Service Manual

JS175W Auto

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Section 2 - Care & Safety

Section 3 - Routine Maintenance

Section B - Body & Framework

Section C - Electrics

Section D - Controls

Section E - Hydraulics

Section F - Transmission

Section K - Engine



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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

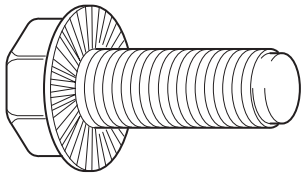


Fig 5.

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

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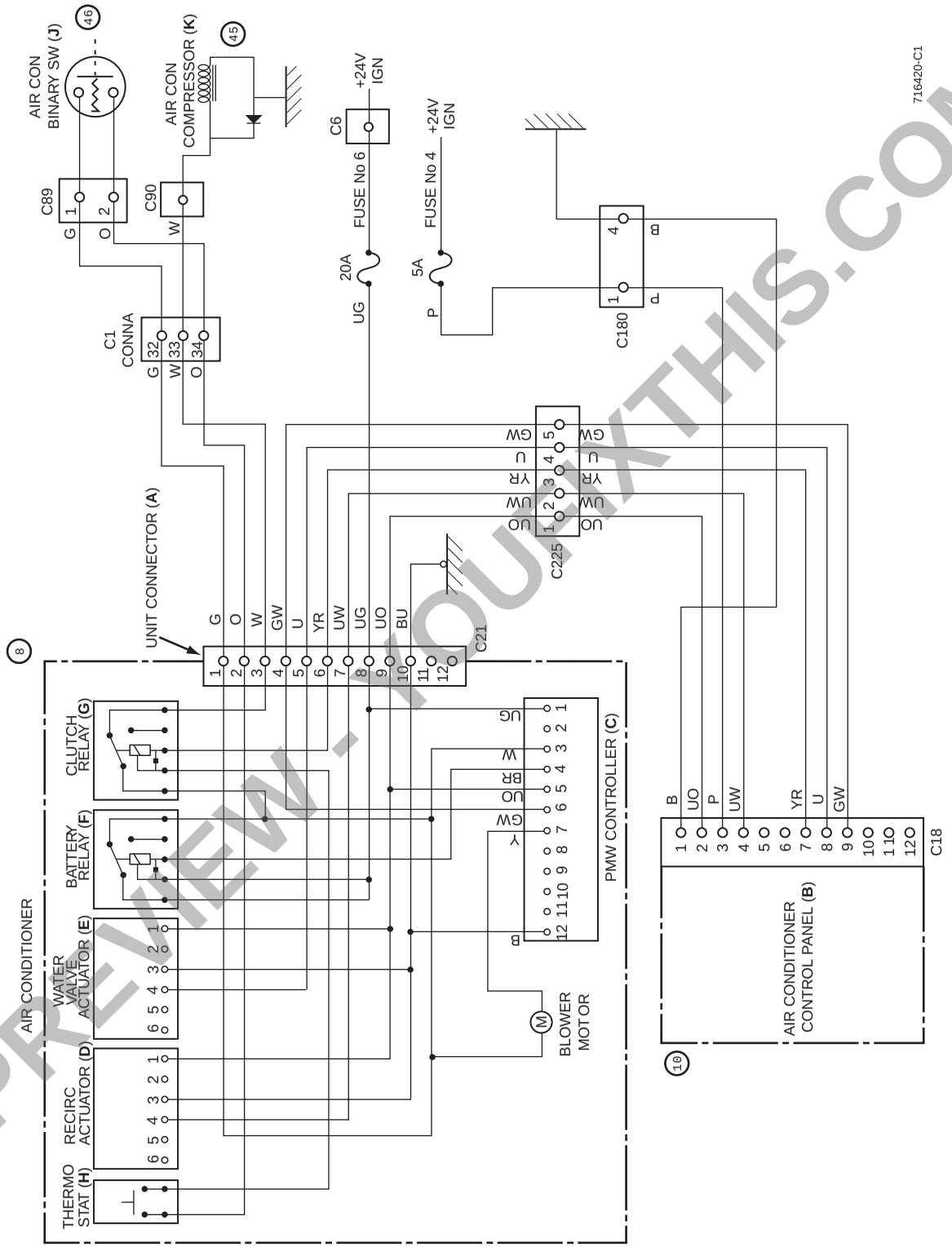


Fig 17.

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Introduction to Hydraulic Schematic Symbols

TE-001

General (Basic and Functional Symbols)

Complex hydraulic components and circuits can be described to the engineer by using graphical symbols. The following pages illustrate and give a brief description for some of the more common symbols used.

There are many symbols in use and it would be impossible to include them all here. However it should be noted that most are only variations or refinements on the basic principles explained here. If more detailed information is required you are recommended to obtain a copy of BS2917 or IS01219.

Once familiar with the symbols, the engineer can use hydraulic circuit diagrams as an aid to fault finding. It will be possible to see the complete hydraulic circuit and decipher the relationship between hydraulic components.

Table 1. General

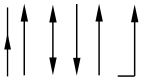
	Spring
	Flow restriction affected by viscosity
	Direction of flow
	Indication of rotation
	Indication of direction and paths of flow
	Variable control

Table 2. Rams

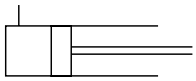
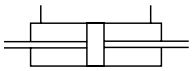
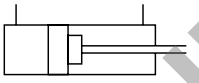
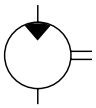
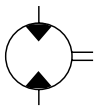
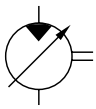
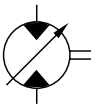
	Single acting
	Double acting
	Double ended
	Double acting with damping at rod area end

Table 3. Pumps and Motors

	Variable capacity pump two directions of flow
	Fixed capacity motor one direction of flow
	Fixed capacity motor two directions of flow
	Variable capacity motor one direction of flow
	Variable capacity motor two directions of flow

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Tool Detail Reference Section B - Body and Framework

Note: *Not all service tools are illustrated. Illustrations are shown in tool number order.*

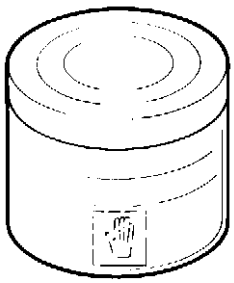


Fig 8. 410/1310

Note: *Special blend for the removal of polyurethane adhesives*

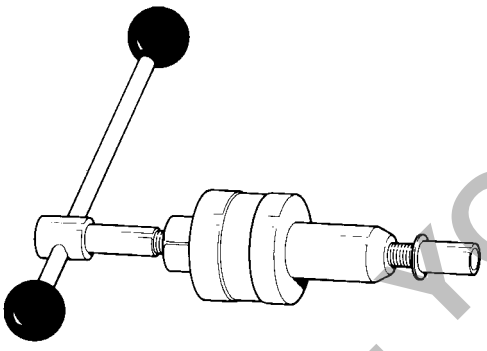


Fig 9.

Installation Tool Available from:

Bollhoff Fastenings Ltd.

Midacre

The Willenhall Estate

Rose Hill

Willenhall

West Midlands, WV13 2JW

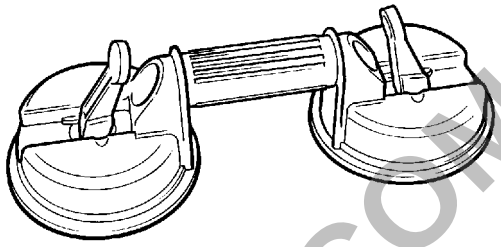


Fig 10. 892/00842

Note: *minimum 2 off - essential for glass installation, 2 required to handle large panes of glass. Ensure suction cups are protected from damage during storage.*

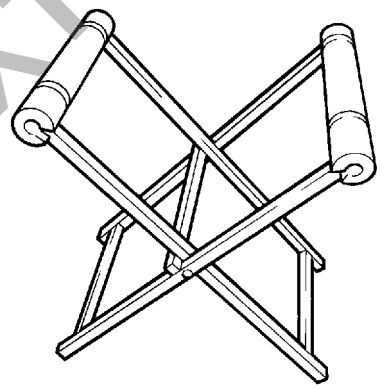


Fig 11. 892/00483

Note: *- essential for preparing new glass prior to installation..*

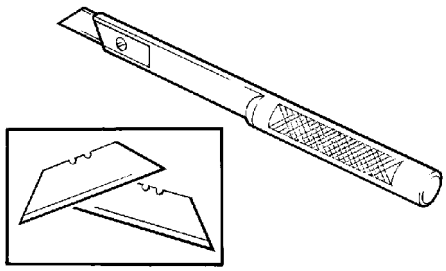


Fig 12. 892/00844

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List of text messages displayed on the EMS.

Table 3: Electrical fault error code

Electrical errors are displayed immediately on the EMS with an alarm buzzer. Pressing “ACK” stops the buzzer and cause the messages to become repetitive.

Note: 1 *Open circuits can only be detected when the output has been turned off.*

Note: 2 *Short circuit conditions can only be detected when the output is turned on.*

Note: 3 *Open circuits, short circuits and no voltage detections cannot be done on the low side drivers.*

Note: 4 *See Harness Data*

Error Code	Error String	Description
101	CRANK	A crank signal was not detected by the ECU1.
102	FUEL	The fuel sensor is open-circuit.
103	EN TMP	The engine temperature sensor is open-circuited.
104	HYD TMP	The hydraulic temperature sensor is open-circuited.
105	SET PT	The throttle set potentiometer is open-circuited.
106	SENS PT	The throttle sense potentiometer is open-circuited.
107	OIL SW	The oil pressure switch is reporting oil pressure is present when the engine is not running.
108	FLYWHEEL	The flywheel sensor is reporting an engine speed even though the engine is not running.
109	ALT	The alternator is reporting a voltage even when the engine is not running.
110	THR SOL	The throttle solenoid is open circuited. This can only be detected when the engine is not running.
111	BOOM SP	The boom lower speed regulation output is open-circuited.
113	MAX FLW	The maximum flow solenoid is open-circuited. For JS200W machines, this error can only be detected when the engine is not running due to the fact that this is proportional valve on these machines.
115	BOOM	The boom priority solenoid is open-circuited.
116	FL PMP	The refuel pump output is open circuited.
117	HORN	The horn output is open-circuited.
118	HYD PMP	The hydraulic pump is open-circuited. Because this is a proportional valve, this error can only be detected when the engine is not running.
119	SLW LCK	The slew lock solenoid is open-circuited.
120	HYD FAN	The hydraulic fan output is open-circuited. This can only be detected when the engine is not running.
121	SLW BRK	The slew brake solenoid is open-circuited.
122	SLW ST	The slew shut off valve solenoid is open-circuited.
127	TL CHNG	The travel change solenoid is open-circuited.
128	WASHER	The washer motor is open-circuited.
129	DOZER	The dozer solenoid is open-circuited.
130	GRB CW	The grab/rotate clockwise solenoid is open-circuited.
131	GRB CCW	The grab/rotate counter-clockwise solenoid is open-circuited.
132	LW FLOW	The low flow solenoid is open-circuited.
133	ISOL	The hydraulic isolator solenoid is open-circuited.

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Cleaning the Machine

Exterior

Clean the exterior of the machine using water and/or steam.

If steam is used the machine must be completely greased afterwards. ⇨ *Greasing (3-25)*

Pay particular attention to the cab windows. Make sure that the radiator grille is not blocked.

Interior

⚠ 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

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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 9. 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 10. 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 11. 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

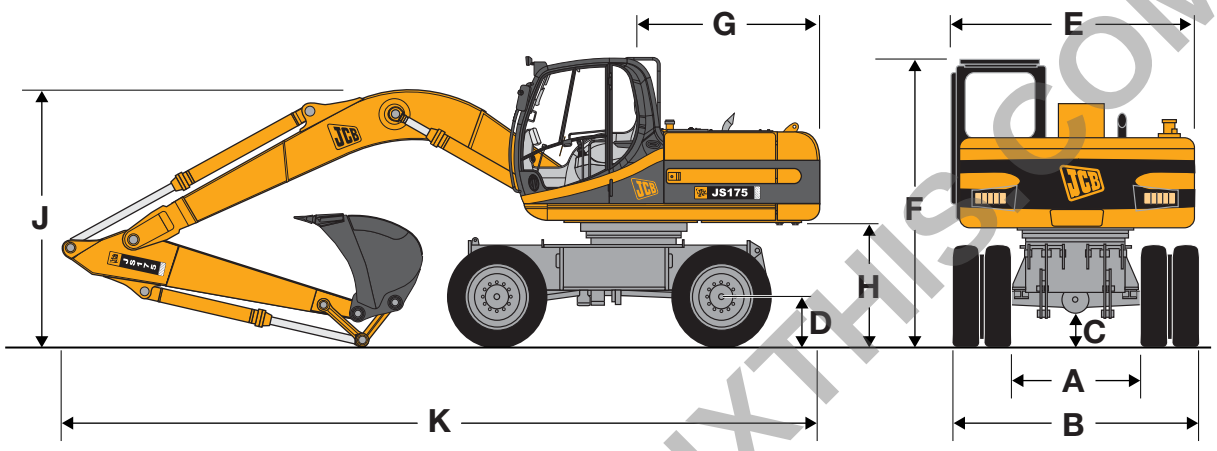
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Technical Data

Static Dimensions

JS175W - Monoboom



Dimensions in millimetres (ft. in)	
A Internal width between dual wheels	1330 (4 ft 4 in)
B External width between dual wheels	2490 (8 ft 2 in)
C Ground clearance	350 (1 ft 1 in)
D Height to axle centre line for dual wheels	498 (1 ft 7 in)
D Height to axle centre line for single wheels	519 (1 ft 8 in)
E Overall width	2470 (8 ft 1 in)
F Height over cab	3185 (10 ft 6in)
G Tail length	2338 (7 ft 8 in)
H Clearance under counterweight	1270 (4 ft 2 in)

Dipper lengths	2.25m	2.7m	3.05m
J Transport height	3185 (10 ft 6in)	3185 (10 ft 6in)	3240 (10 ft 7 in)
K Transport length	8293 (27 ft 2 in)	8293 (27 ft 2 in)	8454 (27 ft 8 in)

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Service Schedules

Introduction

A poorly maintained machine is a hazard. Doing the regular maintenance and lubrication jobs listed in these schedules will help keep the machine in safe running order.

⚠ WARNING

Maintenance must be done only by suitably qualified and competent persons.

Before doing any maintenance make sure the machine is safe, it should be correctly parked on level ground.

To prevent anyone starting the engine, remove the starter key. Disconnect the battery when you are not using electrical power. If you do not take these precautions you could be killed or injured.

8-3-1-1

A Service History Record Book is supplied with every machine to enable you to plan your service requirements and keep a service history record. This record book should be dated, signed and stamped by your Distributor at machine installation and each time your machine is serviced.

2-3-1-9

Apart from the daily jobs, the schedules are based on machine running hours. Keep a regular check on the hour meter reading. Do not use a machine which is due for a regular service. Rectify any defects found during regular maintenance before clearing the machine for use.

Calendar equivalents:

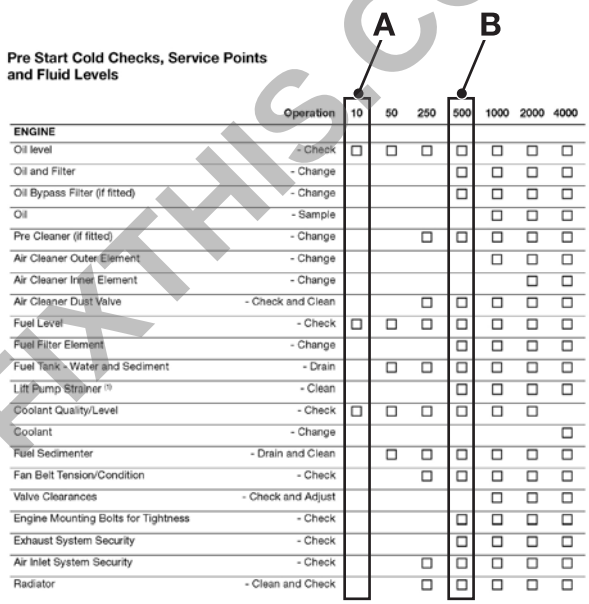
Every 10 Hours	=	Daily
Every 50 Hours	=	Weekly
Every 250 Hours	=	Monthly
Every 500 Hours	=	Three Months
Every 1000 Hours	=	Six Months
Every 2000 Hours	=	1 Year
Every 4000 Hours	=	2 Years
Every 5000 Hours	=	2 Years Six Months

Note: *Services should be carried out at either the hourly interval or calendar interval, whichever occurs first.*

How to Use the Service Schedules

T3-012_2

In the example shown, **A** shows all service requirements to be carried out every 10 hours and **B** shows the requirements to be carried out every 500 hours.



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Safety Notices

Introduction

T1-006

⚠ WARNING

Study the Operator Manual before starting the machine. You must understand and follow the instructions in the Operator Manual. You must observe all relevant laws and regulations. If you are unsure about anything, ask your JCB dealer or employer. Do not guess, you or others could be killed or seriously injured.

INT-1-1-1_2

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

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Safety Decal Recognition

Table 1.

Label	Part No.	Definition
A	817/19470	Warning, Arm or bucket may move; keep clear.
B	JLP0283	Warning, Do not use excavator for lifting loads.
C	817/19660	Instruction, Cold weather conditions. Refer to operators handbook.
D	817/18535	1-Warning, Coolant under pressure. 2-Warning, Risk of severing hands/fingers in rotating parts. 3-Warning, Hot surfaces. 4-Remove ignition key and refer to operator handbook and maintenance manual.
E	817/18536	Warning, Hot surfaces; Keep hands away.
F	817/18537	Warning, High pressure and hot coolant/system; Keep hands away.
G	817/18538	Warning, Risk of severing finger/hand in rotating parts; Keep hands away.
H	817/18566	Do not walk or place any body weight in this area.
K	817/18528	Warning counterweight or whole machine may move; Keep clear.
L	817/02370	Warning, 24V.
M	817/70003	Warning, Risk of trapping fingers/hand in door; Keep hands away.
N	JHP0111	Warning. No hosing or jet washing in cab.
P	817/70116	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.
R	817/19960	Warning, High pressure hydraulic system; 1-Stop the engine. 2-Depress the rubber booted pressure relief valve until all the tank pressure is released. 3-Remove filler plug/breather assembly as required.
S	817/18527	Diesel fuel, Warning, Flammable substance; No ignition source.
T		Lubrication chart.Refer to `Chart Definitions' for details.
V		Lifting chart. Refer to `Chart Definitions' for details.
W	817/70117	1-Instruction, Bucket can foul the boom when dipper is swinging inwards. Maintain clearance between bucket and arm. 2-Warning, Danger of collision, Maintain clearance between bucket and cab. 3-Warning, Risk of tripping; raise the control lock lever before exiting. 4-Warning, Risk of injury by crushing; Do not lean out of the front window. 5-Warning, Risk of electrocution; Maintain the minimum clearance recommended by your local electricitysupplier.
X	817/18531	Warning, Edges without protective railings; Keep clear of edges.
Y	817/18532	Warning, Hoses that may eject a high velocity jet capable of penetrating the skin; Remove ignition key and refer to operator handbook and maintenance manual.

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The AMS System

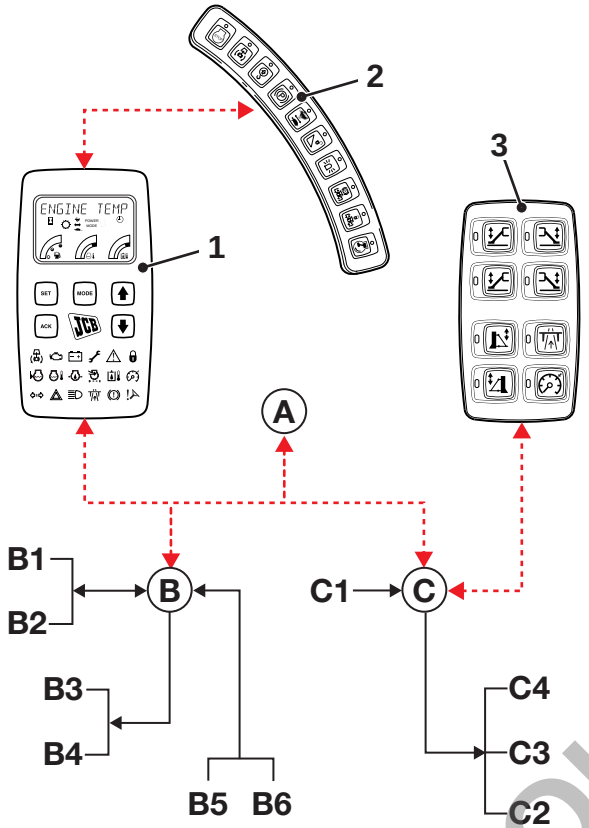


Fig 39.

Table 1. Component Identification

Item	Description
A	Diagnostics
B	Electronic Control Unit (ECU-1)
B1	Engine Throttle Control
B2	Engine Pump Control
B3	Solenoids
B4	Lamps, Wipers, Washers etc.
B5	Switches
B6	Sensors
C	Electronic Control Unit (ECU-W)
C1	Switches
C2	Solenoids
C3	Lamps
C4	Transmission
⇢	Network

1 Electronic Monitoring System (EMS)

2 Fascia switch panel (FSP)

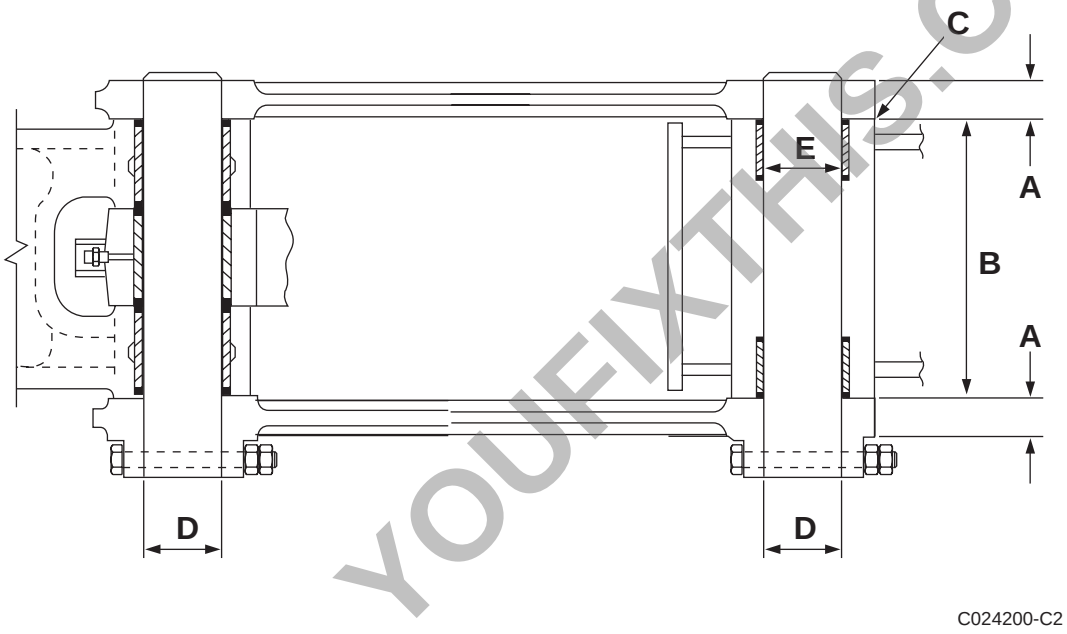
3 Left Hand Console (LHC)

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Dipper and Dipper Link Installation

Equipment Name:. For Location, ⇨ *Location (B-6)*.	Part Name	Code	Standard Value (mm)	Service limit (mm)
H. Dipper and Dipper link installation	Dipper Link	**A**	37	34
	Dipper	**B**	261	258
	Clearance	**C**	1.0-1.5	Shim for Adjustment
	Pin	**D**	ø65	ø64
	Bushing (Dipper)	**E**	ø65	ø66.5



C024200-C2

Fig 9.

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Pulse Width Modulation (PWM)

Ohms law states that, the amount of current flow in a circuit is determined by the voltage, and the resistance. A 24v circuit with a resistance of 6 ohms, would draw a current of 4 amps. This would be the case for a standard solenoid, which is either on or off.

Once the voltage is applied to the circuit, it is present 100% of the time. This would be known as a 100% duty cycle. Therefore the circuit will draw 4 amps constantly.

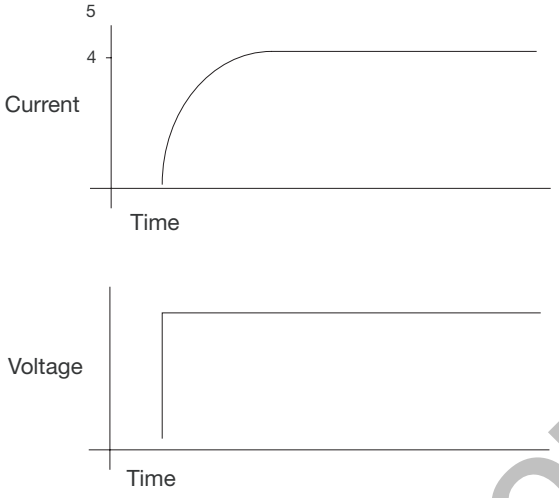


Fig 46.

A proportional solenoid requires differing amounts of current, depending on its condition. As the coil has a fixed resistance, changing the current rating can be done in either of two ways,

1 Having lots of different resistors switched in and out of the circuit at different times to change the current flowing.

2 To change the duty cycle of the solenoid.

It is easier, more economical, and more reliable to change the duty cycle of the circuit, especially using today's computer/ controller technology.

The duty cycle is the amount of time a component is switched on compared to the time it is switched off. If a solenoid is on for three seconds, then off for one second, on for three, off for one etc. this would be a 75% duty cycle.

The graph A although unstable would give a current rating of three amps. To stabilize the current in the circuit, the frequency would need to be increased. If the time scale on the graph A was one second, the frequency would be 4Hz (Hertz (cycles per second)). The graph B shows the same duty cycle, but at a higher frequency of 32 Hz. The proportional solenoids fitted to JS machines operate at a frequency of 125 Hz.

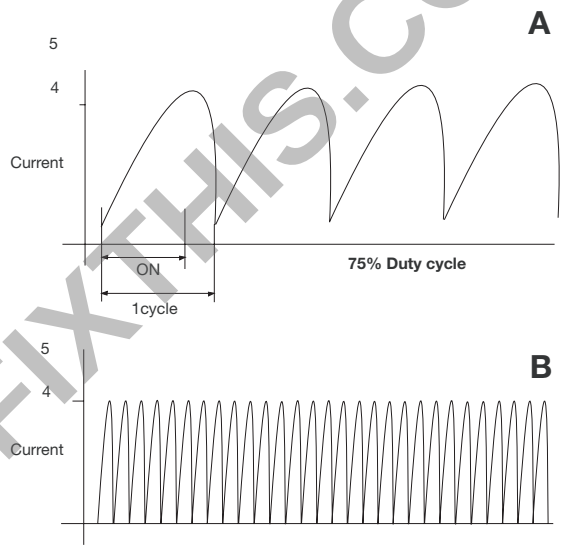


Fig 47.

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Fog/Reversing Light Schematic

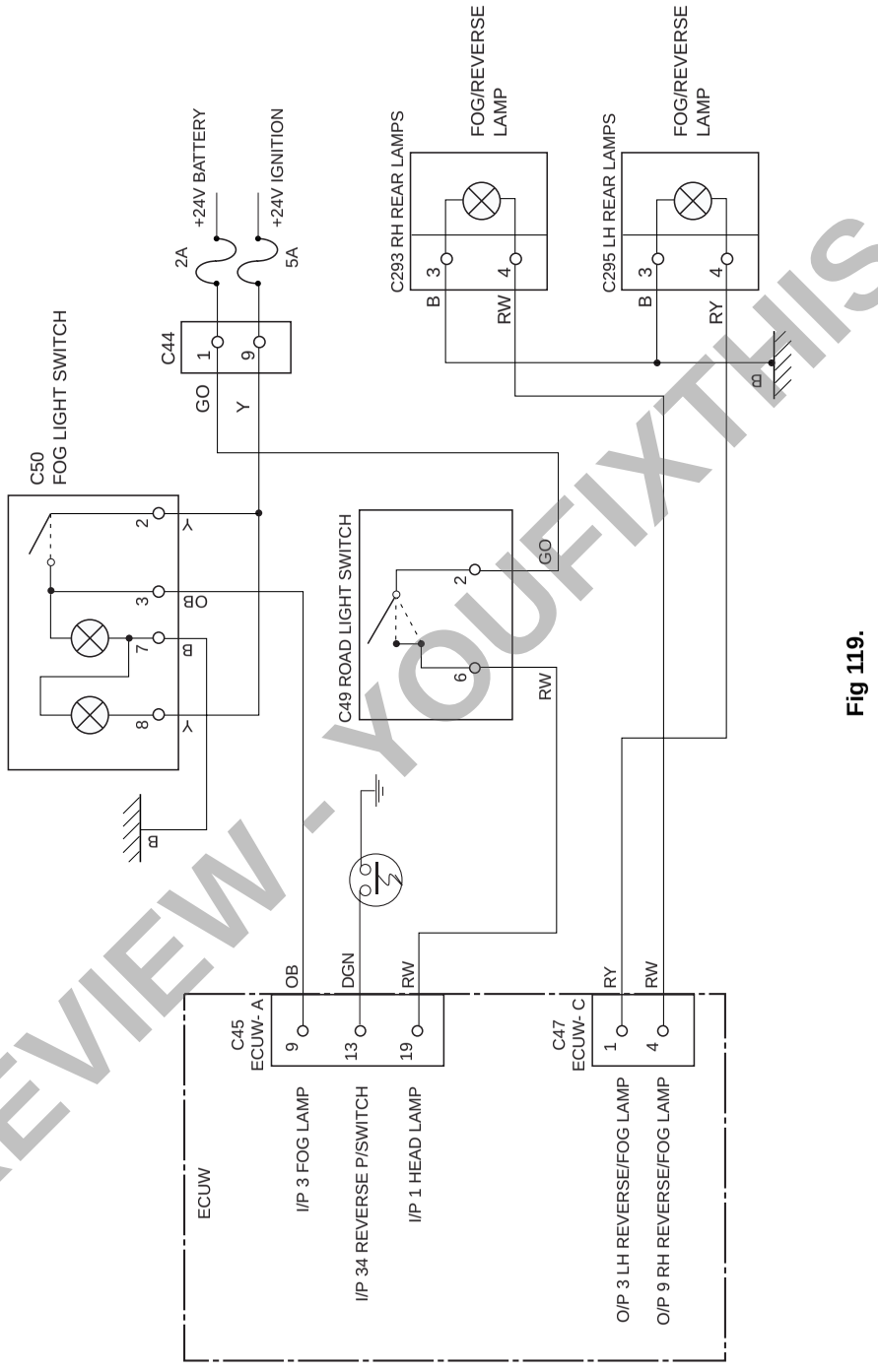


Fig 119.

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Hydraulic Oil

Details Hydraulic Oil operating conditions since last service and accumulated operating hours within defined temperature ranges.

Date	Date of the event.
Duration	Time in minutes of the event.
Machine Hours	Actual Engine Hours at which the event took place.

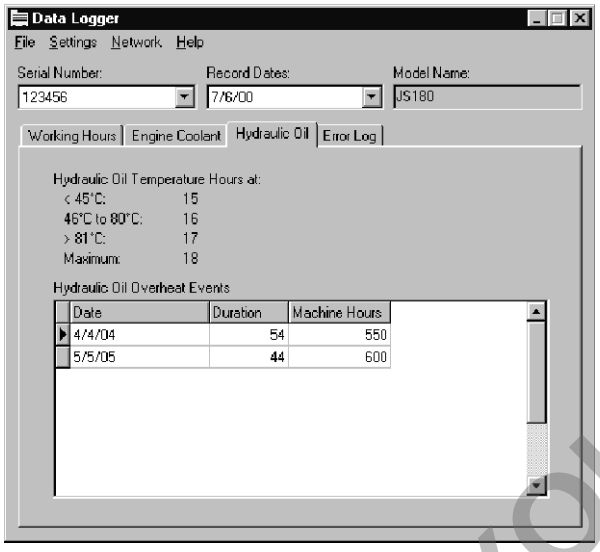


Fig 189.

Error Logs

Various error events are recorded and saved as logs for future analysis by Service and Engineering personnel. Any Error Logs detected and uploaded from the vehicle can be displayed in the Error Log Tabsheet.

Error Types	Details the type of error event logged.
Engine Hours	Engine Hours at the time the error event occurred.
Duration (min)	Time in minutes of the error event. May be blank or zero depending on the type of error, some events do not require a duration parameter.
Output Number	Identifies the hardware Output using the system/schematic circuit ID.

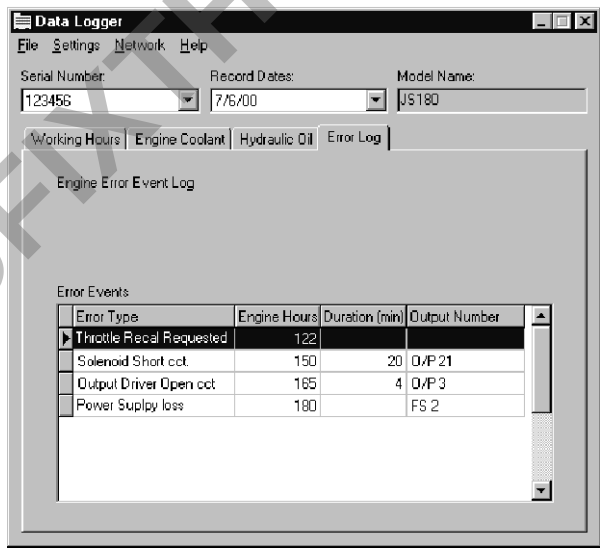
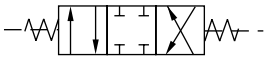
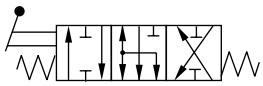
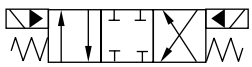
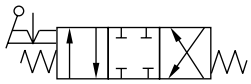
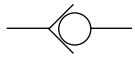
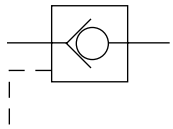
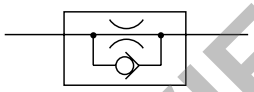
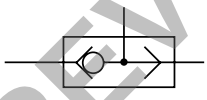


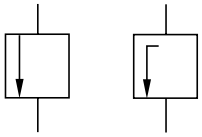
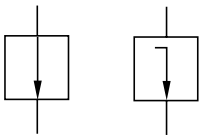
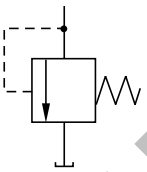
Fig 190.

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Table 4. Control Valves

	Used to enclose several valves indicating they are supplied as one unit
	3-Position, 4-port spring centered pilot operated valve
	3-position, 6-port spring centered pilot operated valve
	3-Position, 4-port spring centered solenoid & pilot pressure operated valve
	3-Position, 4-port spring centered detent hand operated valve
	Non-return valve
	Non-return valve with back pressure spring
	Pilot operated non-return valve
	One way restrictor
	High pressure selector (shuttle valve)

	Throttling orifice - normally closed
	Throttling orifice - normally open
	Relief valve
	Variable restrictor

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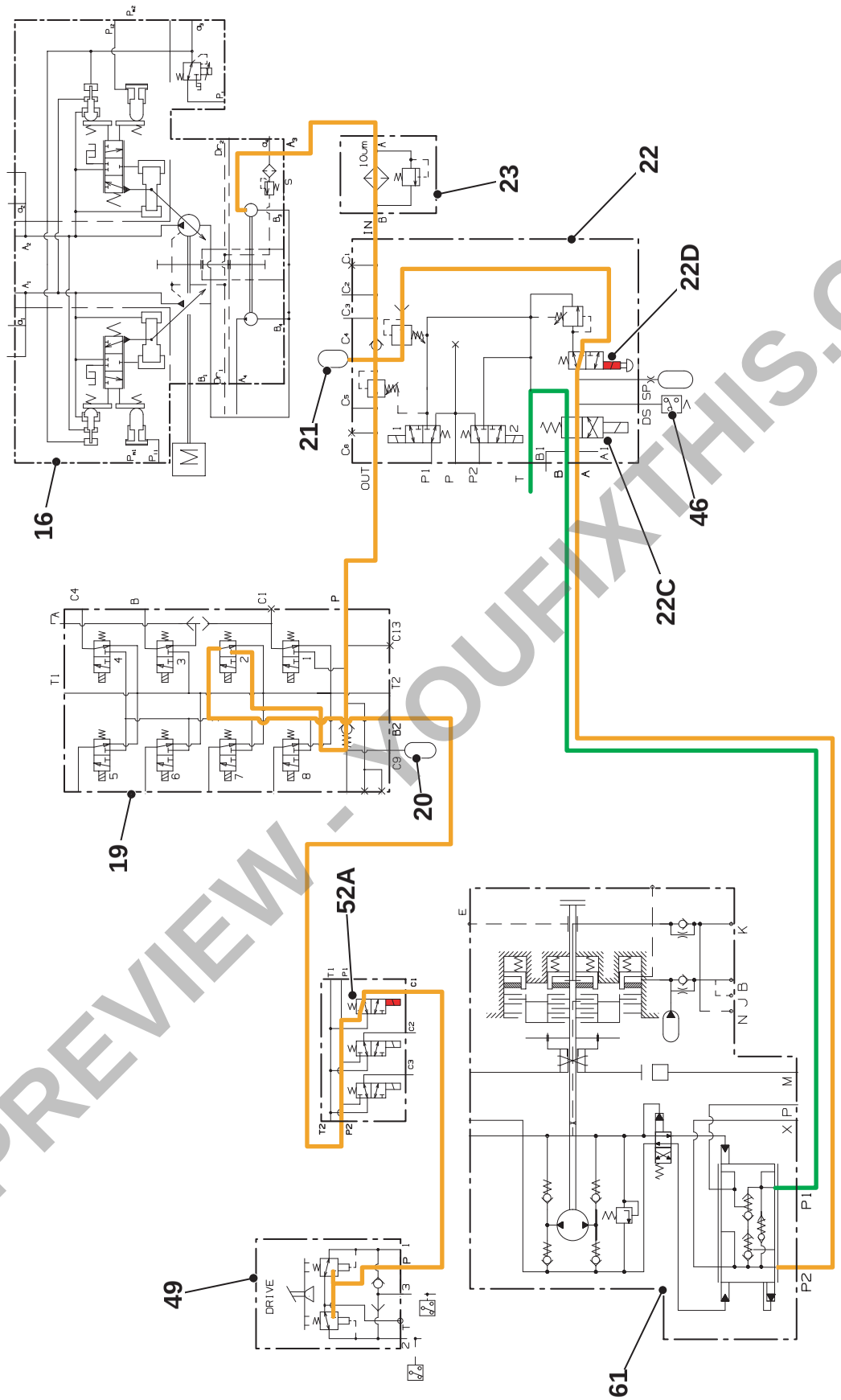


Fig 44. Park Brake Off

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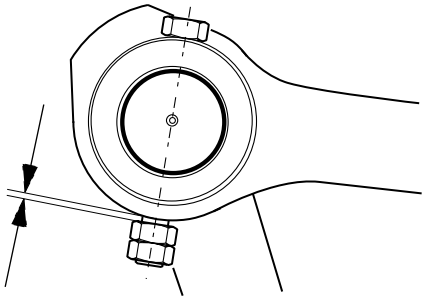


Fig 285.

Note: *When checking or refitting JS machine pivot pins, the retaining nuts and bolts should not be fastened up tight to the pivot boss but must have approximately 3mm of play so that the pin is free from tension.*

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Test 023: Checking Drive Motor Displacement

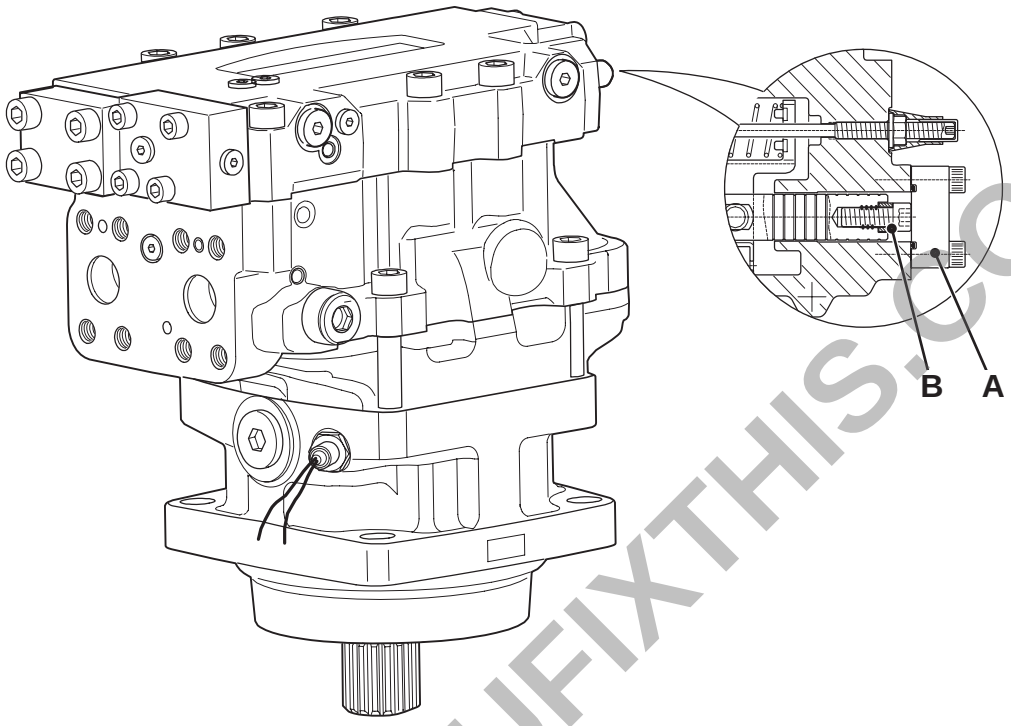


Fig 382.

The motor displacement is adjusted my shims to change the minimum angle of the swash plate to determine the maximum speed of the motor, 2 different settings are used for the motor. One for Germany and one for the rest of the world.

1 Remove the 4 cap screws holding the end cover **A** on the bottom of the motor.

2 Check the length of the bushing fitted on the minimum displacement screw **B**.

a German drive motors should be 28mm.

b Rest of the world drive motors should be 18mm.

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