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PA3530 & 4530

FRONT MOUNTED COMPACT TRIMMER/MOWER

Operator Manual



IMPORTANT

VERIFICATION OF WARRANTY REGISTRATION



Dealer Warranty Information & Registration Verification

It is imperative that the selling dealer registers this machine with McConnel Limited before delivery to the end user – failure to do so may affect the validity of the machine warranty.

To register machines; log onto <https://my.mcconnel.com> and select 'Machine Registration' which can be found in the 'Warranty' section of the site. **Confirm to the customer that the machine has been registered by completing the verification form below.**

Registration Verification	Serial No. <input type="text"/>
Dealer Name:	
Dealer Address:	
Customer Name:	
Date of Warranty Registration:/...../.....	Dealer Signature:

Note to Customer / Owner

Please ensure the section above has been completed and signed by the dealer to verify your machine has been registered with McConnel Limited.

IMPORTANT: During the initial 'bedding in' period of a new machine it is the customer's responsibility to regularly inspect all nuts, bolts and hose connections for tightness and re-tighten if required. New hydraulic connections occasionally weep small amounts of oil as the seals and joints settle in – where this occurs it can be cured by re-tightening the connection – *refer to torque settings chart below*. The tasks stated above should be performed on an hourly basis during the first day of work and at least daily thereafter as part of the machine's general maintenance procedure.

CAUTION: DO NOT OVER TORQUE HYDRAULIC FITTINGS AND HOSES

Torque Settings for Hydraulic Fittings

Hydraulic Hose Ends		
BSP	Setting	Metric
1/4"	18 Nm	19 mm
3/8"	31 Nm	22 mm
1/2"	49 Nm	27 mm
5/8"	60 Nm	30 mm
3/4"	80 Nm	32 mm
1"	125 Nm	41 mm
1.1/4"	190 Nm	50 mm
1.1/2"	250 Nm	55 mm
2"	420 Nm	70 mm

Port Adaptors with Bonded Seals		
BSP	Setting	Metric
1/4"	34 Nm	19 mm
3/8"	47 Nm	22 mm
1/2"	102 Nm	27 mm
5/8"	122 Nm	30 mm
3/4"	149 Nm	32 mm
1"	203 Nm	41 mm
1.1/4"	305 Nm	50 mm
1.1/2"	305 Nm	55 mm
2"	400 Nm	70 mm

WARRANTY POLICY

WARRANTY REGISTRATION

All machines must be registered, by the selling dealer with McConnel Ltd, before delivery to the end user. On receipt of the goods it is the buyer's responsibility to check that the Verification of Warranty Registration in the Operator's Manual has been completed by the selling dealer.

1. LIMITED WARRANTIES

- 1.01. *All mounted machines supplied by McConnel Ltd are warranted to be free from defects in material and workmanship from the date of sale to the original purchaser for a period of 12 months, unless a different period is specified.
All Self Propelled Machines supplied by McConnel Ltd are warranted to be free from defects in material and workmanship from the date of sale to the original purchaser for a period of 12 months or 1500 hours. Engine warranty will be specific to the Manufacturer of that unit.*
- 1.02. *All spare parts supplied by McConnel Ltd and purchased by the end user are warranted to be free from defects in material and workmanship from the date of sale to the original purchaser for a period of 6 months. All parts warranty claims must be supported by a copy of the failed part invoice to the end user. We cannot consider claims for which sales invoices are not available.*
- 1.03. *The warranty offered by McConnel Ltd is limited to the making good by repair or replacement for the purchaser any part or parts found, upon examination at its factory, to be defective under normal use and service due to defects in material or workmanship. Returned parts must be complete and unexamined. Pack the component(s) carefully so that any transit damage is avoided. All ports on hydraulic items should be drained of oil and securely plugged to prevent seepage and foreign body ingress. Certain other components, electrical items for example, may require particular care when packing to avoid damage in transit.*
- 1.04. *This warranty does not extend to any product from which McConnel Ltd's serial number plate has been removed or altered.*
- 1.05. *The warranty policy is valid for machines registered in line with the terms and conditions detailed and on the basis that the machines do not extend a period of 24 months or greater since their original purchase date, that is the original invoice date from McConnel Limited.
Machines that are held in stock for more than 24 months cannot be registered for warranty.*
- 1.06. *This warranty does not apply to any part of the goods, which has been subjected to improper or abnormal use, negligence, alteration, modification, fitment of non-genuine parts, accident damage, or damage resulting from contact with overhead power lines, damage caused by foreign objects (e.g. stones, iron, material other than vegetation), failure due to lack of maintenance, use of incorrect oil or lubricants, contamination of the oil, or which has served its normal life. This warranty does not apply to any expendable items such as blades, belts, clutch linings, filter elements, flails, flap kits, skids, soil engaging parts, shields, guards, wear pads, pneumatic tyres or tracks.*
- 1.07. *Temporary repairs and consequential loss - i.e. oil, downtime and associated parts are specifically excluded from the warranty.*
- 1.08. *Warranty on hoses is limited to 12 months and does not include hoses which have suffered external damage. Only complete hoses may be returned under warranty, any which have been cut or repaired will be rejected.*
- 1.09. *Machines must be repaired immediately a problem arises. Continued use of the machine after a problem has occurred can result in further component failures, for which McConnel Ltd cannot be held liable, and may have safety implications.*
- 1.10. *If in exceptional circumstances a non McConnel Ltd part is used to effect a repair, warranty reimbursement will be at no more than McConnel Ltd's standard dealer cost for the genuine part.*

- 1.11. *Except as provided herein, no employee, agent, dealer or other person is authorised to give any warranties of any nature on behalf of McConnell Ltd.*
- 1.12. *For machine warranty periods in excess of 12 months the following additional exclusions shall apply:*
 - 1.12.1. *Hoses, exposed pipes and hydraulic tank breathers.*
 - 1.12.2. *Filters.*
 - 1.12.3. *Rubber mountings.*
 - 1.12.4. *External electric wiring.*
 - 1.12.5. *Bearings and seals*
 - 1.12.6. *External Cables, Linkages*
 - 1.12.7. *Loose/Corroded Connections, Light Units, LED's*
 - 1.12.8. *Comfort items such as Operator Seat, Ventilation, Audio Equipment*
- 1.13. *All service work, particularly filter changes, must be carried out in accordance with the manufacturer's service schedule. Failure to comply will invalidate the warranty. In the event of a claim, proof of the service work being carried out may be required.*
- 1.14. *Repeat or additional repairs resulting from incorrect diagnosis or poor quality previous repair work are excluded from warranty.*

NB Warranty cover will be invalid if any non-genuine parts have been fitted or used. Use of non-genuine parts may seriously affect the machine's performance and safety. McConnell Ltd cannot be held responsible for any failures or safety implications that arise due to the use of non-genuine parts.

2. REMEDIES AND PROCEDURES

- 2.01. *The warranty is not effective unless the Selling Dealer registers the machine, via the McConnell web site and confirms the registration to the purchaser by completing the confirmation form in the operator's manual.*
- 2.02. *Any fault must be reported to an authorised McConnell Ltd dealer as soon as it occurs. Continued use of a machine, after a fault has occurred, can result in further component failure for which McConnell Ltd cannot be held liable.*
- 2.03. *Repairs should be undertaken within two days of the failure. Claims submitted for repairs undertaken more than 2 weeks after a failure has occurred, or 2 days after the parts were supplied will be rejected, unless the delay has been authorised by McConnell Ltd. Please note that failure by the customer to release the machine for repair will not be accepted as a reason for delay in repair or submitting warranty claims.*
- 2.04. *All claims must be submitted, by an authorised McConnell Ltd Service Dealer, within 30 days of the date of repair.*
- 2.05. *Following examination of the claim and parts, McConnell Ltd will pay, at their discretion, for any valid claim the invoiced cost of any parts supplied by McConnell Ltd and appropriate labour and mileage allowances if applicable.*
- 2.06. *The submission of a claim is not a guarantee of payment.*
- 2.07. *Any decision reached by McConnell Ltd. is final.*

3. LIMITATION OF LIABILITY

- 3.01. *McConnell Ltd disclaims any express (except as set forth herein) and implied warranties with respect to the goods including, but not limited to, merchantability and fitness for a particular purpose.*
- 3.02. *McConnell Ltd makes no warranty as to the design, capability, capacity or suitability for use of the goods.*
- 3.03. *Except as provided herein, McConnell Ltd shall have no liability or responsibility to the purchaser or any other person or entity with respect to any liability, loss, or damage caused or alleged to be caused directly or indirectly by the goods including, but not limited to, any indirect, special, consequential, or incidental damages resulting from the use or operation of the goods or any breach of this warranty. Notwithstanding the above limitations and warranties, the manufacturer's liability hereunder for damages incurred by the purchaser or others shall not exceed the price of the goods.*
- 3.04. *No action arising out of any claimed breach of this warranty or transactions under this warranty may be brought more than one (1) year after the cause of the action has occurred.*

4. MISCELLANEOUS

- 4.01. McConnel Ltd may waive compliance with any of the terms of this limited warranty, but no waiver of any terms shall be deemed to be a waiver of any other term.*
- 4.02. If any provision of this limited warranty shall violate any applicable law and is held to be unenforceable, then the invalidity of such provision shall not invalidate any other provisions herein.*
- 4.03. Applicable law may provide rights and benefits to the purchaser in addition to those provided herein.*

McConnel Limited

POWER ARM & TRACTOR PRE-OPERATION INSPECTION



A daily equipment inspection of machine and tractor should be conducted before the equipment is used.

Use the inspection sheets on the following pages to assist with these daily inspections. Damaged or missing guards should be repaired or replaced before operating the mower. Failure to repair or replace damaged guards can result in objects being thrown from the mower and possibly hitting the operator and/or bystanders.

Inspect the Mower for Safe Operating Condition

- Make sure the driveline guards and shielding are in place and in good repair.
- Inspect the flexible thrown object shielding to assure that they are in place on the front and rear of the mower head and in good repair. Repair or replace any damaged or missing thrown object shields.
- Ensure the mower cutting height is set high enough to reduce the possibility of the mower blades contacting the ground. Actual height will be dependent on the ground conditions. Increase the height when working in rough or undulating conditions.
- Inspect for broken, chipped, bent, missing, or severely worn blades. Replace damaged blades before operating the mower. Ensure the blade retaining bolts and fasteners are secure and tight.
- Ensure all head bolts and nuts are tight.
- Lubricate the driveline universal joints and telescoping members daily.
- Grease the rotor and roller bearings and inspect their condition.
- Inspect for any oil leaks or damaged hoses.
- Inspect for worn and/or damaged decals and safety instructions. Replace unreadable, damaged or missing safety decals.
- Follow the operator's manual(s) inspection and maintenance instructions for lubricating parts, and keeping thrown object shielding, driveline guards, rotating parts shields, mower blades, and decals in good repair.

Inspect the Tractor for Safe Operating Condition

- Inspect the controls, lights, SMV's (Slow Moving Vehicle sign), seat belts, and ROPS to ensure they are in place and in good working order.
- Ensure tyres, wheels, lug bolts/nuts are in good condition.
- Make sure the tractor brakes and steering are in proper operating condition.
- Follow the operator's manual(s) inspection and maintenance procedures for keeping the tractor in good and safe condition before operating.

Copies of the inspection sheets on the following pages should be retained in this manual for reference; two sets are included to allow removal of one set for photocopying purposes. Alternatively, these inspection sheets can be download from our website via the QR code or using the link below;
<https://my.mcconnel.com/service/pre-operation-inspection-documents/>





POWER ARM PRE-OPERATION INSPECTION



Power Arm ID Date: Shift:



WARNING: Before conducting the inspection, make sure the tractor engine is off, the key removed, all rotation has stopped and the tractor is in park with the parking brake engaged. Make sure the mower head is resting on the ground or is securely blocked up and supported and all hydraulic pressure has been relieved.

Item	Condition at start of shift	Specific Comments if not O.K.
The operator's manual is in the canister on the mower.		
All warning decals are in place, clean and legible.		
All lights are clean and working.		
The mounting frame bolts are in place and tight.		
The arm pivot pins are tight and correctly secured.		
There are no cracks in the arms.		
Hydraulic cylinder pins are tight and correctly secured.		
Hydraulic cylinder hose connections are tight.		
Hydraulic pump hose connections are tight.		
Hydraulic valve hose connections are tight.		
Hydraulic valve controls function properly.		
There are no damaged hoses.		
The oil level is to the green mark on the tank sight glass.		
There is no evidence of hydraulic oil leaks.		
Flails are not missing, chipped, broken or excessively worn.		
The flail bolts are tight.		
The front and rear flaps are fitted and in good condition.		
The front hood is in place and in good condition.		
The wire trap is in good condition.		
The skid shoes are in good condition and tight.		
There are no cracks or holes in flail casing.		
Hydraulic motor mounting bolts are tight.		
All flail head nuts and bolts are tight.		
The rotor bearings are in good condition and greased.		
The roller bearings are in good condition and greased.		
The drive line shaft guard is in good condition.		
The drive line shaft guard is correctly secured.		
Controls are securely mounted in the cab.		
With engine running check arm operation.		
Have a spare pack of flails, bushes, bolts and nuts.		

Operators Signature:

DO NOT OPERATE AN UNSAFE TRACTOR OR MACHINE



TRACTOR PRE-OPERATION INSPECTION



Power Arm ID Date: Shift:



WARNING: Before conducting the inspection, make sure the tractor engine is off, the key removed, all rotation has stopped and the tractor is in park with the parking brake engaged. Ensure any implement attached to the tractor is firmly on the ground.

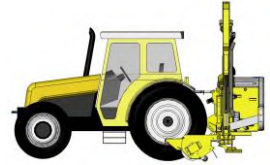
Item	Condition at start of shift	Specific Comments if not O.K.
The flashing lights function properly.		
All lights are clean and working correctly.		
All cab windows are clean and wipers working correctly.		
The SMV sign, where required, is clean and visible.		
The tyres are in good condition with correct pressure.		
The wheel nuts are tight.		
The tractor brakes are in good condition.		
The steering linkage is in good condition.		
There are no visible oil leaks.		
The hydraulic controls function properly.		
The ROPS or ROPS cab is in good condition.		
The seatbelt is in place and in good condition.		
The 3-point hitch is in good condition.		
The drawbar/pick up hook is secure and in good condition.		
The PTO master shield is in place.		
The engine oil level is full.		
The brake fluid level is full.		
The power steering fluid level is full.		
The fuel level is adequate.		
The engine coolant fluid level is full.		
The radiator and oil cooler are free of debris.		
The air filter is in good condition.		

Operators Signature:

DO NOT OPERATE AN UNSAFE TRACTOR OR MACHINE



POWER ARM PRE-OPERATION INSPECTION



Power Arm ID Date: Shift:



WARNING: Before conducting the inspection, make sure the tractor engine is off, the key removed, all rotation has stopped and the tractor is in park with the parking brake engaged. Make sure the mower head is resting on the ground or is securely blocked up and supported and all hydraulic pressure has been relieved.

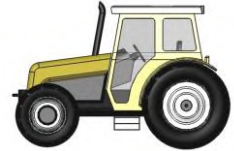
Item	Condition at start of shift	Specific Comments if not O.K.
The operator's manual is in the canister on the mower.		
All warning decals are in place, clean and legible.		
All lights are clean and working.		
The mounting frame bolts are in place and tight.		
The arm pivot pins are tight and correctly secured.		
There are no cracks in the arms.		
Hydraulic cylinder pins are tight and correctly secured.		
Hydraulic cylinder hose connections are tight.		
Hydraulic pump hose connections are tight.		
Hydraulic valve hose connections are tight.		
Hydraulic valve controls function properly.		
There are no damaged hoses.		
The oil level is to the green mark on the tank sight glass.		
There is no evidence of hydraulic oil leaks.		
Flails are not missing, chipped, broken or excessively worn.		
The flail bolts are tight.		
The front and rear flaps are fitted and in good condition.		
The front hood is in place and in good condition.		
The wire trap is in good condition.		
The skid shoes are in good condition and tight.		
There are no cracks or holes in flail casing.		
Hydraulic motor mounting bolts are tight.		
All flail head nuts and bolts are tight.		
The rotor bearings are in good condition and greased.		
The roller bearings are in good condition and greased.		
The drive line shaft guard is in good condition.		
The drive line shaft guard is correctly secured.		
Controls are securely mounted in the cab.		
With engine running check arm operation.		
Have a spare pack of flails, bushes, bolts and nuts.		

Operators Signature:

DO NOT OPERATE AN UNSAFE TRACTOR OR MACHINE



TRACTOR PRE-OPERATION INSPECTION



Power Arm ID Date: Shift:

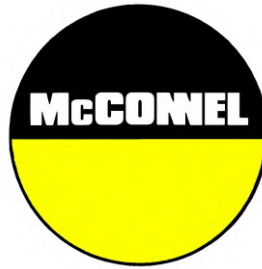


WARNING: Before conducting the inspection, make sure the tractor engine is off, the key removed, all rotation has stopped and the tractor is in park with the parking brake engaged. Ensure any implement attached to the tractor is firmly on the ground.

Item	Condition at start of shift	Specific Comments if not O.K.
The flashing lights function properly.		
All lights are clean and working correctly.		
All cab windows are clean and wipers working correctly.		
The SMV sign, where required, is clean and visible.		
The tyres are in good condition with correct pressure.		
The wheel nuts are tight.		
The tractor brakes are in good condition.		
The steering linkage is in good condition.		
There are no visible oil leaks.		
The hydraulic controls function properly.		
The ROPS or ROPS cab is in good condition.		
The seatbelt is in place and in good condition.		
The 3-point hitch is in good condition.		
The drawbar/pick up hook is secure and in good condition.		
The PTO master shield is in place.		
The engine oil level is full.		
The brake fluid level is full.		
The power steering fluid level is full.		
The fuel level is adequate.		
The engine coolant fluid level is full.		
The radiator and oil cooler are free of debris.		
The air filter is in good condition.		

Operators Signature:

DO NOT OPERATE AN UNSAFE TRACTOR OR MACHINE



For Safety and Performance...

ALWAYS READ THE BOOK FIRST

McCONEL LIMITED

**Temeside Works
Ludlow
Shropshire
England**

**Telephone: +44 (0)1584 873131
www.mcconel.com**

- NOISE STATEMENT -

The equivalent daily personal noise exposure from this machine measured at the operators' ear is within the range 78 – 85 dB, these figures apply to a normal distribution of use where the noise fluctuates between zero and maximum. The figures assume that the machine is fitted to a tractor with a 'quiet' cab with the windows closed in a generally open environment. We recommend that the windows are kept closed. With the cab rear window open the equivalent daily personal noise exposure will increase to a figure within the range 82 – 88 dB. At an equivalent daily noise exposure level of 85 – 90 dB ear protection is recommended and must always be used if any window is left open.



Operating, servicing and maintaining this equipment can expose you to chemicals including gasoline, diesel fuel, lubricants, petroleum products, engine exhaust, carbon monoxide, and phthalates, which are known to the State of California to cause cancer and birth defects or other reproductive harm. To minimize exposure, avoid breathing exhaust, do not idle the engine except as necessary, service your vehicle in a well-ventilated area and wear gloves or wash your hands frequently when servicing your vehicle. Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the state of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov. This website, operated by California's Office of Environmental Health Hazard Assessment, provides information about these chemicals and how individuals may be exposed to them.

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GENERAL INFORMATION

Always read this manual before fitting or operating the machine – whenever any doubt exists contact your dealer or the McConnel Service Department for advice and assistance.

Use only McConnel Genuine Service Parts on McConnel Equipment and Machines

DEFINITIONS – *The following definitions apply throughout this manual:*

WARNING

An operating procedure, technique etc., which –
can result in personal injury or loss of life if not observed carefully.

CAUTION

An operating procedure, technique etc., which –
can result in damage to either machine or equipment if not observed carefully.

NOTE

An operating procedure, technique etc., which –
is considered essential to emphasis.

LEFT AND RIGHT HAND

This term is applicable to the machine when attached to the tractor and is viewed
from the rear – this also applies to tractor references.

MACHINE & DEALER INFORMATION

Record the Serial Number of your machine on this page and always quote this number when ordering parts. Whenever information concerning the machine is requested remember also to state the make and model of tractor to which the machine is fitted.

Machine Serial Number:	Installation Date:
Machine Model details:	
Dealer Name:	
Dealer Address:	
Dealer Telephone No:	
Dealer Email Address:	

INTRODUCTION

Specifications of Standard Build Models

PA3530/4530 - Standard Models

- Linkage Mounted
- Right or Left Hand Build
- 3.7m (12'.0") or 4.5m (14'.9") Reach
- Parallel Arm Geometry
- Operator Guard
- Hydraulic Breakaway Return
- 65 Litre (14 Gallon) Hydraulic Reservoir
- Cable Rotor Control
- 30HP Hydraulic System
- Storage Support Legs
- Choice of Control Systems

PA3530/4530 SI Models

- Semi Independent Hydraulics System
 - Tractor powers arm movements*
 - PTO Pump powers rotor or cutterbar*
- Rotor or Cutter Bar engagement by tractors PTO lever
- Choice of 1.5m Cutterbar or 0.9m Flailhead
- Single Pump Hydraulic System

PA3530/4530 TI Models

- Totally Independent Hydraulics System
- 0.9m Flailhead Only
- Independent Reversible Rotor On/Off Valve
- Tandem Pump Hydraulics System
- Option of Lift Float
- Option of Electric Rotor Control

PA3530/4530 Bobcat / Multicar Builds

- Totally Dependent Hydraulic System
- Electric Rotor Control



This machine has the potential to be extremely dangerous - in the wrong hands it can kill or maim; It is therefore imperative that both owner and operator of the machine reads and understands the following section to ensure they are fully aware of the dangers that do, or may exist, and their responsibilities surrounding the use and operation of the machine.

The operator of this machine is responsible not only for their own safety but equally for the safety of others who may come into the close proximity of the machine, as the owner you are responsible for both.

When the machine is not in use the cutting head should be lowered to rest on the ground. In the event of any fault being detected with the machine's operation it must be stopped immediately and not used again until the fault has been corrected by a qualified technician.

POTENTIAL SIGNIFICANT DANGERS ASSOCIATED WITH THE USE OF THIS MACHINE:

- ▲ *Being hit by debris thrown by rotating components.*
- ▲ *Being hit by machine parts ejected through damage during use.*
- ▲ *Being caught on a rotating power take-off (PTO) shaft.*
- ▲ *Being caught in other moving parts i.e.: belts, pulleys and cutting heads.*
- ▲ *Electrocution from Overhead Power Lines (by contact with or 'flashover' from).*
- ▲ *Being hit by cutting heads or machine arms as they move.*
- ▲ *Becoming trapped between tractor and machine when hitching or unhitching.*
- ▲ *Tractor overbalancing when machine arm is extended.*
- ▲ *Injection of high-pressure oil from hydraulic hoses or couplings.*
- ▲ *Machine overbalancing when freestanding (out of use).*
- ▲ *Road traffic accidents due to collision or debris on the road.*
- ▲ *Burn risk from hot components.*

BEFORE USING THIS MACHINE YOU MUST:

- ▲ *Ensure you read all sections of the operator handbook.*
- ▲ *Ensure the operator is, or has been, properly trained to use the machine.*
- ▲ *Ensure the operator has been issued with and reads the operator handbook.*
- ▲ *Ensure the operator understands and follows the instructions in operator handbook.*
- ▲ *Ensure the tractor front, rear and sides are fitted with metal mesh or polycarbonate guards of suitable size and strength to protect the operator against thrown debris or parts.*
- ▲ *Ensure tractor guards are fitted correctly, are undamaged and kept properly maintained.*
- ▲ *Ensure that all machine guards are in position, are undamaged, and are kept maintained in accordance with the manufacturer's recommendations.*
- ▲ *Ensure flails and their fixings are of a type recommended by the manufacturer, are securely attached and that none are missing or damaged.*
- ▲ *Ensure hydraulic pipes are carefully and correctly routed to avoid damage by chaffing, stretching or pinching and that they are held in place with the correct fittings.*
- ▲ *Always follow the manufacturer's instructions for attachment and removal of the machine from the tractor.*
- ▲ *Check that the machine fittings and couplings are in good condition.*
- ▲ *Ensure the tractor meets the minimum weight recommendations of the machine's manufacturer and that ballast is used as necessary.*
- ▲ *Always inspect the work area thoroughly before starting to note obstacles and remove wire, bottles, cans and other debris.*
- ▲ *Use clear suitably sized warning signs to alert others to the nature of the machine working within that area. Signs should be placed at both ends of the work site. (It is recommended that signs used are of a size and type specified by the Department of Transport and positioned in accordance with their, and the Local Highways Authority, guidelines).*
- ▲ *Ensure the operator is protected from noise. Ear defenders should be worn and tractor cab doors and windows must be kept closed. Machine controls should be routed through proprietary openings in the cab to enable all windows to be shut fully.*
- ▲ *Always work at a safe speed taking account of the conditions i.e.: terrain, highway proximity and obstacles around and above the machine. Extra special attention should be applied to Overhead Power Lines. Some of our machines are capable of reach in excess of 8 metres (26 feet) this means they have the potential to well exceed, by possibly 3 metres (9' 9"), the lowest legal minimum height of 5.2 metres from the ground for 11,000 and 33,000 volt power lines. It cannot be stressed enough the dangers that surround this capability, it is therefore vital that the operator is fully aware of the maximum height and reach of the machine, and that they are fully conversant with all aspects regarding the safe minimum distances that apply when working with machines in close proximity to Power Lines. (Further information on this subject can be obtained from the Health & Safety Executive or your Local Power Company).*

- ▲ *Always disengage the machine, kill the tractor engine, remove and pocket the key before dismounting for any reason.*
- ▲ *Always clear up all debris left at the work area, it may cause hazard to others.*
- ▲ *Always ensure when you remove your machine from the tractor that it is left in a safe and stable position using the stands and props provided and secured if necessary.*

WHEN NOT TO USE THIS MACHINE:

- ▲ *Never attempt to use this machine if you have not been trained to do so.*
- ▲ *Never use a machine until you have read and understood the operator handbook, are familiar with it, and practiced the controls.*
- ▲ *Never use a machine that is poorly maintained.*
- ▲ *Never use a machine if guards are missing or damaged.*
- ▲ *Never use a machine on which the hydraulic system shows signs of wear or damage.*
- ▲ *Never fit, or use, a machine on a tractor that does not meet the manufacturer's minimum specification level.*
- ▲ *Never use a machine fitted to a tractor that does not have suitable front, rear and side(s) cab guarding made of metal mesh or polycarbonate.*
- ▲ *Never use the machine if the tractor cab guarding is damaged, deteriorating or badly fitted.*
- ▲ *Never turn a machine cutting head to an angle that causes debris to be ejected towards the cab.*
- ▲ *Never start or continue to work a machine if people are nearby or approaching - Stop and wait until they are at a safe distance before continuing. WARNING: Some cutting heads may continue to 'freewheel' for up to 40 seconds after being stopped.*
- ▲ *Never attempt to use a machine on materials in excess of its capability.*
- ▲ *Never use a machine to perform a task it has not been designed to do.*
- ▲ *Never operate the tractor or machine controls from any position other than from the driving seat, especially whilst hitching or unhitching the machine.*
- ▲ *Never carry out maintenance of a machine or a tractor whilst the engine is running – the engine should be switched off, the key removed and pocketed.*
- ▲ *Never leave a machine unattended in a raised position – it should be lowered to the ground in a safe position on a level firm site.*
- ▲ *Never leave a tractor with the key in or the engine running.*
- ▲ *Never carry out maintenance on any part or component of a machine that is raised unless that part or component has been properly substantially braced or supported.*
- ▲ *Never attempt to detect a hydraulic leak with your hand – use a piece of cardboard.*
- ▲ *Never allow children near to, or play on, a tractor or machine under any circumstances.*

ADDITIONAL SAFETY ADVICE

Training

Operators need to be competent and fully capable of operating this machine in a safe and efficient way prior to attempting to use it in any public place. We advise therefore that the prospective operator make use of relevant training courses available such as those run by the Agricultural Training Board, Agricultural Colleges, Dealers and McConnel.

Working in Public Places

When working in public places such as roadsides, consideration should be paid to others in the vicinity. Stop the machine immediately when pedestrians, cyclists and horse riders etc. pass. Restart only when they are at a distance that causes no risk to their safety.

Warning Signs

It is advisable that any working area be covered by suitable warning signs and statutory in public places. Signs should be highly visible and well placed in order to give clear advanced warning of the hazard. Contact the Department of Transport or your Local Highways Authority to obtain detailed information on this subject. The latter should be contacted prior to working on the public highway advising them of the time and location of the intended work asking what is required by way of signs and procedure. – *‘Non-authorized placement of road signs may create offences under the Highways Act’.*

Suggested Warning Signs Required

‘Road works ahead’ warning sign with a supplementary ‘Hedge cutting’ plate. ‘For 1 mile’ or appropriate shorter distance may be added to the plate.

‘Road narrows’ warning signs with supplementary ‘Single file traffic’ plate.

White on blue ‘Keep right’ () arrow sign on rear of machine.*

** Note – this applies to UK Market machines where traffic passes to the right of a machine working in the same direction as the traffic flow. The direction, use and colour of the arrow sign will depend on the country of use and the Local Highway Authorities regulations in the locality.*

Use of Warning Signs

- ▲ *On two-way roads one set of signs is needed facing traffic in each direction.*
- ▲ *Work should be within 1 mile of the signs.*
- ▲ *Work only when visibility is good and at times of low risk e.g.: NOT during ‘rush-hour’.*
- ▲ *Vehicles should have an amber-flashing beacon.*
- ▲ *Ideally, vehicles should be conspicuously coloured.*
- ▲ *Debris should be removed from the road and path as soon as practicable, and at regular intervals, wearing high visibility clothing and before removing the hazard warning signs.*
- ▲ *Collect all road signs promptly when the job is completed.*

Although the information stated here covers a wide range of safety subjects it is impossible to predict every eventuality that can occur under differing circumstances whilst operating this machine. No advice given here can replace ‘good common sense’ and ‘total awareness’ at all times, but will go a long way towards the safe use of your McConnel machine.

Safe use of rotary flail hedge cutters

HSE information sheet

Agriculture Information Sheet No 21 (Revision 1)

Introduction

This information sheet outlines typical hazards when using most types of tractor-mounted rotary flail hedge cutter. It gives guidance on reducing risks to the operator and others during work with hedge cutters and will help employers, employees and the self-employed comply with their duties under health and safety law.

All users of rotary flail hedge cutters need to be aware of the particular features of their make/model of hedge cutter when considering the hazards, risks and precautions.

Hazards

The greatest risk of injury comes from contact with the machine's moving parts and in particular:

- entanglement on inadequately guarded power take-off shafts;
- contact with the cutter head parts, drive belts or pulleys;
- being struck by the cutting head or machine arm as it moves.

Other risks associated with tractor-mounted hedge cutters can include:

- being hit by material or other debris ejected by the cutters;
- being hit by component parts ejected from the machine;
- coming into contact with overhead electricity power lines (OHPLs);
- the tractor overbalancing when the machine arm is extended;
- injection of high-pressure oil from damaged hydraulic hoses or couplings;
- being struck by the machine overbalancing when un-hitched from the tractor;
- road traffic accidents due to collisions with other vehicles either directly or from debris on the road.

Control measures

It is extremely dangerous to carry out any work on a machine while it is under power. The most important safety measure is to follow the 'safe stop' procedure before dismounting, or carrying out any maintenance or adjustments, including dealing with a blockage or other problem:

- Handbrake on.
- Controls neutral.
- Stop engine.
- Remove key.

Guards and machine safety

Check that all guards and other protective devices are in place before starting work. Don't use the machine if the guards are missing or damaged. Make sure:

- the power take-off (PTO) shaft is fully enclosed in a guard along its entire length from the tractor power take-off to the power input connection on the hedge cutter;
- the tractor rear and side(s) are fitted with protective glazing, metal mesh or polycarbonate guards of a size/strength specified by the hedge cutter manufacturer to protect the operator against thrown debris or other projectiles;
- tractor mesh/polycarbonate guards are suitable for the job, undamaged and maintained in accordance with the manufacturer's instructions;
- all hedge cutter guards and safety devices are in position, correctly fitted and maintained in accordance with the manufacturer's recommendations;
- flails and their fixing heads are the right size for the task. Flails, and their fixings, should be of the type recommended by the manufacturer, securely attached, and should not be missing or damaged;
- hydraulic pipes are carefully routed to avoid damage;
- machine fittings and couplings are in good condition.

General guidance on safe working practice

- Operators should receive adequate instructions and training to enable them to use the machine safely. Take advantage of relevant training/courses provided by manufacturers/dealers. They will help ensure your safety and that of your staff, and help you get the best performance from your hedge cutter.
- Make sure the operator reads, understands and follows the instruction manual.
- Follow the manufacturer's instructions when hitching or unhitching the machine from the tractor. Do not stand in any position where you may be at risk of being crushed, eg in the area between the back of the tractor and the cutter.
- Make sure the machine is left in a stable position when it is removed from the tractor, using any stands or props provided, and securing it further if necessary.
- Do not carry out maintenance on the hedge cutter with the cutting arm/dipper arm raised, unless the arm is properly supported.
- Check the tractor is at least the minimum weight recommended by the hedge cutter manufacturer. Use ballast as necessary.
- Inspect the hedge before starting to cut and remove wire, bottles, cans and other debris. Check for any telegraph/electricity pole stays. Damaged stays should be reported to the relevant Telecoms Company/Distribution Network Operator.
- Use appropriate warning signs to alert others to the hedge-cutting operation where necessary.
- Work at a safe speed, taking account of the conditions (eg terrain, proximity to the highway, or obstacles).
- Use safe practices when work needs to be done near OHPLs. Flailhead units on some dipper arms can reach over 5.2 metres, the minimum height of OHPLs above ground level (see Further reading).
- Clear up debris after cutting if it could be a hazard to others.

Roadside hedges

Take extra care if you are hedge/verge cutting along a road. Consider what measures you will need to control the risks to other road users (eg vehicles, cyclists, pedestrians, or horse riders). For roadside work (on the public highway) there are other legal requirements. For example, there may be obligations to:

- display specific warning signs in defined locations where work is carried out;
- fit flashing beacons to tractors/machines;
- clear debris from paths and roads;
- restrict your working hours.

Consult your local authority highways department and the Department for Transport for advice (see Further reading).

Further reading

Traffic signs manual 2009. Chapter 8. Traffic safety measures and signs for road works and temporary situations. Part 2: Operations DfT ISBN 978 0 11 553052 4 <http://assets.dft.gov.uk/publications/traffic-signs-manual/traffic-signs-manual-chapter-08-part-02.pdf>

Working safely near overhead electricity power lines AIS8(rev3) HSE Books 2012 www.hse.gov.uk/pubns/ais8.htm

Further information

For information about health and safety, or to report inconsistencies or inaccuracies in this guidance, visit www.hse.gov.uk/. You can view HSE guidance online and order priced publications from the website. HSE priced publications are also available from bookshops.

This guidance is issued by the Health and Safety Executive. Following the guidance is not compulsory, unless specifically stated, and you are free to take other action. But if you do follow the guidance you will normally be doing enough to comply with the law. Health and safety inspectors seek to secure compliance with the law and may refer to this guidance.

This document is available at www.hse.gov.uk/pubns/ais21.htm.

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SAFETY & INFORMATION DECALS (Power Arms)

Power Arm machines are equipped with safety and information decals designed to warn of dangers, operational information and machine protection. Operators must understand the decals and heed all warnings. Keep decals in a good condition and replace immediately if they are damaged or missing.



1.



2.



4.



5.



6.



7.



8.



9.



10.



11.



12.



13.



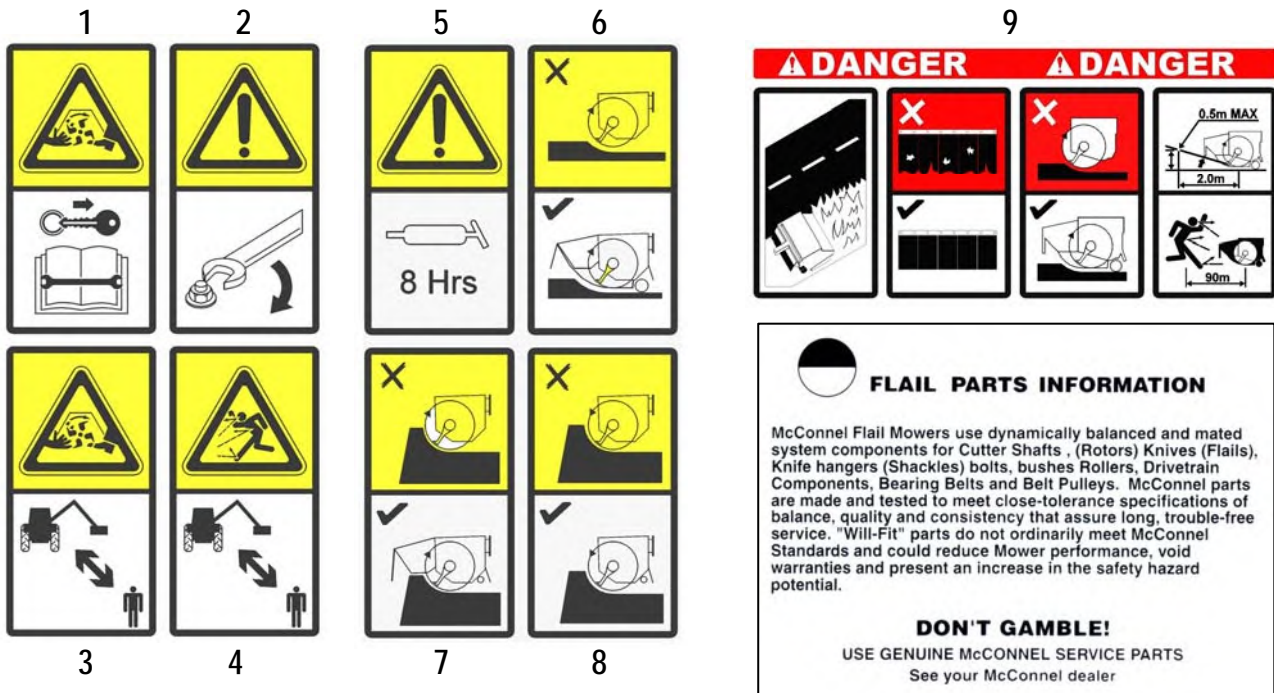
14.



15.

1. General Safety Warnings.
2. Driveline Hazard Warning.
3. Tighten Check Chains Warning.
4. 'In vehicle' Safety Rules Decal.
5. Serial Number Plate.
6. Read the Book First.
7. Lift Point with SWL (Kg).
8. Specific Pinch Point Warning.
9. Maximum vehicle PTO Speed & Direction Warning.
10. Oil Filter Initial and subsequent change information.
11. Lift Point for shipping only; *stow when machine installed on vehicle. (Models with stowable lift eyes only).*
12. Auto-breakaway Return Warning; *in 'Auto-Reset' arm will automatically return to the work position, when possible.*
13. Vehicle Clearance Warning; *leave 300mm+ between arm and vehicle.*
14. Lift Stop Clearance Warning; *leave 300mm+ between arm and vehicle, leave 5mm between arm and stop.*
15. Lift Tap 'Lock' Warning; *leave 300mm+ between arm and vehicle, lock lift taps for transport.*

SAFETY & INFORMATION DECALS (Flail Heads)



1. **Caution!** Rotating blades; keep clear of machine, stop machine (wait for rotor to stop), remove vehicle key and read the book first before performing any service or maintenance.
2. **Caution!** Keep all nuts and bolts tight.
3. **Caution!** Rotating components; keep clear of the working machine.
4. **Caution!** Thrown objects risk; keep all persons at a safe distance from the working machine.
5. **Caution!** Lubricate greasing points every 8 working hours.
6. **Caution!** Grass/Verge Mowing; front hood, front flap, rear roller and rear flap must be fitted and correctly adjusted when using the machine for grass and verge mowing. Flaps must be in good condition.
7. **Caution!** Hedging (Uphill cutting); front hood, front flap and rear flap must always be fitted and correctly adjusted. Rear roller should be placed into the raised position. Flaps must be in good condition.
8. **Caution!** Hedging (Downhill cutting); front hood may be removed; rear flap must be fitted and rear roller placed into the raised position. Flap must be in good condition.
9. **Danger!** Road side mowing. Flaps must be in good condition. Do not work if front hood, front flaps, rear roller and rear flaps not fitted. Front hood, front flaps, rear roller and rear flaps must be fitted. Adjust front hood to the correct height position for verge mowing. A extended straight line from the bottom of the rotor and bottom of the front flap should not be higher than 0.5m at a horizontal distance of 2.0m from the rotor. Keep all persons at 90m from the working machine, stop machine if persons are closer. *Refer to front hood height setting section for details.*
10. **Important!** Parts information; for safety and performance only use 'Genuine McConnel Service Parts'.

FITTING – Tractor Selection

Linkage Requirements

Where required tractor must be equipped with Category 1 Linkage.

Linkage Isolation

A linkage isolation facility is necessary for SI models only.

Check Chains/Stabilisers

Check chains or stabiliser bars must be fitted and tightened.

Tractor Relief Valve

PA3530 SI models the tractor relief valve must be set above 160 Bar (2300 PSI).

PA4530 SI models the tractor relief valve must be set above 230 Bar (3336 PSI).

Tractor Hydraulic Flow Rate

Hydraulic flow rates are not crucial for SI models.

PTO Shaft

Tractor must be equipped with live drive independent PTO shaft to enable forward movement to be halted while the flail head continues to operate.

Horse Power Requirements

PA3530 / PA4530 with cutterbar - 25HP minimum

PA3530 / PA4530 with flail head - 30HP minimum

Stability Requirements

PA3530 with cutterbar - 1100kg minimum tractor weight including front ballast.

PA3530 with flail head - 1300kg minimum tractor weight including front ballast.

PA4530 with cutterbar - 1800kg minimum tractor weight including front ballast.

PA4530 with flail head - 2000kg minimum tractor weight including front ballast.

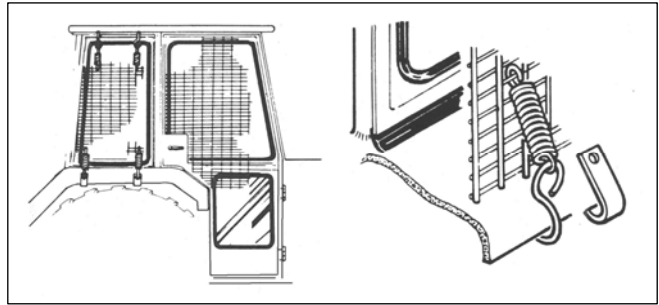
NOTE: For machines fitted with a flail head the tractor must have minimum outside tyre width of 1.4m.

VEHICLE / TRACTOR PREPARATION

We recommend vehicles are fitted with cabs using 'safety glass' windows and protective guarding when used with our machines.

Fit Operator Guard (part no. 73 13 324) using the hooks provided. Shape the mesh to cover all vulnerable areas.

Remember the driver must be looking through mesh and/or polycarbonate



glazing when viewing the flail head in any working position - unless the vehicle/ cab manufacturer can demonstrate that the penetration resistance is equivalent to, or higher than, that provided by mesh/polycarbonate glazing. If the tractor has a roll bar only, a frame must be made to carry both mesh and polycarbonate glazing. The operator should also use personal protective equipment to reduce the risk of serious injury such as; eye protection (*mesh visor to EN1731 or safety glasses to EN166*), hearing protection to EN352, safety helmet to EN297, gloves, filter mask and high visibility clothing.

Vehicle Ballast: It is imperative when attaching 'third-party' equipment to a vehicle that the maximum possible stability of the machine and vehicle combination is achieved – this can be accomplished by the utilisation of 'ballast' in order to counter-balance the additional equipment added.

Front weights may be required for rear mounted machines to place 15% of total outfit weight on the front axle for stable transport on the road and to reduce 'crabbing' due to the drag of the cutting unit when working on the ground.

Rear weights may be required to maintain a reasonable amount of rear axle load on the opposite wheel from the arms when in work; for normal off-ground work i.e. hedge cutting this should be 20% of rear axle weight or more for adequate control, and for ground work i.e. verge mowing with experienced operators, this can be reduced to 10%.

All factors must be addressed in order to match the type and nature of the equipment added to the circumstances under which it will be used – in the instance of Power Arm Hedgecutters it must be remembered that the machines centre of gravity during work will be constantly moving and will differ from that during transport mode, therefore balance becomes critical.

Factors that effect stability:

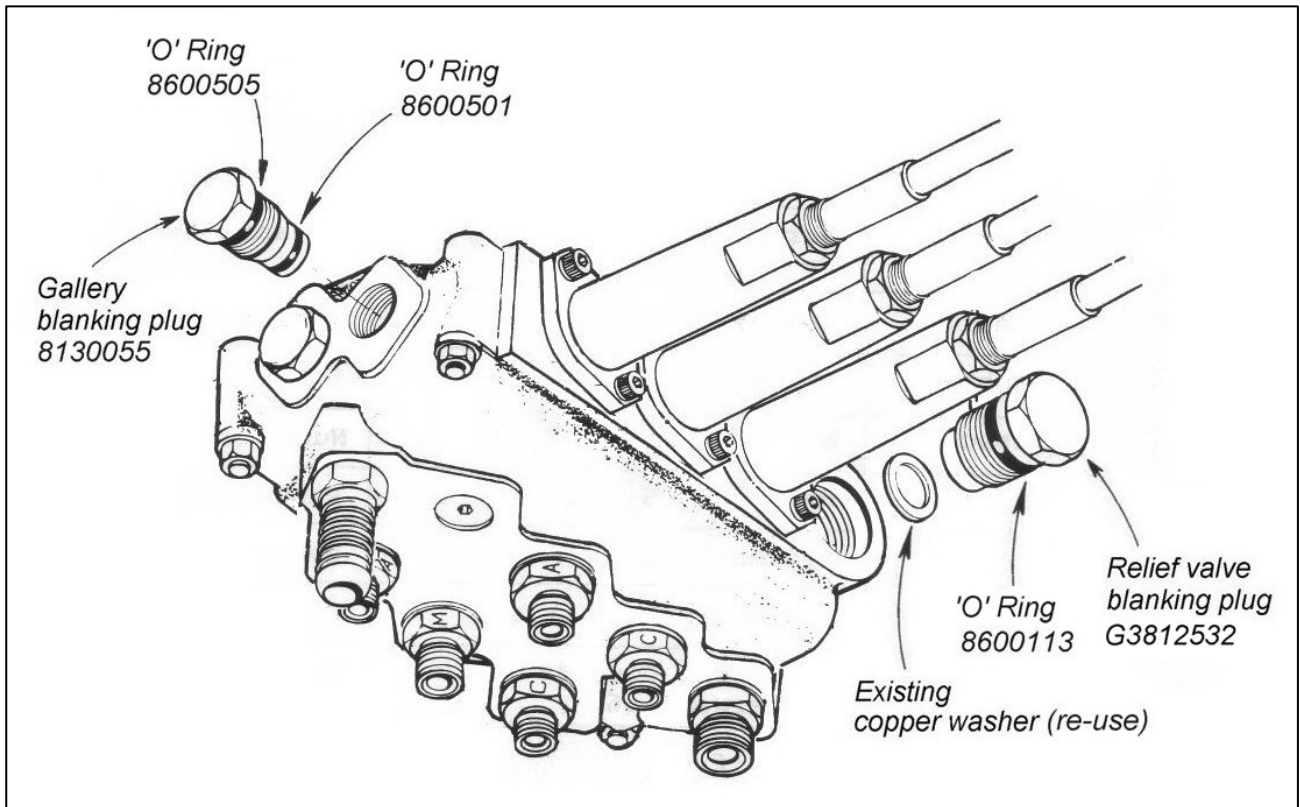
- Centre of gravity of the tractor/machine combination.
- Geometric conditions, e.g. position of the cutting head and ballast.
- Weight, track width and wheelbase of the tractor.
- Acceleration, braking, turning and the relative position of the cutting head during these operations.
- Ground conditions, e.g. slope, grip, load capability of the soil/surface.
- Rigidity of implement mounting.

Suggestions to increase stability:

- Increasing rear wheel track; a vehicle with a wider wheel track is more stable.
- Ballasting the wheel; it is preferable to use external weights but liquid can be added to around 75% of the tyre volume – water with anti-freeze or the heavier Calcium Chloride alternative can be used.
- Addition of weights – care should be taken in selecting the location of the weights to ensure they are added to a position that offers the greatest advantage.
- Front axle locking, check with tractor manufacturer.

The advice above is offered as a guide for stability only and is not a guide to vehicle strength. It is therefore recommended that you consult your vehicle manufacturer or local dealer to obtain specific advice on this subject, additionally advice should be sought from a tyre specialist with regard to tyre pressures and ratings suitable for the type and nature of the machine you intend to fit.

CLOSED CENTRE CONVERSION KIT (SI Models Only)



Closed Centre Conversion Kit 8130059 for SI models only

A control valve conversion kit (*Part Number 8130059*) consists of a relief valve blanking plug which should be installed in place of the existing relief valve, and a pressure gallery blanking plug which is installed in place of the standard blanking plug at the valve outlet end next to the lift ram gland connection.

NOTE: Care must be adopted when extracting the relief valve not to damage the copper sealing washer as this is re-used.

OIL RECOMMENDATIONS

Hydraulic Oil Tank

The machine will be delivered from the factory without oil. Fill the reservoir with light hydraulic oil as specified in the chart below to a level approximately 75mm (3") below the top of the tank.

The total capacity of the tank is approximately 65 Litres (14 Gallons).

Do not overfill the tank.

Recommended Oils

Manufacturer / Supplier	Cold or Temperate Climate	Hot Climate
BP	<i>Bartran 46</i> <i>Energol HLP-HM 46</i>	<i>Bartran 68</i> <i>Energol HLP-HM 68</i>
CASTROL	<i>Hyspin AWH-M 46</i>	<i>Hyspin AWH-M 68</i>
COMMA	<i>Hydraulic Oil LIC 15</i>	<i>Hydraulic Oil LIC 20</i>
ELF	<i>Hydrelf HV 46</i> <i>Hydrelf XV 46</i>	<i>Hydrelf HV 68</i>
ESSO	<i>Univis N 46</i>	<i>Univis N 68</i>
FUCHS (UK/Non UK Markets*)	<i>Renolin 46</i> <i>Renolin HVZ 46</i> <i>Renolin CL46/B15*</i> <i>Renolin AF46/ZAF46B*</i>	<i>Renolin 68</i> <i>Renolin HVZ 68</i> <i>Renolin CL68/B20*</i> <i>Renolin AF68/ZAF68B*</i>
GREENWAY	<i>Excelpower HY 68</i>	<i>Excelpower HY 68</i>
MILLERS	<i>Millmax 46</i> <i>Millmax HV 46</i>	<i>Millmax 68</i> <i>Millmax HV 68</i>
MORRIS	<i>Liquimatic 5</i> <i>Liquimatic HV 46</i> <i>Triad 46</i>	<i>Liquimatic 6</i> <i>Liquimatic HV 68</i> <i>Triad 68</i>
SHELL	<i>Tellus 46</i> <i>Tellus T46</i>	<i>Tellus 68</i> <i>Tellus T68</i>
TEXACO	<i>Rando HD 46</i> <i>Rando HDZ 46</i>	<i>Rando HD 68</i> <i>Rando HDZ 68</i>
TOTAL	<i>Equivis ZS 46</i>	<i>Equivis ZS 68</i>

Gearbox Oil

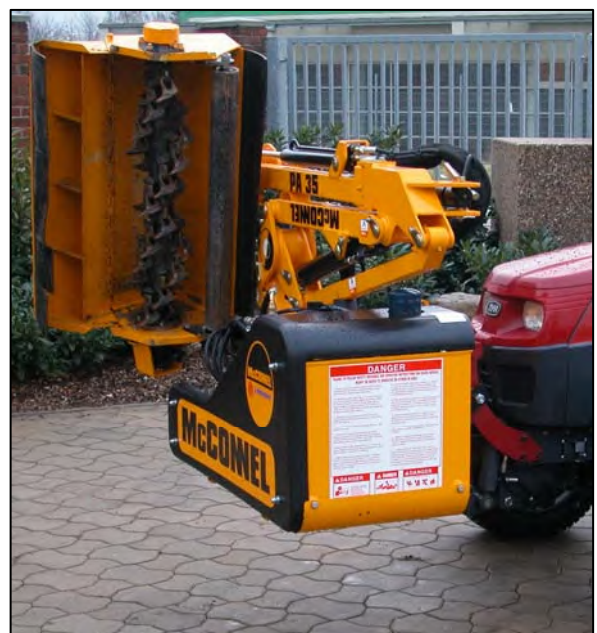
Check the gearbox oil level. Always check the oil with the machine on level ground, the gearbox should be filled to a point where it is visibly level with the lip of the filler plug aperture. Do not attempt to fill by removing the breather as the depth of the tapped thread in the casing at this point is insufficient to allow repeated loosening and tightening of the breather plug.

The gearbox capacity is **0.7L (1¼ pints)** and the oil type is **SAE75W90 Fully Synthetic**.

MACHINE ATTACHMENT

PA3530 & PA4530 machines are designed for front mounting on suitable vehicles that are capable of carrying and supporting their weight. Attachment fixings and attachment procedure will differ greatly depending on the particular application and therefore cannot be illustrated here. Whatever the particular application, the machine must be rigidly attached and safely secured to the vehicle with the mainframe in the vertical position and the gearbox stub axle horizontally in line with the PTO drive when in the working position. Fixings must be capable of permitting safe attachment and removal of the machine in addition to safe transportation and work. Wherever possible check chains and/or stabilizers should be fitted and tightened to eliminate sideways movement of the machine. Where any doubt exists regarding the attachment of a machine or vehicle suitability contact the McConnel Service Department for advice before attempting to fit the machine.

Example Applications



PTO DRIVESHAFT INSTALLATION

The PTO driveshaft attaches between the tractor and the machine gearbox to transfer the power required to run and operate the machine – it is important to achieve the correct shaft length to avoid risk of it ‘bottoming out’ when raising or lowering the machine. The procedure for measuring and cutting the shaft is as follows:

Measuring the PTO Shaft

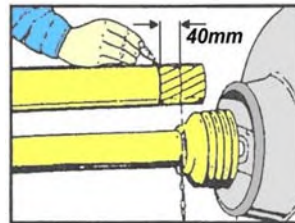
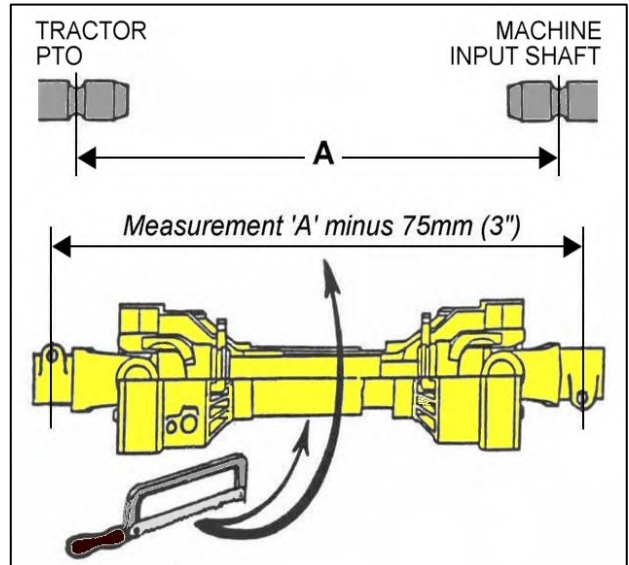
With the machine attached to the tractor in the working position measure the horizontal distance ‘A’ from the tractor’s PTO to the input shaft on the machines gearbox and subtract 75mm (3”) – *this figure is the required shaft length.*

Place the fully closed PTO shaft on the ground and measure its overall length, if the shaft is shorter than the required length you can use it without the need to shorten - *providing it allows for a minimum 150mm (6”) overlap when fitted.*

If the shaft is longer subtract the required shaft length plus an additional 75mm (3”) - *the resulting figure is the excess length that will need to be removed from each half of the shaft.*

Cutting the PTO Shaft

Separate the two halves and using the measurement obtained above shorten both the plastic guarding and the inner steel profile tubes of each shaft by this same amount. De-burr the cut tubes with a file to remove rough or sharp edges and thoroughly clean to remove swarf before greasing, assembling and fitting the shaft.



NOTE: For subsequent use with different tractors the shaft should be measured again to check suitability – *there must be a minimum shaft overlap of 150mm (6”).*

WARNING: Always fit torque chains to the PTO shaft shields to prevent them rotating with the shaft.

FITTING OPERATOR CONTROL UNITS

Fitment of the operator controls in the tractor cab will vary depending on the particular model or specification of machine – the information below lists the differing methods of fitment for the various types of controls available.

Cable Controls

Cable control units are provided with, and attached to, a mounting bracket – the bracket should be securely fixed to the internal mud wing or cab cladding in a suitable convenient location that offers ease of use without interfering with normal tractor operation.

In deciding the final position of the control unit bear in mind the location of the cable run – make sure the minimum acceptable cable bend radii of 8" (200mm) is not exceeded.

Ensure during fitting that no structural member of the tractor cab or roll bar is drilled or damaged.

The cable rotor control valve lever on cable controlled machines will be assembled as a component part of the main bank of controls and therefore shares the same mounting bracket.

On electric machines with cable operated rotor control valve the lever will be supplied as a 'standalone' unit with its own individual mounting bracket – this should be fitted in the same manner as above adopting the same precautions pertaining to attachment and cable runs.

Electric Controls

Depending on the particular type of control, electric units are supplied either with a mounting bracket or a mounting pillar which should be bolted to the internal mud wing or cab cladding in a suitable convenient location that offers ease of use without interfering with normal tractor operation. Mounting pillars can be bent or twisted to achieve a comfortable working position.

Ensure during fitting that no structural member of the tractor cab or roll bar is drilled or damaged.

The power supply cable should be connected directly to the tractors battery - do not use cigarette lighter type connections as these prove to be sporadic and unreliable for control applications. Control units are 12 volt D.C. operated; the brown lead is positive (+) and the blue lead is negative (-).

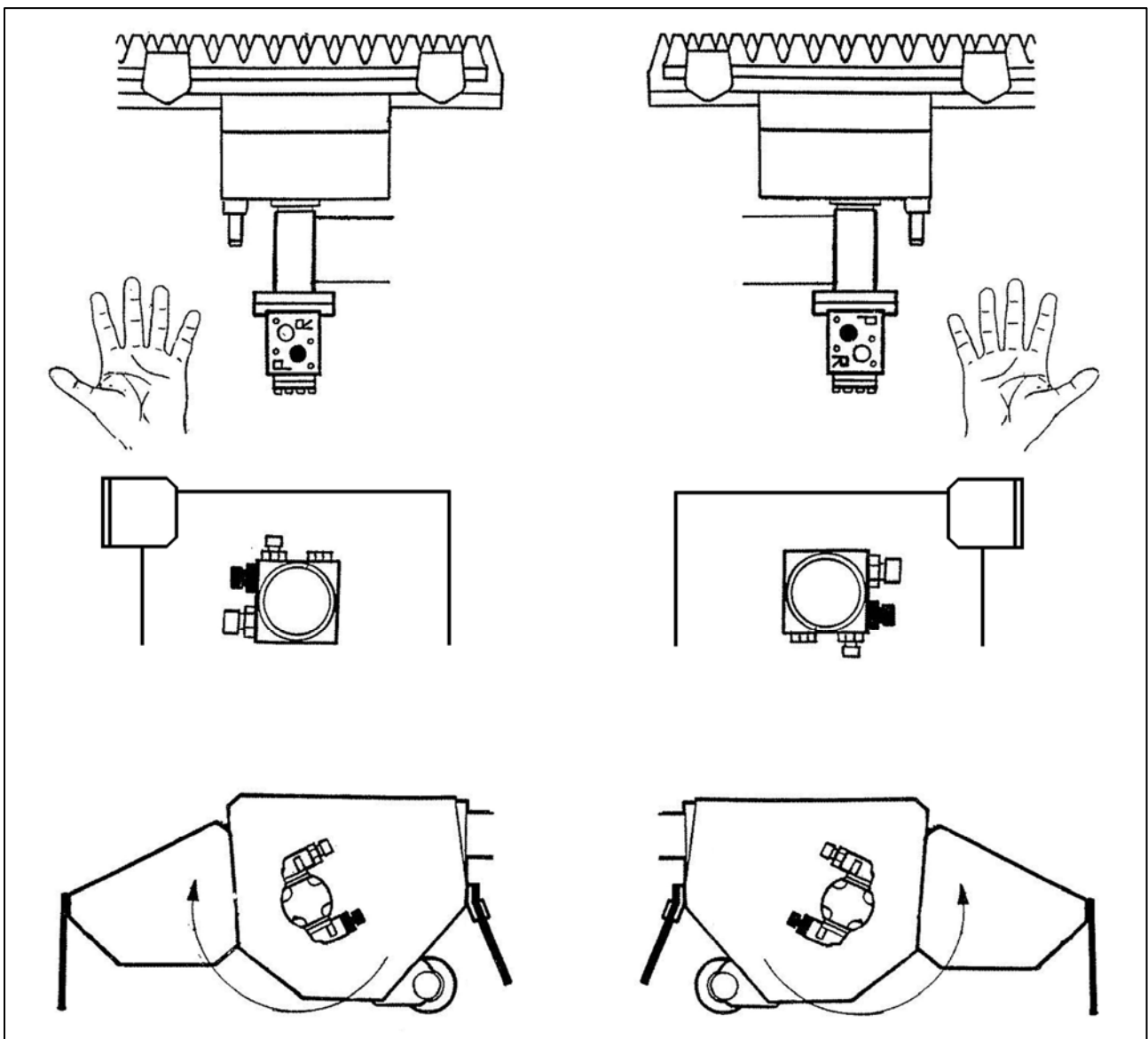
FLAIL HEAD AND CUTTERBAR ATTACHMENT

With the tractor external services activated on SI models or with the PTO engaged on TI models, operate and manoeuvre the arms into a position that will allow fitment of the cutting head. Flail heads are attached and secured with nuts and bolts and cutterbars with circlip, washers and split pin.

NOTE: For cutterbars only engage the motor splines in the drive tube and bolt in position with connections uppermost.

Connect hoses as shown in the illustration below:

- **Pressure Connection**
- **Return Connection**



When fitted, operate the machine through its full range of movements to check that hoses are not strained, pinched, chaffed or kinked and ensure all movements are functioning correctly.

The machine can now be folded into the transport position ready for transportation to the worksite.

RUNNING UP PROCEDURE

TI Models only (with flail head)

- Ensure that the rotor control valve is in 'STOP' position, start tractor, engage PTO and allow the oil to circulate through the return line filter for about 5 minutes without operation of the armhead control lever.
- Operate the armhead levers through their complete range ensuring that all movements are functioning correctly.
- Place the flail head at a safe attitude and move the rotor control to 'START' position. After initial fluctuation the rotor should settle to a steady speed. Increase PTO speed to approximately 360RPM and run for a further five minutes before disengaging the PTO and stopping the tractor.
- Check the hose runs and observe that they are free from any pinching, chafing, straining-or kinks.
- Re-check the oil level in the tank and top up as necessary.

SI Models only (with cutterbar or flail head)

- Ensure PTO lever is in neutral position and isolate tractor hydraulic linkage.
- Start tractor and select external service supply. Allow the tractor to run for several minutes before attempting to operate any of the machine control levers. On operating, move the levers through their complete range ensuring that all movements are functioning correctly.
- Check the tractor rear axle oil level and top up if necessary.
- On cutterbar models ensure the motor hoses are connected correctly - *see previous page*.
- Place the cutterhead at a safe attitude and bring tractor engine revolutions to 1000RPM. Engage PTO, and allow the cutter to run for several minutes. Do not leave the tractor cab or allow anyone to approach the cutter head during this procedure.
Caution: do not allow the pump to continue working if the cutter does not operate - overheating and serious damage to the pump can be caused in a very short time.
- After running up the machine increase PTO speed to approximately 360RPM and run for a further five minutes to allow the oil to circulate through the return line filter before disengaging the PTO and stopping tractor.
- Check the hose runs and observe that they are free from any pinching, chafing, straining or kinks.
- Re-check the oil level in the tank and top up as necessary.

MACHINE REMOVAL & STORAGE

DANGER: Extreme care must always be adopted when removing a machine from its carrying vehicle - the following rules should be observed:

- Never attempt to operate the machine or tractor controls whilst standing on or between linkage components.
- Always seek assistance if required.
- Keep bystanders and onlookers at a safe distance from the machine.
- Disconnection of the top linkage must always be the last operation before driving the tractor away from the machine.

General Removal Procedure

The specific removal procedure will be dependent on the particular application but in general the order of operations for removal will be similar to that stated below:

- Always select a firm level site on which to park up and remove the machine.
- Lower and secure the parking legs.
- Operate the hydraulic service to place the arms at half to three quarters reach with the flail head or cutterbar horizontal and level with the bottom of the parking legs.
- Disengage the PTO and remove.
- Disconnect stabilizer bars or loosen check chains where applicable.
- **TI models** – remove control unit from the tractor cab and stow in a suitable location clear of the ground.
SI models – disconnect the supply and return hoses from the tractor and stow with their ends covered and clear of the ground.
- Lower machine to the ground so that the parking legs and the flail head or cutterbar are firmly placed at rest.
- Disconnect lower linkage attachment.
- Disconnect top link attachment.
- Drive tractor away from the machine.

NOTE: Ensure the machine is left standing in a stable condition without risk of falling over – if necessary use suitable props and/or blocks to support it.

Storage

Wherever possible storage should ideally be under cover in a clean dry environment. If the machine is to be left standing for an extended period of time lightly coat the exposed portions of the ram rods with grease. Subsequently, the grease which after a period of time will be contaminated with dust and grit should be wiped off before the rams are next moved.

If the machine has to be stored outside tie a piece of tarpaulin or canvas over the control assembly to protect it from the elements - do not use plastic bags as these can promote corrosion.

OPERATION

Preparation

Ensure the operator of the machine has read the book first and is fully aware of all aspects related to the safe operation of the machine. Practice operating the machine in an open space without the rotor or cutterbar running until you are familiar with the controls and functions of the machine.

CAUTION: Care must always be taken when working with the cutting head close in as it can come into contact with tractor components.

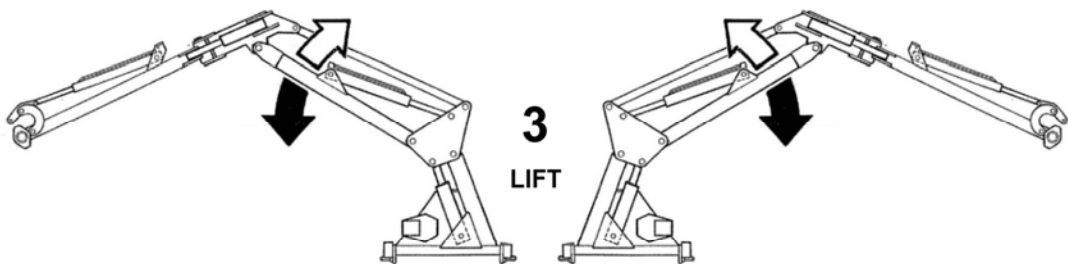
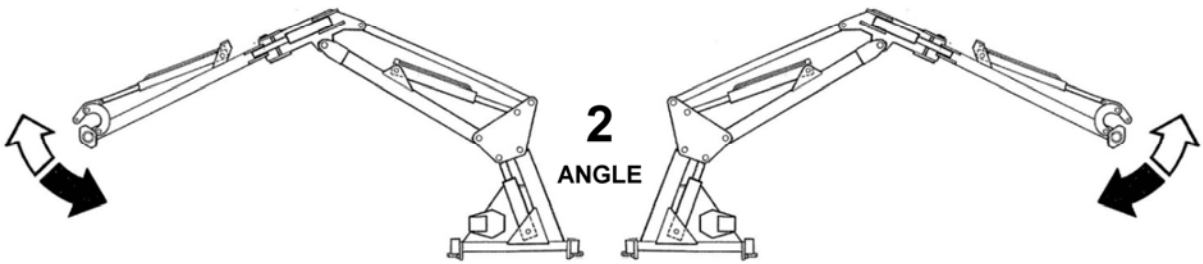
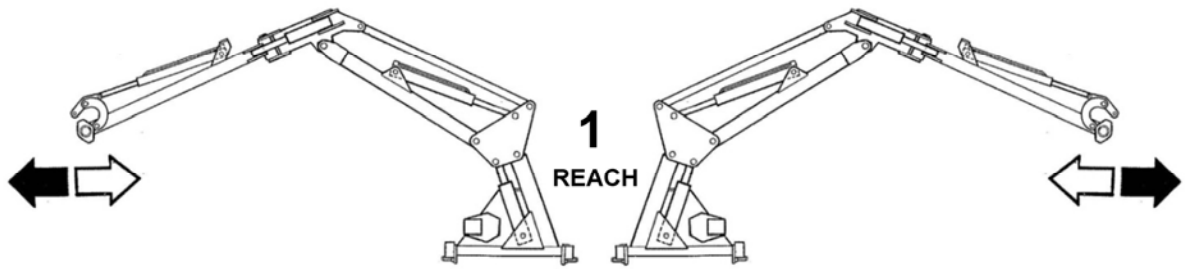
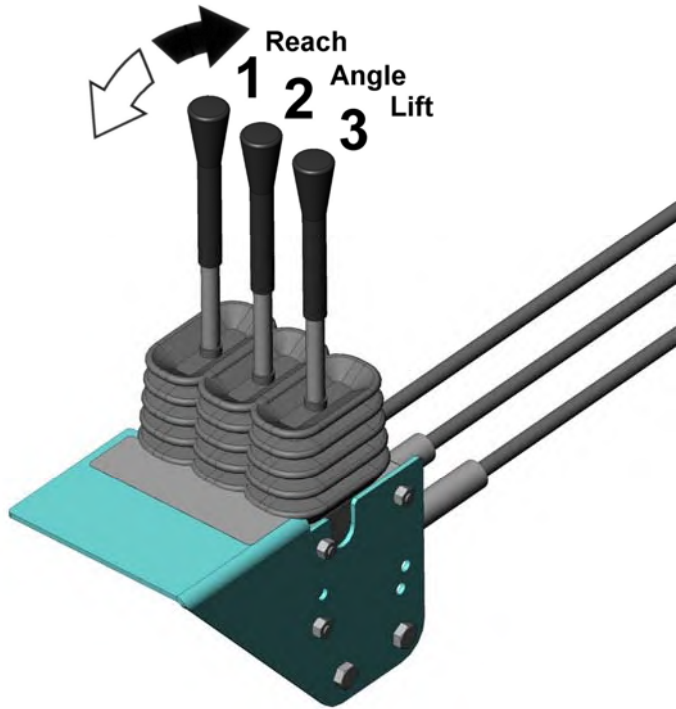
Material Thickness Cutting Limitations



Cutterbar

The cutter bar is for use as a light trimming tool – any attempt to cut unsuitable material will cause the knife blades to stall resulting in the motors relief valve blowing and overheating of the oil.

CABLE CONTROLS – Armhead Functions



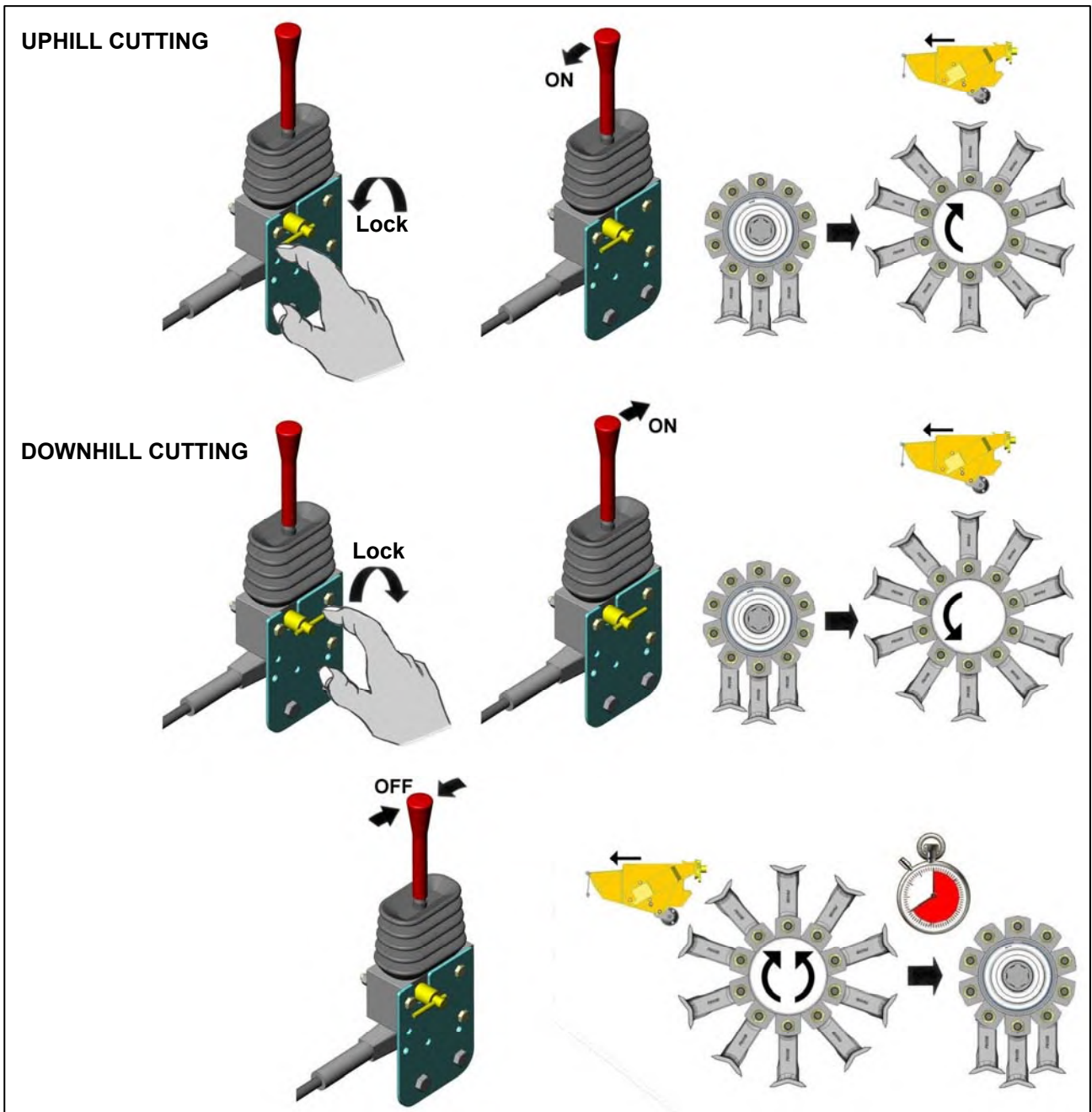
LEFT HAND MACHINES

RIGHT HAND MACHINES

CABLE ROTOR CONTROL

On cable rotor control machines the rotor is operated by the lever shown below – from the upright 'off' position pushing the lever forward switches the rotor on for downhill cutting and pulling the lever backwards switches the rotor on for uphill cutting. The small pivot locking lever mounted on the side of the control assembly rotates through 180° to lock the rotor in a specific cutting direction – this is a safety feature to avoid changes of rotor direction without first stopping the rotor. To change the direction of cut the rotor lever must be placed in the upright 'off' position; when the rotor has stopped rotating completely the pivot locking lever can be turned to the opposing position allowing the control lever to be operated for opposite cutting direction.

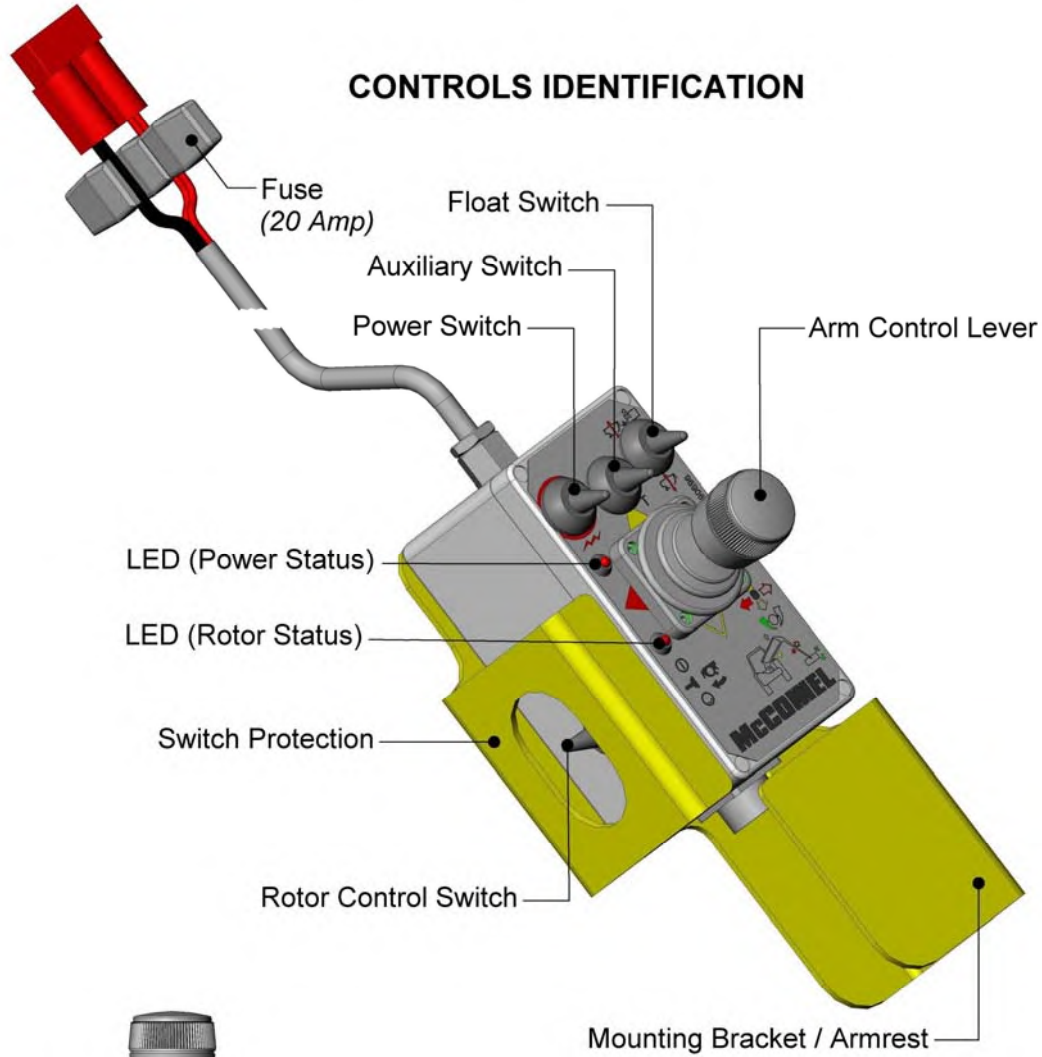
On some cable operated machines the rotor control lever will be assembled as part of the main bank of controls, whereas on others and all electric models it will be supplied as a 'standalone' unit with its own mounting bracket.



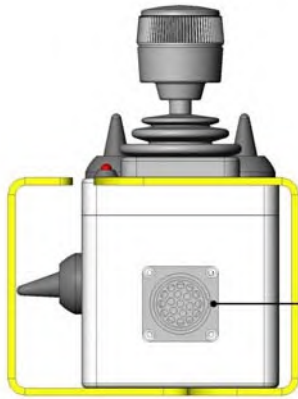
CAUTION: Ensure the rotor has stopped turning completely before attempting to change direction - When switched off a rotor can continue to 'freewheel' under its own momentum for up to 40 seconds before stopping.

MINI ELECTRIC PROPORTIONAL CONTROL

CONTROLS IDENTIFICATION



ELECTRICAL CONNECTIONS

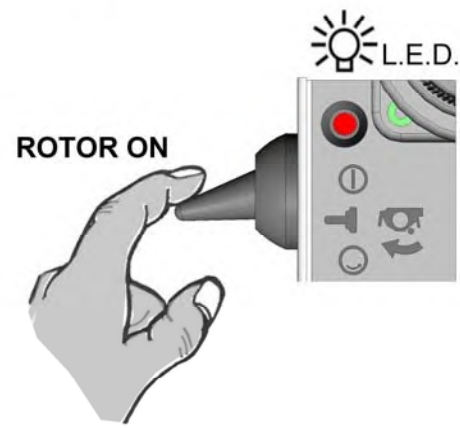
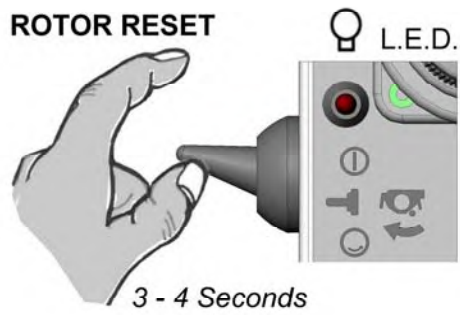
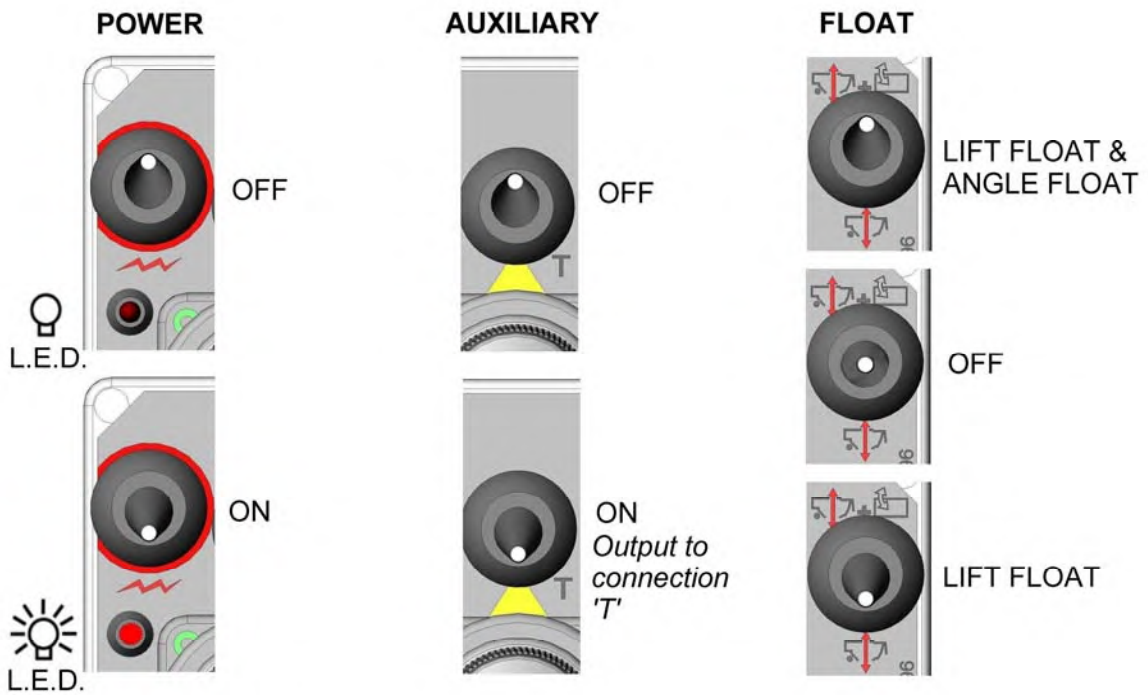


- A - COMMON
- B - REACH IN
- C - REACH OUT
- D - LIFT UP
- E - LIFT DOWN
- F - COMMON
- G - N/A
- H - N/A
- J - ANGLE DOWN
- K - ANGLE UP

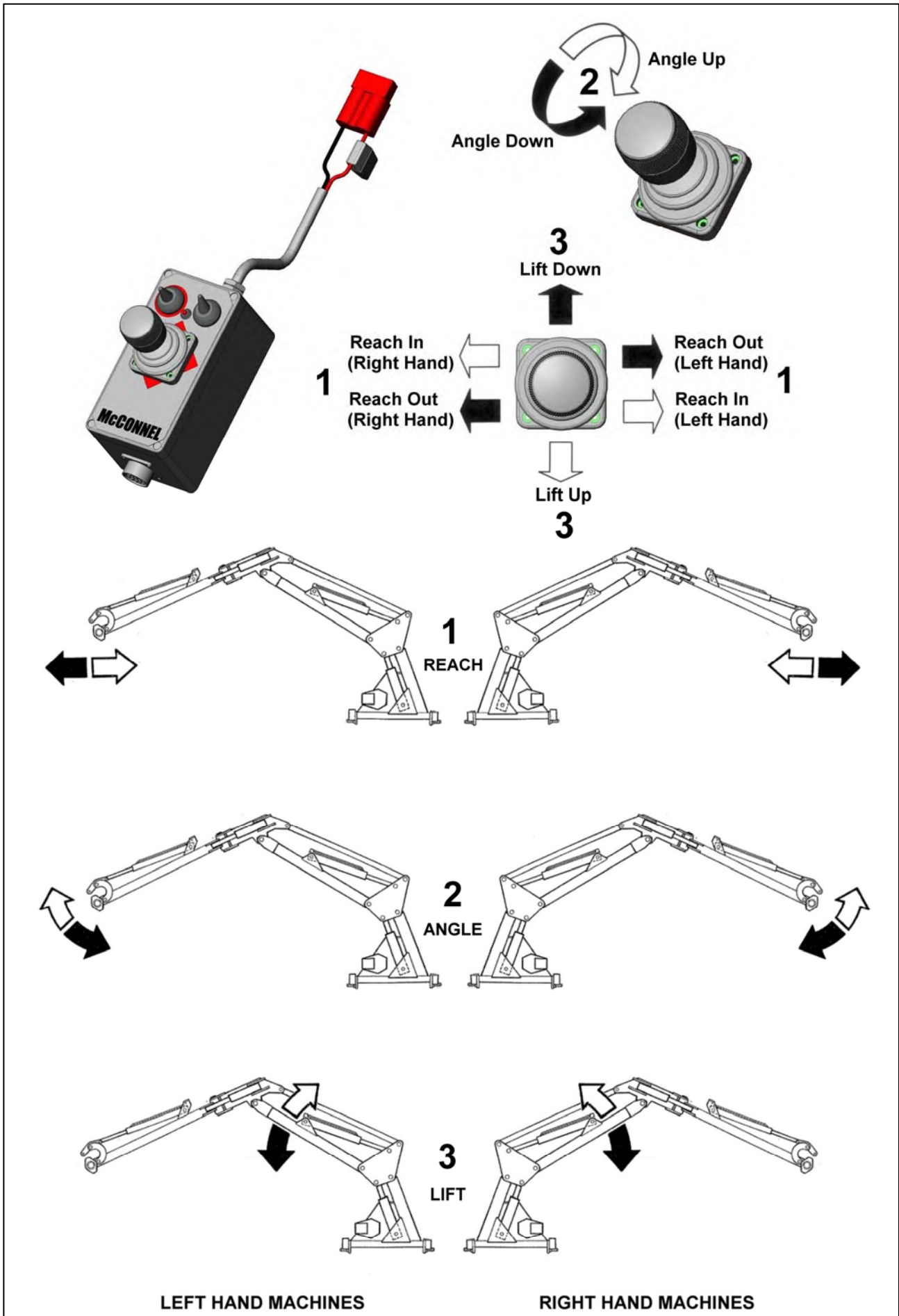


- L - N/A
- M - N/A
- N - COMMON
- P - ANGLE FLOAT
- R - LIFT FLOAT
- S - PUMP 1
- T - AUXILIARY
- U - N/A
- V - CUT OFF

SWITCH FUNCTIONS



MINI ELECTRIC PROPORTIONAL CONTROL – Armhead Operation



TRANSPORT POSITION

For transport on the public highway the flail must be folded within the overall width of the tractor.

PA3530 / PA4530 with Flail Head

- Position the arm until the head is approximately four feet (1.5m) clear of the ground and the dipper is horizontal.
- Pull the dipper arm to the rear to remove tension on the breakaway ram base pin and remove it.
- Manually break back the dipper until the base of the ram is re-located between the inboard holes in the ram lugs. Replace the ram base pin.
- Select 'Lift up' until the main arm is as high as it can go without projecting beyond the tractor width. Fully select 'Reach in'. Select 'Angle down' to turn the flails towards the tractor.

For 'off road' transport where width is not critical it will be sufficient to fully fold the arms.

PA3530 / PA4530 with Cutterbar

- With cutterbar horizontal and with tractor switched off fit knife guard.
CAUTION: Remember to keep fingers away from the knife as it can move even with the tractor engine switched off.
- Select 'Lift up' until the main arm is as high as it can go without projecting beyond the tractor width. Fully select 'Reach in'. Fully select 'Angle up'.

To revert to 'work' mode the above procedures must be reversed.

ENGAGING DRIVE

TI models only

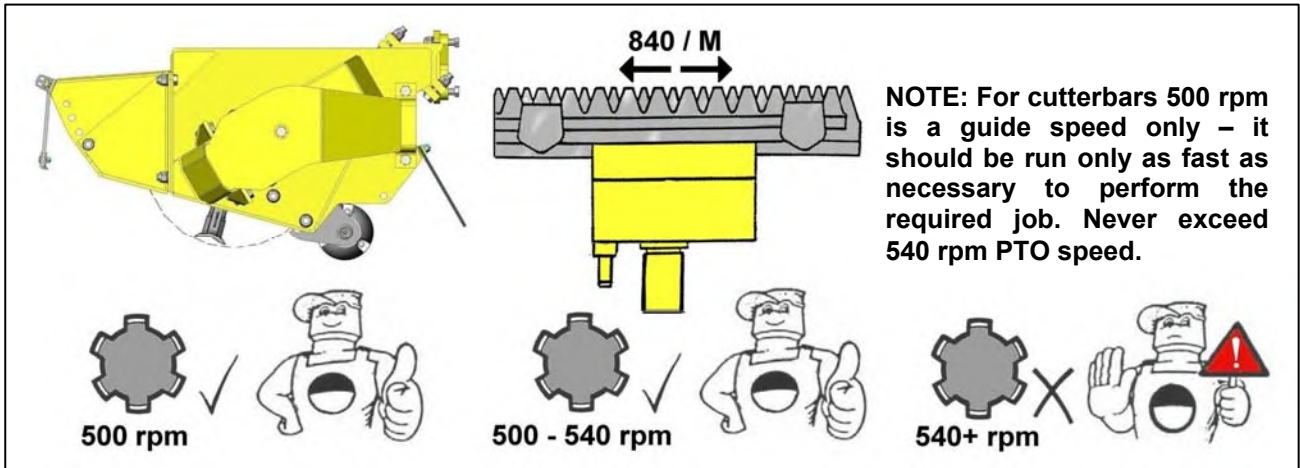
Ensure that the rotor control lever is in the 'Stop' position before engaging the PTO shaft. Allow the oil to circulate for a minute or so before operating the armhead levers.

Position the flail head in a safe position, increase the engine speed to a high idle and move rotor control lever to 'Start'. After initial surging the rotor will run at an even speed.

SI models only

On cutterbar models ensure that the motor hoses are connected correctly – *refer to hose connection page*. Place the cutter head at a safe attitude and bring the tractor engine revolutions to 1000RPM. Engage the PTO and slowly increase revs until operating speeds are attained.

OPERATING SPEED



WARNING: Damage to the machine may occur if the maximum PTO speed is exceeded.

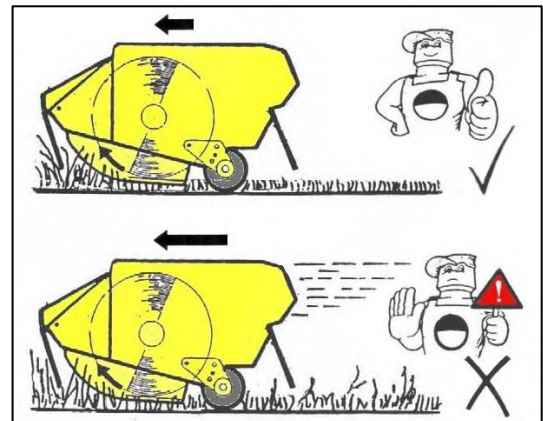
Engaging Drive

- Ensure the rotor control lever/switch is in the 'stop' position before engaging the PTO.
- Allow the oil to circulate for a minute or so before operating the armhead controls.
- Move the flail head into a safe working position just clear of the material to be cut.
- Increase engine speed to a high idle and start the rotor – *after initial 'surging' the rotor will run at an even speed.*
- Carefully lower the flail head into the work area and begin work.

Tractor Forward Speed – Flail Head Fitted

The material being cut will determine the tractor forward speed. Forward speed can be as fast as that which allows the flail head sufficient time to cut the vegetation both efficiently and neatly.

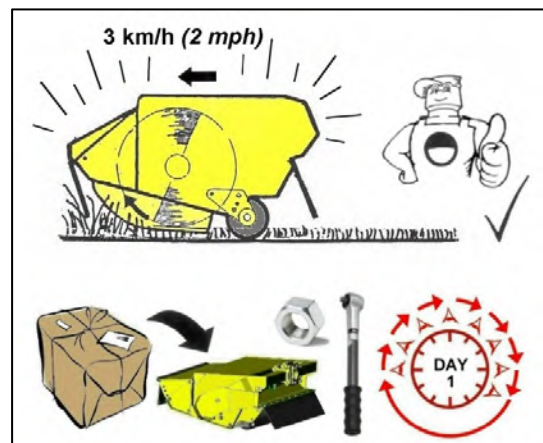
If forward speed is too fast this be indicated by over frequent operation of the breakaway system, a fall off in tractor revs and a poor untidy finish to the work leaving ragged uncut tufts and poorly mulched cuttings.



'Running In' a New Machine

For the first days work with a new machine it is recommended that tractor forward speed is restricted to 3km/hr (2mph) maximum. This will allow machine components 'bed in' and allow the operator to become familiar with the controls and their response under working conditions whilst operating at a relatively slow speed. If possible, select a first days work that affords mainly light to average cutting with occasional heavy duty work – *during this period check the tightness of nuts and bolts every hour, retightening as and when required.*

First day use - check tightness of nuts & bolts hourly ►



CUTTERBAR OPERATION

Tractor Control Settings

Refer to the tractor's hand book to ascertain the correct control settings to suit the type of machine and the hydraulic installation.

Operational Limitations

The cutterbar is a light hedge trimming tool - attempting to cut unsuitable material will cause the knife to stall resulting in the tractors relief valve blowing and overheated oil.

Tractor Engine Speed

The tractor engine should be run at a speed which will give 2½ - 4½ gpm (12 - 20 litres) of oil flow to the cutterbar motor. Less will be insufficient to do the work; more will result in increasing cutterbar vibration and greatly accelerated wear.

Tractor Forward Speed – Cutterbar Fitted

This is a matter for common sense and experience. It must be fast enough to maintain the correct oil flow but slow enough to enable the cutterbar to do its job properly.

Highway Working

If it is intended to cut roadside hedges or to work in the vicinity where the public have access, it is a statutory requirement that suitable warning signs are placed at both ends of the work area. These signs should not be more than ½ mile (0.8km) apart. To further promote highway safety the use of headlamps would be beneficial. Hazard warning lamps should not be used as oncoming vehicles could easily misjudge braking distance in presuming the tractor approaching them is stationary.

Cutterbar – Unclogging, Checking or Adjusting

Before leaving the tractor seat select 'Cutterbar Off', switch off tractor engine and remove the starting key. Should the cutterbar become clogged NEVER, NEVER, NEVER clear any debris from the fingers or knife with your hands - use a stick from the hedge or other suitable tools.

WARNING: Always keep fingers away from the knife as the crankshaft fly wheel can move under gravity and activate the knife even though the tractor engine is switched off.

Transport

Place the cutterbar guard over the knife remembering to keep your fingers away from the knife as it can move even with the tractor engine switched off. Place the machine in the transport position by carrying out the following procedure:

- Position the main arm to the side of the machine.
- Fully retract the angle ram.
- Fully extend the reach ram and operate 'lift up' until the main arm abuts against the transport stop.

Optional Extras

Cuttings Tray – this bolts to the cutterbar and projects to the rear providing a plate which encourages cuttings to slide off the hedge when topping.

Finger Bar - bolted to the cutterbar it deflects the cuttings away from the drive mechanism preventing any likelihood of the drive becoming clogged.

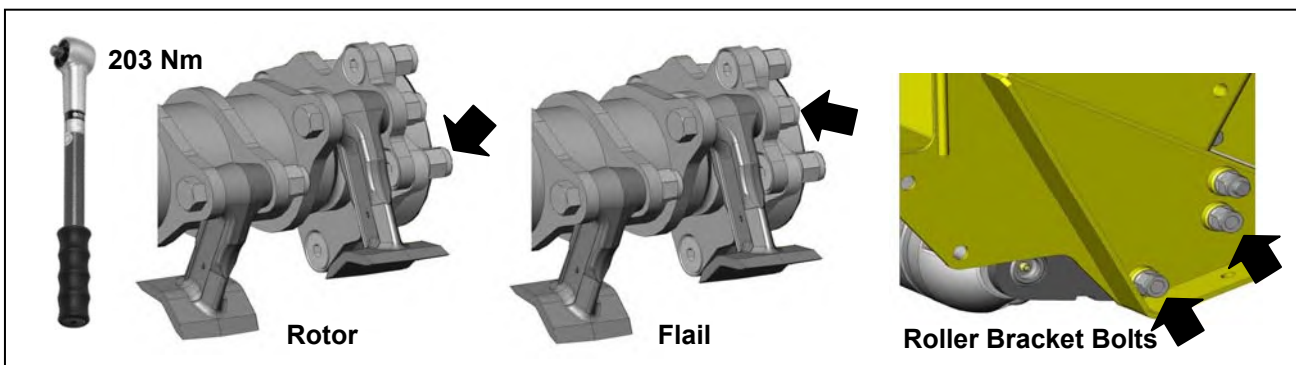
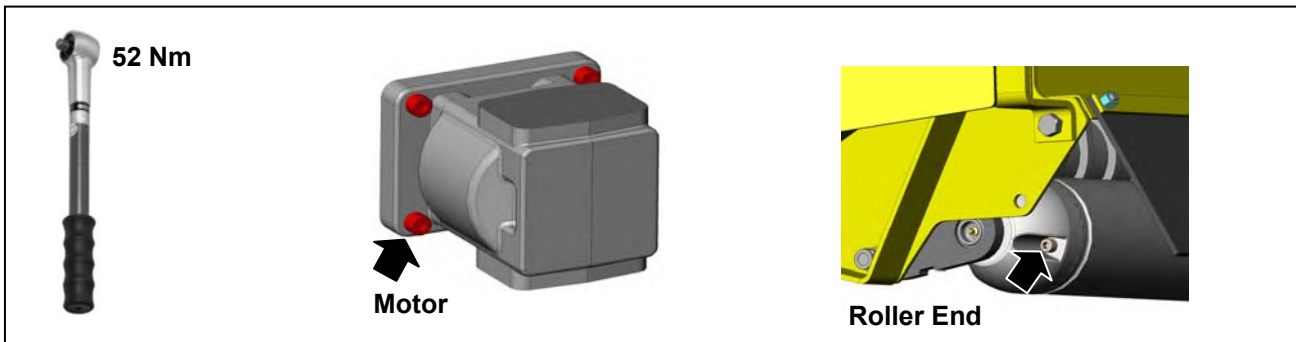
PRE-WORK PREPARATION & PRECAUTIONS

IMPORTANT: Always read the book first before attempting to operate the machine – practise operating the machine, without the rotor running, in a safe open space until you are fully familiar with all controls and functions of the machine. Only begin using the machine for work when you are confident that you have mastered control and operation sufficient for safe use of the machine.

CAUTION: Care must always be taken when working with the flailhead close in to avoid contact with the tractor.

Pre-work Machine Checks

Prior to use of the machine always check all bolts are tight and that the torque figures are correct for the specific locations indicated below:



General Work Precautions

Inspect the work area prior to operation, remove any hazardous materials and note any immovable objects - *it may also be a wise precaution to mark these hazards with a visible marker than can be easily seen from the operating position in the tractor.*

If the type of work being undertaken makes this important precaution impractical, always maintain a high degree of alertness and restrict the tractors forward motion to a speed that allows sufficient time to stop the tractor or avoid the hazard before contact is made.

General Working Practice

It is the operator's responsibility to develop safe working procedures;

Always:

- ▲ Be aware of potential hazards in the vicinity of the work area.
- ▲ Ensure all guards are fitted correctly and in good condition.
- ▲ Disengage PTO before stopping the engine.
- ▲ Wait until the flail has stopped running before leaving the tractor seat.
- ▲ Disengage the PTO, stop the engine, remove and pocket the key before making any adjustments to the machine.
- ▲ Check frequently that all nuts and bolts are tight.
- ▲ Keep bystanders at a safe distance.

EMERGENCY STOPPING

In all emergency situations machine operation and functions must be stopped immediately; **Stop PTO operation** using the tractor controls then immediately kill electrical power to the machine using the **Off (Emergency Stop)** switch on the machine's control unit.

WARNING: Auto-Reset Machines



When the Auto-Reset feature is active the machines arm set is capable of unintentional movement even when the PTO is switched off and stationary. Always ensure that electrical power to the machine is switched off using the **Off (Emergency Stop)** switch on the machine's control unit in emergency situations and/or when the machine is not being operated.

WARNING: Cable Operated Machines



In certain conditions, and/or if the Auto-Reset feature is active, the arm sets on cable operated machines possess the potential to move unintentionally, even when the PTO is switched off and stationary, if the levers were to be accidentally operated. Care must be adopted to avoid any movement of the levers when the machine is not being operated. Ensure arm sets are lowered fully to the ground when the machine is parked up or not in use.

BREAKAWAY

The machine is fitted with a hydraulic breakaway device which protects the structure of the machine should an unforeseen obstacle be encountered.

The pivoted arm is held in the working position by the oil pressure in the fully extended breakaway ram. When the flail head meets an obstruction and the tractor continues to move forward oil pressure will build up against a relief valve situated in the base of the breakaway ram - when the preset pressure is reached the valve will blow and the oil will be vented into the lift ram, this will allow the flail head to pivot backwards and at the same time cause the arms to rise. When the obstruction is cleared oil pressure contained in the lift ram will cause the arm and flail head to return to the work position.

NOTE

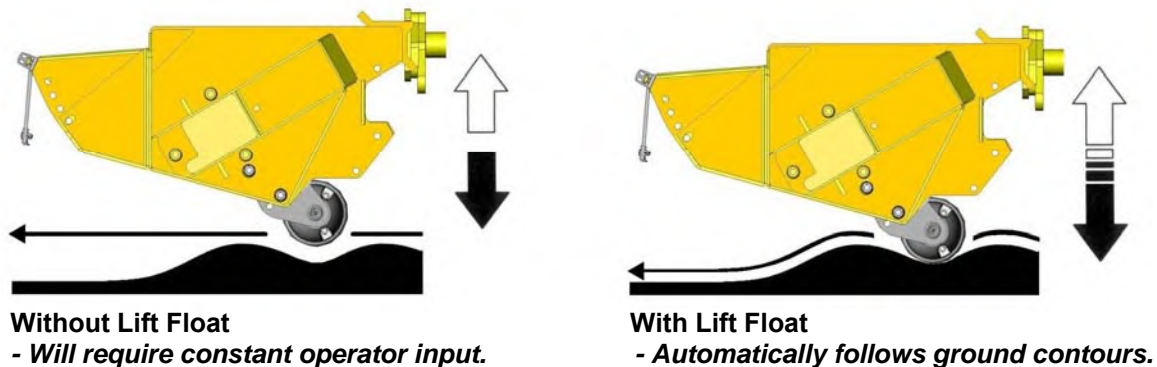
The breakaway function does not relieve the operator of his responsibility to drive carefully – always be alert and avoid obvious hazards before contact occurs.

LIFT FLOAT (Optional Extra for Ground Work)

Work without lift float requires far more concentration and input from the operator to quickly react and re-adjust to the ground contours often resulting in patches of higher cut material where the head is cutting too high and ‘scalping’ of the ground where it is cutting too low – *in the case of the latter this can lead to increased flail wear, damage or even loss of flails.*

The Lift float feature is an optional extra for use during mowing work. When the function is activated the pressurised accumulator(s) work in conjunction with the valve and lift ram to take a proportion of the flailheads weight off the flail roller allowing the head to automatically follow the natural contours of the ground; this produces a cleaner more uniform cut without the need for constant operator re-adjustment.

Operation of the lift float function is as follows: with lift float switched off, position the flailhead approximately 1m clear of the ground before switching the float function on to charge the accumulator(s) – *the arms may drop at this point depending on the current level of retained pressure.* Lower the flailhead into the work position, release the lift control and proceed to work. **NOTE: Occasional operation of the lift function will be required when working on downhill or uphill slopes and when reaching in or out in order to replenish the oil level within the accumulator(s) to retain optimum float capability.**



Lift float operation when supplied as a factory fitted option is controlled from the controls unit that accompanied the machine (*refer to controls section for details*), but the feature is also available for a range of models as an after market kit, in which case operation will either be via an auxiliary switch on cable controlled machines, or by utilisation of the auxiliary three-position type switch on the control unit of electric controlled machines - *this will allow for selection of ‘lift float alone’ or ‘lift and angle float in unison’ if both features are fitted.* Operation of the lift float control for these models will then be as specified in the main controls section.

Power Connection on Cable Machines

On cable controlled machines the switch supplied will need to be mounted in a convenient location in the cab. The supply cable from the poppet valve solenoid must be connected into the tractors ignition system - the brown lead is positive and the blue lead is negative.

Power Connection on Electric Machines

On electric controlled machines power to the unit is via the following connections:

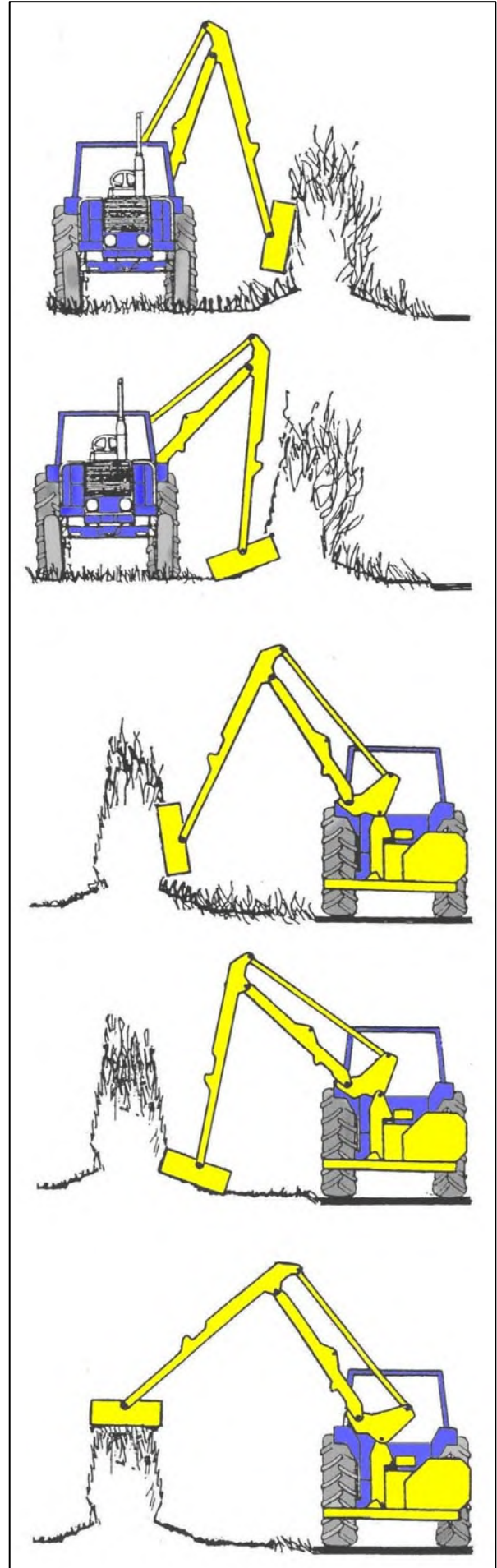
Machines with 14 core looms use connection 10 and common connection 11.

Machines with 19 core looms use connection 15 and common connection 16.

Depending on the particular machine after market lift float kits will either be frame mounted or ram mounted – they should be fitted and positioned in a location where they do not foul or interfere with other components during normal movements of the machine.

HEDGECUTTING PROCEDURE

Cut the side and bottom of the field side first. This leaves the maximum thickness of hedge on the road side to prevent the possibility of any debris being thrown through the hedge into the path of oncoming vehicles.



Cut the side and bottom of the road side.

Top cut the hedge to the height required.

HAZARDS & DANGERS

Adverse Slopes

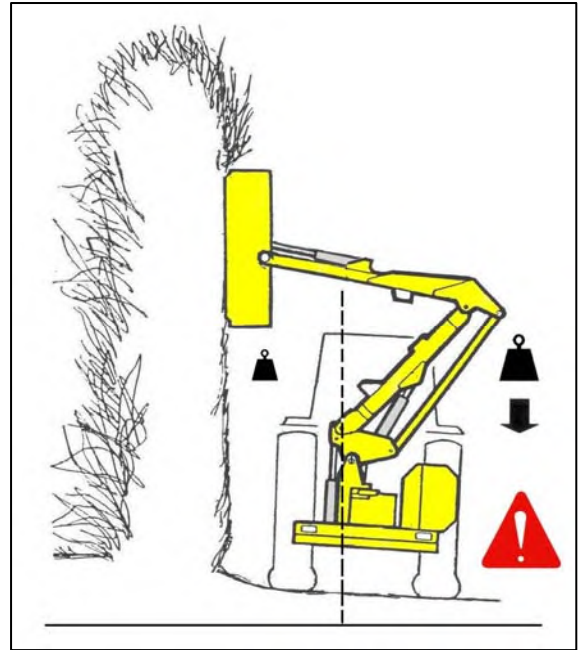
When working with the flailhead high and reach fully in it is possible for the main arm balance to go over centre and take the weight off the lift ram. A restrictor in the gland circuit of the lift ram will prevent sudden unpredictable movements if this should occur - *for reasons of safety this restrictor should not be removed.*

DANGER!



NEVER REMOVE THE RESTRICTOR FROM THE LIFT RAM GLAND CIRCUIT.

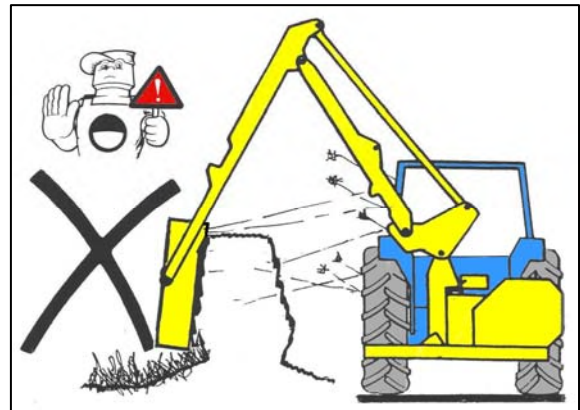
Never work the machine on adverse slopes with the arms positioned such that the tractor is unbalanced ►



DANGER!



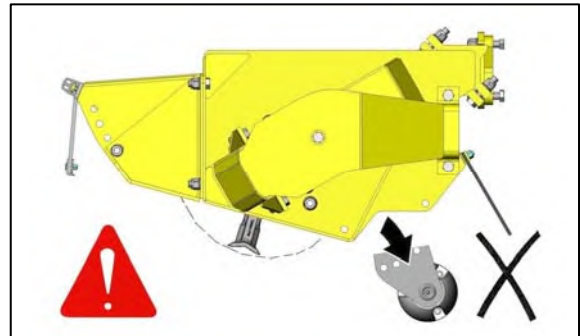
NEVER CUT TO THE BLIND SIDE OF A HEDGE
- it is impossible to see any potential hazards or dangers and the position of the flail head would allow debris to be propelled through the hedge towards the tractor and operator.



DANGER!



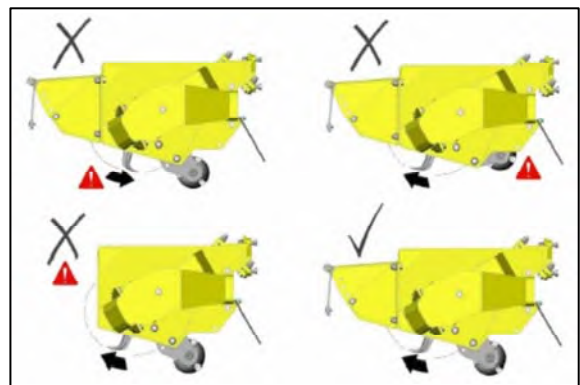
NEVER OPERATE THE MACHINE WITH THE FLAIL HEAD ROLLER REMOVED



DANGER!



WHEN GRASS MOWING THE ROTOR MUST ALWAYS CUT IN THE UPHILL DIRECTION WITH FRONT HOOD FITTED AND THE ROLLER POSITIONED BELOW THE CUTTING HEIGHT OF THE FLAILS



OVERHEAD POWER LINES (OHPLs)

It cannot be stressed enough the dangers involved when working in the vicinity of Overhead Power Lines (OHPLs). Some of our machines are capable of reach in excess of 8 metres (26'); they have the potential to well exceed, by possibly 3 metres (9' 9"), the lowest legal minimum height of 5.2 metres from the ground for 11,000 and 33,000 volt power lines.

Remember electrocution can occur without actually coming into contact with a power line as electricity can 'flashover' when machinery gets close to it.

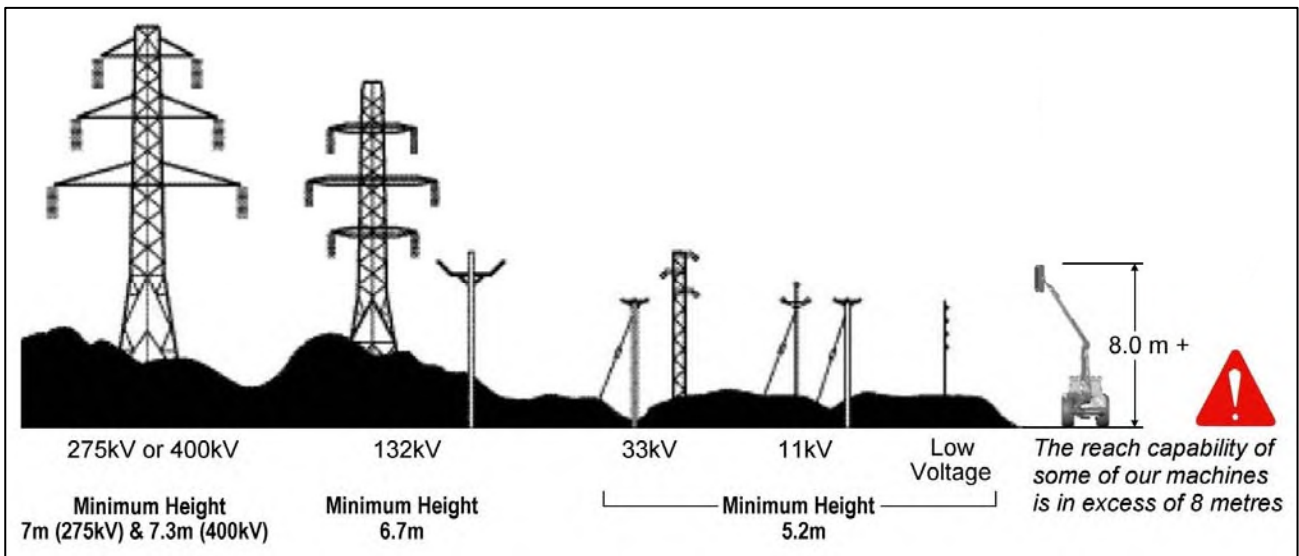


WARNING: All operators must read the following information and be aware of the risks and dangers involved when working in the vicinity of Overhead Power Lines (OHPLs).

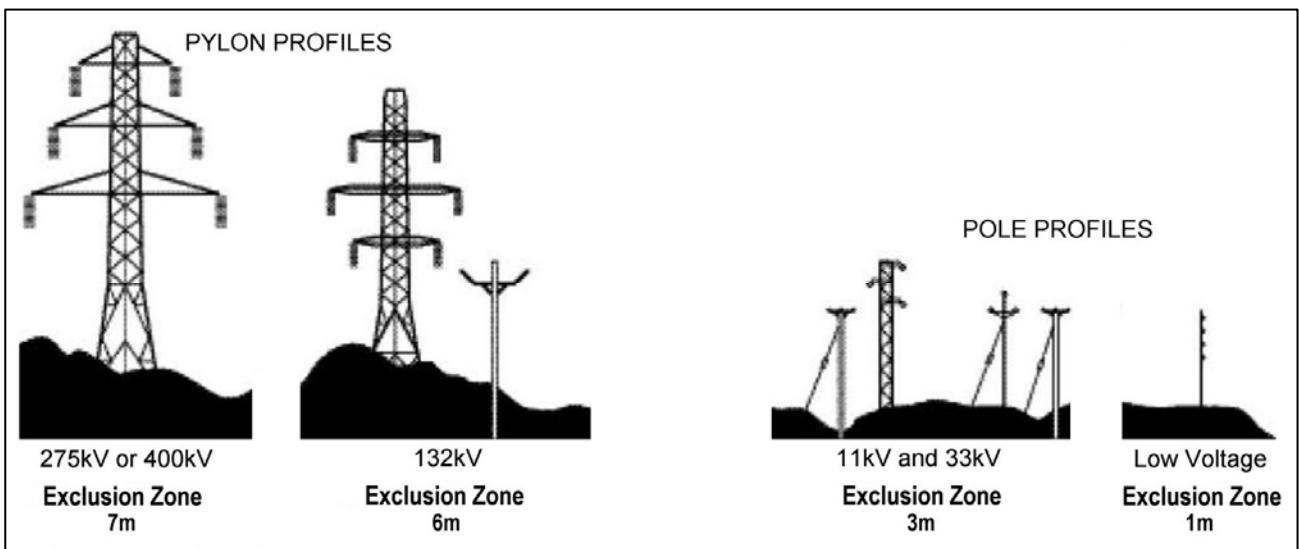
Wherever possible the safest option is always to avoid working in areas close to OHPLs. Where unavoidable, all operators must perform a risk assessment and implement a safe procedure and system of work – see *following page for details*.

All operators should perform a risk assessment before operating the machine within 10m horizontal distance of any OHPLs.

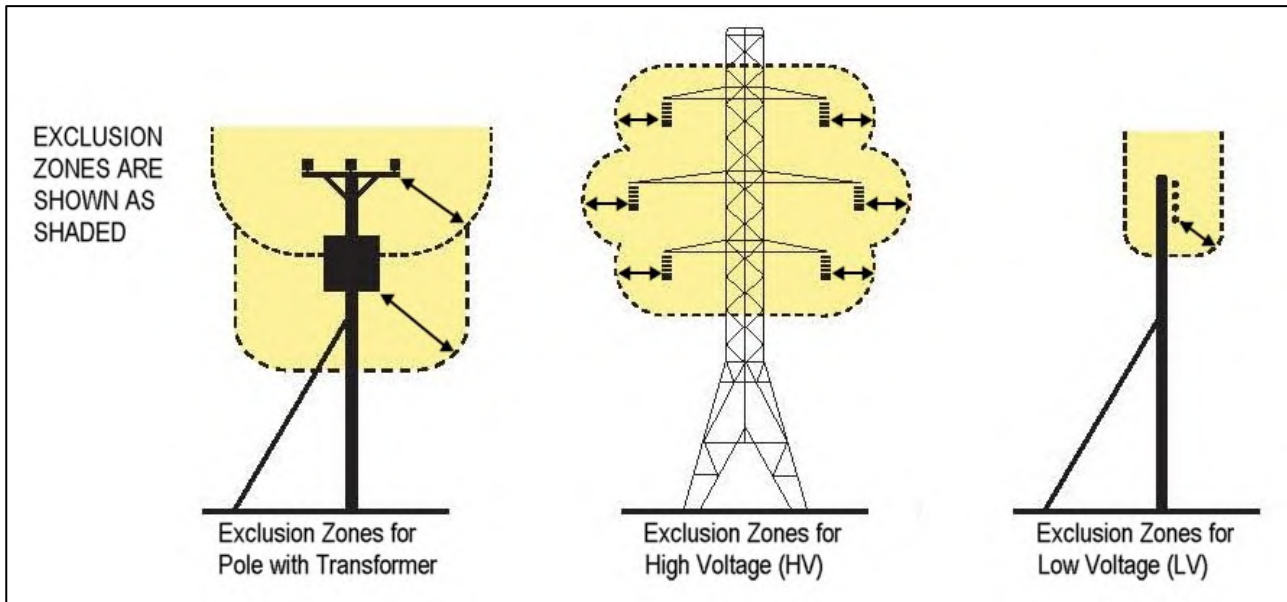
Minimum Heights for Overhead Power Lines



Absolute Minimum Exclusion Zones for Specific Overhead Power Lines



Definitions of Exclusion Zones



Risk Assessment

Before starting to work near OHPLs you should always assess the risks. The following points should be observed;

- **Know** the risks of contacting OHPLs and the risk of flashover.
- **Find out** the maximum height and maximum vertical reach of your machine.
- **Find out** the location and route of all Power Lines within the work area.
- **Find out** the operating voltage of all Power Lines within the work area.
- **Contact** the local Distribution Network Operator (DNO) who will be able to advise you on the operating voltage, safe minimum clearance distance for working, and additional precautions required.
- **Never** attempt to operate the machine in exclusion zones.
- **Always** work with extreme caution and plan your work ahead to avoid high risk areas.
- **If doubt exists** do not work in the area – never risk the safety of yourself or others.

Emergency Action for Accidents Involving Electricity

- Never touch an overhead line - even if it has been brought down by machinery, or has fallen. Never assume lines are dead.
- When a machine is in contact with an overhead line, electrocution is possible if anyone touches both the machine and the ground. Stay in the machine and lower any raised parts in contact or drive the machine out of the lines if you can.
- If you need to get out to summon help or because of fire, jump out as far as you can without touching any wires or the machine - keep upright and away.
- Get the electricity company to disconnect the supply. Even if the line appears dead, do not touch it - automatic switching may reconnect the power.

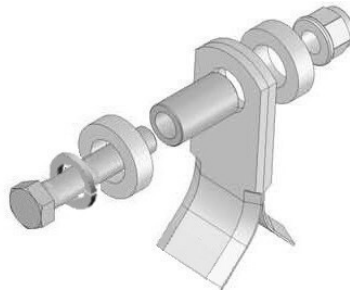
Further information and leaflets on this and other agricultural safety subjects are available on the 'Health & Safety Executive' website at the following address: www.hse.gov.uk/pubns/agindex.htm

FLAIL TYPES

NOTE: The flails listed are for a general range of McConnel heads, therefore some flails shown will not be suitable for the particular head fitted to this machine.

Grass Flails

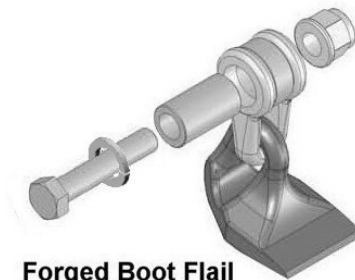
Designed specifically for general mowing activities – low power usage, ideal for cutting materials of low density.



F10 Grass Flail
(Part No. 7190315)

Universal Boot Flails

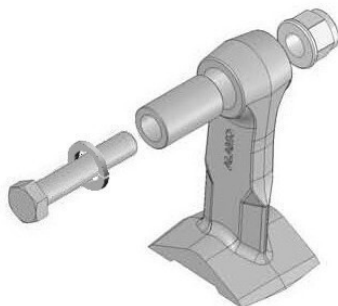
Designed for general purpose work - suitable for mowing duties and the cutting of hedges with up to 2 years growth.



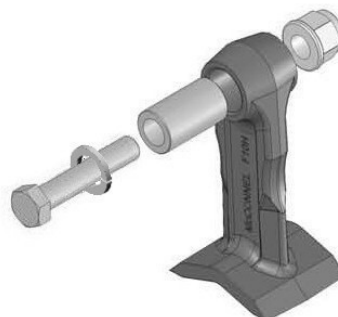
Forged Boot Flail
(Part No. 7190462)

Hedge Flails

Double edged flail designed specifically for heavy duty hedge cutting - capable of cutting materials up to 75/80mm diameter. Can be used for mowing work where they produce a good finish but will require considerably more power and reduced forward speed when used for this purpose.



F10 D.E. Forged Flail
(Part No. 41391.02)

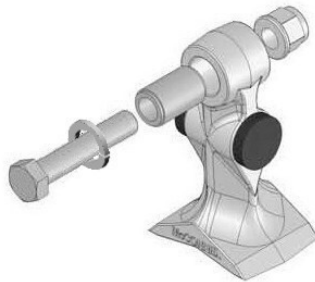


F10 D.E. Cast Flail
(Part No. 7314366D)

NOTE: Cast flails are more suitable where the work is predominantly hedge cutting as they maintain a sharper cutting edge – forged versions possess a higher degree of durability and are therefore more suitable where the primary function is mowing work and there is increased risk of hitting foreign objects.

Hedge Flails

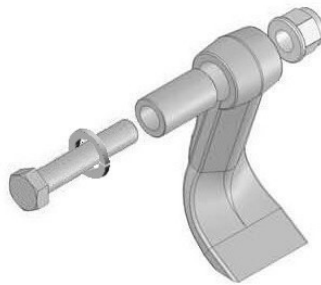
Double edged flail designed specifically for heavy duty hedge cutting, capable of cutting materials up to 75/80mm diameter. Can be used for mowing work where they produce a good finish but will require considerably more power when used for this purpose. The flails are fitted with rubber stops for both shaft protection and noise reduction purposes.



F16 D.E. Cast Flail
(Part No. 21904.02)

Competition Flails

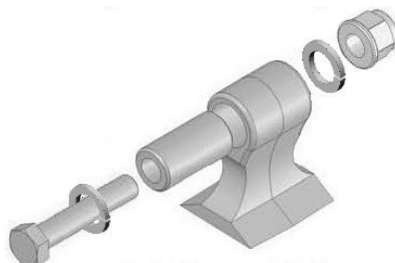
Single edged flail designed specifically for heavy duty hedge and grass cutting, capable of dealing with materials up to 75/80mm diameter. When used for mowing work they produce a better finish and performance than double edged flails requiring less power and increased forward speed.



F10 S.E. Cast Flail
(Part No. 7390276)

Omega Flails

Double edged flail for use on 'Omega' rotors only - designed specifically for heavy duty hedge cutting where they are capable of cutting materials up to 75/80mm diameter. Unique rotor design allows the flail to rotate 360° on its pivot protecting the flail on impact with immovable objects. Not suitable for mowing work.

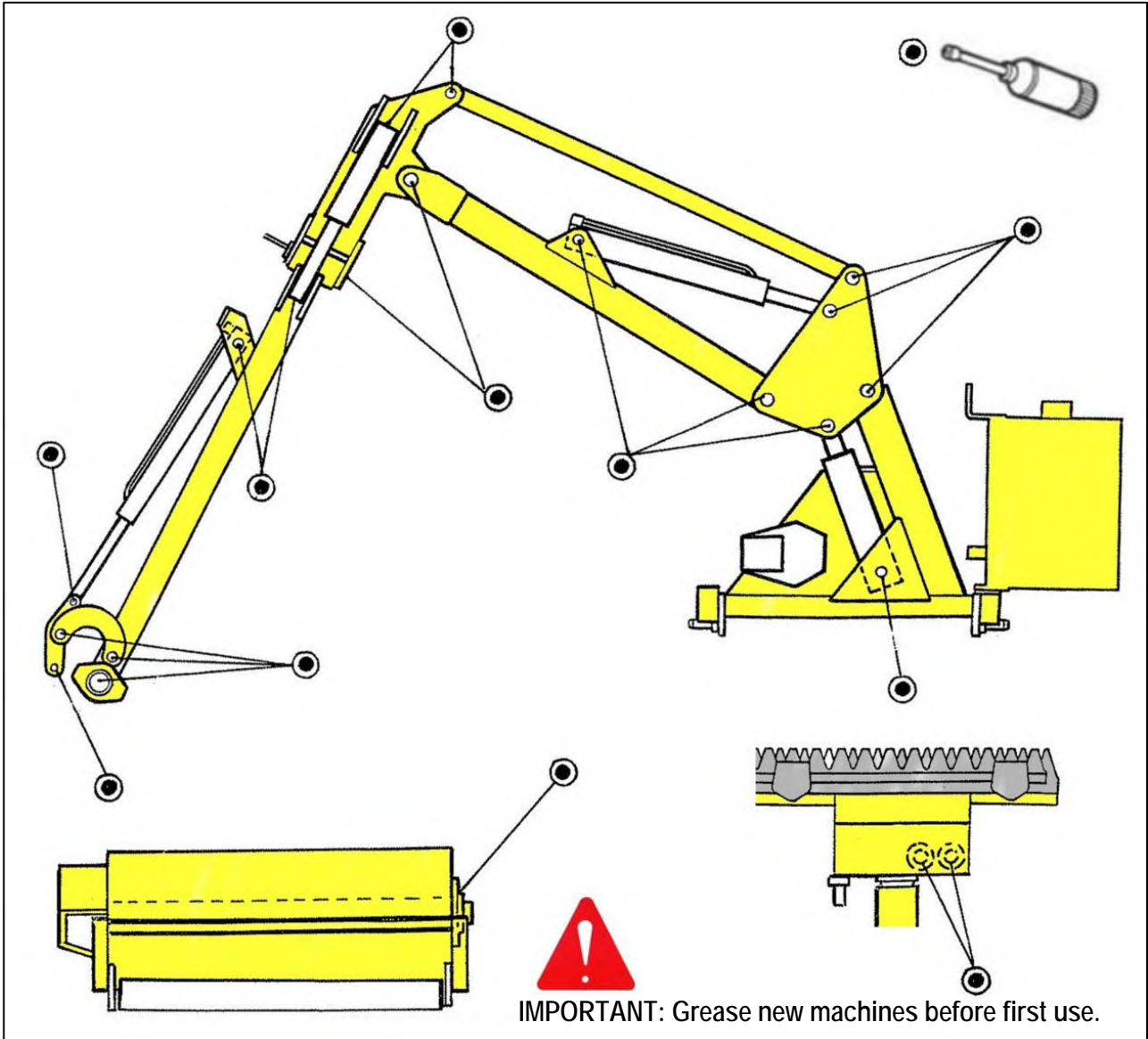


D.E. Omega Flail
(Part No. 7190464)

GENERAL MAINTENANCE

General Lubrication

The example illustration below indicates the general locations of lubrication points - all points should be greased on a daily basis and prior storage of the machine.



Gearbox Lubrication

Refill the gearbox after an initial 50 hours of use and thereafter at annual or 500 hour intervals, whichever occurs earliest.

Gearbox Capacity

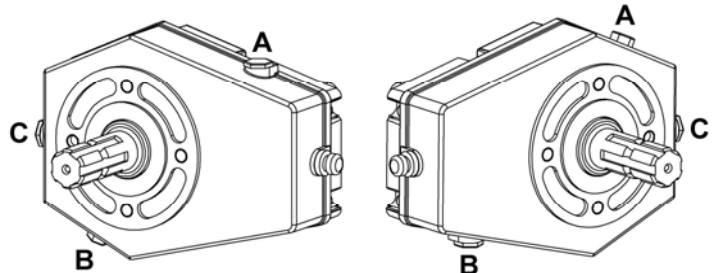
The gearbox capacity is 0.7L (*1¼ pints*). Oil type is SAE75W90 Fully Synthetic.

Refilling or ‘topping up’ the oil is via the filler plug located on the top of the gearbox to a point where the oil starts to run from the level plug orifice – replace the plugs and tighten securely.




RIGHT HAND BUILD MACHINES

LEFT HAND BUILD MACHINES



A) Breather / Filler Plug B) Drainage Plug C) Oil Level Plug

SERVICE SCHEDULE

Every Day	
<ul style="list-style-type: none">Grease machine fully prior to work (and prior to storage). NOTE: New machines must be fully greased before initial use.Check for broken or damaged flails.Check tightness of flail nuts and bolts.Visually check for oil leaks and damaged hoses.Check all guards and safety shields are correctly fitted and undamaged.Ensure all lights are working and clean.Check oil level.Clean cooler matrix; in dusty conditions more frequent cleaning is required.	
After initial 50-hours	
<ul style="list-style-type: none">Change gearbox oil.	
Every 25-hours	
<ul style="list-style-type: none">Grease PTO Shaft universal joints and tubes.	
Every Week	
<ul style="list-style-type: none">Check tightness of all nuts and bolts.Check gearbox oil level.Check for wear on telescopic arm pads – <i>where applicable</i>.	
Every 100-hours	
<ul style="list-style-type: none">Grease PTO shaft shield lubrication points.Check bushes for wear; <i>wherever possible, remove end caps to allow inspection</i>.	
Every 500-hours	
<ul style="list-style-type: none">Change return line filter element (<i>500-hours or annually, whichever occurs first</i>).Change tank breather.Change gearbox oil.Check condition of hydraulic oil and change if required; <i>when changing the oil, new return line filter and suction strainer elements should be fitted and the return line filter changed again after 100 hours of work</i>.	
Annually	
<ul style="list-style-type: none">Change tank breather.	

Cooler Matrix

To ensure maximum cooler efficiency, the cooler matrix must be kept as clean as possible to allow free air flow through the unit; this is especially important in dry hot arduous conditions where the matrix can rapidly become blocked by dust causing overheating. Cooler units are best cleaned using a high-pressure air line that will clear blocked areas without risking damage to the matrix.

HYDRAULIC SYSTEM

Oil Supply

Check the oil level in the reservoir daily.

Oil Condition & Replacement

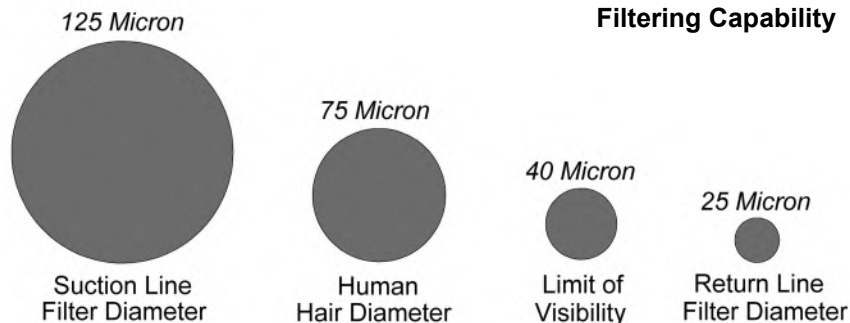
No fixed time period can be quoted for oil changes as operating conditions can vary widely but a visually inspection of the oil will often indicate its current overall state. Signs of a reduction in its condition will be apparent by changes in colour and appearance when compared to new oil. Oil in poor condition can be dark, smell rancid or burnt, or in some cases be yellow, unclear or milky in appearance indicating the presence of air or emulsified water. Moisture resulting from condensation can become entrapped in the oil causing emulsification that can block the return line filter, consequentially the filter system will be by-passed and the oil and any possible contaminants present will continue to circulate without filtration risking damage to hydraulic components. All are indications or conditions that will require replacement of the oil.

Hydraulic oil is a vital component of the machine; contaminated oil is the root cause of 70% of all hydraulic system failures. Contamination can be reduced by the following:

- Cleaning around the reservoir cap before removal, and keeping the tank area clean.
- Use of clean containers when replenishing the system.
- Regular servicing of the filtration system.

Filtration System

Machines are protected by both replaceable 125 micron suction strainers and low pressure 25 micron full flow return line filters – the diagram below is a ‘scaled up’ view illustrating the filtering capability built into the hydraulic system of the machine:



Suction Strainers

The replaceable 125 micron suction strainers (*Part No. 8401169*) are fitted within the hydraulic tank and are ‘screw’ fitted with easy access for removal and replacement, *dependant on model*.

Return Line Filter

The 25 micron absolute filter elements (*Part No. 8401095*) should be changed after the first 100 hours or 12 months (whichever occurs first), and thereafter at 500-hour intervals. It is important to note hours worked as if the filter becomes blocked an internal by-pass within the canister will operate and no symptoms of filter malfunction will occur to jog your memory.

Tank Breather

To reduce the risk of pump cavitation it is advisable to replace the 25 micron absolute tank breather (*Part No. 8401182*) on an annual basis under normal working conditions – for machines operating in dry dusty environments it is recommended that replacement be increased to 6 monthly.

HYDRAULIC HOSES

The condition of all hoses should be carefully checked during routine service of the machine. Hoses that have been chaffed or damaged on their outer casing should be securely wrapped with waterproof adhesive tape to stop the metal braid from rusting. Hoses that have suffered damage to the metal braid should be changed at the earliest opportunity.


Hose Replacement

- Replace one hose at a time to avoid the risk of wrong connections.
- When the hose is screwed to an additional fitting or union, use a second spanner on the union to avoid breaking both seals.
- Do not use jointing compound on the threads.
- Avoid twisting the hose. Adjust the hose line to ensure freedom from rubbing or trapping before tightening hose end connections.


Before changing hoses study the installation these are carefully calculated to prevent hose damage during operation. Always replace hoses in exactly the same manner. This is especially important for the flail hoses where they must be crossed, upper to lower, at the dipper and head pivots.

All BSP Hydraulic Hoses fitted to McConnel Power Arms have 'Soft Seal' connections on the flail circuit and ram circuit.

Recommended torque settings for nut security:

	Nut Size	Nm	Ft-lbs	O-Ring
	1/4" BSP	24	18	P/No. 10.000.01
	3/8" BSP	33	24	P/No. 10.000.02
	1/2" BSP	44	35	P/No. 10.000.03
	5/8" BSP	58	43	P/No. 10.000.04
	3/4" BSP	84	62	P/No. 10.000.05
1" BSP	115	85	P/No. 10.000.06	

Recommended torque settings for BSP hose unions fitted in conjunction with bonded seals:

	Union Size	Nm	Ft-lbs	Bonded Seal
	1/4" BSP	34	25	P/No. 8650102
	3/8" BSP	75	55	P/No. 8650103
	1/2" BSP	102	75	P/No. 8650104
	5/8" BSP	122	90	P/No. 8650105
	3/4" BSP	183	135	P/No. 8650106
1" BSP	203	150	P/No. 8650108	

Safety Note

The soft seal hose connections are capable of holding pressure when the nut is only finger tight, it is therefore recommended when dismantling that the hose be manually flexed with the retaining nut slackened to relieve any residual pressure prior to complete disassembly.

CONTROL CABLES

The control cables operate on a push/pull system with the spool centring springs always returning the spool to the neutral position when the handle is released.

Care should be taken during installation and operation to ensure that the cables are not trapped or kinked. Any abrasion or damage to the outer casing should be sealed with plastic insulation tape to avoid moisture penetrating.

No routine adjustments of the cables are necessary, as they do not stretch. The threaded collar is correctly adjusted when the lever is in a vertical position in its housing allowing an equal amount of travel in either direction.

CAUTION

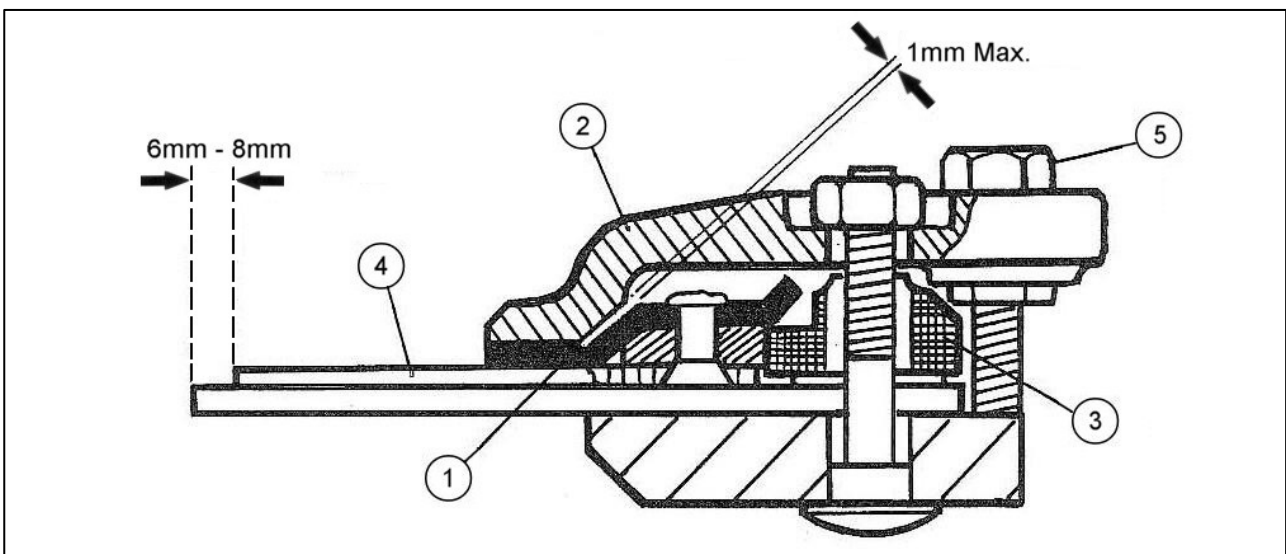
On no account should any attempt be made to lubricate the cables – these are assembled with a special 'lifelong' lubricant during manufacture and will not require any additional lubrication.

Note: Take care to ascertain the correct cable connections on both the control unit and the valve in the event of cable replacement.

CUTTERBAR

Adjusting the Knife Guides

Before commencing any checks or adjustments lay the cutterbar flat on the ground, select cutterbar off, switch off the tractor remove starting key and disconnect the con rod.



When adjusted correctly the knife sections (4) lie flush between the fingers and the underside of the knife holder (1) with the fingers projecting 6mm to 8mm in front of the knife tips. In addition there must be a maximum clearance of 1mm between the sloping faces of the knife holder (1) and the guide plate (2). This allows clearance for the knife to move freely and can be checked by placing a 5/8" dia bar into the con rod socket in the knife heel and operating by hand.

The guide plate (2) and rubbing plate (3) are mounted through slotted holes which allow the correct lateral positioning of the knife in relation to the fingers.

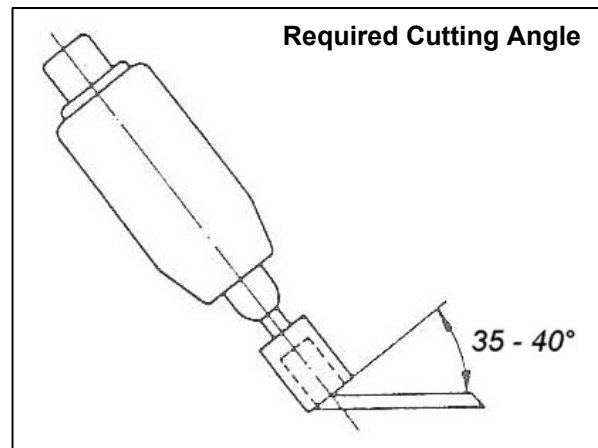
Any play caused by wear between the knife holder (1) and the knife sections (4) is removed by turning the setscrew (5). The knife guide should be adjusted until the mating faces are flush. No downward pressure should be exerted onto the knife as this may impede its free movement.

Sharpening the Knife

After five to twenty operating hours, depending on the work involved, the knives require re-sharpening. It is recommended that the knives be removed from the cutterbar for sharpening. The procedure is as follows:

Switch off tractor and remove the starting key.

- Disconnect the con rod, remove the three setscrews securing the knife heel to the knife and withdraw the knife from the cutterbar.
- Clean the knife and ensure that neither the back nor the knife sections are bent – if required, straighten as necessary.
A cutting angle of 35°- 40° is required.



A high speed hand grinder should be used, with ideally, a pot shaped pencil grinder of approximately 1" (25mm) diameter by 1 3/8" (35mm) long. Grinding is carried out with the end face of the grinder moving from the base of the knife section up to the points.

It is possible to re-sharpen the knives in situ, the procedure is as follows:

Position the cutterbar on or parallel to the ground. Switch off the tractor engine and disconnect the con-rod. Manually position the knives so that they cover the fingers and clamp together in this position.

Sharpening with files is not recommended as the process tends to leave small burrs on the edge which curl under when the knife is replaced thus impeding the free movement of the knife and leaving a blunt cutting edge.

DANGER: It is imperative that great care is adopted at all times when working with the cutterbar to avoid injury – the use of safety gloves and safety glasses is recommended at all times when working with this and all associated components.

FLAIL HEAD

Frequently inspect the rotor assembly for damaged or missing flails. Bolts and nuts securing the flails to the rotor should be regularly checked and kept tight. The correct torque setting for these locknuts is 135 Nm (100 lbf/ft). Use only the correct flail bolt and locking nut. Check the flail pivot bushes for possible damage or wear. They do not require any lubrication.

Do not attempt to run the rotor with flails missing - imbalance will cause severe vibration and can rapidly damage the rotor shaft bearings. As an emergency measure if a flail is broken off or lost, remove another on the opposite side of the rotor to retain balance. Always replace flails in opposite pairs and never match up a new flail with a re-sharpened one which will of course be lighter.

Blunt flails absorb a lot of power and leave an untidy finish to the work. They should be sharpened on a grindstone or with a portable grinder periodically. Always wear protective gear when sharpening flails.

Ensure that the bearing housings and hydraulic mounting nuts and bolts are kept tight - these should always be checked during servicing.

PTO SHAFT MAINTENANCE

PTO Shaft Lubrication

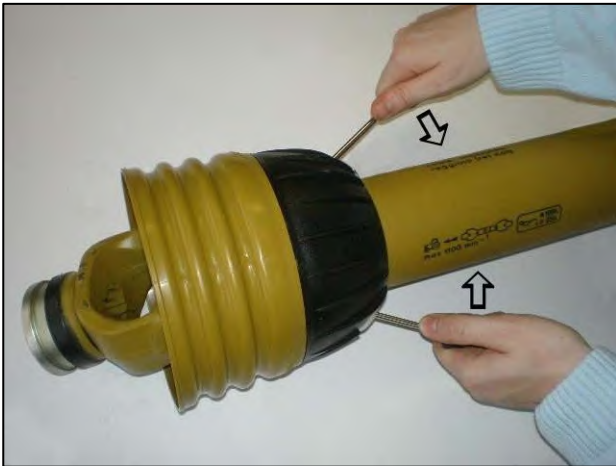
The PTO shaft should be lubricated on a regular basis using lithium based grease – each end of the shaft has 2 greasing points; one for lubrication of the universal joint and one for lubricating the rotating fixing ring of the shaft shield – access to the lubrication points is gained by releasing the shaft shield from its fixing ring and sliding it back along the body of the driveshaft – *the procedure and lubrication frequency is illustrated below.*



Shaft shield fixing clasps



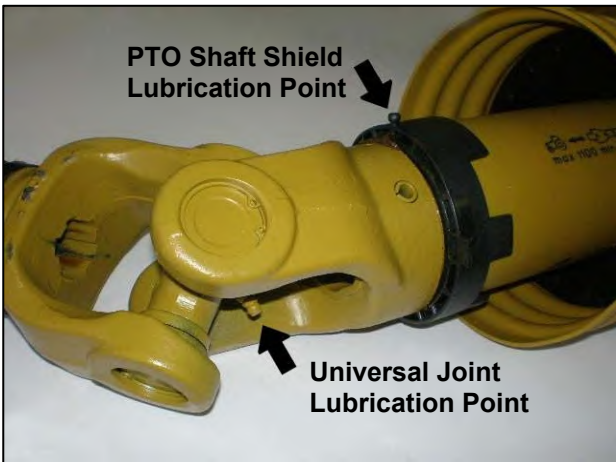
Insert screwdrivers into the clasps



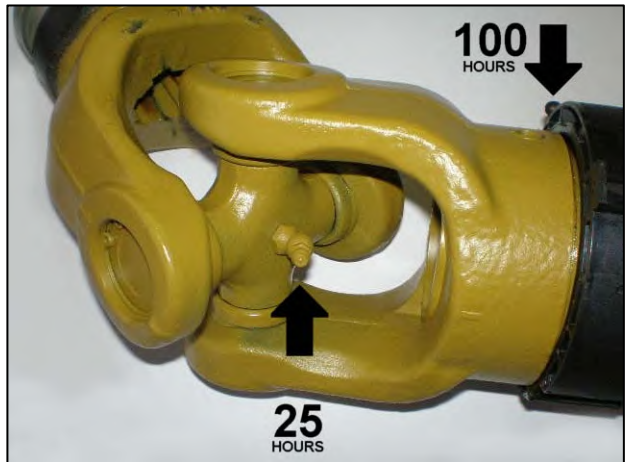
Pry clasps open to release the shield



Slide shield back to reveal universal joint



Location of lubrication points



Recommended lubricating frequency

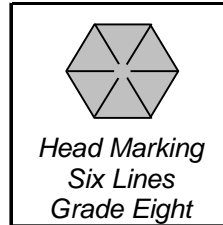
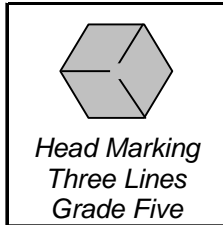
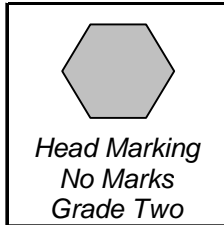
Slide the shaft shield back into place after lubrication ensuring the clasps relocate correctly in the fixing ring – always fit torque chains to the shields to stop them from rotating with the shaft during operation.

TORQUE SETTINGS FOR FASTENERS

The Chart below lists the correct tightening torque for fasteners. The Chart should be referred to when tightening or replacing bolts in order to determine the grade of bolt and the correct torque unless specific torque values are assigned in the text of the manual.

Recommended torque is quoted in Foot-Pounds and Newton-Metres within this manual. The equation for conversion is 1 Nm. = 0.7376 ft.lbs.

TORQUE VALUES FOR IMPERIAL BOLTS



NOTE:
The values in the chart apply to fasteners as received from the supplier, dry or when lubricated with normal engine oil. They DO NOT apply if special graphited, molydisulphide greases, or other extreme pressure lubricants are used. This applies to both UNF and UNC coarse threads.

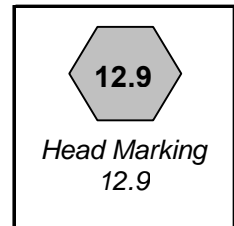
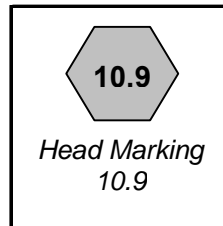
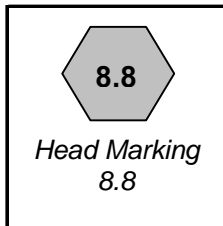
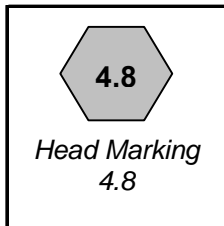
Bolt Dia.
1/4"
5/16"
3/8"
7/16"
1/2"
9/16"
5/8"
3/4"
7/8"
1"
1-1/8"
1-1/4"
1-3/8"
1-1/2"

Value (Dry)	
ft.lb.	Nm.
5.5	7.5
11	15.0
20	27.0
32	43.0
50	68.0
70	95.0
100	135.0
175	240.0
175	240.0
270	360.0
375	510.0
530	720.0
700	950.0
930	1250.0

Value (Dry)	
ft.lb.	Nm.
9	12.2
18	25.0
33	45.0
52	70.0
80	110.0
115	155.0
160	220.0
280	380.0
450	610.0
675	915.0
850	115.0
1200	1626.0
1550	2100.0
2100	2850.0

Value (Dry)	
ft.lb.	Nm.
12.5	17.0
26	35.2
46	63.0
75	100.0
115	155.0
160	220.0
225	305.0
400	540.0
650	880.0
975	1325.0
1350	1830.0
1950	2650.0
2550	3460.0
3350	4550.0

TORQUE VALUES FOR METRIC BOLTS.



Bolt Dia.
6mm
8mm
10mm
12mm
14mm
16mm
18mm
20mm
22mm
24mm
27mm
30mm

Value (Dry)	
ft.lb.	Nm.
4.5	6.1
11	14.9
21	28.5
37	50.2
60	81.4
92	125.0
125	170.0
180	245.0
250	340.0
310	420.0
450	610.0
625	850.0

Value (Dry)	
ft.lb.	Nm.
8.5	11.5
20	27.1
40	54.2
70	95.0
110	150.0
175	240.0
250	340.0
350	475.0
475	645.0
600	810.0
875	1180.0
1200	1626.0

Value (Dry)	
ft.lb.	Nm.
12	16.3
30	40.1
60	81.4
105	140.0
165	225.0
255	350.0
350	475.0
500	675.0
675	915.0
850	1150.0
1250	1700.0
1700	2300.0

Value (Dry)	
ft.lb.	Nm.
14.5	20.0
35	47.5
70	95.0
120	160.0
190	260.0
300	400.0
410	550.0
580	790.0
800	1090.0
1000	1350.0
1500	2000.0
2000	2700.0

TROUBLESHOOTING CHART

The chart below lists possible causes and solutions to problems that may be encountered.

PROBLEM	POSSIBLE CAUSE	SOLUTION
Gearbox overheating	Oil level incorrect	Check oil level
	Oil grade incorrect	Check oil grade
	Implement overloaded	Reduce forward speed
	Wrong PTO speed	Ensure tractor PTO speed matches implement
Excessive belt wear	Belt and pulley condition	Replace if necessary
	Pulley alignment	Check alignment
	Incorrect belt tension	Tension belts to spec
	Overloading of implement	Reduce forward speed or increase cut height
PTO wear / UJ failure	Working angle too great	Reduce mis-alignment of drive stub shafts
	Shaft length incorrect; bottoming out	Resize PTO shaft as recommended
	Lack of maintenance	Grease PTO shaft as recommended
Cut Quality	Flails worn or damaged	Replace worn/damaged flails
	Rotor speed / direction	Check rotor direction/tractor PTO speed
	Cutting conditions	Work in suitable cutting conditions
Rotor bearing failure	Rotor out of balance	Refer to rotor vibration below
	Wire / string in bearing	Remove wire / string
	Lack of maintenance	Grease bearings to schedule
	Moisture in bearing(s)	Grease bearing(s) to expel moisture
Rotor vibration	Flails broken or missing	Replace flails
	Bearings worn or damaged	Replace bearings
	Rotor unbalanced / bent	Re-balance / replace rotor
	Debris build up	Remove debris
	Incorrect speed	Check rotor RPM
Oil tank overheating	Oil level incorrect	Fill tank to correct level
	Oil grade incorrect	Drain and refill tank with correct grade oil
	PTO speed too fast	Match the tractor's PTO speed to machine
	Ambient temperature too high	Reduce work rate / install oil cooler
	Machine overloaded	Reduce forward speed or increase cut height
Frequent Break-back	Machine overloaded	Reduce forward speed or increase cut height
	Working on excessive incline	Disable auto-reset
	Machine weight sat on rear roller	Raise head or operate with head float
	Machine not set vertical	Adjust top link
	Internal valve leakage	Contact local dealer or McConnel Service
Hydraulics not responding	Oil level low	Fill oil to correct level
	Oil pump suction filter blocked	Replace filter element
	Oil leak in pressure line	Check machine for hydraulic leaks
	Drive line broken	Check pump is rotating
Irregular arm movement	Spool contacting with housing	Check spool moves freely
	Broken spring in spool valve	Check spring in spool valve
	Ram seal failure	Replace ram seals
Electric valve unresponsive	Faulty wiring	Check wiring and switches
	Dirt in valve	Check for ingress of dirt
	Sticking valve	Replace the valve
	Insufficient voltage	Ensure power is sourced direct from battery



McConnel Limited, Temeside Works, Ludlow, Shropshire SY8 1JL. England.
Telephone: 01584 873131. Facsimile: 01584 876463. www.mcconnel.com