

ROTARY RAKES

RR350 / RR360 / RR400 / RR430 / RR470

OPERATOR MANUAL

Publication 525

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IMPORTANT VERIFICATION OF WARRANTY REGISTRATION



DEALER WARRANTY INFORMATION & REGISTRATION VERIFICATION

It is imperative that the selling dealer registers this machine with Twose of Tiverton 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 Twose web site at www.twose.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 Twose Office on 01884 253691.

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 Twose of Tiverton 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.

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 Twose of Tiverton 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 Twose of Tiverton 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 Twose of Tiverton 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 Twose of Tiverton 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 Twose of Tiverton 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 Twose of Tiverton Ltd cannot be held liable, and may have safety implications.*
- 1.09. *If in exceptional circumstances a non Twose of Tiverton Ltd part is used to effect a repair, warranty reimbursement will be at no more than Twose of Tiverton 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 Twose of Tiverton 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. Twose of Tiverton 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 Twose of Tiverton 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 Twose of Tiverton 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 Twose of Tiverton 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 Twose of Tiverton 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 Twose of Tiverton Ltd Service Dealer, within 30 days of the date of repair.
- 2.05. Following examination of the claim and parts, Twose of Tiverton Ltd will pay, at their discretion, for any valid claim the invoiced cost of any parts supplied by Twose of Tiverton 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 Twose of Tiverton Ltd is final.

3. LIMITATION OF LIABILITY

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

TWOSE of TIVERTON LIMITED,
6 Chinon Court, Lower Moor Way,
Tiverton Business Park, Tiverton, Devon, EX16 6SS, UK

Hereby declare that:

The Product; Tractor Mounted Rotary Rake

Product Code; TSIP

Serial No. & Date Type

Manufactured in; Slovenija

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 14121-1 (2007) Safety of machinery - Risk assessment, Part 1: Principles Part 2: practical guide and examples of methods.
- BS EN ISO 12100-1 (2010) Safety of machinery - Part 1: Basic terminology and methodology Part 2: Technical principles.
- BS EN 349(1993)+ A1 (2008) Safety of machinery - Minimum distances to avoid the entrapment with human body parts.
- BS EN 953 (1998) Safety of machinery - Guards General requirements for the design and construction of fixed and movable guards.
- BS EN 982(1996)+ A1 (2008) Safety requirements for fluid power systems and their components. Hydraulics

Signed *Responsible Person*
CHRISTIAN DAVIES on behalf of **TWOSE of TIVERTON LIMITED**

Status: General Manager

Date: May 2011

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Technical Data

Specification	RR350	RR360	RR400	RR430	RR470
Working width (m)	3.3	3.60	4.00	4.30	4.70
Rotor diameter (m)	2.8	2.83	3.15	3.335	3.56
Transport width (m)	1.64	1.68	1.99	2.2	2.2
Machine width (m)	2.96	2.99	3.51	3.51	3.72
Machine height (m)		1.56	1.42	1.58	1.57
Spring tine arms per rotor	8	10	11	12	13
Spring tines per arm	4	4	4	4	4
Spring tines per machine	32	40	44	48	52
Tyres	15x6.00 4ply	16x6.50-8 4ply	16x6.50-8 4ply	16x6.50-8 4ply	16x6.50-8 4ply
Tractor power required (kW/HP)	22/30	22/30	22/30	22/30	30/41
PTO speed (rpm)	540	540	540	540	540
Optimum PTO speed (RPM)	350-450	350-450	350-450	350-450	350-450
Depositing direction	left	left	left	left	left
PTO safety clutch adjustment	60Nm	60Nm	60Nm	60Nm	60Nm
Working speed (km/h)	Up to 12	Up to 14	Up to 14	Up to 14	Up to 14
Working capacity (ha/h)	Up to 4	Up to 4.5	Up to 5.0	Up to 5.5	Up to 6.2
Chassis type	Tandem axle	Tandem axle	Tandem axle	Tandem axle	Tandem axle
Hitch type	3-point	3-point	3-point linkage	3-point linkage	3-point linkage
Weight (kg)	390	495	550	564	575

Noise Level

The noise level of the machine is less than 70dB

Machine Serial Number Plate

All machines will have a serial number plate fitted to them stating; the machine model, serial number of the machine, and the machine's weight. When ordering replacement parts or requesting service information always quote the machine model and serial number as stated on the serial number plate.

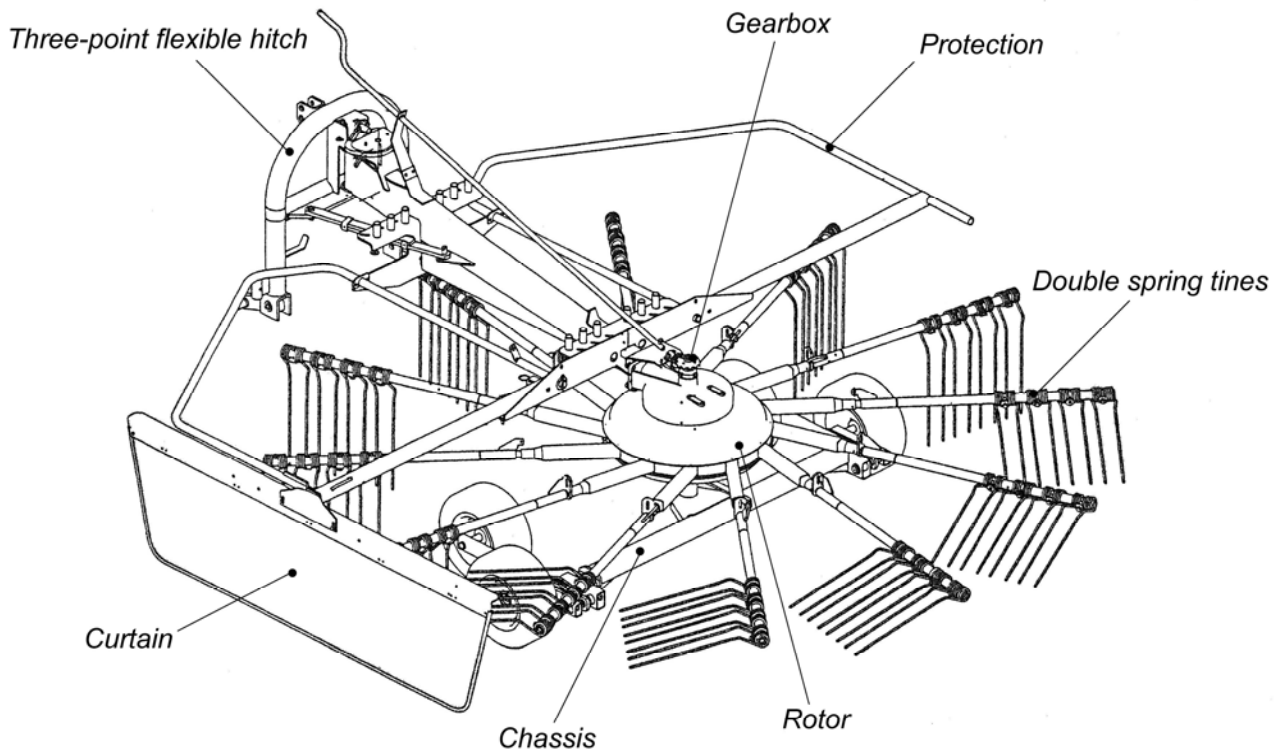
Description

Twose Rotary Rakes are three-point linkage, tractor mounted, agricultural implements specifically designed for gathering into swaths dry or faded forage, grass, and clover. The machines are capable of producing single, double, multiple and semi-swaths. They may also be utilised for the turning of swaths.

These machines must only be used to perform the designated task for which they were designed. Use of these machines for any other function may cause damage to the machine and possible injury to the operator or other persons.

General Arrangement

The diagram below shows the location of the machines main components



Safety Information

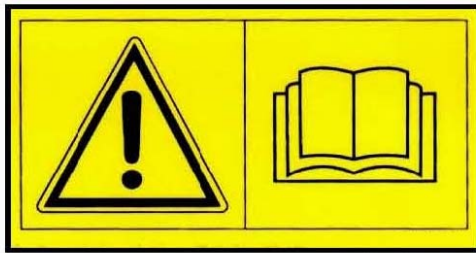
In the interest of safety it is important that great care is adopted at all times during the attachment, transportation, operation and maintenance of this machine. Both the owner and the operator of the machine should read and understand the following section to ensure the safety of themselves and all other persons who enter into the close proximity of these machines.

- ▲ In addition to the instructions stated here always abide by general safety and accident regulations.
- ▲ Safety and warning decals placed on the machine give important instructions for safe work - take them into consideration for your safety and the safety of others.
- ▲ While driving on public roads always abide by traffic signs and road regulations.
- ▲ Familiarise yourself with the controls and functions of the machine and practice them in a safe location before attempting to start work.
- ▲ Never approach this machine whilst it is working or running – switch off the machine and wait until it has stopped fully before approaching.
- ▲ Do not wear loose fitting clothes in the vicinity of this machine - clothes should fit tight to the user's body.
- ▲ Check no one is near to, or on, the machine before attempting to start or transport it. Ensure your visibility is kept clear at all times.
- ▲ Never permit anyone to ride on this machine.
- ▲ Implements should always be attached according to the manufacturer's instructions and fastened correctly to the prescribed devices using the correct components.
- ▲ When disconnecting the machine from the tractor select a firm level site and use the support leg.
- ▲ Take care when connecting or disconnecting the implement to the tractor – keep onlookers at a safe distance.
- ▲ Ensure controls for the machine are positioned such that the machine cannot accidentally be started during transport.
- ▲ For transportation on the road, prepare and secure the machine according to the manufacturer's instructions.
- ▲ Never leave the driver seat whilst the tractor or the machine is running.
- ▲ Always adjust the driving speed to suit the driving conditions. Avoid fast turning when driving uphill, downhill or across a slope. Braking performance and turning ability will be affected when implements are connected or mounted to the tractor - allow extra time for turning and braking.

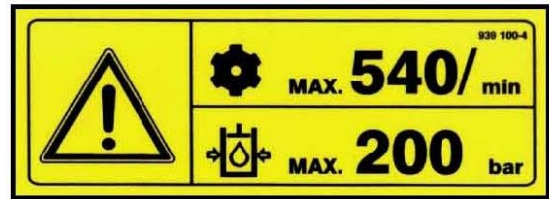
- ▲ Never attempt to operate a machine without its safety devices fitted or incorrectly secured.
- ▲ Ensure all bystanders are kept at a safe distance from a moving or working machine.
- ▲ Even when the machine is unattached some hydraulic or mechanical components on the machine are able to be rotated or moved by hand and are therefore capable of causing injury to fingers or hands due to trapping. Wherever possible secure these components during storage to prevent accidental injuries.
- ▲ Always place the machine in a safe position before leaving the tractor - lower the implement completely, switch off the engine and remove the ignition key.
- ▲ Never permit anyone between the machine and the tractor whilst either is working or when the machine is in a raised position.
- ▲ Only use machines on a tractor that is capable of taking its weight - use weights or ballast as required ensuring stability of the unit.
- ▲ Be aware at all times of the width, height and length of any machinery you are operating – especially when transporting on the public highway or near obstructions.
- ▲ Ensure the work area is clear of obstructions before starting work – clear stones, wire, glass or any other dangerous objects from the work site before attempting to start work.

Although the information given 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 Twose machine.

Safety Decals



1



2



3



4



5

1. Read the book first.
2. Maximum PTO speed 540 RPM.
3. Lower protection rails before operating the machine.
4. DANGER – Keep a safe distance from working machine.
5. DANGER – Moving parts, keep clear.

Machine Attachment

Select a firm level site on which attach the machine to the tractor.

Reverse the tractor squarely up to the machine to a position where the tractors lower links (1) can be attached to the lower connection points of the machine, secure with lynch pins provided (2).

Fit top link (3) and secure with locking pins (4). Lift support leg (5) and secure in the raised position with locking pin (6).

Do not remove the support leg.

Fit check chains or stabilisers to prevent sideways movement of the lower links.

Set handle for machines height adjustment to a position where it is easily accessible from the tractor's driving seat ensuring it does not foul the tractor when the machine is raised or in the transport position.

Note; raising and lowering the machine must always be performed slowly, constantly checking that machine components are clear of the tractor and cab.

PTO Shaft

Fit and connect the PTO halves to the machine side (1) and tractor side (2) - on initial attachment the shafts will need to be measured and adjusted to suit the tractor used – see below.

When fitting the PTO the half with the overload clutch must be fitted on the machine side (1).

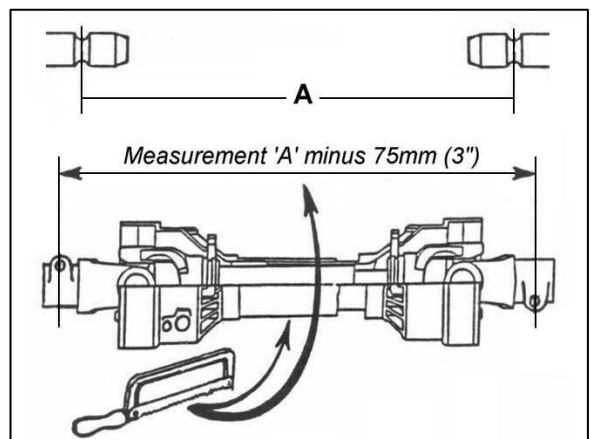
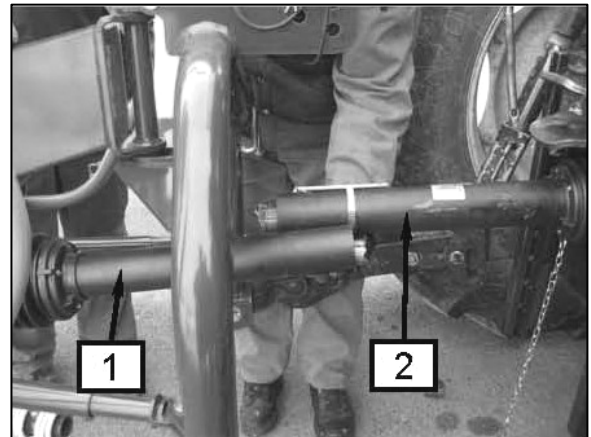
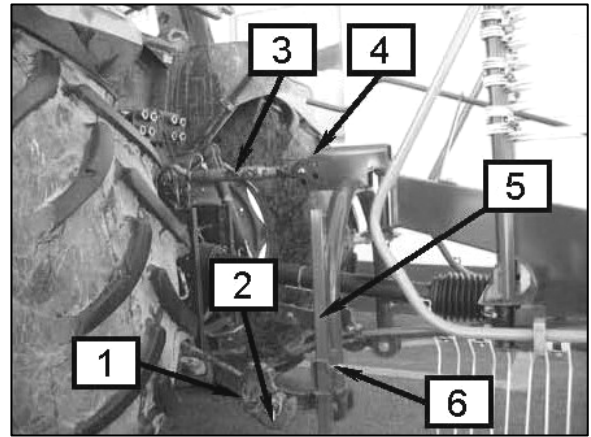
Fit and secure torque chains to PTO guards to prevent them from rotating with the shaft.

Measure the PTO shaft and cut to the dimension shown - see diagram opposite.

The finished length of the PTO shaft should be 75mm (3") less than the measured distance 'A' - between the tractor shaft and gearbox stub shaft - to enable correct fitting.

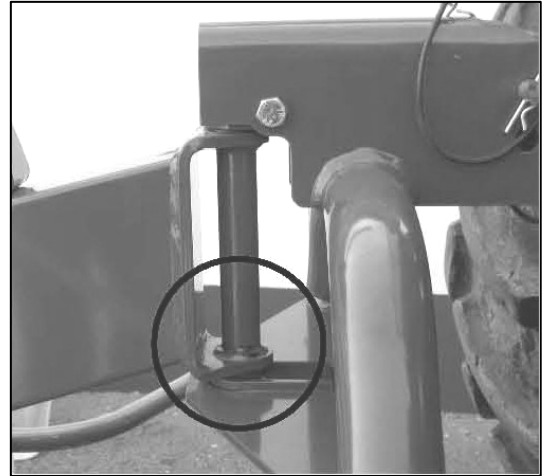
Note: For subsequent use with different tractors measure again – there must be a minimum shaft overlap of 150mm (6").

Once fitted, ensure the PTO has freedom of movement and does not foul on the tractor or machine during normal manoeuvres.



Basic Setting

Lower the machine slowly. Set linkage control lever in the 'float' position. With the machine hitch in the position shown opposite, adjust the top link to bring the machine into the horizontal or slightly inclined forward position. The spring tines should be lightly touching the ground.

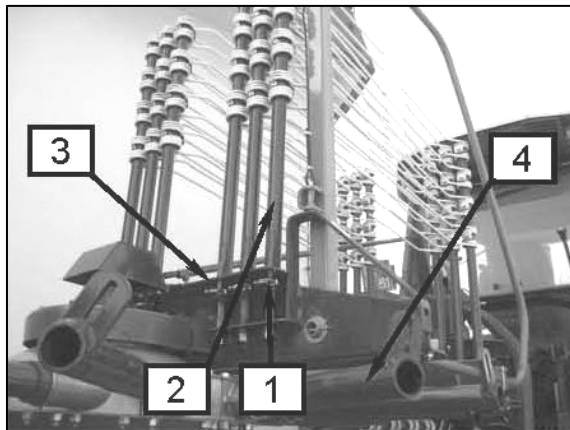


Transport & Work Positions

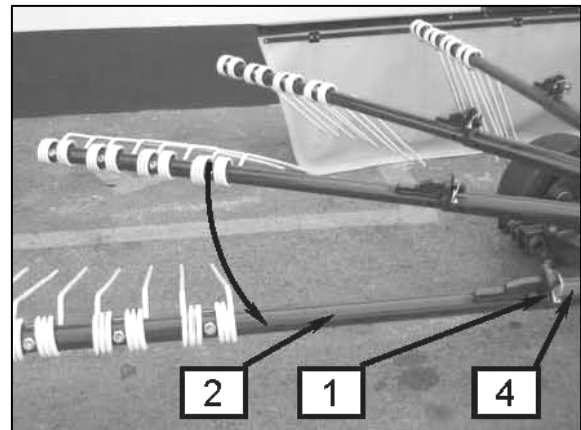
For transportation of the machine the rake arms must first be removed from their work position on the rotor and stowed upright in their transport position on the hitch, the curtain and guard rails must then be placed into their upright transport positions. Raise the machine using the tractor's hydraulics. Fix support leg into its transport position.

Moving Spring Tine Arms into Transport Position

Remove pins (1) from the spring tine arms (2), pull out the spring tine arms and stow upright in the transport holder (3), ensure spring tines are turned inwards, secure in position with locking pins (1).



Tine Arms - Transport Position



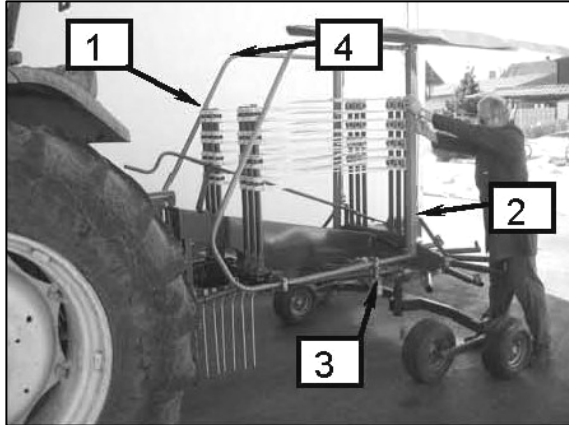
Tine Arms - Work Position

Moving Spring Tine Arms into Work Position

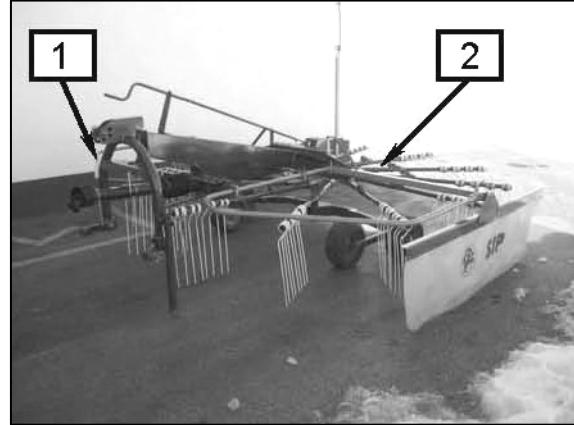
Remove pins (1) from the spring tine arms (2), remove spring tine arms from the transport holder (3), and insert into rotor pipes (4), secure in position with locking pins (1). Ensure locking pins are fitted against the rotor's direction of rotation.

Setting Guard Rails into Transport Position

Pull out latch (2) using cord, raise guard rail (1) into transport position ensuring safety device (3) connects correctly. Transport position is correct when the latch (2) re-locks.



Guard Rails - Transport Position



Guard Rails - Work Position

Setting Guard Rails into Work Position

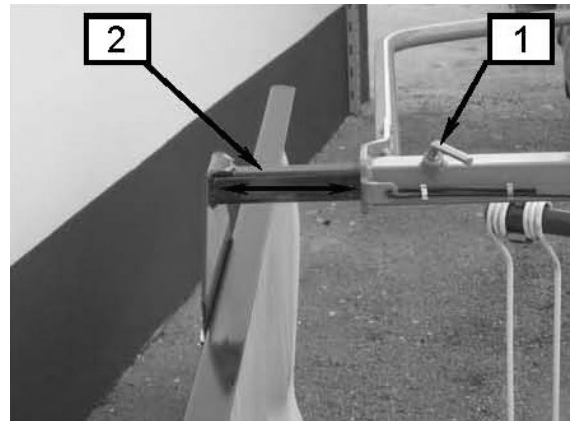
Pull out latch (2) using cord, lower guard rail (1) into working position ensuring latch (2) locks correctly.

Work Position

For work the rake arms must be relocated from their transport position on the hitch to their work position on the rotor and secured in place by their locking pins as described on the previous page.

The guard rails and swath curtain can then be lowered into the work position and the curtain (2) adjusted to the desired position and fastened with its locking screw (1).

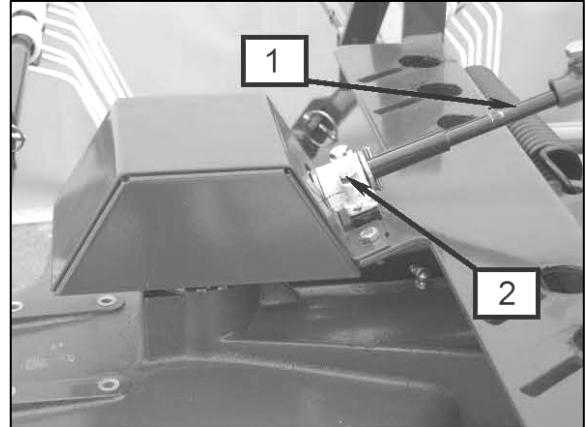
The angle of the curtain will determine the density of material forming the swath – large curtain deviation will produce a dense swath whereas acute or no deviation will produce a lighter swath.



For work the 3-point hitch should be in the low position and set to 'float'.

Set the inclination of the rotor by adjustment of the top link on the three point linkage - *for work the rotor should be parallel to the ground or inclined slightly forward and the spring tines should be set to a height where they lightly touch the ground – adjustment to height can be made during work .*

Working Height Adjustment

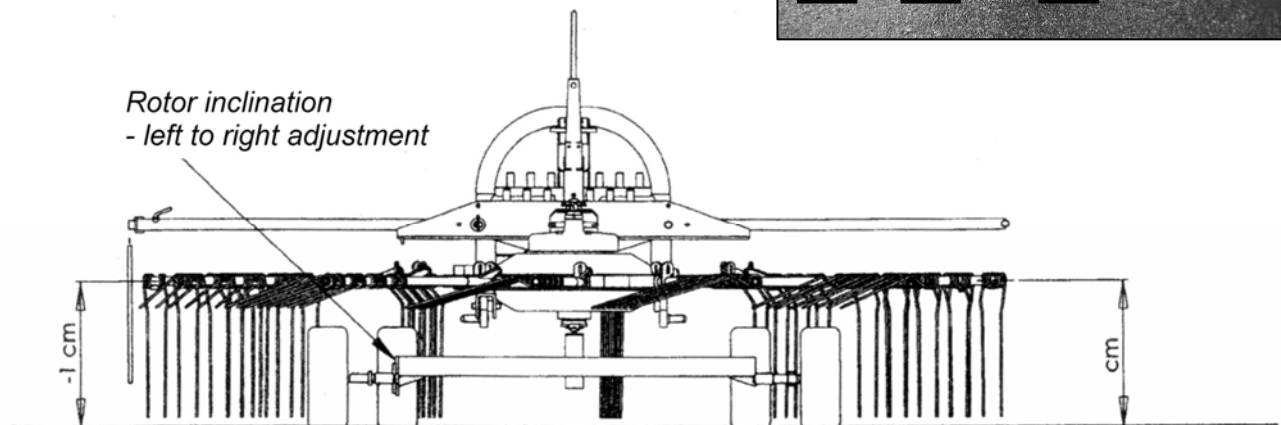
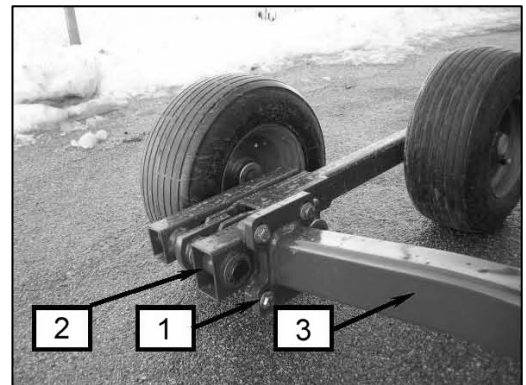


The working height of the machine is adjusted using lever (1) shown above. During work the height may need to be adjusted to suit varying driving speeds and fodder condition. An adjustable bolt (2) can be tightened or loosened to increase or decrease friction on the height adjustment lever; set the bolt to a tightness that will allow normal operation of the lever whilst offering sufficient tension to prevent unintentional operation.

Transverse Adjustment

Rotor inclination is performed by altering the position of the bolts on the left hand wheel assembly mounting point with the chassis axle - refer below. It is recommended that transverse adjustment is set to lean the machine leftwards by approximately 1cm.

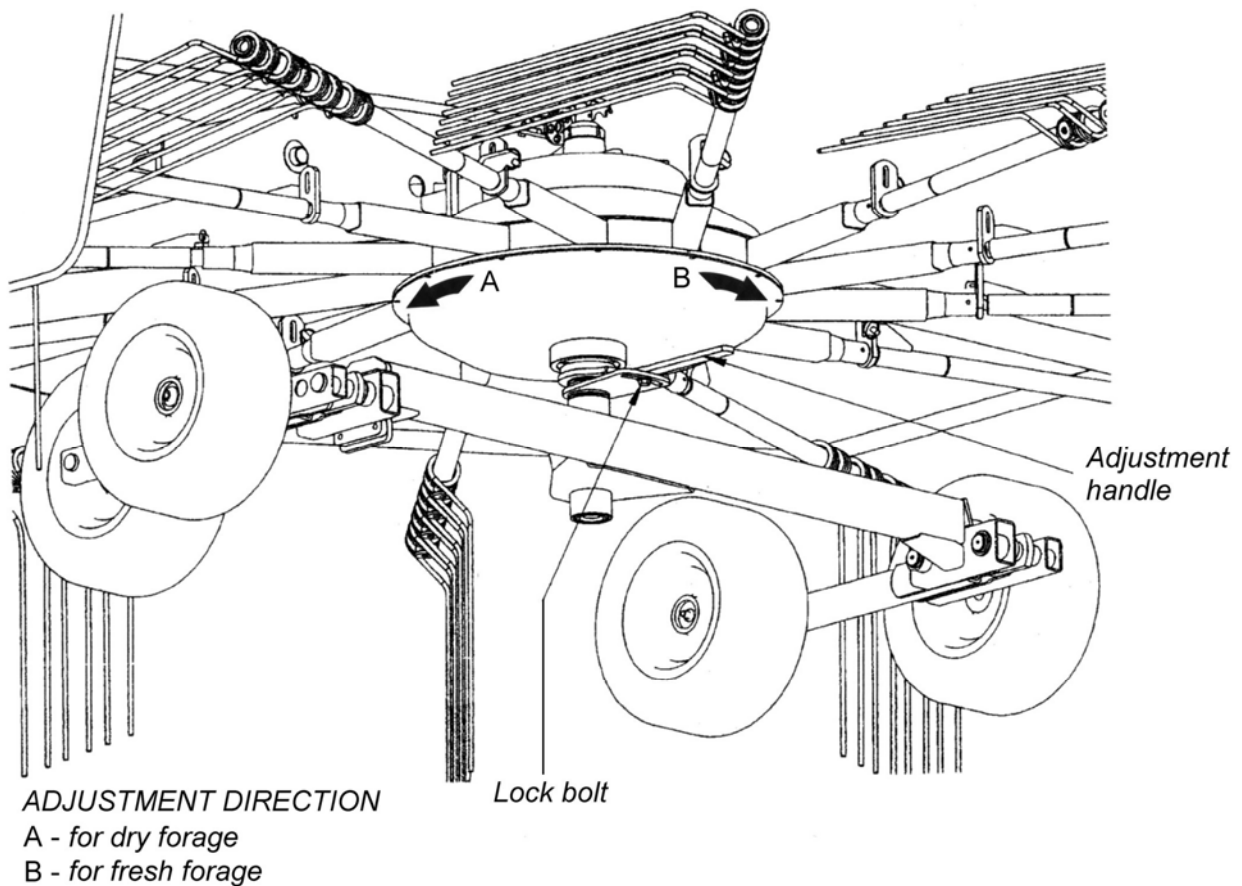
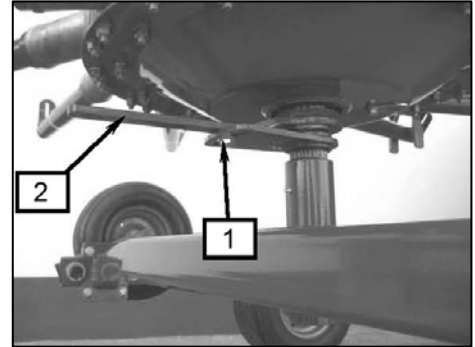
- (1) Wheel Assembly Mounting Bolts
- (2) Left Hand Wheel Assembly
- (3) Chassis Axle



Rotary Rake Timing

If it is found that the spring tines of the rake are lifting too early or too late and failing to produce a proper swath this can be corrected by an adjustment on the underside of the rotor – raise the machine on the tractors hydraulics and loosen the lock bolt (1) on the base of the rotor body, the tine lifting timing can then be adjusted by turning the adjustment handle (2) in a clockwise or anti-clockwise direction to advance or retard the lifting of the tines. The cam has an adjustment of approximately 35°. Ensure that the lock bolt is tightened fully after adjustment has been made. This adjustment can be used to set the machine for more efficient raking of the particular forage types – adjust the rotor anti-clockwise when viewed from below for dryer forage and clockwise for fresher forage. Practice at the different settings will determine the best work results.

Refer to the diagram below for the location of the adjustment components and suggested adjustment direction.



Working with the Machine

This machine will only work whilst driving in a forwards direction.

The machine is capable of making swaths from fresh, faded or dry forage but adjustments must be made to suit the differing types of work. The PTO shaft speed and driving speed needs to be adjusted to suit the type of forage and the ground condition. Make sure that the three point hitch bars are lowered before starting work, and that the machine is supported by the support bar for rotor adjustment. If the machine height is incorrect this can be adjusted from the tractor seat by means of the adjustment lever located on the machine above the hitch.

Ensure that the spring tines do not 'dig' into the soil during work as this may damage the tines and/or pollute the forage.

The width of the swath is set by the adjustment of the curtain which can be moved inwards or outwards and is locked to the desired position by means of a screw.

Machine Removal

Always park and remove the machine on a firm level site and ensure bystanders and onlookers are kept at a safe distance during the removal procedure.

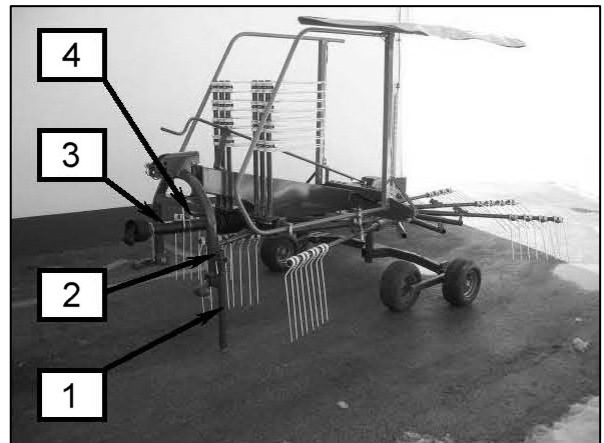
Removal Procedure

Lower support leg (1) and secure in position with locking pin (2).

Lower the machine onto the ground.

Disconnect PTO Shaft (3) and place on PTO Support Hook (4).

Carefully drive tractor clear of machine.

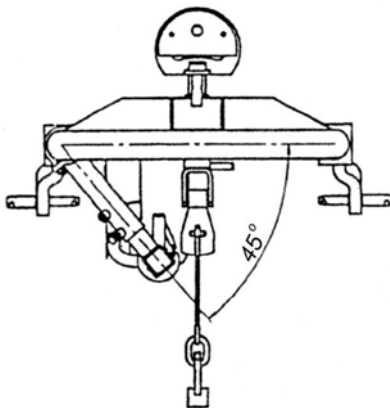
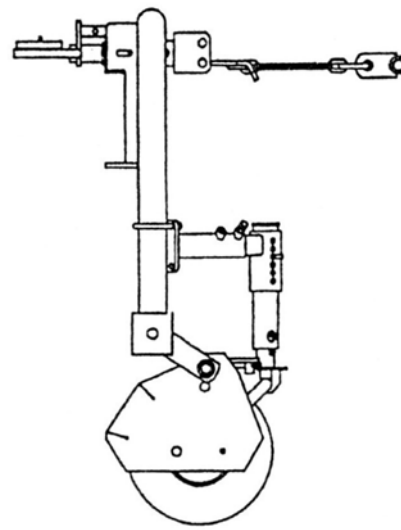
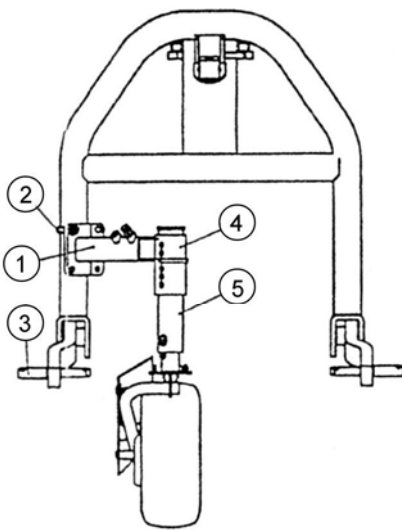


Additional Equipment

Wheel and Chain Top Link – for work on undulating terrain

The additional wheel mounts on the three point hitch frame as shown in the diagram below. Attach bracket (1) with clamp (2) onto the three point hitch frame. The bracket must be positioned at 45° towards the centre of the machine to avoid the wheel 'fouling' lower hitch point (3). The height of the additional wheel is adjusted at location (4) by selection of a suitable hole at the desired height.

The additional wheel uses the added chain in place of the classic upper link – in work position the chain must be loose to allow the wheel to adapt to the contours of the ground. In transport position the chain adopts the role of the classic upper link.



**For road transportation
always use
Classic Upper Link**

Maintenance

Maintenance of the Rotary Rake is as follows:

Tyres

Tyre pressure should be checked on a regular basis – the recommended tyre pressure for work is 2.0bar (*approx 29psi*).

Gearbox

The gearbox which consists of two cone gears must be lubricated with grease every 10 to 15 working hours – as the gearbox is not fully filled with grease a couple of pumps of the grease will be sufficient to lubricate it. The lubrication point is located on the top of the gearbox.

Bearings

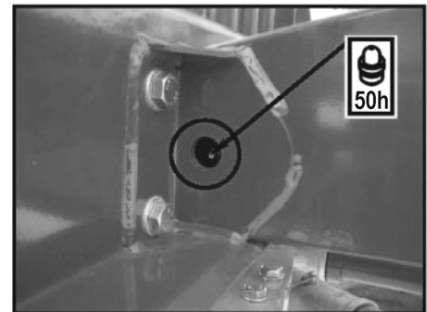
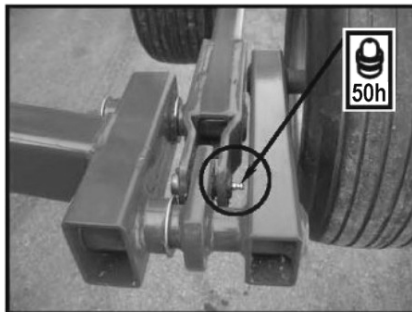
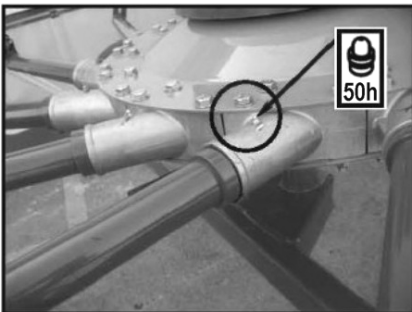
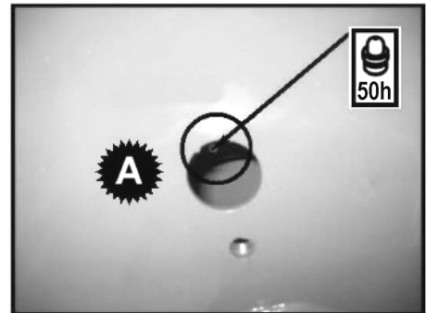
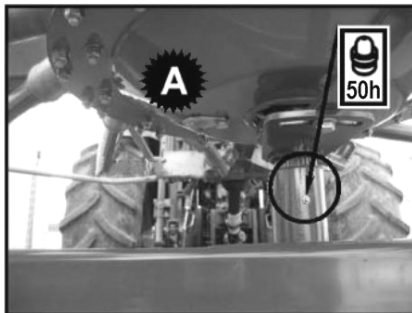
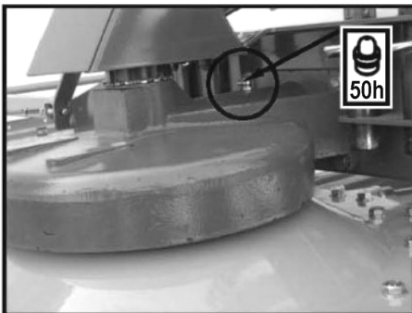
The bearings in the wheels, rotor, and gearbox are all factory sealed and maintenance free therefore they will not require additional lubrication.

Rotor

The rotor is hermetically sealed and filled with 7 litres of fluid grease.

Lubrication Points

Lubricate the locations indicated below every 50 hours during use.



It is recommended that the machine is cleaned and lubricated prior to storage at which time a thorough check of all components should be made to identify any worn or damaged components so that replacements can be ordered in preparation for the next seasons work.

