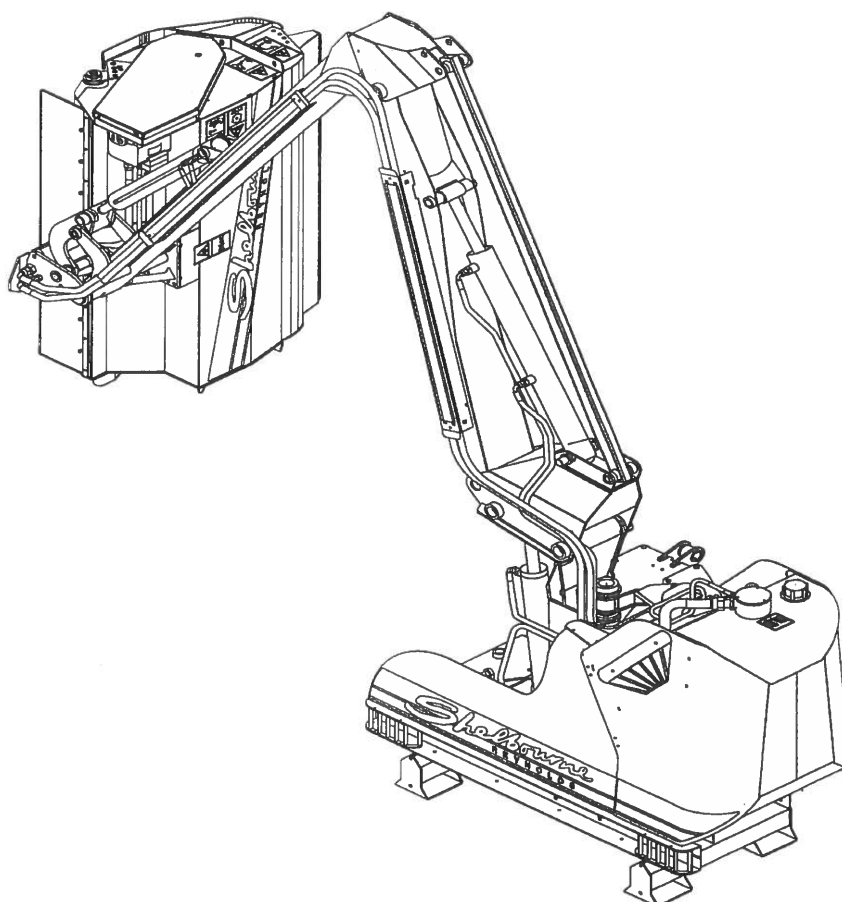


Hedge trimmer

All Models

OPERATORS MANUAL



Shelbourne Reynolds Engineering Ltd
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ISSUE 1
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EC DECLARATION OF CONFORMITY

MANUFACTURERS ADDRESS :

SHELBOURNE REYNOLDS ENGINEERING LTD.
SHEPHERDS GROVE INDUSTRIAL ESTATE,
STANTON,
BURY ST. EDMUNDS,
SUFFOLK.
IP31 2AR
ENGLAND.

MACHINE SPECIFICATION :

MAKE :

Powerblade trimmer

MODEL :

SERIAL NO.:

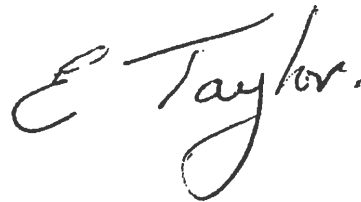
DIRECTIVES COMPLIED WITH :

MACHINERY DIRECTIVE 98/37/EC

APPLIED HARMONISED STANDARDS :

BS EN 292 PART1 & 2 : 1991
BS EN 294 : 1992
BS EN 349 : 1993

SHELBOURNE REYNOLDS SIGNATORY :



ERIC TAYLOR
OPERATIONS DIRECTOR

PLACE :

Stanton, England.

DATE :

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Please read and observe these instructions very carefully before you proceed to operate the **hedgetrimmer**. In this way you will avoid accidents, reduce repair costs and downtimes and increase the reliability and service life of your **hedgetrimmer**. Pay particular attention to the safety instructions! Shelbourne Reynolds Engineering Ltd cannot assume any liability for damage or malfunctions caused by failure to observe the instructions contained in this operating manual.

The purpose of this operating manual is to enable you to familiarise yourself with the working of your **hedgetrimmer**. The manual will first of all explain the machine in general and then proceed to describe the special features.

The terms "right", "left", "front" and "back" in this manual are for an operator sitting in the tractor seat looking forward.

This operating manual must be read and used by all persons who are required to carry out work either on or with the **hedgetrimmer**, e.g.,

- Operation (including preparatory work, troubleshooting during operation, care)
- Maintenance (servicing, inspection)
- Transporting.

Enclosed with this operating manual is a registration card. Your dealer will instruct you on the operation and care of your **hedgetrimmer**. After this has been done, return the registration card to your dealer. This will confirm your acquisition of the machine.

We reserve the right to make changes to the illustrations and data on specifications and weights contained in this operating manual if we make any improvements to the **hedgetrimmer**.

SECTION 1:

INTRODUCTION

1.1 FOREWORD

This manual will assist the operator in using the Shelbourne **hedgetrimmer** machines and in realising their full potential whilst indicating safe procedures. This manual should be used in conjunction with the manual of the tractor or prime mover.



Figure 1

1.2 IMPROVEMENTS AND CHANGES

Shelbourne Reynolds Engineering are continually improving their products to meet the farmers needs and therefore reserve the right to make improvements and changes when practical to do so, without incurring any obligation to make changes and additions to equipment which has been sold previously.

1.3 SERVICE PARTS

Use guaranteed and genuine Shelbourne Reynolds Engineering service parts on Shelbourne Reynolds machinery to ensure maximum life and best performance. These are available through your Shelbourne Reynolds Engineering dealer.

1.4 MACHINE IDENTIFICATION

The serial and machine numbers are stamped on a plate (Figure 2), attached to the main frame, near to the tractor's left lower link arm end.

Shelbourne
REYNOLDS

CE WEIGHT TOTAL KG

FOR SPARES QUOTE BOTH

MC No. SERIAL No.

SHELBOURNE REYNOLDS ENGINEERING LTD
STANTON, SUFFOLK, IP31 2AR, ENGLAND.

Figure 2

1.5 POWERBLADE WARRANTY POLICY

NEW MACHINE WARRANTY

All new machines supplied by **Shelbourne Reynolds Engineering Ltd. ("Shelbourne")**, are warranted to the original purchaser, under normal use and service, to be free from defects in material and workmanship for a period of 12 months from the date of delivery to the original purchaser. This limited warranty gives you specific legal rights and is in addition to any statutory rights to which you may be entitled. Your statutory rights are not affected by this warranty.

To qualify for the full benefit of this warranty, the dealer must ensure that the warranty registration details have been returned to Shelbourne within 30 days from the date of delivery. Using the machine implies the knowledge and acceptance of these instructions and the limitations contained here in this Manual. Shelbourne reserves the right to suspend the operation of these warranty conditions unless and until the purchaser has paid in full for the goods or parts in question.

LIMITATIONS AND EXCLUSIONS

Shelbourne and the authorised Shelbourne dealer shall not be liable to the original purchaser under any circumstance for injuries, death, property damage or damages of any kind whatsoever directly, consequential or contingent to any person or property. Furthermore, the warranty shall not extend or apply to temporary repairs or in respect of loss or any expense incurred for labour, additional or substitute machinery, rental or for any other reason or purpose.

Shelbourne will not be liable under this warranty for any repairs carried out without its prior consent to the work being done. Any fault should be reported to an authorised Shelbourne dealer as soon as discovered. Continued use of the machine could cause further failures for which Shelbourne cannot be held liable and may also have safety implications.

Authorisation must be given by Shelbourne Service personnel – no other employee, dealer or other person is authorised to give any warranties on behalf of Shelbourne.

Subject to the conditions and exclusions noted in this limited warranty, Shelbourne shall repair or replace free of charge any warranted parts which in our opinion show evidence of such defect provided that any such parts are returned within 30 days by the authorised Shelbourne dealer from whom the purchase was made.

Any parts on which warranty is allowed becomes the property of and must be returned to Shelbourne if Shelbourne so requests. All claims must be submitted to Shelbourne by an authorised Shelbourne dealer within 15 days of the date of the repair on a Shelbourne Warranty Claim Form. The submission of a claim is not a guarantee of payment. Any decision reached by Shelbourne is final.

This limited warranty by Shelbourne does not cover:-

- 1) Damage or depreciation caused by normal wear and tear. Any parts which have been subjected to alteration, modification or fitment of non-genuine Shelbourne parts, wilful or accidental damage, damage caused by contact with overhead power lines, damage caused by foreign objects (e.g. stones, metals and any materials other than vegetation).
- 2) Damage or depreciation caused by neglect, failure due to use of incorrect oil or lubricants, contamination of the oil, or oil which has served its useful life or failure to carry out proper maintenance as recommended in the Shelbourne Operators Manual.
- 3) Damage or depreciation caused by abnormal or in-proper use in accordance with Shelbourne recommendations and/or as per the Operating Instructions.
- 4) Items not covered by this warranty are wearing items, these include flails, skids, bearings or any other items which are considered to be soil engaging or normal wearing or consumable items.
- 5) Items not manufactured by Shelbourne such as trade accessories e.g. Joystick, Pumps, Motors, PTO's, Hydraulic Valves etc. are warranted by their respective manufacturer. The original purchaser shall only be entitled to the benefit of any such warranty given by them.
- 6) Environmental damage.

TRANSFER OF WARRANTY

Shelbourne may at its sole discretion allow this warranty to be transferred to a subsequent owner of the machinery for the balance of the warranty period, subject to all of the warranty conditions being met and only with Shelbourne giving prior written consent.

WARRANTY ON PARTS

Shelbourne warrants that any part or components supplied by Shelbourne in accordance with this limited warranty are free from defects in material or workmanship from the date of sale to the original purchaser for 6 months. Shelbourne will at its option, either repair or replace the defective part free of charge. Original Purchaser shall be responsible for labour and all freight charges to and from the place where the warranty work is performed.

Shelbourne Reynolds Engineering Ltd. cannot be held responsible for any failures or safety implications arising from the use of non-genuine parts. Use of non-genuine parts may seriously affect the machine's performance and safety.

1.6 CHOICE OF TRACTOR

Refer to Section 2.8 for the recommended weight of tractor and the typical horsepower requirement for the various machine configurations.

The machine is suitable for a Category 2 tractor linkage and in most instances Category 3. Shelbourne Reynolds Engineering Ltd recommend that this is of good quality and in good condition. Check the condition of any quick release ball ends carefully, as they will be subjected to upward forces. Check chains and stabilisers must also be in good condition when using the stabilising kit, as they will be relied upon to assist it in its function.

A fully independent PTO operating at 540 rpm, with a 1.3/8" SAE 6 spline shaft and rotating in a clockwise direction is required.

Fully independent hydraulics means that there is no requirement for an oil supply from the tractor.

To counteract the overturning effect of the head at long reaches, setting the track wide, adding ballast and using a large 4 wheel drive tractor are all recommended.

All machines are fitted with a rear lighting board; this should be connected to the standard 7-pin trailer plug.

A 12 volt power supply is required where electrical controls or oil coolers are fitted. These must be connected, via a suitable fuse, to a substantial ignition fed power supply. The supply must not come from the cigarette lighter or trailer socket, otherwise the voltage supplied will be too low due to the current being drawn. Low voltage will cause the system to function erratically. We recommend using an ignition-controlled power supply as this avoids the risk of a user inadvertently leaving the system powered up and thereby draining the tractor battery over a few days. Section 4 contains important information on the wiring required for electrical controls.



Erratic operation or serious damage to the system can result if these instructions are not followed.

SECTION 2:

SAFETY PROCEDURES

The following safety instructions are applicable for all chapters of this manual.

DANGER SYMBOLS

On the machine - the following symbols appear on the machine and are for your safety and the safety of other people. Ensure that you identify each symbol and understand its warning.

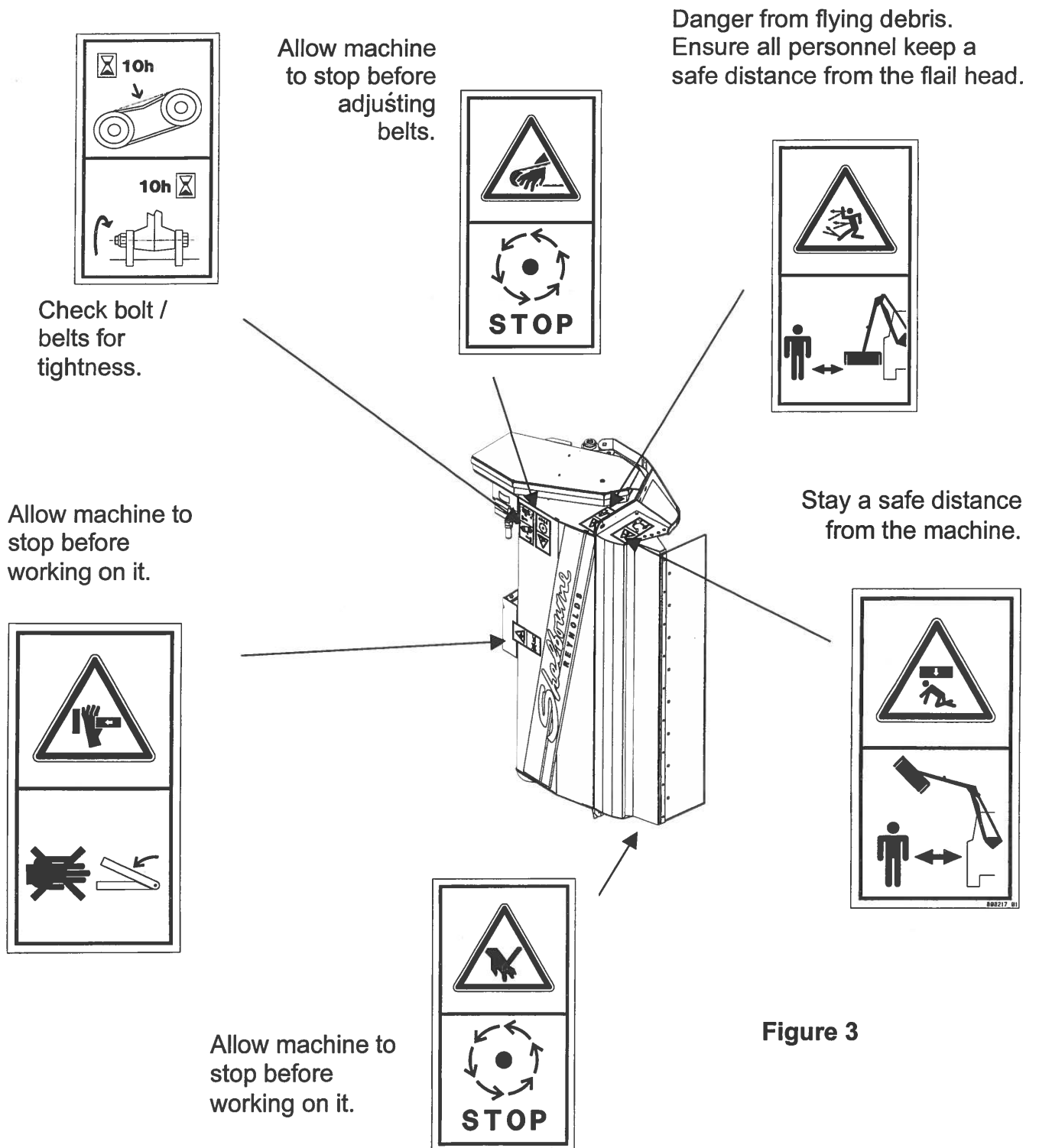
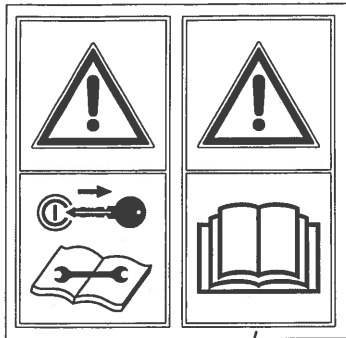
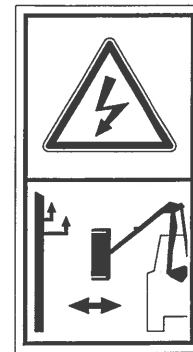


Figure 3



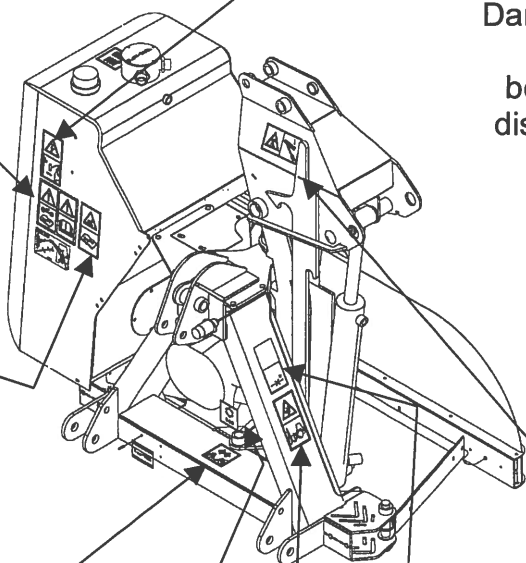
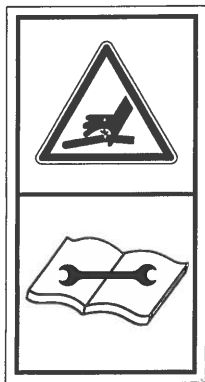
Stop the engine and remove the key from the tractor before carrying-out any work on the machine.

Carefully read the manual before handling / operating the machine.

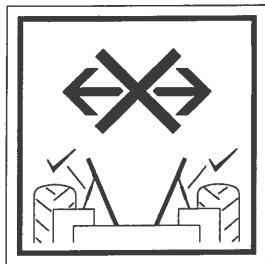


Danger of electrocution. Ensure head and booms are kept a safe distance from electrical

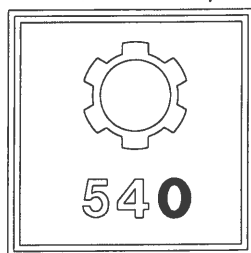
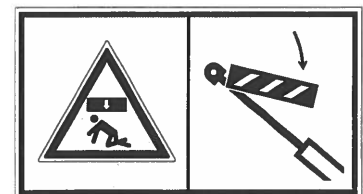
Carefully read the operating manual before carrying-out any work on the machine



Lock cylinders before working beneath head or booms.



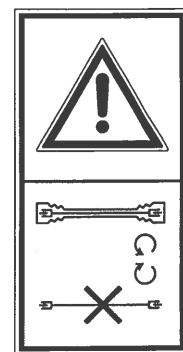
Tighten check chains to stop lateral movement



PTO shaft rotational speed must not exceed 540 revolutions per minute.



Stay clear of tractor-machine area when coupling-up.



Ensure PTO shaft guards are fitted and chains attached

Figure 4

2.1 PRECAUTIONS

Accident programmes can only prevent accidents with the co-operation of the persons responsible for the operation of the equipment.

For the safety of others, operate equipment with care and do not take unnecessary risks, which could cause an accident.

The tractor manufacturers operator manual safety precautions should be adhered to along with the following additional safety precautions listed when using a Shelbourne Reynolds **hedgetrimmer**.

CAUTION



In addition to the following list, this symbol will appear throughout this manual whenever your safety, the safety of others or the machinery, is involved.

Please read all safety instructions contained in this operating manual with the utmost care and also observe all warning signs attached to the **hedgetrimmer**. These warning signs must be kept in a legible condition and must be replaced if missing or damaged. This is especially the case when whole sections are replaced when making repairs. Warning signs are available from your dealer or importer.

Follow these instructions to prevent accidents. These instructions must also be made available to all other users. You are advised to refrain from any working methods, which may be hazardous.

PROPER USE

Shelbourne Reynolds **hedgetrimmers** are based on state-of-the-art technology and are manufactured in accordance with recognised safety requirements. Nevertheless the use of the machine does not preclude the risk of injury to the user or third parties and/or the risk of damage to the machine itself or to other materials or items of equipment.

Always make sure that the **hedgetrimmer** is in a technically perfect condition and that it is used properly and for its intended purpose and entirely in accordance with the instructions given in this manual. Any malfunctions or defects, which might affect the safe operation of the machine, must be immediately eliminated.

The **hedgetrimmer** must be used, maintained and repaired only by persons who are familiar with its working and have been made fully conversant with the risks involved.

OEM replacement parts and accessories from Shelbourne Reynolds have been specially designed for use with the Shelbourne Reynolds **hedgetrimmer**. Any replacement parts and accessories not supplied by Shelbourne Reynolds have not been tested and approved by us. The installation and/or the use of non-Shelbourne Reynolds products may under certain circumstances have a negative influence on the given design features of your machine and may therefore adversely affect its safe and reliable operation and your safety. Shelbourne Reynolds cannot therefore be held liable for damage or injury caused by the use of non-OEM replacement parts or accessories.

The Shelbourne Reynolds **hedgetrimmer** is intended for cutting hedges and verges. Any uses other than those for which the machine is intended, such as craning, or stump-grinding, will automatically exempt Shelbourne Reynolds or the supplier from its/his liability in respect of ensuing damage. Such cases of improper use will therefore be entirely at the user's own risk.

All relevant accident prevention regulations, as well as other generally acknowledged health and safety regulations and road traffic regulations must be strictly observed.

Improper use also comprises failure to observe the instructions given in this operating manual and the manufacturer's maintenance and servicing requirements.

OPERATIONAL SAFETY

The **hedgetrimmer** must not be put into operation until the user has been given proper initial instructions either by the dealer or by one of Shelbourne Reynolds' representatives or employees.

The **hedgetrimmer** may be used only if all safety devices, e.g. detachable guards, are fitted and in proper working order.

Nuts and bolts should be checked at regular intervals and tightened if necessary.

Oil level must also be checked regularly.

In the event of a malfunction, immediately cease operation and secure the machine in a safe and stable position. Malfunctions must be eliminated immediately.

No liability for consequential damage

Even though your Shelbourne Reynolds **hedgetrimmer** has been manufactured with the utmost care and you are using it properly, fluctuations and interruptions in feed rate may still occur.

It is the duty of the operator/user to ensure that foreign objects, e.g. stones, metal objects etc. are not allowed to enter the cutting head and are therefore not ejected dangerously. Failure to observe this may result in damage to the **hedgetrimmer** and/or injury to the operator/user and members of the public.

Any claims for damages not directly incurred by the **hedgetrimmer** cannot be accepted. By the same token, Shelbourne Reynolds cannot be held liable for any consequential damage resulting from incorrect use of the machine.

ROAD SAFETY

Road traffic regulations must be observed when using or transporting the **hedgetrimmer** on roads, paths and other public places. The machine must be in a roadworthy condition.

Observe the maximum permissible width for road transport and fit all necessary rear lights, warning signs and guards. Switch off the lights and indicators before connecting.

For transporting, close the booms and secure all rubber flaps, guards and covers so that they cannot cause injury or damage to other users of the public place.

Ensure that the lighting system is in full working order and that the vehicle carrying the

hedgetrimmer can fully and correctly operate it.

Observe the maximum permissible axle loads, the load bearing capacity of the tyres and the maximum total weights in order to ensure adequate steering and braking. Attached implements also influence the behaviour of the tractor. Take the width and the overhung weight into consideration, especially on sharp bends.

No person may be allowed to ride on the **hedgetrimmer**.

ACCIDENT PREVENTION

Careful heed must be paid not only to the safety instructions contained in this operating manual but also to the accident prevention regulations governing the operation of agricultural machinery.

You could injure yourself on the blades, which are located on the flail rotor, inside the head. These blades need to be kept reasonably sharp for the **hedgetrimmer** to work effectively.

When coupling the hedgetrimmer to the tractor

The work of coupling and uncoupling the **hedgetrimmer** involves a high risk of injury. The following instructions must therefore be carefully observed. The machine can be supplied to fit a Category 2, 3 point linkage, or with axle brackets. These brackets, once fixed to the axle of the specified tractor, will allow the hitch subframe to be latched into them.

When the hedgetrimmer is fitted with an axle-mounting subframe ensure that the tractor is fitted with compatible latches of the correct spacing.

The following instructions must be carefully observed:

- Secure the **hedgetrimmer** in such a way that it is on level ground and cannot tip forwards or backwards.
- Slowly reverse the tractor towards the **hedgetrimmer** - always ensure that there are no other persons in the vicinity of the machine or the tractor.
- Connect the **hedgetrimmer** to the tractor linkage using only the method recommended in the tractor's operator's manual.

When using the PTO shaft

Use only the power take-off shaft supplied with the **hedgetrimmer**, which is intended for use with the machine. Ensure that it is fitted with the prescribed protective equipment (protective tube and funnel-shaped PTO shaft guard must be fitted). Make sure that the tractor engine and the PTO shaft are switched off before proceeding to fit the shaft.

Make sure that the tubes overlap by the prescribed distance when lifted to working height and are secured in such a way that they cannot rotate with the shaft.

Be absolutely sure that there is nobody standing in dangerous proximity to the **hedgetrimmer** when you switch on the PTO shaft.

Be aware that the rotor will take a considerable time to stop. Do not leave the tractor seat until it has stopped.

The PTO shaft speed of the tractor must correspond with the maximum permissible

rotational speed of the **hedgetrimmer**. The angle of attachment will depend on the operating length of the PTO shaft, the height of the machine and on the relative position of the tractor's PTO shaft. Always switch off the PTO shaft if the angle of divergence becomes excessive or whenever the PTO shaft is not required.

When using the hydraulic system

The hydraulic system generates extremely high pressures. All piping, hoses and connections must therefore be checked regularly for leakage and visible external damage. Use proper and thorough means of searching for leakage and repair all damage immediately. Spurting hydraulic oil can cause injuries and fires. Call a doctor immediately in the event of injury.

2.2 BEFORE STARTING THE MACHINE

1. Read the manual thoroughly.
2. Check that all guards are properly secured.
3. Ensure that no person is working on or inside the machine.
4. Check that all observers are clear of the machine.
Always check the area for bystanders.
5. Check there are no foreign objects inside the machine.

2.3 THE MACHINE IN THE FIELD

6. Always ensure that safety screens are fitted in such a way that the operator is protected from thrown debris. Always inspect the work area to ensure any dangerous objects (stones, steel posts etc) are removed before commencing cutting. Do not cut the far side of a hedge with the flails towards the operator.
7. Do not check or adjust the machine whilst the PTO shaft is connected to the tractor. Remove the ignition key from the tractor. Never leave the tractor seat while the engine, or machine is still running.
8. When intending to operate on the highway consult the local Highways Department regarding notifications and approval, as rules and regulations will vary from area to area.
9. Never use the boom arms as a crane in any way.
10. Always be aware of your surroundings and operate accordingly. Be aware of confined areas and reduced heights. Bear in mind adverse weather conditions, such as snow, ice, wind and rain.
11. Do not reach into the machine whilst it is running.
12. Keep bystanders away from the machine at all times. Do not operate the

machine with bystanders in the danger area.

13. For transportation, fold the booms onto the pads provided. Ensure that the head is as close to the tractor as is practicable.

2.4 LEAVING THE MACHINE

14. Always park the machine on a level and firm site. Ensure the parking stands are securely locked into position. Do not leave the machine where it might be knocked over by animals or vehicles.
15. Never allow children to play on or near parked machinery.

2.5 SERVICING THE MACHINE

16. Do not check or adjust the machine whilst the PTO shaft is connected to the tractor. Remove the ignition key from the tractor. Never leave the tractor seat while the engine, or machine is still running.
17. Ensure that the machine is lowered to the ground or supported in such a way that hydraulic or mechanical failure cannot injure any personnel.
18. Replace all guards after servicing.
19. Always dispose of discarded parts carefully – at an approved site.

2.6 DESCRIPTION

The machine consists of a cutting head, which is positioned by a number of articulating arms, mounted to a frame, which carries the relevant control and drive systems.

A double-skinned head shell (A) with a rotor (B) is fitted with a choice of cutting flails. This is driven via belts by a hydraulic motor (C) mounted within the envelope of the head. An adjustable nose (D) is fitted to minimise the effect of any thrown objects. An hydraulic cylinder (E) rotates the head about the outer boom arm (F). The outer boom arm can be standard (as here) or, optionally, can be telescopic or variable forward reach. An hydraulic cylinder (G) varies the reach of the arms in an almost straight line due to the effect of the parallel arm (H). The first boom (I) is fitted with a pad (J) to close the arms together for safe, controlled, transportation. An hydraulic cylinder (K) rotates the rocker (L) and thus lifts and lowers the head and arms. An hydraulic cylinder (M) rotates the pillar (N) to give forward and rearward slew and a safety breakback action. A choice of gearboxes, pumps and controls (O) use a fully independent oil supply from the large stylish hydraulic tank (P) to operate the aforementioned cylinders and motor, which are protected from contamination by an economical built-in return filter (Q). A simple but attractive guard (R) covers and helps to protect the hydraulic components.

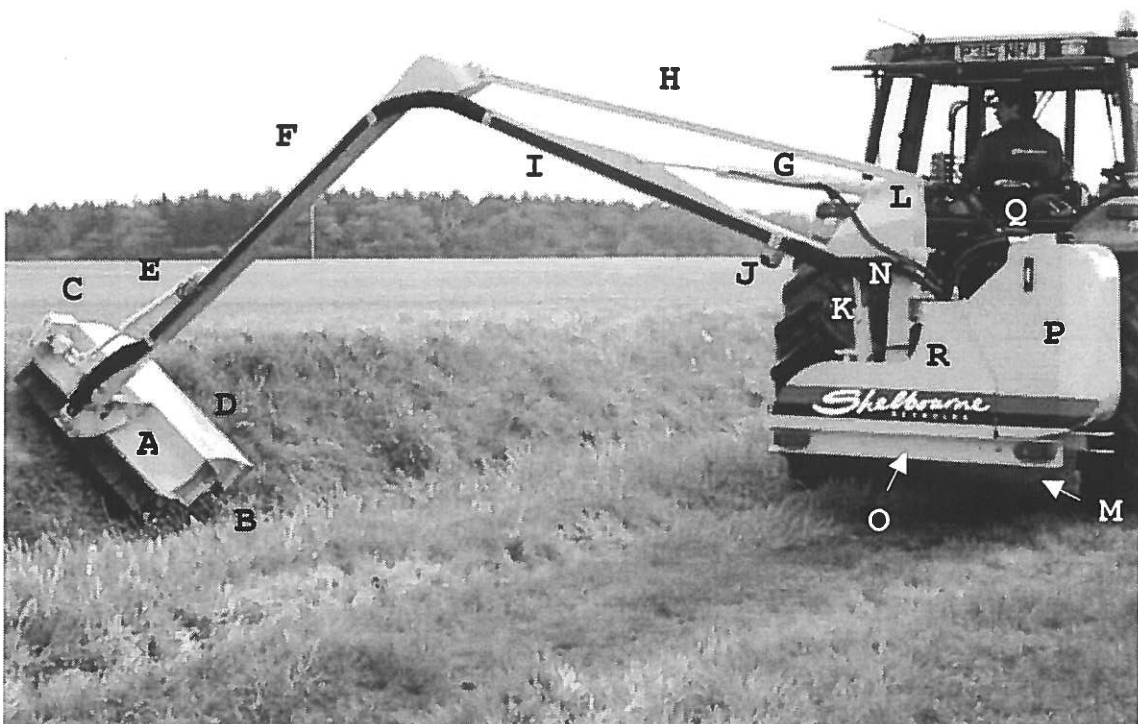


Figure 5

2.7 INTENDED USE

The machine is intended to be used on typical farms and highways for annual or biennial cutting of hedges and for cutting grass and weeds on verges and banks.

The fine cutting action of the flails reduces the need for clearing up after cutting (though may not remove it altogether) and (unless the growth is particularly luxuriant) leaves no swath which might kill underlying grass.

2.8 SPECIFICATIONS

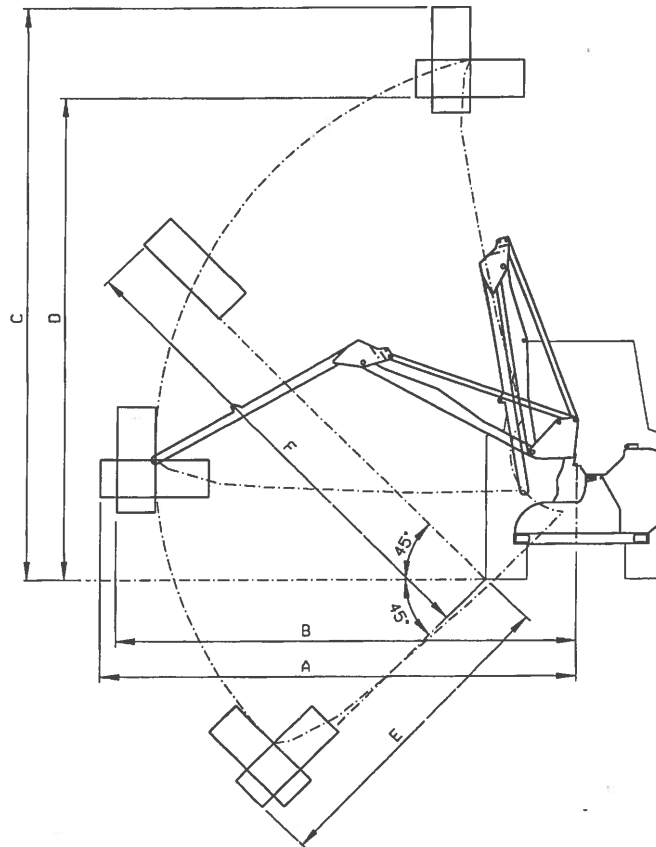


Figure 6

	46	53	60	53T		60T		53VFR		60VFR	
				Retracted	Extended	Retracted	Extended	Retracted	Extended	Retracted	Extended
A	4.61	5.29	6	4.61	5.31	5.29	5.99	4.61	5.28	5.29	5.96
B	4.44	5.12	5.83	4.44	5.13	5.12	5.82	4.44	5.11	5.12	5.79
C	5.84	6.51	7.2	5.84	6.43	6.51	7.09	5.84	6.4	6.51	7.01
D	4.82	5.48	6.18	4.82	5.4	5.48	6.06	4.82	5.37	5.48	6.03
E	2.88	3.57	4.27	2.88	3.58	3.57	4.27	2.88	3.56	3.57	4.24
F	4.69	5.41	6.13	4.69	5.44	5.41	6.14	4.69	5.41	5.41	6.11
Weight c/w oil (kgs)	1250	1300	1350	1350		1450		1430		1480	
Min. tractor weight (T)	2200	2600	3000	2800		3200		2700		3100	
Attachment	3pt linkage as standard throughout.										
	< Axle mounting option recommended >										

Note: if fitted with the 1.5m head option, Shelbourne Reynolds Ltd recommend the use of axle bracket mounting on the remaining machines also.

Figure 7

Width of cut (m)	1.2 (1.5 optional)
Head rotation	240°
Cut height (mm)	(-25) 20 40 60 80 100
Cut diameter (mm)	420
Input PTO speed (rpm)	540
Rotor direction	Reversible
Roller diameter (mm)	127
Breakback	Hydraulic, 90°

Figure 8

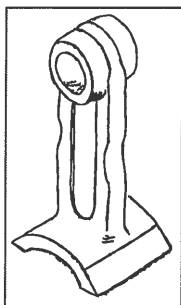
Controls - Power -	Cable		Switched		Oil proportional	El proportional
	Standard	High	Standard	High	High	High
Drive hyd. Flow (l/min)	73.8	101.5	73.8	101.5	101.5	101.5
Drive pressure (bar)	240	270	240	270	270	270
Cutting speed (rpm)	2830	2856	2830	2856	2856	2856
Drive pump/motor	CAST IRON					
Controls flow (l/min)	17.5	28.2	17.5	28.2	28.2	28.2
Controls pressure	200 bar					
Controls pump	Aluminium	CI	Aluminium	CI	CI	CI
Electrical supply	N/A		12V		12V	12V
Horsepower required	55+	70+	55+	70+	70+	70+
Head angle float	Std.					
Boom float	Option		Std		Std.	Std.

Note: all dimensions weights and other data are approximate

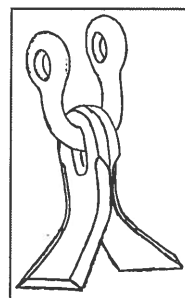
Figure 9

The machine can be assembled to work on the left or right hand side of the tractor. A small number of parts would need to be replaced. This is a major job and could not be undertaken in the field.

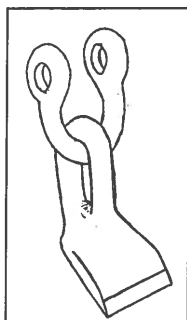
Choice of flails -



'T' flails, reversible
(hedges and
occasional grass)



Back to back flails,
reversible
(grass and light
hedges)



Boot flail and shackle,
up cutting only (grass
and light to medium
hedges)

Figure 10

SECTION 3:

OPERATION



Carefully read the operators manual before operating the machine.



Only operate the tractor or machine controls from the tractor seat. Do not do so if anyone is anywhere near the machine.

3.1 PREPARATION FOR USE

Your dealer should have undertaken all assembly work and pre delivery checks. As a precaution, before using check: -

1. There are no foreign objects inside the head shell.
2. The PTO shaft is fitted and revolves freely.
3. The hydraulic oil tank has been filled.
4. The gearbox has been filled.

3.2 ATTACHMENT – 3PT LINKAGE AND STABILISERS

As standard the machine is provided with provision for it to be carried on the 3pt linkage of a tractor. A stabilising system is supplied as standard to help to limit any rolling movement of the machine relative to the tractor.



Keep clear of tractor machine area when coupling-up

Place the machine on a firm level site with plenty of room to conduct the fitting operation. Fit the nose piece (see parts list, KIT-08014, items 6 and 7) and stabiliser frame (item 2) to the top link clevis of the tractor. Cat 2 and Cat 3 versions of the nose piece will have been supplied. Each nose piece can be turned over to bring the frame back or up to avoid parts of the tractor. If the control unit is in a vulnerable position (that is if it is close to the 3pt linkage pick up points) detach it and temporarily move it to the rear of the machine. The tractor should then be reversed slowly to the machine. The lower link arms can then be attached in the usual way. The check chains of the tractor should then be adjusted so that there is no side sway and so that the machine sits central to the tractor.



Ensure the check chains are tight.

Then connect the top link from the **hedgetrimmer** to the back of the stabiliser frame, using the upper of the 2 holes provided. Ensure that the correct pins are used and that the lynch pins are used and are secure. The machine should then be slowly and carefully raised to a height that brings the tractor's PTO shaft and the gearbox input shaft to the same approximate height. The top link should be adjusted to bring the machine level. The stabiliser frame should now be pressing against the round protrusions on the stabiliser base unit (item 1). (If the frame does not press against the base unit lower the machine to the ground and connect the top link using the lower hole in the stabiliser frame. If this does not solve the problem consider putting the machine end of the top link into a higher hole). Put the pins (item 13) through the holes in the stabiliser frame and the stabiliser base unit; this may require the machine to be raised or lowered slightly. (If the holes in the stabiliser frame cannot be made to align with

those in the base at a suitable height, then consider removing the base unit and replacing it the other way up). . Ensure that the correct pins are used and that the lynch pins are used and are secure.

3.3 ATTACHMENT – AXLE MOUNTING FRAME OPTION

As an option the machine can be supplied with a sub-frame and brackets to enable it to be latched to the tractor's rear axle. This is strongly recommended for all variable forward reach and telescopic machines, all machines equipped with a 1.5m head, plus all 6m reach conventional machines. The system will not only reduce the stress on the tractor linkage but also makes the actual response of the head to the controls more predictable.



Keep clear of tractor machine area when coupling-up

Place the machine on a firm level site with plenty of room to conduct the fitting operation. Attach the axle plates and brackets to the tractor according to the instructions supplied with the kit. The sub-frame (see parts list, KIT-08015, item 1) should be fitted to the machine with the pins and lynch pins. The pin arms (item 2) should be bolted to the sub-frame; note that these can be turned over to give 1000mm centres or 1100mm centres between the pins. They can also be fixed in various holes so that the assembled unit can be of different lengths. Check the centres of the brackets on the tractor to find the necessary lateral dimension and the distance from the axle bracket to the rear of the tyre to find the most suitable length. (If necessary up to 140mm of the 'tractor end' of the subframe can be cut off to shorten the distance between machine and tractor even further). Remove the lower ends of the tractor's drop arms from its lift arms and fit links (item 12) to each drop arm using the existing pin. Lift arms should ideally be removed, or otherwise secured so that they cause no obstruction. The fasteners should at this point only be tightened sufficiently that the pin arms are held securely.

If in a vulnerable position (that is if close to the 3pt linkage pick up points) detach and temporarily move the control unit to the rear of the machine. The tractor should now be reversed slowly until it is in approximately the intended final position relative to the machine. If still attached the lower link arms may need to be repositioned. Lower the lift arm control and attach the links to the subframe with fasteners (items 13-15). Slowly and carefully raise the tractor's lower links. The sub-frame will rise at its front so that the pin arms engage in the latches. Raise slowly and carefully until these are fully home and secure. Fit relevant retaining pins and clips. There is no need to tighten the check chains of the tractor with this system. Connect the top link from tractor to machine. Note that the top link has a Cat 2 and a Cat 3 end with a spacer. Together these allow connection to Cat 2 or Cat 3 tractors. Ensure that the correct pins are used and that the lynch pins are used throughout and are secure. The machine should then be slowly and carefully raised to a height that brings the tractor's PTO shaft and the gearbox input shaft to the same approximate height, whilst checking at all times that if the lift arms are still attached they are fouling nothing.

To prevent undue stress on the top link clevis of the tractor, the system uses the tractor's lower link arms to carry the weight of the machine. Some tractors, particularly of high hours, may be prone to their link arms sinking when switched off. With the PTO connected (refer to Section 3.4) but with its drive disengaged, ensure that the machine can be lowered fully without the PTO fouling on any part of the tractor or machine, the

link arms (if attached) fouling in any way or the control cables or any electrical cables being stretched.

Once the arrangement is suitable fully tighten all the fasteners.

3.4 ATTACHMENT - CONTINUED

Connect the PTO shaft to the output shaft of the tractor. In many cases the shaft will need to be shortened to prevent it bottoming. There should be 25mm (1") of free movement remaining in the shaft when it is at its shortest. Note that the telescoping members should overlap by at least 1/3rd of their length and by not less than 250mm. If cutting is required both steel tubes and both plastic tubes should be cut back by equal amounts.



Ensure the inner and outer PTO shafts are overlapped by at least 250mm when the machine is in its working position. Check that the PTO shaft will not run out of slide travel or separate if the machine is lowered. Damage to the shaft and injury may result.



Keeping PTO guards in place and in good order is a requirement of the law as well as safe practice.

The anti-spin chains should then be attached to suitable points on both tractor and machine.



Having connected the PTO shaft ensure the anti-rotation chains are clipped to the machine and tractor at both ends. The PTO shaft should turn clockwise ONLY.

The control unit can then be passed into the tractor cab. Connect the lighting cable and, where applicable, the separate power supplies. Refer to Section 4 for further information.

The cab safety guards should now be fitted. These must protect any screens which will be in direct line of sight from the flail head in its various positions. This will include all the side windows on the work side, the rear screen and in some cases the windscreen. Guards can be purchased from Shelbourne Reynolds Engineering. Note it is essential that the cab is fitted with safety glass and that the relevant windows and doors remain closed when the **hedgetrimmer** is in use.



Ensure cab safety guards are fitted and all windows are kept closed.

The parking stands can now be swung from their 'parked' to their 'work' positions. Check that the rotor control cable head is in the stop position where applicable. Start the tractor and engage the PTO at low to moderate revs. Allow the oil to circulate for about 20 minutes without operating the valves. This will make sure that the oil is thoroughly filtered by passing it through the return filter but the minimum of other components.

Ensure that there are no bystanders and that the area is still clear of obstructions.



Ensure all personnel keep a safe distance from the machine.

Open the taps on the lift cylinder to allow it to move (tap heads will now be in line with the oil flow).

Having first read and understood the information on the controls (Section 4), again set the tractor speed to a slow to moderate level. Now carefully operate the control levers, buttons and/or joystick, and ensure that the movements are functioning correctly; be ready at all times to cancel the action, should it be incorrect.



Ensure head does not hit tractor cab or wheels.

Place the flail head roller on the ground, or just above the ground if it has been set to a short cut length. Now start the rotor. This will require moderate revs to avoid stalling-out the tractor, but full revs should not be used. Adjust the revs to give approximately 350rpm at the PTO and run the rotor for about 3-4 minutes.



Ensure all personnel keep a safe distance from the flail head.

Check all hose runs to ensure that they are not pinching or chafing. Now check the oil level in the tank and top up if necessary.



Oil is an irritant to the skin. At high pressures it can penetrate the skin and be a considerable health risk.

3.5 REMOVAL - 3PT LINKAGE AND STABILISERS

Select a firm and level site to park the machine. Slew the machine fully backwards and retract any telescopic or variable forward reach cylinders fully. Retract the reach cylinder, while bringing the head to the horizontal, until the head end almost touches the rear lighting board frame and its base is level and in-line with the base of the machine. Disengage and detach the PTO. Turn the taps on the lift cylinder to the off position. Raise the linkage slightly to allow the pins between stabiliser frame and stabiliser base to be removed. The parking stands (see parts list, 809000 01, item 5) can now be swung to their 'parked' positions and the machine lowered onto them. The head should now also be on the ground. The top link may now need to be adjusted. Once sitting stable the top link and then the lower links can be detached. Remove the controls from the cab, leaving the controls fixing plate attached to the armrest if desired, where applicable. Also remove the lighting cable and any separate power supply. It is suggested that the driver double-checks that there are no connections still 'made' between tractor and machine, both before pulling away and again on stopping after moving forward a few inches. See Section 5.11 Laying Up.

3.6 REMOVAL – AXLE MOUNTING FRAME OPTION

Select a firm and level site to park the machine. Slew the machine fully backwards and retract any telescopic or variable forward reach cylinders fully. Retract the reach cylinder, while bringing the head to the horizontal until the head end almost touches the rear lighting board frame and its base is level and in-line with the base of the machine. Disengage and detach the PTO. Turn the taps on the lift cylinder to the off position. The parking stands (see parts list, 809000 01, item 5) can now be swung to their 'parked' positions and the machine lowered onto them. The head should now also be on the ground. The top link may need to be adjusted to allow this. Once sitting stable

the top link can be detached. Release the axle bracket latches and slowly lower the linkage to allow the pins to detach from the latches. Once clear continue lowering the linkage until the sub-frame is on the ground. The tractor drop arms can now be detached from the linkage frame, ideally leaving the links (see parts list, KIT-08015, items 12) connected to the frame. The lift arms can now be refitted. Remove the controls from the cab, leaving the controls fixing plate attached to the armrest if desired, where applicable. Also remove the lighting cable and any separate power supply. The tractor can now be driven away. It is suggested that the driver double-checks that there are no connections still 'made' between tractor and machine, both before pulling away and again on stopping after moving forward a few inches. See Section 5.11 Laying Up.

3.7 REATTACHING THE MACHINE

Reattaching follows the same sequence as in the initial attachment methods. It will not be necessary to adjust the length of the stabilisers, the length and width of the sub-frame unit, or the PTO shaft length unless there has been a change of tractor. Any cab screens that have been removed must be refitted. Unless the hydraulic circuit has been disturbed it will not be necessary to follow a running-up procedure, though the system should always be run slowly until the oil begins to warm up.



If the PTO is run quickly when oil is very cold the thick oil will be difficult for the pumps to suck in, causing cavitation. Damaging pressures can also be generated in oil coolers.

3.8 CARE OF HYDRAULICS

Hydraulic component life can be radically shortened by contamination, overheating or cavitation.

To minimise contamination – Ensure that any oil, containers and funnels used to top up the system are scrupulously clean and that the filler area is cleaned thoroughly before removing the cap. Follow the stated change intervals for the return and suction filters. When undertaking repair or servicing keep all components scrupulously clean. Ensure the filler cap and breather are intact and always kept in place (moisture is a contaminant as well as dirt).

To minimise overheating – Do not operate the machine above 540rpm PTO speed. Avoid stalling the rotor, or operating the cylinders against their end limits, as in each case large amounts of heat will be generated across the relevant relief valve.

To minimise the risk of cavitation – Ensure the oil level is maintained. Limit the PTO speed when oil is cold. Ensure pump suction components are sound and tight and that the suction filter is renewed as specified. Make smooth and limited changes to PTO speed. Cavitation is usually accompanied by unusual noises: since cavitation can very rapidly ruin a pump it is suggested that the machine is stopped immediately if noises are heard.

3.9 CARE OF THE ROTOR

Damage to the rotor can be costly to rectify. It undergoes a series of machining and balancing operations to ensure that it will run smoothly.



Never operate at a speed greater than 540 rpm at the PTO.

It is unwise to use the tractor's 1000rpm setting at a reduced engine speed – because revving the engine when distracted (for example when having to reverse for an impatient motorist) would then over-rev the rotor by a considerable amount.



Always use the correct and genuine flails, bushes, bolts and nuts. Check them regularly and keep them tight

A missing flail will put the rotor considerably out of balance, to an extent, which will rapidly damage the rotor bearings and rapidly generate fatigue cracks in the head shell.

3.10 MOVING FROM TRANSPORT TO WORK POSITION

Where relevant lower the linkage so that the weight of the machine is carried by the stabiliser frame. Check that the rotor control lever is not engaged (cable machines). Start PTO at low revs (note 540rpm setting). Open the taps on the lift cylinder. Extend the reach cylinder so that as the breakback cylinder is extended to rotate the arms to the work position the head misses the tractor wheel/cab. Use the lift, reach and head angling cylinders to bring the head to a position near to the tractor and parallel to, and close to, the ground.

3.11 STARTING THE ROTOR

With the PTO running and the head positioned as above, engage the head drive control (see Section 4). Slowly raise the engine revs to the correct speed; 540 rpm for grass cutting, 450-rpm approx. for hedgecutting.

3.12 STOPPING THE ROTOR

The rotor can be disengaged with the PTO running at working revs, because of the design of the motor control valves. However it is good practice to reduce the engine speed first.

3.13 TRANSPORTING

With the rotor stopped as above, bring the head to a horizontal position approx. 1m (3') from the wheel and 1m from the ground. If applicable close any telescopic or variable forward reach cylinders. Use the breakback cylinder to rotate the arms fully back, and then fully close the head angle cylinder. The reach cylinder can now be fully closed. Taking care that the arms do not foul the cab top, extend the lift cylinder to bring the head suitably close to the rear. Disengage the PTO.

On 3pt linkage mounted machines we recommend that the linkage is carefully raised by a small amount for transportation – so that the weight of the machine is carried on the lower links of the tractor rather than its top link anchor point. As the linkage is raised you will find that the nose piece can rotate by a small amount within the stabiliser frame. Once there is a small gap between the front of the stabiliser frame and the recess in the nose piece the weight is being carried on the link arms. Do not raise to the point that the stabiliser frame touches the other side of the recess or the frame will bend.

Care must be taken that the positioning of this machine relative to the tractor does not cause the dimensions of the combination (especially its width) to make it ineligible to travel at higher road speeds.

The arms should be arranged so that the head is as close as is practicable to the rear of the tractor (while leaving a safe distance from boom arms to cab top).

The booms must be closed against the pad provided, otherwise the boom members will be subjected to considerable stress should the head/outer arm bounce. Even then the transportation speed must be reduced on uneven surfaces. With the pad in its extended position the operator can position the head so that the flails face forward; which some may consider more appealing to following traffic.

Standard lighting connections are provided.

To transport with the machine not attached to a tractor first reattach the fork-lifting plates which were attached to it on dispatch (see parts list, 809004 01, item 16). With the head in the parked position its near end should be bolted to the rear plate (items 20, 21, 19). The lift cylinder taps must be switched off and the delivery strut (item 22) reattached between the 2 ends of the lift cylinder. If the unit is to be craned reattach the lifting lugs (items 23, 17, 18, 19) to the rearward side of the rocker and first boom.

3.14 WORKING ON THE HIGHWAY

When intending to operate on the highway consult the local Highways Department regarding notifications and approval, as rules and regulations will vary from area to area and with the class of highway. It is likely that, at least, warning signs will need to be placed at both ends of the work area. A flashing beacon and dipped headlights will assist in drawing the attention of other road users to the tractor and machine.

3.15 FLAIL HEAD ADJUSTMENTS



Always lower the cutting head into the work gently.

The rear roller can be placed in one of 6 height settings. For hedge work the roller can be raised so that it is 25mm (1") above the cut height. Obviously this is totally unsuitable for verge work; for which the remaining positions are provided. These will leave the vegetation at a height of 20, 40, 60, 80 or 100mm. It is necessary to loosen the pivot bolt in the bracket on each side and then unscrew and remove the other bolt. The bracket can then be swung to the desired position and the bolts replaced and tightened.



Never remove the rear roller completely. It helps to control the flow of cut material out of the head and helps to shield the flails from obstructions.

The nose is adjustable into one of four positions. To reduce the danger of debris being thrown out of the front of the head the nose should be set in its lowest position for verge work, and as low as is practicable for hedgecutting.

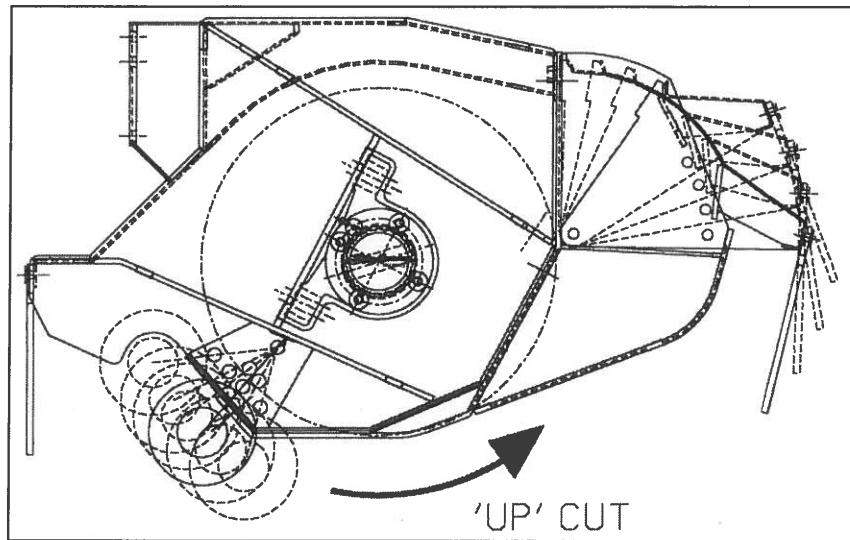


Figure 11



Never remove the nose completely when upward cutting. Always keep the front and rear curtains in good condition.

The rotor control can be engaged to cut 'up' or 'down'. Shelbourne Reynolds Engineering do not recommend downward cutting, because it puts greater strain and shocks on the rotor and drive components and leaves a ragged finish. If intending to downward cut, ensure that the flails fitted are suitable for this task.



Never reverse the direction of cut while the rotor is still turning.

3.16 ADJUSTABLE ROLLER OPTION

An adjustable roller is an optional extra. Two hydraulic cylinders are mounted on the head shell and can infinitely vary the position of the roller throughout the range possible for the standard bolted version. Simple transfers on the side of the head with indicators on the brackets show the operator the cut height set. The cylinders are actuated by a double-acting service from the tractor.



Ensure that both hoses are correctly connected before adjusting the roller. Damagingly high oil pressures can be generated if actuated with one hose disconnected.

3.17 HEDGE SHAPE AND CUTTING SEQUENCE

The shape of the hedge is likely to be influenced by regional practices and what is required of the hedge. An 'A' shape is usually recommended as the wide base encourages wildlife and favours new growth. It is considered that, though neatest, a rectangular hedge favours top growth, which can cause the base to die back. Heavy falls of snow can then damage it. Where heavy snow is likely a sloping top is often used; the extra light reaching the base keeps the base strong and also helps to throw off deep accumulations of snow.

If the hedge bounds a road it is suggested that the siding cuts on the non-road side are completed first, followed by the bottom on that side. The advantage here is that the hedge will be as thick as possible to resist debris flying through it onto the road. The side(s), top and then the bottom can then be cut from the roadside.



Never cut the other side of the hedge with the rotor facing towards you. Debris would have a direct path to you and you are more likely to hit dangerous objects, as you cannot see them.

3.18 CUTTING THICKNESS

Annual or biennial growth only should be cut.

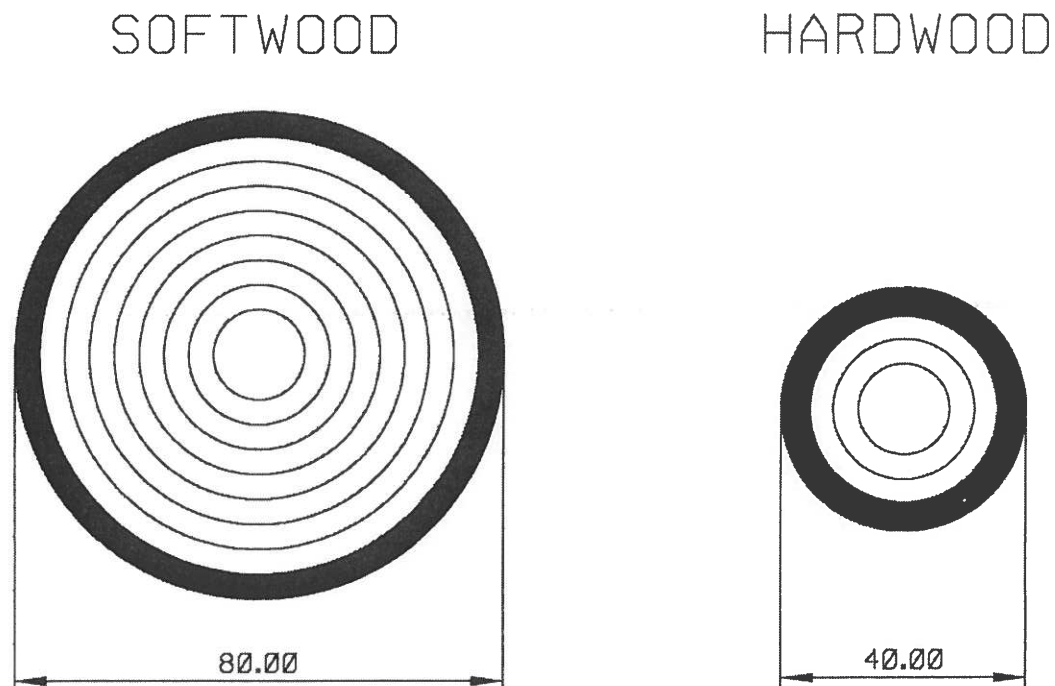


Figure 12

3.19 VERGE CUTTING

All models have the provision of head angle float. The centrally-placed head can then roll naturally with the ground contours, easing the operator's task. Machines fitted with electric controls have a lift float facility as standard, be that by manually charging an accumulator (switched electric and remote oil systems, and optional on cable machines) or by automatically sensing and maintaining the necessary

pressure in the lift cylinder (electronic system). This reduces the load on the roller; thereby lowering the breakback force, and saves the operator from having to constantly alter the cutting height. Cable controlled machines have a relief valve built into their lift slice so that, though the roller may carry the weight of head and outer arm, no further weight is transferred from the tractor



Never attempt to cut hedges with the lift float engaged.
Never leave the lift float engaged when folding for transport.

As the head is brought inwards the pressure in the lift cylinder needed to support it is reduced. If the lift float is left engaged the excess pressure can cause it to lift too much and/or unexpectedly.

Going too fast along the ground will tend to leave a ragged finish.

3.20 REACH AND WORKING ON SLOPES

The considerable reach of any hedgecutter combines with the weight of the head to produce a large overturning effect. The operator should remain aware of the danger this can present, particularly on slopes; where the tractor may already not be as stable as it would on a flat surface.



Take particular care on slopes.



Always use the minimum reach necessary to make the cut.

When moving between bouts of cutting always retract the arms. High shock loads can be generated when moving at speed with the arms outstretched and these will initiate fatigue cracking in the booms. Once cracks begin they will lengthen even under light loads.

3.21 BREAKBACK

The arms are protected when travelling in the forwards direction by a relief valve mounted on the breakback cylinder. The arms **are not** protected in a high speed collision, or when travelling backwards.



Do not attempt to use the machine when travelling backwards.



Neither the arms, nor the obstacle, will be protected in a high speed collision.

When the breakback operates, stop the tractor's forward movement immediately and reposition the head before resetting the breakback position.

The breakback cylinder is also equipped with check valves to ensure that the arms are held securely in the transport position. Do not remove the relief cartridge, or reduce its setting, as this would allow oil to bypass the checks.

On remote oil proportional controls and electronic proportional controls an Autoreturn function is fitted as standard. With autoreturn switched on the machine senses if the arms have broken back and if so automatically returns them to the working position. This function must be switched off for transportation.

3.22 TELESCOPIC ARM OPTION

Telescopic outer arms are an optional extra. These give an extra 800mm (2'8") of horizontal reach, which can be useful for high hedges, deep or wide ditches and banks, while still keeping a compact arrangement for close work when closed-in.

3.23 VARIABLE FORWARD REACH OPTION

Variable forward reach outer booms are an optional extra. They allow the operator to attain the same amount of extra reach that a telescopic arm offers, but when this is not needed the arms can be arranged to give a more visible 'mid-cut' head position.

3.24 WIRE CUTTER

The wire cutter is an important safety feature. It is located on the underside of the adjustable part of the nose. Its function is to, as far as possible, cut longer lengths of wire into shorter, safe lengths. However, the danger that wire presents means that the operator must ensure that there is no wire in the area to be cut and that there is no wire wrapped around the rotor.



Check the work area for wire. Where possible, remove unwanted wire and mark the remainder clearly.



Stop the rotor and clear it immediately if it picks up wire.



Never interfere with, or modify the wire cutter.

3.25 OVERHEAD LINES

The machine could stand as much as 4.3m (14'1") high if poorly positioned, even with the reach cylinder closed. The operator should take care to minimise the height of the machine in its transport position. He should also be aware of any obstructions overhead, such as power or telephone lines or bridges.

The operator should also be aware of power and other lines when cutting. Because of the risk of flashover the head should not come within 1.5m of any line which might be suspected of carrying a high voltage.



Always avoid overhead cables

SECTION 4:

CONTROLS

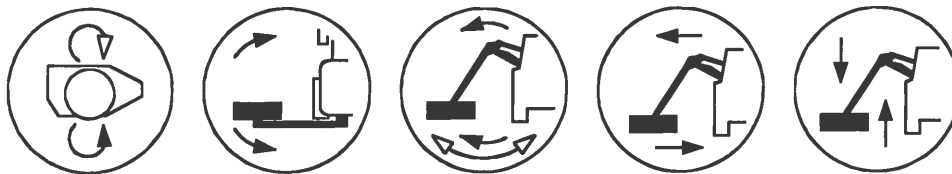
Controls should be mounted near-to-hand on the head side of the tractor. Ideally the controls should move with the seat so that if the terrain is bumpy the seat and controls will move up and down together.

All controls are supplied attached to a bracket. We supply a strip (see parts list, 809004 01, item 1) which is intended to be secured under the tractor seat armrest on the head side of the tractor with the tie strips provided (items 2). It can be secured in such a way that it stays fixed under the armrest (with the coachbolts trapped in place), the control brackets being unbolted from it when trimmer is to be detached. We also supply arms and brackets (items 7-9) intended to allow the controls to mount from under the seat pan (but above its suspension). The latter is necessary where the seat has no armrest or where the armrest is not strong enough to support the weight of the controls (especially oil remote controls and in some cases cable controls). Otherwise a bracket can be fabricated, or the unit can be fixed to the cab side. (Note; consult your dealer before drilling the cab side, as there is a risk this could weaken the structure or damage underlying parts.)

4.1 CABLE CONTROLS

The cable controller units are supplied banked together and fixed to a bracket as above. Each controller head is marked on the top with its function.

Left hand machines -



Cut down	Forward	Anticlockwise	Out	Down	Push away
Rotor	Breakback	Head angle	Reach	Lift	<i>Nearest to operator</i>
Cut up	Back	Clockwise	In	Up	Pull towards
		Float			

Figure 13

Right hand machines –



Push away	Down	Out	Clockwise	Forward	Cut down
<i>Nearest to operator</i>	Lift	Reach	Head angle	Breakback	Rotor
Pull towards	Up	In	Anticlockwise	Back	Cut up
			Float		

Figure 14

In the event that the machine is fitted with the telescopic boom or variable forward reach option the relevant controller will be inserted into the above arrangement between the breakback and rotor controllers. The transfer will be the relevant one of the 4 which follow.

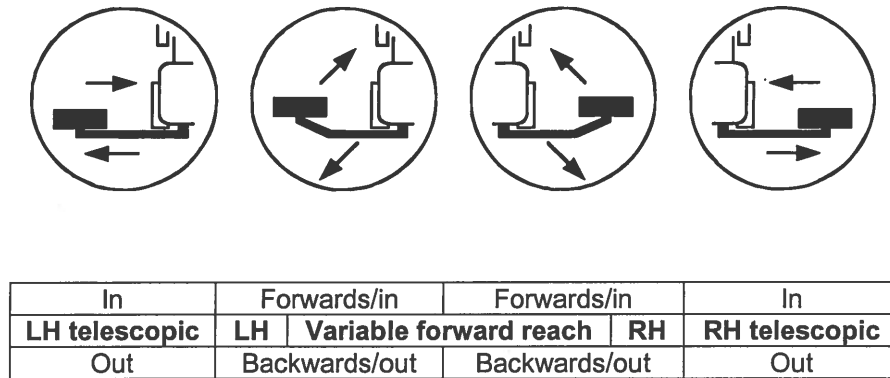


Figure 15

4.2 SWITCHED ELECTRIC CONTROLS

Switched electric controls are offered as an option. This system incorporates a serial link (all switch signals are encoded at the cab control unit, sent down a single pair of wires and then decoded at the control box on the machine). This reduces the amount of wiring and connections, improving reliability and as a spin-off gives useful diagnostics.

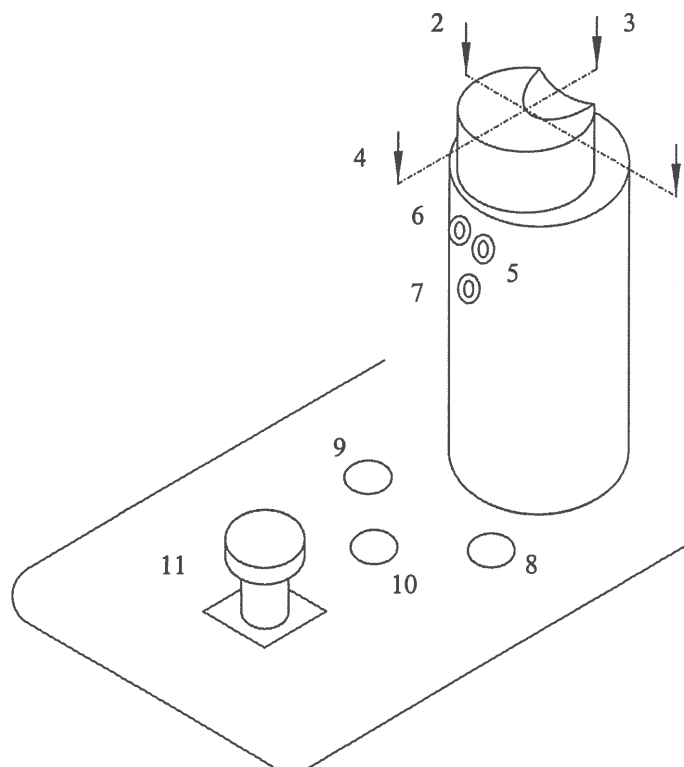


Figure 16

Pressing the rocker switch on the top of the grip in the cross direction **1**, **2** gives reach in the relevant direction with **3** and **4** giving lift and lower respectively. Buttons **5** and **6** at the front of the grip give anticlockwise and clockwise head rotation. With button **7** depressed; **1** and **2** now operate telescopic or variable forward reach in the relevant direction, **3** and **4** give slew forward and back respectively, while **5** becomes head float and **6** lift float (**5** lift float and **6** head float on RH machines). Switching floats on requires holding both buttons in for one second (for safety), switching off requires only that both are pressed.

This system will operate only one cylinder at a time, ignoring 'secondary' commands from the grip. Buttons **5** and **6** take precedence over directions **1** and **2** of the rocker, which take precedence over directions **3** and **4**.

Initiating lift float will also initiate head float. In the unlikely event only lift float is desired head float can be toggled off.

LEDs illuminate when floats are engaged - on LH machines LED **8** illuminates when head float is on and **9** when lift float is on (**8** lift float and **9** head float if a RH machine). A third LED **10** indicates that power is reaching the system. An emergency stop switch **11** signals the control unit to cut power to any/all solenoids. (Note the system remains energised, hence the power LED remains on when the emergency stop button is depressed).

Head angle float automatically disengages while head is angled and is re-engaged afterwards. Lift float remains engaged with lifting/lowering as this is the means to vary lift float pressure.

Rotor control is via a separate control cable.

The system is designed so that if electrical power is lost all functions except the rotor will cease, this situation will be apparent as the 'power' LED will not be lit. If the LED is lit and these functions are disabled, check first that the emergency stop switch is raised.

The power supply for the switched electric system must be connected, via a suitable fuse, to a substantial ignition fed power supply. The supply must not come from the cigarette lighter or trailer socket, otherwise the voltage supplied will be too low due to the current being drawn. Low voltage will cause the system to function erratically. We recommend using an ignition-controlled power supply as this avoids the risk of a user inadvertently leaving the system powered up and thereby draining the tractor battery over a few days

For machines fitted with oil coolers, in the event the hydraulic oil in the tank reaches 70°C the system will inform the driver by flashing the LEDs together and sounding a buzzer. See Section 3.8 for tips on avoiding overheating. In order to bring the oil temperature down disengage the rotor and run the PTO at approximately half revs for an extended period.

4.3 REMOTE OIL PROPORTIONAL CONTROLS

Remote oil proportional controls are offered as an option. For the electricians this system incorporates a serial link between the control unit in the cab and the control box on the machine. This reduces the amount of wiring and connections, improving reliability and as a spin-off gives useful diagnostics.

By moving the joystick to left and right the reach cylinder is actuated in the relevant direction; moving it back/towards and forwards/away from the operator gives lift and lower respectively. These actions are proportional; that is small joystick displacements give slow cylinder movements and large displacements faster movements.

Buttons **1** and **6** give forward and rearward slew respectively. Buttons **2** and **3** give anticlockwise and clockwise head rotation respectively. Buttons **4** and **5** operate the telescopic or variable forward reach cylinder (the nearest button to the operator bringing the head inwards for both left hand and right hand machines). With button **7** depressed **1** switches on and off autoreturn mode, **2** and **3** head angle float and lift float (the nearer to the operator being lift float in each case). Switching on floats requires holding both buttons in for one second for safety, switching off requires only that both are pressed. Similarly (with **7**) **4** and **5** start and stop the rotor (the nearer to the operator being cut up in each case), the necessary delay in these cases is 3 seconds.

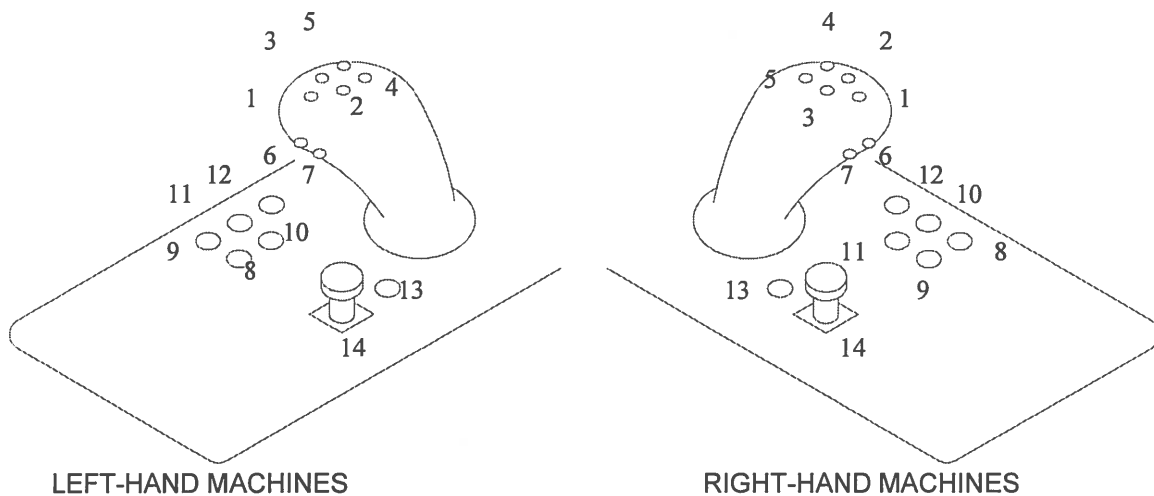


Figure 17

Initiating lift float also engages head float. In the unlikely event that only lift float is desired head float can be toggled off.

Head angle float disengages while head is angled and then re-engages afterwards. Lift float remains engaged when lift or lower are used as this is the means by which lift float pressure is varied.

LEDs indicate float and rotor status. **8** indicates that the rotor is cutting down, and **9** cutting up. These flash when the system is starting up or stopping the rotor. **10** indicates head angle float and **11** lift float. **12** indicates autoreturn mode; it is illuminated steadily when on and standing-by, but flashes whenever the system is attempting to power the arm back to the working position.

The system starts and stops the rotor in a controlled way – the rotor speed is ramped up over about 8 seconds to reduce shocks and ramped down over about 30 seconds for maximum safety. (Note in the event of electrical power failure the rotor will take considerably longer to run down as the spools must open fully for safety).

LED **13** indicates that power is reaching the system.

Pressing emergency stop switch **14** signals the control unit to cut power to any/all solenoids. (Note the system remains energised, hence the power LED remains on when the emergency stop button is depressed).

The system is designed so that if electrical power is lost all functions except lift and reach will cease, this situation will be apparent as the 'power' LED will not be lit. If the LED is lit and these functions are disabled, check first that the emergency stop switch is raised.

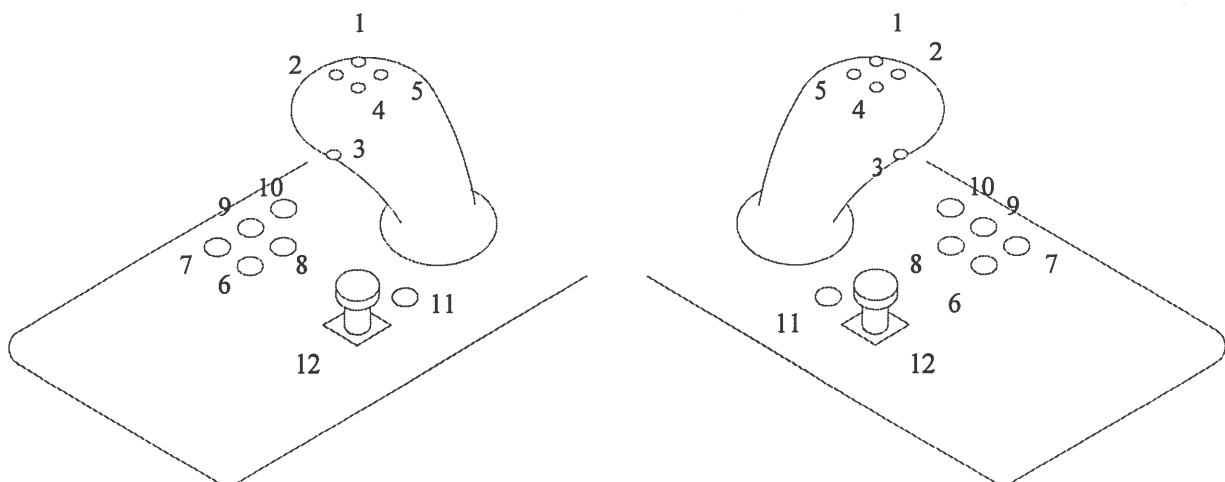
In the unlikely event of the loss of the pilot oil supply lift, reach and rotor drive will fail, but the remaining cylinders and the floats will still function

The power supply for the remote oil system must be connected, via a suitable fuse, to a substantial ignition-fed power supply. The supply must not come from the cigarette lighter or trailer socket, otherwise the voltage supplied will be too low due to the current being drawn. Low voltage will cause the system to function erratically. We recommend using an ignition-controlled power supply as this avoids the risk of a user inadvertently leaving the system powered up and thereby draining the tractor battery over a few days

In the event the hydraulic oil in the tank reaches 70°C the system will shut off the rotor and inform the driver by flashing the LEDs together. See Section 3.8 for tips on avoiding overheating. In order to bring the oil temperature down run the PTO at approximately half revs for an extended period.

4.4 CANBUS ELECTRONIC PROPORTIONAL CONTROLS

Canbus electronic proportional controls are offered as an option. This system has serial links not only from cab control unit to controller, but also to each valve slice. This reduces the number of connections to an absolute minimum, maximising reliability. Like the joystick axes, the buttons are fully proportional; that is depressing them partially gives slower movement speeds than depressing them fully.



LEFT-HAND MACHINES

RIGHT-HAND MACHINES

Figure 18

By moving the joystick to left and right the reach cylinder is actuated to give head movement in the relevant direction, moving it back/towards and forwards/away from the operator gives lift and lower respectively. Head angling is via buttons **1** and **2** on the top of the joystick.

The far top button **4** starts and stops the rotor (in conjunction with the trigger **3** for downwards rotation), each must be held in for 3 seconds to start, but the stop command is made instantaneously.

Pressing the trigger **3** allows the towards/away and left/right movements to actuate the breakback and (where fitted) the telescopic or variable forward reach cylinders in the logical directions.

Button **5** in conjunction with the trigger and joystick axes allows head angle float (reach out direction), lift float (lift direction), auto-return (lower direction) and HAC (reach in direction) modes to be initiated.

The operator can, at any time the lift float is initiated, press button **5** with trigger **3** to reduce the lift pressure and thereby increase the weight carried on the roller and button **4** with **3** to increase lift float pressure and thereby reduce the weight on the roller.

LEDs indicate float and rotor status. **6** indicates head angle float and **7** lift float are engaged. **8** indicates head angle compensation mode and **9** indicates auto-return mode. LED **10** indicates that the rotor is turning.

LED **10** illuminates steadily when the rotor is cutting up and with a long on period and short off period when cutting down. **10** also flashes when the system is starting or stopping the rotor so that it is clear to the operator that a command has been accepted. The system starts and stops the rotor in a controlled way – the rotor speed is ramped up over about 5 seconds to reduce shocks and ramped down over about 8 seconds for maximum safety. (Note in the event of electrical power failure the rotor will take considerably longer to run down as the spools must open fully for safety).

LED **11** indicates that power is reaching the system. In this case this LED is connected to the emergency stop button **12**, so that the LED is only lit when power supply is connected **and** the emergency stop button is up.

Head angle float allows the centrally-placed head to roll naturally with the ground contours, easing the operator's task when cutting verges. If the head is angled while head angle float is engaged the system will disengage it momentarily, to allow the head angle adjustment, and then reinstate head float once the adjustment is completed.

Lift float reduces the load on the roller; thereby lowering the breakback force, and saves the operator from having to constantly alter the cutting height when cutting verges. Lift float should be initiated with the head off the ground. The system can then measure the pressure required to support the head while it executes the task of lowering the head to the ground in an efficient and prompt way. The system then automatically applies a suitable proportion of this pressure to the lift cylinder. This sequence is re-executed every time the lift float is re-engaged and when the reach, telescopic or variable forward reach functions are used.

To aid the operator, the lift float indicator LED flashes between one (high) and 6 (low) times to give an indication of the lift float pressure being applied. This occurs periodically and upon initiating float, or altering float pressure.

Lift float automatically disengages when lift or lower are used, as a safety feature. However, by first pressing and holding button **5** the operator is able to make lift and lower movements then release the button and have lift float reinstate. (It is essential

that the joystick is fully returned to centre before the button is released or float will disengage.) While button **5** is held in float is suspended, so the button can also be used in isolation to stop the head from following downward contours which the operator doesn't wish to cut.

Initiating lift float will also initiate head float. In the unlikely event only lift float is desired head float can be toggled off.

Autoreturn mode senses if the arms have broken back and if so automatically returns them to the working position. With autoreturn on, LED **9** is illuminated steadily when arms are in the working position but flashes when the system is attempting to power the arm back to the working position. This function must be switched off for transportation.

HAC mode attempts to keep the angle of the cutting head constant relative to the ground, compensating for the actions of the lift and reach rams which attempt to alter it. The operator is still able to adjust the head angle manually while HAC is engaged.

Auto-return and HAC will only disengage when the routine used to switch them on is repeated.





Whenever the system is first powered up all the LEDs will flash simultaneously. Trigger **3** must then be pressed to initiate the system.

The power supply for the electronic proportional system must be connected to a substantial power supply which is interrupted when the tractor starter is operated. It should also be off when the ignition is off to reduce the risk of discharging the battery if left for a long period. The supply must not come from the cigarette lighter or trailer socket, otherwise the voltage supplied will be too low due to the current being drawn. Low voltage would cause the system to function erratically. If the system is not isolated when the tractor's starter operates serious damage to the electronics is possible. Loss of power will completely disable the system, this will be apparent as the 'power' LED will not be lit.

In the event the hydraulic oil in the tank reaches 70°C the system will shut off the rotor and inform the driver by flashing the rotor LED as it runs down. See Section 3.8 for tips on avoiding overheating. In order to bring the oil temperature down run the PTO at approximately half revs for an extended period.

SECTION 5:

MAINTENANCE

-  Carefully read the operators manual before carrying-out any work on the machine.
-  Stop the engine and remove the ignition key from the tractor before carrying-out any work on the machine.
-  Allow the machine to stop before working on it.
-  Lower the head to the ground and/or fit safety struts before working on it.

5.1 GREASE POINTS

Grease nipples at the pivots of arms and cylinders should be greased every 50 hours.

Grease nipples at either end of the rotor and at either end of the roller should be greased every 10 hours.

For those with the telescopic outer arm option the wear pads can be lightly greased if desired. Note that the cylinder has no grease nipples as it does not articulate.

The following transfer will be found on the machine –

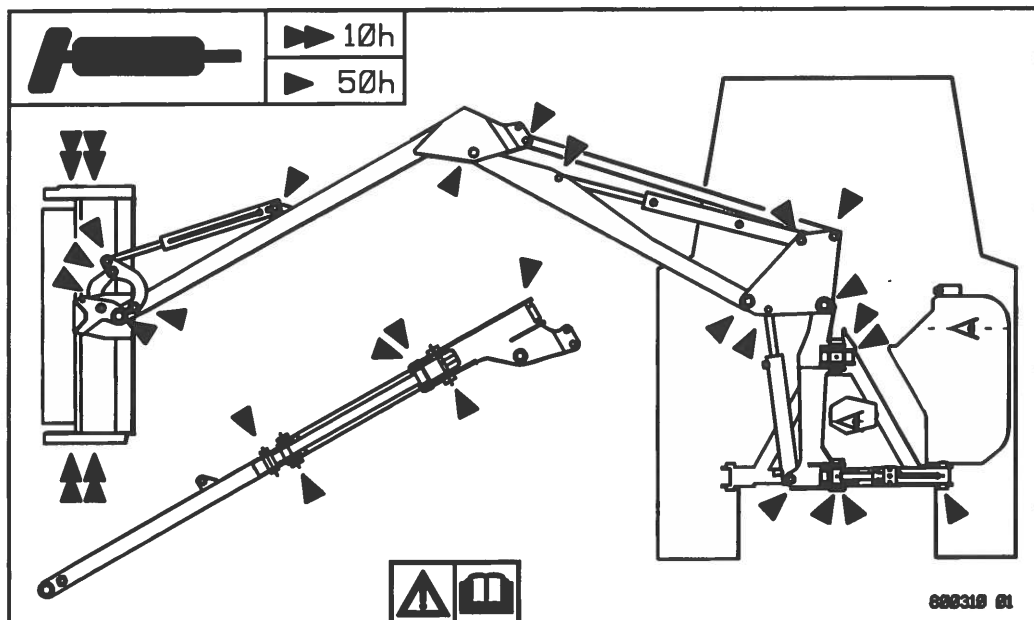



Figure 19

5.2 PTO SHAFT

-  Keeping PTO guards in place and in good order is a requirement of the law as well as safe practice.

Grease both universal joints every 8 hours. Fortnightly, or every 100 hours, separate the telescoping members and grease along the length of the inner shaft.

5.3 GEARBOX

For a standard power drive system the gearbox is prefilled with an SAE EP90 gear oil. This gearbox has a 2 piece aluminium case. Its capacity is 0.5 litres.

For a high power drive system the gearbox is prefilled with an SAE EP80 gear oil, though a 30/50 tractor universal oil is also suitable. This gearbox has a one piece cast-iron case, with a cover plate. Its capacity is also 0.5 litres.

In both cases after 50 hours and then every 1000 hours, or 2 years, the gearbox should be drained and then refilled with new oil.

Check gearbox oil level monthly, a sight glass is fitted to facilitate this.

5.4 HYDRAULIC OIL



Oil is an irritant to the skin. At high pressures it can penetrate the skin and be a considerable health risk.

The tank is prefilled with 'Elfolna HM46' an ISO VG 46 mineral hydraulic oil. Oil tank capacity is 230 litres for machines without, and 150 litres for those with, an oil cooler fitted. Check the oil level daily, a sight glass is fitted to facilitate this.

The interval at which the oil should be renewed will depend on the way in which the oil is worked and how well it is looked after. It will eventually break down due to the effects of contamination, oxidisation and condensation. These are caused by dirt getting into the system, overheating and moisture ingress. Contamination can cause the oil to become discoloured; as will oxidisation, but in the latter case along with a burnt smell. Condensation will tend to give the oil a milky appearance.

In order to get the best life from the oil: only add clean oil, from clean containers and with a clean funnel. Renew the return filter at the specified interval and clean the filler cap area before removal. Avoid pushing the machine beyond its capacity, as this generates large amounts of heat at the relief valves. Ensure that the filler cap and breather unit are intact and always kept in place.

5.5 FILTRATION

The machine is equipped with a suction strainer, situated in the bottom of the tank. When the oil is changed, or if the symptoms of cavitation are suspected (see Section 3.8) clean and dry the suction strainer.

A return filter is also fitted to the machine, in a housing, which is part of the top of the hydraulic tank. This must be changed after the first 50 hours and then subsequently after every 300 hours. Note that if the filter is allowed to become clogged then the oil will bypass the filter (to avoid the danger of the filter bursting) and allow contaminants into the tank and thence into the system components.

If another hydraulic component has failed then the return filter should also be renewed forthwith.

5.6 HYDRAULIC HOSES

Check the hose ends and other hydraulic connections daily to ensure there are no leaks.

Check the hoses themselves regularly to ensure there is no damage to the sheathing; if this has exposed the steel braiding it should be covered with self-adhesive tape to protect it from rust. If the braiding itself has become damaged then the hose should be replaced, as there is a danger it could burst.



Release pressure in hydraulic lines (e.g., by lowering head to the ground) before undoing connections.



Take extreme care when working on hoses related to (where fitted) the accumulator. When lift float is switched off the float block is designed to maintain the highest pressure possible in the accumulator (so that when switched on the head does not immediately fall to the ground). The head will need to be lowered to the ground and the lift float switched on to dissipate this pressure.



Do not assume that having partially unscrewed a connection there will be no residual pressure. 'Soft-seal' couplings can hold high pressures even with the fitting partially unscrewed.

When working on the hydraulics, care must be taken to ensure that any connections which are broken are remade in the same way; to ensure the safety of components and that the movements of the machine remain consistent and logical. Ensure that any replacement hose is of the same pressure rating as the hose it replaces. Always use 2 spanners when tightening hoses.

5.7 CABLE CONTROLS

No maintenance of cables or controllers is necessary and the cables should not be lubricated.

If the controller becomes difficult to operate check that there are no kinks or tight radii in the route of the cables. If this does not improve the situation check that the trumpet (see parts list, KIT-08018, part of item 5H) and the spool it actuates are properly aligned; slacken the fixing screws, reposition and then retighten.

5.8 SWITCHED, REMOTE OIL AND ELECTRONIC CONTROLS

No maintenance is required for switched, remote oil, or electronic controls.

5.9 FLAIL HEAD

Check for loose, broken or missing flails every 4 hours. Also check the rotor, roller and other bolts on the head for tightness. Keep the flails reasonably sharp in order to give a neat finish and reasonable power consumption.



Always use the correct and genuine flails, bushes, bolts and nuts. Check them regularly and keep them tight

A missing flail will put the rotor considerably out of balance, which will rapidly damage the rotor bearings and rapidly generate fatigue cracks in the head shell.

To balance the rotor for smooth running, suitable weights are attached as necessary at the factory to relevant flail stations, using slightly longer bolts. If flails are to be removed ensure that the weights and bolts are returned to the same end of the same station and with the bolt and nut in the same relative positions. These weights should only be discarded if the rotor is re-balanced.

Replace spacers, bolts and nuts when replacing flails. The flails themselves should be replaced as a set. Should one flail be lost then those which balance it should be renewed at the same time to preserve the balance: on a 1.2m head there will be a flail at 180°, one place along. On a 1.5m head there will either be a single flail at 180°, or 2 others at 120° to this one around the rotor.

When ordering new bolts you will need to identify how many bolts are of which length – 'standard' is 95 long, with lengths of 105 and 115 being used where balance weights are mounted.

Grease the rotor (2 places) and roller (2 places) bearings daily.

Ensure that there is nothing wrapped around the rotor or roller.

Check the belt tension daily. This requires the removal of the drive cover (see parts list, 809001 01, item 38). A load of 5 Kgs (10lbs) should give a deflection of 9mm. To adjust, slacken the motor fixing bolts and the adjuster locknut, then turn the adjuster bolt in the required direction. Then tighten locknut and fixing bolts and replace the drive cover.



Allow the machine to stop before adjusting the belts.

5.10 BUSHES AND PINS

All pivots subject to movement are protected by bushes. In the unlikely event these are subjected to extreme wear they should be renewed promptly; to reduce shocks, keep movements predictable and protect the underlying steel.

5.11 STORAGE

Clean the machine thoroughly, making sure that high-pressure water does not contact bearings, seals or electrical components. Avoid washing paintwork at very close range or very high pressure.

Release the tension in the drive belts, but replace the drive cover to keep the light out.

The machine should be stored undercover, to protect it from the effects of sun and rain.

Make any necessary repairs and then apply grease to all grease points until fresh grease shows. Also, apply a layer of grease to all unprotected surfaces that are prone to corrosion, in particular any exposed hydraulic cylinder rods. (This grease should be carefully removed prior to the next use of the machine, as it will contain sufficient dirt to damage the cylinder seals.

Disconnect and remove the switched electric or proportional electronic joystick control units and store in a safe secure place. Wrap control levers, or remote oil joysticks, in plastic sheeting (NOT fertiliser bags) and seal with tape. Ideally put in a dessicant bag to remove moisture.

