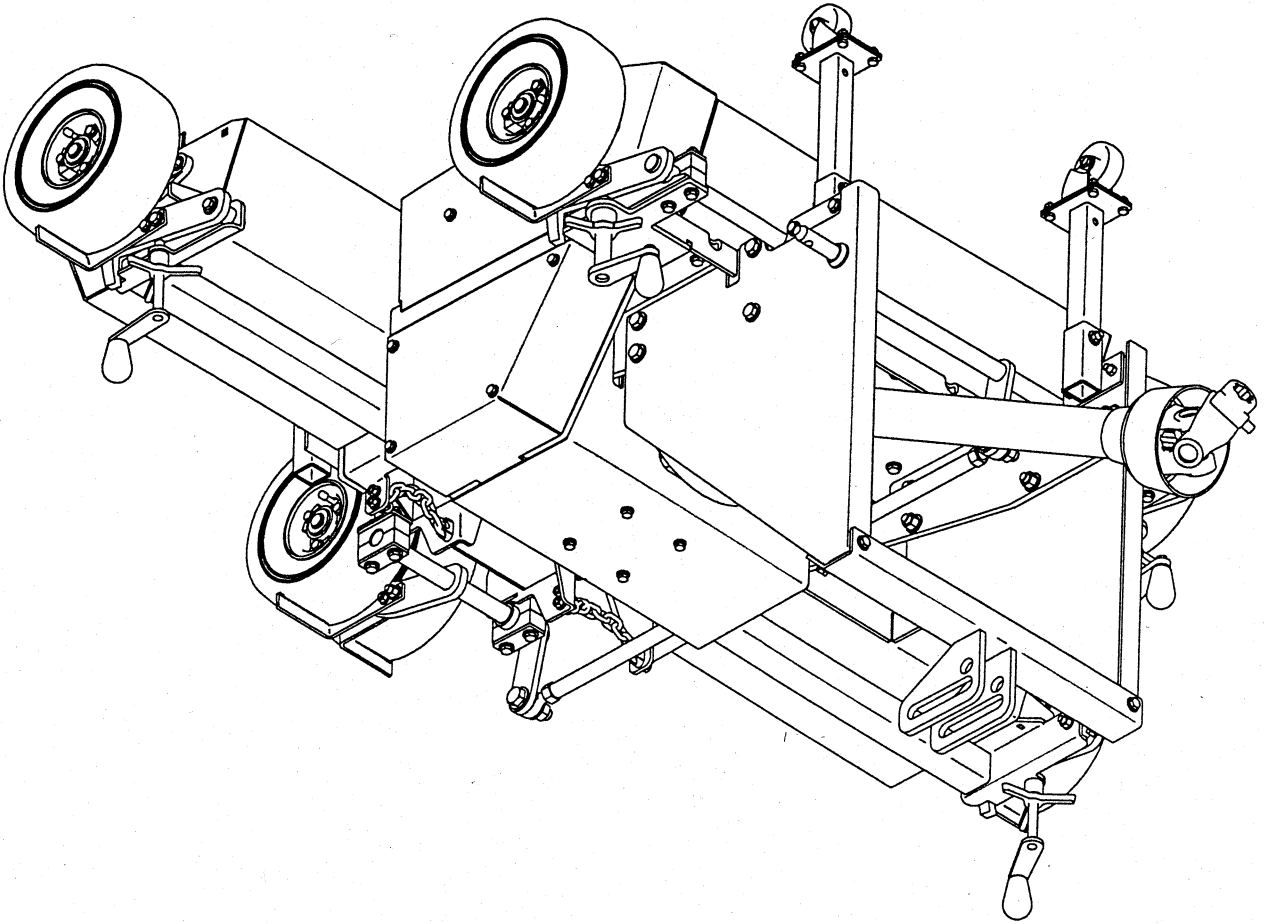


OWNERS MANUAL



VERTICUTTER/SCARIFIER  
SWING-WING  
SW04

INDUSTRIES PTY LTD  
**GARDEN**

**Graden Industries Pty. Ltd.**  
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Date: 11-08-04

"Responsible" Person empowered to sign: *[Signature]*  
 Mr Graham Dryden  
 Managing Director

Together with all relevant National Technical Standards and Specifications as applicable:  
 (including parts/clauses of):

EN292 pt 1, EN 292 pt 2, EN 294 1992, EN 563 1994.

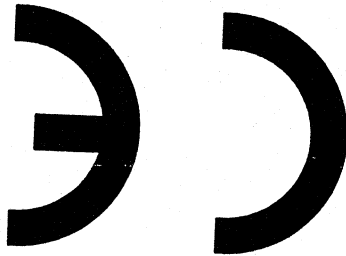
Harmonised standards applied: (including parts/clauses of):

Equipment description	:	Turf scarifier/aerator
Type	:	Tractor mounted
Title	:	SW04 SWING-WING VERTICUTTER
Serial No.	:	000501 thru to 010001

and the National Laws and Regulations adopting this directive  
 and all relevant Essential Health and Safety Requirements.

## EC Machinery Directive (98/37/EC)

Graden Industries Pty. Ltd. Of 26-28 Scammel Street, Campbellfield 3061, PO Box 29 Somerton 3062,  
 Victoria, Australia, as the manufacturer,  
 Certifies that the machine stipulated below complies with all the relevant provisions of the:



## EC Declaration of Conformity

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## 1.1 Specifications

<b>Model</b>	<b>Graden SW04 Swing-Wing Verticutter</b>
<b>P.T.O. Horsepower</b>	20 - 35 h.p.
<b>Drive</b>	Belt drive via Tractor PTO
<b>Gearbox</b>	Cormer T27A Increasing Gearbox
<b>Gearbox oil</b>	Gear Oil - SAE 80W90
<b>Cutting Reels</b>	1 Fixed (13 blades), 2 Floating (8 blades ea.)
<b>Cutting width</b>	1520mm (60 inches)
<b>Cutting depth (nominal)</b>	0 to 40mm (maximum with standard blades)
<b>Blades</b>	Tungsten carbide tipped spring steel Standard : 210mm x 2mm tip Part No. 0232 210mm x 3mm tip Part No. 0217 210mm x 1mm tip Part No. 1122
<b>Blade tip speed</b>	1250m/min (standard blades at normal PTO speed of 540 rpm)
<b>Weight</b>	290 kg
<b>Height</b>	1110 mm (machine on stands)
<b>Overall width</b>	1980 mm
<b>Length</b>	1330mm
<b>Tyres</b>	4.10/3.50 - 4 Slick Pattern (6 per machine)
<b>Tyre pressure</b>	275 - 345 kPa (40 -50 psi)
<b>Rotor belts</b>	A47 Dayco Super 2 Series (8 per machine)

## 1.2 Statement of Machine Use

The Graden SW04 Swing-Wing Verticutter/Scarifier's main use is as a verticutting/scarifying/de-thatching tool on areas such as golf courses, bowling greens, cricket wickets, tennis courts, and other sporting fields.

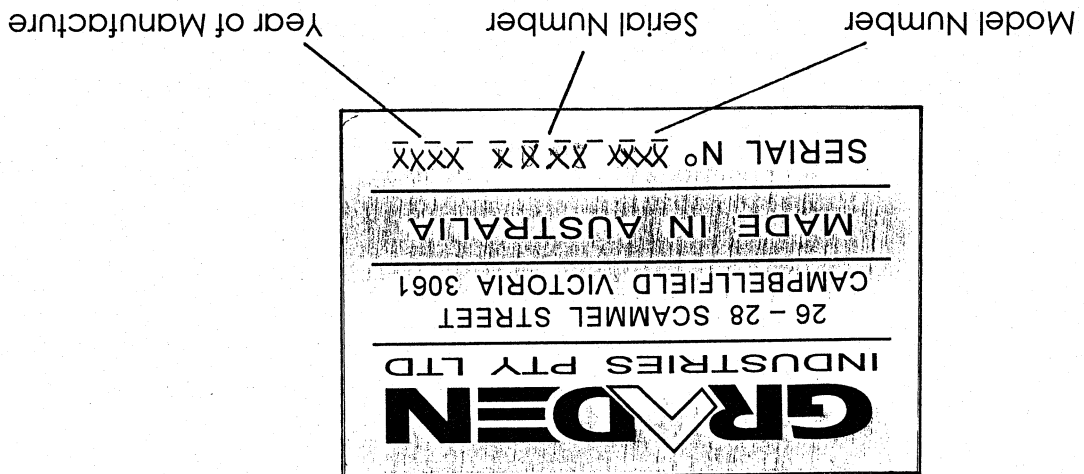
It is not for use on turf areas where rocks and other hard foreign bodies may be present. The use of this machine in turf profiles of this nature will likely cause premature wear or shattering of the blade tips and could result in rocks being projected at dangerous speeds, resulting in potential injury to the operator or damage to the machinery.

This machine is not for use in anything other than the soil profiles typically to be found on the sporting fields mentioned above. Any use of this machine in any other type of surface or for any other purpose may void the warranty.

Please contact Graden Industries if you are unsure about your application complying with the intended use of this machine.

## 1.3 Serial Number Plate

The serial number plate layout is shown below. The serial number is comprised of three sections. The first section is the model number, the second section is the serial number and the third section is the year of manufacture of the machine, as indicated below:



## 2. To the Owner

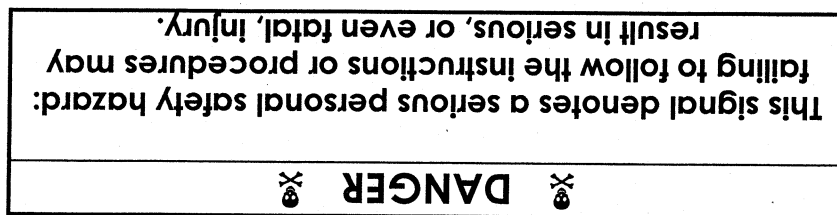
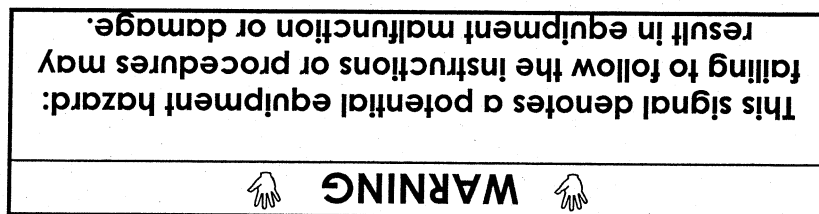
Read this manual before operating the Swing-Wing Verticutter

### 2.1 Preliminary Instructions

- It is important that the owner completely familiarises themselves with the contents of this manual
- Keep this manual at hand as a ready reference for anybody using the Graden Swing-Wing Verticutter
- The designed and tested safety features of this machine are dependent on it being operated within the limitations described in this manual

### 2.2 Warning Symbols

Throughout this manual the following symbols are used to indicate important safety issues. When either or both of these symbols are present the operator must be aware that there is the potential to damage equipment and/or incur serious personal injury.



### **2.3 Service the SwingWing Verticutter**

The Graden Swing-Wing Verticutter has been carefully engineered and manufactured to provide safe, dependable and effective service.

As with all mechanical equipment it requires routine cleaning and maintenance.

Your authorised Graden representative has access to tools, genuine spares and equipment to service any and all of your requirements.

Use only genuine Graden parts; substitute parts will void the warranty and may not meet the safety and performance standards required for safe and effective operation of the Swing-Wing Verticutter.

Please record the model and serial numbers of the Swing-Wing Verticutter in the space provided below and quote this information when ordering parts or communicating with Graden Industries or its' approved representatives.

Model Number : \_\_\_\_\_

Serial Number : \_\_\_\_\_

Date Purchased : \_\_\_\_\_

### 3. Safety Information

This manual is provided to help you operate and maintain the Swing Wing Verticutter. Please read it carefully.

It has been compiled from extensive field experience and engineering data.

In some aspects it is generalised because it is impossible to cover all operating

scenarios. However, combining the information provided in this manual with your own increasing experience and knowledge with the Swing-Wing Verticutter will enable you to develop procedures suitable for your individual needs.

The Swing-Wing Verticutter, like most modern machinery, is constantly undergoing

development on the basis of experience and market needs. At the time of printing, material in this manual was current but may vary due to the aforementioned ongoing

development.

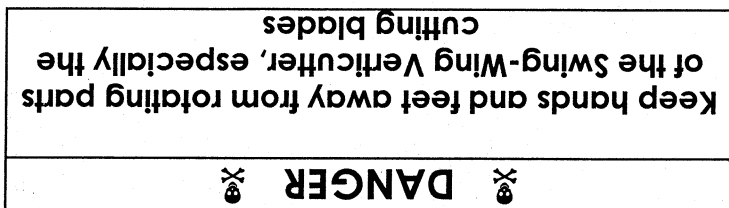
Graden Industries reserve the right to change the machinery specifications without notice.

#### 3.1 General Rules

- Direction on the machine (right or left) is determined from standing behind the machine and facing in the direction of forward travel, all directions are given in this manual with this rule in mind

- When viewed from the right side the blades rotate anti-clockwise (counter rotating to the forward rotation of the tractor wheels)

- This is a precision piece of machinery with high speed cutting blades



- Do not allow children to operate the machine or be near it during its' operation.
- Never allow anyone to ride on the Swing-Wing Verticutter at any time.
- Only people who are very familiar with the rules of safe operation should be allowed to use this machine

<b>⚠ DANGER ⚠</b>
<b>Read any manuals supplied with the tractor and know how to stop it and shut down all actions in an emergency.</b>

- Do not allow anybody to operate the machine without instruction
- Know your controls and how to stop the machine and shut down the tractor quickly in an emergency
- To maintain control and reduce the possibility of upset, damage or collision, operate the machine smoothly. Avoid erratic operation and excessive speed.
- The tractor has its' own set of safety and operating rules. These must be complied with.

<b>⚠ WARNING ⚠</b>
<b>Read this manual completely before beginning to learn how to use the Swing-Wing Verticutter</b>



### 3.2 Training

<b>⚠ DANGER ⚠</b>
<b>Never operate the Swing-Wing Verticutter with any of the covers or safety guards removed or not properly secured.</b>

- Only use the machine during daylight or in good artificial light
- Some illustrations in this manual show the Swing-Wing Verticutter with safety guards removed. This is not a normal situation.



- Ensure that the Swing-Wing Verticutter is correctly mounted on the tractor and that the machine is properly adjusted.
- Ensure all safety warnings and decals are in place and legible (on both the Swing-Wing and the tractor).

### 3.4 Preparation

 <b>DANGER</b> 
<b>Never wear sandals, sneakers or have bare feet when operating the tractor.</b>

- Use appropriate PPE for eyes, ears and hands
- Wear sturdy footwear, preferably steel capped safety shoes or boots
- Clothing should be reasonably snug fitting and not free flowing so as to avoid the risk of entanglement in moving parts.

### 3.3 Personal Protective Equipment (PPE)

 <b>DANGER</b> 
<b>The engine uses highly flammable petroleum fuel and produces toxic exhaust gases.</b> <b>Only add fuel to, or run, the engine in the open - never indoors.</b>

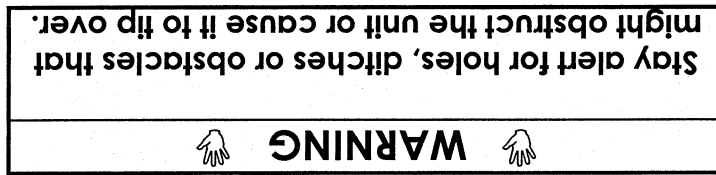
- If the tractor is fitted with a Roll Over Protection Structure (ROPS), do not exceed the ROPS weight certification and always wear your seat belt.
- Be aware of the hazards associated with the tractor engine:
  - ⇒ The fuel used (Petrol, diesel, etc.) is highly flammable so only use an appropriate container
  - ⇒ Never remove the fuel cap or add fuel while the engine is running or still hot
  - ⇒ Never add fuel indoors and wipe up any spillages
  - ⇒ Never run the engine in an enclosed area because exhaust gases are toxic

- Remove any accumulated debris that might represent a fire hazard.
- Ensure that the blades are in a serviceable condition and that the rotor shaft mounting bolts are secure.
- Perform any appropriate scheduled maintenance before operating the machine.

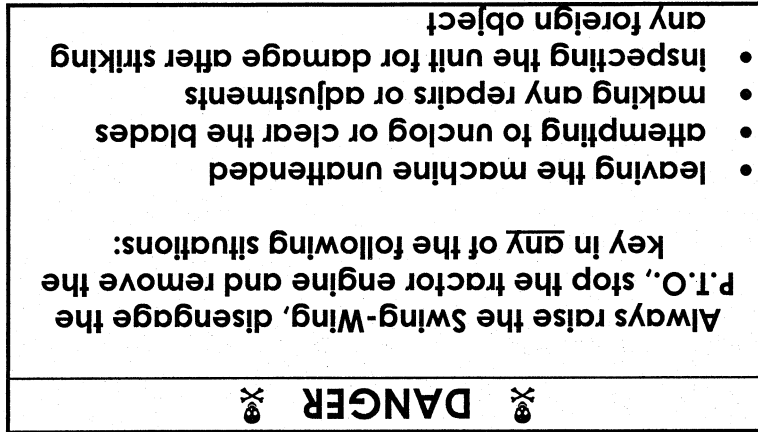
### 3.5 Operational Safety

- Always disengage the P.T.O before attempting to start the tractor.
- Always raise the Swing-Wing Verticutter clear of the turf before attempting to engage the P.T.O.
- Always raise the Swing-Wing Verticutter clear of the ground and disengage the P.T.O when crossing gravel, walkways, roads, etc., or indeed any ground which you do not wish to verticut.

- Be very careful and maintain minimum ground speed when operating over rough ground, around trees, ditches, fences or on sloping ground.





- Never allow anybody in front or behind the tractor and Swing-Wing Verticutter while operating. Before reversing, disengage the P.T.O, then lift the machine clear of the ground and ensure that the area behind you is clear.





- Always repair any damage before recommencing operation.

### 3.6 Maintenance Safety

Maintenance on the Swing-Wing Verticutter is best carried out with the machine mounted on the castor wheel-equipped supports that are supplied with the unit. Alternatively, maintenance can be carried out with the unit mounted on the tractor, so long as it is securely blocked up on jack stands. Do not rely on the tractor hydraulics to maintain the unit at a safe working height.

 <b>DANGER</b> 
Raise the Swing-Wing clear of turf or surface, disengage the P.T.O., turn off the engine, set the park brake and remove the key before carrying out any maintenance or servicing.

- Never allow anybody near the tractor controls while adjustments, maintenance or servicing are being performed.
- Keep both the Swing-Wing and the tractor (especially around the engine) free of any debris
- Remove debris from underneath the Swing-Wing Verticutter after each use.
- Verify that all warning labels and decals are present, visible and legible.
- Periodically check that all bolts, fasteners and catches are secure and in safe operating condition.
- After any maintenance or servicing, ensure that all guards and safety devices are correctly installed and secure before operating the Swing-Wing Verticutter.

 <b>DANGER</b> 
Frequently check the rotor blades. Verify that all the tips are in good condition. Ensure that the blades are firmly held and there is no slack due to damaged or worn spacers.

## 4. Assembly Instructions

Your Verticutter has been manufactured, assembled and tested at Graden Industries before being shipped.

Depending on your local distributor, your Verticutter may have been partially disassembled prior to dispatch. Your machine may be received in the following condition :

- \* Left and Right wheel axle assemblies bolted in reverse mounting position (for packing purposes only)
- \* Castor wheels removed from supports
- \* Left and Right Hand Uprights removed
- \* Crossbar removed
- \* P.T.O shaft (supplied separate)

As appropriate, please carry out the following assembly instructions.

Tools required :

- 1/2 inch AF spanner (x2)
- 9/16 inch AF spanner (x2)
- 3/4 inch AF spanner (x2)
- 15/16 inch AF spanner (x2)
- Large Adjustable spanner

### Steps

1. Remove all packaging material.
2. Ensure that all documents are present. With each machine should be this manual, and a manual for the PTO Shaft (this may still be attached to the PTO Shaft).
3. Unscrew the stands from the pallet and remove the machine from the pallet.
4. Attach the Castor Wheels (5299) to the front (0622) and rear (0624) stands with the bolts supplied (use 1/2 inch AF spanners).
5. Attach Height Connecting Rod (1119) to Rear Wheel Axle (1114), (use 15/16 inch AF spanners), ensuring the Retaining Chain (1151) is hanging beneath the Height Connecting Rod (1119).
6. Attach the Left and Right Hand Wheel Axle Assemblies (1115 & 1116) to their respective Rotor Housings (1111 & 1112) with the bolts supplied as shown in Diagram Three (use 9/16 inch AF spanners).
7. Attach the Left and Right Hand Uprights to the Swing-Wing Frame (use 3/4 inch AF spanners and large adjustable spanner) with the bolts supplied, but do not tighten them up completely.
8. Fit the Crossbar (1118) to the Uprights (1096 & 1097), getting all four bolt and nut sets started in the holes, (use 9/16 inch AF spanners), but before final tightening of these bolts, tighten up all the bolts for the Uprights (1096/1097) to the Swing-Wing Frame (1110). Now tighten the Crossbar (1118) bolts completely.

Your machine should now be assembled and ready to use.

## 5. Operating Instructions

**Do not operate the Verticutter until you have completely read this manual.**

**DANGER**

### 5.1

#### Preliminary Checks

1. Clear any debris from above and underneath the machine
2. Ensure scheduled maintenance activities have been completed.
3. Inspect belts for condition and correct tension.
4. Inspect blades for wear or damage.
5. Ensure all guards and covers are firmly fixed in place

### 5.2

#### Set Up

1. Ensure that the Swing-Wing is on a firm, level surface
2. Release the four height adjustment locking levers (0970 & 1129) and screw the four height adjustment screws (0986 & 1150) clockwise to lower the wheels as far as they will go.
3. Lock the supports (0622 & 0624) in the raised position so that the Swing-Wing is resting on its' wheel assemblies.
4. Gradually raise the front (1113) and rear (1114) wheel axles so that the centre, fixed blade reel is just about to touch the ground.
5. Gradually raise the left and right hand wheel axles (1115 & 1116) until both of the Swing-Wing blade reels are about to touch the ground.
6. Attach the P.T.O shaft to the Swing-Wing, ensuring the locking pin pops up.
7. Position the tractor in front of the Swing-Wing and lower the tractor 3-point hitch.
8. Attach the lower tractor arms to the lifting pins, secure with 3/8" lynch pins and connect the upper tractor arm to the hole, not the slot, in the crossbar.
9. Adjust the tractor sway bars so that there is no side-to-side motion.
10. Attach the P.T.O. shaft to the tractor, ensuring the locking pin pops up.
11. Secure the P.T.O guard retaining chains at both ends.
12. Raise the Swing-Wing off the ground and verify that the unit is level.
13. This procedure establishes that the Verticutter is level. However this does not ensure that the tractor and its' hitch are even and level. Adjustments may need to be made at the work site to compensate for any variations. This is covered in 5.4

**The P.T.O retaining chains must be connected to prevent the outer guard from rotating with the P.T.O shaft**

**DANGER**

## 5.3 Transporting (Traversing) the SwingWing Verticutter

1. Raise the Swing-Wing just clear of the turf (ground).
2. Disengage the P.T.O
3. Drive smoothly to your next destination. Avoid excess speed, especially over rough or uneven ground.

## 5.4 Verticutting

1. Once in position to use the machine, move the upper tractor arm hitch point from the hole to the long slot. Adjust the tractor arm so that it is sitting in the middle of the slot to allow the machine to tilt forward and back with the undulations of the turf.
2. Set the depth of cut via the 4 height adjustment screws (0986 & 1150) to the desired depth. Normal range of cut (with standard 210mm blades) is 0mm to 40mm deep. Clockwise rotation of the screws produces a shallower cut ; anti-clockwise produces a deeper cut. There is an indicator arm on the back of the wheel axles which can help you in setting the heights level.
3. Start the tractor, raise the Verticutter clear of the turf and with the engine at idle gently engage the P.T.O
4. Increase the P.T.O speed to 540 rpm.
5. Gently lower the Swing-Wing into the ground and allow the rotating blades to pull themselves into the turf.
6. Make a test cut on level ground of several metres and check that the Verticutter is cutting to a consistent depth across the full width of the cut.
7. Adjust the fore and aft tilt of the machine and the level on the wings if required.
8. Following these level adjustments, adjust the depth of the cut by altering all the height adjustment knobs by the same amount in the same direction if required.
9. Repeat the short test cut and verify that the cut is even across the Verticutter and that the depth of cut is satisfactory.
10. Forward speed will be determined by such variables as :
  - depth of cut
  - soil hardness
  - moisture content of soil
  - degree of thatch
  - soil texture
  - smoothness of ground, etc..If you are only detaching then a forward operating speed of 5-10 kmh should be achievable. Deeper cutting will require slower operation. Experience with the machine will establish optimal operating conditions.
11. Steer the tractor in a straight line while the blades are cutting. Trying to change direction while the blades are in the turf may lead to a furrowing/scalping action and can put undue stress on the machine.
12. At the end of a pass:
  - raise the blades just clear of the turf
  - turn the tractor around to make your next run
  - repeat from Step 4 onwards

**WARNING**

Never use high-pressure water units to clean the Swing-Wing Verticutter. Using this type of device around bearings and gearbox seals can compromise their integrity and lead to premature failure of these components.

1. Raise blades just out of turf.
2. Disengage P.T.O.
3. Drop the machine down and remove the top mounting link from the slot and put it back into the hole on the crossbar.
4. Fully raise the Swing-Wing
5. Traverse machine to storage/maintenance area.
6. Generally clean the Swing-Wing Verticutter, making sure that there is no accumulated debris around the blades and P.T.O.
7. Slide front and rear stands down to the lower height so that they protrude below the blades.
8. Lower the machine onto the castor wheels.
9. Disconnect the P.T.O from the tractor.
10. Wheel the Swing-Wing to its' storage area under cover or cover the machine with tarpaulins or other suitable cover if it is to be stored in an uncovered area.

## 5.5 Shut Down

**WARNING**

Never change direction while the blades are still in the turf : damage to the turf and the Swing-Wing can result

13. When travelling from area to area raise the blades just clear of the turf and disengage the P.T.O. Drive to avoid unnecessarily bouncing the machine around.

## 6. Maintenance Operations

The performance of certain maintenance, adjustment or repair operations will be determined by the owner's facilities.

Work can be carried out with the machine supported on the castor wheel mounts supplied with the Swing Wing or, alternatively, with the machine still attached to the tractor.

<p><b>⚠ DANGER ⚠</b></p> <p>If any maintenance operations are carried out with the Verticutter mounted on the tractor, ensure that the unit is supported on jack stands Do not rely on the tractor hydraulics Disengage the PTO, turn off the engine and remove the key before proceeding.</p>
--

<p><b>⚠ DANGER ⚠</b></p> <p>Raise the Swing-Wing clear of turf or surface, disengage the P.T.O., turn off the engine, set the park brake and remove the key before carrying out any maintenance or servicing.</p>
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### 6.1 Adjustments and Settings

The P.T.O. from the tractor drives the gearbox, which in turn drives the blade reels via two sets of drive belts.

#### 6.1.1 Rotor belts (centre rotor)

The central blade reel is driven by a set of three drive belts on the left side of the Swing-Wing.

- Remove the side belt guards (1106 & 1109).
- Adjust the tension by loosening the lock nut on the idler adjuster (0424) and screwing the adjusting nut on the end (clockwise : increases tension; anticlockwise : decreases tension). Re-tighten lock nut.

## 6.1.2 Rotor belts (wing rotors)

- **Note** : The recommended tension is 1.0 - 1.5 Kgf (2.2 - 3.3 lbf) to give a deflection of 6mm (1/4 in.) in one of the belts at the mid point between the two pulley centres. This force is approximately the maximum that can comfortably be applied using just the index finger.
- Re-fit the belt guards

The rear, Swing-Wing blade reels are driven by a set of five belts that come off the gearbox (5134) to a central pulley (0418). This pulley is connected to the Swing-Wing blade reels via universal joint assemblies (5141). Tension is maintained by a wide idler pulley (0421) that is located behind the gearbox, under the gearbox cover (1108).

- Remove the Gearbox Cover (1108).
- Loosen the long bolt through the long idler pulley (0421) until there is just enough tension to hold the idler pulley in place.
- Tap the idler pulley forward in the slots with a plastic mallet or similar tool until sufficient tension is being applied to the five belts.
- Re-tighten the long bolt.
- Re-fit the Gearbox Guard.

If, due to belt stretch, there is no adjustment left to be able to slide the long idler pulley forward, you can re-position the idler brackets to increase the tension:

- Loosen the idler pulley bolt completely and slide it to the rear of the slots.
- Loosen the bolts holding the idler brackets (0385) and slide them forward; ensure that the two brackets are moved an equal amount so an even pressure will be applied to all five belts. Re-tighten these brackets.
- Push the long idler pulley forward and re-tension the belts as above.
- If there is still insufficient adjustment left to achieve sufficient tension on the belts, then the belts need to be replaced (see 6.2.2).

## 6.2 Replacements

These operations are best carried out with the Verticutter mounted on the supplied castor wheel supports but can be done with the unit still attached to the tractor.

<b>⚠ DANGER ⚠</b>
<b>If any maintenance operations are carried out with the Verticutter mounted on the tractor, ensure that the unit is supported on jack stands Do not rely on the tractor hydraulics Disengage the PTO, turn off the engine and remove the key before proceeding.</b>

### 6.2.1 Blade replacement

#### 6.2.1.1 Centre blade reel

1. Fit the front and rear stands to the Verticutter using the highest hole in the support.
2. Remove side belt guards (1106 & 1109)
3. Slacken idler arm adjuster (0424) to remove all tension on belts
4. Remove belts (5143) from the rotor shaft pulley (5128)
5. Loosen the grub screw from the eccentric locking collar on the bearing (5088) at the right end of the rotor shaft and tap the locking collar in the opposite direction to which it has been locked. Remove the collar.  
**Note :** These eccentric locking collar bearings are always locked in an opposite rotation to the travel of the rotor shaft during assembly at the factory.
6. Undo the bolts holding the bearings (5025 & 5088) at each end of the blade reel.
7. Allow the right bearing (5088) to slide along the rotor shaft (0134) to provide some free movement and gently allow the blade reel to drop free from the machine.  
**Note :** Take care to perform this operation with a protective layer under the machine (old carpet is ideal) to protect the blade tips from any hard surface.
8. Push the Verticutter clear of the blade reel.
9. Slide the right end bearing (5088) from the end of the rotor shaft (0134).
10. Remove the right Nylon nut (5089) and rotor shaft washer (0039) from the rotor shaft (0134).
11. Remove blades (0232) and spacers from the shaft.