

SPEARHEAD

TWIGA PRO / FLEX



Edition 1.0 – September 2023
PART No. 8999187

HANDBOOK

IMPORTANT VERIFICATION OF WARRANTY REGISTRATION

DEALER WARRANTY INFORMATION & REGISTRATION VERIFICATION

It is imperative that the selling dealer registers this machine with Spearhead Machinery 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 Spearhead Machinery Limited web site at www.spearheadmachinery.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 Spearhead Service Department on 01789 491867.

Registration Verification

Dealer Name:
Dealer Address:
Customer Name:
Date of Warranty Registration:/...../..... Dealer Signature:

NOTE TO CUSTOMER / OWNER

Please ensure that the above section has been completed and signed by the selling dealer to verify that your machine has been registered with Spearhead Machinery 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.

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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

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Introduction

The TWIGA PRO & FLEX are a very robust high capacity reach mower that is easy to operate and maintain. To ensure trouble-free operation this manual should be carefully studied.

The term Left and Right hand applies to the machine when coupled to the tractor and viewed from the rear, this also applies to the tractor.

Important Note

The information contained in this manual is correct at the time of publication. However, in the course of constant development, changes in specification are inevitable. Should you find the information given in this book different to the Machine it relates to please contact the "After Sales Department" for advice.

Please ensure that this manual is handed to the operator before using the machine for the first time. The operator must fully understand the contents of this manual before using this machine.
(If the machine is resold the Manual must be given to the new owner.)

Safety Recommendations

Beware of the following Potential Dangers associated with the use of this machine:

- Becoming trapped when hitching or unhitching
- Tractor overbalancing when arm is extended
- Electrocution due to hitting overhead power lines
- Getting caught on rotating power take off (PTO)
- Being hit or caught by any moving part, e.g. belts, pulleys, arms, cutting head
- Being hit by flying debris or machine parts due to machine damage
- Machine overbalancing when not in use
- Injection of high-pressure oil from damaged couplings or hydraulic hoses
- Accidents due to collision with other machines, or debris left on road

Always

- Ensure the operator has read this handbook and has been trained to use the machine.
- Ensure all cab safety guards are in place and all tractor windows closed.
- Before leaving the tractor cab always ensure that the flail head is firmly on the ground, no weight is on the machine's hydraulics and the rotor has stopped spinning.
- Check that all guards are properly fitted and there are no damaged or loose parts. Particular attention should be given to the flails to ensure they are not damaged, cracked or missing.
- Inspect work area for wire, steel posts, large stones and other dangerous materials and remove before starting work.
- Beware of the danger of overhead power cables. The operator must be aware of the maximum height and reach of the machine when working under power cables. For more information contact the Health and Safety Executive or your local power company.
- Ensure that all warning labels are always visible and that they are not damaged, defaced or missing.
- Lower the head to the ground when parking up
- Fit locking pins to slew and height before transport and before unhitching when applicable.
- Wear ear defenders if operating without a quiet cab or with the cab windows open.
- Ensure tractor guards are fitted correctly and are undamaged
- Work at a safe speed, considering terrain, passing vehicles and obstacles
- Ensure that the tractor meets the minimum weight recommendations of the machine manufacturer and that ballast is used if necessary
- Check that machine fittings and couplings are in good condition

- Follow the manufacturer's instructions for attachment and removal of machine from the tractor are warning signs to alert others to the type of machine working in the vicinity. Signs should be placed at both ends of the work site and should be in accordance with Department of Transport recommendations.
- Ensure flails are of the type recommended by the manufacturer, are securely fitted and are undamaged.
- Ensure hydraulic pipes are correctly routed to avoid damage from chafing, stretching, pinching or kinking.
- Disengage the machine, stop the engine and remove the key before leaving the tractor cab for any reason.
- Clean up any debris left at the work site.
- Ensure that when you remove the machine from the tractor it is secured in a safe position using the stands provided.

NEVER

- Never operate the machine with other people present, as it is possible for debris, including stones, to be discharged from the front and rear of the flail head.
- Never operate the machine until you have read and understood the relevant Handbook and are familiar with the controls.
- Never use a machine that is poorly maintained or has guards that are damaged or missing
- Never allow an inexperienced person to operate the machine without supervision.
- Never use or fit a machine onto a tractor if it doesn't meet the manufacturer's specification.
- Never use a machine if the hydraulic system shows signs of damage.
- Never attempt to detect a hydraulic leak with your hand, use a piece of card.
- Never allow children to play on or around the machine at any time.
- Never attempt any maintenance or adjustment without first disengaging the PTO, lowering the head to the ground, stopping the tractor engine and applying the tractor parking brake.
- Never leave the cab without removing the ignition key.
- Never operate the tractor or any controls from any position other than from the driving seat.
- Never stop the engine with the PTO engaged.
- Never operate with flails missing.
- Never operate PTO **above** recommended speed for your machine, 540 R.P.M. flail head, 150 R.P.M. cutter-bar.
- Never operate with wire around the rotor. Stop immediately.
- Never use the head at an angle, which may throw debris towards the cab.
- Never attempt to use the machine for any purpose other than that it was designed for.
- Never transport with the PTO engaged
- Never enter the working area of the machine (risk of injury!)
- Never transport with the controls live, always turn off electrical isolator switch (red) and disconnect supply.

Overhead Power Lines

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

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



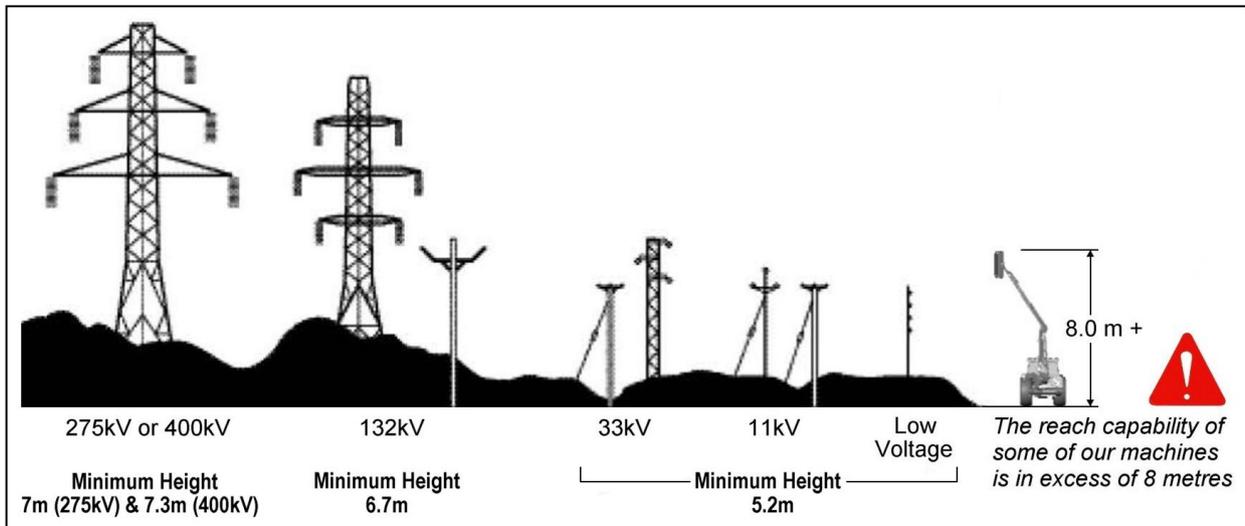
WARNING: All operators must read the following information and be aware of the risks and dangers involved when working in the vicinity of Overhead Power Lines (OHPLs).

Wherever possible the safest option is always to avoid working in areas close to OHPLs.

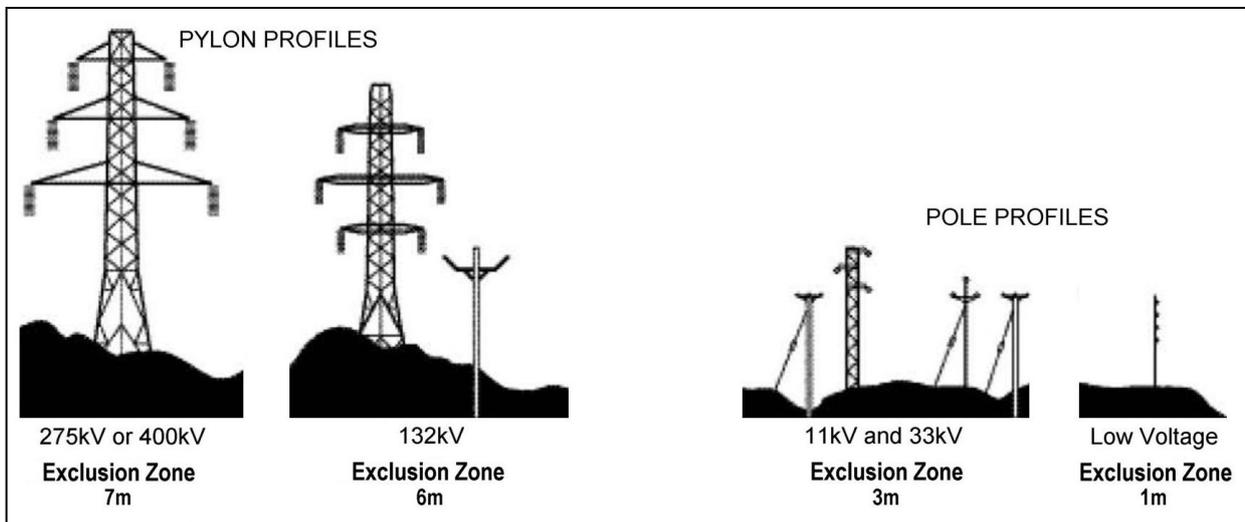
Where unavoidable, all operators must perform a risk assessment and implement a safe procedure and system of work – see *following page for details*.

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

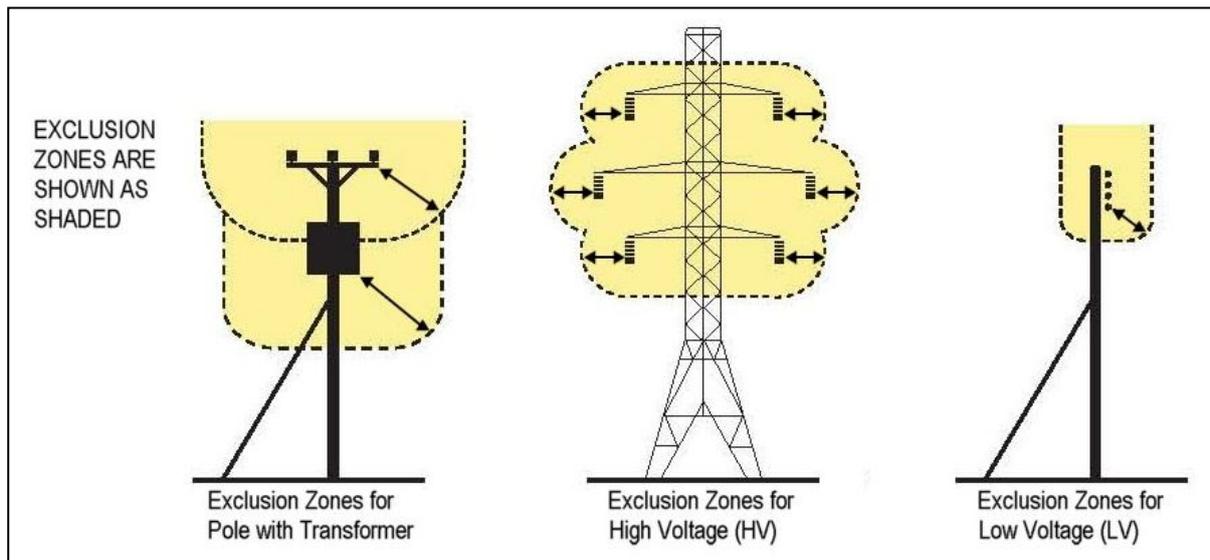
Minimum Heights for Overhead Power Lines



Absolute Minimum Exclusion Zones for Specific Overhead Power Lines



Definitions of Exclusion Zones



Risk Assessment

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

Know the risks of contacting OHPLs and the risk of flashover.

Find out the maximum height and maximum vertical reach of your machine.

Find out the location and route of all Power Lines within the work area.

Find out the operating voltage of all Power Lines within the work area.

Contact the local Distribution Network Operator (DNO) who will be able to advise you on the operating voltage, safe minimum clearance distance for working and additional precautions required.

Never attempt operate the machine in an exclusion zones.

Always work with extreme caution and plan your work ahead to avoid high risk areas.

If doubt exists do not work in the area – never risk the safety of yourself or others.

Emergency Action for Accidents Involving Electricity

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

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

Safety

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

Warning Signs

You are advised to display clear warning signs to indicate the type of machine when working in public places. The signs should be carefully placed at either end of the work site to give advanced warning of the hazard. Contact your local Highways Authority or Department of Transport for more information.

Roadwork Guidelines:

- On two-way roads, one set of signs should face the traffic in each direction.
- Work should be within 1 mile of the signs.
- Work only when visibility is good and at times of low risk, e.g. NOT during rush hour.
- Vehicles should show an amber flashing light.
- Vehicles should be conspicuously coloured.
- Debris should be removed from the road or path at regular intervals and the operator should wear high visibility clothing.
- Collect all warning signs promptly when the job is finished.

Training

It is the responsibility of the Spearhead dealer to provide instruction on the safe installation, operation and maintenance of the machine in the first instance. Further training is available from Spearhead Machinery Ltd on request, at cost.

Tractor Requirements

- Check your Tractor size and minimum weight on the Specification table
- Before hitching, ensure position control is selected. Do not attempt to hitch in draft control.
- Set wheel width as wide as possible.
- Ballast weight is to be fitted within tractor manufacturer's recommended requirements
- Check chains and stabilisers must be in good working order to hold the machine firmly. Do not operate without checking chains and stabilisers are tight.
- Spearhead particularly recommend 'turn buckle' type stabiliser.
- Set linkage lift rods to an equal length
- Certain machines require a 12V fused electric supply that is controlled by the tractor's ignition key.
- Spearhead particularly recommend three point linkage of ball end type, we do not advise the use of claw type hitching. The quick release latches should be checked, if worn or insecure they may cause accidental damage or personal injury if the machine becomes detached.
- Ensure tractor link arms can be isolated from accidental lifting.

Lighting Kits

For additional safety, rear mounted lighting kits are already fitted as standard. For more detailed information, contact the Department of Transport or your local Highways Authority.

Attaching Machine to Tractor – 3 Point Linkage



1. Reverse tractor to machine and attach lower links.



2. Fit stabiliser bracket into top link clevis and fit top link. The standard link comes with a Cat III hole plus a Cat III to Cat II reducing bush, a 28mm bracket is available on request.



3. Fit stabiliser tubes between A frame and stabiliser bracket. Ensure the tubes are free to slide, do fit locking pins.

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4. Raise machine to required height. Both P.T.O. shafts should be roughly in-line, an upward angle of up to 17° is acceptable to ensure adequate clearance.



5. Adjust the top link so that the machine sits vertically.

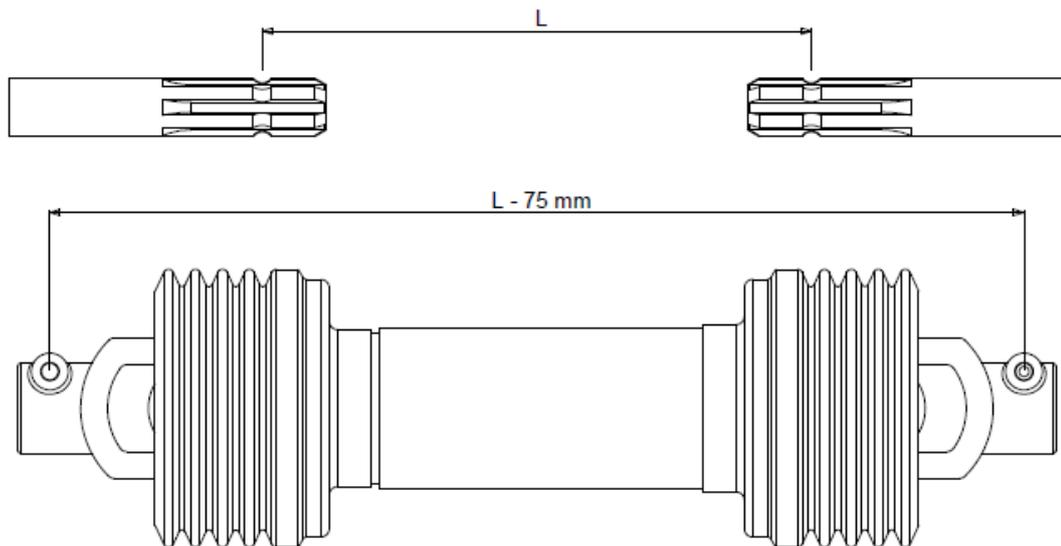


6. Fit locking pins to stabiliser tubes, then the linkage can be lowered so that the weight of the machine is taken by the stabilisers. It is essential that both tubes are set to equal lengths, more than one attempt may be required to achieve the correct height as the machine settles on the stabilisers.

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7. It is recommended that the controls are mounted in-place of the seat armrest on the side of the cutting head. A pivoting bracket is supplied with every machine, if additional brackets are required contact your local dealer. A 12v/30Amp power supply will be required.

8. Ensure the engine is switched off and then fit the P.T.O. shaft. If fitting for the first time follow instructions below to cut P.T.O. to length. Ensure both sections are cut to equal lengths

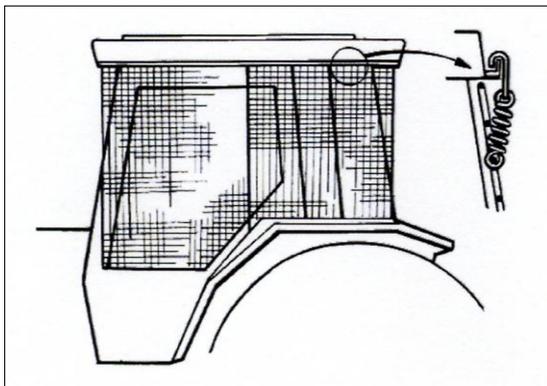


9. Remove slew locking pin.

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9. Raise leg stands to ensure they don't get damaged. Adjust check chains ensure the machine is secure and cannot swing from side to side.

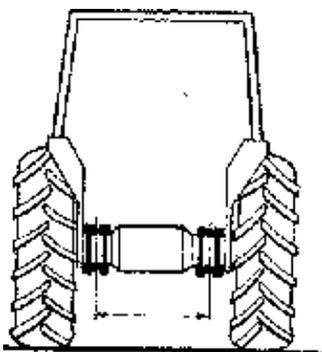


10. Use only tractors with safety glass. If windows are not laminated safety glass, polycarbonate glazing must be fitted between operator and cab meshing. Shape mesh to cover all windows that the driver will look through to view flail head in any operating position. Mesh can be retained by springs and clips supplied, but it is the operator's responsibility to ensure guarding is firmly in place.

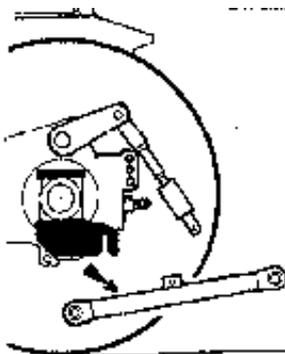
Warning

Avoid raising the tractor linkage once the stabiliser bars are locked in place. Always lower the tractor linkage and allow all the weight to be carried by the stabiliser frame. Failure to observe this warning will result in bending the stabiliser bracket. When operating the machine's controls do so only when seated in the tractor cab. Do not allow anyone to stand on or amongst linkage for any reason

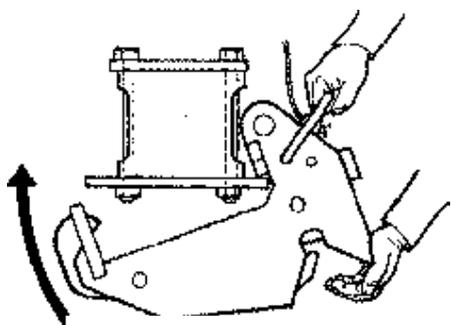
Attaching Machine to Tractor – Axle Mounting with Sub-Frame



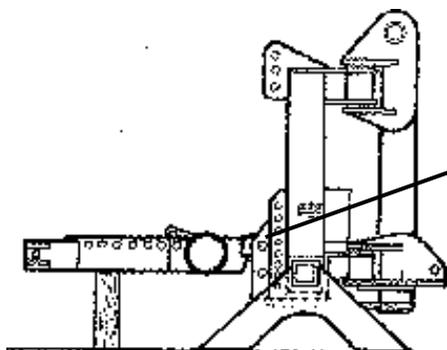
1. Mount axle brackets as instructed on separate fitting sheet specific to your tractor type.



2. Detach tractor draft links.

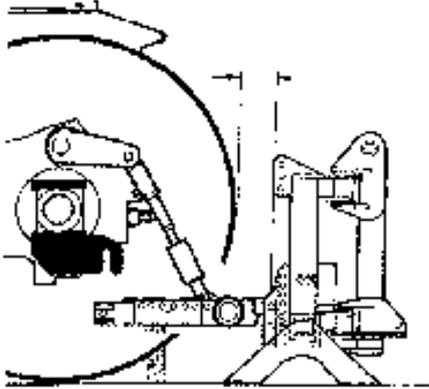


3. Fit lift-in hitch assembly



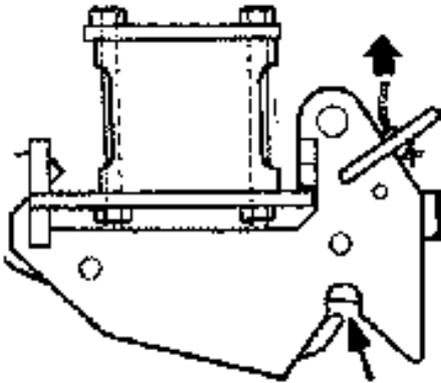
4. Assemble sub frame to suit axle width 1m or 1.1m, mount sub frame assembly to your machine using bottom pin holes.

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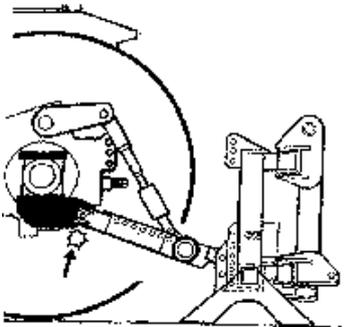


5. Offer up frame to tractor and adjust to give required length. Distance "X" to be kept to the minimum ensuring the machine is close coupled, as a guide set the same as original. Attach tractor lift links to frame with suitable pins.

Note: The hole sizes may not match the tractor links, this will not matter as the machines weight will be carried on the stabilisers.

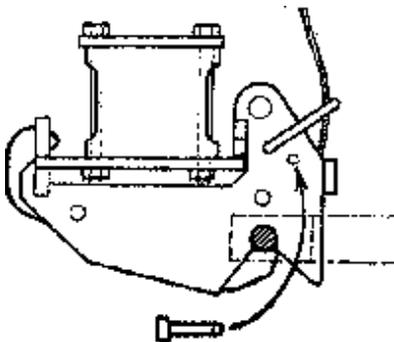


6. Open catch



7. Ensure top link is fitted to prevent machine from tipping over before raising. Lift sub frame until it engages in the catches.

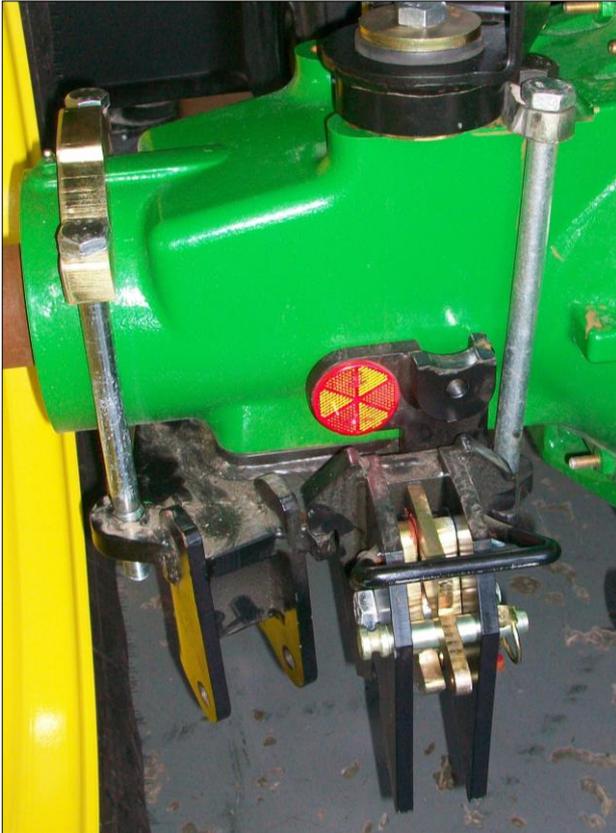
Note: It is best to mount the sub frame to the tractor first.



8. Insert latch locking pin

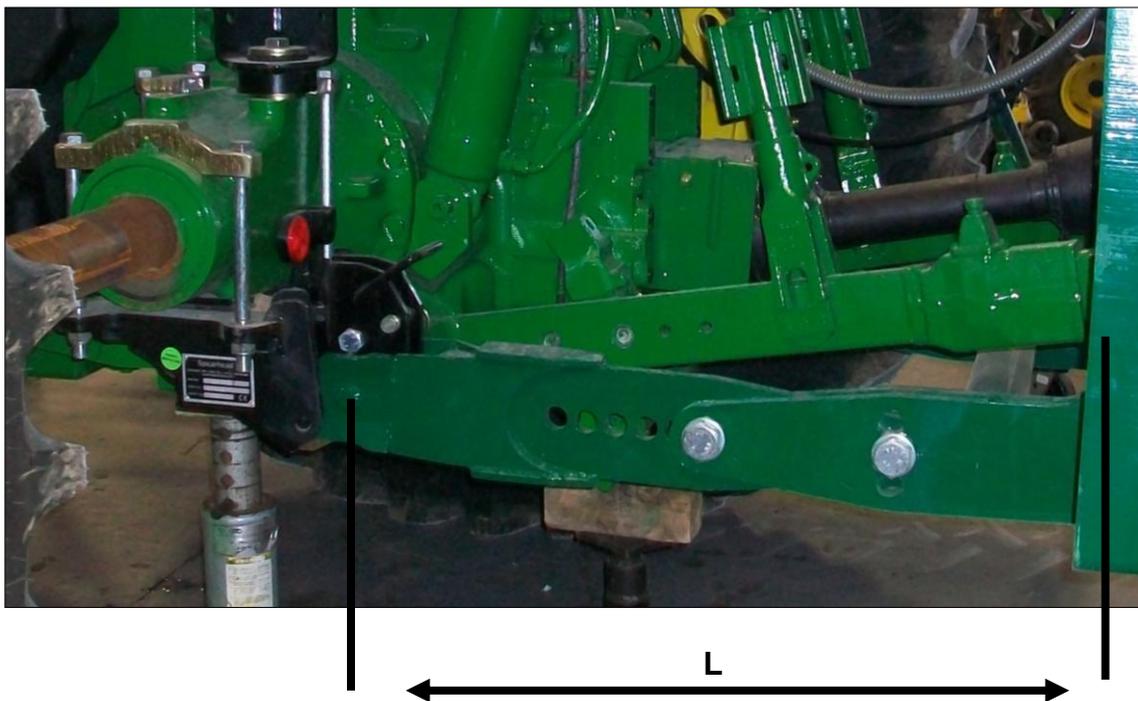
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Attaching Machine to Tractor – Integrated Axle Mounting



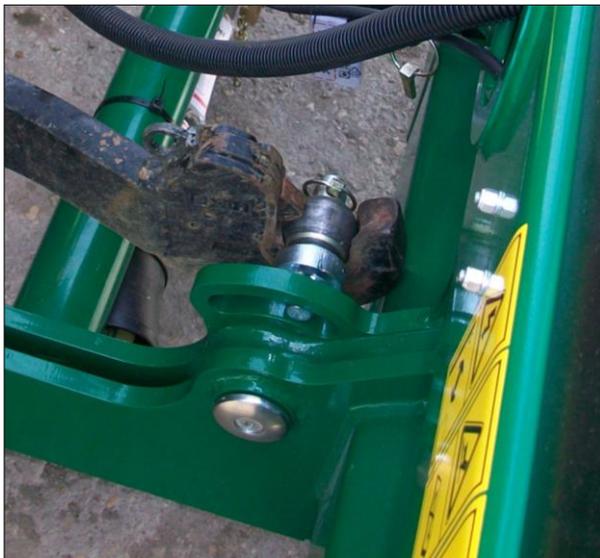
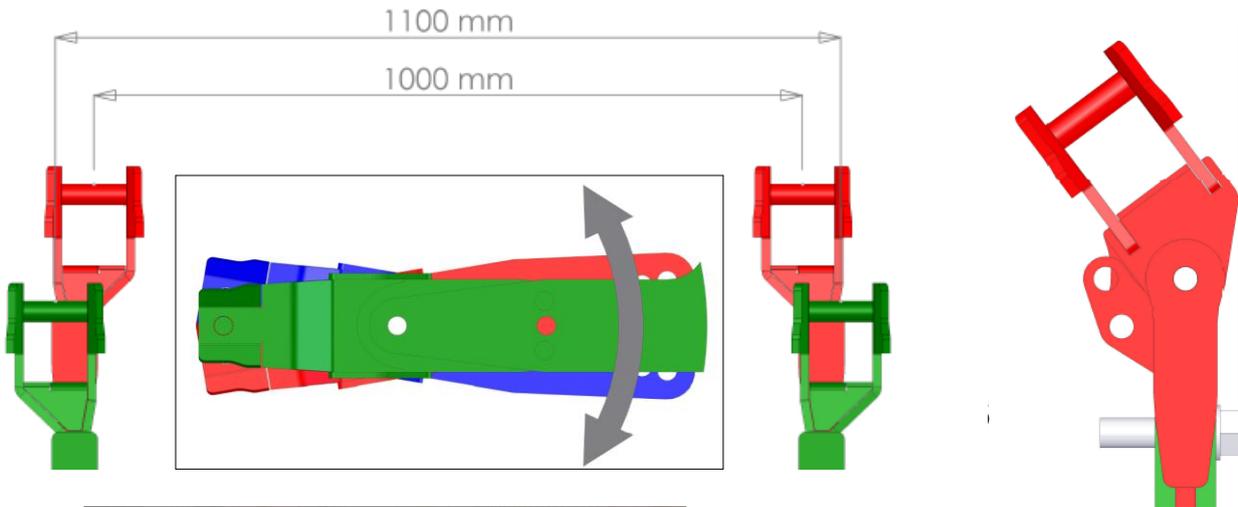
1. Fit the brackets and latches as described in the previous section.

2. Measure the distance between the latch point and the lower link ball (L),



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3. You will also need to measure the centres between the latches to ascertain whether you have 1.0M or 1.1M centres, this will determine which way around you mount the arms. Then set the adjustable arms to the nearest setting to match "L" and at the correct width. The rear bolt holes in the arm allow you to set the pitch of the arm to give you a higher or lower setting depending on the tractor.



4. Reverse tractor to the machine and attach lower links. If the distance between the rear wheels does not allow for them to pass the brackets you may require an optional set of swinging bracket arms shown above which fold in to allow the wheels to pass.



5. With the P.T.O. and controls mounted as described in the earlier sections and with the arm at the rear you can then raise the link arms to bring the arms into the latches and fit the locking pins. Raise to just above the desired height then adjust and fit the top link so that the machine sits vertically, the swinging lower link pins will allow for this. Lower the link arms, the machine should sit at the desired height with no weight on them.

Running Up Your Machine

1. First ensure the rotor is in the 'off' position and P.T.O. drive is disengaged, and then start the tractor.
2. Engage P.T.O. into gear and run machine up to half revs allowing oil to circulate for about 5 minutes before operating arms.
3. Re-check oil level, - check for oil leaks
4. Operate the arms through the full amount of travel, check all movements are functioning correctly.
5. Place flail head near ground in a safe position and with tractor revs low idle, select 'start' position for the flail motor.
6. Once rotor is settled, slowly increase revs of P.T.O. to 540 R.P.M. and run for a further 5 minutes. Slowly reduce revs and then disengage P.T.O.
7. Check all hoses for kinks, pinching, chafing and leaks.
8. Re-check oil level.

Warning

The rotor will take a long time to stop. Never leave the cab until P.T.O. is disengaged, engine stopped and rotor has stopped spinning.

Removing From The Tractor

The following steps **MUST** be followed in exactly the same order in which they appear, with removal of the top link being the last action before driving the tractor away.

Do not attempt to operate machine controls through the rear cab window whilst standing on or amongst the linkage.

1. Select a level firm site such as a concreted surface.
2. Fit parking stands. Place the flail head on the ground approximately 1m out from machine main assembly, to the rear.
3. Ensure head float is discharged and turned off.
4. The arms must be slewed back into transport position and the locking pin fitted to slew post. (Fig. 1)
5. Disengage PTO.
6. Slightly raise the lower lift arms with great care to enable the stabiliser locking pins to be removed.
7. Lower all weight securely onto parking stands (Fig.2).



8. Stop engine; ensure all weight is off the tractor and machine hydraulics.
9. Remove stabiliser bars, lower link pins, PTO shaft and control unit from the cab.
10. Remove top link.
11. Slowly drive tractor away.

Subsequent Attachment to a Different Tractor

Follow the steps for "Attaching your Machine to the Tractor".

Operational Warnings

- Never drive the tractor with arm out stretched (except when cutting). When moving at work always first retract arms. Transport with care. Metal fatigue is always caused by careless transportation and misuse. If the ground is uneven or bumpy slow down.
- Read operator's manual and be fully familiar with all operational maintenance and safety procedures.
- Practice in open space without rotor running until familiar with controls. Take care working the head close to the tractor as it may be possible to strike the tractor.
- Remember one of the clever features of the TWIGA range is its ability to operate within a very narrow space, often within the tractors width. This will mean it is quite possible for the flail head to foul the tractor. Practice all these positions and be very familiar with your machine before ever attempting work.
- Never operate above the recommended P.T.O. speed of 540 R.P.M. failure to heed this warning will result in severe damage, i.e. greatly increased oil temperature, risk of rotor going out of balance, as well as reduced machine life, and could cause expensive repairs.
- Failure to start and stop the rotor at a low P.T.O. speed or to operate at the correct speed will result very quickly in severe motor and/or pump damage.
- Be very careful when operating on sloping ground.
- Never attempt to operate the machine while going backwards. It will immediately damage the arms and possibly the flail head. Remember, before selecting reverse gear always lift the flail head out of work and retract the arms towards the tractor.
- Never operate with flail rotor facing towards the tractor. This is potentially dangerous with debris being thrown towards the tractor, and unseen hazards may cause damage.
- Never attempt to slew arms when fully out stretched - always retract before operating the slew. Be very careful when operating on sloping ground.
- Never attempt to slew arms with the head on the ground, always raise the head before slewing.
- Never change/reverse the rotor rotation until it has come to a standstill, serious damage will occur leading to premature pump and/or motor failure.

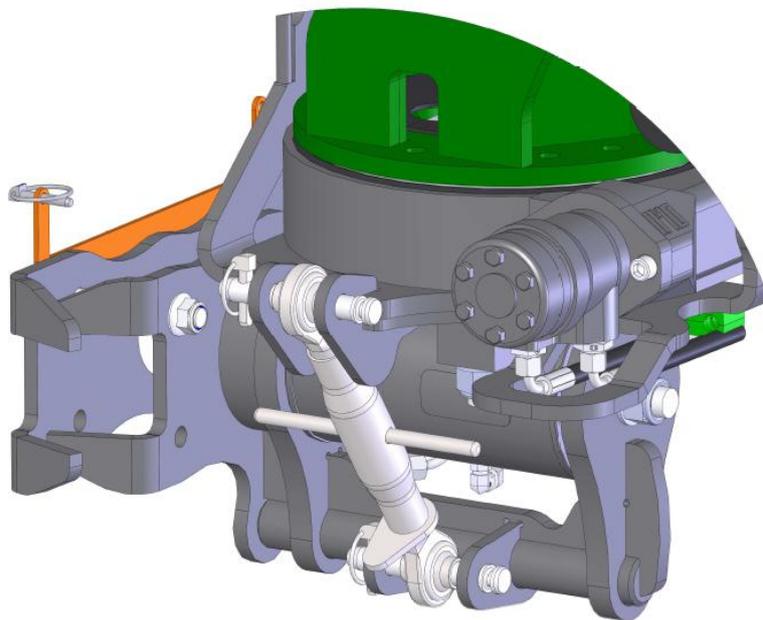
Moving Into Transport Position - FLEX

Warning

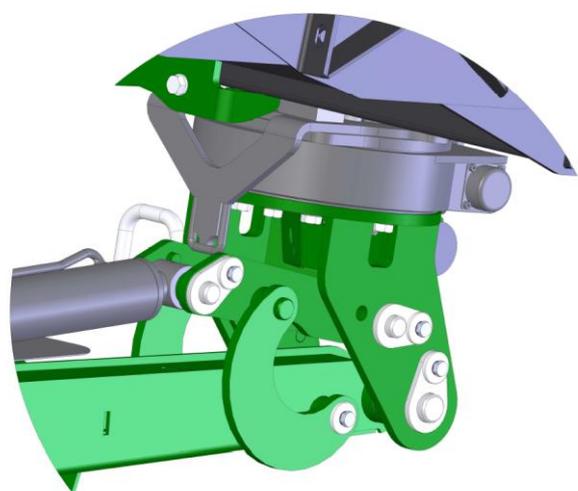
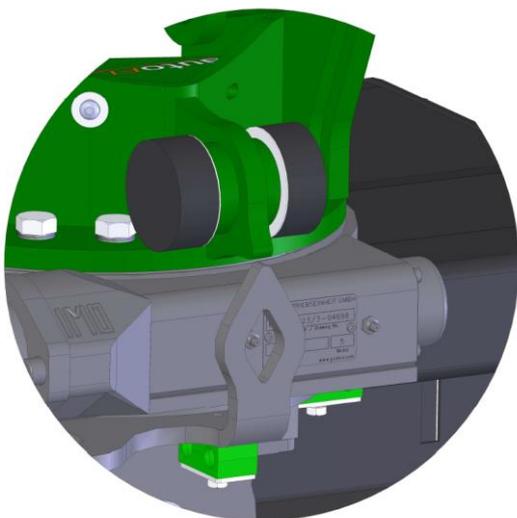
Always transport machine with the slew-locking pin fitted and the arms closed in the transport position on the bump stops. Avoid high transport speeds, which will cause unnecessary strain on machine and tractor.

Never travel with the reach arm away from bump stop on the main arm failure to adhere to this warning will cause damage to ram seals and arms.

1. Disengage the head motor drive and allow the rotor to fully stop. Ensure that the Arm float/Autopilot, Head float and Autoflex are all discharged and turned off. With the head level the head angle transport link can be fitted.

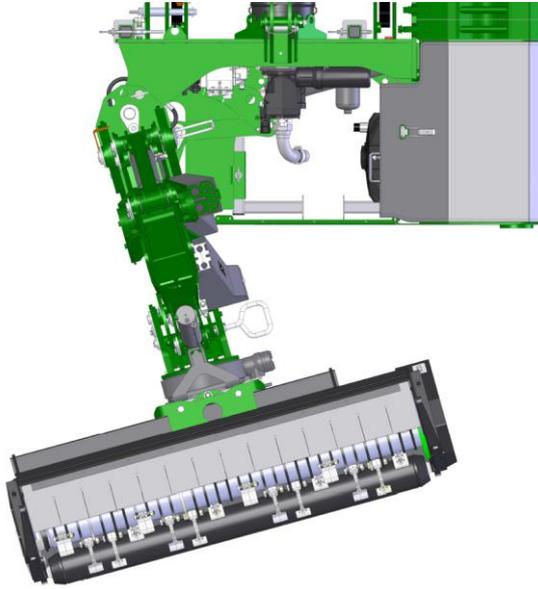


2. Slew the head round to line the pointer on the slew ring with the head crowd bracket. This will then ensure when the head ram is fully retracted the head slew is in-line and the stop bracket will fit inside the linkage.

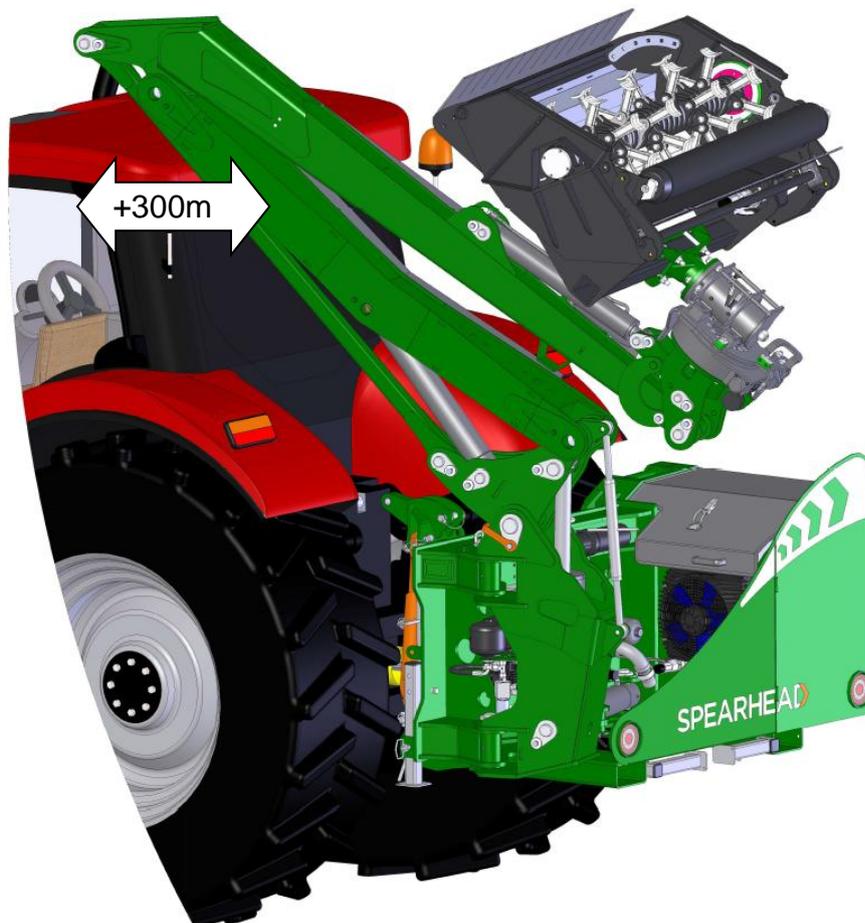


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3. Gently close arms together so that the dipper arm rests on the bump stop. Slew the arm slew round so that the ram is fully retracted, then fit slew locking pin. **Warning:** Do **NOT** attempt to slew machine until locking pin has been removed, serious damage will occur to machine frame.



4. Carefully position main boom over the tractor cab roof, allow minimum of 300mm.



Operation

Transport to work position

- Remove locking pin from slew post.
- Remove transport links.
- Ensure rotor/motor switch is off.
- Engage PTO low revolutions.
- Lower main lift ram only, until main arm is vertical.
- Extend dipper arm outward.
- Slew arm forward through 90°.
- Position head till horizontal, just above ground.

Engaging Head Drive

- Select 540rpm PTO and run with low engine revs.
- With flail head in safe position switch rotor control to 'ON'.
- **Cold start** - it is important not to run at full speed with cold oil. Run at low speed for at least 15 minutes to allow oil to warm up.
- Afterwards slowly increase engine revs to obtain correct PTO speed, 540rpm.
- Never attempt to start rotor while under load.

Disengage Head Drive

- Slowly decrease engine revolutions to a fast idle.
- Switch to 'OFF'.
- Never increase or decrease PTO speed rapidly, this could seriously damage pumps and motor.

Reversing Head Drive

- Ensure the rotor has stopped spinning or is not blocked; failure to ensure this will cause irreparable damage to hydraulic components.
- Change rotor rotation via reverse rotor button on the switch box.

Break Back

The Twiga FLEX range of reach mowers have as standard a slew ram to position the machine from transport to work or any position midway for narrow lane cutting. This ram also acts as the break back ram for machine protection should an obstacle be encountered while travelling forward.

As standard, the Flex is fitted with an automatic Break Back that will protect against overloading. There is an option of a more advanced system that alters the Break Back force as the arm is stretched out and the forces increase, this system is activated via the Break Back switch on the switch box.

The break back will operate if the machine is overloaded i.e. a dense patch of vegetation, too high a forward speed, and when working uphill. The tractor must be halted, and the flail head manoeuvred around the obstacle before the break back is reset via the slew control.

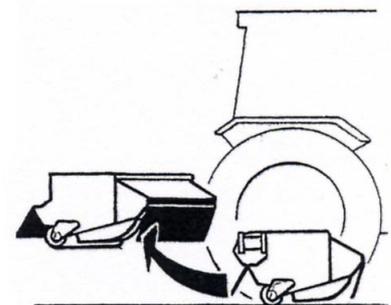
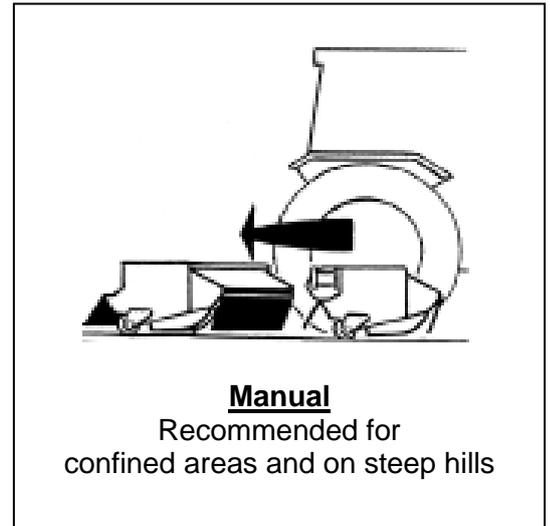
The Twiga Flex range is unique in that Break Back functions in either direction of travel. Care must still be taken to avoid obstacles.

Auto Reset

This is recommended for normal use either verge mowing or hedge cutting. When auto reset is selected the flail head rises as the arm slews back past an obstacle, once past, the weight of the head causes the arm to automatically slew forward and down to the original position. Therefore, when verge mowing, too much weight on rear roller will cause arm to break back prematurely, as will too high a forward speed and a dense crop.

Under certain conditions it may be beneficial to turn off auto reset and operate break back manually, especially in confined areas and up steep hills.

Never attempt to operate the machine when travelling backwards, the break back will not function, and any damage caused will not be considered warranty. The break back feature does not excuse the machine operator of their need to be aware of obstacles and to avoid hazards. It is your responsibility to maintain a long reliable working life.

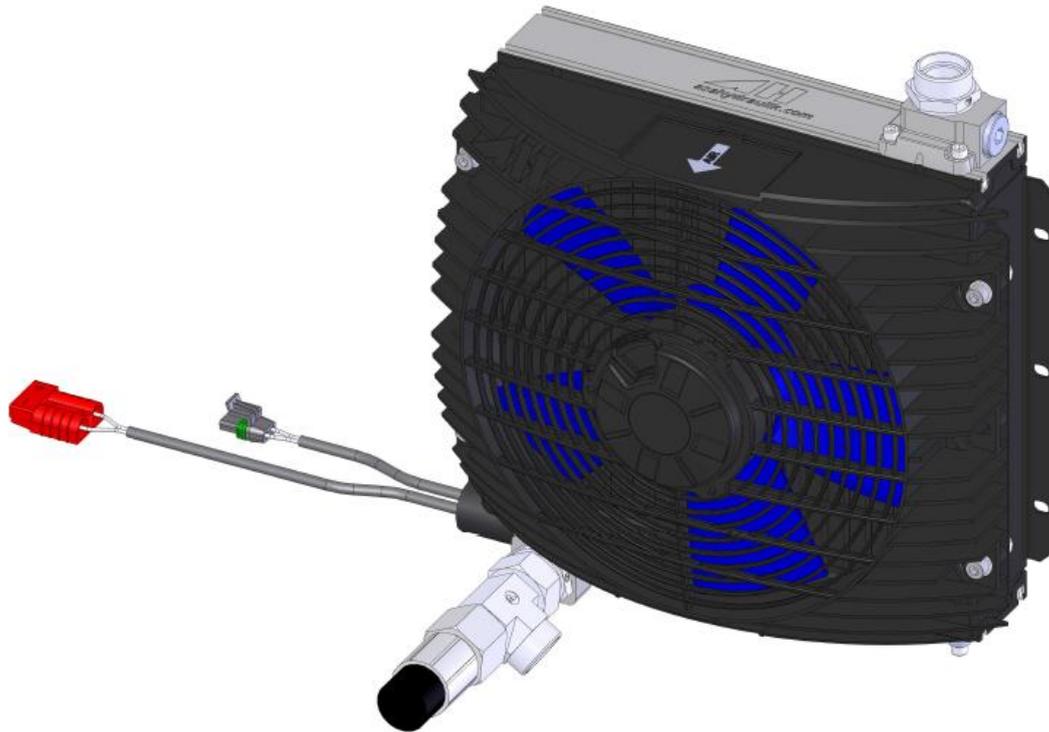


Oil Cooler

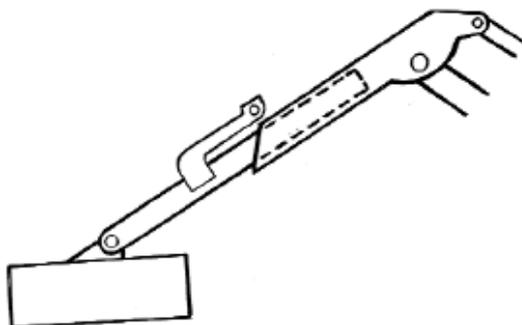
The fitment of an oil cooler prolongs the life of the hydraulic oil and components in hot and arduous conditions.

It is important to connect the power lead to the controller directly to the tractor battery.

It is essential to keep the radiator clear from debris to ensure a free air flow that will effectively keep the oil cool.



Telescopic Arm



Description

Telescopic extending arm provides extra reach, particularly useful for deep ditches, banks and for reaching high hedges.

Operating the Telescopic Arm

Use the electric switch to adjust the length of the extending telescopic dipper arm to suit working conditions and use dipper ram to vary reach as required.

Over frequent use of telescopic arm will cause premature wear of adjustable pads.

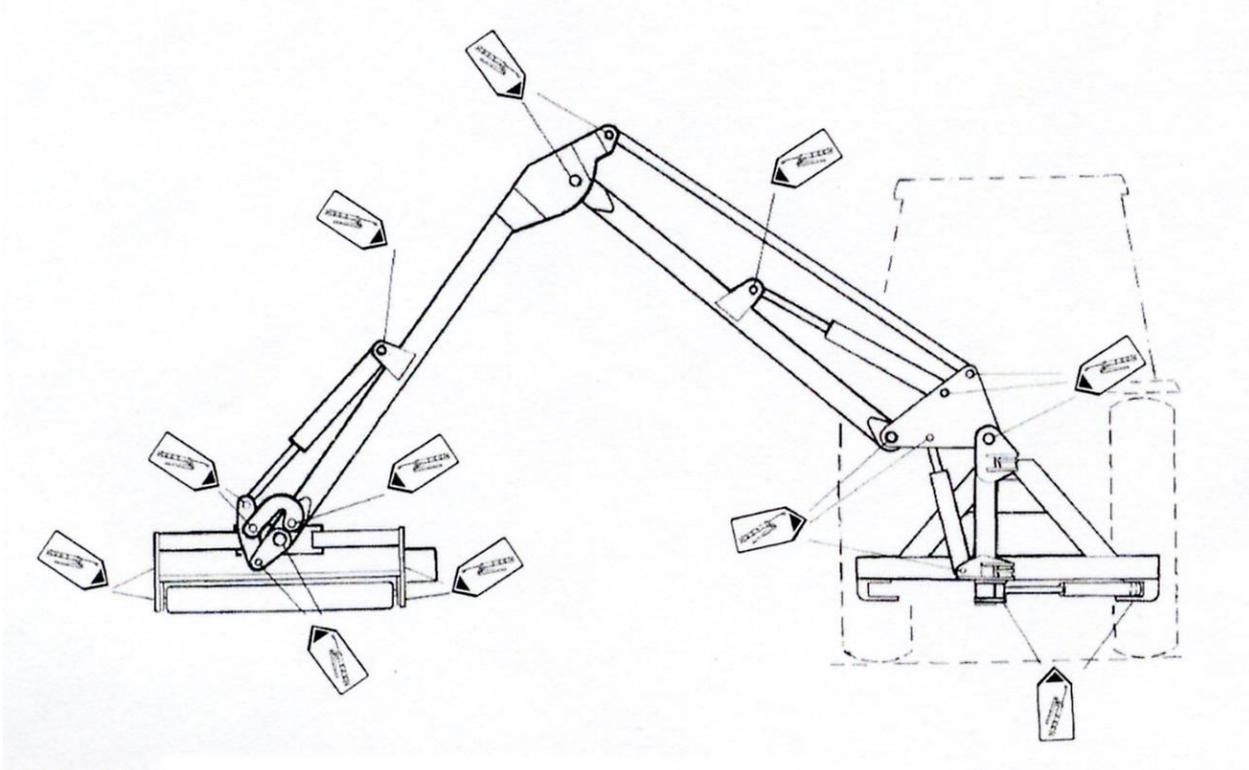
Transporting the Telescopic Arm

Always fully retract before folding machine arms into transport position.

TWIGA PRO / FLEX

Service and Maintenance

Daily grease points



TWIGA machine

Washing your machine

Grease all your machine and optional parts after each time you wash your machine.

Gearbox

Before first use check gearbox oil level, thereafter, check every 8 hours. After the first 50 hours drain and replace the gearbox oil, thereafter annually. Replace with EP90. Do not over tighten oil plugs, as this will damage the housing.

P.T.O.

Dismantle; clean the input drive shaft sliding surfaces and re-grease, failure to do this will result in serious damage to the gearbox. Grease both U.J. joints every 8 hours.

Oil Requirements

Fill the tank to centre of sight gauge with approximately 220 litres of HD46 or equivalent oil. Do not over fill.

Torque Settings

The Torque figures given below are recommended maximum settings only.

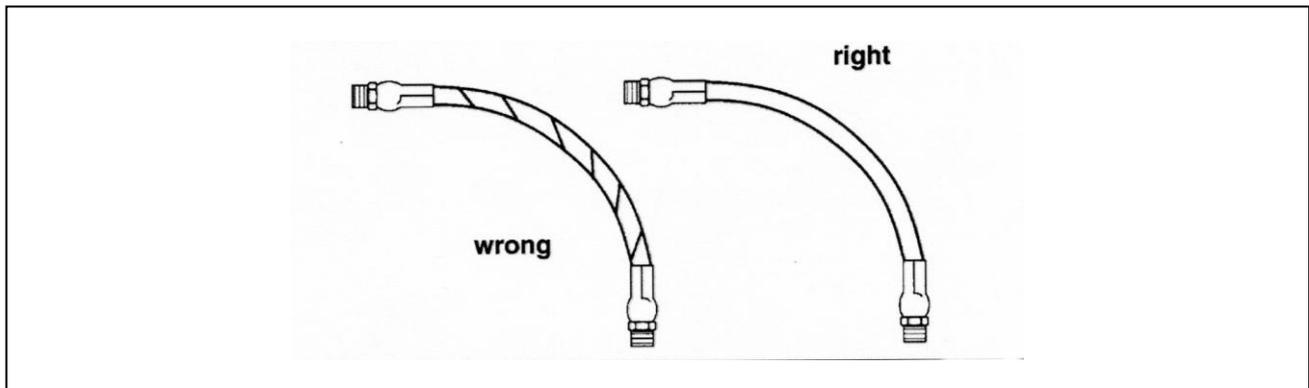
Size:	Tensile strength:	Description:	Torque setting: Nm.
M10	8.8	General fasteners	65
M12	8.8	General fasteners	114
M12	12.9	Head bolts	170
M12	10.9	Flail bolts	100
M16	8.8	Head bracket bolts	280

Hydraulic Hoses

- Carefully check condition of all hoses during routine service paying particular attention to chafed outer casing. Secure wrap with waterproof adhesive tape to stop the metal braid from rusting.
- Daily inspect all hydraulic hoses and fittings to be in good order. Any damages or leaks must be rectified immediately; this is part of the daily maintenance and is your responsibility, to ensure a long reliable working life.
- Hoses with damaged metal braid should be replaced.
- When replacing hoses quote number stamped on fitting at one end. The Spearhead hydraulic system works at very high pressure, when replacing hoses use only genuine hoses, a burst hose could be very dangerous.
- When replacing hoses to avoid twisting fitting, use two spanners to slacken and tighten.

Warning

Hose is weakened when installed in twisted position. Also, pressure pulses in twisted hose tend to fatigue wire and loosen fittings.



- Always check the black protective sleeve is in good order, to replace sleeve is far cheaper than replacing expensive hoses.
- Hose warranty is limited to replacement of hoses due to faulty materials or manufacture Warranty will not be considered on hoses damaged by chafing, abrasion, cuts or pinching while in work, or to damaged threads due to over tightening.
- All hose connections are of a “Parker” soft seal type and only need 1/2 a turn more than finger tight to become leak-proof.

Oil Supply

- Daily before starting up check oil level in tank reservoir.
- It is a good practice to constantly keep an eye on the tank level gauge, (this can be seen from the tractor seat) as a pipe burst could empty the tank within minutes.
- A pump or motor starved of oil will be damaged beyond repair.
- Replace oil if signs of contamination occur (discoloured)
- Contamination can be reduced by:
 - Thoroughly cleaning around reservoir cap before removing.
 - Using a clean container when replenishing the system.
 - Regularly servicing the filtration system.
 - Never allowing oil level to fall below the sight gauge.
- Daily inspect all hydraulic connections and fittings to be in good order. Any damage or leaks must be rectified immediately, this is part of the daily maintenance and is your responsibility, to maintain a long reliable working life.
- When tightening fittings always use two spanners when necessary and do not over tighten. If a fitting leaks it will need to be replaced.

Filtration Maintenance

The machine is protected by a suction strainer and a low pressure full flow return line filter.

1. The suction filter is permanently fixed in the reservoir tank. Should symptoms of pump cavitations or spongy operation occurs, the tank must be drained, the tank and suction filter thoroughly cleaned and dried before refilling with clean oil.
2. The return line element should be replaced after the first 50 hours and thereafter at 300 hour intervals. It is most important to replace the filter within these intervals because once blocked, oil will bypass the filter element infiltrated.
3. When tightening fittings always use two spanners when necessary and do not over tighten. If a fitting leaks it will need to be replaced.

Pins & Bushes

All main pivot points are furnished with replaceable bushes. If there are any signs of wear, these must be replaced. All bushes are available from Spearhead Parts Department.

Warning

Do not use grease containing Molybdenum disulphide on nylon bushes and wear pads.

Storage

Remember regular maintenance will greatly increase the life of the machine.

Before storing away, thoroughly wash the machine removing all traces of grass and dirt. Care must be taken when washing with high-pressure hoses, do not hold the water jet close to the paintwork. Use steam cleaners with caution, be sure to remove all detergents to avoid any discolouring or damage to paint. Grease all grease points until fresh grease shows. It is important where possible to store undercover to protect against rain and sunlight. Always ensure a firm level surface.

Smear greaser on all areas vulnerable to corrosion, in particular the chrome on the ramrods.

Before you attempt to do any repairs, service, maintenance or adjustment on your machine, ensure the engine has stopped and the key removed. P.T.O. is disengaged, handbrake secure, and the head is firmly on the ground.

Control levers must be wrapped in plastic sheeting and taped over to keep dry.

PROPILOT controls should be removed and stored in a safe and dry area.

Regular Services Chart

Service Hours	Service points	Grease	Drain	Check	Clean	Change
1-4 hrs	Bolts are fully tightened			X		
	Condition of flails			X		
	Condition of hoses especially for chafing			X		
	Flail bolts are fully tightened			X		
	Flail head retaining bolts are fully tightened			X		
	Gearbox seals (If oil is leaking replace immediately)			X		(X)
	Inspect leaks from fittings and pipes			X		
	Pins and bushes			X		
	Rotor bearing bolts are fully tightened			X		
8 hrs	Bearings	X				
	Gearbox & pump bolts are fully tightened			X		
	Gearbox oil level			X		
	Grease points & PTO shaft	X				
	Motor Drive	X				
	Maintain correct belt tension on head (only with belt drive heads)			X		
	Oil level in reservoir	X		X		
	U.J. joints					
50 hrs	Gearbox oil (use EP 90 oil)		X			X
250-300 hrs	Return line filter element					X
	Hydraulic oil if any signs of contamination appears		X	X		

Pump & Motor Failure Prevention

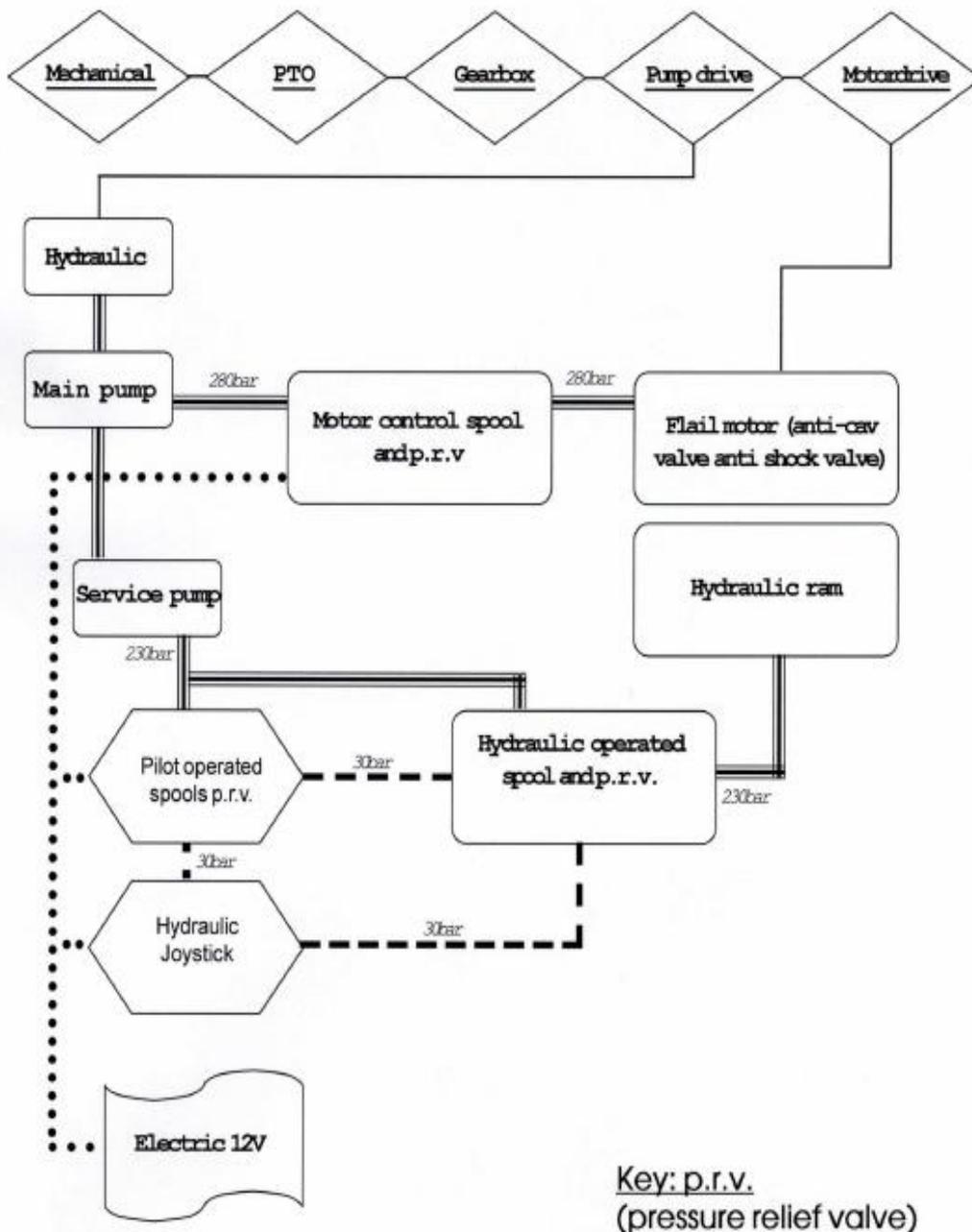
- Never run out of oil.
- Never run a cold machine straight up to speed, first ensure engine revolutions are low then engage/disengage the head motor.
- Never increase or decrease engine speed quickly.
- Never stop or start rotor at high engine speed.
- Never transport with P.T.O. in gear.
- Regularly check condition of suction line hose.
- Never operate above recommended P.T.O. speed.
- Check that pump fittings are tight.
- If any strange noise occurs from the hydraulics, stop immediately and investigate.
- Remember, pump and motor warranty is limited to replacement due to faulty materials or manufacturer. Cavitations and peak pressures are very easily detected on pump inspection.
- Warranty will not be considered if fault is due to misuse.
- Never cause severe sudden movements to arms. Pressure will peak and will transmit back to pump, resulting in failure.

Trouble Shooting

Problem	Cause	Solution
Gearbox overheating	Oil level incorrect	Check oil level
	Oil grade incorrect	Check oil grade
	Implement overloaded	Reduce forward speed
	Wrong PTO speed	Ensure tractor PTO speed matches implement
Excessive belt wear	Belt and pulley condition	Replace if necessary
	Pulley alignment	Check alignment
	Incorrect belt tension	Tension belts to spec
	Overloading of implement	Reduce forward speed or increase height of cut
P.T.O. wear U.J. failure	Working angle too great	Reduce offset of implements
	Shaft incorrect length i.e. bottoming out	Resize PTO shaft as recommended
	Lack of maintenance	Grease PTO shaft as recommended
Cut Quality	Flails worn	Replace worn flails
	Rotor speed/direction	Check tractor PTO speed
	Crop condition	Look for suitable conditions
Rotor bearing failure	Rotor out of balance	See rotor vibration
	Wire/string in bearing	Remove wire/string
	Lack of maintenance	Grease bearings to schedule
	Water in bearing	Expel water with grease
Rotor vibration	Flails broken or missing	Replace flails
	Bearings worn or damaged	Replace bearings
	Rotor bend	Re-balance/replace rotor
	Build up of debris	Remove debris
	Incorrect speed	Check rotor R.P.M.
Oil tank overheating	Oil level incorrect	Fill tank to correct level
	Oil grade incorrect	Drain and refill tank with correct grade oil
	PTO speed too fast	Ensure the tractor's PTO speed matches implement
	Ambient temperature too high	Reduce work rate / install oil cooler
Break-back operating Frequently	Machine overloaded	Reduce forward speed or increase height of cut
	Machine being used on excessive incline	Switch off auto reset
	Weight of machine being carried upon rear roller	Use Autopilot or head float
	Machine not set vertical	Shorten top link
	Hydraulics not responding	Oil level low
	Oil pump suction filter blocked	Replace filter element
	Oil leak in pressure line	Check machine of leaks
	Drive line broken	Check pump is rotating
Joystick control sluggish	Air in pilot lines from joystick	Slacken off each line of pilot circuit individually at spool valve whilst operating. When all air is expelled retighten the line

Trouble Shooting

Problem	Cause	Solution
Irregular arm movement	Spool contacting with housing	Check spool is free moving
	Broken spring in spool valve	Check spring
	Failed ram seals	Repair ram
Electrically operated valve not responding	Faulty wiring	Check wiring and switches
	Dirt in valve	Check of ingress of dirt
	Sticking valve	Replace the valve
	Insufficient voltage	Attend to bad connection



SPEARHEAD 