Service Manual

JZ140

Service Manual - JZ140

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Section 2 - Care & Safety

Section 3 - Maintenance

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Section C - Electrics

Section E - Hydraulics

Section F - Transmission

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Section K - Engine



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Safety Notices

Important Information

T1-042

The Operator Manual

⚠ WARNING

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

INT-1-4-2

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

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

Safety Warnings



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

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

⚠ 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

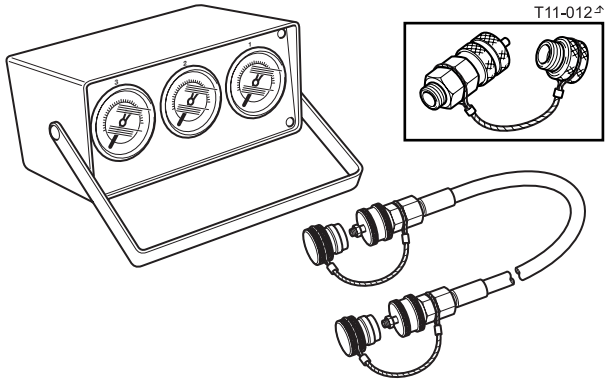
⚠ CAUTION

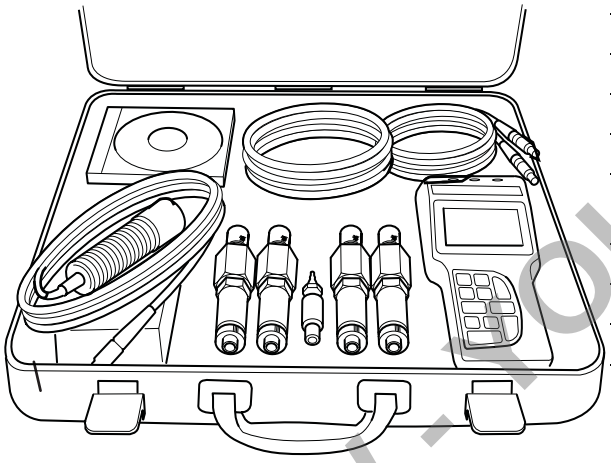
Denotes a reminder of safety practices. Failure to follow these safety practices could result in injury to the operator (or others) and possible damage to the machine.

INT-1-2-3

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Note: *No longer available, refer to 998/11051 JCB ServiceMaster Digital Hydraulic Datalogger Pressure Test Kit.* ⇨ *Fig 43. (1-27)**.*	892/00201	Replacement Gauge 0-20 bar (0-300 lbf/in²)
 **Fig 42. 892/ 00253 Hydraulic Circuit Pressure Test Kit**	892/00202	Replacement Gauge 0-40 bar (0-600 lbf/in²)
	892/00203	Replacement Gauge 0-400 bar (0-6000 lbf/in²)
	892/00254	Replacement Hose
	993/69800	Seal Kit for 892/00254 (can also be used with probe 892/00706)
	892/00706	Test Probe
	892/00347	Connector - Hose to gauge

 **Fig 43. 998/11051 JCB ServiceMaster Digital Hydraulic Datalogger Pressure Test Kit**	998/11052	Hand Held 4-Channel ServiceMaster Unit
	998/11053	SensoWin Software Kit and PC Cable
	998/11054	Equiment Case SCC-750
	998/11055	0-600 Bar Pressure Transduce x2
	998/11056	0-100 Bar pressureTransducer x2
	998/11057	RPM Tachometer (includes fixed cable, 2 meters)
	998/11058	5 Meter Connecting Cable
	998/11059	M16 Metric Adaptors for Test Points x4
	998/11060	400mm Test Hose 90˚ HSP to M16 x2
	998/11061	400mm Test Hose Straight HSP to M16 x2

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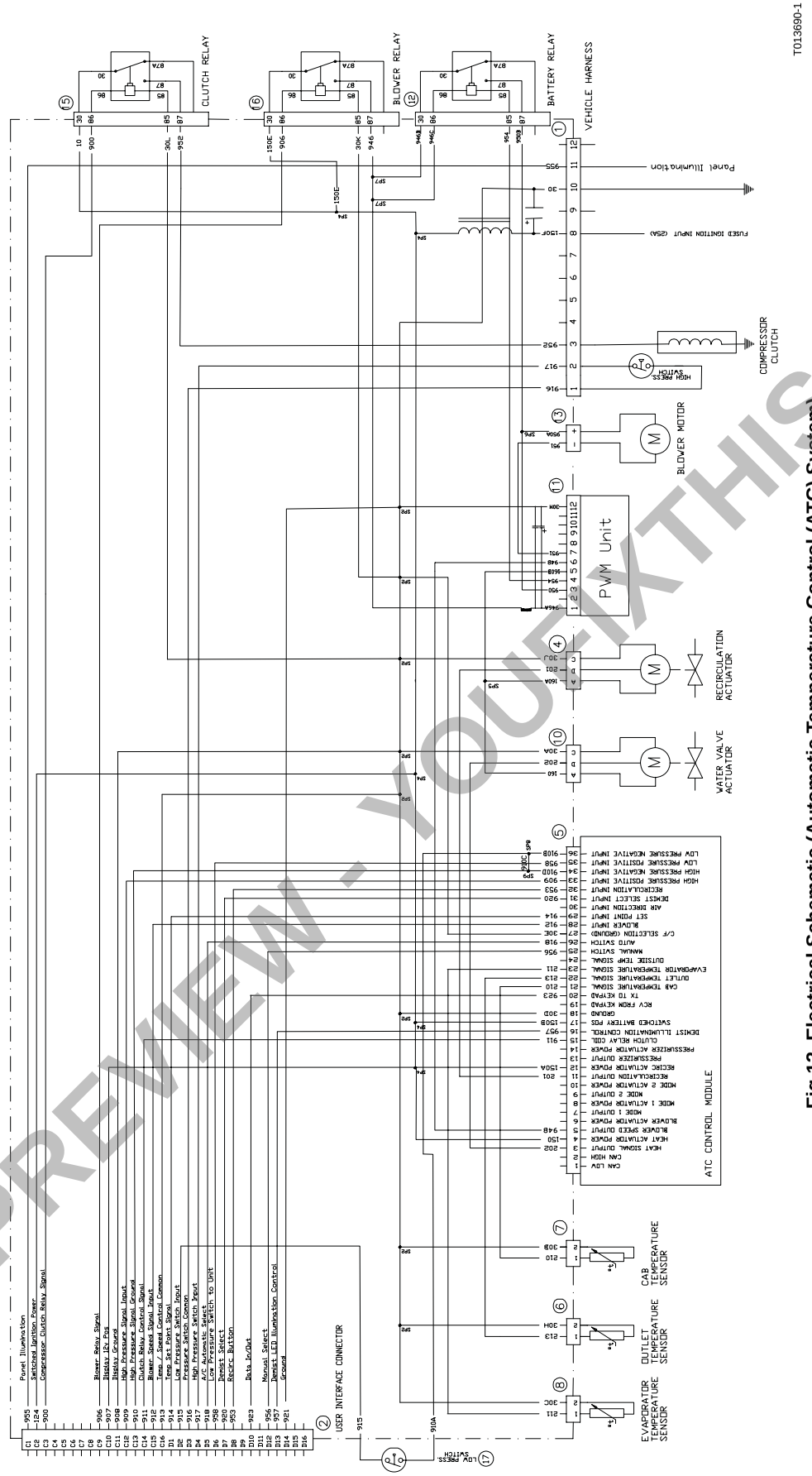


Fig 12. Electrical Schematic (Automatic Temperature Control (ATC) System)

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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 10. General

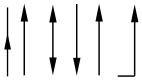
	Spring
	Flow restriction affected by viscosity
	Direction of flow
	Indication of rotation
	Indication of direction and paths of flow
	Variable control

Table 11. Rams

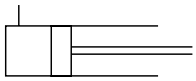
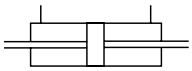
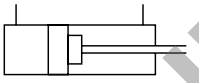
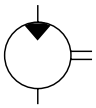
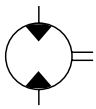
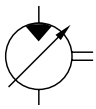
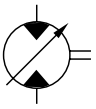
	Single acting
	Double acting
	Double ended
	Double acting with damping at rod area end

Table 12. 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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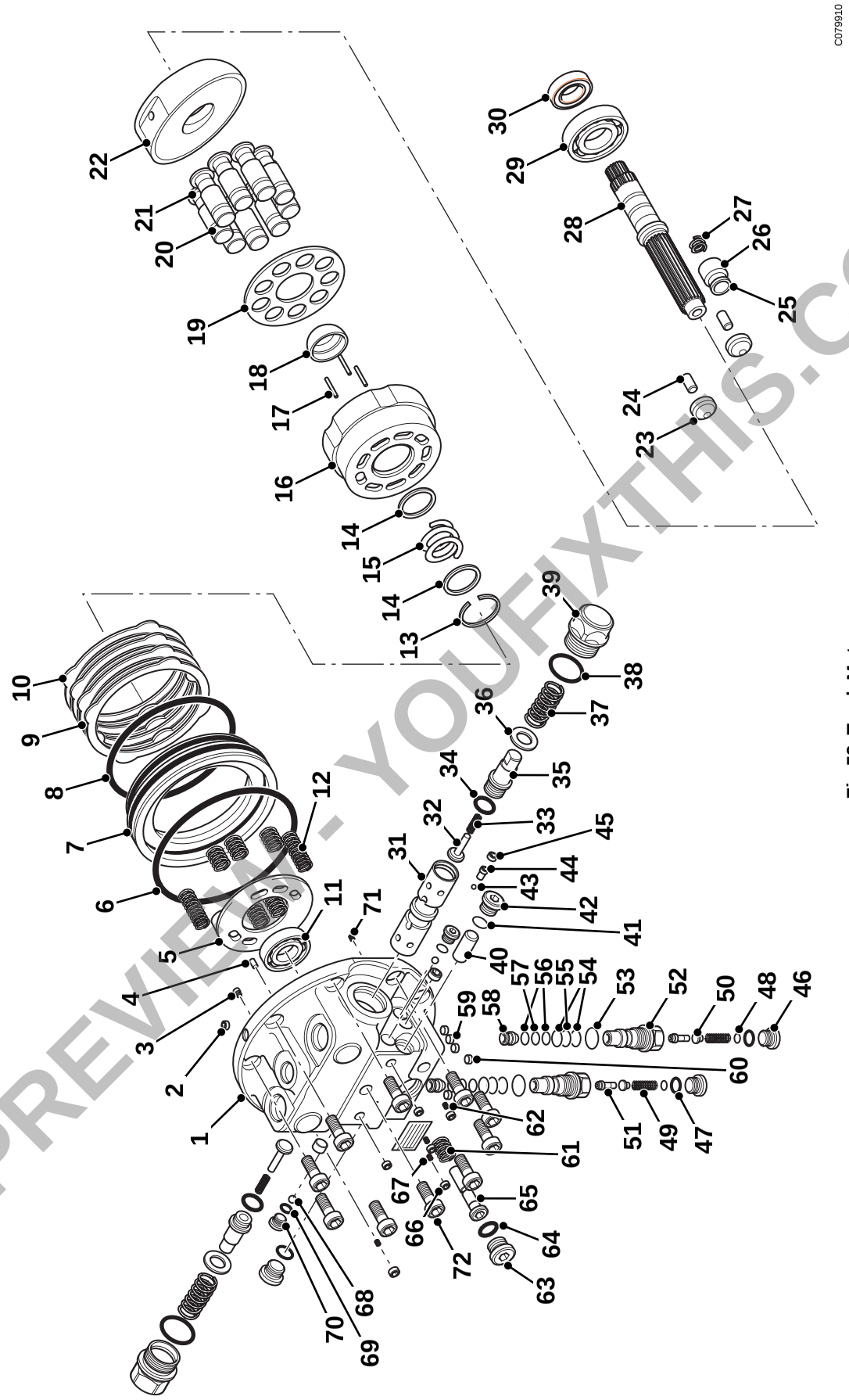


Fig 52. Track Motor

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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 (1-7)*.

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

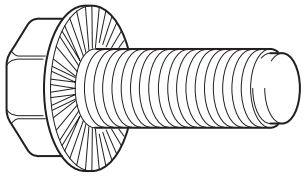


Fig 6.

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

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Engine Error Codes

TK-001

Engine `NO RESTART'. If this message appears the engine will continue to run to allow the machines to be moved to a position of safety where the machine can be repaired. Once the engine is stopped it will not restart until the repair as been carried out.

If the message `LOW POWER' displays the engine power is reduced to 60% power to protect the engine.

Table 3.

Use for identification the repair part			**Engine fault LED**	**Caution LED**	**Buzzer ON (1.5 sec)**	**Error Code Display (eg. ENG P0335)**	**Message Displayed**
DTC	Diagnostic Monitoring Item (Malfunction Title)	Condition for Setting DTC					
P0087	Fuel rail pressure is too low (Fuel leak)	Actual rail pressure < Minimum target rail pressure at actual rail pressure is 15MPa or more	✓		✓	✓	LOW POWER
P0088	Common rail pressure (1st stage)	Rail pressure is over 185MPa	✓		✓	✓	LOW POWER
P0088	Common rail pressure (2nd stage)	Common rail pressure failure (1st. Stage) is occurred and the rail pressure is over 190MPa.	✓		✓	✓	LOW POWER
P0089	Common rail pressure (excessive pressure for pump)	DUTY for SCV is 40% or more. Or Actual rail press -Target rail press >40MPa~ then target fuel flow is 90mm 3/st or less.	✓		✓	✓	LOW POWER
P0090	Fuel pressure regulator control circuit	SCV driving current > 2400mA or 50mA < SCV driving current, or Target current - Actual current >1000 mA	✓		✓	✓	LOW POWER
P0107	Air pressure sensor (low voltage)	The voltage of air pressure temperature sensor falls below 0.099V.	✓			✓	
P0108	Air pressure sensor (high voltage)	The voltage of air pressure temperature sensor exceeds 4.85V.	✓			✓	
P0112	Intake air temperature circuit (low voltage)	The voltage of intake temperature sensor falls below 0.099V.	✓			✓	
P0113	Intake air temperature circuit (high voltage)	The voltage of intake temperature sensor exceeds 4.85V.	✓			✓	

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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.

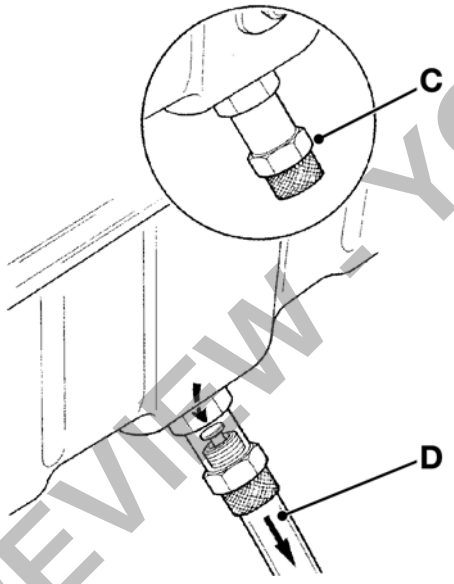


Fig 30.

- **c** Remove the self sealing drain plug outer cover **C**.
- **d** Fit the self sealing drain kit threaded union (with attached pipe) **D**. Drain sump oil into a suitable container.
- **e** Remove the self seal drain kit, clean and refit the outer cover. (Do not over tighten the cover).

4 Change the Filter

- **a** Remove the remote filter **E**.

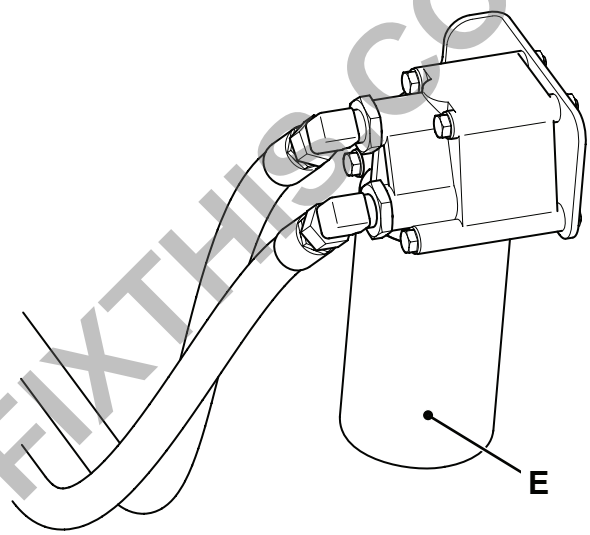


Fig 31.

- **b** Clean the filter head.
- **c** Smear the seal on the new filter **E** with oil.
- **d** Fill the filter with engine oil before fitting.
- **e** Tighten the filter until the seal bites onto the filter housing.
- **f** Tighten the filter a minimum of one more full turn.

5 Fill the System.

- **a** Fill the engine with new oil through filler **B** ⇨ *Fig 28. (3-46)*,⇨ *Fig 29. (3-46)*, ⇨ *Fluids, Lubricants and Capacities (3-16)*
- **b** Wipe off any spilt oil.
- **c** Check for leaks.

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Typical Lubrication Chart

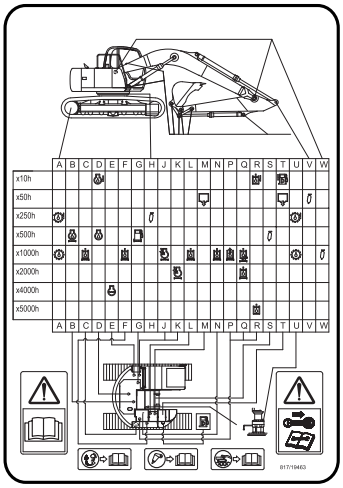


Fig 1.

Table 7. Location Identifier

A	Travel gearbox
B	Engine oil filter
C	Plexus filter
D	Engine oil pan
E	Engine cooling system
F	Servo oil filter
G	Fuel filter
H	Swing ring bearing
J	Air cleaner, outer
K	Air cleaner, inner
L	Drain line filter
M	Fuel separator
N	Hydraulic return filter
P	Hydraulic tank air breather
Q	Suction strainer
R	Hydraulic tank
S	Swing ring gear teeth
T	Fuel tank
U	Slew gearbox
V	Boom/arm grease points
W	Boom/arm grease points

Table 8. Icon Definitions

	Excavator grease
	Engine oil change
	Engine oil filter change
	Engine coolant change
	Engine air filter clean
	Engine air filter change
	Transmission oil change
	Transmission oil level
	Fuel (diesel)
	Fuel filter change
	Hydraulic oil change

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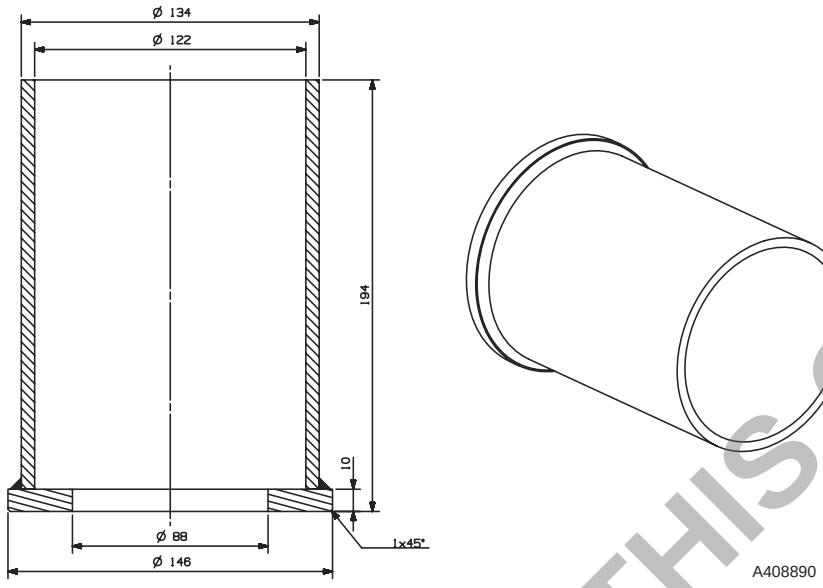


Fig 53. Stopper

Note: *For assembly of slew motor gearbox. This tool can not be ordered from JCB.*

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Service Schedules

Introduction

T3-036_3

⚠ WARNING

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

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

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

8-3-1-1

A badly maintained machine is a danger to the operator and the people working around him. Make sure that the regular maintenance and lubrication jobs listed in the service schedules are done to keep the machine in a safe and efficient working condition.

Apart from the daily jobs, the schedules are based on machine running hours. Keep a regular check on the hourmeter readings to correctly gauge service intervals. When there is no hourmeter fitted, use the calendar equivalents to determine the service intervals. Refer to ***Calendar Equivalents***. Do not use a machine which is due for a service. Make sure any defects found during the regular maintenance checks are rectified immediately.

How to Use the Service Schedules

T3-012_3

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

Important: *Services should be carried out at either the hourly interval or calendar interval, whichever occurs first. Refer to* ***Calendar Equivalents****.*

Pre-start Cold Checks, Service Points and Fluid Levels

Operation		A: 10	50	100(1)	B: 500	1000	2000	8000
ENGINE								
Coolant Quality and Level	- Check	□	□	□	□	□		
Cooling System	- Drain and Refill						□	□
Oil level	- Check	□	□					
Oil and Filter(2)(3)(4)	- Change				□	□	□	□
Air Cleaner Dust Valve(5)	- Change				□	□	□	□
Air Cleaner Outer Element(5)	- Change					□	□	□
Air Cleaner Inner Element	- Change						□	□
Pre-Cleaner (if fitted)	- Check			□				
Water Seperator	- Check for contamination and Drain		□	□	□	□	□	□
Engine Fuel Filter	- Change					□	□	□
Front End Accessory Drive (FEAD) Belt Condition	- Check				□	□	□	□
Front End Accessory Drive (FEAD) Belt	- Change							□
Engine Mounting Bolts for Tightness	- Check			□	□	□	□	□
All Hoses - Condition	- Check			□	□	□	□	□
Radiator(5)	- Clean				□	□	□	□
Crankcase Ventilation Filter	- Change					□	□	□

795390-1

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

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Notes:

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Prepare the Machine for Maintenance

Introduction

⚠ WARNING

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

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

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

8-3-1-1

Make the machine safe before you start a maintenance procedure.

Unless a maintenance procedure instructs you differently, you must lower the Excavator. Refer to ***How to Make the Machine Safe (Excavator Lowered)***.

How to Make the Machine Safe (Excavator Lowered)

Important: *Unless a maintenance procedure instructs you differently, you must lower the Excavator.*

1 Park the machine on level, solid ground.

If necessary, refer to ***Stopping and Parking the Machine*** in the Operator Manual.

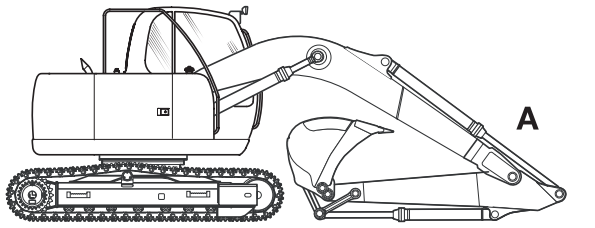
2 Lower the excavator so the attachment is flat on the ground as at **A**.

3 Stop the engine and remove the starter key.

4 Release tank pressure. Refer to ***Releasing Tank Pressure***.

5 Release the hydraulic pressure. Refer to ***Releasing the Hydraulic Pressure***.

6 Disconnect the battery to prevent accidental operation of the engine.



808071-5

Fig 4.

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Hydraulic System

Introduction

⚠ WARNING

The temperature of the hydraulic oil will be high soon after stopping the engine. Wait until it cools (less than 40°C) before beginning maintenance.

8-3-4-10

⚠ WARNING

Fluid Under Pressure

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

INT-3-1-10_3

⚠ WARNING

Hydraulic Pressure

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

INT-3-1-11_2

⚠ CAUTION

Using incorrect fluid could damage the system. See Fluids, Capacities and Lubricants for the correct fluid. The fluid can harm your skin. Wear rubber gloves. Cover cuts or grazes.

2-3-5-1_2

⚠ CAUTION

Do not allow dirt to enter the system. Before disconnecting any part of the system, thoroughly clean around the connection. When a component has been disconnected, always fit protective caps and plugs to prevent dirt ingress.

Failure to follow these instructions will lead to dirt entering the system. Dirt in the system will seriously damage the systems components and could be expensive to repair.

INT-3-3-12

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ATC Control Panel



T013670

Fig 11.

The ATC system includes an electronic control system that protects the system components if a problem occurs. The electronic control system also lets the operator control the cab temperature, fan speed and air flow direction at the ATC control panel. The ATC control panel (user Interface) on the right hand side console in the cab is connected to an electronic control module (ECM). The ECM is attached to the top of the ATC unit. The ECM monitors the inputs and controls the outputs in the system as selected by the operator and as the temperature conditions change. If a system problem occurs, the LCD display shows an error code.

Inputs

High Pressure Switch

The high pressure switch is on the receiver drier. The switch is an input used to monitor the fluid pressure in the high pressure side of the system. The switch tells the ATC control panel when the high pressure is abnormal.

Low Pressure Switch

The low pressure switch is in the ATC unit. The switch is used to monitor the low pressure gas on the low pressure side of the system. The switch tells the ATC control panel when the low pressure is abnormal.

Evaporator Temperature Sensor

The evaporator temperature sensor is in between the evaporator cores in the ATC unit in the cab. The sensor tells the ATC control panel the evaporator temperature. This temperature is for control of the compressor clutch and output to stop the evaporator cores freezing

Cab Temperature Sensor

The cab temperature sensor is on the inlet vent in the ATC unit in the cab. The sensor operates with the outlet temperature sensor to let the ATC control panel know when the cab temperature is correct.

Outlet Temperature Sensor (Air Off)

The outlet temperature sensor is on the outlet vent in the ATC unit in the cab. The outlet temperature sensor operates with the cab temperature sensor to let the ATC control panel know when the cab temperature is correct.

Outputs

PWM Module (Pulse Width Modulation)

The PMW module is in the ATC unit above the filter panel, access is through a removable plate. The PMW module controls the output signals from the ECU through actuators and a fan motor.

The components controlled by the PWM module are as follows:

- **Blower Motor**. The PWM module changes the signal to the blower motor as requested on the fan speed dial on the ATC control panel to increase or decrease the motor speed.
- **Re-circulation Motor (Actuator)**. The PWM module changes the signal to the re-circulation motor (Actuator) as requested on the ATC control panel to

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Table 2.

Machine	Auto	Economy	Intermediate	Idle
JZ140	2050 rpm	1950 rpm	1850 rpm	1000 rpm

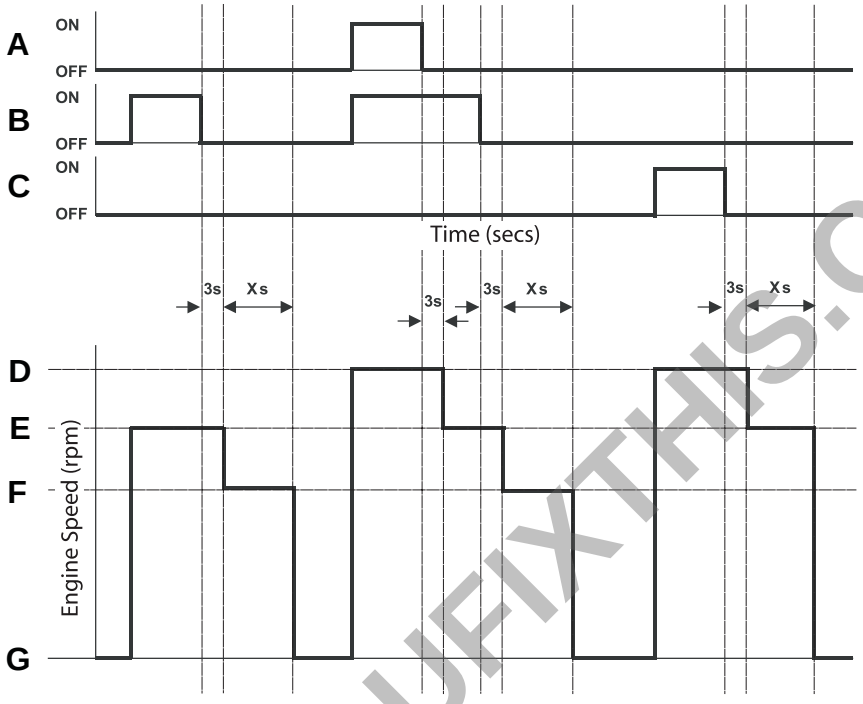


Fig 22.

Table 3.

Item	Auto Mode Pressure Switch
A	Auto Pressure Switch
B	Upper Pressure Switch
C	Travel Pressure Switch
D	Full Auto
E	Economy
F	Intermediate
G	Idle

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Slew Brake Solenoid Valve Failure

Operation

In the event of slew brake solenoid or the slew pressure switch failing, the slew brake will still operate. The pilot signal from the hand controller passes through the shuttle block and enters the slew brake valve via port A. When the pressure overcomes the slew brake shuttle, the signal passes through the slew brake valve via port B and is directed to the slew brake. When sufficient pressure is raised the slew brake is lifted.

The slew operation will tend to be notchy, as the brake on and off timing will depend upon the position of the slew joystick.

Note: *This operation is only to be used to make the machine safe i.e. to slew the machine into a safe position, for transportation to a place where an appropriate repair can be carried out.*

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100% Slew Lock

For schematic, ⇒ *Fig 26. (E-55)* .

When the slew lock button is operated in the cab, the ECU1 give two outputs:

1 To the CT6 Solenoid on the 8 Station solenoid valve **60**, allowing servo pressure to enter the Shuttle valve **46** at port C6 causing the slew spool in the main control valve **14** to be hydraulically locked in its neutral position.

2 To the CT3 solenoid on the 8 Station solenoid valve **60**, allowing any pressure in the slew brake to drain to tank.

3 The CT1 slew brake solenoid is de-energised as soon as the slew lock button is pressed.

Note: *The CT3 solenoid is energised either, 5 seconds after the button is operated, or 5 seconds after the slew pressure switch **45** opens, depending on which is last to operate. This allows the slew to come to a standstill on the cross line relief valves, before the brake is applied.*

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Key

1	O-ring	18	Carrier Pin
2	Pin	19	Sun Gear
3	O-ring	20	Carrier
4	Spindle	21	Pin
5	Shim	22	Thrust Washer
6	Floating Seal	23	Planetary Gear
7	Floating Seal	24	Needle Roller Bearing
8	Angular Bearing	25	Thrust Washer
9	Hub	26	Carrier Pin
10	Angular Bearing	27	Coupling
11	Lock Washer	28	Sun Gear
12	Carrier	29	Thrust Plate
13	Pin	30	Circlip
14	Thrust Washer	31	Cover
15	Planetary Gear	32	Hexagon Socket Head Screw
16	Needle Roller Bearing	33	Plug
17	Thrust Washer	34	O-ring

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