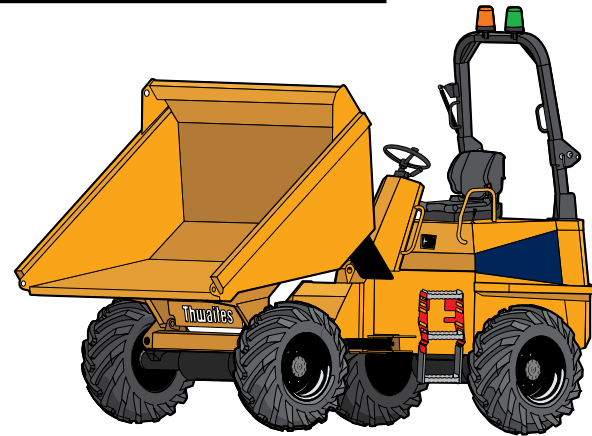


5 - 9 Tonne

Thwaites

MACH 2257, 2263, 2264,
2265, 2266, 2290, 2297, 2298.

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 - 5.0m/s² (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/s² (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 Safety label identification

Safety labels

The safety labels fitted to these machines are to warn the operator or bystanders of possible hazards.

- Be sure you fully understand the content and position of the labels.
- Ensure labels are clean and in good condition, do not clean labels with solvents.
- Replace lost or damaged safety labels.



There are also other labels in addition to the safety labels, handle these labels in the same way. Orientation of labels may vary from those shown.

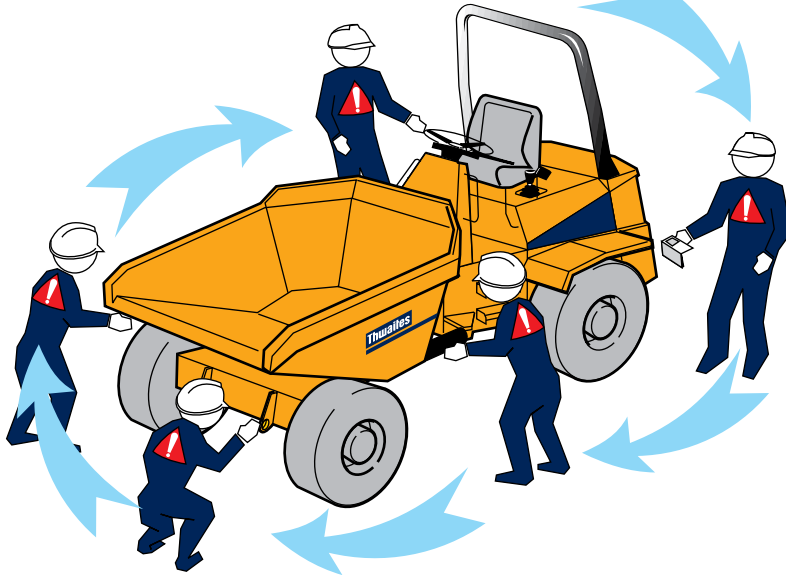
Item	Description	Qty	Item	Description	Qty
A	Gradient Front Tip - Read the operator's manual before working on gradients	1	J	Warning - Read the operator's manual before you operate the machine	1
B	Stability hazard - Do not discharge load when working on sloping ground	1	K	Warning - Do not stand or step in this area	2
C	Gradient Powerswivel - Read the operator's manual before working on gradients	1	L	Crushing hazard due to machine roll over - Always wear seat belt	1
D	Warning roll over protective structure (ROPS) - Never modify structure	1	M	Warning engine maintenance - Read the service manual before working on the machine	1
E	Warning - Read the operator's manual before towing a trailer	1	N	Warning severing of finger or hand - Keep hands a safe distance from rotating parts (under engine cover)	2
F	Crushing of whole body - Never work under an unpropped skip	2	P	Electrical shock - Do not use pressure washer on electrical items (under engine cover)	1
G	Warning lift point - Read the operator's manual before lifting the machine	1	R	Hot surface - Keep hands a safe distance from hazard (under engine cover)	1
H	Crushing of whole body - Stay a safe distance from articulation area	2	S	Warning hot fluid under pressure - Read the operator's manual (under engine cover)	1

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 Roll-Over Protective frame (ROPS frame) secure, fully upright and undamaged?
- 4 Is the seatbelt anchorage secure and serviceable?
- 5 Are the covers and mudguards secure?
- 6 Are the hoses free from fluid leaks?
- 7 Are all safety decals legible?
- 8 Are the tyres free of cuts or splits?
- 9 Are all bolts tight and in position?
- 10 Are there fluid leaks under the machine?
- 11 Is there exhaust system damage?
- 12 Are the steering wheel and the steering column undamaged?
- 13 Have the daily maintenance tasks been performed? (See section 5)

Report all faults immediately.



WARNING

Incorrect tyre pressures reduce machine stability.



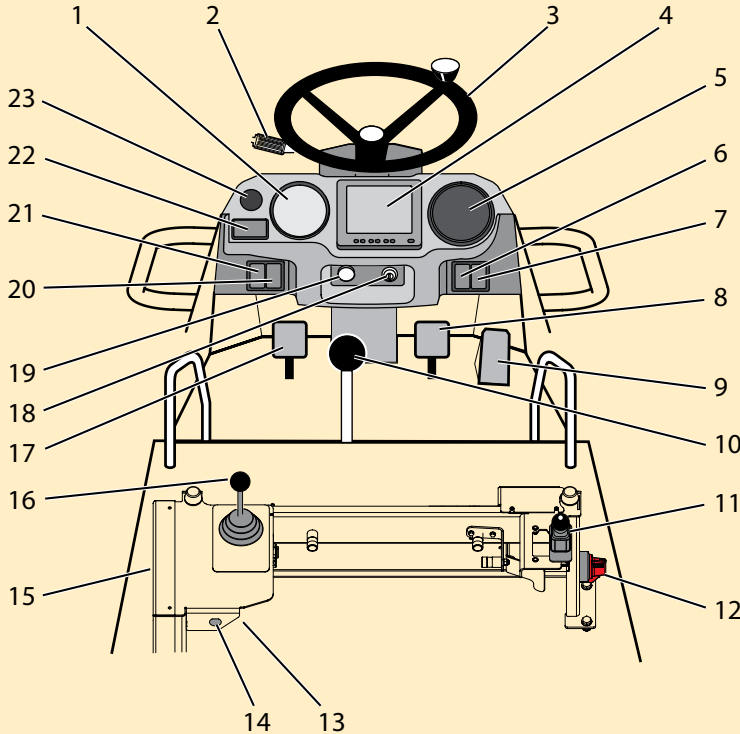
DO NOT OPERATE THE MACHINE UNTIL ALL FAULTS HAVE BEEN RECTIFIED

Complete checks in section



before starting the engine

1 Layout of controls



Control locations and functions

1. Speedometer*
2. Forward/Neutral/Reverse lever
(Includes gear selection Powershift only)
3. Steering wheel
4. Camera monitor
5. Display unit
6. Hazard warning light switch*
7. Blank
8. Footbrake pedal
9. Throttle pedal
10. Gear lever (*Powershuttle only*)
11. Handbrake lever
12. Battery isolator
13. Engine control unit
14. Diagnostic plug
15. Power distribution board
16. Bucket control lever
17. Dump valve pedal
18. Ignition switch
19. Warning buzzer
20. Regeneration switch
21. Light switch*
22. Indicator switch*
23. Horn push

* *Optional items*

Complete checks in section  before starting the engine

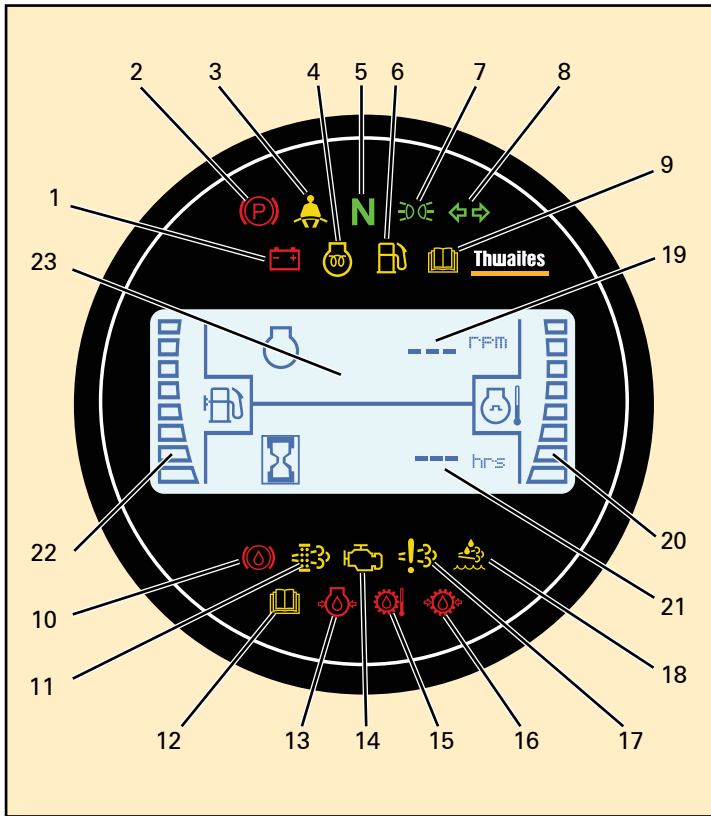
1 Warning light location and functions

Warning light location and function

1. Battery charging
2. Hand brake
3. Seat belt
4. Cold start pre-heat in operation
5. Neutral
6. Low fuel
7. Lights
8. Direction indicators
9. Air filter blocked or water in fuel or low fuel pressure
10. Low brake oil level
11. DPF Regeneration required
12. Warning air boost pressure or air temperature high
13. Engine oil pressure
14. Engine Warning Lamp
15. Transmission oil temperature
16. Transmission oil pressure
17. DPF Ash load limit reached
18. Selective Catalytic Reduction (SCR) System fault (Not applicable to these machines)

Multi function display

19. Engine rpm
20. Engine temperature
21. Hourmeter
22. Fuel level
23. Fault codes (Refer to Control functions in depth Section 1)

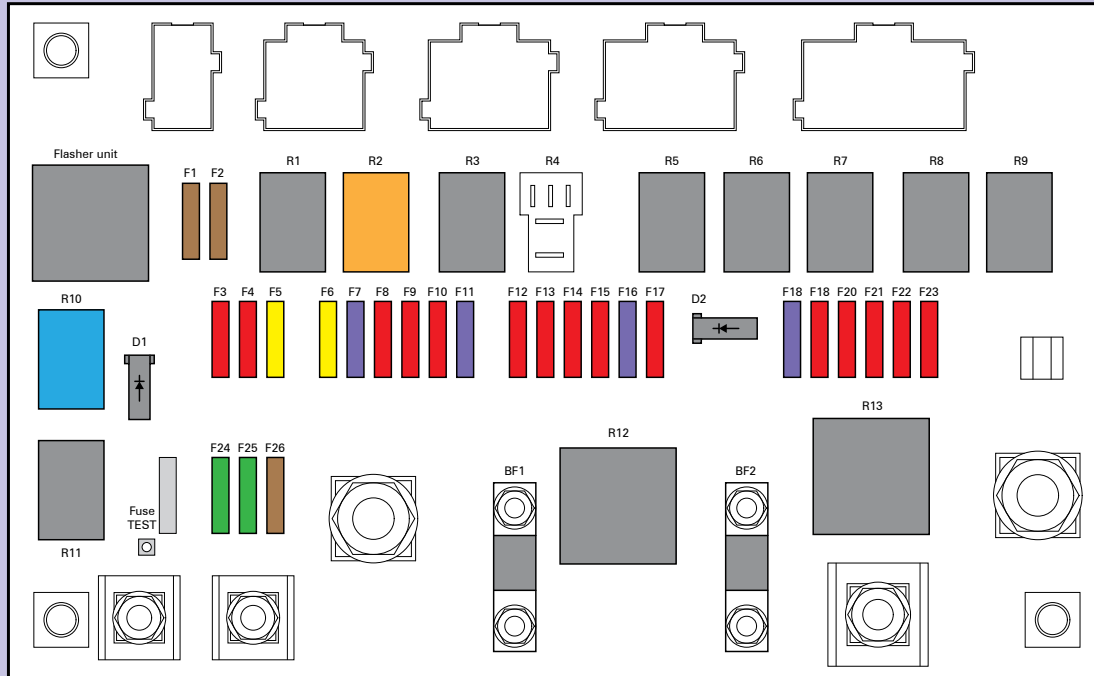


Complete checks in section



before starting the engine

1 Power distribution board layout



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

1 Power distribution board layout

Thwaites

Fuse Table

Fuse No.	Rating	Function
F1	5A	Side lights LH
F2	5A	Side lights RH
F3	10A	Side lights
F4	10A	Hazard lights
F5	20A	Fuel pump
F6	20A	Ignition switch
F7	3A	Display unit
F8	10A	Spare #6 - Battery
F9	10A	Spare #5 - Battery
F10	10A	Spare #4 - Battery
F11	3A	Camera system
F12	10A	DRL and Headlights
F13	10A	Indicators and Brakelights
F14	10A	Amber beacon
F15	10A	Horn
F16	3A	Speedometer
F17	10A	Spare #2 - Ignition
F18	3A	Display unit
F19	10A	Transmission
F20	10A	Engine diagnostics
F21	10A	Spare #1 - Ignition
F22	10A	Motion Inhibit system
F23	10A	Handbrake switch/Fuel level/Regen switch/ Warning buzzer
F24	30A	Engine ECU
F25	30A	SCR system
F26	5A	Engine after-run
BF1	100A	Ignition circuit feed
BF2	100A	Glow plug feed

Relay Table

Relay No.	Function
R1	DRL
R2	Fuel pump
R3	Neutral start
R4	SPARE
R5	Motion inhibit - Drive (if fitted)
R6	Drive
R7	Seatbelt green beacon (if fitted)
R8	Motion inhibit - Latch (if fitted)
R9	Safety
R10	Timer Relay - After-run control
R11	Engine ECU control
R12	Ignition circuit feed-KL15
R13	Glow plugs
Flasher unit	LED flasher unit

Diode Table

Diode No.	Function
D1	ECU control system
D2	Motion Inhibit system

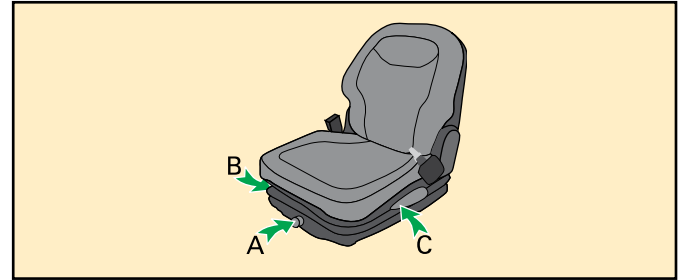
Complete checks in section  before starting the engine

1 Control functions - in depth

Thwaites


Seat adjustment


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

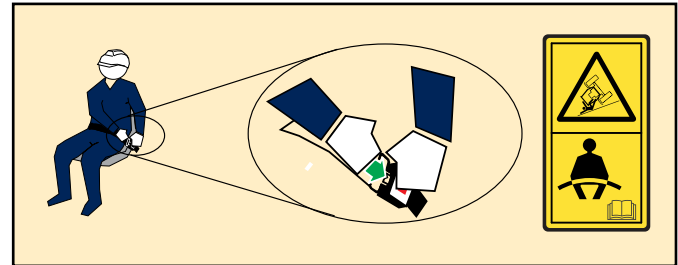


Seatbelt

- 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.*

 *When optional electric seatbelt is fitted, machine will not move if buckle is not inserted into the lock.*



Throttle pedal - right foot

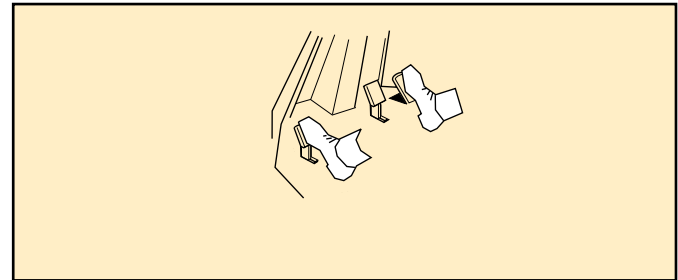
- Apply pressure to increase speed
- Release pressure to reduce speed

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  before starting the engine

1 Control functions - in depth

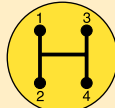
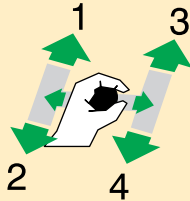
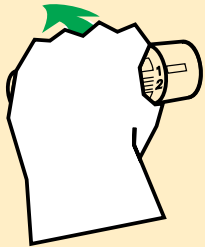


Forward/neutral/reverse lever (FNR lever) (powershuttle)

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



If green beacon option is fitted seat belt must be buckled for lever to function



Gear lever (powershift)

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



Warning - Overspeed time delay sensor fitted

Gear lever (powershuttle only) - left hand

forward-left
first gear

forward-right
third gear

neutral

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 back to apply, lift collar pull back and release collar to lock.
- Lift collar and lever will move forward 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

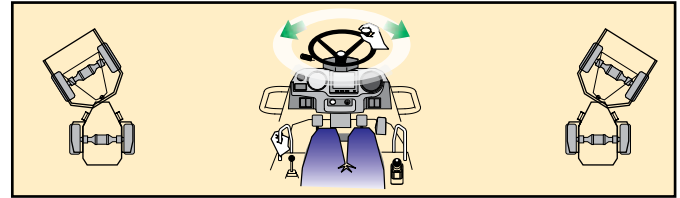
1 Control functions - in depth

Thwaites

Steering wheel - both hands

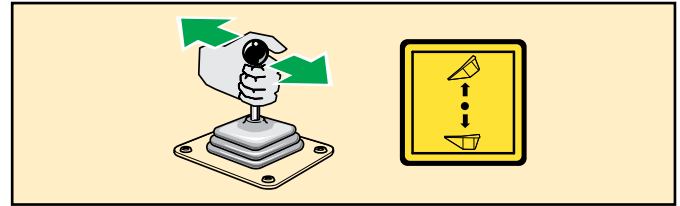
- Turn the wheel clockwise to turn machine to right
- Turn the wheel anti-clockwise to turn machine to left

 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

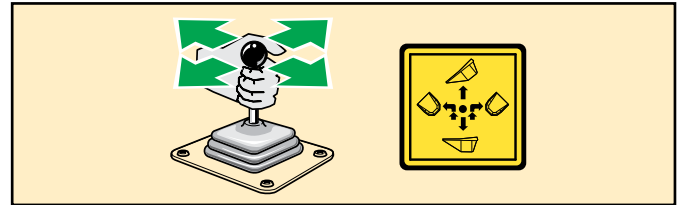
- Push forward to raise skip
- Push backward to lower skip



Tipping control lever (powerswivel models) - left hand

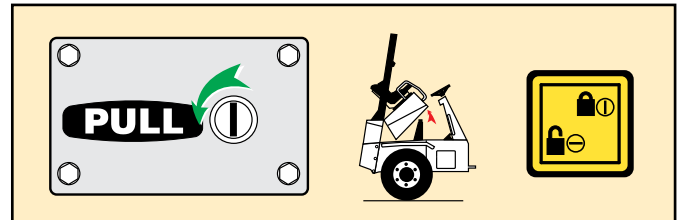
- Raise skip 100 mm (4") to disengage pivot centring lock
- Rotate skip to a central position (fully lowered) to automatically engage centring lock
- Raise skip and push lever to the right to rotate skip clockwise
- Raise skip and push lever to the left to rotate skip anti-clockwise
- Increased engine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

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



Opening and closing the engine cover

- Insert ignition key and turn anti-clockwise to unlock
- Pull handle to release and raise cover
- Lower cover, secure and lock before driving



Complete checks in section  before starting the engine

1 Control functions - in depth

Thwaites

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.

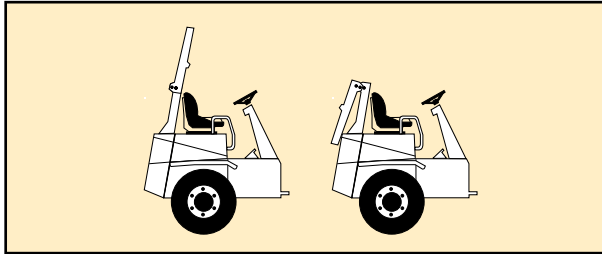
Complete checks in section



before starting the engine

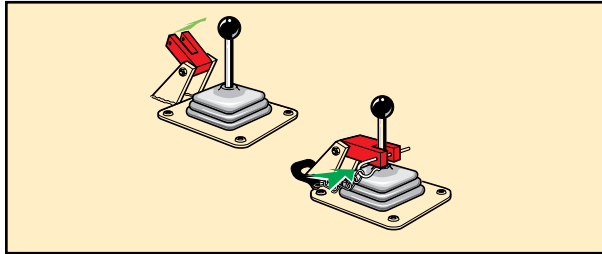
1 Control functions - in depth

Thwaites



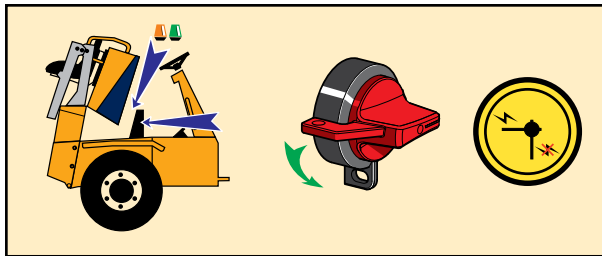
Lowering and raising the ROPS frame

- Remove lynch pins and withdraw frame lock pins
- Lower frame and insert lock pins and lynch pins in new position
- Reverse the procedure to raise the frame
- Ensure all pins are secure before driving



Tipping lever lock (if fitted)

- Place yoke over tipping lever and secure with lynch pin



Beacon storage

- Unscrew and remove beacons
- Secure beacons on brackets provided beneath bonnet

Battery isolator (*beneath engine cover*)

- Turn switch anti-clockwise to isolate the battery power supply
- Machine - can be isolated immediately after ignition off

Complete checks in section  before starting the engine

1 Control functions - in depth

Thwaites

Indicator switch

- Push the switch to the left to indicate a left turn
- Push the switch to the right to indicate a right turn
- Place in central position to cancel

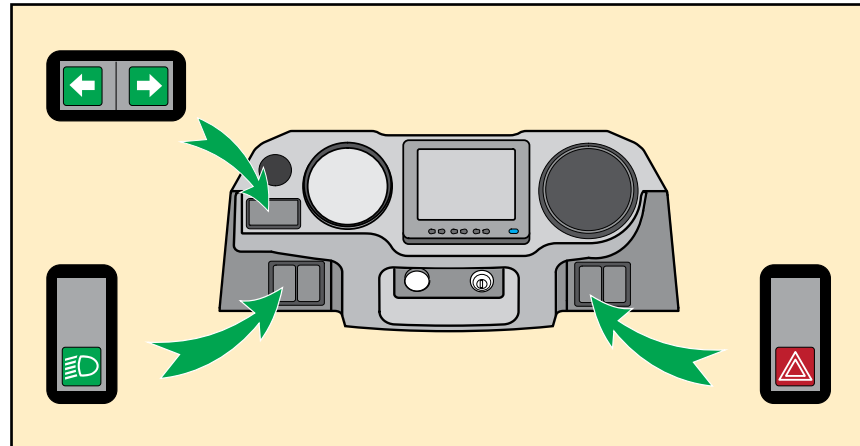
Light switch

- Top position = Lights off
- Central position = Side lights
- Bottom position = Head lights

Hazard warning light switch

- Top position = Lights off
- Bottom position = Lights on

Switches illuminate when activated

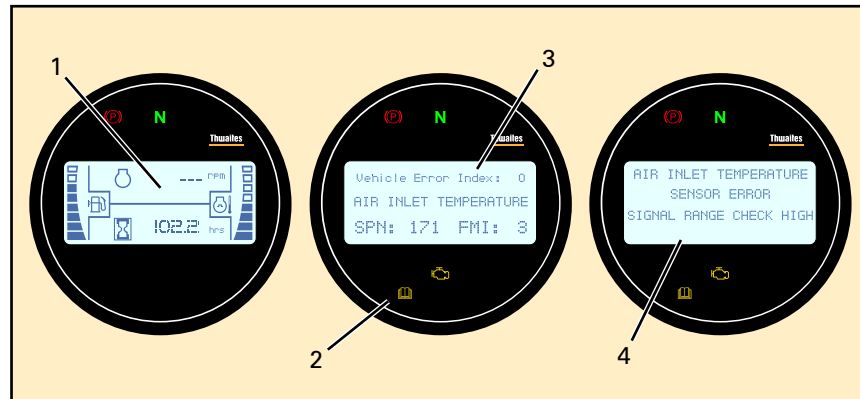


Multi Function Display

1. Normal display (engine rpm and hourmeter)
2. Fault lamps
3. Fault code
4. Fault description

Lit fault code lamps indicates waiting error code, this will show in place of the engine rpm and hourmeter, followed by a fault description.

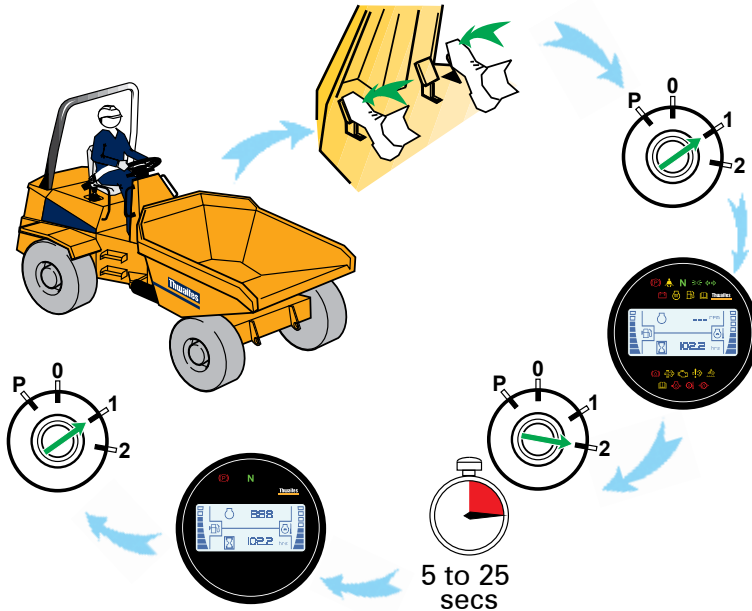
If the machine has multiple faults, codes and description will show for a few seconds each.



Complete checks in section  before starting the engine

2 How to START and STOP the engine

Thwaites



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.

CAUTION

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

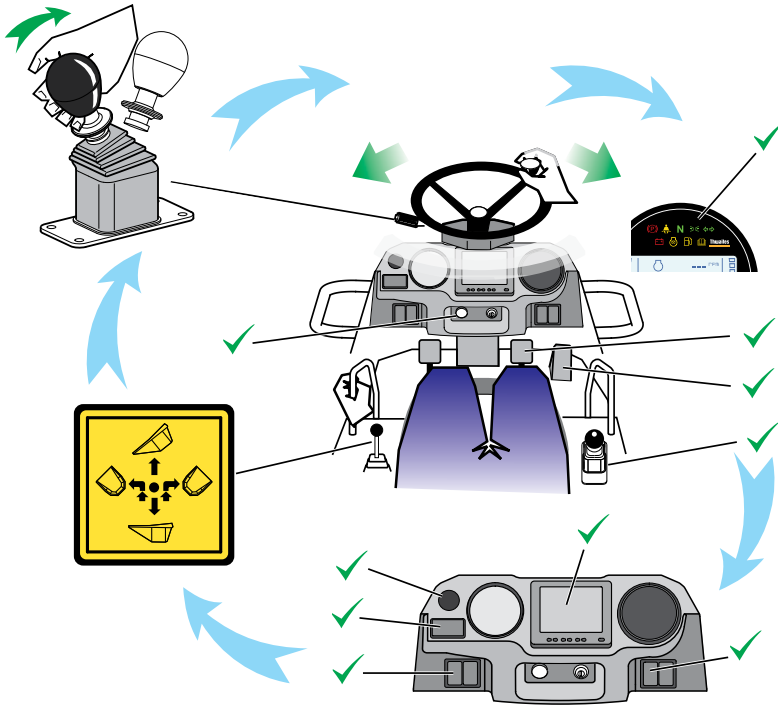
Complete checks in section



before loading the machine

2 Preliminary checks

Thwaites



Function checks - engine ON

Brakes

- Does the foot brake feel firm?
- 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 camera and monitor work?
- Is the camera lens clean?
- Do the beacons flash?
- Do all lights work? (optional):

Side lights

Head lights

Brake

Indicators

Hazard

Tipping lever

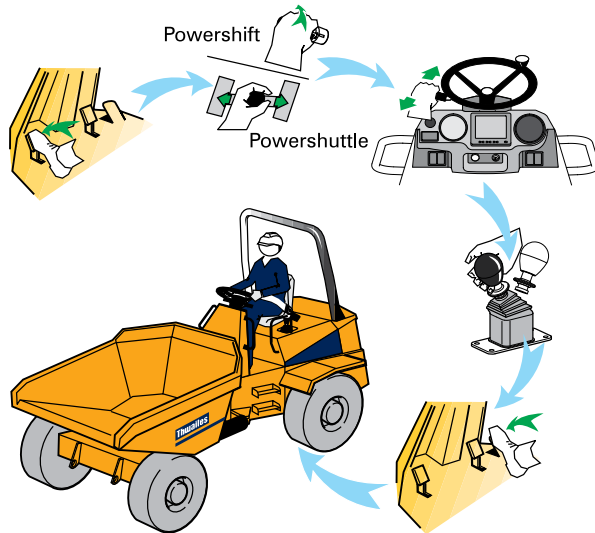
- Raise and lower skip.
- Rotate skip clockwise and anti-clockwise (*Power Swivel model only*).



Complete checks in section  before loading the machine

2 Driving procedure and safe parking

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.

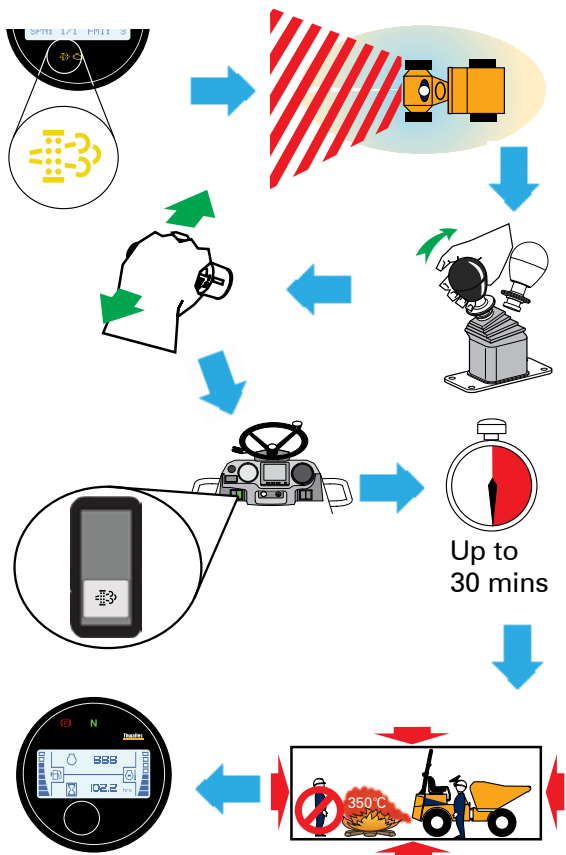
CAUTION

- 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
- Do not leave engine idling for long periods, this will increase ash build up in the DPF system

Complete checks in section  before loading the machine

2 How to operate DPF regeneration

Thwaites



Standstill Regeneration

When the regeneration lamp flashes:

- Run the machine under load or;
- Standstill Regeneration.

Note: Standstill Regeneration with reduce soot levels on DPF filter.

WARNING

Failure to respond to DPF regeneration lamp **will** cause the engine control unit to automatically reduce available power and / or automatically shutdown the engine and bring the machine to a halt.

Implementation of Standstill Regeneration

The machine must be brought into a safe state for regeneration.

1. Park the machine on an open terrain at a safe distance from flammable objects
2. Engage parking brake to prevent movement
3. Put machine into neutral
4. Ensure machine is idling
5. Dismount machine.
6. Push regeneration switch once, engine revs will increase.
7. Regeneration lasts 30 minutes on average.
8. Regeneration lamp goes out on completion – engine revs will return to normal idle.

Complete checks in section

2

before loading the machine

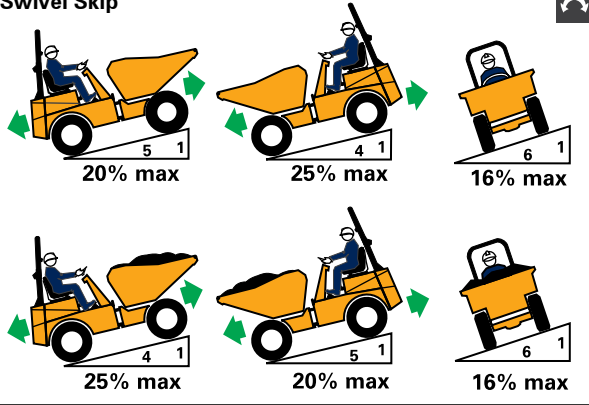
3

DANGER

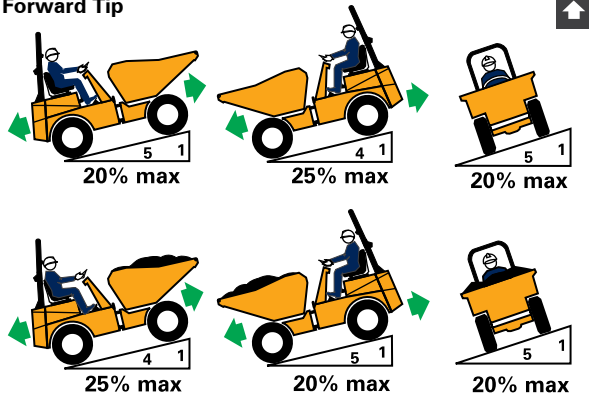
IMMEDIATE HAZARDS WHICH WILL RESULT IN SEVERE PERSONAL INJURY OR DEATH

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

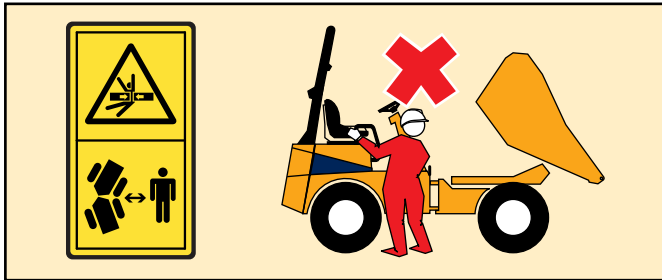


Always position swivel skip in central lock

Attention! Section



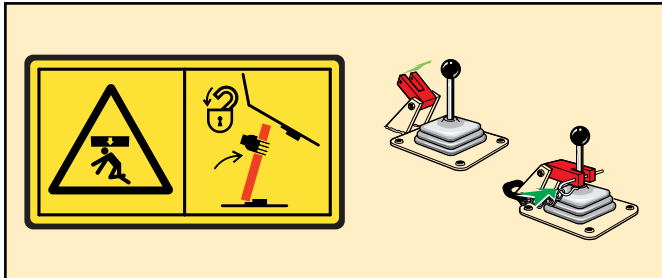
correct and incorrect working practices

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**

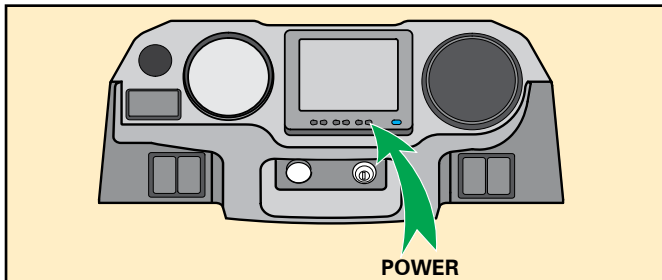
Lock both skip safety props during maintenance



Never work under an unpropped skip



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

**CAMERA MONITOR**When the machine is in use the camera monitor **MUST** be switched **ON**.To turn the monitor on press **POWER**, the power indicator light will illuminate.

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

Attention! Section



correct and incorrect working practices

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

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.

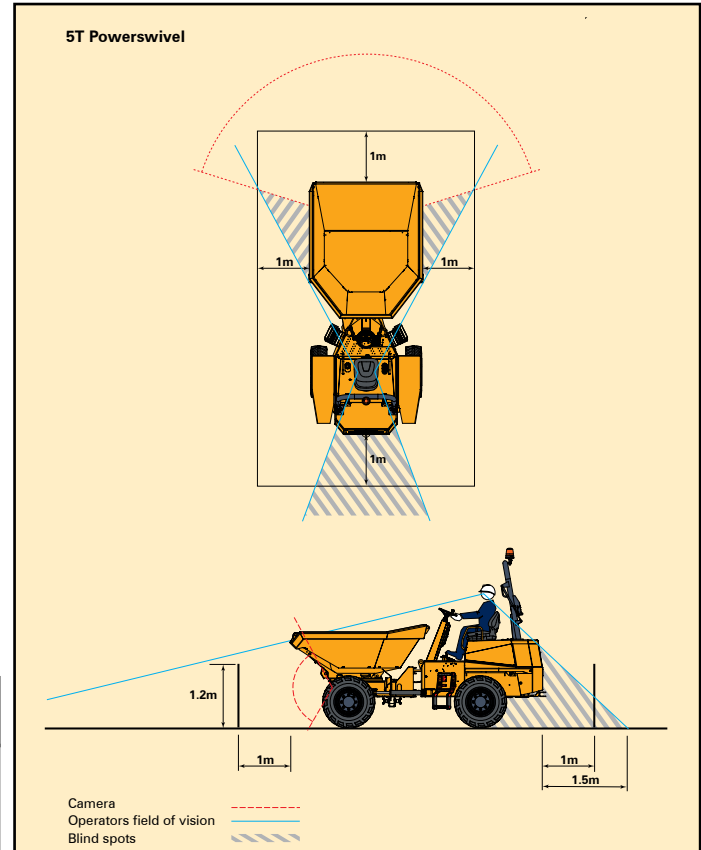
- Check all around the machine before operation.
- Be sure all mirrors are adjusted before operating the machine (if fitted).
- All cameras and mirrors must be kept clean (if fitted).
- Be aware of all blind spots.


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



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.



Attention! Section  correct and incorrect working practices

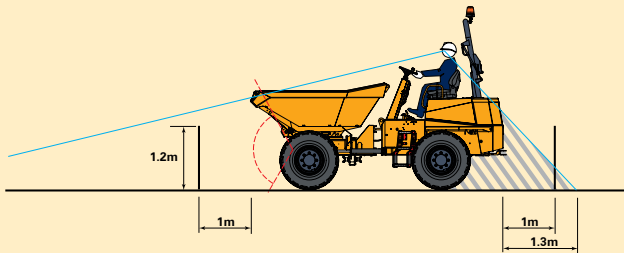
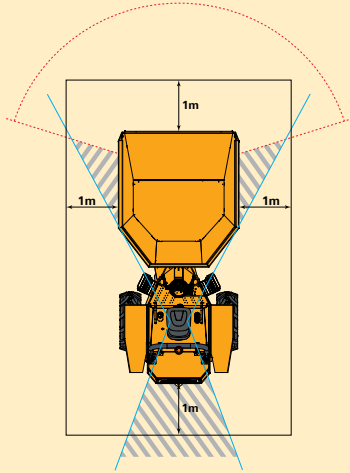
3 




DANGER

IMMEDIATE HAZARDS WHICH WILL RESULT IN SEVERE PERSONAL INJURY OR DEATH

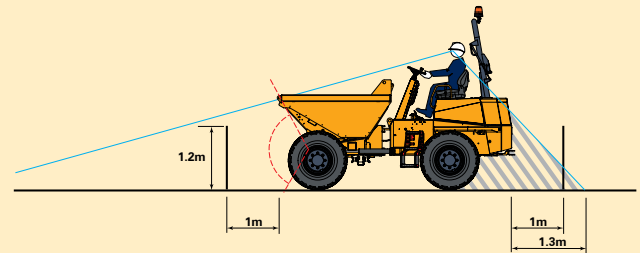
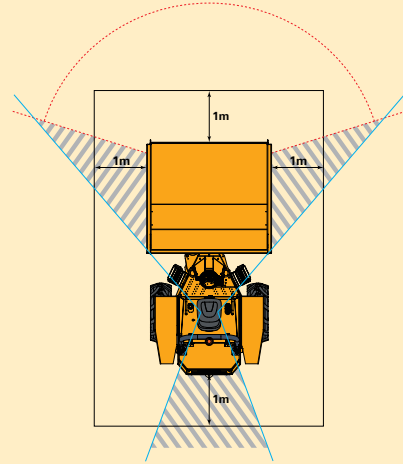
Thwaites




6T Powerswivel




Camera 
Operators field of vision 
Blind spots 

6T Forward Tip



Camera 
Operators field of vision 
Blind spots 

Attention! Section  correct and incorrect working practices

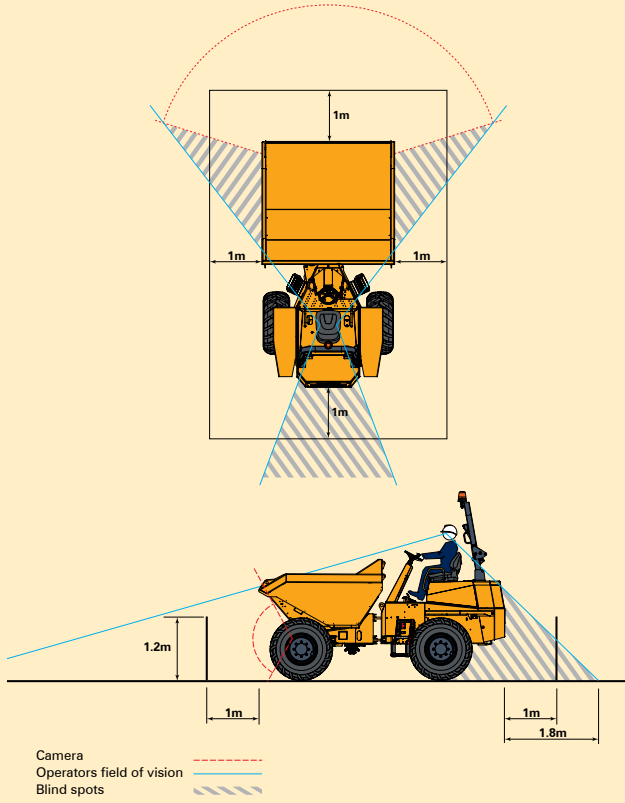
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DANGER

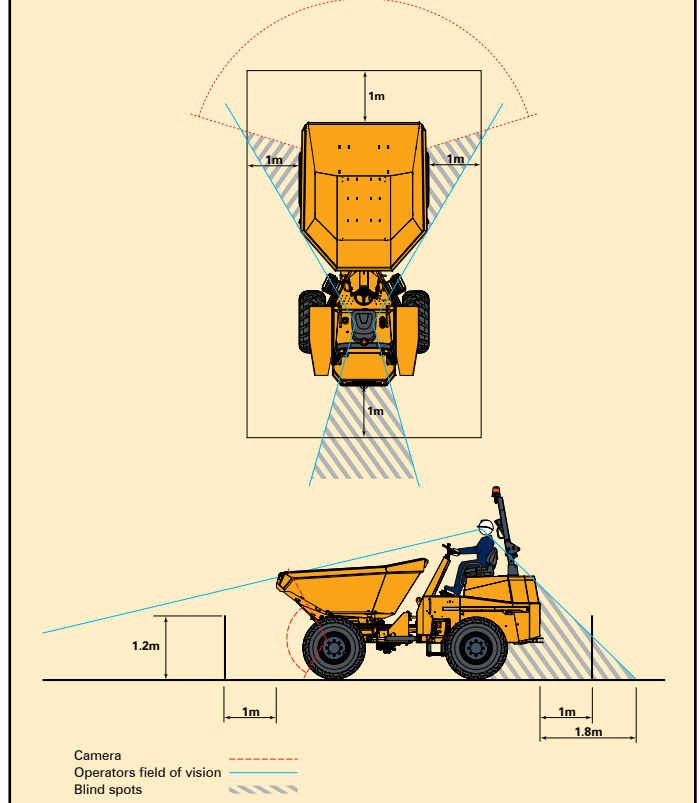
IMMEDIATE HAZARDS WHICH WILL RESULT IN SEVERE PERSONAL INJURY OR DEATH


Thwaites

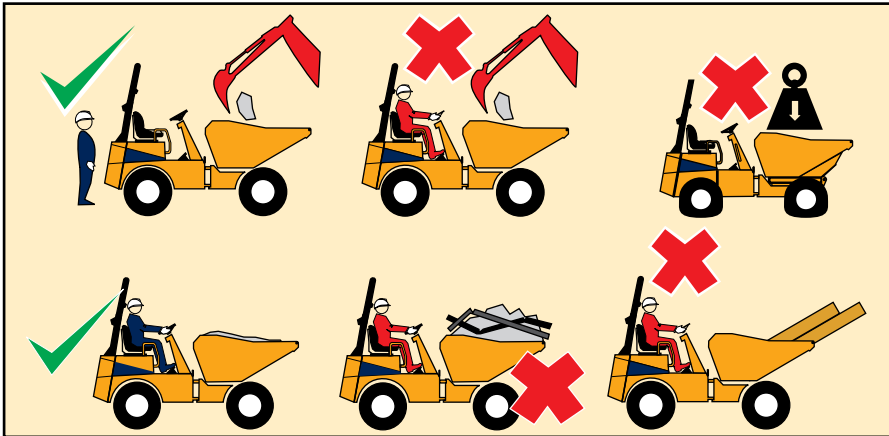
9T Forward Tip



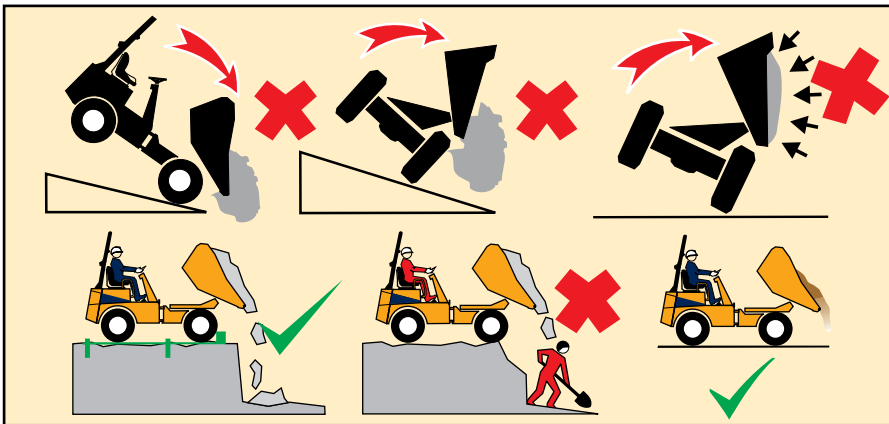
9T Powerswivel



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

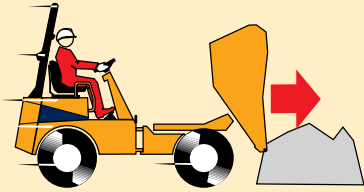
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WARNING

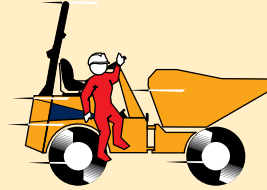
HAZARDS OR UNSAFE PRACTICES WHICH COULD RESULT IN SEVERE PERSONAL INJURY OR DEATH

Thwaites

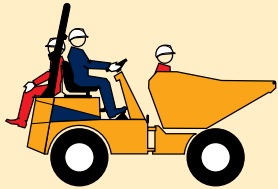
DRIVING



DO NOT drive with the bucket tipped (bulldozing)



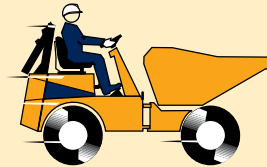
NEVER dismount from a moving machine



DO NOT carry passengers



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



DO NOT operate with the ROPS frame folded down



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

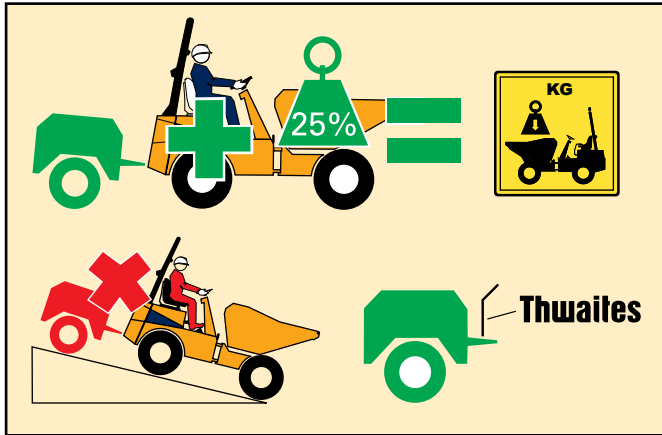


Wading depth must not exceed centre of axle, short periods only.

Attention! Section



correct and incorrect working practices

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

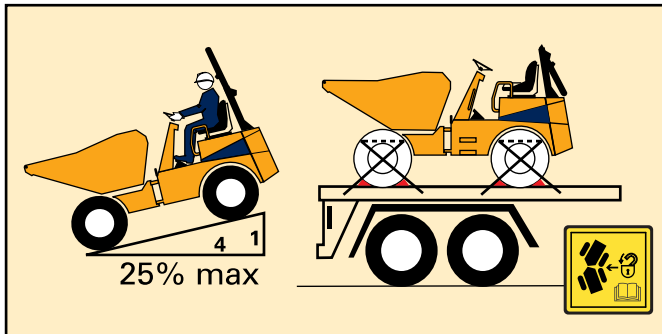
Apply hand brake

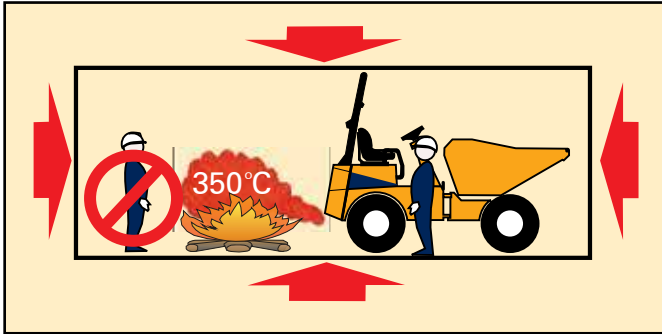
Stop engine

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****Thwaites****EXHAUST GAS REGENERATION**Park machine **outside** in a safe, **clear** area away from people, building and **flammable** materials.**DO NOT** stand in front or behind machine. High exhaust gas temperature, 600°C!

Dismount and stand clear



Ensure handbrake is engaged to prevent machine movement!

**ENGINE MAINTENANCE**

Shut engine off and remove key before performing maintenance or repair work. Read service manual.



Keep hands clear of moving parts



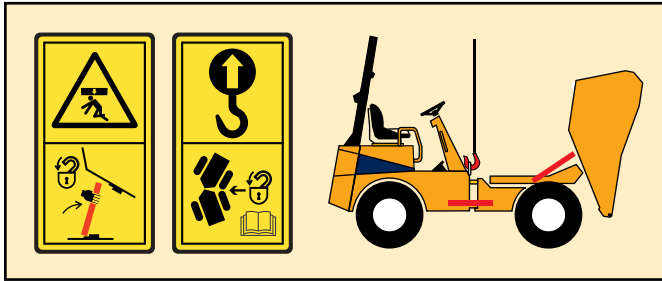
Keep clear of hot surfaces

**DO NOT** remove radiator cap whilst engine is hot.

Attention! Section

3

correct and incorrect working practices

3**CAUTION**HAZARDS OR UNSAFE PRACTICES WHICH **COULD** RESULT IN MINOR PERSONAL INJURY OR PRODUCT OR PROPERTY DAMAGE**Thwaites****USING A CRANE TO LIFT THE MACHINE**

Tip skip fully forward (except 9 Tonne)



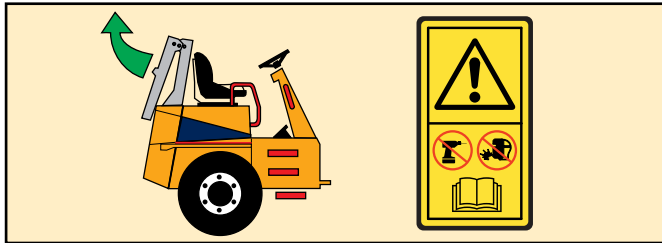
Engage skip safety prop



Engage chassis locking bar



Lift using centre eye provided

**HINGED ROPS**

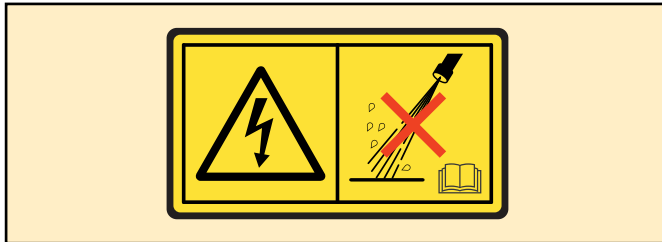
Use grab handles, tread grips and steps when standing on the machine to lower the ROPS frame.



Avoid wet surfaces.



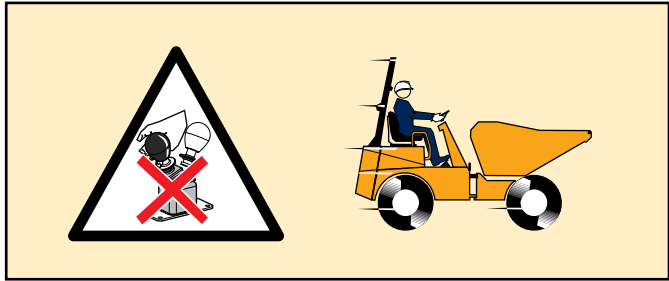
Never modify structure

**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.

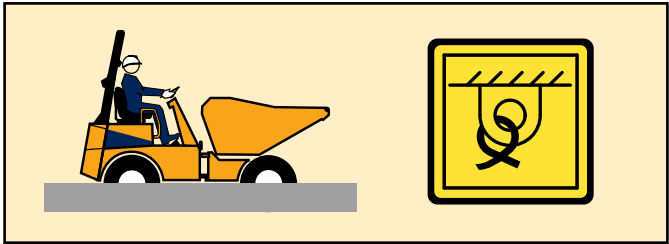
Attention! Section



correct and incorrect working practices



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



- MACHINE RECOVERY**
- Towing procedure**
- Ensure towing straps or chains are suitable for the machine to be towed. (1.5 time more than the gross weight.)
 - Tow the machine using the front tie down points or around the rear axle.
 - Tow the machine in neutral with the engine running. Release handbrake.

Moving a disabled machine
Towing or pushing a disabled machine can only be done after the handbrake emergency release procedure has been carried out.

WARNING
If rear axle brakes are not disengaged damage will be caused to transmission and hydraulics.

3

CAUTION

HAZARDS OR UNSAFE PRACTICES WHICH **COULD** RESULT IN MINOR PERSONAL INJURY OR PRODUCT OR PROPERTY DAMAGE



HANDBRAKE EMERGENCY RELEASE

DANGER

Wheels must be chocked before carrying out this procedure

Loosen the four lock nuts (Fig 1 A) on the release screws (Fig 1 B) then back off the nuts by approximately 8 mm.

Tighten the four release screws (Fig 2 B) until they are in contact with the pressure plate.

Tighten each release screw (Fig 2 B) in an alternate sequence by 1/4 turn at a time to disengage the braking disks. To a maximum of one full turn.

CAUTION

Tighten to a maximum of one turn

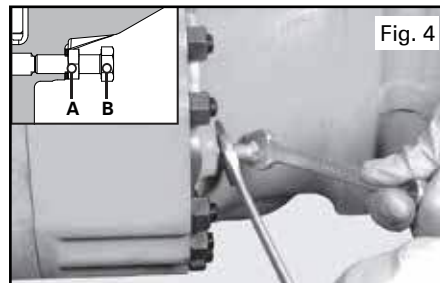
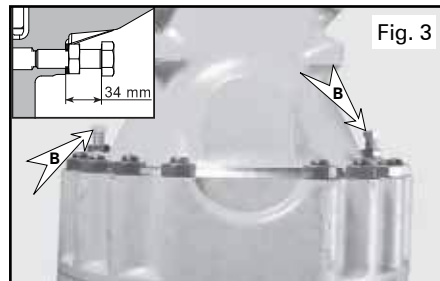
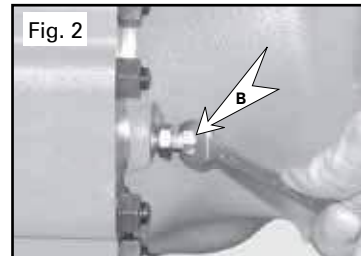
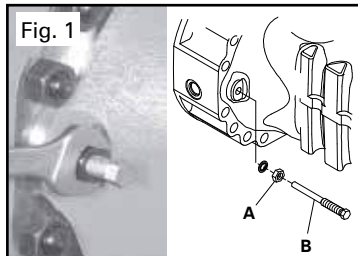
RESET BRAKE FUNCTION

Adjust release screws (Fig 3 B) to obtain a distance of 34 ± 0.5 mm between axle machined surface and screw underhead.









Lock into position with nuts (Fig 4).

CAUTION










Hold screws in position while locking the nuts.
Re-check the distance of screws.



4 Troubleshooting

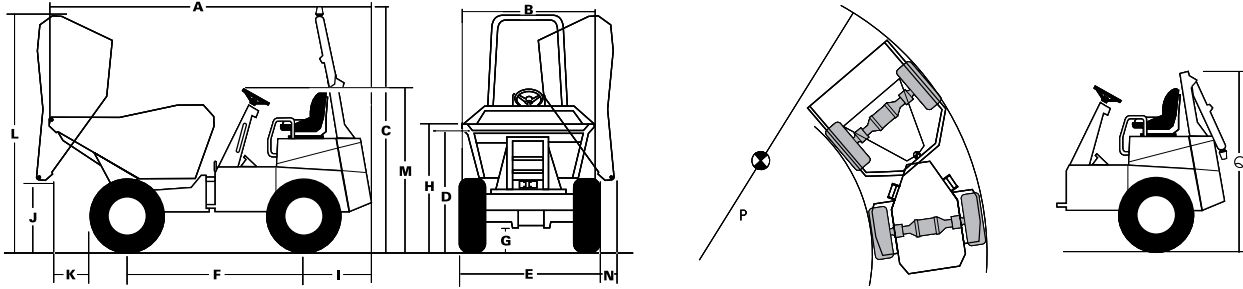
Instrument panel warning lights			
Symbol	Designation (Error Code)	Reason for illumination	Required action
1 	Battery charging	Alternator not charging	Check belt tension
2 	Hand brake	Hand brake ON	Cancel as required
3 	Seat belt	Seat belt has NOT been fastened	Fasten seat belt
4 	Cold start pre-heat	Cold start pre-heat in process	None
5 N	Neutral	Transmission in neutral	None
6 	Low diesel oil	Diesel oil in tank low	Check fuel level
7 	Lights	Lights selected	Cancel as required
8 	Directional Indicators	Indicator selected	Cancel as required
9 	Air filter	Blockage air filter	Check error code display
	Water in fuel	Fuel pre-filter bowl requires draining	
	Fuel Pressure	Low fuel pressure	



4 Troubleshooting

Instrument panel warning lights			
Symbol	Designation	Reason for illumination	Required action
10 	Low brake oil	Brake oil in reservoir low	Check brake oil level
11 	DPF Regeneration	Blocked DPF filter	Initiate standstill regen or increase engine load, See section 2
12 	Boost Air temperature / pressure	Air Temperature to high. Air pressure too low or too high.	Check radiator core is clear
13 	Engine oil pressure	Oil pressure is either too high or too low	Switch off engine and check oil level.
14 	Engine warning lamp	System fault detected	Check error code display Note - If no error code displayed refer to reset function section 1, if error continues investigate further.
15 	Transmission oil temperature	Oil temperature too high	Check oil cooler clean if required.
16 	Transmission oil pressure	Oil pressure too high or too low	Check oil level
17 	Ash charging	Indicates diesel particle filter has become permanently clogged, can no longer regenerate.	Contact Distributor/Thwaites Ltd.
18 	Selective Catalytic Reduction (SCR) System	Not applicable to these machines	None

4 Data Chart – Powerswivel

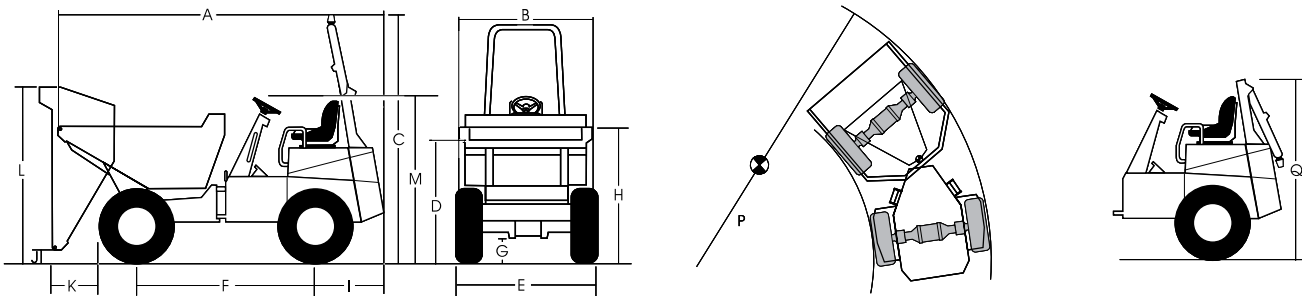
Thwaites




Dimensions (mm)	5T	6T	9T	Weight (kg)	5T	6T	9T	Noise
A. Length.....	4815	4815	5047	Unladen				Airborne (10 m)  55.4 kW
B. Width.....	2135	2280	2435	Front axle.....	1730	1800	2160	
C. Height (ROPS frame & Beacon).....	3380	3430	3610	Rear axle.....	2640	2660	3460	Operator  84
D. Bucket lip height.....	1615	1670	1820	Total.....	4370	4460	5620	
E. Width over tyres.....	2100	2240	2440	Laden (including driver at 80 kg)				
F. Wheelbase.....	2480	2480	2660	Rated payload.....	5000	6000	9000	
G. Ground clearance.....	320	370	447	Front axle.....	6180	7270	9870	
H. Bucket load height.....	1795	1850	2002	Rear axle.....	3270	3270	4830	
I. Axle to rear.....	1235	1235	1256	Total.....	9450	10540	14660	
J. Tipping ground clearance.....	1050	1100	1134	Towbar (Max)				
K. Tipping tyre clearance.....	540	550	1131	Pull load.....	3750	4500	6750	
L. Height tipped (skip).....	3650	3694	4000	Vertical load.....	500	500	500	
M. Max height without ROPS frame.....	2190	2230	2630	Tyre Pressure				
N. Tipping side clearance.....	140	100	378	Bar (psi) front.....	4.9(71)	3.9(57)	3.4(49)	
P. Tyre clearance diameter (m).....	12.0	12.0	13.4	rear.....	2.5(36)	2.5(36)	1.6(24)	
Q. Height (ROPS frame folded).....	2170	2230	2630					

4 Data Chart – Front tip

Thwaites



Dimensions (mm)	6T	9T	Weight (kg)	6T	9T	Noise
A. Length	4475	4670	Unladen			Airborne (10 m)
B. Width	2354	2485	Front axle	1460	1720	
C. Height (ROPS frame & beacon)	3430	3530	Rear axle	2720	3000	
D. Bucket lip height	1610	1740	Total	4180	4720	Operator
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	6230	8760	
H. Bucket load height	1740	1975	Rear axle	4030	5040	
I. Axle to rear	1235	1255	Total	10260	13800	
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. Max height without ROPS frame	2230	2440	Tyre pressure			
P. Tyre clearance diameter (m)	12.6	14.0	Bar (psi) front	3.5(51)	3.2(46)	
Q. Height (ROPS frame folded)	2230	2555	rear	2.7(39)	1.6(24)	

5 Maintenance Tasks

Thwaites

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
- 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

First (100 hours) - New machine - change:

- Engine oil filter, Transmission oil filter, Hydraulic oil filter
Axle oil (Refer to service manual for procedures)

5 Daily (10 Hour) maintenance checks

Diesel fuel tank volumes

- Check fuel level, indicator flashes when 2 bars remaining (Fig 1).
- Fill fuel tank through filler cap (Fig 2, A) with required amount of diesel, use tank gauge (Fig 2, B) to aid filling.

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).



CAUTION - HOT FLUIDS

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

Fig. 1

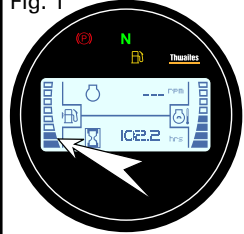


Fig. 2

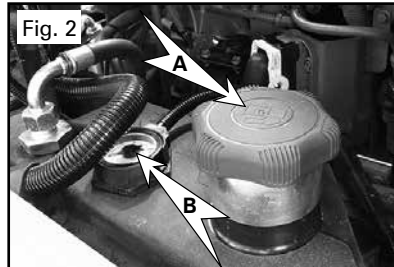


Fig. 3

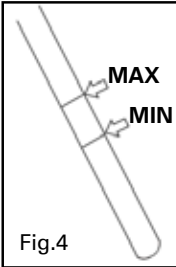
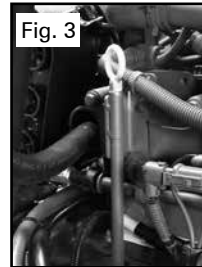
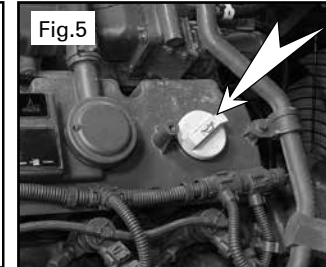


Fig.5




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

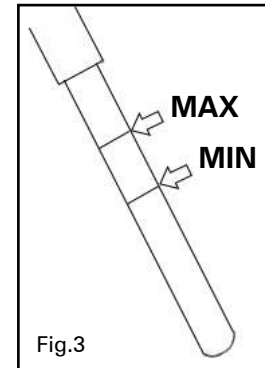
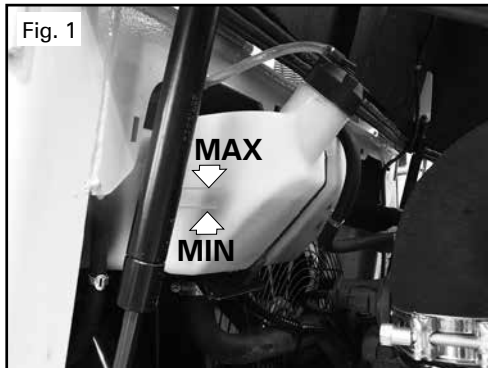
DO NOT attempt to remove the expansion bottle cap until system has cooled down to avoid serious scalding.

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.



5 Daily (10 Hour) maintenance checks


Thwaites

Check brake functions

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

Hand Brake


No regular maintenance is required. Check hoses for leaks.

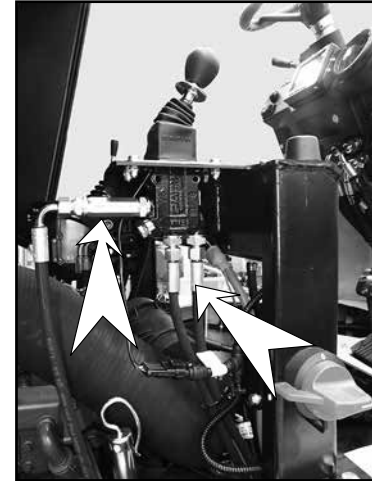
 *If leaks or damage is found do not operate the machine until the fault has been corrected.*

Foot brake (Primary)

From the drivers seat, with your 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.*



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)

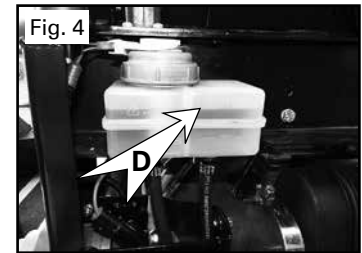
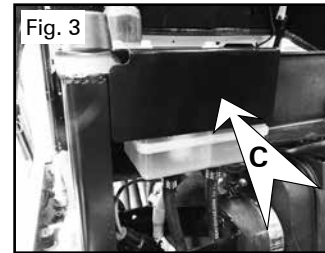
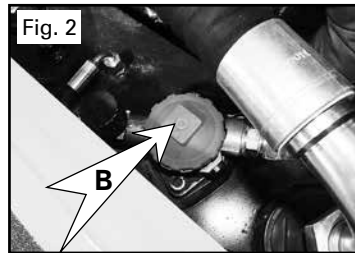
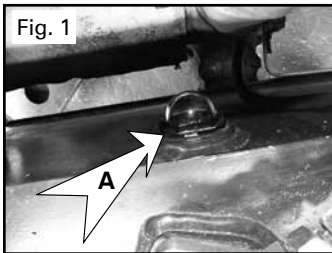
Brake reservoir oil level

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



WARNING - AVOID SYSTEM FAILURE

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



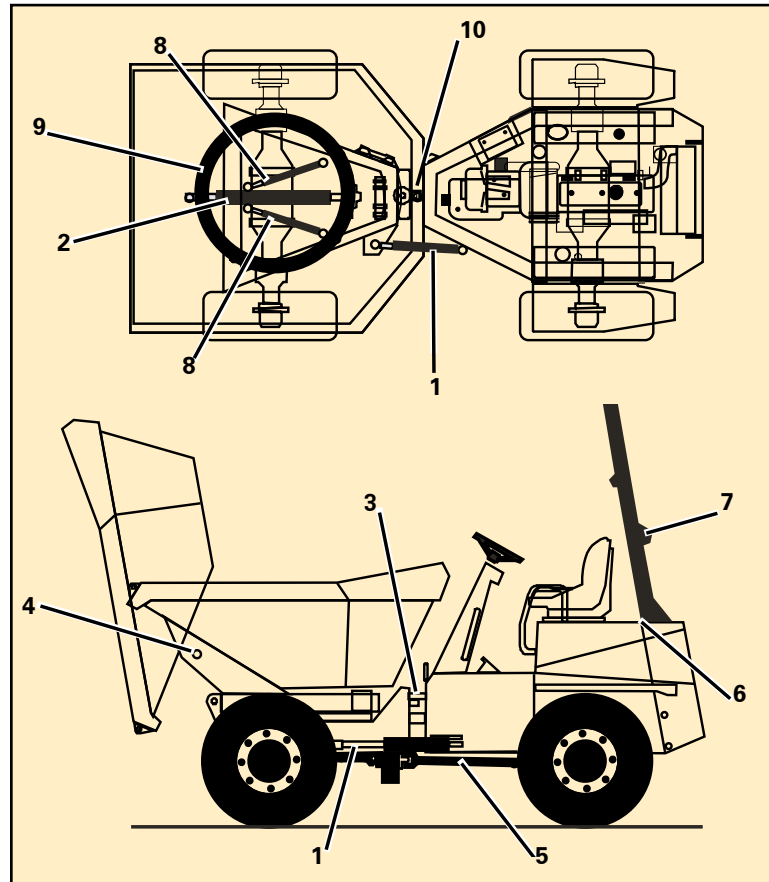
5 Weekly (50 Hour) maintenance checks

Thwaites

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. Folding ROPS frame pins
8. Slew cylinders (Powerswivel Only)
9. Slew Ring (Powerswivel Only)
10. Central skip lock (Powerswivel Only)



The Thwaites logo is centered on the page. It features the word "Thwaites" in a white, bold, sans-serif font, enclosed within a dark blue rectangular box.

Normal service intervals:

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

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

We reserve the right to change all specifications without prior notice.

www.thwaitesdumpers.co.uk