Service Manual

Midi Excavator

9803/9330	8080	1024000 Onwards

Publication No.
S2-eng

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Customer Support

Service Manual

8080

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Introduction

This publication is designed for the benefit of JCB Distributor Service Engineers who are receiving, or have received, training by JCB Technical Training Department.

These personnel should have a sound knowledge of workshop practice, safety procedures, and general techniques associated with the maintenance and repair of hydraulic earthmoving equipment.

Renewal of oil seals, gaskets, etc., and any component showing obvious signs of wear or damage is expected as a matter of course. It is expected that components will be cleaned and lubricated where appropriate, and that any opened hose or pipe connections will be blanked to prevent excessive loss of hydraulic fluid and ingress of dirt. Finally, please remember above all else **SAFETY MUST COME FIRST!**

The manual is compiled in sections, the first three are numbered and contain information as follows:

1 = **General Information** - includes torque settings and service tools.
2 = **Care & Safety** - includes warnings and cautions pertinent to aspects of workshop procedures etc.
3 = **Routine Maintenance** - includes service schedules and recommended lubricants for all the machine.

The remaining sections are alphabetically coded and deal with Dismantling, Overhaul etc. of specific components, for example:

A = **Attachments**
B = **Body & Framework** ...etc.

The page numbering in each alphabetically coded section is not continuous. This allows for the insertion of new items in later issues of the manual.

Section contents, technical data, circuit descriptions, operation descriptions etc are inserted at the beginning of each alphabetically coded section.

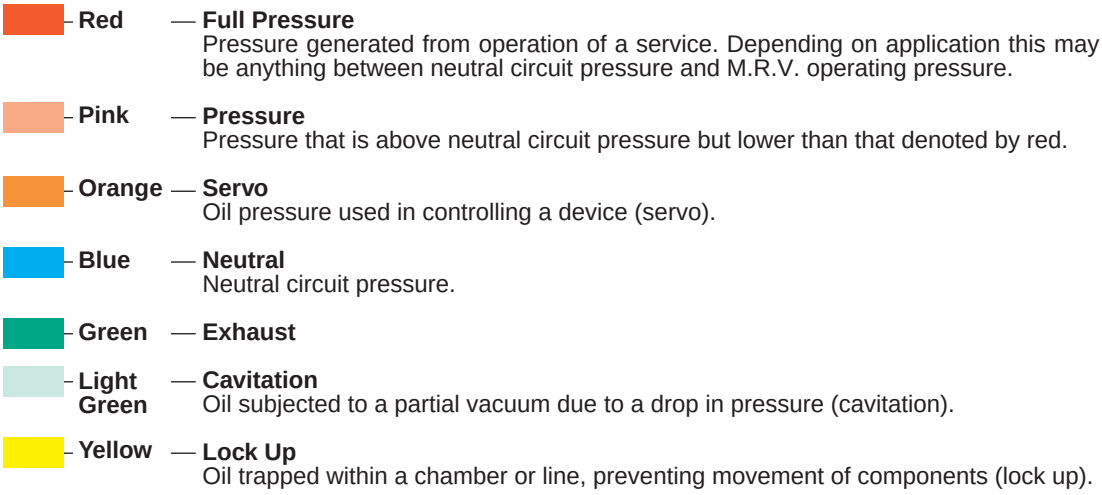
All sections are listed on the front cover; tabbed divider cards align directly with individual sections on the front cover for rapid reference.

Where a torque setting is given as a single figure it may be varied by plus or minus 3%. Torque figures indicated are for dry threads, hence for lubricated threads may be reduced by one third.

With the exception of slewing operations 'Left Hand' and 'Right Hand' are as viewed from the rear of the machine facing forwards.

Colour Coding

The following colour coding, used on illustrations to denote various conditions of oil pressure and flow, is standardised throughout JCB Service publications.



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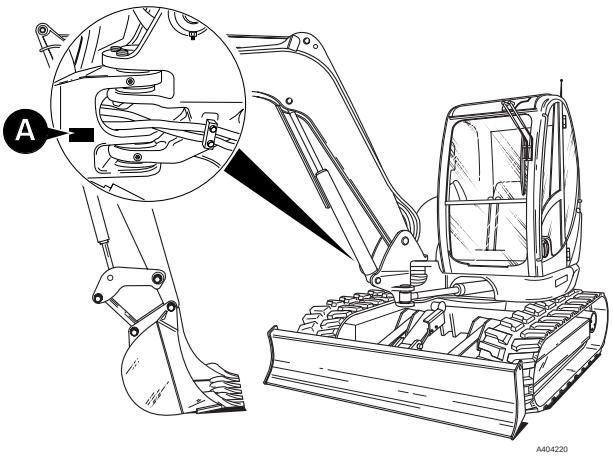
Contents Page No.

Contents **Page No.**

Identification Plates

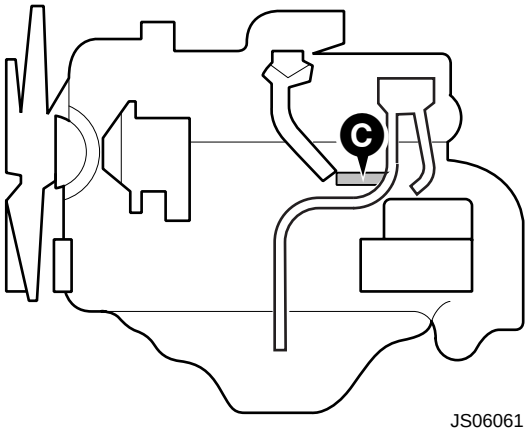
Machine Identification Number

Your machine has a Data Plate **A** located on the right hand side of the kingpost. The VIN number is also stored in the machine's EMS Panel (see **EMS Panel**).



Engine Identification Number

The engine number is located at **C**. If the engine is replaced by a new one, the data plate serial number will be wrong. Either stamp the new number on the plate or stamp out the old one. This will prevent the wrong number being quoted when you order replacement parts.



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Introduction

This chapter is arranged to guide you step-by-step through the task of learning how to operate the machine. Read it through from beginning to end. By the end of the chapter you should have a good understanding of the machine and how to operate it.

Pay particular attention to all safety messages. They are to warn you of possible danger. Do not just read them; think about what they mean. Understand the dangers and how to avoid them. If there is anything you do not understand, ask your JCB distributor. He will be pleased to advise you.

When you have learned where the track driving controls are and what they do, practice using them. Practice driving the machine in a safe, open space clear of other people. Get to know the 'feel' of the machine and its track controls.

Move on to the boom and dipper controls only when you can drive the machine confidently and safely. When you have learned where the boom and dipper controls are and what they do, practice using them but take great care at the same time. Practice in an open space clear of other people.

Do not jerk the controls; operate them slowly until you understand the effect they have on the machine.

Finally, do not rush the job of learning. Take your time and take it safely.

Remember

BE CAREFUL
BE ALERT
BE SAFE

INT-1-3-1/1

Before Entering the Cab

The following checks should be made each time you return to the machine after leaving it for any period of time. We advise you also to stop the machine occasionally during long work sessions and do the checks again. All these checks concern the serviceability of the machine. Some concern your safety. Get your service engineer to check and correct any defects.

⚠ WARNING

Walking or working under a raised boom and dipper is hazardous. You could be crushed by the boom and dipper or get caught in the linkages. Lower the boom and dipper before doing these checks. If you are new to this machine, get an experienced operator to lower the boom and dipper for you.

If there is nobody to help you, study this handbook until you have learned how to lower the boom and dipper.
8-2-1-1

⚠ CAUTION

On machines fitted with hose burst protection valves, the attachments cannot be lowered with the engine stopped. On these machines start the engine and lower the attachments before doing the walk round inspection.
2-2-3-5

⚠ CAUTION

The hydraulic oil filler cap may be hot if the machine has recently been used. If this is the case, wear suitable gloves when tightening or loosening this cap.

1 Check for Cleanliness

a Clean the windows, light lenses and rear view mirrors.

b Remove dirt and debris, especially from around the linkages, rams, pivot pins and radiator grille.

c Make sure the cab step and handholds are clean and dry.

d Clean all safety decals. Replace any that are missing or cannot be read.

2 Check for Damage

a Inspect the machine generally for damaged and missing parts.

b Make sure that all pivot pins are secured in place.

c Inspect the windows for cracks and other damage.

d Check for oil, fuel and coolant leakages beneath the machine.

e Check the tracks (rubber). Check for cut rubber and penetration by sharp objects. Do not use a machine with damaged tracks.

3 Check for Security

a Check the security of the hinged covers on the engine compartment and hydraulic compartment.

b Make sure that the hydraulic oil and diesel fuel filler caps are both tightly closed. REMEMBER THAT THE HYDRAULIC FILLER CAP MAY BE HOT IF THE MACHINE HAS RECENTLY BEEN USED. (We also recommend that you lock the fuel filler cap.)

⚠ CAUTION

Always face the machine when entering (and leaving) the cab. Make sure your shoes and hands are clean and dry. Otherwise you could slip and fall.

2-2-1-3

Entering the Cab

1 Open the cab door and, if necessary, secure it in the fully open position (see **Doors and Windows, Opening and Closing the Door**).

2 **Check that the Controls Lock Lever** (see **Switches and Controls**) is raised.

3 Holding the two handrails (one each side of the cab entrance), climb onto the top of the track (as at **A**). Do not use the skirt **1** as a step.

4 Retaining hold of the left handrail, step into the cab and swing yourself into the operator's seat (as at **B**).

⚠ WARNING

Do not use the machine controls as handholds when entering (or leaving) the machine.

2-2-1-4

Leaving the Cab

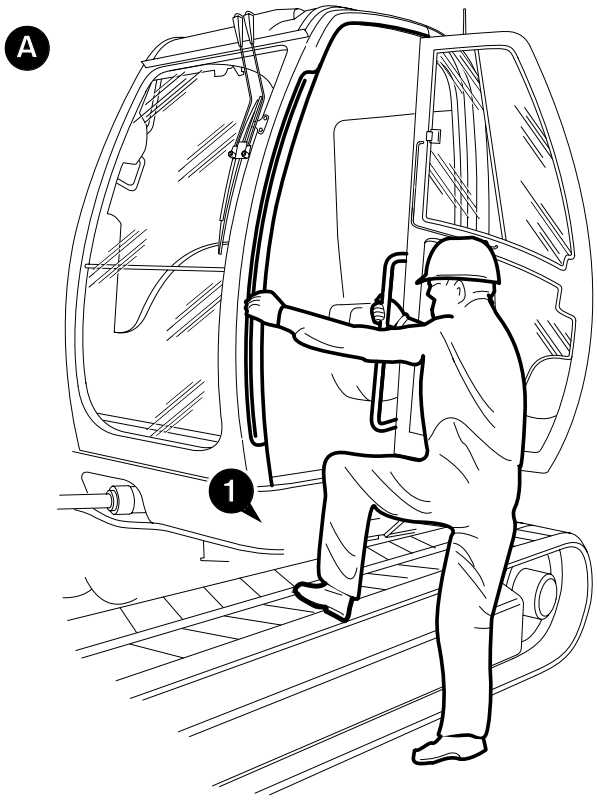
1 Stop the engine and, with the **Starter Switch** set to ON, operate the hydraulic controls several times to release any residual hydraulic pressure in the system. Turn the **Starter Switch** OFF.

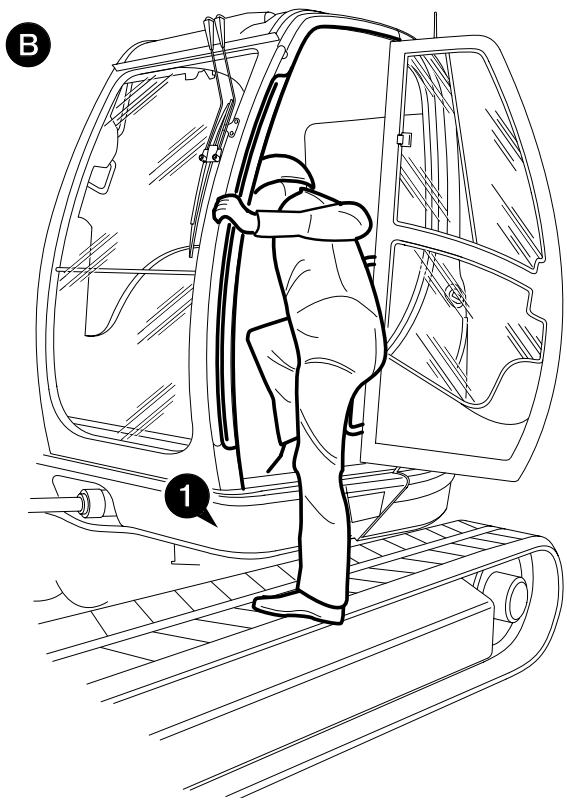
2 Open the cab door and, if necessary, secure it in the fully open position (see **Doors and Windows, Opening and Closing the Door**).

3 Press the **Servo Isolator Switch** (see **Facia Panel**) to isolate the controls.

4 Raise the **Controls Lock Lever** (see **Switches and Controls**).

5 Leave the cab by reversing instructions **3** and **4** of **Entering the Cab**. Do not use the skirt **1** as a step.



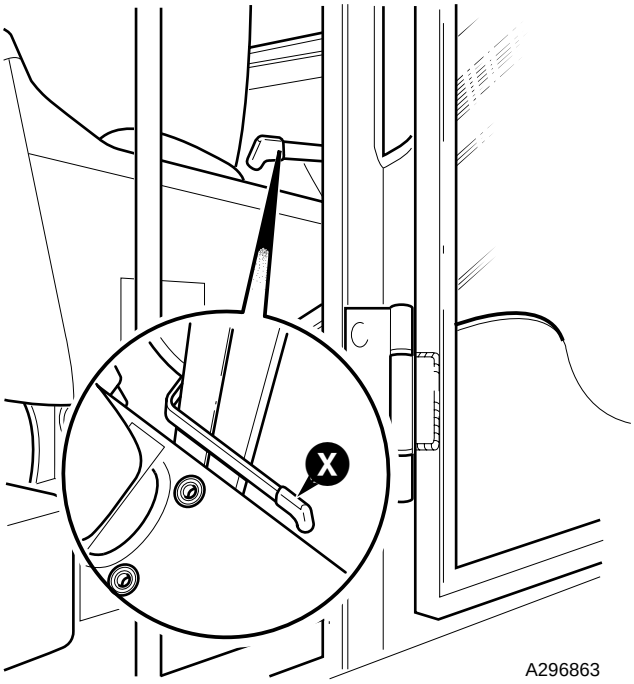


Opening and Closing the Door

To open the door from the outside, unlock it with the key provided and pull the handle.

Once in the cab, close and secure the door by pulling with the bar until the latch clicks shut. To open the door from the inside, pull the lever to the rear.

The door can be secured in the fully open position. Swing the door fully open until the bar on the door locates securely in the socket on the side of the cab. To release the door when it is secured fully open, move lever **X** on the left side of the operator's seat downward.



Opening and Closing the Front Upper Window

⚠ CAUTION

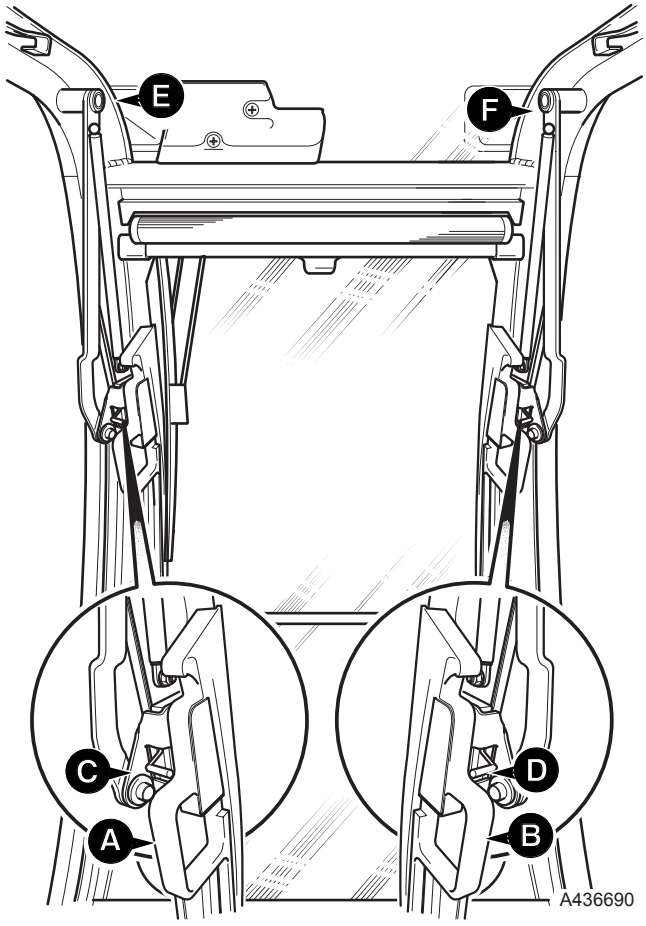
Take care when raising and lowering the window; lower your head as you pull the window back. Isolate the hydraulic controls before opening and closing the window.

1 Opening

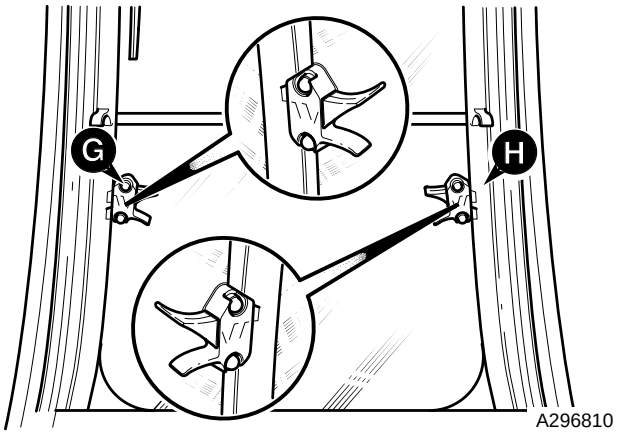
To open the front window, hold the left and right handles **A**, **B** and depress the catches **C**, **D** with your thumbs. Pull the handles backwards and swing the front window upwards until it locates on the catches **E**, **F** in the ceiling.

2 Closing

To close the front window, hold the left and right handles **A**, **B** and depress the catches **C**, **D** with your thumbs. Pull the handles downward and swing the front window until it locates in the closed position.



Opening and Closing the Front Lower Window



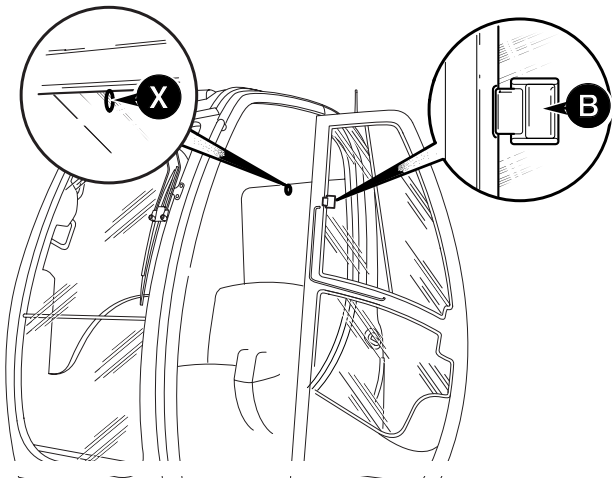
The front lower window can be opened in two positions:

For a small amount of ventilation pinch the locks **G**, **H** between finger and thumb and push the window down until the locks locate on the lower catch positions.

For a larger amount of ventilation pinch the locks **G**, **H** between finger and thumb and push the window up until the locks locate on the top catch positions.

To close the front lower window pinch the locks **G**, **H** between finger and thumb and return the window to the closed position.

Emergency Exit

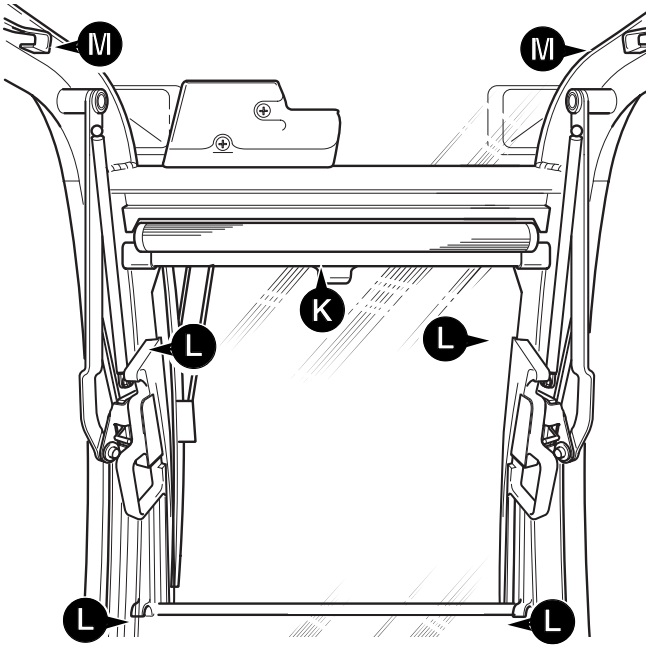


In an emergency, if the door cannot be used, release the rear window by pulling on ring **X** to remove the window retaining bead completely. Push the window outward and clear of the frame.

Door Sliding Window

When the lock **B** is released, the window can be opened and closed.

Opening and Closing the Sunblind



The sunblind is located at the top of the cab front window and can be placed in three positions.

Pull the sunblind down using the handle **K** in the centre of the blind lower edge. Locate both sides of the sunblind lower edge on to the hooks **L** as shown.

The sunblind can also be located on the hooks positioned on the cab ceiling **M**.

To release the sunblind, hold the handle **K**, disengage the bottom edge of the sunblind from the locating hooks and let the sunblind slowly rewind back into the stowed position.

Seat

The operator's seat can be adjusted for your comfort. A correctly adjusted seat will reduce operator fatigue. Position the seat so that you can comfortably reach the machine controls.

Fore/Aft

Lift handle **1** and slide the seat into the required position. Release lever **1**. Make sure the seat is locked in position. To move the seat **and** the left and right consoles, which are all mounted on the seat base, lift lever **2** and slide the seat base into the required position. Release lever **2**. Make sure the seat base is locked in position.

Weight

Turn adjuster **3** until the operator's weight on scale **4** is adjacent to the pointer.

Cushion Height/Angle

Sit in the seat, press or lift lever **5** and use your weight to position the height of the front and rear of the cushion as required. Release lever **5**.

Backrest

Raise lever **6**, position the backrest to the required angle. Release lever **6**.

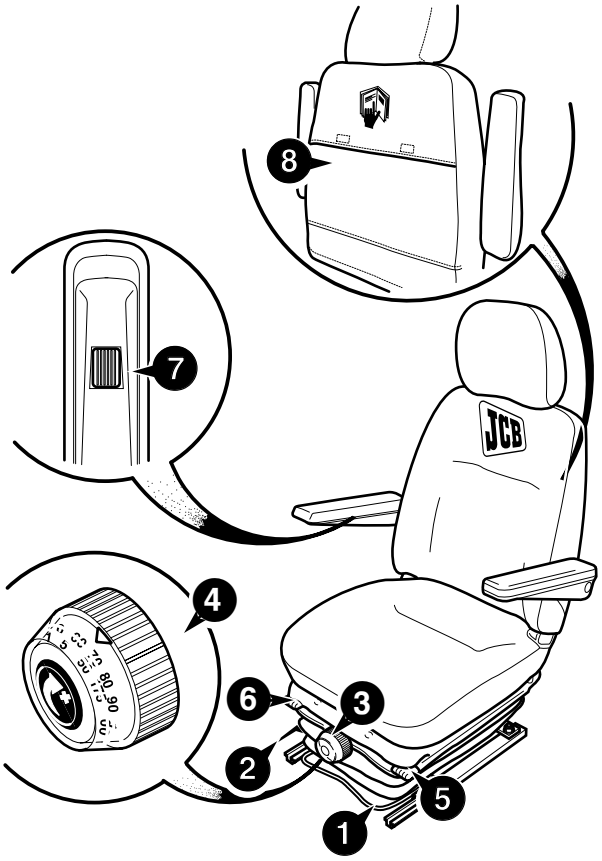
Headrest (if fitted)

Raise/lower and adjust the angle as required. ENSURE THAT THE HEADREST IS BEHIND THE HEAD, NOT THE NECK.

Armrests

To position the armrests, turn the adjuster **7** on the underside of each armrest. Note that the armrests are mounted on the left and right consoles, rather than the seat itself, but operate in the same way.

The Operator Handbook is located in the pouch **8** on the rear of the seat.



Seat Belt

Fasten the Seat Belt

Sit correctly in the seat. Make sure the belt is not twisted. Push the male fitting **A** into the buckle **B** until it latches.

Release the Seat Belt

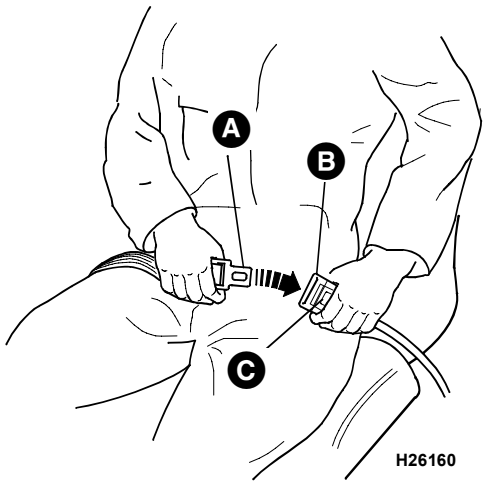
Press button **C** and pull the other side of the belt outward.

Adjust the Seat Belt

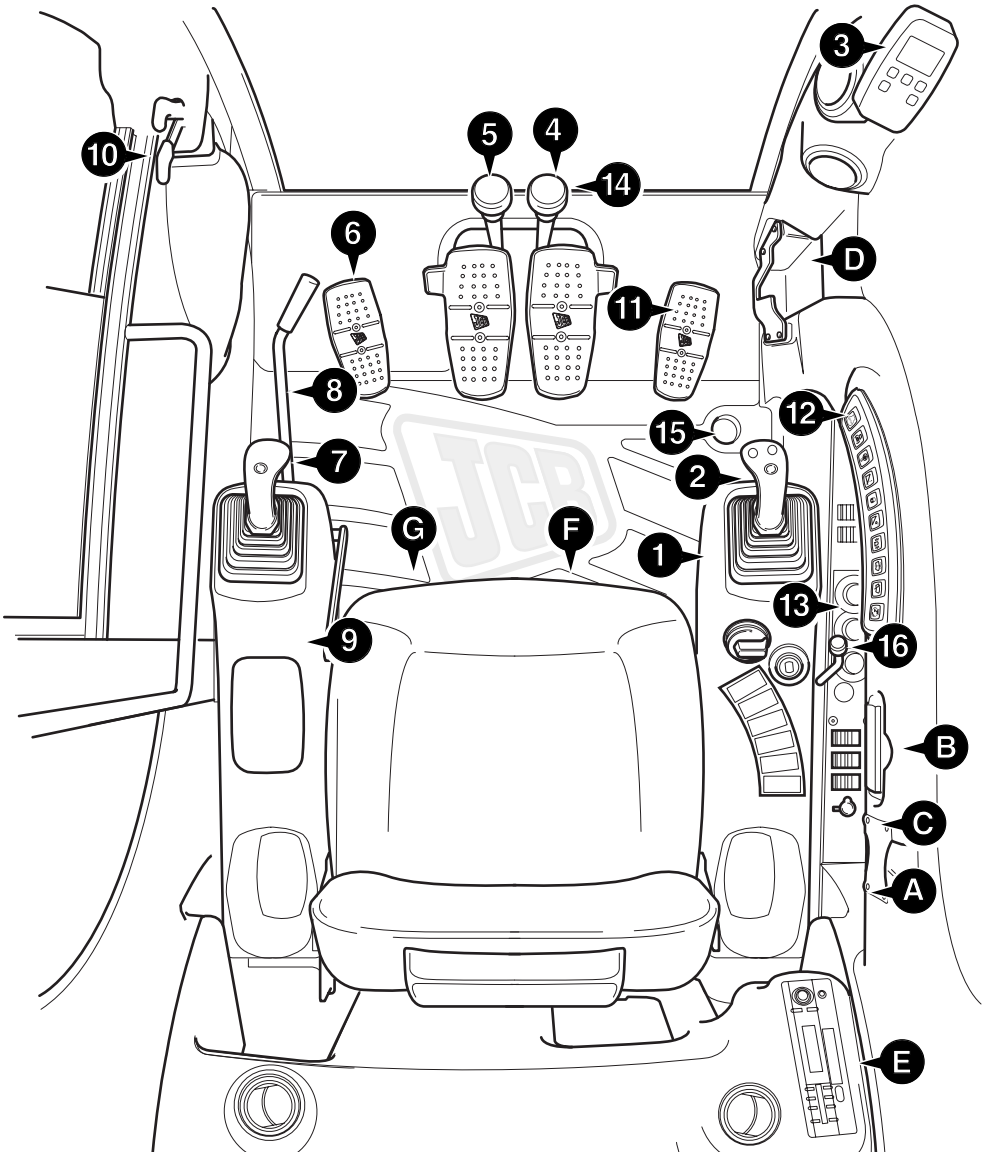
The right hand side of the belt is adjustable. A friction roller inside the male fitting **A** allows you to increase or reduce the effective length of the strapping.

⚠ WARNING

If the machine suddenly lurches for any reason you could be thrown around inside the cab - or even thrown out of the cab. Wearing the seatbelt will keep you in your seat and help you keep control of the machine. Always wear the seatbelt, correctly adjusted and fastened, when using this machine.



Location of Controls and Components



1 Right Console
(see **Switches and Controls**)

2 Right Excavator Joystick Control
(see **Excavating Controls**)

3 Electronic Monitor System (EMS)
(see **Switches and Controls**)

4 Right Hand Track Control
(see **Switches and Controls**)

5 Left Hand Track Control
(see **Switches and Controls**)

6 Swing Control
(see **Excavating Controls**)

7 Left Excavator Joystick Control
(see **Excavating Controls**)

8 Control Lock Lever
(see **Switches and Controls**)

9 Left Console
(see **Switches and Controls**)

10 Door Lock Release Lever
(see **Doors and Windows**)

11 Optional Circuit Pedal (if fitted)
(see **Operating Attachments**)

OR **Optional TAB Boom Control (if fitted)** (see **Triple Articulating Boom**)

12 Facia Panel
(see **Switches and Controls**)

13 Air Cond./Heater Controls
(see **Switches and Controls**)

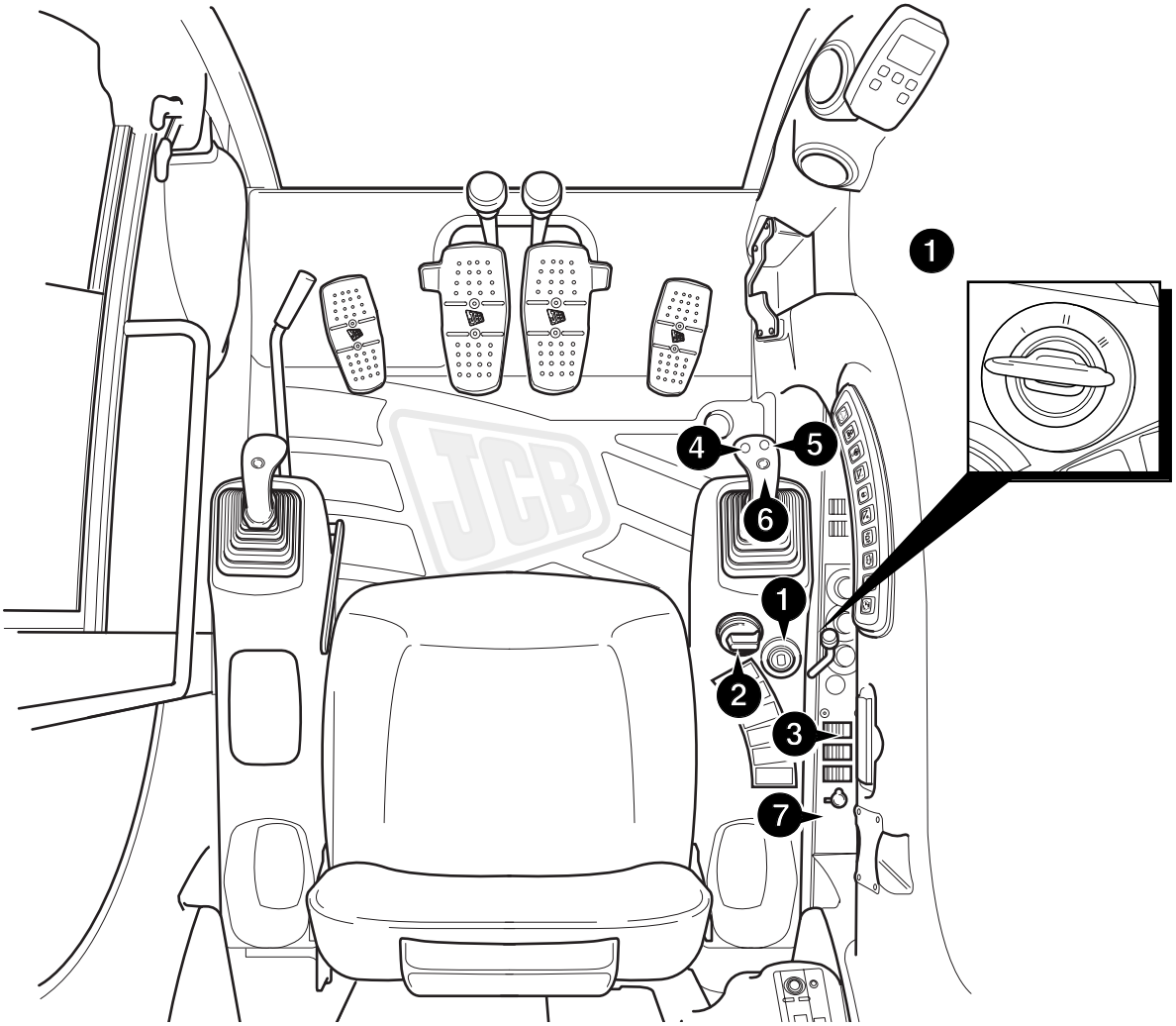
14 2-Speed Tracking Switch
(see **Switches and Controls**)

15 High Flow Auxiliary Switch
(see **Operating Attachments**)

16 Dozer Operating Lever
(see **Switches and Controls**)

A Mobile Phone Holder
B Ashtray
C Cigarette Lighter/ Mobile Phone Charger
D Cup Holder
E Radio
F Tool Box
G Cool Box

Switches and Controls



Right Console

1 Starter Switch
This is operated by the starter key. It has four positions. The key can only be removed when in the 'O' position.

O Off/Stop Engine
Turn the key to this position to stop the engine. Make sure the controls are in neutral and the excavator and dozer are lowered before stopping the engine.

I On
Turning the key in this position connects the battery to the electrical circuits The key will spring back to this position when released from II.

II Heat Position (Not Functional)
Turning the switch to this position has no effect. The engine is pre-heated automatically if necessary.

III Start
Operates the starter motor to turn the engine.

Note: Do not operate the starter for more than 20 seconds at one time. If the engine does not start in this time, return the key to the ‘O’ position. Wait at least one minute before trying again. The switch mechanism prevents you from reselecting ‘Start’ without first returning to ‘O’.

2 Throttle Dial
This rotary control provides progressive engine speed control over the full range.

Note: If the engine speed does not change even after turning the throttle dial it may be because the idle switch **6** is ON. Push the idle switch to OFF to reactivate the throttle dial.

If the engine is started with the throttle dial not at the minimum position, no engine speed control will be possible until the dial is turned to the minimum position.

Switches and Controls (cont'd)

Right Console (cont'd)

3 Radio Mute Switch

This switch is used to temporarily switch the sound from the radio OFF. When the mute switch is selected the indicator light will illuminate. When the switch is reselected the radio sound will resume and the indicator will extinguish.

4, 5 High-Flow Auxiliary Switches

These switches operate high-flow hydraulic attachments, such as augers. Press and hold switch **4** to operate the attachment in the 'forward' direction. Press and hold switch **5** to operate the attachment in the 'reverse' direction.

Note: 'Forward' and 'reverse' directions will be determined by the hydraulic connections to the attachment.

Forward operation can also be activated by a foot-operated switch, see **Operating Attachments**.

Note that the EMS will prevent the high flow circuit operating if the hydraulic oil temperature is at or below 0 °C (32 °F), or if is at or higher than 98 °C (208 °F).

6 One Touch Idle Switch

Pressing this switch instantly changes the engine speed back and forth between that selected for working and a 'low idling' speed. When 'low idling' has been selected the message "LOW IDLE" is displayed on the **EMS Panel**.

7 Cigar Lighter/12 V Power Point

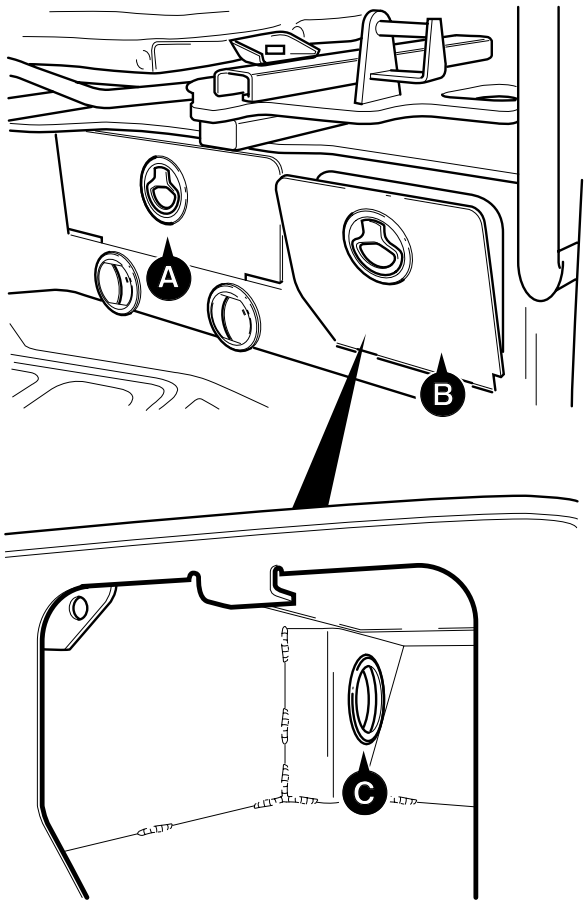
To operate the lighter, press it fully into its socket. When it has heated up sufficiently it will spring forward a little way out of its socket. It can then be removed for use. REMEMBER IT WILL BE HOT. Return the lighter to its socket after use.

This machine is equipped with a 12 V system and can be used for mobile phone chargers or other 12 V powered devices (maximum current 5 A).

Underseat Tool Box and Cool Box

For operator convenience a toolbox **A** and coolbox **B** are located under the seat.

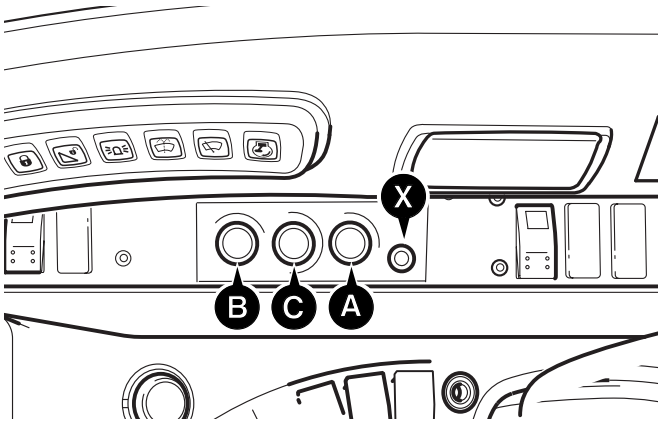
The coolbox includes a vent **C** which allows you to control the level of coolness in the coolbox.



Switches and Controls (cont'd)

Heater/Air Conditioning Controls

Located on the **right console**, the heater/air conditioning controls are used in conjunction with the heater fan controls.



Air Conditioning On/Off

Press switch **X** to switch the air conditioning system on or off. The system will only operate if the cab temperature is above 0 °C (32 °F).

Fresh Air/Recirculated Air

Turn rotary switch **A** fully anti-clockwise for fresh air, turn it fully clockwise for recirculated air. (Intermediate positions give a mixture of fresh and recirculated air.)

Heater Fan

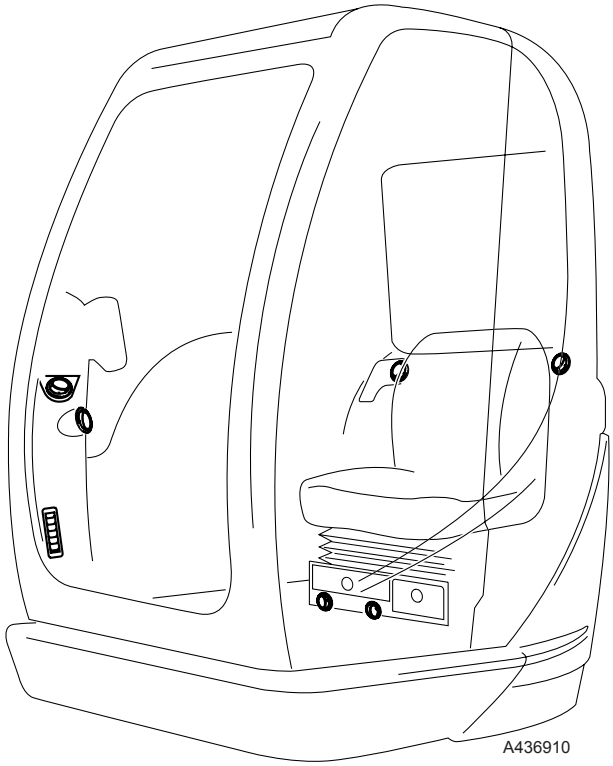
Turn rotary switch **B** clockwise to turn on the heater fan. Turn further clockwise for faster speeds. Functions only with the starter switch ON.

Temperature

Turn rotary switch **C** clockwise to increase the heat.

Vents

Air can be distributed as required using the vents shown in the illustration opposite. The vents can be adjusted for both direction and flow.



Using the Air Conditioning

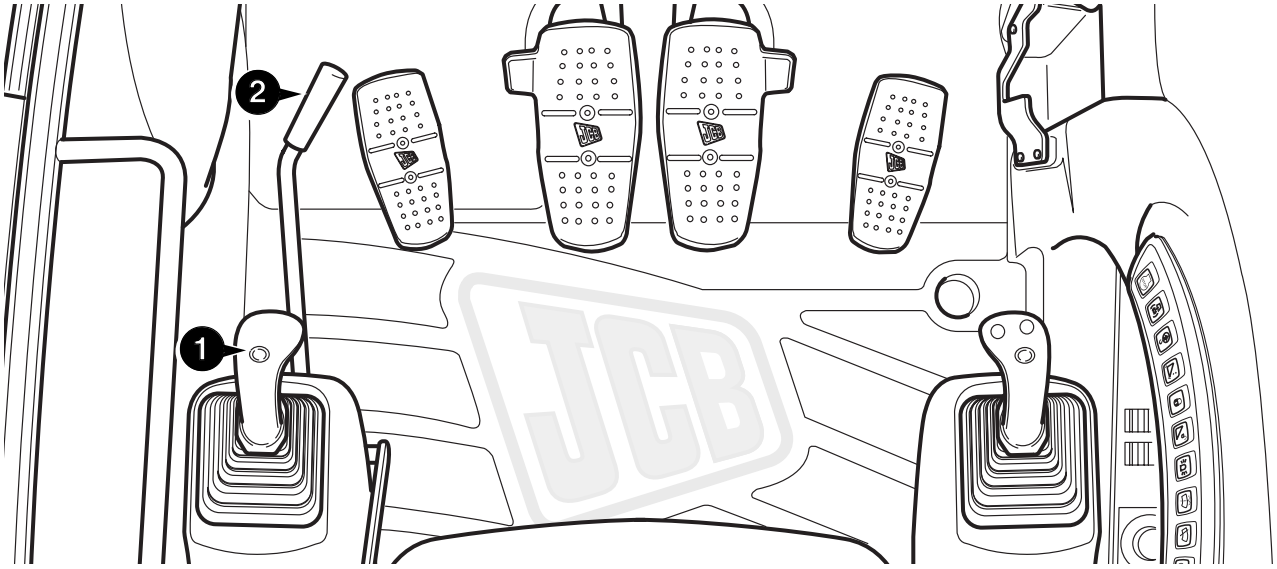
1 In hot weather to produce comfortable working conditions.

- **a** Close the door and windows. Turn on the air conditioning switch **X**.
- **b** Set control **A** fully anti-clockwise to avoid drawing hot air in from outside the cab.
- **c** Set control **B** to the required fan speed.
- **d** Set control **C** as required to achieve the required temperature.

2 In cold/damp weather, to minimise misting.

- **a** Close the door and windows. Turn off the air conditioning switch **X**.
- **b** Set control **A** fully clockwise to avoid drawing damp air in from outside the cab.
- **c** Set control **B** to the required fan speed. Adjust the vents as required to direct maximum air to the windows.
- **d** Set control **C** as required to achieve the required temperature.

Switches and Controls (cont'd)



Left Console

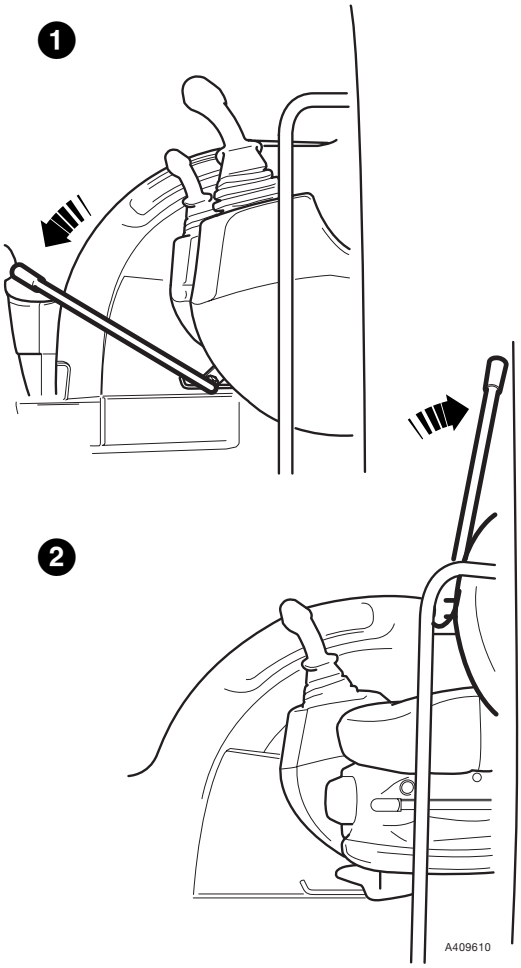
1 Horn Button

When the horn button is pressed the horn will sound.

Note: Always press the switch and sound the horn to give signals, when the machine is started or you engage travel or slew.

2 Control Lock Lever

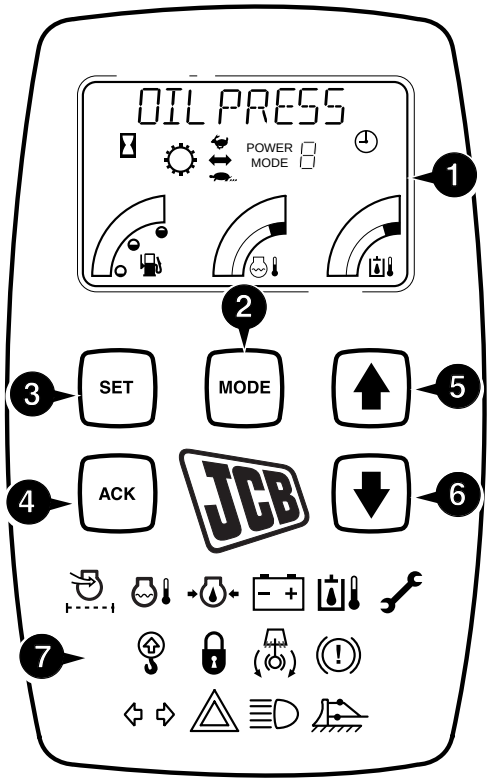
When the Control Lock Lever **A** is at its lowest position **1** the hydraulic controls are unlocked and therefore usable. Raising the lever to position **2** lifts the left console clear of the doorway and isolates the hydraulic controls for entering/leaving the cab. The controls remain locked until both the lever **and** the console are returned to position **1**. (The controls can also be isolated by pressing the servo isolator switch, see **Facia Panel**.)



Switches and Controls (cont'd)

EMS Panel

The EMS (Electronic Monitoring System) provides a sophisticated means of controlling and monitoring various aspects of the machine's engine and hydraulic systems. The EMS panel, in conjunction with the Facia Panel, provides the operator interface to the EMS, using an LCD display and a series of indication lamps to display warnings and messages. Five pushbutton switches allow the operator to access the functions of the EMS. An integral buzzer sounds to attract the operator's attention to any warning messages.



A410580

1 LCD Display
The LCD has 20-segment bar graph gauges for fuel, hydraulic and water temperatures. There are also indicators for time, travel speed (Hare/Tortoise type), power mode and hours run. The panel also has an eleven character message area to display warning and operational messages. If a machine error occurs then the normal Engine Hours/Clock display is replaced by a warning message. If the error persists, the display will alternate between the warning message and the Engine Hours/Clock display. If there are multiple warning messages to be displayed, the display will cycle the messages through the display. The normal clock and engine hours display is also overwritten by one-time status messages which indicate machine operational changes. These will automatically be cleared after a short period of time.

2 Mode Button
Press to select working mode. The machine will be in **S** mode when started. Pressing the button cycles through the modes as follows:
S ➡ H ➡ L ➡S ➡ H ➡ L etc.
Select the appropriate work mode suitable for the work to be carried out:

S - STANDARD MODE
For general digging and loading work.

H - HEAVY MODE
For harder digging work.

L - LIGHT MODE
For precise or light duty work.

3 Set Button
Press the SET button to access the monitor Set Up menu. The menu can be scrolled through using the Scroll Up and Scroll Down buttons **5**, **6**. The SET button can also be used to exit from EMS menus.

4 ACK Button
Press to acknowledge warnings shown on the display. This will clear the message and silence the buzzer but will not extinguish the warning lamps. It is also used when navigating the menu system and to acknowledge any changes to EMS settings.

5 Scroll Up Button

6 Scroll Down Button

7 Indication Lamps
Fourteen indication lamps are included on the monitor. (See **Indication Lamps**.)

EMS Panel (cont'd)

LCD Display Icons

Indicates that machine hours are displayed top left of the display. This icon flashes while the engine is running.

Indicates the time.

⚠CAUTION

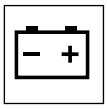
All the warning lights should go out when the engine is started. Rectify any faults immediately.
4-2-1-4

Indication Lamps

Engine Air Filter Blocked (WARNING LAMP)
Illuminates if the engine air filter is blocked.

High Engine Coolant Temperature (WARNING LAMP)
Illuminates if the engine coolant temperature rises too high.

Low Engine Oil Pressure (WARNING LAMP)
Illuminates if the engine oil pressure drops too far. The light should go out when the engine is started.



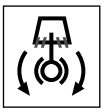
Charging System Fault (WARNING LAMP)
Illuminates when the battery voltage is low.

High Hydraulic Oil Temperature (WARNING LAMP)
Illuminates if the hydraulic fluid temperature rises too high.

Service Required (Status Lamp)
If illuminated contact your JCB dealer. Note that this will first light at 20 hours before the next service interval is due and will be accompanied by the 'SERVICE RQD' message on the monitor. Pressing 'ACK' will cancel the message but the LED will stay illuminated. If the service is not carried out within 20 hours of the specified interval, you can still cancel the message but the LED will flash until the service has been performed.

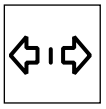
Lifting Overload (Optional) (Status Lamp)
Illuminates if the safe working load of the machine is exceeded (if this feature is activated on the Facia Panel by means of the **Overload Caution** button). This feature is only available when Hose Burst Check Valves are installed.

Servo Isolator ON (Status Lamp)
Illuminates when the machine's servo isolator is engaged. Lower the lock lever or press the isolator switch to disengage the isolator.



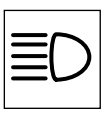
Slew Lock ON (Status Lamp)
Illuminates when the machine slew lock is engaged. Press the slew lock switch to disengage the slew lock.

Brake Pressure Low (WARNING LAMP)
Not used.



Direction Indicator (Status Lamp)
Not used.

Hazard Warning Lamps Indicator (Status Lamp)
Not used.



Main Beam Indicator (Status Lamp)
Not used.

Dozer Mode Indicator (Status Lamp)
Not used.

Switches and Controls (cont'd)

EMS Panel (cont'd)

Menu Modes

The EMS Panel has three Menu modes: **Set Mode**, **Diagnostic Mode** and **Calibration Mode**. The first two modes are designed to allow the operator to monitor the operation of the vehicle. The third mode allows properly trained JCB personnel to adjust the calibration of the system and is detailed in the machine service manual.

Set Mode
Pressing the SET button on the EMS panel enters the Set Mode menu. Pressing the Scroll Up and Scroll Down buttons will cycle through the entries, and pressing the ACK button will select an item. Pressing the SET button will return the operator to the normal display.

The Set Mode entries and their descriptions are as follows:

Entry	Format	Details
CLOCK:	**12/24? 24** **XX:XX**	Use the arrow keys select 12/24 hour format. Then press "ACK" to accept the format. This will display the currently set time. Use the arrow keys to set the hours and press "ACK" to accept the value. Now do the same for the minutes.
HIGH FLOW	**XXXXX XXXX**	The total hours that the high flow or double acting high flow features are in use. If the input for these features is active, then hours will be accumulated. The left number shows the total hours (99, 999 max). The number on the right shows the number of hours used since the last service (9, 999 max). This value will be flashing and can be reset to zero by pressing the "ACK" button.
AUTO IDLE T:	**XX SECONDS**	This is the auto idle delay time. The scroll keys increase/decrease the delay time from a minimum of 5 seconds up to a maximum of 30 seconds. Press the "ACK" button to accept the value. The default value for this setting is 5 seconds.
LANGUAGE:	**English**	Language set up. Use the scroll keys to change between pre-programmed alternative languages and English. Press the "ACK" button to accept.
INT WIPER S:	**Wiper SPD-X**	Intermittent wiper speed. Use the scroll keys to increment/decrement the delay between stroke time. There are 10 different speed settings. Press the "ACK" button to accept the new value.
DATE:	**XX-XX-XXXX**	The current date. Use the scroll keys to increment each value. Press the "ACK" button to move from year to month. Press it again to move from month to day. One more press will store the value into memory.

Monitor Messages

Repetitive Messages

The following messages are repetitive, i.e. they will be displayed for as long as the source of the message still requires it to be displayed. The table shows which messages have buzzers. The 'ACK' column indicates whether or not the buzzer can be silenced by pressing the "ACK" button. In some cases, the fact that a message has been triggered is stored into the EMS memory. Contact your dealer if any of these messages occur.

Message	Meaning	Buzzer	ACK
ALTERNATOR	The engine is running and the alternator is not charging.	YES	YES
AUTO IDLE	The auto idle feature is active and therefore the system has been dropped to low idle.	NO	N/A
BATT VOLTS	The battery voltage is out of range.	YES	NO
NO THROTTLE	This will be displayed whenever there is a throttle related error.	YES	YES
OIL PRESS	The engine is running with no oil pressure.	YES	NO
RECALIBRATE	The ECU-MIDI has not had its throttle calibrated.	YES	YES
SENSOR VOLT	The sensor voltage is less than 4V.	YES	YES
SETUP RQD	Either the EMS or the ECU-MIDI requires set-up.	YES	YES

Switches and Controls (cont'd)

EMS Panel (cont'd)

Diagnostic Mode
The EMS Diagnostic Mode allows the operator or service personnel to display various parameters monitored by the EMS. Pressing the SET button and the MODE button together for 5 seconds enters the Diagnostic Mode menu. The message "MODEL TYPE" will indicate that the EMS is in Diagnostic Mode. Pressing the Scroll Up and Scroll Down buttons will cycle through the entries, and pressing the ACK button will select an item. Pressing the SET button will return the operator to the normal display.

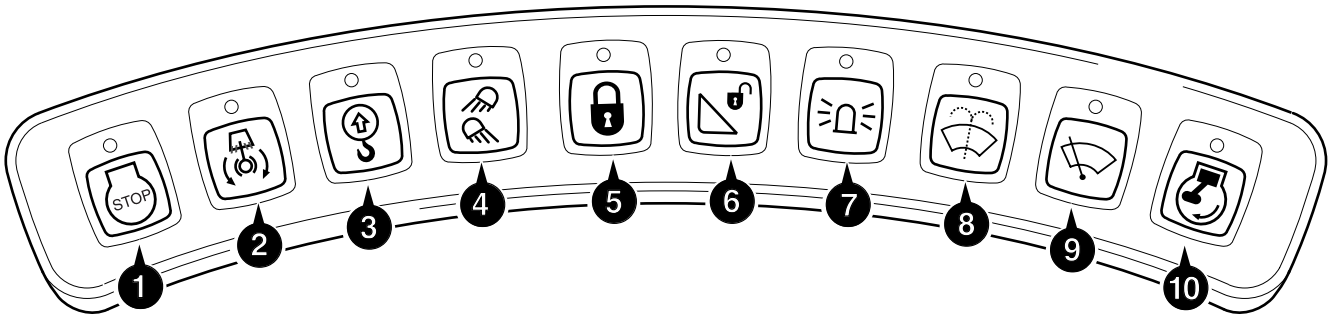
The Diagnostic Mode messages are listed below.

Diagnostic Mode Messages

Message Display	Meaning
ALT CHARGE	Shows if the alternator is charging or not.
ECU--M--v X.XX	The hardware or software version number for the ECU-MIDI.
EMS--v X.XX	The hardware or software version number for the EMS.
FUEL LEVEL	Display the amount of fuel remaining.
HRDWARE VER	Display the hardware version numbers of the EMS and the ECU-MIDI.
HYD TEMP	Display the current hydraulic oil temperature.
MAIN OFF	Main pressure switch is off.
MAIN ON	Main pressure switch is on.
MODEL NUM	Show the model of the vehicle.
OFF	The alternator is not charging.
ON	The alternator is charging.
PILOT SWITCH	Show the state of the machine pressure switches.
QH ENABLE?	Menu option for enabling and configuring the Quickhitch.
QH OFF	Disable the Quickhitch.
QH ON	Enable the Quickhitch.
QH TYPE 1	Set the Quickhitch to type 1.
QH TYPE 2	Set the Quickhitch to type 2.
QH TYPE ?	Set the type of Quickhitch on the machine.
SENSE POT	Displays the reading of the throttle sense potentiometer.
SENSOR VOLT	Displays the measurement of the sensor voltage (5V supply).
SERIAL NO	Display the serial number of the machine.
SFTWARE VER	Display the software version numbers of the EMS and the ECU-MIDI.
SWING OFF	Swing pressure switch is off.
SWING ON	Swing pressure switch is on.
SYS VOLTS	Displays the measurement of the battery voltage.
THROTTL PWM	Displays the PWM duty cycle being provided to the throttle actuator.
THRTTLE POT	Displays the reading of the throttle set potentiometer.
TRAVEL OFF	Travel pressure switch is off.
TRAVEL ON	Travel pressure switch is on.
WATER TEMP	Displays the current engine water temperature.
X.XX VOLTS	The sensor voltage reading.
XX DEG C	Current temperature reading of either the water or hydraulic fuel.
XX PERC	The reading of the fuel level given in percent full.
XX VOLTS	The battery voltage reading.
XX.X PERC	The PWM reading in percent duty cycle.
XXXX OHMS	The measurement in Ohms of the throttle sensor set potentiometer.

Switches and Controls (cont'd)

Facia Panel



1 Emergency Stop
Press to stop the engine. The EMS Panel will display "EMER STOP". Press again to allow the engine to be re-started.

2 Slew Lock
Press to enable the slew lock The monitor will display "SLEW LOCK". This message will flash until the Slew Lock engages, at which point the message will stop flashing. Press again to release the slew lock. (The EMS will prevent the Slew Lock from engaging until the machine has stopped slewing and the slew brake has engaged.)

3 Overload Caution (Option)
Use this to switch the Overload Caution system on and off. When the system is ON, if a load exceeding the lift capacity of the machine is lifted the monitor will display "OVERLOAD" warning message and a buzzer will sound. (This feature is only available when Hose Burst Check Valves are installed.)

4 Work Lights
Press once to switch on the boom and front worklights.
Press a second time to switch on the rear worklight (the boom and front worklights will remain lit).
Press a third time to switch all these lights off.

5 Servo Isolator
Press to isolate the servo system. The monitor will display "ISOLATOR". When pressed the controls are isolated and no machine movement is possible. Press again to de-isolate the system.

6 Quickhitch (option) - Position bucket on floor
When a quickhitch system is fitted, press to release the hitch. The monitor will display "Q/H DISCON?" and the alarm will sound, press ACK switch on the monitor within 5 seconds. The monitor will display "Q/H DISCON". Press again to re-apply the quickhitch.

7 Beacon (option)
When a beacon is fitted, press to activate the beacon. The monitor will display "BEACON ON". The switch gives power to the jack socket into which the rotating beacon or the service inspection lamp is plugged.

8 Windscreen Washer
Press to operate the windscreen washer. The washer will stop when the button is released. The windscreen wiper will operate for approximately four wipes once the button is released. The button's LED will flash during intermittent operation and remain lit during continuous operation.

9 Wiper
Press once to operate the wiper in intermittent mode. The monitor will display "WIPER INT". The frequency of wipe can be adjusted using the EMS menu. Press a second time to operate the wiper continuously. The monitor will display "WIPER ON".

10 Auto Idle
Press the switch to activate the automatic engine idle system. The monitor will display "AUTO IDLE". The engine speed will drop to idle when the machine hydraulics have remained unused for 5 seconds; the monitor will display "LOW IDLE". The time delay can be adjusted by the monitor menu. (See **EMS Panel, Set Mode.**)

Note: Regardless of the state of this switch, you can manually switch to and from LOW IDLE using the One Touch Idle Switch, see **Right Console**.

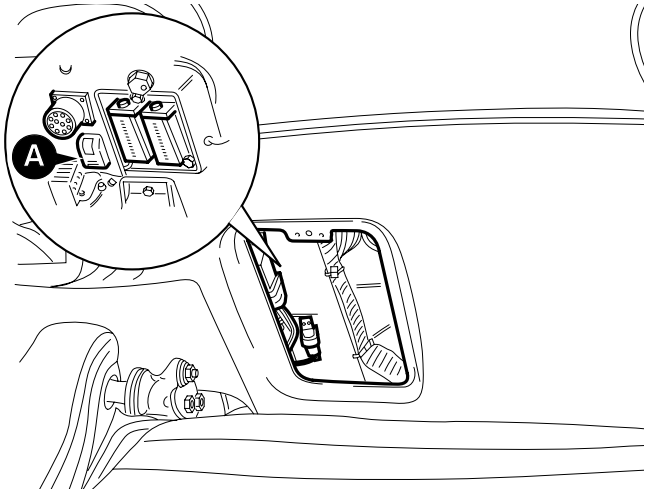
Switches and Controls (cont'd)

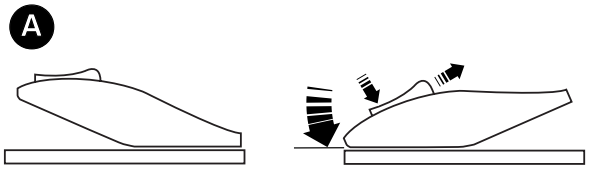
Redundancy Switch

The Redundancy Switch allows you to start and operate the machine with the EMS system switched off. This may be necessary in the event of system failure or when jump-starting the machine. The switch is located in the fuse box behind the seat.

Under normal conditions the switch **A** is OFF. The switch has a lock in the cap which must be slid towards the centre of the switch when pressing.

By switching the Redundancy Switch the engine can be started, the hydraulic functions are operable and the engine will run at idle speed. The monitor will display "LIMP MODE". The machine should be operated in this mode only to allow the machine to be moved to a safe position (See below for a method of raising engine speed while in this mode.)





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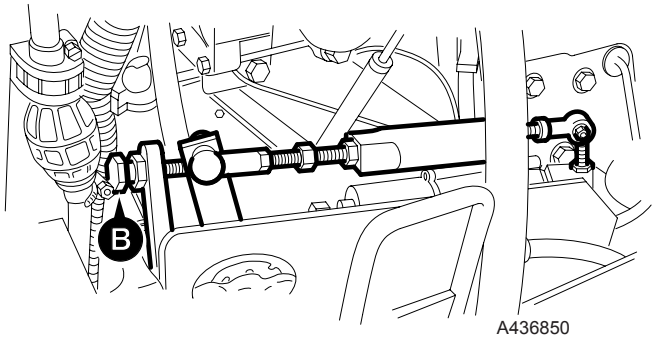

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Mechanical Engine Speed Override

To use the machine in redundancy (LIMP) mode, adjust the mechanical engine speed override screw **B**. Increase the r.p.m. to an intermediate speed which is adequate for the machine to operate.

Servo Controls Immobilisation

There are two means of immobilising the machine servo controls:

1 Raising the **Control Lock Lever** (see **Left Console**).

2 Pressing the **Servo Isolator Switch** (see **Facia Panel**).

Note: If you use the Control Lock Lever to isolate the controls, then only that lever can reactivate the controls. Similarly, if the Servo Isolator Switch has been used to isolate the controls, only that switch will reactivate them.

⚠WARNING

Servo Isolator Switch

Use the servo isolator switch when you are not operating the machine, to avoid accidentally operating the controls and causing a dangerous movement of the machine.

Before adjusting the cab environment, e.g. opening the windows or adjusting the seat, you must always isolate the controls using the servo isolator switch.

8-1-2-7

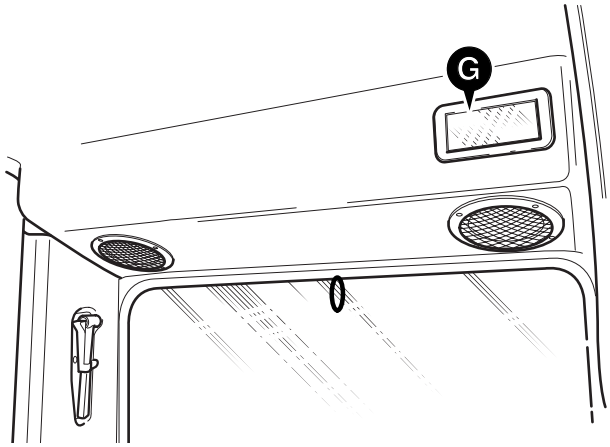
Switches and Controls (cont'd)

Cab Interior Light

The interior light **G** is located on the left of the cab back wall.

To turn it on, press the right hand side of the light.

To extinguish press the side of the light to return it to the centre position. The lamp is also switched by a door operated switch. The light will remain lit for five seconds after the door has closed, then it will dim down until it is fully extinguished.



Radio (Optional)

The radio, located on the right hand side of the rear panel, operates only with the Starter Switch ON. It has the following controls:

A Tone control

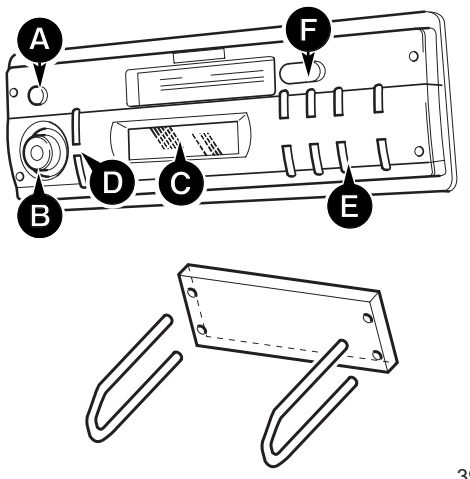
B On/off switch and volume control

C Tuning display (waveband, memory number, frequency)

D Waveband/frequency select buttons

E Pre-set memory store/select buttons

F Cassette loading/control features



399760

Removal

Insert the bows as shown, lock the bows in, and press outward to release the retaining catches. Remove the radio.

Replacement

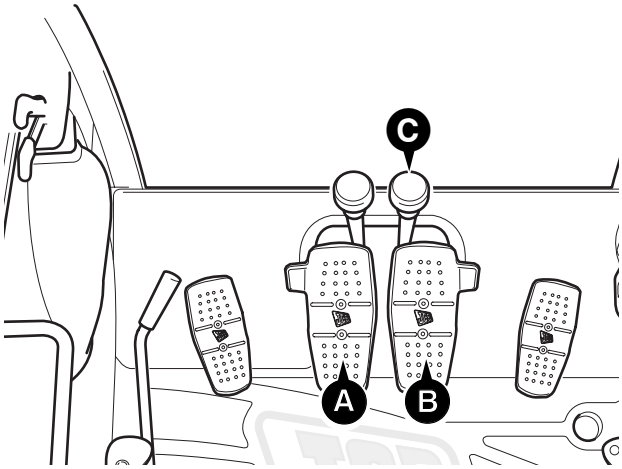
Insert the bows as shown, lock the bows in, and press outward to release the retaining catches. Replace the radio.

Radio Mute Switch

A radio mute switch is located on the right hand console. Pressing this switch turns the radio on and off (assuming that the radio's own on/off switch is set to ON).

Travel Levers

Travel is controlled by the two levers/foot pedals **A** and **B** at the front of the cab. Each lever controls the track on the same side, i.e. the left lever controls the left track, when the cab is facing forwards, that is towards the dozer blade. Before operating the travel lever, confirm whether the undercarriage is facing forwards or backwards.



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Note: When not travelling, do not place your feet on the travel pedals.

WARNING

When the cab is swung around so that it is facing the track motor end of the undercarriage, the action of the tracking controls is reversed. Take extra care!
8-2-8-1

Travel Speed Change Button

The travel speed of the machine can be changed between high and low by pressing button **C**. (The travel speed is recorded at engine shutdown and is re-applied at the next engine start up). Each time the button is pressed, the speed is changed.

Travel Mode	Choice Selected
High Speed 	Use when the ground is level. When the load on the track motors increases, eg when travelling up a slope or dozing, speed automatically changes to Low. When the load reduces, speed returns automatically to High.
Low Speed 	Use when climbing or descending a slope or when the ground is rough. It does not change automatically.

Note: Do not change the mode when travelling. Stop the machine to select different speeds.

Excavating Controls

Excavating

Excavating is controlled mainly by the movements of the left **A** and right **B** Excavator joystick Controllers. Other associated controls are Mode Select (see **EMS Panel**), the Slew Lock button and the swing pedal.

Many excavating movements are a combination of two (or more) movements at the same time, which requires practice. Practice the movements singly at first and then in combination until you are completely familiar with the effects of all the controls.

⚠ CAUTION

Do not excavate on hard or rocky ground with the boom positioned diagonally across the undercarriage. The resulting rocking motion could cause damage to the track gear box sprockets.

8-2-2-6

Operation

Before starting to excavate make sure that the control lock lever is down (see **Left Console**), and the Slew Lock Switch and Servo Isolator Switch are set to OFF (see **EMS Panel**).

Use the decal to remind you of the movements when you are operating.

After the engine is stopped there will be sufficient pressure available for a limited time to enable the boom/dipper to be lowered to a safe position.

⚠ CAUTION

When carrying out deep digging it is possible that part of the boom structure may contact the undercarriage. Take extra care when digging, to avoid damaging the machine.

8-2-8-2/2

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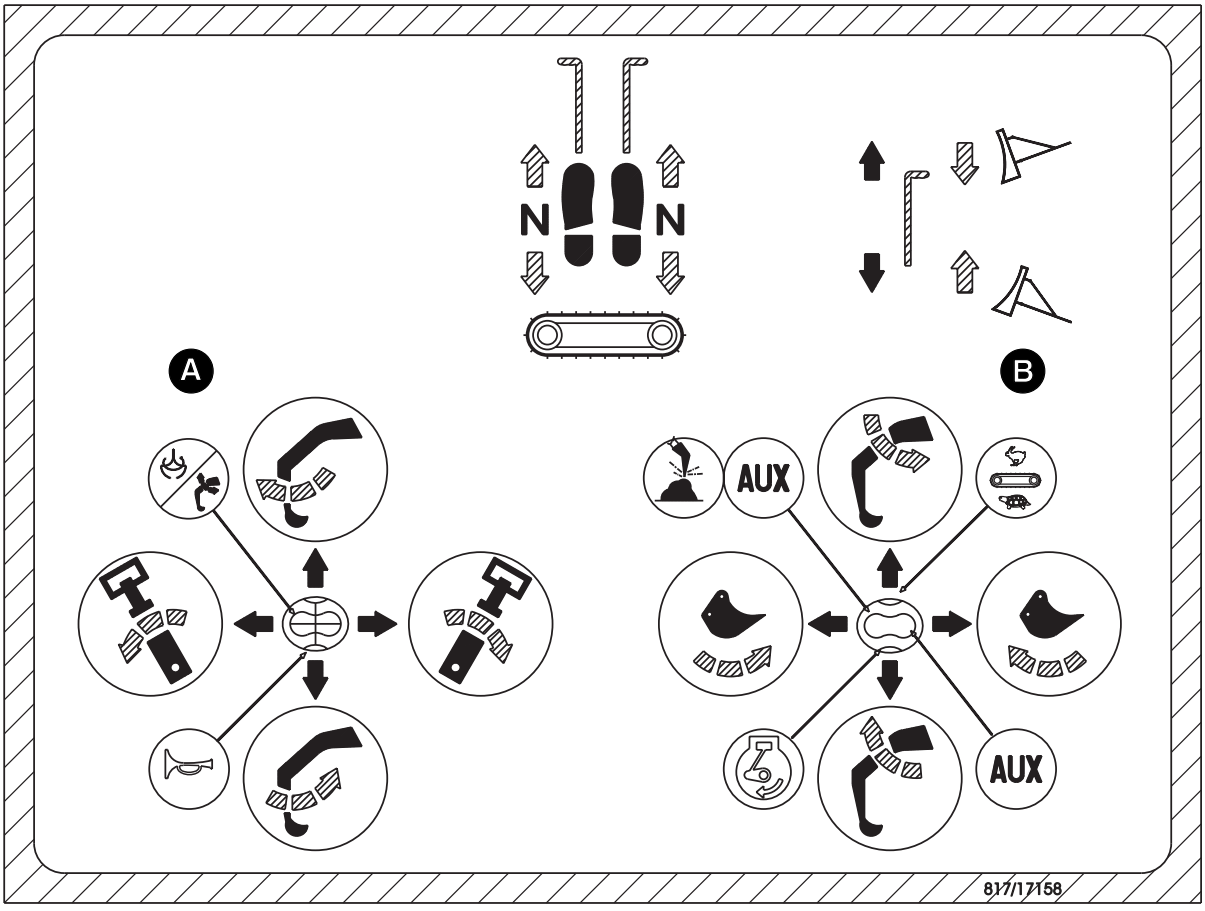


Excavating Controls (cont'd)

Slewing

⚠ WARNING

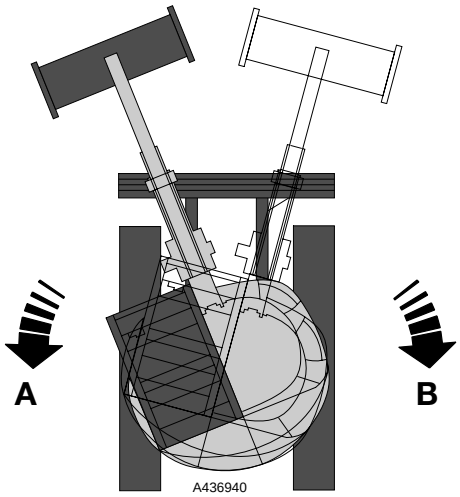
When using the boom and dipper fully extended, take the following precautions, otherwise the machine could get damaged or become unstable and a danger to you and other people.

Make sure you do not exceed the working capacity of the boom at maximum reach.

Swing the boom slowly to prevent any chance of the machine becoming unstable. For the same reason avoid dumping downhill if possible.
HOP36

⚠ CAUTION

Do not excavate on hard or rocky ground with the boom set diagonally across the undercarriage. This induces a rocking motion that can cause damage to the track gearbox sprockets and tracks.
HOP37



Before slewing the cab, ensure that the slew lock is switched off (see **Facia Panel**).

Slew Left

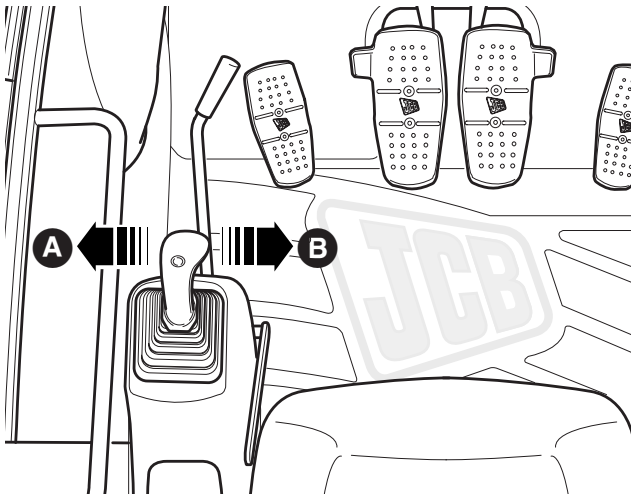
To slew the upperstructure to your left, move the left controller to the left **A**. Release the controller when you have moved to the desired position.

Slew Right

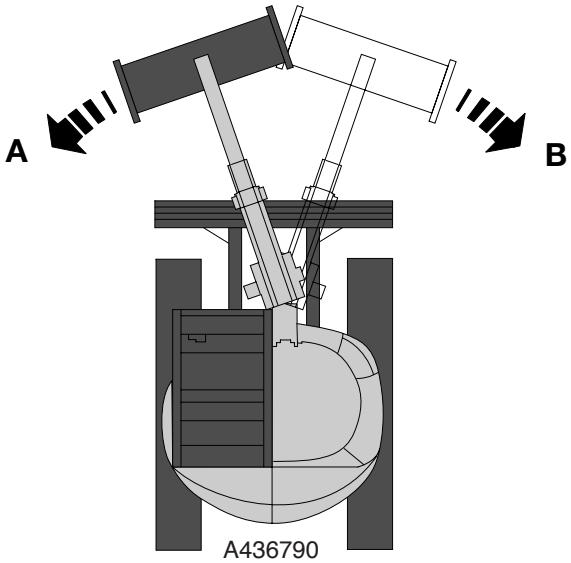
To slew the upperstructure to your right, move the left controller to the right **B**. Release the controller when you have moved to the desired position.

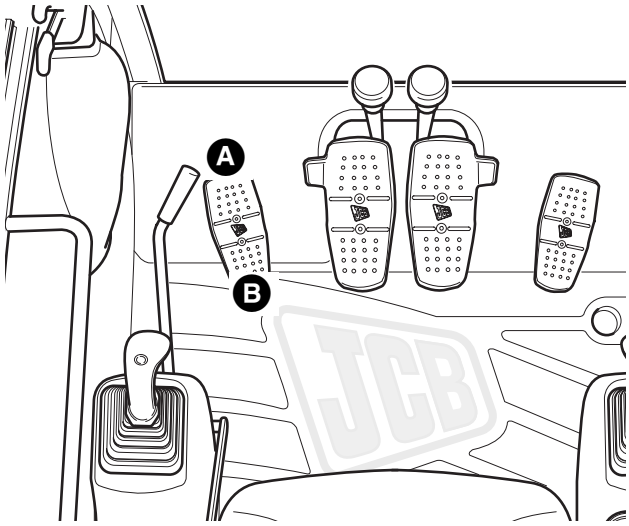
⚠ WARNING

Before operating the excavator controls always check to see which control pattern has been selected. Operate the machine slowly until you are familiar with the pattern selected. If the pattern selection indicator lamp is not illuminated, DO NOT operate the machine until any faults have been rectified.



Excavating Controls (cont'd)





Boom Swing

Note: The pedal casting incorporates arrows which indicate boom swing direction.

Note that the swing ram incorporates 'end damping' at the limits of its travel. This reduces the speed of the piston at each end of its travel, thereby eliminating 'shock loading' of the system.

Swing Boom Left

To swing the boom to your left **A**, press the toe end of the pedal. Release the pedal when the excavator end has reached the desired position.

Swing Boom Right

To swing the boom to your right **B**, press the heel end of the pedal. Release the pedal when the excavator end has reached the desired position.

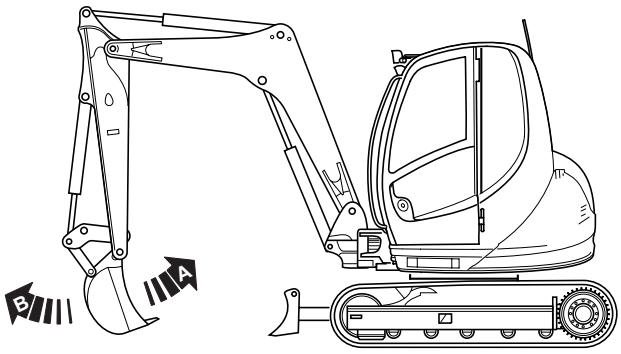
⚠CAUTION

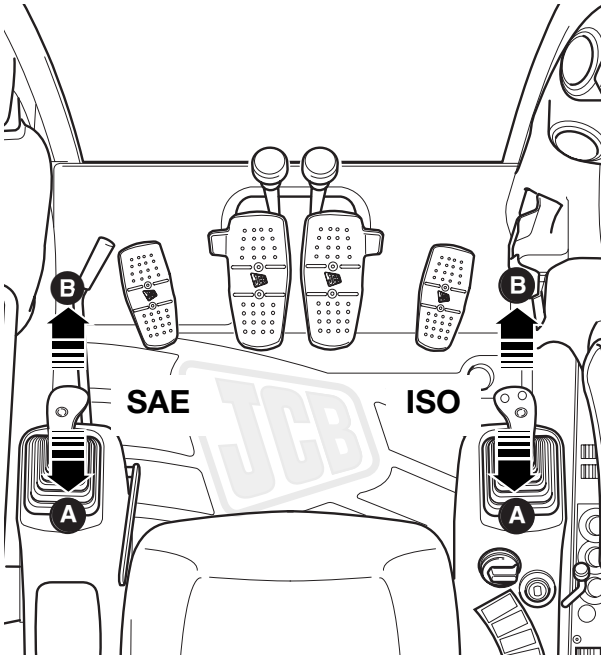
When buckets 750 mm (29 in) or wider are fitted to the machine, use extreme caution in operation to avoid contact with the cab.

Boom Swing Stop

A boom swing stop can be fitted to restrict the kingpost swing angle when wide buckets are installed.

Excavating Controls (cont'd)





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Boom Raise/Lower

⚠ WARNING

Thoroughly warm the hydraulic oil before operating the excavator services. Before selecting boom up, check there are no overhead obstructions or electric power cables.

HOP40

Raise Boom

To raise the boom pull the respective controller backwards **A**. Release the controller when the boom has reached the desired position. The boom ram incorporates damping at the limit of boom raise, reducing the speed of the ram and thereby eliminating shock loadings.

Lower Boom

To lower the boom, push the respective controller forwards **B**. Release the controller when the boom has reached the desired position.