



5 - 10 Tonne

Thwaites

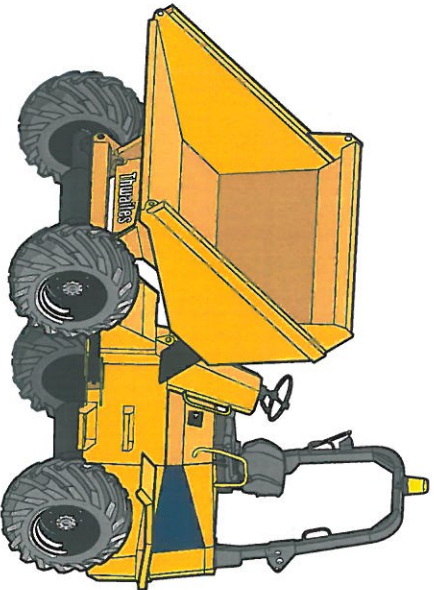
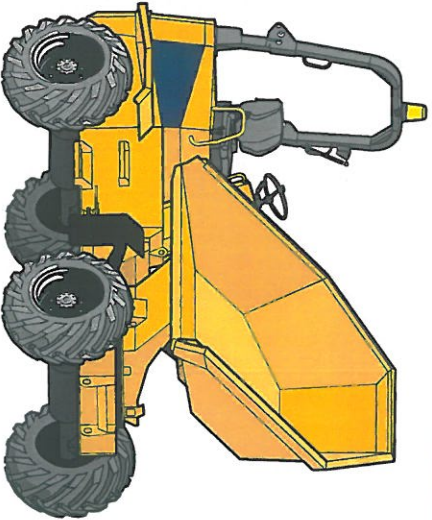
DOC only -

MACH 690, 692, 693, 694,
697, 698, 755, 757, 864, 865,
866, 2057, 2060, 2061, 2062,
2063, 2064, 2065, 2066, 2090,
2092, 2093, 2097, 2098.

DOC/DPF -

MACH 752, 763, 695, 699.

Operator's Instruction Manual



1 Introduction

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



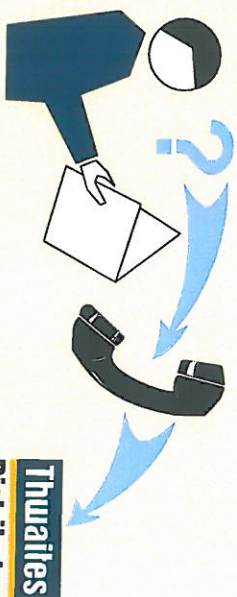
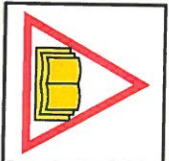
CAUTION

1 Before operating this machine

Thwaites



Read operator's instruction manual



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

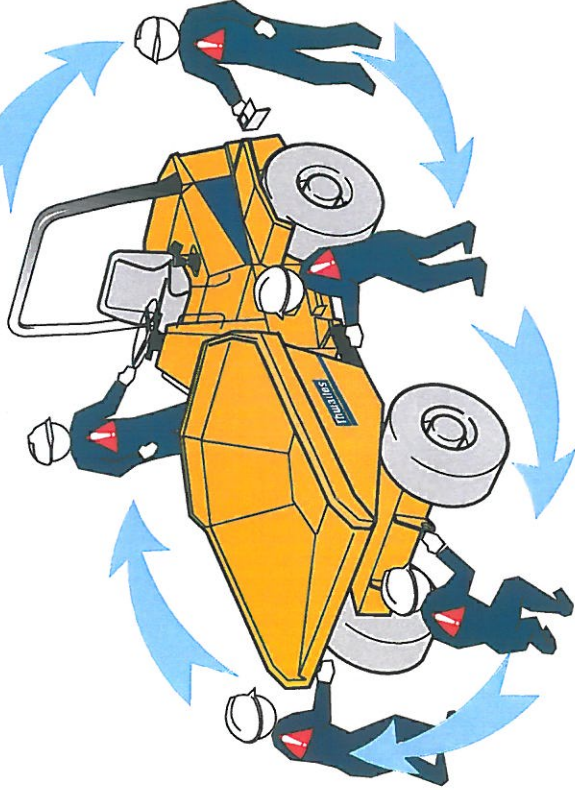
Complete checks in section

1

before starting the engine

1 Before operating this machine

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

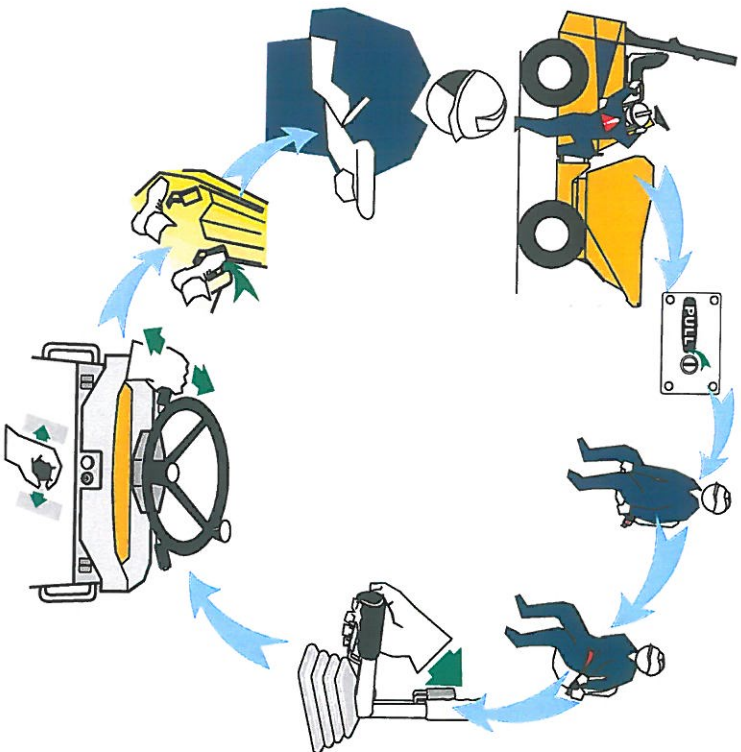
Complete checks in section

1

before starting the engine

1 Before operating this machine

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- 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 machines fitted with a ROPS frame



Complete checks in section

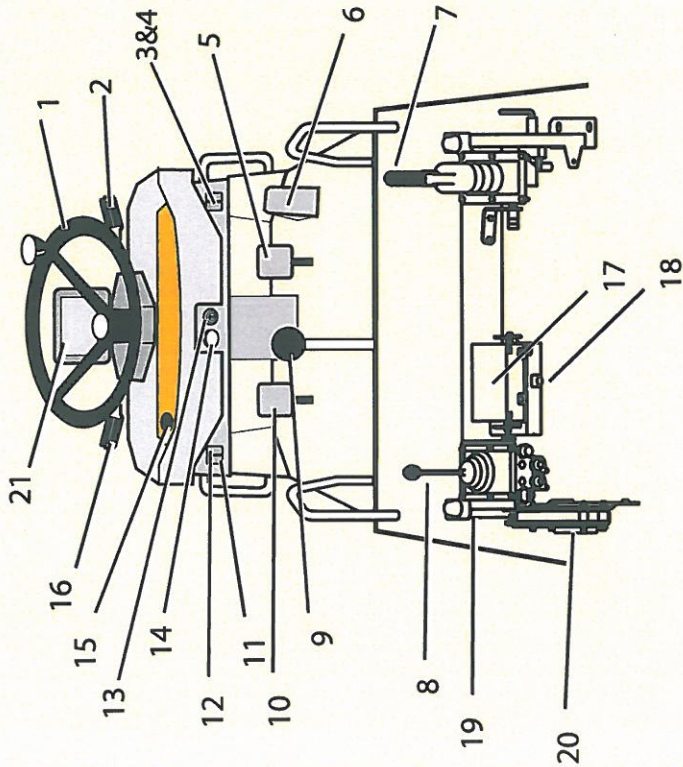
1

before starting the engine

Control locations and functions

1. Steering wheel
2. Light switch lever*
3. Hazard warning light switch*
4. Blank
5. Footbrake pedal
6. Throttle pedal
7. Handbrake lever
8. Bucket control lever
9. Gear lever (*Powershuttle only*)
10. Dump valve pedal
11. Handbrake test switch
12. Regeneration switch (**DPF only**)*
13. Ignition switch
14. Warning buzzer
15. Horn push
16. Forward/Neutral/Reverse lever
(Includes gear selection Powershift only)
17. Fuse/Relay panel
18. Diagnostic plug
19. Hourmeter/Error code display
20. Engine control unit
21. Camera monitor (if fitted)

* *Optional items*



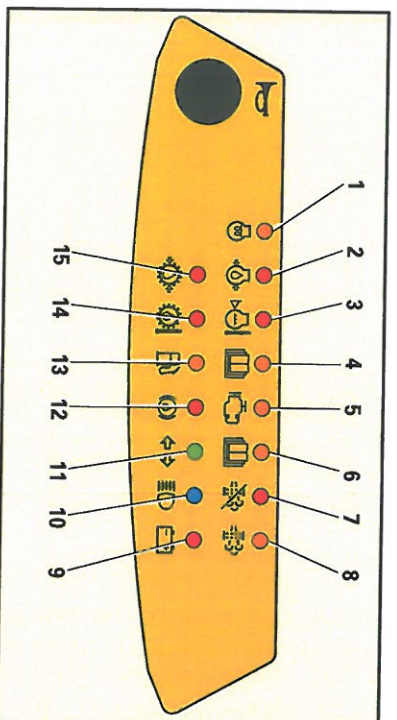
Complete checks in section

1

before starting the engine

1 Warning light location and functions

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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

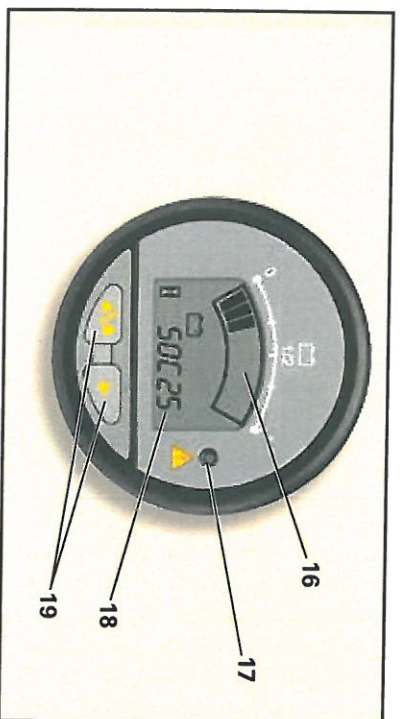
16. Battery state of charge
17. Fault Code light
18. Hourmeter or error code - display
19. Reset buttons



Refer Control functions in depth Section 1

*Reading of error code display required

**Optional equipment



Complete checks in section

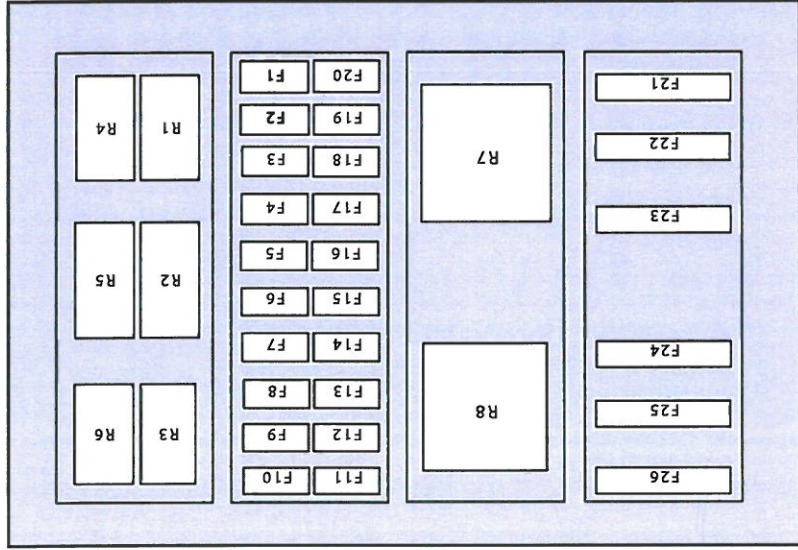
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before starting the engine

1 Fuse and relay panel location and function

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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	5A	EGS Pin 3
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	5A	EGS Pin 6(DPF only)
F20	10A	Air Intake Throttle(DPF only)
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	Regeneration Safe (DPF only). 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
R13	Seat Belt Immobiliser Relay
R14	Seat Belt Immobiliser Relay
R15	Flasher Relay

Control Bracket (O/S)

Relay No.	Function
R16	Relay
R17	Ground Timer Relay (GTR)

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

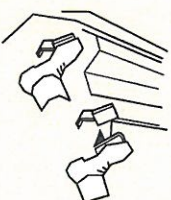
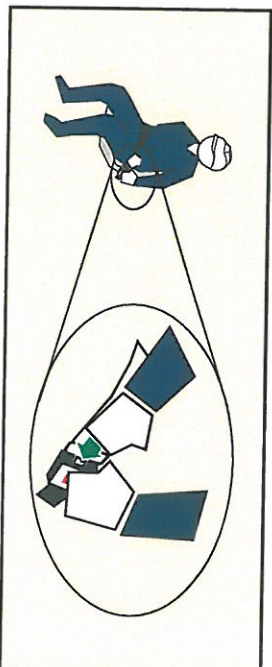
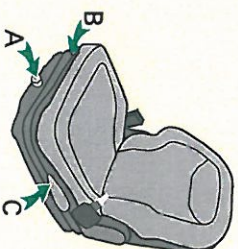
- Apply pressure to increase speed
- Release pressure to reduce speed

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

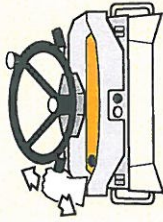
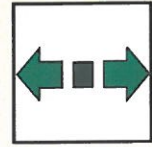
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before starting the engine

1 Control functions - in depth


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

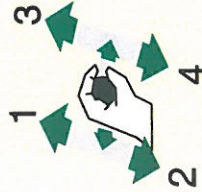
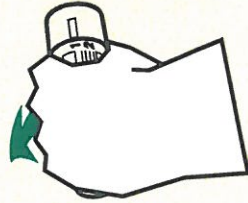
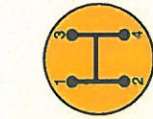


Gear lever (powershift) - left hand

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

 Warning - Overspeed time delay sensor fitted

Gear lever (powershuttle only) - left hand

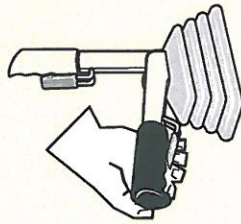


Hand brake lever - right hand

- 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

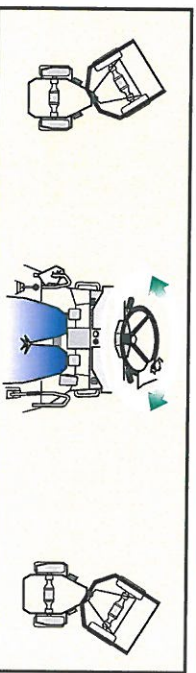
1 Control functions - in depth

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.




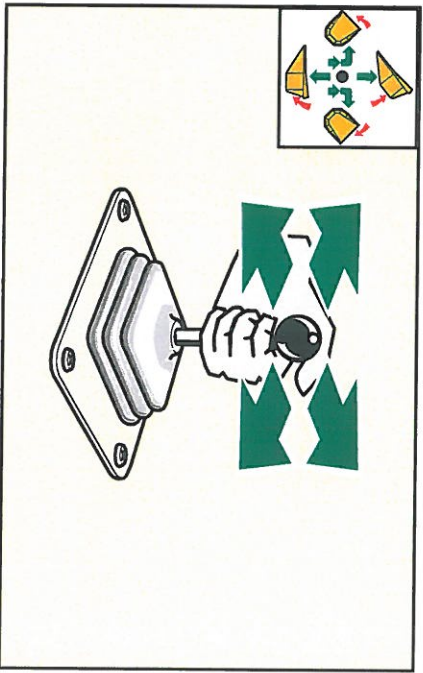
Tipping control lever (front tip models) - left hand

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

Tipping control lever (powerswivel models) - left hand

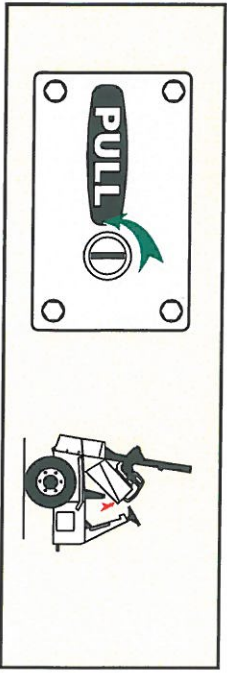
- Raise skip 100 mm (4") to disengage pivot centring lock
- Rotate skip to a central position (fully lowered) to automatically engage centring lock
- Raise skip and push lever to the right to rotate skip clockwise
- Raise skip and push lever to the left to rotate skip anti-clockwise
- Increased engine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

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



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

1

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.

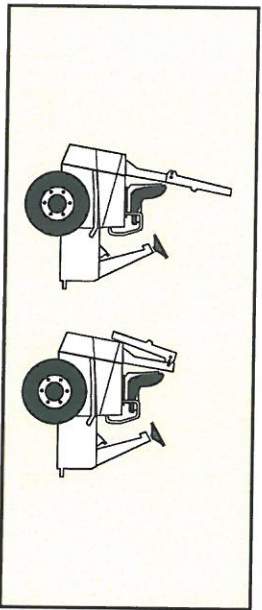


Complete checks in section

1 before starting the engine

1 Control functions - in depth

Thwaites



Lowering and raising the ROPS frame

- Remove linch pins and withdraw frame lock pins
- Lower frame and insert lock pins and linch 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 linch pin

Beacon stowage

- Unplug and remove beacon
- Secure beacon on bracket provided beneath bonnet

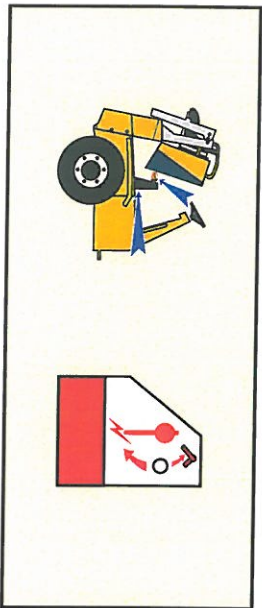
Battery isolator (*beneath engine cover*)

- Turn key anti-clockwise to isolate the battery power supply
- DPF ONLY machines - can be isolated immediately after ignition off
- DOC ONLY machines - See Caution note below:



CAUTION - DOC ONLY

DO NOT isolate the battery power within 3 minutes of stopping the engine, may damage Engine Control Unit (ECU).



Complete checks in section



before starting the engine

1 Control functions - in depth

Thwaites


Light switch lever (Right hand)

Operates both lighting and direction indicators.

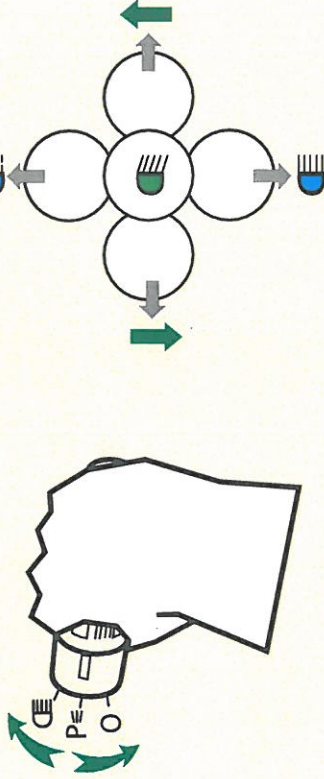
With the lever in the middle position rotate switch body to select;

O = Lights 'Off'

P = Sidelights 'On'

O  = 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



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

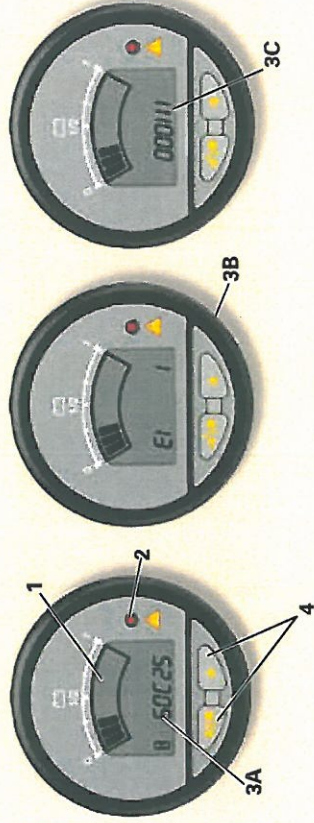
A lit fault code lamp indicates waiting error code, this will show in place of the hourmeter reading with multiple codes showing for a few seconds each.

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



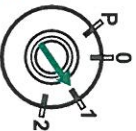
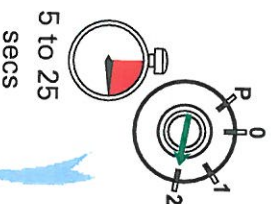
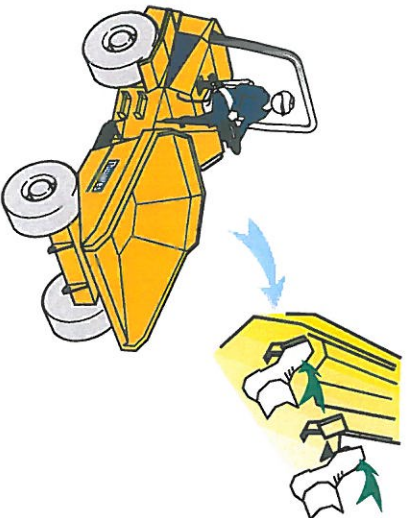
Complete checks in section

1

before starting the engine

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. 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.

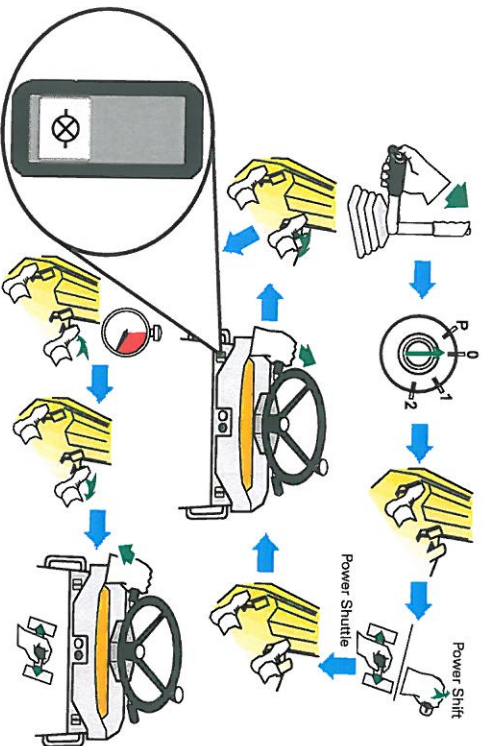
Complete checks in section

2

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

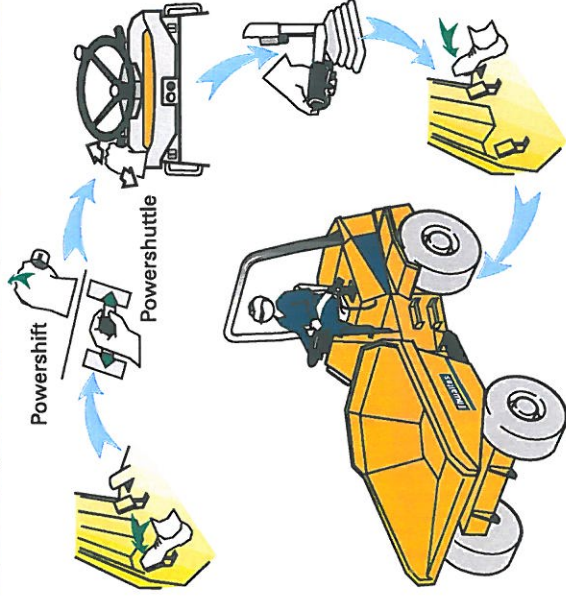
Do not operate a machine that has moved during the above parking brake test.



Complete checks in section

2

before loading the machine



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 (if fitted)

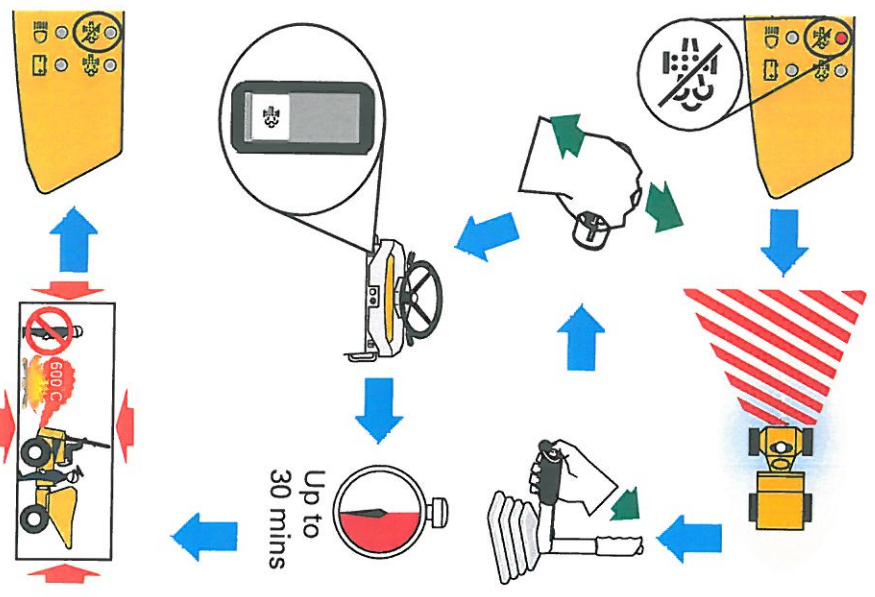
Complete checks in section

2

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:

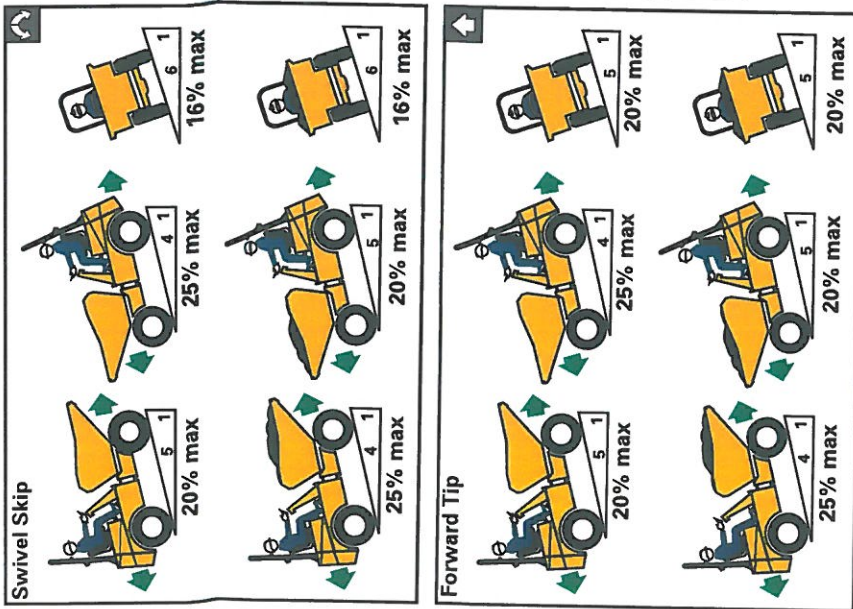
WARNING
Failure to respond to DPF regeneration lamp will cause the engine control unit to automatically reduce available power and / or automatically shutdown the engine and bring the machine to a halt.

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



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

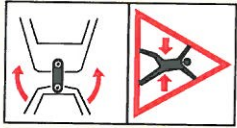
DO NOT run downhill with controls in neutral

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

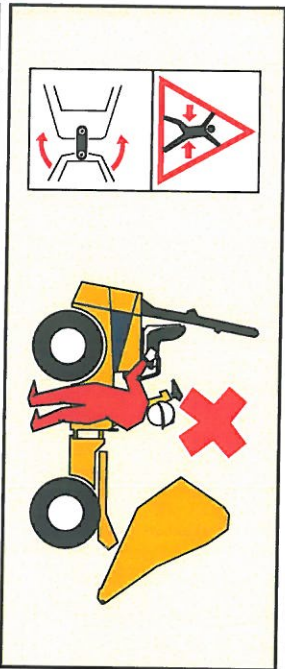
Always position swivel skip in central lock

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**

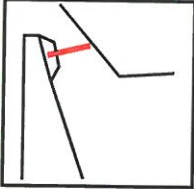
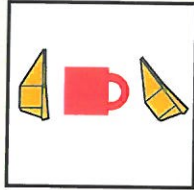
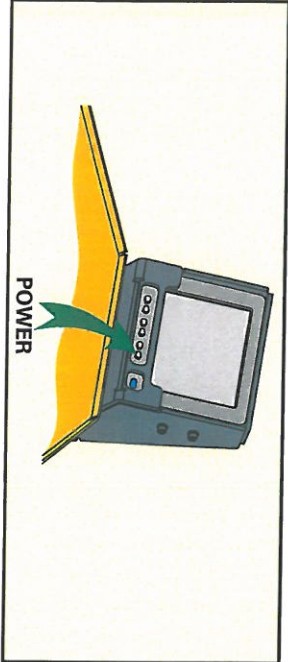
Lock both skip safety props during maintenance



Never work under an unpropped skip



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

**CAMERA MONITOR - (if fitted)**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

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.

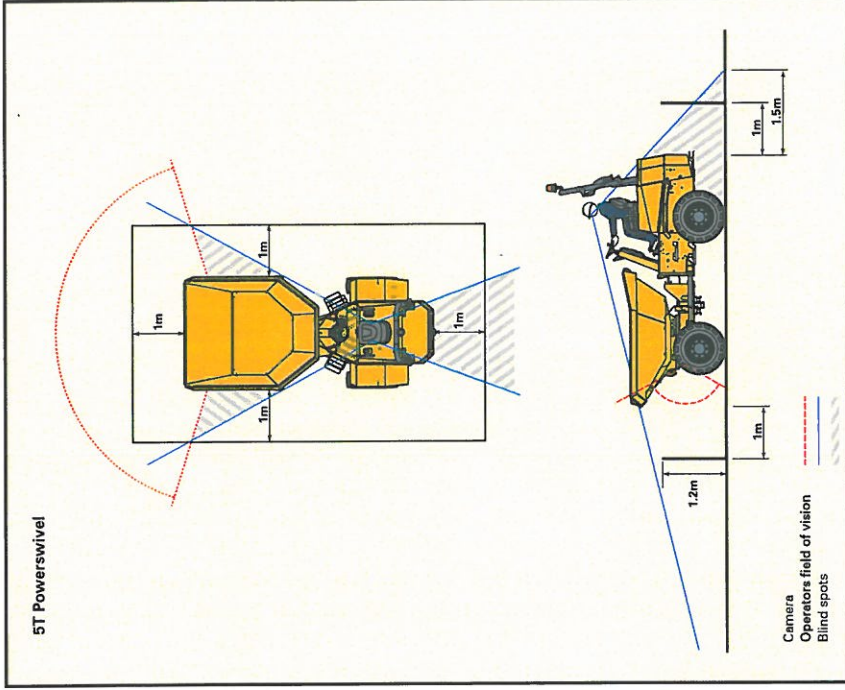
- Check all around the machine before operation.
- Be sure all mirrors are adjusted before operating the machine (if fitted).
- All cameras and mirrors must be kept clean (if fitted).
- Be aware of all blind spots.


 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

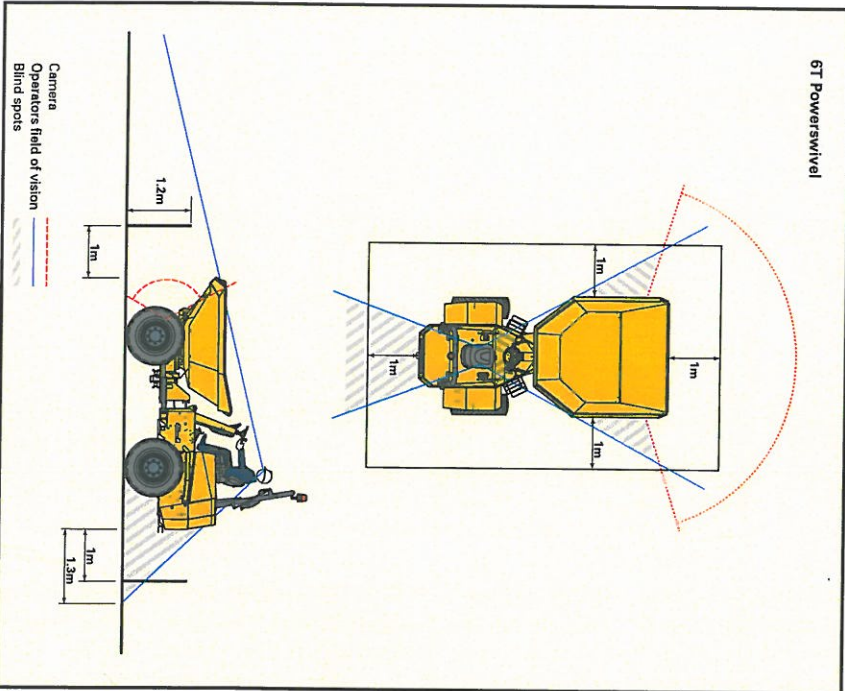


DANGER

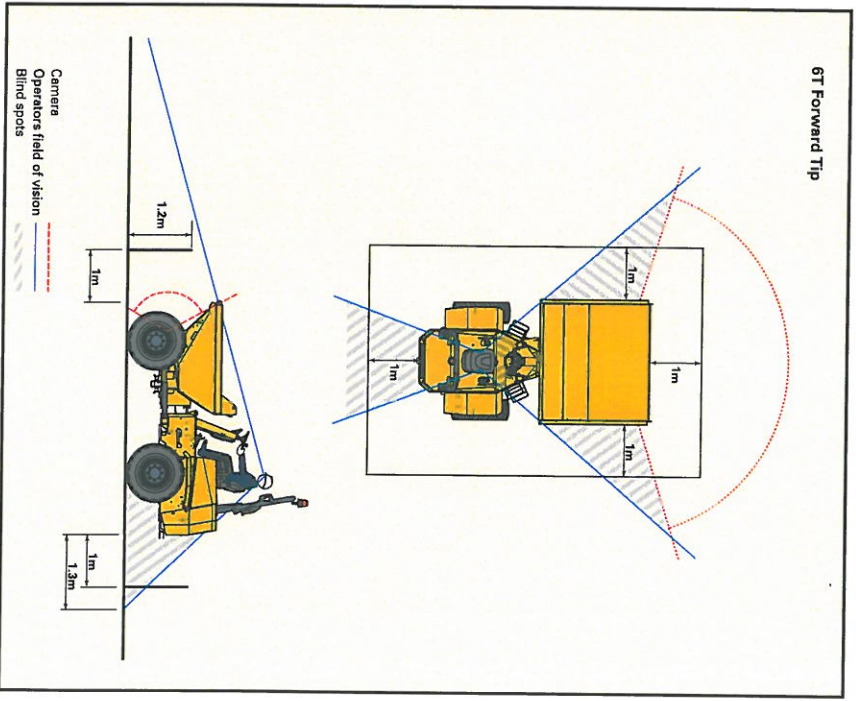
IMMEDIATE HAZARDS WHICH WILL RESULT IN SEVERE PERSONAL INJURY OR DEATH

Thwaites

6T Powerswivel



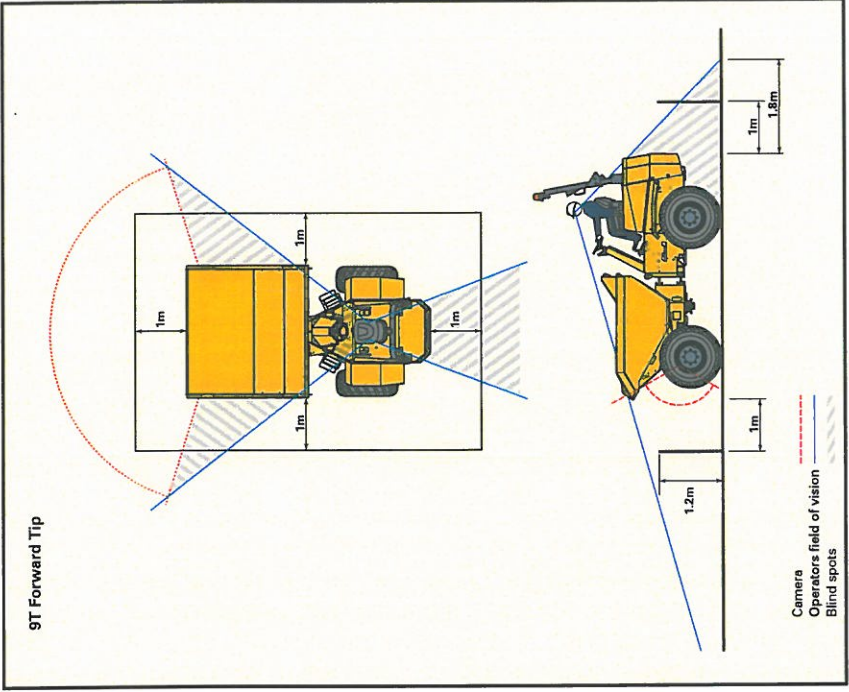
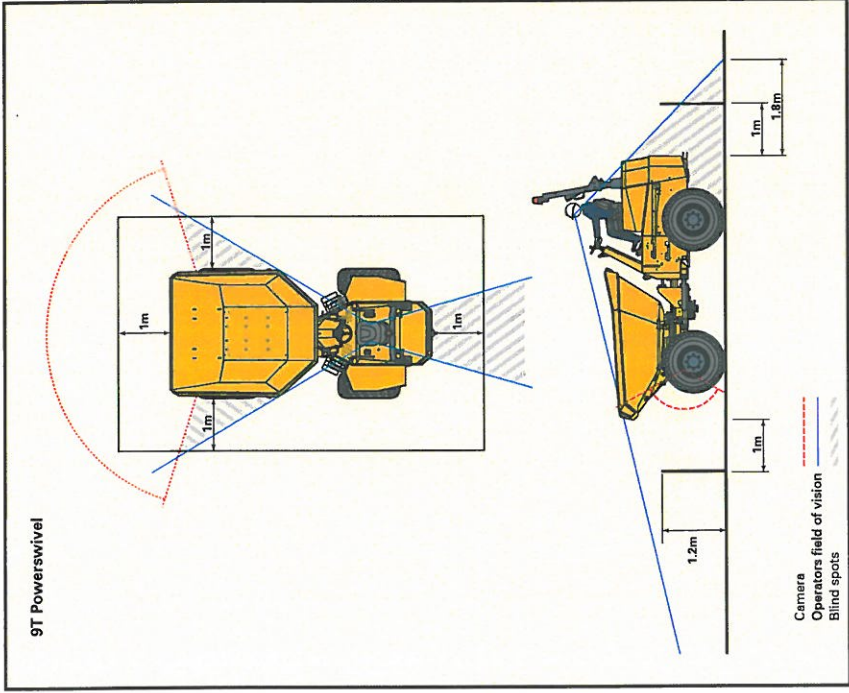
6T Forward Tip



Attention! Section



correct and incorrect working practices



3

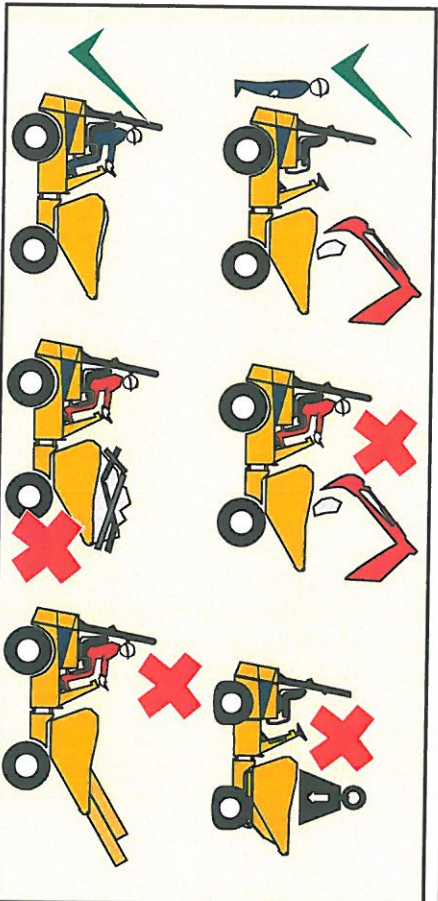
WARNING

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

Thwaites

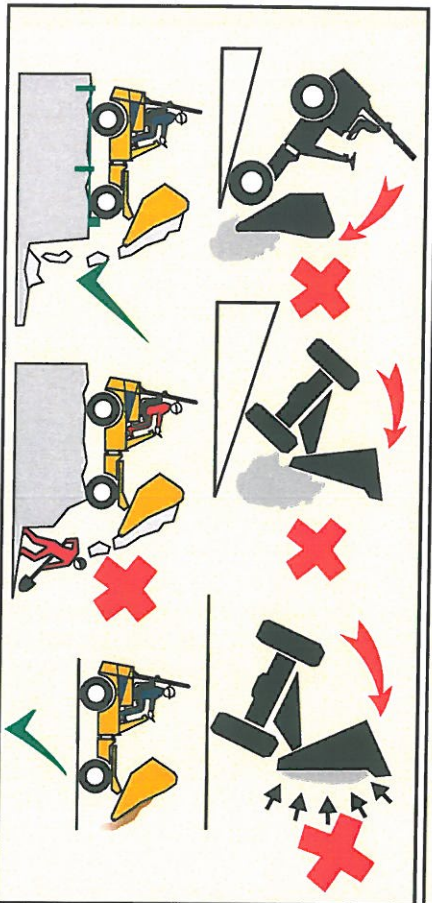
LOADING THE MACHINE

- 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



correct and incorrect working practices

3

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



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



DO NOT carry passengers



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

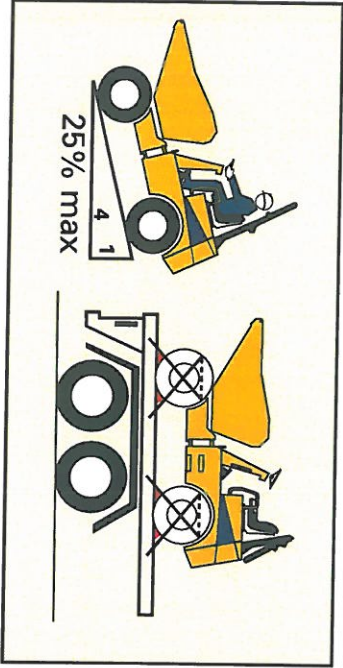
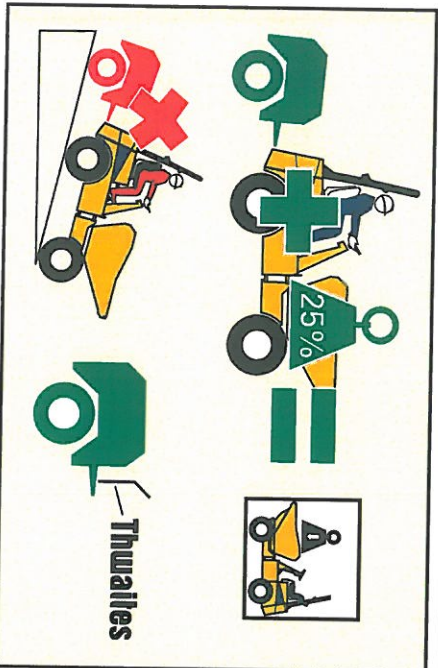
3 correct and incorrect working practices

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



correct and incorrect working practices

3

WARNING

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

Thwaites

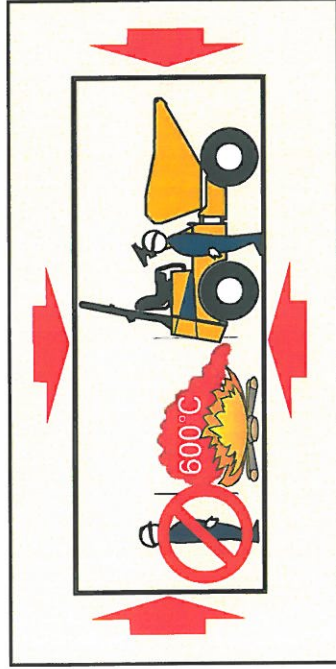
EXHAUST GAS REGENERATION (DOC/DPF ONLY)

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!



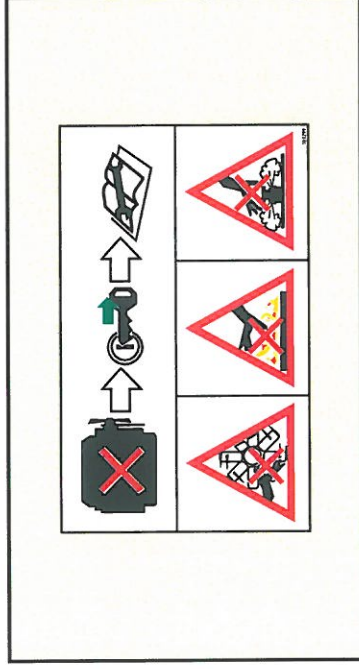
ENGINE MAINTENANCE

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

Keep hands clear of moving parts

Keep clear of hot surfaces

DO NOT remove radiator cap whilst engine is hot.



3

Attention! Section

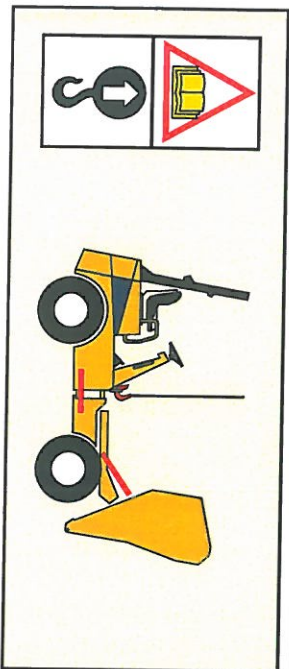
correct and incorrect working practices

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 and 10 Tonne)

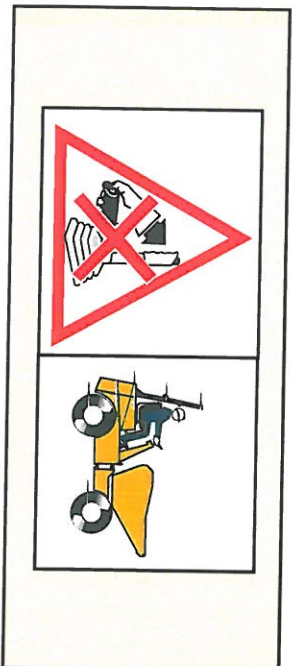
Engage skip safety prop



Engage chassis locking bar



Lift using centre eye provided



HAND BRAKE

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

**SLOPING SURFACES**

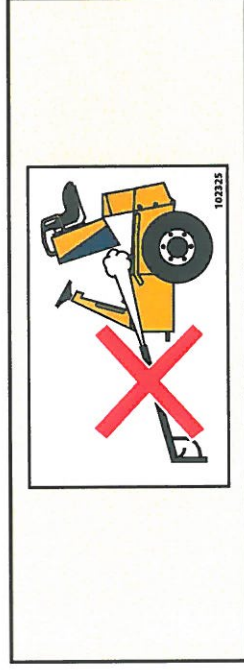
DO NOT step on the rear mudguards' sloping surfaces. Use tread grip area (if fitted) to raise or lower hinged ROPS.

**HINGED ROPS**

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



Avoid wet surfaces.

**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 Troubleshooting

Thwaites








Instrument panel warning lights

Symbol	Designation (Error Code)	Reason for illumination	Required action
	Cold start pre-heat	Cold start pre-heat in process	None
	Engine oil pressure (000100)	Oil pressure is either too high or too low	Switch off engine and check oil level.
	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	
	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	
	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.
	Boost Air temperature / pressure (000105)	Air Temperature to high. Air pressure too low or too high.	Check radiator core is clear
	DPF Regeneration	Blocked DPF filter	Initiate standstill regen or increase engine load, See section 2
	Ash charging	Indicates diesel particle filter has become permanently clogged, can no longer regenerate.	Contact Distributor/Thwaites Ltd.

 * Engine warning lamp (symbol 5) will become lit in conjunction with other warning lamps - 2,3,4,6,7 & 8

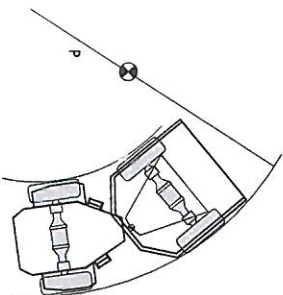
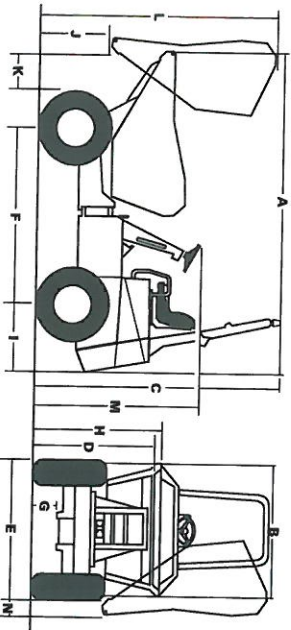
4 Troubleshooting

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

4 Data Chart – Powerswivel

Thwaites



Dimensions (mm)	5T	6T	9T
A. Length.....	4815	4815	5047
B. Width.....	2135	2280	2435
C. Height (ROPS frame & Beacon).....	3320	3300	3415
D. Bucket lip height.....	1615	1670	1820
E. Width over tyres.....	2100	2240	2440
F. Wheelbase.....	2480	2480	2650
G. Ground clearance.....	320	370	447
H. Bucket load height.....	1795	1850	2002
I. Axle to rear.....	1235	1235	1256
J. Tipping ground clearance.....	1050	1100	1134
K. Tipping tyre clearance.....	540	550	1131
L. Height tipped (skip).....	3650	3694	4000
M. Max height without ROPS frame.....	2190	2230	2630
N. Tipping side clearance.....	140	100	378
O. Tyre clearance diameter (m).....	12.0	12.0	13.4
P. Height (ROPS frame folded).....	2170	2230	2630

Weight (kg)	5T	6T	9T
Unladen			
Front axle.....	1730	1800	2160
Rear axle.....	2580	2600	3200
Total.....	4310	4400	5360
Laden (including driver at 80 kg)			
Rated payload.....	5000	6000	9000
Front axle.....	6180	7270	9870
Rear axle.....	3210	3210	4570
Total.....	9390	10480	14440
Towbar (Max)			
Pull load.....	3750	4500	6750
Vertical load.....	500	500	500
Tyre Pressure			
Bar (psi) front.....	4.9(71)	3.9(57)	3.4(49)
rear.....	2.5(36)	2.5(36)	1.6(24)

Noise

Airborne (10 m)
 55.4 kW

70 kW

85 kW

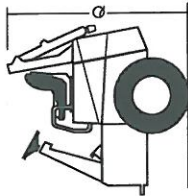
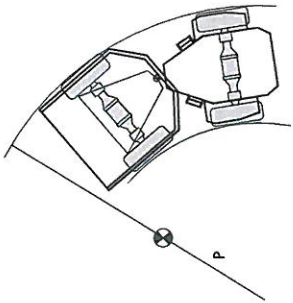
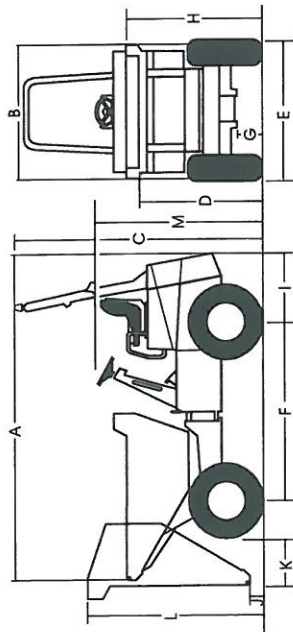
90 kW

Operator

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4 Data Chart – Front tip

Thwaites



Dimensions (mm)	6T	9T	10T	Weight (kg)	6T	9T	10T	Noise
A. Length	4475	4670	4686	Unladen				Airborne (10 m)
B. Width	2354	2485	2485	Front axle	1460	1720	1720	101 55.4 kW
C. Height (ROPS frame & beacon)	3390	3335	3415	Rear axle	2660	2940	3020	102 70 kW
D. Bucket lip height	1610	1740	1740	Total	4120	4660	4750	103 85 kW
E. Width over tyres	2240	2444	2440	Laden (including driver at 80 kg)				103 90 kW
F. Wheelbase	2480	2615	2615	Rated payload	6000	9000	10000	Operator
G. Ground clearance	370	447	447	Front axle	6230	8760	9500	84
H. Bucket load height	1740	1975	2135	Rear axle	3970	4980	5330	
I. Axle to rear	1235	1255	1256	Total	10200	13740	14830	
J. Tipping ground clearance	340	436	436	Towbar (Max)				
K. Tipping tyre clearance	520	642	768	Pull load	4500	6750	7500	
L. Height tipped (skip)	2505	2840	2860	Vertical load	500	500	500	
M. Max height without ROPS frame	2230	2440	2540	Tyre pressure				
P. Tyre clearance diameter (m)	12.6	14.0	14.0	Bar (psi) front	3.5(51)	3.2(46)	3.2(46)	
Q. Height (ROPS frame folded)	2230	2555	2630	Bar (psi) rear	2.7(39)	1.6(24)	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 props)



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

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

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 - 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.

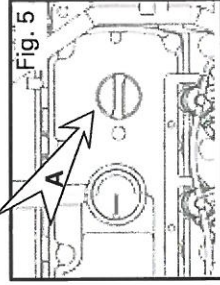
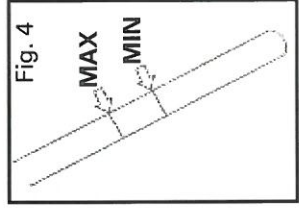
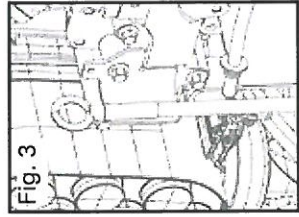
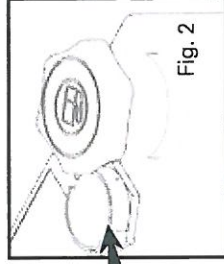
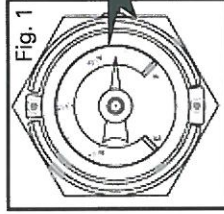
DIN 51628, EN 590 or BS 2869 (Sulphur <10 mg/kg)

! CAUTION - HOT FLUIDS

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

! CAUTION - LOW FUEL

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




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

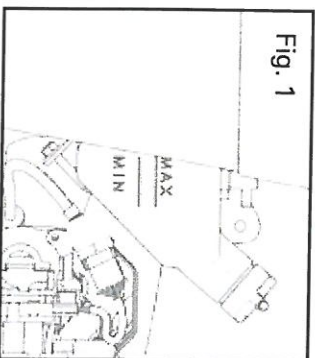


Fig. 2

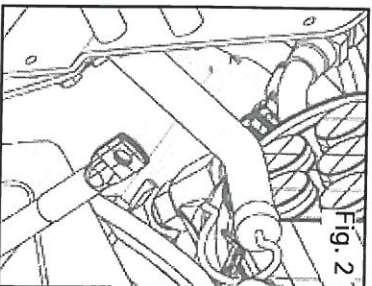
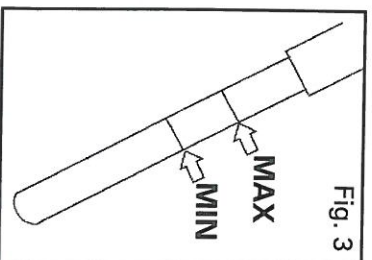


Fig. 3



5 Daily (10 Hour) maintenance checks

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 ($1.6 \pm 0.3 \text{ Nm}$) (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.

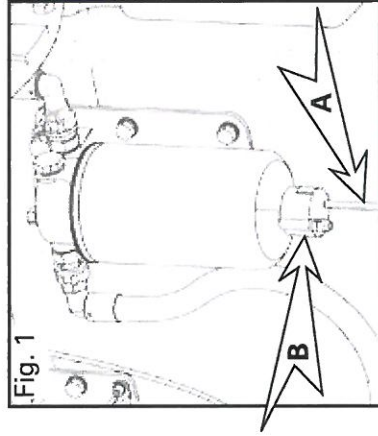


Fig. 1

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

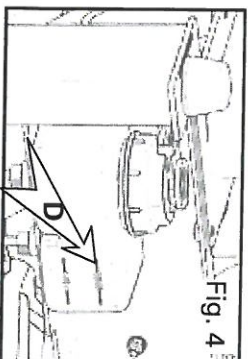
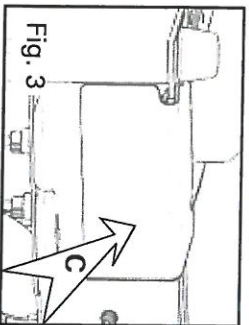
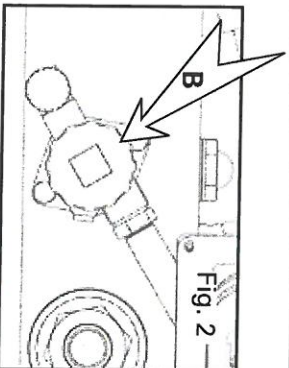
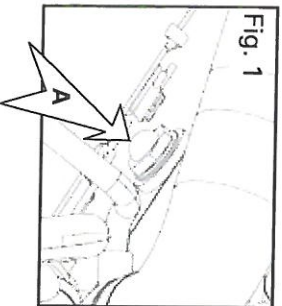
Thwaites

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

- 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)

