RIVENDELL

PROTEA GROOMERS

OWNER'S HANDBOOK

English Version

FROM SERIAL NOS:

MODEL 510Groomer: 267157
MODEL 630Groomer: 212357

HANDBOOK: Groomer Version 1.2

ISSUE: 1st.January 2008

EC DECLARATION OF CONFORMITY

RIVENDELL PROJECTS LIMITED
THE GRANGE
SUTTON-CUM-GRANBY
NOTTINGHAMSHIRE
NG13 9QA
ENGLAND

Declares that the scarifier:

Manufacturer:	Protea Turf Equipment cc, 32, Shaft Road, Knights, Germiston, 1400 Gauteng, Republic of South Africa
Machine Type No.	510 Groomer fitted with Robin EX13 Engine
Category:	Pedestrian Scarifier
Engine - Manufacturer:	Fuji Heavy Industries Ltd.
- Speed of rotation:	3,000 min^{-1}
Width of cutting device:	457mm
Speed of rotation of the cutting device:	1,385 min^{-1}
Measured sound power level:	95 dB (L_{WA})
Guaranteed sound power level:	98 dB (L_{WA})

Complies with the provisions of Directive: 98/37/EC Essential Health & Safety Requirements Relating to the Design & Construction of Machinery and Safety Components.
Also Directive 89/336/EEC amended by 92/31/EEC Electromagnetic Compatibility.
Also Directive 2000/14/EC Noise emission in the environment by equipment for use outdoors. (ANNEX V)

Standards Used: EN292, EN13684, ISO11094 & ISO3744

Authorised Signatory:

Signed

KEITH JOHN COLLINGWOOD
DIRECTOR

Date: 4th. May 2007

Declared at and Technical File retained at:
THE GRANGE
SUTTON-CUM-GRANBY
NOTTINGHAMSHIRE
NG13 9QA
ENGLAND

VIBRATION INFORMATION

RMS acceleration measured in 3 - axes at operators contact position on the handlebars 3.8 ms^{-2}, measured in accordance with EN13684 Annex E

NOISE AT OPERATOR EAR

84 dB (L_{PA}), measured in accordance with EN13684 Annex C & ISO11201

EC DECLARATION OF CONFORMITY

RIVENDELL PROJECTS LIMITED
THE GRANGE
SUTTON-CUM-GRANBY
NOTTINGHAMSHIRE
NG13 9QA
ENGLAND

Declares that the scarifier:

Manufacturer:	Protea Turf Equipment cc 32, Shaft Road, Knights, Germiston, 1400 Gauteng, Republic of South Africa
Machine Type No.	630 Groomer fitted with Robin EX13 Engine
Category:	Pedestrian Scarifier
Engine - Manufacturer:	Fuji Heavy Industries Ltd.
- Speed of rotation:	3,000 min^{-1}
Width of cutting device:	597mm
Speed of rotation of the cutting device:	1,385 min^{-1}
Measured sound power level:	94 dB (L_{WA})
Guaranteed sound power level:	98 dB (L_{WA})

Complies with the provisions of Directive: 98/37/EC Essential Health & Safety Requirements Relating to the Design & Construction of Machinery and Safety Components.
Also Directive 89/336/EEC amended by 92/31/EEC Electromagnetic Compatibility.
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NG13 9QA
ENGLAND

VIBRATION INFORMATION

RMS acceleration measured in 3 - axes at operators contact position on the handlebars 3.9 ms^{-2}, measured in accordance with EN13684 Annex E

NOISE AT OPERATOR EAR

83 dB (L_{PA}), measured in accordance with EN13684 Annex C & ISO11201

CONTENTS

1. INTRODUCTION

Thank you for purchasing your Protea Groomer. The following pages are designed to help you gain safe and efficient service from your machine.

IMPORTANT: This Owners Handbook should be regarded as part of the machine as it gives essential information regarding machine safety, operation, maintenance and specifications. Read and understand this handbook prior to operating your Groomer for the first time. Make sure you are familiar with all the controls and points of regular maintenance.

If you have any doubts, consult your Rivendell authorised dealer or Rivendell Projects Limited, either of which will be pleased to give you assistance.

The contents of this handbook apply to the following Protea products:

510 Groomer **610 Groomer**

Where specific instructions apply to a particular model, these are clearly marked.

The Protea Groomer is designed only for use on high quality level turfed areas and lawns, where accurate light scarification is required. The Normal Operator Position is in a standing or walking position behind the machine with both hands gripping the top section of the handles, as shown in this illustration:

Fig 1

Use in any other way is considered as contrary to the intended use. Compliance with and strict adherence to the conditions of operation, service and repair as specified in this handbook also constitute essential elements of the intended use.

This machine should be operated, serviced and repaired only by persons who are familiar with its particular characteristics and who are acquainted with relevant safety procedures. The safety precautions listed herein and all other generally recognised regulations relating to safety must be observed at all times.

All Protea machines are robustly constructed and designed for efficient economical performance under normal operating conditions. Correct operation and maintenance will ensure a long and satisfactory service life. Prior to despatch from the factory every effort is made to ensure your machine arrives in perfect condition.

If you have purchased through an authorised dealer, please allow him to familiarise you with the controls and safety features of the machine during installation: otherwise please ensure you are familiar by studying the contents of this manual prior to use.

Throughout this handbook all references to left hand and right hand are as viewed from behind the handles, facing in the direction of forward travel.

This owners handbook is based on information available at the time of publication.

Rivendell Projects Limited reserves the right to make changes at any time without notice.

LOCATION OF KEY COMPONENTS

Viewed from the front of the machine:

Fig 2

1	Engine Speed Control
2	Handles Top Section
3	Operator Safety Control
4	Drive Control Lever
5	Engine Start Handle
6	Engine On/Off Switch
7	Rear Roller (not visible)
8	Rear Roller Height Adjuster
9	Deflector
10	Cutting Reel
11	Front Roller
12	Safety Guard
13	Grassbox Mounts (LHS)

ARRANGEMENT OF CONTROLS

Viewed from the front of the machine:

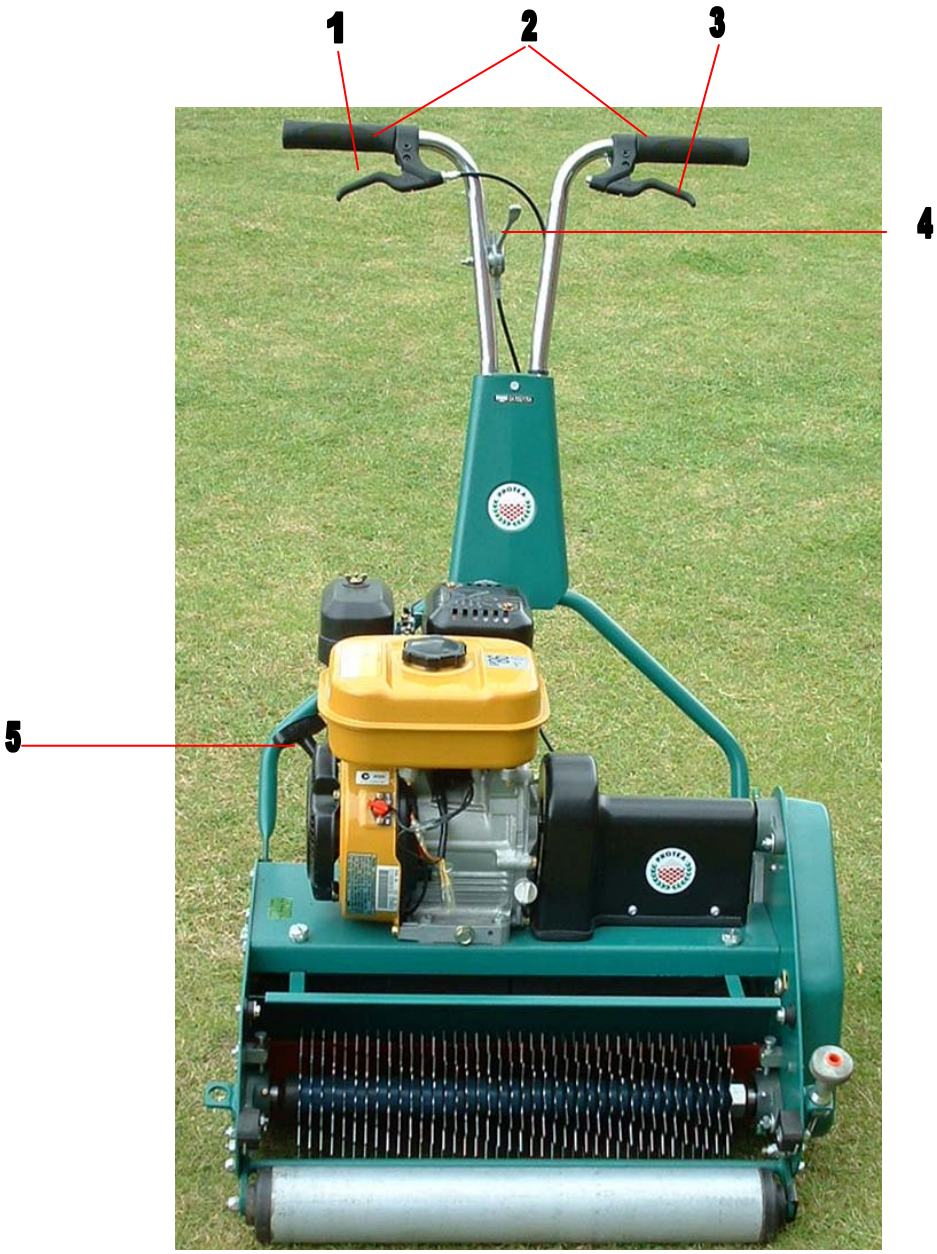

Fig 3

1	Drive Control Lever
2	Handles Top Section
3	Operator Safety Control
4	Engine Speed Control
5	Engine Start Handle

2. WARRANTY

Rivendell Projects Limited warrants to the original user/purchaser that this unit shall be free from defects in material and workmanship under normal use and service for a period of one year from the date of purchase. To qualify for the full benefit of this warranty, the warranty registration form must be completed and returned to Rivendell Projects Limited within 60 days of purchase. Subject to the conditions and exclusions noted in this limited warranty we shall, at our option, repair or replace any warranted part during the applicable period. The manufacturers of the engine furnish their own warranty and their services are provided through the Rivendell Authorised Dealer network. If you are in doubt or experience any difficulty concerning either warranty, please consult a Rivendell Authorised Dealer for clarification.

This warranty does not apply to those items which are subject to normal wear and tear e.g. blades, rollers, clutches, cables and other consumable wearing parts, warranty of which is strictly limited to manufacturing defects.

This warranty does not apply to any unit that has been tampered with, altered, misused, used for hire or commercial reward or not properly maintained adjusted and serviced in accordance with the recommendations in this Handbook, and will become invalid if any parts, which are not genuine Protea parts, are fitted. This warranty does not cover minor mechanical adjustments unless they are due to defective material or workmanship. Consult the Owner's Handbook or a Rivendell Authorised Dealer for assistance when making these adjustments.

To make a warranty claim, return the unit to your original supplier along with proof of purchase stating the machine serial number and date of purchase. Subject to the conditions and exclusions in this limited warranty, we or the authorised dealer will, at our option, repair or replace any warranted part within the duration of the warranty period.

This limited warranty gives you specific legal rights and is in addition to any statutory rights to which you may be entitled and your statutory rights are not affected by this warranty. If you need additional information concerning this written warranty, or assistance in obtaining services, please write to the sole official European Distributors:

Rivendell Projects Limited, The Grange, Sutton-cum-Granby, Nottinghamshire NG13 9QA, tel. 01949-851420

or by email to: service@rivendell-projects.co.uk

3. SAFETY PRECAUTIONS

 THIS SYMBOL MEANS BE ALERT! YOUR SAFETY IS INVOLVED.

WHEN YOU SEE THIS SYMBOL BE ALERT TO THE POSSIBILITY OF INJURY. CAREFULLY READ THE MESSAGE THAT FOLLOWS AND INFORM OTHERS. EXERCISE GREAT CARE AND FOLLOW THE ADVICE GIVEN TO AVOID POTENTIALLY HAZARDOUS SITUATIONS.

Your Protea Groomer is perfectly safe if used correctly. Failure to observe the following simple precautions may result in serious injury.

Training

 Read the instructions carefully. Be familiar with the controls and the proper use of the equipment.

 Never allow children or people unfamiliar with these instructions to use the machine. Local regulations can restrict the age of the operator.

 Never operate the machine while people, especially children, or animals are nearby.

 Keep in mind that the operator or user is responsible for accidents or hazards occurring to other people or their property.

Preparation

 While operating, always wear substantial footwear and long trousers. Do not operate the equipment when barefoot or wearing open sandals.

 Thoroughly inspect the area where the equipment is to be used and remove all objects which can be thrown by the machine.

 WARNING — Petrol is highly flammable:

- — store fuel in containers specifically designed for this purpose;
- — refuel outdoors only and do not smoke while refuelling;
- — add fuel before starting the engine. Never remove the cap of the fuel tank or add petrol while the engine is running or when the engine is hot;
- — if petrol is spilled, do not attempt to start the engine but move the machine away from the area of spillage and avoid creating any source of ignition until petrol vapours have dissipated;
- — always use fresh fuel. Stale fuel can block the fuel system and cause leakage;
- — replace all fuel tanks and container caps securely;
- — replace faulty exhausts and silencers.

 Always ensure that the machine is in a safe operating condition. Frequently check all nuts, bolts and screws for tightness. Use only genuine Protea replacement parts.

SAFETY PRECAUTIONS (continued)

Damaged cutting reels and loose fixing bolts are major hazards. Before use, visually inspect the cutting mechanism to ensure that it is in good condition. A damaged cutting blade must be replaced immediately with a genuine Protea replacement part. Blades which are worn or slightly damaged should not be resharpened.

Please refer to the section titled "Maintenance."

Operation

Do not operate the engine in a confined space where dangerous carbon monoxide fumes can collect.

Operate only in daylight or in good artificial light.

Avoid operating the equipment on wet grass, where feasible.

Always be sure of your footing on slopes.

Walk, never run.

Exercise extreme caution when changing direction on slopes.

Do not operate on excessively steep slopes.

Use extreme caution when reversing or pulling the machine towards you.

Stop the engine if the machine has to be tilted for transportation when crossing surfaces other than grass, and when transporting it to and from the area to be scarified.

Never operate the machine with defective guards or safety devices.

Never start the engine with the clutch engaged.

Start the engine carefully according to instructions and with hands and feet well away from the blades.

Never pick up or carry the machine while the engine is running.

Reduce the throttle setting during engine shut down and close the fuel supply valve at the conclusion of operation.

SAFETY PRECAUTIONS (continued)

Do not change the engine governor settings or overspeed the engine. Operating an engine at excessive speed can increase the hazard of personal injury;

Do not put hands or feet near rotating parts while the machine is being operated;

Stop the engine and disconnect the spark plug lead:
— before checking, cleaning or working on the machine;
— after striking a foreign object. Inspect the machine for damage and make repairs before restarting and operating it;
— if the machine starts to vibrate abnormally (check immediately);

Stop the engine:
— whenever you leave the machine other than to empty the grassbox;
— before refuelling;
— before clearing blockages.

WARNING: THE REEL CAN CONTINUE TO ROTATE AFTER THE ENGINE IS SWITCHED OFF

Maintenance and storage

Keep all nuts, bolts and screws tight to be sure the equipment is in safe working condition.

Never store the equipment with petrol in the tank inside a building where fumes can reach an open flame or spark.

Allow the engine to cool before storing in any enclosure.

To reduce the fire hazard, keep the engine, silencer and petrol storage area free of grass, leaves, or excessive grease.

Inspect the machine frequently for wear or deterioration.

Replace worn or damaged parts for safety.

If the fuel tank has to be drained, this should be done outdoors.

Be careful during adjustment of the machine to prevent entrapment of the fingers between moving blades and fixed parts of the machine.

WARNING DECALS:

The following decals are displayed on the machine. Please read this section carefully and ensure you are familiar with the symbols and their messages.

 Warning - caution risk of danger - safety alert.

 Carefully read the operators manual before using the machine

 Danger of being hit by thrown objects

 Keep bystanders at a safe distance from the machine

 Stop engine and remove spark plug lead before performing maintenance or repair work

 Danger of severing toes or fingers in cutting mechanism.

Warning: the reel can continue to rotate after the engine is switched off

 Carefully read the operators manual before performing maintenance on the machine

4. SPECIFICATIONS

MODELS	**510 Groomer**	**630 Groomer**
Engine: Subaru Robin	EX13	EX13
Engine type	Air-cooled 4-cycle single cylinder, overhead camshaft	
Engine displacement	126cc	126cc
Maximum output (Manufacturer's rating)	3.2kW	3.2kW
Maximum engine speed rpm (Manufacturer's rating)	*4,000*	*4,000*
Maximum permitted engine speed in this installation	3,000	3,000
Fuel type	Premium unleaded petrol	
Fuel capacity	2.7 Litres	
Oil type	Automotive detergent oil, SAE 10W-30	
Oil sump capacity	0.6 Litres	
Working width mm	457	597
Cutting height mm	From -2 to +30	
Length mm ***	920	920
Width mm	675	795
Height mm	930	930
Dry Weight Kg ***	70	76

*** including grassbox

5. OPERATING INSTRUCTIONS

SAFETY NOTICE

Before using the machine, read this owners handbook carefully.

Pay particular attention to the safety precautions.

IMPORTANT – PREVENT ENGINE DAMAGE – KEEP MACHINE UPRIGHT

The machine must always be stored and used in the upright position. If the machine is tilted excessively, fuel and/or oil can leak and cause damage. Always follow these instructions:

1. **NEVER** tilt the machine rearwards when the engine is running except to raise the front roller slightly when turning. The engine manufacturer warns that it can suffer serious damage if tilted more than 27 degrees when running.

2. **ALWAYS** turn the fuel tap to the closed (horizontal) position before tilting the machine back to adjust the cutting height. If the fuel tap is in the open position, fuel can leak from the carburettor.

3. **NEVER** leave the machine tilted fully back on its handles, even when adjusting the height of cut with a setting gauge or straight edge. If the machine is left in this position, oil will flow from the sump to the cambox. If this occurs inadvertently **DO NOT ATTEMPT TO START THE ENGINE**, as oil will be drawn into the combustion chamber. Instead, stand the machine upright and leave for 30 minutes to allow the oil to drain back into the sump.

4. **ALWAYS** transport the machine in the upright position, i.e. both front and rear roller resting on a horizontal surface. The handles are designed to be folded if necessary during transportation to allow the machine to be carried in a vehicle with limited headroom.

If the machine must be tilted to gain access to the underside, the grassbox should be used as a support for the handles as shown in the following illustration:

5.1 STARTING THE ENGINE

5.1.1 BEFORE STARTING THE ENGINE

IMPORTANT - PREVENT ENGINE DAMAGE: The engine may be shipped without oil or petrol. The engine must be filled with the correct grade of oil and petrol before starting the engine. Always check the oil level before starting the engine.

Your Protea Groomer is equipped with an interlocking electrical safety system which disables the engine ignition circuit when the operator controls are set to certain combinations of positions. In addition, the Subaru Robin engine has a separate ignition cutout switch, which can prevent the engine from starting or running independently of the position of the operator controls.

The engine will stop and be prevented from starting if:

1) the engine cutout switch is set to “off” or, if fitted with the engine oil sensor, the engine oil is below the minimum safe level

OR

2) (a) the engine speed control is NOT at its slowest setting

AND

(b) the operator safety control is released.

Thus, the machine will only operate normally with the engine cutout switch “on” and the operator safety control held against the handle.

For operator convenience, the engine will continue to run (“tickover”) when the operator safety control is released provided the engine speed control is moved to its slowest setting. This enables the grassbox to be emptied safely without the need to re-start the engine.

5.1.2 STARTING THE ENGINE

Turn the fuel tap “on”: the tap is “on” when the lever is pointing downward.

Operate the engine cutout switch: the engine cutout switch must be set to the “on” position.

Close the choke lever on the engine. The choke is necessary to richen the fuel:air mixture when starting a cold engine. Operation of the choke is usually unnecessary when starting a warm engine.

Operate the operator safety control: Pull back the lever.

Operate the engine control lever: Move the lever about one-third of its travel towards the “fast” position.

Operate the engine start - grip: Stand behind the machine and maintain a firm hold on the handlebar to prevent the machine moving. Use your right hand to hold the engine start-grip and pull slowly until resistance is felt, then pull rapidly to crank the engine. When the engine starts carefully return the engine start-grip to the storage position.

Allow the engine to run for a few seconds, then open the choke lever slowly until the engine is running smoothly. Do not allow the engine to run for more than a few seconds with the choke lever closed. Reduce the engine speed to idle by moving the engine control lever.

If the engine does not start after 5 attempts refer to the engine handbook for assistance.
IMPORTANT: Prevent engine damage. Never pull the engine start-grip when the engine is running.

5.2 STOPPING THE ENGINE

Stopping the engine: release the operator safety control and move the engine speed control to increase engine speed. This operation will confirm that the safety cutout system is operating correctly. If the engine does not stop, move the engine speed control to its slowest setting, move the engine cutout switch to the "off" position and contact a competent person for assistance. **DO NOT** restart the engine until the safety cutout system has been checked and approved by a competent person.

Emergency stop: release the operator safety control.

Always turn off the fuel tap when mowing is finished. This will avoid petrol leakage and help prevent gumming when the machine is in storage. The tap is "off" when the lever is pointing horizontally.

5.3 ADJUSTMENTS PRIOR TO SCARIFYING

SAFETY NOTICE

WARNING - PREVENT ACCIDENTAL STARTING: Always stop the engine and disconnect the spark plug lead before cleaning, inspecting or working on the machine.

WARNING: PREVENT ACCIDENTS Before scarifying, thoroughly inspect the area where the machine is to be used and remove all stones, sticks, wires, bones and other foreign objects, which when contacted by the scarifying reel could become dangerous projectiles or cause damage. Inspect the area for hidden obstructions which when contacted by the cutters could risk health and safety or cause damage. Remember the location of these obstructions and ensure that you scarify around them.

CAUTION: Prevent engine damage - DO NOT use the machine on a slope greater than 30% (16.7 degrees).

5.3.1 HEIGHT OF CUT

CAUTION: Prevent damage - Always select a height of cut to suit operating conditions. Prevent transmission overload by running the engine at, or slightly below, its maximum speed. Do not attempt to scarify deeper than the recommended limit of 2mm below surface level. Do not allow blockages to occur – empty the grassbox before it fills and do not allow debris to overflow into the cutting reel. Never use the machine on long grass, i.e. greater than 12.5mm. high.

To adjust the height of cut (See Fig.4):

FRONT ROLLER

The height of cut of the machine is controlled by the adjustment of the front roller.
The machine cuts lower if the front roller is raised, or alternatively the machine cuts higher if the front roller is lowered.

HEIGHT ADJUSTMENT

WARNING – AVOID PETROL SPILLAGE – TURN OFF PETROL BEFORE TILTING MACHINE.

Adjust the front roller position by rotating the height adjustment knob (4) Fig.4. As an approximate guide, each complete turn of the height adjustment knob will raise or lower the cutting height by 1.25mm.

Before using the Groomer for the first time, set the cutting height exactly at ground level using a straight edge. Tilt the machine back using the grassbox as shown in Section 5 above. Place a metal straight edge under the machine at a tangent to the front and rear rollers. Holding the straight edge in place, turn the reel by hand, adjusting the front roller with the height adjustment knob until the reel just contacts the straight edge. Then turn the height adjustment knob clockwise two complete turns. This will set the cutting height at 2.5mm. As all greens differ, the best setting will now be determined by experimentation. Never adjust cutting height by more than 1.25mm without testing the result.

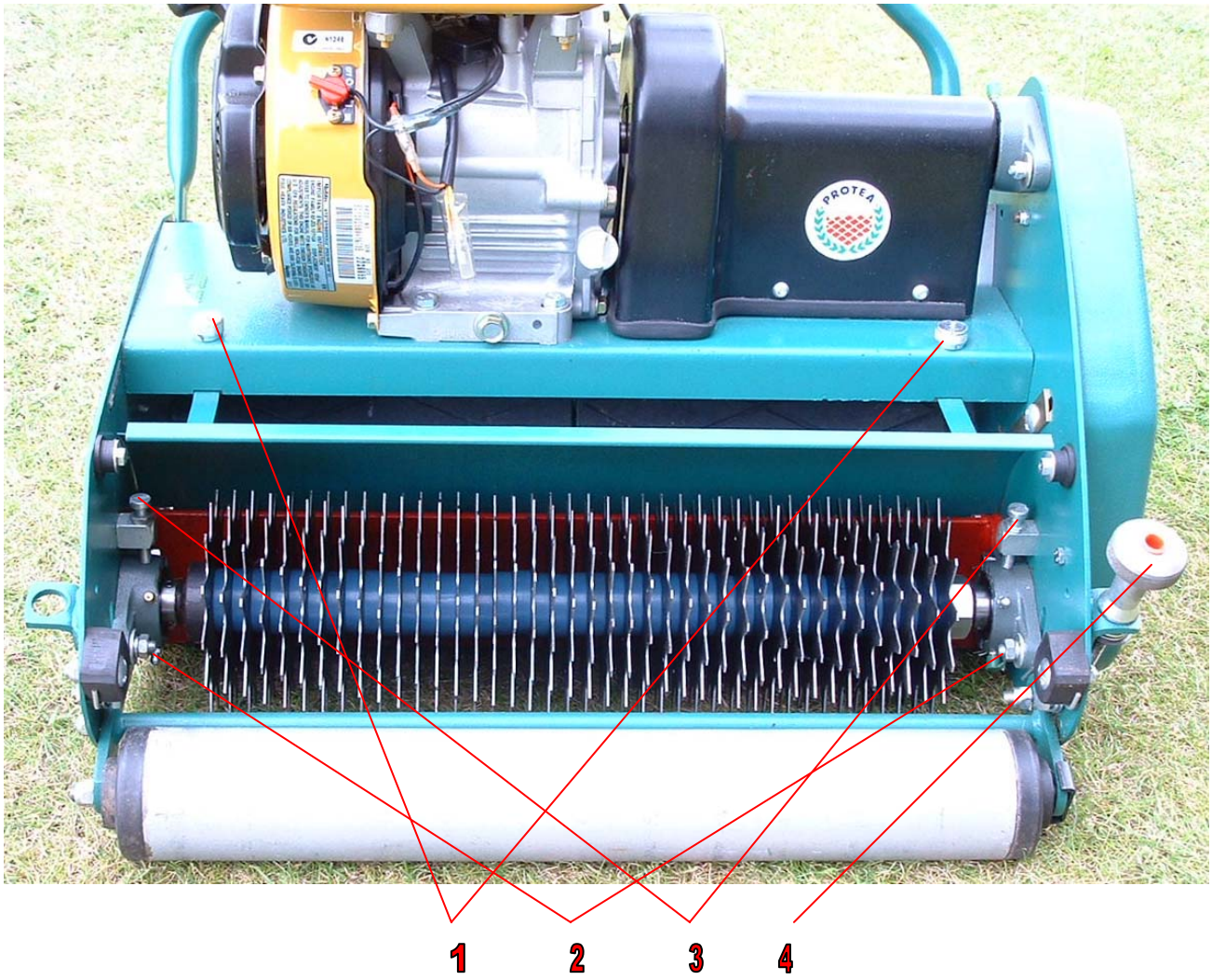

Fig.4

5.3.2 DEFLECTOR

Collection of material into the grassbox can sometimes be improved by altering the deflector. To adjust, loosen the adjustment set screws (1) Fig. 4, and by moving the deflector plate upwards, the throw will be higher, or downwards and the throw will be lower. After adjustment retighten the set screws. Prior to experimenting with different positions, a note of the original position should be made. Make small adjustments and note the effect of each until the desired result is achieved.

5.4 OPERATING THE MACHINE

The operator safety control must be held against the handlebar at all times during operation.

5.4.1 CUTTING

Move the engine control lever to set the required engine speed. The automatic clutch will engage and the grooming reel will rotate. Ensure the engine speed is sufficient to engage the automatic clutch fully before commencing operation.

Move the engine control lever to the slowest position to stop the rotation of the grooming reel. At low engine speeds the automatic clutch will disengage.

5.4.2 TRAVEL

Forward Travel: To cut without using the engine to drive the rear roller, push the machine forward. This is useful when scarifying small areas in tight spaces.

To use the engine to drive the rear roller, pull back the drive control lever.

Release the drive control lever to stop the machine from travelling in a forward direction

Speed Control: Travel speed can be altered by selecting a different position on the engine control lever. With the engine running and the drive control lever pulled back, moving the engine control lever will increase and reduce travel speed.

Reverse Travel: Release the drive control lever. Hold and pull against the handlebar with both hands to reverse the machine towards you.

WARNING - PREVENT ACCIDENTS : Always reverse the machine carefully towards you. Do not reverse with the drive control lever pulled back. Always switch off the engine before walking backwards with the machine. Always ensure your footing is sound. Reverse only on level ground. Never reverse on damp or wet grass or other slippery surfaces.

5.4.3 TURNING THE MACHINE

To make a wide turn : Steer the machine with the handlebar whilst travelling forward.
To make a tight turn : Reduce forward travel speed. Apply downward pressure on the handlebar to raise the front roller just above ground level and steer the machine using the handlebar in the required direction.

WARNING - PREVENT ACCIDENTS : DO NOT raise the front of the machine excessively when making a turn. NEVER raise the rear of the machine when the engine is running.

5.4.4 GROOMING WITH GRASS COLLECTION

The grassbox is designed to collect all the material removed from the surface during grooming. To achieve the best collection performance, groom or scarify only in dry conditions. Dependent on the nature of material removed, collection may be significantly impaired in wet or damp conditions. Wet moss and thatch can choke the grooming reel and place an excessive load on the engine and transmission. Do not allow the grassbox to overfill.

The grassbox can be emptied only by removal from the machine. CAUTION: When full, the grassbox is heavy and should be lifted and carried with care to avoid strain or injury.

 WARNING - PREVENT ACCIDENTS : ALWAYS ensure that the engine speed is at the lowest possible setting before releasing the engine stop lever and moving to the front of the machine to empty the grassbox.

5.4.5 GROOMING WITHOUT GRASS COLLECTION

This practice is strongly discouraged, as it can result in the spread of unwanted vegetation such as moss, and can result in the accumulation of large quantities of debris ahead of the Groomer with consequent overload.

5.4.6 HEAVY GROWTH

CAUTION: Prevent damage – do not use the machine to groom grass with a height greater than 12.5mm. Grass in excess of this height can choke the grooming reel and may place an excessive load on the engine and transmission system.

Areas of heavy growth are ofter accompanied by deep thatch and this should be removed in stages. First mow the area, reducing the height of cut and mow the area again as necessary until the required height is achieved. Set the Groomer to an operating height of 3mm above surface level and experiment with the results, gradually reducing the operating height until a modest amount of material is removed. Repeat this process over several grooming sessions, reducing the operating height gradually.

5.4.7 MOVING THE MACHINE ACROSS NON-GRASSED AREAS

All Protea Groomers are fitted with smooth steel rear rollers and should not be moved across hard surfaces. An optional wheeled cradle is available to enable them to be moved across non-grassed areas without damage to the rollers.

To use the cradle, first switch off the engine. Remove the grassbox from the machine and set it aside. Place the cradle behind the machine, touching the rear roller. Move to the rear of the machine, grip both handles and tilt it forwards whilst steadying the cradle with one foot. Pull the Groomer back over the cradle until the cradle is positioned between the rear roller and the soleplate. The welded tubes on top of the cradle are designed to fit this gap ahead of the rear roller. The machine can now be pushed forwards to the desired location. To remove the machine from the cradle, tilt it forward and push it until it is free of the cradle.

CAUTION: Prevent damage – do not leave the machine on the cradle without the grassbox attached, as it can fall backwards – see Section 5 above.

 WARNING - PREVENT ACCIDENTS: NEVER permit the engine to run when the machine is mounted on the cradle.

 WARNING - PREVENT ACCIDENTS: NEVER permit the engine to run when moving across non-grassed areas.

6. SERVICING INSTRUCTIONS

WARNING - PREVENT ACCIDENTS: DO NOT ATTEMPT TO CARRY OUT ANY OF THE PROCEDURES IN THIS SECTION UNLESS YOU ARE SUITABLY QUALIFIED.

THE PROCEDURES IN THIS SECTION SHOULD BE CARRIED OUT ONLY BY SUITABLY QUALIFIED MAINTENANCE ENGINEERS WITH APPROPRIATE TRAINING AND SUPERVISION AND WITH WORKSHOP FACILITIES.

WARNING - PREVENT ACCIDENTS: ALWAYS stop the engine, allow hot parts to cool and disconnect the spark plug lead before attempting to carry out cleaning or maintenance procedures on the machine.

6.1 ASSEMBLY INSTRUCTIONS

Your Rivendell Authorised Dealer will normally supply your new Protea Groomer fully assembled. Where machines are supplied directly, comprehensive assembly instructions are provided. If for any reason you wish to dismantle and reassemble the machine please follow the instructions in this section.

WARNING: ALWAYS keep machine in the upright position. NEVER tilt machine fully back on its handles or damage can occur. Refer to Section 5 of this handbook for more information.

6.1.1 HANDLE ATTACHMENT

Fig.10

Fig.11

Loosen the nut on the upper fixing bolt through the antivibration mounts on each side of the machine (1) Figs. 10 and 11, and pull the lower handle section back.

Carefully raise the upper handle section, taking care to keep the central plate away from the exhaust deflector. Ensure the clutch cable does not kink or become tight. Carefully feed the electrical connectors and cable through the gap between the handle sections so that the cable does not become trapped between the sections when the bolt is tightened (see fig.15). Fit the handle securing bolt (which is usually taped to the engine handbook cover) and tighten, using screwdriver and spanner.

Move the handles to the desired position on the antivibration mounts and retighten the upper fixing nuts to the bolts, checking tightness to ensure the fixings do not move in normal use (the handles are mounted flexibly and some free play is normal).

Visually check underside of machine to ensure no foreign bodies can impede proper operation. Wearing protective gloves, carefully turn the grooming reel to ensure it is free from obstructions and can rotate with slight resistance. Visually check correct fitting of all nuts and bolts. Using spanner set, check that all are securely fitted.

6.1.2 ENGINE SPEED CONTROL CABLE ATTACHMENT

Fig.14

All Protea Groomers are supplied with a high quality Magura engine speed control lever and cable which may be supplied separately to avoid transit damage. Correct installation is essential for reliable operation. If for any reason the lever and cable need to be installed or replaced, follow these instructions:

1. Check engine control mechanism is free from resistance by moving speed control lever on engine (refer to engine manual, inside front cover, fig 4 item 3). This lever should be free to move in both directions with very little resistance.

2. If lever offers resistance, using socket spanner loosen nyloc nut on pivot bolt until lever is completely free to move. The pivot bolt acts as the hinge to the lever and can be seen on top of the linkage between the air filter and the silencer. In Fig.14 it can be seen to the left of the cable cleat screw.

3. Check the engine speed control stop has not been screwed in. The screw is sited just in front of the speed control lever (see 1. above) and the threads should protrude no more than 8mm. To adjust, slacken the locknut, turn the screw and retighten the locknut.

4. Remove the nyloc nut and washer from the Magura lever and feed the bolt through the handle hole with the cable underneath and pointing towards the engine.

5. Using a screwdriver to hold the bolt in place and to prevent it turning, attach the washer and nyloc nut and tighten the nut until the lever is firmly attached to the handle. Check the lever moves freely, adusting the resistance by temporarily loosening the nyloc nut and turning the bolt slightly, then retighten the nut.

6. Move the lever back until a “click” is heard. Leave the lever in this position.

7. (Refer to Fig.14.) Partly unscrew the cable outer securing mount screw (2) Fig.14 and the cable cleat screw (1) Fig.14, sufficiently to allow the cable to be inserted through both holes as shown in Fig.14. Thread the cable through the outer securing mount and the inner wire through the cleat. The inner cable should slightly overlap the cleat. Tighten the cable cleat screw (1) Fig.14. taking care not to bend the inner cable.

8. Using slight forward pressure on the outer cable to ensure the engine control mechanism is fully closed, tighten the securing mount screw to secure the sheath.

9. Carefully move the Magura lever forwards and back several times to check the engine speed control operation. Check tightness of all fixings.

6.1.3 ELECTRICAL SAFETY SYSTEM CONNECTION

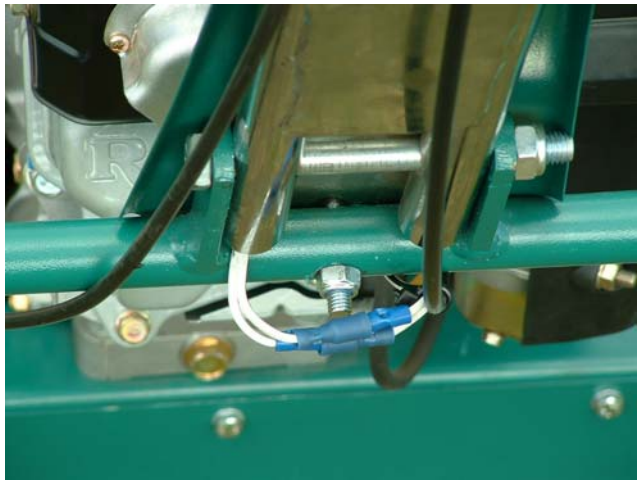

Fig.15

The electrical safety system should be connected by pushing together the two connectors until they snap into the locked position as shown in Fig. 15

6.2 MAINTENANCE

6.2.1 CLEANING

During a scarifying session debris may accumulate on or in the machine. When this occurs stop, switch off the engine and, observing the safety precautions in this handbook, remove all debris. Clean the machine as soon as possible at the end of every grooming session. Do not permit the machine to become clogged with debris.

GRASSBOX
Remove debris from the grassbox immediately after use and check its condition for signs of damage.

MACHINE FRAME AND CHASSIS COMPONENTS
Remove debris from the machine, using a small brush to reach into recessed parts.

IMPORTANT - PREVENT DAMAGE: Fertilisers and top dressings are particularly corrosive. Thoroughly clean the machine immediately after use on treated grass and store well away from corrosive materials.

6.2.2 ENGINE

Engine handbook: For details of engine maintenance refer to the engine operating and maintenance instructions handbook supplied with your machine.

IMPORTANT - Draining engine oil: To drain the engine oil, first drain fuel by operating the engine until the fuel tank is empty and the engine stops. Remove the spark plug lead and allow the engine to cool. Unscrew both engine oil filler plugs, mounted at front and rear of engine. Fit draintube to rear oil filler hole and to oil receptacle. Tilt machine rearwards by pressing down on handles.

WARNING – AVOID PETROL SPILLAGE – TURN OFF PETROL BEFORE TILTING MACHINE.

6.2.3 SECURING NUTS AND BOLTS

Regularly check that all securing nuts and bolts are tight.

Replace missing or damaged items immediately.

6.2.4 GROOMING REEL ALIGNMENT

The grooming reel is provided with height adjusters to enable it to be aligned accurately within the frame. It should be set to leave a 2mm gap between the tips of the blades and the soleplate. This allows debris to be collected efficiently whilst ensuring the reel does not contact the soleplate.

To adjust the reel, loosen the clamping bolts (2) Fig. 4, at each side. Using a ring spanner, slacken the adjuster locknut and hold whilst turning the adjuster with a screwdriver (3) Fig. 4, clockwise to lower the reel towards the soleplate. Retighten the locknut whilst holding the adjuster with the screwdriver.

Whenever the reel is adjusted, the cutter drive chain MUST be checked and adjusted to provide the correct amount of slack (see 6.2.5).

6.2.5 CHAIN TRANSMISSION

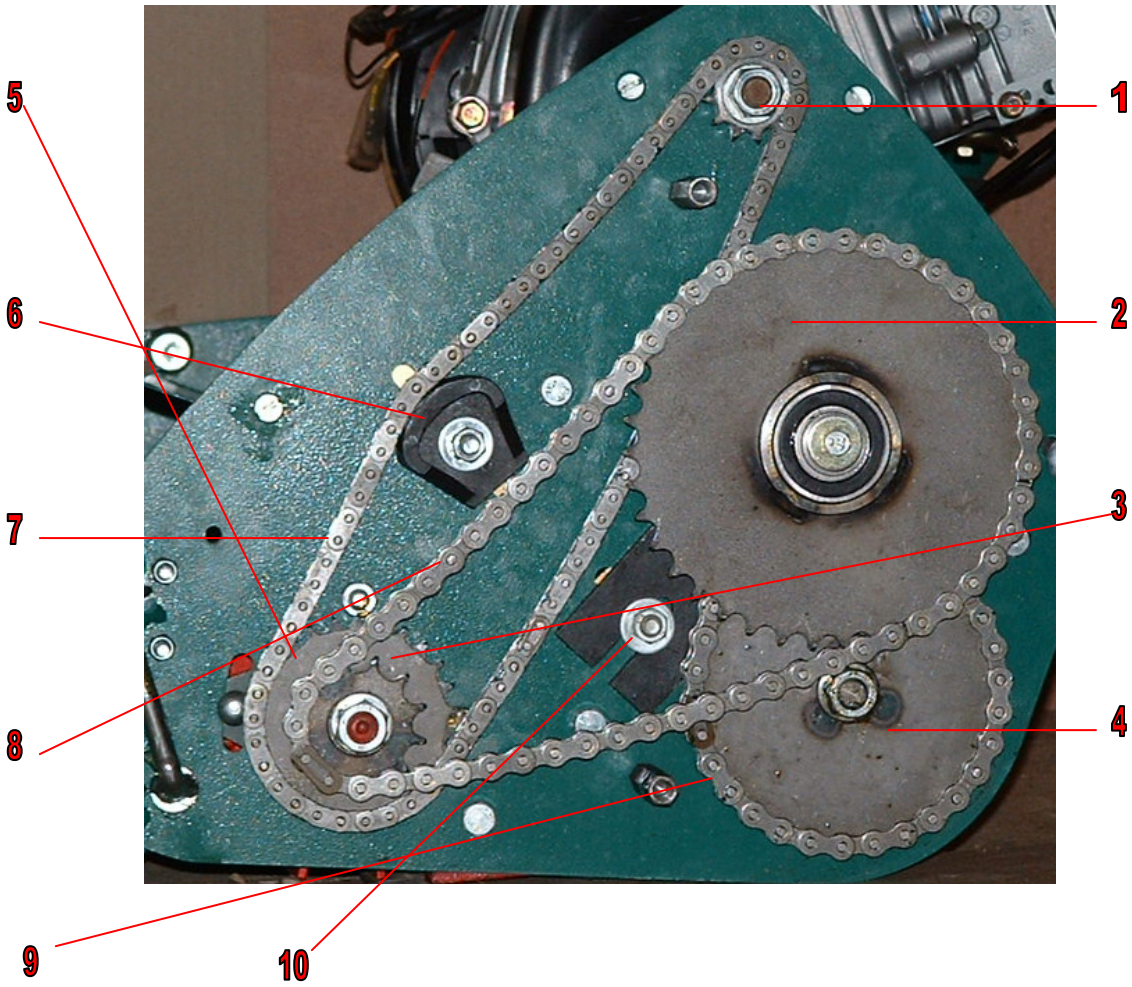

Fig.16

The cutter drive chain (7) Fig.16 is provided with a chain adjuster. It is not an automatic tensioner and requires regular inspection and adjustment (see 6.3 below). Whenever the reel is adjusted (see 6.2.7 below), the cutter drive chain MUST be checked and adjusted to provide the correct amount of slack.

To adjust this chain, remove the chaincase cover (3 bolts). Slacken the bolt securing the adjuster (6) Fig.16 and slide the adjuster up or down until the centre of the untensioned side of the chain is free to move about 12mm. Tighten the bolt, checking tension. Replace the chaincase cover.

The clutch and drum chains are adjusted simultaneously by moving the clutch sprocket (2) Fig.16.

To adjust these chains, remove the chaincase cover (3 bolts). Slacken the two bolts securing the adjuster ((10) Fig.16 and the second bolt behind the clutch sprocket) and slide the adjuster up or down until the centres of both chains is free to move about 8mm. Tighten the bolts, checking tension. Replace the chaincase cover.

6.2.6 DRUM AND COMPONENTS

The drums are manufactured from steel tube with welded ends. The bushes are greased at assembly and do not require further attention. On the right hand side frame of the machine (6) Fig. 4, provision is made to adjust the drum into alignment with the reel. This adjuster is aligned precisely during assembly and should only be used in the unlikely event that the reel is no longer level with the rear rollers, usually a result of the machine being dropped.

6.2.7 REEL REPLACEMENT

The grooming reel can be removed to permit the replacement of worn or damaged blades, to fit a brushing reel, or to convert the Groomer to a cylinder mower using the optional Protea conversion kit.

Firstly, remove the chain cover.

Loosen the chain adjuster (6) Fig.16 and take off the chain (7) Fig.16.

Loosen the cutter sprocket locknut (normal RH thread), and pull off the sprocket (5) Fig.16 from the keyed shaft (Take care not to lose the Woodruf key).

Loosen and remove the pivot bolts and clamping bolts on the RH & LH reel bearing housing.

The reel is now loose and can be pulled out

Pull off the 2 bearings on the reel, and slide them on to the new reel (the bearings are not tight – they will slide off easily). Now slide the new reel assembly back into the machine, fit and tighten the pivot bolts, clamping bolt and cutter sprocket

Adjust the reel downward against the soleplate, leaving a gap of 2mm, and lock it in that position. The height of cut, scarification or sweep is selected by adjusting the front roller up or down – refer to 5.3.1. Replace and adjust the cutter chain.

IMPORTANT - PREVENT DAMAGE: Always check and adjust the cutter drive chain before locking the chain adjuster. An excessively slack chain can cause it to “jump” on the sprockets and break. If the chain is taut, the chain adjuster and chain will show excessive wear after a short period of time, and it can also damage the clutch. A taut chain will always give an uneven cut. This applies especially to the cutting cylinder reel. An excessively taut chain will normally lift the cutting cylinder on the LH side (sprocket side).

Finally, replace the chain cover.

6.3 MAINTENANCE SCHEDULE

The following maintenance activities should be carried out at the earlier of the hourly or calendar intervals under normal conditions. Prolonged working under dusty or dry conditions, or where longer grass is cut, will necessitate shorter maintenance intervals.

Please note: the engine manufacturer provides a separate maintenance schedule in the engine handbook provided with your machine. Both schedules should be followed.

Always before commencing mowing:

- Check engine oil level
- Check fuel level
- Ensure machine is clean and free of debris
- Check correct operation of electrical safety system by releasing Operator Safety Control (see Fig. 3) when engine is first started and engine control lever is moved back – IF ENGINE DOES NOT STOP, DO NOT ATTEMPT TO USE THE MACHINE UNTIL IT HAS BEEN CHECKED AND CONFIRMED SAFE BY A COMPETENT PERSON.

Immediately following completion of cutting:

- Clean machine thoroughly, removing all grass cuttings and soil. Use a low-pressure water jet if necessary. Thoroughly dry all surfaces and spray with a water repellant anti corrosion product to protect metal components from rust.

IMPORTANT - PREVENT DAMAGE: NEVER use high pressure water jets or high pressure air to clean the machine. Use of high pressure fluid jets can force moisture or dirt past seals into bearings, resulting in rapid corrosion and consequent damage to bearings.

Every 30 hours or 6 weeks:

- Lubricate the following points with light oil:

  Clutch cable – both ends
  Height adjustment controls: remove red plastic plug, add oil to threads and replace plug
  .
- Apply chain wax or light oil to all three chainsets. Take care to avoid excess lubricant, as this may contaminate the clutch friction surfaces resulting in clutch slippage.

- Check all three chains are correctly tensioned and adjust if necessary (see 6.2.5).

- Check all controls operate smoothly without undue resistance, Clean, lubricate and adjust as necessary.

Every 60 hours or 12 weeks. In addition to above:

- Lubricate the following points with grease, using a grease gun:

  Rear roller bearings (2)
  Cutter bearings (2)
  Clutch shaft bearing

6.4 PREPARING THE MACHINE FOR STORAGE

Storage for periods in excess of 30 days:

Engines stored in excess of 30 days need to be protected as described in the engine manufacturers handbook. Please follow the instructions given in the engine handbook.

Clean grass and debris from the engine cylinder, cylinder head cooling fins, under top cowl, and around and behind muffler/muffler guard. Clean all other areas of the machine and ensure that the grassbox is clean.

Lubricate the machine with light oil, grease and chain wax as described in Section 6.3. Treat metal parts with a water repellent anti-corrosion product. Place the machine on a clean dry surface. Cover the machine with a protective sheet and store it in a dry, ventilated area.

CUSTOMER DATA – FILE COPY – DO NOT DETACH

This form is provided for the original customer to record the details submitted on the Customer Registration Form and should be completed and retained in the Handbook for future reference.

Model: _____

Serial No.: _____

Engine Serial No.: _____

Supplying Dealer Name: _____

Supplying Dealer Address: _____

_____

Date of Purchase: _____

Original Customer Name: _____

Original Customer Address: _____

_____

Customer Contact Details:

Name: _____

Telephone: _____

Fax: _____

E-mail: _____

7. PARTS LISTS

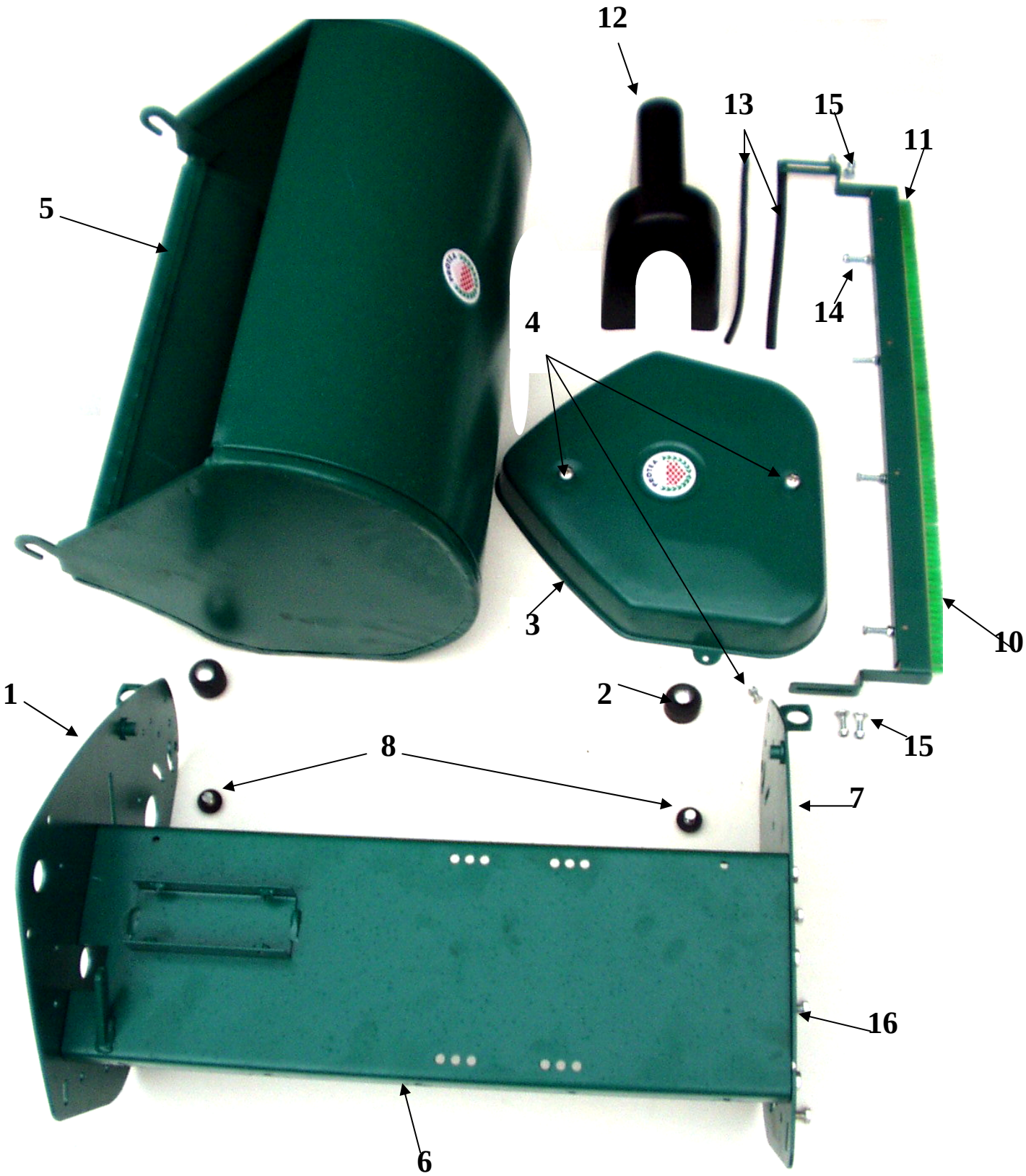

FIGURE 1 - CHASSIS

FIG.	ILLUS. NO.	DESCRIPTION	PART NO.
1	1	MOWER FRAME LH	455697
1	2	GRASSBOX SUPPORT RUBBER WITH M8 x 30 CUP SQUARE/NUT	453085
1	3	CHAIN COVER	455777
1	4	CHAIN CASE MOUNTING SCREWS + M6 x 10 BOLTS/NUTS	1191908
1	5	510 GRASSBOX ASSY	451290
1	5	630 GRASSBOX ASSY	458065
1	6	510 ENGINE TABLE	451338
1	6	630 ENGINE TABLE	458056
1	7	MOWER FRAME RH	455700
1	8	GRASSBOX ANTIVIBRATION MOUNTS	458085
1	9	SLOT COVER (NOT SHOWN)	458080
1	10	TEASING RAKE BRUSH	Not Applicable
1	11	TEASING RAKE ASSY	Not Applicable
1	12	CLUTCH COVER	350050
1	13	CLUTCH COVER SEAL	458150
1	14	TEASING RAKE BRUSH M6 x 25 C.S.K SCREWS/NUTS	Not Applicable
1	15	TEASING RAKE BRACKET M6 x 25 CUP SQUARES/NUTS	Not Applicable
1	16	FRAME M8 x 20 SCREWS/NUTS	Universal

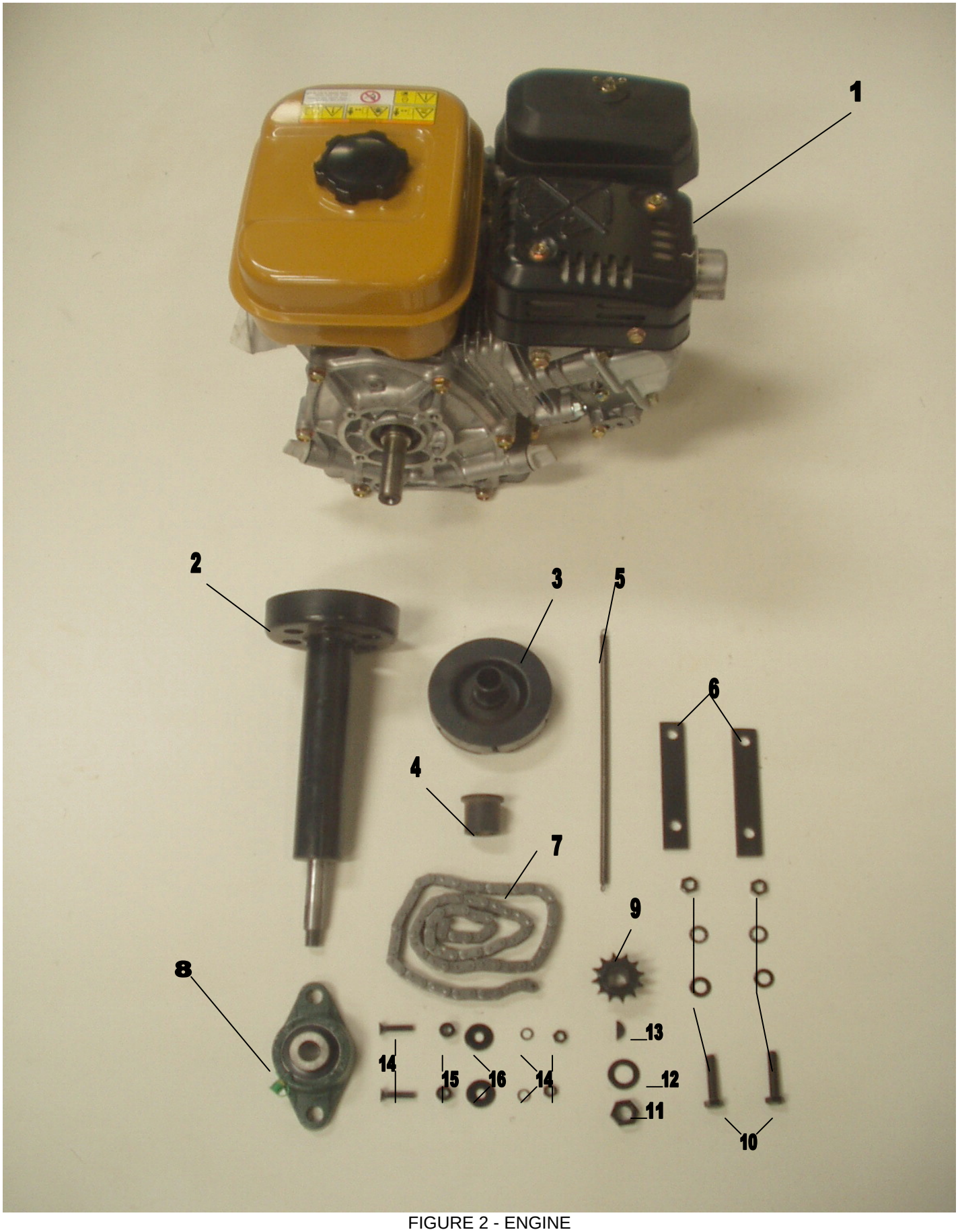

FIGURE 2 - ENGINE

FIG.	ILLUS. NO.	DESCRIPTION	PART NO.
2	1	ROBIN ENGINE 4 1/2 HP EX13	6200050
2	2	CENTRIFUGAL CLUTCH SHAFT	458168
2	3	CENTRIFUGAL CLUTCH BODY	6200450
2	4	CENTRIFUGAL CLUTCH SHAFT OIL LITE BUSH	3115997
2	5	CENTRIFUGAL CLUTCH TENSION SPRING	458040
2	6	ENGINE PACKING FOR ROBIN EY20 (NOT APPLICABLE TO EU MODELS)	458102
2	7	CLUTCH CHAIN 1/2"	2984806
2	8	CLUTCH SHAFT BEARING UCLF 202-15	1121200
2	9	CLUTCH SPROCKET 9T	453989
2	10	HEX BOLT M8 X 45	Universal
2	11	NUT 1/2" UNF	Universal
2	12	M12 WASHER	Universal
2	13	WOODRUF KEY NO.6	3802051
2	14	M6 X 25 COUNTER SUNK SCREWS	Universal
2	15	PILLOW BLOCK SPACING	458048
2	16	M6 X 22 X 2 FLAT WASHER	Universal
2	-	MICROSWITCH (NOT SHOWN)	1673000

FIGURE 3 - HANDLES

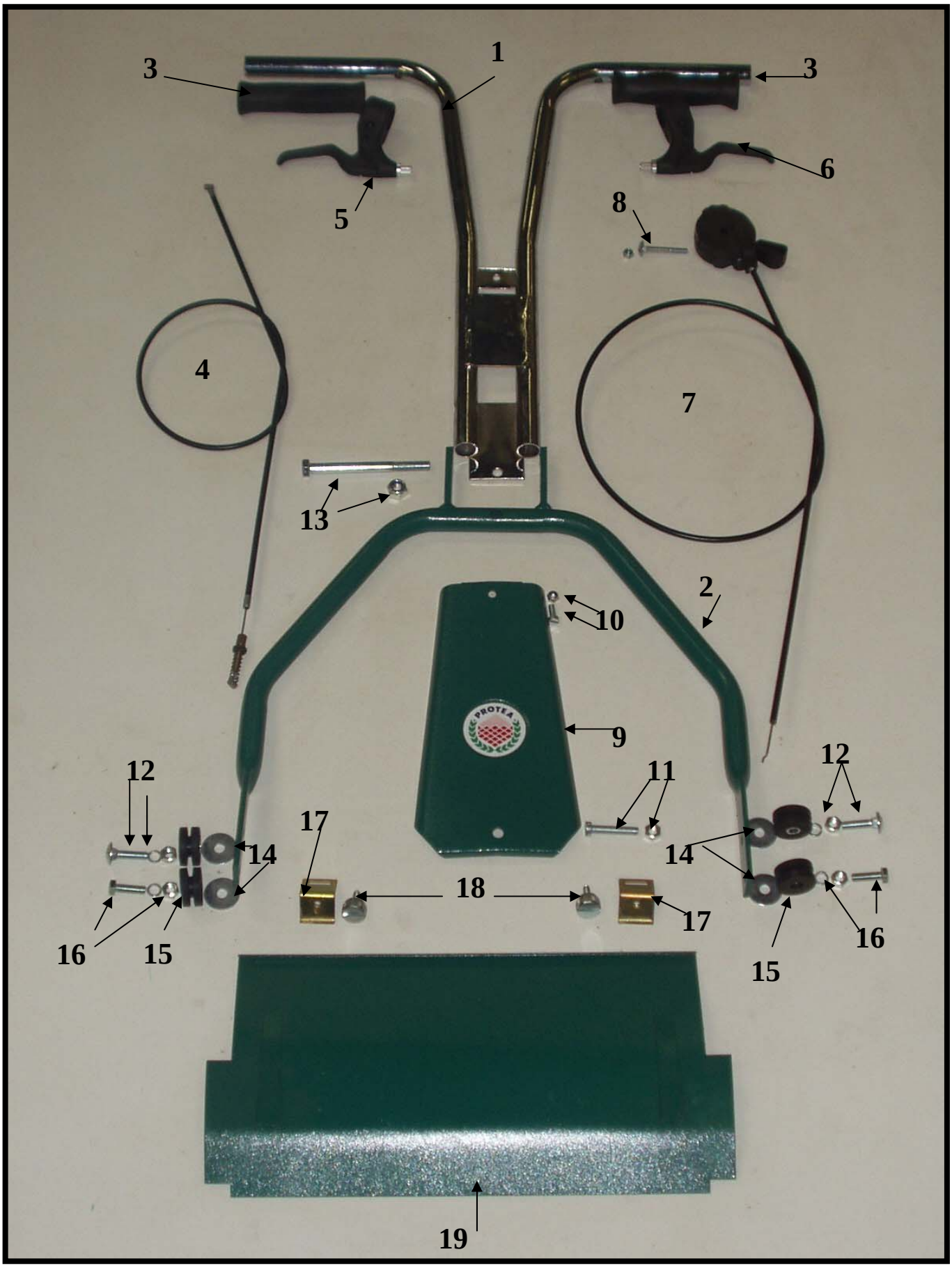

FIG.	ILLUS. NO.	DESCRIPTION	PART NO.
3	1	UPPER HANDLE ASSY	456375
3	2	510 LOWER HANDLE ASSY	458026
3	2	630 LOWER HANDLE ASSY	458030
3	3	HANDLE GRIP	1851071
3	4	CLUTCH WIRE ASSY	451242
3	5	R.H. DEAD MAN LEVER	403013
3	6	L.H. CLUTCH LEVER	403012
3	7	THROTTLE WIRE ASSY – OLD VERSION	656720
3	7	THROTTLE LEVER (MAGURA METAL TYPE)	459100
3	7	THROTTLE CABLE (TO FIT MAGURA)	459101
3	8	CUPSQUARE M8 x 45 NUTS/SPRINGWASHER FOR 656720	Universal
3	9	COVER PLATE ASSY	453739
3	10	BOLT M6 x 15 NUT/SPRINGWASHER	386046
3	11	BOLT M8 x 40 + NUT/SPRINGWASHER	1213807
3	12	CUPSQUARE M8 x 30 + NUT/SPRINGWASHER	2321180
3	13	HANDLE PIVOT	1216946
3	14	FLATWASHER M8 x 30 x 2	Universal
3	15	ANTIVIBRATION MOUNT ASSY	458050
3	16	BOLT M8 x 30 + NUT/SPRINGWASHER	Universal
3	17	DEFLECTOR MOUNT CLAMP	451143
3	18	DEFLECTOR CLAMP SCREW	432428
3	19	510 DEFLECTOR ASSY	451135
3	19	630 DEFLECTOR ASSY	458068

FIGURE 4 - CUTTER

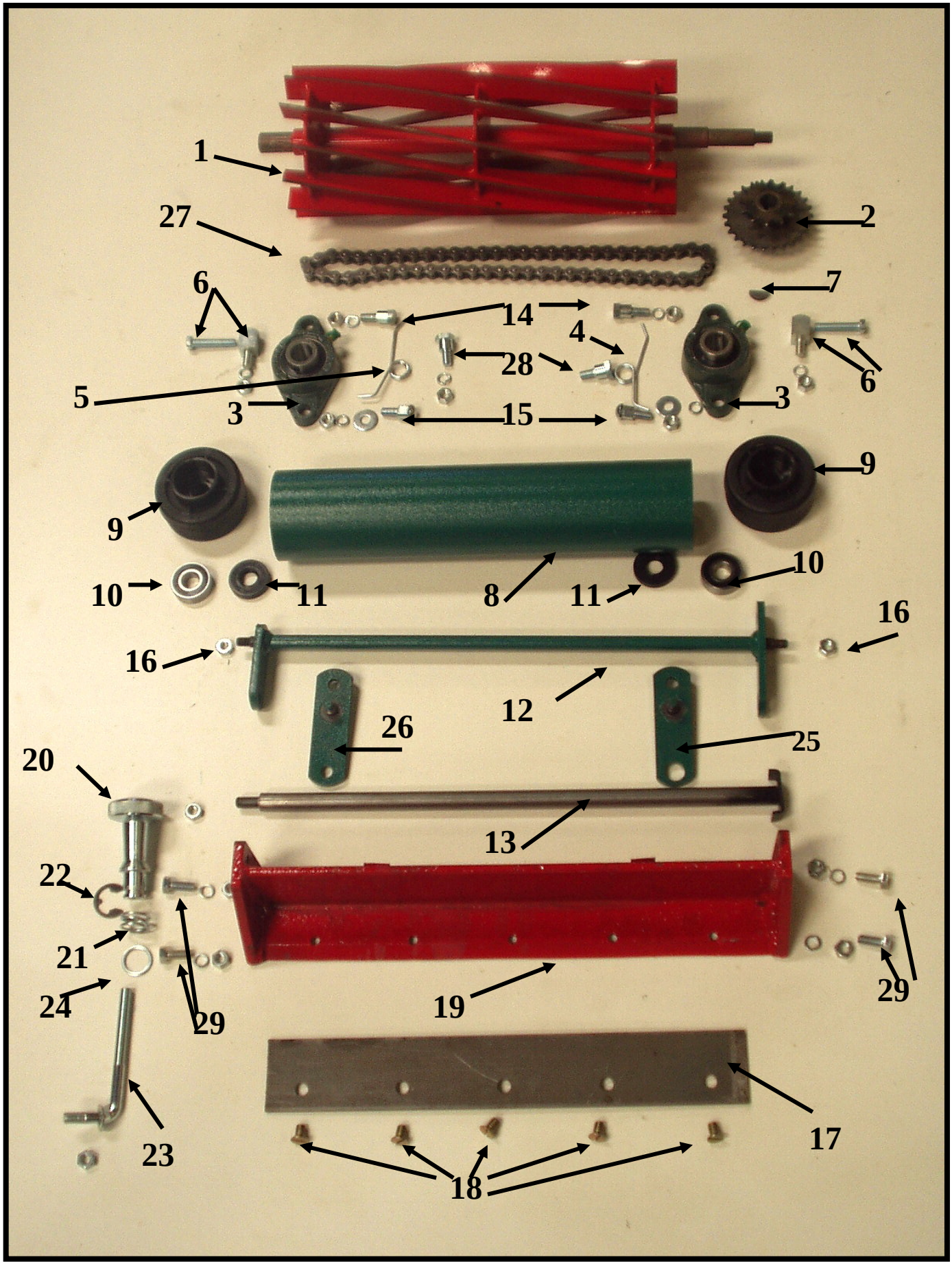

FIG.	ILLUS. NO.	DESCRIPTION	PART NO.
4	**1**	**CUTTING CYLINDER**	Not Applicable
4	**1**	**510 GROOMING REEL (NOT SHOWN)**	5306070
4	**1**	**630 GROOMING REEL (NOT SHOWN)**	5306085
4	**2**	**CUTTING CYLINDER SPROCKET**	451485
4	**3**	**CUTTING CYLINDER FLANGE BEARING** UCLF 204-12-19	1129100
4	**4**	**CUTTING CYLINDER SPRING LH**	457305
4	**5**	**CUTTING CYLINDER SPRING RH**	457306
4	**6**	**CUTTING CYLINDER ADJUSTER BLOCK c/w SCREW + M8 NUT**	457300
4	**7**	**WOODRUF KEY**	3802051
4	**8**	**510 FRONT ROLLER TUBE**	451040
4	**8**	**630 FRONT ROLLER TUBE**	458097
4	**9**	**FRONT ROLLER END CAP**	451042
4	**10**	**FRONT ROLLER BEARINGS 6202**	1122222
4	**11**	**FRONT ROLLER SEALS 35 x 15 x 7**	2724500
4	**12**	**510 FRONT ROLLER ADJUSTER BRACKETS**	455911
4	**12**	**630 FRONT ROLLER ADJUSTER BRACKETS**	458063
4	**13**	**510 FRONT ROLLER SHAFT + 3/8 UNF NUT**	451048
4	**13**	**630 FRONT ROLLER SHAFT + 3/8 UNF NUT**	458098
4	**14**	**CUTTER BEARING HOUSING PIVOT BOLT (BACK) + M8 NUT/SPRINGWASHER**	457301
4	**15**	**CUTTER BEARING HOUSING CLAMPING BOLT (FRONT) + M8 NUT**	457302
4	**16**	**FRONT ROLLER BRACKET NUT ½" UNF**	2441244
4	**17**	**BOTTOM BLADE**	Not Applicable
4	**18**	**BOTTOM BLADE SCREWS**	Not Applicable
4	**19**	**510 SOLE PLATE**	453309
4	**19**	**630 SOLE PLATE**	458060
4	**20**	**HAND NUT**	454964
4	**21**	**HAND NUT SPRING**	454707
4	**22**	**HAND NUT CIRCLIP E CLIP RS**	454723
4	**23**	**FRONT ROLLER ADJUSTER SCREW + 3/8 UNF NUT**	454678
4	**24**	**HAND NUT WASHER**	454715
4	**25**	**DOUBLE ADJUSTER LH (GREENS ONLY)**	Not Applicable
4	**26**	**DOUBLE ADJUSTER RH (GREENS ONLY)**	Not Applicable
4	**27**	**CUTTER CHAIN**	2984806
4	**28**	**SPRING BOLT WITH M8 NUT**	457301
4	**29**	**SOLEPLATE BOLTS M8 x 25 NUT + SPRINGWASHER**	Universal

FIGURE 5 – REAR DRUMS

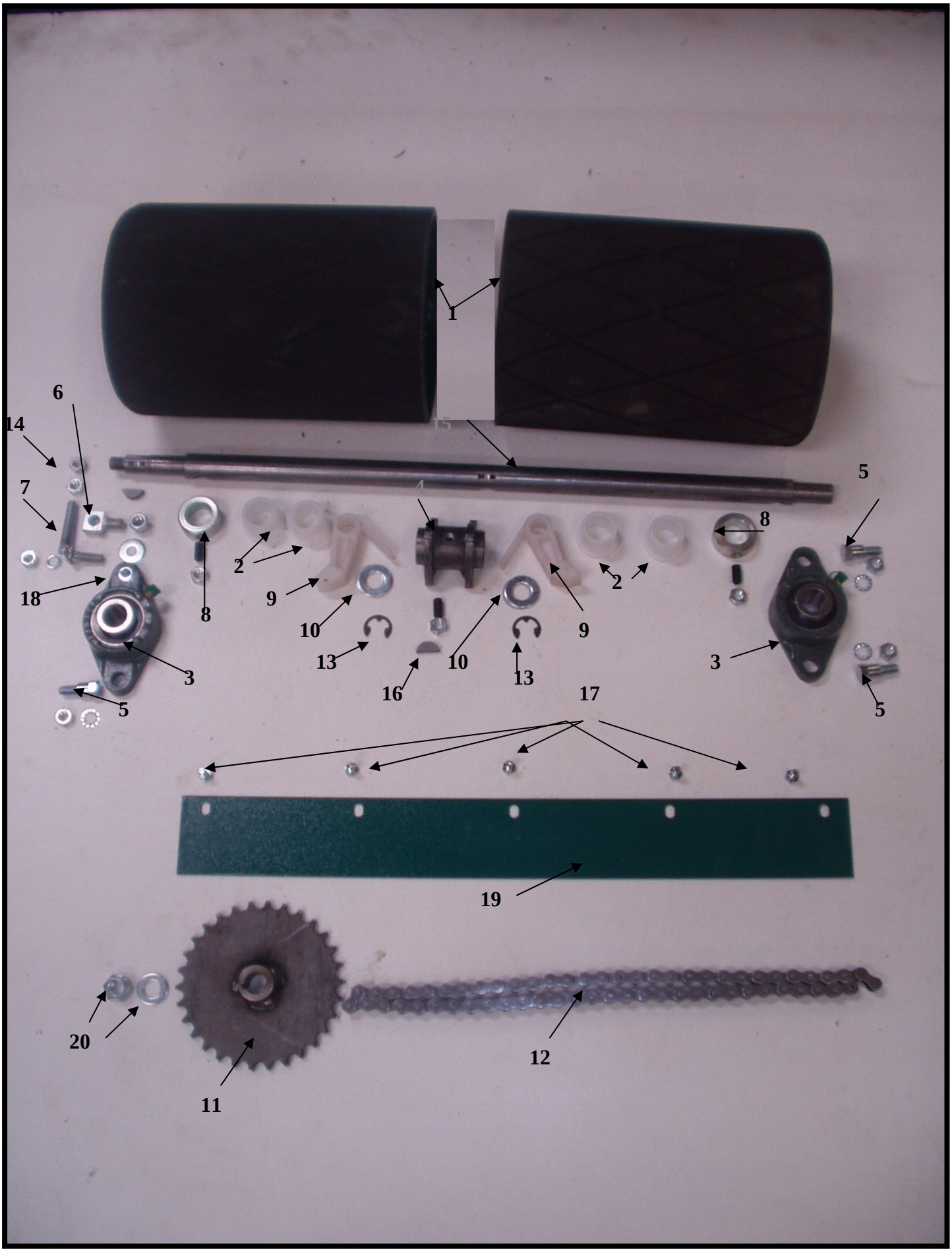

FIG.	ILLUS. NO.	DESCRIPTION	PART NO.
5	**1**	**510 DRUM BUSHED : RUBBERISED (SPECIAL ORDER)**	458006
5	**1**	**510 DRUM BUSHED : SMOOTH**	458165
5	**1**	**630 REAR ROLLER BUSHED : RUBBERISED (SPECIAL ORDER)**	458055
5	**1**	**630 DRUMS: SMOOTH**	458163
5	**2**	**DRUM BUSHES**	458000
5	**3**	**DRUM BEARING UCLF 203-17**	1129110
5	**4**	**RATCHET**	458002
5	**5**	**DRUM BEARING HOUSING PIVOT BOLT/NUT/SPRING WASHES**	457301
5	**6**	**PURCHASE BLOCK + 3/8 UNF NYLOC NUT**	BG/301727
5	**7**	**DRUM ADJUSTER BOLT + M8 NUT/SPRING WASHER**	457304
5	**8**	**DRUM COLLAR + M8 x 20 GRUB SCREW + M8 LOCK NUT**	ROT/201404
5	**9**	**DRUM PAWL**	458001
5	**10**	**PAWL WASHER M14 BRIGHT FLAT**	3651247
5	**11**	**DRUM SPROCKET**	451207
5	**12**	**DRUM CHAIN**	2981385
5	**13**	**PAWL CIRCLIP M14 EXT**	1502474
5	**14**	**DRUM SHAFT NUT M12**	2441244
5	**15**	**510 DRUM SHAFT**	458003
5	**15**	**630 DRUM SHAFT**	458090
5	**16**	**WOODRUF KEY**	3802051
5	**17**	**REAR ROLLER SCRAPER BOLT M6 x 15 + NUT**	451207
5	**18**	**SPACER : REAR ROLLER BEARING**	458015
5	**19**	**510 REAR ROLLER SCRAPER**	458071
5	**19**	**630 REAR ROLLER SCRAPER**	458070
5	**20**	**M 12 NUT + WASHER**	Universal

FIGURE 6 - TRANSMISSION

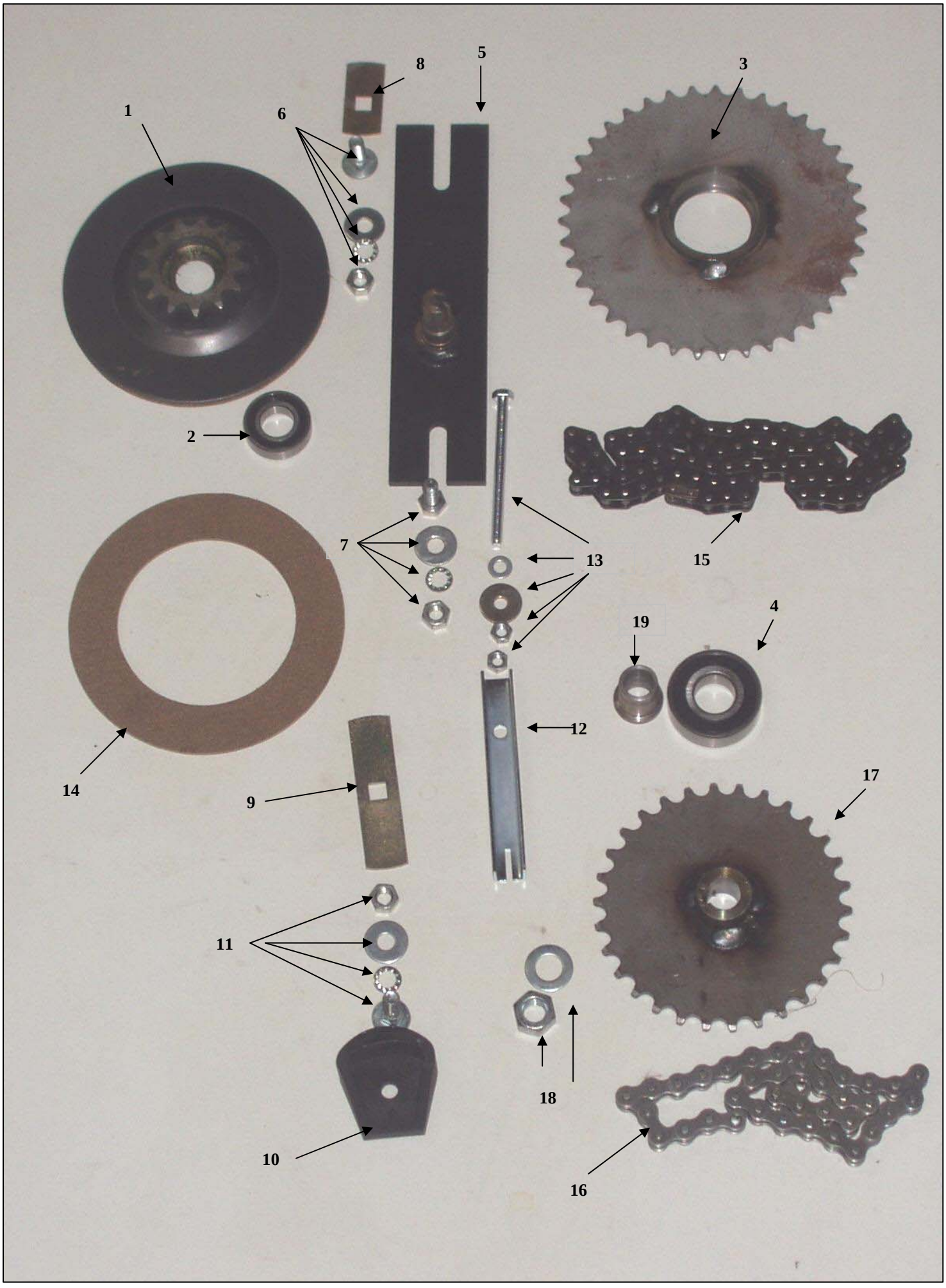

FIG.	ILLUS. NO.	DESCRIPTION	PART NO.
6	1	SMALL INTER. SPROCKET ASSY.	451231
6	2	SMALL INTER SPROCKET BEARING 6003	1126037
6	3	LARGE INTER. SPROCKET ASSY.	454774
6	4	LARGE INTER. SPROCKET BEARING 6202	1122422
6	5	INTER. ADJUSTMENT BRACKET ASSY.	451215
6	6	CUP SQUARE BOLT/NUT/WASHER M8 x 20	191011
6	7	M8 x 20 BOLT/WASHER/NUT/SPRING WASHER	Universal
6	8	SLOT COVER: TOP	458200
6	9	SLOT COVER: BOTTOM	458080
6	10	CHAIN ADJUSTER SLIDE	455769
6	11	CUP SQUARE BOLT/NUT/WASHER M8 x 30	191020
6	12	OPERATING LEVER RELEASE	453560
6	13	CLUTCH OPERATING BOLT/NUT/WASHER/LOCKNUT M6 x 50	1215863
6	14	LINING	333032
6	15	CHAIN 1/2 x 3/16 x .305 59 ROLLER: CUTTER/CLUTCH	2981590
6	16	CHAIN 1/2 x 3/16 x.305 38 ROLLER: CLUTCH/DRUM	2981385
6	17	DRUM SPROCKET	451207
6	18	NUT/WASHER M12	2441244
6	19	SLEEVE CLUTCH WITH SHEAR PIN	454790

SERVICE RECORD

CUSTOMERS ARE ADVISED TO KEEP A SERVICE RECORD AND RETAIN ALL SERVICE INVOICES.

SERVICE DATE	WORK DONE	COST

CUSTOMER REGISTRATION FORM – ACT NOW TO VALIDATE YOUR PURCHASE

AND TO ACTIVATE YOUR DATATAG PROTECTION SYSTEM!

This copy should be completed, detached from the Handbook and posted to Rivendell Projects Limited by the original purchaser as soon as possible but no later than 60 days after the date of purchase.

Please note: this information is required solely for the purpose of warranty validation, verification of anti-theft registration data and distribution of technical bulletins: it will not be passed to any other party nor used for marketing purposes.

Model: _____

Serial No.: _____

Engine Serial No.: _____

Supplying Dealer Name: _____

Supplying Dealer Address: _____

_____

Date of Purchase: _____

Original Customer Name: _____

Original Customer Address: _____

_____

Customer Contact Details:

Name: _____

Telephone: _____

Fax: _____

E-mail: _____

Please post this copy to: Rivendell Projects Limited
The Grange
Sutton-cum-Granby
Nottinghamshire
NG13 9QA