

TM180/220

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Electrical Device Codes

This manual uses a code system to help you identify the electrical devices on the machine.

When the electrical system is designed at the factory codes are given to the electrical connectors on the electrical harnesses. The system allows the same code to be used for different connectors.

For this reason a different system is used in this manual.

Each main category of devices is given a code type:

Code Type	Category
-000	Earth points
+000	Power (from battery or alternator)
1000	Switches
2000	Relays
3000	Valves/Coils
4000	ECU's
5000	Sensors
6000	Indicators/Lamps
7000	Other devices
8000	Harness Interconnections
9000	Fuses

Each device is given one code and the code is used throughout the manual. The same code is given to both the device and its electrical connector.

Important: *The electrical schematics and the harness drawings in Section C are reproduced from the factory drawings. For this reason they retain the factory connector codes.*



Section 1-2 - General Information Machine Identification

Component Identification Plates

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'Positional Type' Hydraulic Adaptors

Fitting Procedure

On a typical machine, some hydraulic components may utilise 'Positional Type' SAE Hydraulic Adaptors. When fitting 'Positional Type' Hydraulic Adaptors it is important to adopt the following procedure. If this procedure is not followed correctly, damage to the 'O' ring seal **4-A** can occur resulting in oil leaks.

- 1 Ensure the locknut **4-B** is screwed back onto the body of the adaptor as far as possible as shown.
- 2 Check the 'O' ring backing washer **4-C** is a tight fit on the adaptor. Note that the washer should not move freely, if the washer is slack do not use the adaptor.
- 3 Check the 'O' ring **4-A** is fitted and that it is free from damage or nicks. Before fitting the adaptor, smear the 'O' ring with clean hydraulic fluid.

Note: The dimensions and shore hardness of the 'O' ring is critical. Should it become necessary to replace the 'O' ring, ensure that only JCB Genuine Parts are used.

- 4 Screw the adaptor into the port of the hydraulic component as far as possible, so that ALL the threads engage and the 'O' ring is correctly seated against the sealing face.
- 5 Set the angular position of the adaptor as required, then secure by tightening the locknut **4-B**.

Note: When fitted correctly no more than one thread should be visible at **5-Z** as shown.

- 6 Torque tighten the locknut to 81 Nm (60 lbf ft).

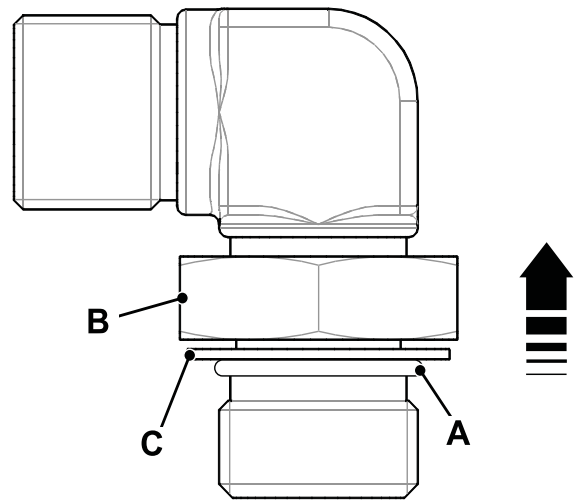


Fig 4.

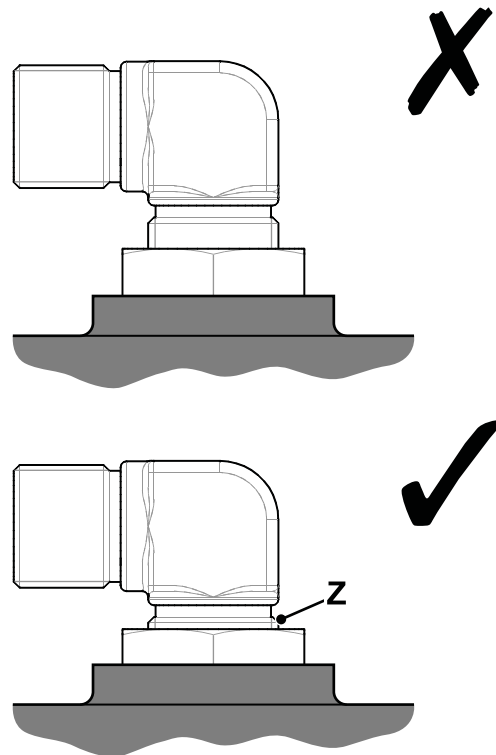


Fig 5.

⇒ Electrical Repair Kit (1-4-36)		
1		Electrical Repair Kit
2A	7212/0002	2 Way Pin Housing
2B	7212/0004	2 Way Pin Retainer
2C	7212/0003	2 Way Socket Retainer
2D	7212/0001	2 Way Socket Connector
3A	7213/0002	3 Way Pin Housing
3B	7213/0004	3 Way Pin Retainer
3C	7213/0003	3 Way Socket Retainer
3D	7213/0001	3 Way Socket Connector
4A	7213/0006	3 Way Pin Housing (DT)
4B	7213/0008	3 Way Pin Retainer (DT)
4C	7213/0007	3 Way Socket Retainer (DT)
4D	7213/0005	3 Way Socket Connector (DT)
5A	7214/0002	4 Way Pin Housing
5B	7214/0004	4 Way Pin Retainer
5C	7214/0003	4 Way Socket Retainer
5D	7214/0001	4 Way Socket Connector
6A	7216/0002	6 Way Pin Housing
6B	7216/0004	6 Way Pin Retainer
6C	7216/0003	6 Way Socket Retainer
6D	7216/0001	6 Way Socket Connector
7A	7218/0002	8 Way Pin Housing
7B	7218/0004	8 Way Pin Retainer
7C	7218/0003	8 Way Socket Retainer
7D	7218/0001	8 Way Socket Connector
8A	7219/0002	10 Way Pin Housing
8B	7219/0004	10 Way Pin Retainer
8C	7219/0003	10 Way Socket Retainer
8D	7219/0001	10 Way Socket Connector
9A	7219/0006	14 Way Pin Housing
9B	7219/0008	14 Way Pin Retainer
9C	7219/0007	14 Way Socket Retainer
9D	7219/0005	14 Way Socket Connector
10	7210/0001	Dummy Plug
11	7210/0002	Wire Seal (1.4 - 2.2 mm dia.)
12	7210/0003	Wire Seal (2.2 - 2.9 mm dia.)

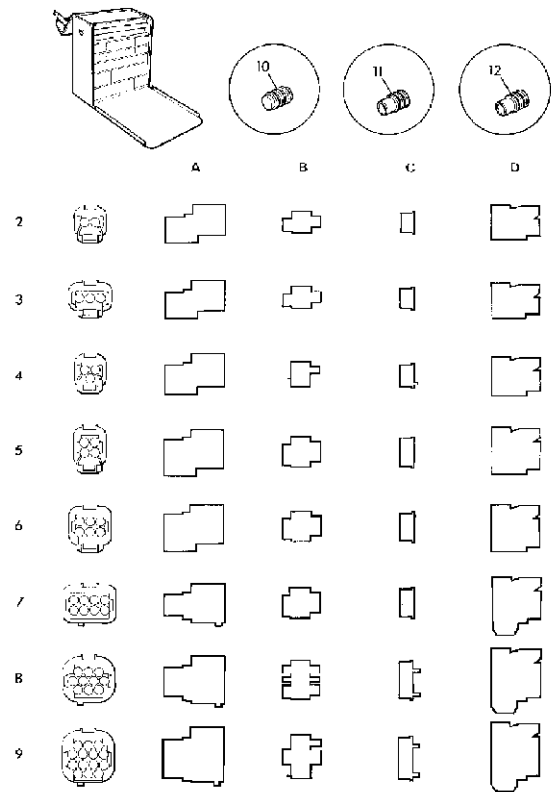


Fig 23. Electrical Repair Kit

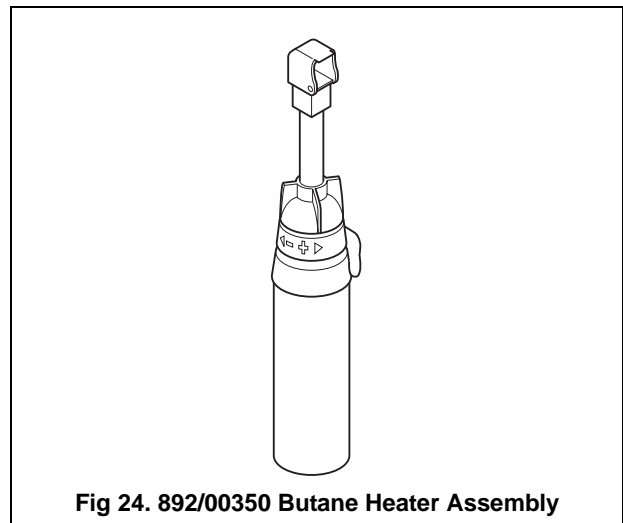


Fig 24. 892/00350 Butane Heater Assembly

<p>T11-018²</p> <p>Fig 53. Ram Piston Nut Removal/Fitting Rig</p>	993/99525	Rig Assembly (not including spanners and ram)
	993/99522	Anchor Side Plate (supplied loose unwelded)
	993/99523	Anchor Cross Member (supplied loose unwelded)
	993/99524	Ram Eye End Modification Plate Assembly
	556/43400	Lift Ram
	545/18000	Lynch Pin
	811/50232	1.1/4in Pivot Pin



Related Topics

Table 1. Related Topics in This Publication

The table lists other topics in the manual that contain information related to this topic. Refer to the applicable topics to complete your procedures. Where applicable the text in this section contains cross references to this page to help you find the correct information. Some machines have different systems and devices. Make sure you refer to the correct topic, refer to **Section 1 - Applications**.

Sections	Topic Titles	Sub Titles
1	⇒ Applications (□ 1-7-63)	
2	ALL (Care and Safety) ⁽¹⁾	ALL
3	Service Schedules	ALL

(1) You must obey all of the relevant care and safety procedures.

Section B - Body and Framework

Topic Ref	Title	Variant	Machine models	
			TM180	TM220
B1	<i>Fork Carriage</i>		●	●
B2	<i>Cab Heating and Ventilation System</i>		●	●
B3	<i>Cab Air Conditioning System</i>		●	●
B4	<i>Load Moment Indicator (LMI) System</i>		●	●
B5	<i>Longitudinal Load Moment System</i>	Agri, Agri Plus, Agri Super Nov 2009 on	●	●
B6	<i>Cab</i>		●	●
B7	<i>Air Conditioning Condenser - Cooling Pack Mounted</i>		Machines with non intercooled engines	
B8	<i>Air Conditioning Condenser - Cab Roof Mounted</i>		Machines with intercooled engines	
B9	<i>Cab HV and HVAC Unit</i>		●	●
B10	<i>Air Conditioning Binary Switch</i>		●	●
B11	<i>Heater Valve</i>		●	●
B12	<i>Fuel Tank - Side Mounted</i>		●	●
	<i>Fuel Tank - Rear Mounted</i>			
B13	<i>Chassis Panels</i>		●	●
B14	<i>Boom</i>	2 Stage	●	
		3 Stage		●
B15	<i>Hydraulic Tank</i>			
B16	<i>Load Moment Indicator Axle Transducer</i>		●	●
	<i>Electric Inclinometers</i>	Agri, Agri Plus, Agri Super Nov 2009 on	●	●
B17	<i>Stabilisers</i>			

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

WARNING

Fuel

Fuel is flammable; keep naked flames away from the fuel system. Stop the engine immediately if a fuel leak is suspected. Do not smoke while refuelling or working on the fuel system. Do not refuel with the engine running. Completely wipe off any spilt fuel which could cause a fire. There could be a fire and injury if you do not follow these precautions.

INT-3-2-2_3

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.

INT-3-2-3

CAUTION

It is illegal to pollute drains, sewers or the ground. Clean up all spilt fluids and/or lubricants.

Used fluids and/or lubricants, filters and contaminated materials must be disposed of in accordance with local regulations. Use authorised waste disposal sites.

INT-3-2-14

WARNING

Soft Ground

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

INT-3-2-4

WARNING

Always wear safety glasses when dismantling assemblies containing components under pressure from springs. This will protect against eye injury from components accidentally flying out.

GEN-6-2

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

CAUTION

Cleaning

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

INT-3-2-11

WARNING

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

GEN-1-9

Venting Hydraulic Pressure

WARNING

Hydraulic Pressure

Hydraulic fluid at system pressure can injure you. Before disconnecting or connecting hydraulic hoses or couplings, vent the pressure trapped in the hoses in accordance with the instructions given in this publication.

HYD-1-5

***Important:** This procedure is only to be used before disconnecting hydraulic hoses. Before removing other hydraulic components refer to the correct Removal procedure.*

- 1 Park the machine and make it safe. → [Parking the Machine and Making it Safe \(□ 2-17\)](#).
- 2 Stop the engine.
- 3 Carefully remove the hydraulic tank filler cap and vent the hydraulic pressure as follows:
 - a For manually operated services, operate the controls of the service to be disconnected.
 - b For electrical and pilot operated services, turn the starter key to the ON position but DO NOT start the engine.

Operate the controls of the service to be disconnected.

***Note:** Make sure that the pressure is vented correctly. Electrical and pilot services have a small quantity of accumulated pressure available for venting.*

- 4 Refit the hydraulic tank filler cap.



- a** If parts other than genuine JCB parts are used, the desired results may not be obtained. Use only genuine JCB parts.
- 3** Caution during dismantling and reassembly.
- a** Dismantling the ram while it is still installed on the machine can be dangerous as unexpected movements of the machine can occur. Remove the ram from the machine and then dismantle.
 - b** If reassembled with dirty hands, foreign matter can enter the ram causing a shorter life span and also the other hydraulic equipment may be damaged. Reassemble in a clean state.
 - c** Follow the instructions in the diagrams regarding torque tightening for screwed parts. If the torque is too high or too low, it can cause damage.



- 3 Avoid skin contact with oil soaked clothing.
- 4 Don't keep oily rags in pockets.
- 5 Wash dirty clothing before re-use.
- 6 Throw away oil-soaked shoes.

First Aid - Oil

Eyes

In the case of eye contact, flush with water for 15 minutes. If irritation persists, get medical attention.

Swallowing

If oil is swallowed do not induce vomiting. Get medical advice.

Skin

In the case of excessive skin contact, wash with soap and water.

Spillage

Absorb with sand or a locally approved brand of absorbent granules. Scrape up and remove to a chemical disposal area.

Fires

WARNING

Do not use water to put out an oil fire. This will only spread it because oil floats on water.

Extinguish oil and lubricant fires with carbon dioxide, dry chemical or foam. Fire fighters should use self contained breathing apparatus.

7-3-1-3_1

Fuels

Acceptable and Unacceptable Fuels

T3-093_2

CAUTION

Consult your fuel supplier or JCB distributor about the suitability of any fuel you are unsure of.

GEN-9-2

CAUTION

A combination of water and sulphur will have a corrosive chemical effect on fuel injection equipment. It is essential that water is eradicated from the fuel system when high sulphur fuels are used.

ENG-3-2

Important: No warranty liability whatsoever will be accepted for failure of fuel injection equipment where the failure is attributed to the quality and grade of the fuel used.

Quality

Use commercially available diesel fuels with a sulphur content of less than 0.5%. If the sulphur content is higher, the oil change intervals must be reduced by half.

Table 15. Permitted Fuel Specifications

Fuel	Specification
Diesel fuel	DIN 51628
	EN 590
	ASTM D 975 grade no. 1-D and 2-D
	NATO code F-54
	JIS K2204 grade 1 and 2
Light fuel oils	DIN 51603
	ASTM D 396 grade no. 1 and 2
	BS 286 class A 2
	CSR 441

The certification measurements for the observance of legal emission limits are carried out with the test fuels defined by legislation. These correspond with the diesel fuels described in accordance with D EN 590 and ASTM D 975. Emission values cannot be guaranteed with the other fuels listed above.

Winter Fuel

At low ambient temperatures paraffin discharges can lead to blockages in the fuel system and cause operating faults.

- Below 0°C (32°F) ambient temperature: use winter diesel (down to -20°C (-4°F)).
- Below -20°C: paraffin should be added. The relevant percentages are shown. → Fig 1. (□ 3-14).
- Special diesel fuels can be used for arctic climates to -44°C (-47°F).

Important: Only carry out mixing in the tank. First pour in the necessary amount of paraffin, then the diesel fuel.

If it is necessary to use Summer diesel fuel below 0°C (32°F), up to 30% petroleum can be added as shown. → Fig 1. (□ 3-14).

Usually a sufficient cold resistance can be achieved by adding a flow improver. Ask your JCB Distributor.

Key:

- I Summer diesel fuel
- II Winter diesel fuel
- A Outside temperature
- B Paraffin mixing proportion

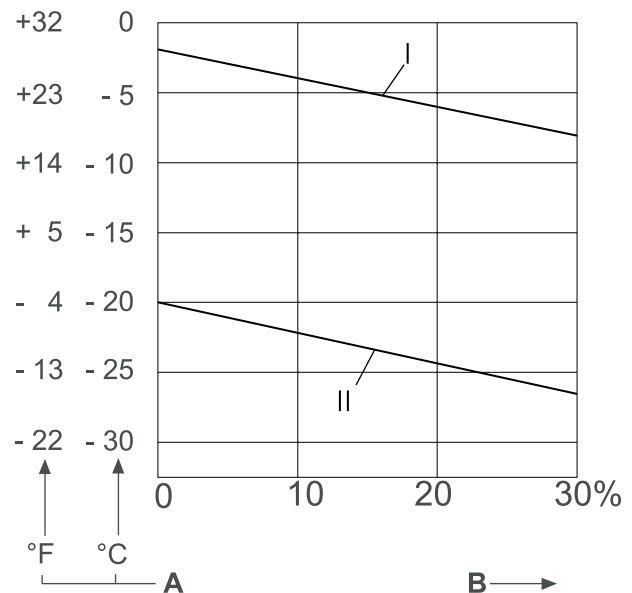


Fig 1.

C080710-1

Boom Grease Points

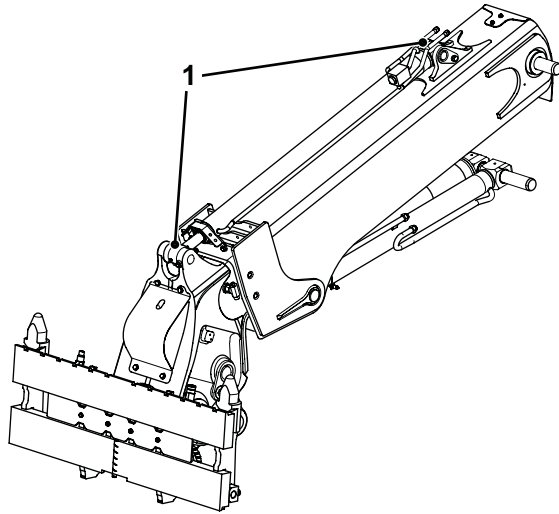


Fig 4.

T053770

Two grease points on the extension ram 1.

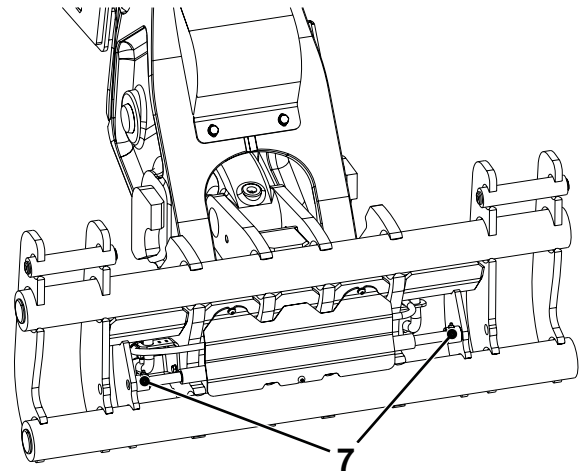


Fig 6.

333-R3033-2

Two grease points on the Euro carriage 7.

Note: The compact tool carrier is a hydraulic carriage, it has no grease points.

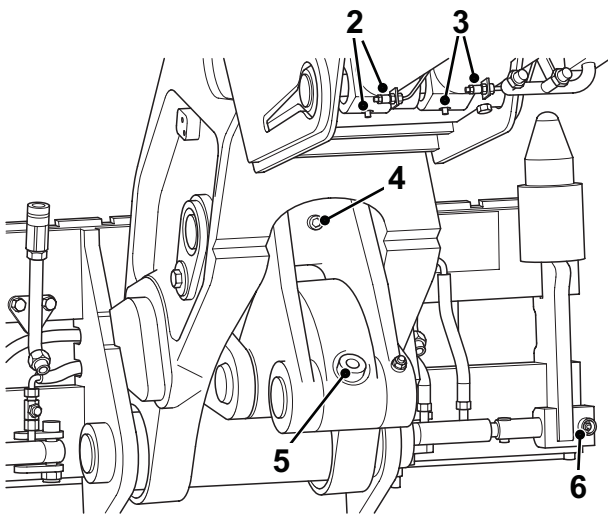


Fig 5.

T053790

Two grease points on the compensation ram 2.

Two grease points on the lift ram 3.

One grease point on the Z-bar 4.

One grease point on the tipping link-1 5.

Two grease points on the pin and cone carriage 6.

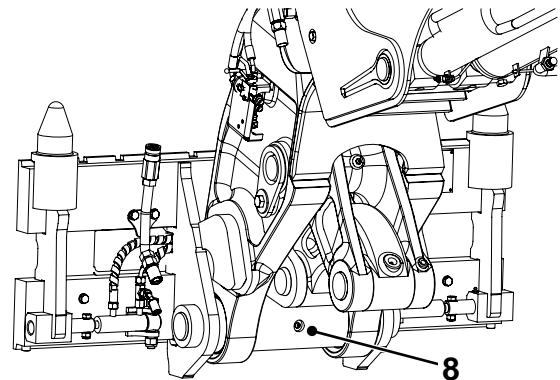


Fig 7.

T053790-

One grease point on the tipping link-2 8.

Electrical System

Battery

Battery Disconnection/Connection

T3-019_4

WARNING

Keep metal watch straps and any metal fasteners on your clothes, clear of the positive (+) battery terminal. Such items can short between the terminal and nearby metal work. If it happens you can get burned.

5-2-2-4

Disconnection

- 1 Get access to the battery. See **Access Panels**.
- 2 If the machine has a battery isolator, move the switch to the OFF position then remove the key.
- 3 Remove the leads. Disconnect the earth (-) terminal first.

Connection

- 1 Check the battery.
 - a If the terminal is dirty, clean the post.

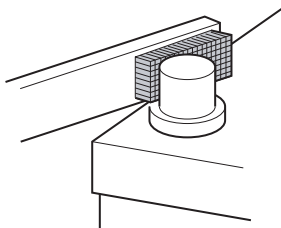


Fig 19.

- b If the terminal post is corroded and generates white powder wash the terminal with hot water. If considerable corrosion is detected, clean with a wire brush or abrasive paper.
 - c After cleaning, apply a thin coat of petroleum jelly to the terminal.
- 2 Re-connect the leads. Connect the earth (-) terminal last.
- 3 If the machine has a battery isolator, move the switch to the ON position.
- 4 Close and lock the access panels.

Checking the Electrolyte Level

T3-020_3

Low maintenance batteries used in normal temperate climate applications should not need topping up. However, in certain conditions (such as prolonged operation at tropical temperatures or if the alternator overcharges) the electrolyte level should be checked as described below.

- 1 Get access to the battery. See **Access Panels**.
- 2 Disconnect and remove battery. See **Battery Disconnection/Connection**.

WARNING

Do not top the battery up with acid. The electrolyte could boil out and burn you.

2-3-4-6

- 3 Remove covers **A**. Look at the level in each cell. The electrolyte should be 6 mm (1/4 in) above the plates. Top up if necessary with distilled water or de-ionized water.

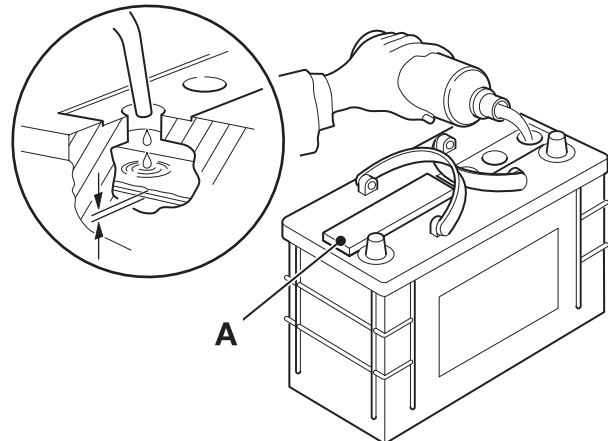


Fig 20. Typical Battery

- 4 Refit battery.
- 5 Close and lock the access panels.

Changing the Drive Belt

12 Close and secure the engine cover.

- 1 Do steps 1 to 5 of **Adjusting the Drive Belt**.
- 2 Disconnect the two flexible straps **M** from their bolts **N**. (One strap on either side of the fan cowl **Q**).
- 3 Loosen the four bolts **P** on the fan cowl.

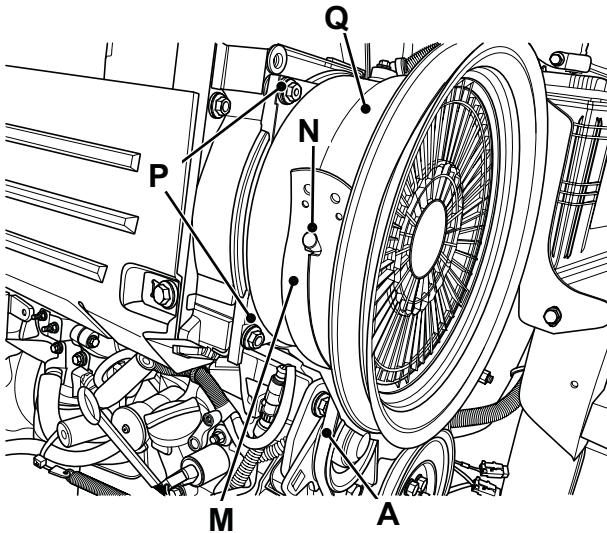


Fig 31.

T063290

- 4 Support the fan cowl, then remove the four bolts.
- 5 Remove the belt **A**.

Note: Before a new belt is installed, make sure the tensioner pulley turns smoothly and there is no side-play in the bearing.

- 6 Put the new belt in position.
- 7 Put the fan cowl in position, then install its bolts.
- 8 Connect the two flexible straps.
- 9 Tighten the bolts **H** and **J**. → [Fig 30.](#) (□ 3-43).
- 10 Check the tension of the belt. Refer to **Checking the Drive Belt**.
- 11 Check the tension of new belt after 15 minutes of engine run-time, it should be 210N. If necessary, adjust the tension of the belt.

Changing the Filter Element

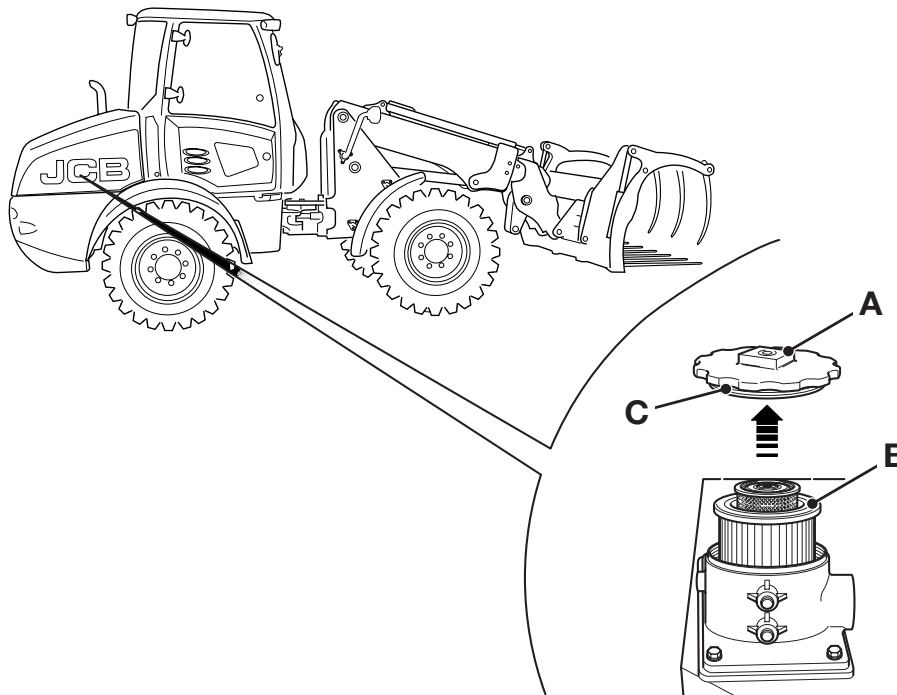


Fig 41.

C010480

- 1 Make the machine safe with the boom lowered. Refer to **Prepare the Machine for Maintenance**.
- 2 Open the engine cover.
- 3 Loosen the filter cover **A**.
- 4 Lift the handle attached to the top of the filter **B** and pull the filter straight up from its housing.
- 5 Discard the old filter.
- 6 Replace the O-ring **C** on the filter cover.
- 7 Put a new filter into its housing and make sure it is fully home.
- 8 Lower the handle attached to the top of the filter **B**.
- 9 Put the filter cover in position, then torque tighten to 40 Nm (29.5 lbf ft).
- 10 Check the hydraulic oil level and top-up if necessary. [⇒ Fluids, Lubricants and Capacities \(□ 3-13\)](#).
- 11 Close and lock the engine cover.

Note: Do not exceed the torque setting for the filter cover.

Front Axle

Checking the Oil Level

⚠ CAUTION

The oil level must be checked with the machine level, otherwise a false indication of the amount of oil will be given.

16-3-5-3_2

- 1 Make the machine safe with the boom lowered. Refer to ***Prepare the Machine for Maintenance***.
- 2 Clean the area around the fill/level plug **A**. → [Fig 54.](#) (□ 3-64).
- 3 Remove the fill/level plug **A** and its sealing washer. The oil should be level with the bottom of the hole.
- 4 If necessary, top-up the system with the recommended oil. → [Fluids, Lubricants and Capacities](#) (□ 3-13).
- 5 Clean, then install the fill/level plug **A** and its sealing washer.

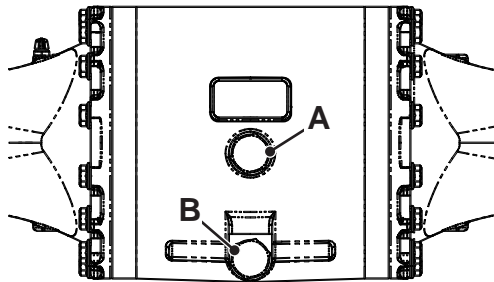


Fig 54.

Changing the Oil

The axle oil is used to lubricate the brake components and cool the brake plates.

It is important that the oil is changed regularly as specified in the service schedule. The lubrication properties of the oil will decrease as a result of brake wear.

Consult your JCB Dealer for advice if necessary.

- 1 Park the machine on level ground so that the 'OIL LEVEL' mark on one hub is at the bottom. → [Fig 55.](#) (□ 3-64).
- 2 Make the machine safe with the boom lowered. Refer to ***Prepare the Machine for Maintenance***.

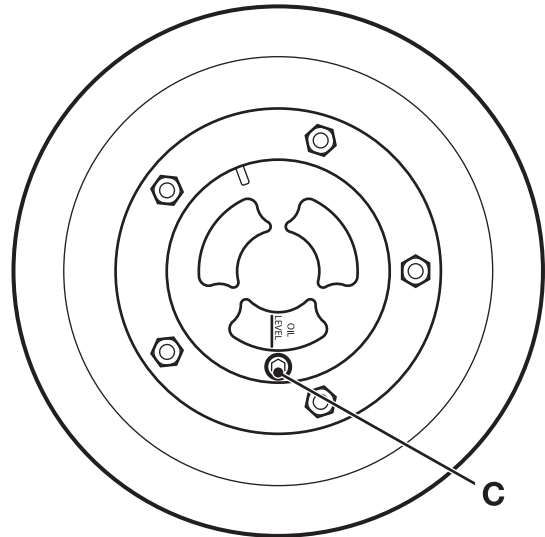


Fig 55.

356040-2

- 3 Put a suitable container below the fill/level plug **C** (to collect the oil.)
- 4 Remove the fill/level plug **C** from the hub.

Let the oil drain completely. The plug is magnetic.
- 5 Clean the fill/level plug **C**. (Carefully remove all metallic particles).
- 6 Clean, then install the fill/level plug **C**.



Section A - Attachments

Contents

Page No.



Related Topics

Table 1. Related Topics in This Publication

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Sections	Topic Titles	Sub Titles
1	Applications	ALL
2	ALL (Care and Safety) ⁽¹⁾	ALL

(1) You must obey all of the relevant care and safety procedures.

- i Press the handle to start the knife blade oscillating.

Important: This tool must not be used on toughened glass.

- ii Insert the knife blade into the sealant.
 - iii Slowly move the knife along the sealant with the blade positioned as close to the glass as possible. Do not allow the knife blade to overheat or the sealant will melt.
- b Braided Cutting Wire and Handles.** ⇒ Fig 5. (□ B-12). This method uses a 3-core wire, a wire starter tube and two handles.

- i Insert the steel tube **A** into the old sealant on the inside of the glass.

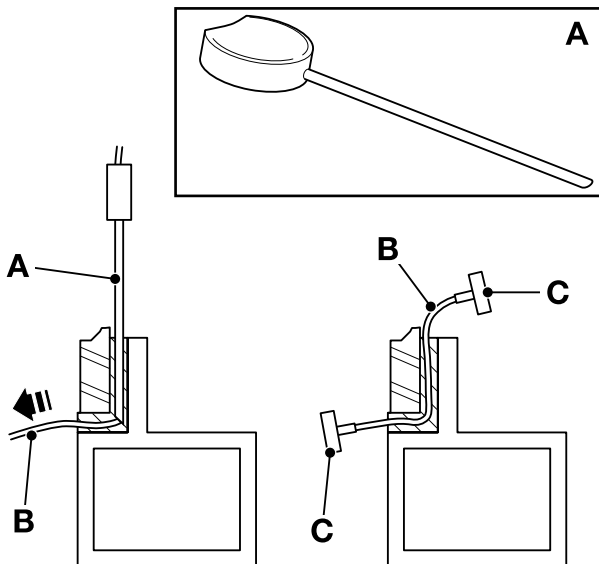


Fig 5. Braided Cutting Wire and Handles

- ii Insert the braided cutting wire **B** down the centre of the steel tube. If necessary, from the outside, cut out local sealant at the point of the tube to gain access to the wire.
- iii Using suitable pliers, pull the cutting wire through the sealant to the outer side of the glass.
- iv Secure each end of the braided cutting wire in the special handles **C**.

- v Move the cutting wire backwards and forwards in a sawing motion and at the same time gently push or pull the wire to cut through the old sealant.

- c Cut-out Knife. ⇒ Fig 6. (□ B-12). The cut-out knife can be used as a left handed or right handed tool.

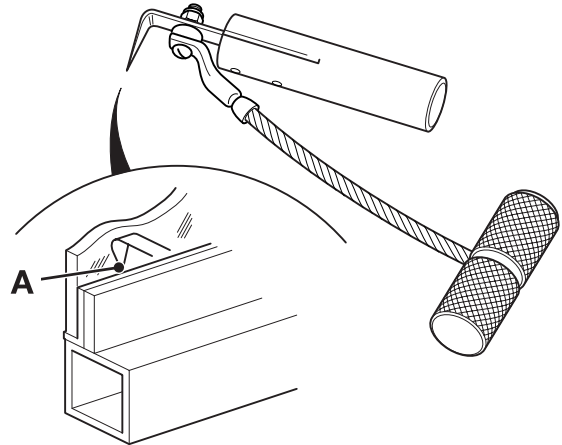


Fig 6. Cut-out Knife

- i Insert the knife blade into the sealant.
 - ii Make sure that the blade of the knife is against the glass **A**. ⇒ Fig 6. (□ B-12).
 - iii Use the 'pull-handle' to pull the knife along and cut out the old sealant.
- d Craft Knife.** ⇒ Fig 7. (□ B-13). The blades **A** are replaceable.
- i Insert the knife blade into the sealant.
 - ii Pull the knife along and cut out the old sealant.

System Operation

To maintain optimum operator comfort in warm climates or during seasons of high ambient temperature, the air conditioning system delivers cool, dehumidified air into the cab. Cooling is provided by passing the warm ambient air, together with re circulated air, over an evaporator matrix in the air conditioning unit.

The air conditioning system is a closed circuit through which the refrigerant is circulated, its state changing from gas to liquid and back to gas again, as it is forced through the system.

The major components of the system are the compressor **A**, condenser matrix **B**, receiver drier **C**, binary pressure switch **E**, thermostatic expansion valve **F** and evaporator matrix **G**.

Operate the air conditioning as described in the **Operator Handbook**.

Air conditioning system power is generated from the engine, via an electromagnetic clutch to the compressor. Switches, connected in series, are included in the clutch supply line, all must be closed for the clutch and therefore the air conditioning system to operate.

The compressor **A** draws in low pressure refrigerant gas from the suction line (evaporator to compressor) and increases refrigerant pressure through compression. This process also increases the refrigerant temperature.

High pressure refrigerant is forced from the compressor to the condenser **B**. Ambient air is drawn across the condenser by the condenser fans. In the condenser, the refrigerant changes state to a high pressure, high temperature liquid but with a lower heat content.

The refrigerant passes through the receiver drier **C**, which contains a desiccant to remove moisture from the system. The receiver drier serves as a reservoir for refrigerant and also includes a filter to remove foreign particles from the system.

Note: The receiver drier can only hold a limited amount of moisture, additional moisture can lead to icing and ultimately blockage of the thermostatic expansion valve. If the air conditioning system has been left open or has been leaking for a prolonged period of time, the desiccant will become saturated and the receiver drier will need to be renewed.

The high temperature, high pressure refrigerant is forced by compressor action into the Thermostatic Expansion Valve (TEV) **F**, which meters the amount of refrigerant entering the evaporator. In the Thermostatic Expansion Valve the refrigerant instantaneously expands to become a low pressure, low temperature liquid.

The refrigerant is drawn through the evaporator matrix **G** by the suction of the compressor. The temperature of refrigerant is now considerably below that of the air being drawn across the evaporator matrix by the blowers. Heat is transferred from the ambient and re circulated air to the refrigerant, causing the low pressure liquid to vaporise and become a low pressure gas. Moisture in the air condenses on the evaporator matrix and is drained away via condensate.

Cool de-humidified air is emitted through air vents into the cab.

The low temperature, low pressure, high heat content refrigerant gas, is now drawn by suction back to the compressor, where the cycle is completed.

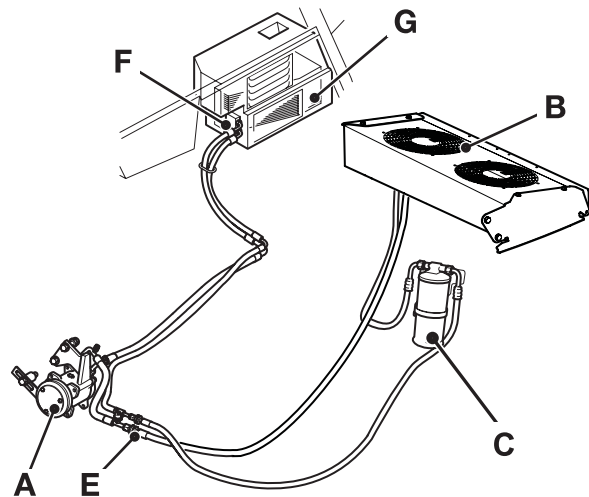


Fig 2.

C067580-C3

No Refrigerant Circulation

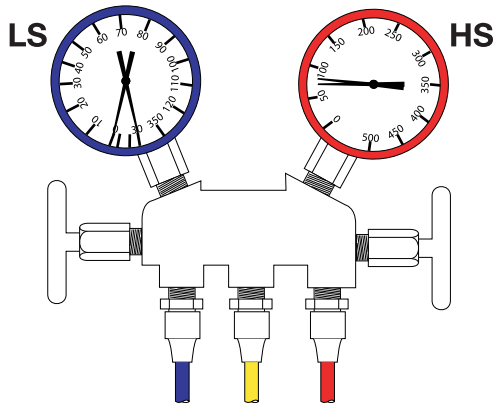


Fig 8.

A268040-1

Insufficient Cooling of Condenser or Refrigerant Overcharge

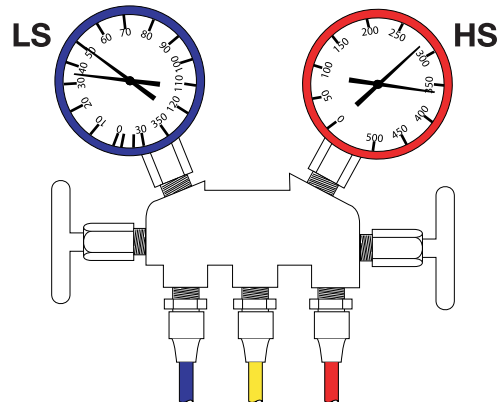


Fig 9.

A268060-1

Table 10. Gauge Readings

Gauge	Pressure
Low Side LS	Zero to negative: -1.0 bar (-1.1 kgf cm ²)(-15 lbf in ²)
High Side HS	Low: 5.4 bar (5.5 kgf cm ²)(78 lbf in ²)

Other Symptoms

Receiver Drier - Frost or moisture on tubes before and after receiver-drier.

Diagnosis

Refrigerant flow obstructed by dirt, moisture or gas leakage from expansion valve heat sensing tube.

Correction

- 1 Evacuate air Con. system.
- 2 Check heat sensing tube at expansion valve. Replace expansion valve if necessary.
- 3 Remove expansion valve and attempt removal of dirt. If dirt cannot be removed, replace expansion valve.
- 4 Replace receiver drier.
- 5 Charge system with R-134a.
- 6 Operate system and check performance.

Table 11. Gauge Readings

Gauge	Pressure
Low Side LS	High: 13.0 bar (3.0kgf cm ²)(43 lbf in ²)
High Side HS	High: 22.1 bar (22.5 kgf cm ²)(320 lbf in ²)

Diagnosis

Refrigerant overcharge, condenser cooling fins clogged with dirt or cooling fans malfunctioning.

Correction

- 1 Clean condenser cooling fins.
- 2 Check cooling fan operation.
- 3 Evacuate air con. system
- 4 Charge system with R-134a.
- 5 Operate system and check performance.

Charging

This procedure is industry recommended practice for refilling air conditioning systems with refrigerant.

Evacuate the system beforehand to 740mm (29 in) of mercury.

- 1 Close all valves and connect the manifold as shown. Connect the blue hose **19-A** to system low pressure and the red hose **19-B** to system high pressure. Connect the yellow hose **19-C** to the refrigerant cylinder **19-D**.
- 2 Invert single valve cylinder on the scales **19-E** and zero the scale reading

Note: Some refrigerant cylinders have separate valves for gas and liquid. Be sure to connect to the liquid port when following the above procedure.

Note: Refrigerant can be used either in gas or liquid form. If recharging with gas follow the manufacturers instructions and recharge only via the low pressure port. Do not use liquid refrigerant at the low pressure port.

- 3 Slowly open the high pressure valve and allow the vacuum to draw-in refrigerant to the specified weight for the system. Refer to **Technical Data**.

Add refrigerant until the scales **19-E** indicate the specified weight for the system or the weight obtained when the system refrigerant was previously recovered.

Note: To speed up the process a thermostatically controlled thermal blanket **19-F** can be used around the replenishing cylinder.

- 4 Close all valves and remove the equipment.

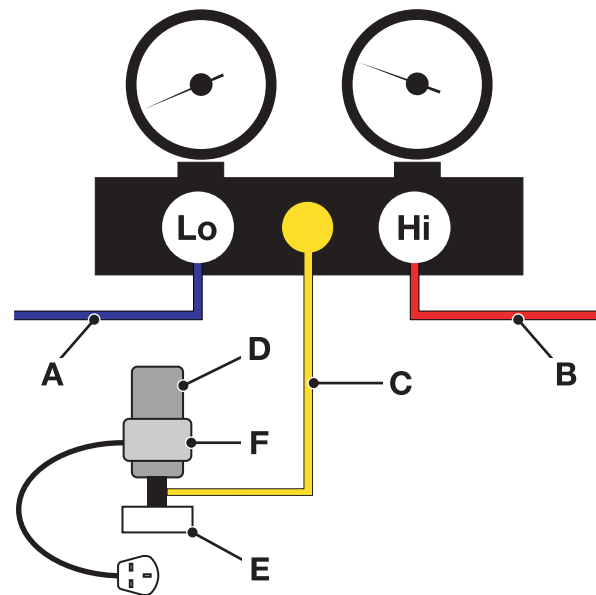


Fig 19. Charging



Section B - Body and Framework Air Conditioning Binary Switch

Removal and Replacement

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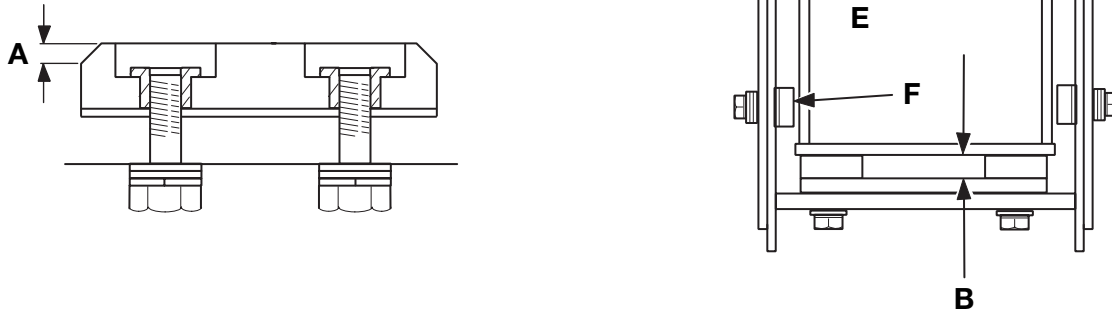


Fig 5.

C097760-C1

Table 4. Measurements

Dimension B	Lower inside face of outer boom to underside of inner boom Standard 17 mm < 15 mm (0.59 in) add shims
Dimension E	Vertical clearance (Front and rear) Max 2.0 mm (0.07 in)
Dimension F	Total side clearance (Front and rear) Max 2.0 mm (0.07 in)

Front Top Wear Pads

- 1 Park the machine on firm level ground and apply the parkbrake.
- 2 Chock both sides of all four wheels.
- 3 Lift the boom until the inner boom is resting on the lower wear pads.
- 4 Measure the distance **E** between the upper inner and outer boom faces. If this measurement is below the limits given add or remove shims under the top wear pads **5** to give the correct dimension ⇒ [Table 4. Measurements \(□ B-62\)](#).
- 5 Measure the total shim thickness of shims under each pad.
- 6 There must be 8-10 mm of thread engaged between the bolt thread and the wear pad assembly. This can

be adjusted by selecting either the 25mm (1 in) long bolts or the 30mm (1.2 in) long bolts. The bolt thread must not protrude beyond the surface of the wear pad insert.

- 7 Apply a coating of JCB High Strength Threadlocker to the bolts **5** before fitting.
- 8 Install the shims and torque tighten the bolts **J** ⇒ [Table 6. Torque Settings \(□ B-67\)](#).



Related Topics

Table 9. Related Topics in This Publication

The table lists other topics in the manual that contain information related to this topic. Refer to the applicable topics to complete your procedures. Where applicable the text in this section contains cross references to this page to help you find the correct information. Some machines have different systems and devices. Make sure you refer to the correct topic, refer to **Section 1 - Applications**.

Sections	Topic Titles	Sub Titles
1	Applications	ALL
2	ALL (Care and Safety) ⁽¹⁾	ALL

(1) You must obey all of the relevant care and safety procedures.

Removal and Replacement

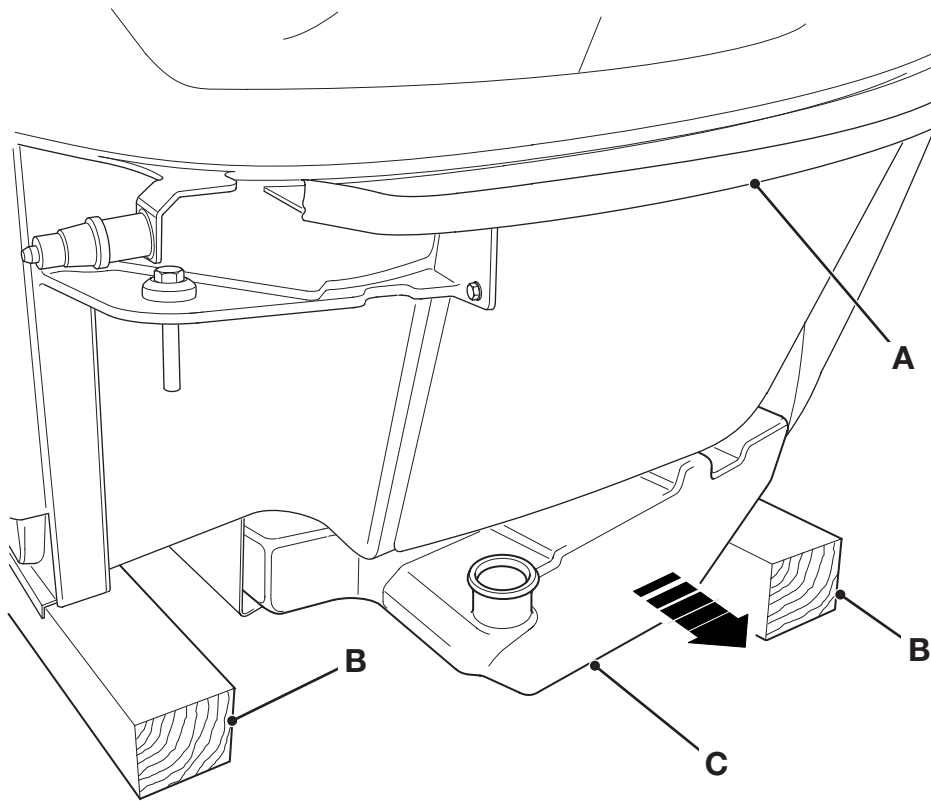


Fig 2.

C097770

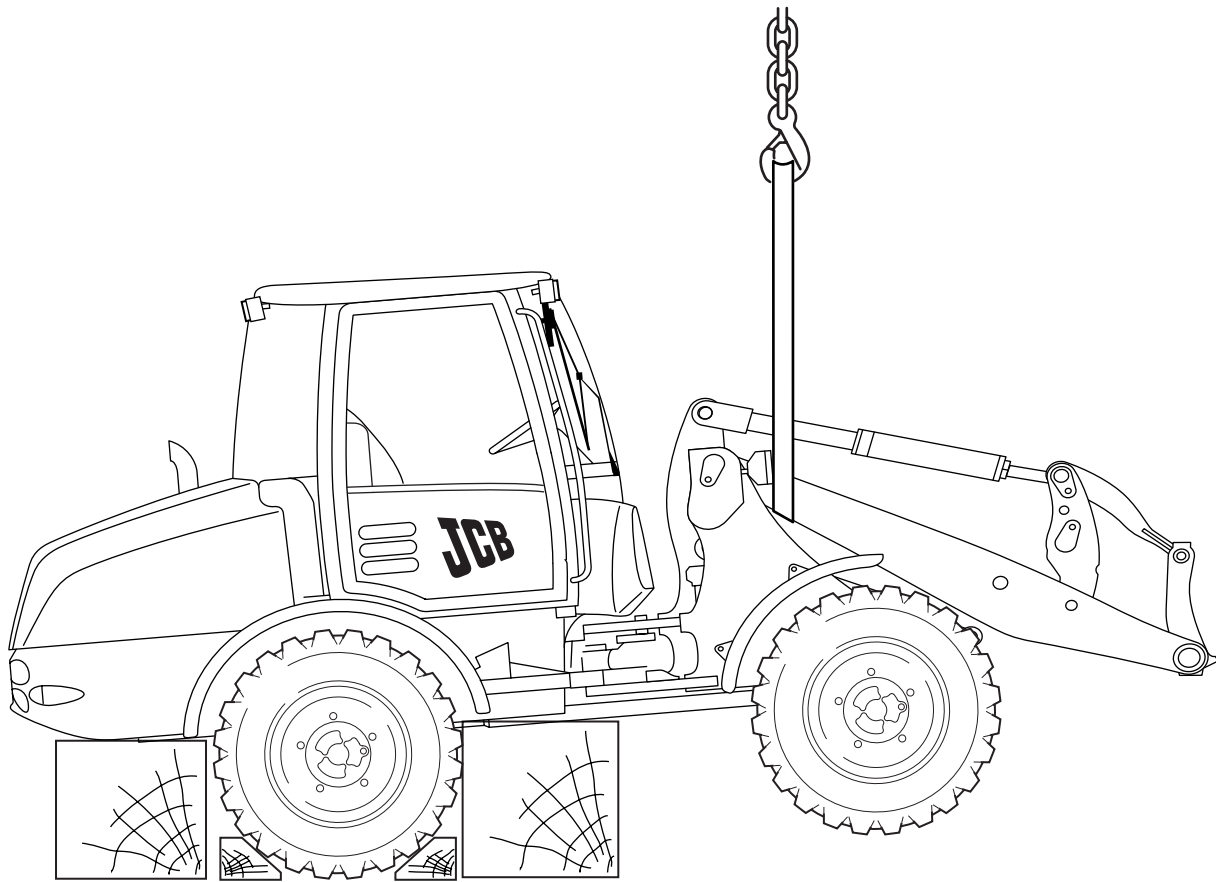


Fig 4. Chassis Securing Block Positions



Section C - Electrics Fuses and Relays

Relays and Fuses

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Worklights, Beacon, LLMC and Quickhitch Release

Component Key: Sheet 5 of 15 → [Fig 5. \(□ C-15\)](#)

AA	Beacon
ER	Quickhitch Switch (Momentary)
FH	Quickhitch Solenoid
FL	Boom Retract Proximity Switch
FM	Strain Guage
FN	Boom Angle Sensor
FP	Strain Guage
GD	Front Worklight Switch
GE	Rear Worklight Switch (On-Off)
GF	Beacon Switch (On-Off)
RN	LH Front Worklight
RP	RH Front Worklight
RS	LH Rear Worklight
RT	RH Rear Worklight
RXA	Load Moment Indicator (LMI)
RXB	Load Moment Indicator (LMI)

Machine Earth Points

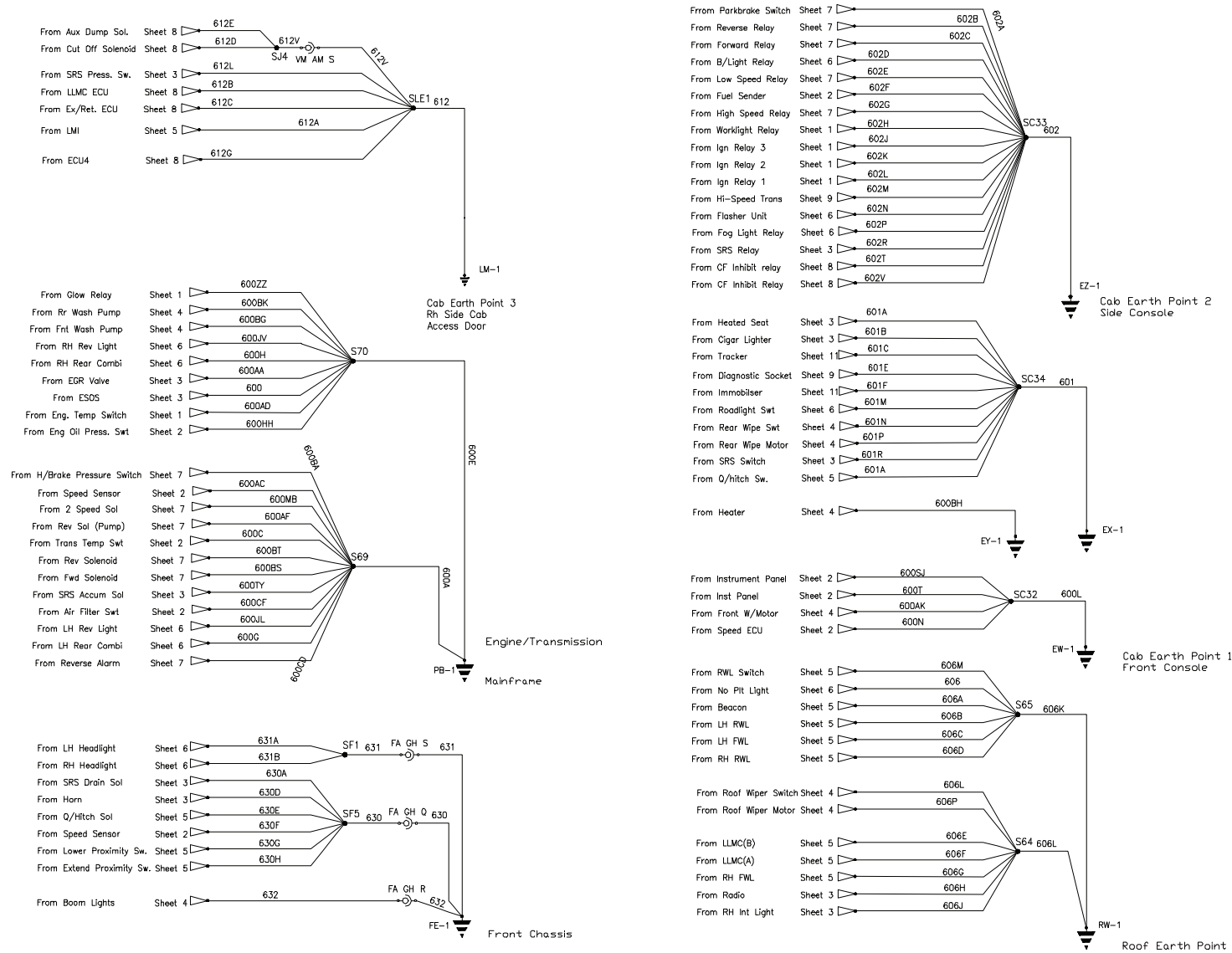


Fig 10. Machine Earth Points

332-W8127-4-10



EW
Front Console Earth

1	1600L	4.0	SC32-2
---	-------	-----	--------

Ring Terminal M10 4.0-6.0 : 1 : 7207/1502
Adhesive Lined Heatshrink : 1.0 : 7000/3212

EX
Side Console Earth

1	6014	0	SC34-4
---	------	---	--------

Ring Terminal M10 4.0-6.0 : 1 : 7207/1502
Adhesive Lined Heatshrink : 1.0 : 7000/3212

EY
Heater Earth

1	600BH	4.0	DT-4
---	-------	-----	------

Ring Terminal M10 4.0-6.0 : 1 : 7207/1502
Adhesive Lined Heatshrink : 1.0 : 7000/3212

EZ
Relay Earths

1	6024	0	SC33-9
---	------	---	--------

Ring Terminal M10 4.0-6.0 : 1 : 7207/1502
Adhesive Lined Heatshrink : 1.0 : 7000/3212

FE
Front Chassis Earth

1	614A	2.0	EH-SH-QGH
---	------	-----	-----------

Ring Terminal M10 6.0-10.0 : 1 : 7207/1510
Adhesive Lined Heatshrink : 1.0 : 7000/3212

GA
Rear Wash Wipe Switch

1	864	1.0	GB-2
2	862	1.0	GB-4
3	103F	1.0	GA-8
4			
5	LINK	1.0	GA-10
6	863B	1.0	SC36-2
7	601N	1.0	SC34-8
8	103A	0.75	GA-3
9			
10	LINK	1.0	GA-5

10 Way 6.3 Fastin Switch Hsg : 1 : 7219/0013

GB
Rear Wiper Motor

1	601P	1.0	SC34-3
2	864	1.0	GA-1
3	103J	1.0	SC25-1
4	862	1.0	GA-2

4 Way DT06 SOC HSG NO END CAP : 1 : 7214/0061
4 Way DT06 Wedge : 1 : 7214/0016

GC
Roof Conn 2

1	117	2.0	CH-4
2	303	1.5	CH-14
3	103B	1.5	CG-8
4	116	2.0	CH-2
5	855M	1.0	DWA-1
6	304	1.0	CH-16

6 Way DT06 SOC HSG NO END CAP : 1 : 7216/0041
6 Way DT06 Wedge : 1 : 7216/0016

GD
Front Chassis Connector

A	5530	1.0	SC23-2	J	5560	0.75	DM-6	R	632	2.0	FE-1
B	805E	1.0	SC28-5	K	830E	1.0	SC29-3	S	631	2.0	FE-1
C	806E	1.0	SC27-5	L	814	1.5	ES-2	T	464	1.0	CJ-3
D	834	2.0	CH-6	M	829E	1.0	SC19-3	U	463	1.0	CJ-4
E	837	2.0	CH-8	N	114B	0.75	SC20-2	V	541	1.0	DF-12
F	5550	0.75	DM-10	O	7210	0.0030		W	540	1.0	DE-5
G	500B	1.0	ER-3	P	5190	0.75	SC42-1	X	454A	0.75	SC35-2
H	916	2.0	CZ-3	Q	630	2.0	FE-1	~			

23 Way HDP Bulkhead Reversed Socket Housing : 1 : 7220/0062
Size 24 Lockwasher : 1 : 7210/0047
Size 24 Plastic Nut Jam : 1 : 7210/0048

GG
Buzzer

1			
2	106C	1.0	SC15-3
3			
4			
5			
6	411	1.0	SC31-2
7			
8			
9			

9 Way Mini Relay Housing : 1 : 7241/0005

GL
40K Indication lights

1	889G	0.75	SC2-6
2	107C	0.75	SC22-3
3	7210	0.0030	
4	815B	0.75	SC6-3
5	107D	0.75	SC30-4
6	107B	0.75	SC22-2

6 Way DT06 SOC HSG NO END CAP : 1 : 7216/0041
6 Way DT06 Wedge : 1 : 7216/0016

GM
ZV-L LINK

1	7210	0.0030	
2	7210	0.0030	
3	7210	0.0030	
4	7210	0.0030	
5	107BA	0.75	GM-6
6	107BA	0.75	GM-5

12 Way DT04 Pin Housing Key B : 1 : 7219/0023
12 Way DT04 Wedge : 1 : 7219/0026

GN
ZV IMMOBILIZER

1	105	1.0	CF-6
2	105A	1.0	CS-2
3	810B	0.75	SC11-1
4	810D	0.75	CP-6
5	445A	0.75	SC16-1
6	602NA	1.0	SC5-3
7	305B	0.75	SC14-1
8	106A	0.75	CF-4
9	7210	0.0052	
10	7210	0.0052	
11	602NB	1.0	SC5-2
12	445	0.75	EG-10

12 Way DT06 Socket Housing Key B : 1 : 7219/0019
12 Way DT06 Wedge : 1 : 7219/0024

GO
ZV-L LINK

1	579	1.0	ZV-L-1
2	578	1.0	ZV-L-4
3	577	1.0	ZV-L-12
4	578	1.0	ZV-L-3
5	7210	0.0052	
6	7210	0.0052	
7	7210	0.0052	
8	7210	0.0052	
9	7210	0.0052	
10	7210	0.0052	
11	7210	0.0052	
12	577	1.0	ZV-L-5

12 Way DT04 Pin Housing Key B : 1 : 7219/0023
12 Way DT04 Wedge : 1 : 7219/0026

GP
Low Range

1	889B	0.75	CU-14
2	889E	0.75	DWE-1
3	889A	1.0	ET-7
4	889D	1.0	EL-2
5	889C	1.0	CS-4
6	889G	0.75	GL-1

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GQ
SC1

1	872A	0.75	ET-8
2	872D	0.75	EJ-2
3	872B	0.75	DWE-2

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GR
SC2

1	123B	0.75	CU-3
2	123	1.5	CG-20
3	123A	1.5	CR-1
4	123C	1.0	EF-6

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GS
SC3

1	835	1.0	CT-2
2	835A	1.0	CS-17
3	835B	0.75	DWD-1

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GT
SCB

1	815A	0.75	EG-7
2	815A	0.75	CU-4
3	815B	0.75	GL-4

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GU
SC7

1	406A	0.75	CU-18
2	406B	0.75	CR-2
3	406B	0.75	CX-2

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GV
SC8

1	403A	0.75	CU-10
2	403D	0.75	CR-3
3	403B	0.75	CX-3

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GW
SC9

1	402A	0.75	CU-21
2	402D	0.75	CR-4
3	402B	0.75	CX-4

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GX
SC10

1	404A	0.75	CU-22
2	404D	0.75	CR-6
3	404B	0.75	CX-5

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GZ
SC11

1	810B	0.75	ZV-3
2	443D	0.75	EG-3
3	810D	0.75	EJ-8

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GA
SC12

1	107G	0.75	ET-1
2	107B	0.75	GL-6
3	107C	0.75	GL-2
4	107E	0.75	EJ-3
5	107F	0.75	CT-8

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GB
SC13

1	444E	0.75	EG-5
2	444A	0.75	EG-4
3	444B	0.75	CP-4
4	444C	1.0	SC17-1
5	444D	1.0	BK1-1

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GC
SC14

1	553B	0.75	CU-24
2	553C	1.0	CH-A
3	553A	1.0	CS-15
4	553D	0.75	DC-2

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GD
SC15

1	107M	0.75	EG-8
2	107O	0.75	CF-12
3	107A	0.75	EJ-7
4	107D	0.75	GL-5

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GE
SC16

1	445A	0.75	ZV-5
2	445B	0.75	CS-1
3	445C	1.0	BK1-2

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GF
SC17

1	444C	1.0	SC13-4
2	444H	1.0	EK-3
3	444K	1.0	EM-3

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GG
SC18

1	602AB	1.0	EK-1
2	602A	1.0	SC33-13
3	602AC	1.0	EM-2

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GH
SC19

1	829	1.0	CG-2
2	829D	1.0	CS-9
3	829E	1.0	GH-M

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GI
SC20

1	114A	0.75	CJ-1
2	114B	0.75	GH-N
3	114D	0.75	CG-16

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GJ
SC21

1	001A	4.0	EE-6
2	001B	1.0	CK-6
3	001L	1.0	CL-6
4	001M	1.0	CM-6
5	001P	1.0	CN-6

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GK
SC22

1	830	1.0	CG-4
2	830D	1.0	CS-11
3	830E	1.0	CH-K
4	830F	1.0	CG-5
5	830Y	0.75	CU-7

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GL
SC23

1	107M	0.75	EG-8
2	107O	0.75	CF-12
3	107A	0.75	EJ-7
4	107D	0.75	GL-5

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GM
SC24

1	110A	1.0	DR-3
2	110B	1.0	DP-1
3	110	1.5	CF-8

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GN
SC25

1	103J	1.0	GB-3
2	103F	1.0	GA-3
3	103	1.5	CG-8

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GO
SC26

1	108A	1.5	EF-1
2	108D	1.0	ED-3
3	108	1.5	CF-2

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GP
SC27

1	806	1.0	DWB-1
2	806B	1.0	DP-11
3	806A	0.75	CU-6
4	806F	1.0	CS-19
5	806E	1.0	GH-C

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GQ
SC28

1	805	1.5	EB-5
2	805B	1.0	DP-10
3	805A	0.75	CU-1
4	805F	1.0	CR-5
5	805E	1.0	GH-B

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GR
SC29

1	830	1.0	CG-4
2	830D	1.0	CS-11
3	830E	1.0	CH-K
4	830F	1.0	CG-5
5	830Y	0.75	CU-7

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GS
SC30

1	107M	0.75	EG-8
2	107O	0.75	CF-12
3	107A	0.75	EJ-7
4	107D	0.75	GL-5

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GT
SC31

1	411A	0.75	CU-11
2	411	1.0	GG-6
3	411B	0.75	DWC-1

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GU
SC32

1	600AK	1.0	DR-1
2	600L	4.0	EW-1
3	600T	0.75	CU-16
4	600S	0.75	CU-30
5	600N	0.75	AJ-4

In Line Ultrasonic Splice : 1 : 7000/3104
Adhesive Lined Heatshrink : 45.0 : 7000/3212

GV
SC33

1



Section C - Electrics Electrical Harness System

Harness Details

333-S8365-1-1

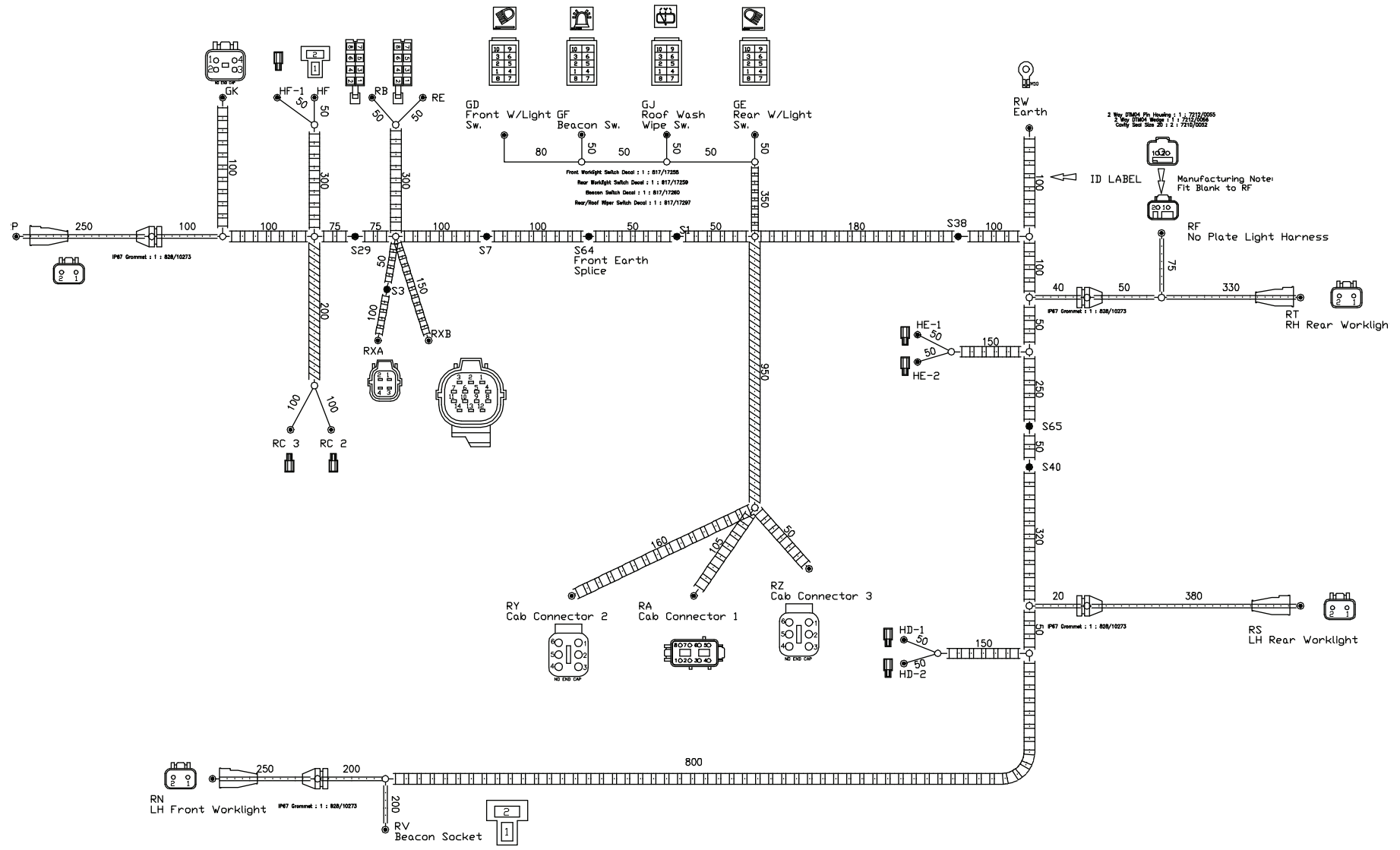


Fig 14. Cab Roof Harness 333/S8365



Mainframe Harness CAD 332/W8263 Issue 5

Key to Connectors:

MA	Permanent Earth	PE	Primary Fuse 5 and 6
MB	Cab Connector 1	PF	Primary Fuse 7 and 8
MC	Cab Connector 2	PG	Temperature Switch
MFW	Alternator	PH	Brake Pressure Switch
MFD+	Alternator	PK	Fused Earth
MG1	Glow Relay Coil	S4	Forward
MG2	Glow Relay Coil	S50	Reverse
MH	Speed Sensor	S59	Rear Fog Splice
MJ	Starter Motor	S69	Earth 1
MK	Starter Advance Solenoid	S70	Earth 2
ML	Oil Temperature Sender	S72	Brake Light
MM	Engine Oil Temperature Switch	SM2	In Line Splice
MP	Transmission Oil Temperature Switch	SM1	In Line Splice
MR	Fuel Pressure Solenoid	S9	Wire Extend
MS	Air Filter Switch		
MT	Engine Oil		
MV	EDOS		
MW	EGR Valve		
MX	SRS Solenoid		
MZ	Front Washer Pump		
NA	Rear Washer Pump		
NB-1	AC High Pressure Switch		
NB-2	AC Low Pressure Switch		
ND	AC Compressor		
NF	LH Rear Combi Lights		
NG	LH Reverse Light		
NK	RH Rear Combi Lights		
NL	RH Reverse Light		
NS	Forward Solenoid		
NT	Reverse Solenoid		
NU	Retardation Solenoid (Motor)		
NV	Reverse Alarm		
NW	High Speed Solenoid		
PB	Mainframe Earth		
PC	Primary Fuse A		
PD	Primary Fuse B		

LiveLink 2 Harness- CAD 333/S8603 Issue 3

Key to Connectors:

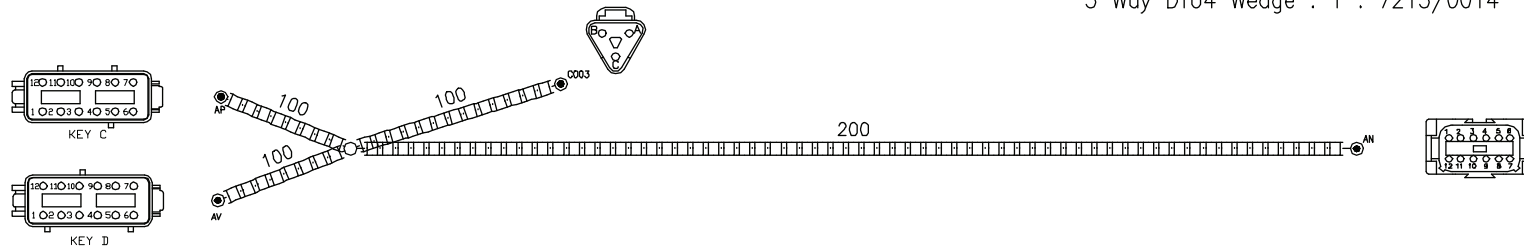
AN 12-way DT04

Key to Connectors:

AP 12-way DT06

AV 12-way DT04

C003 3-way DT04



C003

A	CAN	H	0.75	AP-11
B	CAN	L	0.75	AP-2
C	SCR		0.75	AP-1

3 Way DT04 Pin Housing : 1 : 7213/0030
 3 Way DT04 Wedge : 1 : 7213/0014

AP

1	SCR	0.75	C003-C	7	407A	0.75	AN-10	
2	CAN	L	0.75	C003-B	8	106L	0.75	AN-9
3			7210/0052	9	620	0.75	AN-1	
4	305C	0.75	AN-7	10	600AB	0.75	AN-8	
5			7210/0052	11	CAN	H	0.75	C003-A
6			7210/0052	12			7210/0052	

12 WAY DTM06 SOCKET HOUSING KEY C : 1 : 7219/0141
 12 Way DTM06 Wedge : 1 : 7219/0024

AV

1		7210/0052	7		7210/0052		
2		7210/0052	8	404C	0.75	AN-5	
3		7210/0052	9		7210/0052		
4	402C	0.75	AN-4	10	406C	0.75	AN-2
5	403C	0.75	AN-3	11		7210/0052	
6		7210/0052	12		7210/0052		

12 WAY DTM06 SOCKET HOUSING KEY D : 1 : 7219/0142
 12 Way DTM06 Wedge : 1 : 7219/0024

AN

1	620	0.75	AP-9	7	305C	0.75	AP-4
2	406C	0.75	AV-10	8	600AB	0.75	AP-10
3	403C	0.75	AV-5	9	106L	0.75	AP-8
4	402C	0.75	AV-4	10	407A	0.75	AP-7
5	404C	0.75	AV-8	11		7210/0030	
6		7210/0030	12		7210/0030		

12 Way DT04 Pin Housing : 1 : 7219/0015
 12 Way DT04 Wedge : 1 : 7219/0010

Fig 29. LiveLink2 333/S8603

333-S8603-4-1



free from grease, dirt, and corrosion as these can cause a false reading.

- 3 When measuring voltage: Make sure that the correct range is selected, that is set the selector to a value equal to or greater than that you are about to measure. e.g. If asked to measure 12 Volts, set the selector to the 12V range. If there is no 12V range, set the selector to the next range higher, 20V for instance. If the meter is set to a range that is too low, it may be damaged. e.g. setting to the 2V range to measure 12V.

Measuring DC Voltage

- 1 Select the correct range on the multimeter.
 - a On the FLUKE 85.

Turn the switch to position **B**.
 - b On the AV0 2003.

Move the right slider switch to position **A**, and the left hand slider switch to the appropriate range.
 - c On an analogue meter.

Turn the dial to the appropriate DC Volts range.
- 2 Connect the black probe to the nearest available suitable earth point, usually this will be the starter motor earth, the battery negative, or the chassis. Connect the red probe to the wire or contact from which you are measuring the voltage.

Measuring Resistance

- 1 Make sure there is no power to the part of the circuit you are about to measure.
- 2 Connect one probe at one end of the component or wire to be checked and the other probe at the other end. It does not matter which way round the two probes are placed.
- 3 Select the correct range on the multimeter.
 - a On the FLUKE 85.
 - i Turn the switch to position **C** and check that the **W** sign at the right hand side of the display window is on. If the **F** sign is on instead, press the blue button **G** to change the reading to Ω . Touch the meter lead probes together and press the **REL**³ key on the meter to eliminate the lead resistance from the meter reading.
 - b On the AV0 2003.
 - i Move the right hand slider switch to position **B**, and the left hand slider switch to the appropriate Ohms (Ω) range.
 - c On an analogue meter.
 - i Move the dial to the appropriate Ohms (Ω) range.

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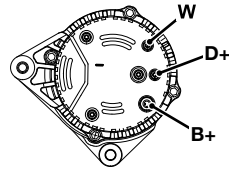


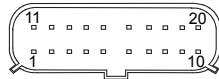

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Electrical Connectors

The table shows the harness connectors that connect to the electrical devices. The connectors are shown looking at the mating face when disconnected. Remember that the drawings show the harness connectors NOT the device connectors.

Use the table and the relevant electrical schematic to identify the pins in the harness connectors. Continuity checks on the harness wires can be carried out using a multi-meter. Do not touch ECU connector pins. Do not use a multi-meter on ECU connector pins.

Device	Description	Location	Harness Connector
A	Alternator	Right side of engine	
+022	Battery connector A	Located on the battery +ve terminal post	 M8
+023	Battery connector B	Located on the battery +ve terminal post	 M8
2053	Starter motor relay	Located on the starter motor	Threaded terminal posts - cable connection
4012	LMS display connector J1	The ECU connectors are located behind the LMS display unit. Be sure to identify the correct connector. Connector J1 is coloured Grey. ⇒ Electrical Harness System (□ C-27) .	
6017	Centre Display Panel	The display panel connectors are located behind the instrument panel. See cab removal and replacement procedures.	
8000	Harness interconnections	⇒ Electrical Harness System (□ C-27)	
9000	Fuses	⇒ Fuses and Relays (□ C-1)	



Section C - Electrics Alternator

Removal, Inspection and Installation

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Auxiliary Relief Valves (ARV's) - Using Hand Pump

WARNING

Hydraulic Pressure

Hydraulic fluid at system pressure can injure you. Before disconnecting or connecting hydraulic hoses or couplings, vent the pressure trapped in the hoses in accordance with the instructions given in this publication.

HYD-1-5

Insert the ARV into the test block, part no 892/00252. Connect hand pump 892/00223 and a 0 - 400 bar (0 - 6000 lbf/in²) pressure gauge. Plug the two large diameter (3/4 inch B.S.P.) ports of the test block using blanking plugs (892/00059) and bonded washers (1406/0021).

Pressurise until oil begins to escape from the drain hole **6A**. At this point the gauge will indicate the crack pressure of the ARV. The pressure should be 10 bar (145 lbf/in²) below the operating pressure.

The ARV's are non-adjustable. If the ARV fails to achieve the required pressure it must be replaced.

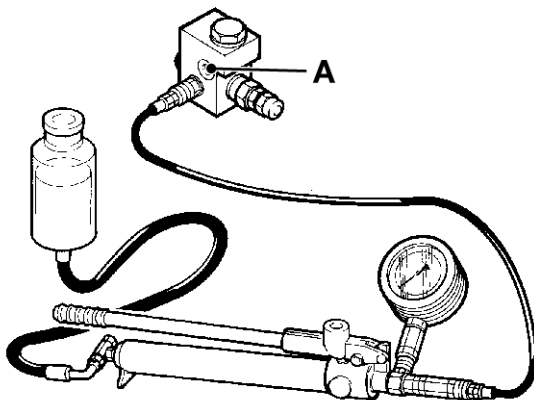


Fig 6.

Example of Schematic Circuit

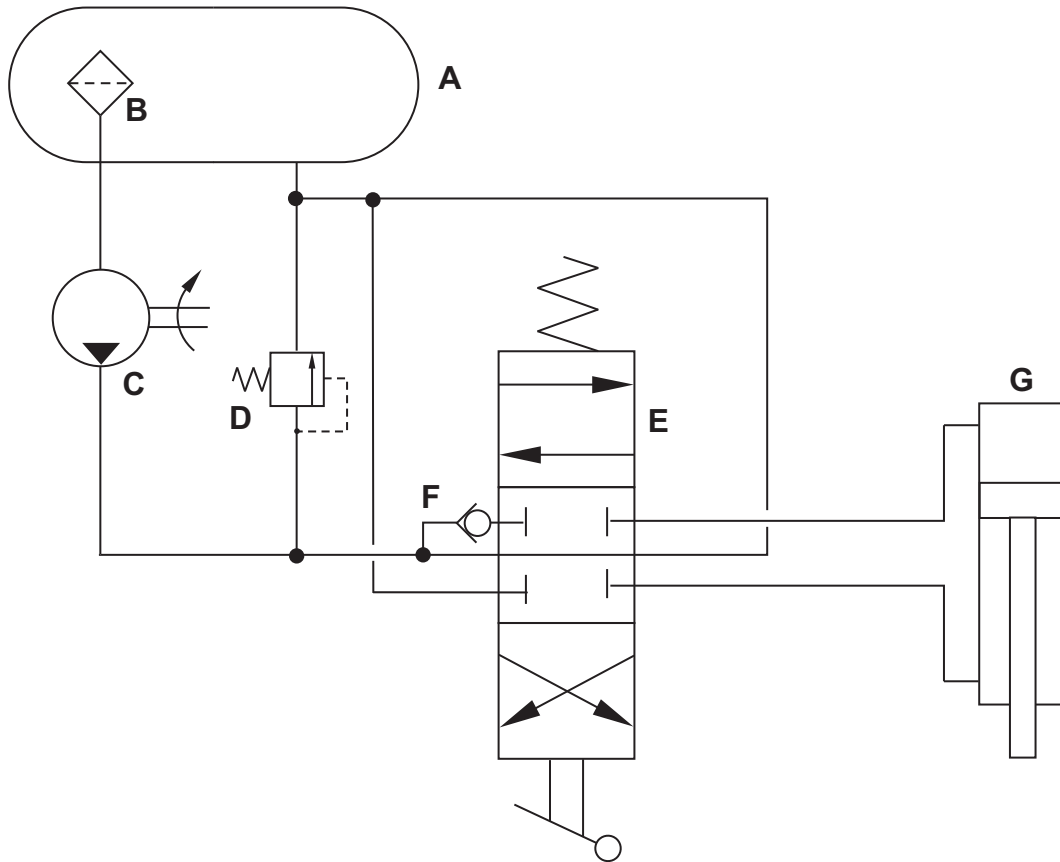


Fig 16. Simple Schematic Circuit

Some of the symbols described on the preceding pages have been arranged into a simple schematic circuit. → [Fig 16.](#) ([□ E-14](#)).

Hydraulic tank **16-A** is a pressurised tank with an internally mounted strainer **16-B** on the suction line to the fixed displacement pump **16-C**. System pressure is limited to the setting of relief valve **16-D**.

Valve spool **16-E** is an open-centre spool that is in neutral position; flow from the pump passes through the spool and returns to the hydraulic tank.

If the lever operated spool is moved away from neutral position hydraulic fluid is directed to either head side or rod side of hydraulic ram **16-G**. Notice that the fluid must first open one way valve **16-F** before flowing to the ram.

Example Circuit Key

- 16-A** Hydraulic Tank
- 16-B** Strainer
- 16-C** Fixed Displacement Pump
- 16-D** Relief Valve
- 16-E** Spool
- 16-F** One Way Valve
- 16-G** Double Acting Hydraulic Ram

Operation

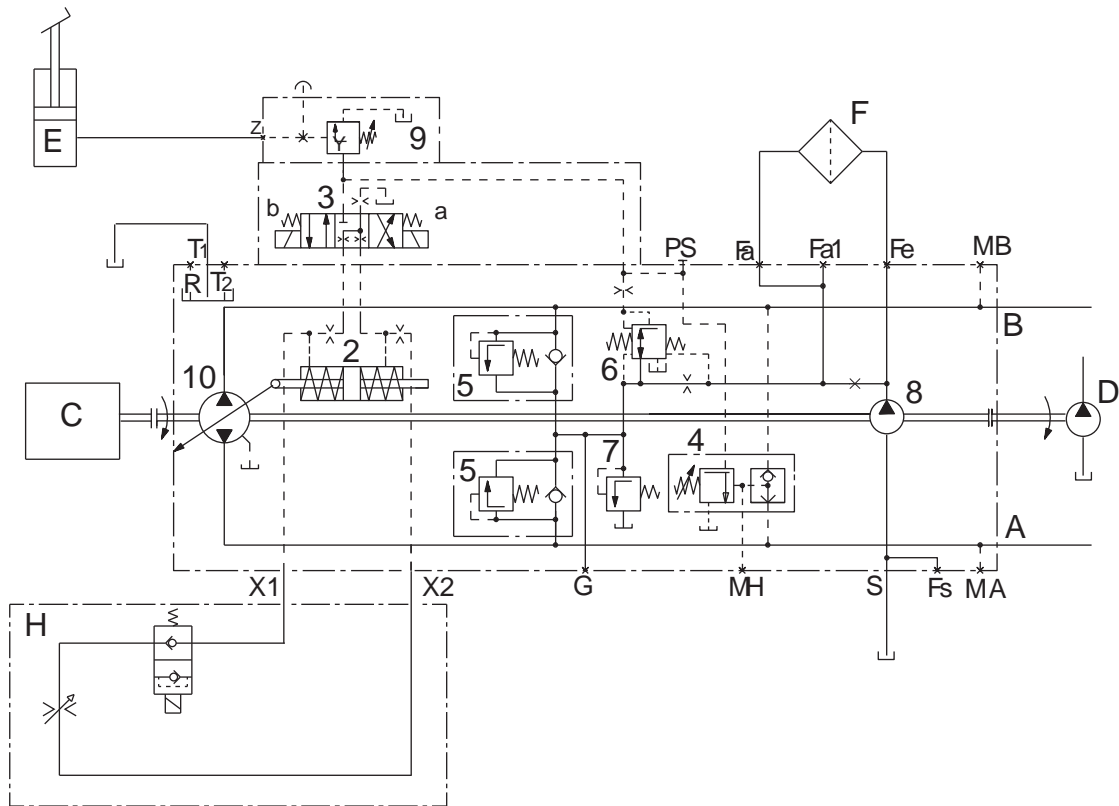


Fig 23.

The transmission pump is a variable displacement axial piston pump **10** with related control circuits.

The case-drain is from the port **T1**, through the transmission motor case-drain to the tank.

A solenoid operated Directional Control-Valve (DCV) **3** operates on the swash-angle control piston **2** to supply the forward/reverse control. The DCV switches the swash-plate **11** in the pump from one direction to the other. Move the swash-plate over-centre to change the direction of flow.

The swash-angle is also affected by the displacement angle control-valve **6**, which adjusts for changes in the load, for example a 'pull down' of the engine speed because of an increased load or a hydraulic circuit demand.

The charge-pump **8** supplies the control pressure for the pump operation.

The inching-valve **9** uses the pressure from the master brake cylinder **E** to give progressive braking.

The oil flow which operates the transmission motor leaves through port **A** and returns through port **B** or vice versa, dependant on the direction of drive.

The external high pressure (control pressure) filter **F** supplies the filtration.

Transmission Motor

Components of Transmission Pump

⇒ [Fig 33. \(E-34\)](#), ⇒ [Fig 34. \(E-34\)](#) and
 ⇒ [Fig 35. \(E-35\)](#)

- 1 Driveshaft
- 2 Swash angle control piston
- 3 Solenoid operated 2 position valve
- 4 Flushing and boost pressure valve (FBPV)
- 5 Relief-valve
- 6 Displacement angle control-valve
- 7 Driveshaft (see note below)
- 8 Rotary piston group

Note: Be careful when you remove or install the motor not to hit the driveshaft, this can cause a failure of the piston group centre-pin.

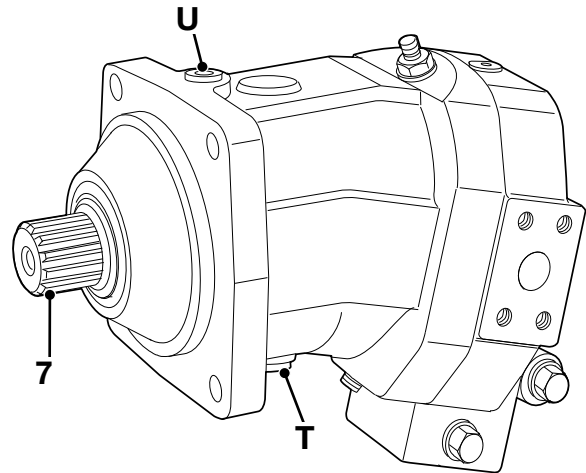


Fig 33.

Ports

⇒ [Fig 33. \(E-34\)](#), ⇒ [Fig 34. \(E-34\)](#) and
 ⇒ [Fig 35. \(E-35\)](#)

- A Drive circuit inlet/outlet
- B Drive circuit inlet/outlet
- U Case-drain from pump
- T Case-drain return to tank
- G Test port

The hydrostatic motor is an axial piston variable displacement motor, which uses the bent-axis design.

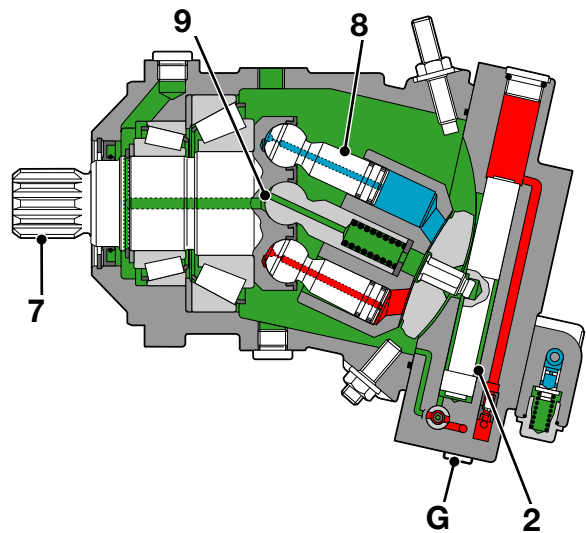


Fig 34.

Operation 2

⇒ Fig 42. (□ E-44).

Also ⇒ Table 15. Key to Oil Flow and Pressure (□ E-42).

As the neutral circuit has been blocked by the central land of the selected spool **3C**, the pressure in parallel gallery **B** increases until it is greater than that in service line **D**.

At this point, load hold check-valve **3J** opens and lets the oil to flow from the parallel gallery into the service line and operate the lift ram **33**.

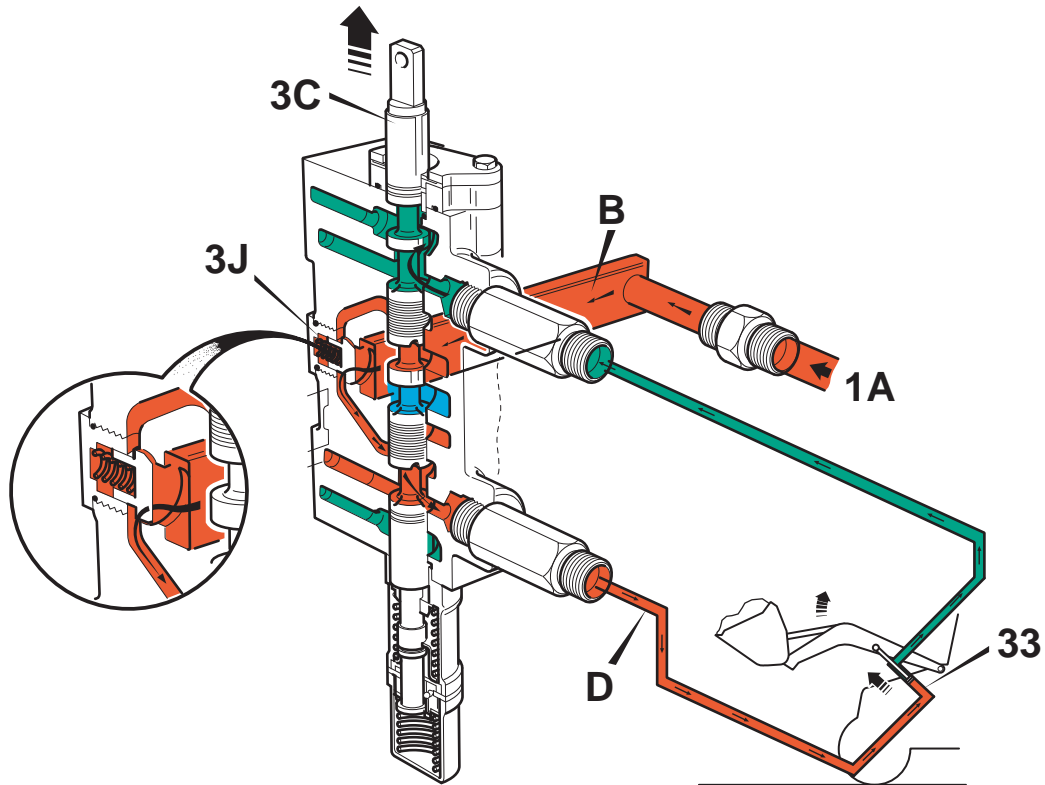


Fig 42.

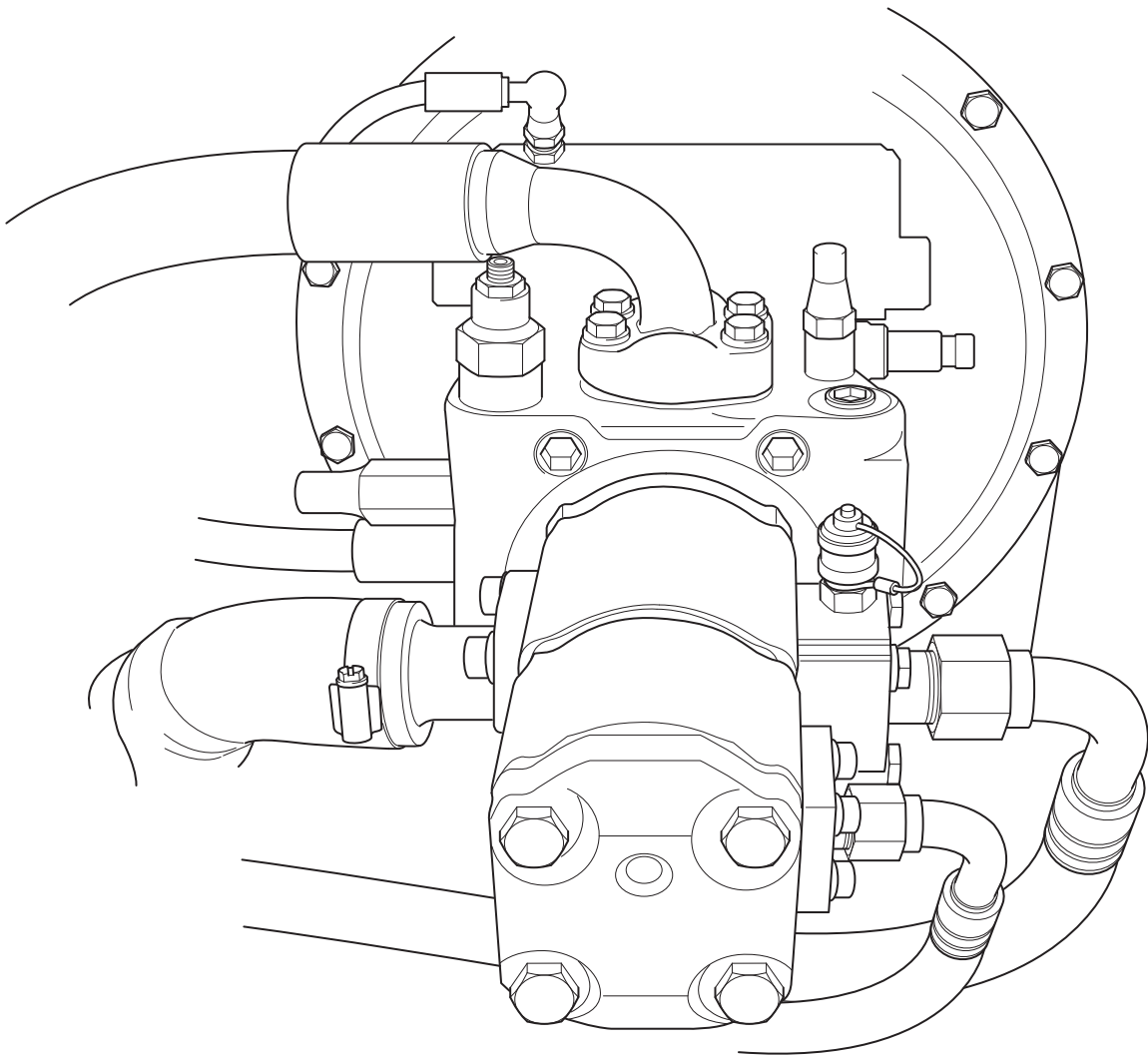


Fig 1. Hydraulic Service and Fan Pumps (later models)

Table 1. Torque Settings

Item	Nm	Kgf m	lbf ft	Notes
E	9 - 10	0.9 - 1.02	6.6 - 7.4	M6 X 25
E	29 - 30	2.9 - 3.0	21 - 22	M8 X 25
F	51	5.2	37.6	M10 X 25

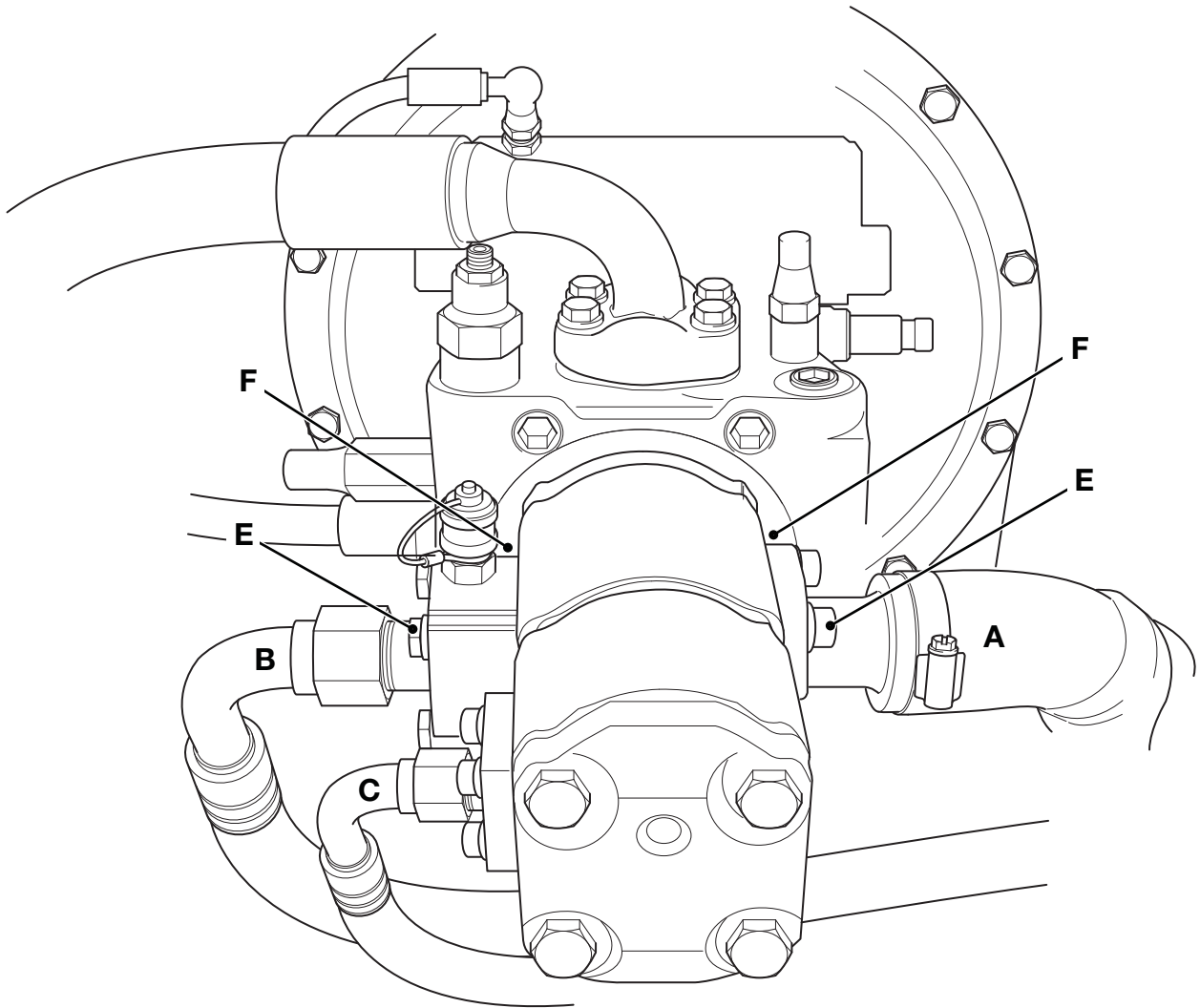


Fig 6. Hydraulic Service and Fan Pumps

Table 5. Torque Settings

Item	Nm	Kgf m	lbf ft	Notes
E	9 - 10	0.9 - 1.02	6.6 - 7.4	M6 X 25
E	29 - 30	2.9 - 3.0	21 - 22	M8 X 25
F	51	5.2	37.6	M10 X 25

Dismantling and Assembly (TM180)

Note: Before removing or dismantling the motor, check that its performance is as specified in **Technical Data**. If the performance is below that specified, the motor or the motor's gears should be renewed. Renewal of components such as gears, bearings and housing will not effect a permanent cure. If a motor's output is satisfactory but there is evidence of external leakage, it should be dismantled for re-sealing only. Before dismantling make sure the motors external body and the work area are thoroughly cleaned and are free from possible causes of contamination.

For motor components, → [Fig 12.](#) ([□ E-75](#)).

Dismantling

Prior to starting to dismantle the motor, mark the motor body **9**, flanges **3** and **16** to ensure correct alignment when assembling.

Note: It is very important to work in a clean environment when repairing hydraulic motors. Plug all ports and wash the exterior of the motor with a proper cleaning solvent before stripping the motors.

- 1 Remove the port plugs and ensure all oil is drained from the motor.
- 2 Using a permanent marker pen, mark a line across the mounting flange, gear housings, distance plate and end cover. This will assure the correct alignment of the components during reassembly.
- 3 Mount the motor vertically in a vice (use vice soft-jaws to protect the motor mounting flange) by the mounting flange, with the driveshaft pointing downwards and slacken the bolts **18**.
- 4 Remove the bolts **18** and remove the end cover **16**.
- 5 Carefully remove the gear housing **9** and place on a clean work bench. Ensure the rear bearing block **13** stays in place on the driven **12** and idler **11** gears.
- 6 Remove the rear bearing block **13**, remove the idler shaft **11** and the driven gear **12**.
- 7 Remove the front bearing block **6**.
- 8 Turn the mounting flange over, with the shaft seal uppermost, and remove the retaining circlip **1** and the seal **2**.
- 9 Clean all sealant from mating surfaces, discard all seal and "O" ring.

Inspection

- 1 Clean and dry all parts thoroughly prior to inspection. (It is not necessary to check the seals as all seals

need to be replaced). Inspect all "O" ring grooves and shaft seal recesses, make sure there are no burrs.

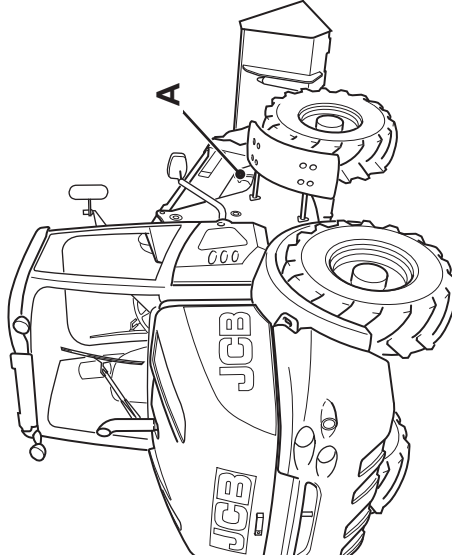
- 2 Check the driveshaft spline for twisted or broken teeth. Check for marks or grooves on the driveshaft in the area of the seal. Slight discolouration of the shaft is allowable.
- 3 Inspect the faces of the gears for scoring or excessive wear. If the face of the gear is sharp, it could mill into the bearing block. If wear is evident then the parts must be replaced.
- 4 Inspect the bearing blocks for excessive wear or scoring on the surfaces that are in contact with the gears. Also inspect the bearing for excessive wear or damage.
- 5 Inspect the area inside the gear housings. It is normal for the surface inside the gear housing to show a clean "wipe" on the surface of the intake side. There should however be no excessive wear or scoring.

The motor must be renewed if any of the following defects are found:

- v The gear cut-in track in the body low pressure side is deeper than 0.08 mm or has a scared and matt appearance.
- vi The PTFE coated bearings in the body or flanges are worn through so that the bronze base is visible.
- vii The gear side faces or bearing blocks are scared.
- viii The drive shaft has a wear groove where the shaft seal lips run.

Component Identification

The control resistors (23, 24 and 26) in the cab HVAC door area behind the access door **A** on the right hand side of the machine.



333-4794-1-sheet2

Fig 2.

Control Valve Assembly

	Control valve assembly
1	Solenoids (proportional control)
2	Solenoids (proportional control)
3	Pump inlet port
4	Return to tank port
5	Load Sense Relief Valve (LSRV)
6	Auxiliary 2
7	Extend
8	Lift
9	Dump
10	Auxiliary 1
11	Retract
12	Lower
13	Crowd
14	Lift assist
15	Dump pilot, to front chassis
16	Steer return
17	Sump port drain
18	ARVs
19a	Pressure test adapters (pump)
19b	Pressure test adapters (LSRV)
20	TM LLMC High Specification ECU ABI
21	TM LLMC Ext/Ret ECU ABI
22	TM Aux ECU ABI
23	Resistor 3R3 75W
24	Resistor 65 Ohm
25	5V voltage converter
26	Resistor 2R2 150W

Description	TM220	Measurement
Crowd ARV	260 bar - non adjustable	Non adjustable: 260 bar measured at the comp ram during boom lower with the carriage against the crowd stop sensors
Dump ARV	260 bar - non adjustable	Non adjustable: 260 bar measured at the comp ram during boom raise with the carriage against the dump stop sensors
Lift ARV	280 bar - non adjustable	Non adjustable: Remove and replace with the crowd ARV to measure, 280 bar measured at the comp ram during boom lower with the carriage against the crowd stop sensors

Checking the MRV and LS Margin

Connect a pressure gauge (400 bar) at the pump pressure port (19a) and connect a pressure gauge (400 bar) at the LSRV pressure port (19b). Both ports are on the valve block. → [Fig 3.](#) (□ E-85).

Lower and hold the boom against the end-stops at maximum engine rpm.

Make a record of the pressures shown on both of the gauges.

Pump pressure (MRV) - LSRV pressure = Margin

Note: Do not record the pump pressure directly at the pump. This is up stream of the steer priority valve and will give a different margin reading.

LS Margin Adjustment

Refer to JCB Service.

MRV Adjustment

The MRV pressure (the pump pressure when its at relief) is actually the LSRV and the margin combined. An adjustment to the LSRV will change the LS pressure, and consequently the pump pressure changes with it. The margin should remain the same.

Checking the Pilot Pressure Control Range

All the joystick pilot services (Lift, Lower, Crowd, Dump).

Connect an in-line test point in the service line to be measured. Check the pressure gauge against the movement of the boom as the joystick is moved.

Checking the Electro Hydraulic Solenoid Control Range

Both the Telescopic and Auxiliary services.

Check the solenoid resistance: Measure the resistance across the solenoid pins with a multimeter. Refer to **Servo Hydraulic Circuit, Load Control Valve**.

Check the sense-resistor: Find and disconnect each resistor in sequence, measure the resistance across the pins with a multimeter.

Connect a test lead (in-line, series configured) at the solenoid to be checked. Make a record of the current in the supply line to the solenoid with a multimeter. As the thumbwheel is moved, check the current against the movement of the boom.

The system does not have a feedback loop from the solenoid pressure output. The system depends on a correct pilot pressure which is the result of an accurate solenoid current.

A sense-resistor feedback circuit accurately maintains the coil current. If the ECU is to supply the correct current to the coil, it is essential that the sense-resistor is in specification.

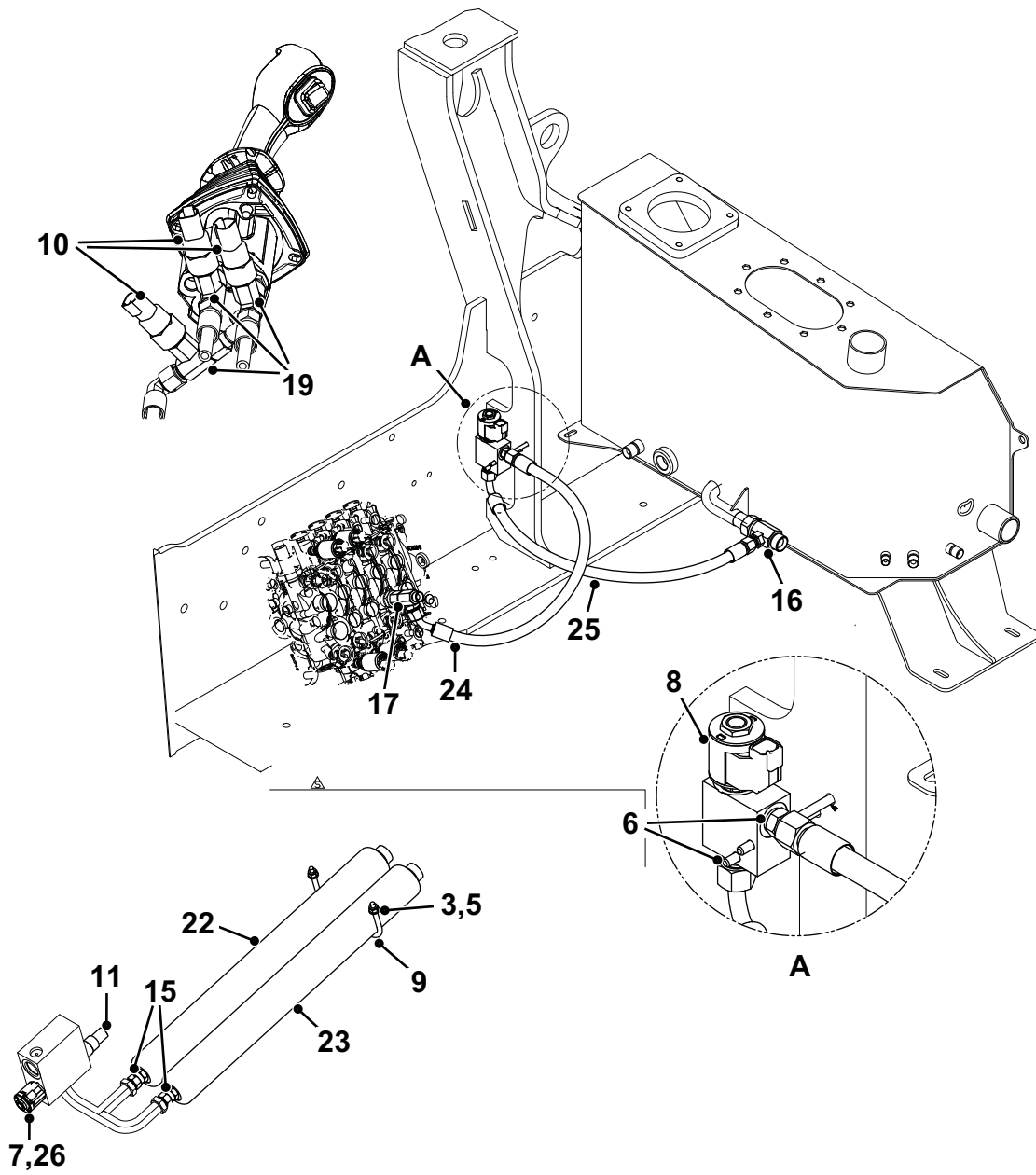


Fig 21.

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minimum. If leaving for more than one week, apply a light coating of suitable grease or petroleum jelly to the exposed part of the ram piston rod.

- 2** Use genuine JCB parts when replacing parts.
 - a** If parts other than genuine JCB parts are used, the desired results may not be obtained. Use only genuine JCB parts.
- 3** Caution during dismantling and reassembly.
 - a** Dismantling the ram while it is still installed on the machine can be dangerous as unexpected movements of the machine can occur. Remove the ram from the machine and then dismantle.
 - b** If reassembled with dirty hands, foreign matter can enter the ram causing a shorter life span and also the other hydraulic equipment may be damaged. Reassemble in a clean state.
 - c** Follow the instructions in the diagrams regarding torque tightening for screwed parts. If the torque is too high or too low, it can cause damage.

Note: If hydraulic oil contacts uncured Threadlocker a weakening of the bond will result. Cure times vary according to the ambient temperature. The following approximate cure times apply to 20 degree C and is the minimum period between assembly and filling the ram with oil.

JCB Threadlocker or JCB Threadlocker and Sealer (High Strength) with JCB Activator - 1 Hour.

Loctite 262 or 932 with Acitvator N - 1 Hour.

Loctite 262 or 932 with Activator T - 2 Hours.

Note: Cold weather operation. When operating in conditions which are constantly below freezing, it is recommended that the rams are operated slowly to their full extent before commencing normal working.

Table 2. Torque Settings

Ram Size	Item	Nm	kgf/m	lbf/ft
All Rams Unless Stated	1	678	69	500
70 x 30	1	450	46	332
70 x 30	3	300	41	300
100 x 50	3	405	41	300
100 x 60	3	405	41	300

Table 1. Drill Depth Chart

Ram Size	Diameter X	Depth Y
70 x 30	6.02 mm - 6.10 mm	27.0 mm - 28.0 mm
100 x 50	8.02 mm - 8.10 mm	32.0 mm - 33.0 mm
100 x 60	8.02 mm - 8.10 mm	27.0 mm - 28.0 mm

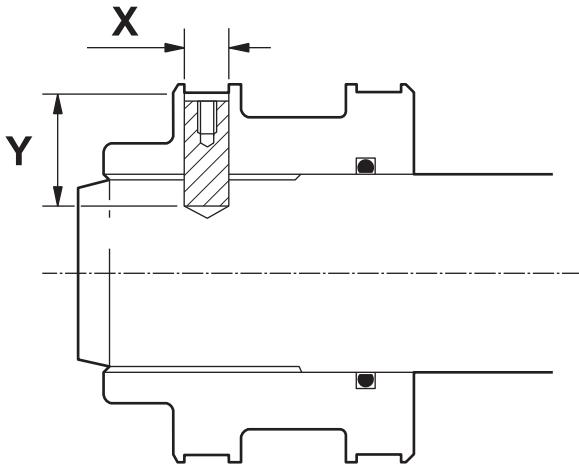


Fig 8. Drill Depth Illustration

Fault 2 - Red Light on on Start-Up



T058820-1

No.	Potential Cause	Solution	Image
1	A hydraulic hose has been connected backwards	<p>Check all of the hoses, (include the Cetop valve shown opposite)</p> <p>The hoses must be assembled as shown in the hydraulic schematic (332/59934)</p>	<p>T058820-2</p>
2	The switches are the wrong way round	Check that the switches and the wiring are connected correctly, as per (332/S2005 sheet 7)	
3	Software fault	Connect a second ECU to the system in place of the original one (position shown opposite, refer to 332/S2005 sheet 7)	<p>T058820-3</p>
4		Investigate with the ServiceMaster faults system	

Warm Up Procedure

For the machine hydraulic system to work efficiently, the hydraulic oil should be at a temperature of 10°C (50°F) or above.

If the air temperature is above freezing (0°C, 32°F), the oil will reach this temperature during start up without any special warm up procedure.

If the air temperature is below freezing, do the following warm up procedure:

- 1 Stop the machine (unloaded) on level ground with the engine running.
- 2 Apply the park brake and put the forward/reverse lever in the neutral position.
- 3 With the engine at about half throttle, about 1500rpm:
 - a Raise and lower the boom - 5 times
 - b Extend and retract the boom - 5 times
 - c Dump and crowd the forks - 5 times.

Daily Functional Check

At the start of each shift you must complete a functional check of the LLMI/LLMC system.

WARNING

If the system is faulty, contact your JCB distributor. Do not try to repair it yourself.

0206

- 1 Park the machine (unloaded) on level, solid ground. Do not stop the engine.

Apply the park brake, then move the transmission lever to the neutral position.
- 2 Check the display:

Make sure the green LED **A** at the bottom of the display is ON, (this indicates that the display is receiving power).

Push the display/test button **B** and release.

If the unit is functioning correctly, all the LEDs in section **C** of on the display will flash and an audible alarm sounds.
- 3 Put the boom in the horizontal position, then extend it to the 1 metre (3 foot) position.

- 4 Push then hold the display/test button **B**. Make sure that all of the LEDs flash and the alarm sounds. Do not release the display/test button **B**.
 - a Try to extend then lower the boom. Make sure that the boom does not move.
 - b Lift the boom. (The boom must be able to move in this direction).
 - c Retract the boom. (The boom must be able to move in this direction).
 - d Release the display/test button **B**.
- 5 Retract, then lower the boom.
- 6 The functional test is complete.

Note: If a system fault is detected, different combinations of LEDs will light to give a diagnostic fault code. → [Diagnostic Fault Codes \(E-155\)](#).

Note: During operation the system continuously self checks for faults.

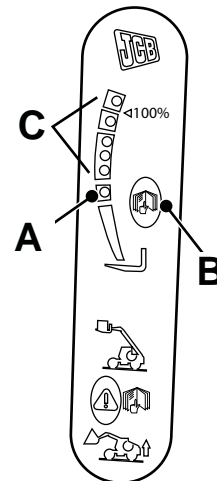


Fig 3.

T052390-1



Section E - Hydraulics

Basic Hydraulic and Electrical System Information

Longitudinal Load Moment Control

End-Damping

The boom angle sensor and the boom retract sensor are used to provide a cushioned end-stop to the lift and telescopic cylinders. (Boom lower and boom retract only).

At the end of the boom lower stroke, a signal is sent from the boom angle sensor to the LLMC ECU. This signal will override the servo-control lever command and slow the boom down to provide a cushioned stop.

At the beginning of the boom lower stroke, a signal is sent from the boom angle sensor to the LLMC ECU. This signal will override the servo-control lever command to give a slow start of control to enhance the stability of the machine.

At the end of the boom retract stroke, a signal is sent from the boom angle sensor to the LLMC ECU. This signal will override the servo-control lever command and slow the boom down to provide a cushioned stop.

Table 8.

			TM180/ 220	TM310
Boom lower end-damping through the angle sensor input	0.7 - 1.3V control range	Start of reduction at 1.3V		
		Full speed reduction at 0.7V (mA at the boom lower control valve)	760mA	750mA
Boom retract end-damping using the retract switch input	A step change in the maximum control current when retracted	Control current (maximum) at the retract solenoid when the retract switch is closed	960mA	750mA
		Measured in series using a link harness at the main valve block solenoid		



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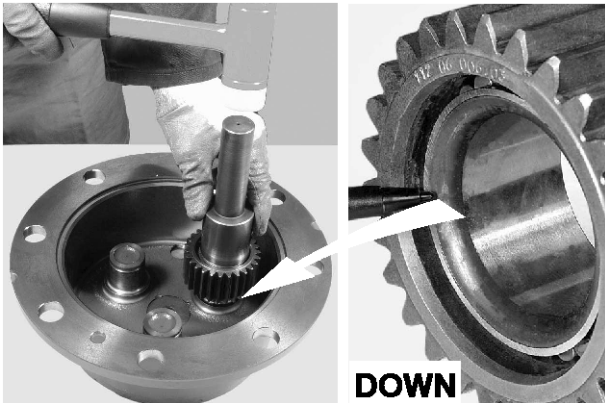


Fig 12.

- 5 Secure the planetary-gears **16** in position with the circlips **15**.
- 6 Lubricate the new axle shaft-seal **6**, then use a suitable tool to attach it the axle-tube. When installed the seal lips and the spring will be facing you. [⇒ Fig 13. \(□ F-10\).](#)

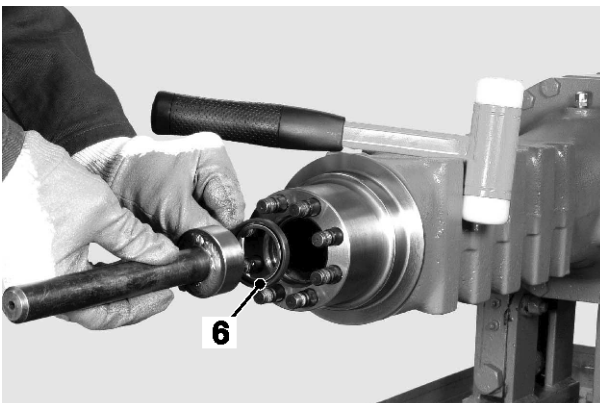


Fig 13.

- 7 Lightly grease the inner hub-seal **7** sealing lip, then install the hub onto the axle.
- 8 Lightly oil and install the outer-bearing **26** into the hub. Lightly tap around the face of the outer-bearing **26** with a soft-faced hammer to make sure that its fully in position. [⇒ Fig 14. \(□ F-10\).](#)

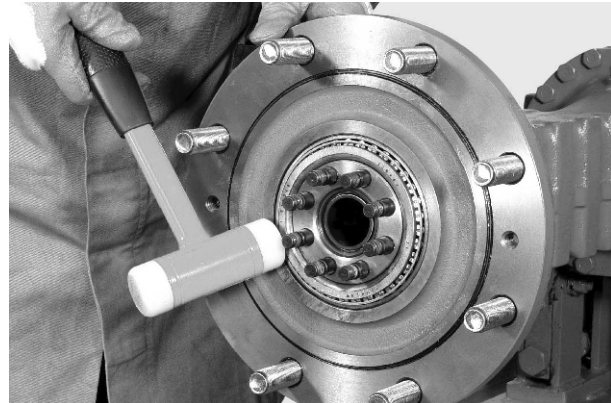


Fig 14.

- 9 Install the annulus-ring **25** onto the studs on the axle. Make sure that one of the large drain holes is facing directly downwards. [⇒ Fig 15. \(□ F-10\)](#) and [⇒ Fig 16. \(□ F-11\).](#)

Note: To install the annulus-ring, use a soft-faced hammer and apply alternative blows at several points around the annulus-ring.

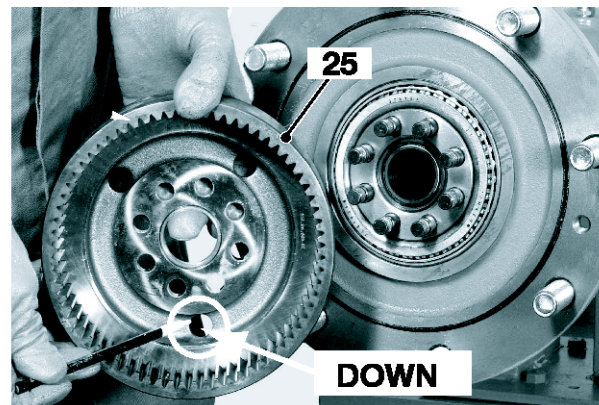


Fig 15.

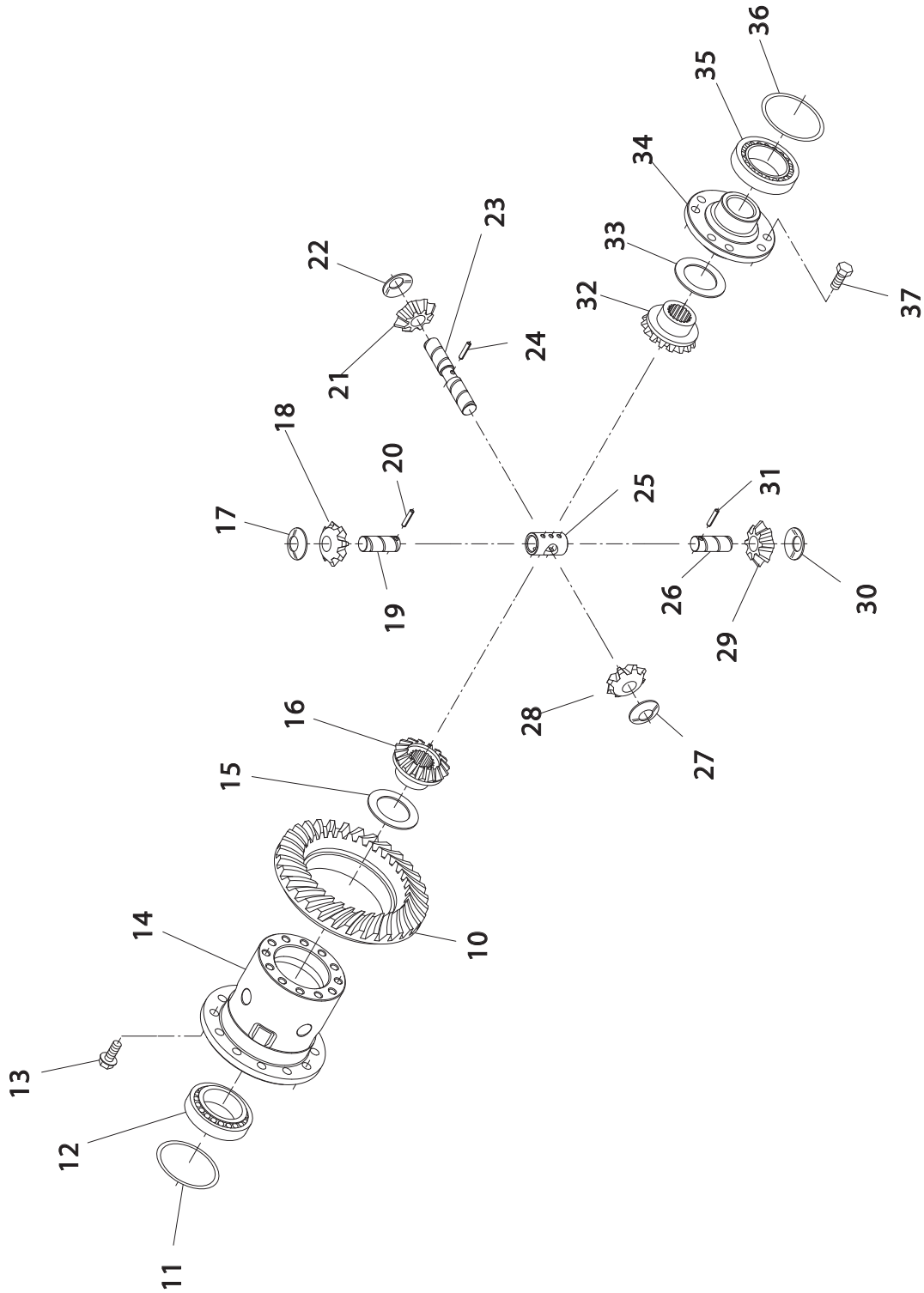


Fig 36. Standard Front Differential Components

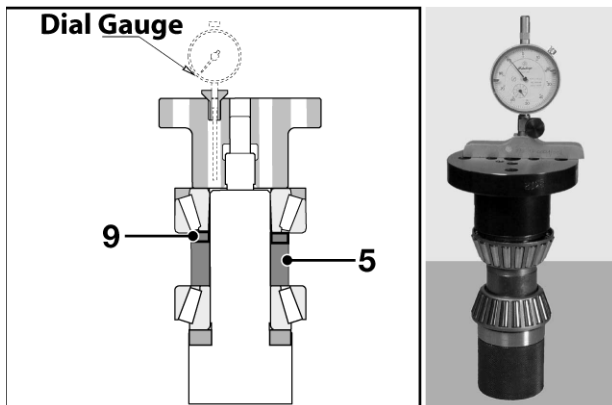


Fig 60.

- 13 Put the depth dial-gauge (set to zero) in position and measure the distance. Make a record of the value **B**.

Calculate the difference **H**.

$$H = A - B$$

For example $H = 0 - -0.07 = 2.93 \text{ mm}$

A = Value at step 10 (zero with a 3.0 pre-load)

B = Value at Step 13 -0.07

Note: In the above example the dial-gauge reads 2.93 this is 0.07 less than the pre-set of 3.00, to make the value **B** (0.07) for the calculation a minus value.

- 14 Calculate the thickness of the required shim **9** (S2):

For example $S2 = H + X = 3.01 \text{ mm}$

H = 2.93 (as calculated at step 13)

X = 0.07 to 0.08 standard deviation

WARNING

To avoid burning, wear protective gloves when handling hot components

GEN-9-4

- 15 Heat the inner-bearing **14** to 100 °C (212 °F), then push onto the pinion **11**.

- 16 Install the distance-ring **5** and the pre-calculated (S2) shim **9** onto the pinion, then install the pinion into the pinion-housing **12**. → Fig 61. (□ F-30).

Note: If a number of shims **9** were been used to assemble the shim pack S2, then position the finer shims between the thicker ones, or between the distance-ring and the thicker one.

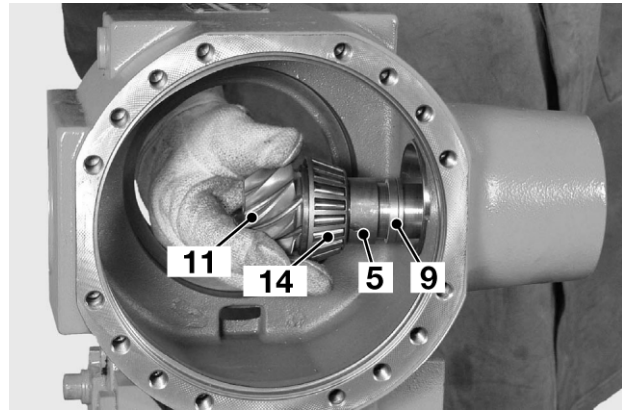


Fig 61.

WARNING

To avoid burning, wear protective gloves when handling hot components

GEN-9-4

- 17 Heat the external bearing **4** to 100 °C (212 °F), then install onto the pinion.

Pinion Set-up Non-Revolution Counter Version

- 1 Install the spacer-ring **8A**.
- 2 Install the pinion-flange **2**, but do not install the oil-seal **3**.
- 3 Install the flange nut **1**. Do not apply Threadlocker to the threads.
- 4 Attach a suitable flange holding device to the flange and torque the flange nut **1** to 260 - 300 Nm (192 - 221 lbf ft).
- 5 Apply a torque-meter to the pinion nut and check the rolling-torque, it must be 80 - 120 Ncm.



Dismantle, Inspection and Assembly - TM180 Axles

Make sure that you identify the axle sub-assemblies designations correctly.

The procedures for dismantling, inspection and assembly are described in the Transmissions Service Manual.

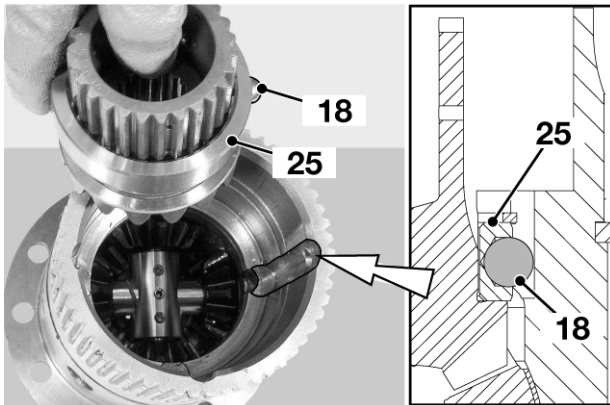


Fig 31.

- 9 Install the planetary-gear locking snap-ring 19.
- 10 Install and replace, if necessary the differential lock discs 20 and 24. ⇒ Fig 32. (□ F-50).

Note: The first and last disc of the pack must be a steel disc.

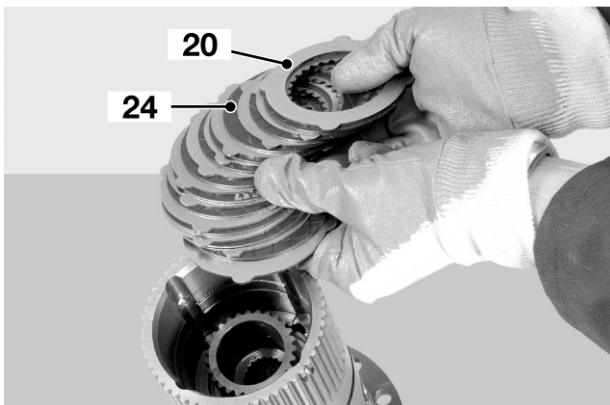


Fig 32.

- 11 Put the thrust-washers 21 and thrust-bearing 23 in position.
- 12 Install the snap-ring 22.

Note: If a new crown-wheel is installed, also replace the drive-pinion. Install these items as a matched-set. See ⇒ Pinion Assembly - TM220 Axles (□ F-53)

- 13 Install the crown-wheel onto the carrier 4. Install and torque a set of new bolts 32. ⇒ Table 5. Torque Settings (□ F-51).

Note: If the replacement bolts are not pre-treated with a thread locking agent, apply a coating of JCB Threadlocker (High Strength) to the threads of the bolts before installation.

WARNING

To avoid burning, wear protective gloves when handling hot components

GEN-9-4

- 14 Pre-heat the crown-wheel side taper roller-bearing 2 to 100 °C (212 °F), then push the roller-bearing onto the crown-wheel side of the carrier 4.
- 15 Install the circlip 33 to the carrier 4. ⇒ Fig 33. (□ F-50)

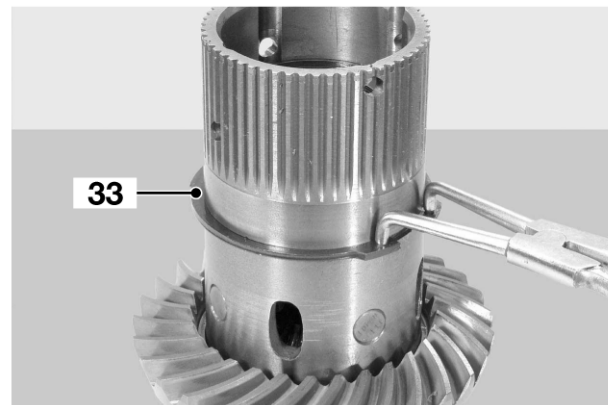


Fig 33.

WARNING

To avoid burning, wear protective gloves when handling hot components

GEN-9-4

- 16 Pre-heat the shim 34 and the bearing 35 to 100 °C (212 °F), then push them onto the carrier 4 (shim first) until they touch the circlip 33. ⇒ Fig 34. (□ F-51).

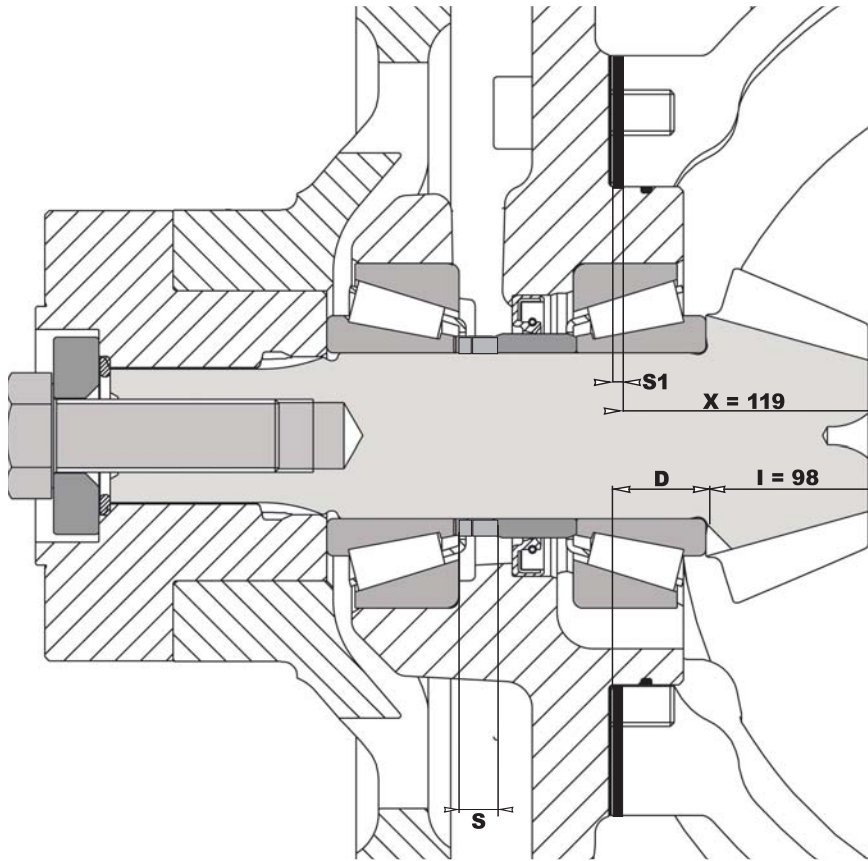


Fig 58. Pinion Housing to Differential Carrier Pinion/Shim Position Drawing

Dismantling and Assembly - Two Speed Option

Two Speed Selector - Dismantling

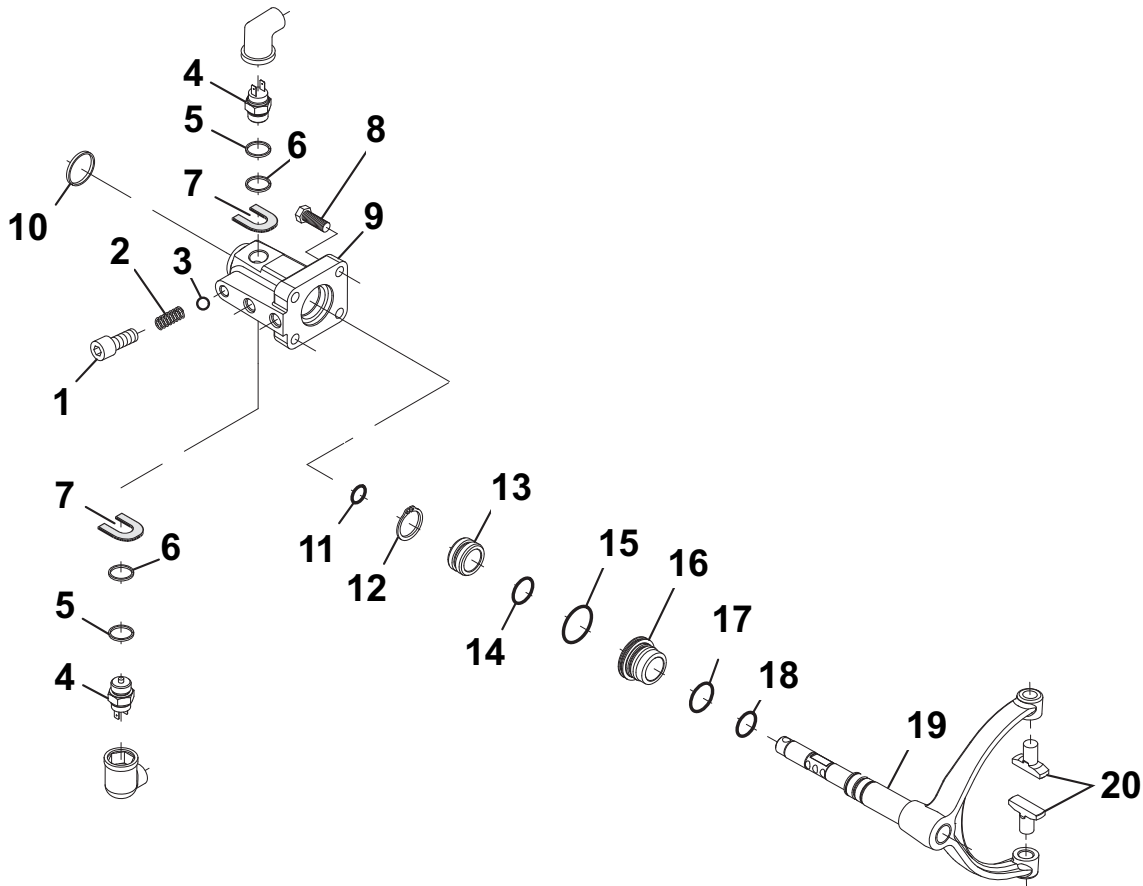


Fig 16.

DS367A-005

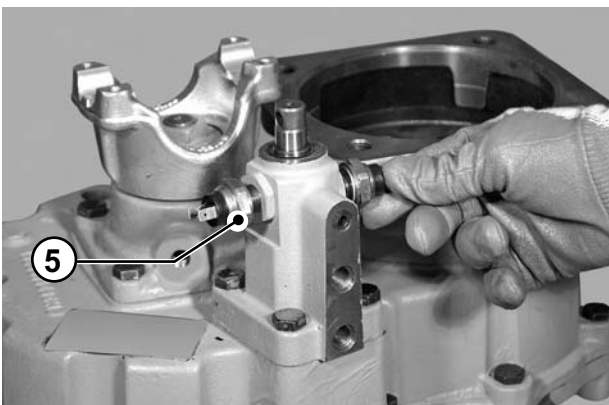


Fig 17.

DS367A-001



Fig 18.

DS367A-006

1 Remove gear selected indicator switch 4, 'O' ring 5 and washer 7. → [Fig 16.](#) (□ [F-70](#))

2 Remove cap 1 from the gear selector.

Assemble Speed Sensor

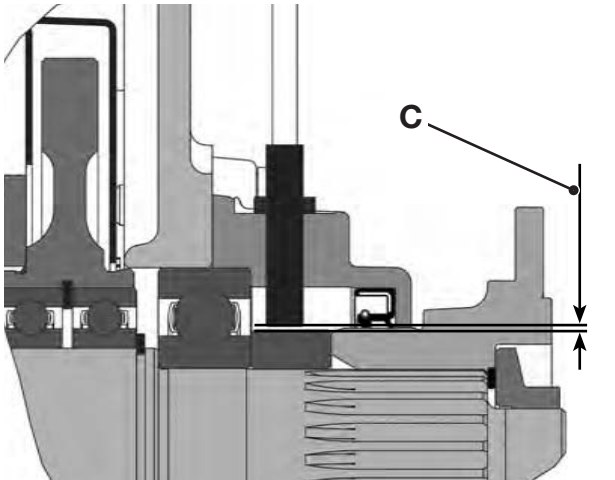


Fig 50.

DS367A-039

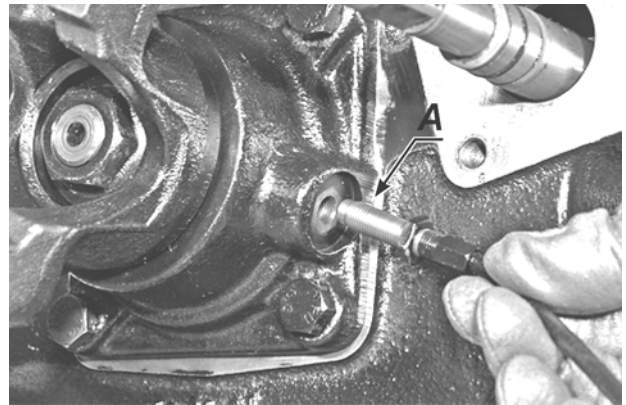


Fig 52.

DS367A-041

27 Replace the speed sensor if damaged.

Note: Clean the end **A** of the sensor at every oil change if instances of malfunction are apparent.



Fig 51.

DS367A-040

26 Undo the sensor lock nut and remove sensor.

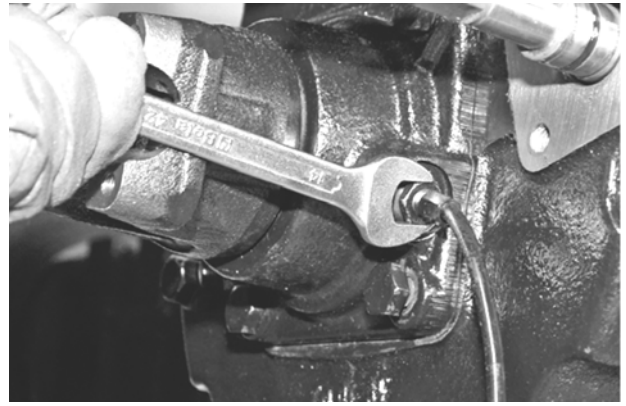


Fig 53.

DS367A-042

28 Screw the speed sensor slowly into casing until it contacts the rotating shaft assembly. Unscrew the sensor 1/2 -3/4 turn to achieve the 0.5 - 0.7 mm clearance. Tighten locknuts. → Fig 50. (□ F-80)

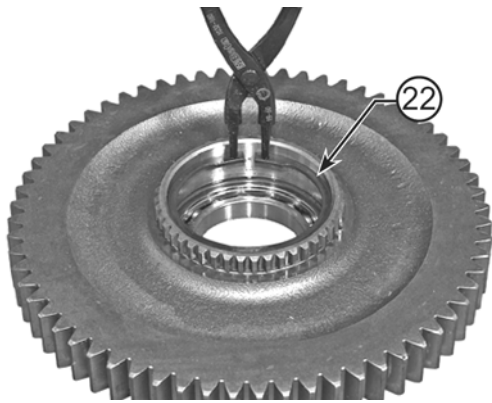


Fig 87.

DS367A-077

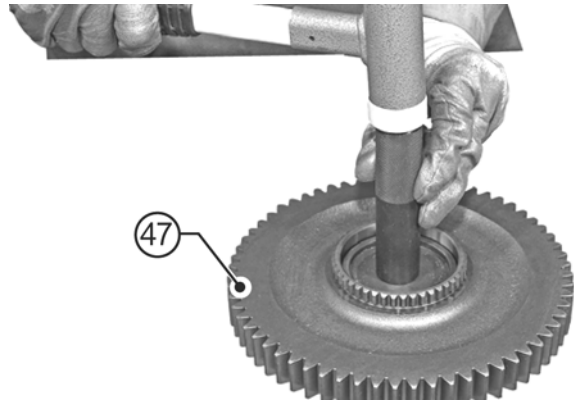


Fig 89.

DS367A-079

33 Remove snap ring 22.

35 Remove remaining bearing 20 from gear.

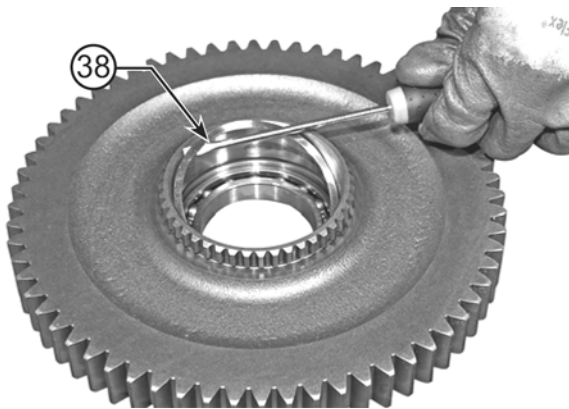


Fig 88.

DS367A-078

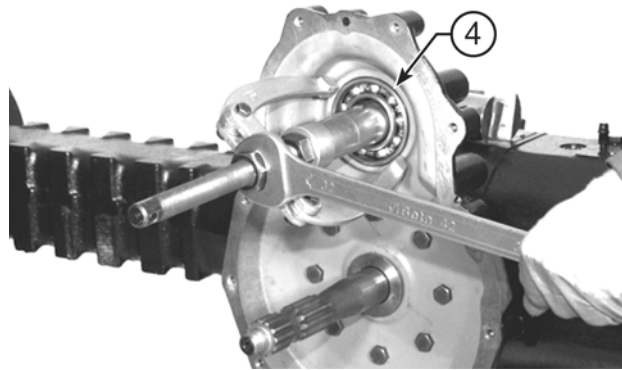


Fig 90.

DS367A-080

34 Remove second distance piece 38.

36 Using an internal extractor, remove bearing 4 from casing.

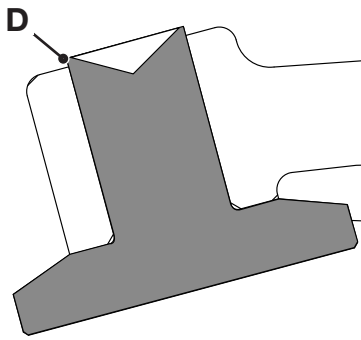
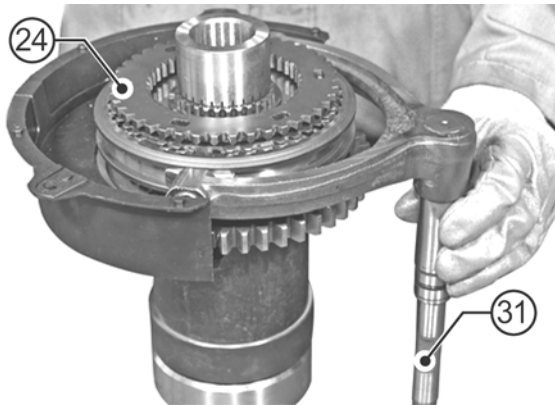


Fig 127.

DS367A-117

- 31** Ensure wear pad is fully inserted into selector fork as shown.



DS367A-118

- 32** Fit the selector fork **31** to the synchroniser hub **24**.

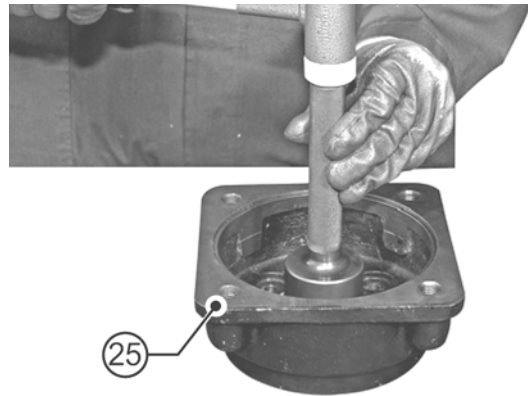


Fig 128.

DS367A-119

- 33** Insert new sealing ring into the hydraulic motor mounting cover.

Important: Ensure the lip seal is fitted the correct way round. Lubricate lips of seal with grease.

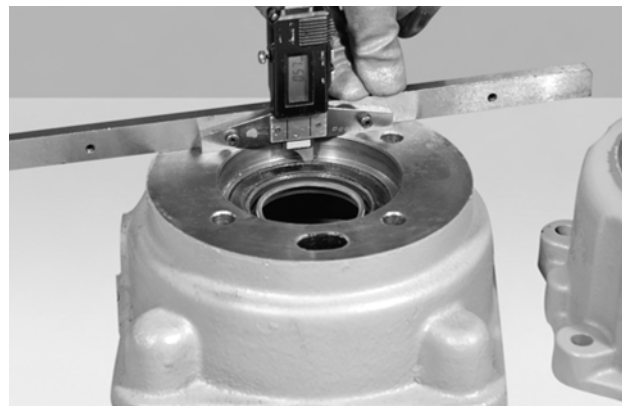


Fig 129.

DS367A-120

- 34** Position depth gauge on cover surface with measuring probe on bearing contact surface. Zero gauge.

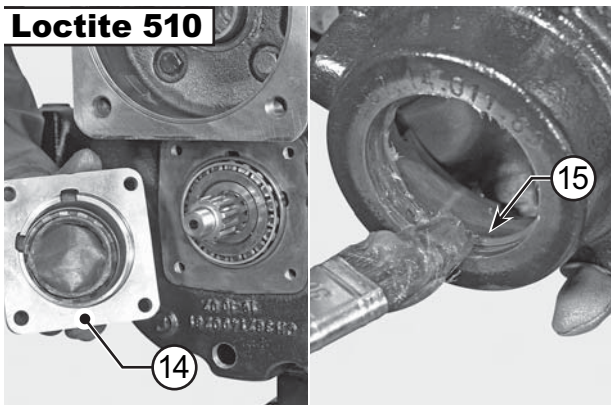


Fig 163.

DS367A-157

- 72** Apply Loctite 510 to the joint face. Lubricate the sealing ring and re-assemble cover with niche pointing upwards. Grease inner lip of seal **15**.

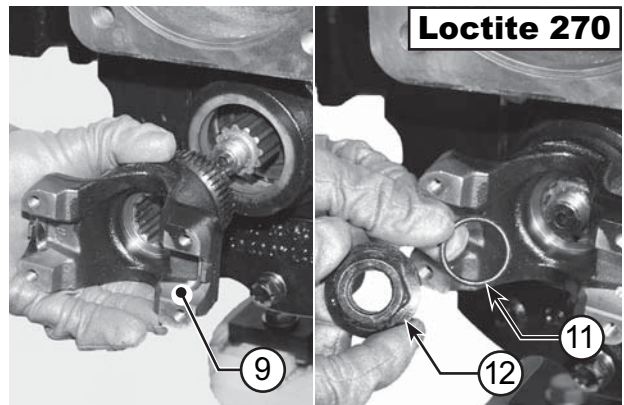


Fig 165.

DS367A-159

- 74** Assemble flange **9**, 'O' ring **11** and nut **12** using Loctite 270.

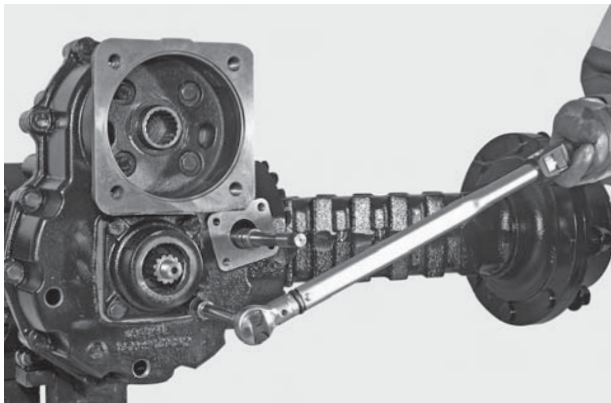


Fig 164.

DS367A-158

- 73** Apply Loctite to threads of screws **28**. Secure cover in position with screws **28**, torque tighten screws to 48-53 Nm.

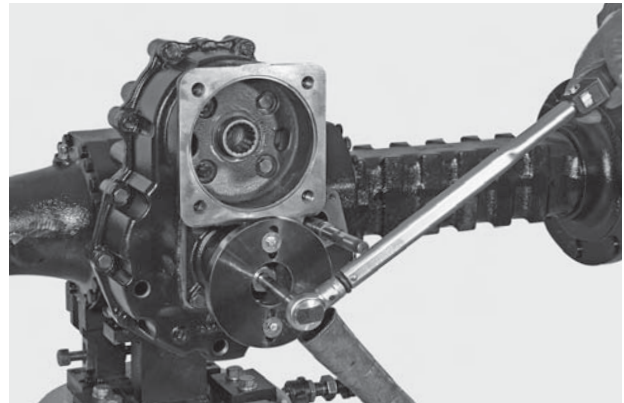


Fig 166.

DS367A-160

- 75** Using flange spanner to prevent shaft turning, torque tighten locknut **12** to 280-310 Nm.



Section G - Brakes

Contents

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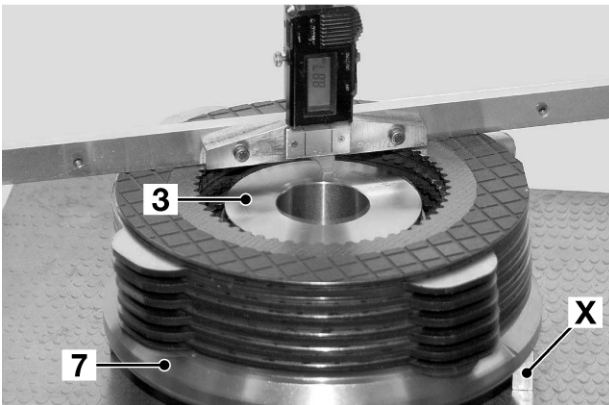


Fig 19.

- 7 Zero a depth gauge from the end of the differential brake disc carrier-splines to the thrust bearing-face of the differential friction pack. [⇒ Fig 20. \(□ G-10\).](#)

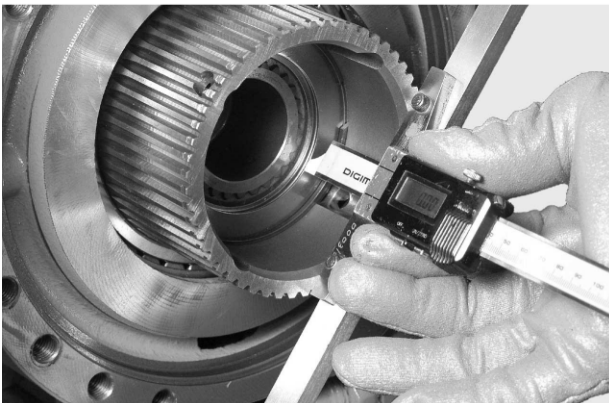


Fig 20.

- 8 Move the depth gauge onto the brake pack contact face on the differential carrier housing. Make a record of the value A. [⇒ Fig 21. \(□ G-10\).](#)

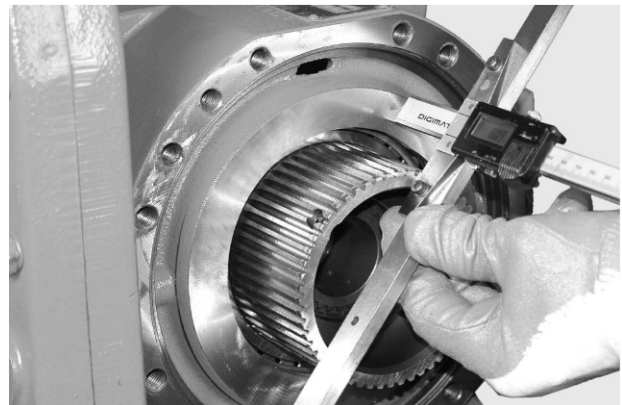


Fig 21.

- 9 Calculate the thickness of the necessary shim 6 (S):

$$S = (B + G) - (A + R)$$

$$\text{For example } S = (8.6 + 1.4) - (8 + 0.1) = 1.9$$

B = Value recorded at Step 6

G = Fixed gap of 1.4 mm

A = Value recorded at Step 8

R = Fixed gap of 0.1 mm

For a complete illustration of the above calculation. [⇒ Fig 29. \(□ G-14\).](#)

- 10 Remove the brake-discs from the intermediate-plate 7. Remove the coupling 3 from the intermediate-plate and install the necessary shim 6 as calculated above.
- 11 Install the coupling 3 with pre-determined shim 6 into the intermediate-plate 7 and secure with the snapping 14. [⇒ Fig 22. \(□ G-11\).](#)

- 5 Temporarily install and tighten sufficiently one of its bolts **B** to hold the compensator assembly in position.
- 6 Remove the securing-clip and the clevis-pin from the yoke-end at the operating arm.

Note: Do not apply pressure to the operating arm when the alignment of the hole centres is checked, as this gives a false reading.

Note: Do not use the locknut and the threaded section of the yoke-end to get the necessary setting. Do all of the adjustments at the compensator assembly as given.

- 7 Align the yoke-end with the operating arm as shown. The centre of the clevis-pin hole in the yoke-end **A** must extend 5mm through the centre of the clevis hole in the operating arm **B**. → [Fig 3.](#) ([□ G-20](#)).

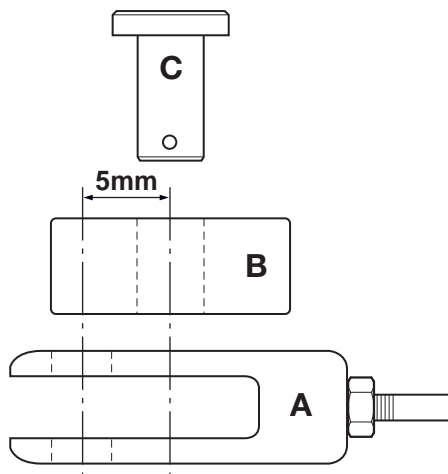


Fig 3.

- 8 Adjust the cable (Steps 4 and 5) to get the alignment necessary at Step 7.
- 9 Install and secure the clevis-pin **C**.
- 10 Install the second compensator assembly bolt **B**, then tighten the two bolts correctly.
- 11 Tighten the cable locknut **A**.

Related Topics

Table 1. Related Topics in This Publication

<p>The table lists other topics in the manual that contain information related to this topic. Refer to the applicable topics to complete your procedures. Where applicable the text in this section contains cross references to this page to help you find the correct information. Some machines have different systems and devices. Make sure you refer to the correct topic, refer to <i>Section 1 - Applications</i>.</p>		
Sections	Topic Titles	Sub Titles
1	<i>Applications</i>	ALL
2	ALL (Care and Safety) ⁽¹⁾	ALL
G	<i>Service Brakes System</i>	<i>Bleeding</i>
H	<i>Steering System</i>	<i>Bleeding</i>
H	<i>Steering System</i>	<i>Re-Phasing</i>

(1) You must obey all of the relevant care and safety procedures.

Table 2. Related Topics in Publication 9803/8610, Transmissions

<p>The table lists topics in another manual that contain information related to this topic. Refer to the applicable topics to complete your procedures. Where applicable the text in this section contains cross references to this page to help you find the correct information. Some machines have different systems and devices. Make sure you refer to the correct topics, refer to <i>Designations</i>.</p>		
Sections	Section Titles	Topic Titles
A	Axle Hubs	<i>55 and 70 Series Hubs</i>
A	Axle Hubs	<i>80 Series Hub</i>
B	Axle Hub Swivels and Driveshafts	<i>55 Series Hub Swivel and Driveshaft</i>
C	Axle Integral Brakes	<i>70 Series Integral Brakes (3 Piece Axles)</i>
D	Axle Drive Heads	<i>80 Series Drive Heads (3 Piece Axles)</i>

Related Topics

Table 1. Related Topics in This Publication

The table lists other topics in the manual that contain information related to this topic. Refer to the applicable topics to complete your procedures. Where applicable the text in this section contains cross references to this page to help you find the correct information. Some machines have different systems and devices. Make sure you refer to the correct topic, refer to <i>Section 1 - Applications</i> .		
Sections	Topic Titles	Sub Titles
1	Applications	ALL
1	Service Tools	ALL
2	ALL (Care and Safety) ⁽¹⁾	ALL
3	Hydraulic System	Checking the Hydraulic Fluid Level
3	Wheel Alignment	
E	Systems and Schematics	ALL
E	Main Pump	Specifications
E	Main Pump	Pressure and Flow Tests - Steering Section
F	Wheels and Tyres	Tyres and Tyre pressures
H	⇒ Hydraulic Steering Unit (□ H-17)	ALL
H	⇒ Priority-Valve (□ H-23)	ALL
H	⇒ Left Turn - Unassisted (□ H-11)	ALL
H	⇒ Steering Operation (□ H-7)	ALL
M	Loadall Monitoring System	ALL

(1) You must obey all of the relevant care and safety procedures.

Table 2. Service Tools

The table lists the service tools you will need to do some of the procedures in this topic. Make sure you have the correct service tools BEFORE you start the procedures	
Tool Part Number	Description
892/01268 ⁽¹⁾	Digital Pressure Gauge
892/01271 ⁽¹⁾	Hose for Pressure Gauge
892/00253 ⁽¹⁾	Hydraulic Pressure Test Kit and Relevant Adaptors

(1) Tool available from JCB Service, refer to Section 1 - Service Tools

Shock-Valve Operation

During normal operation the oil flows from the pump into the steering unit through the right hand port, which opens a spring-loaded non-return valve **H**. The steering circuit directs the flow of oil to get the necessary amount of turn (right hand shown). If an outside force creates a pressure shock wave in the system, the shock-valve **G1** vents this

pressure to the exhaust to prevent damage to the steering circuit.

The non-return valve **J1** is kept in position by this pressure and the non-return valve **H** closes to prevent the shock wave being fed back to the pump. Some of the excess oil flows through the non-return valve **J2** to the opposite side of the steering-ram to prevent cavitation.

⇒ Fig 10. (□ H-12).

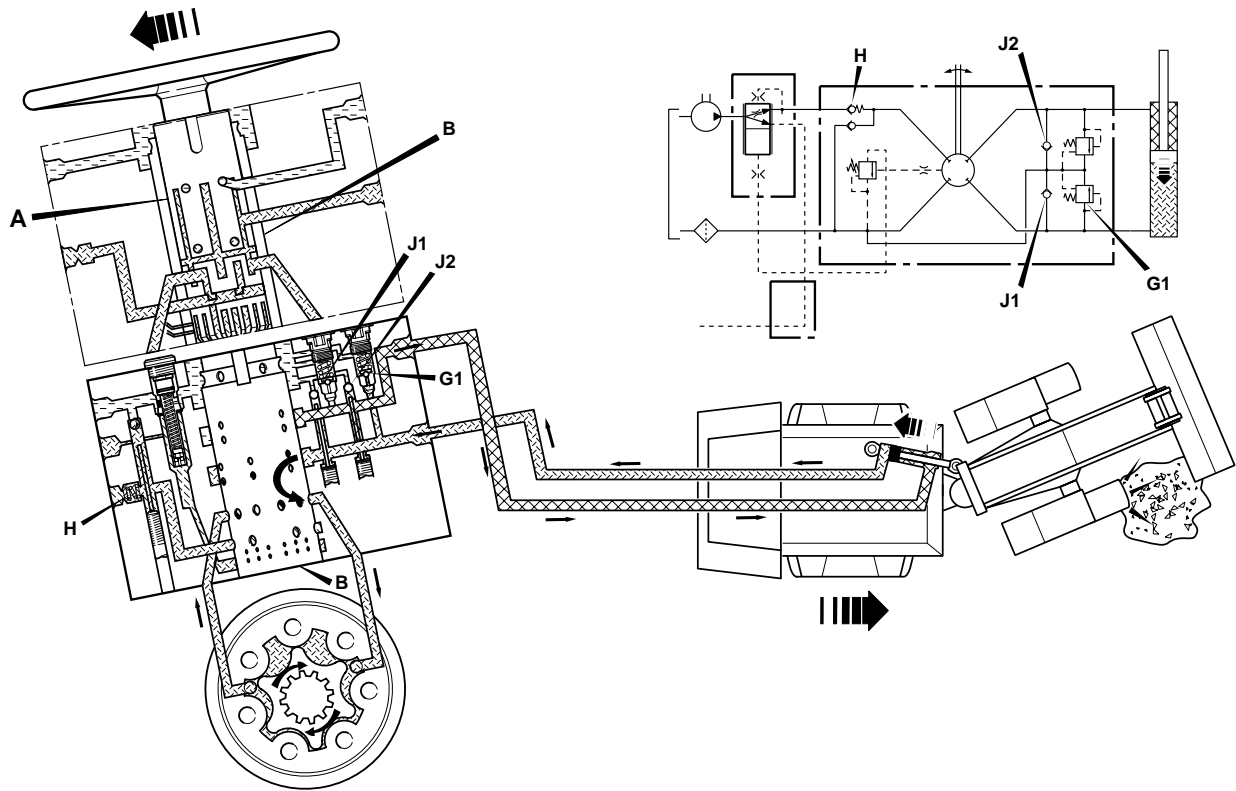


Fig 10.



Section H - Steering Hydraulic Steering Unit

Removal and Replacement

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Section K - Engine

Contents

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