CE EN

Original Instructions

SP20001_EN REV9 // **December 2025**

Instruction Manual

Petrol Cassette Mower

FT Series

DENNIS

Original Instructions in English (UK).
Part number: SP20001_EN.
Models covered: FT430 (D090) / FT510 (D060) / FT610 (D0100).

Rev.	Date	Description of Changes	Author
9.0	12/ DEC/ 2025	Complete redesign of manual	C.B

For a digital copy of this manual, parts catalogue and other information regarding this product, please scan:

For a digital copy of the Honda engine documentation, please scan:

Serial numbers:

Chassis
Engine

Head Office

Howardson Works,
Ashbourne Road,
Kirk Langley,
Derbyshire,
DE6 4NJ,
UK
Tel: +44 (0) 1332 824 777
howardsongroup.com

Table of Contents

Table of Contents

List of Key Figures

1.1. Introduction

1.1.1. Operator Manual Overview

This operator manual contains important information regarding the safe, proper and efficient operation of the FT430 / FT510 / FT610, referred to as 'machine' in this manual. This operator manual must always be available and read by every User of the machine. 'User' is defined as an authorised person tasked with working on or with the machine, typically operators, groundskeepers and maintenance personnel.

Adherence to this operator manual will help to avoid and minimise risk to you as the User and to the machine. It will also lead to a greater quality of cut, lower repair costs and reduce downtimes. Prior to use, every User must ensure they have:

- Fully read and understood these instructions,
- Understood the machine controls,
- Understood the dangers and hazards involved, and methods to mitigate risk.

Reference will be made to the use, safety and maintenance of the petrol engine. However this is supplementary information only and you must also read the supplied OEM manual for the engine.

In the case of any difficulty or if further information is required, call Howardson Group or your Dealer. In the interests of speed and accuracy of information, please quote the serial number of the machine when making enquiries.

Location descriptions (e.g. left/right hand) throughout this manual are observed from the operators view whilst in normal drive position, as per Fig.1.

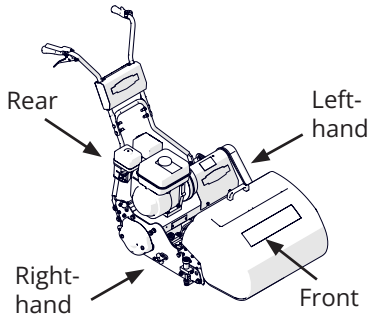


Figure (Fig.) 1 - Viewpoints

1.1.2. Machine Description

The FT430, FT510 and FT610 are professional petrol grass mowers, using a 430mm (17"), 510mm (20") or 610mm (24”) cassette respectively. These cassettes are interchangeable, each used for a different application including cutting, brushing, scarifying, verti-cutting and sorrel rolling.

All models are powered by an air cooled, single cylinder, four stroke petrol engine, the specification of which can be found in the supplied OEM manual, or selected specifications in this manual.

The rear roller and cassette are controlled independently, with the rear roller operated from the handlebar and the cassette from a engagement knob on the side.

The design of the machine incorporates a system for quick adjustment of the height of cut and a sectional assembly system for easy service and maintenance of the main components. A mechanical parking brake is fitted which stops uncontrolled rolling when left unattended.

1.2. Safety Instructions

Throughout this manual, potential safety risks are identified with a word and coloured coded box. They denote the following:

DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTE

Indicates information considered important but not hazard related.

1.2.1. Warning Symbols & Decals

The following symbols and decals are used throughout this Operator Manual and across the machine. Familiarise yourself with them prior to operating the machine. They are located near areas of potential danger or convey further information on machine use.

Warning Signs

General warning sign

Warning; Explosive material

Warning; Sharp element

Warning; Toxic material

Warning; Flammable material

Warning; Corrosive substance

Warning; Crushing of hands

Prohibition Signs

General prohibition sign

No smoking

No open flame; Fire, open ignition source and smoking prohibited

No metallic articles or watches

Do not touch

No sitting

Do not alter the state of the switch

Not to be serviced by users

Mandatory Signs

General mandatory action sign

Refer to instruction manual/booklet

Wear ear protection

Wear eye protection

Wear a mask

Wear safety footwear

Wear protective gloves

Wear protective clothing

Disconnect before carrying out maintenance or repair

Other Signs

Take note

Recycle

Heavy weight

Decals

Your machine decals must be replaced when they become worn or damaged. Contact Howardson Group Service department with the part number listed below:

B32902_REV2
(200x50mm)

B32903_REV0

SP18037

229376

1.2.2. Important Safety Instructions

DANGER - IMPORTANT SAFETY INSTRUCTIONS

- ***Always*** read this operator manual carefully and understand the controls and safety signs before commencing work. Improper use or care of the machine may result in injury or death.
- This machine is dangerous if not used correctly - take great care and consideration when using it.
- ***Always*** keep hands, feet and any other body part clear of the cassette and rollers. Remember that blades, brushes and rollers can continue to rotate even after the engine has stopped.
- ***Always*** use the correct personal protective equipment (PPE) - see *"1.2.4. Personal Protective Equipment (PPE)" p.9.*
- ***Always*** use the machine with all safety guards correctly fitted. They are supplied for your protection.
- ***Always*** operate the engine in a well ventilated space.
- ***Always*** read and understand the engine OEM 'Owner's Manual' before using the machine.
- ***Always*** store the petrol in a suitable container, away from direct sunlight, high temperatures and areas with risk of sparks.
- ***Always*** disengage the drive and cassette levers before starting the engine. Start the engine carefully following the instructions.
- ***Always*** be alert for pedestrians.
- ***Always*** stop the engine and allow to cool *entirely* before servicing or making repairs.
- ***Always*** wait for the cassette to stop rotating before travelling over anything that is not grass.

DANGER - IMPORTANT SAFETY INSTRUCTIONS

- ***Always*** keep the machine maintained with the schedule and procedures found in *"4. Maintenance and Servicing" p.37.* Doing so keeps the machine in good condition, thereby reducing accidents and injuries, and maintaining better turf.
- ***Always*** operate standing behind the machine with two hands on the handlebar.
- ***Always*** assess the job prior to starting. This includes:
  - Slopes - mitigate use on slopes where possible. Take extra caution and use horizontally across the face of slopes, not up and down.
  - Remove any debris and objects such as stones and branches prior to working in the area. Also observe and avoid anything that can damage the machine such as sudden dips, verges etc
  - Lighting - always operate in daylight or good artificial light.
- ***Never*** use the machine if it is damaged or faulty in any way.
- ***Never*** put any body parts, including limbs, near moving parts of this machine.
- ***Never*** operate the engine in a confined space as carbon monoxide fumes can accumulate.
- ***Never*** smoke or have naked flames around the machine.
- ***Never*** change engine governor settings or overspeed the engine.
- ***Never*** carry out adjustments whilst the machine is running.
- ***Never*** allow any unauthorised person to operate the machine, in any way, at any time.

DANGER - IMPORTANT SAFETY INSTRUCTIONS

- ***Never*** **operate the machine if you are experiencing any of the following conditions: illness, reduced physical capacity, or under the influence of drugs or alcohol.**
- ***Never*** **let a child operate the machine or be in the work area when it is being operated.**
- ***Never*** **lift or carry a machine whilst any parts are moving.**
- ***Never*** **use the machine in adverse weather conditions, particularly in heavy rain, storms or high winds.**
- ***Never*** **use the machine at a speed greater than your walking pace.**

1.2.3. Intended Use and Residual Risks

This machine is designed for the cutting and maintenance (scarify, brush etc) of grass lawns with Dennis, machine specific cassettes. Any use beyond this is outside the scope of this machine and could cause injury or damage to the machine. This includes, but not limited to, riding on the machine, using it to transport goods and using it to cut thick vegetation.

WARNING - INTENDED USE AND RISKS

Personal injury and damage to the machine can result in using the machine for alternative uses. ***Never*** **use the machine for anything else other than its intended use. Risks will always be present and you must be vigilant at all times while operating machine.**

You must follow instructions and information found in ***"1.2. Safety Instructions" p.6*** **and** ***"3.7. Operating Environment" p.34.***

1.2.4. Personal Protective Equipment (PPE)

During use you must adhere to local rules and regulations regarding Personal Protective Equipment (PPE). In addition to this we recommend:

- **Footwear;** heavy duty, slip resistant boots to protect against injury.

- **Eye protection;** to protect from flying debris.

- **Hearing protection;** must be worn at all times when the machine is activated.

- **Clothing;** suitable for the environment you are operating in (hot, cold, wet etc)

- **Hand protection;** to avoid cuts and blisters.

- **Respiratory protection;** for when there are occurrences of high dust and pollen.

1.3. Assembly, Installation and Commissioning

1.3.1. Unpacking and Inspection

The machine will arrive on a wooden pallet base, with either a cardboard or wooden outer frame. Carefully remove this outer packaging. You alternatively may have the machine delivered direct from our factory or your Dealer.

Visually inspect the machine for any signs of damage which may have occurred during transport. Contact Howardson Group or your Dealer as soon as possible should there be damage.

Included with the machine is this operator manual, a warranty registration document and machine parts catalogue.

To remove the machine from the pallet:

1. Remove all tie-down straps.
2. Wherever possible, use a suitably rated ramp to roll the machine off backwards to the ground. Refer to sections ***"3.2. Starting the Engine" p.23*** and ***"3.4. Drive" p.25*** for the relevant procedures. Gently toggle the park brake on/off to aid going down the ramp.

CAUTION - MACHINE WEIGHT

The machine is very heavy. Machine weight can be found on the serial plate or section *"2.1.2. Specification Table" p.12*. Take care when removing from the wooden pallet - we recommend two people to help with this. Follow all manual handling techniques for your business and region.

3. If a ramp is not available, disengage the parking brake and, while following correct manual handling techniques, ***gently*** lower the rear roller to the floor. Continue to roll backwards, keeping pressure on the handlebar so the front wheels remain in the air. Once clear of the pallet, lower the front to the floor ***gently***.

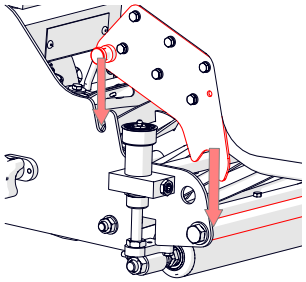
Dispose of all packaging according to local laws - recycle where possible.

1.3.2. Assembly Instructions

Minimal assembly is required to get your machine into a ready state:

1. **Attach the grass box;** lower the grass box onto the machine using the pin and notch of the grass box to the corresponding cut-out and tie-bar on the machine. (Fig.2A), removing any plastic wrapping that may be left.
2. **Set handlebar height;** the handlebar may need readjusting to be optimum for your height. See section ***"4.3.1. Handlebar Height Adjustment" p.46*** for further information.
3. **Fill the fuel tank** with unleaded petrol (pump octane rating 86).

Fig.2 - Lower grassbox



1.3.3. Installation Requirements

Adjustments will be required to make adequate space for the storage and routine maintenance of the machine:

- See section ***"2.1.1. Dimensions" p.11*** for minimum space requirements.
- See section ***"4.6. Storage" p.49*** for correct storage requirements.

1.3.4. Commissioning

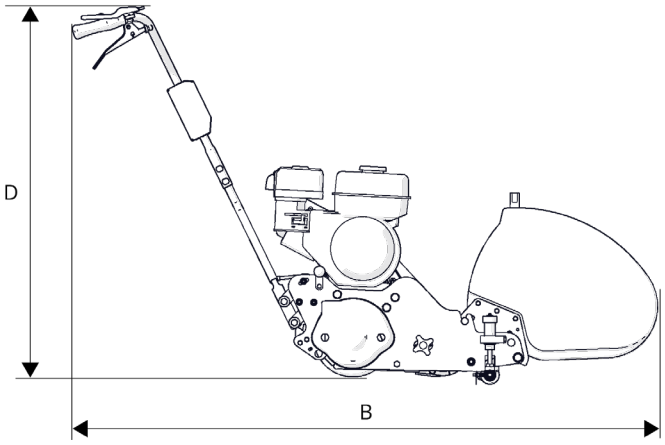
Your Dealer or a Howardson Group representative will be present to commission and set-up your machine. They will walk through the process of basic controls and getting started with your machine.

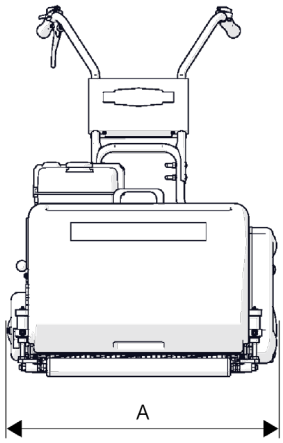
1.3.5. Calibration

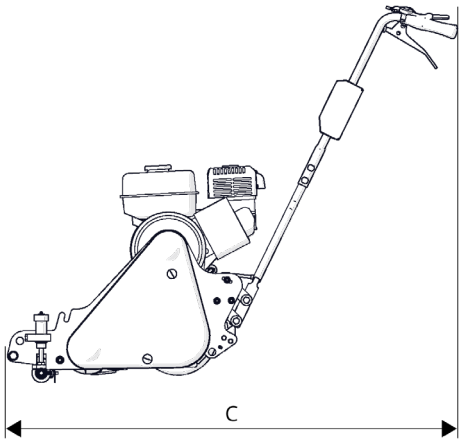
No calibration procedures are required.

2.1. Technical Specifications

2.1.1. Dimensions







View	Model		
	FT430	FT510	FT610
A	675mm	750mm	840mm
B	1592mm		
C	1229mm		
D	971mm		

2.1.2. Specification Table

System			Model		
			FT430	FT510	FT610
Weight	Machine		96 kg	102 kg	107 kg
	Cassette only		See *"2.5. Cassettes" p.20*		
Drive	Engine[1]	Type	Petrol Engine		
		Model	Honda GX120	Honda GX160	
		Net Power	2.4 kW / 3,600 rpm	3.6 kW / 3,600 rpm	
		Fuel Tank Capacity	3.1 L		
		Engine Oil Capacity	0.6 L		
		Engine Oil Type	Genuine Honda, SAE 10W-30		
		Dry Weight	13.2 kg	15.1 kg	
		Spark Plug Type	BPR6ES (NGK) or W20EPR-U (DENSO)		
		Spark Plug Gap	0.7–0.8mm		
	Rear Roller System		'V' Belt		
	Cassette Drive System		Multi 'V' Belt		
Speed (maximum)	Forwards		3.77 km/h		
Cutting	Blade unit		Cassette - removable		
	Cutting Width (mm) [inches]		430 mm [17"]	510 mm [20"]	610 mm [24"]
	Number of blades		5 / 10		
	Height of cut (mm)		03–20 mm		
	Clips per Metre	5 blade	66		
		10 blade	132		
	Grassbox volume (L)		80 L	97 L	110 L
Environmental	Operating temperature range ()		-15 °C to +40 °C (+10 °C to +30 °C optimal for grass cutting)		
	Storage temperature range (°C)		0 °C to +30 °C For additional information, see section ***"4.6. Storage" p.49***.		

[1]*For technical specifications of the engine, please refer to the 'Owner's Manual' supplied.*

2.1.3. Noise and Vibration

System		Model		
		FT430	FT510	FT610
Noise	Measured Sound Power Level	92 dB(A)	92 dB(A)	92 dB(A)
	Guaranteed Sound Power Level	96 dB(A)	95 dB(A)	95 dB(A)
	 **WARNING - NOISE LEVELS** **Hearing protection must be used when using this machine.**			
Vibration	Total value to which the hand-arm system is subjected (m/s^2)	4.0	4.0	4.0

2.2. Machine Components

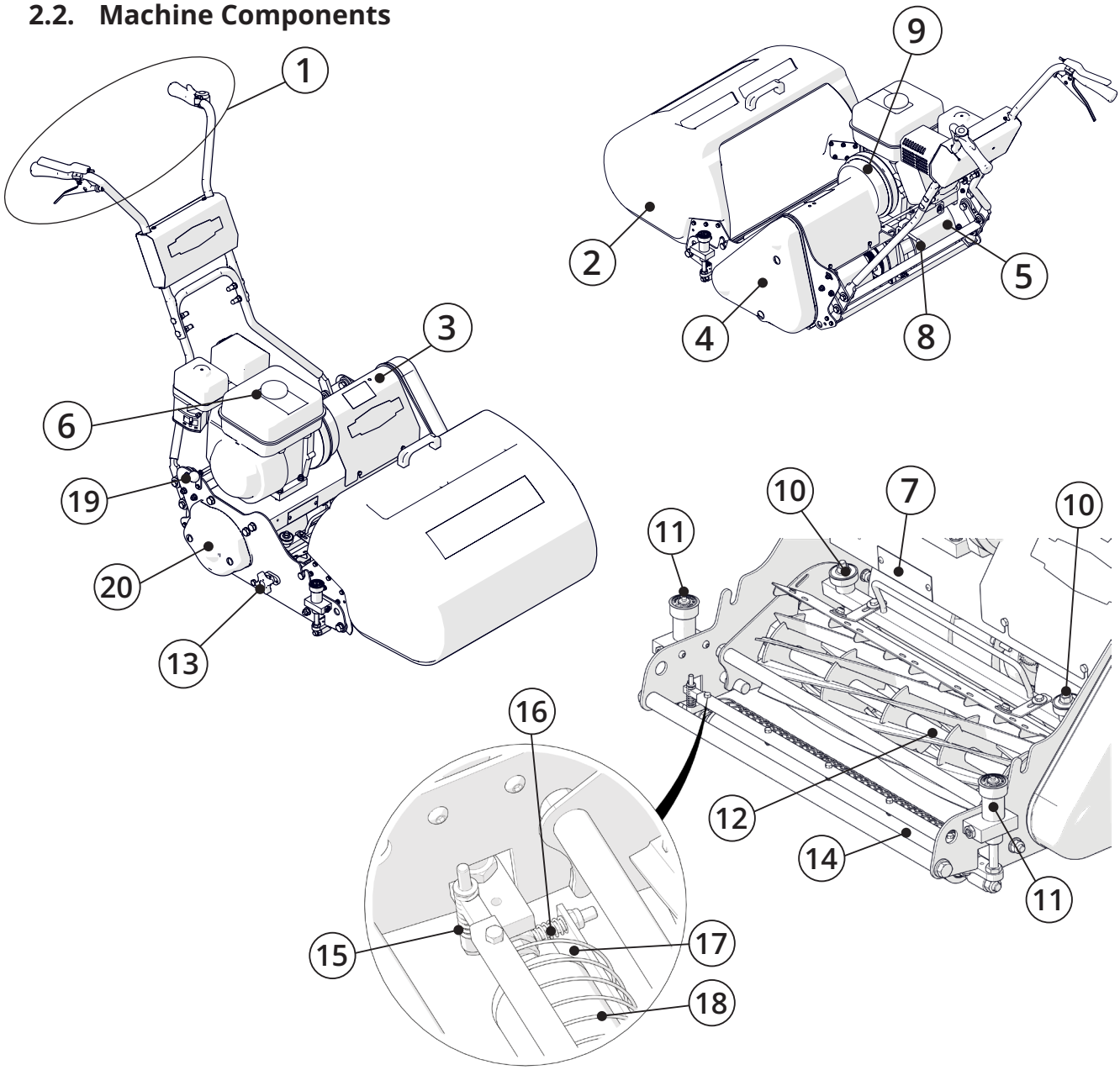


Fig.3 - Machine components overview.

1. Control Components
2. Grass Box
3. Top Drive Guard
4. Side Drive Guard
5. Rear Roller
6. Engine
7. Serial plate
8. Parking Brake
9. Centrifugal Clutch Drum
10. Shear Blade Adjuster
11. Cut Height Adjuster
12. Cassette; *type depending on order*
13. Cassette Retaining Pin
14. Front Roller
15. Comb Tine Height Adjuster
16. Front Roller Scraper Bar Adjuster
17. Scraper Bar
18. Comb Tine
19. Cassette Clutch Rod
20. Brake Cover

1. Control Components

See *"2.3. Control Components" p.17.*

2. Grass Box

The grass box collects the clippings from the cassette. Remove/attach to the machine by using the pin and notch of the grass box to the corresponding cut-out and tie-bar on the machine.

Maximum volume: FT430 = 80L, FT510 = 97L, FT610 = 110L.

3. Top Drive Guard

Under the top drive guard is the main drive shaft and dog clutch mechanism for the cassette. Two holes in the guard allow direct access for oiling the dog clutch, see ***"4.1. Maintenance Schedule" on page 37.***

This guard protects the operator and machine from injury and damage. It must be kept on and secured at all times.

4. Side Drive Guard

Behind the side guard is a belt and pulley assembly to split power from the engine to both cassette and rear roller. The guard must be kept on and secured at all times.

5. Rear Roller

The rear roller maintains stability along with the front roller, but also creates a striping effect behind the machine. It is split into three segments, with the two outer segments operated by differential to aid in manoeuvrability.

6. Engine

Refer to supplied OEM manual and ***"2.4. Engine Components" p.19*** for further information.

7. Serial Plate

The serial number can be found on the chassis between the engine and cassette. Please make a note of the serial number of your machine and engine in the table found on the inside cover of this manual. Always quote these in any communication with Howardson Group.

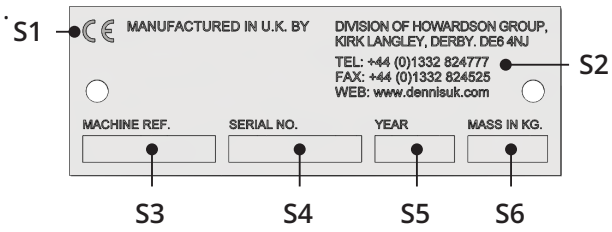


Fig.4 - Serial plate components overview.

S1. CE marking
S2. Business/manufacturer address and contact details
S3. Machine code designation
S4. Serial number
S5. Year of build
S6. Mass of machine (kg)

8. Parking Brake

The mechanical parking brake physically stops the rotation of the rear roller when engaged. This stops any unintended rolling and is to be used when the machine is not in use. The mechanism features a 'C' shaped cut-out that guides the brake lever/pad ensuring it secures into position. Push forward and around the inner curve to engage brake, or pull back and around to disengage.

CAUTION - PARKING BRAKE

- ***Always*** **engage the parking brake when the machine is not in use.**
- **Do *not* use the parking brake to stop the machine while moving. This may result in damage to the braking system. To stop, release the drive/speed lever and the machine will slow to a stop.**

9. Centrifugal Clutch Drum

The centrifugal clutch drum is a key component that allows a smooth transition of power from the engine to the rear roller and cassette. The design means the engine has to reach optimal speed and torque before the clutch drum engages. This design ensures smooth engagement and helps prevent strain on engine components.

At low engine revolutions (e.g., idle or light throttle), the driveshaft speed is insufficient to generate enough centrifugal force to overcome the internal springs holding the clutch shoes in place. As engine speed increases, the centrifugal force becomes strong enough to push the clutch shoes outward, causing their friction pads to engage with the drum's inner surface and rotate it, thereby transmitting power.

WARNING - CLUTCH DRUM SAFETY

Always keep all body parts away from the centrifugal clutch drum while the engine is on. Risk of injury and trapped limbs.

10. Shear Blade Adjuster
Over time the quality of cut will decrease due to blade wear. Adjustment of the shear blade carrier is required to maintain the cut ***"4.3.2. Shear Blade Adjustment" p.47.***

11. Cut Height Adjuster
Located either side of the machine, cut height is adjusted here. Adjustment is in quarter turn 'clicks' of 0.25mm increments. Therefore a full rotation of the adjuster raises or lowers by 1mm. See ***"3.5.2. Adjusting Height of Cut (Cylinder)" p.28.***

12. Cassette
The cassette is a removal, interchangeable cartridge that houses specialised blades or discs to alter the function of the machine. Using the same drive system, the machine can use this power to perform different lawn care duties, including cutting, brushing and scarifying - for the full list of cassettes, see ***"2.5. Cassettes" p.20.***

It is designed to be easily swapped with another cassette, changing the function of the machine in a matter of minutes.

Replace worn or damaged cassettes with genuine Dennis replacements.

DANGER - CASSETTE BLADES/DISCS

Worn or damaged blades/discs are dangerous. Incorrect use or maintenance can cause serious injury or death. Inspect before and after every use, as per *"4.1. Maintenance Schedule" p.37*.

Always **inspect the blades/discs with the machine *off*.**

13. Cassette Retaining Pin
Used to secure the cassette in place. Check prior to use to ensure it is secure. Do not over-tighten.

14. Front Roller
The front roller maintains stability and guides the machine. As standard, a Smooth roller is supplied but a Weile roller is available as an optional extra.

15/16. Comb Tine Height / Front Roller Scraper Bar Adjuster
These adjustment points allow for the height to the comb tines/gap between front roller and scraper, to be changed. Use a 10mm spanner to adjust accordingly.

17. Scraper Bar
Removes soil and debris attached to the front roller. This avoids clumping, allows for easier steering and improved cutting performance. Recommended to leave a gap of 1-3mm between scraper bar and front roller.

18. Comb Tine
Used to lift and 'present' grass blades prior to being cut. Adjust using a 10 mm spanner, so the tines hang below the height of cut (determined by shear blade height).

19. Cassette Clutch Rod
This rod engages or disengages power to the cassette. Lift and push in to disengage, lift and pull outwards to engage. A hex nut separates the engagement/disengagement points. Perform either of these actions at low engine speed when

the centrifugal clutch drum is not spinning as to avoid grinding components.

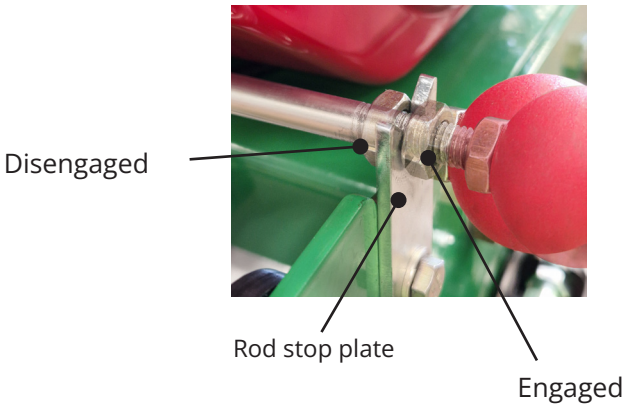


Fig. 3A - Cassette Clutch Rod engagement points.

20. Brake Cover
This cover protects the brake drum and brake band ring. Access inside is required for periodic maintenance but not daily operation.

2.3. Control Components

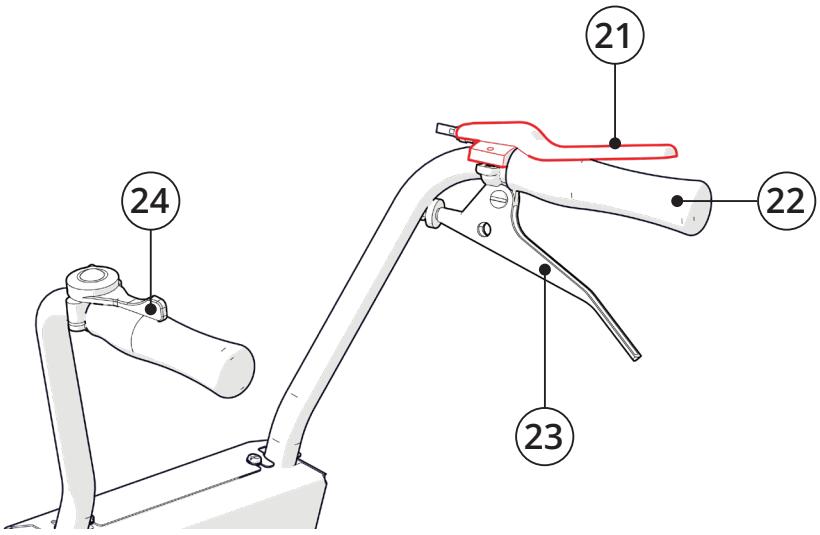


Fig.5 - Control components overview.

21.Operator Presence Control (OPC)
22.Operating Handle
23.Drive/Speed Lever
24.Throttle Lever

21. Operator Presence Control (OPC)

This lever mechanism is a safety feature to prevent accidents. It signals to the machine of your control, active or otherwise, and either supplies or stops power to the cassette and rear roller respectively.

The OPC requires continuous engagement to provide power to the cassette and rear roller. When released, this indicates you are no longer present or in control. At this, the machine immediately ceases all power to the cassette and rear roller, regardless of lever position. This minimises risk caused by the machine being able to operate unattended or in unsafe conditions.

DANGER - BYPASSING OPC

Never **interfere or tamper with the OPC in any way. This includes taping, tying up or any other modification. Doing so bypasses a key safety mechanism of the machine and puts you and fellow pedestrians at risk.**

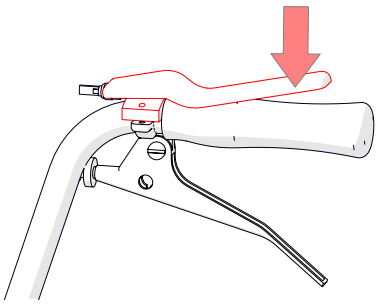


Fig.4A - OPC

22. Drive/Speed Lever

This lever engages power to the rear roller when there is sufficient power, as indicated by a spinning centrifugal clutch drum (9). Squeeze up towards the operating handle to engage (i.e. start moving forward), or release to disengage (i.e. stop moving). Speed is proportional to the pressure given, so a stronger squeeze will result in a faster machine.

This lever must be used in conjunction with the OPC to be operated. Only engage when it is safe to do so.

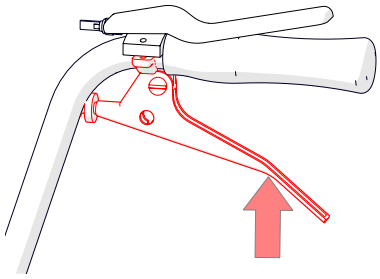


Fig.4B - Drive/speed lever

24. Throttle Lever

This lever alters the speed of the engine only, ***not*** directly the speed of the machine. To allow drive or cassette spin to occur, the engine speed must be sufficient to spin the centrifugal clutch drum (9). To achieve this, turn the throttle towards hare until the centrifugal clutch drum spins.

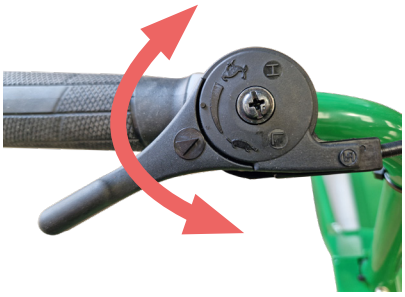


Fig.4C - Throttle lever

2.4. Engine Components

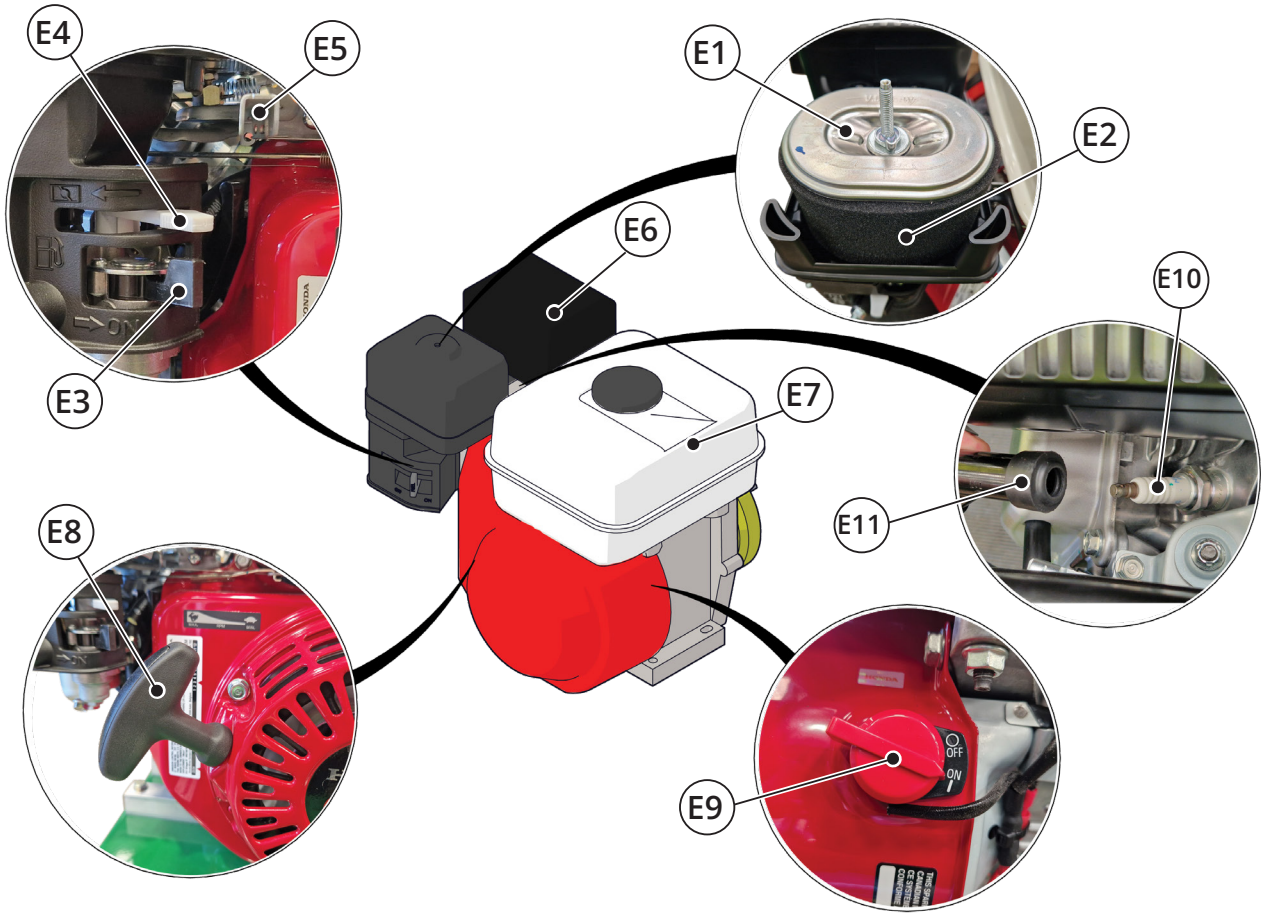


Fig.6 - Engine components overview.

E1. Air Filter (paper)

E2. Air Filter (foam cover)

E3. Fuel Lever

E4. Choke Lever

E5. Throttle Control Lever

E6. Exhaust

E7. Fuel Tank

E8. Starter Grip

E9. Engine On/Off

E10. Spark Plug

E11. Spark Plug Cover

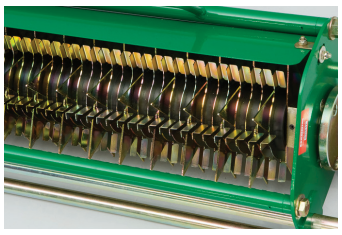
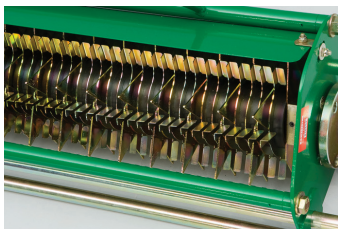
Please refer to supplied OEM 'Owner's Manual' for description and use of each of the above components.

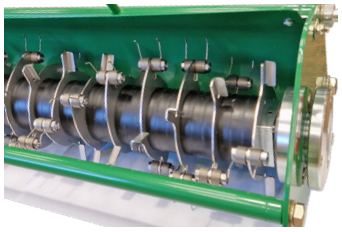
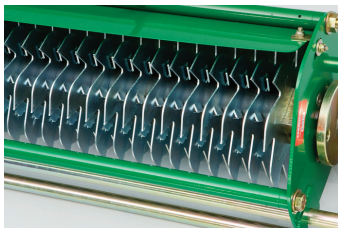
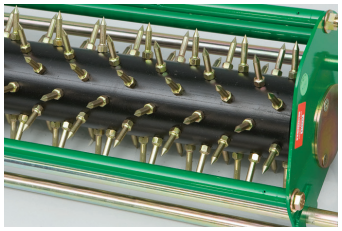
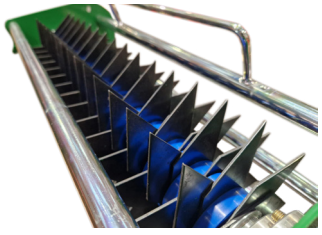
2.5. Cassettes

Twelve interchangeable cassettes are available for all FT-Series machines. These are model specific and cannot be used interchangeably (i.e. a FT430 cassette cannot be used in a FT510/FT610 machine and vice versa). Different cassette types are available for various grounds-care work, as outlined in the following table. With exception of the sorrel roller, they are all powered by the cassette pulley assembly allowing for easy interchangeability (the sorrel roller is free spinning and does not have the means to engage with the cassette drive).

For instructions on removing the cassette, see ***"3.5.1. Removing and Inserting a Cassette" p.27.***

Type		Description and Use	Weight (kg)		
			FT430	FT510	FT610
Cutting	**5 Bladed Cylinder**				
		Five steel blades in a spiral format. Good general purpose cylinder and ideal for use on longer grass. As standard, no relief grind.	*TBC*	18.7	21.6
	10 Bladed Cylinder				
		Ten steel blades in a spiral format. Higher clip rate compared to 5 bladed cylinder and ideal for short length grass. As standard, relief ground.	*TBC*	21.3	24.6
Brushing	**Brush**				
		For moss and debris removal and use as a light scarifier for final pre-cut preparations.	*TBC*	11.0	*TBC*
	Brush Multi-Dense				
		For moss and debris removal and use as a light scarifier for final pre-cut preparations.	*TBC*	11.2	12.8

	Type	Description and Use	Weight (kg)		
			FT430	FT510	FT610
Scarifying	**1mm Scarifier**				
		1mm thick replaceable, wear resistant blades. 12mm spacing for thatch removal throughout the season and autumn/ spring renovation work.	*TBC*	11.5	*TBC*
	2mm Scarifier				
		2mm thick replaceable, wear resistant blades. 12mm spacing for thatch removal throughout the season and autumn/ spring renovation work.	*TBC*	12.8	14.6
	2mm Scarifier Tungsten Tipped				
		2mm thick replaceable, tungsten tipped blades. Designed for heavy duty thatch removal throughout the season and autumn/spring renovation work.	*TBC*	12.8	14.6

	Type	Description and Use	Weight (kg)		
			FT430	FT510	FT610
Verti-Cutters	**Spring Tine Rake**				
		Ideal for lifting lateral growth, helping to stand grasses up, removing dead matter or broken leaves. Helps to break up algae crust or help remove the glutinous slime that can sometimes appear on fine turf.	*TBC*	*TBC*	15.2
	Verti-Cutter				
		1mm thick 10 fingered replaceable discs. Regular use controls, thatch, lateral growth and the ingress of unwanted species such as annual meadow grass. Encourages vertical growth and ground cover. Cuts vertically into plant growth and ***above*** the soil, typically 2–3mm. Do ***not*** use to cut soil or during extended dry spells/drought.	*TBC*	14.0	*TBC*
	Verti-Cutter Tungsten Tipped				
		1mm thick 10 fingered replaceable discs. Tungsten tip gives extra durability for heavy usage. Regular use controls, thatch, lateral growth and the ingress of unwanted species such as annual meadow grass. Encourages vertical growth and ground cover. Cuts vertically into plant growth and ***above*** the soil, typically 2–3mm. Do ***not*** use to cut soil or during extended dry spells/drought.	*TBC*	16.7	19.4
Non-Powered	**Sorrel Roller**				
		Replaceable spikes relieves surface tension and allows penetration of air, water and fertilizer to the root zone. Good for over seeding and preparing damaged areas for repair.	*TBC*	18.4	*TBC*
	Slitter				
		Helps relieve surface tension and prevents thatch, penetrating deeper than a verti-cutter, into the soil layer.	*TBC*	*TBC*	*TBC*

3.1. Pre-Start Maintenance and Safety Checks

Before using the machine, ensure all maintenance checks are complete, as per ***"4.1. Maintenance Schedule" p.37.***

3.2. Starting the Engine

DANGER - POWER ON

- **Prior to using the machine, ensure you read and understand this Operator Manual carefully. Failure to do so may result in personal injury and damage to the machine.**
- **Before turning the engine *on*, you *must* ensure the area is clear of people and obstacles, and all safety guards are present.**
- **Hearing protection must be worn whenever the engine is *on*.**

To turn your engine ***on***:

1. Engage the parking brake (Fig. 7A).
2. Set the engine switch (located on the engine) to the ***on*** position (Fig. 7B).
3. Set the fuel lever to the ***open*** position (Fig. 7C).
4. Set the choke lever to the ***closed*** position (Fig. 7D). Note, setting the choke to this position is not required if the engine is warm or the air temperature is high.
5. Set the throttle lever to the ***tortoise*** position (Fig. 7E).
6. Grasp the starter grip handle and extend until the slack is removed. At this point, pull with a steady and fluid motion (Fig. 7F). The engine will start.
7. Allow the starter grip handle to return gently, avoid releasing it to 'snap' back into position.
8. Gradually move the choke lever into the ***open*** position (towards the front) (Fig. 7G). Leave to warm up for 3-5 minutes.

Fig.7 - Power on procedure

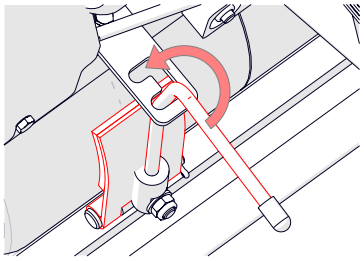


Fig.7A - Parking brake on.

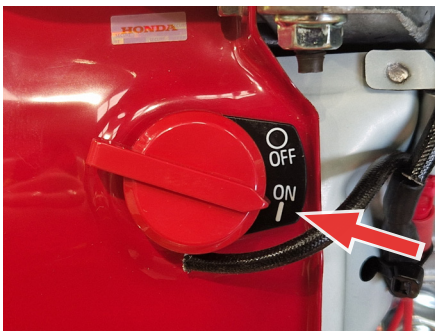


Fig.7B - Engine switch on.

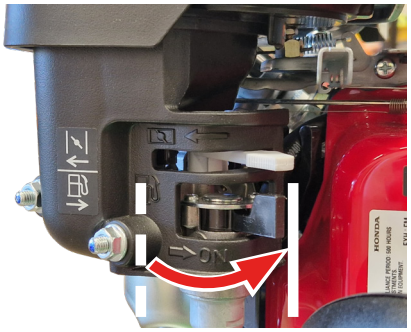


Fig.7C - Fuel lever open.

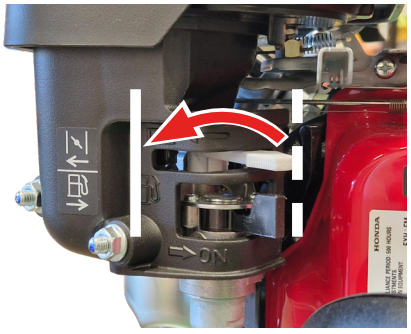


Fig.7D - Choke lever closed.

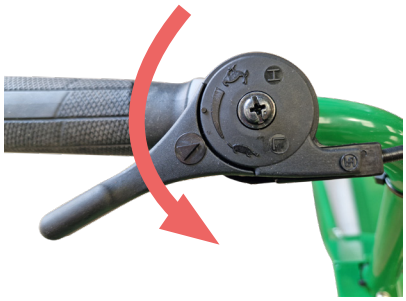


Fig.7E - Set throttle to tortoise.

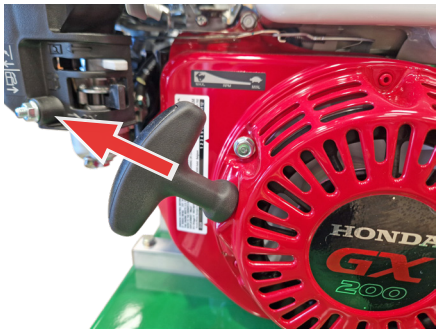


Fig.7F - Pull starter grip handle.

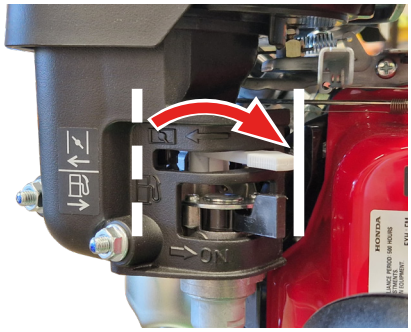


Fig.7G - Move choke lever into open position.

3.3. Stopping the Engine

Two methods are available to stop the engine:

- Increase the throttle lever fully to the ***hare*** position (Fig. 8A) while ensuring nothing else is held or pressed. As a safety mechanism, the engine will automatically cease without the engagement of the OPC.
- Alternatively, decrease the throttle to the tortoise position and wait until engine revolutions have reduced and the centrifugal clutch drum has stopped rotating. Then from the front of the engine, set the engine switch to the ***off*** position (Fig. 8B).

Fig.8 - Power off procedure

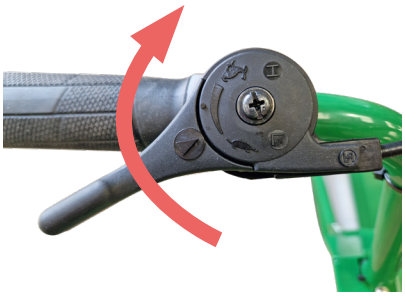


Fig.8A - Increase throttle to hare only.

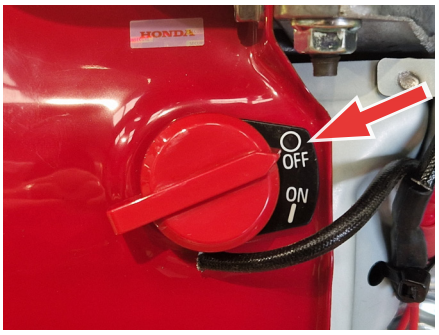


Fig.8B - Alternatively, turn the engine to off.

3.4. Drive

3.4.1. Moving and Transport (no cut)

CAUTION - HANDLEBAR HEIGHT

Prior to moving the machine, set handlebar to the correct height. See *"4.3.1. Handlebar Height Adjustment" p.46*.

1. Start the engine as per ***"3.2. Starting the Engine" p.23.***
2. Release the parking brake (**off** position).
3. With one hand on each operating handle, depress the OPC with the right hand. Then with the left hand, ***slowly*** increase the throttle from idle until the centrifugal clutch drum starts spinning (this occurs approximately from the halfway position and will depend on engine size, temperature and other factors). If the drum does not start spinning, increase the throttle further.
4. With the right hand, slowly squeeze the drive/speed lever while keeping the OPC depressed. The machine will slowly start moving forward.
5. Squeeze or release the drive/speed lever to go faster or slower, respectively. If it is still too slow or feels like it is about to stall, increase the throttle.
6. To ***stop*** drive ***temporarily***, release the drive/speed lever only. Releasing the OPC at this point will cut-out the engine and would require restarting. To ***idle***, turn the throttle ***down*** to tortoise first and then release the OPC.

NOTE - ENGINE STOP

Depressing the OPC while in low engine speed (i.e. tortoise) will result in the engine stopping. Ensure engine speed/'revs' are sufficiently high before trying to move.

NOTE - DRIVING OVER HARD GROUND

When travelling over surfaces other than grass, tilt the machine backward to elevate the front roller, ensuring it travels solely on its rear roller. This avoids potential damage to the cassette and blades.

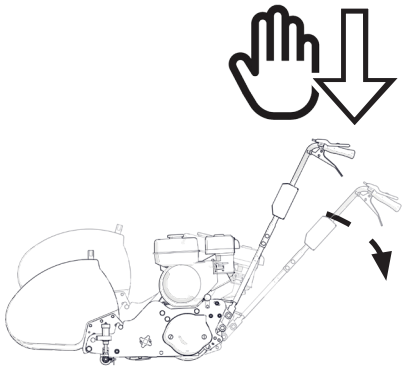
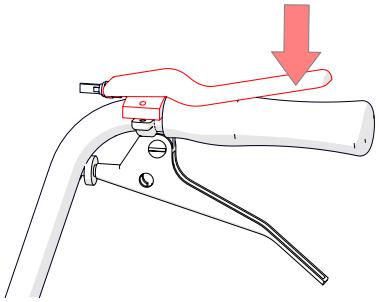


Fig.9 - Driving procedure



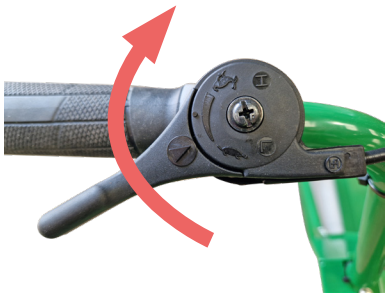


Fig.9A - Depress OPC and increase the throttle.

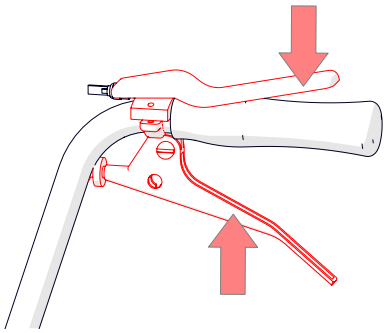


Fig.9B - While depressing OPC, squeeze drive/speed lever.

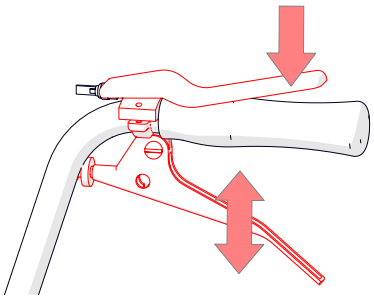


Fig.9C - While depressing OPC, squeeze or release drive/ speed lever to adjust machine speed.

3.4.2. Moving (with cut/scarify/brush)

NOTE - HEIGHT OF CUT

Prior to cutting, set the cassette to the correct height. See ***"3.5.2. Adjusting Height of Cut (Cylinder)" p.28.***

1. Start the engine as per ***"3.2. Starting the Engine" p.23.***
2. Release the parking brake (**off** position).
3. Lift and pull the clutch rod slightly so it is in the engaged state (Fig. 10A). Alternatively, the nut can rest on the rod stop plate (Fig. 10B) and it will drop into the engaged position once throttle is increased.
4. With one hand on each operating handle, depress the OPC with the right hand. Then with the left hand, ***slowly*** increase the throttle from idle until the centrifugal clutch drum starts spinning (this occurs approximately from the halfway position and will depend on engine size, temperature and other factors). When the drum starts spinning the cassette will spin too (the clutch rod will fall into the engage position if left on the stop plate).
5. Increase the throttle to full. With the right hand, slowly squeeze the drive/speed lever while keeping the OPC depressed. The machine will start moving forward.
6. Squeeze or release the drive/speed lever to go faster or slower, respectively. If it is too fast even with light pressure on the drive/ speed lever, reduce the throttle slightly, ensuring the engine speed is still enough to spin the drum.
7. To ***stop*** drive ***temporarily***, release the drive/ speed lever only. Releasing the OPC at this point will cut-out the engine and would require restarting. To ***idle***, turn the throttle ***down*** fully and then release the OPC. This will also stop the cassette.
8. To resume, depress the OPC and increase the throttle and the cassette will start spinning.
9. To ***stop*** drive ***completely***, see ***"3.3. Stopping the Engine" p.24.***

Fig.10 - Cutting procedure

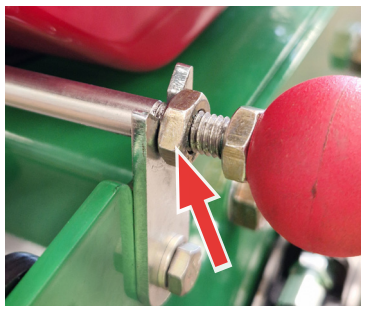


Fig.10A - Clutch rod in the engaged position.

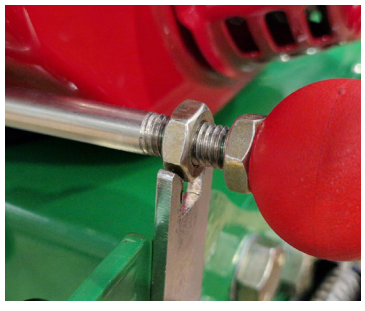


Fig.10B - Clutch rod nut resting on the rod stop plate.

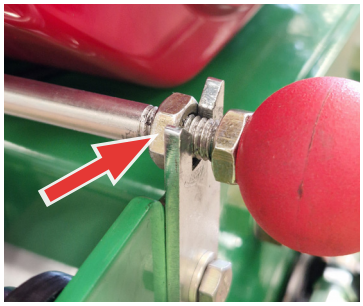


Fig.10C - Clutch rod in the disengaged position.

3.4.3. Operating on Slopes

WARNING - SLOPES

The machine operates best on flat ground. Follow the safety points below when operating on slopes:

- **Slopes can tip a machine over. Observe extreme caution. Check for obstacles or anything that may lead to instability (e.g. dips, bumps, uneven ground) prior to operating.**
- **There is no maximum operating machine slope angle; use personal judgement, taking into account surrounding environment and weather. If in any doubt, do not use on a slope.**
- **Operate across the face of a slope, never up and down.**
- **Avoid when wet as this can increase the risk of an accident occurring.**
- **Go slow; speed can increase the risk of an accident occurring. Take extra care when turning.**

3.5. Cutting Preparation

WARNING - CASSETTE SAFETY

- **Always turn the engine *off* before removing/inserting the cassette. Failure to do so creates a very high risk of cutting or damaging hands. Always wear hand protection.**
- **The cassettes are heavy - see "2.5. Cassettes" p.20 for more information. Some may require two people to remove/ insert.**

3.5.1. Removing and Inserting a Cassette

No tools are required for removing or inserting a cassette.

1. Turn the engine off.
2. Remove the grassbox and store to the side.
3. Loosen the cassette retaining pin (Fig. 11A) until the pip end is inside the nut on the side frame.
4. Slide the cassette along the tie-bars towards the R/H side of the machine. The L/H of the cassette will be clear of the three pins of the drive coupling (~15mm) (Fig. 11B).
5. From the front of the machine, hold onto the cassette handle and remove by a lift-and-swing motion, from the back to the front. ⚠ (Fig. 11C). We recommend two people to help with this for larger cassettes.
6. To insert a cassette: Lift the cassette using the handle and lower the front slots of the cassette unit onto the front bearing studs. Slowly lower the back end onto the back tie-bars.
7. Slide the cassette to the L/H of the machine until there is full engagement with the three pins of the drive coupling (Fig. 11D). The cylinder may need slight manual rotation to align with the pins. ⚠
8. Tighten the cassette retaining pin (Fig. 11E).
9. Normal use can now be resumed.

Fig.11 - Removing and Inserting a Cassette

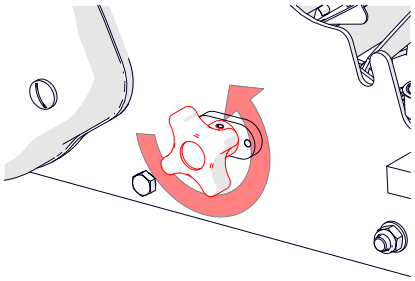


Fig.11A - Unscrew retaining pin.

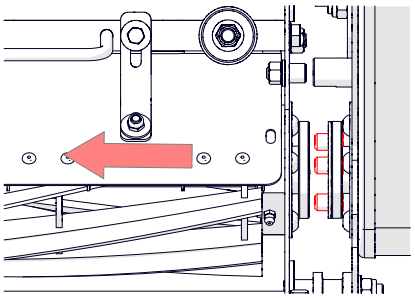


Fig.11B - Slide cassette until pins are visible.

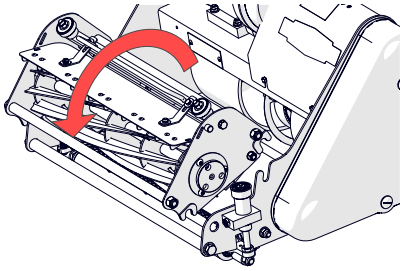


Fig.11C - Lift the cassette out.

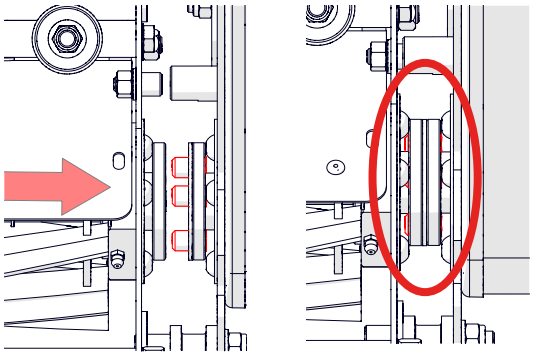


Fig.11D - Lower the new cassette in and slide across, engaging with three pins.

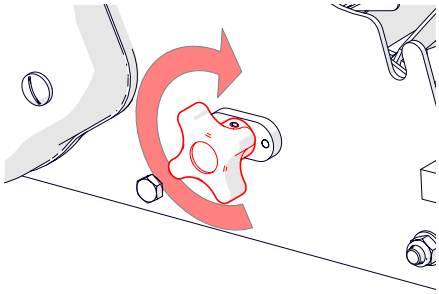


Fig.11E - Secure the locknut.

3.5.2. Adjusting Height of Cut (Cylinder)

The following procedure is for adjusting the height of cut for the cylinder cassettes only. For other cassettes, see ***"3.5.3. Adjusting Height of Cut (Scarification, Dethatching and Brushing)" p.31***.

Tools required:

- 19mm spanner
- Rule
- Setting bar

1. Turn the engine off.
2. Remove the grassbox and store to the side.
3. On the setting bar, adjust the bolt against the rule until the distance between the base of the bolt head and rule is that of the desired grass length. Secure with the nut [19mm spanner] (Fig. 12A).
4. Tip the machine gently back so it rests on the rear roller and handlebar (Fig. 12B).
5. Two positions along the cassette are required to be measured and adjusted to result in an even cut. Choosing either end of the cassette first, lay the setting bar across the front and rear roller. Correct height is achieved when the underside of the bolt head rests, or is level with, the lip of the shear blade (Fig. 12C). If it already is, then no further adjustment is needed. If not, then continue with step 6.
6. Manually turn the cut height adjuster to alter the height (Fig. 12D). It adjusts in quarter turn 'clicks' of 0.25mm increments. Therefore a full rotation of the adjuster raises or lowers by 1mm.

   Clockwise = reduce height.
   Anti-clockwise = increase height.

   While adjusting the height, position up the setting bar again between the front and rear roller. Stop adjusting when the head rests within the lip of the shear blade (Fig. 12E).

7. Repeat step 6 for the second position on the other side of the cassette.
8. Check the setting bar again for both sides. Adjust if necessary.
9. Lift the machine gently up to rest on its front and rear rollers. Return the grass box.
10. Normal use can now be resumed.

NOTE - HEIGHT OF CUT

- If planning on adjusting the shear blade at the same time, always adjust the shear blade first then adjust the height of cut. Doing the opposite way may result in a different height of cut than planned.
- From the factory, the machine is set to cut mid-height.
- Remember height of cut is affected by moisture of turf, weight of the machine and thatch density. We advise to set the height a little higher than your preference and reduce height by trial.

Fig.12 - Adjusting Height of Cut

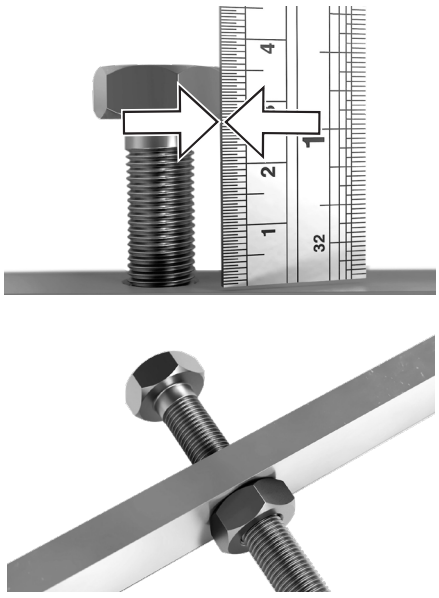


Fig.12A - Adjust bolt to desired cut height and secure nut (above example set for 27mm).

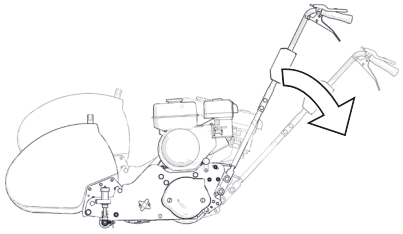


Fig.12B - Gently tip the machine back.

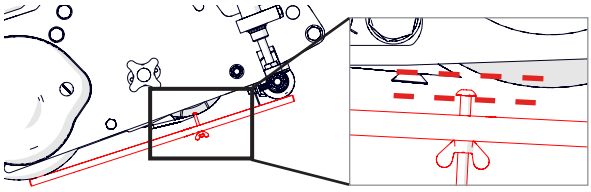


Fig.12C - Position the setting bar and observe distance between the top of the shear blade and bottom on the bolt head. In this example, the bolt head is below the shear blade, indicating the machine cut height is currently too high and therefore needs lowering.

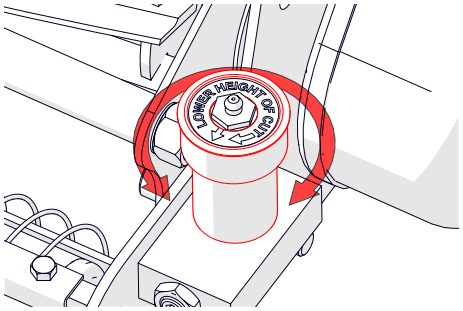


Fig.12D - Adjust the cut height adjuster.

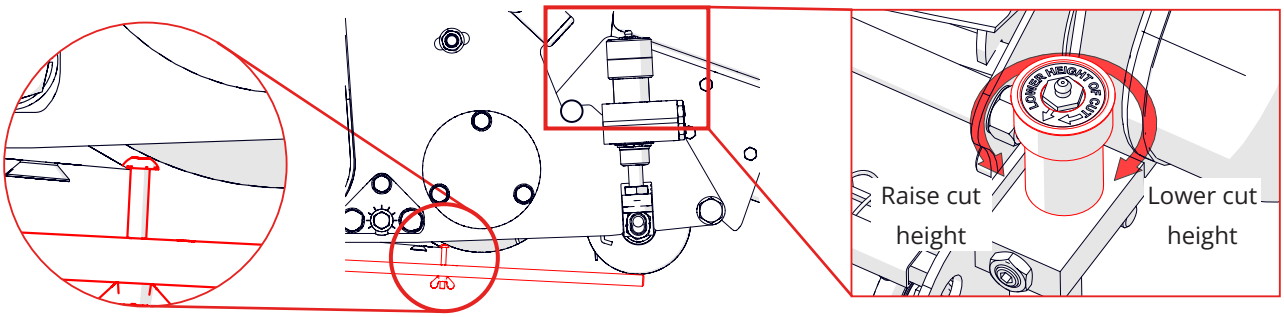


Fig.12F - Rotate the cut height adjuster while offering up the setting bar. Stop when the head rests level/within the shear blade

3.5.3. Adjusting Height of Cut (Scarification, Dethatching and Brushing)

The following procedure is for adjusting the height of cut for the scarifying, dethatching and brushing cassettes. For cylinder cassettes, see *"3.5.2. Adjusting Height of Cut (Cylinder)" p.28.*

Tools required:

- 19mm spanner
- Rule
- Setting bar

1. Turn the machine off (Fig. 12A).
2. Remove the grassbox and store to the side.
3. On the setting bar, adjust the bolt against the rule until the distance above or below the setting bar (to the head or end, respectively) is to that desired (Fig. 13). To note:

- Brush/Verti-cutter/Spring-tine rake = Measure from top side of setting bar ***up***.
- Scarifier/Sorrel roller = Measure from top side of setting bar ***down***.

Secure the bolt height with the nut [19mm spanner].

4. Tip the machine gently back so it rests on the rear roller and handlebar (Fig. 12B).
5. Two positions along the cassette are required to be measured and adjusted to result in an even brush/verti-cut/scarify. Choosing either end of the cassette first, lay the setting bar across the front and rear roller (Fig. 12C). Correct height is achieved when either the tips of the brush hairs/verti-cutters are level with the bolt head, or the

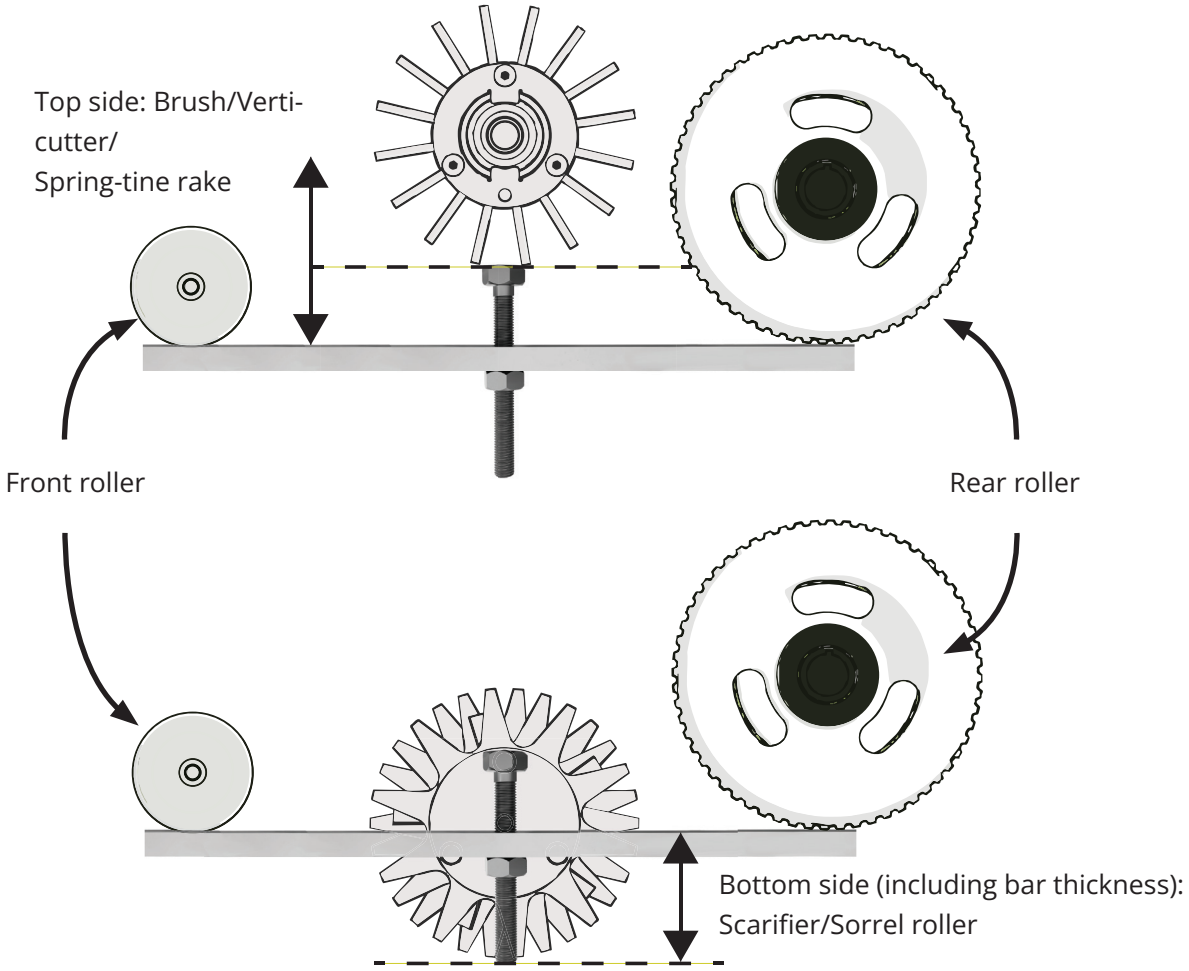


Fig.13 - Setting bar measurement for above/below ground cassettes.

tips of the scarifier/sorrel roller are level with the bolt end. If it already is, then no further adjustment is needed. If not, then continue with step 6.

6. Manually turn the cut height adjuster to alter the height (Fig. 12D). It adjusts in quarter turn 'clicks' of 0.25mm increments. Therefore a full rotation of the adjuster raises or lowers by 1mm.

   Clockwise = reduce height.
   Anti-clockwise = increase height.

   While adjusting the height, position up the setting bar again between the front and rear roller. Stop adjusting when either the tips of the brush hairs/verti-cutters are level with the bolt head, or the tips of the scarifier/ sorrel roller are level with the bolt end. (Fig. 13).

7. Repeat step 6 for the second position on the other side of the cassette (Fig. 12E).
8. Check the setting bar again for both sides. Adjust if necessary.
9. Lift the machine gently up to rest on its front and rear rollers. Return the grass box.
10. Normal use can now be resumed.

3.5.4. Cutting Technique

There is no set technique for cutting as it will suit individual circumstances. However we recommend the following:

- Mow in straight lines - turning while cutting may damage the turf and produce an inferior quality of cut.
- To perform a turn, press the handlebar down to lift the front of the machine before applying force to the left/right side. The three part differential rear roller allows for easier and tighter turning.
- Mow at a standard walking space - alter the throttle speed accordingly to achieve this.
- Do not cut for too long in a single spot or without cutting grass. This can damage the grass and increase blade wear.
- Avoid cutting more than one third of the grass blade. Doing so can increase the risk of disease and stress for the plant.

3.6. Engine

3.6.1. Safety Information

WARNING - ENGINE SAFETY

Follow the engine guidance below to avoid damage and injury risk:

- ***Always*** refer to the OEM Operator's Manual for definitive engine instructions - it contains additional important information not given in this manual. Reference to the engine in this document is intended solely as supplementary information to support machine operation.
- ***Flammable risk - Always*** store fuel in specifically designed containers and handle correctly. Store the fuel in a suitable environment and use PPE when handling it.
- ***Always*** use regular unleaded petrol only (pump octane rating 86 or higher). Using the wrong fuel can damage the engine.
- ***Always*** keep maintained as per *"4.1. Maintenance Schedule" p.37*. This includes checking oil levels and leaks, keeping air filters clean and removing all debris blockages.
- ***Always*** operate outdoors or in a well ventilated area.
- ***Always*** add fuel before starting the engine. ***Never*** add while it is running.
- If fuel is spilt, move the machine a safe distance away and clean up the spill before starting the engine up.
- ***Always*** keep children and unauthorised personnel away from this unit.
- ***Never*** attempt to disassemble, repair or modify the engine.
- ***Never*** place anything on the engine due to fire risk.

WARNING - ENGINE SAFETY

- Allow the engine to idle for a short time before driving, especially in cold weather.
- The exhaust system/muffler becomes very hot and remains hot long after use. Be careful not to touch while still hot and allow to cool before transporting or storing indoors.
- Do not open, puncture, crush, incinerate, immerse in water, or tamper the engine in any way. Risk of fire or explosion.

3.6.2. Refuelling

Note the following for correct and safe refuelling use:

- Turn off the engine and allow it to cool before refuelling.
- Avoid smoking or using any ignition sources near the refuelling area.
- Refuel outdoors or in a well ventilated area.
- Only refuel using unleaded petrol (pump octane rating 86 or higher).
- Fill to no further than the neck of the tank.

3.6.3. Installation and Removal

The engine is supplied mounted to the chassis on engine bearers. During normal use, there is no expectation to remove the engine. However, if the engine is required to be removed entirely:

1. Turn the machine ***off*** from both the start switch (located with the control components) and the engine on/off switch.
2. If the engine is being removed permanently, remove all fuel and oil with a syphon pump

or similar. If the engine is being removed temporarily, ensure the fuel cap and oil plug are secure.

3. Remove the 4 x M8 hex bolts securing the engine to the engine bearings [13mm spanner].
4. Slide the engine towards the right hand side of the machine - this will disconnect the engine coupling from the driveshaft.

3.6.4. Engine Specifications

For engine specification, see ***"2.1.2. Specification Table" p.12*** and within the supplied OEM manual for the engine.

3.6.5. Replacement and Disposal

Should the engine require disposal, follow the points in ***"4.7. Disposal" on page 50.***

3.7. Operating Environment

The machine has been designed to be used on fine turf and meeting the demands of day-to-day use. The following operating conditions shall also be observed:

Temperature:
-15 to +40°C. Usage in the upper and lower limits of this range will affect performance and engine life. It will also have an impact on the quality of cut and subsequent issues*. Operators must take necessary precautions against temperature, such as sun protection and suitable clothing. **The machine can operate beyond the temperature range of the optimum for grass cutting. Grass is best cut between 10-30°C.*
Humidity:
30–70% RH. High humidity can lead to rust and corrosion on metal parts. It can also lead to fungal diseases on the grass after cutting. Low humidity can lead to wilting and browning of the grass after cutting.
Weather:
Use in dry conditions. This avoids damage to engine components and traction hazards caused from slippery grass. Cutting wet grass leads to poorer cut quality, clumping and reduced collection into the grass bag. This results in additional cleaning of the machine . Compaction of the soil is more likely with wet weather. Operators must take necessary precautions against the weather, such as sun protection and suitable clothing.
Terrain/Slope:
Ensure the ground is firm and preferably dry. Soft or wet ground can cause manoeuvrability problems. There is no maximum slope angle, however use professional judgement when using on slopes (see ***"3.4.3. Operating on Slopes" p.27.*** Free from obstacles and obstructions, including rocks, branches and debris.
Dust and particulate:
Avoid dusty or sandy conditions. Such environments can damage the machine and be hazardous to the operator.
Vibration and Shock:
Keep vibration and shock to a minimum to avoid damage to machine components. This includes, bumps, pot holes and kerbs. Store the machine away from passing traffic and avoid transporting over rough ground - lower gently over kerbs or use alternative routes.
Lighting Conditions:
Use the machine in good lighting conditions, either natural or artificial. This allows for the safe operation of the machine.
Safety Zones:
Other than the operator, all other personnel must keep their distance from the machine during use. This must be maintained by the operator to keep the zone free.

3.8. Emergency Procedures

3.8.1. In the Event of a Breakdown

WARNING - MACHINE BREAKDOWN

- **Take full care and attention while investigating the cause of a fault. Where possible, wear suitable PPE including gloves and safety glasses.**
- **Never touch leaked materials, avoiding contact with skin and eyes. Rinse immediately with water and seek medical attention if necessary.**
- **Secure the working area with appropriate warning notices.**
- **In case of a petrol spill, clean it up immediately using appropriate absorbent materials.**

Regular service and maintenance will prevent the majority of machine breakdowns. The below procedure outlines the immediate actions if the machine fails to function entirely. If the machine is not working as intended and a minor issue, refer to ***"4.8. Troubleshooting & FAQ" p.50.***

In the event of a breakdown:

1. Turn the engine ***off.***
2. Disconnect the spark plug by holding between the thumb and fore-finger and pulling away. This prevents accidental engine starting.
3. If possible, move the machine to a safe area where further investigation can be carried out. If the machine cannot be moved, clearly label it as 'faulty' and cordon around the machine to mitigate unauthorised personnel from accessing the machine.
4. If there are fuel leaks, immediately clean up and adsorb with appropriate materials.
5. Once in a safe area or in a serviceable state, inspect the machine for any obvious defects. Do not attempt repairs beyond basic troubleshooting unless qualified. Full repairs to be carried out by qualified service engineer and documented accordingly.
6. If the source of the breakdown cannot be found, contact your Dealer or Howardson Group for further information.

3.8.2. Hazardous Substances and Fire

WARNING - HAZARDOUS SUBSTANCES

- **Always operate and refuel the lawnmower outdoors or in well-ventilated areas - never operate the engine in enclosed spaces. Avoid inhaling exhaust fumes.**
- **Wear appropriate PPE when handling petrol, such as gloves and safety glasses.**
- **Dispose of petrol and contaminated materials in accordance with local regulations.**

When operating the lawnmower, the combustion of petrol in the engine produces several emissions that may be hazardous to health and the environment. This includes predominantly:

- Carbon Monoxide (CO): A toxic, odourless gas that can cause dizziness and headaches,
- Nitrogen Oxides (NO_x): Can irritate the respiratory system,
- Other emissions include Carbon Dioxide (CO_2), unburned hydrocarbons, particulate matter and Volatile Organic Compounds (VOCs).

Operating outdoors or in well ventilated area will reduce this risk.

WARNING - HANDLING PETROL AND FIRE PREVENTION

Note the following when working and handling petrol:

- **Always use approved containers for petrol storage.**
- **Store petrol in a cool, well-ventilated area away from open flames or sparks.**
- **Avoid overfilling the fuel tank to prevent spills.**
- **Keep the area immediately around the engine and exhaust free of grass and debris to prevent fire hazards.**
- **Regularly inspect the machine for fuel leaks. Repair any found immediately and prior to use.**

In the event of a fire involving the machine or fuel:

- Stop the engine immediately (if safe to do so).
- Evacuate the area and ensure all persons are at a safe distance.
- Do not attempt to move the machine if it is on fire.
- Call Emergency Services if the fire cannot be quickly and safely controlled.
- Use a Class B fire extinguisher, which is designed for flammable liquids such as petrol.

Important: Only attempt to extinguish the fire if you are trained and it is safe to do so. Personal safety must always come first.

4.1. Maintenance Schedule

WARNING - CORRECT MAINTENANCE

Following the schedule set out below will prolong the life of your machine and deliver high performance.

Failure to carry out these checks at the specified intervals will result in damage to your machine and possible injury to personnel. If you are unsure of anything, contact Howardson Group or your Dealer.

Not servicing your machine correctly will invalidate your warranty. See *"4.9. Warranty Policy" p.50* for more information.

Always use genuine Dennis/Honda parts when servicing and replacement.

The following checks must be actioned as per date, running hours or distance, whichever comes first. Ensure checks are performed in an appropriate area (such as a storage shed), and not on the playing surface due to risk of containments/petrol/oil. Complete checks with the engine ***off*** and when following 'Post-use', check only when the engine has cooled.

Checks regarding the petrol engine must be in conjunction with the maintenance items in the OEM manual. Where maintenance intervals differ, always follow the more frequent schedule to ensure optimal performance and warranty compliance.

Service kits are available for the machine - see *"Appendix B. Service Kit" p.52.*

Maintenance and Safety Checks	Daily		Weekly 15hr	6-monthly 360hr	Annually 720hrs
	Pre-use	Post-use			
Controls					
Check the following for signs of damage and that they operate freely and as intended: • OPC • Drive / speed levers • Throttle	•	•	•	•	•
Set the parking brake to ***on*** and check it secures the machine and the mechanism moves freely.	•		•	•	•
Operate the OPC (engine off), ensure the 'click' is heard from its microswitch.	•		•	•	•
Set the cassette rod to engage position and start engine. Tip the machine back slightly and depress OPC. Increase engine speed to maximum so cassette starts spinning. Release the OPC only - the cassette and engine ***must*** stop. If it does not, see ***"4.8. Troubleshooting & FAQ" p.50.***	•		•	•	•

Maintenance and Safety Checks	Daily		Weekly 15hr	6-monthly 360hr	Annually 720hrs
	Pre-use	Post-use			
Chassis					
Check all guards are fitted correctly.	•		•	•	•
Visually check all fixings (secure and in place).	•		•	•	•
Visually check condition of shear blade.	•		•	•	•
Check the cutting height is set correctly.	•		•	•	•
Check the grass box is fitted correctly.	•		•	•	•
Clean off all grass cuttings from bodywork.		•	•	•	•
⚠ Clean off all grass cuttings from the cassette blade/disc (ensure the machine is turned off first. Use a long handled brush).		•	•	•	•
Lubricate the dog clutch. See ***"4.2.5. Oiling Dog Clutch" p.45***		•	•	•	•
Remove side drive guard and visually check condition of drive belts. Adjust/change if required.			•	•	•
Grease rear rollers. See ***"4.2.6. Greasing points" p.46***			•	•	•
Renew oil in rear roller. See ***"4.2.4. Changing Rear Roller Oil" p.45***				•	•
Check rear roller bushes for wear and lateral movement.				•	•
Lubricate front roller pivot bushes.				•	•
Replace all drive belts.					•
Engine					
Check engine oil level.	•				
Check air filter.	•				
Check fuel level is enough for intended use (do no overfill past the neck). Clean all grass/debris around the neck first to avoid contaminating the fuel.	•				
Check condition of the entire engine (including driveshaft guards) following for signs of damage. Do not use if anything is damaged.	•	•	•	•	•
Clean off all grass cuttings/debris from the entire engine using an air-hose, brush or similar. This includes: fuel tank, air filter, starter grip and exhaust. Failure to clean will increase fire risk.	•	•	•	•	•
Change engine oil (20 hours first change).			•	•	•

Maintenance and Safety Checks	Daily		Weekly 15hr	6-monthly 360hr	Annually 720hrs
	Pre-use	Post-use			
Clean sediment cup.			•	•	•
Check/clean spark plug.			•	•	•
Remove air filter cover and clean debris from base of filter.			•	•	•
Remove air filter cover and remove outer foam filter and wash in warm, soapy water. Ensure thoroughly dry before returning. Replace if damaged.			•	•	•
Remove air filter cover and clean debris from around the paper filter by tapping several times on a hard surface. Replace if excessively dirty or damaged.			•	•	•
Check/adjust valve clearance*.				•	•
Clean fuel tank and strainer*.				•	•
Check fuel line. Replace if necessary*.	Every two years				
Cassette 					
Check the blades/discs spin freely, with no grinding or metal-on-metal contact noises (***always*** turn the machine ***off*** first).	•	•	•	•	•
Check for wear or damage (impact, dents, material cracking and excessive thinning).	•	•	•	•	•
Check the retaining pin is tight and secures the cassette.	•	•	•	•	•
Grease cylinder bearings (x2). See ***"4.2.6. Greasing points" p.46***		•	•	•	•
Check the cassette can be removed and replaced easily.			•	•	•
Check the three pins of the drive coupling engage with the cassette.			•	•	•
Replace worn or damaged blades/discs.				•	•

*Authorised Honda dealer or mechanically proficient only.

4.2. Servicing Instructions

WARNING - SAFETY

- **You *must* turn the machine *off* before service work. Failure to do so may cause major injury.**
- **Always wear suitable PPE for the job at hand.**

CAUTION - SERVICE LOCATION

When servicing the machine, position in a suitable environment for working on (for oil spills etc) and if planning leaving for extended periods.

4.2.1. Cassette and Drive Belt Replacement/ Tensioning

CAUTION - BELT TENSIONING

Incorrect tensioning of a belt can lead to a range of issues and premature failure of components. Issues include slippage (resulting in poor power transmission), increased component wear, increased noise, increased stress on bearings and pulleys, pulley damage and many others.

New belts will stretch during the first hours of use and must be monitored regularly. Inspect after ~30 minutes to four hours operating under full load and re-tension accordingly.

After approximately 24 hours of operation, inspect and re-tension again.

Tools required:

- Slotted screwdriver
- 10mm spanner
- 13mm spanner
- 9/16" spanner
- Replacement belt (*if required, cassette belt p/n J209005, drive belt p/n J209003)*

1. Turn the machine ***off*** and disengage the cassette clutch rod.
2. Remove 2 x outer screws of the side drive guard [slotted screwdriver] (Fig. 14A) and keep to the side.
3. Remove 4 x hex screws of the top drive cover [10mm spanner] (Fig. 14B) and keep to the side.
4. Loosen the rear roller tensioner pulley [13mm spanner] (Fig. 14C).
5. For the rear roller belt (skip to step 6 for cassette belt):
   i. Hold the rear roller tensioner pulley away. Remove the belt and replace (if required) (Fig. 14D).
   ii. Engage the rear roller tensioner pulley to the belt and apply light pressure. Tighten its nut securely [13mm spanner].
6. Cassette belt:
   i. Hold the rear roller tensioner pulley away. Remove the rear roller belt (Fig. 14D).
   ii. Loosen the cassette tensioner pulley from its backplate [9/16" spanner] (Fig. 14C).
   iii. Hold the cassette tensioner pulley away. Remove the belt and replace (Fig. 14D).
   iv. Adjust the tensioner pulley to add tension to the belt and tighten. Tension is tested by twisting the belt between thumb and forefinger. Achieve a twist between 70–90° (Fig. 14I). Re-adjust the tensioner pulley if necessary, making more or less contact to achieve these values. Tension may also change based on age of the machine and belt wear (if re-adjusting).
   v. Refit/replace rear roller belt - see step 5.
7. Secure 4 x hex screws of the top drive cover [10mm spanner] (Fig. 14B).

8. Secure 2 x outer screws of the side drive guard [slotted screwdriver] (Fig. 14A).
9. The machine is now ready for use.

Fig.14 - Drive belt replacement / tensioning

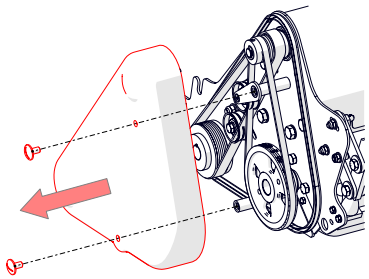


Fig.14A - Remove 3 x outer screws and cover.

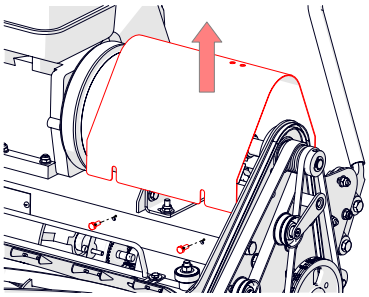


Fig.14B - Remove the top drive cover screws and remove cover.

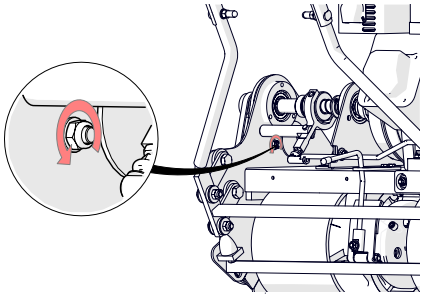
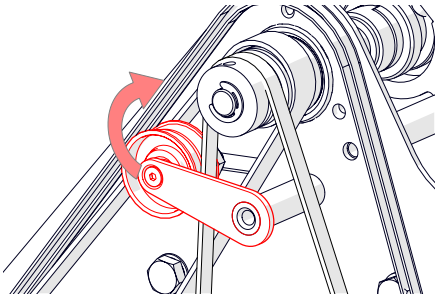


Fig.14C - Loosen rear roller tensioner pulley.



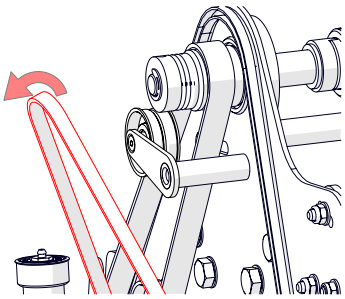


Fig.14D - Move the rear roller tensioner away and remove/replace the belt.

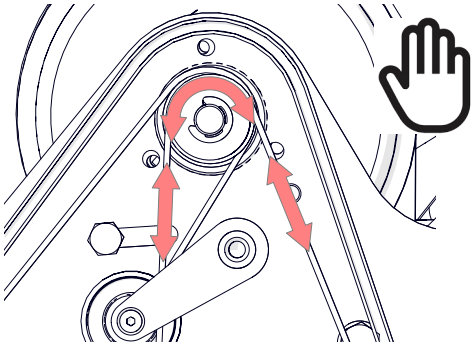


Fig.14F - Check correct tension by moving the pulley by hand.

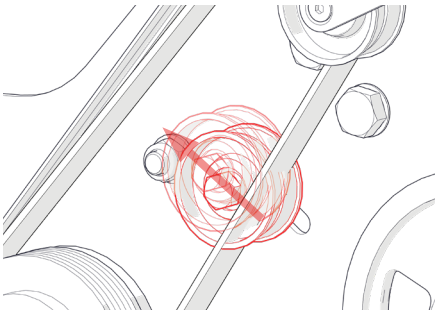


Fig.14G - Loosen the tensioner pulley.

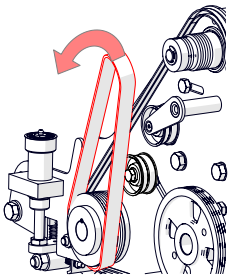


Fig.14H - Remove and replace the belt.

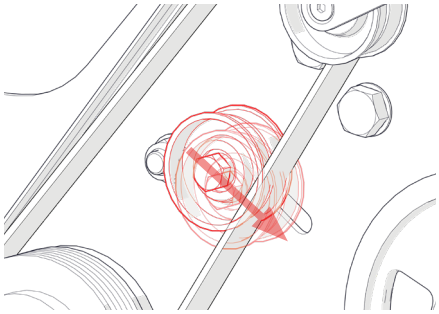


Fig.14I - Adjust the pulley to add pressure to the belt.

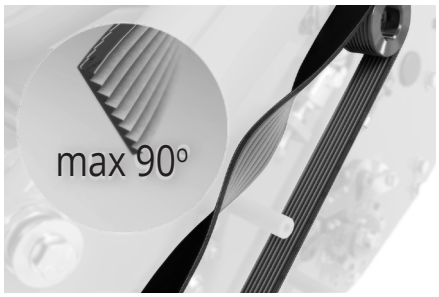


Fig.14J - Correct pressure achieved when the belt twists 90º.

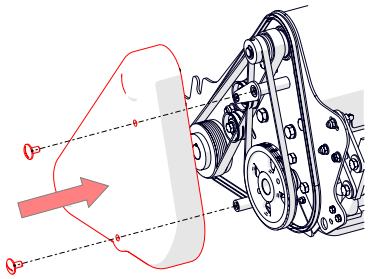


Fig.14K - Reattach cover.

4.2.2. Backlapping

Cutting blades will become blunt over time, producing an inferior quality of cut. Backlapping is the method of sharpening both the cylinder and shear blade simultaneously using a grinding compound while manually running the drive in reverse. This maintains a sharp edge on the blades to prolong their life, however it is not a substitute for a true grind. Do ***not*** backlap on damage blades or those beyond repair.

Grinding paste is required to achieve the sharpening of the blades. Three grit types are commonly available (80/120/220 grit) - the type chosen should be based on blade number, wear and expected use.

WARNING - BACKLAPPING

- ***Always*** **wear suitable PPE, including eye protection and gloves.**
- ***Always*** **use a long handled brush. This minimises risk of close contact with the spinning cylinder.**
- **Backlap in a suitable area where the paste can be washed away afterwards. The paste can splatter so ensure a distance is maintained around the machine.**

Tools required:

- Long handled brush
- Back lapping paste
- Backlap drive adaptor (p/n 229571)
- Speed brace /drill (1/2" drive)

1. Turn the machine ***off***. Remove the cassette from machine (see ***"3.5.1. Removing and Inserting a Cassette" p.27)***.
2. On a level surface, place the cassette on its back, with the shear blade pointing upwards.
3. Apply a small amount of grinding paste along the whole length of each blade using a

long handled brush (Fig. 16A).

4. Insert the backlap drive adaptor into the cassette drive coupling.
5. Using a suitable brace or drill, rotate the cylinder clockwise causing a grinding action with the shear blade (Fig. 16B). This should be continued until a sharp lip is achieved on the leading edge of each cylinder blade. This may take a few minutes - stop periodically to check the edge and reapply paste as necessary.

   Note: rotating the cylinder clockwise is opposite to the normal operation of the machine. This may cause the drive coupling to become unscrewed. If this occurs, chock the cylinder with a piece of wood or similar, and tighten the drive coupling [Left hand thread].

6. When backlapping is complete, all grinding paste must be cleaned off the cylinder. This can be achieved with a low powered hose or a sponge and bucket of water. Failure to clean thoroughly will result in accelerated wear while cutting.
7. Return the cassette to the machine. The machine will now need the shear blade adjusting to account for the change to the cylinder, ***"4.3.2. Shear Blade Adjustment" p.47.***

Fig.15 - Backlapping

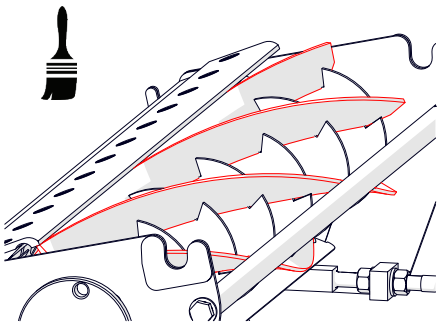


Fig.15A - Apply paste to the blades

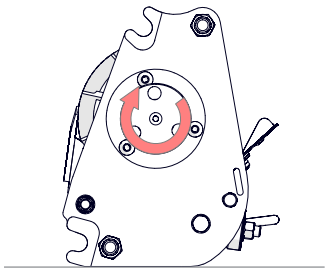


Fig.15B - Rotate the cylinder clockwise

4.2.3. Grinding Cutting Blades

Grinding, as with backlapping, restores the sharp edge of the blades, allowing for a clean, precise cut. Grinding is highly recommended to maintain optimal performance and extend the life of the cutting cassette. However unlike backlapping, this method creates an 'as new' sharp edge, rather than a temporary honed one.

Grinding is recommended when paper does not cut cleanly from the shear blade test (see ***"4.3.2. Shear Blade Adjustment" p.47),*** or when backlapping does not achieve the sharp edge required (usually caused by the edge being rounded too far beyond the capabilities of backlapping). Grinding can also help restore the cylindrical shape of the cylinder, which without, would be seen in poor grass cutting quality and streak marks.

Two grinding methods are performed on our cutting cylinders - spin and relief. As standard, all Dennis cutting cylinders are spun ground, with those of eight blades or more having an additional relief grind. Relief grinding is the process of removing material from the back of each cylinder blade to create a slight angle (i.e. the 'relief').

This relief angle produces a number of benefits:

- Improved cutting quality.
- Increased efficiency: Relief ground cylinders have been shown to reduce the power required to achieve a cut, thereby reducing fuel consumption. This is achieved from

less friction between the cylinder and shear blade.

- Less wear between the cylinder and shear blade resulting in:
  i. Longer blade life for both cylinder and shear blades.
  ii. Less cylinder/shear blade adjustments.
  iii. Less backlapping maintenance.
- Longer service life of adjacent moving parts, such as bearings and gears.

Factory standard relief grind is 50% land area at 30 degrees (see Fig. 16). It is recommended to grind to these values.

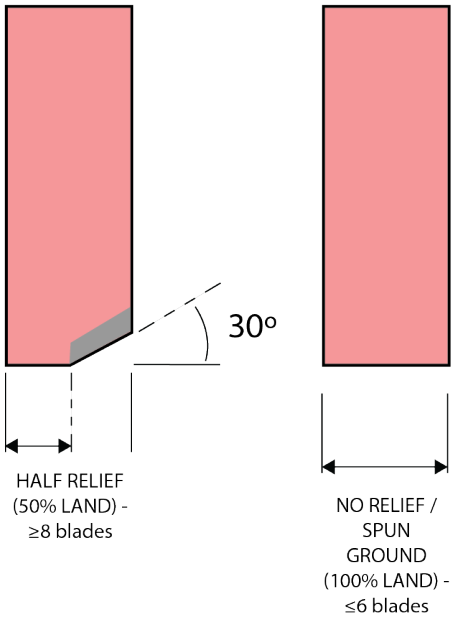


Fig.16 - Recommended cylinder grind angle

Shear blades also need to be ground, ideally at the same time as the cutting cylinder. It is important to include a relief grind as this helps present the grass at the correct height for cutting. Without this, using a flat or positive front angle can lead to inconsistent cutting heights and an uneven grass surface (see Fig. 18).

Factory standard is a front angle of -10º and top angle of -2º, as shown in Fig. 17.

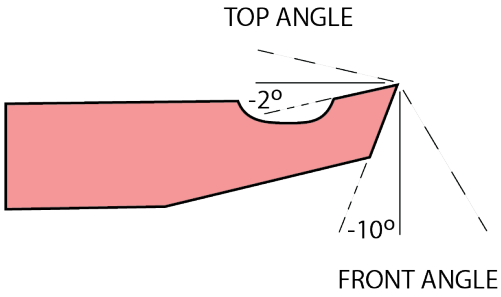
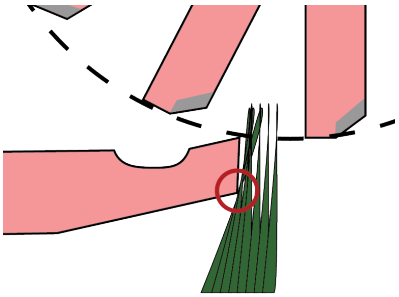
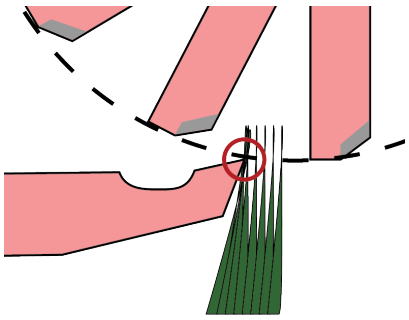


Fig.17 - Recommended shear blade grind angle



Flat front angle and too early contact.



Negative front angle and correct contact point.

Fig.18 - Illustration of two different shear blade angles and their grass contact point

For any method of grind, you must use a professional grinding service or dedicated grinding machine. Fail to do this may result in a far inferior cut and increased risk of injury.

4.2.4. Changing Rear Roller Oil

To replace the oil in the rear roller:

Tools required:

- Lifting jack, raised platform or another method to raise the machine
- Wooden chocks
- 1/4" or 6mm hex socket
- Oil tray (volume >0.5L)
- Oil absorbent pads
- Oil (grade EP90) - 100ml
- Oil funnel and tube, or similar

1. Turn the machine ***off*** and allow the engine to cool.
2. Chock the front rollers. Lift the rear of the machine enough to gain clearance for 8mm hex socket and oil tray.
3. Place oil absorbent pads down under the roller along with an oil tray.
4. Rotate the central roller until the drain hole is pointing upwards, between the brake and chassis (Fig. 19A & Fig. 19B).
5. Remove the tapered plug [1/4" hex socket]. Rotate the roller down and let the oil drain.
6. Once fully drained, rotate the roller upwards again, between the brake and chassis.
7. Fill the roller with the correct grade and quantity of oil using the funnel/tube or similar.
8. Insert the tapered plug. Remove the oil absorbent pads and trays and dispose of in a responsible manner.
9. Lower the machine. The machine is now ready for use.

Fig.19 - Rear roller oil

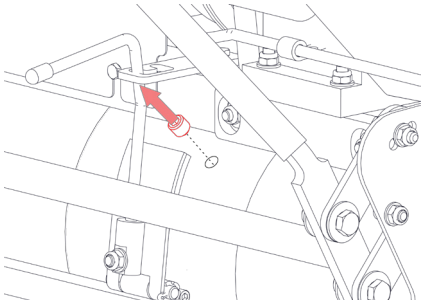


Fig.19A - Rotate central roller.

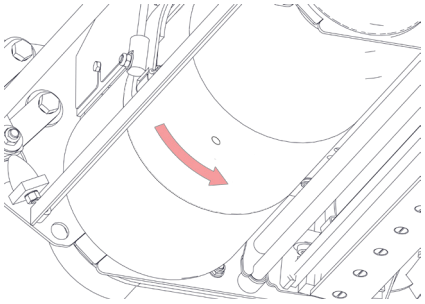


Fig.19B - Rotate roller so drain hole points downwards and oil drains.

4.2.5. Oiling Dog Clutch

The dog clutch transfers power from the centrifugal clutch drum to the cassette and rear roller pulleys. It is used via the cassette clutch rod and requires periodic oiling to prevent engagement issues. For operator convenience, two holes are located in the guard to provide direct access to oil the clutch. Apply 2-3 drops of multi-purpose oil (e.g. 3-in-one) in each hole according the schedule set out in ***"4.1. Maintenance Schedule" p.37.***

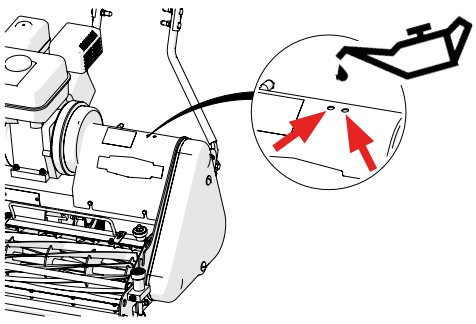
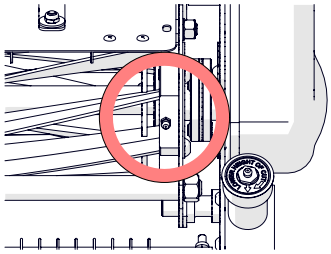
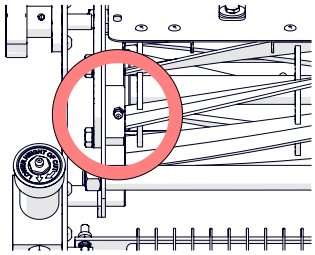
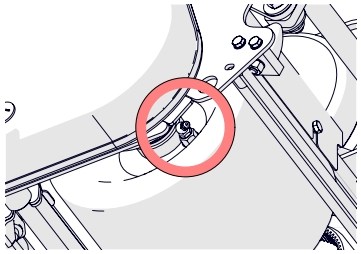
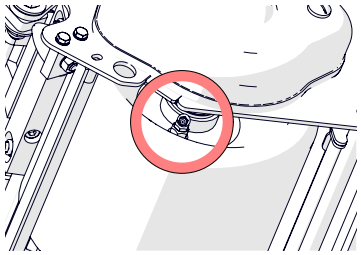


Fig.20 - Dog Clutch Oiling

4.2.6. Greasing points

Grease the following locations at the intervals stated. We recommend to use a grease gun with a multipurpose lithium EP2 grease.

Location		Frequency
Cylinder bearing, left side		Post-use
Cylinder bearing, right side		
Rear roller, left side (access from underneath)		Weekly
Rear roller, right side (access from underneath)		

4.3. Adjustments and Settings

4.3.1. Handlebar Height Adjustment

Tools required:

- 13mm spanner
- 19mm spanner

1. Turn the machine ***off***.
2. Choosing either side of the machine, locate the upper nut at the bottom of handlebar and loosen [13mm spanner] (Fig. 21A & 19B). Secure the pivot bolt while doing so [19mm spanner].
3. Repeat with the other side.
4. Remove the pivot bolt, washer and nut. Adjust the handlebar to the desired height, using one of the three adjustment holes and reinsert fixings.
5. When set, tighten both sides sufficiently [13mm and 19mm spanner].

Fig.21 - Handlebar adjustment

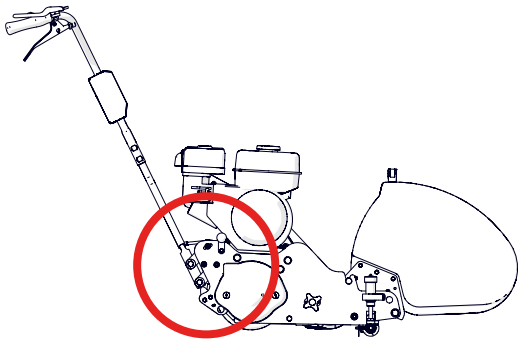


Fig.21A - Handlebar adjustment location.

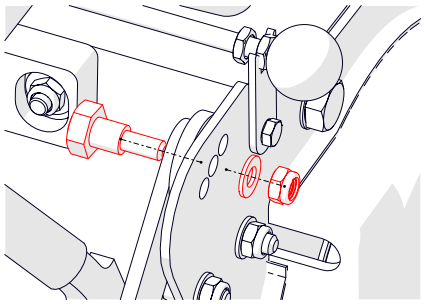


Fig.21B - Loosening the nut and bolt.

4.3.2. Shear Blade Adjustment

CAUTION - RISK OF INJURY

- ***Always*** turn the machine ***off*** before commencing this task.
- ***Always*** wear protective gloves to reduce risk of cuts and finger trapping.

Tools required:

- Scrap paper
- 9/16" spanner

1. Turn the machine ***off*** and disengage the cassette clutch rod.
2. Remove the grassbox and store to the side.
3. Tip the machine gently back so it rests on the rear roller and handlebar (Fig. 22A). Chock the rear roller to stop unintended rolling.
4. Choosing the left or right hand side of the cassette, test the cut by moving the cassette blade with a gloved hand and using a piece of paper between the cassette and shear blade (Fig. 22B). If it does not cut the paper, or does not cut cleanly, then adjustment of the shear blade is required - see step 5. If it does cut cleanly, repeat test on the other side before proceeding to step 5 if required.
5. Located at each end of a cassette are two shear blade adjusters. On the side being adjusted, loosen the lock nut [9/16" spanner] (Fig. 22C).
6. Manually alter the gap with the adjustment knob (Fig. 22D). Only very small adjustments are required - start with ⅛ of a turn and repeat the paper cut test. Repeat adjustment until the paper cuts cleanly.

NOTE - ADJUSTMENT DIRECTION

A sticker next to the adjuster informs of direction:

- ON = Decrease gap (i.e. cut 'on'),
- OFF = Increase gap (i.e. cut 'off').

7. Secure the lock nut.
8. Repeat step 6 on the opposite side.
9. Repeat the paper cut test on both sides. Adjust where necessary. Tighten the lock nuts.
10. Lift the machine gently up to rest on its front and rear rollers. Return the grassbox.
11. The machine is now ready for use.

NOTE - ORDER OF ADJUSTMENT

If planning on adjusting the height of cut at the same time, always adjust the shear blade first then adjust the height of cut. Doing the opposite way may result in a different height of cut.

Fig.22 - Shearblade adjustment

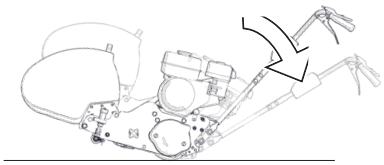


Fig.22A - Tip to rest of handlebars

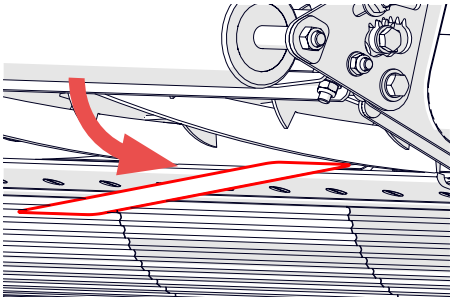


Fig.22B - Repeating adjustment for other side

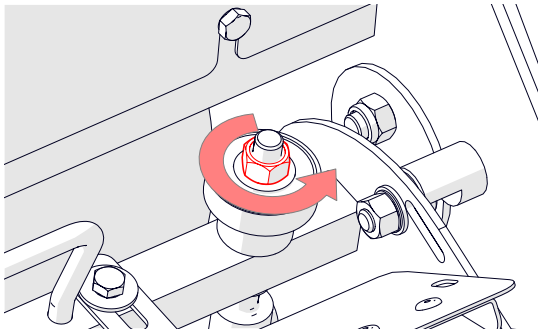


Fig. 22C - Loosen the lock nut

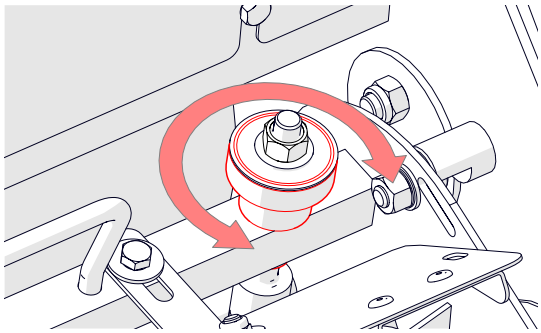


Fig.22D - Tighten/loosen the adjustment nut

4.4. Cleaning

CAUTION - WATER DAMAGE

Do *not* use a pressurised hose to clean your machine. Doing so may cause water ingress, damage and invalidate your warranty.

WARNING - SAFETY

***Never* place your hands inside the cassette area without firstly turning the machine *off*. We recommend to wear safety gloves and to use a long handled brush for cleaning.**

Use a soft brush to remove as much grass and debris as possible. If further cleaning is required:

- **Chassis** - Remove the grass box and tilt the machine backwards so it rests on the handlebars. Using a low pressure hose, wash all of the grass from under the machine and around the cassette. Take extra care around the bearings, avoiding direct contact with the hose. Dry thoroughly after use.
- **Engine** - Allow to cool for at least 30mins before cleaning. Do ***not*** use a hose or pressurised hose to clean as this can cause damage. Use a damp cloth and brush.
- **Grass box** - Use a low pressure hose to rinse the inside of the box. Leave upside down to drip-dry before returning back to the machine.

4.5. Handling and Transport

WARNING - LIFTING

Do *not* lift the machine as it does *not* have designated lifting points. Lifting the machine may result in injury, damage to the machine, or both.

- Use a ramp to aid the machine onto a vehicle. For the technical specification of the machine, please refer to ***"2.1. Technical Specifications" p.11.*** The weight can also be found on the serial number plate.
- Anchor the machine to the floor/pallet using suitably rated tie-down straps. Anchor around the front and rear tie-bars (highlighted red in Fig. 23).
- Transport with fuel emptied - see note.
- Turn the machine ***off*** during transport (both from the engine and control components on the handlebar).

NOTE - SHIPPING THE ENGINE

Legislation for transporting and shipping a machine with an engine vary country to country. In most cases the fuel tank and carburettor must be completely emptied before transport. Additional requirements may include certification, declarations and packaging requirements. Always follow the requirements for your country and destination.

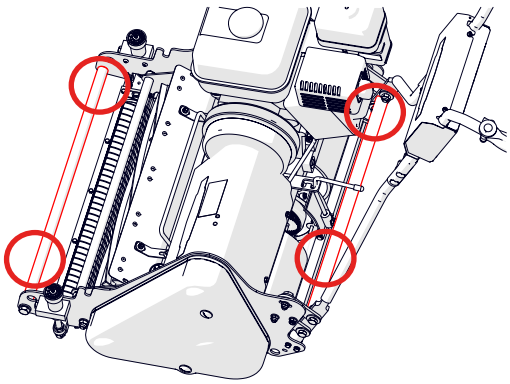


Fig.23 - Anchor points for transport.

4.6. Storage

Follow the points below for correct storage of your machine. For the storage of petrol, refer to the regulations of your country:

- Store in a location away from direct sunlight, flames, heat sources and areas with high shock/vibrations.
- Store in a location maintaining a consistent temperature of 0ºC to +30ºC and avoiding high fluctuations.
- Store in a location that is dry, preferably with a relative humidity of 75% or less.
- If storing for > 30 days, empty the fuel tank using a siphon pump. Over extended periods, petrol can degrade and absorb moisture, leading to engine and carburetor issues. See engine OEM 'Owner's Manual' for more information.
- Thoroughly clean and dry the machine prior to storage.
- Apply a small amount of grease to the cutting edge of the cylinder and shear blade. Use a small brush to achieve this.
- Store on a flat surface with the parking brake ***on***. Chock the front and rear of the machine.
- Cover the machine to protect from damage and dust.

NOTE - INCORRECT STORAGE

Legislation for transporting and shipping a machine with an engine vary country to country. In most cases the fuel tank and carburettor must be completely emptied before transport. Additional requirements may include certification, declarations and packaging requirements. Always follow the requirements for your country and destination.

4.7. Disposal

4.7.1. Machine Disposal

NOTE - DISPOSAL NOTES

Check and comply with all environmental regulations and local disposal guidelines.

Dispose of the product in an environmentally friendly manner. The machine is predominately made up from metal waste - these can be suitably recycled at a local refuse collection site.

CAUTION - INJURY

Take care when removing components from the machine. If done incorrectly it may cause injury to yourself or damage to the surrounding environment. Wear suitable PPE and dismantle in an appropriate area.

1. Take the machine to a suitable area to allow for the removal of parts. Take into account access to the machine, tool availability, oil and other contaminants.
2. Wear suitable PPE. This must include safety glasses and gloves as a minimum.
3. Place oil absorbent pads under and around the machine.
4. Safely drain all fluids from the machine and engine, including oil and fuel. Use appropriate containers to collect these fluids and clearly label with their contents.
5. Clean the machine thoroughly.
6. Detach any removable parts, such as the handlebar, bodywork, rollers and cassette.
7. Separate recyclable parts like metal, plastic and electronic. Recycle at a recycling facility.
8. Dispose of non-recyclable components in accordance with local waste disposal regulations.
9. Document the decommissioning process for record keeping.

4.7.2. Hazardous Materials

The engine contains petrol and oil which are classed as hazardous waste. Dispose of at a suitable recycling facility.

Other components to note include lubricating grease and roller bearing oil which may contaminate waste during recycling. The oil and grease should be removed prior to disposal with a suitable solvent or degreaser such as brake cleaner /denatured alcohol and wipes.

4.8. Troubleshooting & FAQ

WARNING - SAFETY

- **You *must* turn the machine *off* before actioning any cause. Failure to do so may cause major injury.**
- **Always wear suitable PPE for the job at hand.**

The most common troubleshooting issues are shown in Appendix C. If your fault is not shown or you are still experiencing problems, please contact Howardson Group directly.

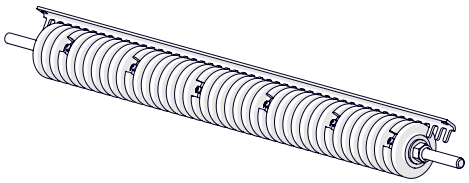
4.9. Warranty Policy

For full warranty terms and conditions, please contact your Dealer or refer to the warranty policy supplied separately.

Appendix A. Optional Items and Attachments

A1. Weile (Grooved) Roller

This option replaces the standard smooth front roller with a weile (grooved) roller. A weile roller has less surface area so the machine sits lower in the turf, allowing for the leaf blades to stand more upright in the grooves prior to being cut. This generally achieves a more consistent height and quality of cut. The grooves also help maintain better traction, so more suited to thicker turf, uneven ground and slopes.



However, a smooth roller distributes the machine weight more evenly provides and is therefore less aggressive on the turf. Use a smooth roller on well maintained level turf, or if your turf is stressed, recently aerated or in soft ground conditions.

To remove and swap the front roller:

1. Fully loosen both LH and RH height adjusters as far as they can go (Fig. 24A). This will allow the front roller, end blocks, comb tine and scraper bar to be removed as one from the machine (Fig.24B).
2. Remove the comb tine and scraper bar [10 mm spanner]. This will allow the end block to be removed (Fig.24C).
3. Assemble the end block and comb tine (if applicable) onto the weile roller.
4. Assemble the end block with weile roller back onto the machine, using the height adjusters to screw back in.
5. Perform cut-height adjustment ***"3.5.2. Adjusting Height of Cut (Cylinder)" p.28.***

Fig.24 - Front roller removal

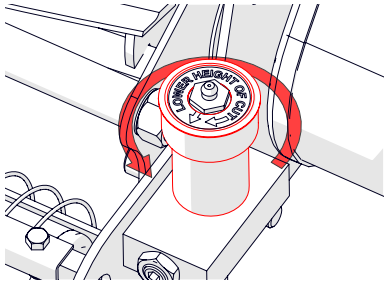


Fig.24A - Loosen height adjusters.

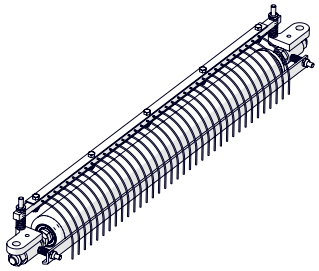


Fig.24B - Whole front roller assembly.

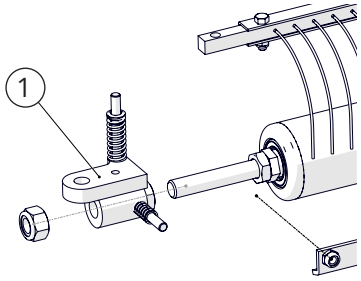


Fig.24C - Remove comb tine and scraper to gain access to end block (1).

Appendix B. Service Kit

The service kits below are available to be purchased to aid in the servicing of the machine:

Machine	Service area of machine	Kit number	Item description	Item part number	Qty
All	(SK02) - REAR ROLLER	SK02012	BEARING R18 2RS	J20454	2
			BEARING RLS8 2RS	J20455	1
			GRUB SCREW M8 X 8	J20467	2
			CIRCLIP INTERNAL 57 X 2	J20474	1
			CIRCLIP INTERNAL 54 X 2	J20475	2
			Roller Drive Belt	J209003	1
			TENSIONER PULLEY	J209047	1
			CSK CAP HEAD M6 X 25	SP01056	1
	(SK04) - HANDLES	SK04004	Throttle Cable	J20112	1
			Brake Band Cable	J20113	1
	(SK05) - DRIVE / POWER	SK05015	Roller Drive Belt	J209003	1
			Cylinder Drive Belt	J209005	1

Appendix C. Troubleshooting & FAQ

Issue	Possible Cause	Action
Engine won't start	[See OEM 'Owner's Manual']	[See OEM 'Owner's Manual']
Engine lacks power	[See OEM 'Owner's Manual']	[See OEM 'Owner's Manual']
Engine starts but stalls	1. Choke left in the 'closed' position after warm-up. 2. Dirty carburettor. 3. Blocked fuel line or filter. 4. Low oil level triggering shutoff.	1. Move choke to the 'open' position. 2. Clean carburettor. 3. Inspect and clean fuel system. 4. Check oil level.
Engine runs rough or misfires	1. Dirty or incorrect spark plug gap. 2. Contaminated fuel. 3. Air leak in intake system. 4. Clogged air filter. 5. Choke left in the 'closed' position after warm-up.	1. Clean or replace spark plug, check gap. 2. Drain and replace fuel. 3. Inspect intake gaskets and connections. 4. Clean or replace air filter. 5. Move choke to the 'open' position.

Issue	Possible Cause	Action
Grass does not cut.	1. Cutting height is higher than grass length. 2. Gap between cylinder and shear blade is too much. 3. Cylinder and shear blades not sharp.	1. Adjust cutting height so it is below current grass height. 2. Adjust the shear blade - see ***"4.3.2. Shear Blade Adjustment" p.47.*** 3. See ***"4.2.2. Backlapping" p.42.*** If backlapping not sufficient, remove and re-sharpen using professional grinder/services.
Cassette keeps spinning with the clutch rod in the 'disengaged' position.	1. Cassette belt tension incorrect. 2. Top drive mis-alignment from the engine output shaft.	1. Re-tension cassette belt. See ***"4.2.1. Cassette and Drive Belt Replacement/Tensioning" p.40.*** 2. With a hammer, gently tap the top drive pulley towards the engine.
Cassette does not spin with the lever in the 'engaged' position.	1. Cassette belt tension incorrect. 2. Top drive mis-alignment from the engine output shaft. 3. Clutch rod not adjusted correctly.	1. Re-tension cassette belt. See ***"4.2.1. Cassette and Drive Belt Replacement/Tensioning" p.40.*** 2. Inspect the dog drive and adjust where required. 3. Inspect the clutch rod and adjust where required.
OPC will not disengage when released	1. Check the OPC operates freely and no damage to pivot block.	1. Service/replace OPC if faulty.

Page intentionally left blank.

Page intentionally left blank.

Proudly part of Howardson Group Ltd

DENNIS

Email
sales@howardsongroup.com

UK & International
Tel: +44 (0) 1332 824777

Head Office
Ashbourne Road, Kirk Langley,
Derby DE6 4NJ, UK