

Spearhead Machinery
Operator Instruction Manual For

TWIGA CARRIER

2.00m fixed and 3.00m folding cut width

Vegetation control arm mower

8999145EN v1.1

IMPORTANT

Verification Of Warranty Registration

Dealer Warranty Information & Registration Verification

It is imperative that the selling dealer registers this machine with Spearhead 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:

<https://my.spearheadmachinery.com/warranty/machine-registration/>

Should you experience any problems registering a machine in this manner please contact the Spearhead Service Department on 01789 491860.

Confirm to the customer that the machine has been registered in the section below.

Registration Verification

Model Type:		Twiga Carrier
Model Number:		956 _____
Serial Numbers:	Machine:	S _____
	Cutting Implement:	S _____
	Other:	
Name Of Owner:		
Name Of Installing Dealer:		
Dealer Address:		
Dealer Signature:		
Date Of Delivery / Installation:		
Date Of Warranty Registration:		

IMPORTANT

At the point of transfer of ownership record the above information. Note the serial number of your machine and always quote it in any communication with us or your dealer. (The serial number plate is located on the machine mainframe.) This is particularly important when ordering spares. Remember to include all numbers and letters.

The information given throughout this manual is correct at the time of publication. However, in the course of constant development of Spearhead machines, changes in specification are inevitable. Should you find the information given in this book to be at variance with the machine in your possession, you are advised to contact the Spearhead Service department where up-to-date information will be provided.

The manual can contain standard and optional features and is not to be used as a machine specification. The machine has been tested and is considered safe if carefully used. Ensure your operator is properly trained in its use and maintenance.

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Twiga Carrier

This manual covers the Twiga Carrier, which comes in two versions;

- Twiga Carrier CF20, which is a fixed arm with no breakout
- Twiga Carrier CF30, which is a folding arm with hydraulic breakout

Both versions allow the arm to be rotated from 0 to 136 degrees on a ram-equipped unit, or from vertical to horizontal (with small adjustments either side) on a manual actuated unit.

The arm is attached via a DIN-type mounting plate, using bolt holes or user-supplied brackets, specific to their prime mover. The prime mover itself can be a tele-handler or a tractor with a front loader attachment – both types require hydraulic flow rate of 50 to 80 litres per minute for the saw motor, as well as an additional spool valve if using the ram-equipped unit.

The arm is designed for vegetation control, to cut and thin all types of hedges, from thin to thick growth, with duty cycles of 500 hours per annum. It is essential that all guards are fitted to the cutting attachment and the prime mover's cab when in use, and that the machine is operated in line with the procedures and practices detailed in this manual.

IMPORTANT

This operator's manual should be regarded as part of the machine. Suppliers of both new and second-hand machines are advised to retain documentary evidence that this manual was provided with the machine.

This machine is designed solely for ground vegetation control and must not be used for any other purpose. Use in any other way is considered as contrary to the intended use. Compliance with, and strict adherence to, the conditions of operation, service, and repair, as specified by the manufacturer, also constitute essential elements of the intended use.

This machine should be operated, serviced, and repaired only by persons who are familiar with its characteristics and who are acquainted with the relevant safety procedures.

Accident prevention regulations, all other generally recognised regulations on safety and occupational medicine, and all road traffic regulations must always be observed.

Any arbitrary modifications carried out to this machine may relieve the manufacturer of liability for any resulting damage or injury.

It is potentially hazardous to fit or use any parts other than genuine **Spearhead** parts.

The company disclaims all liability for the consequences of such use which, in addition, voids the machine warranty.

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1 Machine Description

1.1 Intended Usage

Twiga Carrier arms intended to be used exclusively with Spearhead attachments, and no other unit should be fitted. There are two versions of the Twiga Carrier:

1. a 2.0m basic fixed arm that can slide out sideways for reach and transportation;
2. a 3.0m folding version that includes a breakout ram to allow the head to be safely pushed back if an obstacle is encountered. A pin may be removed from the arm on this version to allow it to be folded forward and locked for transport.

Both versions allow head angling through the use of a cowl bracket arrangement, which can be actuated hydraulically or manually with a two position pin. Both versions are also able to be reduced in width for transport purposes.

Twiga Carrier attaches to tele-handlers and loaders arms via a DIN-type mounting plate. The mounting plate allows the end user to either bolt-on or weld their own specific brackets to any quick attach system that may be included with their own particular brand.

The arms' overall reach will be dependent on the end user's prime mover of choice, and that vehicle's overall capability.



Figure 1.1 Twiga Carrier

1.2 General Arrangement

The layout and naming convention used throughout this manual are shown in Figure 1.2 below

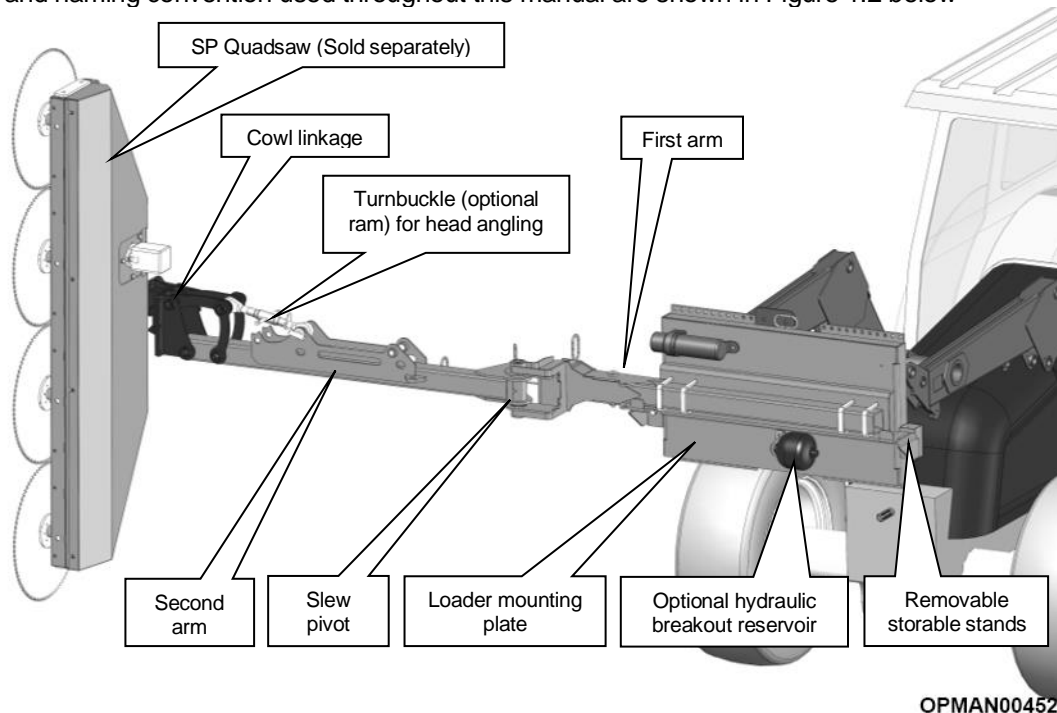


Figure 1.2
(Twiga Carrier CF30 shown)

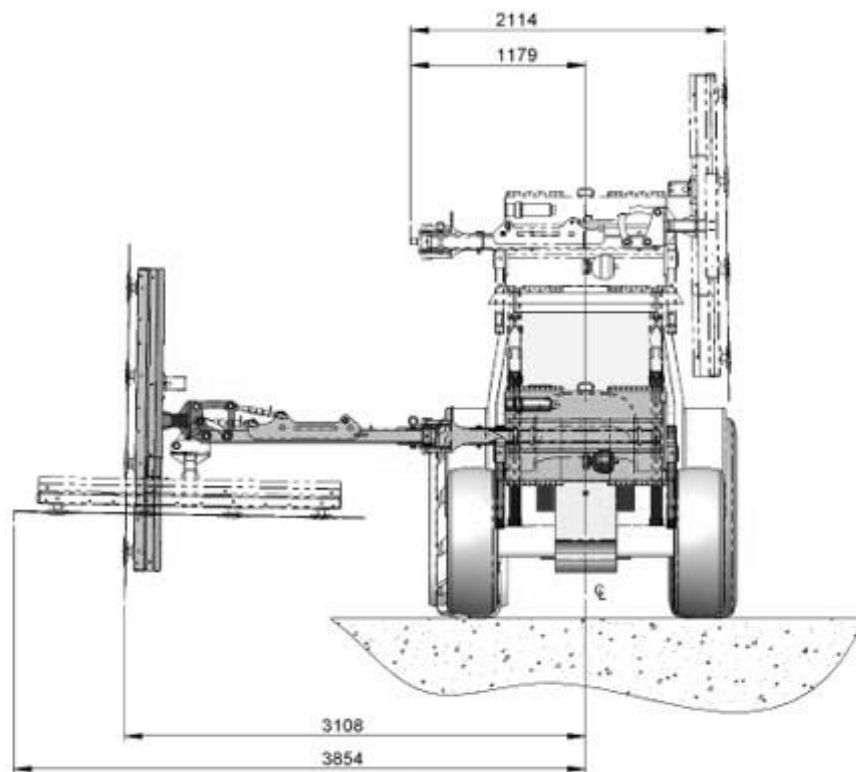
1.3 Machine General Specification

Twiga Carrier (CF20 fixed/CF30 folding) : Technical specification (1)			
Machine weight	Base unit with no oil	280kg (folding) / 225kg (fixed)	
Minimum Tractor	(With ballast)	50hp (@ 1000kg)	
Hydraulic protection	Main line relief pressure	n/a	
Reach arm dimensions (2) (3) (4)	Max lateral off-ground side cut	3108mm (10' 2") [See Figure 1.3]	
	Max lateral off-ground side cut (fixed)	1989mm (6' 6") [See Figure 1.3]	
	Max vertical side cut (folding)	3854mm (12' 7") [See Figure 1.3]	
	Max vertical side cut (fixed)	2753mm (9' 0") [See Figure 1.3]	
	Max transport width to centreline	1179mm (3' 10") [See Figure 1.3]	
	Max transport width to centreline	1153mm (3' 9") [See Figure 1.3]	
Twiga Carrier (CF20 fixed/CF30 folding): Cutting unit data (1)			
Cutting unit	SP15 Quadsaw	SP20 Quadsaw	SP25 Quadsaw
Drive	Loader hydraulics	Loader hydraulics	Loader hydraulics

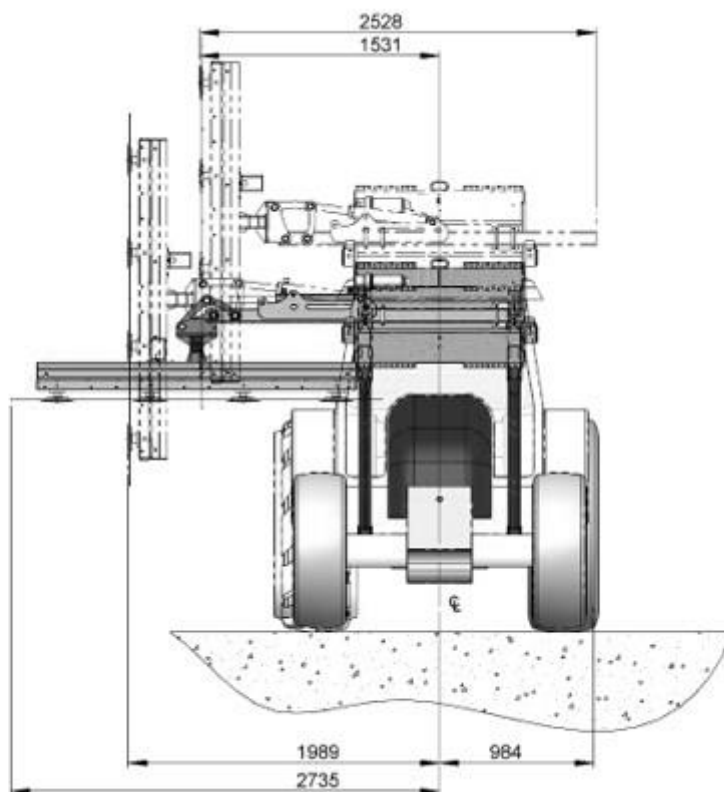
Notes:

- (1) Spearhead Machinery constantly reviews and improves product designs and reserve the right to change this information. As a consequence actual machines may vary from specification. Contact your Spearhead Machinery Sales representative if you have any queries.
- (2) All dimensions are taken with a **SP25 Quadsaw**
- (3) All lateral reach dimensions are taken from the centreline of a notional tractor with a **2030mm** overall width. Consequently down bank dimensions are measured assuming this notional tractor has the outside of its rear wheel on the edge of an embankment.
- (4) This specified geometric maximum is stated for information purposes only. It does not imply that it is safe or appropriate to cut material in this position. The actual safe maximum side cut height will depend on the width of the tractor that the arm mower is mounted to.
- (5) The transport width quoted is a half width and is measured to the PTO centre which is notionally assumed to be on the tractor centreline. As a consequence the full on road width is the quoted transport width plus half the tractor width plus (or minus) any mounting offset from the tractor centreline.

- (6) All dimensions are determined from computer models. As a result actual measurements may vary as a result of deflections due to weight. Tractor tyres will naturally compress on the working side of the tractor as the arm is deployed and the centre of gravity shifts. The amount is affected by tyre construction, age, inflation pressures and the use of local ballast weight. For example a 20mm compression of the cutting side rear tyre will be magnified by the arm reach which will have an effect on the actual cut height.

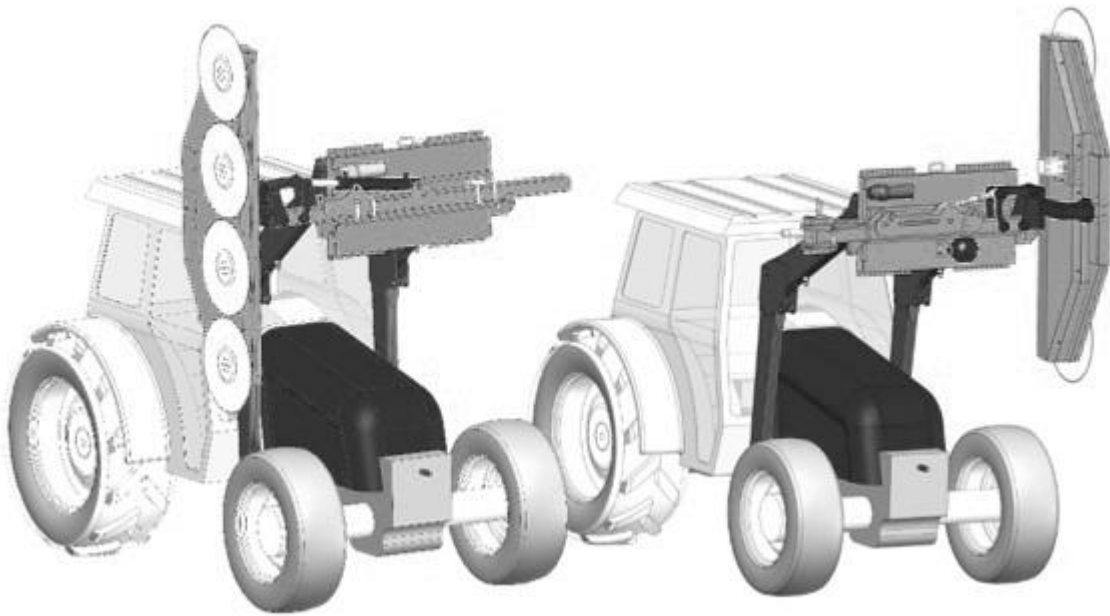


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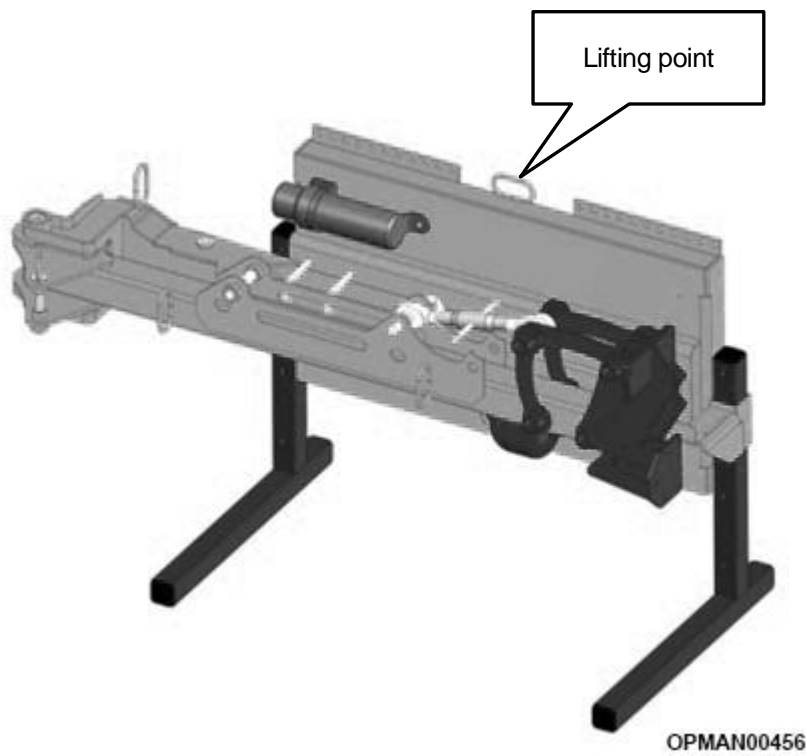
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Figure 1.3 Reach dimensions – Twiga Carrier *CF30 folding (top), CF20 fixed (bottom)*



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Figure 1.4 Transport Position – Twiga Carrier *CF20 Fixed (Left), CF30 Folding (Right)*



OPMAN00456

Figure 1.5 Shipping Position

2 Safety

2.1 Safety Warnings

The operator must read, understand and follow all of the Safety instructions. Serious injury or death may occur unless care is taken to follow the warnings and instructions provided. The level of safety is indicated in three levels and the following notation is used throughout this operator instruction book;



DANGER! Level 1; alerts for imminent death or critical injury.



WARNING! Level 2; warns of serious injury or possible death.



CAUTION! Level 3; indicates possible injury.

Never operate the prime mover or machinery until you have read and completely understand this manual and the prime mover operators manual and each of the safety messages found in the manuals and those displayed on the prime mover and implement.



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

1. Lower the cutting head on to the ground
2. Put the PTO out of gear
3. Stop the prime mover engine, remove and pocket the starting key.



DANGER! Keep a careful watch for passers-by who may inadvertently get in the way of cut material being thrown from the cutting unit. This equipment is capable under adverse conditions of throwing objects great distances at high velocity. Stop the equipment until all people are well clear.



DANGER! **AVOID WIRE.** It can be extremely dangerous if wire gets caught up in the cutting unit, and every care must be taken to ensure this will not happen. Inspect the working area before commencing. Remove all loose wire and obstructions and clearly mark those that are fixed so that you can avoid them. Any unusual noise from the cutting unit area indicates that the cutting elements may have been fouled by an obstruction. A visual indication that wire is in contact with the cutting elements may be a sudden movement of the vegetation ahead of the cutting unit. In any such event **STOP** the prime mover engine **INSTANTLY**. On no account move the cutting unit until the rotor has completely stopped. **NEVER UNDER ANY CIRCUMSTANCES** reverse the cutting operation to 'clear itself'. When the cutting elements have stopped, inspect it and remove any obstruction that may be present. If working under a raised machine ensure that it is safely supported. Before working on the cutting unit stop the prime mover engine and remove the ignition key.



DANGER! This equipment is capable under adverse conditions of throwing objects great distances at high velocity. CHECK the cutting elements for wear and the attachment bolts for tightness every day during work. A few moments; whenever the machine is stopped (e.g. whenever removing obstructions); will help reduce wear or loss.



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



DANGER! To avoid fatalities due to electrocution the operator must pay particular attention when working near overhead power lines. Some machines have vertical reaches in excess of 8m which exceeds the 5.2m minimum legal height for 33,000 volt power lines. Be aware of the maximum reach of your machine. Be aware that you do not have to touch a power line to

receive a discharge. Flashovers can occur due to proximity. See Section 1.2 'Dangers due to overhead power lines'.



DANGER! A wire mesh cab guard must be fitted on the outside of the cab window, between the operator and the cutting head, in such a position as to give the operator maximum protection.



DANGER! Where a hedge trimmer is used in conjunction with prime movers not fitted with a glazed safety cab, a clear polycarbonate safety screen together with a mesh guard must be fitted to the prime mover between the operator and the cutting head. A polycarbonate safety screen must be used on cabs where windows are likely to be left open for ventilation purposes. It is essential that cab windows on the operating side; through which the cutting head is observed; are intact, clean and closed, or a clear polycarbonate safety screen must be fitted where hedge cutting and grass trimming operations are carried out. When hedge cutting, a mesh guard must also be fitted.



WARNING! Do not operate machinery with guards missing. Ensure that the correct guards are properly fitted to the machine and prime mover at all times and that they are in good condition. Refer to Section 2.6 to ensure you have the correct guards fitted for the type of operation being performed.



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



WARNING! Direct the cut material away from the prime mover. It is important that while operating the cut material is not directed towards the operator



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



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



WARNING! Failure to have sufficient stability ballast mounted or to drive at inappropriate speeds on undulating terrain may result in a loss of directional control.

2.2 Emergency Stop

In an emergency bringing the cutting head to a stop requires familiarity with the controls fitted to the machine.

Refer to chapter on 'Operator controls overview' for information regarding controls fitted to Spearhead machines, and then refer to the relevant control overview for whichever is fitted to your specific machine. Make sure the operator reads and understands the relevant controls chapter paying particular attention to the instructions for how to stop the machine quickly in an emergency.

2.3 Dangers Due To Overhead Power Lines

There are significant dangers involved when working in the vicinity of Overhead Power Lines (OHPL's). Be aware that some Spearhead machines are capable of reaches in excess of 8 metres (26') and 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, see Figure 2.1 - Minimum Heights For Overhead Power Lines



DANGER! 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 (OHPL's).



WARNING! Fatal electrocution can occur without contacting a power line. Due to the high electrical potential between the conductors and the ground a flash over can occur from the power line to any conducting medium within range. Steel cutting machines are ideal conductors.

Wherever possible the safest option is always to avoid working in areas close to OHPL's. Where unavoidable, all operators must perform a risk assessment and implement a safe procedure and system of work, see Section 2.3.1 below.

All operators should perform a risk assessment before operating any arm mower within 10m horizontal distance of any OHPL's. If you are unsure do not work in the area. Never put yourself or others at risk.

2.3.1 Risk Assessment

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

- **Know** the risks of contacting OHPLs and the risk of flashover.
- Always **find out** the maximum reach height for your machine mounted on its prime mover, see 'Machine general specification in chapter 1 for guidance.
- Always **find out** the location and route of all Power Lines within the work area.
- Always **find out** the operating voltage of all Power Lines within the work area.
- Always **contact** the local Distribution Network Operator (DNO) who will be able to advise you on the operating voltage, exclusion zones, the minimum safe working distance and any additional precautions required.
- **Never** attempt to operate the machine within an exclusion zone.
- 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

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

2.3.2 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

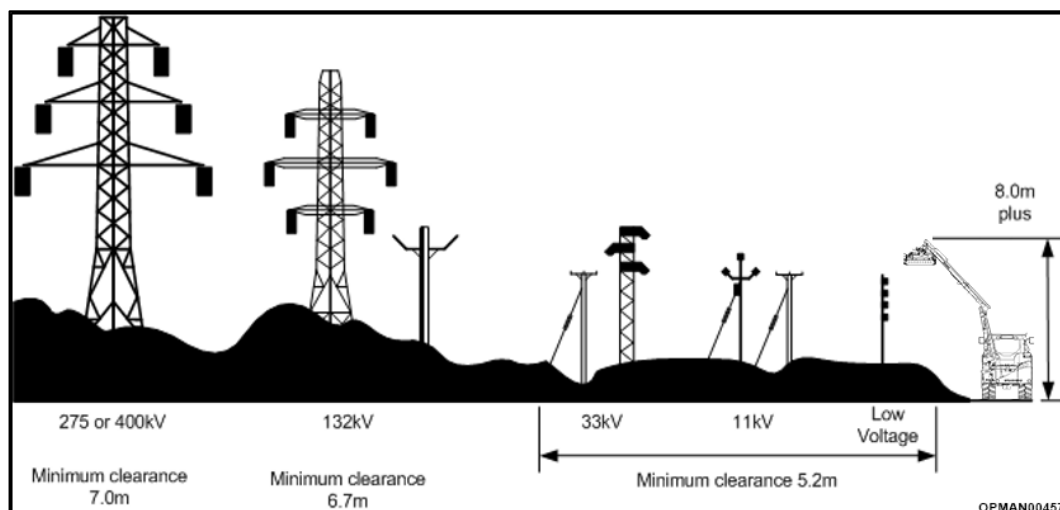


Figure 2.1 - Minimum Heights For Overhead Power Lines

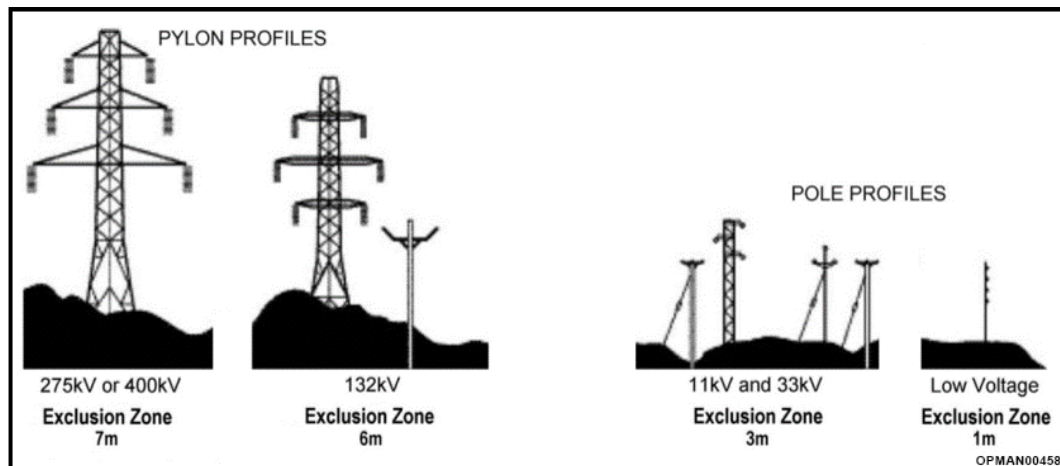


Figure 2.2 - Absolute Minimum Exclusion Zones For Specific Overhead Power Lines

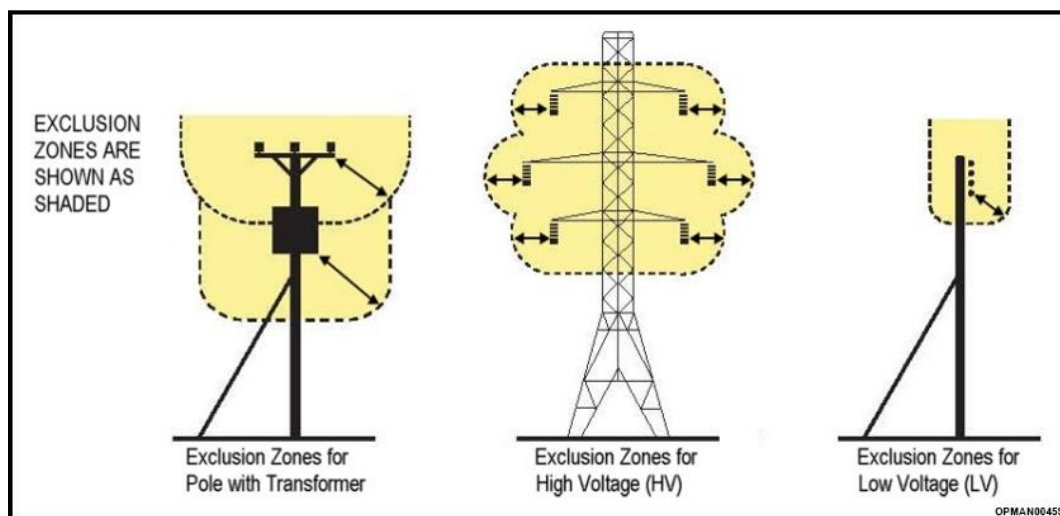


Figure 2.3 - Definitions Of Exclusion Zones

2.4 Noise

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

2.5 Personal Protective Equipment

When working in an unsealed cab or where windows and apertures are open to the environment, operators are advised to wear suitable ear protectors, see Section 2.4.

When handling cutting surfaces or hydraulic equipment, operators are advised to wear suitable gloves.

When clearing blockages, clearing wire, or working with pressurised hydraulic components, operators are advised to wear suitable eye protection.

When working at the work site, but off the prime mover unit, operators are advised to wear a 'high-viz' garment.

2.6 Cab Guarding



DANGER! For safe operation it is essential that that all guards must be kept in position on the machine whenever the machine is running. Spearhead Machinery disclaim all responsibility for any damage or injury arising as a result of guards being removed, or of guards other than of Spearhead manufacture having been fitted, or of operation of the machine other than in accordance with these instructions.

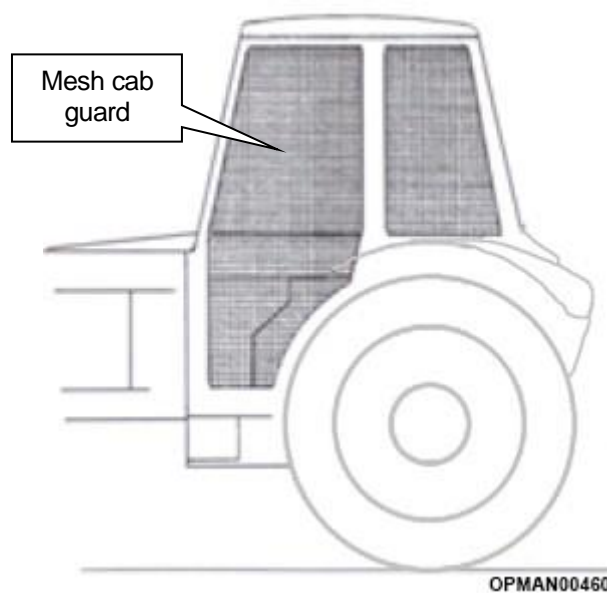


DANGER! When hedge cutting or trimming or any operation where the cutting head is not in contact with the ground, the welded mesh guard; supplied with the machine; must be fitted to the side window of the prime mover cab. Cabs without laminated or toughened glass must also be fitted with a laminated glass or polycarbonate shield in addition to the welded mesh guard.



WARNING! Inspect guards twice daily or immediately damage is suspected.

Always replace guards that have damage or wear which could impair their performance



2.7 Stability

Due to the design of mowers and the work they undertake, it is essential to ensure that the prime mover is stable during work and transport in order to eliminate any risk of loss of directional control, imbalance or overturning.

Before work, extend the arms to full reach slowly and ensure that at full reach the rear wheel on the opposite side to the extended arms is still on the ground. It is advisable to have a helper to check this. Check that the tyre shows evidence of bearing some load.

If the tyre lifts then add ballast in the form of wheel weights to the rear wheel of the prime mover opposite to the extended arms until the tyre shows evidence of bearing some load.

Before driving in transport, place the arm mower in the transport position and again check that all wheels of the prime mover are both on the ground. Again, it is advisable to have a helper to check this. Check that the tyre shows evidence of bearing load. This is especially important to ensure forward directional control at speed on an undulating terrain.

If the front tyres lift add ballast weights to the front of the prime mover.



WARNING! Failure to have sufficient load over the front axle or to drive at inappropriate speeds on undulating terrain may result in a loss of directional control.

If ballast weights have been added to the prime mover, check that the plated prime mover axle loads have not been exceeded.

IMPORTANT: When transporting on the highway, it is the responsibility of the operator to obey all relevant local highway laws.

2.8 Working On Inclined Ground

The ballast instructions in Section 2.7 are sufficient for level ground operation.

Be aware that when working on inclined ground changes in the prime mover centre of gravity can adversely affect the overall stability. As the cutting unit is extended with the arm deployed downhill additional ballast will be required on the rear offside wheel to compensate.

There is naturally a limit to a safe amount of ballast compensation that can be applied for a given prime mover unit and a given incline. If compensating ballast is applied and the compensated axle must be driven on the public highway to reach the work site the operator should ensure that the plated axle load is not exceeded.

Remember, a mower arm represents a significant mass which can generate a significant amount of inertia when moved at speed. Stopping this inertia suddenly can induce overturning reactions.



DANGER! When working on inclined ground avoid high speed hydraulic movements which could cause overturning.

2.9 Working On Embankments

Sudden potholes at speed can quickly cause the prime mover to change direction. At the same time the weight of the implement may try to lift the front axle. This is a potentially lethal combination when working along narrow embankments or dykes and can lead to overturning and potential drowning.

When working on top of embankments it is very important to have sufficient forward stability to ensure rapid steering control. Spearhead recommend 20% forward stability. This means that at least 20% of the total vehicle weight is acting on the steering axle under normal level conditions.



DANGER! When working on raised embankments ensure sufficient weight is on the steering wheels.

2.10 Safety Decals

Safety decals are located on various points of the machine see Figure 2.4a for an example cutting unit attachment and Figure 2.4b for the Twiga Carrier. They can be identified by the yellow upper panel depicting the hazard, and the lower white panel indicating means of avoidance or precautions to be taken. These decals have no text. It is essential that all operators and personnel associated with the machine fully understand their meanings, which are shown in Figure 26.

Safety decals should be kept clean and legible at all times. Any safety decals which are found to be missing or illegible should be replaced.

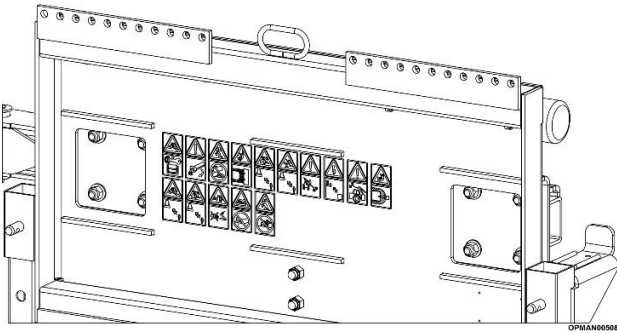


Figure 2.4a

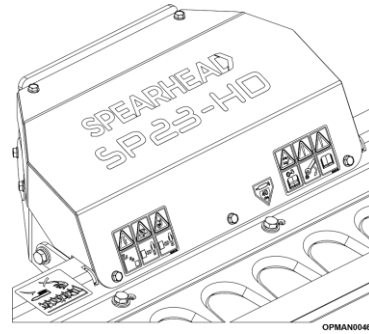


Figure 2.5b
(SP23-HD Cutterbar shown)

 Read instruction manual before operating machine	 Warning! Arms in transport may hit cab if clearance is not sufficient	 Warning! Working arms may hit cab if clearance is not sufficient	 Danger of electric shock, stay clear of cables	 Danger of crushing, stay clear of 3pt linkage hazard zone	 Danger of crushing, stay clear of axle mount hazard zone
 Danger thrown objects, keep all personnel at a safe distance from the machine when working	 Danger rotating machinery keep all personnel at a safe distance from the machine when working	 Danger of entanglement in shaft, keep all personnel clear while tractor is running	 Pinch point, keep clear while tractor is running	 Hot surface do not touch	
 Residual pressure in hydraulic lines. Read instruction book before performing maintenance	 Stop tractor and remove key before unblocking cutting implement or attempting maintenance.	 Keep all nuts and bolts tight	 Do not work or stand under an unsupported cutting unit	 Do not work or stand under an unsupported machine	

Figure 2.6

2.10.1 Proposition 65



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 and 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.

Figure 2.6

3 Machine Preparation

3.1 Prime Mover Requirements

Before fitting the machine to the tractor ensure that specification of the tractor meets the requirements listed below.

3.2 Prime Mover Checks

- 3.2.1.1 Availability of prime mover hydraulic service where the available flow is 50 to 80 litres per minute.
- 3.2.1.2 A suitable mounting interface to the prime mover is available.
- 3.2.1.3 Once the machine is mounted to the tractor and the tractor is correctly ballasted ensure that the maximum axle loads for the tractor have not been exceeded. Failure to meet this requirement may render the operator liable for infringement of public highway regulations.
- 3.2.1.4 Ensure that the tyres fitted to the tractor are correctly rated for the total working weight. NOTE: When the cutting head is deployed in work at the furthest reach the load on the rear tyre on the cutting side increases significantly.
- 3.2.1.5 Spearhead does not endorse the use of water ballast within tyres as this can have adverse effects on fore aft stability at speed.

3.3 Lifting The Machine

The machine will normally be delivered with the arms fully assembled to the support frame, but with the cutting unit detached. If this is not the case then specific re-assembly instructions will be provided with the machine.



WARNING! Only personnel experienced in lift and hoist operation should be involved in lifting machines.

The lifting points; indicated in the Machine general specification in chapter 1 – ‘Machine description’; are for machines without the cutting unit attached. Ensure the correct points are used to suit the machine's condition, as the centre of gravity changes with different configurations (head attached / detached) - Exercise caution!

3.4 Controls Overview

Your Spearhead machine will be supplied without a control system and will rely on the auxiliary controls available with the prime mover. The operator must make sure he is familiar with the use of the prime mover auxiliary controls. Refer to the prime mover operator manual for guidance.

3.5 DIN Mounting To The Prime Mover

The Twiga Carrier attaches to a variety of prime movers via a DIN type interface. The prime mover can be a tele-handler or front loader arms on a tractor, for instance. With these types of machines, an interface kit is usually supplied that will integrate to the quick-attach system, or otherwise the Twiga Carrier can bolt straight on with the aid of the multiple mounting holes supplied on the back of the mounting plate, see Figure 3.5.1

The attached images show a plate system used on a front loader unit. The unit uses a quick release pin that is actuated from the tractor to secure the load onto the loader arms, and a hook arrangement at the top.

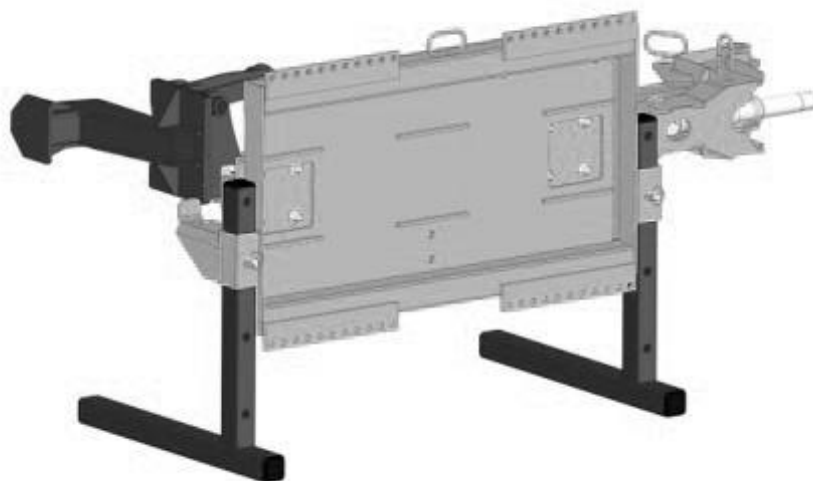
The plates shown are supplied with the loader arms, and are then bolted to the Twiga Carrier DIN plate – this is easiest with the Twiga Carrier stood on its transport legs, at a comfortable height to work on. Once the fasteners are tightened up (to the torque specified in Section 4, the arm is ready to be mounted on the loader. Follow these steps to complete mounting:



- 3.5.1.1 Position the Twiga Carrier on its support legs, with the DIN plate facing the prime mover.
- 3.5.1.2 Drive the prime mover towards the Twiga Carrier, with the arm lowered
- 3.5.1.3 Once close enough, raise the arms slowly to engage the top hook support
- 3.5.1.4 Extend the shot-bolt locking mechanism to lock the DIN plate in position

The hydraulic hose connections then need to be made. The prime mover or front loader typically has connections for these behind and above the loader plate.

- 3.5.1.5 Connect the two 3/4" BSP hoses that supply the saw head to the appropriate quick release coupling on the prime mover
- 3.5.1.6 If fitted, also connect the two 1/4" BSP hoses for the head angling ram to the appropriate quick release ports on the prime mover
- 3.5.1.7 Check that the spool valve lever in the prime mover operates the cowl angling in the required direction – if necessary swap the ports the hoses are connected to on the prime mover
- 3.5.1.8 Make sure that the head is clear of objects, property and personnel, and then carefully engage the saw head by moving the spool valve lever in the prime mover corresponding to the 3/4" BSP circuit
- 3.5.1.9 Let the saw head run for 30 seconds at full speed, and then shut the prime mover down. Check that there are no leaks from this circuit – tighten any loose fittings where oil is seen to be leaking.
- 3.5.1.10 Next, check the head angling ram operation by moving the appropriate lever in the cab of the prime mover. Note that the initial operation may be jerky and sudden as any air is vented out of the system. Check that there are no leaks from this circuit – tighten any loose fittings where oil is seen to be leaking.
- 3.5.1.11 Once the operator is happy that the controls move in the correct sense compared to the lever movement, the machine is ready for work.



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Figure 3.5.1

3.6 Setting Arm Configurations

3.6.1 Manual Shift Operation - Fixed Arm – Twiga Carrier CF20

- 3.6.1.1 In order to move the fixed arm variant between cutting and transport positions, a spanner or socket set with extension will be required.
- 3.6.1.2 Raise the prime mover hydraulics so that the Twiga Carrier is at a comfortable height to work on.
- 3.6.1.3 Loosen the lock nuts on the back of the u-bolts 3 or 4 turns. Take care to not fully remove them as the arm may fall forwards.
- 3.6.1.4 Once the u-bolts have been loosened, the box section can be pulled through to extend the reach sideways. Take care not to pull the box all the way through the u-bolts, as it may drop off from the DIN plate completely. Ensure that the hydraulic hoses do not snag on the steel work as the arm is being moved, otherwise they may be damaged.
- 3.6.1.5 Once the user is happy with the position of the head, re-tighten the lock nuts to 120 Nm

When transporting the Twiga Carrier, the process is a reversal of the extension – loosen locknuts, push the arm back in to its stop, re-tighten locknuts.

3.6.2 Manual Transport / Working Position Operation – Folding Arm - Twiga Carrier CF30

- 3.6.2.1 Starting with the arm in its folded transport position (Figure 3.6.2.1), the process to prepare it for work is as follows:
- 3.6.2.2 Park up with the Twiga Carrier and prime mover on level ground, and the arm presented to the user at a comfortable height to work on.
- 3.6.2.3 Remove the stowage pin by first removing the circlip from the bottom of the pin, then withdrawing the pin fully (Figure 3.6.2.3)



Figure 3.6.2.1 – Transport Position



Figure 3.6.2.3 – Pin Removal

- 3.6.2.4 Pull the arm around to the side, being careful that the arm does not swing out under its own weight.
- 3.6.2.5 Once the two box sections are in line, the breakout ram should be guided into the clevis on the back of the moving arm. Once the ram rod is in the clevis, insert the stowage pin that was removed in point (2) above, and secure it with the circlip. (Figure 3.6.2.5)



Figure 3.6.2.5 – Insert Pin

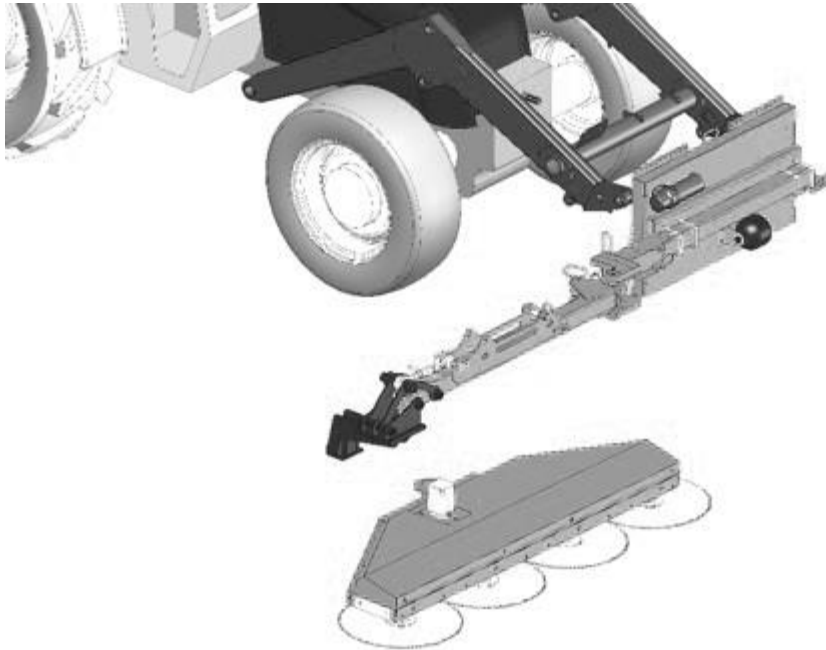
- 3.6.2.6 Ensure that the hydraulic hoses have not been trapped or pinched in a joint
- 3.6.2.7 The machine is now ready for operation.
- 3.6.2.8 When folding the arm for transport purposes, the process is a removal of extension – remove the stowage pin, fold the arm, re-insert stowage pin

4 Cutting Units

4.1 Mounting The Cutting Unit

With the machine assembled, the cutting unit can now be fitted to the end of the arms. To do this;

- 4.1.1.1 The Twiga Carrier includes a cowl interface bracket that mates to the cutting units bolt holes.
- 4.1.1.2 The cutting unit itself will typically be stored on a pallet, on the ground, with its blades flat to the pallet.
- 4.1.1.3 With the Twiga Carrier attached to the prime mover (see Section 3.5), the cowl bracket should be angled so that the mounting plate is parallel with the ground (Figure 4.1.1.3)



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Figure 4.1.1.3 – Plate Parallel To Ground

- 4.1.1.4 Lower the arm set via the prime mover's controls, and approach the cutting unit slowly using the lowest gear selection possible.
- 4.1.1.5 Once the arm set is as close as possible to the cutting unit, the final adjustment can be made by the operator once they have dismounted from the prime mover. Drag the pallet along the ground to accurately line the holes up (Figure 4.1.1.5)
- 4.1.1.6 Insert the set screws and tighten to 80Nm torque.
- 4.1.1.7 Connect the 3/4" motor hoses from the Twiga Carrier to the cutting unit, using the male-male adaptors included
- 4.1.1.8 Re-check all hydraulic connections and ensure all fasteners are secure and tight.
- 4.1.1.9 The Twiga Carrier can now be lifted via the prime mover hydraulics, ready for cutting.

4.2 Connecting The Cutting Unit Motor

Connection of the drive hoses to the cutting unit motor will determine the direction of rotation of the cutting rotor shaft.

4.2.1 Checking Cutting Disc Rotation Direction

Having connected the hoses to the motor supplied, then;

- 4.2.1.1 Start the tractor and engage the Hydraulic drive service.
- 4.2.1.2 Switch on the rotor control from the prime mover cab.
- 4.2.1.3 Check the direction of rotation of the rotor.
- 4.2.1.4 Stop the rotor and the tractor.
- 4.2.1.5 If the rotor has run in the wrong direction, reverse the large hoses on the motor.

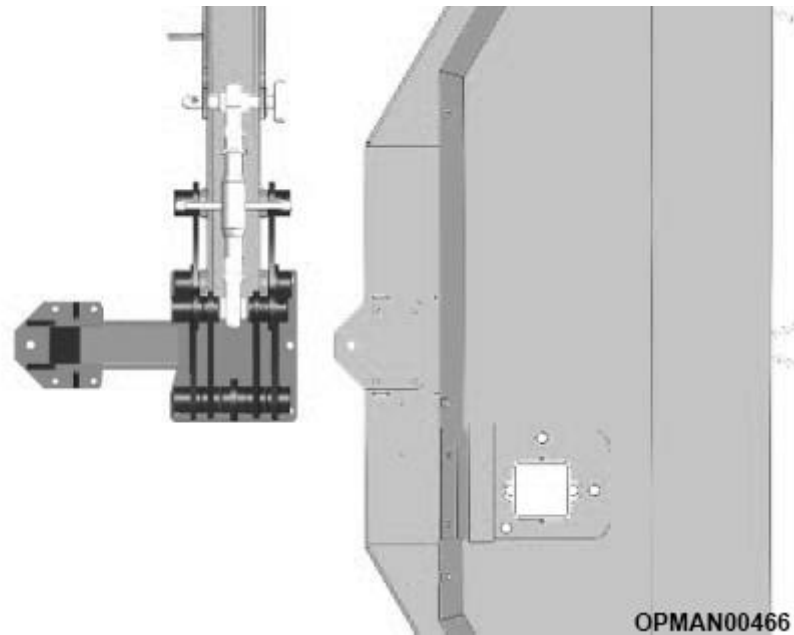


Figure 4.1.1.5 – Line Up Holes On Cutting Unit

- 4.2.1.6 Insert the set screws and tighten to 80Nm torque.
- 4.2.1.7 Connect the 3/4" motor hoses from the Twigia Carrier Arm to the cutting unit, using the male-male adaptors included
- 4.2.1.8 Re-check all hydraulic connections and ensure all fasteners are secure and tight.
- 4.2.1.9 The Twigia Carrier Arm can now be lifted via the prime mover hydraulics, ready for cutting.

5 Installation Checks

With the machine fully assembled, familiarize yourself with all the controls, start the prime mover and check for leaks.

5.1 Breakout Checks – Twiga Carrier CF30 only

Twiga Carrier CF30 breakout systems are designed for the purpose of providing initial protection to the mower and its cutting attachment. This protection is to be afforded in the relatively rare circumstance that an obstruction; unseen by the operator; is encountered during work.

Breakout systems are not designed as a complete protection system to remove operator responsibility. The operator must always be in control. By breaking back the arm signals to the operator that an obstruction has been encountered or that the operator is driving too fast for the cutting conditions. It is then the responsibility of the operator to take appropriate action to prevent any further damage to the arm mower. Damage resulting from continuing to work with the arm 'broken back' will invalidate warranty claims.

In most cases the speed of response required by the operator is proportional to the cutting speed. Operators must therefore work responsibly and appropriately for the cutting conditions and within their own individual capability. To monitor on going capability Spearhead Machinery endorses the maintenance of operator training records.

There are several types of breakout employed on Spearhead machines depending on the duty cycle envisaged for the machine. Take time to familiarise yourself with the breakout supplied with your machine. Make sure you are familiar with its capability before commencing work. The different types are;

5.1.1 Hydraulic Breakout

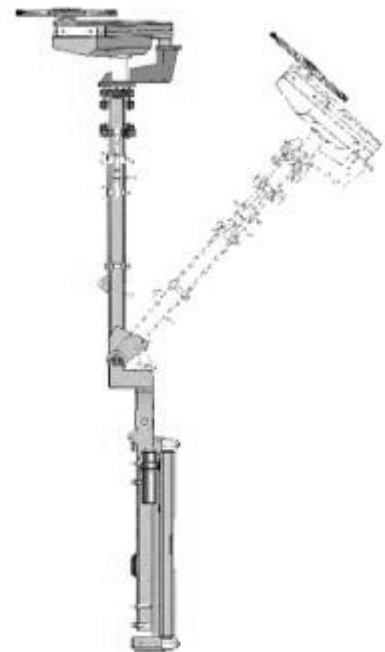
On Twiga Carrier CF30 machines with hydraulically driven arm slewing capability there is a hydraulic breakout which operates on the slew ram. In the event that the cutting unit or arm structure sees a push back force so pressure in the slew ram rises. A pre-set pressure relief cartridge determines the degree of breakout force. Once the relief pressure is exceeded the displaced oil is collected in a pressurised accumulator. This oil stored under pressure is given back to the ram when the push back obstacle is removed and allows the arm to 'recover' its former cutting position automatically. Approximately 25 degrees of recovery is available depending on slew ram and accumulator capacity; see Figure 5.1. Once the accumulator is full and the arm is pushed further back then the arm will need to be powered back into the cutting position.



CAUTION! The accumulator bottle may hold residual hydraulic pressure when not in use. Servicing or repair should only be carried out by skilled hydraulic technicians.



WARNING! The break out relief force is calculated for maximum reach. As a result take care when cutting 'close in' to the tractor as the mechanical advantage is reduced and the force to breakout increases significantly. Be extra vigilant and reduce forward speed. The fatigue life of the arm may be shortened by repeated exposure to 'close-in' breakout loads.



OPMAN00467

Figure 5.1

5.2 Hydraulic Hose Checks

It is important that hoses are fitted correctly. Always check all hoses to ensure that there are no kinks or sharp bends, and that the hoses do not chafe against sharp edges. The following guidelines should be used when checking the hosing of the machine prior to work;

5.2.1 Twists

Hoses should never be twisted or kinked. On most hoses there is a line which runs the full length of the hose acting as a useful guide. If a visual check reveals that no guideline is present along a hose, refer to Figure 5.2 and conduct the following check;

- 5.2.1.1 Loosen any clamps.
- 5.2.1.2 Attach one end of the hose to its coupling, but do not tighten.
- 5.2.1.3 Place the hose in its required position.
- 5.2.1.4 Connect the other end loosely to its union.
- 5.2.1.5 Tighten the and with any angled fittings first ensuring it is in the right position for its intended run.
- 5.2.1.6 Now tighten the straight end. It is possible that as the nut is tightened the hose may twist slightly.
- 5.2.1.7 If this happens, slacken off the nut and turn the hose in the opposite direction to that caused by tightening. Then, re-tighten the nut bringing the hose back to the central position.
- 5.2.1.8 Otherwise tighten the fitting fully. Torque settings for both BSP and Metric hose fittings are shown in Figure 5.5 below.
- 5.2.1.9 Tighten any clamps.
- 5.2.1.10 Finally re-bleed the rams and operate the arms in all positions whilst carefully checking for any twists and obstructions.

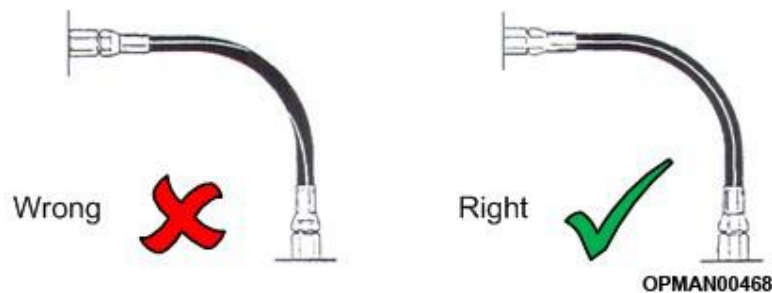


Figure 5.2

5.2.2 Sharp Bends

Hoses should always be fitted to allow enough hose radius for free movement, see Figure 5.3. It is also important to avoid sharp bends in hoses. As a general guideline hoses should not be bent round a radius smaller than ten times the hose diameter. This will vary with hose construction and any queries about specific hoses should be addressed to the Spearhead Machinery service department.

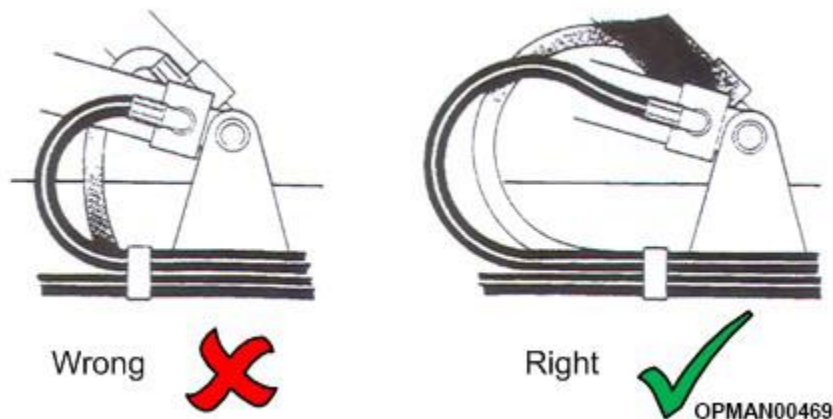


Figure 5.3

5.2.3 Chafing Hoses

It is important that hoses are fitted and clamped so that hose chafing is avoided. Always give plenty of clearance around sharp edges see Figure 5.4.



Figure 5.4

BSP SWIVEL FEMALE TORQUE VALUES				
Thread Diameter (inch)	Metric (Nm)		Imperial (lbf.ft)	
	nominal	Min - max	nominal	Min - max
1/4	20	15 - 25	14.75	11.06 - 18.44
3/8	34	27 - 41	25.07	19.91 - 30.24
1/2	60	42 - 76	44.25	30.97 - 56.05
5/8	69	44 - 94	50.88	32.45 - 69.32
3/4	115	95 - 135	84.81	70.06 - 99.56
1	140	115 - 165	103.24	84.81 - 121.68
1 1/4	210	140 - 280	154.87	103.24 - 206.49
1 1/2	290	215 - 365	213.86	158.55 - 269.17

METRIC SWIVEL FEMALE TORQUE VALUES				
Thread Diameter (mm x pitch)	Metric (Nm)		Imperial (lbf.ft)	
	nominal	Min - max	nominal	Min - max
M 16x1.5	26	25 - 28	19.18	18.44 - 20.65
M 18x1.5	37	35 - 39	27.29	25.81 - 28.76
M 22x1.5	47	45 - 50	34.67	33.19 - 36.88
M 26x1.5	89	85 - 94	65.64	62.69 - 69.33
M 30x2.0	116	110 - 121	85.56	81.13 - 89.25
M 36x2.0	137	130 - 143	101.05	95.88 - 105.47
M 45x2.0	226	215 - 237	166.69	158.58 - 174.80
M 16x1.5	42	40 - 44	30.98	29.50 - 32.45
M 18x1.5	53	50 - 55	39.09	36.88 - 40.57
M 20x1.5	63	60 - 66	46.47	44.25 - 48.68
M 22x1.5	79	75 - 83	58.27	55.32 - 61.22
M 24x1.5	84	80 - 88	61.99	59.00 - 64.91
M 30x2.0	126	120 - 132	92.93	88.51 - 97.36
M 36x2.0	179	170 - 187	132.02	125.39 - 137.92
M 42x2.0	263	250 - 275	193.98	184.39 - 202.83

Figure 5.5

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6 General Operation

6.1 Operator Training

These notes are produced for guidance and are intended to help the operator obtain the best results from the machine, with the minimum of trouble and downtime. The operator should read the following pages carefully and be familiar with the contents before commencing work. A familiar knowledge of the operator instruction manual forms an essential part of the training record for a competent user.

This machine is designed solely for vegetation control and must not be used for any other purpose. Use in any other way is considered as contrary to the intended use. Compliance with, and strict adherence to, the conditions of operation, service, and repair, as specified in this manual is also considered as the intended use.

This machine should be operated, serviced, and repaired only by persons who are familiar with its particular characteristics and who are acquainted with the relevant safety procedures. Accident prevention regulations, all other generally recognised regulations on safety and occupational medicine, and all road traffic regulations must be observed at all times.

This operator's manual should be regarded as part of the machine. Suppliers of both new and second hand machines are advised to retain documentary evidence that this manual was provided with the machine. Make a note of the serial numbers inside the front cover of this manual. The serial number is stamped on the mainframe of the arm mower and on the cowl of the cutting unit. Always quote these numbers in any correspondence with a dealer.

The parts manual supplied with the machine is specific to the construction of the machine. It will already contain the machine serial number on each page. Upon delivery always confirm that the parts book serial number matches the machine serial number.

6.2 Machine Inspection Records

Section 6.2.2 below offers a pro-forma for an inspection record sheet which can be used when inspecting a Spearhead Twiga Carrier. This form can be photocopied from the manual. When completed and filed in a machine log these records together with the operator training records and service records can accumulate to a useful machine ownership record.

Machines should be checked pre-delivery, post installation and prior to each work shift. Inspection should be carried out preferably by the operator or a suitably qualified responsible person.

The tractor engine must be switched off with the key removed. The cutting head must be positioned flat on the ground or suitably rested on blocks either side of the cutting head. All hydraulics must be rested and residual pressure removed from any of the rams. Cleaning the machine will help with this inspection.


6.2.1 In The Maintenance Tool Box

The maintenance toolbox should contain a selection of replacement parts matching those fitted to the flail head prior to work. The toolbox should also contain the appropriate spanners (metric) to make the changes to flails and guarding if necessary.

6.2.2 Machine Inspection Record Sheet

See table oversheet;

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	MACHINE INSPECTION RECORD (For Twiga Carrier CF20/30)	Pre-delivery inspection:	Select
		Installation inspection:	Select
		Daily pre-work inspection:	Select
Model:	Serial No:		
Inspector name (print):	Inspection date:		
Company/Position:			
Inspector signature:			
Visual Checks		Comments	OK
Check that an operator's instruction manual in the correct language for the working territory is in the machine document holder.			
Check that the serial number printed on the parts manual supplied with the machine matches the serial number of the machine.			
Warning decals are present, clean and in good order			
Check arms and mainframe for any structural problems			
Look for any evidence of motor oil leaks			
View the cutting unit for any damage to the cutting edges			
Review all the guards fitted to the machine and tractor, check with the instruction book if unsure.			
If fitted, check that the cutting head wire trap is in good order.			
Road lighting is clean and in working order			
Review the control mount in the cab for security and ease of use.			
Check hoses for damage, kinks, twists, chafing or weeping.			
Check that the prime mover is equipped to supply the correct hydraulic flow and pressure			
Mechanical Checks		Comments	OK
All mounting fasteners to tractor need to be checked for tightness and integrity. This may require the machine being taken off the tractor to do this.			
Review the security and tightness of the main pivot pins and replace any missing securing pins.			
Check the security of any hose fittings for tightness			
Check and adjust tractor tyre pressure. See tractor instruction book.			
Running Checks		Comments	OK
Once you are happy with the above start the tractor and run through the operational checks below.			
Ensure that the controls respond as intended moving the rams in a smooth manner			
Lifting the rotor from the ground run the rotor up to operating speed and check for vibration. If vibrating check with the instruction book for reasons.			
Check the condition and tightness of any adjustment pads, if fitted.			
Check the function of the breakout system(s) fitted to the machine – Twiga Carrier CF30 only			

Other comments:

Other comments continued:

Disclaimer: All guidance and maintenance advise to be carried out on the Quadsaw as written in this inspection record is deemed on the provision that the operator/maintenance operative has fully read and understood the specific operators manual for the given model of machine and follows the guidance and safety precautions described within it.

Spearhead claims no responsibility to any machine and/or physical harm caused by anything other than the practice guidelines stated in its specific machine model operators manual.

Spearhead Machinery Ltd
Station Road, Salford Priors, Evesham, Worcestershire, WR11 8SW, England
Tel: +44 (0)1789 491860

6.3 Basic Machine Controls

Check that the prime mover is equipped to deliver the correct hydraulic flow and pressure for the fitted cutting unit. Refer to the operator manuals for the fitted cutting unit and the prime mover.

The Twiga Carrier attachment is a very basic system that can be ordered without any additional control of the attachment, other than turning the hydraulic motor on and off for the blades.

If fitted, the attachment can be angled via a hydraulic ram, to give the operator a certain degree of controllability of the cut – this allows the cut to be made either vertically, horizontally, or anywhere in between. Care must be taken by the operator when angling the attachment, so that the debris thrown is not angled towards road ways or footpaths, or even towards the driver's cab.

6.3.1 Machine Pre-Start Check

At every opportunity and before getting into the cab and starting the engine perform the following inspections;

- 6.3.1.1 Check that the attachment is free from obstructions especially pieces of wire.
- 6.3.1.2 Check that all cutting elements are in good condition and securely attached.
- 6.3.1.3 Check that all guards are in their correct place and in good condition (see Safety chapter).

6.3.2 Starting Up Procedure

- 6.3.2.1 **Cold start up:** When starting the machine for the first time; when the hydraulic oil is cold; and prior to commencing work, it is essential that the prime mover's pumps must **not** be run at working speeds initially. To avoid cavitation the pumps should be allowed to warm up gradually.

6.3.3 Normal Start Up



CAUTION! Do not start the cutting attachment while it is under load. Always free the cutting attachment from any obstructions first.

6.3.4 Transportation To Work Site

Normally the machine will need to be driven to the work site before commencing work. To keep the tractor and machine width to a minimum it is necessary to fold the arms to the transport position which is illustrated in the 'Machine general specification' in Section 1. On Twiga Carrier CF30 models with a slew breakout ram the arms may also be slewed back at an angle to provide a narrower transport position.

Before driving on the public highway check the following;

- 6.3.4.1 All hoses are sufficiently clear of the tyres to prevent contact during bounce and sway on braking, turning and undulating ground.
- 6.3.4.2 It is an essential requirement that when the machine is in the transport position all the isolator valves are closed.
- 6.3.4.3 When transporting with the arms slewed back, keep the first arm vertical as the arms can bounce forward and damage the tractor cab.
- 6.3.4.4 Ensure sufficient ballast is added to the front of the tractor to maintain steerage under bounce conditions.
- 6.3.4.5 Ensure that the rear axle load does not exceed the plated axle limit for the tractor
- 6.3.4.6 Ensure the rear tyres are correctly inflated and rated for the axle load.
- 6.3.4.7 Ensure all stop, tail and indicator lights (if fitted) are in working order.
- 6.3.4.8 Ensure all stop, tail and indicator lights are visible to road users at the rear and fit a trailer bar if appropriate.

IMPORTANT: When transporting on the highway, it is the responsibility of the operator to obey all relevant local highway laws.

IMPORTANT: Pay due care and attention to the driving conditions and drive accordingly. **DO NOT** travel too quickly over undulating ground. In transport the arms and cutting attachment represent heavy masses on long lever arms, thus braking, turning, sway and bounce can magnify forces and induce significant and damaging

loads into the mainframe which is rigidly attached to the tractor. Spearhead Machinery will not warrant damage bought about by abuse of the machines intended use or neglectful handling.

6.4 Cutting Guidelines

6.4.1 The Work Area

- 6.4.1.1 Examine the piece of work to be cut. It is very important that the work site is inspected before cutting and all hidden obstructions removed or their position clearly marked so that they may be avoided.
- 6.4.1.2 Check hedges for wire and fencing stakes, and ditches for tree stumps, drain pipes, large stones, etc.
- 6.4.1.3 Stalling the cutting attachment in heavy growth is likely to cause damage to the machine.
- 6.4.1.4 Do not operate the machine with the cutting attachment slewed more than 40° backwards and ensure sufficient stability ballast is used when cutting in a slewed position. (Twiga Carrier CF30 only)



WARNING! Do not allow personnel near the machine while it is operating.

6.4.2 General Cutting Hints

- 6.4.2.1 **DO NOT** angle the cutting attachment in such a way as to throw cut material towards the tractor.
- 6.4.2.2 Avoid rushing into the work.
- 6.4.2.3 Always give the cutting attachment enough material to 'bite' into, particularly when a hedge has a lot of leaf and very flexible thin stems.

6.4.3 Hedge Cutting Hints

- 6.4.3.1 Consider how the job should be done before commencing work, as every hedge has a different height, width, thickness and density of growth. Hedges that have previously been cut by machine tend to have denser growth, and although they can be cut to any desired shape, it is advisable to trim to the same shape and height as before.
- 6.4.3.2 Cutting causes the new growth to 'tiller' (spread out) and thicken up the hedge. Therefore it is advisable to cut the hedge side at a slight angle rather than straight, otherwise the hedge may eventually die at the bottom due to lack of light. The following information gives a few hints on how to tackle a hedge.
- 6.4.3.3 First trim the top down to the height of the previous year's trim in one cut, but do not cut into it as the old growth will be very thick and strong and can cause premature wear to the blades.
- 6.4.3.4 Next trim the sides to the previous trim but not into it.



WARNING! Do not angle the cutting attachment so that debris is thrown through the hedge when trimming the far side of the hedge. Always ensure that cut material is directed away from you or on to the ground.

6.5 Hydraulic Breakout – Operation And Servicing - Twiga Carrier CF30 only

The Twiga Carrier CF30 is fitted with a sealed-circuit hydraulic ram and hydra-cushion. The circuit is pre-charged at the factory to create the correct breakout force, which has been calculated to ensure the arm and the attachment are not damaged when the user collides with an immovable object, or if the user tries to drive too fast whilst cutting.

Over time this circuit may leak some hydraulic pressure through operational wear on the ram seals, or may need to be serviced if a hose is damaged during work. This means that the circuit will need to be recharged to the correct pressure, after any remedial work has taken place to rectify a fault.

Recharging is as follows:

- 6.5.1.1 Locate the quick release fitting next to the hydra-cushion device. This should be fitted with a male $\frac{1}{2}$ " BSP fitting. (see Figure 6.5.1.1)
- 6.5.1.2 Attach a suitable hydraulic hose to the fitting that has a pressure gauge in the circuit.
- 6.5.1.3 Using a hydraulic pressure source (power pack, tractor spool valve etc.), slowly add oil into the system until the gauge reads 90 bar / 1305 PSI.
- 6.5.1.4 Vent any pressure in the system (the breakout circuit will seal itself). Detach the quick release fitting and gauge assembly, cleaning up any spilt oil.
- 6.5.1.5 Check the breakout function in operation. If after recharging the breakout does not operate correctly, please contact your nearest Spearhead authorised dealership.

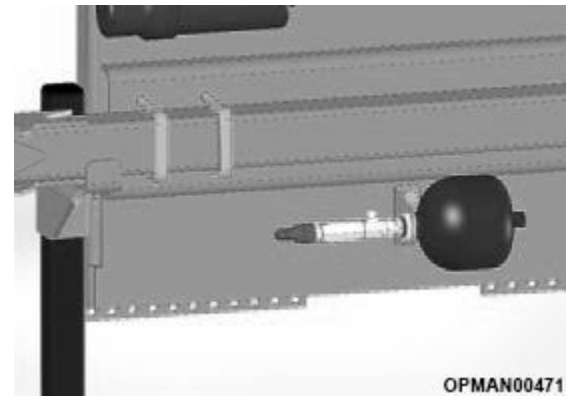


Figure 6.5.1.1 – BSP Fitting

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7 Removal, Storage And Disposal

Before removing the machine from the tractor a thorough check of the machine should be made.

7.1 Preparation For Storage

Thoroughly clean all moving parts, particularly the cutting unit. Check that all blades are in place and that they are in good condition. Check all hoses for damage such as cracks, evidence of chafing and leaks. Smear all unpainted metal parts with grease and lubricate all grease nipples. Finally, in preparation for next seasons cutting make a note of any item that needs replacing so that parts can be ordered in good time.

7.2 Parking And Removal

In the parked position the machine is on its stands with the cutting attachment on the floor. If possible the cutting attachment should be placed in such a way that the stands and cutting attachment form a triangle with the bulk of the machine between them. This then forms a stable 'tripod' which can withstand inadvertently applied forces during storage and better resist toppling forces. See example in Figure 7.1.

Note: Not all machines have arm slewing capability and even some that do are restricted in parking capability due to attachments or forward reach arms. However, it is good practice when parking-up the machine for any length of time to make best use of the cutting attachment placement on the ground to enhance the stability of the stands.

The following guidelines should be used when parking-up the machine at the end of the season;

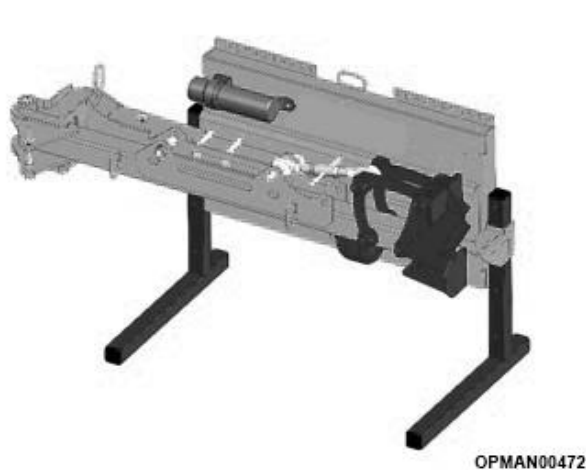


Figure 7.1

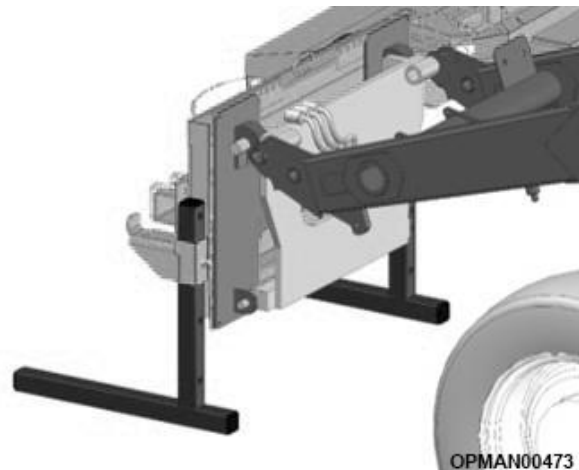


Figure 7.2.1.3 – Legs Mounted

7.2.1 De-mounting The Twiga Carrier

When work with the Twiga Carrier is finished, and the operator requires the unit to be dismantled, there are some steps to follow that differ depending on which model of the arm is used.

For units without the hydraulic breakout (Twiga Carrier CF20):

- 7.2.1.1 The arm must be retracted into the transport position (see Section 3.6.1 for moving the fixed arm in and out)
- 7.2.1.2 The attachment must be folded back over onto itself via the angling ram (if fitted) or the pin removed and replaced in the correct hole to do so on the manual version.
- 7.2.1.3 Transport legs must then be inserted into the box sections (see Figure 7.2.1.3) so that the machine will be able to support itself. Insert the locking pins and the lynch pins to keep them in place.
- 7.2.1.4 Remove all hydraulic hoses from the prime mover. Be careful when removing attachment ram hoses that the attachment does not move once the pressure changes after the quick release has been removed.
- 7.2.1.5 The Twiga Carrier must then be lowered onto level ground. Once the machine has firmly settled, any locking mechanism that the prime mover employs can be retracted to leave the machine free.
- 7.2.1.6 Reverse the prime mover away from the Twiga Carrier. The process is now complete.

For units with the hydraulic breakout fitted (Twiga Carrier CF30):

- 7.2.1.7 The arm must be folded into the transport position (see Section 3.6.2 for moving the breakout arm in and out)
- 7.2.1.8 The attachment must be folded back over onto itself via the angling ram (if fitted) or the pin removed and replaced in the correct hole to do so on the manual version.
- 7.2.1.9 Transport legs must then be inserted into the box sections (see Figure 7.2.1.3) so that the machine will be able to support itself. Insert the locking pins and the lynch pins to keep them in place.
- 7.2.1.10 Remove all hydraulic hoses from the prime mover. Be careful when removing attachment ram hoses that the attachment does not move once the pressure changes after the quick release has been removed.
- 7.2.1.11 The Twiga Carrier must then be lowered onto level ground. Once the machine has firmly settled, any locking mechanism that the prime mover employs can be retracted to leave the machine free.
- 7.2.1.12 Reverse the prime mover away from the Twiga Carrier. The process is now complete.

7.3 Disposal

When Spearhead equipment reaches the end of its economic working life it should be disposed of responsibly, either through an approved recycling centre or by compliance with all applicable regulations in force in its final destination territory.

In most instances Spearhead machines can be broken into its constituent parts with the use of basic workshop equipment.

Figure 7.2 contains a typical list of constituent materials, together with disposal guidelines.

When undertaking a machine breakdown take care to ensure heavy parts are adequately supported at all times to avoid injury and take containment precautions to retain control of liquids to avoid environmental contamination.

It is the owner's responsibility to ensure the machine is disposed of in accordance with all applicable regulations.

Material	Typically found in;	Disposal guideline
Steel	Structural components, fixed guards, fasteners and driveline	Can be dismantled and recycled. Take care when handling heavy and/or sharp objects
Aluminium	Pump and gearbox housings, serial number plates	Can be dismantled and recycled. Take care when handling heavy and/or sharp objects. Take appropriate actions for oil contaminated products
Copper	Wiring, electrical components	Can be recycled using appropriate recovery procedures.
Hydraulic oil	Tank, hydraulic components	Dispose of in accordance with all applicable regulations
Rubber	Hoses, flexible guards, seals, 'O' rings	Dispose of in accordance with all applicable regulations
Plastics	Clips, caps, cable ties, decals, filter housings, document holders, bushes, electrical components, plugs, connectors, wire insulation	Dispose of in accordance with all applicable regulations
Filter element	Filter housings	Dispose of in accordance with all applicable regulations
Cork / paper	Gaskets	Dispose of in accordance with all applicable regulations

Figure 7.2

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8 Maintenance

For routine maintenance or repair spare parts may be obtained from the Spearhead parts department.

To obtain correct part numbers; use the Spearhead on-line parts books. These are available at <https://my.spearheadmachinery.com/parts/public-interactive-parts-database/>. You will need to enter the machine serial number. The correct part numbers must be quoted when ordering spares.

8.1 Hydraulic components

8.1.1 Valves

For valve hosing information refer to the online parts manual specific to the serial number of your machine, by using the Spearhead on-line parts books. This is available at <https://my.spearheadmachinery.com/parts/public-interactive-parts-database/>.

The online parts book contains a hosing diagram for the whole machine.

8.1.2 Rams

It is advisable to check all ram caps for tightness occasionally and if found to be loose tighten them immediately.

8.1.3 Hoses

It is false economy to try and make a damaged hose last a bit longer, because a failure can spill a lot of oil on the road endangering traffic, the environment and costing money. To reduce the risk of this happening and ensure a long life from the hoses, follow the guidelines below. On a weekly basis:

- 8.1.3.1 Check that all hoses and their connections are in good condition and that there are no leaks or damage. Pay particular attention to the rotor drive circuit. Replace any hose that is leaking or damaged.
- 8.1.3.2 Check to see that hoses are not and have not been chafing against sharp edges. If evidence of chafing is found then inspect for damage and if found replace. Re-route any hose that has been chafing; see section on 'Hydraulic hose checks' in 'Installation' chapter.
- 8.1.3.3 Check to ensure that hoses are fitted without kinks or sharp bends. Pay particular attention to the suction hose from the tank to the pump.
- 8.1.3.4 If in doubt about the condition of any hose replace it. When replacing hoses, be sure to tighten to the correct torque setting, see Figure 8.1.



WARNING! Some hoses may contain residual pressure, take care when removing them.

BSP SWIVEL FEMALE TORQUE VALUES				
Thread	Metric (Nm)		Imperial (lbf.ft)	
Diameter (inch)	nominal	Min - max	nominal	Min - max
1/4	20	15 - 25	14.75	11.06 - 18.44
3/8	34	27 - 41	25.07	19.91 - 30.24
1/2	60	42 - 76	44.25	30.97 - 56.05
5/8	69	44 - 94	50.88	32.45 - 69.32
3/4	115	95 - 135	84.81	70.06 - 99.56
1	140	115 - 165	103.24	84.81 - 121.68
1 1/4	210	140 - 280	154.87	103.24 - 206.49
1 1/2	290	215 - 365	213.86	158.55 - 269.17

Figure 8.1 .../cont'd

METRIC SWIVEL FEMALE TORQUE VALUES				
Thread	Metric (Nm)		Imperial (lbf.ft)	
Diameter (mm x pitch)	nominal	Min - max	nominal	Min - max
M 16x1.5	26	25 -28	19.18	18.44 - 20.65
M 18x1.5	37	35 – 39	27.29	25.81 – 28.76
M 22x1.5	47	45 – 50	34.67	33.19 – 36.88
M 26x1.5	89	85 – 94	65.64	62.69 – 69.33
M 30x2.0	116	110 – 121	85.56	81.13 – 89.25
M 36x2.0	137	130 – 143	101.05	95.88 – 105.47
M 45x2.0	226	215 – 237	166.69	158.58 – 174.80
M 16x1.5	42	40 – 44	30.98	29.50 – 32.45
M 18x1.5	53	50 – 55	39.09	36.88 – 40.57
M 20x1.5	63	60 – 66	46.47	44.25 – 48.68
M 22x1.5	79	75 – 83	58.27	55.32 – 61.22
M 24x1.5	84	80 – 88	61.99	59.00 – 64.91
M 30x2.0	126	120 – 132	92.93	88.51 – 97.36
M 36x2.0	179	170 – 187	132.02	125.39 – 137.92
M 42x2.0	263	250 - 275	193.98	184.39 – 202.83

Figure 8.1

8.2 Structural Components

8.2.1 Pins

Periodically check all pins for damage, wear and correct retention.

8.2.2 Greasing

There are a number of greasing points on the machine that need regular attention;

- 8.2.2.1 All pivot bushes on rams, arms and cowl linkage equipped with a grease nipple,
- 8.2.2.2 The breakaway link on the arm (Twiga Carrier CF30 only),
- 8.2.2.3 bearings

These should all be greased after every 50hrs of work.

IMPORTANT: Any good quality lithium based grease may be used for lubrication of pivot pins and bearings.

9 Trouble Shooting

Trouble shooting - Arm mower base unit issues			
	Symptom	Possible cause	Remedy
9.1	Oil over-heating	a) Forward cutting speed too fast	Drop a forward gear and re-try
9.2	Cutting power reduces with time	b) Problem with one of the hydraulic components i.e. motor, ram	Take machine to a Spearhead dealer for a full hydraulic diagnostic check
9.3	Controls not responding	a) Ram hoses not connected	Ensure hoses are correctly seated on the prime mover
		b) Faulty controls in prime mover	Contact your prime mover's dealership
		c) Leaking PO check valves	Change the PO check valve for the valve section
9.4	Breakout too weak (Twiga Carrier CF30 only)	a) Too fast forward speed	Reduce forward speed
		b) Breakout pressure too low	A dealer technician will need to check the breakout pressure.
		c) Blown ram seals	Add a tap to line, switch off and test. If still weak then replace ram seals.
		b) Loss of gas charge (nitrogen)	Switch off tap and hold attachment at full reach about 2m from ground. Switch tap on, head should drop about 0.5m. If solid replace accumulator. Accumulators are not serviceable
9.5	Poor cutting performance	a) Blades worn out	Replace blades once the performance has dropped below an acceptable level
9.6	Vibration – Investigate reasons quickly!	a) Lost cutting blades(s)	Replace any missing blades
		b) Worn bearings	Move attachment from horizontal to vertical and if the vibration changes significantly replace bearings.
		c) Bent cutting disc(s)	Replace discs or contact Spearhead Machinery shaft reconditioning service
9.7	Blades continually stall	a) Forward cutting speed too fast	Reduce forward cutting speed
		b) Worn motor	If a worn motor is suspected, take machine to a Spearhead dealer for a full hydraulic diagnostic check

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10 Spare Parts

10.1 How To Obtain The Correct Spare Part Numbers

For correct part numbers; use the Spearhead interactive online parts books. These are available at <https://my.spearheadmachinery.com/parts/public-interactive-parts-database/>. You will need to enter the machine serial number.

10.1.1.1 Enter the serial number.

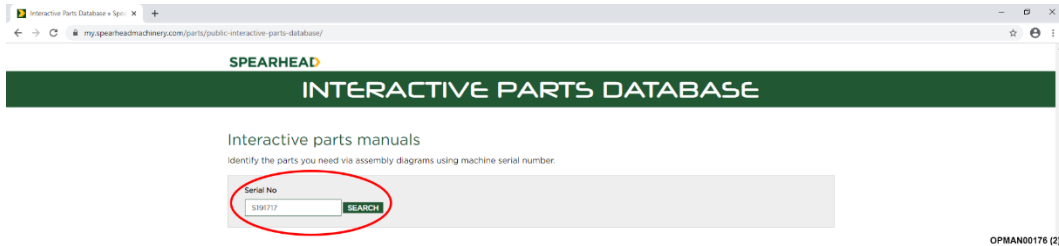


Figure 10.1 – Type In Serial Number

10.1.1.2 After entering the serial number a specification for the machine will appear. Click on the serial number; see Figure 10.2.

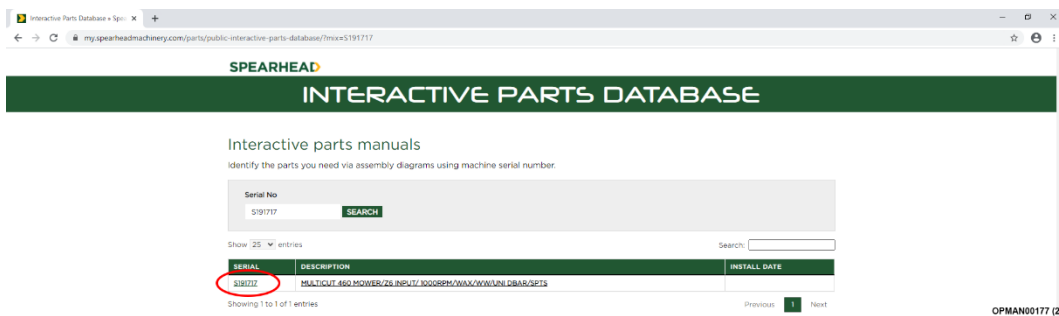


Figure 10.2 – Click On Serial Number

10.1.1.3 After clicking on the serial number a full parts breakdown, specific to the machine serial number will appear showing the various parts and assemblies of the machine. Click on the specific assembly picture required; see Figure 10.3.

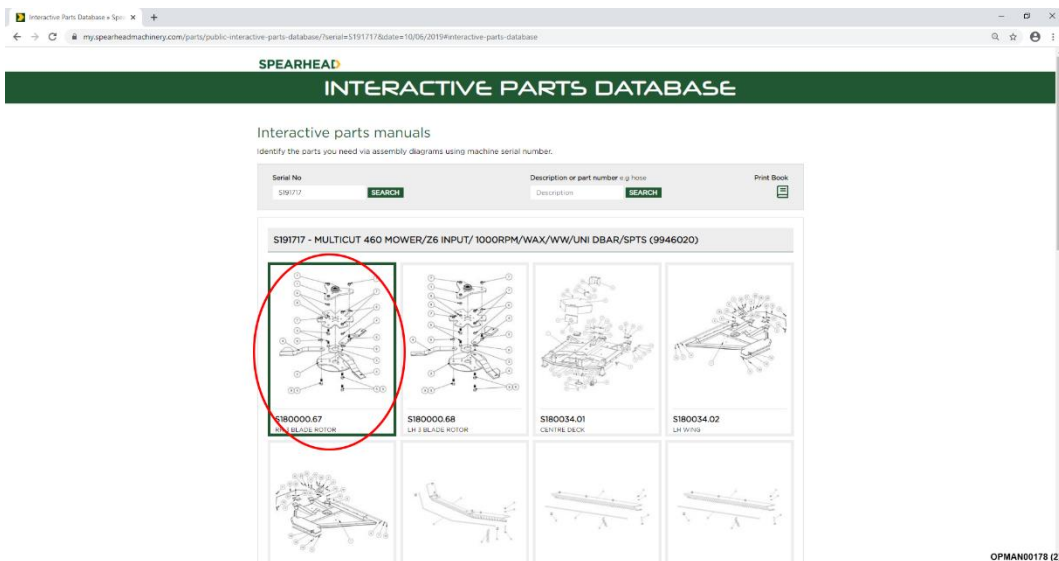


Figure 10.3 – Click On Assembly

10.1.1.4 You will finally be presented with a full exploded parts breakdown for that particular assembly, giving part numbers and the quantities required; see Figure 10.4.

The screenshot displays the 'INTERACTIVE PARTS DATABASE' interface. It features a search bar with 'Serial No' and 'Description or part number' fields. Below the search bar is a table titled 'Print Part List and diagram' with the following data:

Ref	Part No	Description	QTY
1	1770602-342	CHIMBLADE CARRIER LINES (10)	1
2	1770609	LOWER BLADE CARRIER LINES	1
3	1770604-3	SPACER	1
4	7770700	BLADE - RH C/W PIN 25	3
5	277045	BOLT	6
6	7770707	BLADE BUSH	6
7	277044	NUT	6
8	046053	CARRIER	1
9	2770464	WASHER	2

To the right of the table is an exploded view diagram of the assembly, with numbered callouts (1-9) corresponding to the parts in the BOM table. The interface also includes a 'Print Book' button and a 'Serial No' field with the value '59177'.

Figure 10.4 – Exploded Parts Breakdown With Bill Of Materials

10.2 Spare Parts Ordering

It is important to note that when it comes to ordering replacement parts, that this can **only** be carried out through a Spearhead dealer. **Spearhead does not accept direct customer parts orders over email, fax or telephone.**

For guidance on finding your local Spearhead dealer; see Section 10.3.

10.3 Dealer Network

Spearhead has an extensive dealer network which can offer genuine replacement parts.

In order to make it easier to find your local Spearhead dealer, the Spearhead website has a Dealer Locator facility.

<http://www.spearheadmachinery.com/dealer-locator/>

To find your local Spearhead dealer enter your location or postcode into the “Your location” box and then press “Search”; see Figure 10.5.

The screenshot shows the 'DEALER LOCATOR' page on the Spearhead website. The search bar contains 'Evesham' and the search radius is set to '25 mi'. The results show 23 dealers. A map of the United Kingdom is displayed, with a green circle indicating the search radius centered on Evesham. The map also shows other countries like Ireland, the Netherlands, and Germany.

Figure 10.5 – Dealer Locator

Notes

Notes