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# AIRROW

## VERTICUTTER / SCARIFIER



*Owner's Manual*

## **GRADEN TURF MACHINERY**

Manufactured under licence by

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# 1. Specifications

## 1.1 Specifications

<b>Model</b>	<b>Graden Airow Verticutter/Scarifier</b>
<b>Engine</b>	Honda GX200
<b>Power</b>	4.1Kw (5.5hp) Horizontal shaft
<b>Engine Oil</b>	0.6 litres SAE 30W Grade
<b>Fuel</b>	Unleaded 86 RON (minimum)
<b>Transmission Oil</b>	5W-30 Engine Oil
<b>Cutting Width</b>	380mm
<b>Cutting Depth</b>	0-25mm (maximum with standard blades)
<b>Blades</b>	Tungsten carbide tipped spring steel
<b>Blade Size</b>	
<b>Part Number 0381</b>	190mm Diameter – 1mm tip
<b>Blade Tip Speed</b>	2150m/min at 3600 rpm
<b>Weight</b>	100kgs
<b>Width</b>	67cm
<b>Length</b>	132cm
<b>Height</b>	100cm
<b>Tyres</b>	13 x 5.00 / 6
<b>Tyre Pressure</b>	83kPa (12 psi)
<b>Rotor Belt</b>	A25 Super II V-Belt
<b>Jackshaft Drive Belt</b>	A42 Super II V-Belt
<b>Transmission Drive Belt</b>	A33 Super II V-Belt
<b>Rotor Clutch Belt</b>	A35 Super II V-Belt

## 1.2 Statement of Machine Use

The Graden Airrow 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 and fine turf areas.

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. It is important to note in particular the Model and Serial numbers to assist you when ordering parts or discussing servicing needs with your Graden Dealer. Also on the plate you will find mass information and the year of manufacture.

<b>GRADEN</b>	
INDUSTRIES PTY LTD	
26 - 28 SCAMMEL STREET	
CAMPBELLFIELD VICTORIA 3061	
MADE IN AUSTRALIA	
MODEL N <sup>o</sup> _____	MASS _____
SERIAL N <sup>o</sup> _____	YEAR _____

## **2. To the Owner**

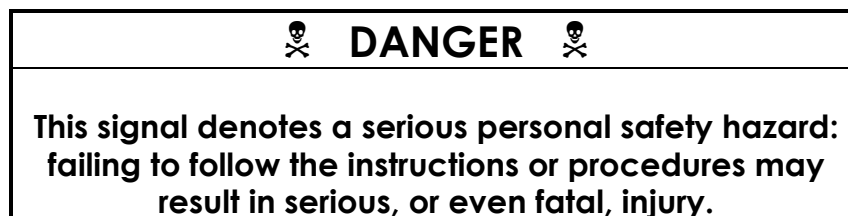
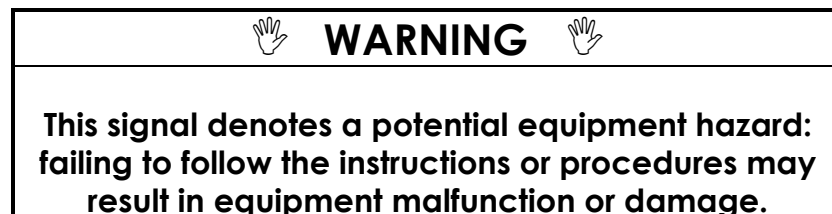
**Read this manual before operating the Verticutter**

### **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 Airrow 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 Servicing the Verticutter**

The Graden Airrow 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 Verticutter.

Please record the model and serial numbers of the 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 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 Verticutter will enable you to develop procedures suitable for your individual needs.

The 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 handles and facing in the direction of forward travel
- When viewed from the right side the blades rotate anti-clockwise (counter rotating to the forward rotation of the rear drive 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.
- Only people who are very familiar with the rules of safe operation should be allowed to use this machine
- Only use the machine during daylight or in good artificial light
- Some diagrams in this manual show the Verticutter with safety guards removed. This is not a normal situation!



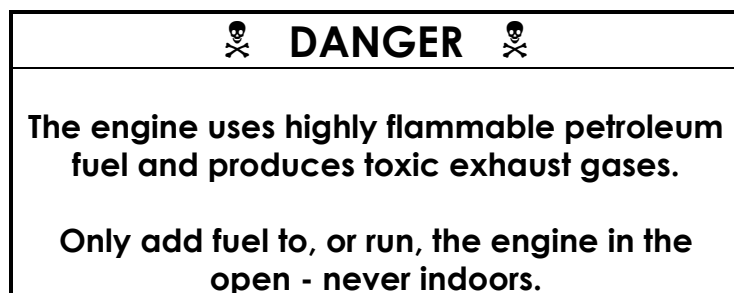
### 3.2 Training



- Do not allow anybody to operate the machine without instruction
- Know your controls and how to stop the machine and shut down the engine 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.



- Be aware of the hazards associated with the engine :
  - ⇒ Petrol 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



### **3.3 Personal Protective Equipment (PPE)**

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





### 3.4 Preparation

- Ensure all safety warnings and decals are in place and legible.
- 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 starting the machine.



### 3.5 Operational Safety

- Always disengage the rotor blades before attempting to start the Verticutter.
- Always raise the rotor blades before attempting to start the machine.
- Always disengage the blades and raise them when crossing gravel, walkways, roads, etc. or indeed any ground which you do not wish to cut.



 <b>DANGER</b> 
<p><b>Always disengage the rotor blades and stop the engine in <u>any</u> of the following situations :</b></p> <ul style="list-style-type: none"><li>• <b>leaving the machine unattended</b></li><li>• <b>attempting to unclog or clear the blades</b></li><li>• <b>making any repairs or adjustments</b></li><li>• <b>inspecting the unit for damage after striking any foreign object</b></li></ul>

- Always repair any damage before recommencing operation.

### 3.6 Maintenance Safety

 <b>DANGER</b> 
<b>Raise blades clear of turf or surface, disengage blades and turn off the engine before carrying out any maintenance or servicing.</b>

- Never allow anybody to start the engine while adjustments, maintenance or servicing are being performed.
- Keep machine free of any debris
- Remove debris from underneath the 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 Verticutter.

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

## **4. Controls**

All directions are given with reference to standing behind the handles and facing in the direction of forward travel.

### **4.1 Pulley Clutch Handle**

Located behind the engine on top of engine base.

This handle engages the rotor blades. To engage the blades pull the pulley clutch handle towards you gently and smoothly until it locks down in position. To disengage simply push the handle away from you. You should have your engine revs up before engaging the blades. You should engage the blades before lowering them into the turf.

### **4.2 Lifting/Lowering Handle**

Located on left hand side of steering column.

This lever lowers and raises the blades out of the turf. The blades should be engaged before lowering them into the turf - this avoids undue stress on the rotor belts and engine. To lower, slowly push the handle forwards. To raise pull the lever towards you until you hit the stop bracket.

### **4.3 Motion Lever**

Located on the right hand side of steering column.

This lever controls forward motion of the Verticutter. Pulling the lever towards you until it stops brings the machine to the stop position. Push the motion lever forwards and the machine travels forward at a rate depending on how far the lever is pushed. Maximum speed corresponds to a brisk walking pace.

### **4.4 Neutral Lever**

Located on the Right Hand Handlebar.

This lever drops the transaxle into neutral which enables you to steer the machine and position it for your next run. Depress the lever and the unit will instantly be dropped into neutral allowing for easy steering due to the light weight of the verticutter. Releasing the lever drops the unit back into drive.

### **4.5 Choke/Throttle Controls**

Located on the engine.

These controls are located on the engine, thoroughly read the engine manual accompanying this owners manual before using this verticutter to ensure you are familiar with the operating procedures of the engine.

## **5. Operating Instructions**



### **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.
6. Check engine oil level; change according to manufacturer's recommendations.

### **5.2 Start Up**

1. Check that blades are disengaged - push the pulley clutch handle all the way forward.
2. Check that the blades are in the raised position - pull the Lifting/lowering handle towards you and ensure that it locks into position.
3. Check that motion lever is in the stop (full back) position.
4. Turn engine switch to ON.
5. Move fuel valve lever to the ON position.
6. Operate the choke lever in the direction of the arrow.
7. Slide the engine lever about half way toward the FAST position.
8. Pull the recoil starter grip lightly until resistance is felt, then pull briskly. Return the starter grip gently. Repeat until engine starts.
9. Once the engine starts slide the choke lever to the off position immediately.

### **5.3 Driving (Traversing) the Verticutter**

1. Use the motion lever to move in the desired direction. Push the lever forward (away from you) to move forward. Speed is controlled by how far the motion lever is pushed forward.
2. To steer or manoeuvre the verticutter in a desired direction depress the Neutral Lever to put the transaxle into neutral then steer the machine as you desire, dropping back into drive once you have lined up your direction of travel by releasing the Neutral Lever.

## **5.4 Verticutting**

1. Select the depth of cut via the height adjustment knob.  
Normal range of cut (with standard 190mm blades) is 0mm to 25 mm deep. One revolution of the knob is approximately equivalent to 1mm change in the cutting depth. Clockwise rotation of the knob means a shallower cut; anti-clockwise means a deeper cut.
2. Increase engine speed to maximum rpm; maximum engine speed results in a high blade tip speed and a cleaner cut.
3. Engage the blades by slowly pulling the pulley clutch handle toward you.
4. Lower the blades into the turf by slowly pushing the lifting / lowering handle forward.
5. Move the motion lever forward until you are moving at the desired speed.
6. The machine will naturally run in a straight line whilst in drive. Ensure that you maintain 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 blades and belts.
7. At the end of a pass:
  - depress the Neutral Lever
  - raise the blades by pulling the Lifting/Lowering Handle towards you
  - line up the Verticutter for your next run
  - lower the blades with the Lifting/Lowering Handle
  - release the Neutral lever

When travelling from area to area always raise and disengage the blades.

## **5.5 Shut Down**

1. Move the motion lever to the stop position
2. Raise the blades out of turf.
3. Disengage blades.
4. Traverse machine to storage/maintenance area.
5. Turn engine speed to idle.
6. Turn engine switch to OFF.
7. Slide petrol lever to OFF.
8. Clear rotor blades of any debris.
9. Clear transmission of any debris, ensuring cooling fins are not clogged.
10. Generally clean the Verticutter, making sure that there is no accumulated debris around the engine.

## 6. Maintenance Operations

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

Tilting of the machine for the purpose of under-deck servicing should be done with great care.

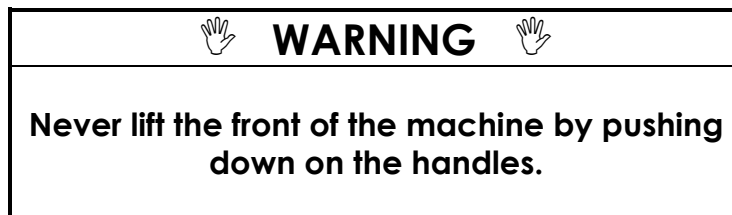
If the Verticutter is tilted forward (i.e. pivoting over the front axle) there is a risk that engine oil can enter the cylinder head of the engine and transmission oil can leak from the breather located on top of the transmission.

Either occurrence can result in expensive repairs to the machine



For the purpose of under-deck servicing, tilting the machine back so that it rests on its handles is acceptable provided that the following precautions are taken:

1. Lift the front of the machine up until the handles contact the ground



2. While holding the machine in this position securely support the front of the machine to prevent it from falling while work is being carried out.
3. When finished, gently lower the front of the machine back down to the ground.



## **6.1 Adjustments and Settings**

### **6.1.1 Rotor belt**

This belt runs from the blade transfer pulley to the rotor shaft. Correct tension on the rotor belt is provided by an idler pulley in a slot under the cover. First remove the cover then loosen the bolt holding the rotor belt idler pulley in place. Slide the pulley so the tension on the rotor belt is sufficient, then tighten the idler pulley back in place. Replace the cover.

### **6.1.2 Rotor Clutch Belt**

This belt runs from the engine shaft to the blade transfer pulley. It is engaged and disengaged by the Pulley Clutch Handle. If it has become loose you can apply extra tension on the belt by adjusting the balljoint at the end of the Clutch rod. Tension should not be too tight, only enough to engage the blades and not incur slippage of the belts under load.

### **6.1.3 Jackshaft Drive Belt**

This belt is spring tensioned and does not need re-tensioning.

### **6.1.4 Transmission Drive Belt**

This belt runs from the Jackshaft to the transmission. It has two idler pulleys providing tension to the belt. Excess tension places unnecessary strain on the transmission and causes premature belt wear.

Inadequate tension will cause slippage and a lack of drive to the rear wheels; however, the tension required to ensure satisfactory operation is relatively low. Tension can be increased easily by loosening the lock nut (higher of two nuts) on the adjusting rod (which is located on top of the engine base, just in front of the steering column) then turning the tensioning nut (the lower of the two nuts) in a clockwise direction. Test the new tension and if sufficient re-tighten the lock nut on the lever.

## **6.2 Replacements**

### **6.2.1 Blade replacement**

1. Remove the belt guard.
2. Remove the rotor belt from the rotor shaft.
3. Loosen the retainer bracket on the bearing housing on the left hand side and swivel it up out of the way.
4. From the operating position, push the Lifting/Lowering Lever forward and tilt back the machine at the same time.
5. Pull the machine backwards and the rotor shaft should come free from the rotor shaft housing
6. Remove the pulley on the rotor shaft and the bearing housing as well.
7. Loosen the large nut on the rotor shaft and remove.
8. Remove the blades and spacers and replace as required, ensuring that they go back on the shaft in the same direction and configuration (i.e. counter-rotating to direction of forward travel and successive blades offset one face on the rotor shaft).
9. Re-fit the bearing housing and pulley on the end of the rotor shaft and re-install into the rotor shaft housing
10. Swivel the retainer bracket on the left hand side back down to retain rotor shaft and tighten back in place.
11. Re-fit the rotor belt and re-tension. Ensure rotor pulley is aligned properly with the rotor belt.
12. Re-fit belt guard.

### **6.2.2 Belt Replacement**

Note: Most of the stretch that the belts experience takes place in the first few hours under load conditions after they have been first installed. After fitting new belts it is advisable that the tension be checked regularly in the first 3 to 4 hours of operation.

#### **6.2.2.1 Rotor Belt**

1. Remove the belt guard.
2. Take all tension off the belt by loosening the idler pulley in its slot.
3. Remove the rotor belt and replace.
4. Re-tension the idler pulley and tighten in place.
5. Re-fit the belt guard.

### **6.2.2.2 Rotor Clutch Belt**

1. Remove the belt guard.
2. Take tension off the rotor belt by loosening the idler pulley in its slot.
3. Remove the rotor belt from the transfer pulley end only.
4. Release tension off the rotor clutch belt by pushing the lever forward.
5. Remove the rotor clutch belt and replace.
6. Replace rotor belt on transfer pulley and re-tension.
7. Re-fit the belt guard.

### **6.2.2.3 Jackshaft Drive Belt**

1. Remove the belt guard.
2. Remove rotor clutch belt from engine pulley end.
3. Take tension off Jackshaft belt by using a crow bar or similar tool to lever the idler pulley mechanism on the jackshaft drive belt up, thereby releasing tension and allowing you to remove the belt from either the jackshaft or the engine pulley.
4. Re-fit a new jackshaft belt, again by levering the idler pulley mechanism up to reduce tension on the belt and allow you to place it around the jackshaft and engine pulleys.
5. Re-fit the rotor clutch belt.
6. Re-fit the belt guard.

### **6.2.2.4 Transmission Drive Belt**

1. Remove the belt guard.
2. Remove the jackshaft belt from the jackshaft as described above.
3. Remove tension on the transmission drive belt by loosening the locknut on the idler arm and turning the tensioning nut anti-clockwise.
4. The belt can now be eased off the transmission and jackshaft pulleys and replaced.
5. Re-tension the belt by turning the tensioning nut clockwise.
6. When sufficient belt tension has been achieved tighten the lock not back down onto the tensioning nut.
7. Re-fit the jackshaft belt to the jackshaft pulley.
8. Re-fit belt guard.

### **6.3 Engine Maintenance**

Maintenance on the Verticutter engine should be carried out as per the manufacturer's owner's manual supplied with this machine.

To drain engine oil a slot has been provided in the Verticutter engine base immediately under the engine oil drain plug.

1. Place a shallow tray under the verticutter, ensuring that it lines up with the hole below the oil drain plug.
2. Remove the oil filler cap and loosen the oil drain plug at the bottom rear edge of the engine until oil begins to flow. Do not completely remove the plug at this stage to avoid oil flooding over the machine's deck.
3. As oil flow diminishes remove the drain plug and allow oil to drain completely.
4. Replace drain plug and re-fill engine with oil as per manufacturer's instructions.
5. Carefully remove the oil drip tray.
6. Dispose of the waste oil as required by local laws.

### **6.4 Maintenance Schedule**

#### **During first 4 hours:**

- Check tension on all belts regularly, tension as required.
- Check all bolts are tight

#### **Daily Before Use:**

- Check for worn, slipping or damaged belts
- Check for worn or damaged blades
- Check for any loose nuts, bolts and fasteners
- Check engine oil for correct level

#### **Daily After Use:**

- Clear rotor blades of any debris
- Clear bottom of transmission, especially unclog cooling fins
- Clear any debris generally, especially from around engine

#### **Every 12 Months:**

- Grease pivot points and tighten bolts where required
- Check all belts for wear and tension ; replace if necessary

#### **Transmission Maintenance**

- Transmission fitted to this machine is a sealed hydrostatic unit which should not require attention. In the event of drive issues contact the company your Verticutter was purchased through or your local Graden agent for advice.

7. Warning Decals



PART NO. 5312 – Cover Removed Decal (x1)



PART NO. 5154 – Danger Decal (x3)