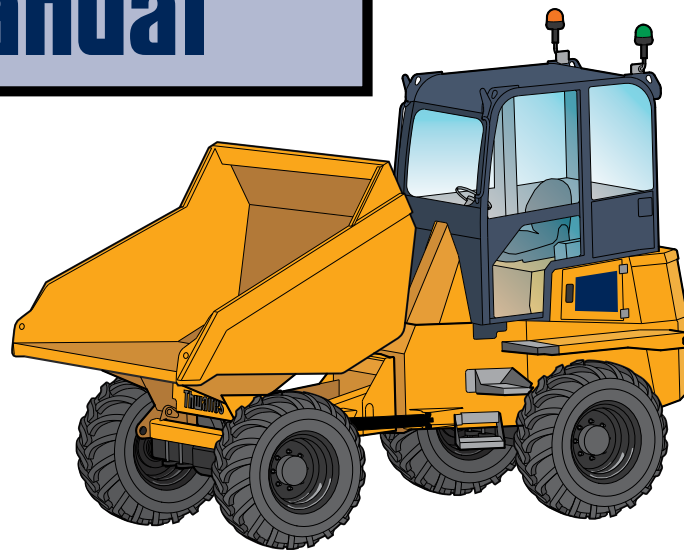
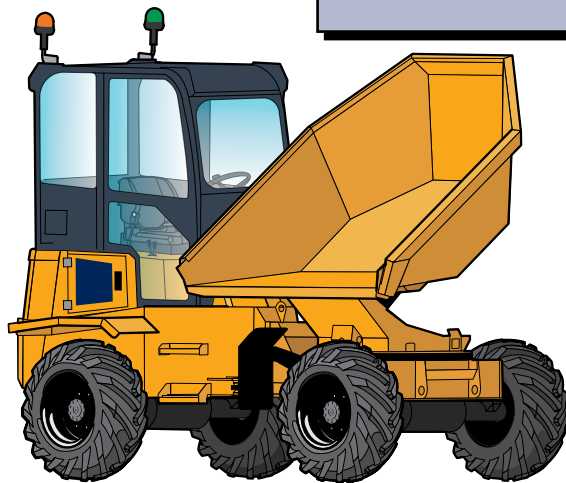


6 - 9 Tonne (Cabbed)

Thwaites

MACH 2164, 2165,
2166, 2190

Operator's Instruction Manual





1 Introduction

Thwaites

Thwaites Limited puts Safety First

It is the policy of Thwaites Limited to promote safety in the operation of its machines and to create a general awareness of site safety and safe working practices for the operators of its machines.

This Operator's Instruction Manual is intended for both new and experienced machine operators. It should remain with the machine at all times. All operators should be aware of its location and contents.

It is important that all operators are fully trained and familiar with the machine and that they have read and understood the information contained within this book, before they attempt to operate in the site conditions for which the machine was designed.

This book details practices and operations which Thwaites Limited recommends. DO NOT operate this machine in ways other than those detailed within this book.

This machine is designed for customary construction site operations, and the transportation of bulk materials commonly carried on such sites; that is their 'intended use'. Under certain controlled conditions the dumper may be used for towing

wheeled loads.

Due to the varied nature of the operation of site dumpers and the absence of an agreed test standard, any figures quoted by Thwaites in relation to vibration values and exposure are for reference purposes only. It is the responsibility of the employer to assess vibration exposure based on the actual site conditions, and operating practices, at the point of use.

Hand Arm Vibration - The daily exposure Action/Limit Values of between $2.5 - 5.0 \text{ m/s}^2$ (A8) are unlikely to be exceeded in an eight-hour reference period.

Whole Body Vibration - The daily exposure can only be accurately determined at the point of use. This exposure must be managed in respect of the Action/Limit Values of 0.5 and 1.15 m/s^2 (A8) respectively.

Employers should not rely solely on published vibration figures when undertaking risk assessments. Depending on the site conditions, cycle times may need to be adjusted in order to reduce operator exposure levels.

Vibration values based on typical duty cycles are available on request from Thwaites. These may be used for reference purposes only.

Safety symbols



- Attention!
- Be alert!
- Your safety is involved!



- Correct action



- Incorrect action/procedure which should NOT be carried out

Signal words

Signal words are used on the machine and within this manual to identify levels of hazard seriousness:



DANGER



WARNING



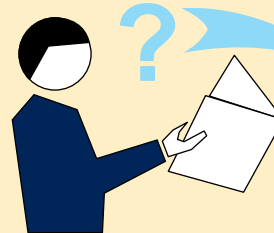
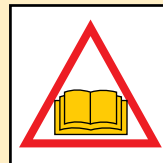
CAUTION

1 Before operating this machine

Thwaites



Read operator's instruction manual



Thwaites
Distributor

1. Contact your Thwaites representative in case of further questions
2. Learn to operate this machine
3. Ensure you are fit to operate
4. Wear correct safety clothing and ensure that safety equipment is available

Complete checks in section

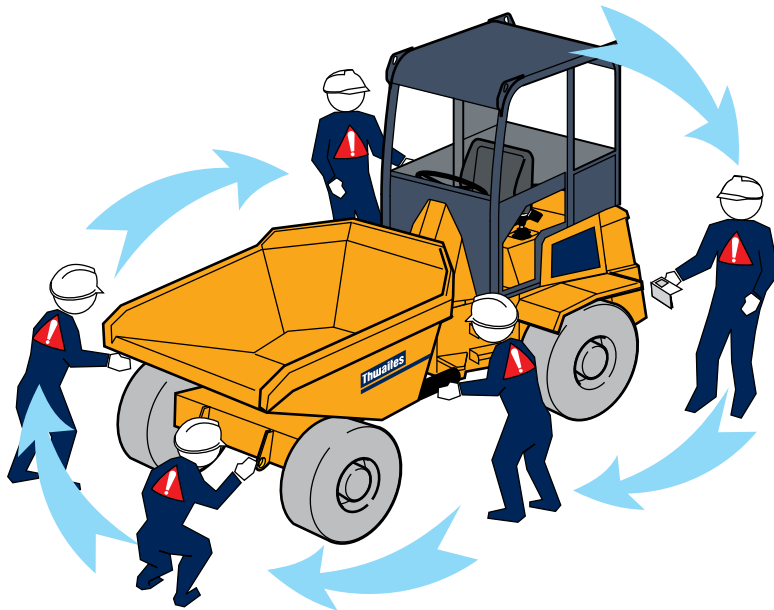


before starting the engine

1 Before operating this machine

Thwaites

Walk around the machine



Visually check the machine

- 1 Are the chassis lock and the skip lock disengaged?
 - 2 Are the controls, crush zone or hydraulic rams clean, and clear of any debris?
 - 3 Is the seatbelt anchorage secure and serviceable?
 - 4 Are the covers and mudguards secure?
 - 5 Are the hoses free from fluid leaks?
 - 6 Are all safety decals legible?
 - 7 Are the tyres free of cuts or splits?
 - 8 Are all bolts tight and in position?
 - 9 Are there fluid leaks under the machine?
 - 10 Is there exhaust system damage?
 - 11 Are the steering wheel and the steering column undamaged?
 - 12 Are the windscreen wipers undamaged?
 - 13 Have the daily maintenance tasks been performed?
- (See section 5)

Report all faults immediately.



WARNING

Incorrect tyre pressures reduce machine stability.



**DO NOT OPERATE THE MACHINE UNTIL
ALL FAULTS HAVE BEEN RECTIFIED**

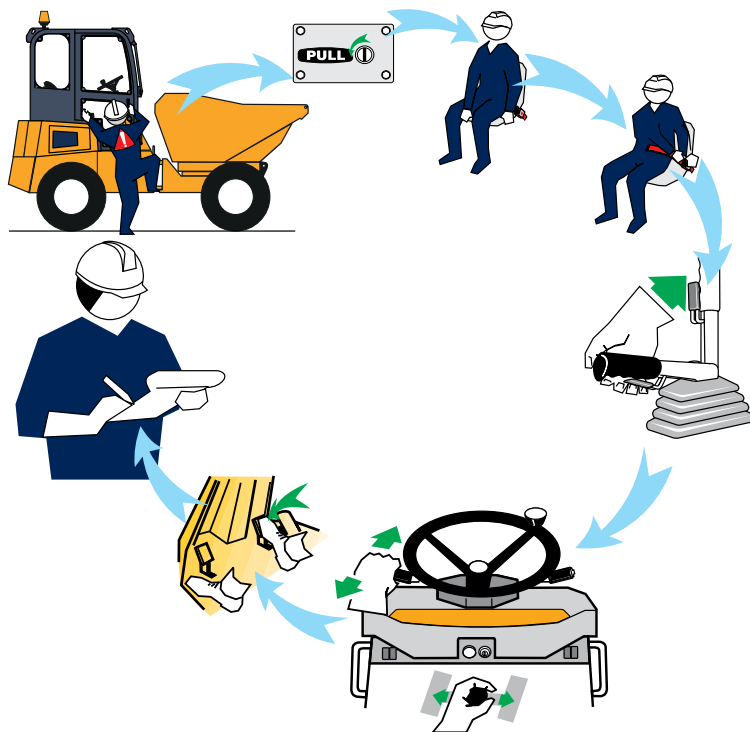
Complete checks in section



before starting the engine

1 Before operating this machine

Thwaites



Mount the machine and check the controls

- 1 Use the grabrails and foot steps provided to manoeuvre into seating position. Face the machine at all times when mounting and dismounting
- 2 Is the engine cover secure and locked?
- 3 Adjust the seat position for comfort and easy access to controls
- 4 Fasten the seat belt. Adjust accordingly for safety and comfort
- 5 Is the hand brake ON?
- 6 Set the transmission to neutral
- 7 Does the foot brake feel firm?
- 8 Do not operate the machine without understanding all its controls as described in the following pages



WARNING

A seatbelt **MUST BE WORN** when operating machine.
The machine will not move if the seatbelt is not fastened.

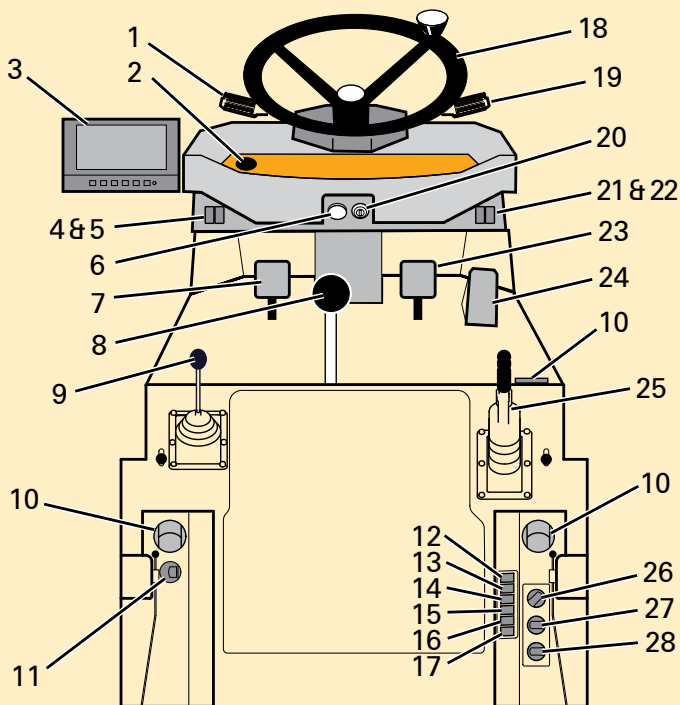
Complete checks in section



before starting the engine

1 Layout of controls

Thwaites



Control locations and functions

1. Forward/Neutral/Reverse lever
(Includes gear selection Powershift only)
2. Horn push
3. Camera monitor
4. Blank
5. Handbrake test switch
6. Warning buzzer
7. Dump valve pedal
8. Gear lever (*Powershuttle only*)
9. Bucket control lever
10. Air vents
11. Hourmeter/Error code display
12. USB sockets*
13. Front work lights switch*
14. Front windscreen wiper / washer switch
15. Blank
16. Rear windscreen wiper switch*
17. Rear work lights switch*
18. Steering wheel
19. Light switch lever*
20. Ignition switch
21. Hazard warning light switch*
22. Blank
23. Footbrake pedal
24. Throttle pedal
25. Handbrake lever
26. Heater - temperature control
27. Heater - fan speed control
28. Air conditioning switch*

* *Optional items*

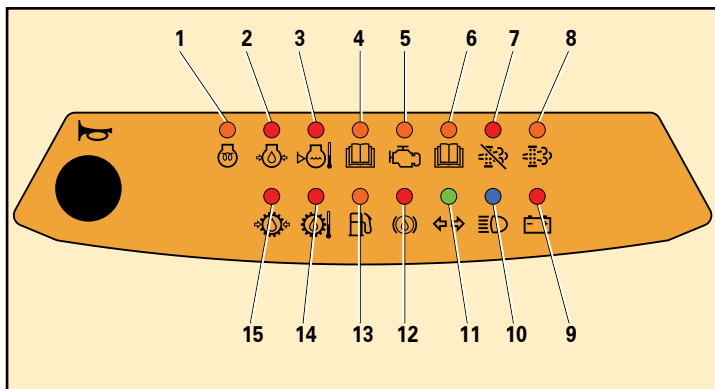
Complete checks in section



before starting the engine

1 Warning light location and functions

Thwaites



Warning light location and function

1. Cold start pre-heat in operation
2. Engine oil pressure
3. Engine coolant level / or temperature high
4. Air filter or water in fuel or fuel pressure*
5. Engine Warning Lamp (EWL), Engine system fault detected*
6. Warning air boost pressure or air temperature high*
7. DPF Regeneration required (**DPF only**)**
8. DPF Ash load limit reached (**DPF only**)**
9. Battery charging
10. Headlamp full beam**
11. Direction indicator**
12. Low brake oil level
13. Low fuel
14. Transmission oil temperature
15. Transmission oil pressure

Multi function display unit

16. Battery state of charge
17. Fault Code light
18. Hourmeter or error code - display
19. Reset buttons

 Refer Control functions in depth Section 1

**Reading of error code display required refer to Section 4*

***Optional equipment*

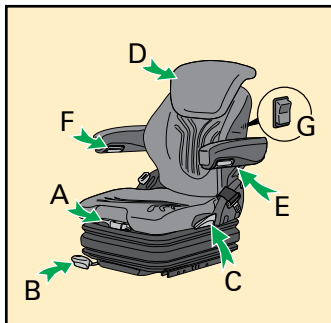
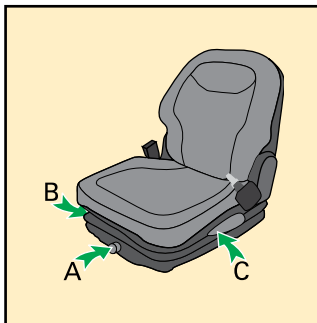
Complete checks in section



before starting the engine

1 Control functions - in depth

Thwaites

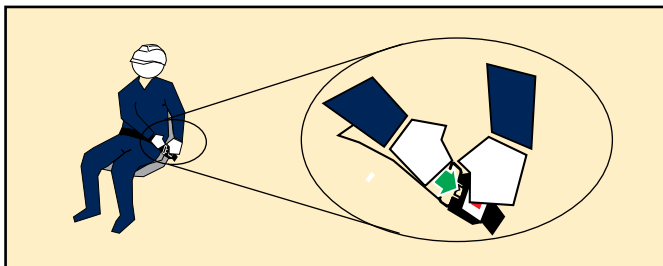


Standard Seat adjustment

- A – Turn knob to set driver weight
- B – Lift to slide seat assembly forwards/backwards
- C – Lift handle to adjust backrest

Heated Seat adjustment (If fitted)

- A – Pull or press the lever to set driver weight
- B – Lift to slide seat assembly forwards/backwards
- C – Lift handle to adjust backrest
- D – Pull or push backrest extension to adjust
- E – Lumber support is increased and decreased by turning the adjustment knob
- F – Armrests can be folded back and height adjusted by turning the adjustment knob
- G – The seat heater is switched on and off by pressing the switch



Seatbelt

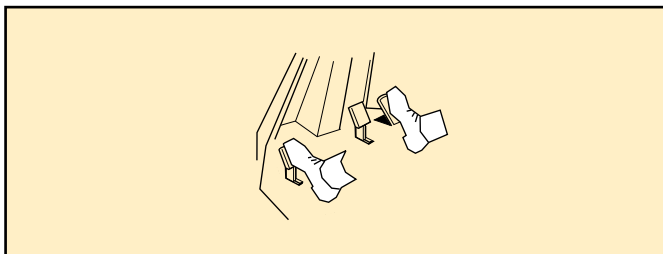
- Adjust length of belt when seated
- Press buckle blade into buckle lock
- Pull belt webbing through buckle blade to remove slack



Seatbelt should not be worn loose. It should pass comfortably across hip bones and not the abdomen.



Machine will not move if buckle is not inserted into the lock.



Throttle pedal - right foot

- Apply pressure to increase engine speed
- Release pressure to reduce engine speed

Foot brake - right foot

Apply pressure to slow or stop the machine

Dump valve pedal - left foot

Press down before each gear change - select gear, then release

Complete checks in section



1

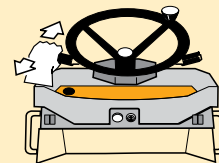
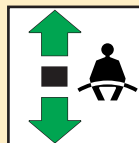
before starting the engine

1 Control functions - in depth

Thwaites

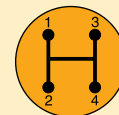
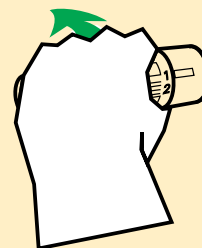
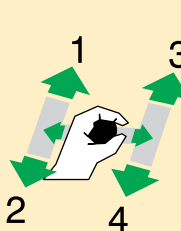
Forward/neutral/reverse lever (FNR lever) (powershuttle) - left hand

- Push forwards to travel in a forward direction
- Lever centred = neutral
- Pull back to travel in a reverse direction



Gear lever (powershift) - left hand

- Up changes - anti-clockwise selects gears 1 to 4
- Down changes - clockwise selects gears 4 to 1



Gear lever (powershuttle only) - left hand

forward-left
first gear

neutral

forward-right
third gear

back-left
second gear

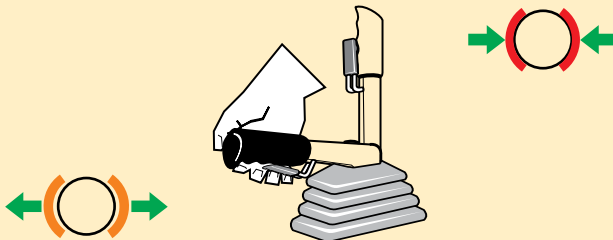
back-right
fourth gear

Hand brake lever - right hand

- Use only when the machine is stationary (or in an emergency)
- Pull lever up to apply
- Pull catch and lower lever to release



An audible warning device is fitted to your machine. This will sound if the parking brake is engaged whilst forward or reverse is selected and machine will not move.



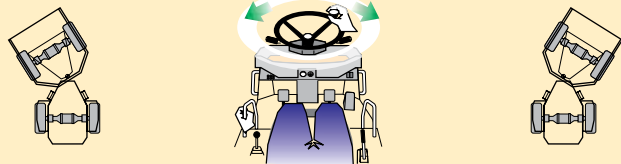
Complete checks in section



before starting the engine


1 Control functions - in depth

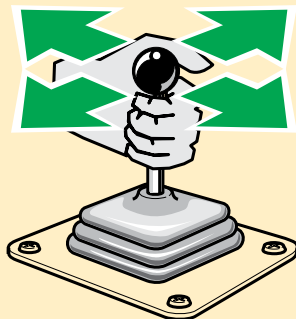
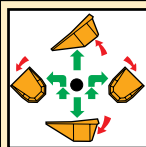
Thwaites



Steering wheel - both hands

- Turn the wheel clockwise to turn machine to right
- Turn the wheel anti-clockwise to turn machine to left

 Ensure the non-steering hand is on the engine cover grabrail when using the spinner knob for low-speed single handed steering.




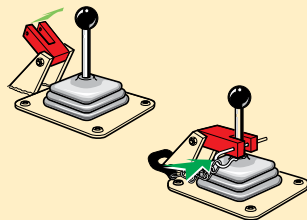
Tipping control lever (front tip models) - left hand

- Push forward to raise skip
- Push backward to lower skip

Tipping control lever (powerswivel models) - left hand

- Raise skip 100 mm (4") to disengage pivot centring lock
- Rotate skip to a central position (fully lowered) to automatically engage centring lock
- Raise skip and push lever to the right to rotate skip clockwise
- Raise skip and push lever to the left to rotate skip anti-clockwise
- Increased engine speed reduces cycle times

 Movement of the bucket is disabled if the steering wheel is moved (steering is given priority)



Tipping lever lock (If fitted)

- Place yoke over tipping lever and secure with linch pin

Complete checks in section  before starting the engine

1 Control functions - in depth

Thwaites

Heater controls

The three heater controls are on the right hand side of the operator's seat

- Temperature - Turn the control knob to blue for coldest setting and red for hottest.
- Fan - The fan control has four positions
 - = Off
 - I = 1st fan speed
 - II = 2nd fan speed
 - III = 3rd fan speed

Air conditioning switch (If fitted)

- The switch has two positions
 - = Off
 - ⚙ = On

👉 Fan switch has to be ON for air conditioning to work. For optimum cooling keep all doors shut, all vents open and fan speed set to 3.

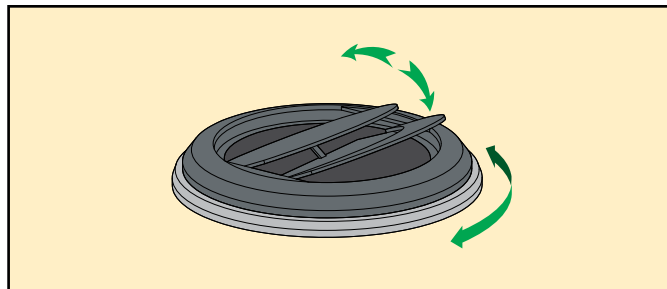
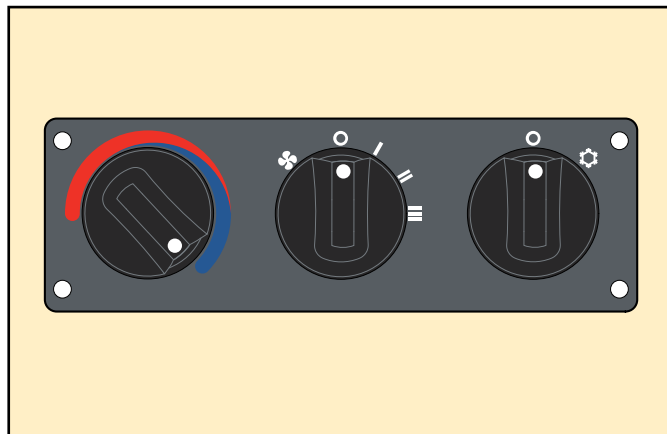
In order to ensure efficient performance, operate the air conditioner for a few minutes once a week, irrespective of the weather and time of year.

Air vents

There are three air vents, one on each side off the drivers seat and one on the righthand side below the seat.

The vents turn and have flaps to direct the air where required.

👉 If the vents are closed all of the air flow is directed to the windscreen for demisting



Complete checks in section



before starting the engine

1 Control functions - in depth

Thwaites

Windscreen wipers

The windscreen wiper switches are on the right hand side of the operator's seat

- Front windscreen wiper and washer (A) press and hold for washer
- Rear windscreen wiper (B) (if fitted)

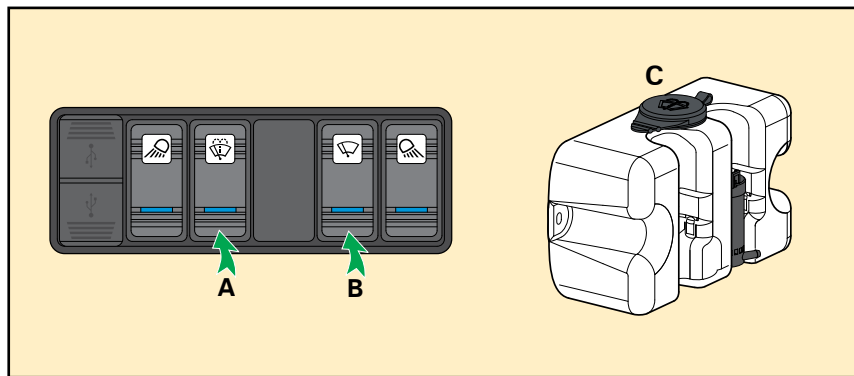


Switch symbol illuminates when switch is on

Windscreen washer fluid

The fluid tank is located to the rear of the operator's seat on the right hand side

Open the cap (C) and fill to 25mm from the top of the tank



Multi Function Display Unit

1. Battery state of charge
2. Fault code indicator lamp
3. (A) Hourmeter display
(B) Number of errors
(C) Error code

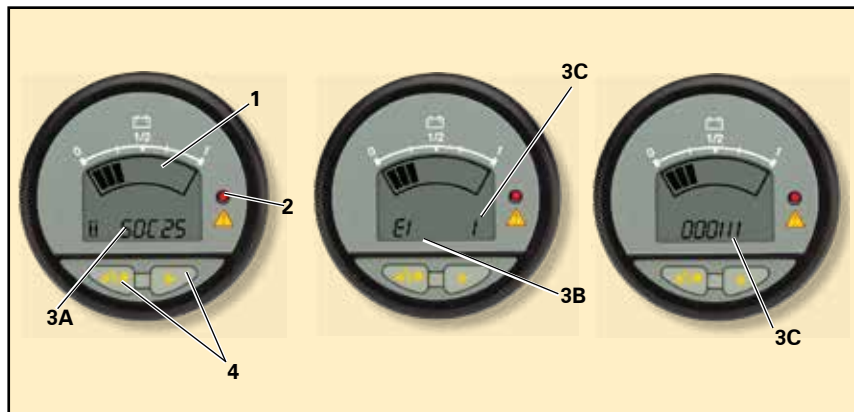
A lit fault code lamp indicates waiting error code, this will show in place of the hourmeter reading with multiple codes showing for a few seconds each.

4. Reset buttons

If engine warning lamp is lit with no error code display showing simultaneously push both buttons for 2 seconds. To reset the ECU and clear any errors.



If engine warning lamp remains lit
Refer to Section 4 for troubleshooting



Complete checks in section **1** before starting the engine

1 Control functions - in depth

Thwaites

Camera monitor


To turn the monitor on press POWER, the power indicator light will illuminate.

- With the machine in neutral or forward drive the monitor will automatically display the forward facing camera and the left and right cameras if fitted.
- With the machine in reverse drive, the monitor will automatically display the rear facing camera only.

For any adjustments to the monitor please read the manufacturers operating instructions supplied together with this manual.

 Monitor defaults to factory settings when ignition is switched off

To adjust the monitor angle slacken off the thumb screws (A). Adjust monitor to required position and tighten thumb screws.

 When the machine is in use the camera monitor **MUST** be switched ON.

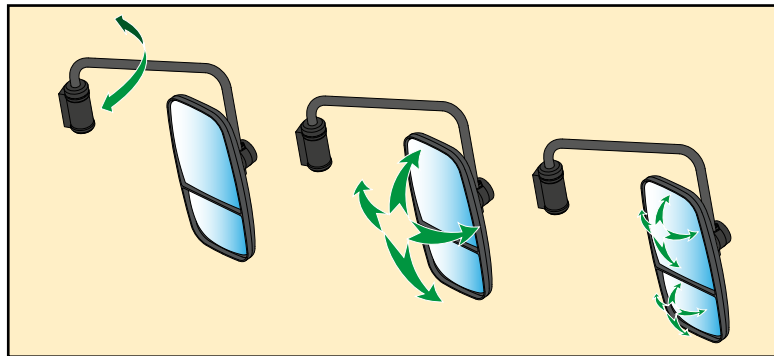
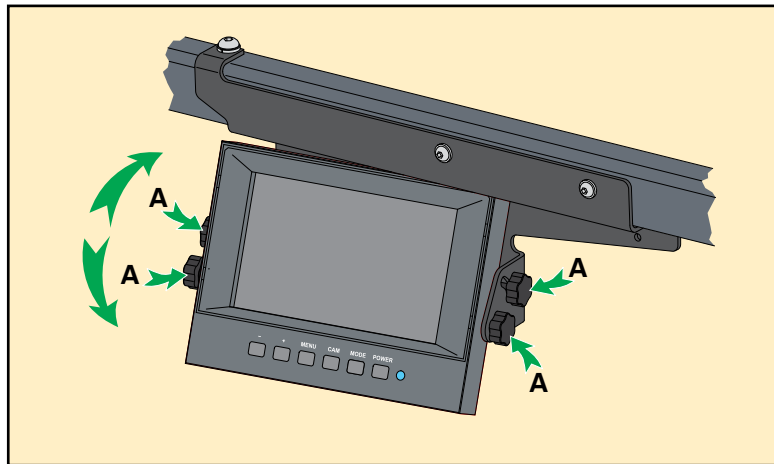
Mirrors

The machine is fitted with two rear view mirrors mounted on either side of the windscreen.

Adjustment

- The mirror arm can be rotated vertically.
- The mirror body can be rotated vertically and horizontally on the mirror arm.
- Each mirror lens can be rotated vertically and horizontally independently within the mirror body.

Move the mirrors to the correct position as shown in this section ?



Complete checks in section



before starting the engine


1 Control functions - in depth

Thwaites

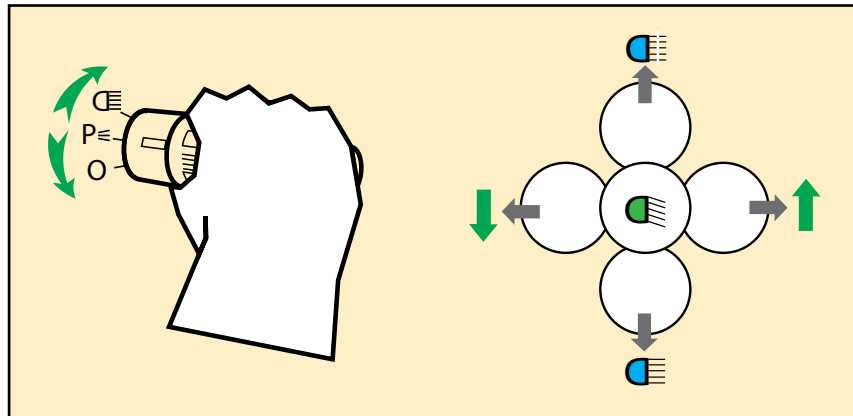
Road lights switch lever - Right hand (If fitted)

Operates both lighting and direction indicators.

With the lever in the middle position rotate switch body to select;

- 0 = Lights 'Off'
- P = Sidelights 'On'
-  = Headlight 'On'


- Lift lever up to flash full beam
- Centre lever to dip beam
- Push lever downwards for constant full beam
- Pull lever backwards for right turn indicators
- Centre lever to cancel indicators
- Push lever forwards for left turn indicators

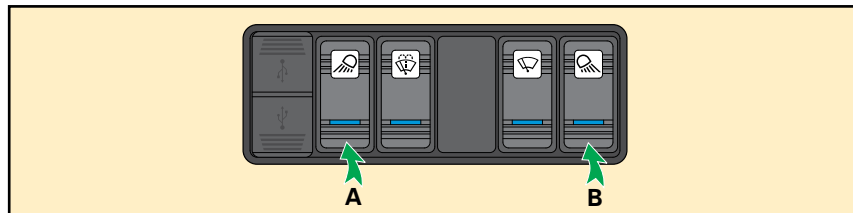


Work lights (If fitted)

The work light switches are on right hand side of the operator's seat;

- Front work lights (A)
- Rear work lights (B)

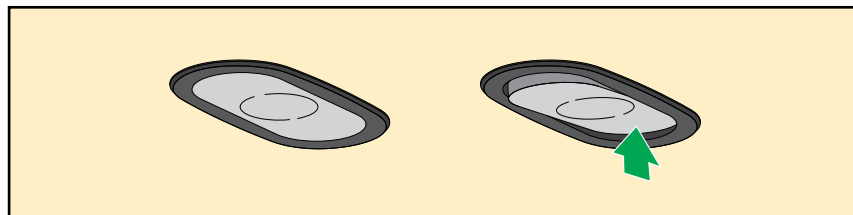
 Switch symbol illuminates when switch is on
If road lights are fitted, side lights have to be on for work lights to operate



Interior light

The interior light is in the roof of the cab;

- Lens in the centre position = Light 'Off'
- Push lens = Light 'On'



Complete checks in section  before starting the engine

1 Control functions - in depth

Thwaites

Access doors

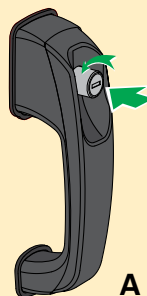
The cab has two access doors, one on each side.

To open the doors from the outside (A);

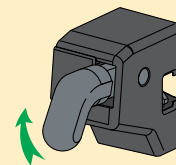
- Insert key and turn anti-clockwise to unlock
- Press the button and open the door

To open the doors from the inside (B);

- Lift the lever to release the lock



A



B

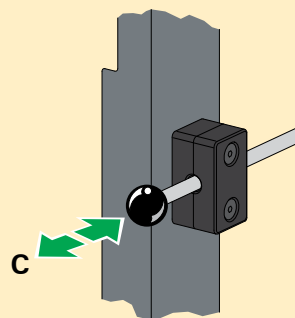
Doors can be secured in two open positions

Door fully open;

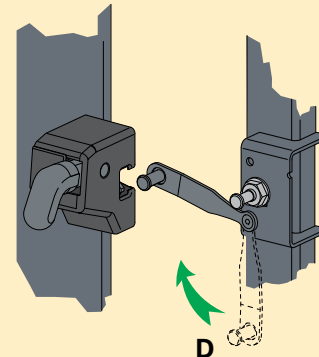
- Push the door fully back until it locks on to the rear door latch
- To release door pull or push the door release lever (C)

Vent position;

- Open the door, lift vent arm (D) and locate into door lock, close door
- To release door lift the lever (B) to unlock



C



D



WARNING

Only operate machine with the doors in a secured position

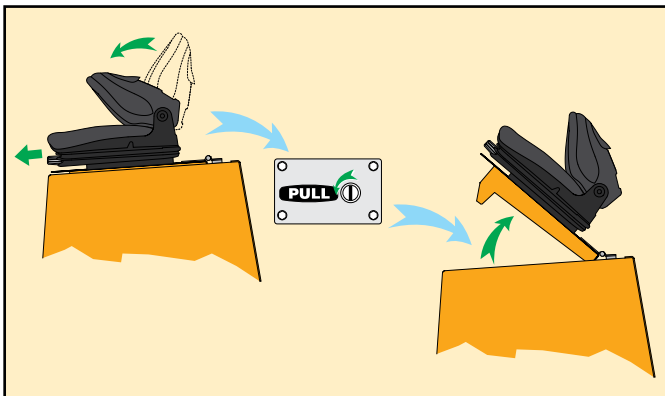
Complete checks in section



before starting the engine

1 Control functions - in depth

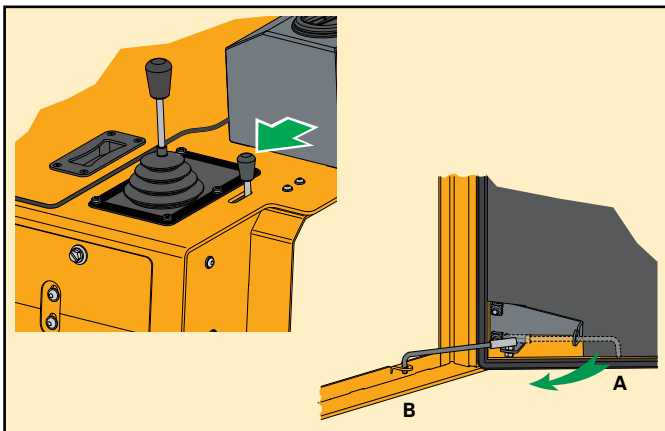
Thwaites



Engine cover

To open engine cover;

- Slide seat assembly forward as far as possible
- Lower backrest
- Insert ignition key and turn anti-clockwise to unlock
- Pull handle to release and raise cover
- Lower cover, secure and lock before driving
- Reposition seat



Engine maintenance panels

The panel release levers are situated on either side of the drives seat;

- To open push lever forward to release panel
- To close push panel firmly it will shut on its own

When maintenance operations are being carried out secure panels using the stays provided.

- Lift stay from its stowage position (A) and insert in to the catch on the engine cover (B).

Complete checks in section **1** before starting the engine

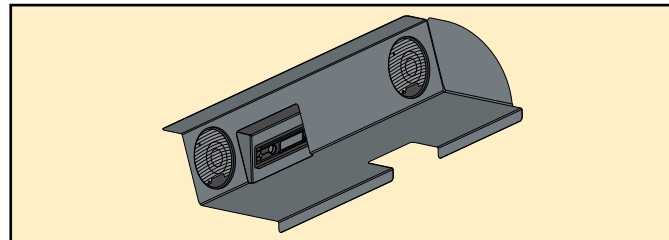
1 Control functions - in depth

Thwaites

Radio and speakers (If fitted)

The radio and speakers are situated to the rear of the cab above the drivers head.

For any adjustments to the radio please read the manufacturers Operating instructions supplied together with this manual.

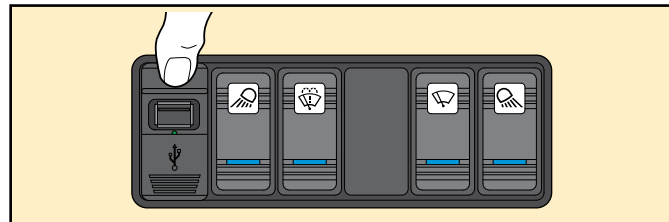


Auxiliary USB sockets (Power only, if fitted)

The dual port USB charger is on the right hand side of the operator's seat designed to charge compatible electronic devices.

The centre LED indicates charging is in progress.

Push spring-loaded access covers to open.

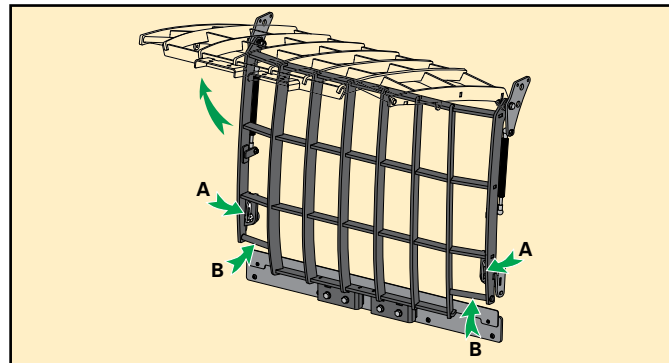



Screen Guard (if fitted)

Only operate the machine with the screen secured in the down position. For access to the windscreen for cleaning or maintenance the screen guard can be raised up.

1. Park the machine on level ground and raise the skip.
2. Release the anti-luce fittings on each side of the guard (A).
3. Raise the guard, the gas strut should at this point start to assist the lift to full height.

To lower the guard use the grab handles (B) to pull the guard down and then secure the anti-luce fittings (A).



 Keep your hands clear of the under side of the guard during this process to avoid injury.

Complete checks in section



before starting the engine

1 Control functions - in depth

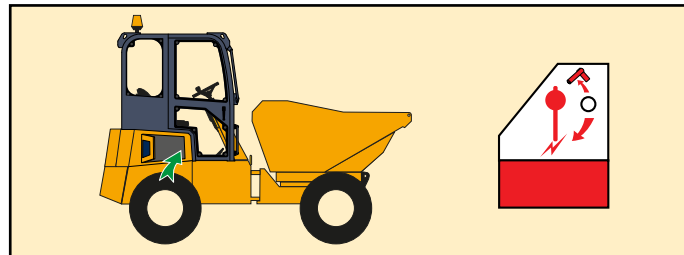
Thwaites

Battery isolator (inside right hand maintenance panel)

- Turn key anti-clockwise to isolate the battery power supply

CAUTION

DO NOT isolate the battery power within 30 seconds of stopping the engine, this may damage Engine Control Unit (ECU).



Engine System Fault Monitoring



The electronic control unit (ECU) protects the engine by monitoring for system faults. If a fault is detected, the error lamp located on the dash panel will either light continuously or flashes. In addition an intermittent audible alarm will sound.

The following action must be taken if error lamp / alarm sounds.

“Continuous error light plus intermittent audible alarm”

The machine **should** be stopped **as soon as safely possible**, the engine switched off and the fault corrected.

WARNING

If initial warning is ignored, the error lamp and audible alarm frequency will change to :-

“Flashing error light plus rapid intermittent audible alarm”

The machine **must** be stopped **as soon as safely possible**, the engine switched off and the fault corrected.



WARNING

If secondary warning is ignored, the engine control unit will automatically reduce available power and / or automatically shutdown the engine and bring the machine to a halt.

“The engine **must** be switched off and fault corrected”



Note - When all the faults have been corrected it may be necessary to switch off the ignition, wait 30 seconds and only then switch the engine back on.



WARNING

Warning - Auto Engine Shutdown

To prevent serious damage the engine monitoring system will automatically reduce engine power and / or shutdown the engine if immediate action is not taken to correct a serious engine system fault notified to the operator by error warning lamps plus audible alarm.

Complete checks in section

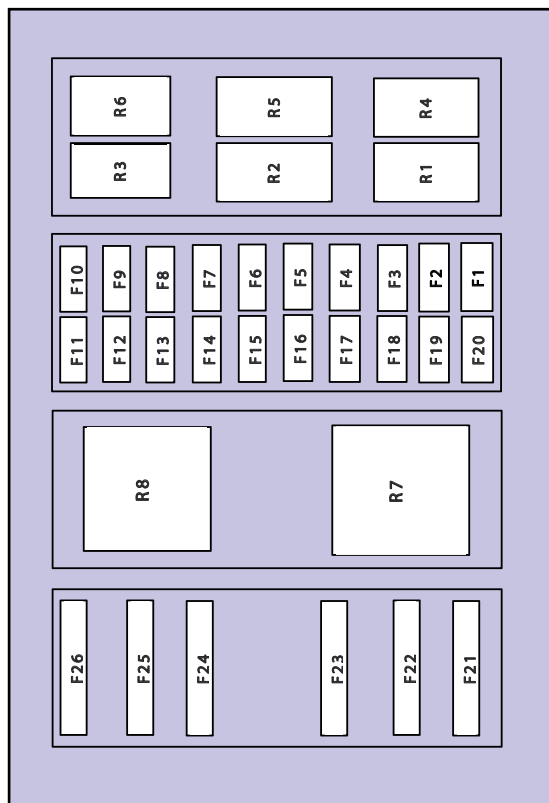


before starting the engine

1 Fuse and relay panel location and function

Thwaites

Fuse and Relay Panel



Fuse Table

Fuse No.	Rating	Function
F1	20A	Light Column Switch
F2	20A	Fuel Pump Relay
F3	15A	Hazard Switch
F4	10A	Ignition Switch
F5	-	Spare
F6	10A	Light Column Switch
F7	30A	Eng ECU Vbatt Ve +
F8	-	Spare
F9	5A	LH Tail Light
F10	5A	RH Tail Light
F11	5A	Hour Meter / LED Module
F12	20A	FNR Selector
F13	20A	Horn Switch
F14	15A	Worklight Beacon
F15	10A	Engine Diagnostic
F16	5A	Motion Inhibit Connection (Option)
F17	20A	Brake light Switch
F18	20A	Headlamp Relay
F19	-	Spare
F20	-	Spare
F21	50A	Preheat Relay
F22	-	Spare
F23	30A	Battery Busbar 2
F24	50A	Battery Busbar 1
F25	30A	KL 15 Ignition Relay
F26	-	Spare

Relay Table

Relay No.	Function
R1	Fuel Pump Relay
R2	Headlamp Relay
R3	Neutral Relay 1
R4	Neutral Relay 2 (Powershuttle only).
R5	Spare
R6	Spare
R7	Preheat Relay
R8	KL 15 Relay

Relay Dash Panel

Relay No.	Function
R12	Seat Belt Immobiliser Relay - Latch
R13	Seat Belt Immobiliser Relay - Drive
R14	Seat Belt Immobiliser Relay - Beacon
R15	Flasher Relay

Complete checks in section



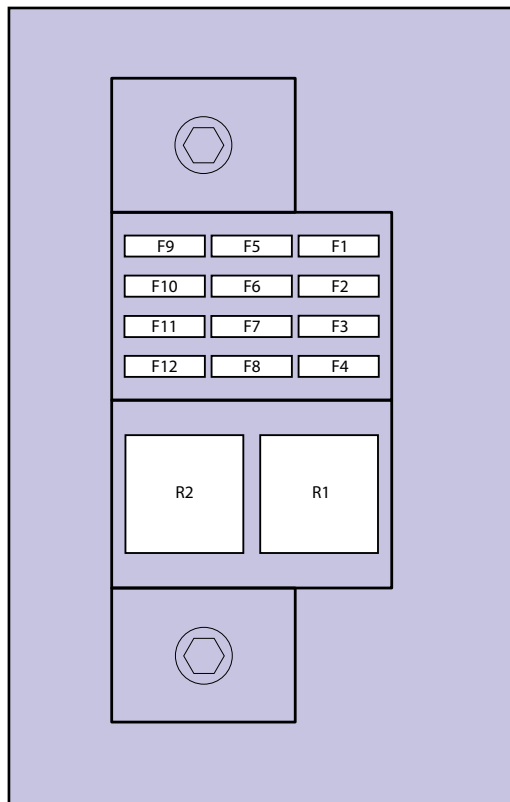
before starting the engine



1 Fuse and relay panel location and function

Thwaites

Cab Fuse and Relay Panels

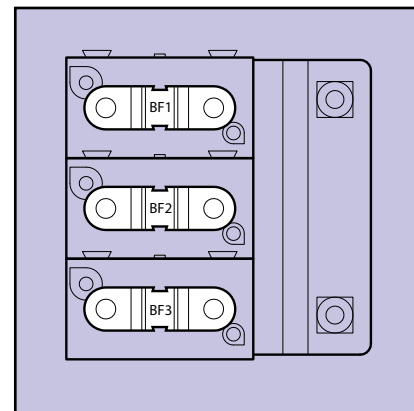


Fuse Table

Fuse No.	Rating	Function
F1	15A	Front Wiper Motor / Washer
F2	15A	Front & Rear Work Lights
F3	15A	Blower Motor & Air Compressor
F4	7.5A	USB Charger & Switch Illumination
F5	15A	Radio
F6	15A	Rear Wiper Motor
F7	3A	Camera System
F8	15A	Air Seat
F9	-	Spare
F10	-	Spare
F11	5A	Radio Memory
F12	20A	AC Condenser Fan

Relay Table

Relay No.	Function
R1	Feeds fuses F1, F2, F3, F4
R2	Feeds fuses F5, F6, F7, F8



Fuse Table

Fuse No.	Rating	Function
BF1	23A	Feeds fuses F1, F2, F3, F4
BF2	40A	Feeds fuses F5, F6, F7, F8
BF3	40A	Feeds fuses F11, F12

Complete checks in section

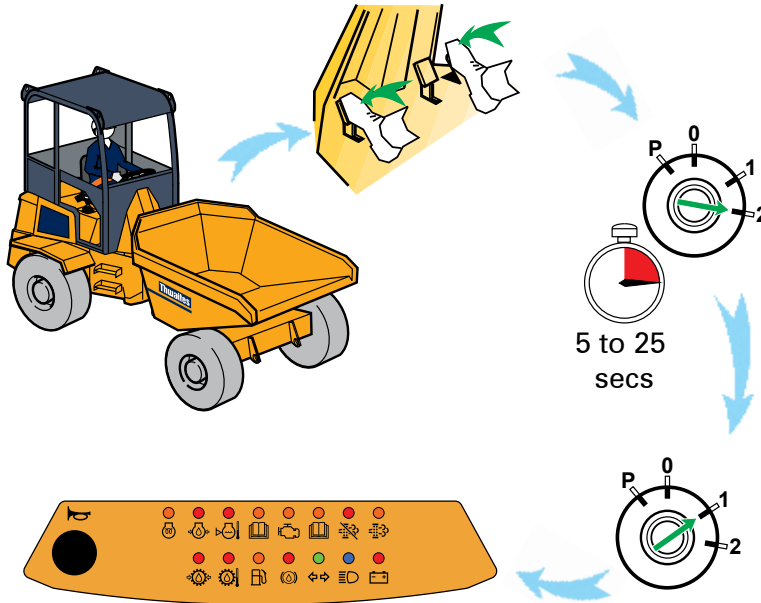


1

before starting the engine

2 How to START and STOP the engine

Thwaites



CAUTION

Run the engine at a low idling speed for approximately one minute before switching off. This avoids turbocharger damage due to possible lack of lubricating oil.

To start the engine

- Insert key into switch - Position 0 = Power Off.
- Turn the key clockwise - Position 1 = Power On.

Cold weather start pre-heating begins automatically as required.

All warning lights illuminate (self-test).

- Turn the key clockwise – Position 2 = Start.

Possible delay may be noticed due to pre-heat requirement before engine start.

All warning lights go out when engine starts.

- When the engine starts release key and it will spring back to position 1.

The length of time taken to start the engine is automatically limited. If the engine fails to start release the key and it will spring back to position 1.

- Turn the key anti-clockwise – Position 0 = Power off

Wait 30 seconds before repeating the engine start procedure

Engine re-starting while the engine is already running is prevented.

To stop the engine

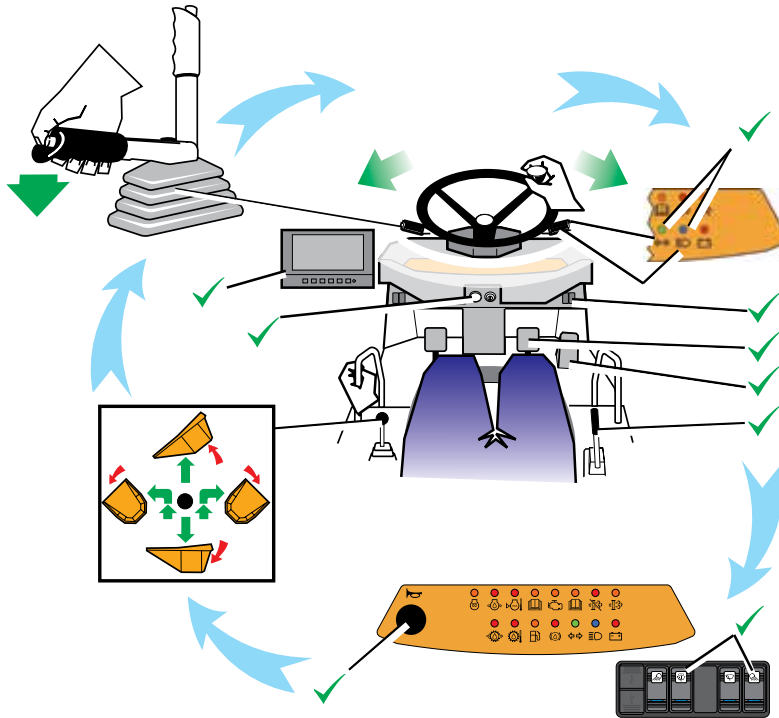
- Turn key anti-clockwise Position 0 = Power Off

Note – Auxiliary ignition switch position P is not in use.

Complete checks in section  before loading the machine

2 Preliminary checks

Thwaites



Function checks - engine ON

Brakes

- Does the foot brake feel firm?
- Carry out the hand brake test (*described on next page*).
- If the hand brake is on, and a gear is selected, a buzzer will sound and the drive may be disconnected.

Steering

- Rotate steering wheel clockwise and anti-clockwise.

Electrics

- Does the horn sound?
- Does the reverse alarm sound?
- Do the beacons flash?
- Do all lights work? (optional):
Side, Main, Brake, Indicators, Hazard & Cab
- Does the windscreen wiper work?
- Do the cameras and monitor work?
- Are the camera lenses clean?

Tipping lever

- Raise and lower skip.
- Rotate skip clockwise and anti-clockwise (*Power Swivel model only*).

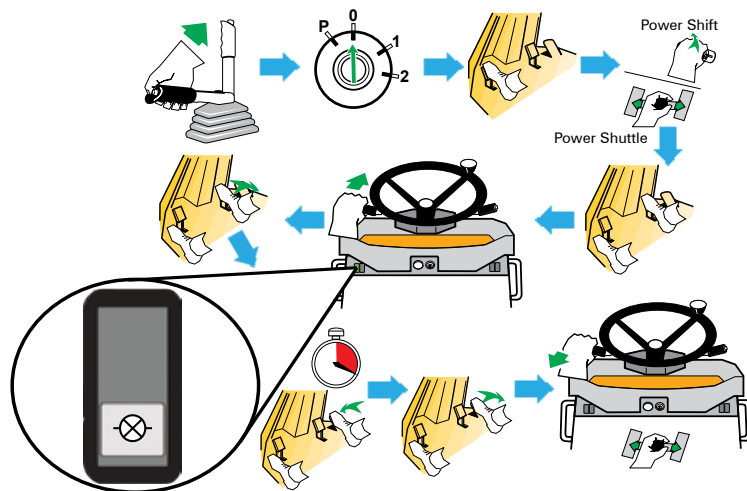
Complete checks in section



before loading the machine

2 How to test the hand brake

Thwaites



- 1 Apply hand brake.
- 2 Start engine and allow a 1-minute warm-up.
- 3 Depress dump valve pedal.
- 4 Select fourth gear.
- 5 Release dump valve pedal.
- 6 Apply firm pressure on the foot brake pedal.
- 7 Select forward drive (the buzzer will sound).
- 8 Press and hold brake test switch.
- 9 Slowly reduce brake pedal pressure.
- 10 If the machine has not moved, use the throttle pedal to gradually increase the engine speed to full revs (20 seconds max).

The machine should not move during these tests.

- 11 Reduce engine speed to idle
- 12 Release test switch.
- 13 Select neutral.

Note: please refer to the service manual if the machine fails this hand brake test.



WARNING

Before testing the hand brake ensure the machine is on firm level ground and that there are no people around the machine. Release throttle and apply foot brake if the machine moves during the following test.



WARNING

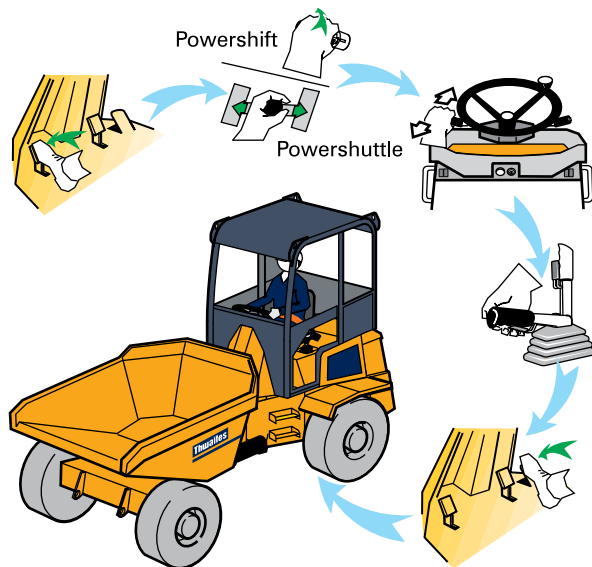
Do not operate a machine that has moved during the above parking brake test.

Complete checks in section

2

before loading the machine

Thwaites



Moving from rest and stopping

- Depress dump valve pedal.
- Select first gear.
- Release dump valve pedal.
- Select forward or reverse.
- Release hand brake fully (machine may move).
- Slowly depress throttle pedal and move away.
- Hold steering wheel with both hands.
- Remove foot from throttle pedal.
- Brake gently to a halt using foot brake.

Changing speed/direction

- Depress dump valve pedal.
- Select next gear.
- Release dump valve pedal.
- The machine must be stationary and the foot brake must be engaged before changing direction.

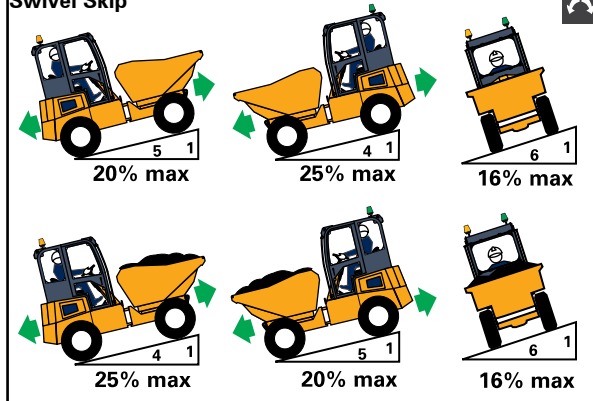
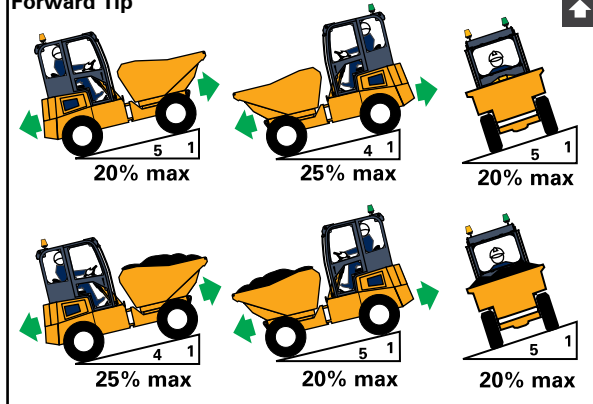
After operating - park safely

- Always leave skip empty when not in use.
- Ensure machine is on firm level ground.
- Apply hand brake.
- Engage transmission to neutral (Power Shuttle).
- Fully lower skip, in a central position.
- Set drive to neutral.
- Stop engine and remove key.
- Ensure machine cannot be started.



CAUTION

- Novice operators should always start with forward motion on clear, level ground
- A low gear should always be selected when a driver is unfamiliar with machine type

3**DANGER****IMMEDIATE HAZARDS WHICH WILL RESULT IN SEVERE PERSONAL INJURY OR DEATH****Thwaites****Swivel Skip****Forward Tip****WORKING ON GRADIENTS**

DO NOT exceed maximum stated gradients



DO NOT turn across gradients



DO NOT brake suddenly in wet, muddy, icy conditions or when operating on loose surfaces



DO NOT run downhill with controls in neutral



Travel straight up, down or along a gradient



Keep speed to a minimum and use the foot brake to reduce speed when travelling down gradients



Always engage hand brake when stopped on sloping ground to prevent movement, and in addition, chock wheels securely when leaving the machine unattended



Always position swivel skip in central lock

Attention! Section



correct and incorrect working practices

VISIBILITY

The visibility maps show machines in standard build and travel configuration.

The maps provide an approximate indication of what can be seen by the operator and any blind spots when seated in the driving position wearing a seatbelt.

The maps have been provided to assist the operator / user and may be used as part of a risk assessment for the safe operation of the machine.

The machines are compliant with the visibility requirement given in EN 474-1 with regards to the rectangular boundary and a test object of 1.2m high and 0.3m wide and the 12m circular boundary.

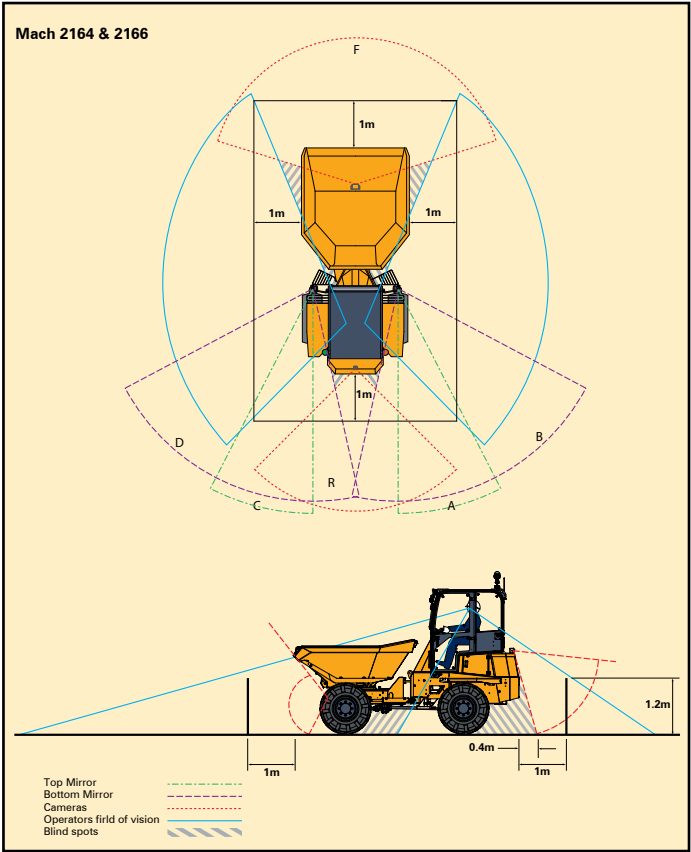
- Check all around the machine before operation.
- Be sure all mirrors are adjusted before operating the machine.
- All cameras and mirrors must be kept clean.
- Be aware of all blind spots.

The blind spot areas marked on the plan views of these maps are ground plane only

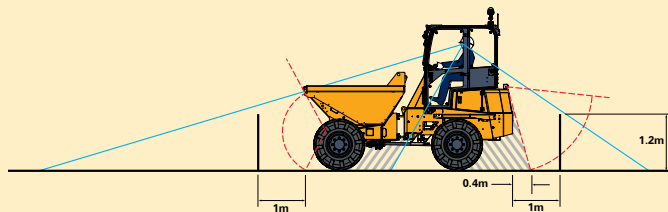
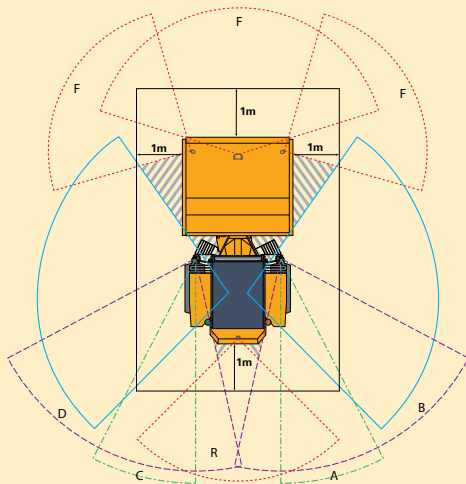
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WARNING

Camera angles are factory set, any modifications to the machine configuration by any end user that may result in the restriction of visibility and will require a new risk assessment to be performed.

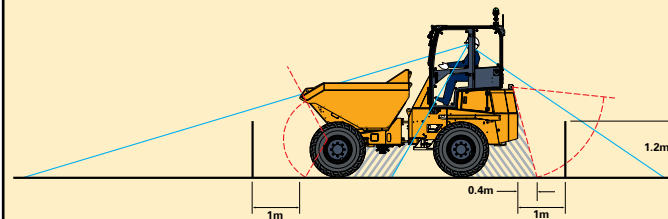
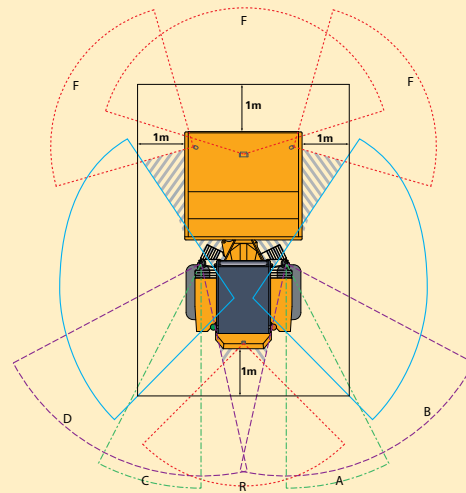


Mach 2165




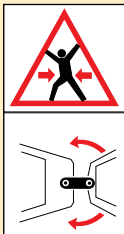
Top Mirror
Bottom Mirror
Cameras
Operators field of vision
Blind spots

Mach 2190



Top Mirror
Bottom Mirror
Cameras
Operators field of vision
Blind spots

Attention! Section  correct and incorrect working practices

3**DANGER****IMMEDIATE HAZARDS WHICH WILL RESULT IN SEVERE PERSONAL INJURY OR DEATH****Thwaites****CRUSH ZONE**

Stay clear of articulation area when the engine is running



Never operate the machine's controls when standing on either side of machine

WORKING UNDER A RAISED SKIP

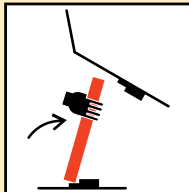
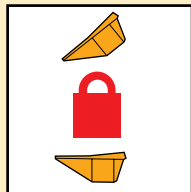
Lock both skip safety props during maintenance



Never work under an unpropped skip



When using skip safety prop engage tipping lever lock (If fitted)



Attention! Section



correct and incorrect working practices

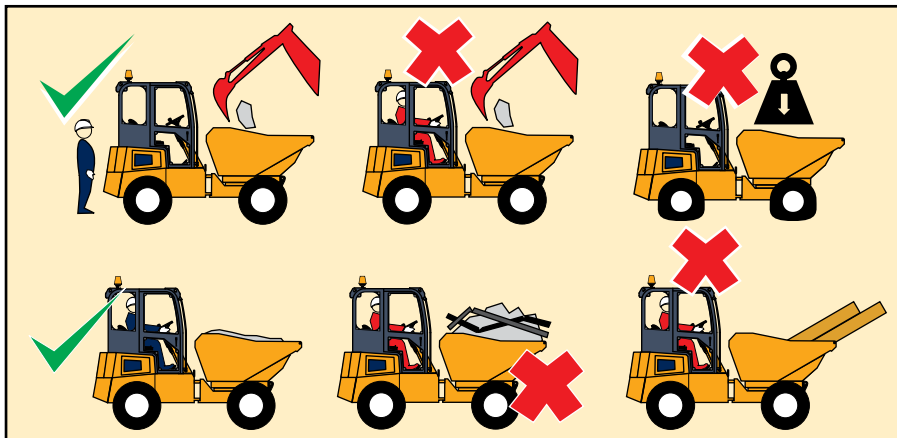
3



WARNING

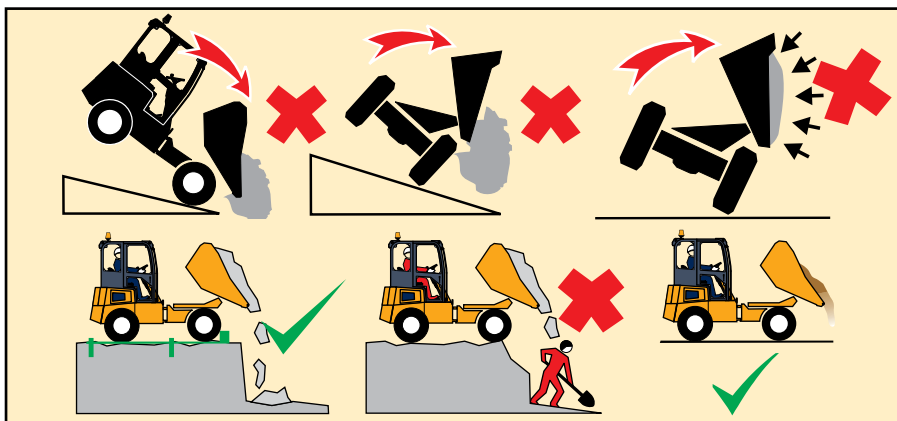
HAZARDS OR UNSAFE PRACTICES WHICH COULD RESULT IN SEVERE PERSONAL INJURY OR DEATH

Thwaites



LOADING THE MACHINE

- ☒ Apply hand brake, set transmission to **NEUTRAL**, turn engine **OFF**, disembark the machine and **STAND CLEAR**
- ☒ **DO NOT** exceed the machine's rated capacity
- ☒ Clear debris from controls and floorplate
- ☒ Ensure **SAFE STABLE LOW** load which allows good visibility
- ☒ Materials carried must be free-flowing

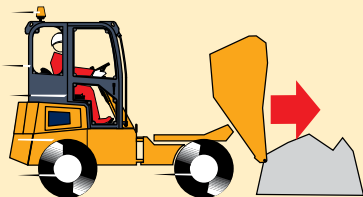


UNLOADING THE MACHINE

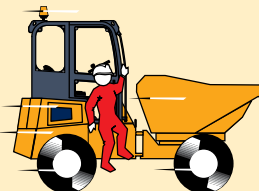
- ☒ **DO NOT** discharge load when working on sloping ground
- ☒ **DO NOT** discharge load to the side of the machine if material carried is not free-flowing
- ☒ Discharge load forwards if material carried is not free-flowing
- ☒ Discharge load on level ground
- ☒ Use **STOPBOARDS** and **SUPPORT** walls on trenches

Attention! section **3** correct and incorrect working practices

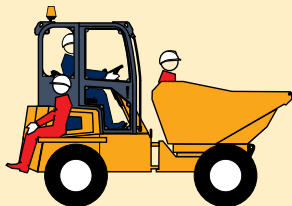
DRIVING



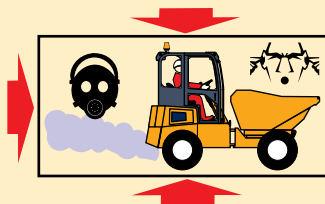
DO NOT drive with the bucket tipped (bulldozing)



NEVER dismount from a moving machine



DO NOT carry passengers



Avoid confined work areas - exhaust fumes and noise can be a hazard



Site hazards to avoid: adverse weather conditions, icy surfaces, people



Wading depth must not exceed centre of axle, short periods only.

3



WARNING

HAZARDS OR UNSAFE PRACTICES WHICH COULD RESULT IN SEVERE PERSONAL INJURY OR DEATH

Thwaites

TOWING A TRAILER



Place ballast load in skip. This load should be a minimum of 25% of the machine's rated payload



The gross weight to be towed plus the ballast load **MUST NOT** exceed rated payload of machine



DO NOT exceed maximum tow bar pull or vertical load



Towing must not be carried out on sloping ground



Always use a Thwaites approved towing pin



TRANSPORTATION

Reverse machine slowly onto a suitable trailer



DO NOT drive the machine forward when loading



Apply hand brake

Stop engine

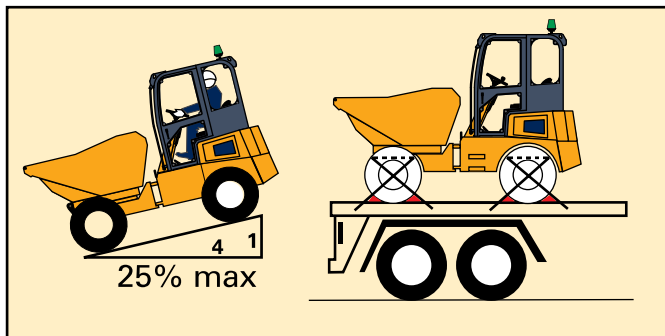
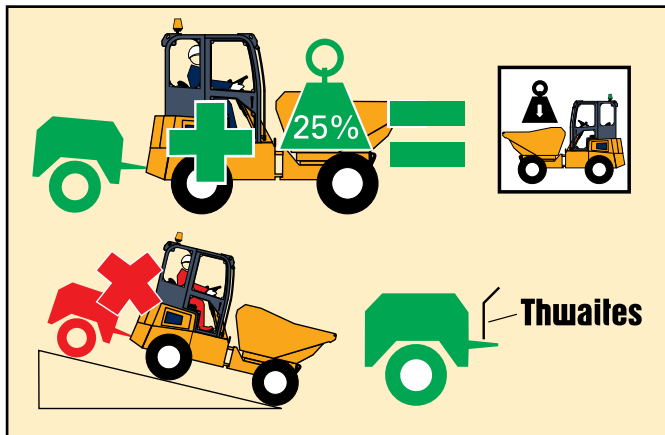
Chock wheels (*To prevent movement*)

Engage chassis locking bar



Secure to trailer

Ensure legal load (*Height/weight of trailer*)



Attention! section **3** correct and incorrect working practices

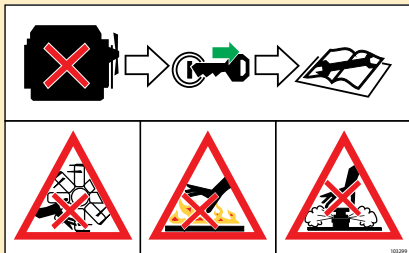


3



WARNING

HAZARDS OR UNSAFE PRACTICES WHICH **COULD** RESULT IN SEVERE PERSONAL INJURY OR DEATH



ENGINE MAINTENANCE

Shut engine off and remove key before performing maintenance of repair work.



Keep hands clear of moving parts



Keep clear of hot surfaces



DO NOT remove radiator cap whilst engine is hot.

NOISE LEVEL



Noise level exposure to the operator and bystander could be higher depending upon the differences in job sites.

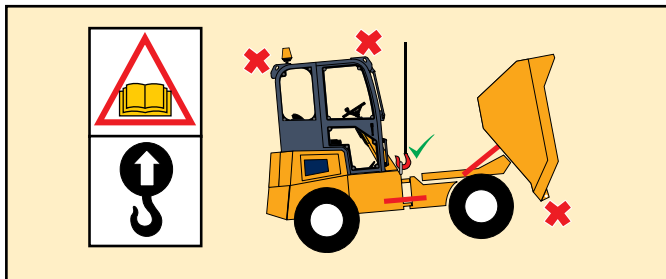
It is essential Noise Level Exposure is measured and complies with regulations Directives 2003/10/EC (UK-Control of Noise at work Regulations 2005)

Model	Discription	Level
All models	Measured sound power level	101dBA
	Operator perceived sound power level	80dBA

Attention! Section



correct and incorrect working practices



USING A CRANE TO LIFT THE MACHINE (9Tonne only)



- Tip skip fully forward
- Engage skip safety prop
- Engage chassis locking bar
- Lift using centre eye provided

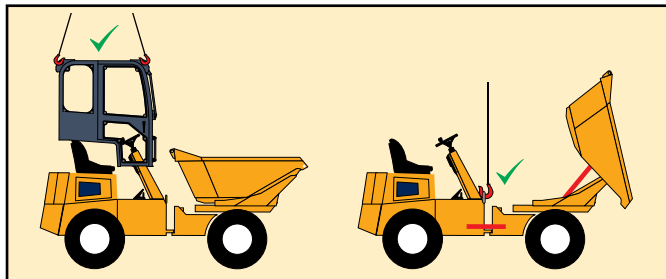


For weight of machine see Section 4 - Data Chart



DO NOT use the lifting eyes on the cab or skip to lift the whole machine.

These lifting eyes are to lift individual parts **ONLY**

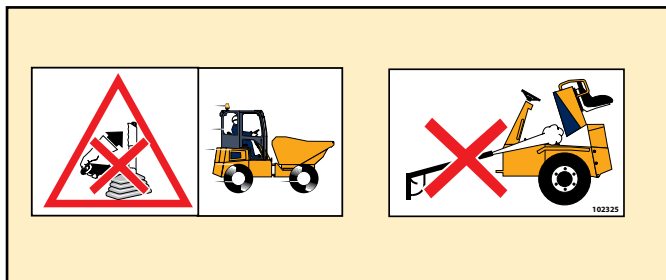


USING A CRANE TO LIFT THE MACHINE (6Tonne)



The 6 tonne machines cannot be lifted from the centre eye with the cab fitted

- Park on level ground
- Remove cab (for full instructions on cab removal contact Thwaites Ltd)
- Tip skip fully forward and engage skip safety prop
- Engage chassis locking bar
- Lift using centre eye provided



HAND BRAKE

DO NOT apply hand brake if machine is moving (except in an emergency)

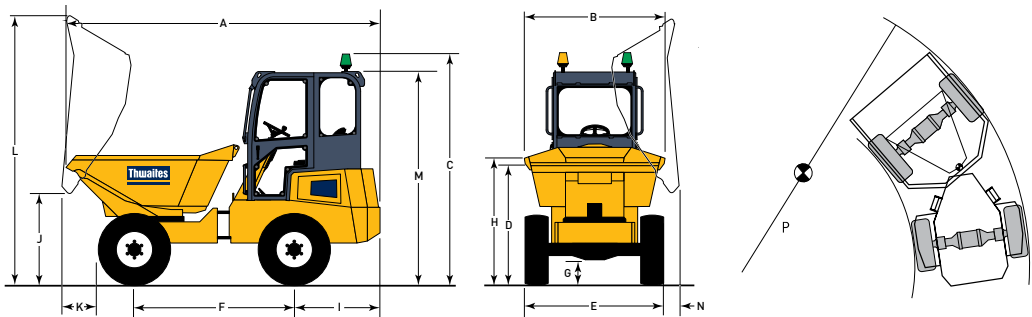




ELECTRICAL SYSTEM DAMAGE

When pressure washing the machine avoid electrical system or component damage. **DO NOT** aim directly at electrical components housed beneath the engine cover or located within the instrument panel.



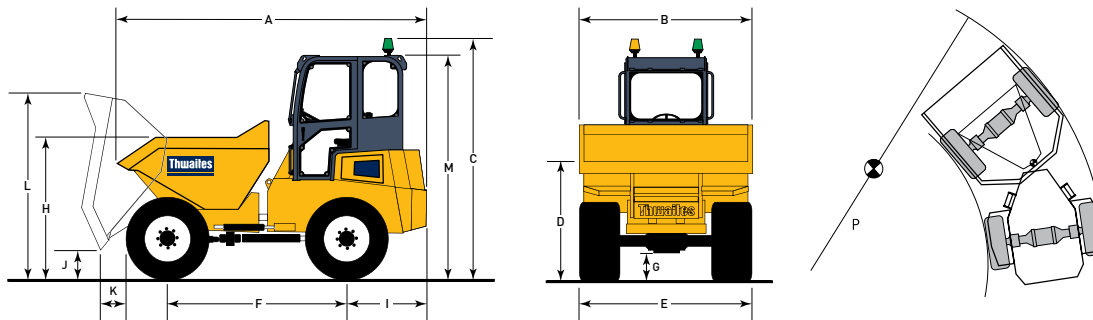
4 Data Chart – Powerswivel





Dimensions (mm)		6T	Weight (kg)		6T	Noise
A.	Length	4815	Unladen			Airborne (10 m)  55.4 kW
B.	Width	2280	Front axle		1740	
C.	Height (& Beacons)	3450	Rear axle		3000	Operator  80
D.	Bucket lip height	1670	Total		4740	
E.	Width over tyres	2240	Laden (including driver at 80 kg)			
F.	Wheelbase	2480	Rated payload		6000	
G.	Ground clearance	370	Front axle		7460	
H.	Bucket load height	1850	Rear axle		3360	
I.	Axle to rear	1235	Total		10820	
J.	Tipping ground clearance	1100	Towbar (Max)			
K.	Tipping tyre clearance	550	Pull load		4500	
L.	Height tipped (skip)	3694	Vertical load		500	
M.	Height (no Beacons)	3145	Tyre Pressure			
N.	Tipping side clearance	100	Bar (psi) front		3.9(57)	
P.	Tyre clearance diameter (m)	16.6	rear		2.5(36)	










4 Data Chart – Front tip

Thwaites



Dimensions (mm)	6T	9T	Weight (kg)	6T	9T	Noise
A. Length	4475	4670	Unladen			Airborne (10 m)  55.4 kW
B. Width	2354	2485	Front axle	1450	1700	
C. Height (& beacons)		3588	Rear axle	3115	3410	Operator  80
D. Bucket lip height	1610	1740	Total	4565	5110	
E. Width over tyres	2240	2444	Laden (including driver at 80 kg)			
F. Wheelbase	2480	2615	Rated payload	6000	9000	
G. Ground clearance	370	447	Front axle	6250	8910	
H. Bucket load height	1740	1975	Rear axle	4395	5280	
I. Axle to rear	1235	1255	Total	10645	14190	
J. Tipping ground clearance	340	436	Towbar (Max)			
K. Tipping tyre clearance	520	642	Pull load	4500	6750	
L. Height tipped (skip)	2505	2840	Vertical load	500	500	
M. Height (no Beacons)		3285	Tyre pressure			
P. Tyre clearance diameter (m)	16.2	17.6	Bar (psi) front.....	3.5(51)	3.2(46)	
			rear.....	2.7(39)	1.6(24)	

4 Troubleshooting








Instrument panel warning lights			
Symbol	Designation (Error Code)	Reason for illumination	Required action
1 	Cold start pre-heat	Cold start pre-heat in process	None
2 	Engine oil pressure (000100)	Oil pressure is either too high or too low	Switch off engine and check oil level.
3 	Coolant level (000111)	Engine coolant level is too low	Switch off engine, check coolant level and system for leaks
	Coolant Temperature (000110)	Temperature too high	
4 	Air filter (000107)	Blockage air filter	Check error code display
	Water in fuel (000097)	Fuel pre-filter bowl requires draining	
	Fuel Pressure (000094)	Low fuel pressure	
5* 	Engine warning lamp	System fault detected	Check error code display <small>Note - If no error code displayed refer to reset function section 1, if error continues investigate further.</small>
6 	Boost Air temperature / pressure (000105)	Air Temperature too high. Air pressure too low or too high.	Check radiator core is clear
7 	DPF Regeneration	Not applicable to these machines	None
8 	Ash charging	Not applicable to these machines	None
 * Engine warning lamp (symbol 5) will become lit in conjunction with other warning lamps - 2,3,4,6,7 & 8			



4 Troubleshooting

Thwaites

Instrument panel warning lights

Symbol	Designation	Reason for illumination	Required action
9 	Battery charging	Alternator not charging	Check belt tension
10 	Headlight Main Beam	Main beam selected	Cancel as required
11 	Directional Indicator	Indicator selected	Cancel as required
12 	Low brake oil	Brake oil in reservoir low	Check brake oil level
13 	Low diesel oil	Diesel oil in tank low	Check fuel level
14 	Transmission oil temperature	Oil temperature too high	Check oil cooler clean if required.
15 	Transmission oil pressure	Oil pressure too high or too low	Check oil level

5 Maintenance Tasks

Safe Working Practice:

Before lubrication and maintenance tasks:

- Machine must be on firm level ground.
- Apply parking brake.
- Stop engine and remove ignition key.
- Isolate the battery (See section 1 - Battery isolator)
- Allow engine to cool.
- Place FNR/gear lever in neutral.
- Fit chassis locking bar
- Chock the wheels
- Prop bucket when working beneath
- Lock skip safety prop(s)



Refer to service manual for further reference



WARNING - FUEL HANDLING

- Diesel fuel is FLAMMABLE.
- Never refuel or service the fuel system while smoking or near naked flames.
- Never refuel the machine while the engine is running.

Recommended maintenance tasks:

- Turn ignition switch '**ON**' without starting engine, and wait 2 seconds for all warning lamps to turn off.
- Note any lamp that remains lit and correct system fault identified before operating the machine.
- Turn ignition switch '**OFF**'.

Daily (10 hour) maintenance check list:

- Diesel fuel level
- Engine oil level
- Engine coolant level
- Transmission oil level
- Foot brake resistance
- Hand brake function
- No water in the fuel pre-filter
- Steering wheel and column condition

Weekly (50 hour) maintenance check list:

- Hydraulic tank oil level
- Tyre pressures & wheel nut torque
- Brake oil level
- Sufficient lubricant in all grease points
- Door locks function - operating and latching

5 Daily (10 Hour) maintenance checks

Thwaites

Diesel fuel tank volumes

- Check fuel level on gauge (Fig 1) and fill fuel tank through filler cap (Fig 2) with required amount of diesel, noting MAX/MIN volumes and fuel quality:

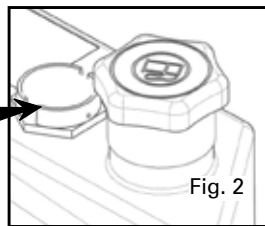
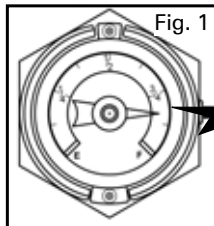
Maximum	72 litres
Gauge indicates full	66 litres
Low level warning	24 litres
Gauge indicates empty	12 litres
Starvation point	5 litres

CAUTION - COMPLIANT FUEL USAGE

To avoid fuel system damage and to satisfy exhaust gas legislation, fuel used in this machine **MUST** comply with one of the following approved low sulphur diesel specifications. DIN 51628, EN 590 or BS 2869 (Sulphur < 10 mg/kg)

CAUTION - LOW FUEL

To avoid fuel system damage add fuel to tank within 30 minutes of low fuel level warning lamp 'ON'.

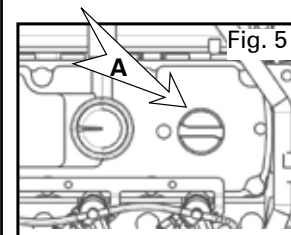
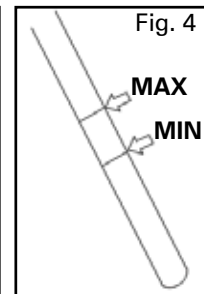
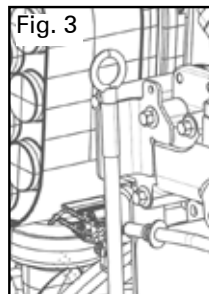


Engine oil level

- Pull out lubricating oil dipstick and wipe clean (Fig 3)
- Insert lubricating oil dipstick as far as it will go.
- Pull out lubricating oil dipstick, ensure oil level is between the MIN and MAX markers (Fig 4).
- Top up to MAX marker if necessary, through oil filler cap, using recommended oil. Machine initially filled with SAE10W40 (Fig 5, A).

CAUTION - HOT FLUIDS

Check oil levels with machine on firm, level ground and with the machine cooled down.





5 Daily (10 Hour) maintenance checks

Thwaites

Engine coolant level

- View level of coolant in expansion bottle
- The coolant level must always be between the MIN and MAX marks (Fig 1).
- Top up at expansion bottle filler cap to the MAX mark if necessary.



Use the correct concentration of coolant. Machine initially filled with water plus 50% antifreeze to BS.6580.



WARNING - HOT FLUID

DO NOT attempt to remove the expansion bottle cap until system has cooled down to avoid serious scalding.

Transmission oil level

- Pull out lubricating oil dipstick and wipe clean (Fig 2)
- Insert lubricating oil dipstick as far as it will go (Fig 2).
- Pull out dipstick, ensure oil level is between the MIN and MAX markers (Fig 3).
- Top up to MAX marker via the dipstick tube if necessary. Using a recommended auto trans. fluid (ATF), initially filled with Terrain CT10.



WARNING - FLUID HANDLING

Handle fluids with care. Avoid contact with skin and use a barrier cream or wear gloves.

Fig. 1

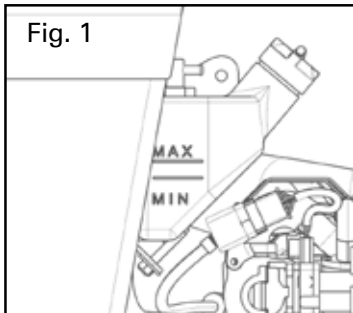
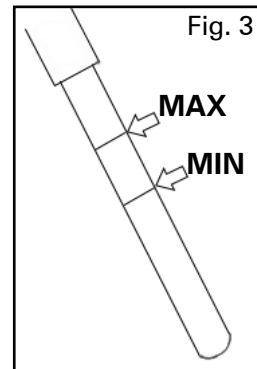


Fig. 2



Fig. 3



5 Daily (10 Hour) maintenance checks

Thwaites

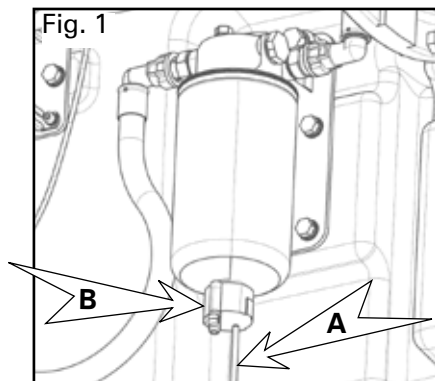
Drain water from the fuel Pre-filter tank

- Place suitable collecting container underneath
- Disconnect cable connections (Fig 1, A).
- Loosen Drain Plug (Fig 1, B)
- Drain fluid until pure diesel fuel runs out.
- Tighten drain plug (1.6 ± 0.3 Nm) (Fig 1, B).
- Connect cable connections (Fig 1, A).



WARNING - FUEL HAZARD

Diesel fuel is **FLAMMABLE**.
Never service the fuel system while smoking or near naked flames.



Check brake functions

Note: Refer to section 1 of this manual for control layout.

Foot brake (Primary)

From the drivers seat, with you right foot press the brake pedal until resistance to movement is felt.

The pedal position should be no more than half way to the end of the slot in the floor plate.



If pedal travel is excessive do not operate the machine until the fault has been corrected.

Hand brake (Emergency & parking)

From the driver seat with your right hand, pull up on the handbrake so that the lever is in the vertical position.

Complete the handbrake test procedure described in section 2 of this manual.



If the machine moves during this test do not operate the machine until the fault has been corrected.

Steering wheel / column

Check the steering wheel for signs of damage (misshapen or broken). Hold the steering wheel push and pull to check for excessive movement in the steering column.



If either is found do not operate the machine until the fault has been corrected.



5 Weekly (50 Hour) maintenance checks

Thwaites

Hydraulic oil level

- With oil cold, ensure rams are in correct position by lowered bucket, turning steering to full left lock and if power swivel, turn bucket into the straight ahead position.
- Level is correct when visible in sight gauge (Fig 1,A).
- If no oil can be seen top up as required using approved hydraulic oil to (ISO6743-4 HM32) through filler cap (Fig 2, B).
- Do not overfill above sight gauge (Fig 1, A).

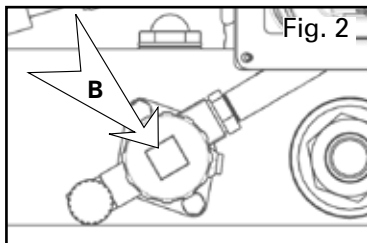
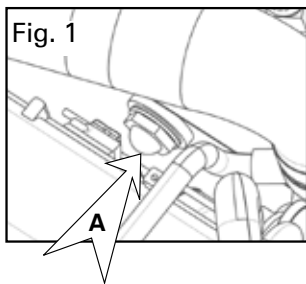


CAUTION

It is imperative that hydraulic oil is clean to avoid damage to hydraulic components.

Check wheels and tyres

Check tyre pressures (Refer to data chart in section 4) and ensure wheel nuts are in position and tight (330Nm)



Brake reservoir oil level

- Open engine cover.
- Visually check the oil level is between MIN and MAX markers on the oil reservoir (Fig 3, C).
- Top up to MAX marker if necessary using a recommended mineral oil to (ISO6743-4 HV32) through reservoir filler cap (Fig 3, D).

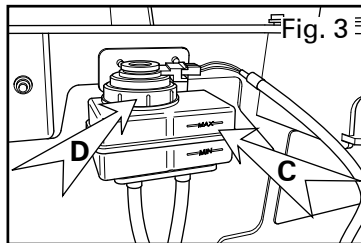


WARNING - AVOID SYSTEM FAILURE

- USE MINERAL OIL ONLY!
- Clean area around cap before removal to prevent contamination.

Door locks

Check that door locks and latches are operating correctly.



5 Weekly (50 Hour) maintenance checks

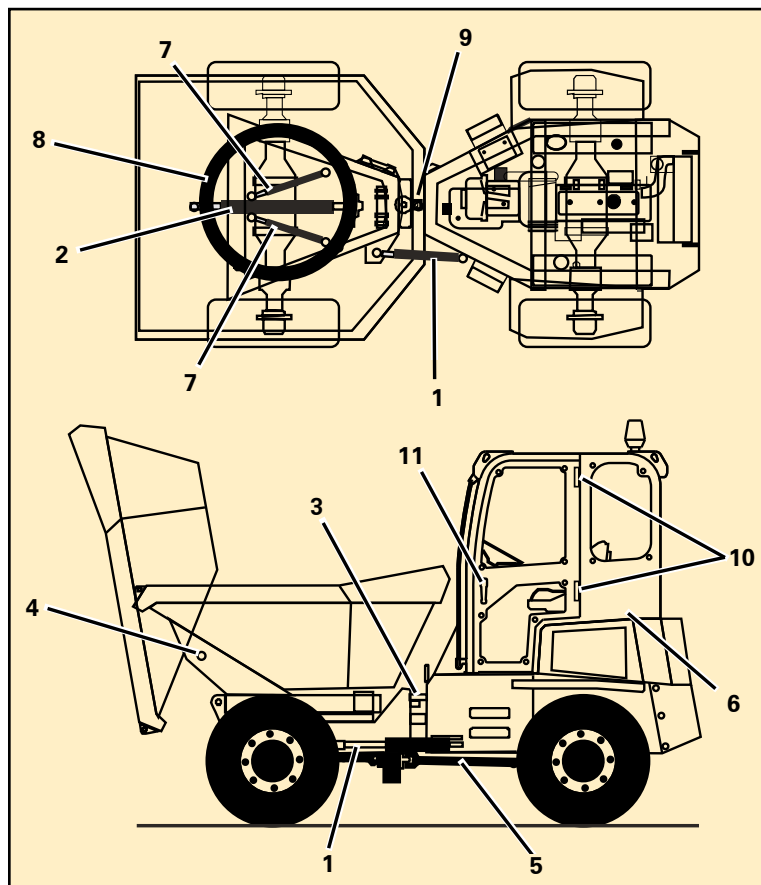
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Lubricate all grease points:

Apply grease to the following points provided around the machine to improve operation of moving parts:

1. Steering cylinder
2. Tipping cylinder(s)
3. Kinglink assembly
4. Skip pivot pins
5. Propshafts
6. Engine cover hinges
7. Slew cylinders (Powerswivel Only)
8. Slew Ring (Powerswivel Only)
9. Central skip lock (Powerswivel Only)
10. Door Hinges
11. Door locks and latches
(use Alpha 2000 or its equivalent only)*

* Do Not use a heavy grease or WD-40





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Normal service intervals:

10hrs, 50hrs, (first 100hrs), 250hrs, 500hrs, 1000hrs, 2000hrs

Please refer to the Thwaites service manual for further maintenance information.

www.thwaitesdumpers.co.uk