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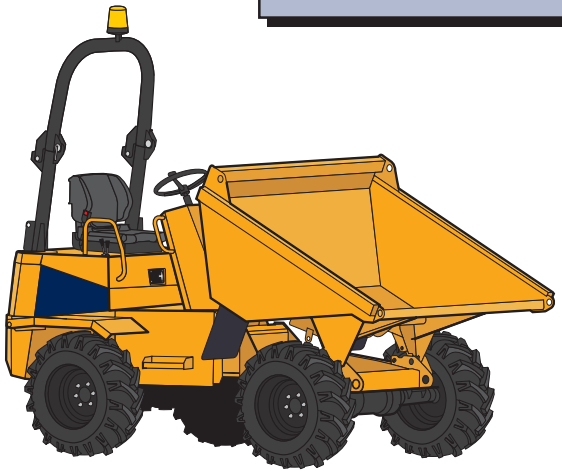
3 – 4 Tonne (Manual)

Thwaites

Mach 440, Mach 445, Mach 470,
Mach 473, Mach 479

Operator's Instruction Manual



Mach 470 - 3 Tonne Front Tip

Mach 479 - 3 Tonne Hi-Swivel

Tier 2: issue 2
T0472

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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

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1 Before operating this machine

Thwaites

Read this manual

1 Contact your Thwaites dealer 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 safety equipment is available

Complete Checks in Section 1 *Before Starting The Engine*

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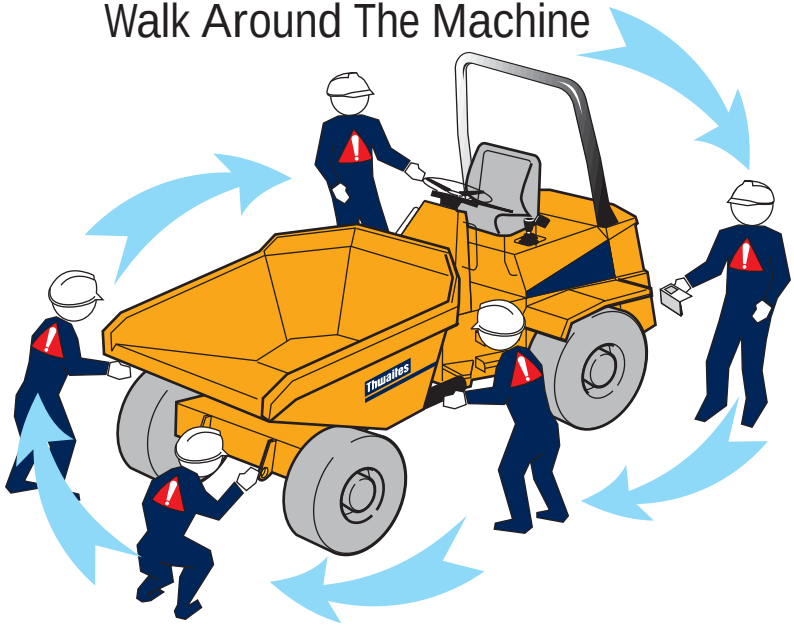
1 Before operating this machine

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 and hydraulic rams clean, and clear of 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. **Have the daily maintenance tasks been performed? (See rear cover)**

Report all faults immediately.

DO NOT OPERATE THE MACHINE UNTIL ALL FAULTS HAVE BEEN RECTIFIED

Complete Checks in Section 1 *Before Starting The Engine*

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Thwaites

Mount the machine and check the controls

1. Use the grabrails and foot steps provided to manoeuvre into the 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 seatbelt. 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

Seatbelt MUST BE WORN when operating machines fitted with a ROPS frame.

Complete Checks in Section 1 Before Starting The Engine

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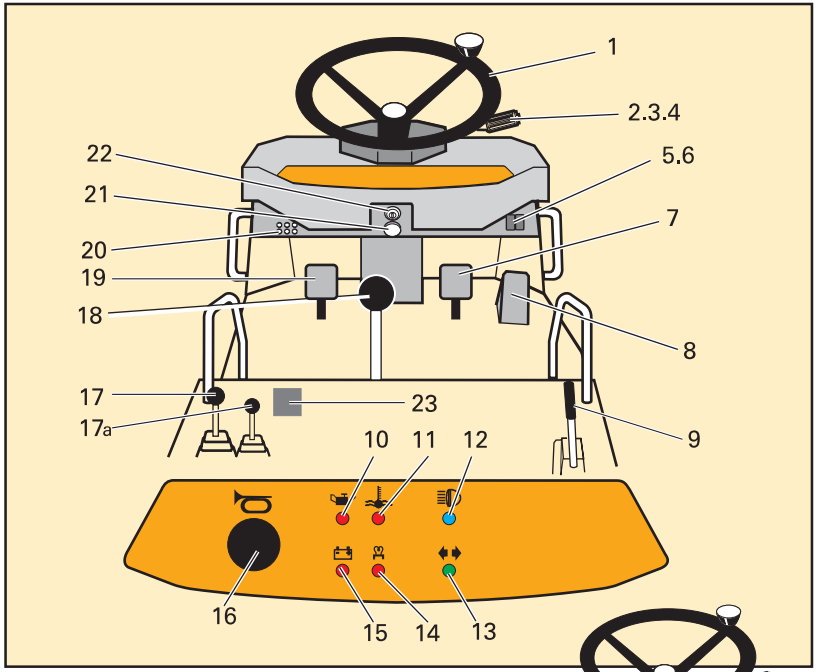
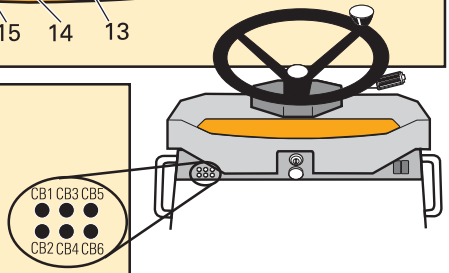
1 Layout of controls

Thwaites



CB1	Fuel/direction solenoids
CB2	Instrumentation/warning
CB3	Lights*
CB4	Flash*
CB5	L/H sidelights*
CB6	R/H Sidelights*



Control locations & functions

1 Steering wheel
2 Direction indicator selector - Forward = left turn - back = right turn*
3 Lights - twist 1 = sidelights ON - Twist 2 = Dipped headlights ON*
4 Up = Flash. Down = main beam*
5 Hazard warning light switch*
6 Beacon switch*
7 Foot brake pedal
8 Throttle pedal
9 Hand brake lever
10 Engine oil pressure warning light
11 Water temperature warning light
12 Headlamp main beam pilot light*
13 Direction indicator pilot light*
14 Heat/start pilot light
15 Battery charging warning light
16 Horn push
17 Skip-tip lever (Front Tip model)
Skip-tip and rotate-skip lever (Powerswivel model)
17a Skip-raise lever (Hi-Swivel model only)
18 Gear lever
19 Clutch pedal
20 Circuit breakers (push to reset)
21 Ignition & hand brake warning buzzer
22 Ignition switch
23 Maxi fuse (under engine cover)

** Optional items*

Complete Checks in Section 1 Before Starting The Engine

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1 Control functions - in depth

Thwaites

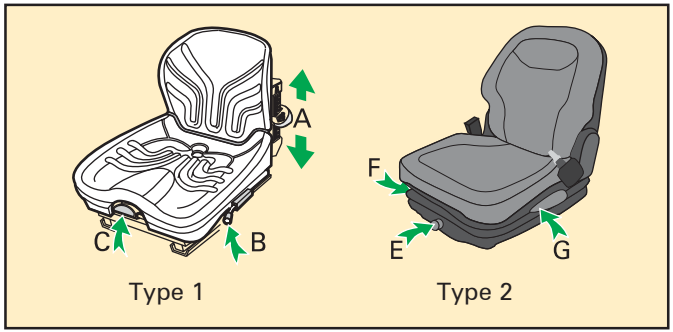
Seat adjustment

Type 1:

A – Push down to set driver weight (seat empty)
Push fully down and release to reset (seat empty)
B – Lift to slide seat assembly forwards/backwards
C – Lift to slide cushion forward and set backrest

Type 2:

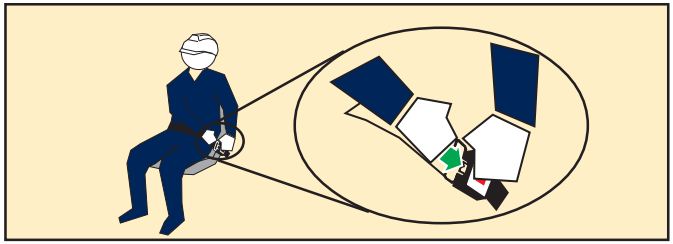
E – Turn knob to set driver weight
F – Lift to slide seat assembly forwards/backwards
G – Lift handle to adjust backrest



Seatbelt (if fitted)

- Adjust length of belt when seated on machine
- 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 the hips and not the abdomen*



Throttle pedal - right foot

- Apply pressure to increase speed
- Release pressure from the pedal to reduce speed

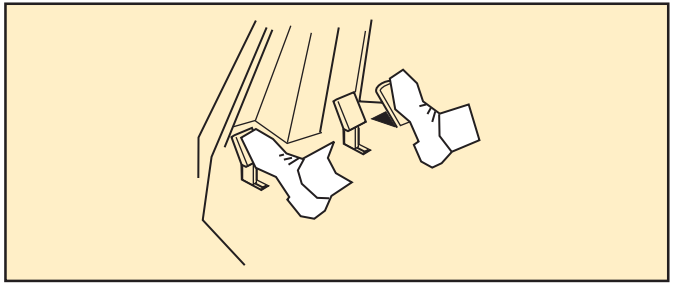
Foot brake pedal - right foot

- Push down on the pedal to slow/stop the machine

Clutch pedal - left foot

- Press down before each gear change - select gear and release

☞ *Start inhibitor fitted - press down clutch pedal before starting engine*



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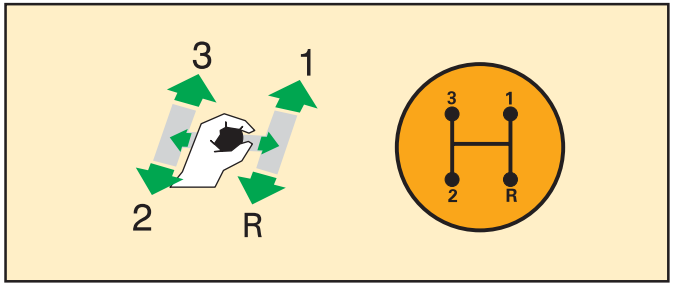
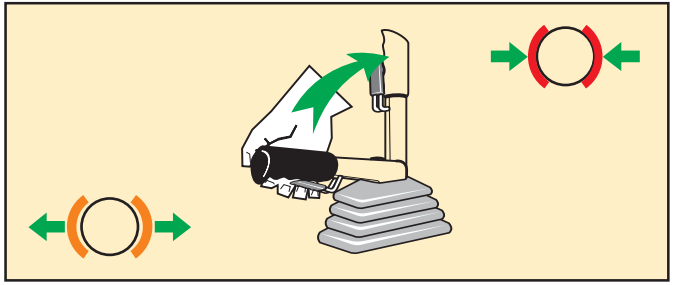
1 Control functions - in depth

Thwaites



Gear lever - left hand

Forward-left Third Gear		Forward-right First Gear
	Neutral	
Back-left Second Gear		Back-right Reverse

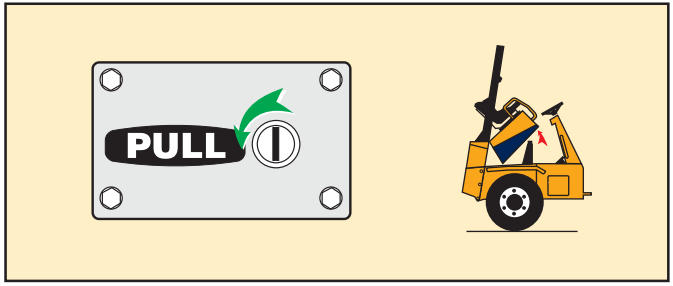


Hand brake lever - right hand

When the machine is stationary (or in an emergency):

- Pull up to apply
- Pull catch and lower to release

An audible warning device is fitted to your machine. This will sound when the hand brake is engaged and the engine is running



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

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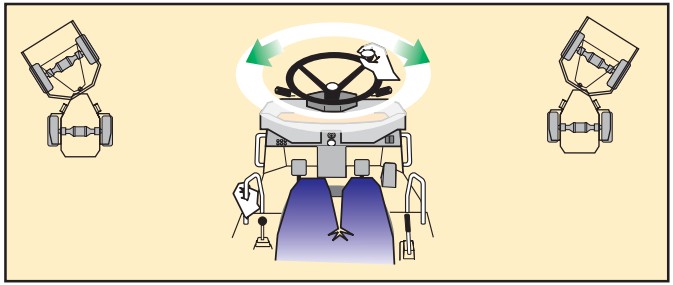
1 Control functions – in depth

Thwaites

Steering wheel – both hands

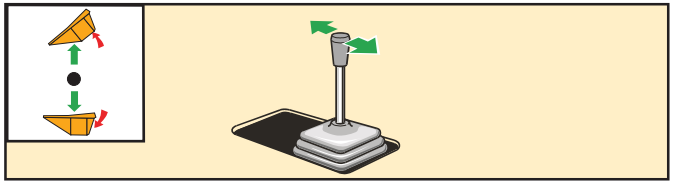
- Turn the wheel clockwise to turn machine right
- Turn the wheel anticlockwise to turn machine left

When using the spinner knob for low-speed single-handed steering ensure the non-steering hand is on the engine cover grabrail



Skip-tip lever (Front tip and Powerswivel models) – left hand

- Push forward to raise skip
- Push backwards to lower skip



Skip-rotate lever (Powerswivel and Hi-Swivel model) – left hand

- Tip skip 100 mm (4”) to disengage pivot centring lock

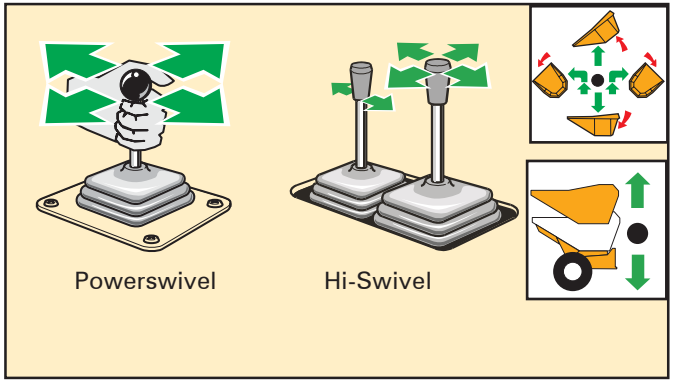
Rotate skip, fully lowered to centre to automatically engage centring lock.

- Push lever to the right to rotate skip to right
- Push lever to the left to rotate skip to left
- An increased engine speed will reduce cycle times

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

Skip-raise lever (Hi-Swivel model) – left hand

- push forward to raise skip
- push backwards to lower skip



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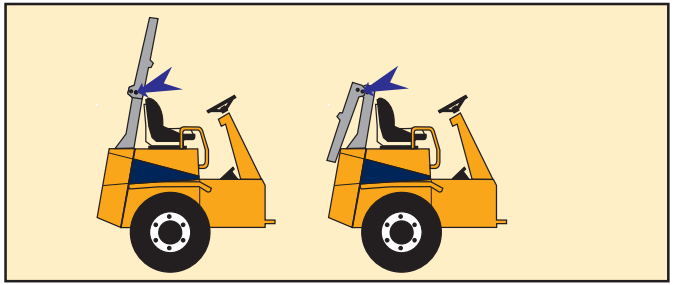
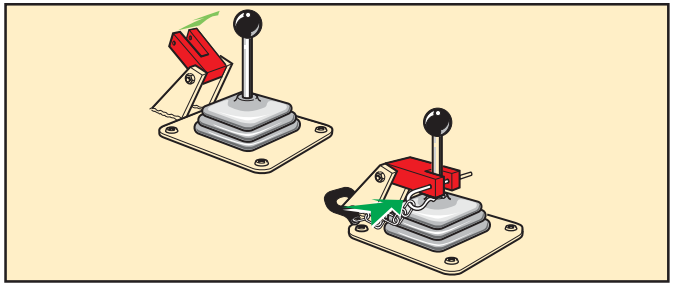
1 Control functions – in depth

Thwaites



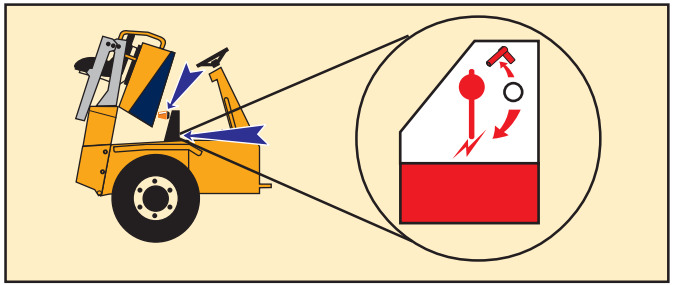
Lowering and raising the folding ROPS frame

- 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



Skip-tip lever lock (if fitted)

- Place yoke over tipping lever and secure with linch pin to lock
- Fold back the yoke and secure using linch pin when not in use



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

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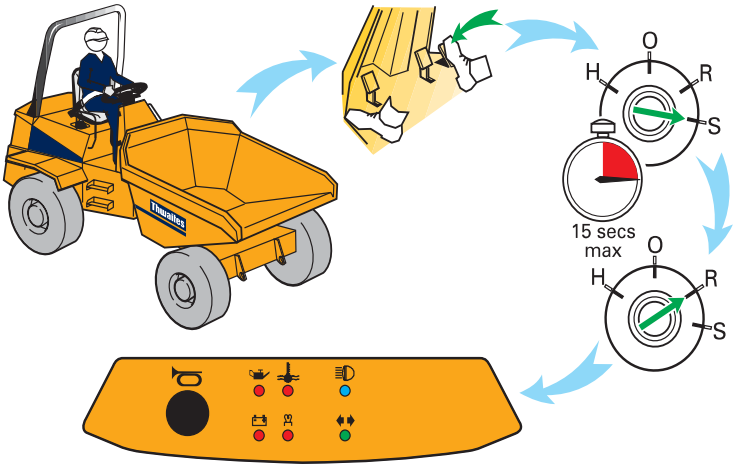
2 How to START and STOP the engine

Thwaites



CAUTION

- Do not use unauthorised starting aids
- Do not tow or bump start
- If a panel light remains on, switch off engine (key to 'O'), and investigate the problem

To start the engine

- Depress clutch pedal

  (Start inhibitor fitted)
- Depress accelerator pedal fully and turn the key clockwise to the start position 'S'

  All panel lights self-test (illuminate) and should extinguish on start-up.
- Allow the engine to turn for 15 seconds max

  If the engine does not start within 15 seconds return key to 'O' and wait 30 seconds. Turn to 'S' again
- When the engine fires, release key

  (the key will automatically turn to 'Run' position 'R')
- Reduce accelerator pedal pressure to prevent over-revving

  Cold Start Aid -

  Turn key to position 'H'. When panel light extinguishes, start the engine (as above)

To stop the engine

- Turn key to position 'O'

WARNING

Do not start the engine unless you are sitting in the driver's seat.

Complete Checks In Section 2 *Before Loading The Machine*

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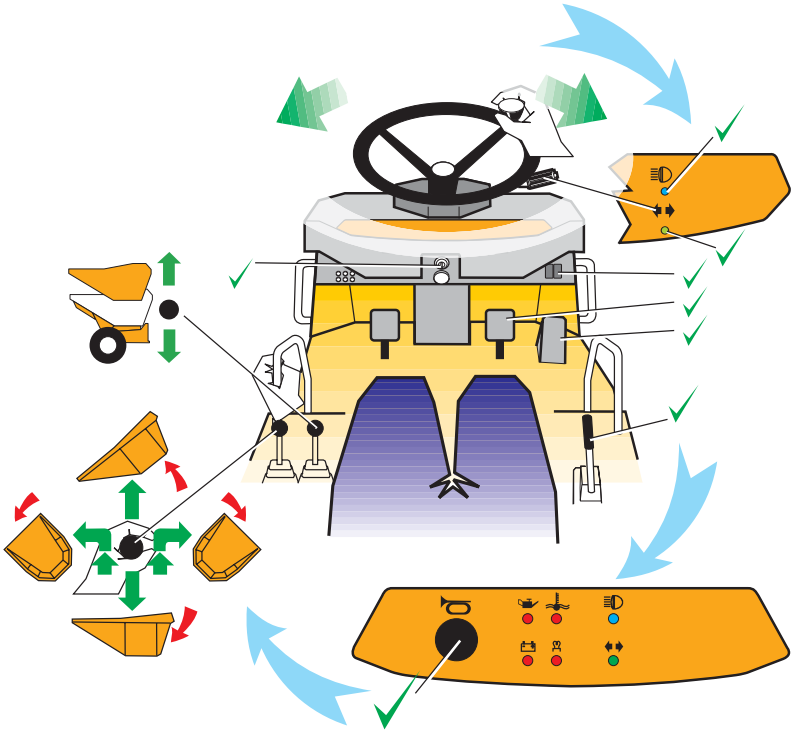

Function checks – engine ON

Brakes

- Does the foot brake pedal feel firm?
- Carry out hand brake test *(Described on next page).*

Steering

- Rotate steering clockwise and anti-clockwise

Electrics

- Does the horn sound?
- Does the reverse alarm sound? (Optional).
- Does the beacon flash?
- Do all the lights function correctly? (Optional):
  - * Side
  - * Main
  - * Stop
  - * Indicators
  - * Hazards

Skip-tip and skip-rotate lever

- Tip and return skip
- Rotate skip clockwise and anti-clockwise (Powerswivel and Hi-Swivel models).

Skip-raise lever (Hi-Swivel model)

- Raise and lower skip

Complete Checks In Section 2 *Before Loading The Machine*

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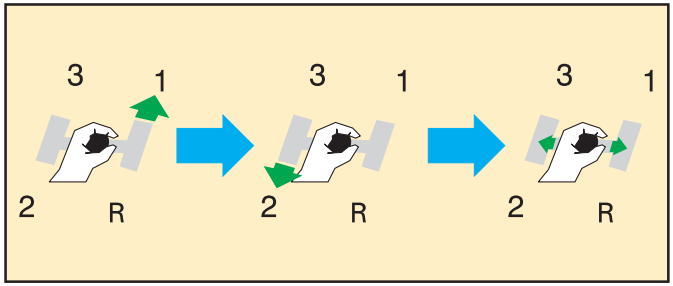
2 How to test the hand brake

Thwaites



WARNING

- Before testing handbrake, ensure that the machine is on firm, level ground and that the area is clear of people.
- Do not operate a machine that has failed the handbrake test.
- The handbrake must not be over-tightened, as this may cause damage to the axle.

If any of the following tests result in failure, consult the service book for instructions for hand brake adjustment.

1 Start engine.
2 With the handbrake applied, engage first gear and release clutch slowly, with engine revs at tick-over; the machine should move forward.
3 Release throttle and apply clutch and footbrake.
4 With the handbrake applied, engage second gear and release clutch slowly, with full engine revs; the machine should stall.
5 If the machine moves forward, release throttle and apply clutch and footbrake.
6 Select Neutral
7 Switch engine off.

Alternatively the handbrake can be checked by measuring the load required to apply the handbrake. The required force for applying the handbrake is a 12 kg pull (+/- 0.5 kg), measured from the end of the grip handle.

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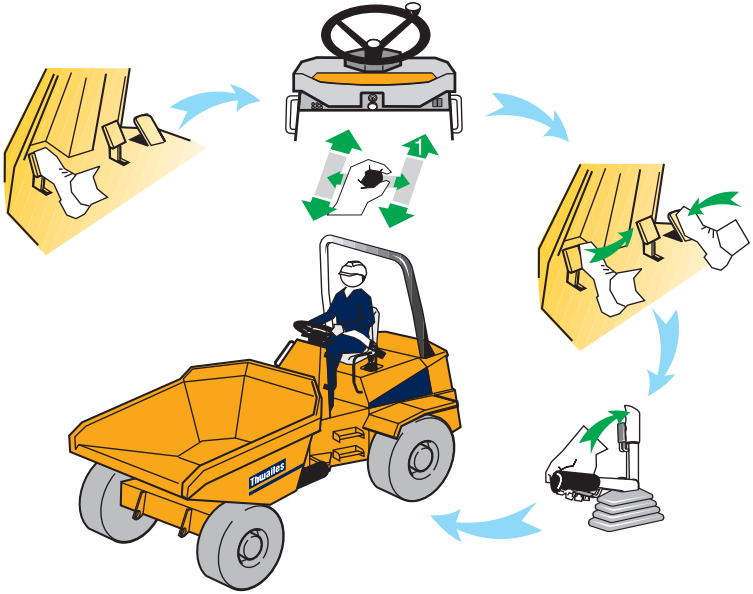
2 Driving procedure and safe parking

Thwaites



Moving from rest and stopping

- Depress clutch pedal
- Select first gear
- Slowly depress accelerator pedal, release clutch pedal and hand brake lever and move slowly
- Hold steering wheel with both hands
- Remove foot from accelerator pedal
- Brake gently to a halt, using foot brake pedal, and press clutch pedal to prevent stalling
- Apply hand brake and select neutral when stationary

Changing speed/direction

- Release accelerator pedal
- Depress clutch pedal
- Select next gear
- Release clutch pedal and press accelerator pedal
- The machine must be stationary and the hand brake must be engaged before changing direction (forward/reverse).

After operating – park safely

- Always leave skip empty when not in use
- Ensure machine is on firm, level ground
- Apply hand brake
- Engage gear lever in neutral
- Hydraulic system at rest in a safe condition
- Stop engine and remove key
- Lock engine cover

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.

Complete Checks In Section **2** *Before Loading The Machine*

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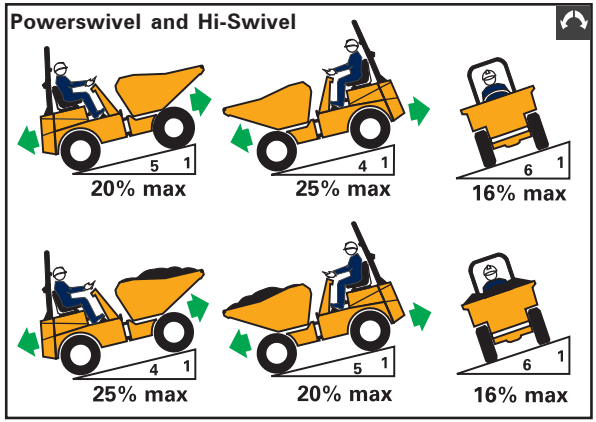
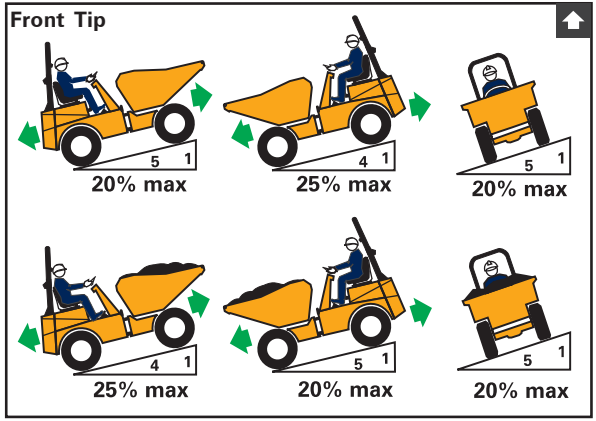
Thwaites





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 down hill with controls in neutral
- ✗ DO NOT operate raise mechanism on sloping ground (Hi swivel model) - Check spirit-level indicator

- ✓ 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

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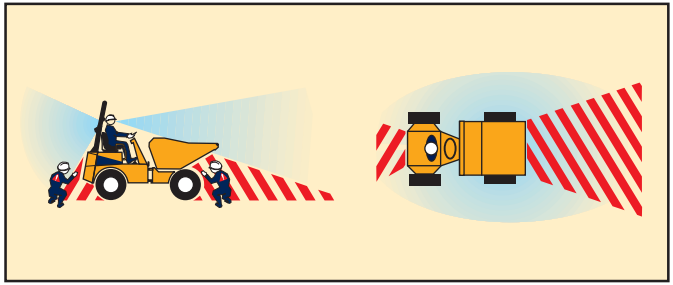


VISIBILITY

Check ahead and behind machine before operation

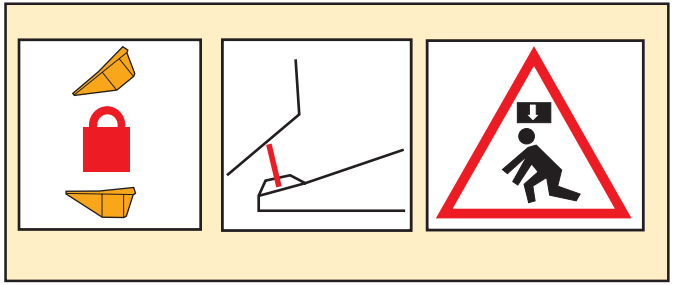
Be aware of low-visibility areas when operating

Before operating, sound the horn to warn people in the immediate area

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 skip safety prop during maintenance

Never work under an un-propped skip

When using skip safety prop engage skip-tip lever lock *(If fitted)*

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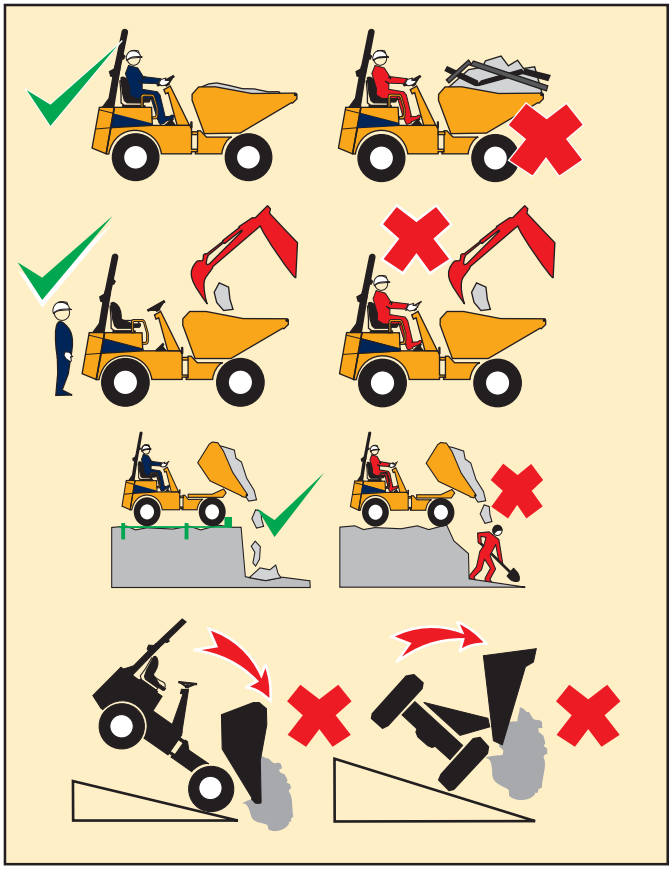

LOADING THE MACHINE

- **DO NOT** exceed the machine's rated capacity
- Apply hand brake, set transmission to **NEUTRAL**, turn engine **OFF**, disembark the machine and **STAND CLEAR**
- Clear debris from controls
- Ensure SAFE STABLE LOW load which allows good visibility
- Reduce payload if materials being carried are not free flowing

UNLOADING THE MACHINE

- Use **STOPBOARDS** and **SUPPORT** walls on trenches
- **DO NOT** tip skip if load is sticking
- **DO NOT** discharge load when working on sloping ground

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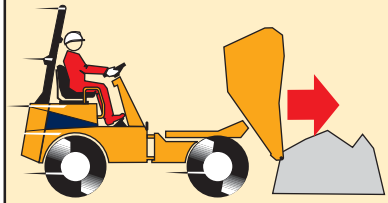
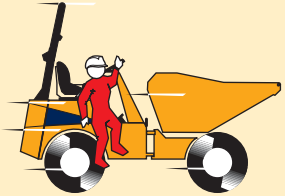
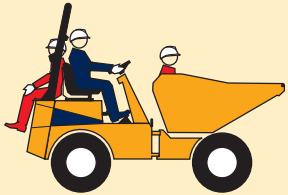
DRIVING



DO NOT drive with the skip tipped (bulldozing)



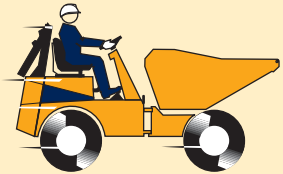
NEVER dismount from a moving machine



DO NOT carry passengers

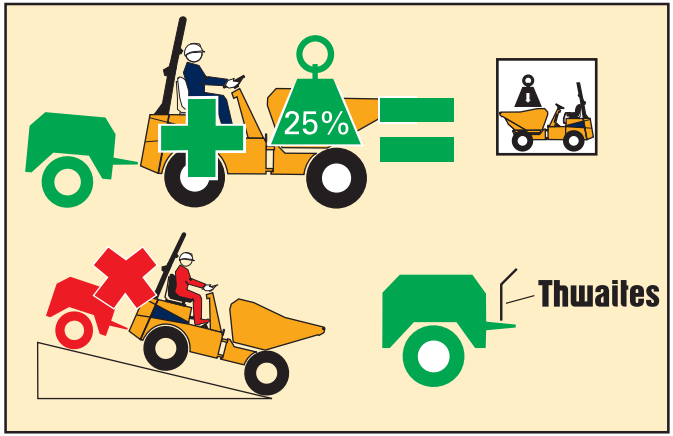
Avoid confined work areas - exhaust fumes and noise can be a hazard

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



DO NOT operate with the ROPS frame folded

https://truckmanualshub.com/



TOWING A TRAILER

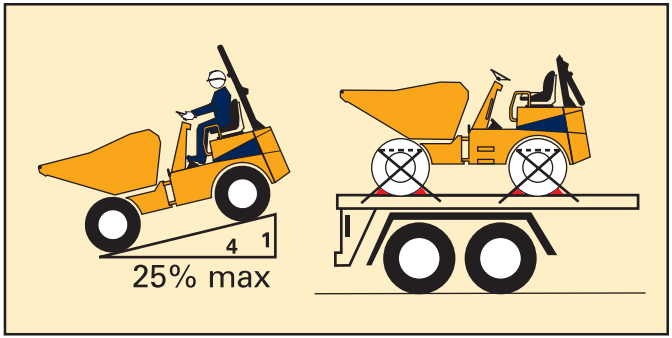
Place ballast load in skip. This load should be a minimum of 25% of the machine's rated payload.

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 forwards when loading

1 Apply parking brake
2 Stop engine
3 Chock wheels (to prevent movement)
4 Engage chassis locking bar
5 Secure to trailer
6 Ensure legal load (Height/weight)

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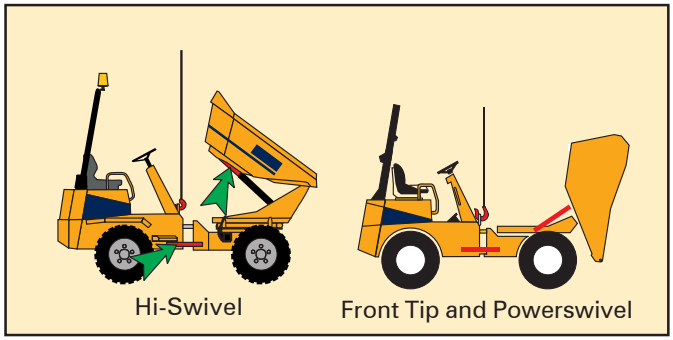


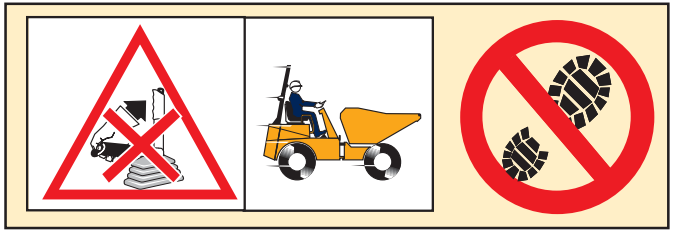
USING A CRANE TO LIFT THE MACHINE

Tip skip fully forward

Place the locking channel over the tipping ram-rod, then reset the skip until it is impeded by the channel

Engage chassis locking bar

Lift using centre eye provided

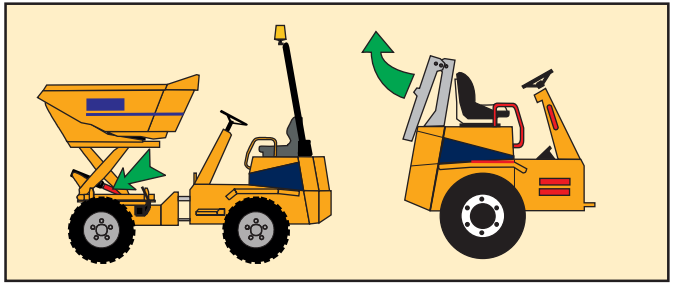


HAND BRAKE

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

SLOPING SURFACES

DO NOT step on the rear the mudguards' sloping surfaces



SCISSOR LIFT (HI-SWIVEL MODEL ONLY)

In order to secure the skip in a raised position, place the locking channel over the lifting-ram rod

HINGED ROPS

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

Avoid wet surfaces

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4 Troubleshooting

Thwaites

Problem	Reason	Solution
Engine will not start	Isolator switch is switched OFF Clutch Pedal not pressed Battery voltage too low Faulty fuel supply Electrical stop on fuel pump defective Circuit breaker tripped	Switch on the isolator switch Press Clutch Pedal Check battery and connections Check fuel level and connections Check connections Reset (Push to reset)
Complete loss of electrical functions	Maxi fuse blown	Rectify electrical fault and replace fuse
Maxi Fuse blown	Faulty starter motor/solenoid (Current drawn by solenoid exceeds 25A) Short circuit on main feed or starter solenoid cables	Replace motor/solenoid and maxi fuse (only replace with a 30 amp fuse) locate and repair
Engine stops soon after start-up	Blocked fuel or air filter Air in fuel system	Replace fuel or air filter Check fuel line connections
Black engine smoke	Air filter clogged (Indicator red) Fuel system defect Wrong fuel	Replace or clean air filter Contact Thwaites dealer Replace fuel and filter
Engine oil pressure	Low oil level	Top up engine oil
High engine temperature	Radiator choked. Low coolant level	Clean radiator Top up coolant
Irregular alternator	Defective or loose alternator belt	Adjust, or, if necessary, replace alternator belt

Always investigate panel warning lights, tripped circuit breakers and a blown maxi fuse.

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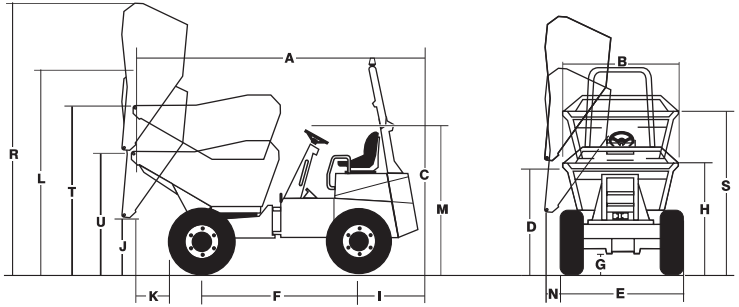
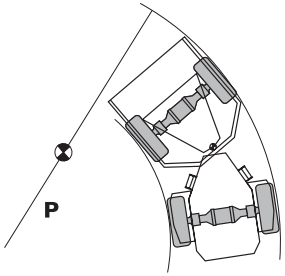
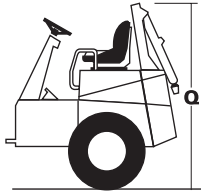
4 Data Chart – Powerswivel and Hi-Swivel

Thwaites







Dimensions (mm)	3T	4T	Hi-Sw
A. Length	4010	4107	3972
B. Width	1770	1859	1770
C. Height (ROPS frame & Beacon)	3140	3213	3140
D. Skip lip height	1520	1595	1600
E. Width over tyres	1750	1840	1750
F. Wheelbase	1980	1980	1980
G. Ground clearance	250	310	280
H. Skip load height	1600	1710	1650
I. Axle to rear	1130	1130	1130
J. Tipping ground clearance	1110	1068	1260
K. Tipping tyre clearance	530	422	361
L. Height tipped (Skip)	3290	3408	3440
M. Max height without ROPS frame	2013	2040	2013
N. Tipping side clearance	190	220	220
P. Tyre clearance diameter (m)	8.2	8.4	8
Q. Height (ROPS frame folded)	2120	2180	2120
R. Max height tipped (raised skip)			4030
S. Skip load height (raised skip)			2240
T. Skip lip height (raised skip)			2170
U. Tipping ground clearance (raised skip)			1850

Weight (Kg)	3T	4T	Hi-Sw
Unladen			
Front axle	880	990	1120
Rear axle	1530	1560	1590
Total	2410	2550	2710
Laden (including driver at 80 kg)			
Rated payload	3000	4000	3000
Front axle	3580	4560	3820
Rear axle	1910	2070	1970
Total	5490	6630	5790
Towbar (Max)			
Pull load	2250	3000	2250
Vertical load	580	800	580

Tyre Pressure			
Bar (psi) Front	3.4(49)	4.0(58)	4.2(61)
Rear	2.0(29)	2.5(36)	2.2(32)

Noise

Airborne (10 m)

L_{WA} 101 dB

Operator

L_{pA} 84

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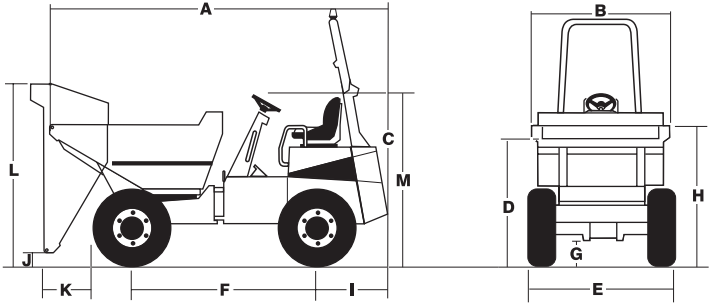
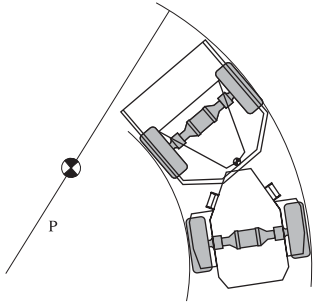
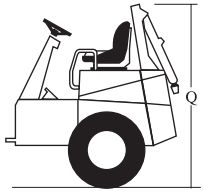
4 Data Chart – Front Tip

Thwaites







Dimensions (mm)	3T	4T
A. Length	3848	3848
B. Width	1930	1980
C. Height (ROPS frame & beacon)	3140	3213
D. Skip lip height	1447	1467
E. Width over tyres	1750	1859
F. Wheelbase	1980	1980
G. Ground clearance	280	310
H. Skip load height	1470	1600
I. Axle to rear	1130	1130
J. Tipping ground clearance	205	365
K. Tipping tyre clearance	620	596
L. Height tipped (skip)	2130	3408
M. Max height without ROPS frame	2013	2040
P. Tyre clearance diameter (m)	9.3	9.5
Q. Height (ROPS frame folded)	2120	2180

Weight (Kg)	3T	4T
Unladen		
Front axle	690	740
Rear axle	1550	1590
Total	2240	2330
Laden (including driver at 80 kg)		
Rated payload	3000	4000
Front axle	3120	3980
Rear axle	2200	2430
Total	5320	6410
Towbar (Max)		
Pull load	2250	3000
Vertical load	580	800
Tyre Pressure		
Bar (psi) Front	3.4(50)	3.5(51)
Rear	2.0(29)	3.0(44)

Noise

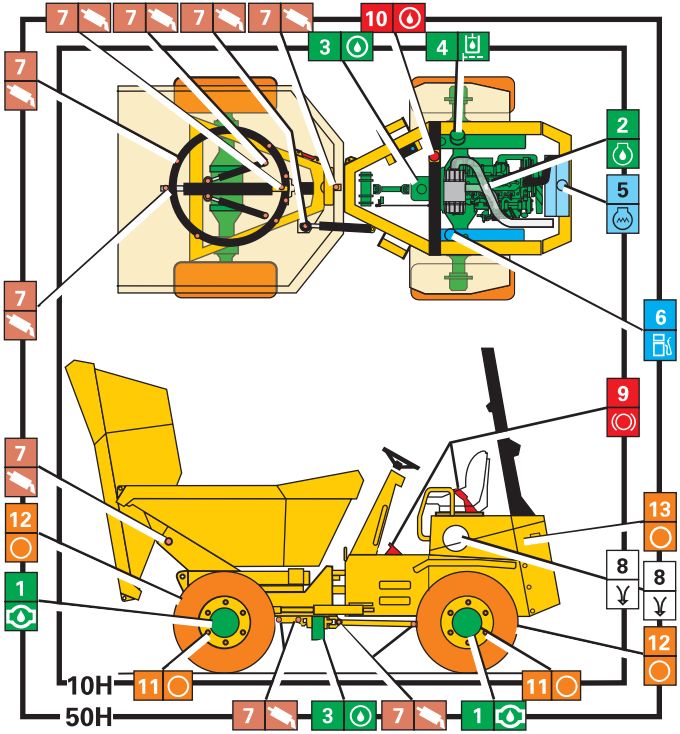
Airborne (10 m)

Operator

https://truckmanualshub.com/

4 Daily/Weekly Checks

Thwaites



AXLE OIL (hubs and centre case)	1	TRACTELF SF3
ENGINE OIL	2	BP Vanellus C5 Global 15W 40
TRANSMISSION OIL	3	BP Energear Hypo 80W 90
HYDRAULIC OIL	4	BP Energol HLP HM32
COOLANT LEVEL	5	$H^2$0 + 50% antifreeze
FUEL LEVEL	6	Diesel
GREASE	7	Fill all points
AIR CLEANER	8	Check indicator
BRAKES	9	Test hand & foot brake
BRAKE OIL	10	BP Bartran HV32
WHEEL NUTS	11	330 Nm
TYRE PRESSURE	12	See data chart
FAN BELT	13	Check condition/tension

This machine must be serviced after first 50 hours

Normal service intervals:

250 hours 500 hours 1000 hours 2000 hours

Contact local Thwaites Distributor for details or www.thwaitesdumpers.co.uk

Note: failure to use Thwaites-approved lubricants may invalidate your warranty