Service Manual

JS200W - Wheeled Excavators - Tier 2 and Tier 4i Engines

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World Class Customer Support

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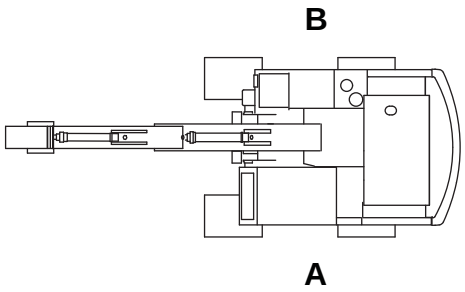
Left Side, Right Side

In this manual, 'left' **A** and 'right' **B** mean your left and right when you are seated correctly in the machine.



T017280-1

Fig 1.

Gas Hydraulic Bladder Accumulators

Some hydraulic circuits and valve blocks are fitted with gas hydraulic bladder type accumulators.

Before removing accumulators make sure hydraulic pressure is vented. ⇨ *Venting the Hydraulic Pressure (1-15)*

Even when the hydraulic pressure is vented the accumulator still contains pressurised nitrogen gas. DO NOT attempt to discharge the gas pressure.

DO NOT transport accumulators charged with pressurised gas by air freight.

Replacement

Replacement accumulators are generally supplied in a discharged state with no nitrogen gas. A label attached to the accumulator indicates the gas charge state.

Charging

⇨ *Fig 1. (1-20)*

Important: *The following charging procedure is only applicable to accumulators supplied in a discharged state.*

To carry out the charging procedure the following is required:

- Pressurised bottle of nitrogen gas with a suitable pressure reducing valve (**3**).
- Correct gas bottle adaptor depending on territory.
- Charging kit 892/00239. Refer to ***Section 1***.

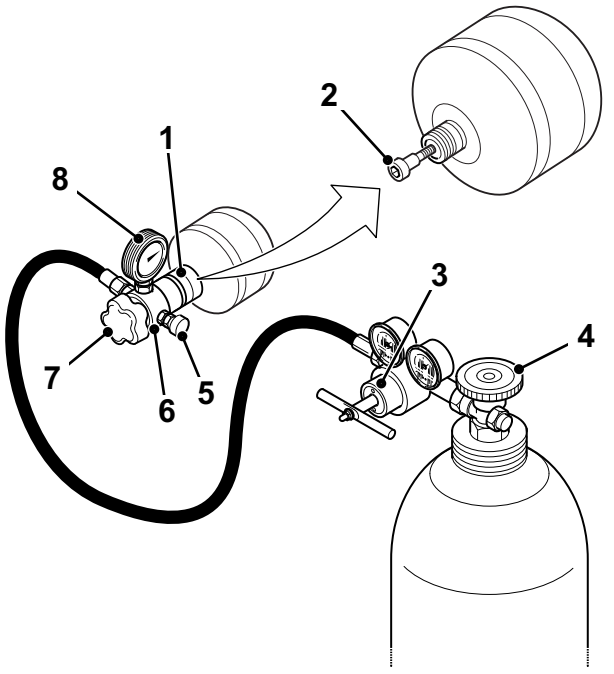
Operating charge pressures; accumulators are charged to different operating pressures depending on the application. For the correct charge pressure refer to the applicable system specifications.

Before fitting a replacement accumulator charge it with nitrogen gas as follows:

⚠ WARNING

Use only nitrogen gas to charge accumulators. The use of any other gas can cause the accumulators to explode. Remember that although nitrogen is not poisonous you can be killed by suffocation if it displaces the air in your workplace. Do not allow excessive quantities of nitrogen to be discharged into the atmosphere.

B-3-1-6



C110540-C2

Fig 1.

1 Hold the accumulator upright and remove the plastic cap from the top of the accumulator.

Note: *Some accumulators are supplied with a measured quantity of oil inside the gas chamber. Take care to prevent oil loss.*

2 Using a suitable allen key, slowly remove the filler plug **2**.

Lightly oil the sealing washer beneath. Replace the washer and plug. Loosen the plug by 1/8 of a turn.

Adaptors into Component Connections with Bonded Washers

Table 11. BSP Adaptors with Bonded Washers - Torque Settings

BSP Size			
in.	Nm	kgf m	lbf ft
1/8	20.0	2.1	15.0
1/4	34.0	3.4	25.0
3/8	75.0	7.6	55.0
1/2	102.0	10.3	75.0
5/8	122.0	12.4	90.0
3/4	183.0	18.7	135.0
1	203.0	20.7	150.0
1 1/4	305.0	31.0	225.0
1 1/2	305.0	31.0	225.0

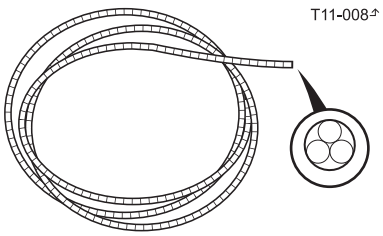


Fig 17. 892/00849 Braided Cutting Wire

Consumable heavy duty cut-out wire used with the glass extraction tool. ⇨ *Fig 14. (1-43)*. Approx 25 m length.

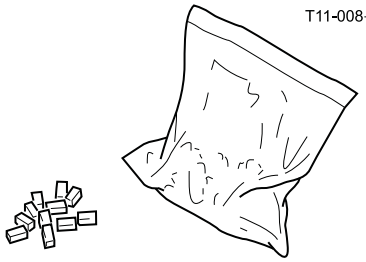


Fig 18. 926/15500 Rubber Spacer Blocks

Used to provide the correct set clearance between glass edge and cab frame. Unit quantity = 500 off.

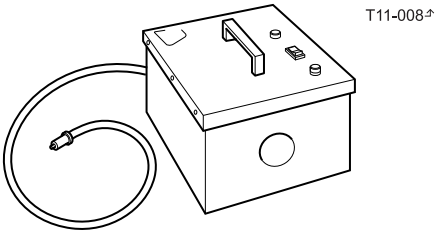


Fig 19. 992/12300 Mobile Oven 12V

1 cartridge capacity. Required to pre-heat adhesive prior to use. It is fitted with a male plug (703/23201) which fits into a female socket (715/04300).

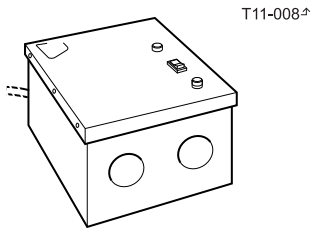


Fig 20. 992/12400 Static Oven 240V

Required to pre-heat adhesive prior to use. No plug supplied.

Note: *110V models available upon request - contact JCB Technical Service.*

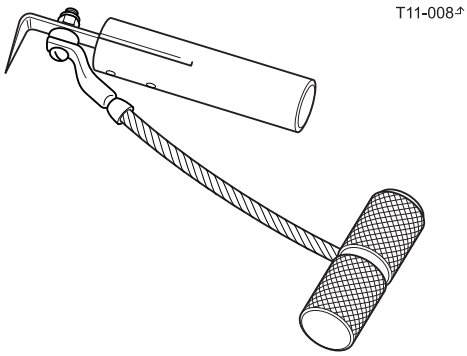


Fig 21. 992/12800 Cut-Out Knife

Used to remove broken glass.

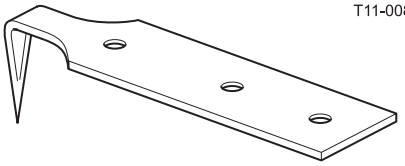


Fig 22. 992/12801 'L' Blades

25 mm (1 in.) cut. Replacement blades for cut-out knife. ⇨ *Fig 21. (1-44)*. Unit quantity = 5 off.

Note: *For assembly of slew motor gearbox.*

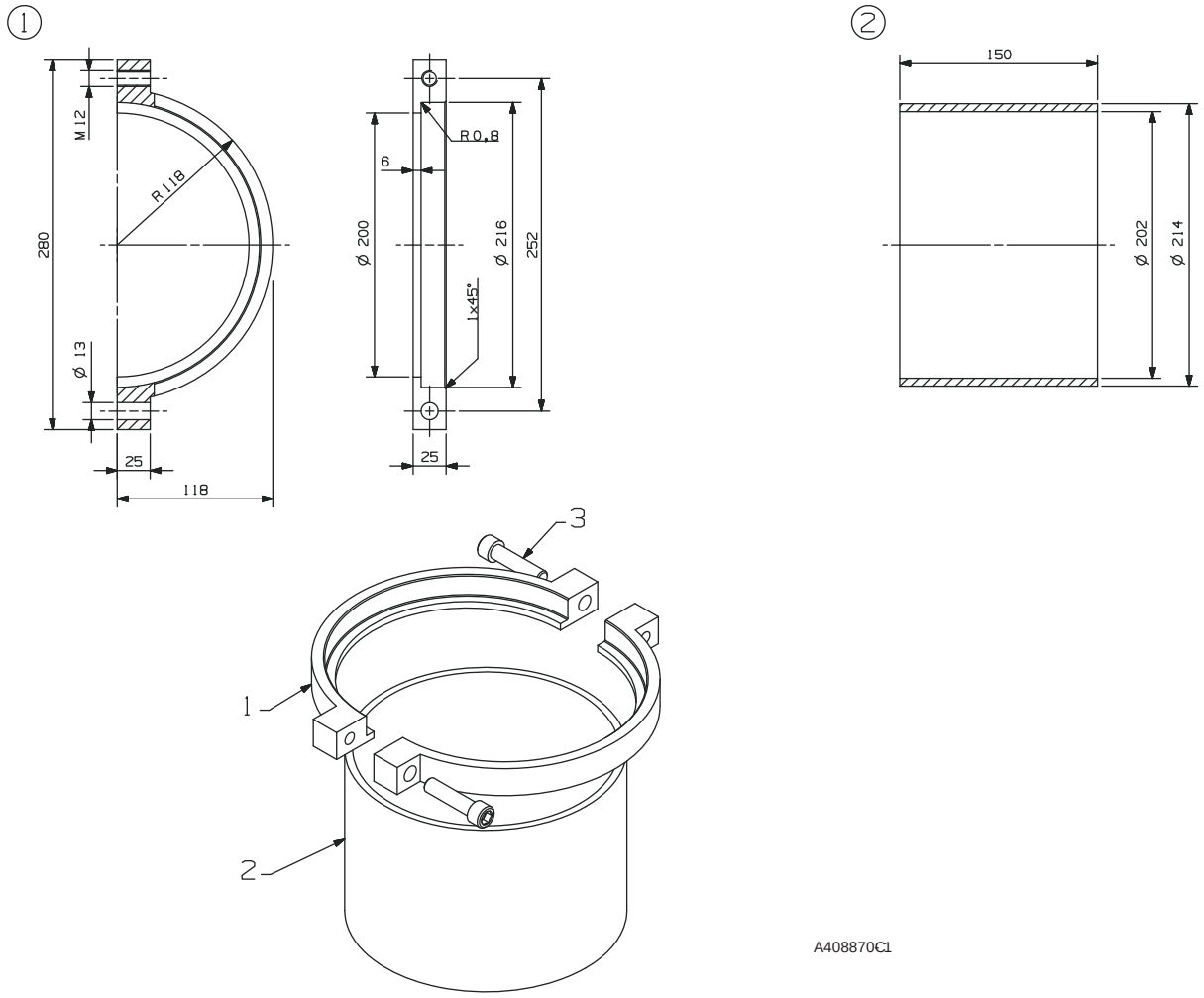


Fig 50. Bearing Rig

Note: *For removal of slew motor bearing.*

Description

General

(For: JS145W, JS160W, JS175W, JS200W)

The JCB Wheeled Excavator is a self propelled machine with a wheeled undercarriage and a revolving upper structure which has a boom, dipper, bucket and slew mechanism.

The excavator is mainly used to dig below ground level with bucket motions towards the machine. The upper structure can slew 360° and discharge material when the wheeled undercarriage is stationary.

(For: JS20 MH, JS200Wastemaster)

The JCB JS20MH is a self propelled machine with a wheeled undercarriage and a revolving upper structure which has a boom, dipper, grab and slew mechanism.

The machine is mainly used to lift materials or scrap with an attachment. The upper structure can slew 360° and discharge the materials or scrap when the wheeled undercarriage is stationary.

Intended Use

(For: JS145W, JS160W, JS175W, JS200W)

The machine is intended to be used in normal conditions for the applications and in the environmental conditions as described in this manual.

When used normally with a bucket fitted the machine the work cycle consists of, digging, elevating, slewing and the discharging of material without movement of the undercarriage.

Applications include earthmoving, road construction, building and construction, landscaping and similar applications.

An excavator can also be used for object handling if it is suitably equipped with relevant parts and systems. Refer to: Operation > Lifting and Loading (Page 141).

The machine is not intended for use in mining and quarrying applications, in demolition activities, forestry, any use underground or in any kind of explosive atmosphere.

If the machine is to be used in applications where there is a high silica concentration, risk due to materials containing asbestos or similar hazards, additional protective measures such as the use of PPE (Personal Protective Equipment) may be required.

The machine should not be operated by any person who does have an appropriate level of qualification, training or experience of use of this type of machine.

Prior to use of the machine, its suitability (size, performance, specification etc.) should be considered with regards to the intended application and any relevant hazards that may exist. Contact your JCB dealer for support in determining the appropriate JCB machine, attachment and any optional equipment that is suitable for the application and environment.

(For: JS20 MH, JS200Wastemaster)

The machine is intended to be used in normal conditions for the applications described in this manual. If the machine is used for other applications or in dangerous environments, for example in a flammable atmosphere

U Wheeled switch panelRefer to: Operation > Instruments > General (Page 84).

Passengers

Passengers in or on the machine can cause accidents. Do not carry passengers.

Fires

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

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

Roll Over Protection

If the machine starts to roll over, you can be crushed if you try to leave the cab. If the machine starts to roll over, do not try and jump from the cab. Stay in the cab, with your seat belt fastened.

Safe Working Loads

Overloading the machine can damage it and make it unstable. Study the specifications in the Operator's Manual before using the machine.

Worksite Safety

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

Warning! There could be dangerous materials such as asbestos, poisonous chemicals or other harmful substances buried on the site. If you uncover any containers or you see any signs of toxic waste, stop the machine and advise the site manager immediately.

Warning! Before you start using the machine, check with your local gas company if there are any buried gas pipes on the site.

If there are buried gas pipes we recommend that you ask the gas company for any specific advice regarding the way you must work on the site.

Some modern gas pipes cannot be detected by metal detectors, so it is essential that an accurate map of buried gas pipes is obtained before any excavation work commences.

Hand dig trial holes to obtain precise pipe locations. Any cast iron pipes found must be assumed to be gas pipes until contrary evidence is obtained.

Older gas pipes can be damaged by heavy vehicles driving over the ground above them.

Leaking gas is highly explosive.

If a gas leak is suspected, contact the local gas company immediately and warn all personnel on the site. Ban smoking, make sure that all naked lights are extinguished and switch off any engines which may be running.

You are strongly advised to make sure that the safety arrangements on site comply with the local laws and regulations concerning work near buried gas pipes.

Caution! Before you start using the machine, check with your local public water supplier if there are buried pipes and drains on the site. If there are, obtain a map of their locations and follow the advice given by the water supplier.

You are strongly advised to make sure that the safety arrangements on site comply with the local laws and regulations concerning work near buried pipes and drains.

Caution! If you cut through a fibre optic cable, Do not look into the end of it, your eyes could be permanently damaged.

An applicable worksite organisation is required in order to minimise hazards that are caused by restricted visibility. The worksite organisation is a collection of rules and procedures that coordinates the machines and people that work together in the same area. Examples of worksite organisation include:

- Restricted areas
- Controlled patterns of machine movement

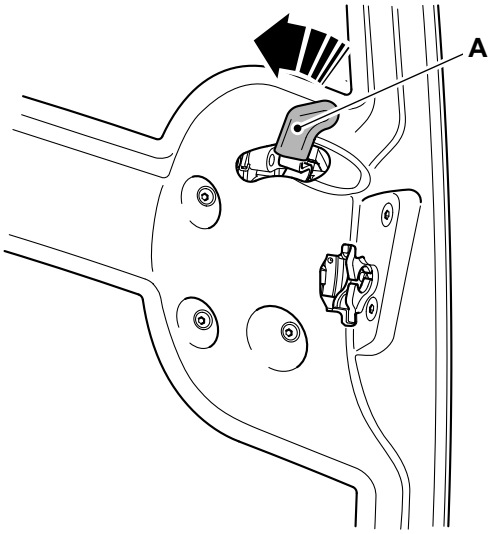
Doors

Operator Door

To open the door from the outside, unlock it with the key provided and pull the handle towards you to release the latch.

To open the door from inside, pull the lever towards you.

Figure 28.



A Lever

Close the door from the inside by pulling it towards you, it will latch itself.

Latch the Door in the Open Position

To latch the door in the open position open the door until it latches correctly on the side of the cab.

To release the door from the stowed position pull the lever in the cab up.

Seat Belt

General

⚠ **Warning!** Operating the machine without a seat belt can be dangerous. Before starting the engine, make sure your seat belt is fastened. Check the tightness and condition of the seat belt securing bolts regularly.

Warning! If you do not wear your seat belt you could be thrown about inside the machine, or thrown out of the machine and crushed. You must wear a seat belt when using the machine. Fasten the seat belt before starting the engine.

Warning! When a seat belt is installed on your machine replace it with a new one if it is damaged, if the fabric is worn, or if the machine has been in an accident. Install a new seat belt every three years.

Inertia Reel Seat Belt

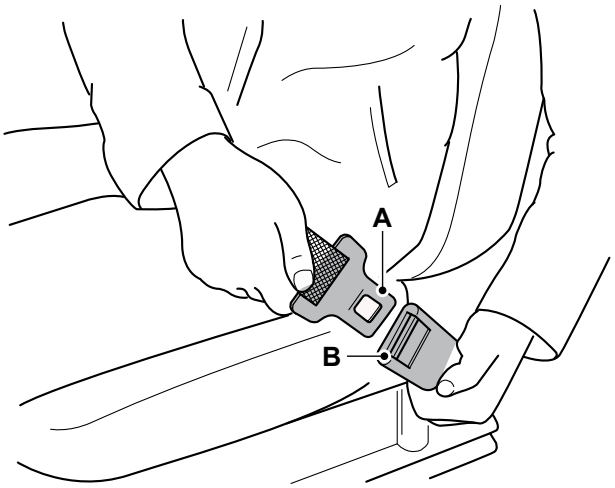
Fasten the Seat Belt

⚠ **Warning!** If you do not wear your seat belt you could be thrown about inside the machine, or thrown out of the machine and crushed. You must wear a seat belt when using the machine. Fasten the seat belt before starting the engine.

1. Sit correctly in the seat.
2. Pull the seat belt and the tongue from the inertia reel holder in one continuous movement.
3. Push the tongue into the latch. Make sure the seat belt is not twisted and that it is over your hips not your stomach.

   3.1. If the seat belt 'locks' before the tongue is engaged, let the seat belt retract into the inertia reel holder then try again. The inertia mechanism can lock if you pull the seat belt too quickly or if the machine is parked on an slope.

Figure 40.



A Tongue
B Latch

Warning! *If the seat belt does not 'lock' when you check if the seat belt is operating correctly, do not drive the machine. Get the seat belt repaired or replaced immediately.*

4. To make sure the seat belt operates correctly, hold the middle of the seat belt and pull. The seat belt should 'lock'. Refer to Figure 41.

3.2. Warm up the hydraulic oil by repeatedly selecting bucket crowd by moving the right hand lever to the left for:

Duration: 5s

3.3. Repeat for several minutes.

3.4. Select dozer up (if installed) by moving the dozer control lever backwards, keep it selected for:

Duration: 1min

4. Warm up the hydraulic circuit.

4.1. Decrease the machine power to medium.

4.2. Raise and lower the boom from ground level to full height, five times.

4.3. Move the dipper fully in both directions, five times.

4.4. Rotate the bucket in both directions fully five times.

4.5. Slew the upper structure clockwise for one revolution and stop.

4.6. Slew the upper structure counterclockwise for one revolution and stop.

4.7. Repeat step 4.3 three times.

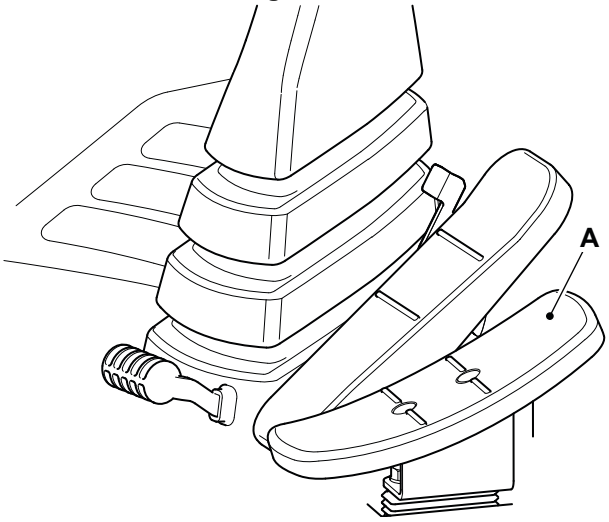
5. If the operation still appears slow, then repeat the steps 4.2 and 4.3.

Accelerator Pedal

⚠ **Caution!** Pressing the brake pedal sharply down will cause the brake to lock on. Take care when using the foot brake while travelling.

1. The accelerator pedal is located on the floor of the cab, to the right of the steering column.
2. The travel speed is governed by depressing the accelerator pedal.
3. Press the pedal to travel the machine forward.
4. Release the pedal to decrease the travel speed.

Figure 63.



A Accelerator pedal

Forward, Neutral and Reverse Switch

For: Rototilt ..... Page 80
Otherwise ..... Page 81

(For: Rototilt)

A forward, neutral and reverse switch controls the direction of the machine.

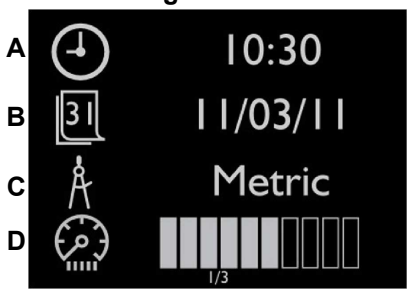
The switch is located on the right hand control lever. The switch has three positions forward (F), neutral (N) and reverse (R).

Pull the switch to the top position to select the forward direction.

Position the switch in the central position to select the neutral.

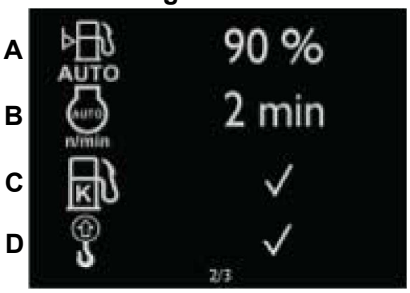
Pull the switch to the bottom position to select the reverse direction.

Figure 86.



A Time
B Date
C Units
D Display brightness

Figure 87.



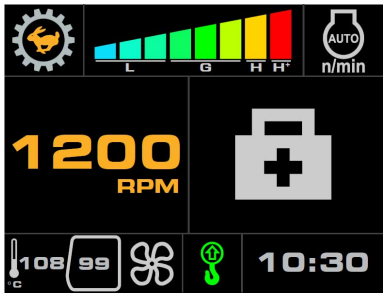
A Auto refuel maximum level
B Auto idle time
C Kerosene
D Overload warning system

Figure 88.

A Slew/boom priority default (JS200W only)
B Dipper arm limiter setup
C ISO/SAE controls selection

Error Log

Figure 89.



	Hydraulics oil temperature high (red)
	Hydraulic oil temperature high (amber)
	Fuel level low (amber)
	Coolant temperature high (amber)
	Engine (amber)
	Engine (red)
	Engine oil pressure low (red)
	Engine oil level low (amber)
	Coolant temp high (red)
	CAN lost communications (red)
	Coolant level low (amber)

Left Joystick

⚠ **Warning!** Deceleration must only be activated when the machine is operated on a firm level ground.

Caution! When deceleration is activated the machine will take longer to stop when operating the slew service.

The left hand joystick controls the slew of the superstructure and the movements of the boom. When released, the joystick returns to the neutral position.

The superstructure will slew for as long as you hold the joystick over to one side. It will stop automatically when you release the joystick.

When the joystick is returned to neutral, the machine will still not stop moving immediately because of inertia. Remember this when you do a slew operation. The operation of the bucket attachment is reversed when it is fitted in the reverse position, be careful.

To slew to the left, move the joystick to the left (position 7).

To slew to the right, move the joystick to the right (position 8).

To raise the boom, pull the joystick backwards (position 5).

To lower the boom, push the joystick forwards (position 6).

If the engine stops and will not re-start, to lower the attachment the ground:

1. Make sure the ignition is on.
2. Make sure the controls isolation lever is down.
3. Make sure the controls isolation switch button is off.
4. Push the joystick forwards (position 6).

Selecting boom priority during simultaneous slew and boom operation will restrict flow to the slew motor and therefore give more flow to the boom up operation. Refer to: Operation > Instruments > Instrument Panel (Page 86).

Press the power boost button to enable improved breakout for the duration specified. 3sRefer to: Operation > Instruments > General (Page 84).

Press and hold the auxiliary low flow hold button to remember the last position of the proportional control (if fitted). Release the button to stop the flow. This is particularly useful where continuous prolonged hydraulic flow is required. A momentary press of the auxiliary hold button whilst the proportional control is not in the neutral position will store the position.

Press the horn button to sound the horn. Sound the horn to give a signal before the machine is started or before you engage travel or slew.

The proportional auxiliary control (high flow) switch is a variable position switch, spring loaded to the central off position, it provides bi-directional flow for relevant attachments, e.g. grab rotate. Press and hold the switch to the right or left, as appropriate, for as long as the attachment is to be used. Release the switch to turn off the attachment. The hammer/auxiliary foot pedal can be used but with on/off functionality only.

The left hand joystick controls the slew of the superstructure and the movements of the boom. When released, the joystick returns to the neutral position.

The superstructure will slew for as long as you hold the joystick over to one side. It will stop automatically when you release the joystick.

When the joystick is returned to neutral, the machine will still not stop moving immediately because of inertia. Remember this when you do a slew operation.

To slew to the left, move the joystick to the left (position 1).

To slew to the right, move the joystick to the right (position 2).

To raise the boom, pull the joystick backwards (position 4).

To lower the boom, push the joystick forwards (position 3).

If the engine stops and will not re-start, to lower the attachment the ground:

1. Make sure the ignition is on.
2. Make sure the controls isolation lever is down.
3. Make sure the controls isolation switch button is off.
4. Push the joystick forwards (position 2).

Selecting boom priority during simultaneous slew and boom operation will restrict flow to the slew motor and therefore give more flow to the boom up operation. Refer to: Operation > Instruments > Instrument Panel (Page 86).

Press and hold the auxiliary low flow hold button to remember the last position of the proportional control (if fitted). Release the button to stop the flow. This is particularly useful where continuous prolonged hydraulic flow is required. A momentary press of the auxiliary hold button whilst the proportional control is not in the neutral position will store the position.

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Press the horn button to sound the horn. Sound the horn to give a signal before the machine is started or before you engage travel or slew.

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6. Set the change-over valve to the bucket position.

(For: JS20 MH, JS200Wastemaster)

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.

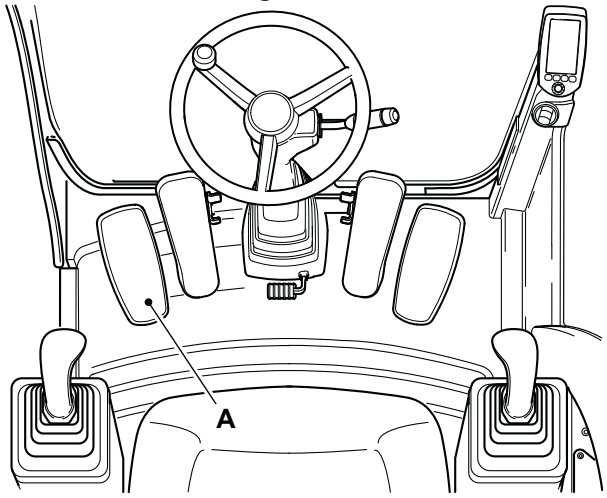
Warning! *Before operating the auxiliary control system make sure that you are aware of all safety notices that apply to the attachment you are using. Also make sure you have installed the attachment correctly and have read its operator's manual.*

General

The auxiliary controls are on the excavator arm controls. Refer to: Operation > Operating Levers/Pedals > Excavator Arm Controls (Page 111).

There is also an auxiliary control pedal option, push the pedal to operate a full flow auxiliary circuit. For more information, refer to the operator manual supplied with the attachment.

Figure 148.



A Auxiliary control pedal

Attachment Systems

Your machine may be equipped with one of four systems, for operating attachments requiring high flow or a system for operating attachments requiring both standard and high flow. An optional low flow two-way circuit is also available in addition to or as an alternative to the above.

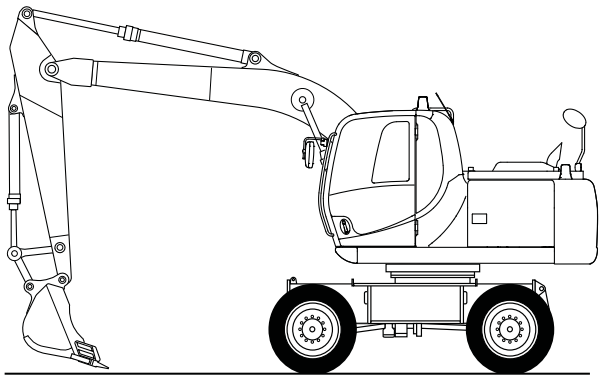
Two-Way Auxiliary Circuit

This system supplies a two-way flow, controlled by the pedal. It is suitable for attachments which need a relatively high flow in either direction.

Low Flow Auxiliary Circuit

This system lets the joystick operate a low flow attachment.

Figure 166.



3. Turn the bucket slightly to the left and adjust it so that the arm end is pressed to the side which is not to be adjusted.
4. Stop the engine and remove the ignition key.
5. Measure the clearance. Refer to Figure 165.
   5.1. The distance should be approximately:
   Distance: 0.8mm
6. If the clearance is incorrect, contact your JCB dealer.

Dipper Stroke Limiter

⚠ **Notice:** In some instances it may be possible to hit the cab with the bucket or attachment. To prevent damage care should be taken when operating with the bucket/attachment close to the cab.

Notice: It is the operator's responsibility that the position of the sensor is correctly adjusted to prevent the attachment striking the cab.

General

The dipper stroke limiter allows the inward stroke of the dipper to be restricted and prevent the attachment from accidentally striking the cab. The adjustment of the dipper stroke limiter is governed by a proximity switch installed on the boom. The dipper stroke limiter is factory set to 500mm

For the dipper stoke limiter to operate it must be enabled by the JCB Service Master set up tool. When enabled, it is set up by the DECU (Display Electronic Control Unit).

When the dipper moves to a preset position detected by the proximity switch, the stroke of the dipper-in service is stopped.

The dipper-out service will continue to operate and when the dipper moves away from the preset position the dipper-in service is available. The DECU will show an icon when the dipper gets to the preset position.

Adjusting the Clearance

1. Disable the dipper stoke limiter.
   Refer to: Operation > Instruments > Instrument Panel (Page 86).
2. Adjust the positions of the boom, dipper and attachment until the attachment is the correct clearance from the operators cab.
   Refer to: Operation > Operating Levers/Pedals > Excavator Arm Controls (Page 111).

Power Sockets

Auxiliary Power Socket

Your machine may be fitted with one or more 12V auxiliary power sockets, which can be used for mobile phone chargers or other 12V powered devices. Refer to: About the Product > Operator Station > Component Locations (Page 19).

Only connect items which are compatible with the power rating of the socket and have the correct plug.

Always operate the engine during the prolonged use of the electrical accessories, or the battery can discharge.

Make sure that the socket cap is closed when the socket is not in use.

Transporting the Product

General

⚠ **Warning!** The safe transit of the load is the responsibility of the transport contractor and driver. Any machine, attachments or parts that may move during transit must be adequately secured.

Caution! Before moving the machine onto the trailer, make sure that the trailer and ramp are free from oil, grease and ice. Remove oil, grease and ice from the machine tracks. Make sure the machine will not foul on the ramp angle.

Check the condition of the transport vehicle before the machine is loaded on to its trailer.

Make sure that the transport trailer is suitable for the dimensions and weight of your machine. Refer to: Technical Data > Static Dimensions (Page 283).

Before transporting the machine make sure you will be obeying the local rules and laws regarding machine transportation of all the areas that the machine will be carried through.

Loading the Product onto the Transporting Vehicle/Trailer

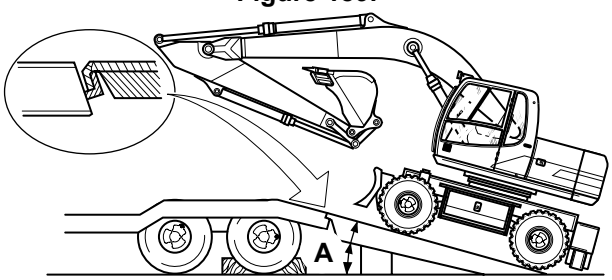
(For: JS145W, JS160W, JS175W, JS20 MH)

⚠ **Caution!** The machine must be securely tied down to the transport vehicle to prevent lateral movement, fore-and-aft movement, and slewing of the superstructure. Failure to do so could cause injury to yourself or others.

1. Stop the transport vehicle on solid, level ground.
2. Apply the park brakes.
3. Lower any stability jacks.
4. Put blocks at the front and rear of the wheels on the transport trailer.
5. Make sure the ramps are in their correct positions and angle, then secure them. The ramps should not be at more than the specified angle:

   Angle: 15°

Figure 189.



A Angle of the ramp

6. Before the machine is driven on to the transport trailer, make sure that the machine will not catch on the ramp/trailer angle. Refer to Figure 189.
7. Start the machine.

   Refer to: Operation > Starting the Engine > General (Page 65).
8. Slew the cab to make sure the excavating equipment is in a position where it will not interfere with your view of the ramp and the transport trailer.

   Refer to: Operation > Operating Levers/Pedals > Control Layouts (Page 111).

Operating Environment

General

In low and high temperature conditions, take the following precautions. They will make it easier to start and prevent possible damage to your machine.

Operating in Low Temperatures

⚠ **Notice:** Do not connect two batteries in series to give 24V for starting as this can cause damage to the electrical circuits.

1. Use the correct viscosity engine lubricating oil.

   Refer to: Technical Data > Fluids, Lubricants and Capacities (Page 323).

2. If available, use a low temperature diesel fuel.
3. Use the correct coolant mixture.
4. Keep the battery at full charge.
5. Fill the fuel tank at the end of each work period, this will help to prevent condensation forming on the tank walls.
6. Protect the machine when its not in use. Park the machine inside a building or cover it with a tarpaulin.
7. Install a cold weather starting aid. In very low temperatures (less than the value shown) additional starting aids may be needed. Examples are fuel, oil and coolant heaters. Ask your JCB dealer for advice.

   Temperature: -20°C (-4.0°F)

8. Before the engine is started, remove any snow from the engine compartment or snow could get into the air filter.

Operating in Extremely Low Temperatures

In extremely low temperatures (below 0°C (32.0°F)) special care must be taken. Extend the warm up time and cover the front faces of the radiator and oil cooler. After warm up, remove the covers.

1. Until the machine is thoroughly warmed up never try to slew quickly or operate the travel system, or damage can occur.
2. Before the machine is operated after a warm up, make sure that the boom, dipper bucket, slew and travel services all operate correctly. A time lag may occur when selecting these services if the hydraulic oil is not sufficiently warm.
3. If the machine will be left outside for more than one day without being used, remove the battery and take it indoors.
4. Drain the water collected in the fuel system to prevent it freezing.
5. Clean the machine after use and put it on wooden blocks. Keep the rams as fully retracted as possible. Remove any water from the exposed portion of the piston rods.
6. Additional low temperature fuel and lubricants and batteries may be required. Contact your local JCB dealer for advice.

Operating in High Temperatures

1. Use the correct viscosity engine lubricating oil.
2. Use the correct coolant mixture.
3. Check the coolant system regularly, keep the coolant at the correct level. Make sure there are no leaks.

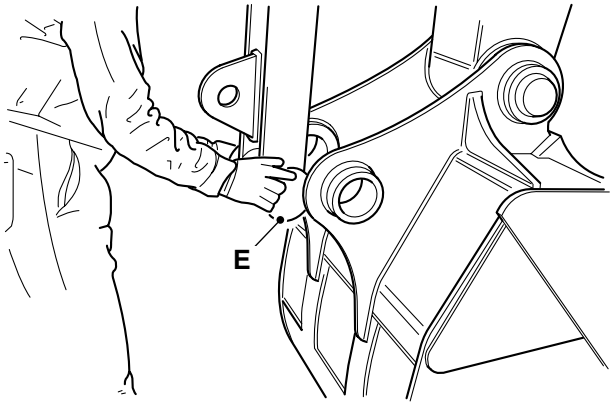
11. Move the bucket to the dump position so that the dipper link and the bucket bores are closely aligned (as shown at position 'C'), with the bucket teeth/toe plate above the ground by the specified distance.

    Distance: 20mm

    11.1. In this position the bucket will be at a point of balance and will be suspended on the steel bar at position 'D', only through the tipping-link.

12. Remove the steel bar from position 'C', then push the pivot pin through.
13. Align the locking pin holes in the pivot pin and the boss, then install the locking pin.
14. Put the bucket flat on the ground in a suitable position.
15. Remove the second steel bar from position 'D'.
16. Swing the bucket link out and hold the O-ring seals in position. Refer to Figure 212.
17. Carefully move the bucket link forwards into alignment with the bucket bosses, as shown at position 'D'.
18. Push the pivot pin through the bores at position 'D'. Be careful, do not to put your fingers in a position where they can get trapped.
19. Align the locking pin holes in the pivot pin and the boss, then install the locking pin.
20. Make sure that the O-ring seals are in their correct positions.
21. Grease the pivot pins.

Figure 212.



E O-ring seals

Reversal

1. Do the bucket removal procedure.
2. Slightly lift the dipper, then turn the bucket by the specified angle.

   Angle: 180°
3. Do the bucket installation procedure.

Security

General

Vandalism and the theft of unattended machines is an ever increasing problem and JCB is doing everything possible to help stop this.

Your JCB dealer will be pleased to provide information on any of these sensible precautions. Act now!

JCB Plantguard

JCB Plantguard is a comprehensive package available to help you safeguard your machine. It includes such devices as vandal proof covers, window etching, immobiliser, concealed serial number, battery isolator, tracker security system etc.

Remember that the installation of any one of these security devices will help to minimise not only the damage or loss of your machine, but also subsequent lost productivity. It could also help to reduce insurance premiums.

Construction Equipment Security and Registration Scheme (CESAR)

CESAR (Construction Equipment Security and Registration) is a simple, effective method of machine identification and registration that operates throughout the United Kingdom and Ireland and across the whole spectrum of JCB products.

CESAR is a scheme to help decrease plant theft, and was developed by the Metropolitan Police and the Home Office Plant Theft Action Group.

The key to the scheme is its simplicity and it will mean that every police officer in the country will know how to identify construction machinery and verify ownership. This will provide a major leap forward in both protecting machinery, and recovering it.

The Construction Equipment Association is managing the scheme, and Datatag are providing the security material and support. JCB is fully supportive of the CESAR initiative and will offer it as a factory option across the range.

The CESAR kit includes 2 tamper proof triangular identification plates installed on either side of the machine, a unique transponder, mini radio frequency identification tags concealed throughout the machine, Datatag micro dots, and a unique DNA coded chemical painted on the machines major components. Plus a registration certificate logged onto the CESAR or DVLA databases, and a change of keeper form.

LiveLink

Your JCB machine may be installed with LiveLink, JCB's advanced machine monitoring system. LiveLink monitors a range of information about your machine and sends it through cellular and satellite communication back to JCB's secure monitoring centre.

The machine owners and JCB dealers can then view that information through the LiveLink website, by email and even through text message. If you want to know how LiveLink can help manage your JCB machines, contact your local dealer for more information.

Anti-Vandal Guards

Anti-Vandalism Guards (option)

The anti-vandalism guards are stored in a purpose built cage on the roof of the machine. Make sure the cage is locked before the machine is moved.

Caution! *Make sure the steps, handrails, and your footwear soles are clean and dry before climbing onto the machine. Always face the machine when climbing on and off it.*

Table 14.

Important Parts	Replacement Interval
Fuel hose (Fuel tank - engine)	Every 2 years or every 4000 hours, whichever comes first.
Fuel hose (Fuel filter - injection pump)	

Table 15.

Important Parts	Replacement Interval
Pump exit hose (Pump - operation valve)	Every 2 years or every 4000 hours, whichever comes first.
Boom ram line hose	
Dipper ram line hose	
Bucket ram line hose	

Table 16.

Inspection Classification	Inspection Item
Start-up inspection	Fuel, hydraulic hose connections, oil leakage from caulked parts.
Special independent inspection (Monthly inspection)	Fuel, hydraulic hose connections, oil leakage from caulked parts. Fuel, hydraulic hose damage (cracks, wear, picking)
Special independent inspection (Yearly inspection)	Fuel, hydraulic hose connections, oil leakage from caulked parts. Fuel, hydraulic hose interference, squeezing, aging, twisting, damage (cracks, wear, picking)

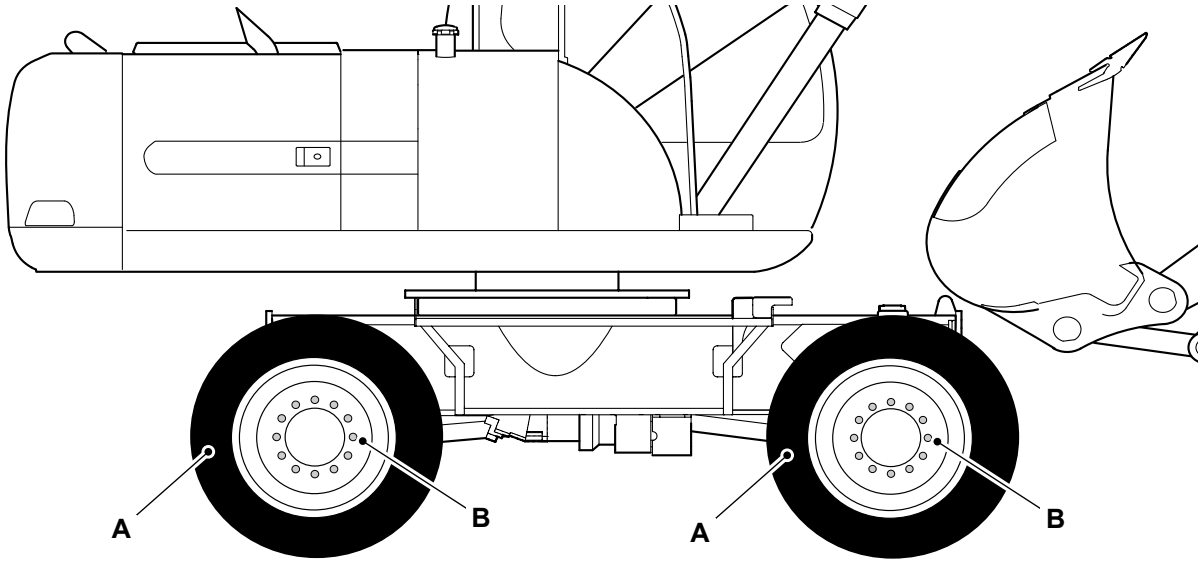
Pre-start Cold Checks, Service Points and Fluid Levels

Table 17.

Component	Task	10	50	250	500	1,000	2,000	4,000
Attachments/Optional Equipment								
As required	Lubricate	○	○	□	□	□	□	□
As required	Check (Condition)	○	○	□	□	□	□	□
Engine speed in breaker mode	Check (Operation)				□	□	□	□
Body and Framework								
General	Clean	○	○	□	□	□	□	□
General	Check (Condition)	○	○	□	□	□	□	□
Slew ring bearing	Lubricate		○	□	□	□	□	□
Slew ring pinion and gear teeth	Lubricate				□	□	□	□
Pivot pins (except boom base and dipper)	Lubricate		○	□	□	□	□	□
Pivot pins (boom base and dipper)	Lubricate					□	□	□
Pivot pins (wet or severe conditions - except boom base and dipper pins)	Lubricate	○	○	□	□	□	□	□
Hydraulic raised cab	Lubricate		○	□	□	□	□	□
Operator Station								
Operator protective structure	Check (Condition)	○	○	□	□	□	□	□
Seat belt	Check (Condition)	○	○	□	□	□	□	□

Undercarriage

Figure 230.



A Tyre
B Wheel nut

(For: JS200W, JS200Wastemaster)

⚠ **Caution!** Make sure the steps, handrails, and your footwear soles are clean and dry before climbing onto the machine. Always face the machine when climbing on and off it.

Tools

General

When you carry tools onto the machine, you must keep three points of contact with the machine at all times.

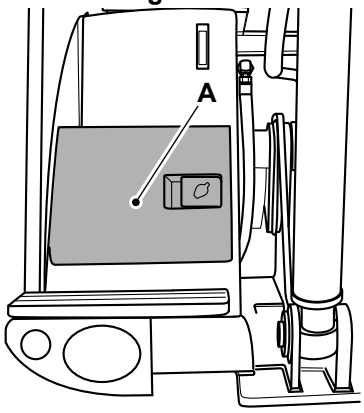
If necessary, lift the tools on to the machine in intervals.

Put the tools down before you adjust your grips on the machine. Do not try to adjust your grips on the machine while holding tools.

Toolbox

The grease gun is stowed in the toolbox. The toolbox can be locked with the key.

Figure 243.



A Toolbox

Air Filter

General

Check (Condition)

⚠ **Notice:** Do not modify or fit non JCB approved components to the engine induction system, otherwise the engine emissions will be compromised.

1. Make the machine safe.
   Refer to: Maintenance > Maintenance Positions (Page 229).
2. Get access to induction system.
   Refer to: Maintenance > Access Apertures (Page 243).
3. Check the system hoses for:
   3.1. Condition.
   3.2. Damage.
   3.3. Security.
4. Replace the system hoses if necessary.

Pre-Cleaner

Clean

Refer to the pre-cleaner manufacturers instructions for specific maintenance/cleaning instructions.

Dust Valve

Check (Condition)

- Check the dust valve for rips/tears.
- Check there are no obstructions.
- Check that the dust valve is free of dirt and dust.
- Check that the dust valve securely attached to the air filter housing.

Drive Gearbox

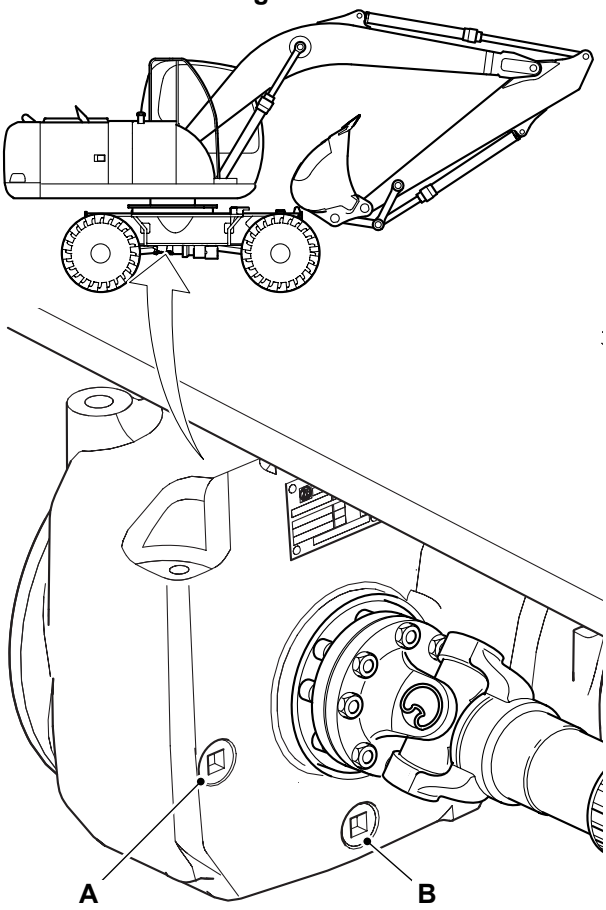
Oil

Check (Level)

⚠ **Warning!** Make the machine safe before working on it. Park the machine on level ground and lower the loader arm. Stop the engine and remove the starter key. Make sure the park brake is engaged. Disconnect the battery to prevent the engine being started. Block all four wheels.

1. Make the machine safe with the excavator arm lowered.
2. Engage the park brake.
3. Stop the engine and remove the ignition key.
4. Check/add oil on the gearbox:
   4.1. Clean the area around the fill/level plug, then remove the plug and its sealing washer. Oil should be level with the bottom of the hole.
   4.2. Add recommended oil if necessary.
   Refer to: Technical Data > Fluids, Lubricants and Capacities (Page 323).
5. Clean and then install the plug and sealing washer.
6. Tighten the drain plug to the correct torque value.
   Torque: 60N·m

Figure 258.



A Level plug
B Drain plug

Table 24.

Lifting hook	12.5t
Lifting lug	17t

Dimensions

(For: JS145W)

JS145 - Monoboom

Figure 265.

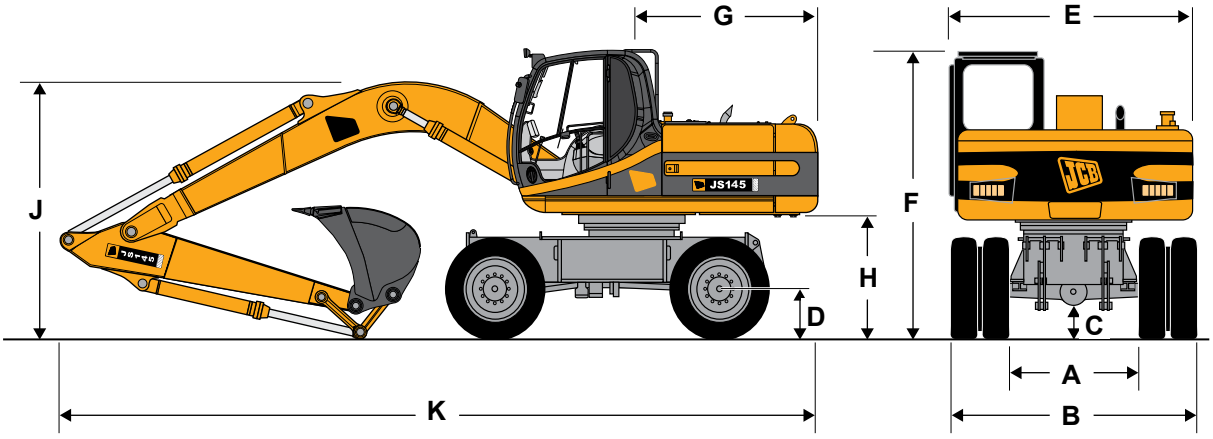


Table 25.

Description		Length
A	Internal width between dual wheels	1,330mm
B	External width between dual wheels	2,490mm
C	Ground clearance	350mm
D	Height to axle centre line for dual wheels	498mm
D	Height to axle centre line for single wheels	519mm
E	Overall width	2,480mm
F	Height over cab	3,155mm
G	Tail length	2,135mm
H	Clearance under counterweight	1,240mm

Table 26.

Dipper lengths		2,100mm	2,500mm	3,000mm
J	Transport height	3,040mm	3,040mm	3,040mm
K	Transport length	7,665mm	7,685mm	7,715mm

JS145W - Triple Articulated Boom

Figure 274.

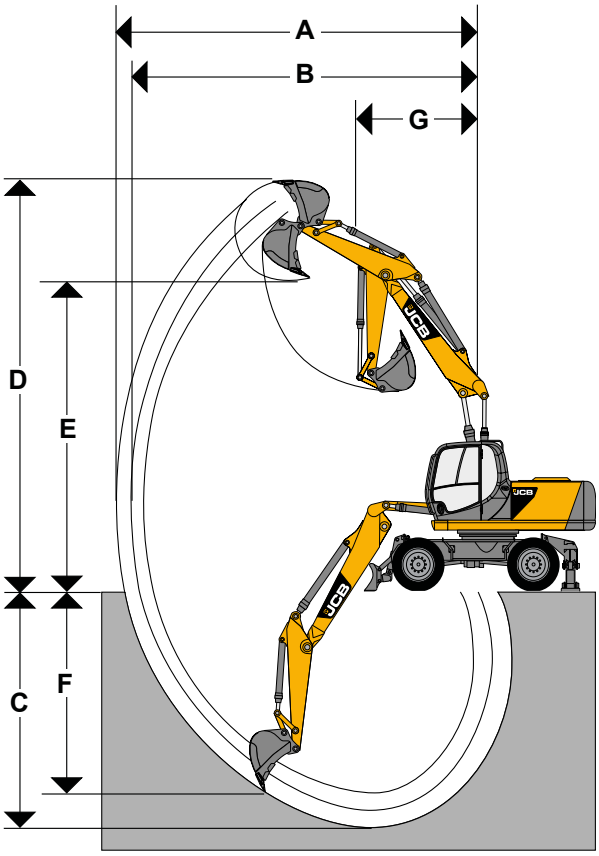


Table 53.

Boom length				
Dipper length		**2,100mm**	**2,500mm**	**3,000mm**
A	Maximum digging reach	8,360mm	8,750mm	9,235mm
B	Maximum digging reach (on ground)	8,140mm	8,525mm	9,000mm
C	Maximum digging depth	5,020mm	5,425mm	5,930mm
D	Maximum digging height	9,675mm	10,000mm	10,400mm
E	Maximum loadover height	7,275mm	7,575mm	7,950mm
F	Maximum vertical wall cut depth	4,240mm	4,625mm	5,105mm
G	Minimum swing radius	2,490mm	2,575mm	2,680mm

Lifting

All the lift capacities are calculated using the L3 power band.

JS200W - Triple Articulated Boom

Figure 289.

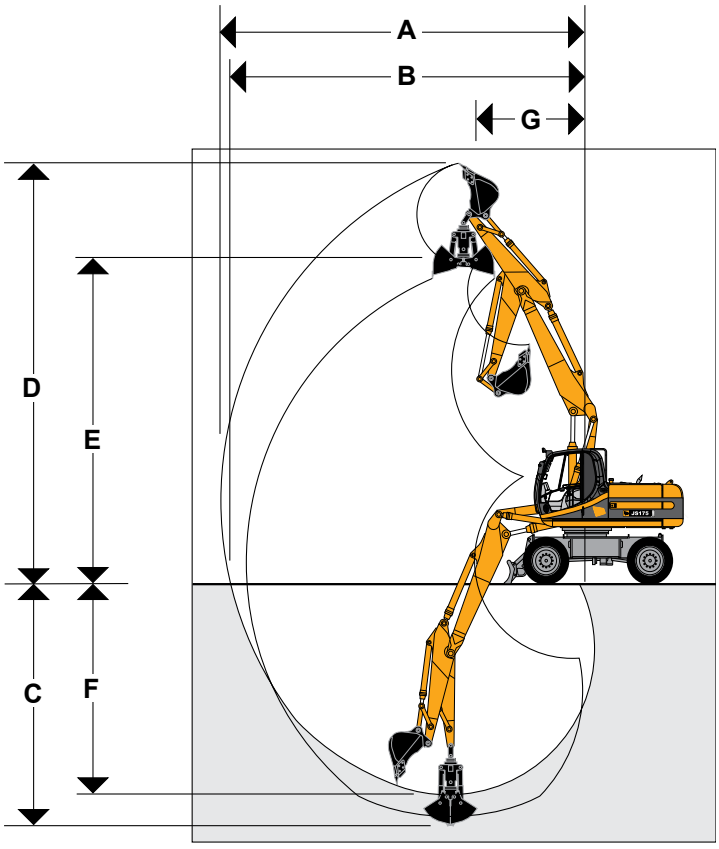


Table 61.

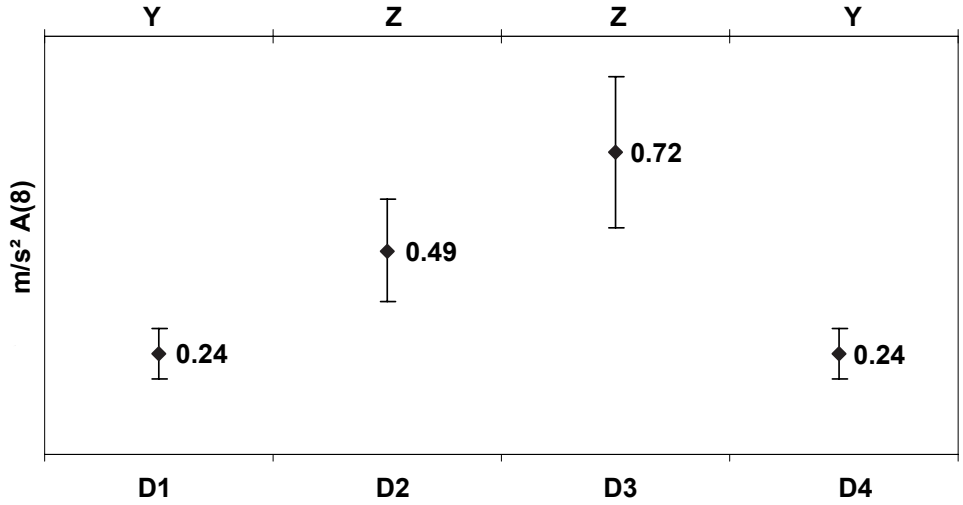
Boom length				
Dipper length		**1,910mm**	**2,400mm**	**3,000mm**
A	Maximum digging reach	8,860mm	9,280mm	9,830mm
B	Maximum digging reach (on ground)	8,650mm	9,140mm	9,650mm
C	Maximum digging depth	5,470mm	5,960mm	6,480mm
D	Maximum digging height	9,530mm	9,930mm	10,160mm
E	Maximum loadover height	6,670mm	7,600mm	7,300mm
F	Maximum vertical wall cut depth	3,760mm	4,200mm	4,800mm
G	Minimum swing radius	3,250mm	3,260mm	2,910mm

Vibration Data

(For: JS145W)

The whole-body vibration emission under representative operating conditions (according to the intended use) are shown. Refer to Figure 304.

Figure 304.



Y-Z Dominant axis
D1 Machine operating duty: Low idle
D2 Machine operating duty: Roading (tarmac)
D3 Machine operating duty: Roading (rough terrain)
D4 Machine operating duty: Excavating

Whole-body vibration emission determined in accordance with ISO 2631-1:1997 for this machine type is 0.24m/s² normalised to an 8h reference period [A(8)] and based upon a test cycle defined in SAE J1166.

The hand-arm vibration calculated in accordance with the dynamic test conditions defined in ISO 5349-2: 2001 does not exceed 2.5m/s².

The errors bars are due to variations in vibration emissions due to measurement uncertainty (50% in accordance with EN 12096:1997).

(For: JS160W, JS20 MH)

The whole-body vibration emission under representative operating conditions (according to the intended use) are shown. Refer to Figure 305.

Bolt Diameter (size)			M6	M8	M10	M12	M14	M16	M18	M20
Hex. socket head bolt	Wrench	(mm)	5	6	8	10	12	14	16	17
	Tightening torque	(N.m)	15	36	72	125	200	311	-	607

(For: JS160W, JS20 MH, JS175W)

Before and after daily work, check for loose or missing nuts and bolts. Tighten if loose and replace if missing.

Tighten the nuts and bolts after the first 50h of the running-in stage and then every 250h.

Tighten the nuts and bolts, Refer to Table 81.

For the tightening torques of the bolts and nuts not listed, Refer to Table 82.

Table 81.

	Tightening Point	Bolt Diameter	Wrench (mm)	Tightening Torque (N.m)	Checking Torque (N.m)
1(1)	Counter weight	M30	46	1147	1050
2(1)	Turntable bearing (under-carriage)	M16/M20	24/30	296/525	265/470
3(1)	Turntable bearing (slew frame)	M16/M20	24/30	296/525	275/470
4(1)	Slew equipment	M16/M20	24/30	296/525	275/470
5(1)	Engine (engine mount)	M16	24	290	265
6(1)	Engine bracket	M10/M12	17/19	68/118	62/107
7	Radiator	M12	19	104	94
8(1)	Hydraulic pump	M10	17	68	62
9(1)	Hydraulic oil tank	M16	24	250	225
10(1)	Fuel tank	M16	24	250	225
11(1)	Control valve	M16	24	290	265
12(1)	Rotary coupling	M12	19	116	105
13	Battery	M6	10	7	6
14(1)	Propeller shaft	3/8 UNC/ M10	3/8UNC/ 17	55/68	55/62
15(1)	Stab leg frame	M30	46	1147	1050
16(1)	Axle lock cylinders	M18	27	330	297
17(1)	Drive motor	M16	24	94	85
18	Rear axle mounts	M20	30	550	515
19	Transmission	M16	24	94	85
20	Cab	M16	24	132	125
21	Wheel nuts	M24	36	500	475

(1) Use JCB Threadlocker and sealer (High Strength) and tighten to the torque listed.

Table 82.

Bolt Diameter (size)			M6	M8	M10	M12	M14	M16	M18	M20
Hex. bolt	Wrench	(mm)	10	13	17	19	22	24	27	30
	Tightening torque	(N.m)	12.5	30	60	104	167	259	506	874
Hex. socket head bolt	Wrench	(mm)	5	6	8	10	12	14	16	17
	Tightening torque	(N.m)	15	36	72	125	200	311	-	607

Figure 320. 3500h/21 Month

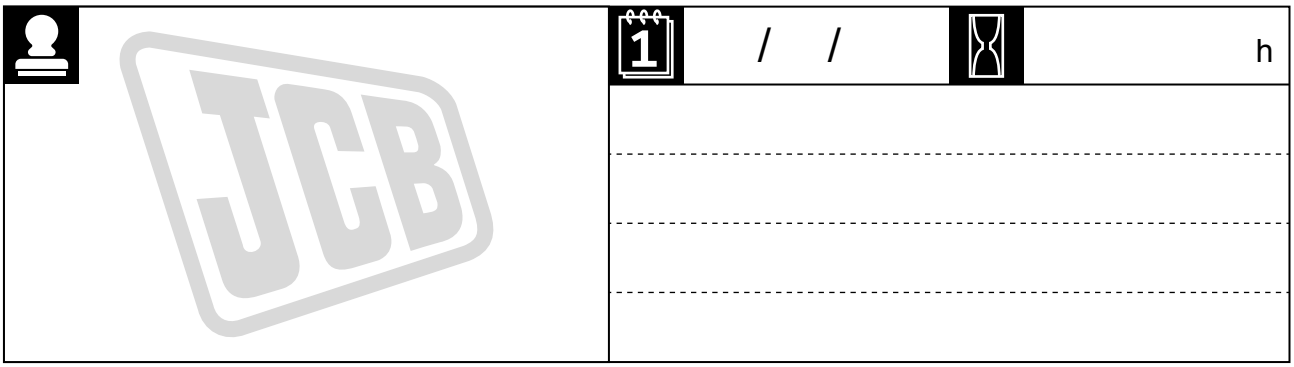


Figure 321. 4000h/24 Month

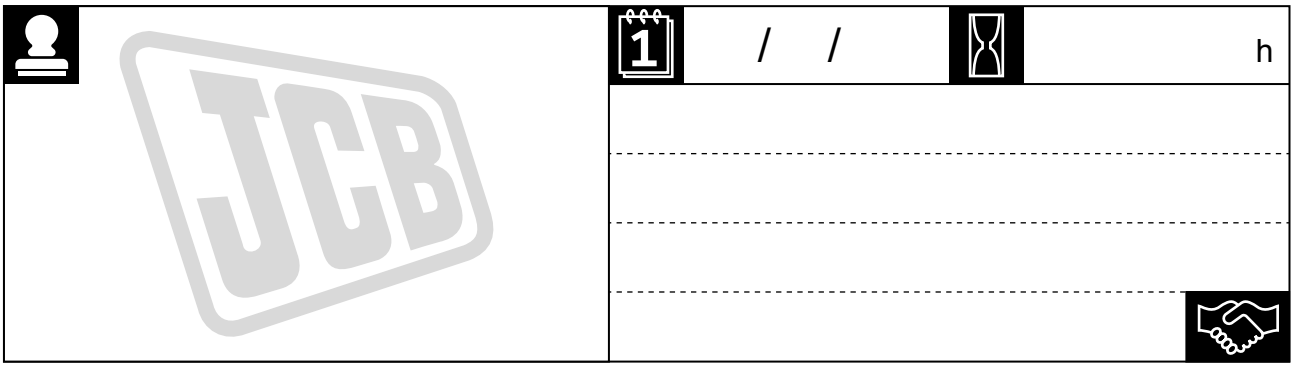


Figure 322. 4500h/27 Month

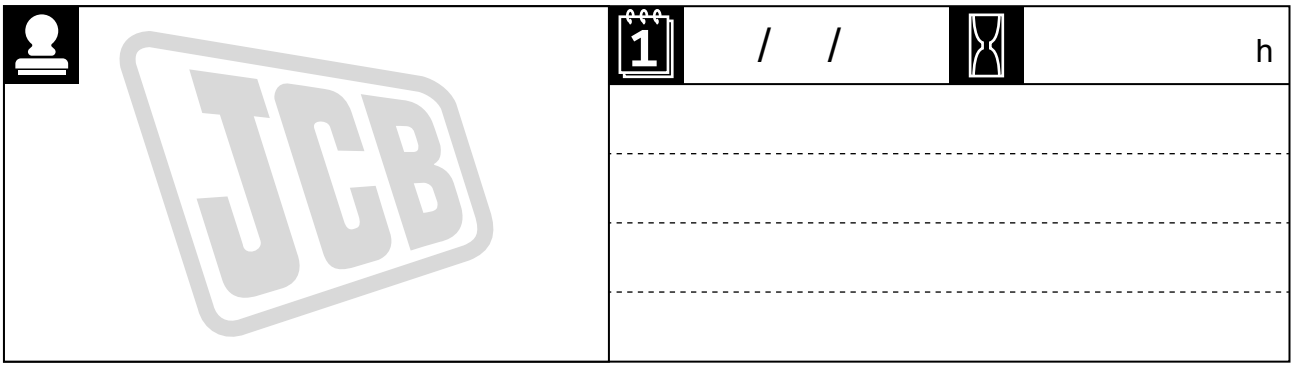
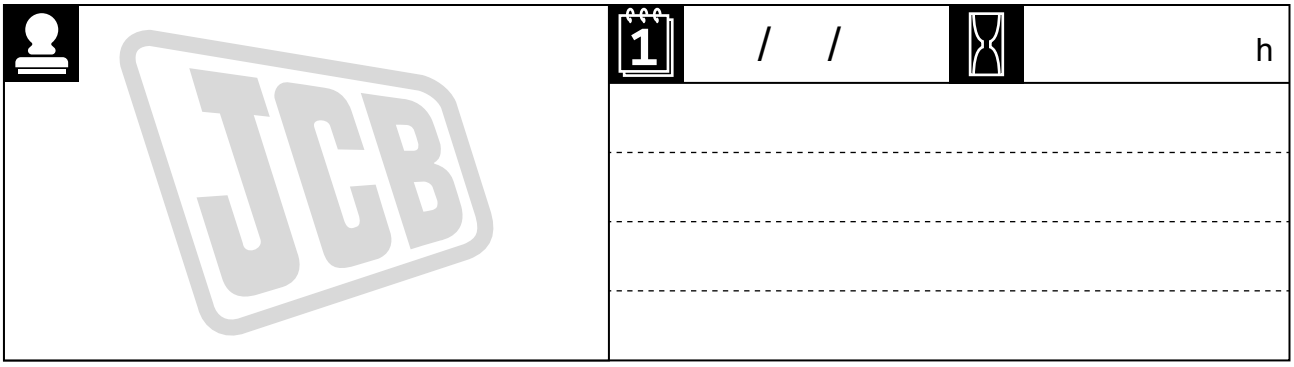
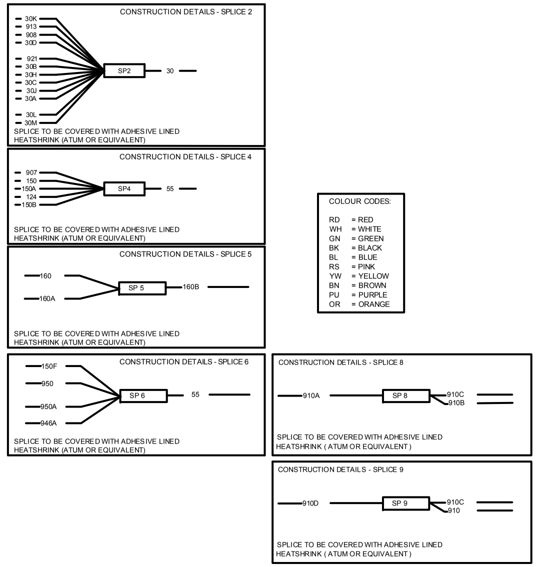


Figure 323. 5000h/30Month



Item	Description
A	ATC HVAC Unit
B	Condenser
C	High Pressure Switch
D	Receiver/Drier
E	Compressor
F	Control Panel
G	Low Pressure Recharge Point
H	High Pressure Recharge Point
J	ATC Electronic Control Module
K	Pulse Width Modulation (PWM) Module
L	Cab Air Sensor
M	Thermal Expansion Valve (TXV)
N	Low Pressure Switch
P	Water Valve
Q	Air-off Sensor
R	Evaporator Temperature Sensor
S	Evaporator Matrix
T	Blower Motor
U	Actuator
V	Recirculation Air Filter
W	Fresh Air Filter
X	Heater Hose, heater inlet (red)
Y	Heater Hose, heater outlet (blue)

						From				To			
Wire No	Size mm²	Colour	Type	Ident	Length mm	Connector	Cavity	Terminal	Seal	Connector	Cavity	Terminal	Seal
1	0.75	GN/WH	W	210	1330	5 ATC CONTROLLER	21	PACKARD 12084912	N	7 CAB AIR TEMP SENSOR	1	PACKARD 12047757	N
2	0.75	GN/YW	W	211	1230	5 ATC CONTROLLER	23	PACKARD 12084912	N	8 EVAP TEMP SENSOR	1	MOLEX 5558	N
3	0.75	GN/BL	W	202	720	5 ATC CONTROLLER	3	PACKARD 12084912	N	10 WATER VALVE ACTUATOR	D	PACKARD 12048074	PACKARD 12048046
4	0.75	RD/BN	W	150	475	5 ATC CONTROLLER	4	PACKARD 12084912	N	SP4	-	-	-
5	0.75	RD/YW	W	548	1190	5 ATC CONTROLLER	5	PACKARD 12084912	N	11 PWM UNIT	3	AMP 770008-3	N
6	0.75	RD/BN	W	150A	475	5 ATC CONTROLLER	12	PACKARD 12084912	N	SP4	-	-	-
7	0.75	BL/RD	W	911	970	5 ATC CONTROLLER	15	PACKARD 12084912	N	15 Comp Clutch Relay	86	AMP 5-160558-2	-
8	0.75	RD/BN	W	150B	475	5 ATC CONTROLLER	17	PACKARD 12084912	N	SP4	-	-	-
9	0.75	BK	W	30D	520	5 ATC CONTROLLER	18	PACKARD 12084912	N	SP2	-	-	-
10	0.75	YW	W	923	970	5 ATC CONTROLLER	20	PACKARD 12084912	N	2 USER INTERFACE	D10	PACKARD 12089649	N
11	0.75	OR	W	920	970	5 ATC CONTROLLER	31	PACKARD 12084912	N	2 USER INTERFACE	D7	PACKARD 12089649	N
12	0.75	BK/OR	W	918	970	5 ATC CONTROLLER	26	PACKARD 12084912	N	2 USER INTERFACE	D5	PACKARD 12089649	N
13	0.75	BK/RD	W	30E	90	5 ATC CONTROLLER	27	PACKARD 12084912	N	18A C/F CONNECTOR	1	AMP 42460-2	-
14	0.75	YW/BL	W	912	970	5 ATC CONTROLLER	28	PACKARD 12084912	N	2 USER INTERFACE	C15	PACKARD 12089649	N
15	0.75	YW/GN	W	914	970	5 ATC CONTROLLER	29	PACKARD 12084912	N	2 USER INTERFACE	D1	PACKARD 12089649	N
16	-	-	-	-	-	-	-	-	-	-	-	-	-
17	0.75	BK	W	30L	260	15 COMP CLUTCH RELAY	85	AMP 5-160558-2	N	SP2	-	-	-
18	0.75	BK/RD	W	30K	850	18B C/F CONNECTOR	1	42281-2	N	SP2	-	-	-
19	0.75	BK	W	30J	480	4 RECIRC ACTUATOR	C	PACKARD 12048074	PACKARD 12048046	SP2	-	-	-
20	0.75	BK	W	30C	850	8 EVAP TEMP SENSOR	2	MOLEX 5558	N	SP2	-	-	-
21	0.75	BK	W	30B	950	7 CAB AIR TEMP SENSOR	2	PACKARD 12047757	N	SP2	-	-	-
22	0.75	BK	W	30A	340	10 WATER VALVE ACTUATOR	C	PACKARD 12048074	PACKARD 12048046	SP2	-	-	-
23	0.75	YW/BK	W	908	990	2 USER INTERFACE	C11	PACKARD 12089649	N	SP2	-	-	-
24	0.75	BL	W	913	990	2 USER INTERFACE	C16	PACKARD 12089649	N	SP2	-	-	-
25	0.75	BK	W	30	70	1 VEHICLE HARNESS	10	DEUTSCH 1060-16-0122	N	SP2	-	-	-
26	0.75	BL/RD	W	907	945	2 USER INTERFACE	C10	PACKARD 12089649	N	SP4	-	-	-
27	-	-	-	-	-	-	-	-	-	-	-	-	-
28	0.75	BL	W	915	730	5 ATC CONTROLLER	35	PACKARD 12084912	N	17 LOW PRESSURE SENSOR	A	PACKARD 12103881	N
30	0.75	BL/BK	W	916	490	1 VEHICLE HARNESS	1	DEUTSCH 1060-16-0122	N	SP9	-	-	-
31	0.75	BL/OR	W	909	590	1 VEHICLE HARNESS	2	DEUTSCH 1060-16-0122	N	5 ATC CONTROLLER	33	PACKARD 12084912	N
32	-	-	-	-	-	-	-	-	-	-	-	-	-
33	-	-	-	-	-	-	-	-	-	-	-	-	-
34	1.50	BK	W	951	930	13 BLOWER MOTOR	2	AMP 5-160558-2	N	11 PWM UNIT	4	AMP 770008-3	
35	0.75	GN	W	124	945	2 USER INTERFACE	C2	PACKARD 12089649	N	SP4	-	-	-
36	0.75	BK	W	921	990	2 USER INTERFACE	D14	PACKARD 12089649	N	SP2	-	-	-
37	1.50	BK	W	30M	810	11 PWM UNIT	5	AMP 770008-3	N	SP2	-	-	-
38	1.50	RD/BL	W	946A	725	11 PWM UNIT	1	AMP 770008-3	N	SP6	-	-	-
39	0.75	RD/BN	W	160	200	10 WATER VALVE ACTUATOR	A	PACKARD 12048074	PACKARD 12048046	SP5	-	-	-
40	1.50	RD	W	950A	450	13 BLOWER MOTOR	1	AMP 5-160558-2	N	SP6	-	-	-
41	0.75	RD/BN	W	160A	380	4 RECIRC ACTUATOR	A	PACKARD 12048074	PACKARD 12048046	SP5	-	-	-
42	0.75	GN/OR	W	201	860	4 RECIRC ACTUATOR	D	PACKARD 12048074	PACKARD 12048046	5 ATC CONTROLLER	11	PACKARD 12084912	N
43	0.75	BK	W	30H	370	6 OUTLET TEMP SENSOR	2	MOLEX 5558	N	SP2	-	-	-
44	0.75	GN/BN	W	213	750	6 OUTLET TEMP SENSOR	1	MOLEX 5558	N	5 ATC CONTROLLER	22	PACKARD 12084912	N
45				-	-	-	-	-	-	-	-	-	-
46	2.00	RD/BN	W	150F	165	1 VEHICLE HARNESS	8	DEUTSCH 1060-16-0122	N	SP6	-	-	-
47	0.75	BN/OR	W	10	215	SP6	-	-	-	15 COMP CLUTCH RELAY	30	AMP 5-160558-2	N
48	0.75	OR/WH	W	952	330	1 VEHICLE HARNESS	3	DEUTSCH 1060-16-0122	N	15 COMP CLUTCH RELAY	87	AMP 5-160558-2	N
49	0.75	RD/OR	W	953	970	2 USER INTERFACE	D8	PACKARD 12084912	N	5 ATC CONTROLLER	32	PACKARD 12084912	N
50	1.5	RD	W	950	480	11 PWM UNIT	2	AMP 770008-3	N	SP6	-	-	-
51	-	-	-	-	-	-	-	-	-	-	-	-	-
52	-	-	-	-	-	-	-	-	-	-	-	-	-
53	0.75	RD/BN	W	160B	2010	I VEHICLE HARNESS	11	PACKARD 12084912	N	SP5	-	-	-
54	-	-	-	-	-	-	-	-	-	-	-	-	-
55	1.50	RD/BN	W	55	235	SP6	-	-	N	SP4	-	-	-
56	-	-	-	-	-	-	-	-	-	-	-	-	-
57	0.75	WH/YW	W	955	1060	2 USER INTERFACE	C1	PACKARD 12089649	N	1 VEHICLE HARNESS	12	DEUTSCH 0462-201-16141	N
58	0.75	WH/BK	W	956	970	2 USER INTERFACE	D12	PACKARD 12089649	N	5 ATC CONTROLLER	25	PACKARD 12084912	N
59	0.75	BL/WH	W	957	970	2 USER INTERFACE	D13	PACKARD 12089649	N	5 ATC CONTROLLER	16	PACKARD 12084912	N
60	-	-	-	-	-	-	-	-	-	-	-	-	-
61	0.75	BL/GN	W	910B	350	5 ATC CONTROLLER	36	PACKARD 12084912	N	SP8	-	-	-
62	0.75	BL/BK	W	910A	380	17 LOW PRESSURE SENSOR	B	PACKARD 12103881	N	SP8	-	-	-
63	0.75	BL/BK	W	910C	250	SP8	-	-	-	SP9	-	-	-
64	0.75	BL/BK	W	910D	100	5 ATC CONTROLLER	34	PACKARD 12084912	N	SP9	-	-	-



T013690-2

Fig 2.

Checks

Failure to take these precautions could result in death or injury to the operator.

Check the structure for damage. Check that the six mounting bolts **A** are installed and undamaged. Check the bolt torques. Tighten them to the correct torque if necessary.

Torque Settings

Item	Nm	Kgf m	lbf ft
A	130	14	96

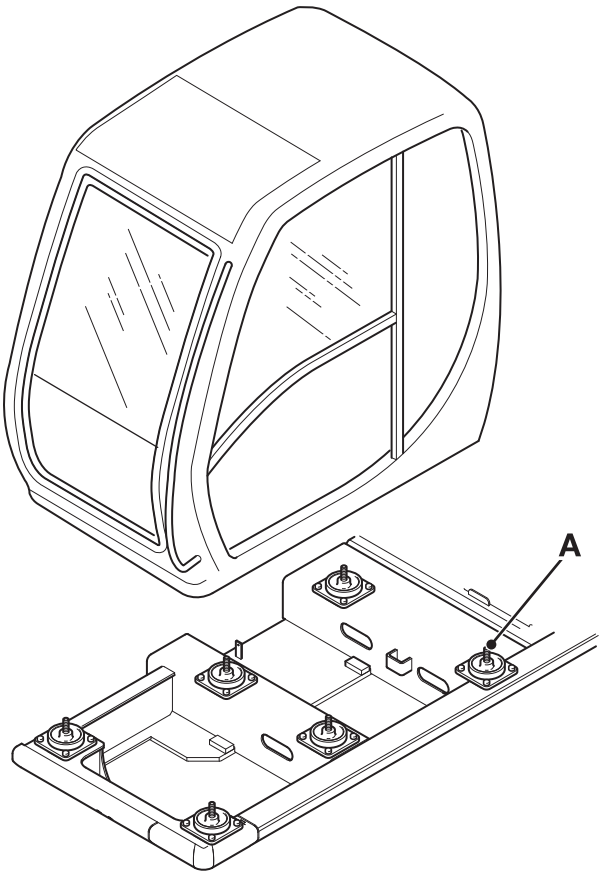
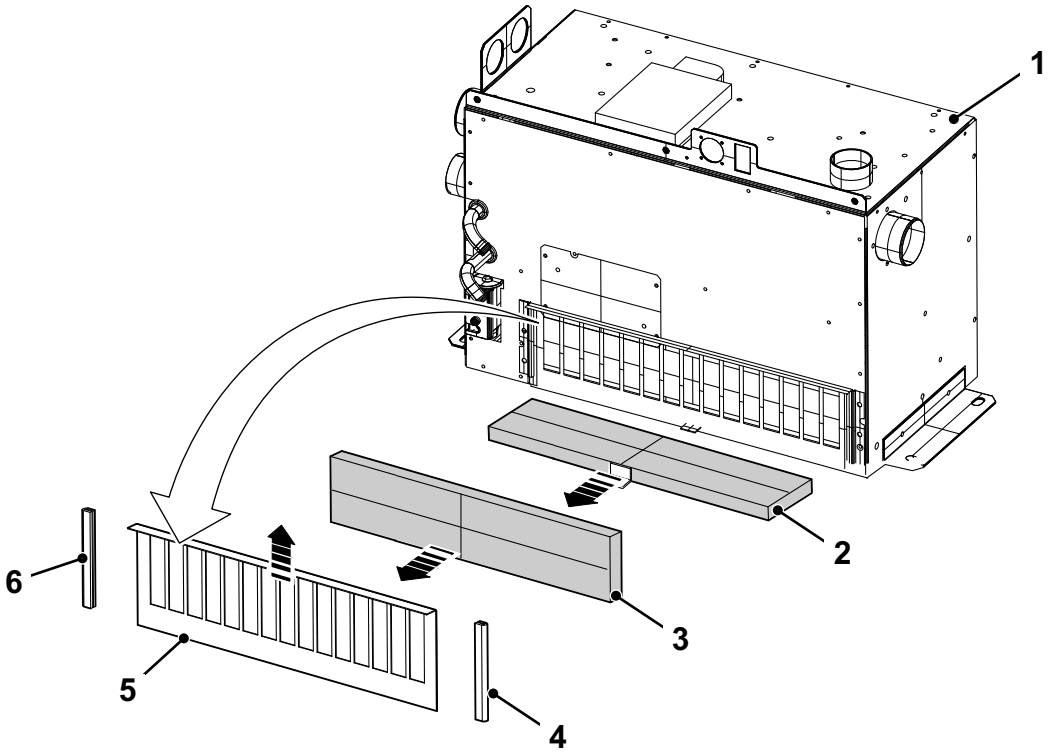


Fig 16.

Cab Heater/Air-Conditioning Filter

General

There are two cab heater/air-conditioning filters. A fresh air filter **2** and a re-circulation filter **3**. The filters are located in the Heating Ventilation and Air-Conditioning (HVAC) unit **1** inside the cab. The HVAC unit is located at the rear of the operator's seat.



C130140

Fig 5.

Replace

1 Prepare the machine. Refer to ***Section 2, Maintenance, Maintenance Positions***.

2 Slide the cover **5** up and remove it from the HVAC unit **1**.

3 Remove the re-circulation filter **3**.

4 Remove the fresh air filter **2**.

5 Install the new filters followed by the cover. Make sure that the cover sealing strips **4** and **6** locate correctly at each end of the cover.

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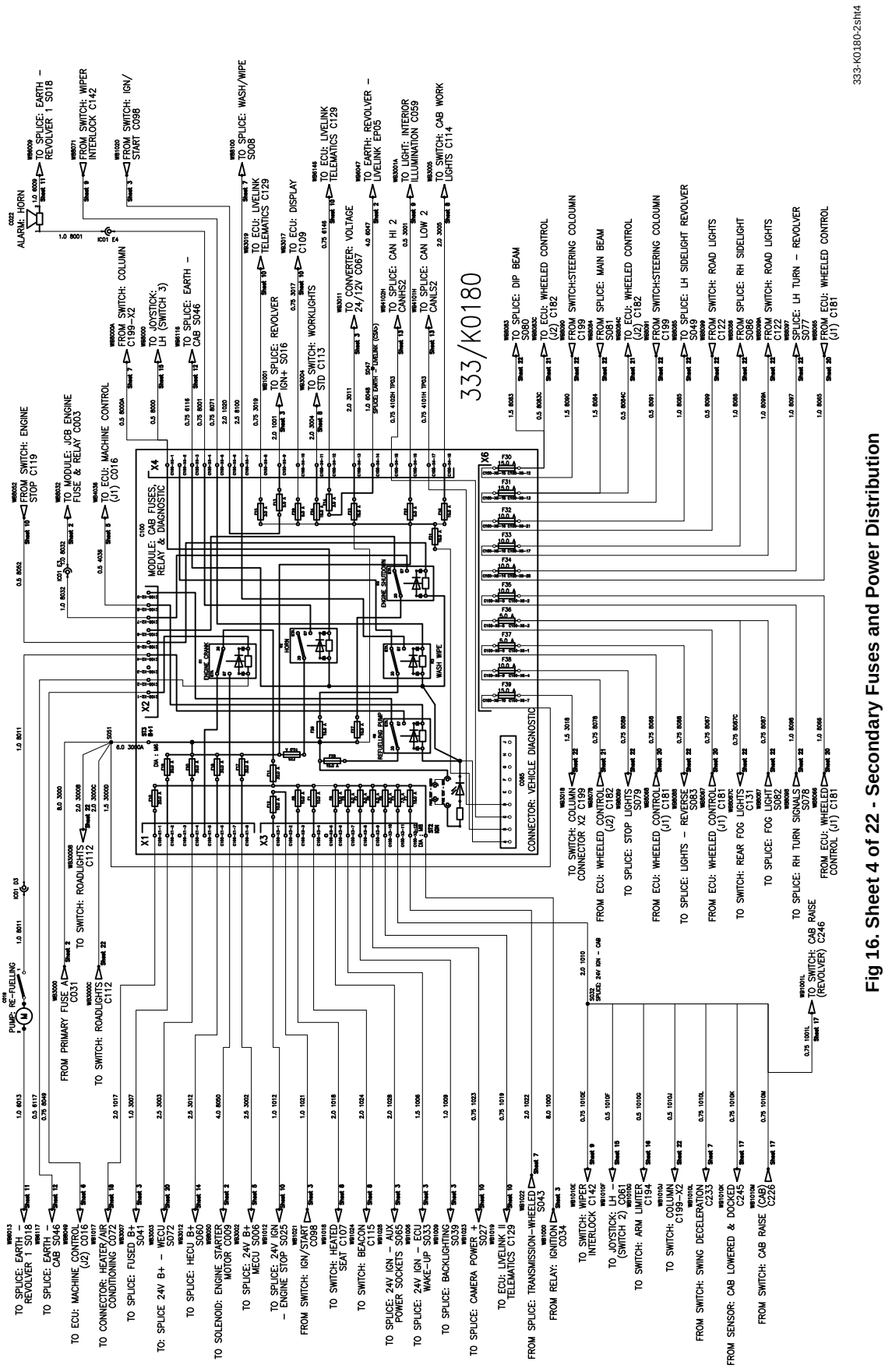


Fig 16. Sheet 4 of 22 - Secondary Fuses and Power Distribution

⇨ *Schematics - Component Keys (C-55)* | ⇨ *Sheets (C-11)*

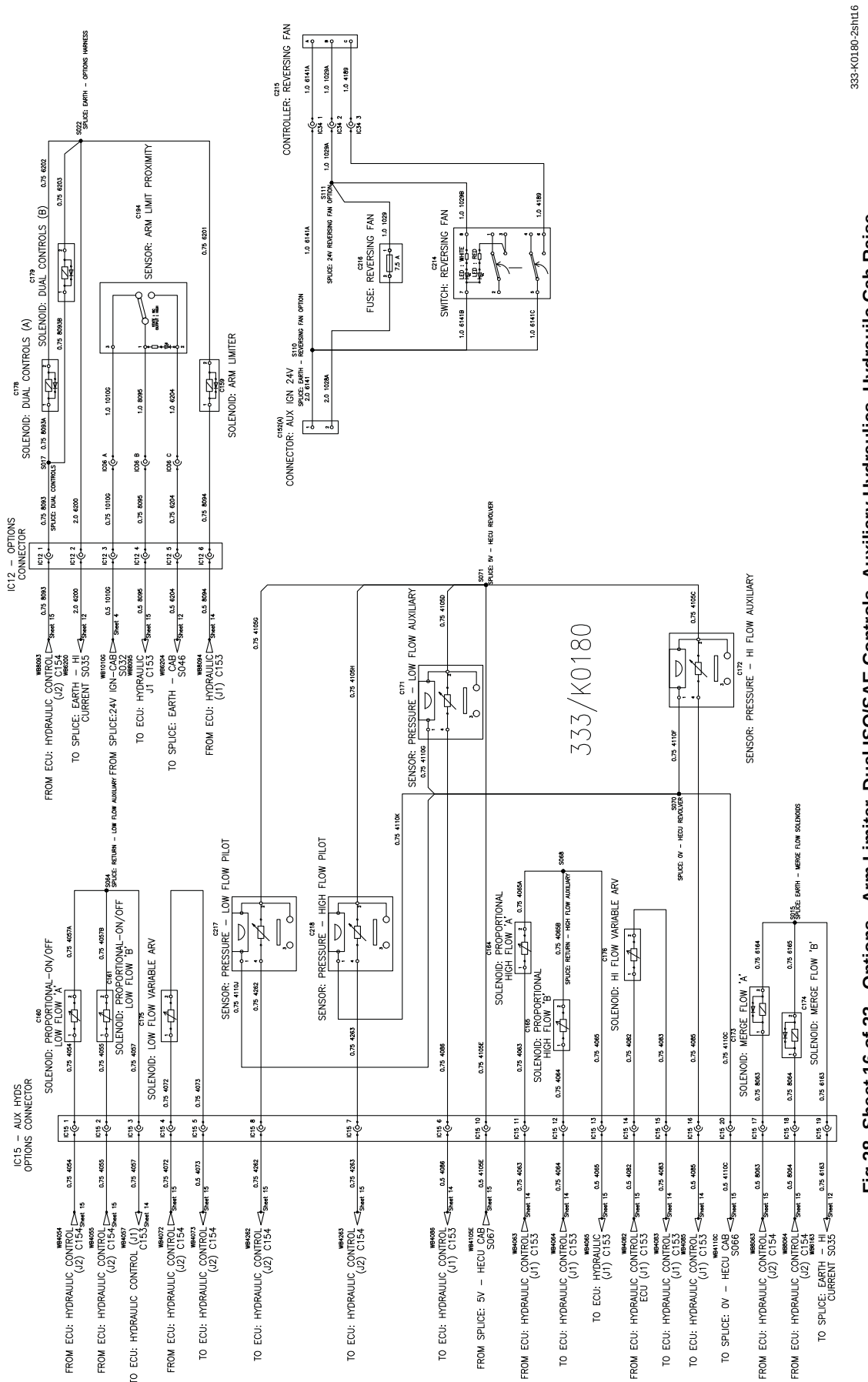


Fig 28. Sheet 16 of 22 - Options - Arm Limiter, Dual ISO/SAE Controls, Auxiliary Hydraulics, Hydrauilc Cab Raise

⇒ *Schematics - Component Keys (C-55)* | ⇒ *Sheets (C-11)*

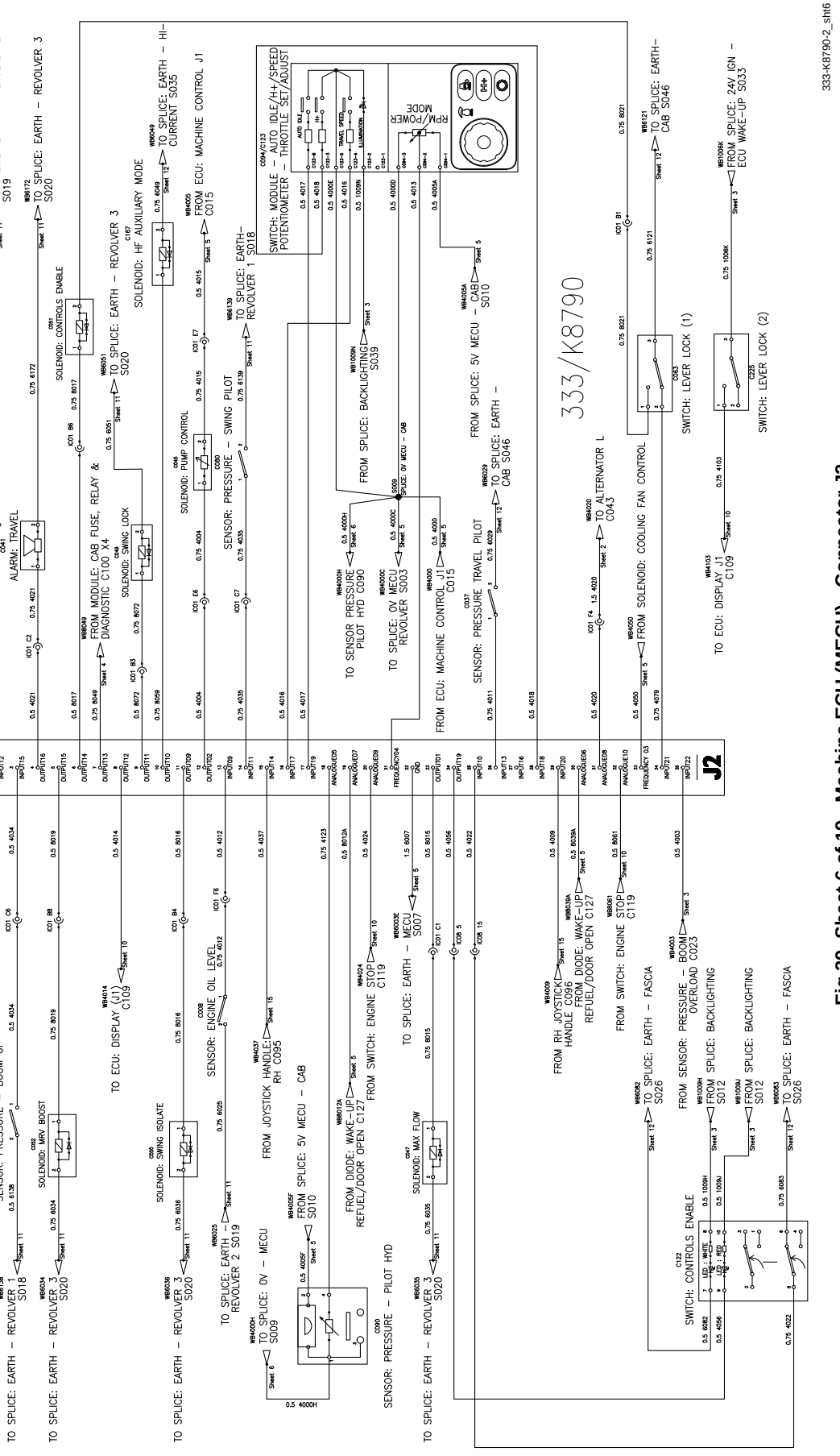


Fig 39. Sheet 6 of 19 - Machine ECU (MECU) - Connector J2

⇒ *Schematics - Component Keys* (C-55) | ⇒ *Sheets* (C-33)

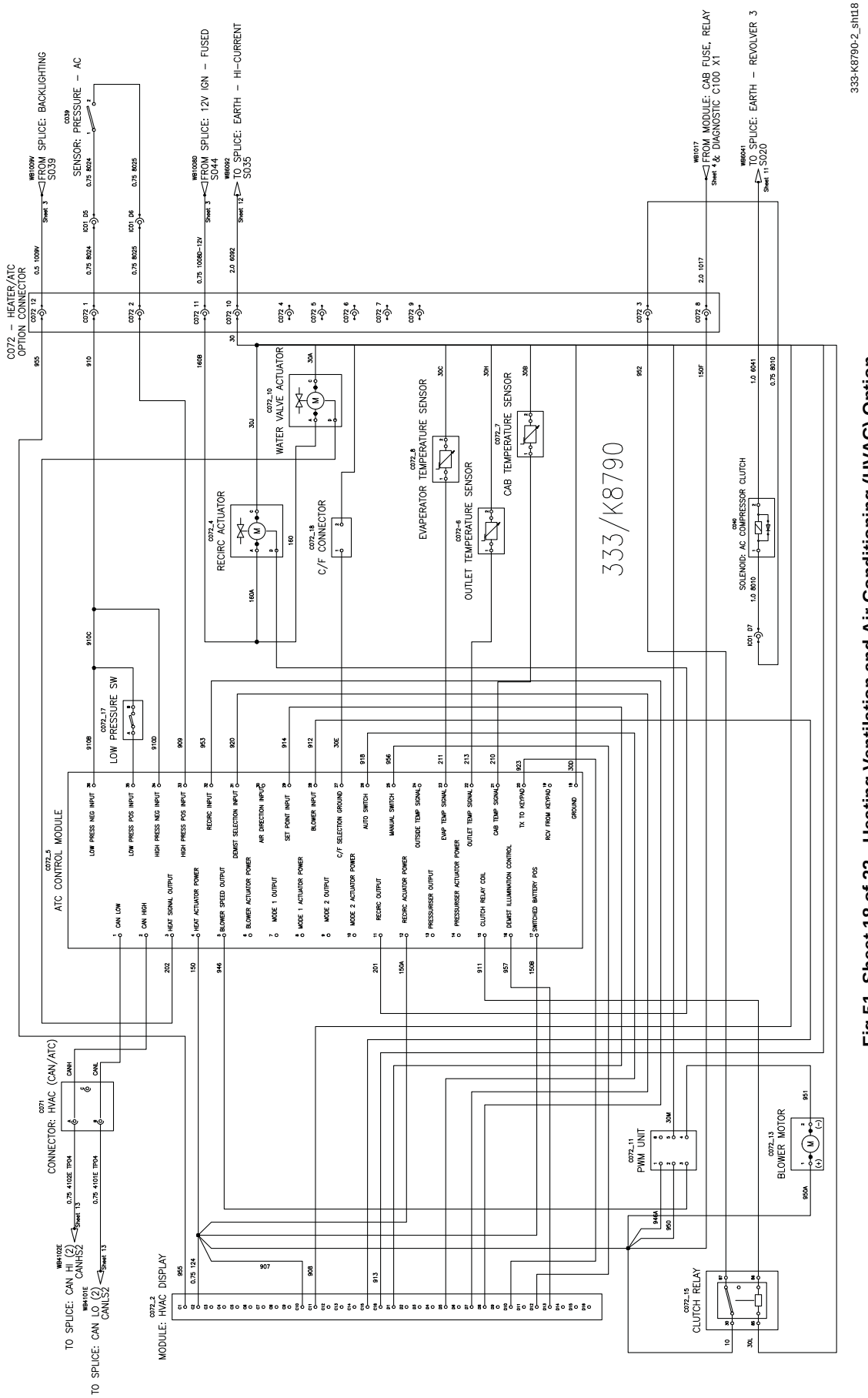


Fig 51. Sheet 18 of 22 - Heating Ventilation and Air Conditioning (HVAC) Option

⇒ *Schematics - Component Keys (C-55)* | ⇒ *Sheets (C-33)*

Test Procedures

High Rate Discharge Test

This test is to determine the electrical condition of the battery and to give an indication of the remaining useful `life'. Before testing ensure that the battery is at least 75% charged (SG of 1.23 to 1.25 for ambient temperature up to 27°C).

Ensure that the battery is completely disconnected from the machine.

C096270

Fig 1. Battery Tester

Check:

1 Connect the battery tester to the battery. Ensure that the positive terminal is connected first.

2 Use rocker switch **A** to select the correct battery voltage.

3 Hold switch **B** to the ‘Check’ position. The battery no-load voltage should be at least 12.4 volts.

Test:

1 Hold down switch **B** to the ‘Load’ position for 5-10 seconds until the meter reading stabilises. The reading should be at least 9 volts.

Note: *Do not hold the switch in the LOAD position for more than 10 seconds.*

Check the results against the table:

Table 1. Tester Readings and Remedies

Battery Tester Readings	Remedy
CHECK: 0 - 12.6 volts LOAD: Less than 6 volts	Renew battery
CHECK: 6 - 12.4 volts LOAD: less than 9 Volts and falls steadily but remains in yellow zone.	Recharge and re-test. If tests still unsatisfactory renew battery.
CHECK: less than 10 volts LOAD: Less than 3 volts	Indicates battery has been over-discharged and unlikely to recover. Renew battery.
CHECK: more than 11 volts LOAD: 6 - 10 volts	Charge battery which will probably recover.

4	**Boom**			
	333/K0019	1		⇨ *Fig 31. (C-101)*
Main components connected to this harness:			Boom work lights	
			Ambient temperature sensor	
	Cab Roof			
	333/K0017	1		⇨ *Fig 33. (C-103)*
Main components connected to this harness:			Radio speakers	
			Interior lights	
			Door and window switches	
			Cab work lights	
	Heater Harness			
	333/K3883	1	Heater unit (machines without air conditioning)	⇨ *Fig 32. (C-102)*
			Heater controls	
	Heating, Ventilation and Air Conditioning (HVAC)			Refer to ***Section B***
	Camera Harness			
	333/K4284	1	Dual camera system	⇨ *Fig 35. (C-105)*
	333/K4283	1	Single camera system	⇨ *Fig 36. (C-106)*
	Auxiliary Hi/Lo Flow Hydraulics			
	333/K4639	1		⇨ *Fig 37. (C-107)*
	HRC Harness			
	333/K7059	1		⇨ *Fig 39. (C-109)*

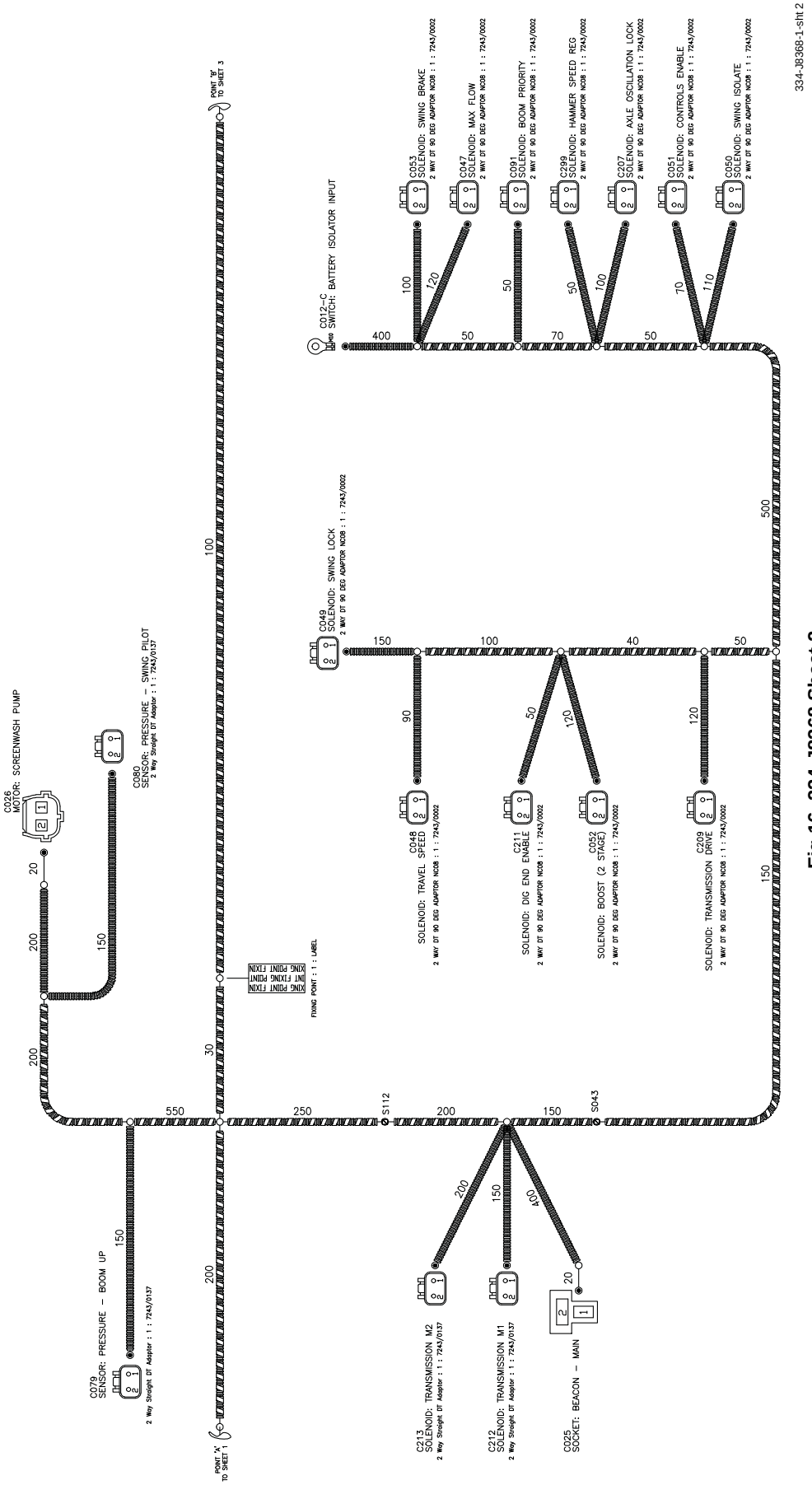


Fig 16. 334-J8368 Sheet 2

C048
SOLENOID: TRAVEL SPEED

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	8014	0.75	IC01−D4	2	6038	0.75	S020−2

2 Way DT06 Socket Housing : 1 : 7212/0052
2 Way DT06 Wedge : 1 : 7212/0031 DO NOT FIT
2 WAY BLUE DT06 WEDGE : 1 : 7212/0084

C049
SOLENOID: SWING LOCK

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	8072	0.75	IC01−B3	2	6051	0.75	S020−14

2 Way DT06 Socket Housing : 1 : 7212/0052
2 Way DT06 Wedge : 1 : 7212/0031

C050
SOLENOID: SWING ISOLATE

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	8016	0.75	IC01−B4	2	6036	0.75	S020−4

2 Way DT06 Socket Housing : 1 : 7212/0052
2 Way DT06 Wedge : 1 : 7212/0031 DO NOT FIT
2 WAY RED DT06 WEDGE : 1 : 7212/0083

C051
SOLENOID: CONTROLS ENABLE

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	8017	0.75	IC01−B6	2	8021	0.75	IC01−B1

2 Way DT06 Socket Housing : 1 : 7212/0052
2 Way DT06 Wedge : 1 : 7212/0031 DO NOT FIT
2 WAY WHITE DT06 WEDGE : 1 : 7212/0082

C052
SOLENOID: BOOST (2 STAGE)

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	8019	0.75	IC01−B8	2	6034	0.75	S020−5

2 Way DT06 Socket Housing : 1 : 7212/0052
2 Way DT06 Wedge : 1 : 7212/0031 DO NOT FIT
2 WAY YELLOW DT06 WEDGE : 1 : 7212/0085

C053
SOLENOID: SWING BRAKE

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	8020	0.75	IC01−B5	2	6042	0.75	S020−6

2 Way DT06 Socket Housing : 1 : 7212/0052
2 Way DT06 Wedge : 1 : 7212/0031

C079
SENSOR: PRESSURE − BOOM UP

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	4034	0.5	IC01−C6	2	6138	0.5	S018−14

2 Way DT06 Socket Housing : 1 : 7212/0052
2 Way DT06 Wedge : 1 : 7212/0031 DO NOT FIT
2 WAY WHITE DT06 WEDGE : 1 : 7212/0082

C080
SENSOR: PRESSURE − SWING PILOT

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	4035	0.75	IC01−C7	2	6139	0.75	S018−12

2 Way DT06 Socket Housing : 1 : 7212/0052
2 Way DT06 Wedge : 1 : 7212/0031

C091
SOLENOID: BOOM PRIORITY

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	8022	0.75	IC01−C5	2	6014	0.75	S018−13

2 Way DT06 Socket Housing : 1 : 7212/0052
2 Way DT06 Wedge : 1 : 7212/0031

C139
CONNECTOR: RH REAR BEACON SOCKET

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	8054	B	1.0	S055−2	2	6043	1.0	S020−7

2 Way Pos Lock Housing T Type : 1 : 7232/0003

C145
CONNECTOR: PRIMARY FUSE SUPPLY

CELL	TAG	CSA	DEST
1	2000	16.0	C30−X1−1

Ring Terminal M6 10−16 : 1 : 7207/1316
Adhesive Lined Heatshrink : 30.0 : 7000/3212

C155
SOLENOID: QUICK HITCH

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	8026	0.75	IC01−F7	2	6040	0.75	S020−12

2 Way DT06 Socket Housing : 1 : 7212/0052
2 Way DT06 Wedge : 1 : 7212/0031

C156
SENSOR: PRESSURE − QUICK HITCH

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	4051	0.75	IC01−D11	2	6045	0.75	S020−9

2 Way DT06 Socket Housing : 1 : 7212/0052
2 Way DT06 Wedge : 1 : 7212/0031

C186−X1
LIGHT: HEAD RH (DIP/MAIN)

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	8084	B	1.0	IC02−A1	3	6185	1.5	S087−8
2	8083	B	1.0	IC02−A2				

THREE WAY FEM HEADLAMP HSG : 1 : 7233/0021

C187
LIGHT: FRONT RH TURN

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	8098	A	0.75	S078−4	2	6186	0.75	S087−6

2 Way DT06 Socket Housing : 1 : 7212/0052
2 Way DT06 Wedge : 1 : 7212/0031

C186−X2−1
LIGHT: FRONT SIDE RH

CELL	TAG	CSA	DEST
1	8086	A	0.75	S086−6

1 Way Pos Lock Housing Straight Red : 1 : 7231/0015

C186−X2−2
LIGHT: FRONT SIDE RH

CELL	TAG	CSA	DEST
1	6215	0.75	S087−9

1 Way Pos Lock Housing Straight : 1 : 7201/0403

C190
LIGHT: REVERSE/FOG LH

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	7210/0030			3	6189	0.75	S087−3
2	8087	A	0.75	S082−2	4	8088	A	0.75	S083−2

4 Way DT06 Socket Housing : 1 : 7214/0025
4 Way DT06 Wedge : 1 : 7214/0016

C191
LIGHT: REVERSE/FOG RH

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	7210/0030			3	6190	0.75	S087−4
2	8087	B	0.75	S082−3	4	8088	B	0.75	S083−1

4 Way DT06 Socket Housing : 1 : 7214/0025
4 Way DT06 Wedge : 1 : 7214/0016

C192
LIGHT: REGISTRATION PLATE

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	6191	0.75	S087−5	2	8086	D	0.75	S086−1

2 Way DT06 Socket Housing : 1 : 7212/0052
2 Way DT06 Wedge : 1 : 7212/0031

C201
SENSOR: REVOLVER ALIGNED

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
A	1001	H	0.75	S016−4	C	8095	1.0	IC02−E4
B	6221	0.75	S018−11					

3 Way DT06 Socket Housing : 1 : 7213/0031
3 Way DT06 Wedge : 1 : 7213/0016

C207
SOLENOID: AXLE OSCILLATION LOCK

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	1022	A	0.75	S043−1	2	8103	0.75	IC02−C3

2 Way DT06 Socket Housing : 1 : 7212/0052
2 Way DT06 Wedge : 1 : 7212/0031

C209
SOLENOID: TRANSMISSION DRIVE

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	1022	B	0.75	S043−3	2	8079	0.75	IC02−C2

2 Way DT06 Socket Housing : 1 : 7212/0052
2 Way DT06 Wedge : 1 : 7212/0031

C211
SOLENOID: DIG END ENABLE

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	8075	0.75	IC02−C1	2	6212	0.75	S020−13

2 Way DT06 Socket Housing : 1 : 7212/0052
2 Way DT06 Wedge : 1 : 7212/0031

C212
SOLENOID: TRANSMISSION M1

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	8104	0.75	IC02−E3	2	8129	A	0.75	S112−1

2 Way DT06 Socket Housing : 1 : 7212/0052
2 Way DT06 Wedge : 1 : 7212/0031

C232
SOLENOID: SWING DECELERATION

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	8109	0.75	IC01−B2	2	6225	0.75	S020−15

2 Way DT06 Socket Housing : 1 : 7212/0052
2 Way DT06 Wedge : 1 : 7212/0031

C238
LIGHT: RH SIDE REPEATER

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	8098	C	0.75	S078−5	2	6217	0.75	S087−10

2 Way DT06 Socket Housing : 1 : 7212/0052
2 Way DT06 Wedge : 1 : 7212/0031

C299
SOLENOID: HAMMER SPEED REG

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	8132	0.75	IC02−C4	2	6227	0.75	S020−16

2 Way DT06 Socket Housing : 1 : 7212/0052
2 Way DT06 Wedge : 1 : 7212/0031

C188
LIGHT: REAR TURN/SIDE/STOP LH

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	8097	B	0.75	S077−1	3	6187	0.75	S087−1
2	8085	B	0.75	S085−1	4	8089	A	0.75	S079−1

4 Way DT06 Socket Housing : 1 : 7214/0025
4 Way DT06 Wedge : 1 : 7214/0016

C189
LIGHT: REAR TURN/SIDE/STOP RH

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	8098	B	0.75	S078−1	3	6188	0.75	S087−2
2	8086	B	0.75	S086−2	4	8089	B	0.75	S079−2

4 Way DT06 Socket Housing : 1 : 7214/0025
4 Way DT06 Wedge : 1 : 7214/0016

C125
LIGHT: WORKLIGHT COUNTERWEIGHT

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	8003	1.0	IC01−E9	2	6022	1.0	S019−4

2 Way DT06 Socket Housing : 1 : 7212/0052
2 Way DT06 Wedge : 1 : 7212/0031

C138
CONNECTOR: LH REAR BEACON SOCKET

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	8054	A	1.0	S055−3	2	6044	1.0	S020−8

2 Way Pos Lock Housing T Type : 1 : 7232/0003

C213
SOLENOID: TRANSMISSION M2

CELL	TAG	CSA	DEST	CELL	TAG	CSA	DEST
1	8105	0.75	IC02−E2	2	8129	B	0.75	S112−2

2 Way DT06 Socket Housing : 1 : 7212/0052
2 Way DT06 Wedge : 1 : 7212/0031

334-J8377-1-sht 6

Fig 28. 334-J8377 Issue 6

Connector Codes

Connector Code	Device	Harness Location
C001	ECU: JCB Engine	Revolver Harness
C002	Resistor: CAN Termination	Revolver Harness
C003	Module: JCB Engine Fuse & Relay	Revolver Harness
C004	Converter: Voltage 24/ 12V	Revolver Harness
C006	Pump: Fuel Lift	Revolver Harness
C007	Sensor: Water In Fuel	Revolver Harness
C008	Sensor: Engine Oil Level	Revolver Harness
C009	Solenoid: Engine Starter Motor	Revolver Harness
C012	Switch: Battery Isolator	Revolver Harness
C015	ECU: Machine Control (J1)	Cab Harness
C016	ECU: Machine Control (J2)	Cab Harness
C019	Pump: Re-fuelling	Revolver Harness
C020	Switch: Re-Fuelling Pump	Revolver Harness
C021	Sensor: Fuel Level	Revolver Harness
C022	Alarm Horn	Revolver Harness
C023	Sensor: Boom Overload	Revolver Harness
C024	Diode: Alternator Suppression	Revolver Harness
C025	Socket: Beacon - Main	Revolver Harness
C026	Motor: Screenwash Pump	Revolver Harness
C027	Sensor: Air Filter Restriction	Revolver Harness
C028	Sensor: Coolant Level	Revolver Harness
C030	Fusebox: Primary	Revolver Harness
C030-X1	Connector: Primary Fuse B+	Revolver Harness
C033	Relay: Ignition	Revolver Harness
C036	Sensor: Pressure - Upper Pilot	Revolver Harness
C037	Sensor: Pressure Travel Pilot	Cab Harness
C038	Solenoid: Cooling Fan Control	Revolver Harness
C039	Sensor: Pressure - AC	Revolver Harness
C040	Solenoid: AC Compressor Clutch	Revolver Harness
C041	Alarm Travel	Revolver Harness
C042	Alternator: 24V 55A	Revolver Harness
C042-X1	Alternator: R Terminal	Revolver Harness
C042-X2	Alternator: L Terminal	Revolver Harness
C045	Solenoid: Pump Control	Revolver Harness
C046	Sensor: Hydraulic Oil Temperature	Revolver Harness
C047	Solenoid: Max Flow	Revolver Harness
C048	Solenoid: Travel Speed	Revolver Harness
C049	Solenoid: Slew Lock	Revolver Harness
C050	Solenoid: Slew Isolate	Revolver Harness
C051	Solenoid: Controls Enable	Revolver Harness
C052	Solenoid: Boost - 2 Stage	Revolver Harness
C053	Solenoid: Slew Brake	Revolver Harness
C055	Light: Working - Cab RH	Roof Harness
C056	Light: Working - Cab LH	Roof Harness
C057	Connector: Radio Power	Roof Harness
C058	Motor: Wiper -Upper	Roof Harness
C059	Light: Interior Illumination	Roof Harness
C060-X1	Joystick: LH Handle - Slider	Cab Harness
C060-X2	Joystick: LH Handle - Switch 2	Cab Harness
C060-X3	Joystick: LH Handle - Switch 3	Cab Harness

CANbus Communications System

C Controller
A Area
N Network

An electronic communications system that connects all the machine ECU's to one pair of data wires called the CANbus. Coded data is sent to and from the ECU's on the CANbus.

By connecting Servicemaster diagnostic software to the CANbus, data is seen and decoded for use by a service engineer.

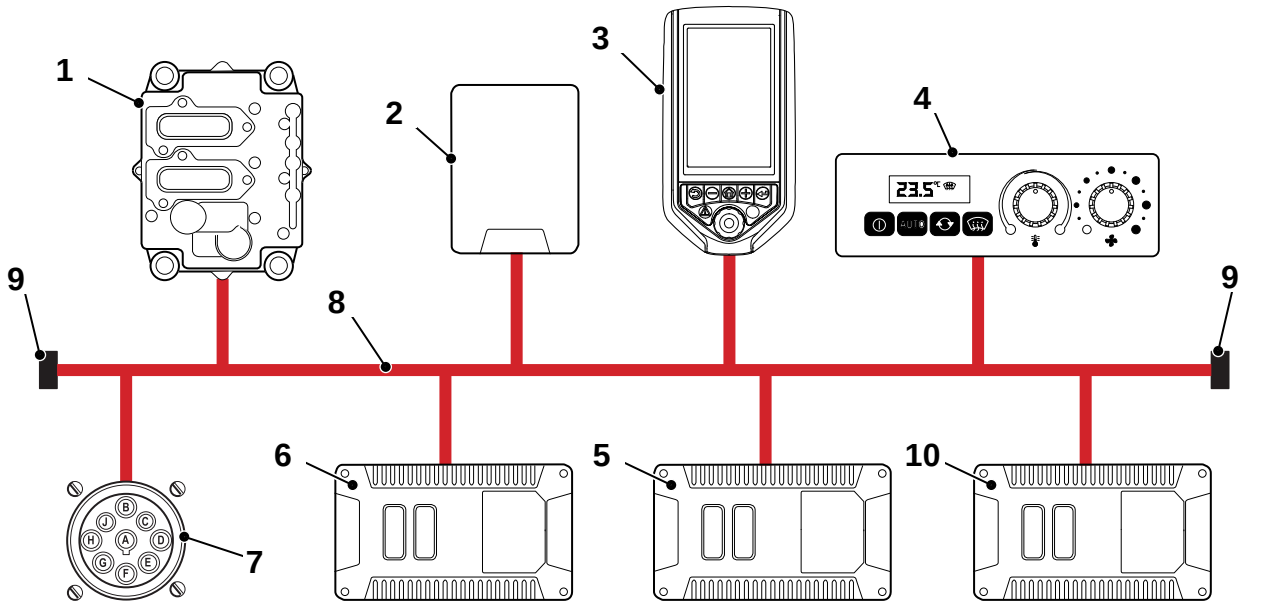


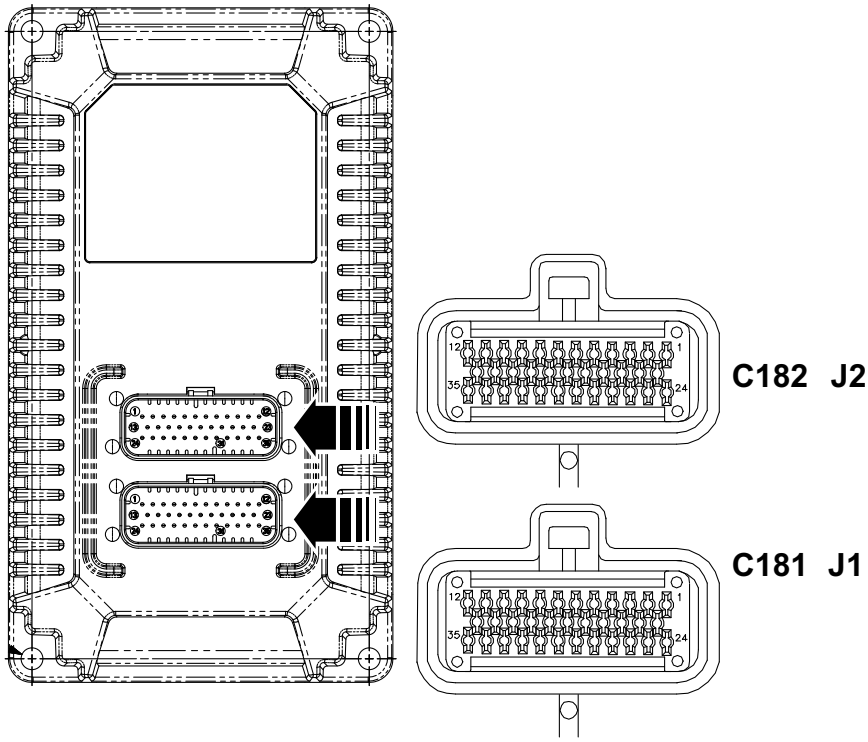
Fig 2. CANbus System

Item	Description	Harness Connectors
1	Engine ECU (bound)(1)	C001
2	Livelink ECU (if fitted) (bound)(1)	C129
3	Display ECU (DECU) (bound)(1)	C109 J1
4	Automatic Temperature Control (ATC) ECU (if fitted)	C071
5	Machine control ECU (MECU)	C015 J1
6	Hydraulic control ECU (HECU) (if fitted)	C153 J1
7	Servicemaster diagnostics connector (cab fuse and relay PCB)	C100 X4
8	CANbus wires	-
9	CAN termination resistor	C200, C002
10	Wheeled control ECU (WECU)	C181

(1) The ECU is "bound" on the CANbus. Refer to "ECU set-up" for information about bound ECU's

⇨ *Fig 3. Circuit (C-123)*

Wires and Connectors



C128270-C2.eps

Fig 11. Harness Connectors C182, C181

Harness Connector C181 - J1 (grey)	
Pins	**Details**
1	Cab fuse and relay box X6
2	Battery (+ 24V)
3	Battery (+ 24V)
4	Battery (+ 24V)
5	Battery (+ 24V)
6	Battery (+ 24V)
7	Not used
8	Input - Revolver aligned
9	Input - RH joystick handle switch - R
10	Input - RH joystick handle switch - F
11	Power signal/wake up - ignition
12	Output - Transmission solenoids
13	Cab fuse and relay box X6 - RH direction indicators
14	Earth - sensors
15	Earth
16	Earth
17	Earth
18	Not used
19	Not used
20	Digital Input - Parking brake switch
21	Digital Input - Parking brake switch
22	Digital Input - Hazard warning lights switch
23	CAN shield
24	Cab fuse and relay box X6 - Fog lights
25	Cab fuse and relay box X6 - Reverse light
26	Output - Transmission solenoid P1
27	Output - Dig end enable
28	Regulated sensor supply (+ 5V)
29	Not used
30	Not used
31	Not used
32	Not used
33	CAN_L
34	CAN_H
35	Output - Axle Oscillation lock solenoid

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Engine Stop

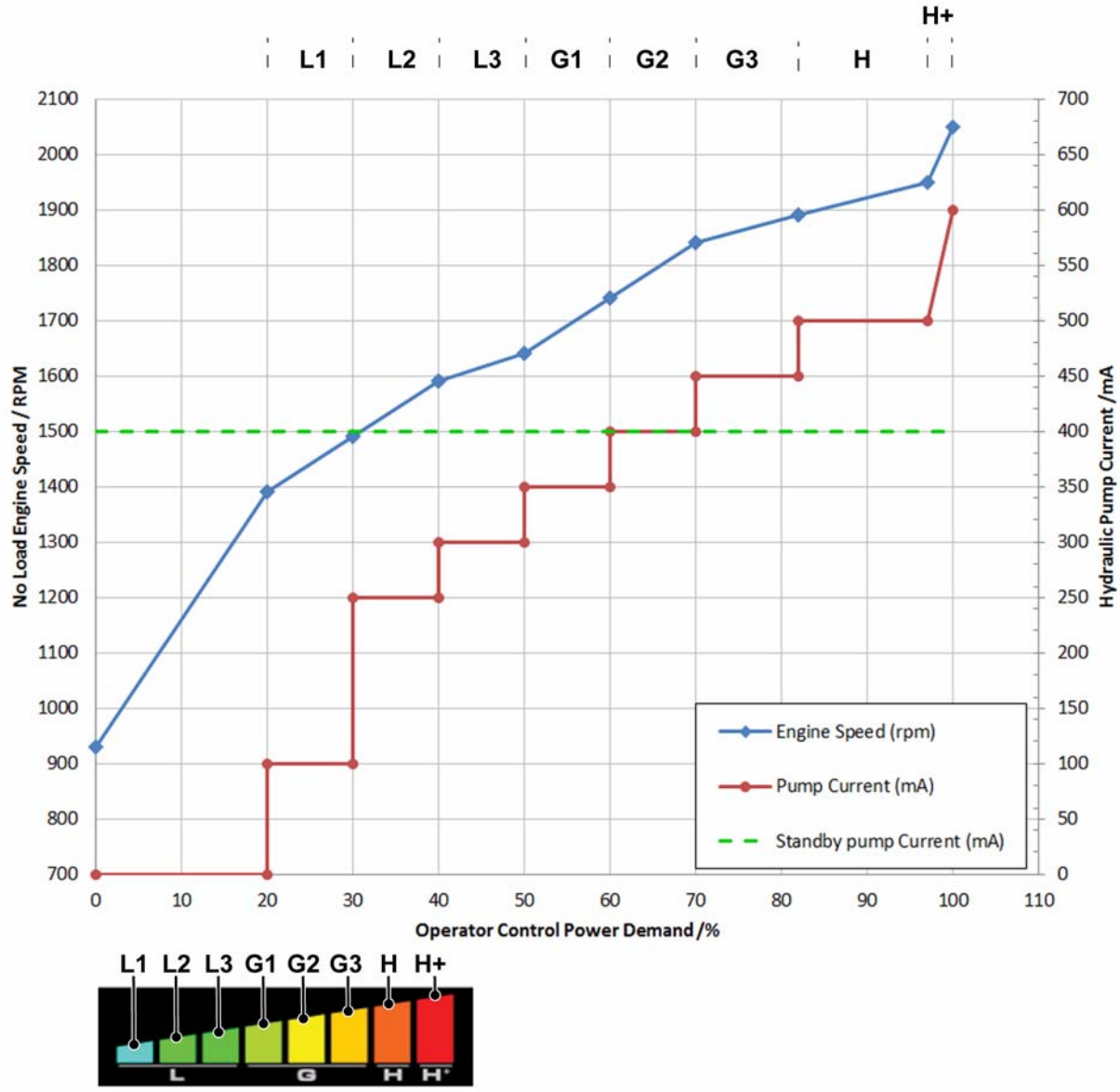
When the ignition switch is set to O (OFF) or the engine stop switch is set to engine STOP, the 24V supply is isolated at pin A of the engine fuse and relay box. The voltage converter relay **A** and ignition relay **E** de-energise.

The 12V input at pin 44 on the engine ECU is switched off. The engine ECU responds by starting the engine shut down sequence.

To complete the engine shut down sequence the engine ECU requires a 12V supply. Although the voltage converter relay **A** de-energises, the voltage converter remains ON via a 24V supply from converter relay **B**.

The engine ECU continues to keep the power hold relay energised for a period of 32 seconds. This allows the engine ECU to complete the engine shut down cycle and reset ready for the next engine start.

After a period of 32 seconds the engine ECU de-energises the power hold relay **D** by turning off its earth connection. The voltage converter relay **B** de-energises and voltage converter switches OFF, isolating the engine fuse and relay box.



C145730-C2

Fig 43. JS200W T2 power band mapping

increases the engine speed in 300 rpm steps at three minute intervals up to the maximum of 1800 rpm.

After three minutes of running at 1800 rpm the engine revs will return to the hand throttle setting.

If during the automatic warm up sequence the required conditions change i.e. engine water temperature reaches 50 ºC or the operator selects an excavator service the MECU will cancel the automatic warm up sequence. If the operator selects the one touch idle function **6** or moves the hand throttle **5** the MECU will cancel the automatic warm up sequence

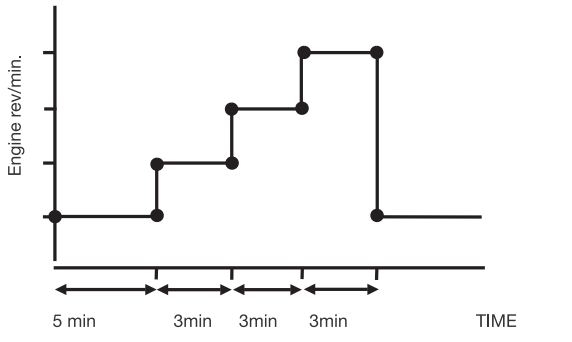


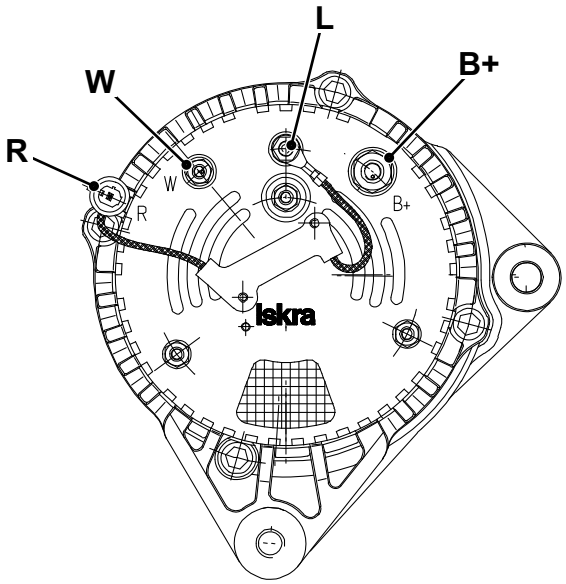
Fig 58. Example of auto warm up cycle if machine is started at idle

Engine Coolant Temperature Switch

The coolant temperature switch is connected to the engine ECU. The coolant temperature status is broadcast on the CANbus by the engine ECU.

For details of the coolant temperature switch refer to the applicable engine documentation.

Wires and Connectors



C128790

Fig 85. Connector Posts (C042)

Alternator Harness Connections	
Pins	**Details**
R	To ignition relay C033 (24V)
L	Alternator output voltage
B+	Battery voltage (24V)

When the starter key is set to position I a 24V supply connects to the alternator at terminal R. The voltage provides a field current to the alternator windings via the voltage regulator.

When the engine is running the output from the trio diode rectifier is fed to regulator which now provides the field current.

Important: *Although the alternator circuit is self sustaining once the engine is running, do not disconnect or isolate the batteries. Disconnection or isolation of the batteries while the engine is running can cause severe damage to the machine electrical systems.*

The regulator changes the field current depending on the load from the machine electrical system.

Power from the alternator is fed into the machine circuits and to charge the batteries via primary fuse B. ⇨ ***Battery Power Supply and Distribution (C-147)***

The L terminal is connected to the MECU (C025) which monitors the voltage output from the alternator (C042). The MECU broadcasts the value of the voltage output on the CANbus. If the voltage is too high or too low the MECU broadcasts a fault code on the CANbus. The charging voltage is displayed on the display monitor in the machine status menu.

⇨ ***Fig 86. Charging Circuit (C-207)***

2 Slow - Creep (momentary press - more than two seconds) - Slow

The selected travel speed mode is indicated on the display monitor **2** as either a hare **5** (Fast), tortoise **4** (Slow), or snail **3** (Creep).

Note: *The last selected travel speed mode is re-instated when the machine is re-started.*

The boost solenoid valve energises when travel is selected to ensure maximum hydraulic pressure is available from the pump.

For details of the travel speed hydraulic operation refer to ***Section E***.

Wires and Connectors

⇨ *Fig 99. Circuit (C-220)*

⇨ *Multi-function Valve Block (C-212)*

– Boost solenoid (C052), Maximum flow cut solenoid (C047), Travel speed solenoid (C048).

⇨ *Pressure Switches and Sensors (C-213)*

– Travel pressure switch (C037).

Table 5. Solenoid Valve Status - Travel Speed Modes

	Boost Solenoid	Max Flow Cut Solenoid (1)	Travel Speed Solenoid	Travel Pilot Valve Solenoid M1	Travel Pilot Valve Solenoid M2
Solenoid Connector	**(C052)**	**(C047)**	**(C048)**	**(C212)**	**(C213)**
ECU	**MECU**	**MECU**	**MECU**	**WECU**	**WECU**
ECU Connector Pin	**J2 - 5**	**J2 - 23**	**J1 - 24**	**J2 - 6**	**J2 - 5**
Creep	Energised	Energised	Energised	Energised	
Slow	Energised			Energised	
Fast	Energised				Energised

(1) The max flow cut solenoid is a proportional solenoid driven by a PWM output from the MECU. The PWM signal is fixed for the required flow rate across the valve.

When the operator uses the controls to select travel, the travel pressure switch (C037) closes. The signal at the MECU connector J2 pin 26 connects to earth. The MECU and WECU respond by energising and de-energising the applicable solenoid control valves. ⇨ *Table 5. Solenoid Valve Status - Travel Speed Modes (C-218)*

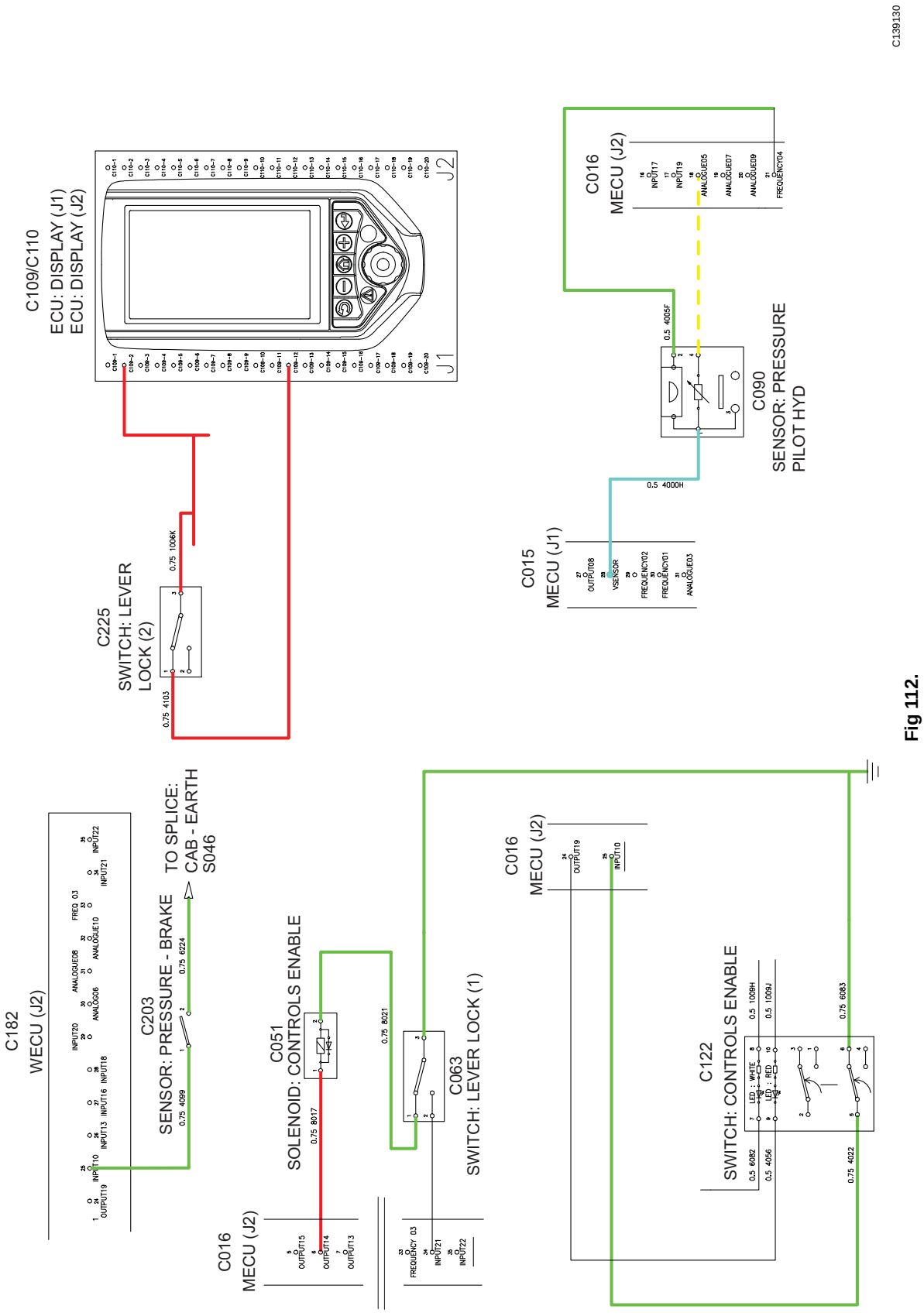
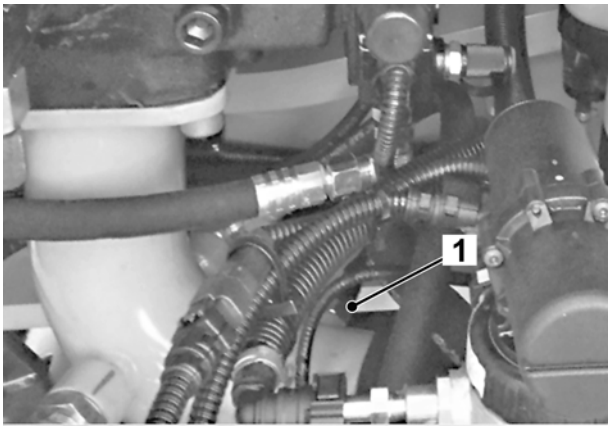

C139130
C109/C110
ECU: DISPLAY (J1)
ECU: DISPLAY (J2)
J1
J2
C225
SWITCH: LEVER
LOCK (2)
0.75 1006K
0.75 4103
C016
MECU (J2)
C090
SENSOR: PRESSURE
PILOT HYD
0.5 4005F
0.5 4000H
C015
MECU (J1)
C182
WECU (J2)
C203
SENSOR: PRESSURE - BRAKE
0.75 6224
0.75 4099
TO SPLICE:
CAB - EARTH
S046
C051
SOLENOID: CONTROLS ENABLE
0.75 8017
0.75 8021
C063
SWITCH: LEVER LOCK (1)
C016
MECU (J2)
C122
SWITCH: CONTROLS ENABLE
0.5 6082
0.5 4056
0.5 1009H
0.5 1009J
0.75 6083
0.75 4022

Fig 112.

Hydraulic Oil Temperature Sensor

Overview

The hydraulic oil temperature sensor **1** is located in the suction pipe assembly below the main hydraulic pump.



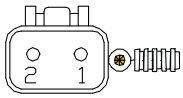
C145760

Fig 125.

Wires and Connectors

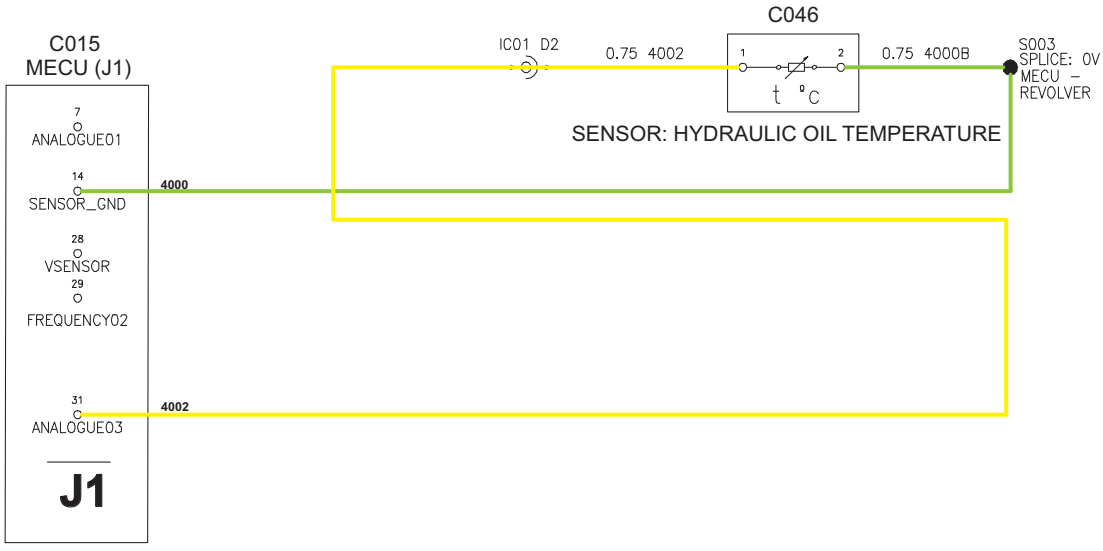
The hydraulic oil temperature sensor (C046) pin 1 supplies a signal to MECU J1 (C015) pin 31. The resistance of the sensor varies according the temperature.

The sensor earths through pin 2 which is connected to the MECU J1 pin 14.



C129450-C2

Fig 126. Harness connector C046



C129390.eps

Fig 127. Circuit

Cab Systems and Lighting

Camera System

Component Location

The typical camera locations are as follows:

– Camera 1 - is fitted to the counterweight to view from the rear of the machine.
– Camera 2 - is fitted to the right hand side of the machine to view the right hand side of the machine.

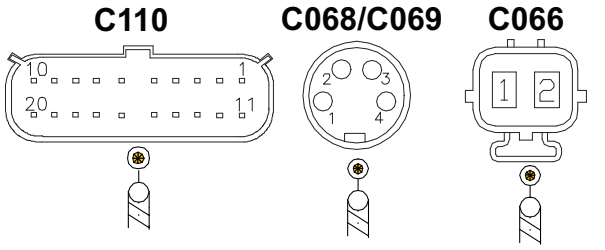


Fig 138. Harness connectors C110, C068, C069 and C066

Overview

If the optional 7” display is fitted then up to two cameras can be fitted and viewed on the DECU LCD.

The cameras can be displayed simultaneously or individually on the DECU.

Wires and Connectors

⇒ Fig 139. Circuit (C-255)

Table 9. C068/C069 Camera Units

Pin	
1	Signal wires to monitor
2	Shield Wire
3	24V supply
4	Ground to cab base earth point

The cameras are connected to a 24V supply from fuse 9 of the main fuse board (C100 X3) to pin 1 of each camera unit.

Pins 4 of the camera units (C068 and C069) are both connected to the cab base earth point (EP07).

The images from the cameras are sent to the DECU (C110 J2) via a coaxial cable.

Pins 1 on the cameras are the signal wires which connect to the DECU at pins 7 and 8. Pins 2 on the cameras are the shield wires which connect to pins 6 and 9 on the DECU.

Important: *Do not dis-connect or connect the harness connectors at the cameras when the ignition is ON.*

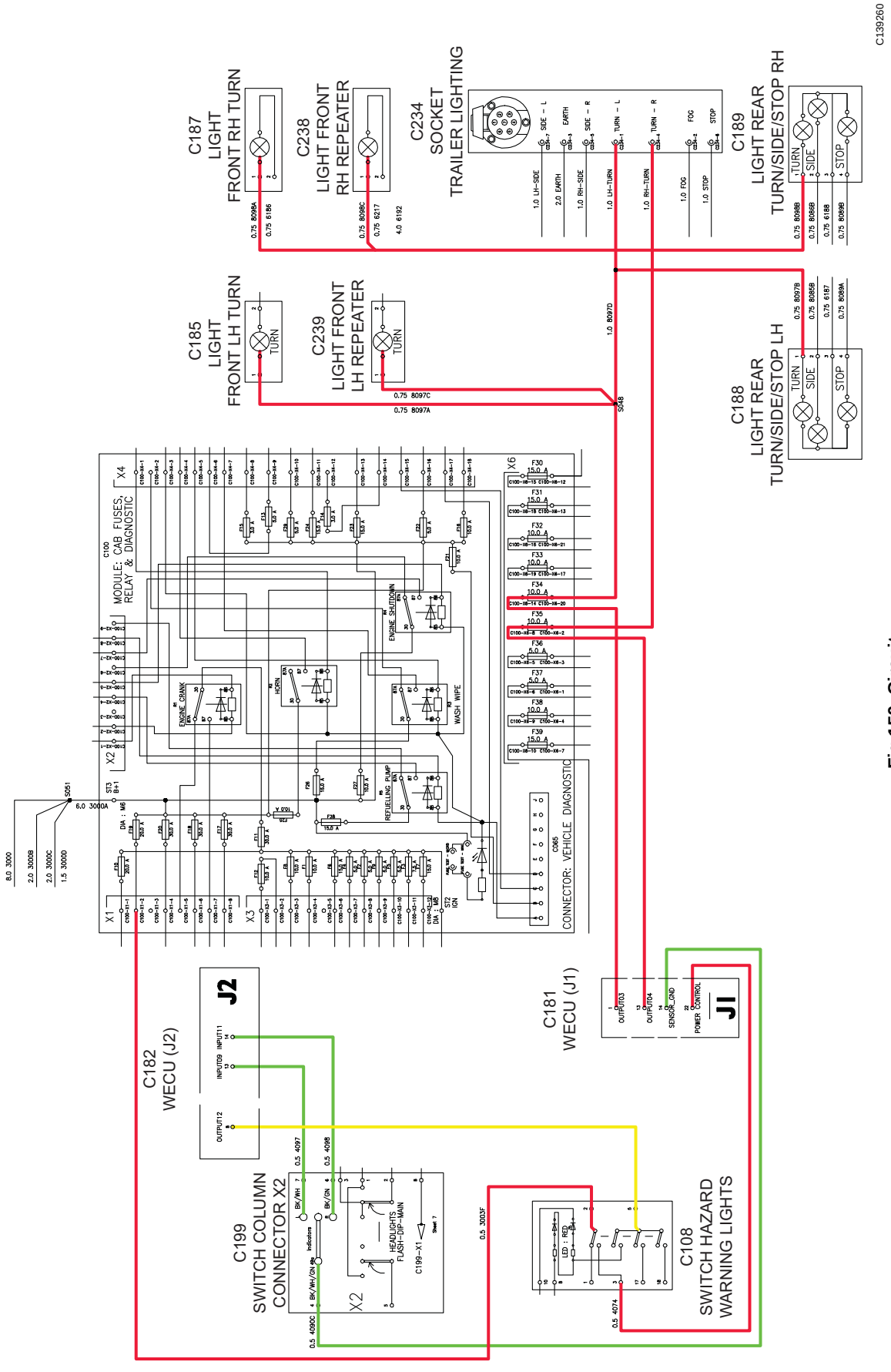


Fig 150. Circuit

HVAC Control

Component Location

Refer to ***Section B - Basic Operation*** for details of the HVAC Components.

Overview

Refer to ***Section B - Basic Operation*** for details of the HVAC controls and operation.

Wires and Connectors

Machines without Air Conditioning

⇨ Fig 162. (C-279)

Fan Speed Switch

The heater fan speed switch (C074)is a four position switch:

- Off Position
- Position L - Low fan speed.
- Position M - Medium fan Speed.
- Position H - High fan speed.

The switch is connected to 24V via fuse F10 in the main fuse board (C100 X1).

When the switch is in position L - the power connects to the blower low terminal at pin 6 of the heater unit (C082).

When the switch is in position M - the power connects to the blower medium terminal at pin 5 of the heater unit.

When the switch is in position H - the power connects to the blower high terminal at pin 4 of the heater unit.

Heater Unit

A 12V ignition supply from pin 5 of the 24 to 12V convertor module (C067) connects to the heater unit at pin 11 (C082). *⇨ 24 to 12 Volt Converter (C-275)*

The heater unit connects to earth via pin 10 to the cab base earth point - internal (EP07)

Temperature Switch

The temperature switch (C076) is a potentiometer which changes resistance according to the position of the switch.

A 12V ignition supply from pin 5 of the 24 to 12V convertor module (C067) connects to the switch at pin 2. *⇨ 24 to 12 Volt Converter (C-275)*

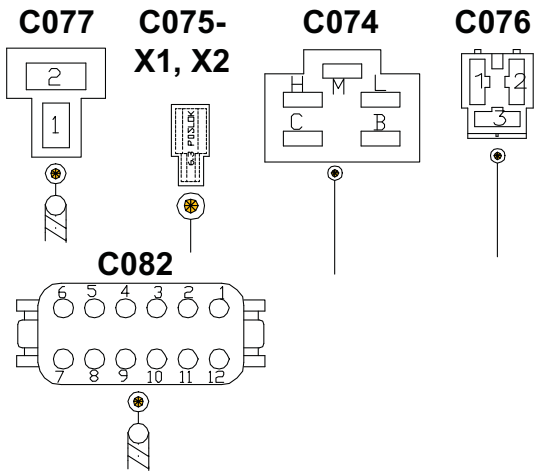
The switch connects to earth via pin 1 to the cab base earth point - internal (EP07).

The switch position signal is sent from the switch at pin 3 to the heater unit (C082) at pin 7.

Re-circulation Switch

The re-circulation switch (C075) pin 1 is connected to 24V via the fan speed switch (C074) pin C when positions L, M or H are selected.

When the switch is closed (set to re circulation), 24V connects to the heater unit (C082) at pin 9.



C129480-C10.eps

Fig 161. Harness connectors C077, C075-X1, C075-X2, C074, C076 and C082

Fault Code Log

The Display Electronic Control Unit (DECU) incorporates a ‘data logging’ feature for recording fault codes.

The log enters the fault code together with the current time and date.

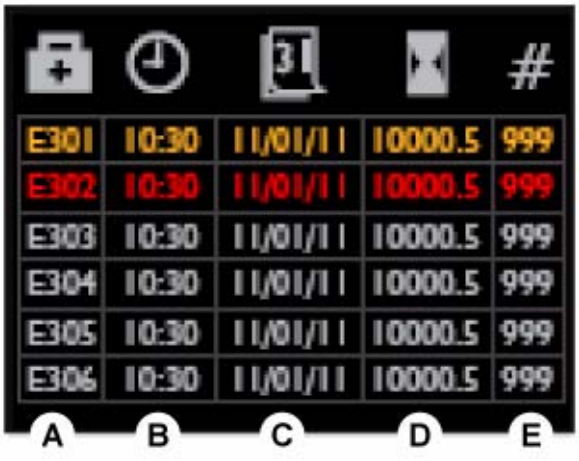
The fault code log can be read on the DECU LCD. Alternatively use the JCB diagnostics tool.

Reading the Fault Code Log with Servicemaster

Error codes logged can be accessed via a suitable laptop computer running the applicable diagnostics software. The computer must be connected to the machine CANbus socket using a data link adaptor (DLA). Once connected all recorded codes can be displayed. The engineer also has a facility to erase the fault code log.

Reading the Fault Code Log on the LCD

1 Operate the rotary wheel to view the fault codes logged in the display monitor ECU.



C127760-C6.jpg

Fig 3. Display fault code log

Key	⇒ *Fig 3. (C-290)*
A	Fault Code
B	Time of Fault Occurrence
C	Date of Fault Occurrence
D	Engine Hours at which Fault Occurred
E	How Many Times Fault Was Recorded.

	
Service History	

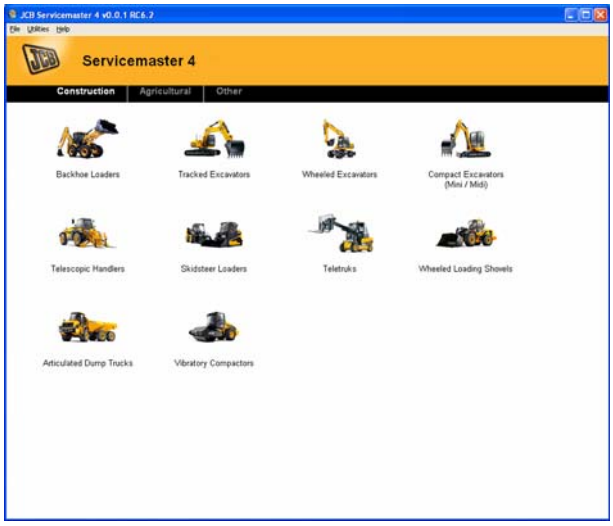
Each tool is specific to the chosen machine range. The tool icons are `shortcuts' to the tool software files. Detailed information about how to use the tools is given in the applicable machine documentation.

Start Servicemaster

1 Double click on the Servicemaster icon. (The icon is found on the desktop or in the `Start' menu - `Programs' - 'JCB'.)

Fig 31.

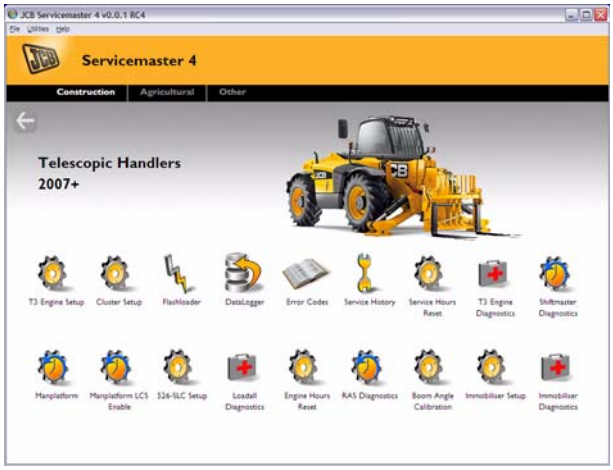
2 The Servicemaster window will open.



T063980

Fig 32.

3 Double click the desired machine group.



T064020-

Fig 33.

Servicemaster Engine Selection

1 Open Servicemaster, refer to ***Servicemaster SYSTEM***.

2 Click on the ‘other’ tab and then click on the applicable engine icon as follows:

For Dieselmax engines click on icon **1**.

For Ecomax engines click on icon **2**.

C139830

Fig 6.

Spring Installation

For arrangement of the centring springs. ⇨ *Fig 3. (D-4)*.

Align the spring slots of sleeve **11** and spool **12**. ⇨ *Fig 4. (D-4)*.

Proceed as follows. Make sure that the extended edges **X** of the springs are downwards.

1 Insert spring a in spring slot of spool **12**. (Raise spool slightly from sleeve **11** for more spring clearance).

2 Insert spring **b**. Make sure the bowed centre sections of both springs are together.

3 Push springs **c** and **d** between the two springs **a** and **b**.Push springs **e** and **f** between springs **b** and **d**.

4 Push spool **12** into sleeve **11** until the springs seat flush with the top and sides of the sleeve.

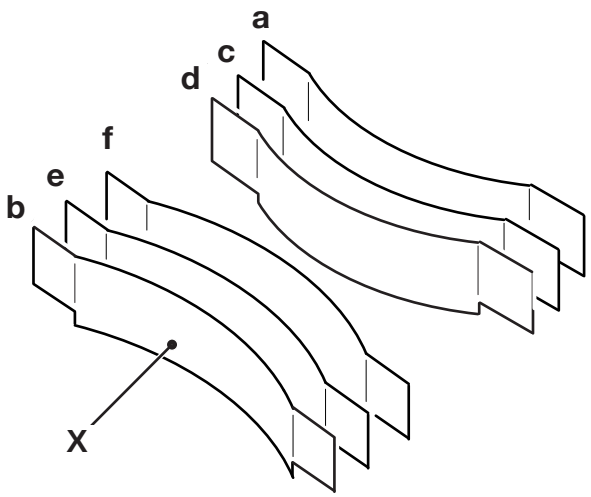


Fig 3.

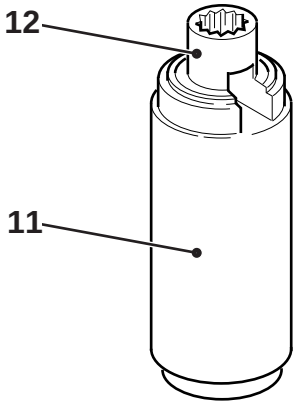


Fig 4.

Relief Valve Operating Pressures		Pressure bar (lb/in²)
TAB	Rod Side	392 (5685)
	Head Side	392 (5685)
Slew Port Relief	Left/Right	279 (4047)
Pilot Relief		37-43 (537-624)
Hammer / auxiliary	Changeover valve	190 (2755)(1)
Hammer / auxiliary flow control	Multi-function valve pilot (80)	19 (275)(1)
Travel flow control	Multi-function valve pilot (70)	15 (217)(1)

(1) Factory setting

Rams

Table 3.

	Bore		Rod Dia		Stroke	
Rams	**mm**	**in**	**mm**	**in**	**mm**	**in**
Boom	125	4.9	85	3.4	1259	49.6
Dipper	130	5.1	95	3.7	1580	62.2
Bucket	120	4.7	80	3.1	1012	39.8
Dozer	110	4.3	60	2.4	530	20.9
TAB	125	4.9	85	3.4	1203	47.4
TAB Pos.	185	7.3	95	3.7	660	26.0
Stab.	120	4.7	65	2.6	476	18.7
Steer	100	4.0	50	2.0	90	3.5
Axle Lock	100	4.0	-	-	155	6.1

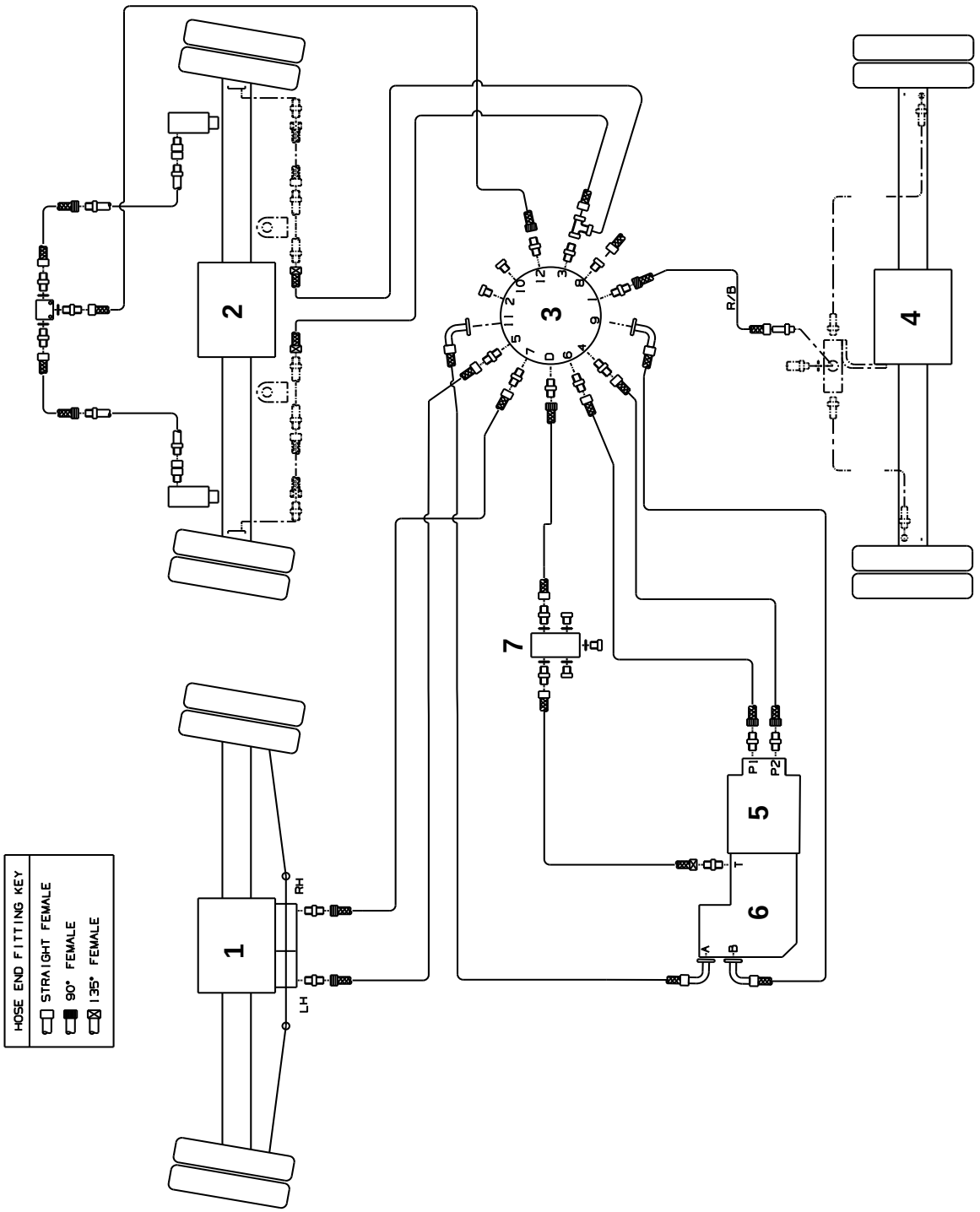


Fig 5. Chassis Hydraulics Schematic 215/14603 - Issue 2

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Boom-down

For schematic. ⇒ *Fig 6. (E-39)*

Oil from the servo pump is supplied to the hand controller **15**. When boom-down is selected oil is fed to the shuttle valve **19**. The valve distributes oil to the HBCV's **44** and the main control valve **34** boom spool.

The boom spool moves allowing main pump pressure to cross the spool, select the compensator, lift the LHCV and supply oil to the service (boom rams **46**).

Load sense pressure is sensed by the pump and is also seen at the excavator pressure sensor **37**.

Returning oil crosses the selected HBCV's and returns to tank via the spool.

Auxiliary Mode

The machine can operate in one of several auxiliary modes. The operator selects the applicable mode using the DECU.

Schematic: ⇨ *Fig 17. (🗋 E-51)*

Oil from the servo pump is supplied to the hammer/ auxiliary pedal controller **16** via the multi-function valve **12**. When the pedal is selected pilot pressure is sent to the ham/aux pressure switch **18**, the multi-function valve and the hammer/auxiliary slice of the main valve block **34**.

When the mode is set to auxiliary mode, the MECU energises the hammer/auxiliary solenoid valve **21**. Oil from the pilot ports in the changeover valve **59** is connected to tank. The spools in the changeover valve move to isolate the direct return to tank (via filter **60**) and the hammer relief valve **59a**.

The HECU de-energises the flow control solenoid in the multi-function valve (10-7). Pilot oil flows to the pressure regulator (80) and the pilot pressure at the auxiliary spool reduces. This reduces the movement of the auxiliary spool. When Super High Flow (SHF) is selected, the HECU energises the flow control solenoid and the auxiliary spool selects fully.

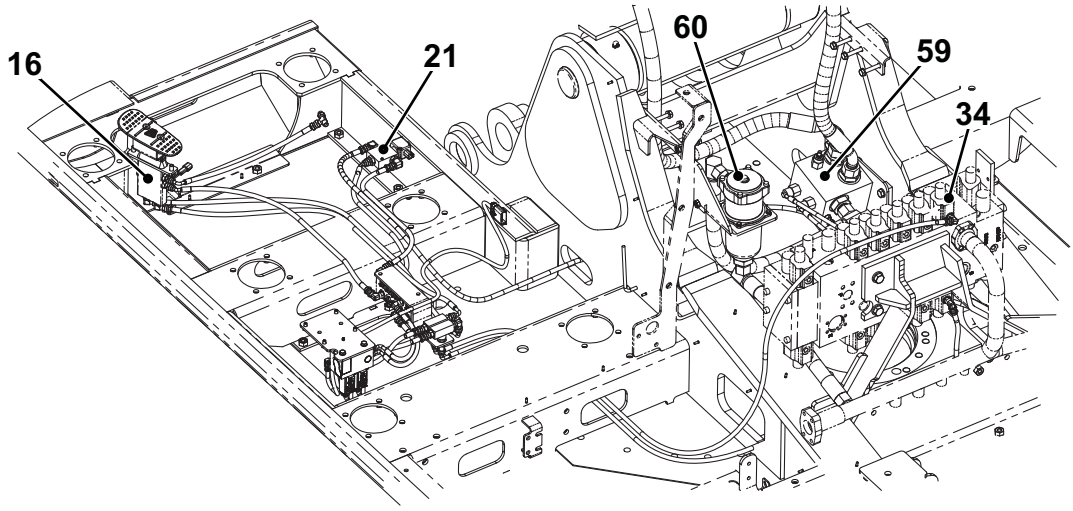
The pilot pressure from the pedal controller moves the auxiliary spool to the right allowing main pump pressure to cross the spool, select the compensator, lift the LHCV and supply oil to the auxiliary service via the coupling **61**.

Load sense pressure is sensed by the pump and is also seen at the excavator pressure sensor.

Oil returns to tank via the coupling **62** and the auxiliary spool.

When the controls are set to operate the auxiliary circuit as a double acting circuit, the foot pedal sends pilot oil to the opposite end of the auxiliary spool. The direction of the oil flow in the auxiliary circuit reverses.

Note: *The auxiliary flow can be adjusted by re-setting the the regulator valve (80) located in the multi-function valve **12**.*



C145850-C2

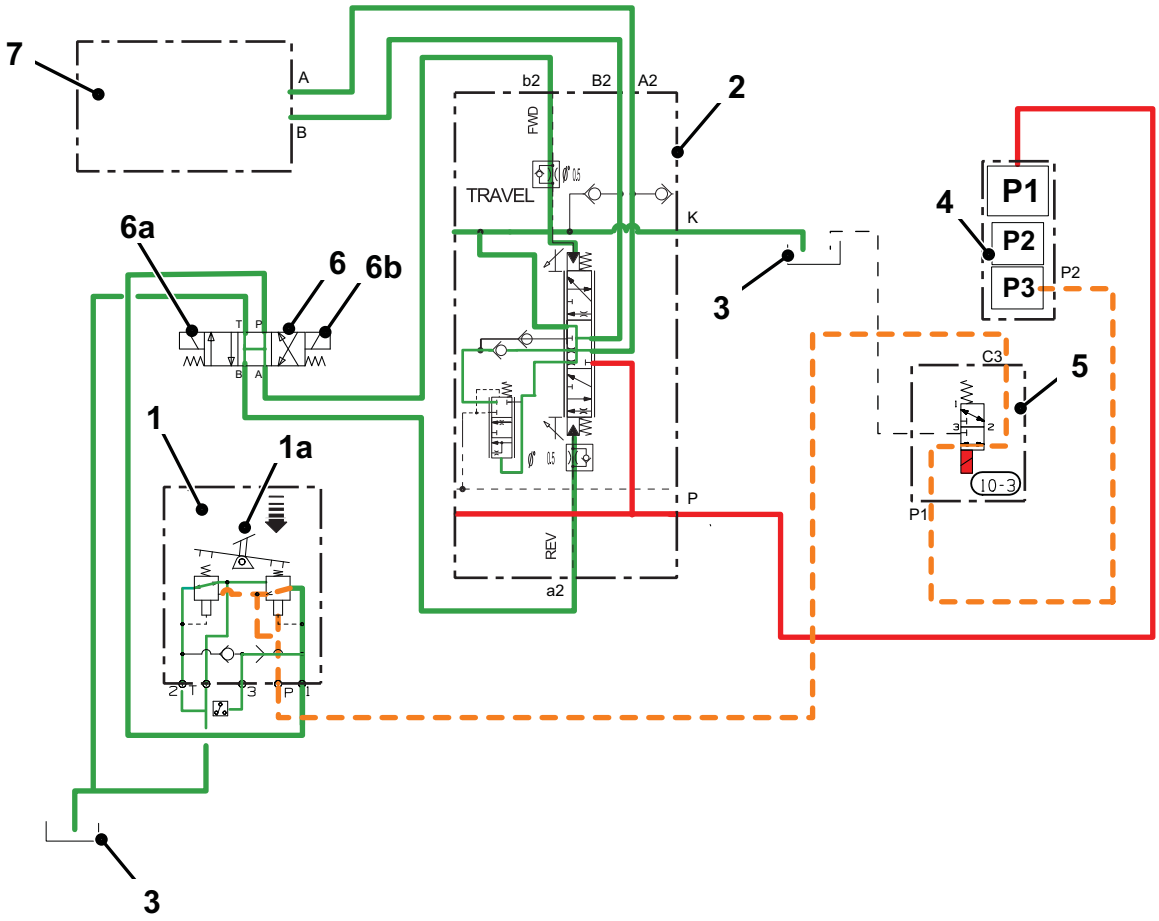
Fig 16.

Neutral

When the operator selects Neutral (N) with the joystick FNR switch, forward solenoid **6a** and reverse solenoid **6b** of the direction control valve **6** de-energise. The valve spool moves to the neutral position.

Oil at both the forward and reverse pilot ports of the travel spool in the main control valve **2** are connected to tank. The travel spool moves to its neutral position. There is no oil flow to the transmission drive motor **7**.

If the operator presses the toe end of the travel pedal **1a** oil at pilot pressure flows to tank **3**.



C140690-C4

Fig 27. Transmission in Neutral (Joystick FNR)

Hydraulic Components

Specifications

Table 1. Cab Lift Valve

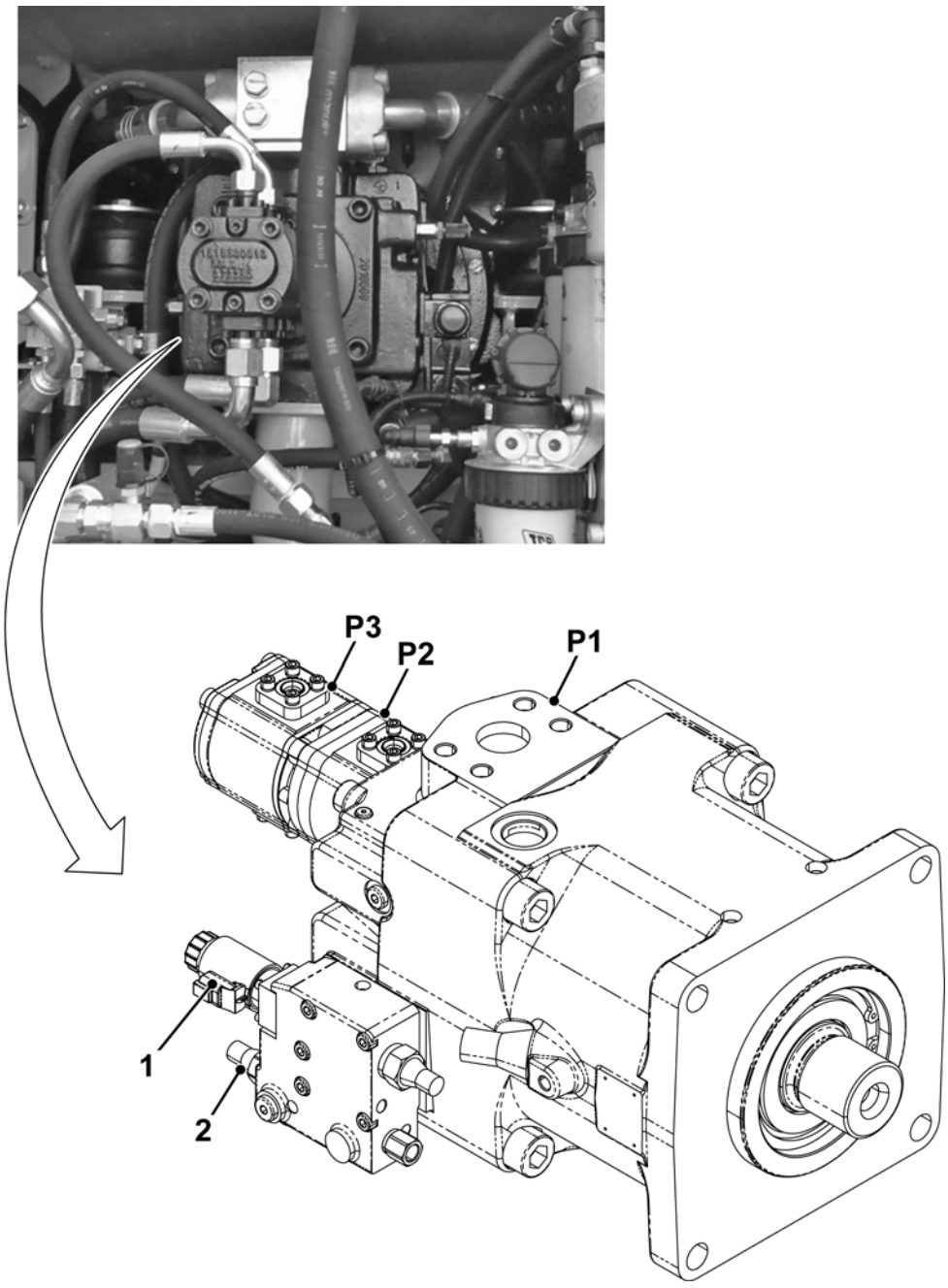
Pressure Relief Valves (CT1 and CT2)	
Crack Pressure	192 bar (2784 lbf/in^2)
Reseat Pressure	175 bar (2538 lbf/in^2)

Table 2. Calculated Flow Rates

Total Flow (L/min)	Time To Raise Cab (Seconds)
15	32
30	16
45	10

Component Location

Key	⇨ *Fig 39. (E-75)*
A	Cab Lift Rams
B	Solenoid Valve
D	Cab Lift Valve
E	Lock Valve



C145660

Fig 1.

6 Remove 2 plugs and remove 2 swivel cradle joint pins.

7 Remove driveshaft seal ⇨ ***Driveshaft Seal (E-93)***.

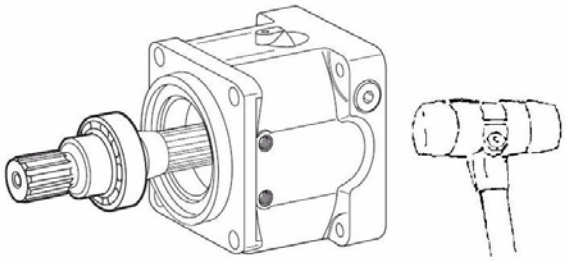


Fig 18.

8 Carefully remove driveshaft and bearing assembly.

9 Noting fitted position, carefully remove swivel cradle complete with bearings.

10 Remove bearing shells from pump housing.

Assembly

Note: *Lightly lubricate all running surfaces with clean hydraulic oil prior to assembly.*

1 Clean and inspect all components and component mating faces ⇨ ***Inspection (E-102)***.

2 Inspect all threads for cleanliness and damage.

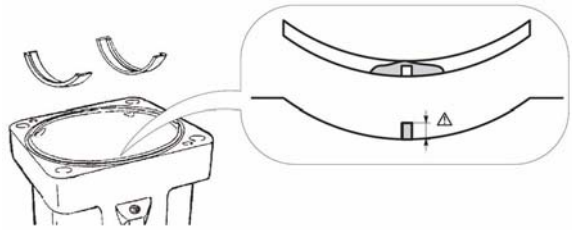


Fig 19.

3 Install new bearing shells.

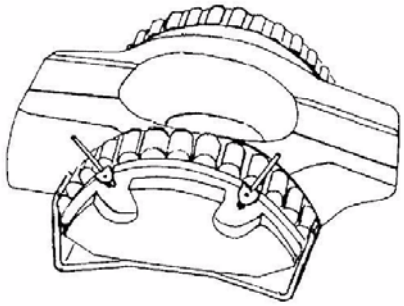


Fig 20.

4 Install clamps on bearings.

5 Carefully install swivel cradle complete with bearings into pump housing using wire guide on swivel cradle.

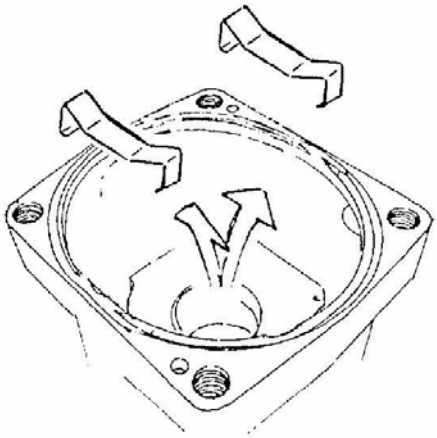


Fig 21.

6 Check that the bearings are seated correctly and remove clamps.

Dismantling and Assembly

Dismantling

Note: *All parts are precision made and require the utmost care when being handled.*

Note: *During dismantling, do not use excessive force to separate components which could cause scratches or burrs on bearing surfaces. Failure to observe this instruction will cause oil leaks leading to poor performance.*

Note: *Label all parts during dismantling, to ensure correct assembly.*

Note: *Storing the valve when dismantled could cause rusting of parts. Ensure they are suitably protected by anti-rust treatment.*

Note: *Refer to the illustration for part number identification* ***⇒ Fig 4. (E-112)***.

1 Push down upper section of gaiter **19** and remove roll pin **20**.

2 Remove control handle from mounting knuckle **3**.

Note: *Take care when removing handle to avoid damage to wiring loom and switches. These should be removed by separating the line connectors in the control handle and below the valve body.*

3 Remove gaiter **19** from valve housing.

4 Slacken locknut **22** and remove mounting knuckle **23**.

5 Slacken and remove joint nut **24** and rocker plate **25**.

⚠ 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

Note: *The return spring **15**, retaining plate **18** and plunger **11** will rise when knuckle joint **26** is loosened.*

6 Using a jig, slacken and unscrew knuckle joint **26**, releasing retaining plate **18**.

Note: *Ensure retaining plate moves freely to prevent sudden release due to spring pressure beneath.*

7 Clean the valve exterior using approved solvent and using soft metal pads for protection, clamp the valve body into a vice.

8 If the return springs **15** are weak, the sliding resistance of the seal **9** will cause the guides **8** to stick in the casing. Using a screw driver, carefully ease out the guides **8** and plungers **11**.

Note: *Care must be taken to prevent damage to the guides when removing. Ensure the guides do not fly out due to the force of the return springs.*

9 Remove spring seats**13**, split washers **12**, return springs **15**, pressure control springs **14** and spools **17**.

Note: *Identify each set of parts and their locations for assembly.*

10 Loosen the two hex bolts **27** on the base of the valve. Remove the base plate and `O'-ring **30** from the valve casing.

11 Slacken and remove body assembly screw **6**. Remove and discard `O'-ring **7**.

12 Separate upper and lower body sections **1** and **2** and remove dowel pins **5**.

13 Remove and discard `O'-rings **3** and **4**.

Note: *The surface of spool **17** and spring **13** can be damaged by mis-handling. Take care not to damage the surface of the spool during removal and do not push the spring seat down more than 6mm (0.24 in).*

14 Hold spools **17** firmly on the work bench and depress spring seat **13** and remove split washers **12**.

Note: *Avoid scratching the surface of the spools. Do not depress the spring seats more than 6 mm (0.24 in).*

15 Separate spools **17**, spring seats **13**, springs **14** and **15** and shims **16**.

16 Remove plungers **11** from guides**8**.

Removal and Replacement

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

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

Removal

1 Make the machine safe, refer to ***Service Procedures, Section E***.

2 Disconnect all the electrical connections to the solenoids **B**, labelling which connector goes to which solenoid. ⇨ ***Fig 3. (E-123)***.

3 Disconnect all hydraulic pilot hoses from the valve and plug all orifices to prevent ingress of dirt. The hoses should be labelled, if not label each hose before disconnecting, this will ensure correct position when refitting.

4 Remove the four M8 bolts from rear of valve and remove valve from machine.

Replacement

Replacement is a reversal of the removal sequence.

Note: *All hydraulic adapters that are installed together with a bonded sealing washer must also have JCB Threadseal applied to the threads of the adapter.*

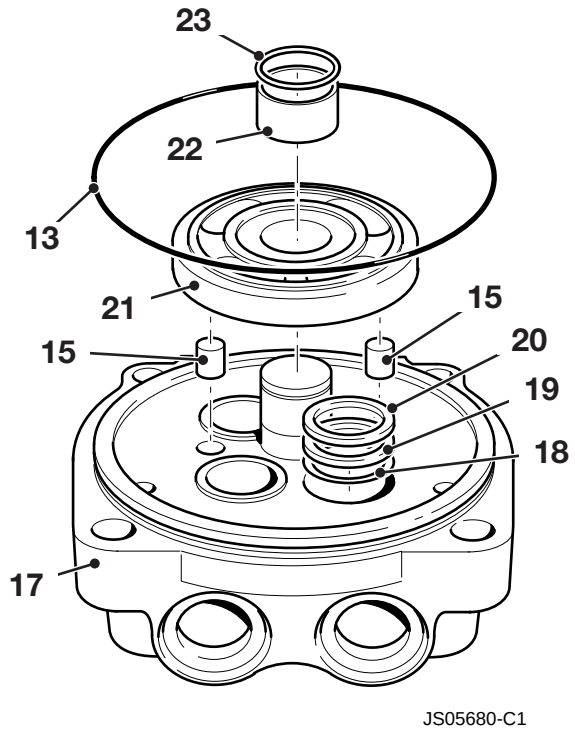


Fig 8.

13 Remove the springs **14** from brake piston **12**.

Note: *Keep the springs in the order in which they are to be reinserted.*

14 It may be difficult to remove brake piston **12** from housing **25** due to resistance caused by `O'-rings **11** and **13**. Therefore remove brake piston 12 using the tapped M6 holes **X** as shown in the illustration.

15 Remove `O'-ring **11** from housing **25** and `O'-ring **13** from brake piston **12**.

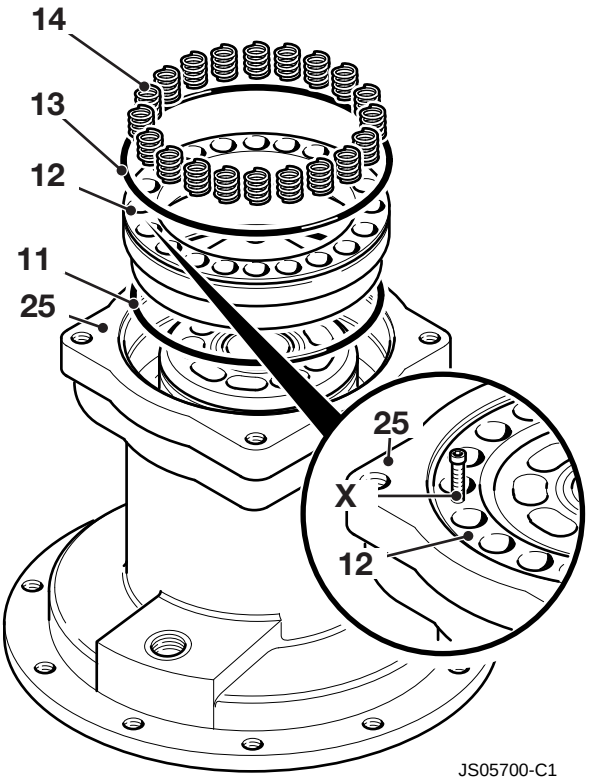


Fig 9.

16 Remove friction plate **9** and mating plate **10**.

17 Hold the end of cylinder **24** by hand and pull out the cylinder assembly from housing **25**.

Note: *The oil seal **2** and the outer ring of taper roller bearing **3** remain in the housing.*

The end face of the cylinder should be protected by clean cloth to prevent it from being damaged.

Make alignment marks or write numbers on the piston bores and the piston assemblies so that the piston assemblies can be replaced in the same bores during reassembly.

18 Remove the outer ring of taper roller bearing **3** from the housing.

Assembly

1 Press fit seat **44** into sleeve **39** which has an 'O'-ring **41**.

2 Mount poppet **43**, spring **42**, shim **40**, piston **38**, liner **51** onto sleeve **39**.

3 Screw cap 37 (with a 14 mm A/F hexagonal socket) with 'O'-ring **36** and back-up **35** mounted, on to sleeve **39** and tighten to a torque of 157 Nm (116 lbf ft).

Check the relief set pressure.

The correlation between the set pressure of the relief valve and the adjusting shims is shown below. However, adjustment must not be attempted if the pressure cannot be checked.

A 0.1 mm (0.003 in) shim equals 5 kgf/cm^2 (71 lbf/in^2) approximately.

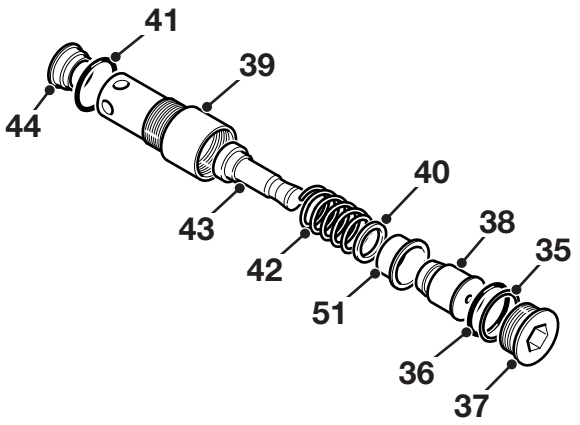


Fig 33.

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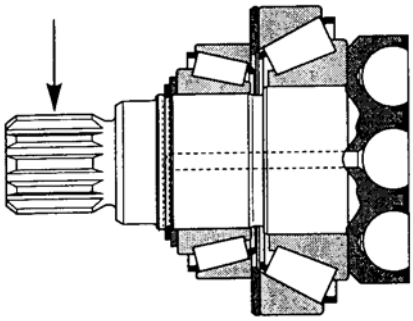

Fig 28.

27 Check that the pistons have no scoring or pitting.

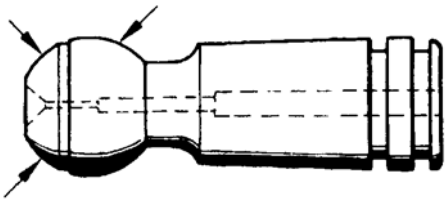

Fig 29.

28 Check that the centre pins have no scoring or pitting.

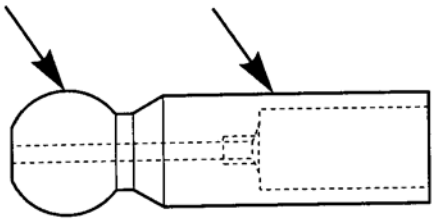

Fig 30.

29 Check that the retaining plate has no scoring or evidence of wear.

Fig 31.

30 Cylinder block/ control lens.

a Check that the bores 1 are free from scoring and have no evidence of wear

b Check that the faces 2 are smooth and even and are free from cracks and scoring.

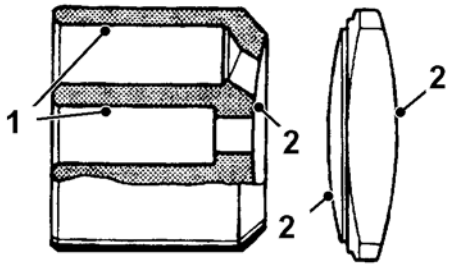

Fig 32.

31 Inspect the control housing, make sure the sliding surface and side guides are free from scoring and show no signs of wear.

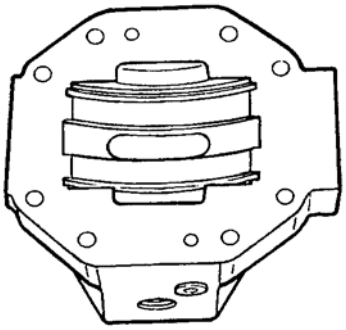

Fig 33.

32 Visually check that the bearing areas are free from scoring and show no evidence of wear.

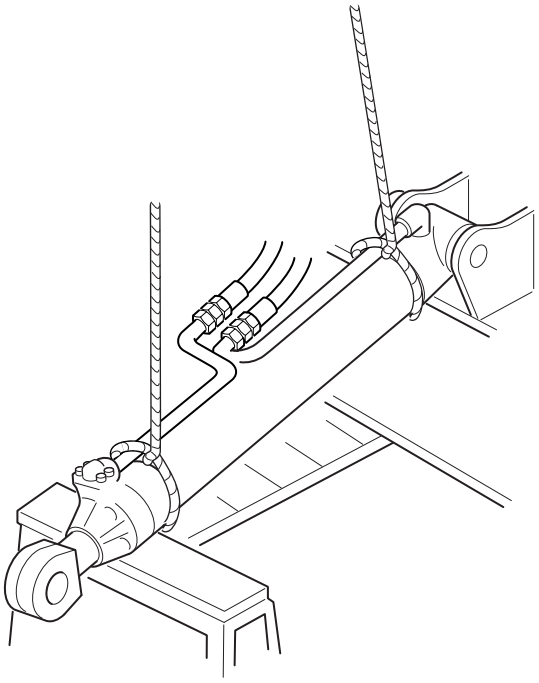

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Fig 18.

5 Restrain the eye end of the piston rod to the ram cylinder, to prevent movement of the rod.

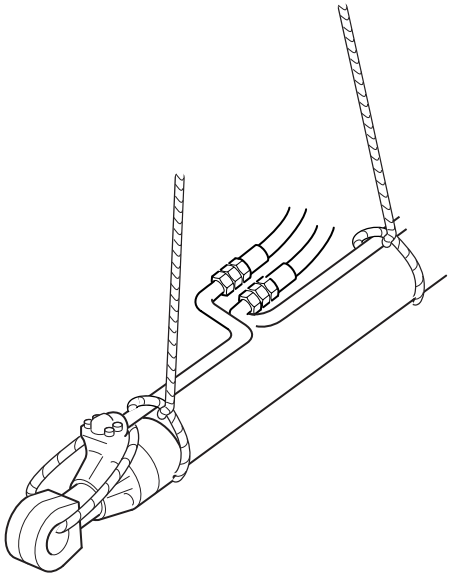

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Fig 19.

6 Press rubber boot **A** to release the tank pressure.

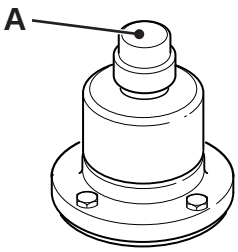

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Fig 20.

7 Remove the hoses, and install plugs or caps to prevent contamination.

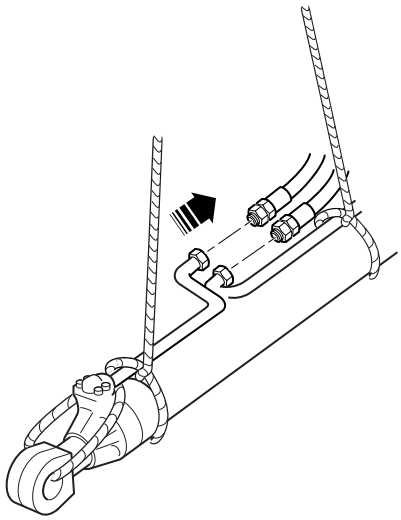

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Fig 21.

8 Remove the nut and bolt and push out the pin with a hammer and bar.

⚠ WARNING

Metal Splinters

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

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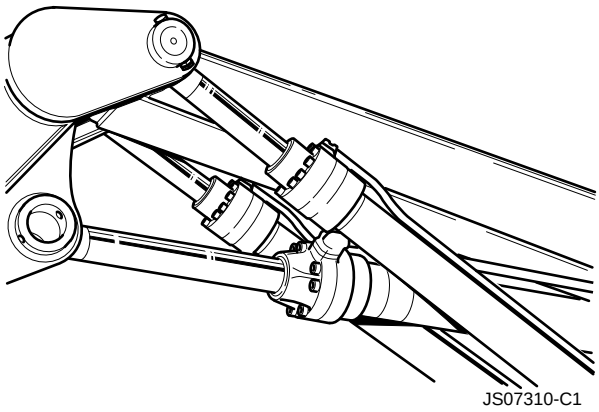


Fig 58.

5 Install the pivot pin and retaining bolt and nuts.

⚠ WARNING

Metal Splinters

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

INT-3-1-3_2

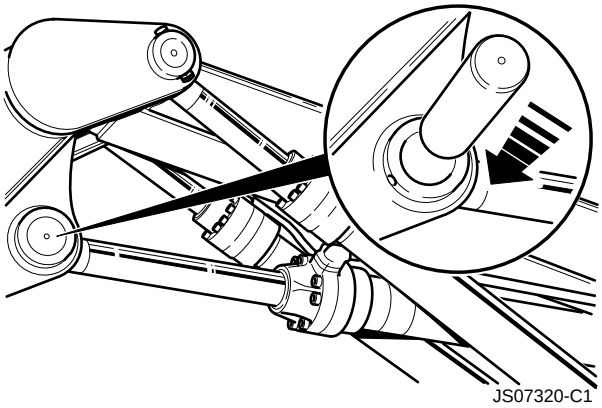


Fig 59.

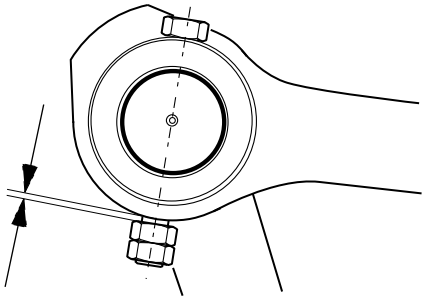
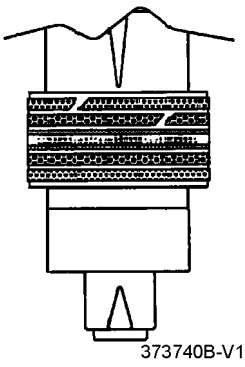


Fig 60.

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

6 Once the installation is complete, start the engine and raise the boom fully. Under no load conditions, expel any trapped air by operating the ram to full stroke in both directions several times. Check for oil leaks.



373740b-V1

Fig 98.

3 Put the piston rod pack into the cylinder tube. Make sure that the piston guiding ring does not get jammed during assembly.

Clean hydraulic oil will help, but do not use a brush as hairs may come off.

When running the piston rod in, turn the cylinder head into the right position. Finish doing this before the cylinder head O-ring has reached the cylinder tube ⇨ *Fig 99. (E-206)*. Do not use assembly grease.

Fasten the cover.

Fasten cylinder head screws and torque tighten to stated torque valve. ⇨ *Table 4. (E-206)*

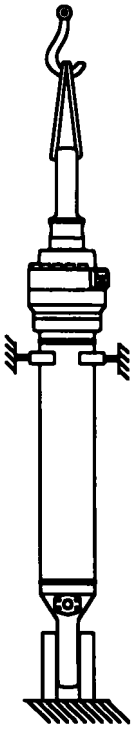


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Fig 99.

4 Tighten in order according to ⇨ *Fig 100. (E-206)*.

Note: *Be careful not to damage the piston rod!*

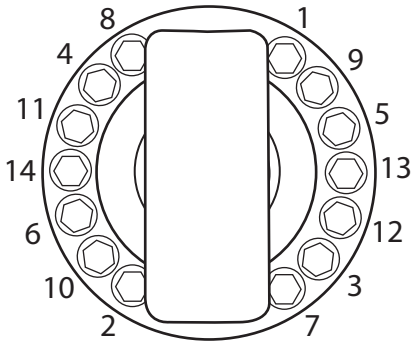

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Fig 100.

Table 4.

Ram	Gland Housing(1)
Boom	383~412 Nm (282~304 lbf ft) (39~42 kgf.m)
Bucket	383~412 Nm (282~304 lbf ft) (39~42 kgf.m)
Dipper	628~687 Nm (463~507 lbf ft) (64~70 kgf.m)

(1) Apply Loctite #242 on the threaded portion.

Slew Motor Pressure Relief

1 Prepare the machine:

a Operate the dipper out and lower the boom to set the bucket on the ground.

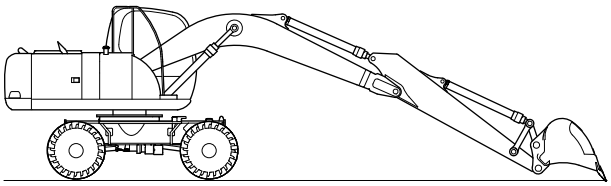

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Fig 8.

b Make the machine safe, refer to ***Section E, Service Procedures.***

2 Connect a 0-400 bar (0 - 6000 lb/in^2) pressure gauge and adaptor to test point **TP1**. ⇒ ***Fig 1. (E-211)***.

3 Initiate slew lock procedures.

a Disconnect the electrical connector from the slew brake solenoid valve (10-10) located on the multi-function valve block. Refer to ***Multi-function Valve Block*** in this section.

Note: *If the electrical connector at the slew brake solenoid valve is not disconnected full slew pressure cannot be read.*

4 Press the slew lock switch on the right hand console inside the cab, and confirm that the slew lock symbol appears on the monitor.

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Wait 5 seconds for the brake to be applied.

5 Start the engine, lower the gate lock lever (error codes may appear for disconnected solenoid) and operate the engine at around 1000 rpm, then operate the slew lever slowly. Listen to confirm that the relief sound is heard and that the machine does not slew.

6 Run the engine at maximum no-load speed and in the H power band.

7 Operate the slew lever in both directions and note the pressure gauge reading for each direction.

8 The pressure gauge readings should be compared to the technical data at the start of this section. If one or more reading is outside the limits adjust the applicable slew motor relief valve as follows:

a Stop engine, remove relief valve to be adjusted.

b The difference between the set pressure and the present pressure determines the number of shims **E** required for adjustment. ⇒ ***Fig 9. (E-218)***.

c Place the relief valve in a vice and remove the cap **A** with a 14 mm hexagonal socket, take out the piston **C**, liner **B** poppet **E**, spacer **D**, shims **E** and spring **F**.

d Add shim to increase pressure. Remove shim to decrease pressure.

e Re-assemble relief valve assembly.

f Fix the sleeve into a vice and install the cap **A** with a torque of 156.9 Nm (115.17 lbft).

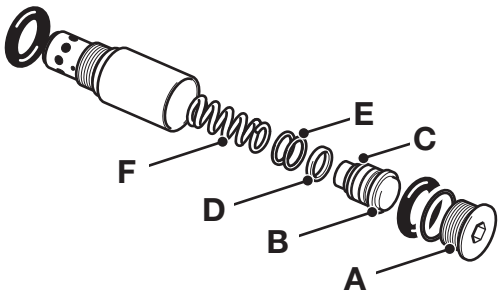

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Fig 9.

g Install the relief assembly in the slew motor unit, and confirm the pressure.

h If it is not within the setting pressure, repeat the procedure.

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Item	Symptoms	Related Parts	Trouble	Treatment
1	Piston rod sliding part oil leakage	Back up ring	The protrusion of the heel of the packing is excessive.	As a rule, replace the rod packing at the same time. (It is desirable to replace parts which are attached to the buffer ring at the same time). It is possible that abnormal high pressure is the cause. Check the same as above (heel of packing protruding).
		Wiper ring	Foreign matter is biting into the lip. The lip is damaged.	Remove the foreign matter.
			There are also other abnormal damage.	Replace.
		Bushing	Wear is large and the clearance with piston rod exceeds the *maximum permissible value. (*Refer to maintenance standards for maximum permissible value.)	Replace.
			Large scratch on the sliding part.	Replace. Also inspect the piston rod.
		Cylinder head	Scratches, rust on the seal attachment parts.	Remove scratch, rust with oil stone. If it cannot be repaired, replace the cylinder head.
2	Oil leakage from cylinder head joint	O-ring	Foreign matter biting on inner and outer diameter.	Remove foreign matter Replace 'O'-ring if damaged. Inspect inside tube: if any scratches or rust, make surface smooth with oil stone Inspect cylinder head 'O'-ring groove: if any scratches or rust, make surface smooth with oil stone. Inspect back up ring: if any deformation or protrusion, replace. Confirm the above and replace 'O'-ring.
			O-ring damaged.	
		Back up ring	Deformation, protrusion	Replace with 'O'-ring.
		Cylinder head	Looseness	Disassemble cylinder head and inspect 'O'-ring and back up ring. Check tube and cylinder head thread for damage. If any damage, replace. After inspection, tighten to specified torque.
		Bolt	Looseness, stretching, broken	Replace all bolts and tighten to specified torque.
		Cylinder tube	Abnormal bulge	Replace with new parts. Oil leakage from connecting parts may be caused by abnormal pressure (including cushion pressure). Inspect the tube for bulges, deformation and check the circuit pressure.

Note: *Always stop the engine when installing or removing the dial gauge or reading the dial gauge.*

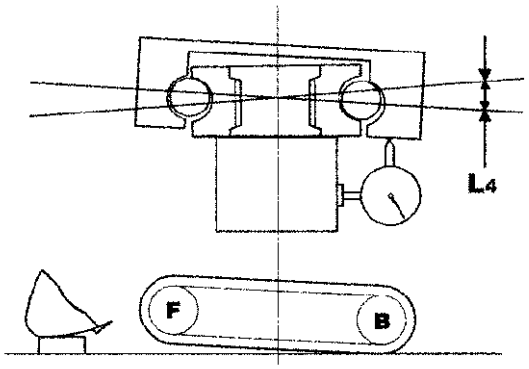


Fig 11.

5 Next, place the dial gauge on the rear of the vehicle and repeat the two above procedures to obtain L2 and L4.

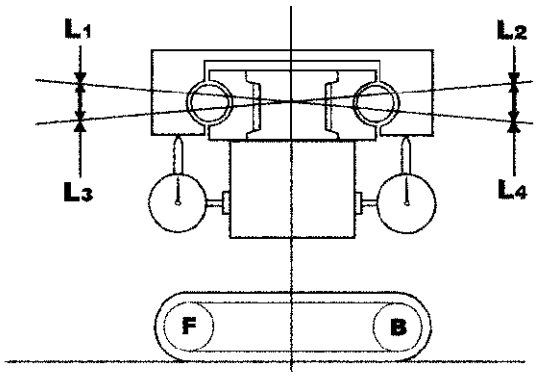


Fig 12.

6 The average lateral movement is shown ⇨ ***Table 14.*** ***(E-254)*** as the result of the equation:

$$\frac{L1+L2+L3+L4}{2}$$

Table 14.

New Machine	Limit of Use
1.2 mm (0.05 in)	3.6 mm (0.15 in)

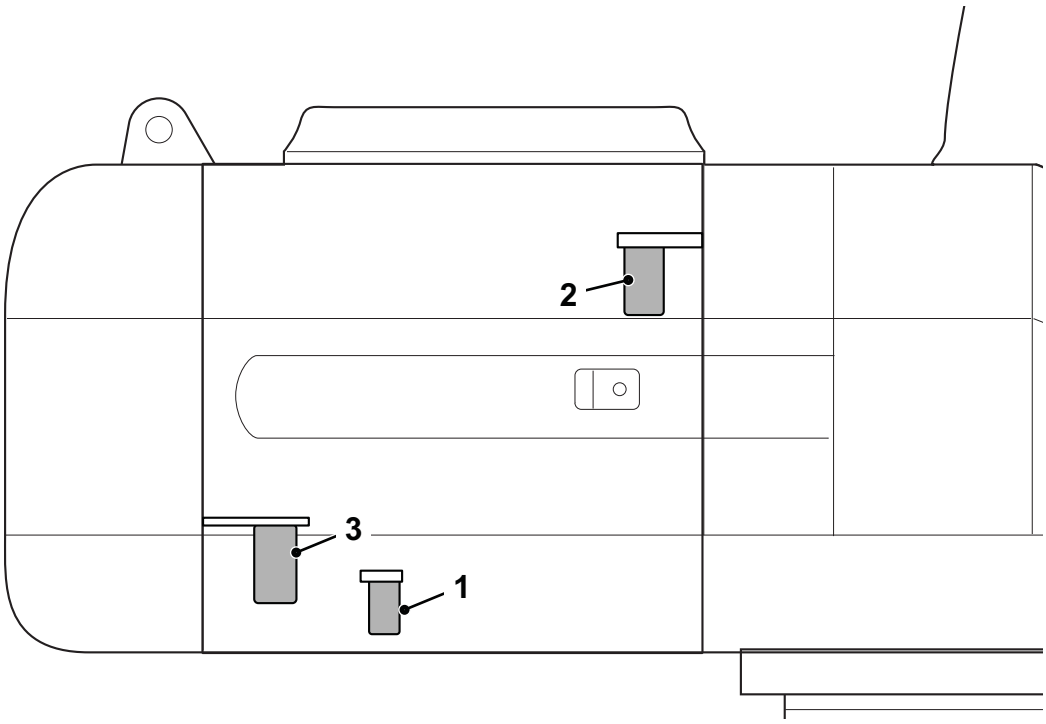
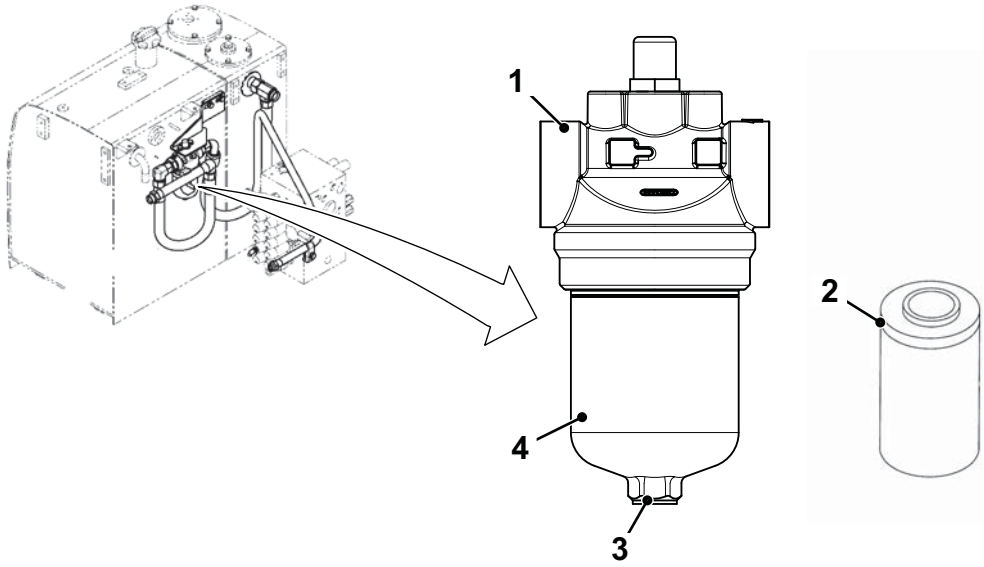


Fig 3. JS200W

Item	Description
1	Servo filter element - JS200W
2	In line drain filter - JS200W
3	Steering line filter - JS200W

Breaker In-Line Filter Element

Replace, JS115 - JS190, JS145W - JS175W



C130310-C1

Fig 15.

1 Prepare the machine. Refer to ***Section 2, Maintenance, Maintenance Positions***.

2 Release tank pressure. Refer to ***Section 2, Maintenance, Hydraulic System***.

3 Get access to breaker in-line filter assembly. ⇨ *Service Points (E-264)*

4 Dismantle the filter as follows:

a Using a wrench on hexagon **3**, unscrew the filter case **4** from the filter head **1**. Take care not to spill the hydraulic oil it contains.

b Remove and discard the filter element **2** and O-ring.

5 Empty the hydraulic oil from the filter case. Clean the filter case and the underside of the filter head.

6 Fit new filter components as follows:

a Coat the new O-ring with hydraulic oil and locate in the filter head **1**.

b Coat the seal area of the new filter element and install it in the filter case.

c Screw the filter case to the head and torque tighten with the wrench.

Table 5. Torque Settings

Item	Nm	kgf m	lbf ft
4	50 to 55	5.0 to 5.6	37 to 40

Note: *When refitting the filter case, it is important that the filter case is tightened carefully to avoid damaging the threads in the filter head.*

7 Start the engine, operate the breaker and then check the hydraulic oil level. Refer to ***Section 2, Maintenance, Hydraulic System***.

Contents **Page No.**

Fig 38.

8 Remove both bearings outer rings from the swivel bearing holes.

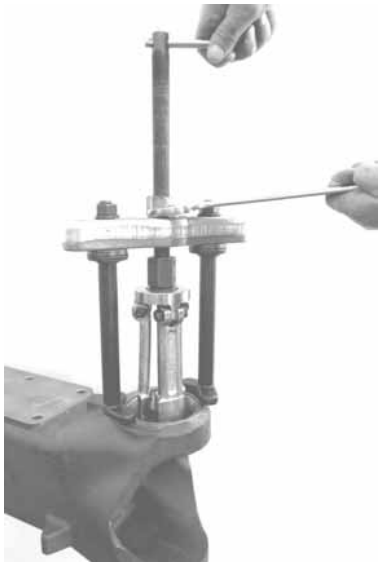


Fig 39.

Differential Input

1 Secure the axle housing with suitable lifting equipment. Undo the securing fasteners of the axle housing on the crown wheel side and separate the axle housing from the axle drive housing.

Fig 40.

2 Remove the bearing outer ring **A**.

Remove the O-ring **B**.Mark the shim prior to removing to aid assembly. Remove the shim.

Fig 41.

3 Lift off the differential from the axle drive housing.

Fig 84.

20 Rotate the pinion drive in both directions several times over the crown wheel to check the contact pattern impression

Fig 85.

21 Remove the differential and check the contact pattern with the ZF guide. If pattern differs from the recommended pattern recheck shim dimension and repeat process.

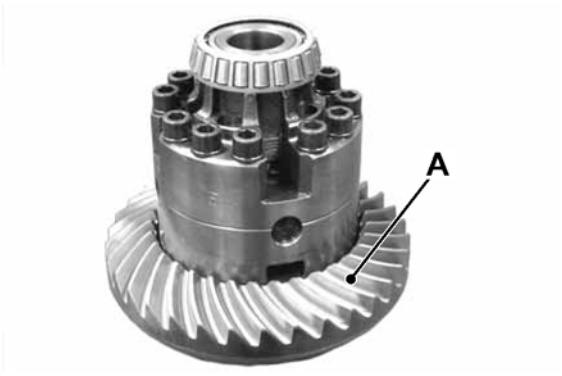


Fig 86.

22 Oil the O-ring and mount it on collar of the axle housing.

Fig 87.

23 Reinstall the differential

Fig 88.

21 Mount breather valve (arrow) and connect HP pump (to connection hole/bearing pin)

High-pressure test: Build up test pressure p = 100 bar and close locking valve of HPpump.

A pressure drop by max.3 bar is permissible during a 5-minute test duration.

Low pressure test: Reduce test pressure to p = 5 bar and close locking valve.

No pressure drop is allowed during a 5-minute testing duration.

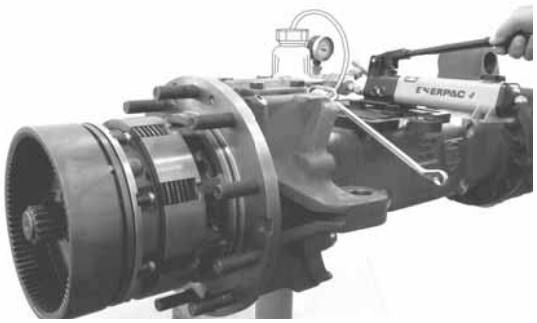


Fig 135.

22 Adjust and check disc clearance/piston stroke:

23 Disc clearance/piston stroke "X"= 0.7to 1.3 mm

24 Breathe brake completely before starting the test

25 Build up braking pressure (100 bar) and find dimension "A", from face/ring gear through measuring hole to face / piston.

26 Dimension "A"e.g = 83.10 mmRelease pressure from brake - i.e. no pressure applied on brake, piston is in contact with ring gear (reset piston through compression springs) - and find dimension "B" from face / ring gear through measuring hole to face/ piston.

27 Dimension „B"e.g. = 82.10 mm

28 CALCULATION EXAMPLE: Dimension "A"83.10 mm, Dimension "B"- 82.10 mm, Result disc clearance = 1.00 mm

29 If the required disc clearance / piston stroke (X = 0.7to 1.3 mm) is not achieved, correct it with corresponding inner clutch disc(s).

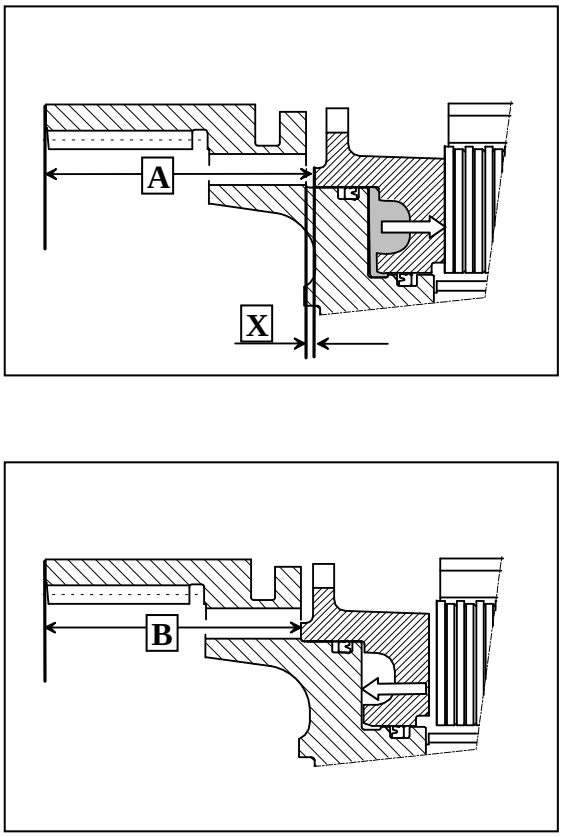


Fig 136.

30 Dismantle HP pump.Just for transport protection, install screw plug with o-ring in oil supply hole.

Tightening torque (M 14 x 1.5) MA = 23 Nm

Dismantling

Output

1 Mount the axle onto the assembly truck.

Fig 2.

2 Remove the plug and drain the oil from the axle.

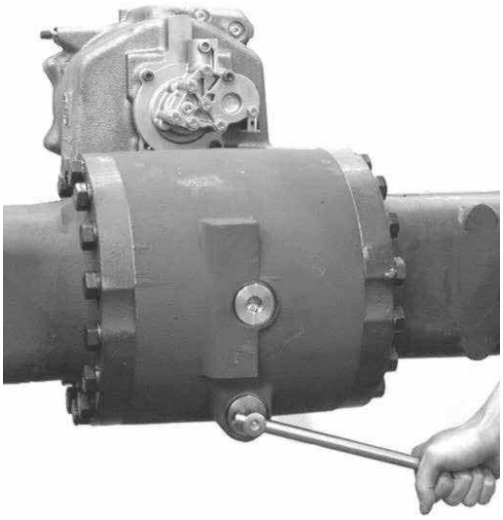


Fig 3.

3 Remove the plug and drain the oil from the planetary carrier.

Note: *To avoid injury due to possible pressure buildup in the oil system of the planetary carrier, turn the carrier until the oil filler and control plug is at the 12 o'clock position*

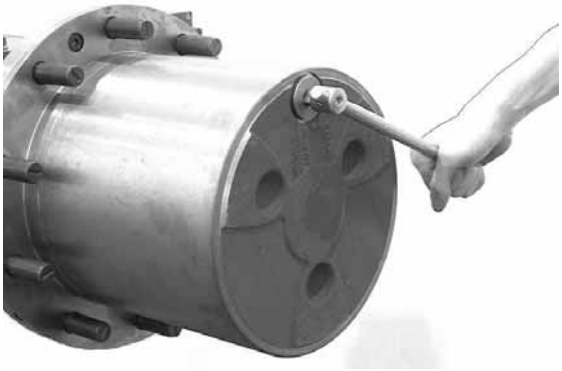


Fig 4.

Planetary Carrier

1 Remove both cylinder screws and separate the planetary carrier from the hub.

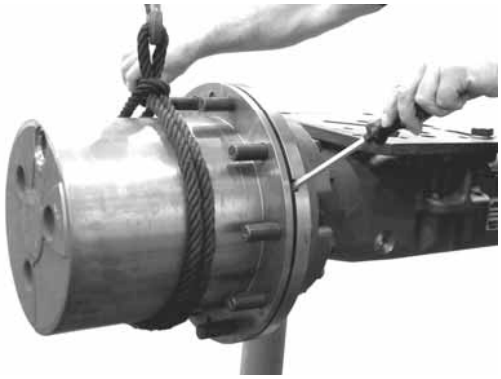


Fig 5.

2 Remove the circlip.

Fig 57.

ZF Axle	Dimension X
MS-E 3050	18.00mm
MS-E 3060	16.00mm
MS-E 3070	16.00mm

19 Place the piston onto ring gear.

Fig 58.

20 Secure the piston using Spring sleeve, Inner and outer compression springs and a new hexagon screw.

Fig 59.

21 Fit the ring gear ensuring correct alignment. ⇨ *Fig 61. (F-60)* . (markings O in 12 00 o'clock position)

Fig 60.

Fig 61.

22 Oil O-ring and insert into recess **A**.

Fig 103.

18 Locate the assembled axle housing (without O-rings) and temporarily fix it in place with screws

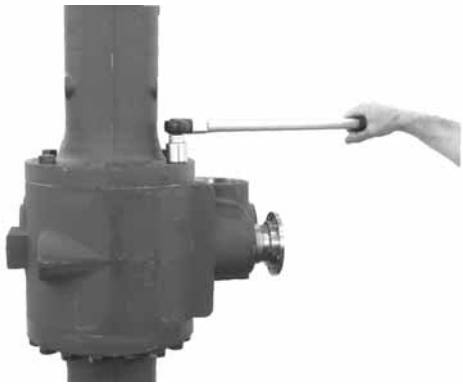


Fig 104.

19 Place a dial test indicator at right angles to a tooth flank of the crown wheel through the oil filler hole and check the backlash

Backlash

MS-E 3050/3060	0.12 to 0.24mm
MS-E 3070	0.15 to 0.27mm

If a deviation from the specified backlash is found, correct it with a suitable shim.

Fig 105.

20 Rotate the pinion drive in both directions several times over the crown wheel to check the contact pattern impression

Fig 106.

21 Remove the differential and check the contact pattern with the ZF guide. If pattern differs from the recommended pattern recheck shim dimension and repeat process.