GREEN MACHINES®
From Tennant Company

525 Hi-Speed

English EN
Operators Manual

CE

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www.greenmachines.com

YM044
Rev. 9 (2-2006)

This manual is furnished with each new model. It provides necessary operation and maintenance instructions.

Read this manual completely and understand the machine before operating or servicing it.

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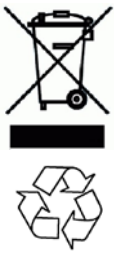
This machine will provide excellent service. However, the best results will be obtained at minimum costs if:

- The machine is operated with reasonable care.
- The machine is maintained regularly - per the machine maintenance instructions provided.
- The machine is maintained with manufacturer supplied or equivalent parts.



PROTECT THE ENVIRONMENT

Please dispose of packaging materials, old machine components and fluids in an environmentally safe way according to local waste disposal regulations.

Always remember to recycle.

MACHINE DATA

Please fill out at time of installation for future reference.

Model No. - _____

Serial No. - _____

Installation Date - _____

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Bankside, Falkirk FK2 7XE
Scotland, United Kingdom
Phone: (+44) 1324- 611666
www.greenmachines.com

Tennant Company
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ADDITIONAL DOCUMENTATION

The Green Machine 525 is supplied with:

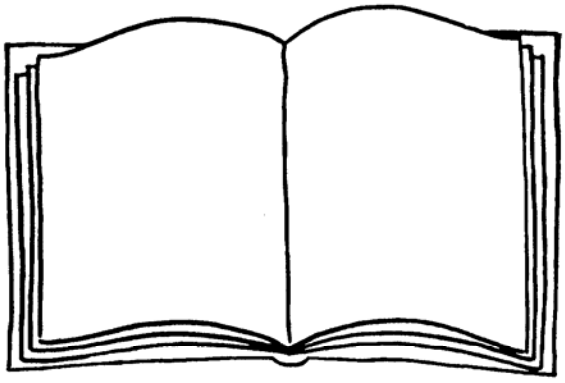
- An Operators Manual
- Service Schedule
- Warranty Card
- Kubota Engine Manual

The above items are provided as part of a support package for the machine and everyone who is involved in Operating, Supervising and managing the machines and their tasking, should be made aware of the above documentation and the information contained therein.

GREEN MACHINES

OPERATORS MANUAL FOR

The 525 Hi-Speed Green Machine®

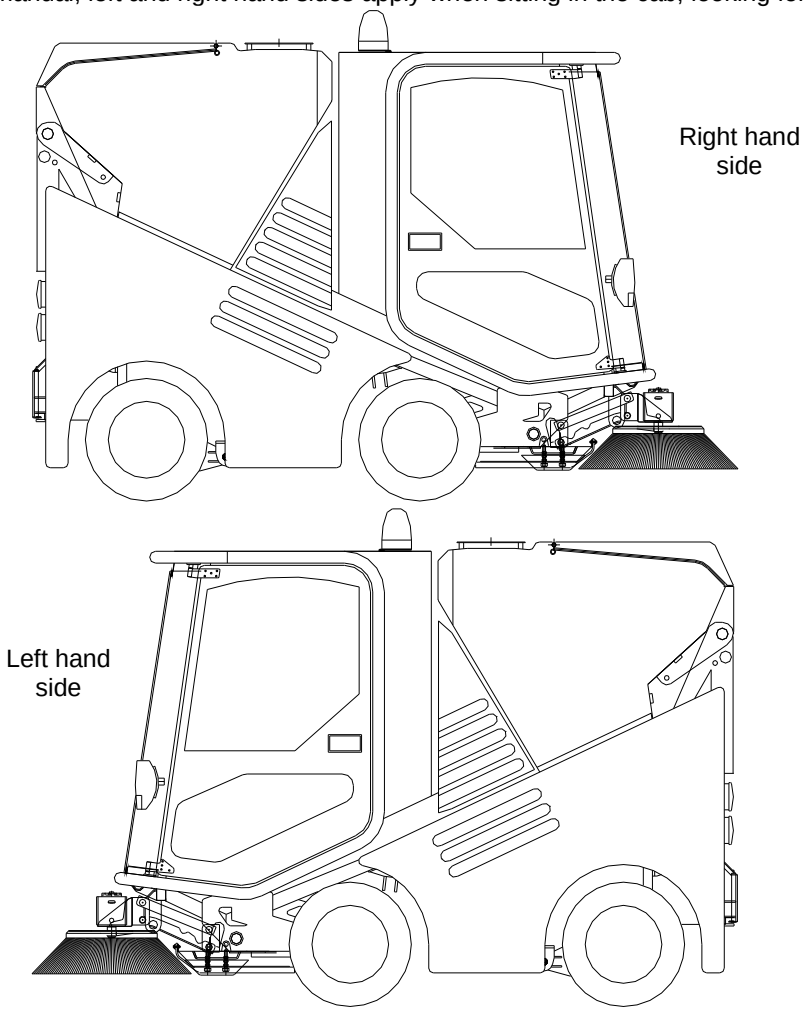


CE

Issue 9 – February 2006

NOTE

Throughout this manual, left and right hand sides apply when sitting in the cab, looking forward.



CONTENTS

SECTION ONE
BEFORE YOU START

Before starting please read the following safety advice, it is provided for your safety, the safety of others and for the correct and efficient use of the Green Machine 525.

1.1 **Always** top ten

1. Carry out the **daily** checks, before using the Sweeper.
2. Wash the machine down at the end of each shift.
3. Ensure that any defects are reported as soon as they are found.
4. Switch the engine **off** while the machine is being refuelled.
5. Remove the ignition key if leaving the machine unattended.
6. Switch the engine **off** before opening the machine side covers.
7. Before trying to clear a blockage, switch the engine off and remove the ignition key.
8. Be aware of your surroundings while sweeping.
9. Use water sprays under dry conditions.
10. Ensure that the machine receives the correct maintenance in accordance with the manufacturer's recommendations.

1.2 **Never** top ten

1. Try and clear a blockage with the engine running.
2. Leave the machine unattended with the engine running.
3. Put fingers or loose clothing near moving parts.
4. Run the engine in an enclosed space.
5. Open the coolant cap when the engine is hot (you may be scalded)
6. Run the engine with the fan casing impeller door open, the front suction hose off, when the side cover is open, or when the cab is tilted.
7. Wash the machine with the engine running.
8. Leave the cab without engaging neutral and applying the hand brake
9. Drive up and down pavement kerbs at too high a speed or too oblique an angle.
10. Make non-approved modifications or use the machine in any other way than that shown or demonstrated by an official representative of Green Machines.

1.2.1 Operator Check List for the 525 Green Machine

Detailed operator checks procedure is described in section 3
Detailed machine wash down procedure is described in section 5.

Maintenance Procedure	Daily Action		End of Week Action
	Before Shift Start	After Shift Finish	
Tilt the hopper, applying the safety stay. **Switch engine off and remove the ignition key.** Check hydraulic oil level – top up if required. Check engine oil level – top up if required. Check water tank is full. Check diesel tank is full.	✓		
Check engine coolant header tank – top up as required. Check window washer bottle is full. Check engine Filter Minder is set to GREEN.	✓		
Check **ALL** vehicle lights, beacon and audible warning devices.	✓		
Check brush wear – replace as required. Check nozzle height and side skids.	✓		
Check tyre pressure and condition.	✓		
Check all safety devices.	✓		
Check all machine functions prior to leaving depot.	✓		
Check all panels are in place and secure and the wander hose is correctly located.	✓		
Wash vehicle including **ALL** hopper screens and cyclones. Avoid directing high-pressure water at electrical components & connections.		✓	
Clean radiator mesh screen and check radiator is clear. If required wash radiator carefully with a low-pressure jet.		✓	
Clean dust suppression water filter during machine wash down.		✓	
Carry out a general inspection of the machine wiring, flexible hoses and piping for security and integrity.			✓
Carry out inspection of hopper door and hopper inlet.			✓
Report any defects as soon as they are found.	✓	✓	✓

Note Defects……
……
……
……
……

NEVER wash down the engine with the engine running, as it may ingest water causing major engine damage.

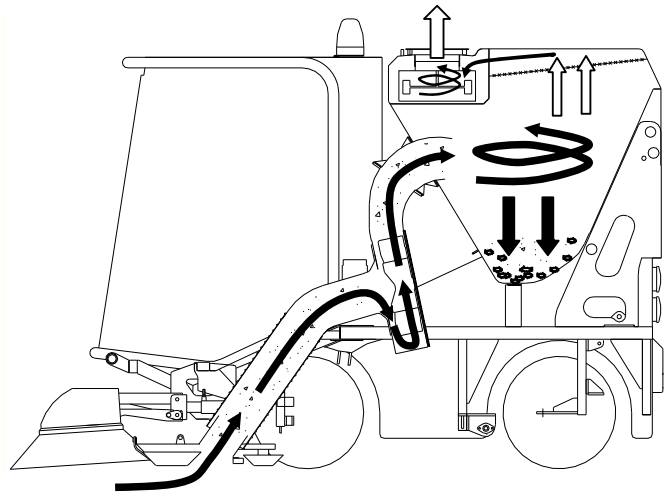
1.3 How the machine works

The machine works due to the air moving through it. The following scheme shows the flow of air through the machine. The two front brushes sweep dirt, trash and debris into the centre of the machine, so that the airflow can pick these up and deposit them into the hopper.

The air and debris mixture is made to swirl in a cyclonic action inside the hopper in order to cause the debris to separate out, falling into the lower part of the hopper and allowing the air to return to atmosphere through exits in the top of the hopper. There are 3 separating actions inside the hopper:

- The initial entry cyclonic action which is aided by swirl plates in the rear of the hopper;
- Screens in the top of the hopper which prevent light material such as dry leaves and paper from escaping;
- The final cyclone spinners located in the top of the hopper, which separate out small dust particles.

As long as airflow is maintained, the machine will work correctly. If the machine does not pick up or leaves a trail, this means the air is not flowing correctly through the machine. Always bear in mind this notion of airflow.

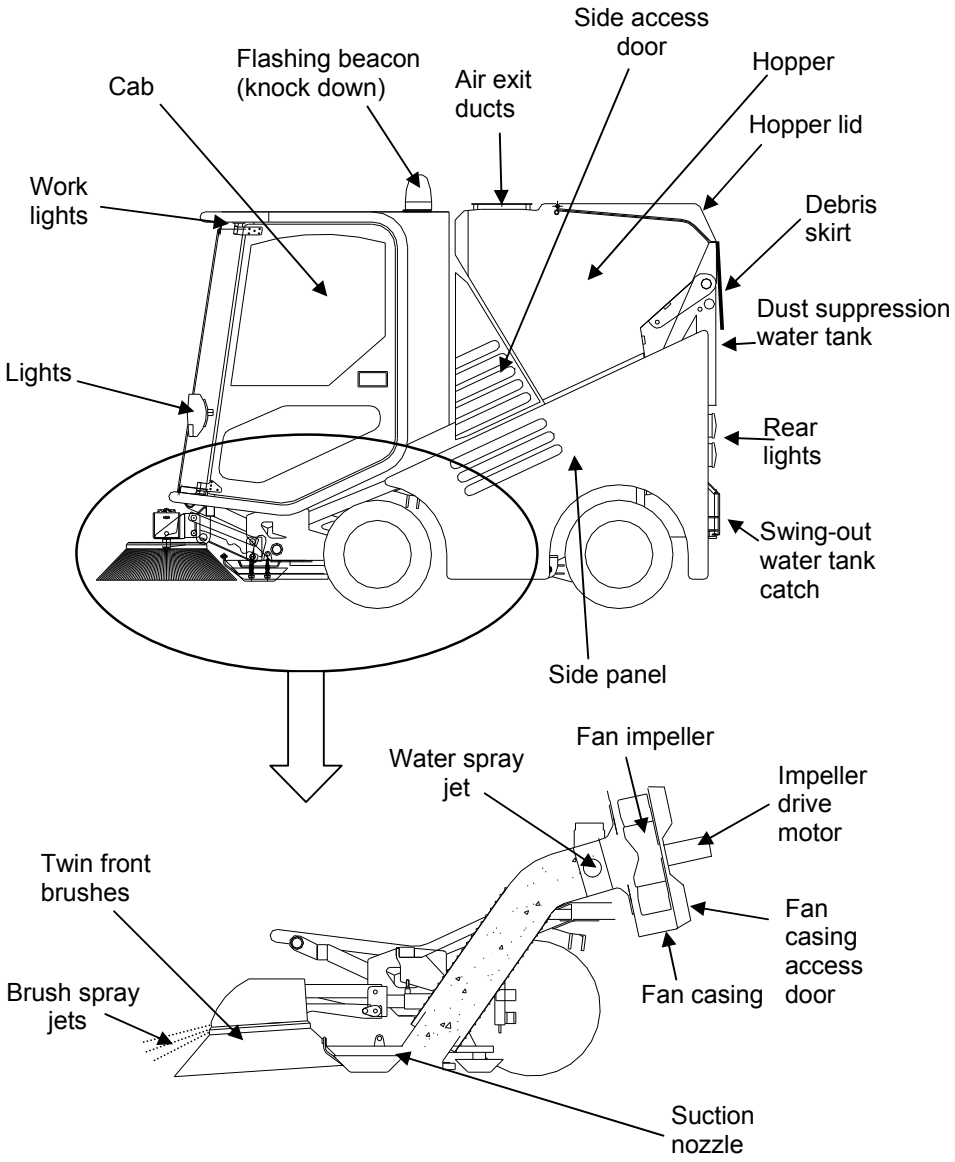


1.4 Things to avoid while sweeping

a. Rope, string
b. Nylon, plastic or metal strapping
c. Large plastic bags
d. Large items of clothing
e. Bricks and very large stones
f. Large pieces of wood, twigs-sticks
g. Aerosols – it is advised to pick these up by hand as they may contain inflammable liquids or gases

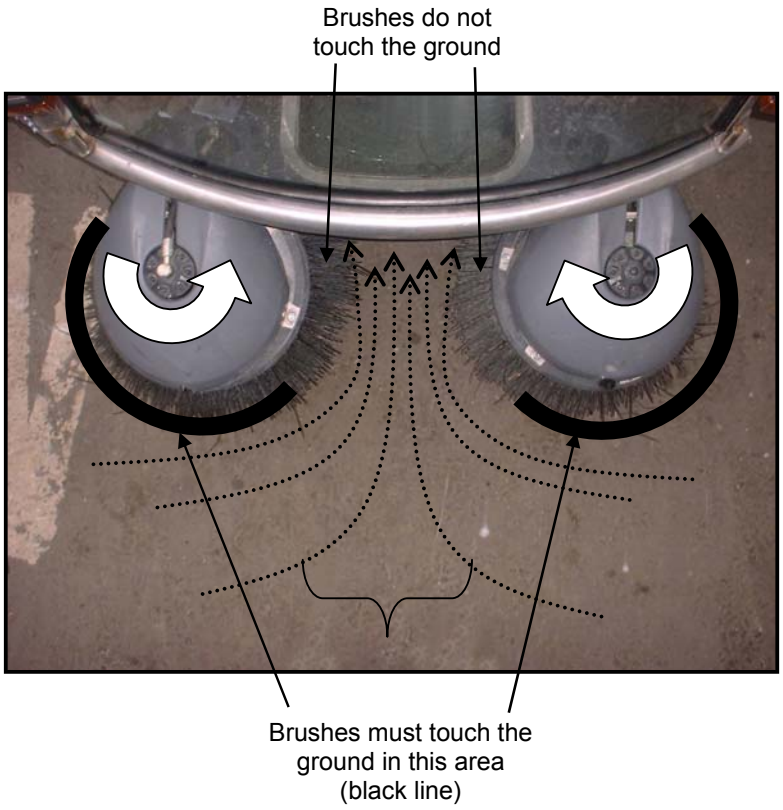
All normal litter, leaves, debris or trash will not normally be a problem to pick up. This includes normal soft drinks cans, glass bottles and broken glass.

1.5 Get to know your machine



1.6 Setting the brush angle

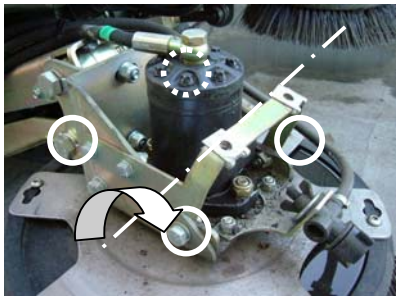
This operation usually only requires to be carried out when the machine is installed. The requirement is to set the angle of the brushes so that they sweep the debris into the central part of the machine, where the airflow will pick it up. To do so, the brushes need to be tilted so as to touch the ground as shown on the following picture:



a. Remove the plastic brush cover.

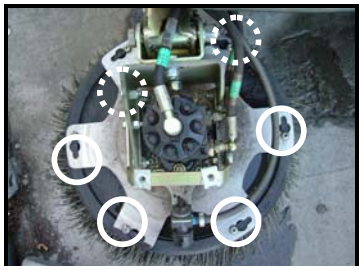
b. Loosen the top nut shown on the picture to adjust the roll angle (usually 5 degrees).

c. Loosen the four screws shown on the picture to adjust the pitch angle. The front two screws are located in slots.



1.7 Changing the brushes

a. Remove the plastic brush cover, and then loosen the six M8 fixing screws shown on the picture using the tools provided.



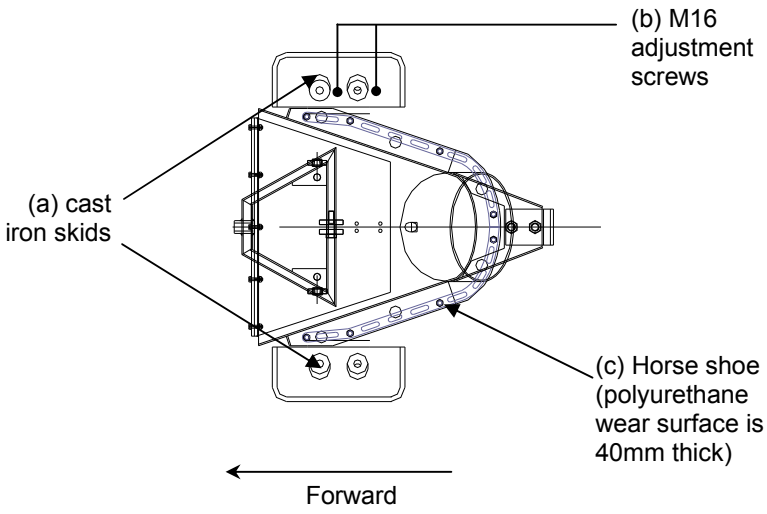
b. Turn the brush until the head of the screws pass through the keyhole. Now replace the old brush with the new one, and turn the brush until the screws are located at the end of the keyhole slots. Turn the right hand brush clockwise (looking down on the brush) and turn the left hand brush anticlockwise.

c. Tighten the flange screws.

1.8 Setting the nozzle height

Setting up

The two chilled iron skids (a) should be set with their lower wear surfaces level with the horse shoe polyurethane (plastic) wear surface (c).



The nozzle is designed to float lightly on the ground in the lowered position, being supported by the hydraulic cylinder. The nozzle is automatically raised when Transit, Brush Lift or Reverse is selected.

Adjusting for wear

The side (a) skids can be adjusted via the M16 adjustment screws (b).

SECTION TWO
GETTING STARTED

If the machine is set correctly and has been cleaned in the manner prescribed you will get continued performance for the whole of the shift.

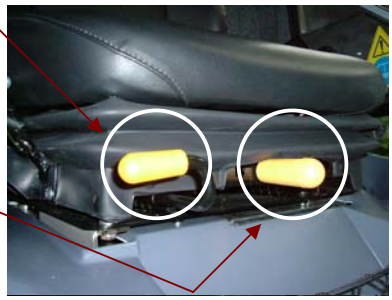
The most common problem experienced by machine operators is that the machine does not pick up, and leaves a trail. Usually, this means either the machine has not been set correctly or there is an airflow restriction (please see 1.3 – How does the machine work).

If you experience problems of the machine not picking up debris/trash, refer to section 6 – Fault finding

2.1 Adjusting the driving controls

a. Your seat is adjustable:

Move the seat forward or backward using the lever below the seat on the right hand side.



Adjust the suspension setting of the seat by adjusting the lever below the seat, in the middle. Pull out knob to obtain more leverage and move towards left for increasing driver weight.

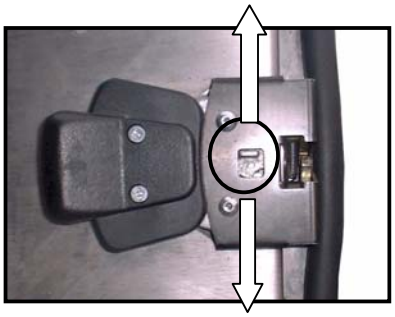
Adjust the backrest with the upper lever at the right hand side of the seat.

To adjust the tilt (thigh support adjustment) use the lower lever at the right hand side of the seat.

b. Adjust the height of the steering wheel using this lever.

c. Please note that the cab includes a **seatbelt**

d. It is possible to **lock the doors** from the inside of the cab. Moving the catch down unlocks the door, moving the catch up locks it.



Locked

Unlocked

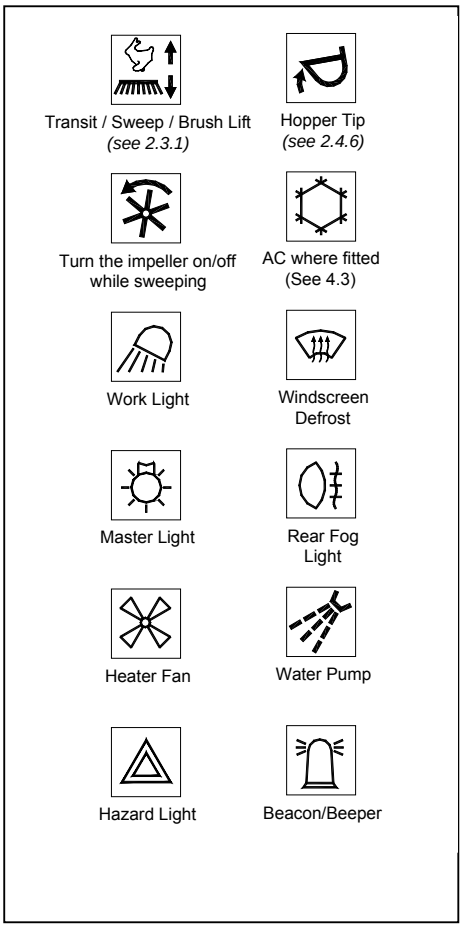
STOP **Ensure that the catches are in the down position prior to leaving the cab**

STOP **If the door is locked from the inside it is not possible to unlock from the outside using the key.**

2.2 Learning about the switches

2.2.1 Switch column

You have probably noticed the switch column on your right hand side. Here is an overview of the functions it provides.



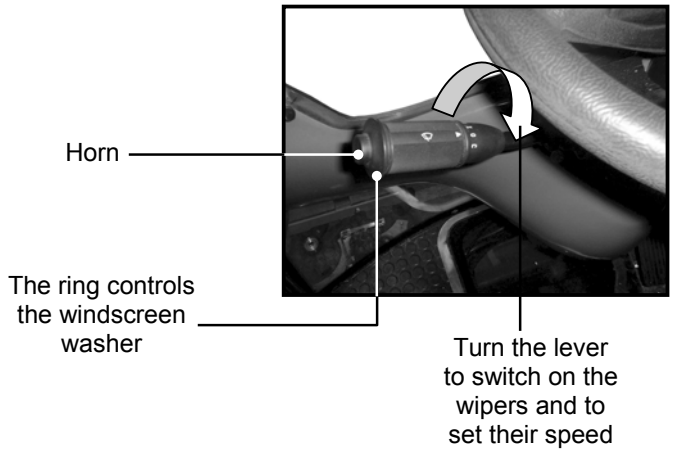
2.2.2 Multifunction lever switch

The steering column multifunction lever switch is similar to the ones used in cars.

Pushing the lever forwards or backwards controls the indicators.

Pushing the lever down controls the main beam (The lights will turn on only if the appropriate column switch is on).

Pushing the lever up flashes the main beam, whatever the position of the column switch.



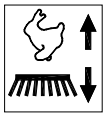
2.3 Driving the machine

Please note that in the United Kingdom a full B driving license is required to drive the 525 machine. For other countries please check with your local distributor.

2.3.1 Movement modes

Before actually driving the machine, you need to know about its movement modes.

The machine has three main movement modes, which you can select on the 3-position rocker switch at the top of the switch column on the right hand side of the windscreen.



- Transit mode
- Sweep mode
- Brush lift mode

1. **Transit mode** is used to drive the machine at high speed (from the storage depot to the sweeping site), up to 32km/h (20 mph). The brushes and nozzle are raised when using this mode. Please note the machine will not travel at high speed until the front wheels have tracked out, thereby increasing the overall vehicle stability. This operation takes about 10 seconds, and will be performed automatically as the machine starts gaining speed. For short distance travelling from one sweeping zone to another, it may be more efficient to use Brush lift mode (see 3 below).

2. **Sweep mode** (work 1) only enables a low-speed drive, up to 15 km/h (9 mph). The front wheels are tracked-in, to enable sweeping access to narrow alleyways. The brushes and suction nozzle are automatically deployed when sweep mode is selected.

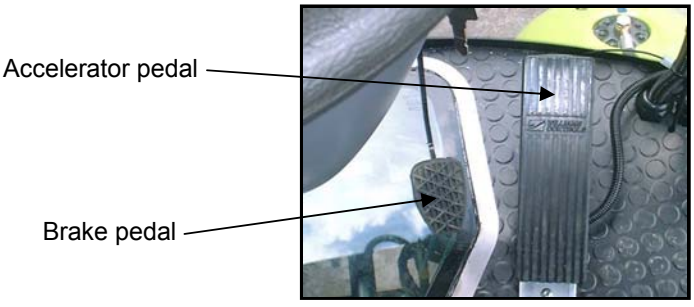
3. **Brush lift mode** (work 2) is used to travel at low speed over short distances when not sweeping. Indeed, it is sometimes not good use of time to use transit mode for a short distance travel, as the front wheels have to track out and then back in. The Brush lift mode is similar to Sweep mode (same max. speed) except the brushes and nozzle are raised.

It is important to check that the front wheels are fully tracked in before sweeping close to a wall or curb. If not fully tracked in tyre damage may result.

2.3.2 Speed control (accelerator) pedal

The pedal is located right of center on the floor. The same pedal is used for both forward and reverse motion.

Pressing the pedal gently will cause the machine to move forward or backward depending on the setting of the Forward / Reverse lever. If the lever is set to Neutral, then pressing the accelerator will simply speed up the engine.



2.3.3 Braking

Releasing the accelerator pedal will cause the machine to slow down by automatically applying hydraulic braking.

The brake pedal operates on the rear brakes.

The handbrake also operates on the rear brakes, and should always be applied when leaving the cab. A buzzer sounds if Forward or Reverse is selected with the handbrake applied to remind you to release it.

2.3.4 Wheel Tracking

525 is equipped with a variable track width front axle. This enables the machine to operate in narrow passageways (1.1m machine width) during the low speed (15 kph max.) Sweep (Work) mode.

In high speed (32 kph max.) Transit mode, the front wheel track width is increased to 1.33m over wheels. This increases machine stability at high speed.

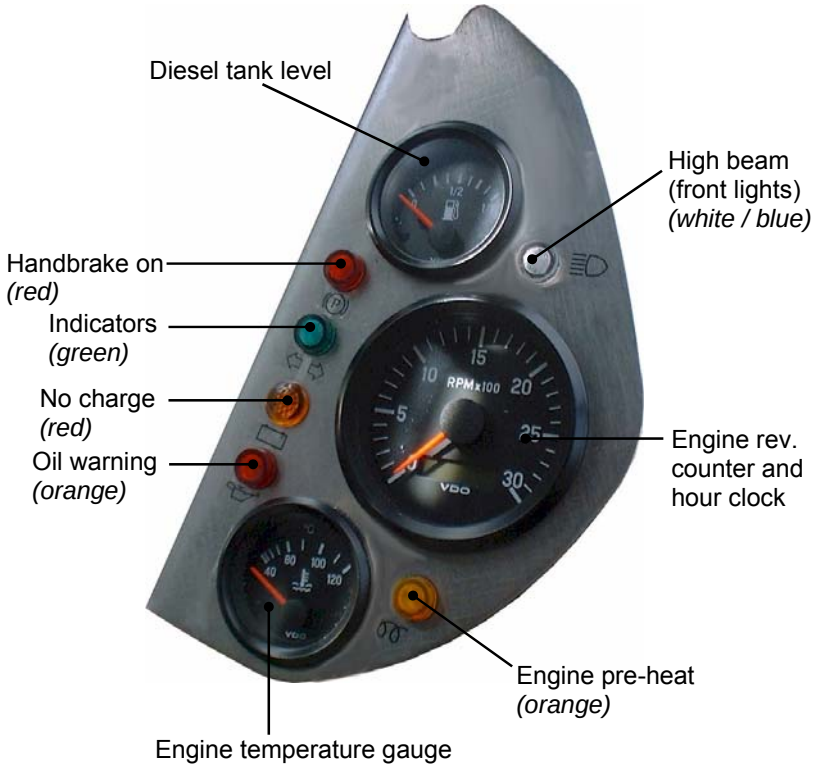
“Tracking” (changing the front wheel track width) is automatically controlled by the MDM electronic control system.

a. TRACKING-OUT – Changing from WORK to TRANSIT
   Reduce machine speed to 5 kph (3.1 mph) (walking speed) and select Transit. When Transit is selected, Tracking-out does not start until the accelerator pedal is depressed when the machine is in Forward and a speed of, at least, 4.5 kph (2.8 mph) is reached.

   The MDM then limits the maximum speed to 5 kph (3.1 mph) until tracking-out is complete (about 10 sec.). A speed of 32 kph (20 mph) is then permitted. During tracking the following message will appear on the MDM display “CAUTION – SPEED RESTRICTION – WHEEL TRACKING OPERATING”.

b. TRACKING-IN – Changing from TRANSIT to WORK
   Reduce the vehicle speed to 5 kph (3.1 mph) and select Work. Tracking-in does not start until a speed of at least 2.5 kph (1.6 mph) is achieved. The MDM will then control the speed to a maximum of 3 kph until Tracking-in is complete. Speeds of up to 15 kph are then permitted. Again, during Tracking-in the MDM display will show the tracking message.

2.3.5 Gauges and warning lights



In addition the IQAN system also monitors machine condition and will provide warnings and information on the graphic display (see Section 2.7).

2.3.6 Forward / Neutral / Reverse

The front joystick switch on the front of the control arm enables you to choose from Forward, Neutral and Reverse mode.

Raise the safety ring while moving the joystick from Neutral mode.

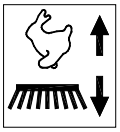
STOP **Remember always to engage Neutral and apply the handbrake before leaving the cab.**

2.3.7 Starting & Stopping the engine

(for switch location see section 2.2)

a. Engage Neutral

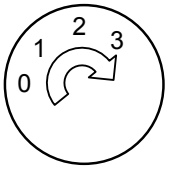
b. Get into Transit mode



- Transit mode
- Sweep mode
- Brush lift mode

c. Turn the ignition key:

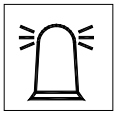
0. Off
1. Power on
   Engine pre-heat. Hold ignition key in pre-heat position until pre-heat lamp is extinguished (about 5 seconds).
2. Start the engine



d. When engine fires, leave it running at low speed idle for 3 minutes, (In cold weather leave on low speed idle for 6 minutes), to allow hydrostatic transmission oil to warm up.

e. Switch on the rear camera display (top left - where fitted)

f. Switch on the flashing beacon
Whenever the vehicle is moving the flashing beacon should always be on.



- Off
- Flashing light
- Light and sound

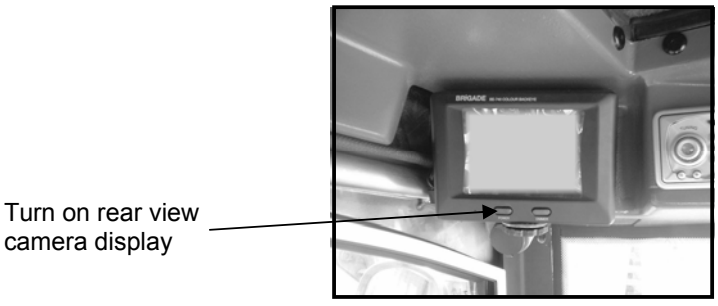
g. Release the handbrake

h. Engage forward or reverse.

i. Press gently on the speed control pedal and the vehicle will start moving. Always try to release the speed control pedal slowly, so as to get a smooth braking action. Releasing the speed control pedal too fast will cause harsh braking.

The wheels should start tracking out (if not already tracked out) as you are gaining speed, provided that you are in Transit mode.

In transit mode, you should drive the machine almost as you would drive a car with automatic transmission. Remember the machine has features such as a seatbelt, a rear-view camera display (where fitted - same use as a rear-view mirror) and indicators.



j. Stopping the Engine.
Prior to switching off the engine directly from Sweep Mode (high engine speed), first engage Transit Mode and idle the engine for 3 minutes before switching off, in order to cool the Turbo.

2.3.8 Going up and down pavement kerbs

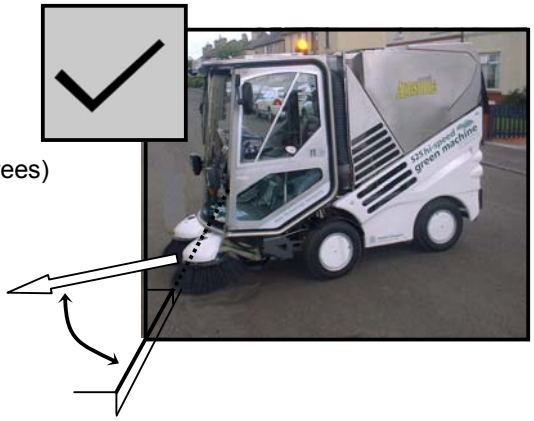
Never go up or down a pavement kerb with the brushes and nozzle down (always use Brush Lift mode)

Never drive up and down pavement kerbs at too high a speed or too oblique an angle.

Angle is too acute
(less than 30 degrees)

Proceed as shown on this picture, driving at **low speed**

(angle around 45 degrees)



2.4 Using the Sweep mode

2.4.1 Switching to Sweep mode

With the engine running, use the top left switch on the switch column to switch to Sweep mode (switch in middle position)

2.4.2 Water system

While sweeping, set the water pump on/off with this switch

Front water jets: When the water pump is on, you can set the amount of water provided to the brushes by turning this control valve (to your left)

The jet can be cleaned by removing the jet holder (half turn).

Fan casing drenching jet (located at the inlet duct of the fan casing) is operational whenever the water pump is on. The jet can be removed for cleaning by pulling the jet assembly out of its socket.

Wet weather sweeping: When sweeping in the rain or sweeping in an area where there are many puddles, the water pump should be switched off.

Dry weather sweeping:

STOP **Always switch on the water pump when sweeping in a dry area**

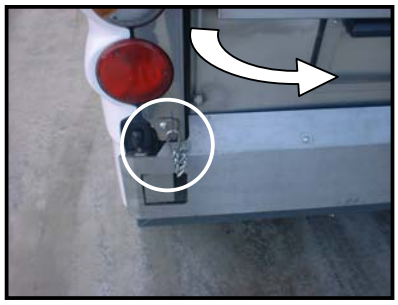
When using the brushes in a dry area, make sure you use the front water jets.

If the water system does not work, check the water tank level at the back of the vehicle behind the hopper skirt (refer to fault finding section if the water system still does not work).

The water mesh filter, located under the rear water tank, must be cleaned regularly.

STOP **Always drain all water from the tank when conditions are frosty**

To swing out the water tank, undo the safety chain and then use the lever shown on the picture.



You may swing out the rear water tank in order to:

- clean the radiator
- get access to the water pump
- get access to the mesh filter
- get access to the water drain

In frosty weather all water must be drained from the water tank in order to protect the pump, filter, pipes and tanks. Swing out the rear water tank to access the drain.

STOP

Ensure the rear water tank is in the stowed (home) position and securely latched with the safety chain engaged before driving the machine or tilting the hopper

Filling the Water Tank(s): Ensure water tank is in the stowed position. Undo the cap on the top of the rear water tank and insert a hose of 30mm (1.2”) maximum outside diameter to allow sufficient space for venting. Do not use too high a flow or the water may enter the tank faster than the air can be vented causing damage to the tank.

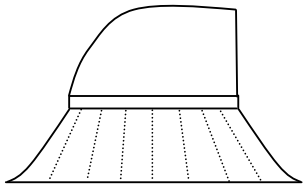
2.4.3 Setting the brush height

In order to sweep correctly, the brush height needs to be set correctly. You do not need to set the brush height each time you engage Sweep mode, but remember the brushes require adjusting as they wear.

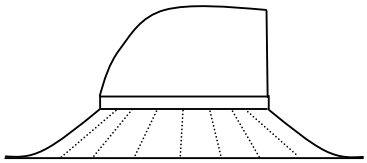
The metal knob located on the left hand side of your seat adjusts the brushes height.

Unlock the locking ring under the knob, adjust, and re-tighten the locking ring.

Use the following drawings to check the brush height.



Correct brush height



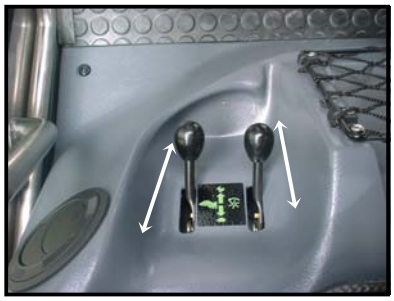
Incorrect brush height
(brushes are too low)

2.4.4 Moving the brushes sideways

There are two small joysticks on the control arm. Each of them controls one brush. You may use this feature when driving next to a wall to clean as close of the wall as needed. The swept track can vary from 1200mm (47.2 in) to 1800mm (70.9 in).

The widest swept track available is sometimes too wide for the sweeping conditions. If debris/trash tends to be left on the sides of the sweep path, try narrowing the swept path. (Also see section 6 - Faultfinding)

2.4.5 Setting impeller/brush speed



To your left hand side are the two levers shown on the picture.

Use the left hand side lever to set the brush rotation speed. The brush speed should be set to the minimum speed necessary to provide clean sweeping for the forward speed being used.

Use the right hand side lever to set the impeller rotation speed. This is the only way you can set the impeller speed (the IQAN only displays the current speed)

The vacuum fan impeller speed should be set to below 2500 rpm for normal sweeping.
The speed can be set to above 2500 rpm (boost) for a short time (up to 5 minutes). When in boost the machine management unit (MMU) will display a countdown bar graph. If the speed is not reduced to under 2500 rpm within 5 minutes, the MMU will shut off the fan and a buzzer will sound. To reset the MMU fan speed limiting system the machine must be stopped and Forward/Neutral/Reverse switch moved to the Neutral position for at least 5 seconds. The machine can then be re-started and the impeller speed reduced to below 2500rpm.

The MMU will restrict boost to a maximum of 5 boost periods per hour.

To turn the impeller on/off while sweeping, use the appropriate column switch

For normal sweeping the impeller speed does not need to be greater than 2400 rpm.

The machine may be operated for short periods of time with the impeller above this speed (up to 2800 rpm) but if impeller speeds greater than 2400 rpm are continually required then the machine is being over-tasked or has a blockage (see section 7 – fault finding).

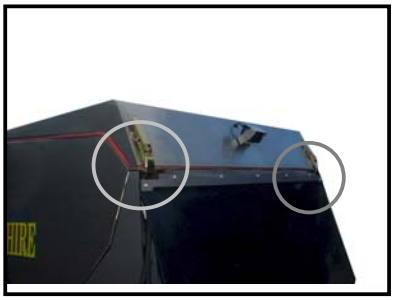
2.4.6 Tilting the hopper

There are two situations where you will need to tilt the hopper:

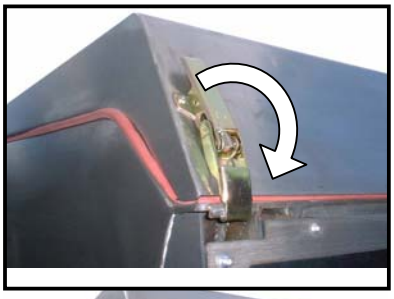
- In order to empty it (unlock catches)
- In order to access the fan casing or the engine (**do not** unlock catches)

In order to empty the hopper

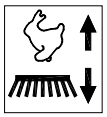
a. Before you tilt the hopper, always unlock both over centre catches shown on the picture.



Simply pull to unlock the catch & ensure the catch is fully open before attempting to raise the hopper.



b. Switch to Sweep mode (so that the engine revs. are high enough to tilt the hopper)

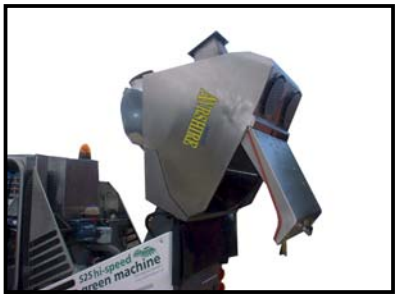


c. Engage neutral.

d. Press the hopper switch (up) until the hopper is fully tilted.

- Raises the hopper

- Lowers the hopper



e. Remove all remaining debris/trash from the inside of the hopper, using the scraper provided (inside the right hand access door).

f. Press the hopper switch (down) until the hopper is in its normal position.

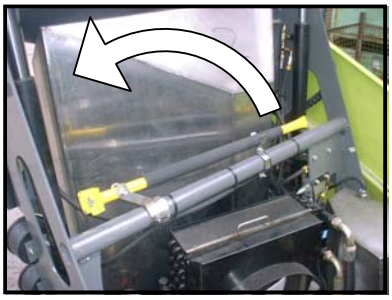
g. For manual tilt of the hopper see Section 9.

STOP **Before tilting the hopper ensure that the machine is on level ground.**

In order to access the engine or the fan casing

When tilting the hopper to access the engine area, **do not unlock the two over centre catches**. Always make sure the **hopper safety stay** is in place before leaning into the engine bay.

Put the safety stay in position as show on the pictures.



STOP **Always remember to remove and re-stow the safety stay prior to lowering the hopper.**

2.5 Whoosh hose

2.5.1 Using the whoosh hose

The whoosh hose is fitted to the machine to allow the operator better flexibility.

Use the whoosh hose to clean an area you cannot sweep directly using the machine (between cars,…)

2.5.2 Unblocking a blocked whoosh hose

Under normal operating conditions the hose should function effectively. However it is possible that the hose may become blocked.

To clear a blocked hose:

a. Switch to Sweep mode.

b. Remove the whoosh hose from its stowage.

c. Slowly and carefully squeeze the hose along its full length until the blockage is found.

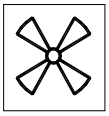
d. Squeeze carefully the blockage area until the blockage is heard entering the impeller casing.

2.6 Cab comfort

2.6.1 Cab temperature

Use this knob (on your left hand side) to set the level of the cab heating system

This switch turns the heater fan on/off



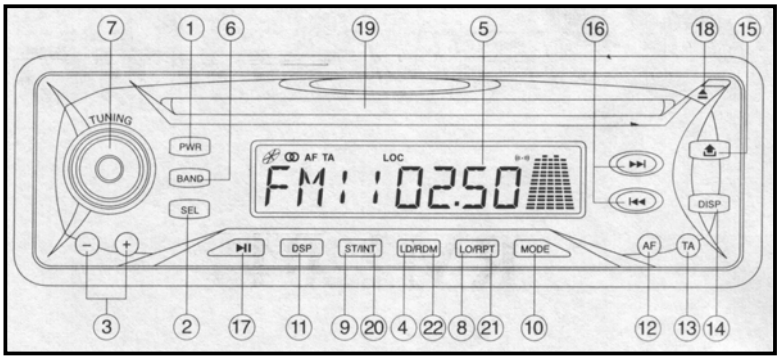
Air vents are located on both sides of the cab.

See also 4.3 for Air Conditioning option.

2.6.2 Other devices

Radio/CD player

A comprehensive manual is provided along with the machine. Here is a summary of the functions provided by the radio/CD player.



1. Power on / off (PWR)
2. Select button: Bass / Treble / Balance / Fader (SEL)
3. Volume up / down for Bass / Treble / Balance / Fader (+/-)
4. Loudness (LD)
5. LCD display
6. Band
7. Manual tuning control (TUNING)
8. LO/DX button (LO)
9. Stereo / Mono (ST)
10. Mode
11. DSP
12. Manual AF mode
13. TA mode
14. Display mode
15. Panel release button
16. Track skip/search
17. Play / Pause button
18. CD eject button
19. CD slot
20. Intro button (INT)
21. Repeat button (RPT)
22. Random button (RDM)

Soft drink can holder

Please note a storage net is fitted on the seat moulding.

The windscreen is electrically heated for de-misting. Because of the high current draw it switches off automatically after 10 minutes.

2.7 Electronic control system (“brain”)

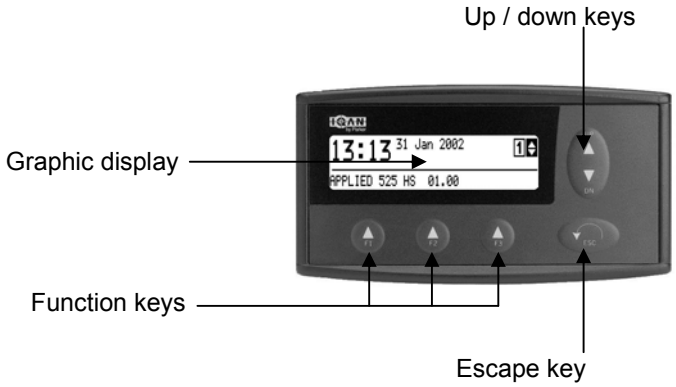
The 525 is controlled by an electronic Machine Management System (MMU) using two main modules:

- The MDM is the “**brain**” of the 525. It has a graphic display and several function keys. It is located top right of the windshield.
- The XT2 is the “**slave**”, and takes orders from the MDM and actually controls the different elements of the machine. It is located inside the back panel of the cab, on the left hand side.

The MMU is also sometimes referred to by its proprietary name, IQAN.

2.7.1 “Brain” & display

Here is a view of the MDM *(located top right of the windshield)*



With the machine on and running, the Display will show the operational window corresponding to the current movement mode (Transit, Sweep or Brush lift mode).

Pressing the Escape key will enter the Menu System. There are five different menus:

- Mode menu
- Information menu
- Settings menu
- Measure menu (workshop use only)
- Properties menu (factory use only)

In the sub menus, use Escape key to return to the previous menu level. Use the function keys (F1, F2 and F3) to select the different functions in the submenus (above each key is a tab displaying the key function)

2.7.2 To set the engine speed during WORK mode

a. With the engine running, the work/transit switch in WORK mode and the Forward/Neutral/Reverse lever in any position.

b. Press F1 (select)

c. Use Up and Down keys to select the engine speed (between 1200 and 2800 rpm) (but see e. below)

d. Choose between:

- OK (F1) : confirm the new speed
- Cancel (F2) : the engine comes back to its previous speed
- Reset (F3) : the engine speed is set to 2400 rpm (Default value)

The engine speed should normally be set to below 2600 rpm.

e. High speed boost (above 2600) is available but is limited by the Machine Management Unit (MMU) to 10 minutes maximum and a maximum of 3 10 minute periods per hour.

When boost speed (above 2600) is selected a countdown bar graph will appear on the MMU display. If the engine speed is not reduced below 2600 within 10 minutes a buzzer will sound and the engine speed will automatically be reduced to 2600. To cancel the buzzer and reset the MMU engine speed control, enter the engine speed menu (See 2.7.2 a to d) and scroll down the speed to under 2600.

f. When sweeping uphill it may be necessary to increase the engine speed in order to obtain more power. See c. above. When the hill climb is complete the engine speed should be reduced back to your original value.

The VACUUM FAN SPEED  **is shown on the display, however you cannot set the impeller speed using the IQAN unit.** (VAC. FAN SPEED is set using the lever to your left-hand side). See section 2.4.5.

If you try to start the machine with Forward or Reverse engaged, the IQAN will disable the transmission for safety reasons. Engage Neutral to be able to use the transmission again.

If either of the following occurs a beeper will start and the MDM will display the message shown below:

- Hydraulic oil temperature reaches 95ºC.
- Engine air filter blocked.

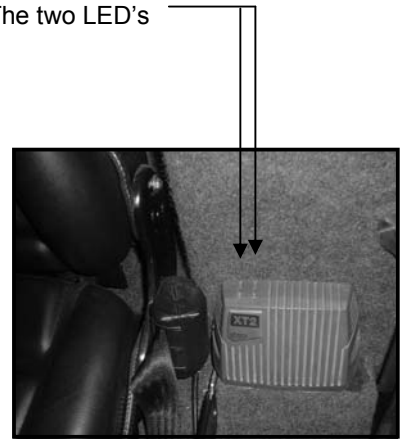
If the above message should appear the following actions should be taken.

- Switch off engine.
- Check the air filter minder (AFM) (located in the engine compartment on the intake pipe between the air cleaner and the engine turbo). If the air filter has blocked the AFM will have tripped and be showing a red ring (normal is green). The air filter element will then require changing, and the AFM resetting (Service personnel task).
- If the AFM is showing green, then the fault will be high temperature, either engine coolant or hydraulic oil.
- Check the coolant header tank for correct coolant level (located above and beside the fuel tank at the front of the engine compartment).
- Check the hydraulic reservoir for correct fluid level (left hand side of vehicle, mid wheel base).
- Allow the cooling system to cool down and check that the debris guard – screen is clean (located between the engine cooling fan and the radiator).

Whenever the MDM requires you to stop the vehicle, please do so. Stop the engine and refer to section 6 (faultfinding). If you cannot solve the problem, do not try to start the engine again and contact your supervisor.

2.7.3 “Slave”

Here is a view of the XT2 *(located inside the back panel of the cab, on the left hand side)*



The XT2 is located inside the back panel of the cab, on the left hand side. It has two LED’s:

- The green LED indicates that the power is on
- The other LED indicates the XT2 status:
    - Yellow flashing means the status is normal (no errors)
    - Red flashing means an error has occurred.

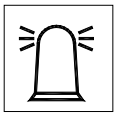
2.8 Safety features & procedures

Some of the information in this section has already been covered in other sections, but has been repeated for your safety and the safety of others.

Folding beacon

The flashing warning beacon on top of the machine can fold if hit by an obstacle when driving under a low roof. Excluding the folding beacon, the machine's height is 1980mm (78 in). You will notice when the beacon folds as it will flash through the cab rear window.

You may turn the beacon and beeper on/off using the appropriate switch on the right hand side column.



- Off
- Flashing light
- Light and beeper

Use the flashing beacon and the lights according to local regulations.

Tilting the cab

The cab can be tilted for maintenance reasons, and should never be tilted otherwise. Before driving the machine, always make sure the cab safety bracket is secured.
(on the right hand side of the machine, as shown on the picture)

Bracket **must** be secured

Important safety notes summary

Always remember the Do's and Don'ts (Sections 1.2 and 1.3)

Always make sure that all the machine labels are in place, intact and readable.

Always apply handbrake and remove ignition key when leaving the vehicle.

Always make sure the cab safety catch is secured before driving the machine.

Always be aware of the machine gauges and beacons

Never work under the hopper without the safety stay being on (remember to remove the safety stay before lowering the hopper)

Always carry out a full operator check at the beginning of each shift (see section 3 and check list in the annex)

Always carry out a full wash down procedure at the end of each shift (see section 5 and check list in the annex)

No welding repairs should be carried out on the machine without disconnecting electronic components (see section 9).

If in doubt use the faultfinding guide in section 6.

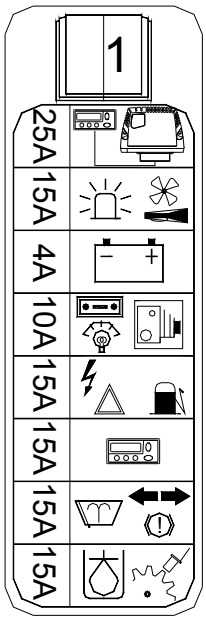
Always report any defects.

2.9 Fuse boxes

There are two fuse boxes on the vehicle. They are located on the right hand side of the vehicle, next to the windscreen. Unclip the cover to access the fuses.

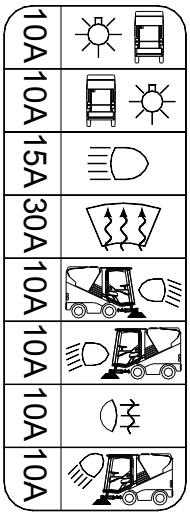
Use the following pictures to identify which element the fuse protects.

First fuse box



Machine Management Unit
Beacon, Voicebox, Horn, Heater
Alternator, Switch Feed
Radio, Reverse Camera, Instrument Feed
Fuel Solenoid, Hazards, Ignition Feed
Iqan MDM
Wipers, Indicators, Screenwash, Brake Lights
Sensor, Hydraulic Solenoid Valves

Second fuse box



LHS Position Lights
RHS Position Lights
Main Beam
Heated Screen
RHS Dipped Beam
LHS Dipped Beam
Fog Lights
Work Lights

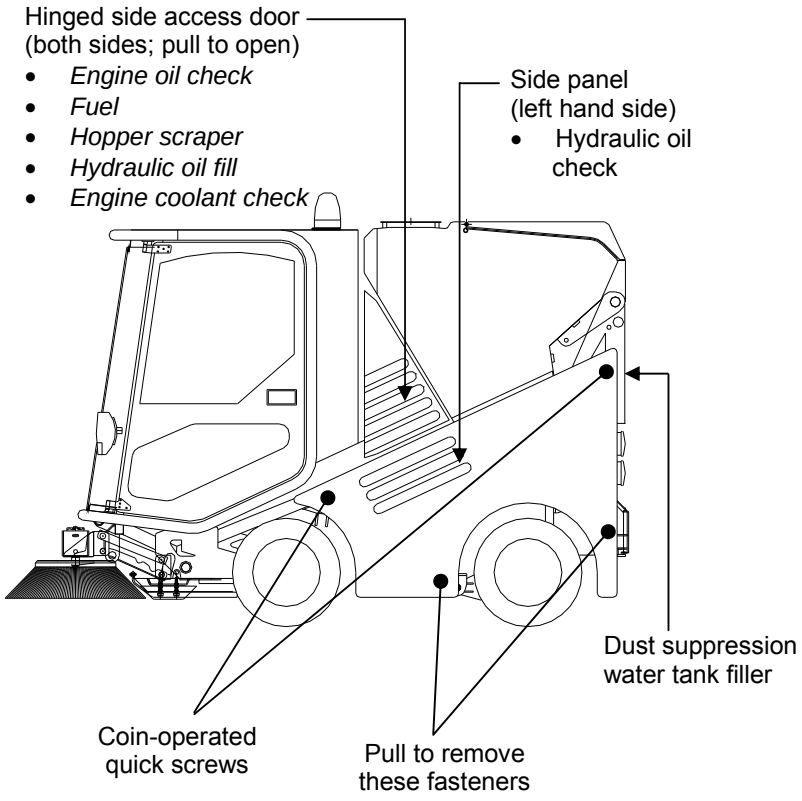
SECTION THREE
OPERATOR CHECKS

Always carry out the operator checks with the engine stopped and when the machine is clean

3.1 Daily Operator Checks

The operator checks should be carried out at the beginning of each shift.

Here is a view of the left hand side of the machine.

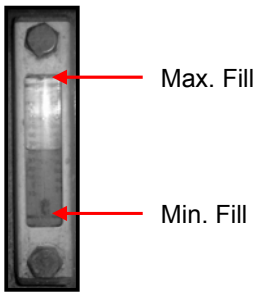


a. Start the engine and tilt the hopper.
Apply the hopper safety stay.
Switch off the engine.

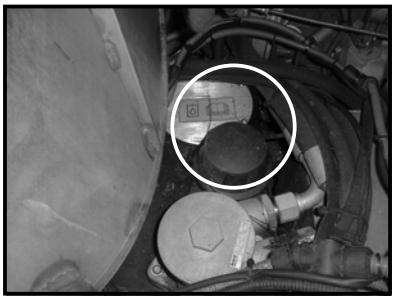
Under no circumstances should anyone work under the hopper without the hopper safety stay being in place

b. Remove the left hand side panel. Store it in a safe place as it is fragile.

c. Check hydraulic oil (located on oil reservoir between front and rear wheels).
Oil type – Turbo Diesel Engine Oil 15W40 Grade API CF/ACEA 2.



d. Open the left hand side access door. Top up hydraulic oil as required

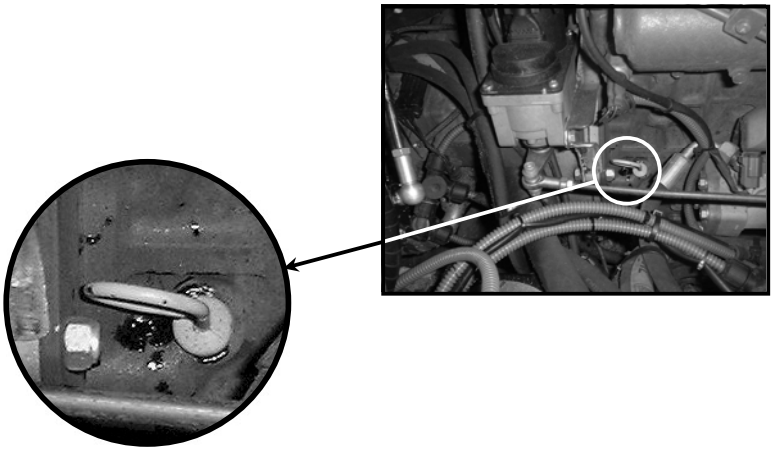


e. Replace the left hand side panel

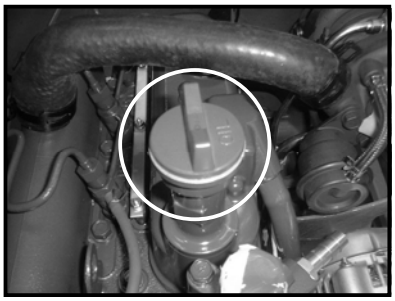
f. Check brake fluid reservoir level (in front of the steering wheel).

Note: by that time the engine oil should have settled enough for you to check the level.

g. Check engine oil
(yellow dipstick gauge).

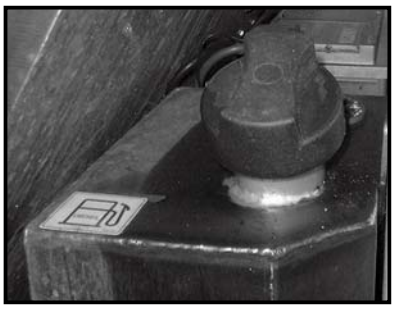


h. Top up engine oil as required



i. Top up main dust suppression water tank. *(back of the vehicle, behind debris skirt)*

j. Top up fuel tank.*(open right hand side access door)*



k. Check the filter minder *(once the filter minder has switched to red, it will stay red, even when the engine is switched off)*

Here is a view of the elements located behind the cab.

l. Check engine coolant header tank. Top up as required with 50/50 Permanent Ethylene Glycol/water mixture.
(behind the cab)

m. Check lights and beacon

n. Check brush wear – replace as required

o. Check nozzle height – The sole of the polyurethane wear plate should be 10mm above the ground.

p. Check tyres for correct pressure (see section 7.9) and condition.

q. Look around the machine checking for damage

r. Check all safety devices

Weekly Operator Checks

a. Clean water filter.

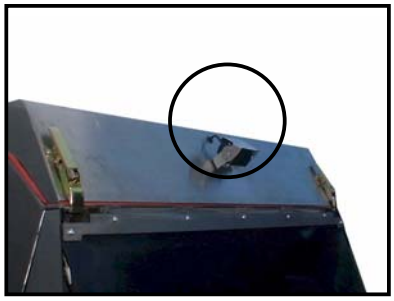
b. Check tyres for wear.

SECTION FOUR
OPTIONS & ACCESSORIES

4.1 Rear-view camera (optional)

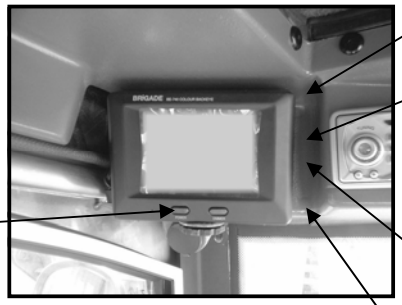
The rear-view camera is used like an interior rear-view mirror.

Rear-view camera (on the hopper)

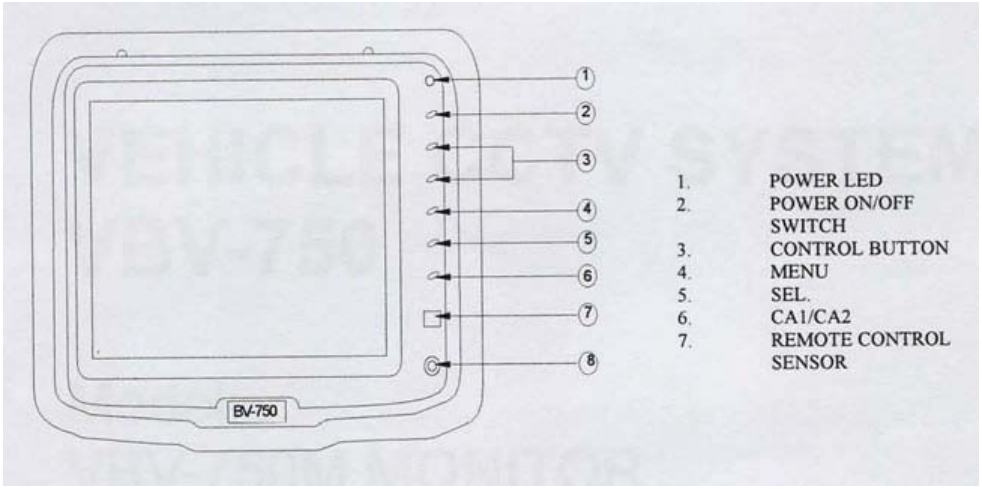


If necessary, **carefully** clean the camera lens using a soft cloth.

Rear-view camera display (left hand side in the cab)



Functions and Operation



Monitor

1. POWER LED
   When the red LED is turned on, it indicates power on.
   When reverse is selected, the image shown by camera will be shown on the monitor.

2. Power ON/OFF switch,

▲ +, ▼ –, CONTROL BUTTON

These control buttons are used to scroll up and down to select menu options.

3. "MENU" Button

If you press the "MENU" button, the following list of options will be shown on the monitor.

PICTURE
SYSTEM
OPTION
CLOCK

The menu list will disappear if no selection is chosen within 2 seconds.

4. SEL.

SELECT CONTROL BUTTON

Use these buttons in order to select the option.

5. Camera selector button.

Enables selection of CA1 and CA2.

The OSD indicates which camera is currently operating.

6. REMOTE-CONTROL SENSOR

The monitor can be operated via remote control. If using remote control, ensure that the IR on the remote is facing the monitor.

How to select your monitor requirements

1. PICTURE CONTROL

i. Press the "MENU" button.
ii. Select "PICTURE".
iii. Move the cursor to the "CONTRAST, BRIGHT, COLOUR, SHARP AND TINTS" with the SEL button.
iv. Press the "▲ + or ▼ –" button.
v. Select one of the five options.
vi. Press the "MENU" button.

2. SYSTEM CONTROL

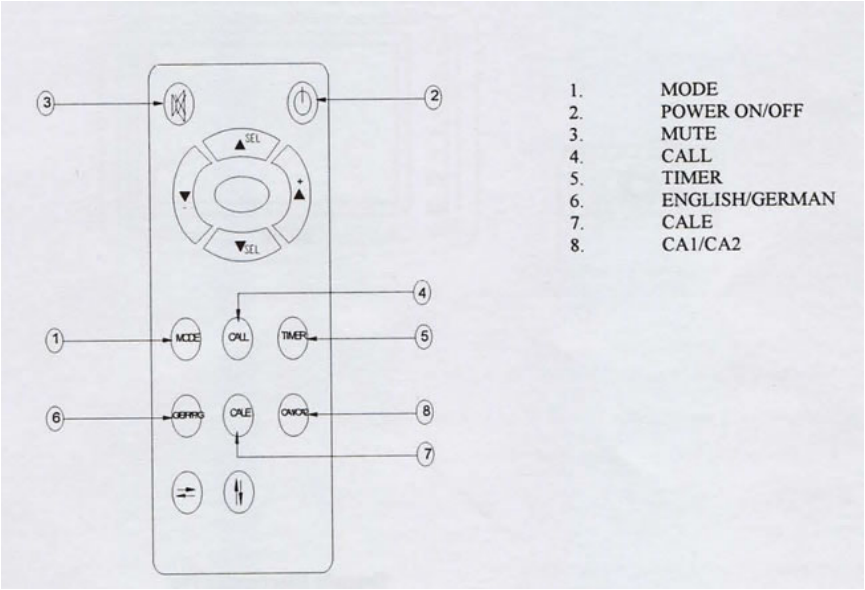
i. Press the "MENU" button.
ii. Select "SYSTEM".
iii. Move the cursor to the "INPUT, COLOUR SYSTEM, BLUE BLACK, LANGUAGE" with the SEL button.
iv. Press the "▲ + or ▼ –" button.
v. Select one of the five options.
vi. Press the "MENU" button.

3. OPTION CONTROL

i. Press the "MENU" button.
ii. Select "SEL".
iii. Move the cursor to the "HORIZONTAL, VERTICAL" with the SEL button.
iv. Press the "▲ + or ▼ –" button.
v. Select one of the two options.
vi. Press the "MENU" button.

4. CLOCK CONTROL

i. Press the "MENU" button.
ii. Select "CLOCK".
iii. Move the cursor to the "TIME, ON TIME, OFF TIME, ATTENTION, CH-TIME" with the SEL button.
iv. Press the "▲ + or ▼ –" button.
v. Select one of the five options.
vi. Press the "MENU" button.



Remote Control

1. MODE
Press the mode for the following options for picture settings; Standard, Soft, Vivid, Light and Personal.

2. POWER (Power switch)
Press this button to turn on and off the monitor.

3. MUTE (Mute)
Press this button to mute, press it again or ▲ + or ▼ – to resume normal sound.

4. CALL
This button displays which camera is being viewed.

5. TIMER
The timer can be set to automatically switch off the monitor (120 minutes maximum).

6. E/G
Press this button to select either English or German.

7. CALE
Press this button to show calendar by Year, Month, Day and Week. Press ▲ or ▼ to make relevant adjustments.

8. VIDEO (CA1/CA2 shift)
Press this button to shift between CA1 and CA2.

←
→ This button flips the picture horizontally.

↓↑ This button flips the picture vertically.

4.2 Pressure Washer (Optional)

The pressure washer is used to clean the machine. It comprises a hydraulically driven high pressure pump (90 Bar) which pumps water to the spray nozzle via a hand held lance. Always hold lance with 2 hands.

DO NOT point the spray nozzle at people or animals, as the high pressure spray can cause serious injury.

DO NOT spray close to engine air intake stack inlet as this can cause permanent damage to the engine.

Avoid jetting electrical areas on the machine (wiring, plugs, sockets, electrical junction boxes, safety switches & lights).

Avoid close jetting of the tyres as the high pressure jet may damage the side walls.

The pressure washer takes its water from the dust suppression tanks via a filter. This filter should be carefully cleaned periodically. If the water tank should run dry, switch off the pressure washer immediately.

The oil reservoir may require topping up from time to time. There is a sight glass for checking the oil level. Use Turbo Diesel Engine Oil 15W40 Grade API CF/ACEA 2.

The pressure washer is started by operating the switch with the "Lance-spray" symbol. The engine must be running with the mode in sweep position (mid position) and the Forward/Neutral/Reverse lever in Neutral. The Lance is removed from the holder and the hose is pulled out from the storage area. Point the Lance spray nozzle towards the ground and pull the Lance trigger.

In frosty weather drain down the water system to protect pump, filter, pipes and tanks.

After use, switch off the pressure washer switch and carefully stow the hose and lance in their respective storage locations, behind the suction fan door.

STOP **NEVER point the spray at people or animals.**

4.3 Street Washer Model – 525SW

Introduction

The street washer 525SW is a dual function machine, which can perform both the functions of Sweeping and Street Washing. The machine cannot Sweep and Street Wash simultaneously. However changing over from one function to the other is relatively quick and does not involve the use of tools.

Because street washing requires large amounts water, extra water has to be loaded onto the machine. The water is loaded into the refuse hopper. This is the reason the machine cannot sweep when street washing.

The hopper contains a special filtration cartridge that is located inside the hopper, laid along its floor. The cartridge is protected by a guard and can be withdrawn from the side of the hopper for cleaning. When the extra water in the hopper is used up, a 3 way valve can be turned to allow the water in the dust suppression tanks to be used.

The street washer comprises a high-pressure reciprocating piston water pump driven by a hydraulic motor. The pump feeds high-pressure water to a folding boom spray bar located at the front of the machine. Operating one of the brush control joysticks can hydraulically slew this spray bar from side to side. The joystick changes function when Street Washer is selected. The spray bar is hinged in the centre and will fold to avoid damage if it accidentally contacts an obstacle when moving in the forward direction. The spray bar can be folded up and stowed out of the way in front of the cab windscreen when the machine is being used as a sweeper.

Preparing to Street Wash

The hopper must be emptied (tip the hopper) and thoroughly washed out. Check that the hopper filter is clean by undoing the toggle clamps on the right hand side of the hopper and withdrawing the cartridge. Clean the textile sleeve. Undo the screw cap and withdraw the stainless steel mesh filter. Clean the mesh filter if necessary.

Fold down the hopper fan duct sealing diaphragm (to prevent water surging out of the hopper into the suction fan casing during braking).

Lower the hopper.

Check the pump inlet filter for cleanliness (located above the rear left hand suspension spring/damper unit). Swing out the rear dust suppression water tank.

Open the hopper water fill/vent point on the left hand side of the hopper intake duct. Insert a 30mm water hose and fill the hopper up to the level of the fill point – about 380 litres. **DO NOT** over fill. Close the filler/vent cover. **DO NOT** fill the hopper through the hopper door as over filling may occur, which will overload the vehicle.

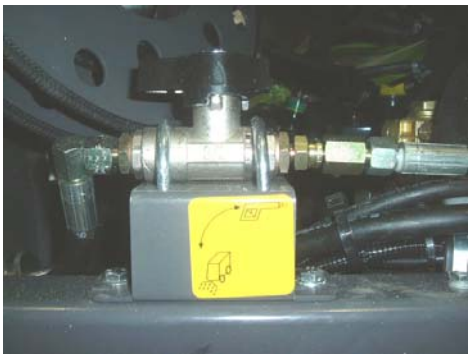
STOP **DO NOT over fill.**

DO NOT fill the hopper through the hopper door.

Fill the rear dust suppression water tank using a 30mm hose – about 130 litres.

Move the 3 way valve, to the “Hopper” position – located above the rear left hand suspension spring/damper (swing out the rear water tank).

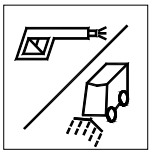
If a pressure washer is fitted, turn the high pressure 3 way valve on left hand side of the machine to “Street Washer” position – open the LH access panel.



Fold down the spray bar at the front of the machine and lock in place.

Ensure that the FAN switch on the right hand switch column is switched to OFF and that the brush speed control is set to the zero speed.

Start the engine, engage Sweep mode and switch on Street Washer (switch is on the header). Engage forward drive on the Forward/Neutral/ Reverse lever switch.



The sprays on the spray bar will start spraying – it may take 1 or 2 minutes to obtain a full spray pattern with the fan sprays meeting. If full spray is not available within 2 minutes, switch off the Street Washer and check for blockages and correct valve position.

DO NOT run the street washer pump for periods in excess of **2 minutes** with no water passing through the pump, as permanent damage to the pump will result.

Use the left hand Brush control joystick on the control arm to slew the spray bar from side to side. Operating the spray bar at an angle will wash debris to one side of the washed path.

The spray bar fan sprays should just meet at the ground. If there are **gaps** between the sprays, **raise** the spray bar using the rotary height adjuster at the rear of the spray bar suspension bracket.

The water in the hopper will provide about 25 minutes of street washing. When the hopper becomes empty, this will be indicated by the sprays becoming intermittent. If the street washing task is not complete an extra 7 or 8 minutes of street washing can be obtained by using the water in the dust suppression water tanks (there are 2 of these connected together). The water is accessed by swinging open the rear water tank and turning the 3 way valve to “Water Tank”.

Close the rear water tank. The street washer pump will now draw water from the dust suppression water tanks.

DO NOT let the high pressure sprays impinge on people or animals.

DO NOT continue to operate the Street Washer pump when there is no water in the system.

STOP **DO NOT run the street washer pump for periods of 2 minutes with no water passing through the pump.**

STOP **DO NOT let the high pressure sprays impinge on people or animals.**

STOP **DO NOT continue to operate the Street Washer pump when there is no water in the system.**

Returning the machine to SWEEP mode
Ensure the hopper is empty of water. If a significant amount of water (more than 50 or 60mm) still remains in the hopper, drain it out by deploying the "wet weather" drogue on the front left hand side of the hopper.

Tip the hopper and fold up and stow the fan ducting seal diaphragm.

Ensure that the 3 way valve (above the suspension spring) is set to "WATER TANK" to prevent dirty water from the hopper accidentally entering the dust suppression water circuit.

Ensure the STREET WASHER switch on the header switch panel is switched to OFF.

Switch the fan switch to ON.

Select SWEEP mode, set up fan and brush speeds and commence sweeping.

Using the Pressure Wash Lance (where fitted)
Ensure that the front 3 way valve (located behind the left hand access panel) is set to "PRESSURE LANCE" and that the rear 3 way valve is set to "WATER TANK".

Check that there is sufficient water in the rear water tank.

Select SWEEP mode and check that the engine speed is above 1800rpm.

Switch the Pressure Lance switch to "PRESSURE LANCE".

Ensure that the handbrake is set and that the Forward/Neutral/Reverse control is set to Neutral.

Open the left hand access panel and withdraw the pressure lance and unreel sufficient hose. Using both hands hold the pressure lance firmly and pointing the spray nozzle towards the ground, press the trigger.

DO NOT run the high pressure pump for sustained periods with the pressure lance trigger closed, as the pump will be on high pressure bypass and will eventually overheat.

DO NOT run the pump with no water in the system.

STOP **DO NOT run the high pressure pump for sustained periods with the pressure lance trigger closed.**

STOP **DO NOT run the pump with no water in the system.**

Prior to tilting cab ensure that Street Washer spray bar is folded up and parked.

STOP **Fold up spray bar before tilting cab.**

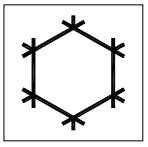
4.4 Air Conditioning (Optional)

The Air Conditioning (AC) operates via an engine driven compressor which is equipped with an electro magnetic engagement clutch.

The air is cooled in an evaporative heat exchanger located behind the drivers headrest. A circulation fan passes air through the evaporator and along a roof duct on the right hand roof rail. The air exits at 2 ducts in this area. The ducts have directional grilles which can be altered to direct the flow of air. The circulation fan blends re-circulated air with fresh air.

The excess heat is rejected in a condenser heat exchanger mounted on the outside, front area of the roof. Electrically operated twin fans circulate cooling air through the condenser.

Prior to switching on the AC, ensure that the Heater Control on the left hand side of the drivers seat is turned off. The heater air circulation fan will automatically be switched off when the AC is switched on.



The AC is switched on via the AC switch (snowflake symbol) on the right hand switch column of the cab. It has 2 positions. Use position 1 for normal cooling and position 2 for boost. The engine must be running. The window and the roof latch should be closed when the AC is operating to prevent all cooled air from escaping from the cab and being replaced with hot air from outside. In hot humid conditions water will condense on the evaporator surface. This water escapes to the outside of the cab via a drain duct. Water dripping from this duct under the cab is quite normal.

STOP **Ensure that the cab window and roof hatch are closed when the AC is switched on.**

4.5 Dog Excrement Attachment (DEA) & (CSA) (Optional)

The Dog Excrement Attachment (DEA or CSA) is designed to suck up anti-social deposits. It comprises a high speed, high suction vacuum pump driven by a hydraulic motor. The suction pump evacuates a stainless steel container. The deposits are sucked into the container via a small diameter hose lance and hose.

Suction Hose – The hose is much smaller than the Wander Hose and is situated on the left hand side of the machine. The hose has a flexible cuff to assist in sucking up anti-social deposits.

Water System – The hose lance has its own water spray jet & control valve, which is designed to assist in the operation of the DEA/CSA and help clean up the area where the animal fouling lies.

The water is supplied from the 525's main dust suppression water system.

The water system will be switched on automatically when DEA is selected but the brush sprays should be turned off via the brush spray control valve, located to the left of the driver on the seat bench console.

STOP **Always make sure that the Acto-Bac disinfectant is added in the Water Tank.**

DEA Container – The container is located behind the Left Hand hinge-open access cover and is mounted on the inner surface of this cover. The container can also be use with a plastic sack liner.

A single peg on the rear locates the container. When closing the access cover ensure that the DEA container lid spigot locates correctly in the vacuum hose socket when the access cover is closed.

DEA Preparations

1. Insert DEA plastic sack into container.
2. Replace container.
3. Ensure water tank has sufficient water.
4. Add neat Acto-Bac to water tank, in the ration of 1:50 (3 litres for a full water tank).

Using the DEA

1. Position the machine just to the right and rearward of object to be removed.
2. Set the machine to Sweep Mode with the Forward/Neutral/Reverse switch in Neutral.
3. Switch on the DEA unit by operating the switch located on the header console.
4. Turn off brush sprays via brush spray control.
5. Remove lance and hose from stowage on the left hand side of the machine.
6. Open water valve on lance, lightly spray the fouling with Water/Acto-Bac mixture then shut off water valve.
7. Place hose end cuff over excrement and draw hose toward you. Continue until all excrement is removed.
8. Stow the suction hose.
9. Switch off the DEA by operating the switch.
10. Now you can continue normal sweeping.

The same procedure applies for de-fouling grassed areas.

STOP

1. **The DEA will only operate with Forward/Neutral/Reverse switch in the Neutral position.**
2. **The DEA should only be used for lifting Dog Fouling, Vomit or Liquid Fouling. (Anti-Social Deposits).**
3. **The DEA should never be used as a general suction hose.**

STOP

1. **Always wear hand protection when using the DEA unit.**
2. **Always make sure that the water tank is treated with Acto-Bac.**
3. **Always carry an additional supply of Acto-Bac**

4.6 Automatic Greasing (Optional)

Introduction
The Interlube AC lubrication system has been specifically designed to provide reliable and virtually maintenance free service. The AC lubricator and its accessories are ruggedly constructed for faultless operation in the most demanding applications.

In common with other electro mechanical devices however, proper operation procedures must be carefully observed.

Operation
The AC lubricating system comprises an electrically operated lubricator and a loom of tubing connecting each chassis bearing to its own respective pumping unit. The lubricator consists of a 1.25 litre reservoir, housing the electronic control, electric motor and drive. The top cover incorporates a filler cap for semi-fluid grease. Housed in the reservoir is a twin-bladed impeller designed to draw grease evenly into the pumping chamber and give a visual indication of cam rotation. Attached to the reservoir is a carcass ring, which houses the cams and pumping units (red 0.010cc/shot, green 0.015cc/shot, yellow 0.025cc/shot, blue 0.040cc/shot, silver 0.060cc/shot and black 0.100cc/shot). This machine is fitted with 34, blue (0.040cc/shot) pumping units.

The AC system is wired via a relay to the vehicle “SWEEP” mode system. The lubrication system only operates when the machine is in SWEEP mode and with the Forward/Neutral/Reverse switch in Forward. In operation the cam rotates operating each pumping unit in turn injecting a measured amount of lubricant into each supply line. During operation a green indicator light shows on the reservoir top cover. To check for satisfactory operation, press the TEST button on top of the unit. This will start the motor and the paddle can be seen to rotate in the reservoir. It will rotate once in about 3 minutes before re-setting to its normal 1 rotation every 12 minute period
A 2A inline fuse is used.

The pump cycle time is 12 minutes and is not adjustable.

Maintenance
As an owner of an Interlube AC system the only maintenance you should find necessary is to periodically check the reservoir lubricant level, topping up with the recommended lubricant as necessary, and occasionally checking the condition of loom connections.

At all times observe the following for fault free operation.

- Use semi-fluid grease specification NGLI 000EP.
- Ensure stored lubricant is kept clean at all times.
- After filling the reservoir make sure the filler cap is secured.

If the system should fail to operate satisfactorily the following diagnostic and remedial advice will help to identify and correct any fault.

Fault Finding

A. All lubrication points are dry.

1. Cause: The lubricant reservoir is empty.

   Action: Refill the reservoir and ensure that all supply pipes are free from air.

2. Cause: The reservoir has been filled with an unsuitable lubricant.

   Action: Drain the reservoir and thoroughly flush the system using a light mineral oil. DO NOT USE SOLVENT CLEANERS. Refill with the correct grade lubricant.

3. Cause: The power supply has failed and the indicator light will not illuminate.

Action: Check main supply. Check 2A fuse, which must be fitted to protect the installation. If the fuse has blown there may a fault with the supply to the unit. Check the cable for damage/short circuits before fitting another fuse. Check continuity of wiring to the unit.

4. Cause: The printed circuit board has failed.

   Action: Check main power supply (see A3 above). Check power in at +ve and –ve on PCB. Check power out on PCB at MM (to motor). NB Power out is AC. If no power out, replace PCB.

5. Cause: The motor/gearbox assembly has failed.

   Action: Check for correct AC supply to motor (see A4 above). If power supply is correct but motor not rotating replace motor/gearbox assembly.

B. One or more (but not all) lubricant points are dry.

1. Cause: Pipes supplying the dry lubrication points have worked loose from their connection.

   Action: Check pipe connections and re-connect where necessary. Ensure sufficient tubing allowance, particularly on King Pins and other moving lubrication points.

2. Cause: Pipes supplying the dry lubrication points are damaged or crushed.

   Action: Install new pipes, re-routing if necessary to avoid repeat damage.

3. Cause: No output from pumping units due to blockage.

Action: Empty the reservoir and replenish with new, clean lubricant of a suitable grade. Fit new pumping units. Do not attempt to clean and reuse blocked units as this could result in further problems resulting in damage to bearings.

4.7 Acto bac

Acto bac is an environmentally friendly product which when added to the dust suppression water system

a. helps to reduce fungal growth in the water system
b. has a high germ kill rate
c. leaves a pleasant fragrance after being applied
d. improves dust suppression

4.8 Ice X

Ice X is an environmentally friendly de-icer which

a. de-ices frozen paths or sidewalks
b. stops the formation of ice
c. prevents snow from settling
d. remains effective for days (assuming no rainfall occurs)

The Ice X is added to the water tank in a neat solution and is sprayed onto the ground via the front brush sprays

SECTION FIVE
THE WASH DOWN

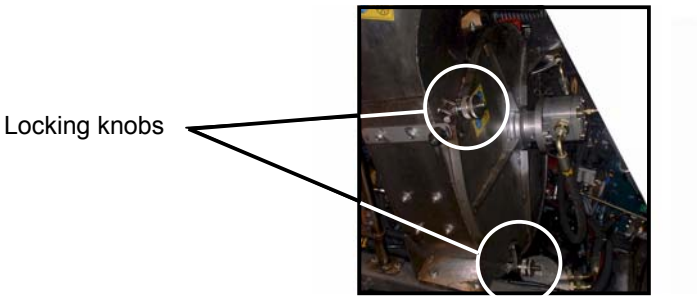
At the end of each shift it is important to wash the machine and components correctly using a fresh water hose.

STOP **Always remove the ignition key before starting to strip the machine down**

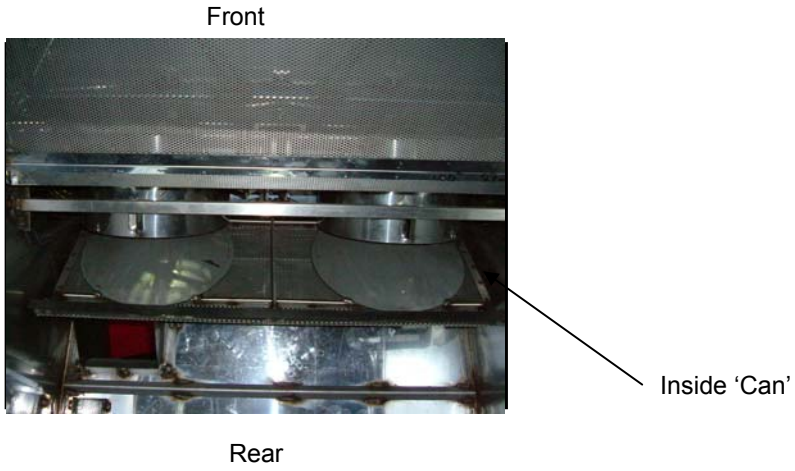
1. Unlatch the hopper door and tip out any debris which may be in the hopper. Leave the hopper in the up position. Fit the hopper safety stay.

2. Switch the engine off and remove the ignition key. (DO NOT WASH THE MACHINE WITH THE ENGINE RUNNING).

3. With the **engine switched off** open the side access doors and remove the plastic side covers and store in a safe place. Open the fan casing until the hold-open pin engages the segment hole. Wash out the casing and down the inside of the suction hose. Wash the area around the engine bay.

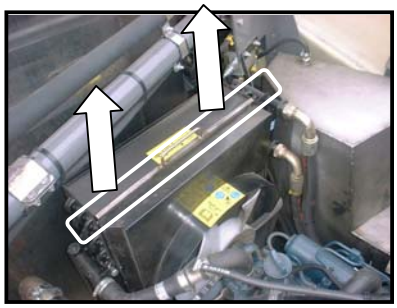


4. Wash inside the hopper. Hinge down the hopper door screen and wash thoroughly. Also wash out the cyclones, paying particular attention to inside the hopper cyclone 'can' area and the cyclone entry swirl vanes on the top of the cyclone can.



5. Put the screens back and wash the outside of the hopper.

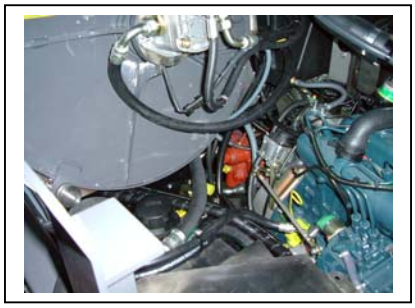
6. Lift out the radiator screen and clean thoroughly. Re-fit the screen.



7. Swing open rear water tank and wash the radiator matrix taking care not to damage the cooling fins.

8. Disengage the hold-open pin and close the fan casing ensuring that the locking knobs are tightly secured.

9. Wash the rest of the machine checking that the area around the hydraulic tank is clean, taking care not to jet wash close to the hydraulic oil filler/vent.



10. Check area between hydraulic tank and main hydraulic pump.

11. Refit the side panels, start the engine and lower the hopper. Switch off the engine.

SECTION SIX
FAULT FINDING

STOP **Always remember, when trying to fault find, switch the machine off, remove the ignition keys, carry out the necessary actions. Restore the machine to its normal running conditions before rechecking the machine.**

a. Machine is not picking up / poor suction thereby leaving a trail
(remember the notion of airflow; see 1.3 How the machine works)

1. Blockage in front suction hose
2. Hopper is getting full (see 2.4.6)
3. Front nozzle is set too low/high
4. Suction impeller casing blocked
5. Engine revs. too low/high (see 2.6.1)
6. Machine travelling too fast for conditions
7. Cyclones blocked (See section 5)

b. Brush bounce

1. Brushes set too low (see 2.4.3)
2. Brush speed too low in relation to machine speed (see 2.4.5)

c. Debris/trash tends to be left on the sides of the sweep path

1. Brush angle incorrect (see 1.*/6)
2. Brush sweep path set too wide (see 2.4.4)

d. Electrical failure (example: lights or IQAN not working)

1. Check fuse boxes (see 2.6.3)
2. Check the status LED's of the IQAN XT2 (see 2.6.1)

e. Overheating engine

1. Radiator blocked or partially blocked
2. Radiator fins damaged
3. Poor washing around engine area
4. Possibly incorrect fuel (see section 7)
5. Low engine coolant level (see section 3).
6. Incorrect coolant used (use 50/50 permanent anti-freeze/water all year) (see section 7)
7. Radiator screen blocked (See section 5 item 6)
8. Ensure that the fan belt is not damaged or incorrectly adjusted

f. Hydraulic oil overheating

1. Low hydraulic oil level (see section 3)
2. Incorrect hydraulic oil in system
3. Radiator dirty or blocked
4. Radiator screen blocked (See section 5 item 6)
5. Ensure that the fan belt is not damaged or incorrectly adjusted

.

g. Water sprays not working

1. Ensure that work 1 & forward gear are selected and the pump is switched on.
2. No water in tank
3. Blocked jet in line filter
4. Blocked jet
5. Pump suction pipe disconnected at tank drain pipe
6. Blocked tank suction strainer
7. Water pump defective

h. Smoking engine

1. Dirty air filter element (black smoke)
2. Incorrect fuel used (see section 7)
3. Burning oil (blue smoke)
4. Leaking cylinder head gasket (white/misty smoke)
5. Faulty Turbo (black or blue smoke & lack of power)

i. Engine will not turn over on start

1. Possible flat battery
   To access the engine compartment when the engine won't start, use the manual hopper tilt system – see Section 9.

j. Ignition/charging light fails to go out on start up

1. Broken fan belt
2. Slipping or loose fan belt

k. Excessive vibration during sweeping

1. Suction fan impeller is damaged
2. Fan casing is blocked
3. A piece of debris has become trapped in the fan casing.

NOTE: having carried out the basic faultfinding as above, if the fault is not found the symptoms should be reported to your supervisor and engineer/fitter as soon as possible.

SECTION SEVEN
GENERAL SPECIFICATIONS

7.1 Machine

Dimensions:

Length – overall (including brushes)	3120mm (123 in)
Length – over body	2730mm (108 in)
Width – over body	1100mm (43.3 in)
Width – over wheels with track extended	1340mm (52.8 in)
Height – (excl. folding beacon)	1980mm (78 in)
Wheelbase	1200mm (47.2 in)
Front wheel track is variable:	950 to 1190mm (37.4 in to 46.9 in)

Weight: 525HS

Kerb weight (ready for sweeping)	1538kg (3390 lb)
Payload	450kg (992 lb)
Gross Vehicle Weight	1988kg (4382 lb)

Weight: 525SW (Street Washer)

Kerb weight (ready for sweeping)	1780kg (3920 lb)
Payload	520kg (1146 lb)
Gross Vehicle Weight	2300kg (5070 lb)

7.2 Engine

Type		Kubota D1105T – three cylinders, water cooled turbo diesel
Typical rpm		2400, can be raised to 2800 rpm
Max power		23.4kW (31.3hp)
Displacement		1123cc (68.5 cu. in.)
Engine oil capacity	capacity	5.1L
	Type	15W40 API CF4/ACEA 2
Engine coolant	capacity	10L
	Type	50/50 mix of Ethylene Glycol Permanent

7.3 Fuel (diesel)

Grade	45 minimum cetane rating. Low sulphur (below 0.05%)
Fuel tank capacity	36L (9.5 US gal.)

7.4 Speed

Transit mode	0 to 32 km/h (20 mph)
Sweeping mode	0 to 13 km/h (8 mph)
Reverse	0 to 6 km/h (4 mph)

7.5 Noise

The machine complies with in-cab noise levels in accordance with 98/37EC and the sound power measurement to 2000/14/EC is 107dBLwa.

7.6 Suction system

High flow, through fan suction system with cyclonic dust separation. Twin contra-rotating floating brushes with in-cab adjustment of height, and independent joystick control of brush swept path width.

7.7 Dust suppression system

Electric pump	12V, 5L/min
Twin water tank capacity	Total 175L (45 US gal.)
Mesh filtration system with fast-dump drain	

7.8 Brushes

Diameter	600mm (23.6 in)
Min. swept track	1200mm (47.2 in)
Max. swept track	1800mm (70.9 in)

7.9 Tyres & wheels 525HS

Size	145R12*8 Ply Tyres on 4.55 Rims
Inflation pressure	4.5 bar (65 psi)
Fitted with Thornguard anti-puncture liners	
Wheel nut tightening torque	100 to 105Nm (74 to 77lb. Ft)

7.9a Tyres & wheels 525SW

Size	155/70 R12C Load Index on 4.55 Rims
Inflation pressure	5.0 bar (73 psi)
Liners	Not fitted (Tubeless Tyres)
Wheel nut tightening torque	100 to 105Nm (74 to 77lb. Ft)

7.10 Hopper

Capacity	750L (198 US gal.)
Clearance for tipping	1.4m (55 in)

7.11 Electrical system

12V battery, 66A.h, heavy duty.
European norm number 566041051

7.12 Hydraulic system

Transmission - Closed centre hydrostatic drive with servo controlled variable output swash plate pump.
- Ge-roller wheel motors (4 wheel drive).

Auxiliaries - Gear type auxiliary pump with pressure compensated variable flow control for suction and brush motors.
Solenoid valve control of hydraulic cylinders.

Steering – gear type pump driven off engine fuel-pump drive with hydrostatic steering unit incorporating cylinder protection valves.

Oil Type – Turbo Diesel Engine Oil 15W40 Grade API CF/ACEA 2.

7.13 Pressure Washer - Option

Type – Hydraulically driven high pressure piston pump. The gear type hydraulic motor is connected to the 525's auxiliary hydraulic system via a solenoid operated valve.

Water Flow – 13 l/min

Max. Water Pressure – 90 Bar

Reservoir Capacity – The pressure washer draws its water from the 525's dust suppression water reservoirs. With full reservoirs a wash period of 10 minutes can be sustained.

Water Pump Lubrication – Turbo Diesel Engine Oil 15W40 Grade API CF/ACEA 2.

DEA (CSA) – Option

Type – Hydraulically driven high vacuum side channel vacuum pump. The gear type hydraulic motor is connected to the 525's auxiliary hydraulic system via a solenoid operated valve.

Vacuum – 200 mbar

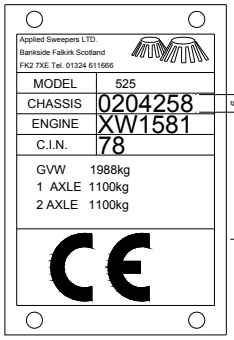
Flow – 200 litres/s

Water System – The DEA lance draws its water from the 525's dust suppression water system.

7.15 Vibrations

The operating controls and whole body vibration levels comply with the Machinery Safety Directive 98/37/EC. Hand/Arm vibration is below 2.5m/s^2 and whole body vibration is below 0.5m/s^2.

SECTION EIGHT
CHASSIS PLATE INDENTIFICATION



525 CHASSIS NUMBER

0204258
1 2 3

1 - Year of manufacture
2 - Month of manufacture
3 - Serial number

Plate fitted to front right corner of chassis with permanent rivets. Chassis number permanentely marked on chassis.

ENGINE NUMBER

Engine number is stamped onto engine block at injector pump housing.

PRESCRIPTION FOR TRAVELLING ON ROAD
Engine prescribed under off road applications.
Road speed limited to 32 km/h.

LIGHTING SYSTEM

TYPE	APPROVAL	QUANTITY
HEADLIGHT/POSITION LAMP	E4 9 496	2
TAIL/STOP/REFLECTOR	E17 9 805	2
FRONT INDICATOR	E4 6 495	2
SIDE REPEATER	E4 6 505	2
NUMBER PLATE LAMP	E1 12 815	2
REAR INDICATOR/FOG LAMP	E17 9 804	1
REAR INDICATOR/REV LAMP	E17 9 801	1
BEACON	E4 6 509	1

BRAKING SYSTEM: Service braking achieved through hydrostatic drive system and hydraulic brake with Ø15.87mm master cylinder operating Ø19.05mm slave cylinder on brake drums. Parking brake lever operated mechanical linkage operating 2 mechanical drum brakes 230mm dia x 56mm wide. Brake lining Carlisle SD1, lining length 222.7mm x 50mm wide and 7.0mm thick.

TRANSMISSION: Kubota D1105T diesel engine driving Eaton swashplate pump model 72400-RRZ-04 servo controlled driving through 4 Eaton disc valve wheel motors model 1051366-OO6.

SECTION NINE
VEHICLE RESCUE

In case of an engine or transmission failure it is preferable to rescue the machine with an uplifting rescue vehicle.

Once the rescue valve on the inner side of the transmission pump has been turned through 90º the machine may be winched onto the rescue vehicle.

The machine may be towed at slow speed (5 mph maximum).for short distances (2 miles maximum) using a solid towing bar. Again the rescue valve must be opened.

Note: whilst being towed with the engine stopped, power steering will not be available. Manual steering will be available provided the steering hoses are intact.

In order to access the engine compartment when the engine won't start, use the manual hopper tilt system. There is a manual pump located on the right hand side of the machine. The pump handle is stowed inside the right hand side access cover. Insert the handle in the pump and start pumping, the hopper will tilt. If it is necessary to lower the hopper manually, there is a needle valve in front of the pump, which can be released. Be especially careful when lowering the hopper by this method, ensuring that all personnel are clear of the hopper lowering zone and that the casing access door is closed. Remember to close this valve after use or the power tilt system will not operate.

It is **very important** that the following actions are carried out before any welding takes place on the 525.

1. Disconnect the positive and negative battery terminals.
2. Disconnect the engine speed sensor at the left hand side, on the bell housing.
3. Disconnect the vehicle speed sensor at the left hand rear wheel motor.
4. Disconnect the vacuum fan sensor (fan casing).
5. Disconnect **every** connector on the main and ancillary hydraulic blocks, left and right hand respectively.
6. Disconnect the earth post (right hand) next to the electrical box (grey) under the cab floor.

Failure to carry out these instructions will damage the machine's electronic control system.

DO NOT tow the machine at speeds of over 5 mph or for a distance greater than 2 miles.