# Twose Series

# MAXICUT

## Rotary Flex Wing Mowers

## Models: M460-3 & M600-3

Operator Manual

Publication 5299 June 2016 (Rev.29.06.20)

# 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 go to the McConnel Limited web site at **www.mcconnel.com**, log onto '**Dealer Inside**' and select the '**Machine Registration button**' which can be found in the Service Section of the site. Confirm to the customer that the machine has been registered in the section below.
Should you experience any problems registering a machine in this manner please contact the McConnel Service Department on 01584 875848.

**Registration Verification**

Dealer Name: ……

Dealer Address: ……

Customer Name: ……

Date of Warranty Registration: ……/……/..…… Dealer Signature: ……

**NOTE TO CUSTOMER / OWNER**

*Please ensure that the above section above has been completed and signed by the selling dealer to verify that 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 machines 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 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.*

*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. 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.*

*1.06. Temporary repairs and consequential loss - i.e. oil, downtime and associated parts are specifically excluded from the warranty.*

*1.07. 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.*

*1.08. 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.*

*1.09. 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.*

*1.10. Except as provided herein, no employee, agent, dealer or other person is authorised to give any warranties of any nature on behalf of McConnel Ltd.*

*1.11. For machine warranty periods in excess of 12 months the following additional exclusions shall apply:*

*1.11.1. Hoses, exposed pipes and hydraulic tank breathers.*

*1.11.2. Filters.*

*1.11.3. Rubber mountings.*

*1.11.4. External electric wiring.*

*1.11.5. Bearings and seals.*

1.12. *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.*
1.13. *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. McConnel 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 McConnel Ltd 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 McConnel 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 McConnel 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 McConnel 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 McConnel Ltd Service Dealer, within 30 days of the date of repair.*
2.05. *Following examination of the claim and parts, McConnel Ltd will pay, at their discretion, for any valid claim the invoiced cost of any parts supplied by McConnel 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 McConnel Ltd is final.*

## 3. LIMITATION OF LIABILITY

3.01. *McConnel 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. *McConnel Ltd makes no warranty as to the design, capability, capacity or suitability for use of the goods.*
3.03. *Except as provided herein, McConnel 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.*

# DECLARATION OF CONFORMITY

*Conforming to EU Machinery Directive 2006/42/EC*

We,

**McCONNEL LIMITED,** Temeside Works, Ludlow, Shropshire SY8 1JL, UK

*Hereby declare that:*

The Product; *Tractor Trailed Wing Mower*

Product Code; *TWRS*

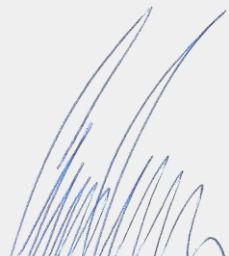
Serial No. & Date …… Type ……

Manufactured in; *United Kingdom*

Complies with the required provisions of the Machinery Directive 2006/42/EC
The machinery directive is supported by the following harmonized standards;

- BS EN ISO 12100 (2010) Safety of machinery – General principles for design – Risk assessment and risk reduction.
- BS EN 349 (1993) + A1 (2008) Safety of machinery - Minimum distances to avoid the entrapment with human body parts.
- BS EN ISO 14120 (2015) Safety of machinery - Guards general requirements for the design and construction of fixed and movable guards.
- BS EN 4413 (2010) Hydraulic fluid power. Safety requirements for systems and their components.

McCONNEL LIMITED operates an ISO 9001:2008 quality management system, certificate number: FM25970.
This system is continually assessed by the;
British Standards Institution (BSI), Beech House, Milton Keynes, MK14 6ES, UK
BSI is accredited by UK Accreditation Service, accreditation number: UKAS 003.
The EC declaration only applies if the machine stated above is used in accordance with the operating instructions.



Signed …….. *Responsible Person*
*CHRISTIAN DAVIES on behalf of McCONNEL LIMITED*

Status: *General Manager* Date: *January 2018*

# INDEX

## GENERAL INFORMATION

Read this manual before fitting or operating the machine. Whenever any doubt exists contact your dealer or the McConnel Service Department for assistance.

**Use only 'McConnel Genuine Parts' on McConnel equipment and machinery**

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 the damage of either machine or equipment if not observed carefully.

NOTE:
An operating procedure, technique etc., which is considered essential to emphasise.

LEFT AND RIGHT HAND:
This term is applicable to the machine when fitted to the tractor and viewed from the rear. This also applies to tractor references.

**Note: The illustrations in this manual are for instructional purposes only and may on occasion not show some components in their entirety. In some instances an illustration may appear slightly different to that of your particular model but the general procedure will be the same. E&OE.**

### 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:** | |

**Tractor Requirements (460 & 600 Models)**
Tractor Power: 80HP
PTO Type: Live
PTO Speed: 1000RPM
PTO Size: 1-3/8” 6 spline

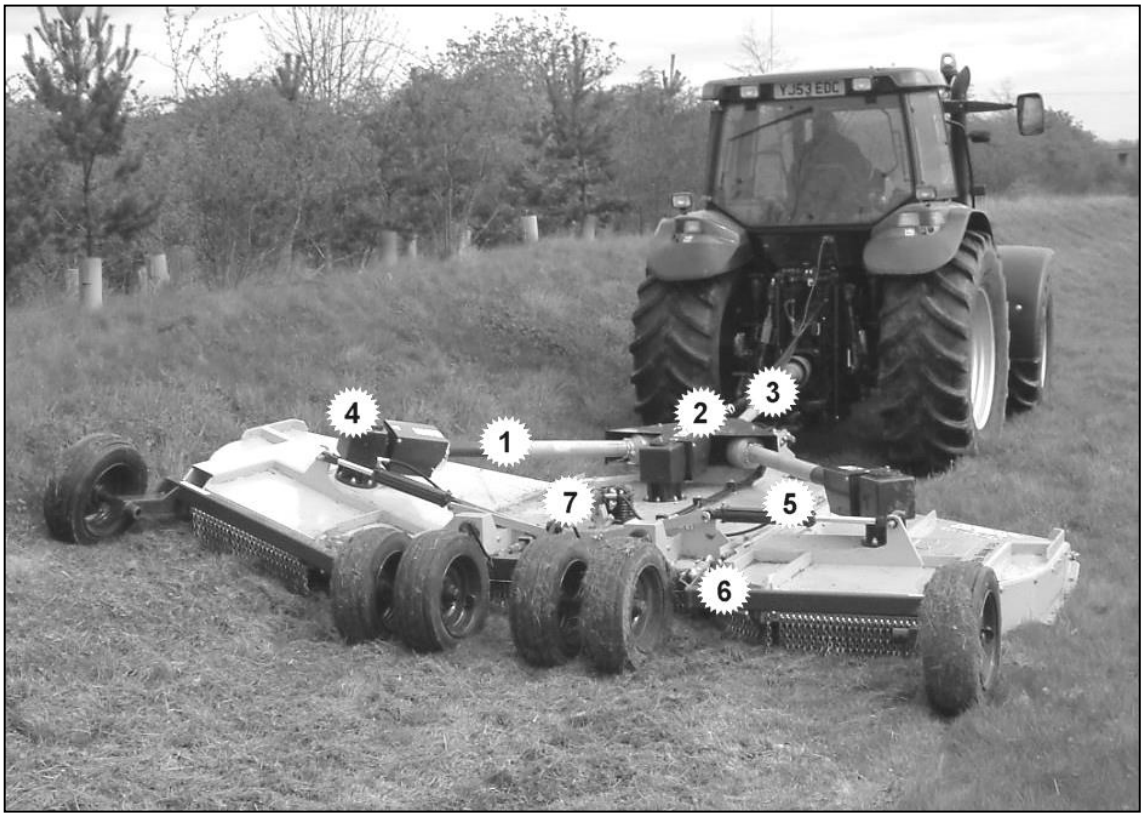
| Specification | Maxicut 460 Model | Maxicut 600 Model |
|---|---|---|
| Machine Weight | 2300kg | 3250kg |
| Cutting Blades | 3 sets | 3 sets |
| Blade Overlap | 150mm | 150mm |
| Cutting Width | 4.60m | 6.30m |
| Cutting Height | 25 – 375mm | 25 – 375mm |
| Cutting Capacity | 50mm (max) | 50mm (max) |
| Overall Width | 4.75m | 6.30m |
| Transport Width | 2.34m | 2.70m |
| Overall Length | 4.47m | 5.15m |
| Wing Lift | Hydraulic | Hydraulic |
| Wing Flex | 112° (90° up / 22° down) | 112° (90° up / 22° down) |
| Wheels | 6 (+2 option) | 6 (+2 option) |
| Tyre Size | 200/60 14.5 x 10 ply | 200/60 14.5 x 10 ply |
| Tyre Type | Duro-rib | Duro-rib |
| Tyre Pressure | 30 psi | 30 psi |
| 2 Blade Option | Yes | Yes |
| 3 Blade Option | Yes | Yes |
| 4 Blade Option | Yes | Yes |
| Shredder Blade Kit Option | Yes | Yes |

**Overview**

Twose Series Maxicut Flex Wing Mowers are available in cutting widths of 4.6 or 6.0 metre. The cutting height is adjusted hydraulically; a self-levelling system ensures the blades remain parallel to the ground irrespective of cutting height. The wings are also raised and lowered hydraulically with power being supplied from the tractors 3 spool valves. The three gearboxes are provided with slip clutch protection. Replaceable skid shoes and rear lighting equipment (for highway transport) are provided as standard.

It is essential that the machine is operated in line with the procedures and practices detailed in this manual.

**Component Identification**




1. **Wing Drive Shaft**
2. **Divider Box**
3. **PTO Shaft**
4. **Gearbox**
5. **Wing Lift Ram**
6. **Wing Leveller**
7. **Levelling Ram**

**Noise**

The equivalent daily personal noise exposure from this machine, measured at the operator's ear, is within the range of 80-85dB when used in conditions where the load fluctuates between zero and maximum. This applies when the machine is attached to a tractor fitted with a quiet cab and used in accordance with the operating instructions in a generally open environment. At equivalent daily noise exposure levels of between 85 and 90dB, suitable ear protectors are recommended.

**Safety**
Read, Understand and Follow the Safety Messages. Serious injury or death may occur unless care is taken to follow the warnings and instructions given in the safety messages,

**CAUTION!** **The lowest level of Safety Message; warns of possible injury.**

**WARNING!** **Serious injury or possible death.**

**DANGER!** **Imminent death/critical injury.**

Never operate the tractor or machinery until you have read and completely understand this manual and the tractor operator's manual and each of the safety messages found in the manuals and those displayed on the tractor and implement.

**DANGER!** DO NOT attempt any maintenance of or adjustment to the machine while it is running. Before carrying out any work on the machine follow the three safety instructions below:

a LOWER THE MACHINE ON TO THE GROUND
b PUT THE PTO OUT OF GEAR
c STOP THE TRACTOR ENGINE

**WARNING!** The operator and all support personnel must wear the appropriate safety clothing i.e. safety glasses and safety shoes at all times for protection from injury by objects thrown from the machine.

**DANGER!** Never allow passengers especially children to ride on the tractor or implement. Falling off can kill.

**DANGER!** Do not mount or dismount the tractor or machine while it is moving. Mount or dismount only when stopped – falling off can kill.

**DANGER!** At all times ensure that the PTO shaft guard is in position, securely fitted and in good condition and that the tractor PTO shaft shield is fitted.

**CAUTION!** Replace the PTO shaft guard if any of the following are evident:- guard cracked or damaged any part of the PTO shaft exposed. Ensure the PTO shaft guard is free to rotate and the anti-rotation chains are securely fitted and effective.

**WARNING!** Ensure that the correct guards are properly fitted to the machine and tractor at all times and check that they are in good condition. Ensure you have the correct guards fitted for the type of operation being performed. Missing or damaged guards must be replaced immediately.

**DANGER!** **AVOID WIRE**. It can be extremely dangerous if wire catches in the blades of the machine, and every care must be taken to ensure this will not happen. Inspect the working area before commencing. Remove all loose wire and obstructions and clearly mark those that are fixed so that you can avoid them. Any unusual noise from the cutting unit area indicates that the blades may have been fouled by an obstruction. A visual indication that wire has become entangled may be a sudden movement of the vegetation ahead of the machine. In any such event STOP the tractor engine INSTANTLY. On no account move the machine until blades have completely stopped. When the machine has stopped inspect it and remove any obstruction that may be present. If working under a raised machine ensure that it is safely supported. Before working on the machine always stop the tractor engine and remove the ignition key.

**WARNING!** While the tractor is running all personnel should keep well clear of the area around the machine as there are numerous crushing, shearing, impact dangers caused by the machine operation.

**DANGER!** Do not operate with wings raised off the ground. Operating with the wings raised exposes the blades and can cause objects to be thrown and there is also danger of entanglement in or being hit by rotating blades.

**DANGER!** Do not work under a wing in the raised position unless it is supported on blocks or propped. A sudden or inadvertent fall by one of these components could cause serious injury or even death.

**DANGER!** These machines are capable under adverse conditions of throwing objects great distances at high velocity. CHECK the blades for wear and the attachment bolts for tightness every day during work .A few moments whenever the machine is stopped, e.g. whenever removing obstructions, will help reduce blade wear or loss.

**DANGER!** Keep your forward speed to a level appropriate to the operating conditions. High-speed manoeuvres are very dangerous, particularly on uneven ground where there is risk of overturning.

**DANGER!** Keep a careful watch for passers by who may inadvertently get in the way of cut material being thrown from the machine. These machines are capable under adverse conditions of throwing objects great distances at high velocity. Stop the blades until all people are well clear.

**WARNING!** Extreme care should be taken when operating near loose objects such as gravel, rocks, wire, and other debris. Inspect the area before mowing. Foreign objects should be removed from the site to prevent machine damage and/or bodily injury or even death. Any objects that cannot be removed must be clearly marked and carefully avoided by the operator. Stop mowing immediately if blades strike a foreign object. Repair all damage and make certain the blade and carrier are still balanced before resuming cutting operations.

**WARNING!** Transport the machine only at safe speeds. Serious accidents and injuries can result from operating this equipment at unsafe speeds

**DANGER!** When the wings are folded for transport, the centre of gravity is raised and the possibility of overturn is increased. Turn slowly and with extra care on hillsides. Overturning the mower could cause the mower to overturn the tractor and vice versa. Never fold wings on a hillside, the mower may overturn.

**WARNING!** Do not transport unless wings are well secured in the transport position. Wings that are not well secured can fall during transport, causing serious damage to the tractor and mower and possibly causing the operator or passers by to be injured or killed.

**WARNING!** Release hydraulic pressure from the rams before attempting maintenance. Lower the machine to the ground and lower the wings or securely block up, disengage the PTO and turn off the engine.

**DANGER!** Do not operate this Equipment with hydraulic oil leaking. Oil is expensive and its presence could present a hazard. Do not check for leaks with your hand! Use a piece of heavy paper or cardboard. High-pressure oil streams from breaks in the line could penetrate the skin and cause tissue damage including gangrene. If oil does penetrate the skin, have the injury treated immediately by a physician knowledgeable and skilled in this procedure.

**WARNING!** Periodically inspect all moving parts for wear and replace when necessary with authorised service parts. Look for loose fasteners, worn or broken parts, and leaky or loose fittings. Make sure all pins have cotter pins and washers. Serious injury may occur from not maintaining this machine in good working order.

**WARNING!** Never un-couple the machine without using the hitch support jack. The hitch is very heavy. Attempting to lift the hitch without using the jack could cause strains. Allowing the hitch to fall suddenly and unexpectedly could result in crushing injury. Use the support jack for lifting the mower only. Overloading the jack can cause failure with possible serious bodily injury or even death.

**WARNING!** Never attempt to lubricate, adjust, or remove material from the Implement while it is in motion or while tractor engine is running. Make sure the tractor engine is off before working on the Implement.

**Emergency Stop**

To stop the blades in an emergency use the tractor stop control. The use of the tractor stop control must only be done in an emergency. Its use to stop the machine can cause damage. After an emergency stop of the machine; ensure that the PTO is disengaged before restarting the tractor.

**Safety Decals**

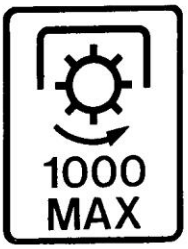
Safety decals are located on various points of the machine. They can be identified by the yellow upper panel depicting the hazard, and the lower white panel indicating means of avoidance or precautions to be taken. These decals have no text. It is essential that all operators and personnel associated with the machine fully understand their meanings, which are shown on the following pages. Any safety decals which are found missing should be replaced immediately.

## SAFETY DECALS

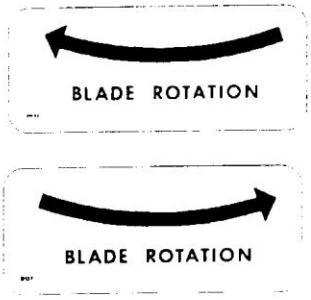
STOP ENGINE AND REMOVE IGNITION KEY BEFORE SERVICE OR MAINTENANCE

DANGER OF ROTATING BLADES KEEP CLEAR

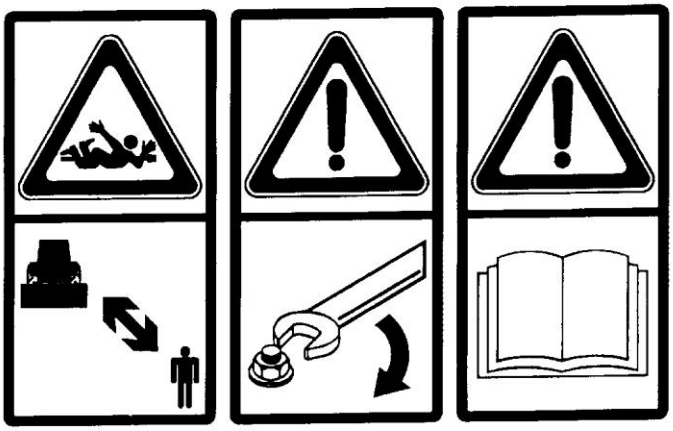
DANGER DO NOT OPERATE MACHINE WHEN RAISED




PTO SPEED



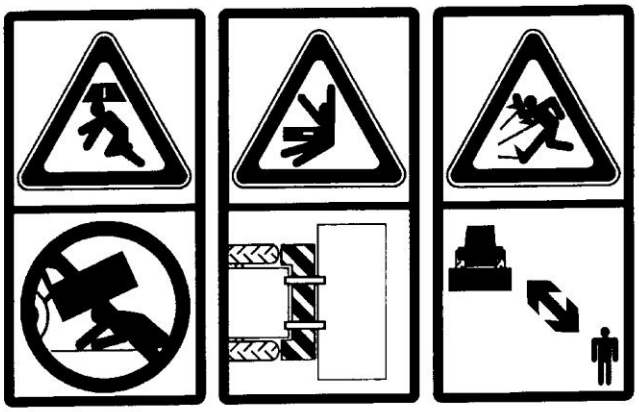

BLADE ROTATION DECALS



DANGER OF ENTANGLEMENT KEEP CLEAR OF MACHINE WHEN IN OPERATION

KEEP ALL NUTS TIGHT

READ INSTRUCTION MANUAL BEFORE OPERATING



DO NOT WORK UNDER UNSUPPORTED MACHINE

DANGER OF CRUSHING STAY CLEAR OF ZONES

DANGER FROM THROWN OBJECTS KEEP CLEAR

**Preparing the Tractor**

A few simple tasks will be necessary to prepare your tractor for use with the rotary mower.

a Adjust drawbar length according to type of hitch fitted (see Fig. 3 or 6).

b Remove cap from PTO shaft.

c Ensure tractor PTO guard is in place.

d Set tractor tyres out to 1500mm (60") dimension between tyres.

**Fitting Machine to Tractor**

**WARNING** Avoid injury. Ensure there are no bystanders between tractor and machine when coupling machine to the tractor.

Use the tongue hitch jack to either hitch or unhitch the mower. Be sure the wheels are properly blocked to avoid rolling.

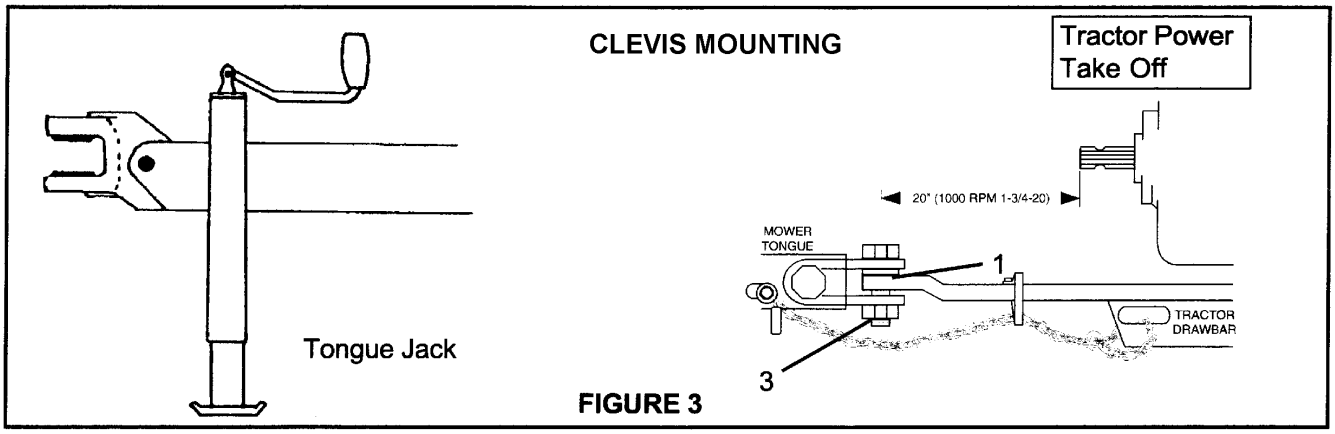



FIGURE 3

**Clevis (Eye Hitch) Mounting**

Place the 25mm (1") hardened washer (1) under top lip of the clevises to act as wear plate on drawbar. Install a 25mm (1") grade 5 or 8 bolt 125mm (5") long. Install a locknut (3) onto the bolt beneath the clevis and tighten the 25mm (1") locknut and bolt securely. (See Fig. 3)

**CAUTION** NEVER ATTACH MOWER TO TRACTOR WITH A PIN NOT HAVING A NUT. The two halves of the clevis must be bolted together securely to carry the load properly without springing or breaking the clevis

**CAUTION** If attaching mower clevis, tractor drawbar must extend to rear to allow running without binding in the tongue clevis. DO NOT USE THIS TYPE DRAWBAR WITHOUT STABILISERS. Install washers the same as detailed previously. (See Fig. 4**.)**

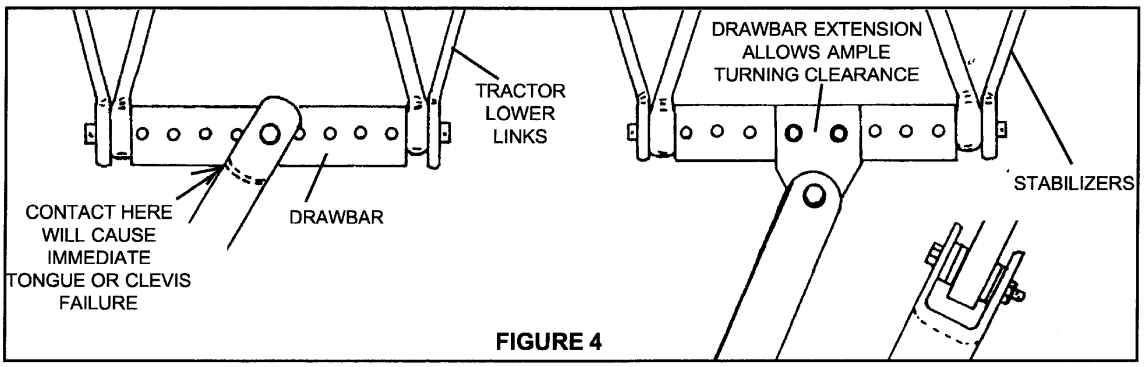



FIGURE 4

**WARNING** Failure to adjust the drawbar to the CORRECT LENGTH, failure to PROVIDE DRAWBAR CLEARANCE sufficient for short turns and/or failure to ATTACH CLEVIS TO THE DRAWBAR correctly and securely MAY ALLOW THE MOWER TO SEPARATE FROM TRACTOR AND/OR THE DRIVELINE HALVES TO SEPARATE WHICH CAN CAUSE SERIOUS BODILY INJURY OR DEATH TO THE OPERATOR OR OTHERS.

**Parking Jack Adjustment**

The tongue hitch is equipped with jack mounting which can be rotated approximately 15° in each direction so that jack may always be positioned in a near vertical position. (See Fig. 5) Loosen nut 'A', install parking jack and then rotate until jack is vertical. Tighten nut 'A'. Always ensure that pin 'B' is engaged in the location holes to prevent jack detaching from mounting.

**Pintle Hook Hitch Option**

Drawbar length must be modified to obtain dimension "A", CV driveline = 430mm ± 50mm (17" ± 2"). Use driveline length check procedure in manual to ensure problems do not occur. (refer to Fig. 6).

**PTO Shaft**

**FIGURE 5**

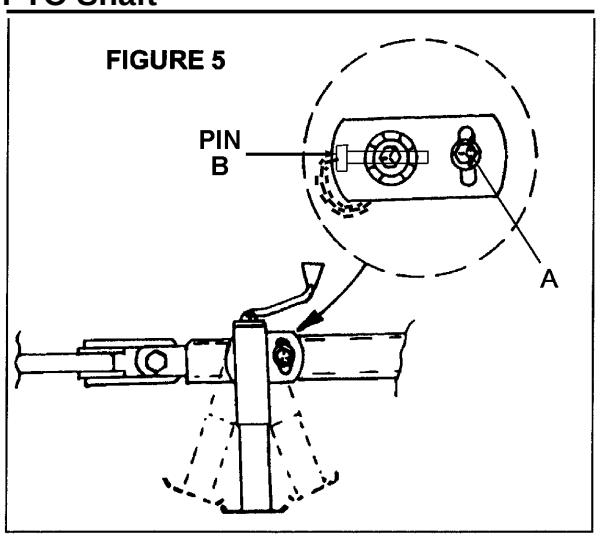
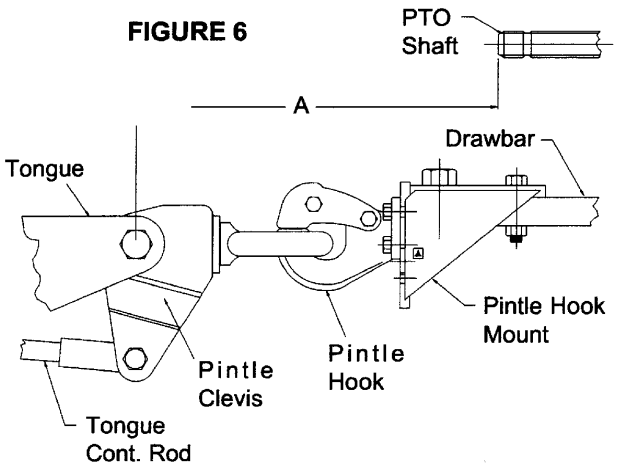



**FIGURE 6**




With the machine attached to the tractor's drawbar, proceed to connect the PTO as follows:

1 Slide the collar back and simultaneously push driveline yoke into PTO shaft on tractor until engaged.

2 Move yoke back and forth to make sure yoke is locked in plate. (QS-type collars will rotate 360º when balls are correctly located.).

**WARNING** A loose yoke could slip and cause personal injury or damage to mower. When attaching driveline yoke to tractor PTO shaft, it is important that the slide collar is fully forward and seated on yoke.

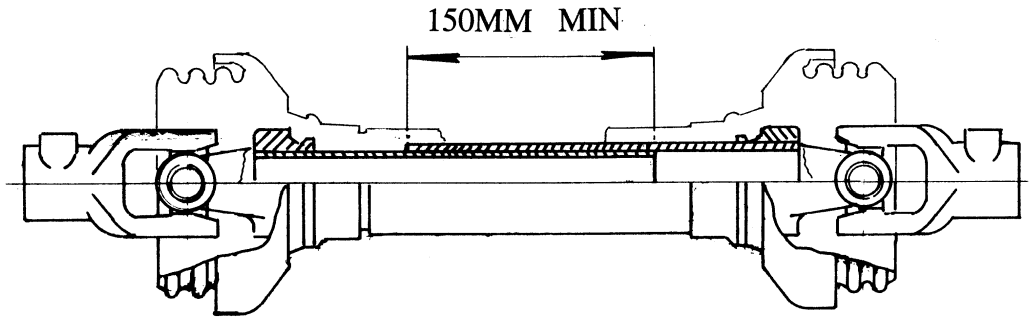
Due to many different makes and sizes of tractor to which mowers may be fitted, a nominal length PTO shaft is supplied with the machine. In some cases it may be found that this PTO shaft is too long and will have to be shortened.

**IMPORTANT** MINIMUM ENGAGEMENT OF PTO IS 150MM IN THE WORKING POSITION. THIS MEASUREMENT MUST BE TAKEN INTO ACCOUNT WHEN SHORTENING THE PTO SHAFT.

Before fitting PTO shaft to tractor, grease the sliding drive shafts and bearing units.

a Fit PTO to tractor ensuring locking peg on the splined coupling is fully engaged.

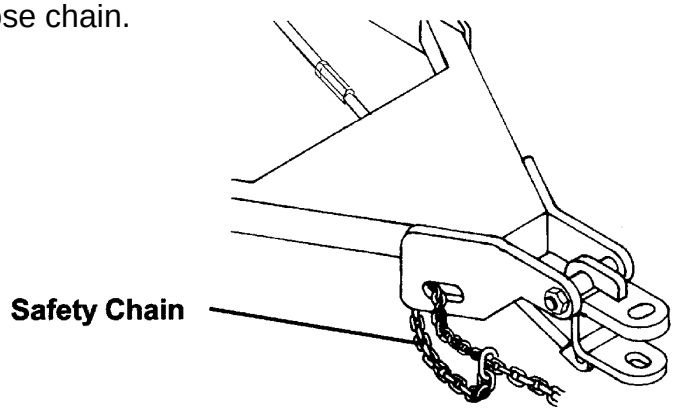
b Attach PTO guard check chains to tractor and machine.




**Safety Chains**

When towing implements on the highway use the safety chain provided, with a tensile strength equal to or greater than the gross weight of the implement to be towed by the tractor. This will control the implement in the event the hitch bolt is lost.

After attaching the safety chain, make a trial run by driving the tractor to the right and to the left for a short distance to check the safety chain adjustment. If necessary, re-adjust to eliminate tight or loose chain.




**Hydraulics**

A three-spool control valve (optional equipment) is available from your dealer for use with tractors having either an open or closed centre hydraulic system. To install the hydraulics from the machine to the control valve, connect the centre axle lift cylinder hose to the right port on the hydraulic valve. Connect the wing-folding cylinder hose to the left side of the control valve as the cylinders are on the mower rather than crossing the hoses. Remove plastic plug from breather of cylinder before operation.

The control valve handles should be set in the float position for most mower operations. This will allow the mower sections to follow the contour of the land. In the float position, the control valve handles are pushed in closest to the valve body. The closed-centre valve handles must be kept in the float position to keep the wings and centre section from creeping up. When extending the left or right wing out over a ditch when mowing, put the control valve handles with detents in the centre position on the valve. This will give the mower more stability and prevent the opposite wing from rising. Do not operate mower in this position over rough terrain or for long periods of time.

Keep hoses and couplings free from contamination. Never leave a disconnected end of hose open. Be sure the hoses are supported by the two hose brackets and are not allowed to come into contact with drivelines.

In case of valve or cylinder malfunction, contact your local dealer. If it becomes necessary to remove the piston from the cylinder, apply a few drops of “Loctite No 227” to nut before replacing.

**Clutch Adjustment**

3 slip clutches are fitted to protect the blades, drivelines, gearboxes, tractor etc. Machines are supplied set to a low torque and clutches should be adjusted prior to first use, as detailed in Maintenance Section.

**Height of Cut**

To achieve maximum cutting efficiency and provide the most uniform cut the mower should be operated with the rear slightly higher 12mm - 20mm (1/2" - 3/4") than the front.

**IMPORTANT:** Avoid very low cutting heights. Striking the ground with blades gives the most damaging shock loads a mower can encounter and will cause damage to mower and driveline.

**Levelling the Centre Section**

1 Place the tractor and mower on a level surface.

2 Using the centre axle hydraulic cylinder, raise or lower the centre section to the approximate cutting height.

3 Level the mower deck front to rear by adjusting the levelling rods linking the hitch and rear axle. To lower front, lengthen level rods and to raise front, shorten level rods. (See Fig. 7)**.**

**IMPORTANT:** Adjust level rods to the same length to maintain equal tension in rods. Improper adjustment may cause rods to snap or bend.

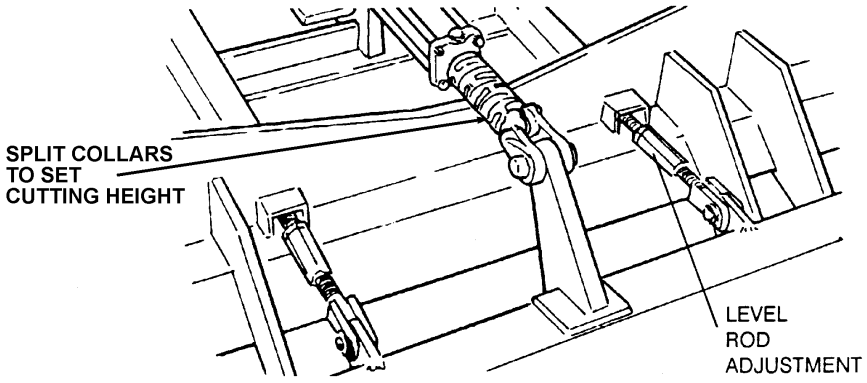
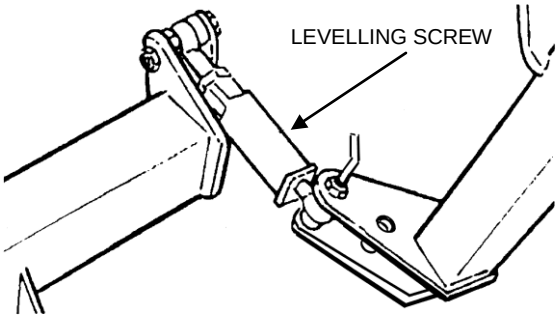



**FIGURE 7**

4 Once machine has been levelled according to directions, the exact cutting height can be set. Use split collar assemblies provided, inserted on centre axle hydraulic cylinder rod, to set height so when cylinder is lowered against collars, the desired cut height is set

**Levelling Wings with Centre Section**

1 To level the wings, with the centre section adjust the levelling screw between the wing axle and the centre axle. To lower the wings, shorten the levelling screw assembly and to raise the wings, lengthen the levelling screw assembly. (See Fig. 8).




**IMPORTANT**: *Refer to Transport Information page.*

**Pre-Start Checks**
Before operating the machine it is advisable to carry out the following checks.

a. Check that the blades are free of obstructions especially pieces of wire.

b. Check that the blades are in good condition and securely attached.

c. Ensure all guards are in position and in a serviceable condition.

d. Examine the work area and remove or identify hidden obstructions, posts and wire etc.

**Starting & Stopping the Mower**
Power for operating the mower is supplied from tractor PTO. Refer to your tractor manual instructions for engaging and disengaging the PTO. Always engage to the PTO at low engine rpm. Always operate at recommended PTO speed. Always reduce engine speed to idle rpm before disengaging PTO. Learn how to stop tractor and mower quickly in case of emergency.

**IMPORTANT** Stop mower and tractor immediately upon striking an obstruction. Inspect the mower and repair any damage before resuming operation. Do not engage PTO when engine is at full PTO rpm. Always idle engine before disengaging PTO.

**WARNING** Avoid personal injury. When attempting to stop a tractor which does not have a live PTO, the momentum created by the blade carrier of a rotary mower can cause the tractor to be pushed forward. DO NOT 0perate this mower unless tractor has live or independent PTO.

To commence operation, reduce engine speed and engage the tractor PTO. Before starting to cut, gradually increase engine speed to develop full PTO speed.

**DANGER** Chain guards must be installed if operating with people or livestock in the area or close to highways or buildings and in all non-agricultural operations.

Enter the area to cut with the mower operating at PTO speed and, if it becomes necessary to temporarily regulate engine speed during operations, increase or decrease the throttle gradually.

To transport the machine, disengage the PTO, raise centre section and wings to full transport height stop tractor and install transport bars and ratchet straps.

**WARNING** When lowering wings from transport position be sure all persons are clear of wings. Do not work under wing in raised position unless transport lock bar is in place.

**IMPORTANT** Wing hydraulic cylinders should always be controlled by a tractor valve or remote valve which has float detent position which allows wings to float over uneven terrain

**Cutting Speed**
Proper ground speed for cutting will depend upon the height, type and density of material to be cut. Normally, ground speed will range from 2 - 5 mph. Tall, dense material should be cut at low speed while thin medium height material can be cut at a faster ground speed.

**WARNING** Do not attempt to raise wings on slopes or banks. Move machine to level area before attempting to raise wings

**Cutting Tips**

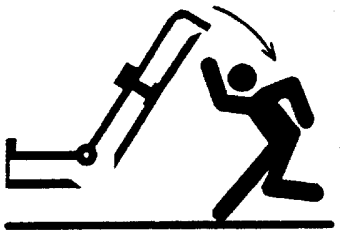
Always operate the PTO at recommended rpm when cutting. This is necessary to maintain proper blade speed and to produce a clean cut.

Under certain conditions, tractor tyres may roll some grasses down and prevent them from being cut at the same height as the surrounding area. When this occurs, reduce the tractor ground speed but maintain the PTO rpm. The lower speed will permit grasses to be at least partially rebound and be cut. Taking a partial cut and/or reversing the direction of travel may also produce a cleaner cut.

Extremely tall grass should be cut twice. Raise mower and cut twice the desired height. Cut the second time at desired height at 90 degrees to first pass.

Remember, sharp blades produce cleaner cuts and use less power.

**DANGER** Wing sections should be raised only for clearance of obstructions; never for continuous cutting operations. Cutting with wings raised above the ground surface exposes the blades and can cause objects to be thrown from under guards at a very high velocity and can cause property damage, bodily injury or even death!



**DANGER** DO NOT raise wing with blades rotating if by-standers are within 100m (300 ft).

**CV Driveline Check Procedures**

The main driveline to tractor is equipped with a special constant velocity (cv) joint that allows the joint to run smoother with no vibration even at joint angles up to 80º. This joint will operate and perform satisfactorily as long as it is not subjected to conditions, which abuse it or go beyond its operating limits.

The constant velocity joint must be greased daily at 8 hour intervals, *see maintenance section.*

Failure to lubricate as instructed will cause rapid wear and failure of operating components of joint. The constant velocity joint must not be subjected to a joint angle greater than 80º, (See Fig. 9), for short duration, or 25º maximum for continuous operation.

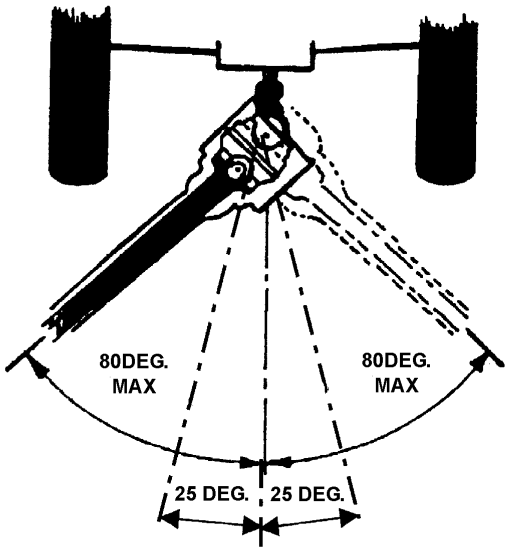



FIGURE 9

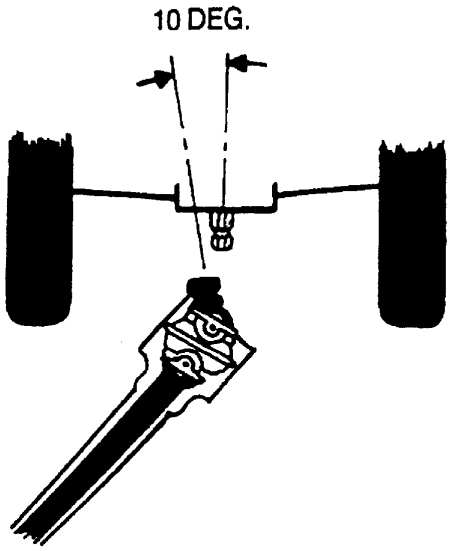



FIGURE 10

To check maximum joint angle, connect cutter to tractor. Do not connect driveline at this time. Start tractor and make a maximum turn to the left until tractor tyre almost contacts frame. Then check joint by holding driveline yoke above PTO shaft and then angle driveline yoke until it stops. There should be approximately a 10 degree difference between centre line of yoke and PTO shaft, (See Fig. 10) if not, check drawbar length and shorten if necessary.

The constant velocity joint must not be subjected to conditions where the telescoping tubes 'bottom out'. Check this condition using driveline length check procedure.

**NOTE:** If the driveline will not connect because it does not have enough clearance, check to see if the drawbar can be lengthened or alternatively cut the driveline shield and tube lengths to provide adequate clearance.

**Driveline Length Check Procedure**

**WARNING** A loose shaft could slip off and result in personal injury or damage to mower. When attaching PTO yoke to tractor PTO shaft, it is important that spring activated locking collar slides freely and locking balls are seated in groove on PTO shaft – Note: QS-lock is fully engaged if collar can be rotated freely.

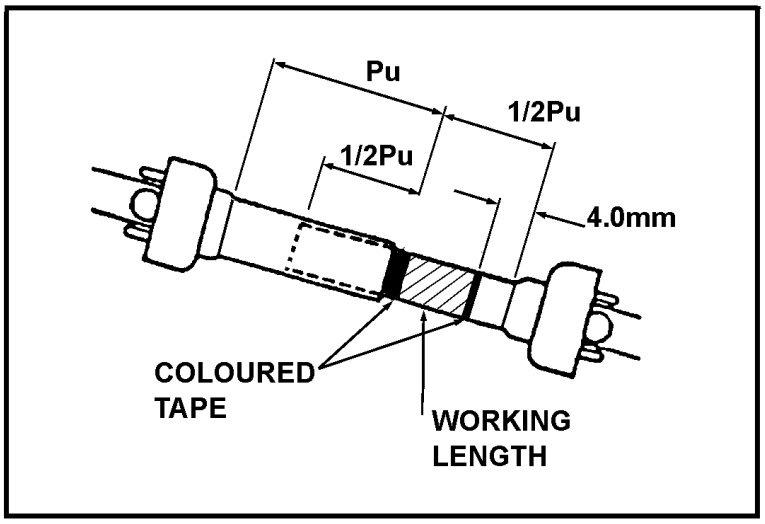
**WARNING** Before operating mower, check to make sure the driveline will not bottom out or become disengaged.

Disengage the driveline from the tractor PTO shaft

Slide the driveline together until it "bottoms out" solidly. Extend shaft 40mm, then apply coloured tape level with outer tube shield. This shows maximum shaft length.

Slide the driveline apart until ½ PU length of inner shaft shield is exposed (see Fig. 11), apply coloured tape level with outer tube shield as before. This then indicates maximum shaft length.

Re-attach driveline to tractor PTO shaft.




**Driveline in maximum extended position**

**FIGURE 11**

With the PTO NOT TURNING, (disengaged) slowly drive the tractor with mower attached through the most severe terrain conditions expected and watch shaft movement. The end of the outer shield should always be located between the two rings of tape.

Check position which places driveline at maximum extended length and at minimum compressed length. The minimum compressed length should always maintain 40mm (1-9/16”) clearance. If not, shorten as described in Fig. 12.

If driveline cannot be shortened and still maintain 1/2 PU dimension engagement, when at maximum extended length, then the operator should be aware of it, so the operator can recognise the terrain conditions that might cause problems (avoiding possible damage by disconnecting driveline from tractor) and cross the terrain in a different manner. If driveline is shortened, re-apply the coloured tapes and re-check length, as previously. *See special instructions for rough terrain operation.*

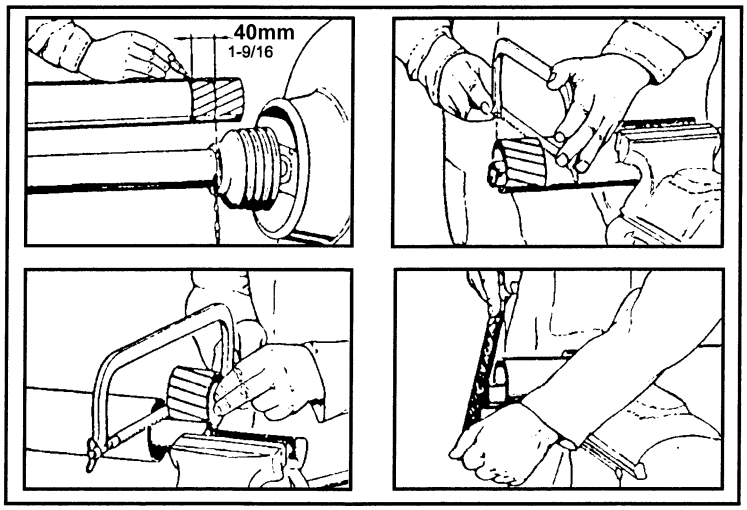



Figure 12

**Special Instructions for Rough Terrain Operations**

When crossing ditches with steep banks or going up sharp inclines, it is possible to “bottom out” the driveline that connects the tractor PTO to the gearbox on mower.

Note: To bottom out means that the inner shaft has penetrated into the outer housing to its maximum depth until the assembly becomes solid - it can shorten no more (See Fig. 13)**.**

If this happens, it can cause serious damage to the tractor PTO by pushing the PTO into the tractor and through the support bearings or downward onto the PTO shaft, breaking it off.

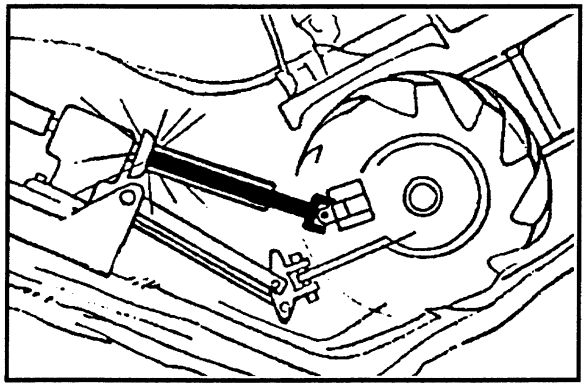
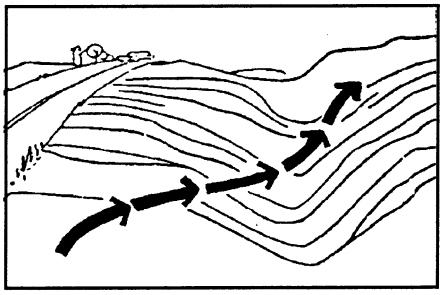


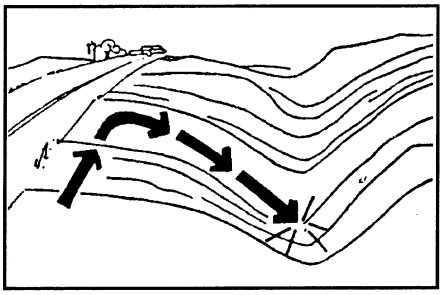
Figure 13

**WARNING** Either failure can allow the driveline to come loose from the tractor which could cause bodily injury to the operator or others in the vicinity along with expensive damage to the tractor and/or mower.

If you have a condition where you tractor will be going up a steep incline with your mower still on the flat area or coming down the opposite incline, you have a potential problem (See Fig. 15)**.** The correct preventative measure is to instruct the operator to cross this kind of terrain at an angle (See Fig. 14)**.** This will reduce the angle between the tractor and the mower. The problem is more likely to occur if the mower is in the raised position while the tractor is turning sharply and going up an incline.



**CORRECT**
**Approach ditch at an angle**
Figure 14



**INCORRECT**
**DO NOT approach ditch straight on**
Figure 15

**Transporting Mower**

When transporting the mower, keep the centre section as low to the ground as is practical to increase stability. Raise the left and right wing sections and use the transport lock bars / ratchet straps to retain them in the upright position.

1. Raise wings to full height.
2. Install transport lock bars.

**NOTE:** If the transport lock bars (when fitted) can not be easily installed, lower wings remove rod end of cylinder and adjust the rod clevis in or out to match transport bar length. Always attach ratchet straps.

3. Raise centre section.
4. For transport on the public highway ensure width does not exceed 3.0m. To reduce width and increase stability, lower centre section.

**WARNING: "Agricultural Vehicles on the Road" (See Table below)**

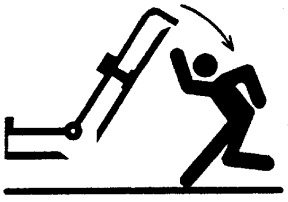
| WIDTH | CONDITIONS OF USE |
|---|---|
| 2.55 to 3 metres | Speed Limit 20mph ** (see caution below) |
| 3 to 3.5 metres | As above plus 24 hour conditional notification to the Police* |

***Explanation of requirements in table above***

**24 hour conditional notification to police; if any part of the journey will be on a road with a speed limit of 40mph or less, or the journey will exceed five miles then 24 hours notice to police is required for each police area the journey will pass through.*

*Should you have any queries you are advised to contact the "Abnormal Loads Officer" at your local police authority.*

**WARNING** This machine can overturn. Use caution when operating in transport position. Limit speed and avoid sharp turns and rough terrain. Be especially careful on rutted roads where the inner rear wheels can ride on the raised ground between the ruts.

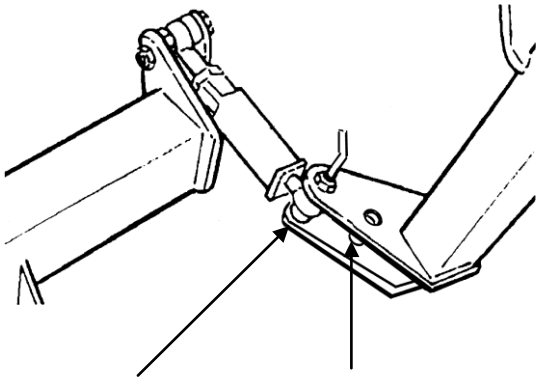


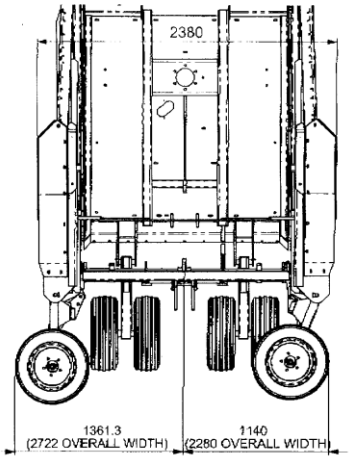
**WARNING** Keep everyone clear while lifting or lowering mower or when raising and lowering the wings.

**CAUTION** Do not exceed 18mph (30Km/h) with pneumatic tyres. (See maintenance section)

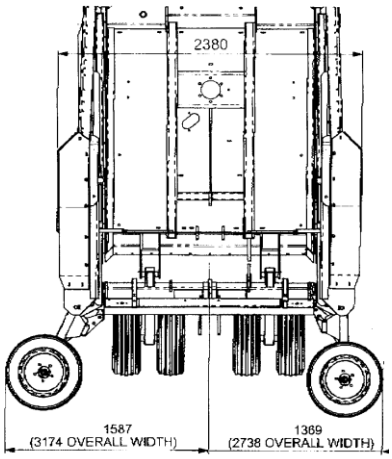
**WARNING** Use the tractor warning lights, reflectors and other devices for adequate warning to the operators of other vehicles. Comply with local government regulations at all times.

**IMPORTANT** On 4.6m (15ft) models an alternative hole is provided to reduce the transport width of the machine (see illustration). This position should be selected with the wing vertical and the transport straps in place.

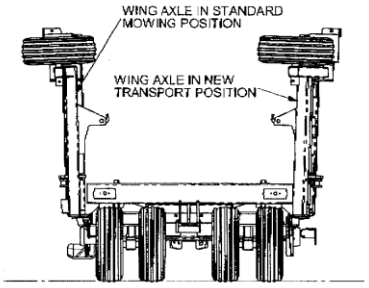


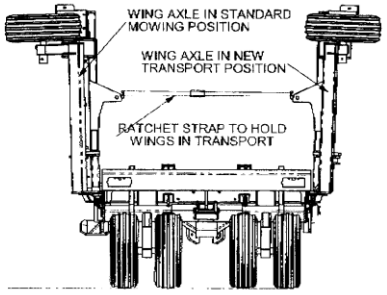



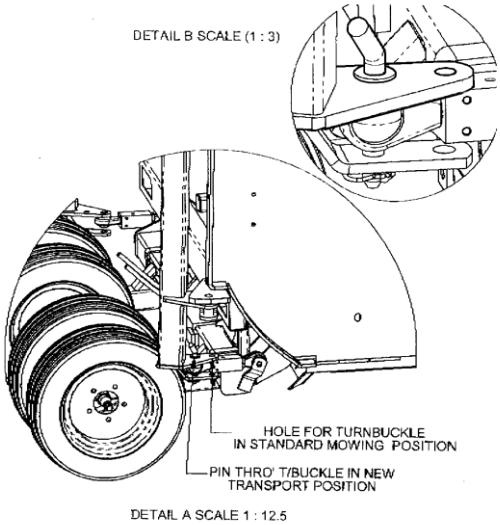

VIEW OF 4.6m (15ft) MACHINE IN LOWEST OPERATING POSITION




VIEWS OF 4.6m (15ft) MACHINE IN HIGHEST OPERATING POSITION




**Detaching and Storing**

Lower the mower to the ground. Park the tractor with the transmission in neutral. Set the parking brake, shut off the engine and remove the key. Wait until the PTO stops rotating before getting down from the tractor. Apply chocks to the mower rear wheels.

Raise hitch with parking jack. Disconnect driveline from tractor PTO shaft. Remove hitch bolt. Drive the tractor forward to clear hitch, lower mower front skids onto baulks of timber, using the jack.

Always refit the shield over the tractor PTO shaft. This shield should always remain in place except when connecting or disconnecting driveline.

Keep hands and feet out from under hitch or mower at all times.

**Maintenance**

Before operating your rotary mower, make sure it is properly lubricated and thoroughly inspected. Only a minimum of time and effort is required to regularly lubricate and maintain this machine to provide long life and trouble free operation.

**WARNING** Always disengage the PTO before raising the rotary mower for transporting or making adjustments.

**Lubrication Information**

Do not let excess grease collect on or around parts, particularly when operating in sandy areas. The accompanying illustration shows lubrication points. The chart states frequency of lubrication in hours based on normal operating conditions. Severe or unusual conditions may require more frequent lubrication. *Figure 1*

Use an SAE multi-purpose, lithium-type grease for all locations shown except location no. 2. On centre and wing gearbox use recommended lubricant on following page. Be sure to clean the fitting thoroughly before using grease gun. Daily lubrication of the wing driveline slip joint is necessary. Failure to maintain proper lubrication will result in damage to U-joints, gearbox and/or driveshaft. *Figure 1*

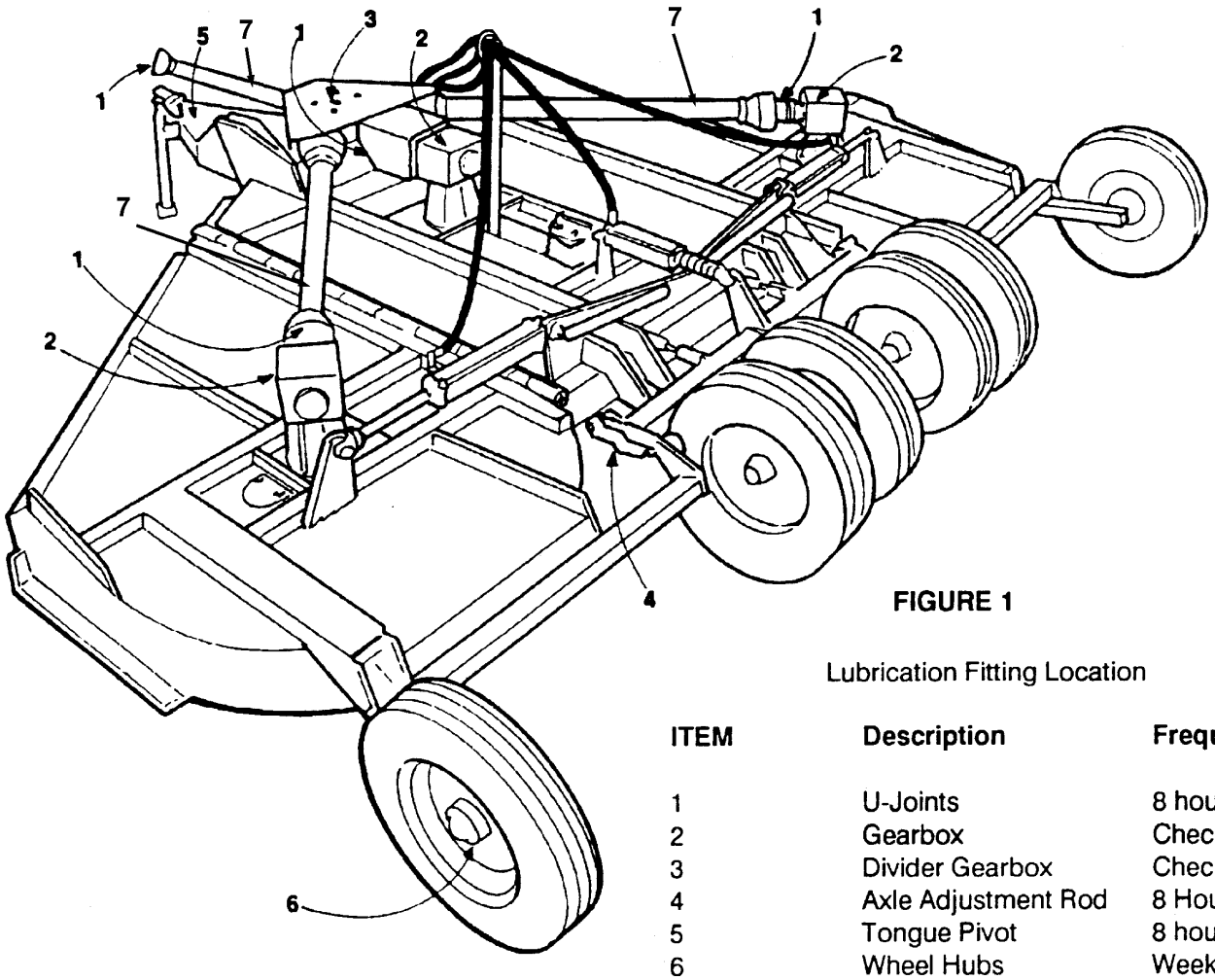



**FIGURE 1**

Lubrication Fitting Location

| ITEM | Description | Frequency |
|---|---|---|
| 1 | U-Joints | 8 hours |
| 2 | Gearbox | Check daily |
| 3 | Divider Gearbox | Check daily |
| 4 | Axle Adjustment Rod | 8 Hours |
| 5 | Tongue Pivot | 8 hours |
| 6 | Wheel Hubs | Weekly |
| **7** | **Driveline Slip Joint** | **8 Hours** |

**Hitch Assembly**

The hitch pins attach the drawbar assembly to the centre section and should be checked regularly for signs of wear or cracking. Replace as needed. The drawbar 25mm (1”) bolt fastens to mower to the tractor drawbar. When the mower is un-hitched and this 25mm (1”) bolt is removed, examine for signs of cracking or wear. Replace the drawbar 25mm (1”) bolt at first sign of either problem.

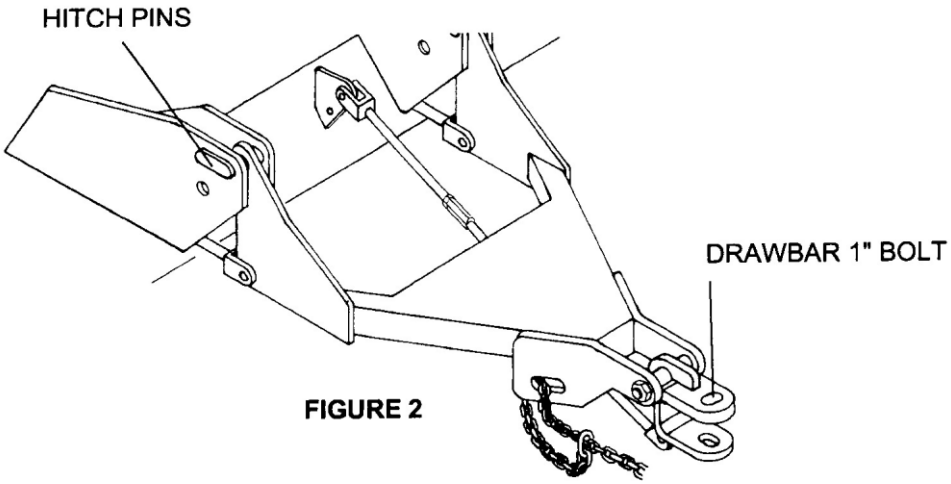



FIGURE 2

**Centre & Wing Gearboxes**

The gearboxes have been filled with lubricant to the test plug level prior to despatch. However, you should check the oil level at test plug before operating and frequently thereafter.

The gearbox should not require additional lubricant unless the box is cracked or a seal is leaking. It is recommended that the oil level plug be removed after every 8 to 10 hours of operation and oil added until it runs out of test plug hole. The test plug on the centre gearbox, right and left wing gearbox is located on the side of the gearboxes. Filler plugs are located on top of all gearboxes *(See Fig. 3).*

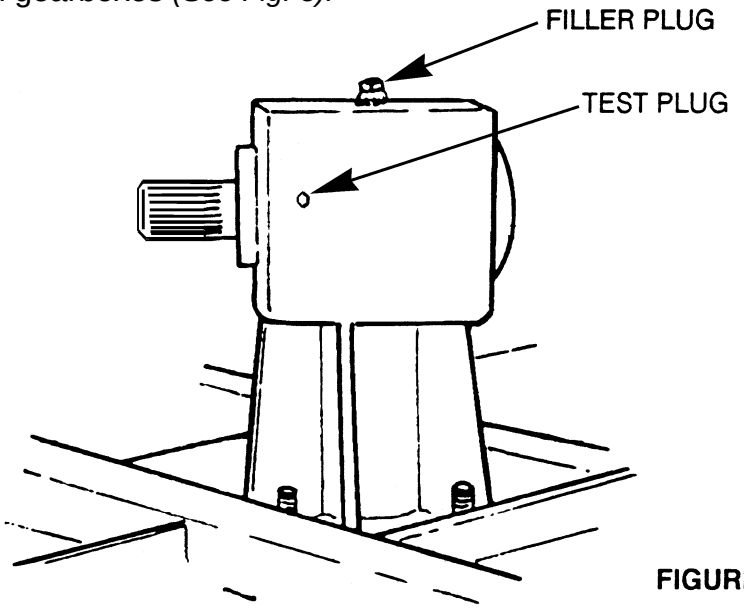



FIGURE 3

*Recommended lubricant is Exxon - Spartan EP220, Mobil HD 80W90 or equal. Required lubricant is SAE 90 or SAE EP80W90T with EP additives for extreme pressure and temperature with an API-GI-5 service rating.*

**Divider Gearbox**

The test plug for the divider gearbox is located on the right side of the input shaft. The filler pressure relief plug is on top of the gearbox. (See Fig. 4)**.**

**CAUTION Do not over-fill.**

If gearboxes are filled above test plug level, pressure under working conditions may cause the grease seals to leak.

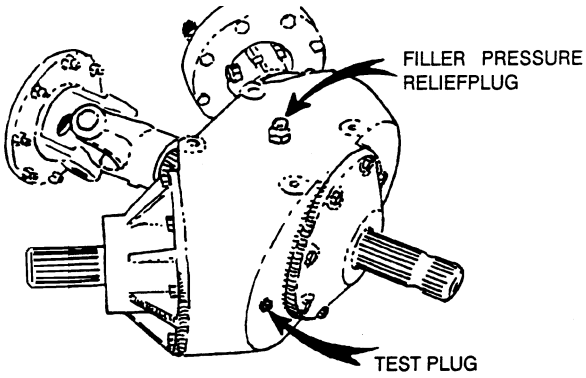
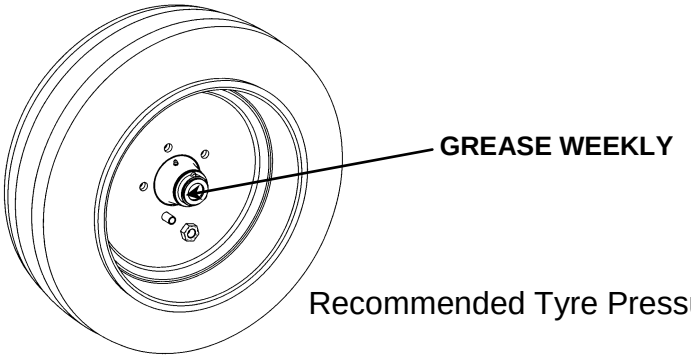



FIGURE 4

Recommended lubricant is; **NLGI 000 grease**

**Wheel Hub Assembly**

The wheel hub assemblies need to be lubricated on a weekly basis.




Recommended Tyre Pressure; **30 psi. (2bar)**

**Drivelines**

The drivelines and U-joints should be inspected each time before the mower is started. *Figs 5 & 6.*

The U-joint and CV joint on the driveline undergo extreme forces when the unit is turning or when the wings are being raised. It is important that the U-joints and CV joint are greased each day before the machine is started. The U- joints are located at each end of the centre and wing drivelines. The CV joint is located at the end of the main driveline. The U-joint and CV joint assemblies are accessible by rotating the driveline safety shield until the hole in the shield matches up with the grease fitting. Use no. 2 bearing grease for lubrication. Inspect the U-joint for wear by holding the shaft on one side of the U-joint while trying to rotate the shaft on the other side of the U-Joint. If there is noticeable movement in the driveline, replace the U-joint before it causes severe damage to the driveline.

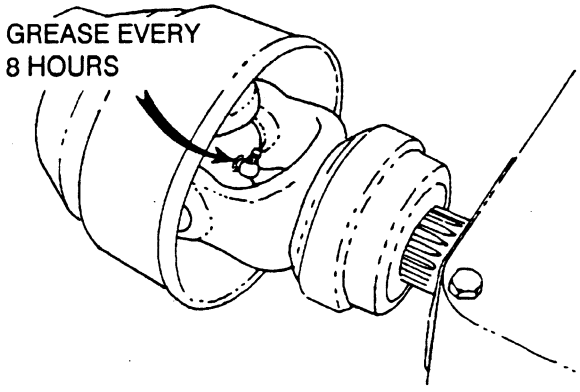



FIGURE 5

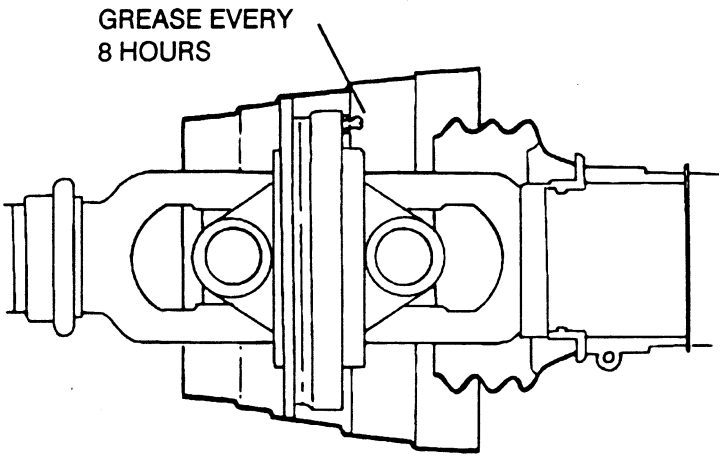



FIGURE 6

**Blade Servicing**
Inspect blades before each use to determine that they are properly installed and in good condition. Replace any blade that is bent, excessively nicked, worn or has any other damage. Small nicks can be ground out when sharpening.

**WARNING** Use only original equipment blades on this mower. They are made of special heat-treated alloy steel. Substitute blades may not meet specification and may be dangerous.

**Blade Sharpening**
Always sharpen both blades at same time to maintain balance. Follow original sharpening pattern as shown in Figure 23. Always sharpen blades by grinding. DO NOT heat and pound out edge. DO NOT sharpen blade to a razor edge, but leave a 2mm (1/16") blunt edge. DO NOT sharpen back side of blade.

**IMPORTANT** When sharpening blades, grind each blade the same amount to maintain balance. The difference in blade weights should not exceed 25g (1 ounce). Unbalanced blades will cause excessive vibration, which can damage gearbox bearings. Vibration may also cause structural cracks in cutter housing.

**WARNING** Never work under equipment supported by a hydraulic device because it may drop if the control is actuated (even with the engine stopped) or in the event of hose failure etc. Always use a secure support for equipment which must be serviced in the raised position.

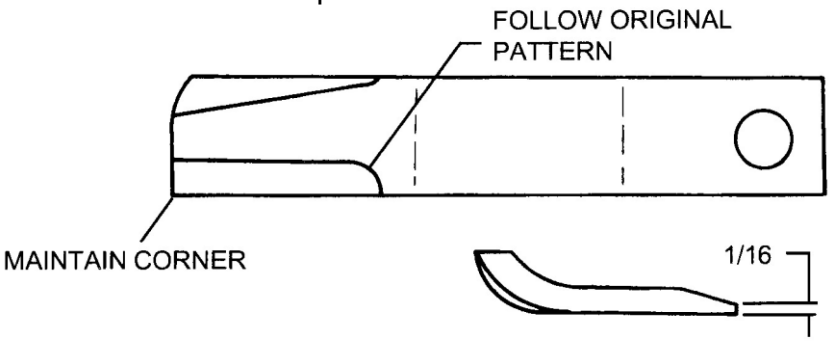



**FIGURE 23**

**Blade Removal**
To remove blades for sharpening or replacement, remove the cover plate on deck of the machine near the gearbox. Remove the locknut from blade bolt.
**NOTE:** Inspect the locknut after removal and replace if the threads are damaged. Always replace the nut when replacing a blade bolt. When installing blades; check the blade bolt pivot diameter for wear. Replace the bolt if worn more than 6mm (1/4") at any point**.** Install the blade bolts with partially worn side of bolt either toward or away from centre. **Tighten locknut to 250ft.lbs. (340 Nm).**

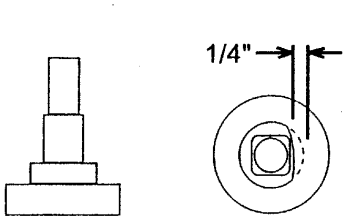
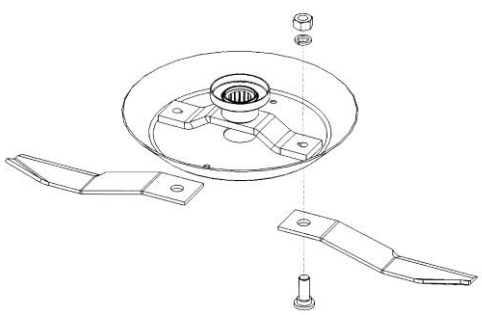



**FIGURE 24**



**WARNING** Avoid personal injury. The blade and/or blade carrier removal should be done only with the tractor engine shut off, key removed, in neutral, parking brake on, PTO disengaged and the cutter blocked in the raised position.

**Blade Carrier Removal**
Remove cotter pin and loosen slotted nut on gearbox shaft. Loosen but do not remove the nut until the blade carrier is loosened. Use a suitable two-jaw gear-puller to pull carrier off tapered gearbox shaft. If a gear puller is not available use a long bar inserted through blade bolt access hole with end against rotor bar. Strike opposite end of bar with sledge hammer. Rotate blade carrier 180 degrees and repeat process.

**Blade Carrier Installation**
Clean the splines on both the blade carrier and output shaft. Position carrier on the gearbox output shaft and install flat washer and 25mm (1") hex nut. Tighten nut holding blade carrier to minimum 450ft. lbs, strike the carrier on the hub several times with a heavy hammer to seat the hub. Use a suitable spacer over the nut to prevent damage to the nuts and threads. Re-tighten the nut to 450 ft lbs (610Nm) Install and spread cotter pin.

**NOTE** After a few hours of operation always re-check blade carrier retaining nut torque.

**WARNING** Avoid personal injury. Do not work under the machine without support blocks to prevent the frame from falling.

**Slip Clutches**
Three slip clutches are incorporated in drivelines. They are designed to slip, absorb the shock loads and protect the drive components. Ideally the clutches will slip on start-up, to clean the mating surfaces, but then grip to provide sufficient cutting power.

Machines are supplied initially with slip clutches set to a low torque valve, to ensure that all slip when powered up for the first time. The slip clutches should be reset before putting to work. The centre clutch should have its springs adjusted to 33.0mm long. The outer clutches should have their springs adjusted to 39.0mm long, as detailed in 'seasonal clutch maintenance'.

After the first hour of operation, check clutches for overheating, check weekly thereafter. To adjust the clutch, tighten all the spring nuts equally 1/6 (maximum) turn at a time. Do not adjust below minimum dimension stated – *Fig. 25.*

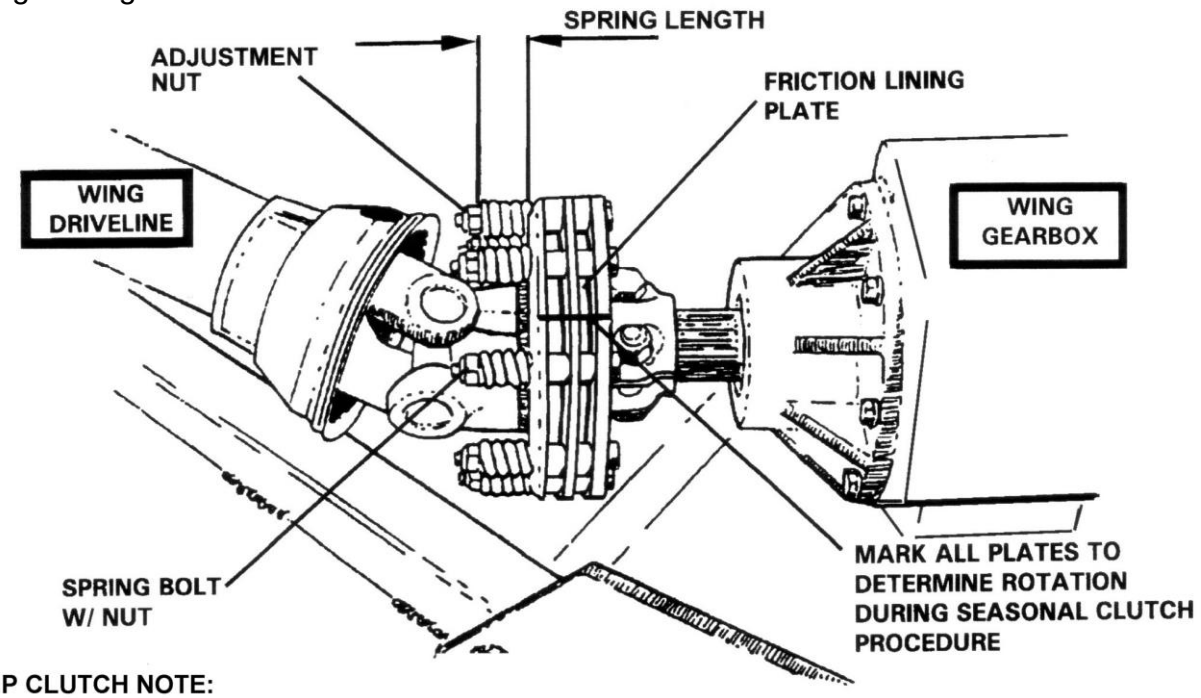
The lining plates are 3mm (1/8") thick when new. Replace after 0.75mm (1/32") wear. If the mower has been idle for an extended period of time, or in wet weather, before operating check to be sure the friction lining plates are not rusted/corroded together. Should this occur refer to the procedure described in the Seasonal Clutch Maintenance section below.

There are four friction lining plates per slip clutch. These should be checked weekly for oil or grease, wear and moisture which could cause corrosion on the drive plates.

**Seasonal Clutch Maintenance**
It is important that the clutches slip when an obstacle or load heavier than the clutch setting is encountered. Therefore, if the machine sits outside longer that 30 days and is exposed to rain and/or humid air, it is important to make sure that the clutch lining plates are not rusted/corroded together. Before using the machine, use the following procedure to make sure the clutch will slip and give the overload protection required.

1. Measure spring length (should be 33.0mm on centre clutch, 39.00mm on outer clutches).
2. Loosen nuts (Figure 25) on springs until the springs can freely rotate, yet remain secure on bolts.
3. Mark outer plates as shown in Figure 25.
4. Set the engine speed at 1200 rpm.

5. Engage the PTO (approximately one second) and then quickly disengage it. The friction lining plates should break loose (check the mark).
6. Turn tractor off. Inspect mark on plates – should be out of alignment, showing that slip clutches have operated. If not, completely dismantle and clean all mating surfaces.
7. If test power ok, tighten the nuts on the springs to their original position and replace all guarding.



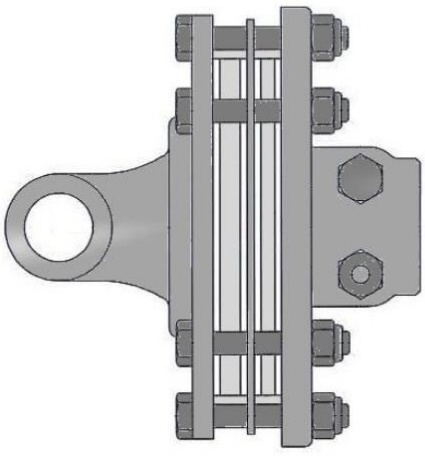

**SLIP CLUTCH NOTE:**
**If spring length is set below 'minimum length' dimesion damage will occur to drivelines / gearboxes /tractor etc.**

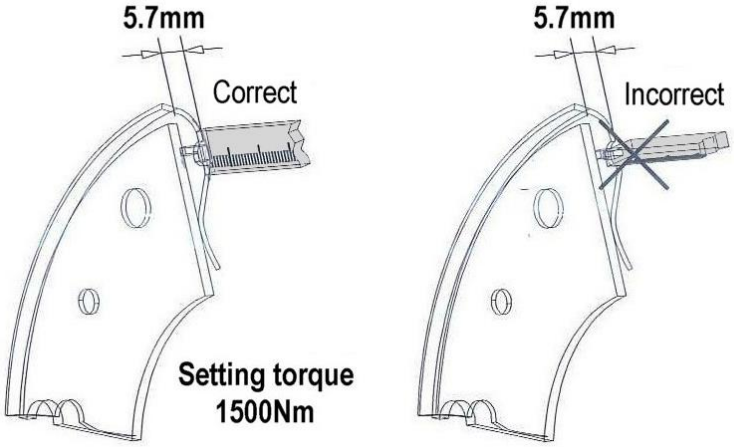
**DRIVE SHAFTS** **SLIP CLUTCH SPRING SETTINGS**

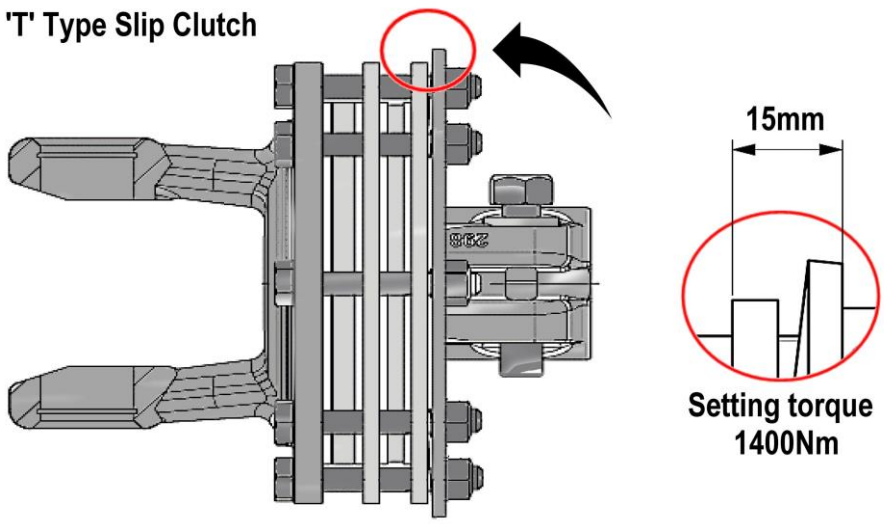
| | Part Numbers | | Centre Shaft | | Wing Shaft | | |
|---|---|---|---|---|---|---|---|
| | ***Centre Shaft*** | ***Wing Shaft*** | ***Normal*** | ***Minimum*** | ***Normal*** | ***Minimum*** | ***Model*** |
| **Walterscheild Shafts** | *00775340* | *1048055* | *38.0mm* | *37.2mm* | *39.0mm* | *38.0mm* | ***SR15*** |
| **EG Shafts (Comer)** | *00756581* | *00757375A* | *33.7mm* | *33.0mm* | *33.7mm* | *33.0mm* | ***SR15*** |
| **EG Shafts (Comer)** | *00756634ACE* | *00756633A* | *33.3mm* | *31.75mm* | *33.3mm* | *31.75mm* | ***SR20*** |

## 'Non Spring' Slip Clutches

'D' Type Slip Clutch








**Hydraulic Hoses**

Replace pinched and damaged hydraulic hoses at once. Tighten any hydraulic fitting with fluid leaking from it. Care must be exercised when tightening hydraulic fittings as over tightening can cause the fittings to fracture and require replacement fittings.

When refitting hoses avoid kinks and sharp bends and ensure that hoses do not chafe on sharp edges. Always allow enough hose for free movement.

**Hydraulic Cylinders**

Although a small amount of oil will be present from bleeding at all hydraulic fittings, significant amounts of oil leaking around the breather plug on the cylinder indicates that the seals in the cylinder are worn out. Replace the seals in the cylinder immediately before the cylinder is damaged or too much hydraulic fluid is lost.

**Skid Shoes**

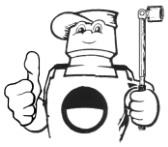
Skid shoes are made of carbon steel to reduce wear and increase service life. Premature wear can be caused by the mower centre or wing sections being set loo low which allows the wing skid shoes to drag on the ground. Dragging the skid shoes on the ground or running the skid shoes into solid objects can contribute to early frame failure on the mower. Replace worn skid shoes as required.

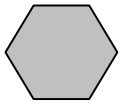
# TORQUE SETTINGS FOR FASTENERS

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.

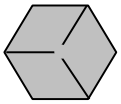
*Recommended torque is quoted in Foot-Pounds and Newton-Metres within this manual. The equation for conversion is 1 Nm. = 0.7376 ft.lbs*

**TORQUE VALUES FOR IMPERIAL BOLTS**

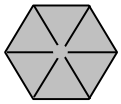




*Head Marking*
*No Marks*
*Grade Two*



*Head Marking*
*Three Lines*
*Grade Five*

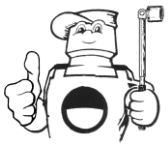


*Head Marking*
*Six Lines*
*Grade Eight*

**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. | Value (Dry) ft.lb. | Nm. | Value (Dry) ft.lb. | Nm. | Value (Dry) ft.lb. | Nm. |
|---|---|---|---|---|---|---|
| 1/4" | *5.5* | *7.5* | *9* | *12.2* | *12.5* | *17.0* |
| 5/16" | *11* | *15.0* | *18* | *25.0* | *26* | *35.2* |
| 3/8" | *20* | *27.0* | *33* | *45.0* | *46* | *63.0* |
| 7/16" | *32* | *43.0* | *52* | *70.0* | *75* | *100.0* |
| 1/2" | *50* | *68.0* | *80* | *110.0* | *115* | *155.0* |
| 9/16" | *70* | *95.0* | *115* | *155.0* | *160* | *220.0* |
| 5/8" | *100* | *135.0* | *160* | *220.0* | *225* | *305.0* |
| 3/4" | *175* | *240.0* | *280* | *380.0* | *400* | *540.0* |
| 7/8" | *175* | *240.0* | *450* | *610.0* | *650* | *880.0* |
| 1" | *270* | *360.0* | *675* | *915.0* | *975* | *1325.0* |
| 1-1/8" | *375* | *510.0* | *850* | *115.0* | *1350* | *1830.0* |
| 1-1/4" | *530* | *720.0* | *1200* | *1626.0* | *1950* | *2650.0* |
| 1-3/8" | *700* | *950.0* | *1550* | *2100.0* | *2550* | *3460.0* |
| 1-1/2" | *930* | *1250.0* | *2100* | *2850.0* | 3350 | 4550.0 |

**TORQUE VALUES FOR METRIC BOLTS.**




*Head Marking*
*4.8*


*Head Marking*
*8.8*


*Head Marking*
*10.9*


*Head Marking*
*12.9*

| Bolt Dia. | Value (Dry) ft.lb. | Nm. | Value (Dry) ft.lb. | Nm. | Value (Dry) ft.lb. | Nm. | Value (Dry) ft.lb. | Nm. |
|---|---|---|---|---|---|---|---|---|
| 6mm | *4.5* | *6.1* | *8.5* | *11.5* | *12* | *16.3* | *14.5* | *20.0* |
| 8mm | *11* | *14.9* | *20* | *27.1* | *30* | *40.1* | *35* | *47.5* |
| 10mm | *21* | *28.5* | *40* | *54.2* | *60* | *81.4* | *70* | *95.0* |
| 12mm | *37* | *50.2* | *70* | *95.0* | *105* | *140.0* | *120* | *160.0* |
| 14mm | *60* | *81.4* | *110* | *150.0* | *165* | *225.0* | *190* | *260.0* |
| 16mm | *92* | *125.0* | *175* | *240.0* | *255* | *350.0* | *300* | *400.0* |
| 18mm | *125* | *170.0* | *250* | *340.0* | *350* | *475.0* | *410* | *550.0* |
| 20mm | *180* | *245.0* | *350* | *475.0* | *500* | *675.0* | *580* | *790.0* |
| 22mm | *250* | *340.0* | *475* | *645.0* | *675* | *915.0* | *800* | *1090.0* |
| 24mm | *310* | *420.0* | *600* | *810.0* | *850* | *1150.0* | *1000* | *1350.0* |
| 27mm | *450* | *610.0* | *875* | *1180.0* | *1250* | *1700.0* | *1500* | *2000.0* |
| 30mm | *625* | *850.0* | *1200* | *1626.0* | *1700* | *2300.0* | *2000* | *2700.0* |

**Hub Assembly**

When attempting taper roller bearing adjustment it should be noted that there is not a specified torque setting for the shaft crown nut since there should always be axial play (end float) with a taper roller bearing set up.

On the hub – stub axle set up the bearings are held axially by a wide base crown nut.

With the double drilling of retention clip holes in the threaded shaft end a +45° to -45° adjustment is possible in order to give maximum axial play (end float) on the bearings of 0.18mm.

**Bearing Adjustment**

1. Ensure that the spindle is clean and that the front bearing can slide on the front spindle. Fit back-up spacer (washer).
2. Fit the rear grease seal, rear bearing, hub and front bearing to the spindle (ensure front and rear taper roller bearings are packed with grease) and screw on the crown nut.
3. Using the appropriate spanner ( a torque wrench is not required) tighten the crown nut while turning the hub clockwise until the bearing friction begins to drag (the hub becomes difficult to turn, do not tighten to the point where the hub will not turn at all).
4. Turn back the crown nut (anti clockwise) until the hole in the spindle and slot in the crown nut line up, (if the hole and the slot line up at the point of tightening as in the previous paragraph it is essential that the crown nut is turned anti-clockwise until the hole and slot again line up).
5. Insert the retention pin and hook the bow spring into the appropriate groove in the crown nut.
6. Check the adjustment by turning the hub clockwise. The hub should turn freely the only friction should be the rear grease seal.
7. Partially fill the metal hub cap with grease and knock into position into the end of the hub.
8. Recheck the bearing set up and hub grease content after 40 hours operation and then every week.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