lamp and the switch status indicator are illuminated. ECU1 now de-energises the output to the isolator solenoid valve (O/p C 36).

A second press of the isolator switch extinguishes both the warning lamp and the switch status indicator. ECU1 now energises the isolator output (O/p C 36) and provided the lever lock is in the correct position, operation of the excavator controls is possible

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Changing the Plexus Filter

1 Prepare the machine. Position the machine on level ground. Stop the engine. Remove the starter key.

2 Locate the plexus filter. ***See Machine Description in Introduction section***.

3 Release tank pressure, ⇨ ***Releasing Tank Pressure (3-54)***

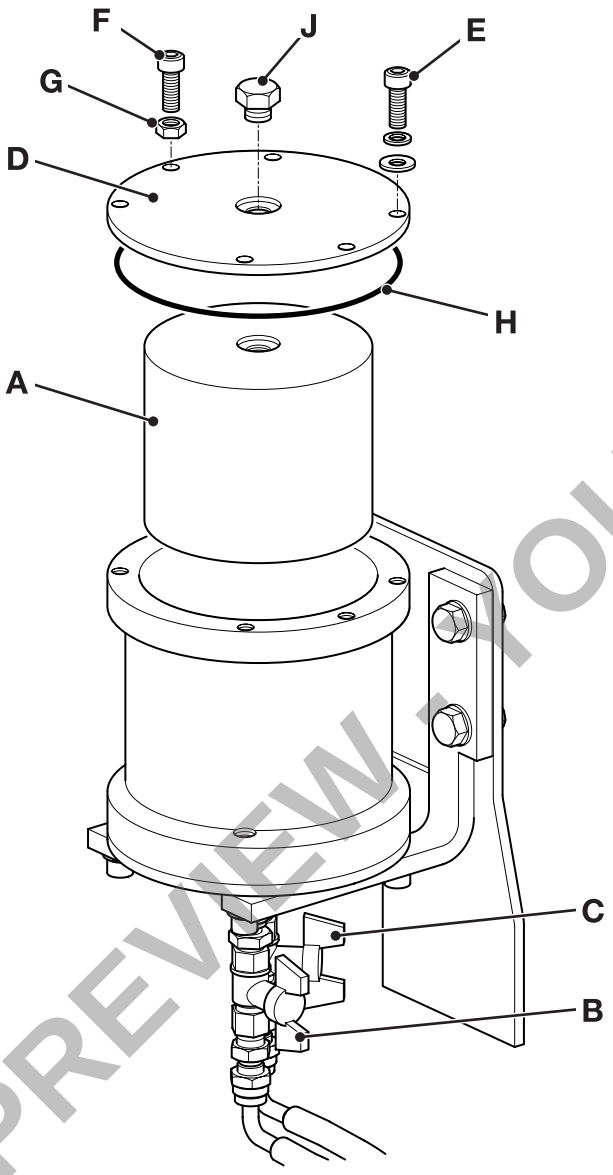


Fig 43.

4 Remove the plexus filter **A**.

a Close the two filter case cocks **B** and **C** by turning them to position **X**.

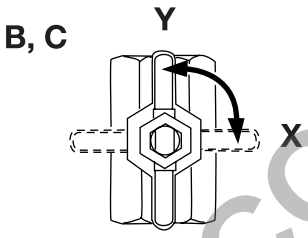


Fig 44.

b Remove bolts and washers **E**.

c Slacken the nuts **G** and insert the screws **F** to lift off the cover **D**.

d Remove the cover **D** and remove the O-ring **H**.

e Lift up the Plexus filter **A** carefully and remove. Take care not to drop any sediment.

5 Fit a new element

a Slowly immerse the new Plexus filter **A**. Install the O-ring **H**, cover **D**, nuts **G** and bolts **F** and bolts **E**.

b Torque tighten bolts **E** to 20Nm (14.75 lbf ft)

c Open the cocks **B** and **C** by turning them to position **Y**.

6 Priming the plexus filter

a Start the engine and set at low idling, loosen plug **J**, then tighten the plug when hydraulic oil flows out.

b Stop the engine, check the hydraulic oil level and top-up if low, ⇨ ***Topping-up Fluid Level (3-54)***

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ECU 1 Supply to Output Drivers

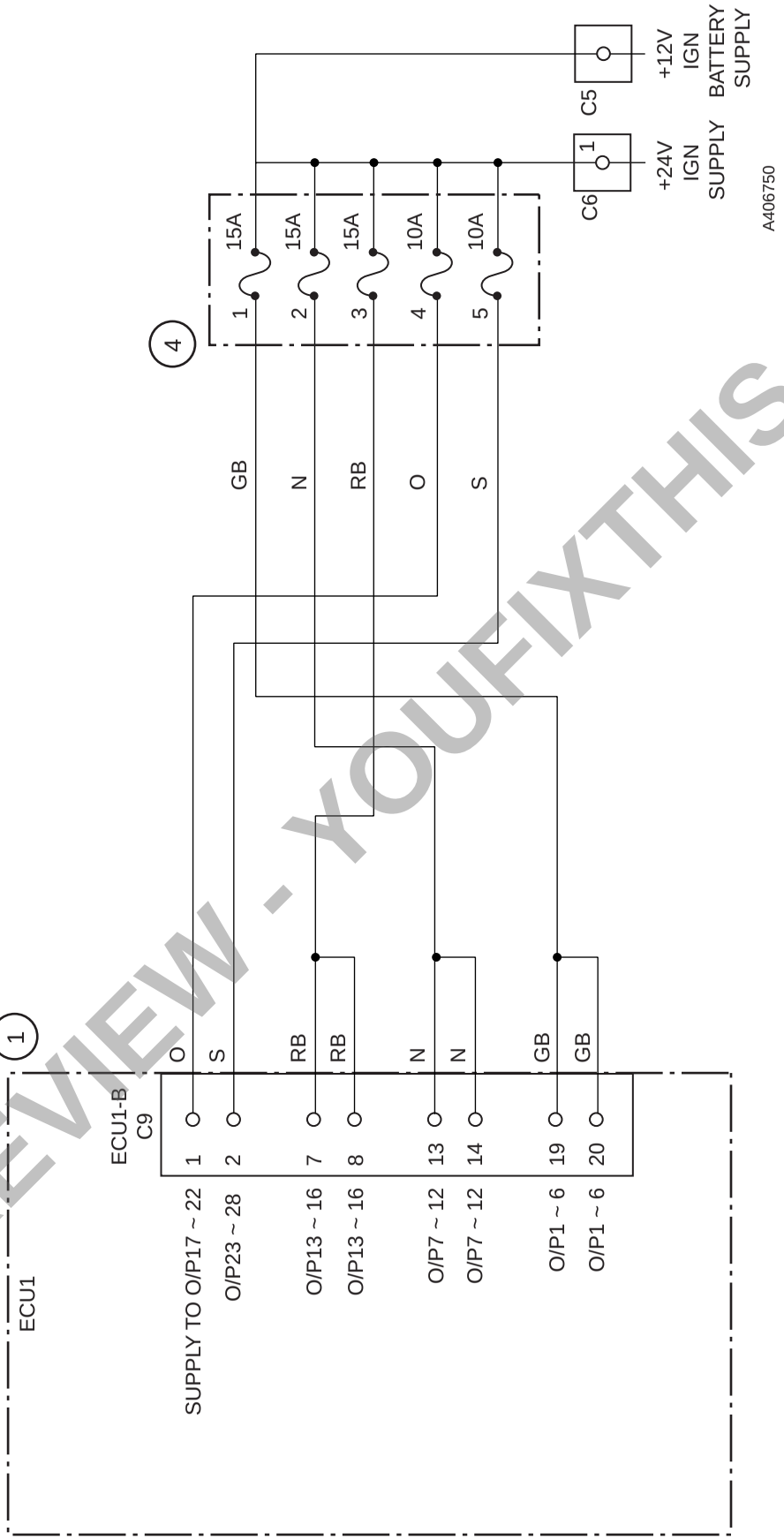


Fig 40.

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HPDataLogs

HPDataLogs is an application designed to extract, compile and present operating data taken from a JS Excavators operating the Advanced Management System. The application software connects a PC to the On-Vehicle network via the DLA (Data Link Adapter) and provides a simple means of requesting data from the network nodes (ECU1, EMS and/or ECW1).

Data collected includes operating hours for particular vehicle functions, hydraulic and coolant statistics. A secondary function on the application is to download additional information taken from 'run time' logging, here the Operator places AMS into a mode to collect running information for 15 minutes at a time. The application allows this data to be downloaded, displayed and printed.

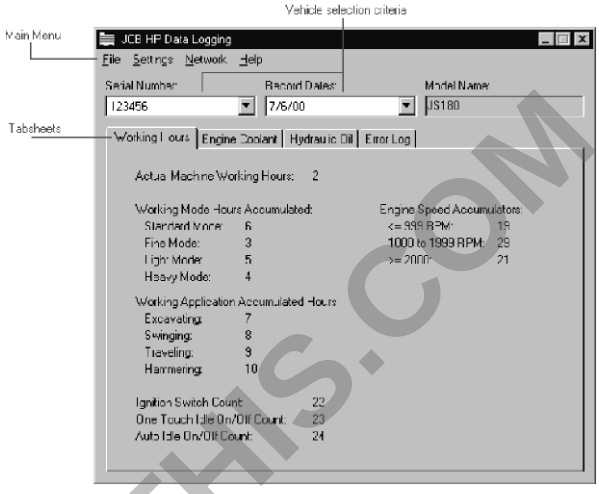


Fig 145.

Using HPDataLogs

Starting HPDatalogs

1. Connect DLA to vehicle On-Board Service connector and to the Personal Computer that will run the HPDataLogs application.
2. Open JCB Service Master
3. Select the Heavy Products Range of Excavators
4. Click the Data Loggin icon. ⇨ ***Selecting Service Tool Applications (C-136)***.
5. The main HP Data Logging screen will open.

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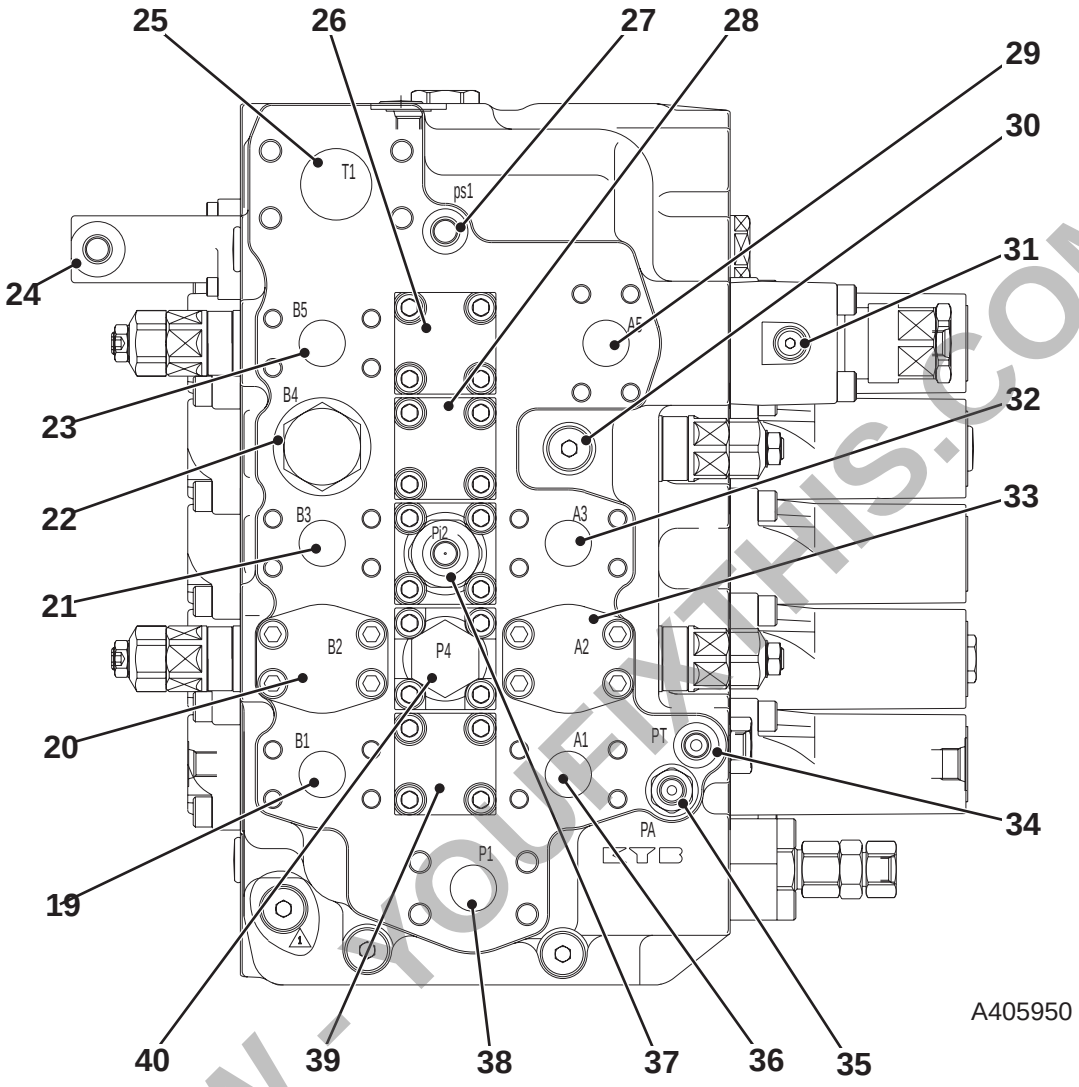


Fig 19. Main Control Valve viewed from right hand side of machine

For port location, ⇨ *Table 12. (E-36)* .

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Assembly

Assembly is a reversal of the dismantling sequence.

1 Lubricate spool 134**E**, spring 134**G** and balls 134**H** and 134**L** with clean hydraulic oil.

2 Tighten components to specified torque.

3 Apply JCB Threadseal to hex plug134**J**.

Table 20. Torque Settings

Item	Nm	Kgf m	lbf ft
A	3.4	20.5	0.36
E	30	22	3
F	10	7	1
I	15	11	1.5
J	10	7	1
K	10	7	1

Table 21. Electrical Connections

Solenoid	Function	Electrical Harness Tape Colour
CT1	Slew Brake	White
CT2	Servo Isolator	Blue
CT3	Slew Lock	No Tape
CT4	Max Flow Cut	Pink
CT5	2 Stage Travel	Red
CT6	Slew Shut Off	Green
CT7	2 Stage Relief	Yellow
CT8	Cushion Control	Light Green

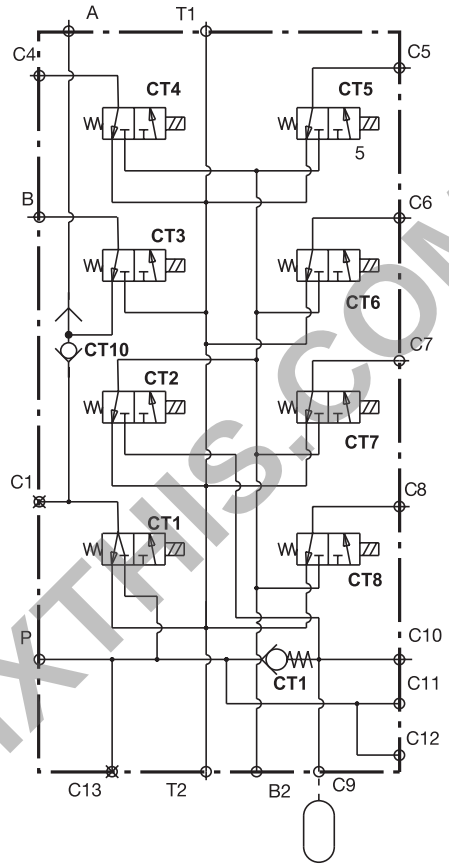


Fig 135.

Table 22. Hydraulic Connections

Port		Hose Colour
C1	=	No Hose
C4	=	Light Green
C5	=	Blue
C6	=	Red
C7	=	Yellow
C8	=	Green
C10	=	White
C11	=	Clear
C12	=	Blue/Pink
C13	=	No Hose
T1	=	Clear
T2	=	White

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Test 012	Testing max flow cut signal
Test 008	Testing track motor speeds
Test 006	Testing pressure switches

Additional information

When creep speed tracking is selected is ‘tortoise’ symbol displayed on monitor? yes / no

Loss of High Speed

Carry out the following tests:

Test 006	Testing operation of main hydraulic spool
Test 008	Testing engine speed settings
Test 012	Testing track motor relief valve settings
Test 014	Testing track Motor speeds and pressure switches.

Machine Selects High Speed Travel

Carry out the following tests:

Test 015	Checking Servo pressure and solenoid voltage.

Slew Bearing Faults

Carry out the following tests:

Test 017	Checking Slew Bearing Vertical Lift and Backlash.

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