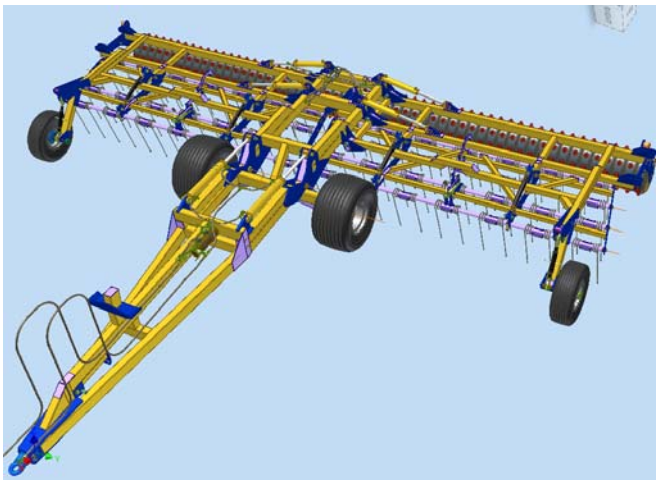
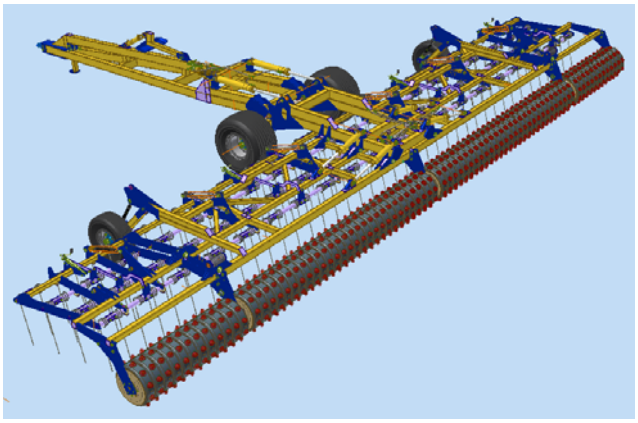
Tillso Rake & Roll

Operating & Maintenance Instructions

Safety Manual & Parts Identification





Tillso Limited hereby declares that the **Tillso .....**
as defined by the Serial Number attached to the Product, S/No: .....
conforms with the following Directives and Regulations, and has been certified accordingly.

EC Machinery Directive 2006/42/EC.

The Supply of Machinery (Safety) Regulations 2008.

The Provision and Use of Work Equipment Regulations 1998.

Specifically related harmonised standards are:
BS EN ISO 12100-1: 2003 (Safety of Machinery).
BS EN ISO 12100-2: 2003 (Safety of Machinery).
BS EN ISO 4254-1: 2009 (Agricultural machinery - Safety - General Requirements).

THE MANUFACTURER
Tillso Limited.
Falls Farm, French Drove,
THORNEY. PE6 0PQ.
England.

Telephone (+44) (0)1733 270135.

CERTIFIED ON BEHALF OF TILLSO LIMITED.

.....
Director.

CE

WARRANTY

TERMS AND CONDITIONS

In this warranty Tillso Ltd., is referred to as "the Company".

1. Subject to the provisions of this warranty the Company warrants each new machine sold by it to be sold free from any defect in material or workmanship for a period of 12 months from date of installation with the end-user.

2. Some specific items have additional warranty over and above the standard 12 months. Details of these can be obtained upon request directly from the distributor or Tillso Ltd.

3. If the machine or part thereof supplied by the Company is not in accordance with the warranty given in clause 1 the Company will at its option:

(a) make good the machine or part thereof at the Company's expense, or
(b) make an allowance to the purchaser against the purchase price of the machine or part thereof, or
(c) accept the return of the machine and at the buyers option either:
(i) repay or allow the buyer the invoice price of the machine or part thereof, or
(ii) replace the machine or part thereof as is reasonably practical.

4. This warranty shall not oblige the Company to make any payment in respect of loss of profit or other consequential loss or contingent liability of the Purchaser alleged to arise from any defect in the machine or impose any liability on the Company other than that contained in clause 3.

5. Any claim under this warranty must be notified to the Company in writing specifying the matters complained of within 14 days from the date of repair.

6. Any claim under this warranty must be made by the original purchaser of the machine and is not assignable to any third party.

7. If the purchaser hires out the machine to any third party the warranty shall apply only to matters notified to the Company in writing within 90 days of the date of delivery and clause 1 shall be read as if the period of 90 days were substituted for the period of 12 months.

8. The warranty will cease to apply if:
(a) any parts not made, supplied or approved in writing by the Company are fitted to the machine or
(b) any repair is carried out to the machine other than by or with the express written approval of the Company or
(c) any alterations not expressly authorized by the Company in writing are made to the machine or
(d) the machine is damaged by accident or
(e) the machine is abused or overloaded or used for a purpose or load beyond its design capabilities, or used in conjunction with a tractor whose power output capability exceeds the stated implement power requirement by more than 40%. For the purpose of these terms and conditions, "stated implement power requirement" refers to wheeled tractors unless specifically stated. These power requirements should be reduced by 20% when used in conjunction with tracked tractors.
(f) the machine is operated as part of a 'cultivation train' where more than one implement is being towed, without the express written approval of Tillso Ltd.
(g) any maintenance is not carried out in accordance with the service schedules in the operator's manual.
(h) the Installation and Warranty Registration Certificate is not received by Tillso Ltd., Service Dept., Falls Farm, French Drove, Thorney, Peterborough PE6 0PQ, within 7 days of installing a new machine.

Contents

Introduction

Foreword

Make sure you have read and follow the Operating Instructions carefully before using the machine or component. By doing so, you will avoid accidents, reduce repair costs and downtime and increase its reliability and service life. Pay particular attention to the safety instructions!

TILLSO will not accept any responsibility for any damage or malfunctions resulting from failure to comply with the Operating Instructions.

These Operating Instructions will assist you in getting to know your machine and in using it correctly for its intended purposes. First, you are given general instructions in handling the machine. This is followed by sections on servicing, maintenance and the action to be taken should a malfunction occur.

These operating instructions are to be read and followed by all persons working on or with the machine, e.g.:

• Operation (including preparation, remedying of faults in the operating sequence and servicing).
• Maintenance (maintenance and inspection)
• Transportation.

Together with these **Operating Instructions**, you will receive a **Spare Parts List** and a **Registration Form**. Field service technicians will instruct you in the operation and servicing of your machine. Following this, the Machine Registration form is to be returned to TILLSO. This confirms your formal acceptance of the machine. The warranty period begins on the date of delivery or installation, whichever is the latter.

We reserve the right to alter illustrations as well as technical data and weights contained in these Operating Instructions for the purpose of improving the Product.

Warranty Guidelines

1. The period of liability for material defects (warranty) relating to our products is 12 months. In the case of written deviations from the statutory provisions, these agreements shall apply.

They shall become effective upon installation of the machine with the end customer. All wear parts are excluded from the warranty.

2. Warranty claims must be submitted to the TILLSO Customer Service Department in Thorney via your dealer. It is only possible to process claims which have been correctly completed and submitted no later than 14 days after the date of repair.

3. In the case of deliveries made under the warranty which are subject to the return of the old parts, the old parts must be returned to TILLSO within 28 days after the damage occurred.

4. In the case of deliveries made under the warranty which are not subject to the return of the old parts, these parts must be kept for the purpose of further decisions for a period of 3 months after receipt of the warranty claim.

5. Warranty repairs to be carried out by outside companies, or repairs which are expected to take more than 10 working hours, must be agreed upon in advance with the Customer Service Department.

1. Safety Data

The following warnings and safety instructions apply to all sections of these Operating Instructions.

1.1 Safety Symbols

On the machine:

Read and observe the Operating Instructions before starting up the machine!

Watch out for escaping pressurised fluids! Follow the instructions in the Operating Instructions!

Never reach into areas where there is a danger of being crushed by moving parts!

Parts may fly off during operation. Keep a safe distance away from the machine!

Keep clear of the working range of foldable machine components!

No passengers are allowed on the machine!

Never reach into any revolving or moving parts!

Refer to Operating Instructions before attempting maintenance!

Operating Instructions:

The Operating Instructions distinguish between three different types of warning and safety instructions. The following graphic symbols are used:

Important!

Risk of injury!

Risk of fatal or serious injury!

It is important that all the safety instructions contained in these Operating Instructions and all the warning signs on the machine are read carefully.

Ensure that the warning signs are legible. Replace any signs that are missing or damaged.

These instructions must be followed in order to prevent accidents. Inform other users of the warnings and safety instructions.

Do not carry out any operations which may affect safe use of the machine or component.

1.2 Use for the Intended Purpose

This Rake & Roll machine is built using the latest technology and in accordance with the relevant recognised safety regulations. However, risks of injury for the operator or third parties and impairment of the machine or other tangible assets can arise during use.

The machine is only to be operated when in a technically perfect condition and for the intended purpose, taking into consideration safety and risks and following the Operating Instructions. In particular, faults that can impair safety are to be remedied immediately.

Original parts and accessories from TILLSO have been specially designed for this machine. Spare parts and accessories not supplied by us have not been tested or authorised. Installation or use of non-original TILLSO or SIMBA products may have a detrimental effect on specific design features of the machine or component and affect the safety of machine operators and the machine itself. TILLSO will accept no liability for damage resulting from the use of non-original parts or accessories.

The machine is designed solely as a cultivation implement, for raking straw and crop debris and for surface rolling and minor secondary cultivations. Use for any other purpose, e.g., as a means of transport, will be deemed to be improper use. TILLSO will accept no liability for damage resulting from improper use. The risk will be borne solely by the operator.

Use of the Rake & Roll in conjunction with any other machine (for example in a cultivations train) is not permitted unless with the express permission of TILLSO. The use of machinery trains can be dangerous and can contravene local road transport regulations.

1.3 Operational Safety

The machine is to be put in operation only after instruction has been provided by an employee of the authorised dealer or an employee of TILLSO. The "Machine Registration" form is to be completed and returned to TILLSO.

All protective and safety equipment, such as removable protective equipment, must be in place and functioning reliably before the machine is put in use.

Check screws and bolts regularly for tightness and retighten if necessary.

In the event of malfunctions, stop and secure the machine immediately.

Ensure that any faults are remedied immediately.

1.3.1 No Liability for Consequential Damage

This machine has been manufactured by TILLSO with great care. However, problems may still occur when it is used for the intended purpose. These may include:

- Worn wearing parts.
- Damage caused by external factors.
- Incorrect driving speeds.
- Incorrect setting of the unit (incorrect attachment, non-adherence to the Setting instructions)
- Unexpected levels of crop residue.

Therefore, it is crucial to always check your machine before and during operation for correct operation.

Compensation claims for damage which has not occurred to the machine or its components are excluded. This includes any consequential damage resulting from incorrect operation which may occur.

1.4 Road Traffic Safety

When driving on public roads, tracks and areas, it is important to observe the relevant road traffic laws as well as the specific regulations relating to this machine. As transport regulations vary regionally, the regulations which apply to your locality should be complied with in terms of this machine. Note specific requirements regarding implement width, speed, and features such as lights and brakes: ensure these are complied with (for example keep to maximum transportation speeds with machines if not fitted with brakes, and/or according to machine transportation width).

Actual dimensions relating to transport may vary with adjustments, however the basic dimensions of the Rake & Roll fall into the categories as follow:

Overall transport width <3m

Overall transport height <4m

Fitting of components can alter the machine configuration, including, for example, its stability in operation or transportation. It is important to recognise such issues and ensure that the safety of the machine, its components, the Operator, and any Third Parties is maintained at all times.

Pay attention to the permitted axle loads, tyre carrying capacity, and total weight in order to maintain adequate braking and steerability.

Passengers on the machine are strictly forbidden!

Max. road transport speed 16mph (25km/h).

1.5 Accident Prevention

In addition to the Operating Instructions, it is important to observe the accident prevention regulations specified by the HSE, and any agricultural trade associations.

It is the Operator's responsibility to ensure that all other persons are excluded from the danger zones surrounding or on the machine or component during its operation.

1.5.1 Hitching-up the machine

There is a risk of injury when hitching and unhitching a machine. Observe the following:

• Secure the machine against rolling.
•Take special care when reversing the tractor!
• There is a risk of being crushed between the machine and the tractor!
• Park the machine on firm, level ground.

1.5.2 Changing Equipment

• Secure the machine to prevent it from accidentally rolling away!
• Use suitable supports to secure any raised frame sections suspended above you!
•Caution! Risk of injury due to projecting parts!

Never climb on to rotating parts such as the roll unit. These parts may rotate causing you to slip and suffer serious injury!

1.5.3 During Operation

Ensure that the working range and the area around the machine or component are clear (be aware of Third Parties, especially Children!) before operating the machine.

Always ensure adequate visibility!

Do not stand on the machine while it is in operation!

Operators must have a suitable valid driving licence in order to drive on public roads.

1.5.4 Machine Owners responsibilities:

It is the Owner's responsibility to ensure the following regarding the machine or component:

- the Operator is trained and competent to use the machine & tractor, and has read and understood the instructions regarding their use;
- the tractor is suitable for the machine,
- the component is suitable for the machine,
- adequate Risk and COSHH assessments have been undertaken regarding the machine's use,

- the Operator is aware of the specific regulations relating to the machine when driving on public roads.

1.6 Servicing & Maintenance
Ensure that regular checks and inspections are always carried out within the periods required by law or specified in these Operating Instructions.

When carrying out service and maintenance work always:

• switch off the tractor engine and remove the ignition key.
• wait until all the machine parts have stopped moving.
• depressurize any hydraulic system. Note many circuits contain lock or overcentre valves which can retain pressure in the lines even after depressurising the tractor side of these circuits. If in doubt, consult trained personnel (such as your local TILLSO or SIMBA Dealer) to ensure such valves are depressurised to the correct procedure before removing or servicing any parts connected downstream of these valves.

Prior to performing maintenance and servicing work, ensure that the machine is positioned on solid, level ground and is secured to prevent it rolling away. Do not use any parts to climb on to the machine or component unless they are specifically designed for this purpose.

Before cleaning the machine or component with water, steam jets (high-pressure cleaning apparatus) or other cleaning agents, cover all openings into which, for reasons of safety or operation, no water, steam or cleaning agents are to penetrate (bearings, for instance).

Next, check all hydraulic lines for leaks, loose connections, chafe marks and damage. **Remedy any deficiencies immediately!**

Pay particular attention to hose renewal intervals as outlined in the specific sections which follow. **ALL** hydraulic hoses have a safe maximum working life of 6 (SIX) years from date of installation, provided they remain in a safe condition. Hoses which exceed 6 years of age should be replaced, or inspected and certified by a suitably qualified person to have an extended life period which should be recorded.

Lubricate all the lubricating points to force out any trapped water.

In the case of hydraulic cylinders that have been cleaned using high pressure equipment ensure that all hydraulic circuits are functional and pressurised fully in both directions. This provides the necessary coating of oil onto cylinder rods after cleaning.

When carrying out servicing and maintenance work, retighten any loose screw connections.

Pay particular attention to those items which require specialist service tools or training to be carried out by qualified personnel. **Do not attempt to service these items yourself!!** These include items retaining pressure (e.g. accumulator circuits), or force (e.g. spring tines), and **DD axles of any type**.

1.7 Operating Areas
The operating areas include the drawbar, hydraulic connections and tine adjustment equipment as well as all operating points requiring maintenance.

All operating areas will be specified and described in detail in the following chapters on servicing and maintenance.

Observe all safety regulations included in the Section dealing with Safety, and in the sub-sequent sections.

1.8 Authorised Operators
Only those persons who have been authorised and instructed by a fully trained operator may operate the machine. The operator must be at least 16 years of age.

1.9 Protective Equipment
For operation and maintenance, you require:

• Tight fitting clothing.

• Strong protective gloves (to provide protection against sharp-edged machine components: Note components may become sharp following use and wear).

• Protective goggles (to stop dirt getting into your eyes).

2. Transportation and Installation
Transportation and initial installation of the machine or component are described in this chapter.

2.1 Delivery
A machine is normally delivered in a fully assembled state. Consult TILLSO or your Dealer for advice on initial removal from transportation means such as low loaders.

• A complete machine can normally be hitched to a tractor and driven off a low-loader.

2.2 Transportation
The machine can normally be transported on public roads by hitching it up to a tractor or on a low- loader.

• It is important to observe the permitted dimensions and weights when transporting the machine.

• If the machine or component is transported on a trailer or a low-loader, it must be secured using straps or other devices.

• Before transporting a machine on public roads, it must be adjusted to its transportation position and the stipulations relating to road transportation fulfilled.

• The maximum permissible speed in transport is 25km/h (16mph).

2.3 Installation

When carrying out installation and maintenance work there is a higher risk of injury. It is important that you familiarise yourself with the machine and read the Operating Instructions beforehand.

Operator instruction and initial installation of the machine are carried out by our service technicians or authorised distributors.

The machine must not be used in any way beforehand! The machine can only be released for operation after instructions have been provided by our service technicians or authorised distributors.

• If any modules or parts have been removed for transportation, or the item is a component rather than a fully complete machine, these shall be mounted by our service technicians/authorised dealers before the instruction takes place.
• Check all important screw connections!
• Lubricate all nipples and joints!
• Check all hydraulic connections and lines for damage.

3. Technical Data:

Rake & Roll 8m:
Working width: 8450mm
Overall width in work 8580mm
Overall length in work: 7900mm
Transport width: 2995mm
Transport height: 3800mm
Transport length: 5800mm
Total weight 5250kg
Axle load in transport: 3800kg (37278N)
Drawbar load in transport 1450kg (14225N)
Maximum drawbar uplift 1000kg (9810N)
Maximum drawbar pull provided for: 125kN
Power requirement 150/200Hp

Rake & Roll 12m:
Working width: 12250mm
Overall width in work 12380mm
Overall length in work: 9325mm
Transport width: 2995mm
Transport height: 3990mm
Transport length: 7150mm
Total weight 6800kg
Axle load in transport: 4400kg (43164N)
Drawbar load in transport 2400kg (23544N)
Maximum drawbar uplift 1250kg (12263N)
Maximum drawbar pull provided for: 125kN

Power requirement 200/275Hp

4. Adjustment/Operation

4.1 Preparing for operation

The Rake & Roll is normally delivered ready for operation. In the event that the machine is delivered part-assembled, do not attempt to assemble or operate the machine before consulting TILLSO.

4.1.1 Hitching to the tractor

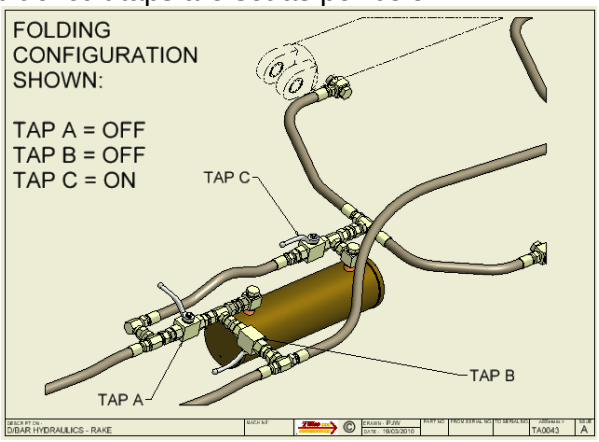
Hitching to the machine when folded on its parking stand is accomplished via a normal tractor pick-up hitch operation. Ensure the machine is on firm, level ground and reverse the tractor to engage the hitch.

NOTE: if a tractor is used not having a pick-up hitch, the machine should be on- and off-hitched unfolded in the work position to allow use of the tilt cylinders to raise the drawbar.

Once hitched and the hook locked, the hydraulic pipes can be connected. The pipes are colour coded according to the cylinder ports with similar colours. There are 2 main circuits for the all machines:
RED: Tilt (to raise for turning & return)
BLUE: Fold (note used in conjunction with tilt)

A further circuit is present on the 12m machine only:
GREEN: Wing transport support on drawbar

Before activating the hydraulics, ensure the tilt circuit taps are set as per below:



This setting should **always be used** when folding, unfolding, or parking the machine. Detailed instructions on the use of this circuit follow in section 4.3.2.

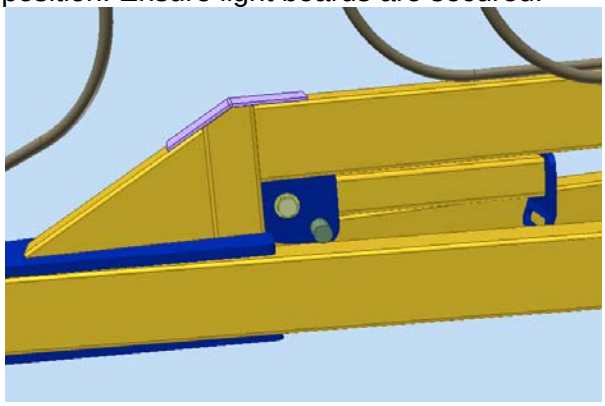
4.1.2 Transportation to field

Ensure the machine is correctly hitched to the tractor, and all hydraulic lines are coupled and locked (hydraulics in neutral or lock).

Ensure that secondary wing locks are fitted.

Ensure wheel nuts are correctly tightened (see maintenance section).

Raise and lock the parking stand in its work position. Ensure light boards are secured.



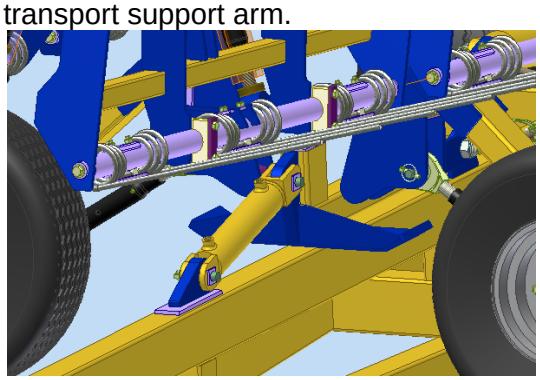
NOTE: maximum transport speed for machines not fitted with brakes is 25kph.

4.2 Preparing for work - unfolding

Ensure the machine is to be unfolded on firm, level ground and the area for unfolding is clear of any third parties.

Ensure the tilt circuit taps are set as the preceding figure (section 4.1.1).

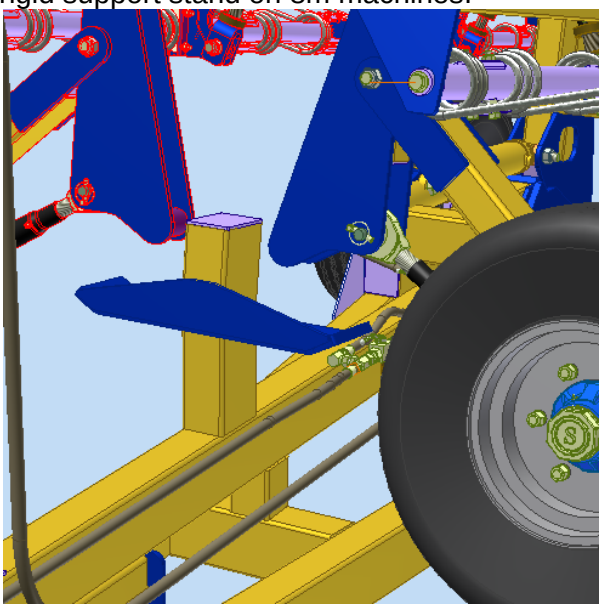
Remove any secondary wing locking devices, and on 12m machines lower fully the transport support arm.



Remove the light board and stow as appropriate. Note this can be stowed on the machine, or away from it if preferred to

minimise vibration damage to bulbs. Ensure if away from the machine that it is available for subsequent fitting as needed.

Tilt the machine slightly rearward to clear the rigid support stand on 8m machines.

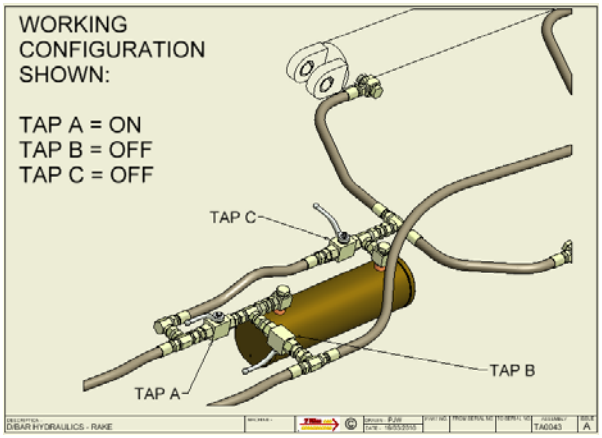


Unfold fully the wings, then tilt fully rearward to lower the machine to ground level.

NOTE: whilst lowering the machine by tilting rearwards, drive slowly forwards to minimise damage to the rake tines as they contact the ground.

4.3 Field setting

If the pre-set pitch is in use (see next section for details), provided the machine is unfolded and fully tilted rearwards, at this position change the tap settings to the work setting as below. **Turn any taps off which will remain so before turning the others on!!**



4.3.1 Adjustment of frame pitch

Depth control of the rake tines is controlled by the frame pitch, using the rear rollers to maintain the desired tine setting. Additional adjustment of the tine angle (see section 4.4.1) allows for effectiveness of straw carry, and of tilth making when rolling seedbeds.

Any major adjustment of the machine pitch by the main tilt cylinders may require the tine frames to be adjusted by their toplinks to maintain an even depth of tine tips fore to aft. See section 4.4.1 for further details.

Setting of this pitch is by the main tilt cylinders. These can be manually controlled on the move by the tractor hydraulics, or the desired pitch can be set via the adjustment circuit. This returns to a pre-set position when tilting downwards from the fully rearward position for turning. This can be achieved by operating the circuit in float (preferred) or lower after a turn is made.

The tilt control can be initially set (this also resets the circuit), adjusted to fine tune and lock this setting, and memorise this setting when folding so this position is available after unfolding to start in another field.

The design of this system uses a closed hydraulic cylinder with an internal piston. This allows for the tilt position to be set (piston at one end of the cylinder) and tilted rearwards for turning (piston between this end and the opposite end). When returning into work, the locked oil then drives the piston back to its original position in the cylinder to maintain the desired pitch. Oil is introduced or taken from the part of the circuit between this cylinder and the tilt cylinders to alter the pre-set pitch as needed. The cylinder is isolated when folding and provided the sequence of isolation is followed, the originally set tilt position is maintained when unfolding in the next field.

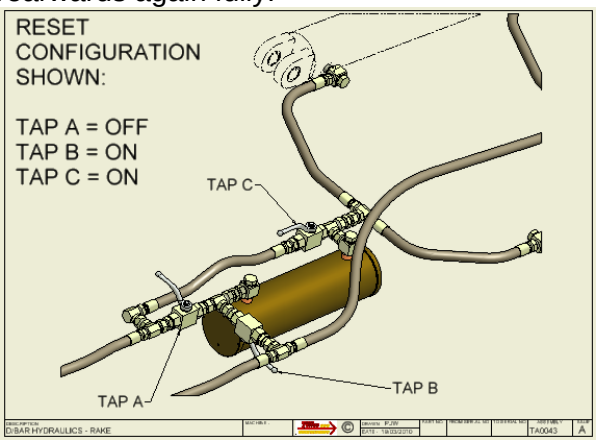
The tilt circuit can also be operated with the tilt control disabled, allowing for simple tilting rearwards and forwards without a pre-set position. See the next section for this detail.

NOTE: it is normal not to raise and lower when turning so straw can be collected from the

headland area and spread out progressively across the field. Consequently, the frame pitch is not constantly being adjusted unless field conditions and straw concentrations vary significantly.

4.3.2 Setting the Tilt Control Circuit
To adjust and then remember a new pitch setting, firstly reset the circuit as follows.

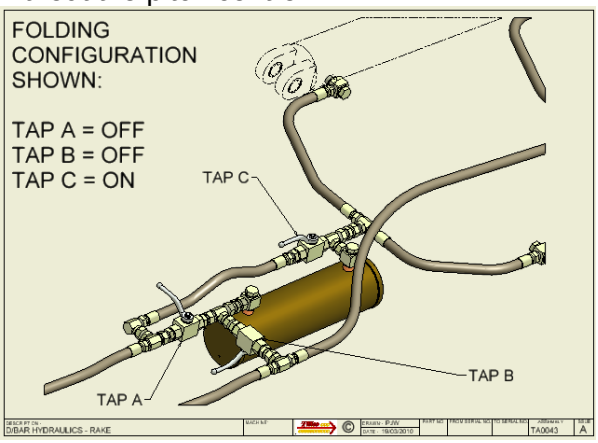
Fully tilt the rake rearwards. In this position, set the taps to reset, as below. Pressure rearwards again fully.



NOTE: take care when changing tap settings as some movement of the machine can occur which can reduce the rearward pitch a little. Turn any taps off first which will remain off.

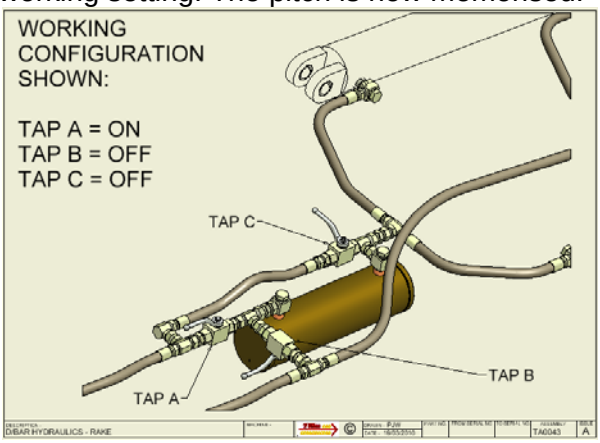
Pressure rearwards fully to reset the circuit.

Next, still tilted rearwards fully, set the taps to fold, which allows the machine to be operated without the pitch control.



Operate the machine until the desired pitch is obtained.

Whilst at this pitch, change the taps to the working setting. The pitch is now memorised.



The machine can be tilted rearwards, upon releasing this pressure it will return back to the desired pitch.

4.3.3 Fine tuning the Pitch Setting

Once a pre-set pitch is in use it can be fine tuned without going through the resetting procedure.

In the working configuration (above figure), ensure firstly the machine is fully tilted forwards, in work. If this is too high or low, adjust as follows.

Change over the tap settings to the fold configuration (figure, below, left) and then adjust the pitch until the required setting is achieved.

this new position, change the taps back to the working setting (figure, above) to memorise the new position.

4.4 Work to transport

Follow the procedure outlined below to keep the pre-set pitch for next time before folding and unfolding.

With the machine **fully tilted rearwards**, change the taps to the fold setting as illustrated opposite.

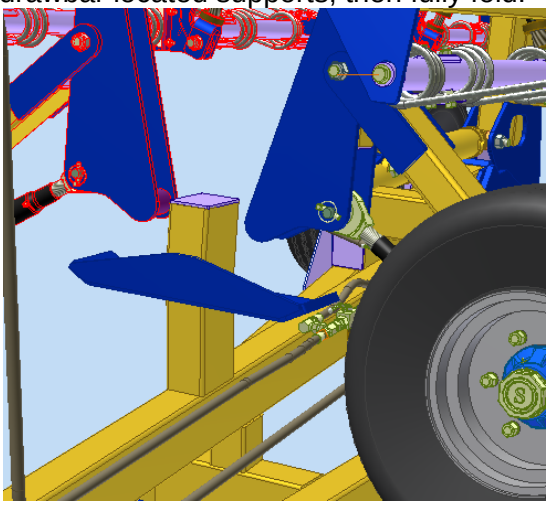
Remember when adjusting tap settings to turn those off first which will remain off.

Provided the tap settings are changed over from work to fold and back with the machine

unfolded and fully tilted rearwards, any pre-set pitch will be retained.

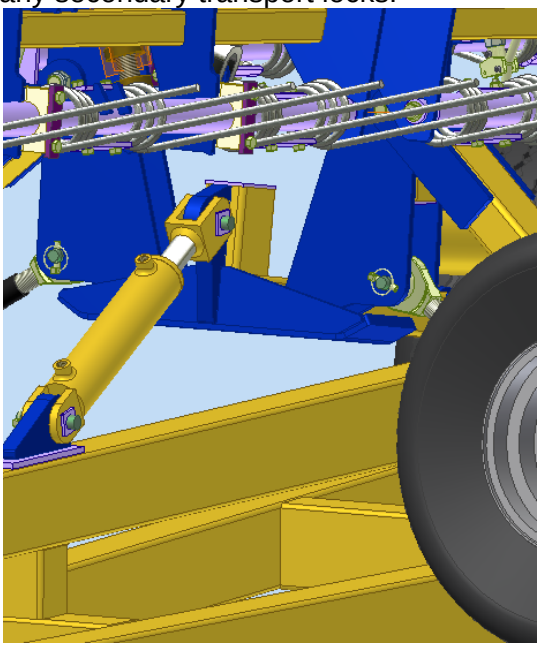
The machine should always be folded and unfolded with the circuit taps set in this configuration.

To fold up, tilt the machine forwards fully, then fold in the wings. On 8m machines, just before completing the fold, tilt slightly back to allow the wings to clear onto, and above the drawbar located supports, then fully fold.



Finally lower the wings onto the supports and fit any secondary transportation locks.

On 12m machines, once fully folded, raise the transport stand to take some weight of the wings, then lock the support stand tap and fit any secondary transport locks.



NOTE: THE MACHINE CAN BECOME UNSTABLE IF FOLDED OR UNFOLDED ON SLOPING GROUND.

Always choose a firm level surface for folding or unfolding. Always face the machine upslope and not across slope so that the wings are sitting horizontal when unfolded.

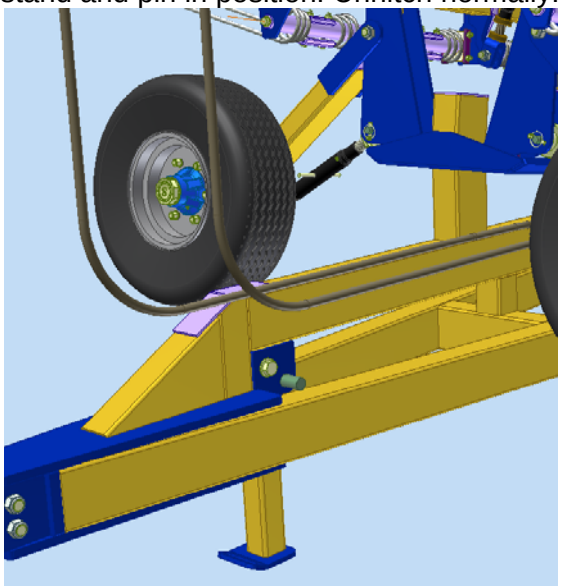
TAKE CARE IN TRANSPORT! THE CENTRE OF GRAVITY IS HIGH WHEN FOLDED AND THE MACHINE COULD BECOME UNSTABLE ON SEVERELY SLOPING GROUND, ESPECIALLY WHEN TURNING.

The machine is stable when static on slopes of up to 15°, however avoid such situations whenever possible.

4.5 Parking

On tractors having a pick-up hitch, choose a level, firm surface for parking.

With the machine folded, lower the drawbar stand and pin in position. Unhitch normally.

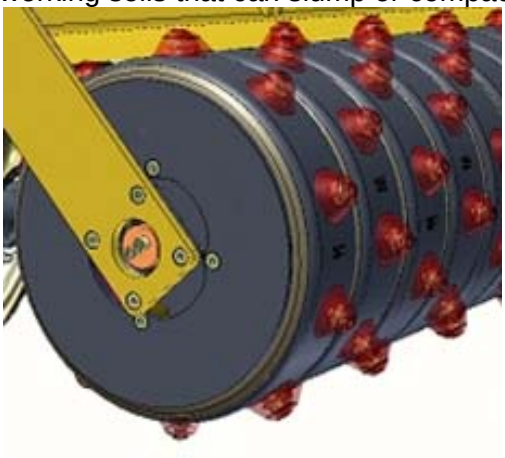


Where tractors are used without a pick-up hitch, it is recommended that the machine is parked unfolded, fully in ground contact.

The tilt circuit hydraulics can be used to support the drawbar safely when unhitching. Drive forwards enough to allow the drawbar to be lowered onto its stand, de-pressurise the tilt hydraulics and uncouple.

4.6 Aqueel 2 Roller

The Aqueel 2 is a rubber, specialist self-cleaning tyre which leaves a patterned surface profile consisting of conical indentations. This is designed to combat surface water movement and wind erosion in the field. The benefit of Aqueeled ground (reservoir tillage) is gained on light, easy working soils that can slump or compact.



4.7 Work Settings

In practice it is possible to use a DD or Aqueel roller on ground conditions that are unsuitable to achieve the desired effect, and it is usually possible to operate such rollers without regular blockage under such unsuitable conditions, assuming that the roll assemblies are tight, the scrapers correctly adjusted and rings smooth. As such, especially under wet conditions, it is advisable to check on the cultivation effect of the machine fitted with such rollers, as these normally do not limit the machines effective use.

The machine can be lifted clear of the ground for headland turns if the tine cultivation effect is not needed. Generally, when being used as a straw rake keep the machine in its working setting at all times to maximise the straw levelling effect.

If straw builds up excessively, tilt rearwards slightly to allow the straw to be spread out over the field. It is normal for straw to build up and diminish as the process of evening up the levels of residue occurs.

Often heaps on the headlands will cause a temporary blockage but this will be lost down the field, achieving the desired effect.

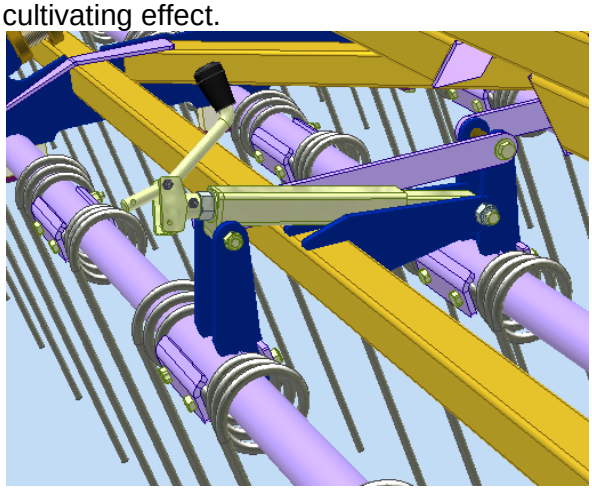
Excessively tight turning could lead to damage of the tine components!. **Avoid sections of the machine going rearwards at all costs otherwise tine breakage will occur.**

4.7.1 Tine adjustment and setting

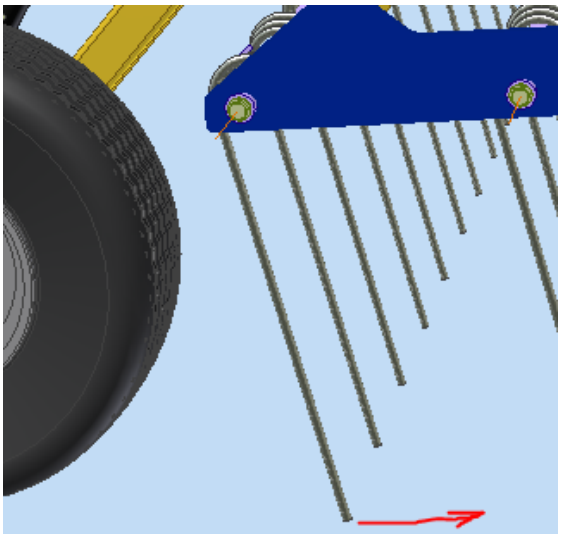
The rake tines can be adjusted for pitch according to conditions. As a general guide, the steeper the tine the more aggressive the cultivation and raking effect.

Avoid setting the tines too far tips forwards that they contact the main axle wheels when folding.

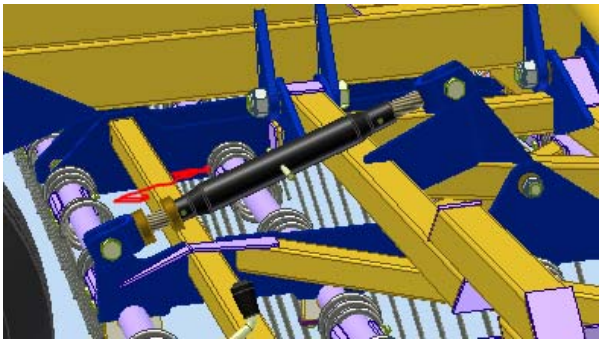
It is normal to set the tine depth and straw holding capacity by the rear roller. This allows for tine angle to be set for the desired cultivating effect.



If straw blocks regularly, initially raise the tines by tilting the rake rearwards slightly on the roller. If additional clearing is needed, increase the rake angle of the tines (angle tips rearwards).



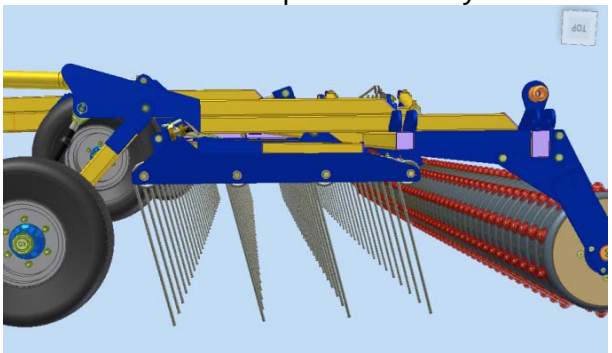
Any major adjustment of the machine pitch and depth by the main tilt cylinders may require the tine frames to be adjusted by the toplinks to maintain an even depth of tine tips fore to aft.



Lengthening the toplinks increases front tine depth which compensates if the main implement pitch has been tilted rearwards; and vice versa.

When cultivator-rolling, the tines can be used to fine up the tilth and provide improved seed to soil contact by finer aggregation.

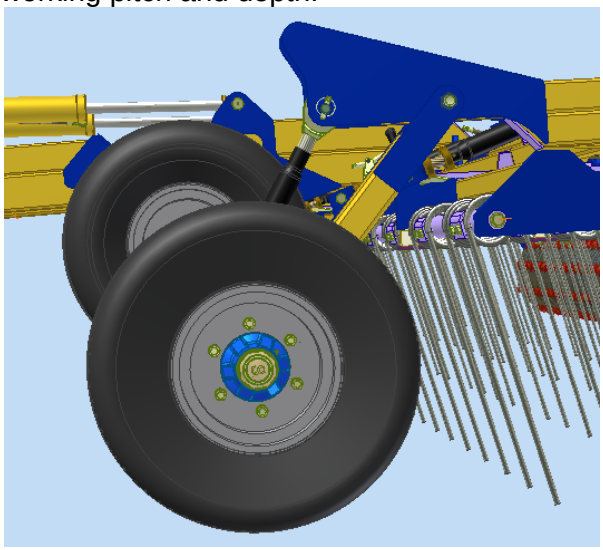
Tines should be running at the same depth for all rows with the toplinks correctly set.



Avoid running the tine frames nose deep; if more tine pressure is needed tilt the main machine forwards and then shorten up the tine frame toplinks so the tine depth is consistent front to rear.

Set tine depth to the minimum needed for the surface finish. Set this by adjusting the tilt setting (main machine pitch) and levelling the tines fore to aft by the turnbuckles as per above.

The wing wheels (if fitted) should be set to just maintain ground contact at the desired working pitch and depth.



The main centre axle wheels will normally be clear of the ground in working mode, allowing the roller to control the depth across the full machine width.

NOTE: the wing wheels act as stabilisers and control the wings when unfolding and folding. As such, they should be set to within ground contact wherever possible in work. This also avoids undue pitching of the wider machines in work if the ground is unlevel across the width.

4.7.2 Wing float adjustment

The wings can float over undulations via an adjustable cushioned suspension system which is pre-set hydraulically (inner wings) or via springs (outer wings - 12m only).

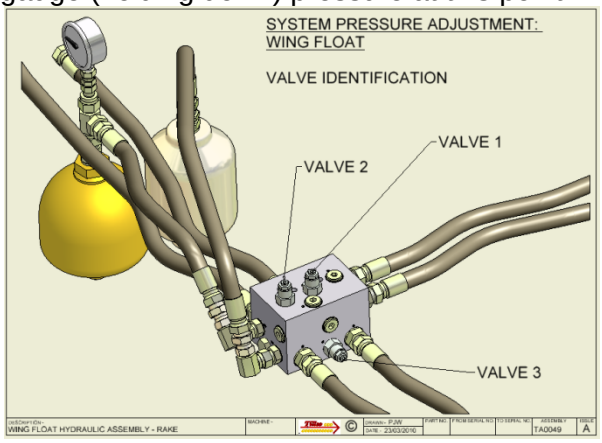
The inner main wings are held by oil in the folding cylinders against an accumulator. This pressure is adjustable if needed via the valve block as detailed below.

Wing pressure can be checked and adjusted as follows. Always minimise tractor oil flow rate provided folding speed is adequate. Excessive oil flow leads to high temperatures, inconsistent and inefficient valve operation.

This circuit is controlled by overcentre locking valves located in the valve manifold block. These positively lock oil pressure holding the wings until pressurised by the tractor when folding or unfolding to release it. **System pressure can be retained even after depressurisation of the tractor quick release couplings**.

Take extreme care when checking the valve and circuits adjacent. **Under no circumstances attempt to loosen or remove fittings without prior reference to your TILLSO authorised Dealer or TILLSO directly.**

With the machine in working setting, tilt forwards to raise the rear end half-way to 45°, then pressure the wings to unfold fully. Pressure the circuit until the gauge has reached a constant maximum value. Return the machine to ground contact and check for evenness of ground pressure. Note the gauge (holding down) pressure at this point.

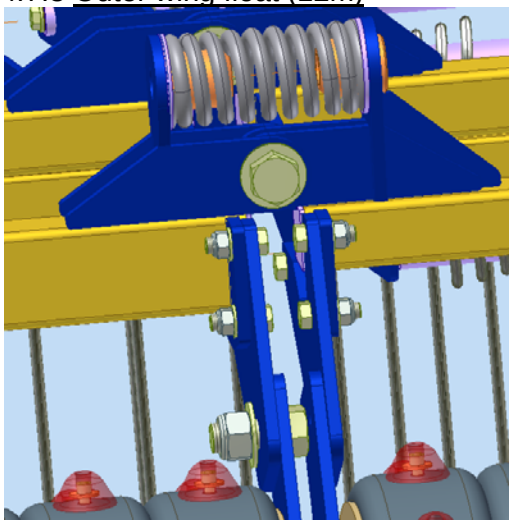


If excessive down pressure is present at the wing tips, pressure in the circuit should be reduced. Adjust valve 3 anticlockwise to do this. To confirm the setting is improved, partially tilt the machine forwards, then partially fold the wings. This releases pressure in the circuit. Then unfold fully and pressurise as above before returning the machine to its working position. The gauge should now read a reduced value. Continue this operation sequence until the desired down pressure is achieved.

Should the pressure require increasing, repeat the above sequence whilst turning the valve clockwise

The amount of over-centre valve holding pressure resisting oil leakage back to the tractor is adjusted by valves 1 and 2; clockwise to increase hold pressure. These valves can be used to reduce the holding pressure if de-pressurisation is required. Consult TILLSO if this is required.

4.7.3 Outer wing float (12m)



A spring controls the weight transferred from the inner to outer wings. This is shimmed during assembly. A stop bolt limits the down float with shims to fine tune this.

Consult TILLSO if any servicing is needed on this component. A clamp bolt is needed to release the spring pressure when unpinning the outer wings to allow the unit to be taken apart.

4.8 Work Instructions

Driving speed:
12 -15 km/h for raking; 6-8 km/h for cultivation rolling is normal.

This depends on the field conditions (type of soil, surface trash, etc.).

Drive more slowly if the conditions are difficult or a firmer finish is required.

4.9 Parking the machine (long term)
In order to avoid damage as a result of moisture or ultra-violet sunlight rays, the machine or component should be parked, if possible, indoors or under cover.

When manoeuvring the machine, pay attention to your surroundings. Ensure that nobody is in the manoeuvring area (watch for children!).

• Park the machine on level and solid ground.
• Lower the machine onto its parking stand ensuring that it is stable when unhitching from a tractor pick-up hitch.
• Ensure undue weight is not applied through the tines if parked unfolded (for example, with tractors not having a pick-up hitch).

4.10 Checks
The working quality depends on the adjustments and checks made prior to and during work, as well as on regular servicing and maintenance of the machine.

Before beginning work it is therefore important to carry out any necessary servicing and to lubricate the machine as required.

Checks prior to, and during work:
• Is the machine correctly installed?
• Is the machine correctly hitched up and any coupling device locked?
• Have any hydraulic lines been connected according to the colour coding?
• Is the machine in a level operating position and the working depth set correctly?

Working Elements
• Are the cultivation tools in a serviceable condition?
• Are the scrapers (if fitted) still operable, so that the rolls do not jam?
• Are the DD axles tight to avoid wear?

5. Servicing and Maintenance
Follow the safety instructions for servicing and maintenance.

5.1 Servicing
Your machine has been designed and constructed for maximum performance, operational efficiency and operator friendliness under a wide variety of operating conditions.

Prior to delivery, your machine has been checked at the factory and by your authorised dealer to ensure that you receive a machine in optimum condition.

To ensure trouble-free operation, it is important that servicing and maintenance work is performed at the recommended intervals.

5.2 Cleaning
In order to ensure that the machine is always in operating condition and to achieve optimum performance, perform the cleaning and servicing work at regular intervals.

Avoid cleaning the roll / disc bearings with a high- pressure hose or a direct water jet. The housing, screwed connections and ball bearings are not watertight.

5.3 DD Light Roll
The spacers and rings on the DD Light Roll are held under tension by the end plates at the outer ends of the roll tube.

Specialist equipment is required for the disassembly of DD Light rollers. Please consult your dealer under any circumstances that require disassembly of these rollers.

Maintenance of these rollers is limited to yearly/end of season greasing of the bearings and regular inspection to ensure the assemblies are tight, and scrapers are correctly set.

The scraper is intended to clear dirt from blocking between adjacent DD rings. If adjustment to the scrapers is required ensure that the scraper cannot contact the spacer even under load. Regularly inspect the spacers for signs of wear and adjust any scrapers to ensure no contact can be made.

5.4 Aqueel Rolls

Maintenance of Aqueel rollers is limited to seasonal greasing of the bearings to ensure grease is present, and regular inspection to ensure the assemblies are tight, and any stones trapping between wheel elements are removed. Do not over-grease sealed bearings otherwise seal damage will occur.

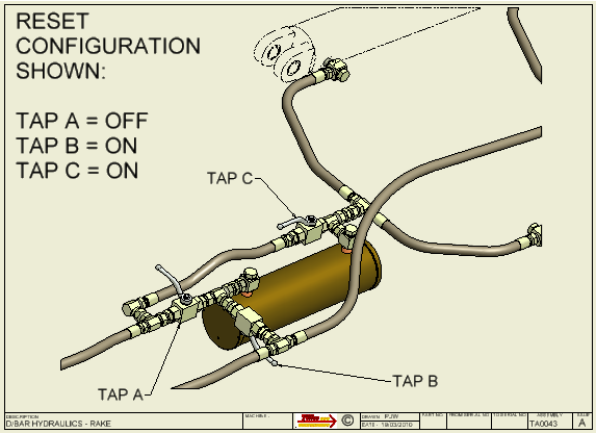
Additionally, regularly check roll elements for abrasion, wear and cutting. Replace as necessary. If in doubt about replacing wheels, consult TILLSO or your local TILLSO dealer for guidance.

5.5 Pitch Control Circuit - Purging & re-setting

If at any time the circuit needs to be purged of air, or reset, use the following procedure.

Ensure the machine is in working position, unfolded in full ground contact (not tilted rearwards).

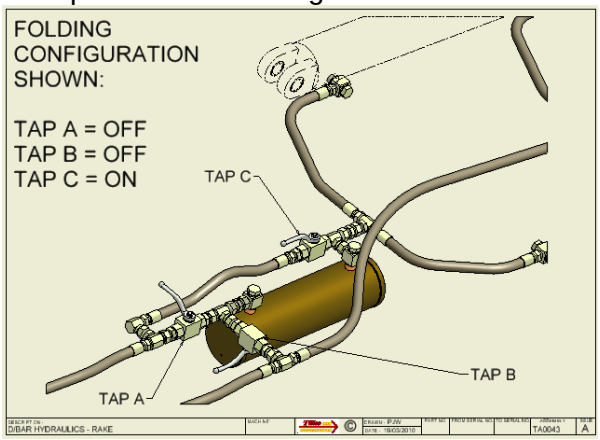
Set the system taps as the following illustration, remembering to initially turn any taps off which need to remain off.



In this setting, work the tilt circuit pressuring either side in turn, holding for a few seconds under pressure. Alternately pressure either side at least 3 times.

NOTE: when lowering back into ground contact **drive forwards slowly** to minimise damage to the tines.

Finally finish this cycling with the machine fully pressured rearwards, tilted back, then set taps to the fold configuration:



In this setting the pitch control is disabled. The machine can be operated without the pitch control, manually adjusting for pitch according to conditions. It can also be folded and unfolded.

5.6 Preparation for Storage

If you need to store the machine for a longer period, observe the following points:

- Park the machine undercover if possible.
- Protect the roll / other elements against rust.

If you need to spray the implements with oil, use light biologically degradable oils, e.g. rape oil.

Cover any rubber or p/u sections before using oil sprays. These sections must not be oiled. Remove any traces of oil with a suitable cleaning agent.

5.6 Operator Support

If you have a problem, please contact your dealer, or TILLSO. In order to enable your dealer to deal with problems as quickly as possible, it helps if you can provide them with the following data. Always state the:

- Customer Number
- Name and Address
- Machine Model
- Serial Number of Machine
- Date of Purchase and Operating Hours

• Type of Problem

5.7 Maintenance Intervals

Apart from daily maintenance, the maintenance intervals are based on the number of operating hours and time data. Keep a record of your operating hours to ensure that the specified maintenance intervals are adhered to as closely as possible.

Never use a machine that is due for maintenance. Ensure that all deficiencies found during regular checks are remedied immediately.

Avoid sharp-edged and pointed parts (tines, points, etc.) when working on the machine. Parts which are initially smooth can wear to form sharp edges. Always wear protective gloves during maintenance!!

Place the machine on suitable supports when working underneath! Do not work under a machine which is not supported!

5.8 Maintenance Overview

DD Light & Aqueel bearings:

- lubricate every 200 hours
- apply 1 pump only to avoid pressurising the seals

General components:

- check for bolt tightness daily
- grease main pivot areas (drawbar to centre and wings) daily
- check and adjust scrapers weekly if fitted
- check bearings, mountings and adjusters weekly to ensure free running and operation
- grease any exposed adjuster threads weekly
- check for component wear daily or more regularly & replace as needed
- check for signs of breakage, cracking, etc on a weekly basis and remedy immediately any faults found!!

End of season check:

- undertake all of the above operations
- spray DD roll rings (if fitted) with a biologically based oil to resist rusting
- check Aqueel tyres for stone trapping and wear. Remove/replace as needed.

5.9 Lubricating the Machine

The machine must be lubricated regularly in order for it to remain serviceable. Regular lubrication also contributes towards extending the service life of your machine. The recommended lubricating intervals are specified in " Maintenance Overview".
After it has been washed using a high-pressure hose or steam cleaned, the machine should always be lubricated using a grease gun. Ensure that any exposed threads, universal joints and splined shafts are lubricated regularly.

5.10 Handling of Lubricants

Please ensure that you read the following instructions as well as the relevant information. This also applies to any of your employees who handle lubricants.

Hygiene

Lubricants do not present a health hazard provided they are used for their specified purpose.
In the case of prolonged skin contact, lubricants - especially low-viscosity oils - may remove the natural layer of fat contained in the skin, resulting in dryness and possible irritation .

It is important to take extreme care when handling waste oil as it may contain other irritants.

Vapours given off by cleaning agents and oils are also a potential health hazard.
You should therefore dispose of any oily cloths safely and immediately. Change soiled work clothing as soon as possible.

Always exercise extreme care and observe the recommended hygiene rules when handling mineral oil products. Details of these handling regulations can be found in information provided by the health authorities.

Storage and Handling
• Always store lubricants where they cannot be accessed by children.
• Never store lubricants in open or unlabelled containers.

Fresh Oil
• Apart from taking the usual care and observing hygiene rules, there is no need to take any special precautions when handling fresh oil.
Waste Oil
• Waste oil can contain harmful contaminants which may cause skin cancer, allergies and other illnesses.

Attention!

Oil is a toxic substance. Should you swallow any oil, do not try to vomit. Contact a doctor immediately. Protect your hands with barrier cream or wear gloves to avoid contact with the skin. Wash off any traces of oil thoroughly with soap and hot water.

• Wash skin thoroughly with soap & water.
• Use special cleaning agents to clean any dirt off your hands.
• Never wash oil residue from your skin with petrol, diesel fuel or paraffin.
• Avoid skin contact with any oily clothing.
• Do not keep any oily rags in your pockets.
• Wash soiled clothing before wearing it again.
• Ensure that any oily footwear is disposed of in the proper manner.

Measures in case of injury through oil
Eyes:
Should any oil be splashed into your eyes, rinse with water for 15 minutes. If the eye is still irritated, contact a doctor immediately
Swallowing:
If oil is swallowed If oil is swallowed, it is important not to induce vomiting. Contact a doctor immediately.
General Contact:
Skin irritation caused by oil In case of prolonged skin contact, wash off the oil with soap and water.
Oil Spills:
Use either sand or a suitable granular absorbent to soak up any spilt oil. Dispose of the oil-contaminated absorbent in the proper manner.
Oil Fires:
Never use water to extinguish an oil fire. The oil will float on the water causing the fire to spread.
Burning oil-lubricant must be extinguished using a carbon dioxide powder or foam extinguisher. Always wear respiratory equipment when dealing with fires of this type.

5.11 Waste Oil Disposal

Oil-contaminated waste and used oil must be disposed of in accordance with current legislation.

Waste oil must be collected and disposed of in accordance with local regulations. Never pour used oil into unsealed sewage systems or drains or onto the ground.

5.12 Lubricants & Hydraulic Oil

Hydraulic System:
If applicable, the hydraulic fluid from the tractor is mixed with the hydraulic fluid from the machine.
The supplied machine hydraulic system contains Total AZOLLA ZS 32 oil.

Lubricants:
TILLSO strongly recommends the use of Lithium Complex EP2 Grease in the bearing hubs of your roller. This grease is a Lithium Complex soap dispersed in a mineral oil and is interpreted by IARC as being non-carcinogenic. Grease cartridges are available from TILLSO or SIMBA (P12710).

All other lubricating points on the machine or component can be lubricated with a multi-grade lubricating grease as specified in DIN 51825 KP/2K - 40.