

**Spearhead Machinery
Operator Instruction Manual For**

HD ROTARY HEAD
FOR MACHINES WITH WGC WSP078.01/9562580/9562581

1.20m and 1.50m cut width

Heavy-duty vegetation control hydraulic drive rotary cutting attachment

8999185EN v1.0

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:		HD Rotary Head
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.

(This page is left blank intentionally)

HD Rotary Head

Spearhead HD Rotary heads are hydraulic arm mounted rotary cutting attachments designed for cutting scrub, brush and foliage of up to 100mm (4") in diameter or multiple branches that have a total cross section area of equivalent size. The machines feature a hydraulically operated front hood (adjustable to 90°) which can be opened to accept larger material into the cutting unit.

Machines are available in a choice of either 1.2m or 1.5m working widths;
SP12 1.2m and 1.5m machines are fitted standard with high-lift blades, with an option of a Ø13mm chain unit.

Also available is the legendary Spearhead 'Starcut System' for extra material mulch.

Designed for use on larger model Twiga reach arms, the HD rotary head is the ideal machine for farmers, forestry teams and contractors alike.

IMPORTANT: This machine must only be used to perform the tasks for which it was designed, use for any other purpose may be dangerous to persons and damaging to the machine.

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.

(This page is left blank intentionally)

Contents List

1	Machine Description	8
1.1	Intended Usage	8
1.2	General Arrangement	9
1.3	Machine Identification	10
1.4	Machine General Specification	11
1.4.1	Standard Specification	11
1.4.2	Machine Options	11
2	Safety	12
2.1	Safety Warnings	12
2.2	Emergency Stop	13
2.3	Safe Maintenance	14
2.4	Dangers Due To Overhead Power Lines	15
2.4.1	Risk Assessment	15
2.4.2	Emergency Action for Accidents Involving Electricity	16
2.5	Safety Decals	18
2.6	Guarding	18
2.7	Noise	19
2.8	Personal Protective Equipment	20
2.9	Stability	20
2.10	Working On Inclined Ground	20
2.11	Working On Embankments	21
2.12	Attachment And Removal From The Reach Arm	21
2.13	Working In Public Places	22
2.14	Safety Distances	22
2.15	Warning Signs	23
2.15.1	Suggested Warning Signs Required	23
2.15.2	Use of Warning Signs	23
2.16	The Machine & The Environment	24
2.16.1	Disposal	24
2.17	Proposition 65	25
3	Machine Preparation	26
3.1	Lifting The Machine	26
3.1.1	Lifting Equipment	26
3.1.2	Lifting Points	26
3.2	Post-delivery/First Use Inspection	27
3.2.1	Tractor Requirements	27
3.2.2	Tractor Checks	27
3.2.3	Machine Adjustment	27
4	Usage Instruction	28
4.1	Operator Requirements	28
4.1.1	Personal Protection Equipment (PPE)	28
4.2	Controls Overview	29
4.3	Machine Attachment	29
4.4	Blade Cutting Direction	30
4.5	Hydraulic Installation	30
4.6	Hydraulic Hose Checks	31
4.6.1	Twists	32
4.6.2	Sharp Bends	32
4.6.3	Chafing Hoses	33
4.7	Work Site Assessment	34
4.7.1	Foreign Debris Hazards	34
4.7.2	Bystanders	35
4.7.3	Weather	35
4.7.4	Fire	35
4.8	Using The Rotary Head	35
4.8.1	Pre-start Checks	35
4.8.2	Starting The Rotary Head	36
4.8.3	Stopping The Rotary Head	36
4.8.4	Stopping The Machine In An Emergency	36
4.9	General Cutting Hints	37

4.9.2	Hedge Cutting Hints	37
4.9.3	Verge Mowing Hints	38
4.9.4	Hydraulic Front Hood.....	38
4.9.5	Pivoted Mounting.....	38
4.10	Transporting The Rotary Head	38
5	Maintenance	42
5.1	Periodic Maintenance.....	42
5.2	Blades & Blade Bar	42
5.2.1	Inspection	42
5.2.2	Blade Removal & Replacement.....	43
5.2.3	Blade Bar Removal & Replacement	Error! Bookmark not defined.
5.3	Chains (option).....	45
5.3.1	Inspection	45
5.3.2	Chain & Chain Carrier Removal.....	45
5.4	Hydraulic Components.....	46
5.4.1	Hoses.....	47
5.4.2	Ram Inspection.....	47
5.5	Lubrication & Greasing.....	48
5.5.1	Greasing Schedule.....	Error! Bookmark not defined.
5.6	Pins & Bushes.....	49
5.7	Skids.....	49
5.8	Torque Settings.....	50
5.8.1	Nuts & Bolts	50
5.8.2	Hydraulic Fittings	51
5.9	Machine Inspection Record	52
5.10	Machine Storage	54
5.10.1	Preparing The Machine For Storage & Reintroduction Into Work.....	54
6	Troubleshooting	56
7	Spare Parts	58
7.1	How To Obtain The Correct Spare Part Numbers	58
7.2	Spare Parts Ordering	59
7.3	Dealer Network	59

1 Machine Description

1.1 Intended Usage.

Spearhead HD Rotary heads are hydraulic arm mounted rotary cutting attachments designed for cutting scrub, brush and foliage of up to 100mm (4") in diameter or multiple branches that have a total cross section area of equivalent size. The machines feature a hydraulically operated front hood (adjustable to 110°) which can be opened to accept larger material into the cutting unit.

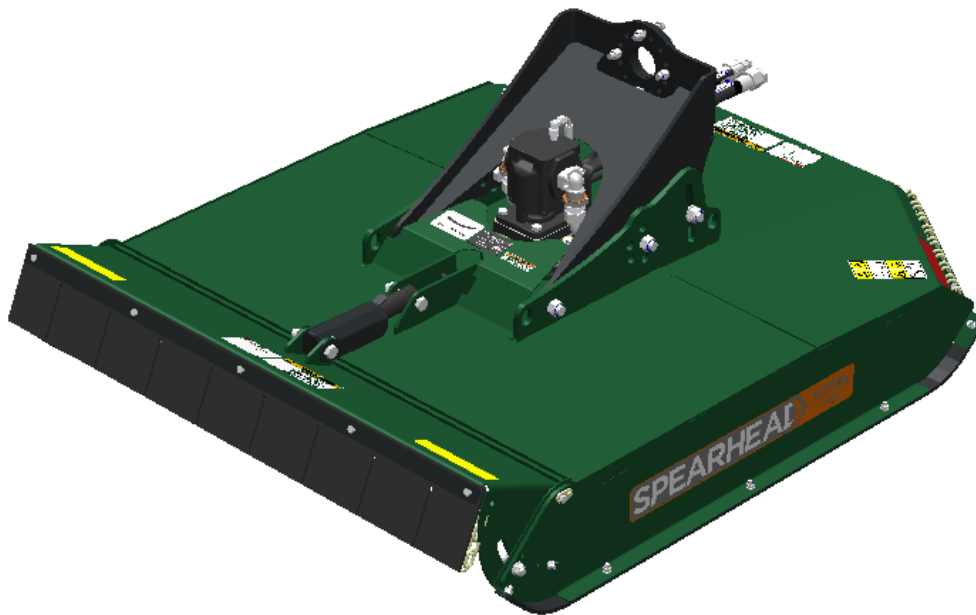
Machines are available in a choice of either 1.2m or 1.5m working widths; SP12 1.2m machines are fitted with a Ø13mm chain unit whilst SP15 1.5m machines are fitted as standard with a Ø10mm chain unit with the option of either the heavier duty Ø13mm chain unit or double edged blade bar.

Ø10mm chain unit - recommended for Grass Work

Ø13mm chain unit - recommended for Scrub Work

Designed for use on larger model Twiga reach arms, the HD rotary head is the ideal machine for farmers, forestry teams and contractors alike.

IMPORTANT: This machine must only be used to perform the tasks for which it was designed, use for any other purpose may be dangerous to persons and damaging to the machine.

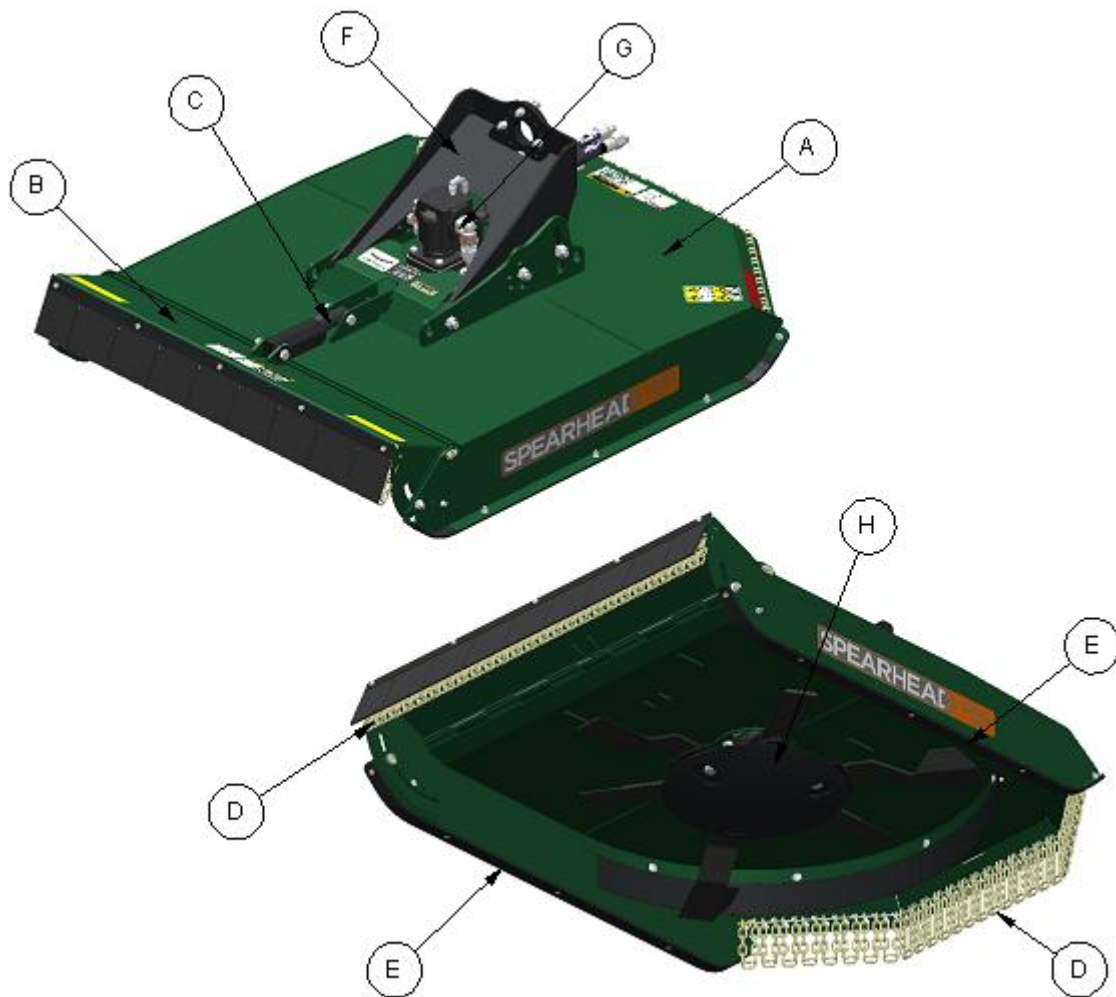


OPMAN01900

Figure 1.1 HD Rotary Head
(SP15 model illustrated)

1.2 General Arrangement

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



OPMA N01501

Item No	Description
A	Deck
B	Front Hood
C	Hydraulic Hood Ram
D	Chain Safety Guarding
E	Side Skirts
F	Pivoting Mounting Bracket
G	Hydraulic Motor
H	Cutting Unit (Blade type shown)

Figure 1.2

(SP15 model with blade bar fitted illustrated)

1.3 Machine Identification

Each machine is equipped with a serial plate; see Figure 1.3 that includes the following data in this order:

- EC Marking.
- Manufacturer marking.
- Name and address of the manufacturer.
- Machine Whole Goods Code (WGC).
- Machine Product Group Code.
- Serial number of the machine.
- Production Year (year of construction).
- Mass in kg.
- Model year.

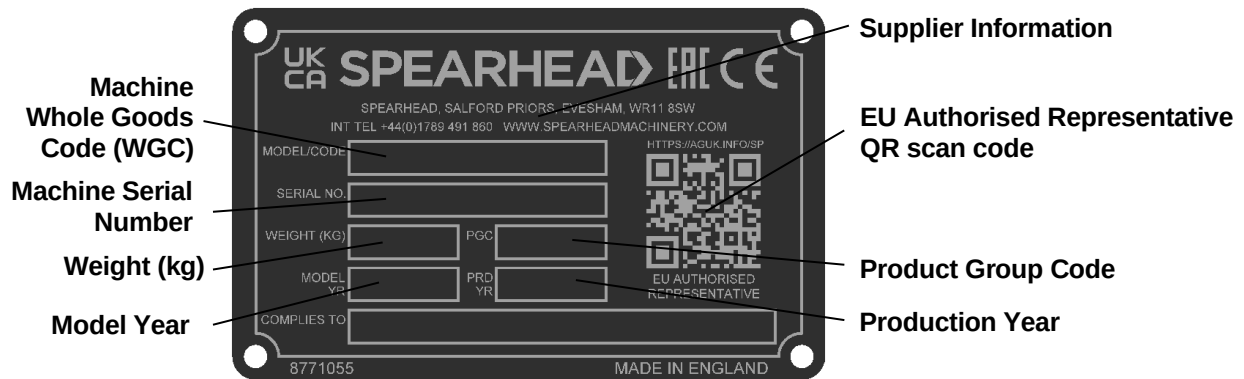


Figure 1.3 – Serial Plate

Data on the Spearhead manufacturer's plate should always be referred to when requesting assistance and/or requiring replacement spare parts.

This data can identify the machine and its characteristics and specification for its particular time of manufacture, certifying that it responds to current regulations. For this reason the plate should never therefore be removed nor be used for other purposes; if the machine is dismantled, it should be destroyed to prevent any form of abuse.



Figure 1.4 – Serial Plate Location
(SP15 model illustrated)

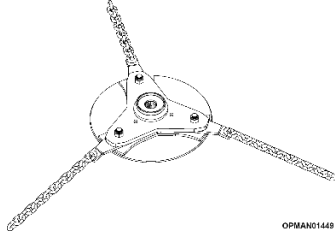
1.4 Machine General Specification.

1.4.1 Standard Specification

Model	SP12	SP15
Working Width (2)	1.20m (48")	1.50m (60")
Choice of Cutting Units (1) (2)	3 x High Lift Cutting Blades or 3 x Ø13mm Chains	3 x High Lift Cutting Blades or 3 x Ø13mm Chains
Length (2)	1.75m (69")	2.05m (81")
Width (2)	1.35m (53")	1.65m (65")
Height (2)	0.78m (31")	0.78m (31")
Deck Material	Strenx 700MC	Strenx 700MC
Side Wall Thickness (1)	3mm (0.12")	3mm (0.12")
Safety Guarding	Heavy Duty Overlapping Chain Guards And Front Rubber Flap	Heavy Duty Overlapping Chain Guards and Front Rubber Flap
Height Adjustment	n/a	n/a
Front Hood	Hydraulically Adjusted (90° action)	Hydraulically Adjusted (90° action)
Mounting Attachment	4 Bolt Ring Mount	4 Bolt Ring Mount
Pivot	Fully Floating $\pm 8.5^\circ$	Fully Floating $\pm 8.5^\circ$
Hydraulic Flow	110 l/min	110 l/min
Hydraulic Pressure (Max)	300 bar	300 bar
Motor Type	Gear	Gear

Table 1.1

1.4.2 Machine Options

Option	Picture
1.4.2.1 Chains	 Ø13mm Chain Cutting Unit (1) Available on SP12 Ø13mm Chain Cutting Unit (1) Available on SP15

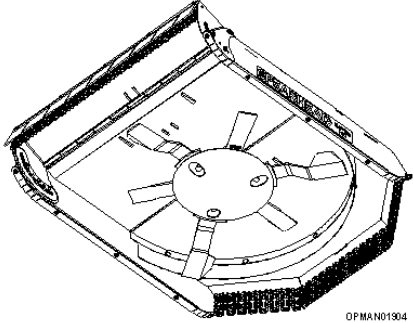
Option	Picture
1.4.2.2 Starcut Blades	

Table 1.2

Notes:

- (1) Spearhead constantly reviews and improves product designs and reserve the right to change this information. Actual machines may vary from the above specification. Contact your Spearhead Sales representative if you have any queries.
- (2) All dimensions are determined from computer models, so actual measurements may vary slightly.

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 tractor or machinery until you have read and completely understand this manual and the tractor operators manual and each of the safety messages found in the manuals and those displayed on the tractor and machine attachment.



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 rotary head on to the ground
2. Put the PTO out of gear
3. Stop the tractor 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 machine. 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 machine attachment, 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 machine indicates that the blades may have been fouled by an obstruction. A visual indication that wire is in contact with the blades may be a sudden movement of the vegetation ahead of the machine. In any such event **STOP** the tractor engine **INSTANTLY**. On no account move the machine until the rotor has completely stopped. **NEVER UNDER ANY CIRCUMSTANCES** reverse the cutting operation to 'clear itself'. When the blades 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 machine stop the tractor engine and remove the ignition key.



DANGER! This equipment is capable under adverse conditions of throwing objects great distances at high velocity. **CHECK** the blades for wear and the mounting 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! Ensure blades and their fixings are of a type recommended by the manufacturer, are securely attached and that none are missing or damaged.



DANGER! Never attempt to use a machine on materials in excess of its capability.



DANGER! Never use a machine to perform a task it has not been designed to do.



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 2.4 '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 machine attachment, in such a position as to give the operator maximum protection.



DANGER! Where a hedge cutter is used in conjunction with tractors not fitted with a glazed safety cab, a clear polycarbonate safety screen together with a mesh guard must be fitted to the tractor between the operator and the machine attachment. 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 machine attachment 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.



DANGER! Never fit, or use, a machine on tractor that does not meet the manufacturers' minimum specification level.



WARNING! Do not operate machinery with any guards missing. Ensure that guards are properly fitted to the machine and tractor 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! The machines features an hydraulic opening front hood. Do not operate the machine with this missing along with any of the chains or skids missing. Ensure that guards are properly fitted to the machine and tractor 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 tractor is running all personnel should keep well clear of the area around the machine as there are numerous crushing, shearing, impact dangers caused by the machine operation.



WARNING! Direct the cut material away from the tractor. 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 cutting. 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 blades strike a foreign object. Repair all damage before restarting work.



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 machine 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 Safe Maintenance



WARNING! It is mandatory to switch the combustion engine off and disengage PTO, lower the machine, ensure that the machine has completely stopped, remove the ignition key from the dashboard of the tractor and engage the parking brake before leaving the driver's seat and engaging in maintenance operations.

IMPORTANT: Maintenance on the machine should be performed by only skilled and specialized personnel, in strict compliance with the instructions in this manual, and any worn or damaged parts should be replaced.

IMPORTANT: Always use genuine Spearhead parts when carrying out repairs and maintenance with thoughts to longevity and reliability of the machine and personnel safety.

IMPORTANT: Store the machine in a safe place which is protected from the elements, when the work is completed to ensure its wellbeing and protection from damage to components.



CAUTION! Relieve hydraulic pressure before disconnecting lines or working on the machine. This can be done by pushing or pulling the selected tractor lever/button. Only once this has been completed can the hydraulic hoses be removed from the machine.



CAUTION! When working with/checking the hydraulic system on the reach arm or machine always wear safety glasses and impenetrable gloves. Use paper or cardboard to search for leaks and not hands or any other body parts.



CAUTION! Keep hands and body away from pin holes and nozzles ejecting hydraulic fluid. Ingested or penetrated hydraulic fluid in the body can become gangrenous. Removal must be carried out by a medical professional.



CAUTION! Ensure all hydraulic hoses, lines and connections in good condition and tight before applying pressure.

IMPORTANT: Do not change any factory-set hydraulic settings to avoid component failures.

IMPORTANT: Do not modify or alter machine functions or components.



DANGER! Do not weld or repair rotating blade components. They may cause vibrations and component failures being thrown from the machine.



DANGER! Replace bent, damaged, cracked or broken blades immediately with new blades.

Do not attempt to straighten, weld or weld hard-facing blades to avoid blade failures and throw broken blades from the machine.



CAUTION! Always wear protective gloves when handling blades, knives, cuttings edges or worn components with sharp edges.



CAUTION! The motor can become hot when in work. Ensure that the motor is sufficiently cool before going anywhere near these components for maintenance. As a precaution though wear gloves when servicing these potentially hot items.



DANGER! If the machine is required to be worked on ensure that the ground is level, sturdy and solid.



DANGER! Do not run the tractor engine inside. Only run the tractor in open outdoor spaces.



Engine exhaust fumes and some of their constituents and certain vehicle components contain or emit chemicals known to the state of California to cause cancer, birth defects or other reproductive harm. See Section 2.17 with regards to Proposition 65.

CAUTION! Ensure maintenance personnel wear suitable PPE clothing when maintaining the machine to ensure a reduced risk of impact or skin injuries. Frequent or prolonged contact with hydraulic oil may cause dermatitis and other skin disorders including (more rarely) skin cancer when not wearing impenetrable gloves. Worn parts may have sharp edges.

Follow the guidance of the lubricant manufacturer with regards to handling oils, solvents, cleansers and other chemical agents.

IMPORTANT: Always replace guards that have been removed for service or maintenance and ensure they are fit for use, give complete protection and work as intended. If not, replace them before proceeding to use the machine.

IMPORTANT: Comply with the laws in force in the country of installation on the use and disposal of products used for cleaning and performing maintenance on the machine, considering the recommendations of the manufacturer and local guidelines on the given products.

IMPORTANT: Before returning the machine back to work ensure the machine has been thoroughly checked over using the Machine Inspection Record; see Section 5.9.

Ensure that when the machine inspection is carried out that the machine is stationary and not running.

Where parts are broken, damaged and deemed not fit for use; replace with genuine Spearhead parts using the online Interactive Parts facility at:

<https://my.spearheadmachinery.com/parts/public-interactive-parts-database/>

You will require the machine serial number. Assistance to its location can be found in Section 1.3.

2.4 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.



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 2.4.1 below.

All operators should perform a risk assessment before operating any reach 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.

2.4.1 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 the tractor.
- 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

2.4.2 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

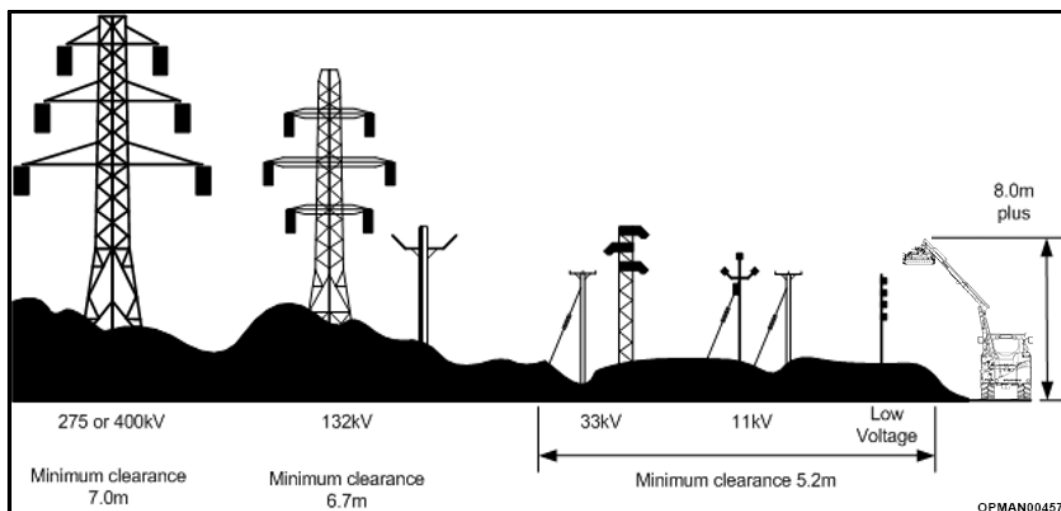


Figure 2.1 - Minimum Heights For Overhead Power Lines

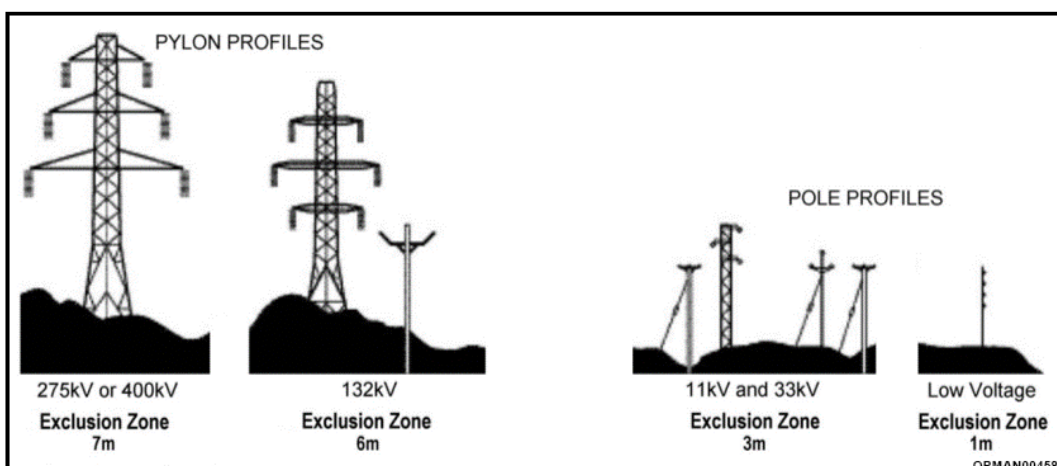


Figure 2.2 - Absolute Minimum Exclusion Zones For Specific Overhead Power Lines

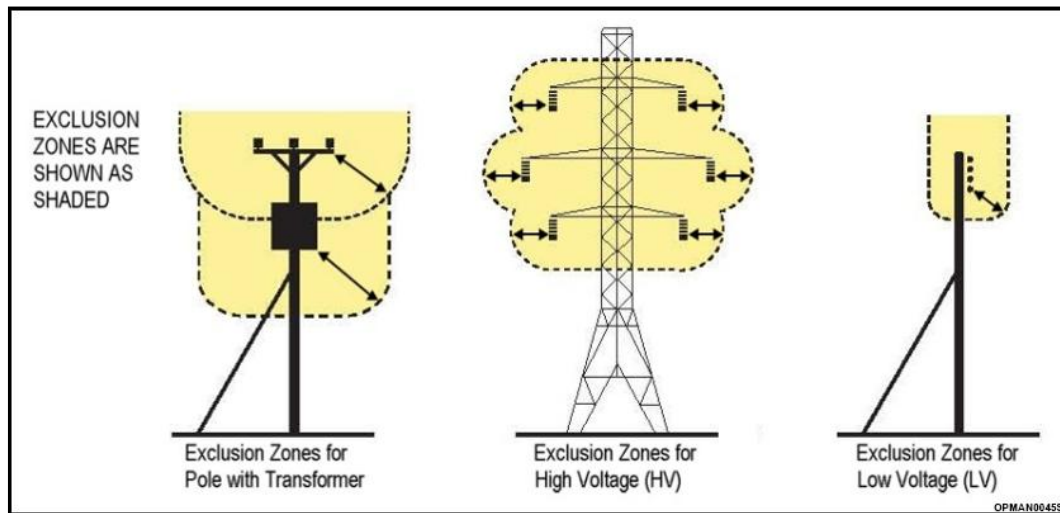


Figure 2.3 - Definitions Of Exclusion Zones

2.5 Safety Decals

Safety decals are located in various points on the machine; see Figure 2.4. They can be identified in yellow with the upper panel depicting the hazard, and the lower 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.

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.

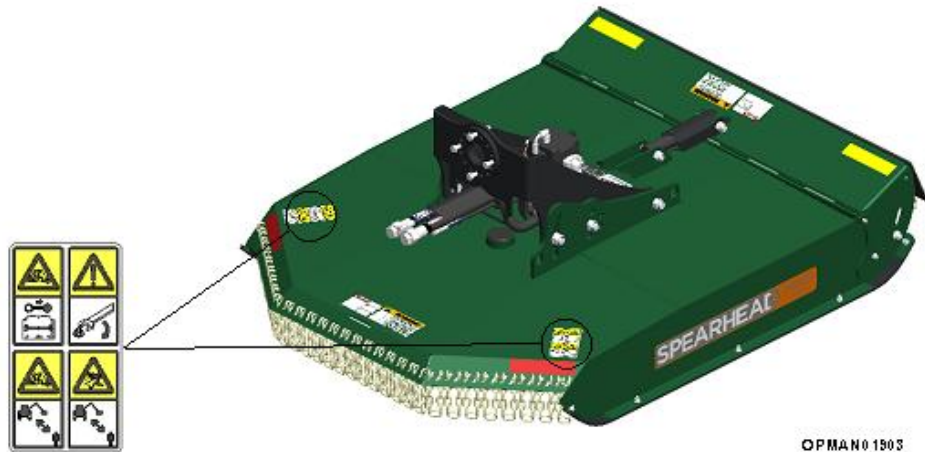


Figure 2.4

1 Stop engine and remove key before performing maintenance or repair work.

3 Danger: keep clear of rotating blades.



2 Check tightness of bolts every 8 hours – retighten if required.

4 Danger: flying objects. Keep a safe distance from the machine when the engine is running.

Figure 2.5

2.6 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 a mesh guard must be fitted to the side window of the tractor 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.

When using the machine on a loader frame or a forward reach reach arm, the machine attachment is in front and above the driver's cab. This makes it necessary to always work with guarding fixed around the front and side of the cab, a typical installation is shown below.

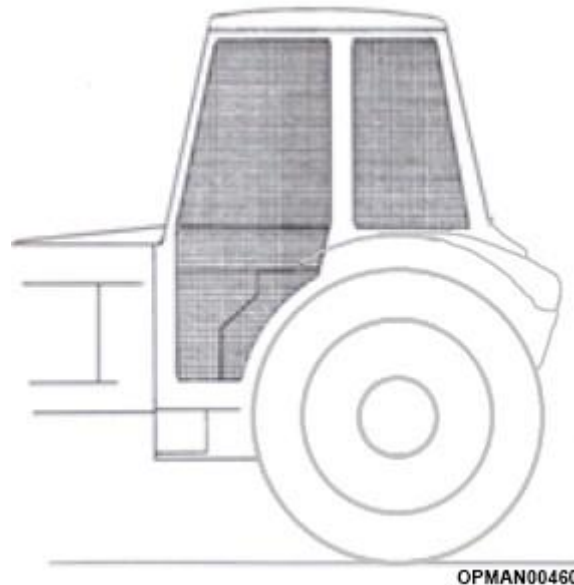


Figure 2.6

The machine features an hydraulic opening front hood. Do not operate the machine with this missing along with any of the chains or skids missing. Ensure the front hood is properly fitted to the machine and that it is in good, sound and intact condition.

Protection chains are located at the front and rear of the machine and must be kept in position at all times. They are an essential part of the machines guarding. The machine must not be operated with any of the chains missing. Ensure that chains are of all the same length in order to maintain the balance of the machine.

Ensure that the wear skids specified and supplied with the rotary head are fitted to the machine. If not, replace. Prolonged use of the machine with no wear skids will cause permanent wear to the main cowl fabrication.

Front hydraulic opening hood	Distorted or insecure. Attached ram leakages.
Wear skids	Distorted or insecure.
Chain guards	Missing chain lengths to permit stones or similar objects to be ejected beneath it in normal conditions

Table 2.1 – Permanent Protection Guard Damages

Ensure that all parts are replaced if required with genuine Spearhead parts.

2.7 Noise

The equivalent daily personal noise exposure from this machine measured at the operators' ear is within the range 78 – 85 dB, these figures apply to a normal distribution of use where the noise fluctuates between zero and maximum. The figures assume that the machine is fitted to a tractor with a 'quiet' cab with the windows closed in a generally open environment. We recommend that the windows are kept closed. With the cab rear window open the equivalent daily personal noise exposure will increase to a figure within the range 82 – 88 dB. At an equivalent daily noise exposure level of 85 – 90 dB ear protection is recommended and must always be used if any window is left open.

2.8 Personal Protective Equipment

Operators should be wearing sufficient personal protection equipment (PPE) to protect them from hearing, respiratory and impact damages.

When working in an unsealed cab or where windows and apertures are open to the environment, operators are advised to wear suitable eye and ear protection, a facemask (depending on conditions) and head protection.

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 and suitable gloves.

Ensure that non-baggy clothing is worn to reduce the chance of entanglement and snagging on components.



OPMAN00161

Figure 2.7- PPE Items

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

2.9 Stability

Due to the design of the reach arm and the work they undertake, it is essential to ensure that the tractor 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 tractor opposite to the extended arms until the tyre shows evidence of bearing some load.

Before driving in transport, place the reach arm in the transport position and again check that all wheels of the tractor 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 tractor.



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 tractor, check that the plated tractor 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.

2.10 Working On Inclined Ground

The ballast instructions in Section 2.8 are sufficient for level ground operation.

Be aware that when working on inclined ground changes in the tractor centre of gravity can adversely affect the overall stability. As the attachment is extended with the reach 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 tractor 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 reach arm with machine attachment 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.

2.11 Working On Embankments

Sudden potholes at speed can quickly cause the tractor to change direction. At the same time the weight of the attachments 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.

2.12 Attachment And Removal From The Reach Arm



DANGER! Always follow the manufacturer's instructions for attachment and removal of the machine from the tractor.



DANGER! Always disengage the machine, kill the tractor engine, remove and pocket the key before dismantling for any reason.



DANGER! Always ensure when you remove your machine from the tractor that it is left in a safe and stable position using the stands and props if provided and secured.



DANGER! Never operate the tractor or machine controls from any position other than from the driving seat.



DANGER! Never leave a machine unattended in a raised position – it should be lowered to the ground in a safe position on a level firm site.



DANGER! Any hydraulically opening feature on the machine must be lowered in order to protect from the item dropping due to inadvertent hydraulic failure causing harm to bystanders, operator or maintenance personnel.



DANGER! Never leave a tractor with the key in or the engine running.



DANGER! Ensure hydraulic pipes are carefully and correctly routed to avoid damage by chaffing, stretching or pinching and that they are held in place with the correct fittings.

2.13 Working In Public Places

When working in public places such as roadsides, consideration should be paid to others in the vicinity. Stop the machine immediately when pedestrians, cyclists and horse riders etc. pass. Restart only when they are at a distance that causes no risk to their safety.



DANGER! Always inspect the work area thoroughly before starting to note obstacles and remove wire, bottles, cans and other debris.



DANGER! Never use a machine that is poorly maintained.



DANGER! Use clear suitably sized warning signs to alert others to the nature of the machine working within that area. Signs should be placed at both ends of the work site. (It is recommended that signs used are of a size and type specified by the Department of Transport and positioned in accordance with their, and the Local Highways Authority, guidelines).



DANGER! Never start or continue to work a machine if people are nearby or approaching - Stop and wait until they are at a safe distance before continuing. WARNING: Some cutting heads may continue to 'freewheel' for up to 40 seconds or more after being stopped.



DANGER! Never allow children near to, or play on, a tractor or machine under any circumstances.



DANGER! Never use a machine on which the hydraulic system shows signs of wear or damage.



DANGER! Always clear up all debris left at the work area, it may cause hazard to others.



DANGER! Never allow any bystanders within a 90 metre radius of the machine when operating. Stop the machine immediately if this safety area is entered and do not restart the machine until the bystanders have escaped the area sufficiently.

2.14 Safety Distances

Never allow any bystanders within a 90 metre radius of the machine when operating. Stop the machine immediately if this safety area is entered and do not restart the machine until the bystanders have escaped the area sufficiently and the working area has been reassessed.

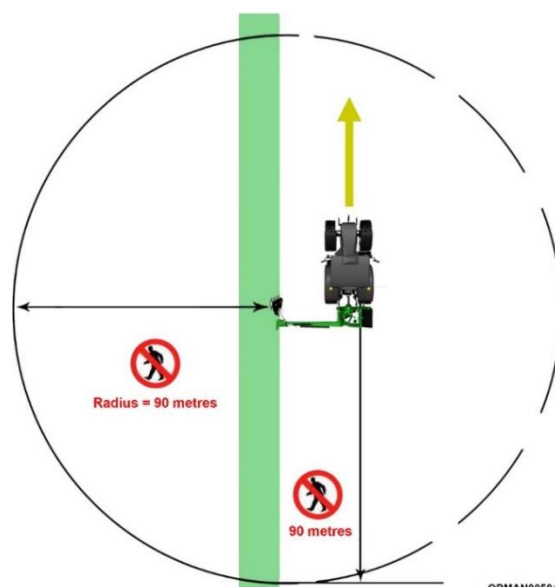


Figure 2.8

2.15 Warning Signs

It is advisable that any working area be covered by suitable warning signs in public places. Signs should be highly visible and well placed in order to give clear advanced warning of the hazard. Contact the Department of Transport or your Local Highways Authority to obtain detailed information on this subject. The latter should be contacted prior to working on the public highway advising them of the time and location of the intended work asking what is required by way of signs and procedure. – ‘Non-authorized placement of road signs may create offences under the Highways Act’.

2.15.1 Suggested Warning Signs Required

The reach arm machine must be fitted with a white on blue, 600mm diameter ‘Keep Left’ (*) direction arrow. A white with red border ‘Hedge Cutting’ warning triangle of at least 750mm tall must be placed at no greater distance than 500m from the tractor at any time. These hedge cutting signs should also be placed at key restricted view areas such as bridges and sharp bends.

*NOTE – this applies to UK Market machines where traffic passes to the right of a machine working in the same direction as the traffic flow. The direction, use and colour of the arrow depend on the country of use and the Local Highway Authorities regulations in the locality.

2.15.2 Use of Warning Signs

- On two-way roads, one set of signs is required to be facing in each direction.
- Work should be carried out within 500m of the signs. The signs will then be required to be moved.
- Work only when visibility is good and at times of flow e.g. NOT during ‘rush-hour’.
- Vehicles should have at least one 360° visible amber flashing beacon (preferably two) or a light bar comprising at least two independent light sources which are clean.
- Ideally, vehicles should be clean and conspicuously coloured with high visibility rear markings.
- Debris should be removed from the road and path as soon as practicable, and at regular intervals, wearing high visibility clothing and before removing the hazard warning signs.
- Collect all road signs promptly when the job is complete.



OPMAN00476

Figure 2.9

2.16 The Machine & The Environment

Below are the minimum provisions to be followed in order to reduce the risk of environmental impact connected to the use of the machine according to European directives related to the Eco-compatibility of products connected to power (Directive 2009/125/EC) and Restrictions in the use of dangerous substances in electrical and electronic equipment (Directive 2011/65/EU):

- If the Country where the machine is used foresees specific sound emission limits, it is best to adapt to the provisions in these standards, if necessary, being supplied with suitable protective equipment (earplugs, muffs, etc.).
- **It is mandatory** to respect current legislation of the Country where the attachment is used, related to use and disposal of lubricants and products used for machine cleaning and maintenance, observing the recommendations of the manufacturer of those products.
- If replacing worn parts or during demolition, one must follow anti-pollution laws foreseen in the country where the attachment is used.
- **It is prohibited** to pour products used for cleaning or polluting substances into the sewerage drain, on the ground, in watercourses, or into the environment.
- **It is mandatory** to collect products used for cleaning and polluting substances in appropriate containers, store them and deliver them to companies authorised for their disposal.

2.16.1 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 regulations in force in the destination territory.

In most instances Spearhead machines can be broken into its constituent parts with the use of basic workshop equipment. Table contains a typical list of constituent materials, together with disposal guidelines.

When undertaking a machine breakdown, take care to ensure that heavy parts are always adequately supported to avoid injury.

To avoid environmental contamination, take containment precautions to retain control of liquids in order.

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

Table 2.2 – Machine Breakdown Component Disposal

2.17 Proposition 65



Figure 2.10

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.

3 Machine Preparation

3.1 Lifting The Machine

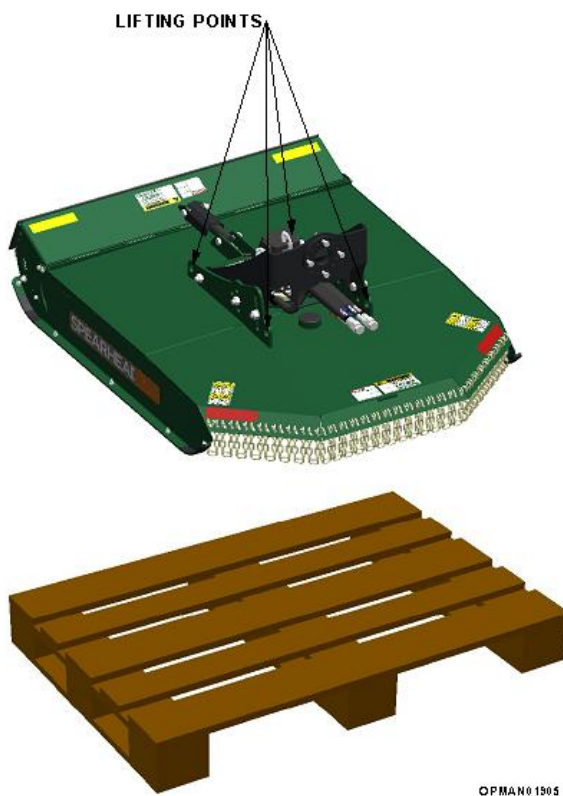
3.1.1 Lifting Equipment

Suitable overhead lifting equipment with a minimum Safe Working Load (SWL) in excess of the machine's overall weight should be used for handling the machine. Ensure the machine is kept balanced and level at all times during the lifting procedure. All operatives and bystanders must remain at a safe distance from the raised machine.

3.1.2 Lifting Points

Spearhead recommends lifting the machine with an approved sling securely looped around the reach arm box section mounting to preserve the condition of the machine. The sling should be placed centred on the box section in order to ensure the machine is balanced and stable when lifted.

Keep clear of the raised machine at all times.



Model Weights	
SP12 HD	440 kg
SP15 HD	TBC

Figure 3.1



DANGER! Lifting of the machine should only be performed on a firm level site.



DANGER! Keep all persons at a safe distance from the raised machine.

3.2 Post-delivery/First Use Inspection

3.2.1 Tractor Requirements

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

3.2.2 Tractor Checks

- 3.2.2.1 Availability of tractor hydraulic service where the available flow is. 105-110 litres per minute at 300 bar for Twiga reach arms.
- 3.2.2.2 A suitable mounting interface to the tractor is available.
- 3.2.2.3 Once the attachment is mounted to the reach arm 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.
- 3.2.2.4 Ensure that the tyres fitted to the tractor are correctly rated for the total working weight. NOTE: When the attachment is deployed in work at the furthest reach the load on the rear tyre on the cutting side increases significantly.
- 3.2.2.5 Spearhead does not endorse the use of water ballast within tyres as this can have adverse effects on fore aft stability at speed.

3.2.3 Machine Adjustment

The head when received from Spearhead is virtually complete and components are set correctly, requiring minimum time to ready the machine for use. Spearhead machines are tested after manufacture.

It is important to assess the machine to ensure that it is of the correct specification ordered from Spearhead or local Spearhead dealer. Information with regards to the specification of the machine can be found on the serial plate. Guidance to the location of the serial plate can be found in Section 1.3.

Before use it is important to inspect the head following the guidance in this operators manual to ensure it is correctly set-up and is suitable for the attaching reach arm and tractor using the inspection guidance sheet in Section 5.9.

4 Usage Instruction

4.1 Operator Requirements



IMPORTANT: Read, understand and follow the safety messages stated throughout this section and the rest of this operator's manual. Serious injury or death may occur unless care is taken to follow the warnings.

Safe operation of the machine and accompanying reach arm is down to the responsibility of the qualified operator. A qualified operator has thoroughly read and understood the machine, reach arm and attaching tractor operator's manuals and is experienced in the correct and safe operation of all machines and all associated safety guidance. In addition to the safety information contained in this manual, warning and operational decals are fixed around the machine; see Section 2.5. The connecting tractor and reach arm will also have them as well with information given in the operator's manual.

If any part of the operation safe use of the machine is not completely understood, consult a local Spearhead dealer or Spearhead for complete explanation.

If the operator cannot read the manuals for themselves or does not completely understand the operation of the equipment, it is the responsibility of the supervisor to read and explain the manuals, safety practices and operating instructions to the operator.

4.1.1 Personal Protection Equipment (PPE)

See Figure 4.1

- Always wear safety glasses
- Hard hat
- Steel toe safety footwear
- Gloves
- Hearing protection
- Close fitting clothing
- Respiration or filter mask (depending on working conditions)



OPMAN00161

Figure 4.1 - PPE Items



DANGER! Do not use drugs or alcohol immediately before or while operating the tractor and accompanying machine attachments. Drugs and alcohol will affect an operator's alertness and concentration and ability to operate the collective machinery safely.

Before operating the collective machinery, a machine operator on prescription or over-the-counter medication must consult a medical professional regarding any side effects of the medication that would hinder their ability to operate the equipment safely.

Supervisors must **never** allow anyone to operate the collective machinery when it is known that their alertness or coordination is impaired. Serious injury or death could occur to the operator and/or bystanders if the operator is under the influence of drugs or alcohol.



OPMAN00162

Figure 4.2 – Do Not Use Drugs Or Alcohol

4.2 Controls Overview

Your Spearhead machine will be supplied without a control system and will rely on the auxiliary controls available with the tractor and reach arm. The operator must make sure he is familiar with the use of the tractor and reach arm auxiliary controls. Refer to each of the relevant operator manuals for guidance.

4.3 Machine Attachment



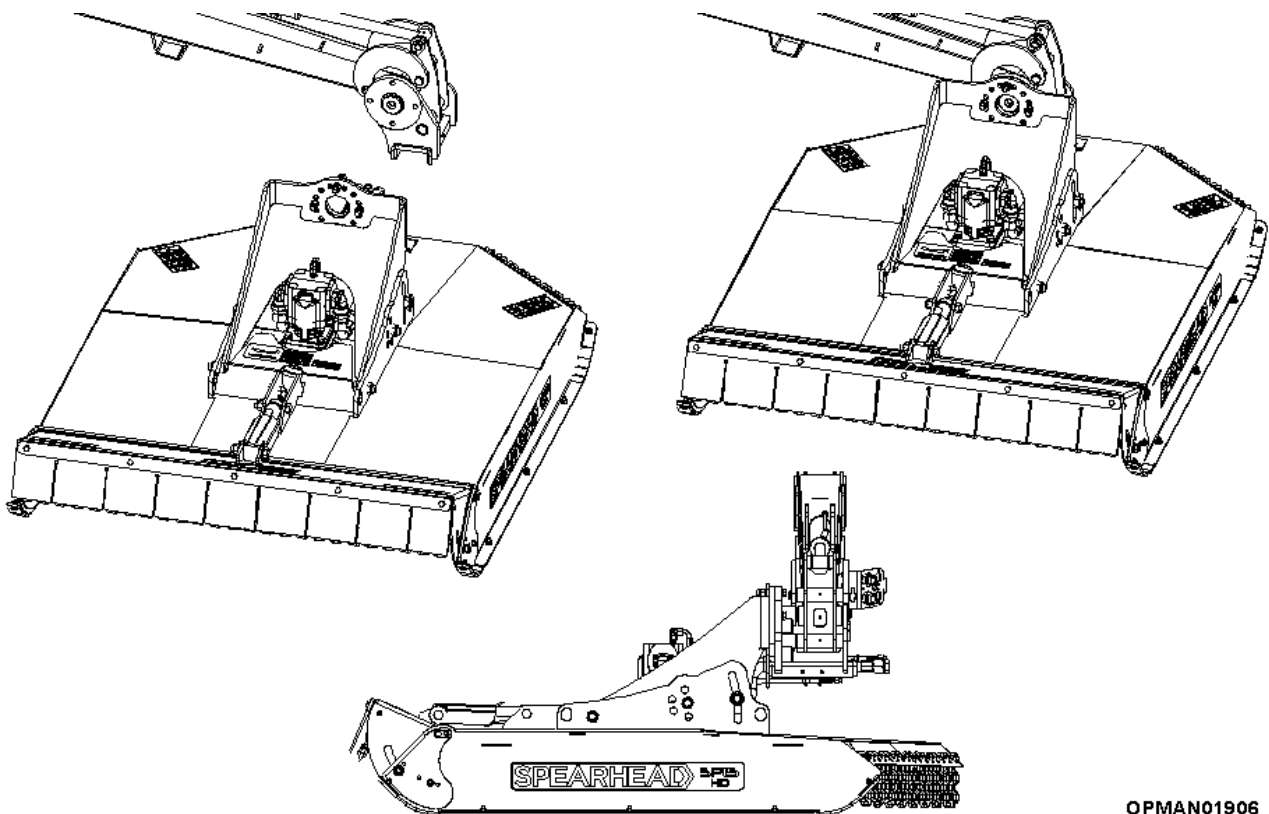
WARNING! Attachment of the machine must be performed on a firm level site.

Care should be adopted at all times when handling or manoeuvring the machine during the attachment procedure; ensure all persons remain clear of the cutting blades which possess the potential to cause injury even when stationary.

The machine attaches to the reach arm via the Spearhead quick hitch and is secured with a pin.



WARNING! While the tractor and reach arm 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. Do not stand between the mating faces of the reach arm and machine attachment.



OPMAN01906

Figure 4.3

With the head located on a firm level site, operate the reach arm to position the reach arm flange inner quick release face into the outer face on the head, lining up the holes for the quick release hitch pin to be fitted.

Fit the quick hitch pin, along with the flat washer and lynch pin.

IMPORTANT: Check blades are correctly mounted; the blades **MUST** be mounted in a downward cut rotation in relation to the tractors driving direction, see Section 4.4.

4.4 Blade Cutting Direction



WARNING! Blades must cut downwards on the leading edge in the direction of tractor travel



DANGER! Rotary heads are capable under adverse conditions of throwing objects for great distances 90m (300 ft) or more and causing serious injury or death. Follow safety messages carefully.

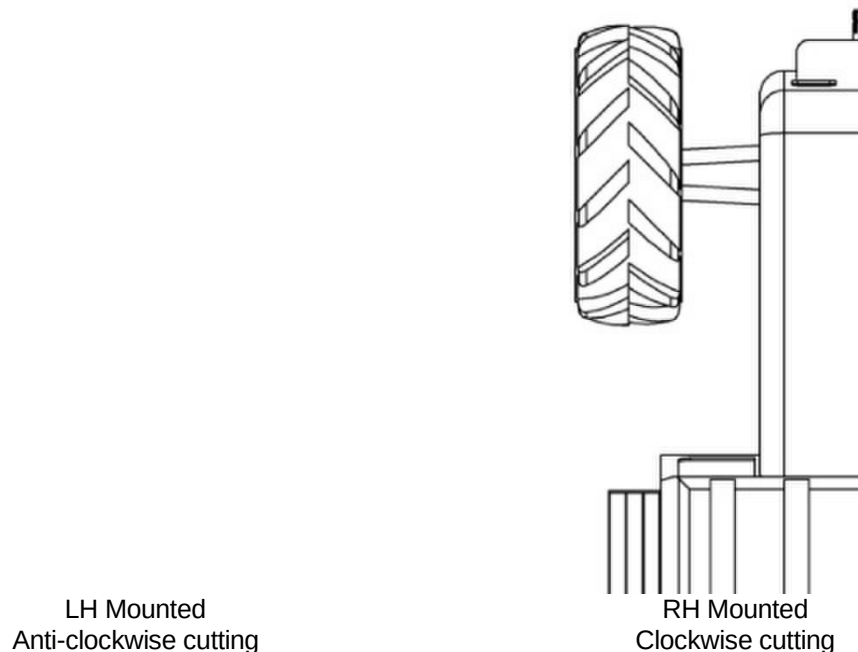


Figure 4.4

It is recommended that the direction of cutting should always be such that the blades or chains are cutting away from the operator at the point where the material first enters the machine; i.e. anti-clockwise for left hand mounted machines and clockwise for right hand mounted machines (when viewed from above).

It is of utmost importance that the tractor and reach arm and attachments are stopped immediately if a bystander comes within 90m (300 ft) while operating. The engine should be idled and the PTO disengaged. Do not restart work until the bystander is well past the 90m (300 ft) and the work zone has been reassessed to ensure there are no external risks.

4.5 Hydraulic Installation



CAUTION! Relieve hydraulic pressure before disconnecting lines or working on the system. This can be done by pushing and pulling the selected tractor lever/button. Only once this has been completed and suitable safety glasses and impenetrable gloves have been put on can the hydraulic hoses be removed from the tractor.

Connecting

Manoeuvre the reach arm and head watching for bystanders and potential dangers in the vicinity to line up the head for attachment. With the tractor switched off and secured in position on level ground, relieve the hydraulic pressure from the tractor by moving the hydraulic control levers/buttons back and forth several times.

HD Rotary head machines are detachable and when disconnected it is important to keep the ends free of contamination and dirt. Utilise blanking plugs on the open adaptor ends in order to ensure no dirt or contaminants enter the motor. Never disconnect a hydraulic hoses and leave ends exposed.

Install and connect hydraulic hoses ensuring the correct cutting direction is achieved. The drain line hose (max.1.5 bar) must be connected directly back to the oil reservoir.

IMPORTANT: Ensure that all the hydraulic hoses are collated together and placed through any hydraulic hose guide on the reach arm. This is to ensure that they do not get pinched or caught in use.

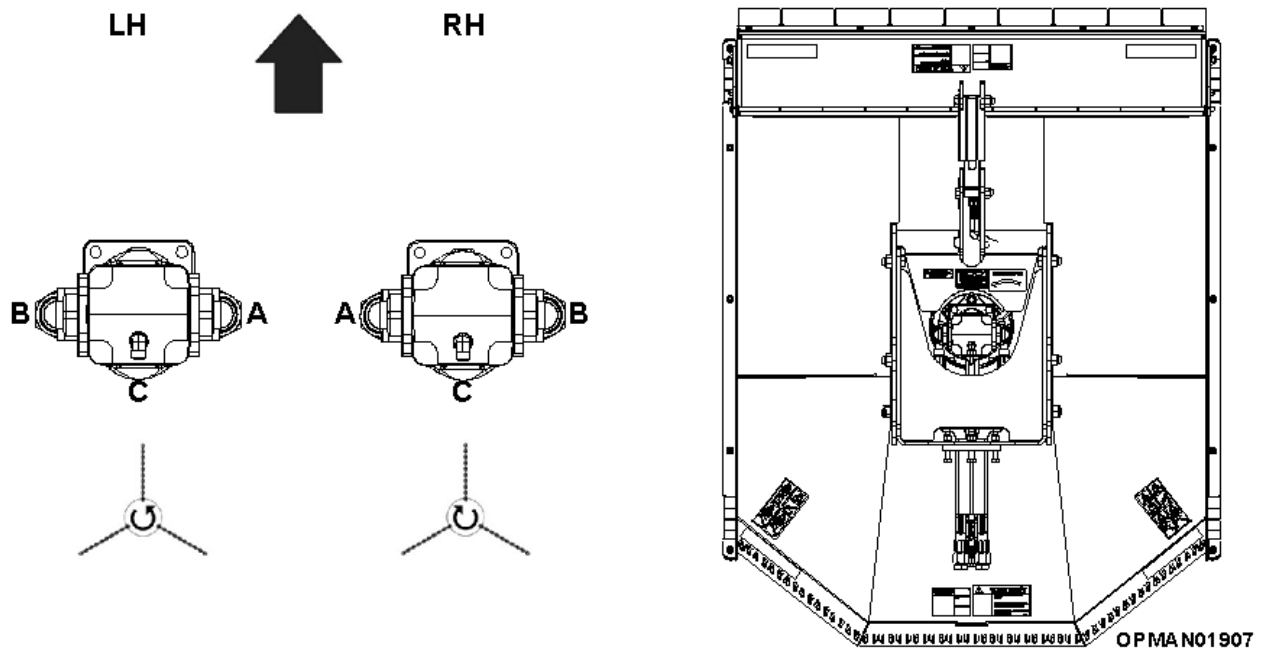


Figure 4.5

No.	Hose
A	Pressure
B	Return
C	Drain Line

Run the machine to confirm that the blade rotation direction is correct.
Switch machine off and inspect the hoses and connections for signs of leaks.
Check belt tension before using the machine for work, refer to belt tensioning section.

Disconnecting

IMPORTANT: The machine should be secure at all times when left unattended so it doesn't move. Ensure that the machine is stored off the ground, preferably in a dry location to preserve its condition; for example on a pallet.

Manoeuvre the reach arm and head watching for bystanders and potential dangers in the vicinity to line up the head for attachment. With the tractor switched off and secured in position on level ground, relieve the hydraulic pressure from the tractor by moving the hydraulic control levers/buttons back and forth several times.

When disconnecting the hoses to the tractor it is important to keep the hoses, and end couplings free of contamination and dirt. Never disconnect a hydraulic hose and leave the coupling end exposed. Utilise blanking plugs to keep them contaminant free. If any component is deemed dirty ensure that it is cleaned with some clean rag.

4.6 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;

4.6.1 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 4.6 and conduct the following check;

- 4.6.1.1 Loosen any clamps.
- 4.6.1.2 Attach one end of the hose to its coupling, but do not tighten.
- 4.6.1.3 Place the hose in its required position.
- 4.6.1.4 Connect the other end loosely to its union.
- 4.6.1.5 Tighten the end of any angled fittings first ensuring it is in the right position for its intended run.
- 4.6.1.6 Now tighten the straight end. It is possible that as the nut is tightened the hose may twist slightly.
- 4.6.1.7 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.
- 4.6.1.8 Otherwise tighten the fitting fully. Torque settings for both BSP and Metric hose fittings are shown in Section 5.8.2.
- 4.6.1.9 Tighten any clamps.
- 4.6.1.10 Finally re-bleed the rams and operate the arms in all positions whilst carefully checking for any twists and obstructions.

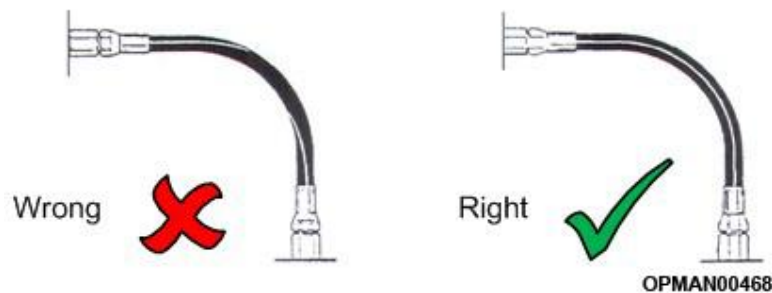


Figure 4.6

4.6.2 Sharp Bends

Hoses should always be fitted to allow enough hose radius for free movement, see Figure 4.7. 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.

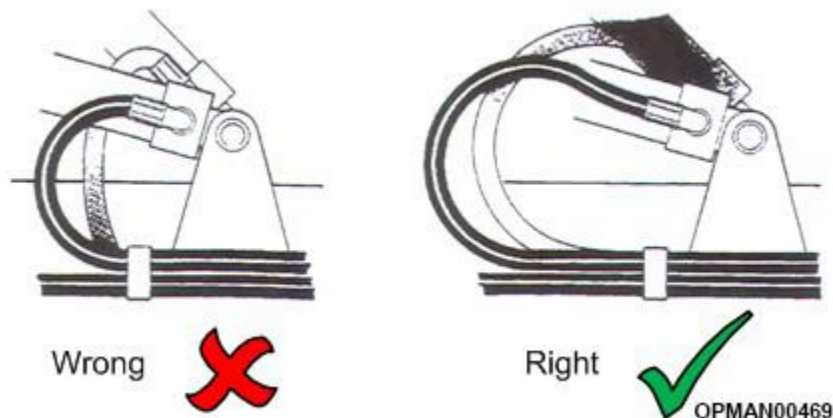


Figure 4.7

4.6.3 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 4.8.



Figure 4.8

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

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

Table 3.1

4.7 Work Site Assessment

4.7.1 Foreign Debris Hazards

The destined work site to use the machine should be thoroughly checked and familiarised following the guidance given in Section 2.1 to assess the working area for hazards; removable and fixed.

Items should be assessed, removed or clearly marked (e.g. if too heavy to move) before cutting:

- Items and ground characteristics which could cause a reduction in the tractors stability and traction and operator safety and ease of control in operation
- Insufficient lighting
- Foreign objects which could be picked up and then flung by the machine damaging and causing risk to bystanders, operator, tractor or the nearby environment. Items seen on the surface and buried deeply in the material. For example rocks, tree stumps and metal girders
- Foreign objects which could be picked up and then damage the machine; for example wire.
- Items which could create a fire risk

In overgrown areas which could potentially hide debris that could be struck by the blades, the area should be: inspected and large debris removed, mowed at an intermediate height and then re-inspected closely with any remaining debris being removed. Then mow at the desired final height. This will also bring benefits to operations with reduced power requirements to mow, reduce wear and tear on the machine, leave less cut debris and give a better overall finish.

Always wear your seat belt securely fastened and only operate the tractor and reach arm with the Roll-over Protection Structure (ROPS) in the raised position. If the tractor or reach arm hits a solid item, a sudden movement could throw you off of the seat and under the tractor and machine. The seat belt is your best protection from falling off the tractor and the ROPS provides protection from being crushed during a tractor roll-over. Cab guarding should be mandatory fitted to the tractor.

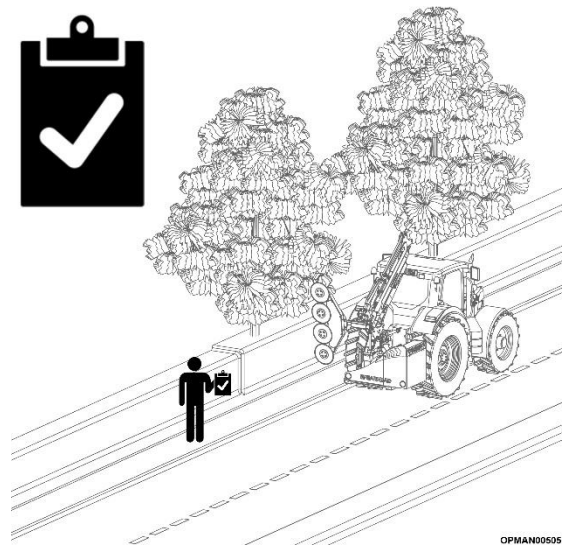


Figure 4.9 – Inspect The Work Site

It is important to inspect the reach arm and attachment to ensure all mandatory fixed and removable guarding is in position and in correct working order before proceeding to begin work.



WARNING! Extreme care should be taken when operating near loose objects such as gravel, rocks, wire, and other debris. Inspect the area before cutting. 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 blades strike a foreign object.

IMPORTANT: Repair all damage and make certain rotor or blade carrier is balanced before resuming cutting.



WARNING! Many varied objects, such as wire, cable, rope, or chains, can become entangled in the machine. These items can swing outside the confines of the safe cutting area of the machine at greater velocities than the blades. Such a situation is extremely hazardous and could result in serious injury or even death. Inspect the cutting area for such objects before cutting. Remove any like object from the site. Never allow the cutting blades to contact such items.

4.7.2 Bystanders



DANGER! Rotary heads are capable under adverse conditions of throwing objects for great distances 90m (300 ft) or more and causing serious injury or death. Follow safety messages carefully.

It is of upmost importance that the tractor and reach arm and attachments are stopped immediately if a bystander comes within 90m (300 ft) while operating. The engine should be idled and the PTO disengaged. Do not restart work until the bystander is well past the 90m (300 ft) and the work zone has been reassessed to ensure there are no external risks.



Figure 4.10 –Bystanders Out Of Working Area

4.7.3 Weather

Mow only in conditions where you have clear visibility in daylight or with adequate artificial lighting. Never mow in darkness or foggy conditions where you cannot clearly see **at least 90m (300 feet)** in front and to the sides of the tractor and reach arm. Make sure that you can clearly see and identify passersby, steep slopes, ditches, drop-offs, overhead obstructions, power lines, debris and foreign objects.

If you are unable to clearly see these type of items do not begin cutting.

4.7.4 Fire

Follow the following guidelines to reduce the risk of equipment and grass fires while operating, servicing, and repairing the machine:

- Ensure the **tractor is equipped with a fire extinguisher** in an easy to access location
- **Do not** operate the reach arm and machine on a tractor with an underframe exhaust
- **Do not** smoke or have an open flame near the machine
- **Do not** drive into burning debris or freshly burnt areas
- Never allow clippings or debris to collect on top of the machine
- Periodically shut down the tractor and machine and clean clippings and collected debris from the cowl

4.8 Using The Rotary Head

4.8.1 Pre-start Checks

Only operate the reach arm and attachment from the tractor operator's seat with the seatbelt securely fastened. The tractor must be equipped with a ROPS cab and cab guarding.



WARNING! Do not let the blades or chains touch the ground for any reason. Ensure that the skids are fitted to the machine at all times. Allowing a blade or chain to hit the ground may cause it to break and be ejected from the machine at great speeds resulting in serious damage and injury or even death to operator or bystanders.



WARNING! Do not put hands or feet near any of the blades or chains during operation or when the machine is static. Blade or chain contact can result in serious injury or even death. Stay away until all motion has stopped and the hydraulic pressure in the system has been successfully relieved.



WARNING! Never run the machine without belt cover mounted.



WARNING! Never use the machine with broken or missing blades or chains.



WARNING! Great care must be taken when attempting to clear debris from the cutting area of the machine; sharp components and numerous pinch risk points exist in these locations. Safety gloves and safety eyewear should be worn and wherever possible the use of a suitable tool should be used to remove any debris to ensure hands and fingers are kept clear of any risk areas.

Ensure you wear all Personal Protection Equipment (PPE) as stated in Section 4.1.1

4.8.1.1 Turn the reach arm into work position.

4.8.1.2 The machine is designed to work vertically but can be angled to work at a maximum angle of 45°. The position should be considered in order to make sure debris doesn't hit the tractor. When cutting hedges always start from the bottom vertically.

4.8.1.3 The machine should NEVER be used at angles which could cause debris to get thrown towards the tractor or other bystanders, vehicles or buildings.

IMPORTANT: Starting the machine should only be carried out once the machine and work site has been inspected and deemed safe and all other safety cautions have been adhered to.

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

4.8.1.4 Check that the head is free from obstructions especially pieces of wire.

4.8.1.5 Check that all blades and chains are in good condition and securely attached.

4.8.1.6 Check that all fixed guards and skids are in their correct place and in good condition.

4.8.1.7 Check that the tractor is equipped to deliver the correct hydraulic flow and pressure for the attachment. Refer to the operator manuals for the tractor and reach arm.

4.8.1.8 Check the operation of the hydraulic opening front hood.

4.8.2 Starting The Rotary Head

Once pre-start checks have been carried out, the machine is can then be started.

4.8.2.1 Start the machine at low oil flow (low rpm). If the machine is starting from cold, warm the machine up for approximately 15 minutes to heat up the oil.

Ensure that the machine is never started in material where it will have to work under load.

4.8.2.2 Slowly increase rpm until the correct oil amount is reached.

4.8.2.3 Operate and adjust the head angling ram to the required working angle. The ram may be operated during work to make minor angling adjustments, but is recommended to stop work before making major adjustments to the cutting angle.

4.8.2.4 Never attempt to restart the attachment if there is something strained/wedged in the machine. Stop the machine and the vehicle engine. Relieve hydraulic pressure before inspecting or trying to address the problem. Remove the ignition key and engage the handbrake. Only then it is safe to remove the wedged in material. Always wear safety glasses and work gloves.

4.8.3 Stopping The Rotary Head

4.8.3.1 Reduce engine RPM gradually to idle and stop the machine.

4.8.3.2 Never increase or reduce the oil amount too fast. This will damage the hydraulic system on a long-term basis.

4.8.3.3 When you are finished working, stop the engine, remove the ignition key and engage the handbrake, leaving the machine in a safe and secure position. Always wear safety glasses and work gloves. Beware of sharp cutting parts!

4.8.3.4 Always show consideration for other road users during transportation.

4.8.4 Stopping The Machine In An Emergency



DANGER! If the machine hits an object, becomes jammed, suddenly develops vibration or any other potentially harmful change happens to the machine.

Stop the machine immediately!

If you hit a solid object or foreign debris:

- 4.8.4.1 Return the tractor to idle engine speed immediately.
- 4.8.4.2 Disengage the PTO.
- 4.8.4.3 Wait for the blades or chains to stop rotating, then raise the reach arm and move the tractor off the object if safe to do so.
- 4.8.4.4 Relieve hydraulic pressure in the system. This can be done by pulling/pushing the selected tractor lever/button.
- 4.8.4.5 Press the emergency stop bottom on the reach arm controls to stop any potential movements whilst inspecting the machine. Stop the tractor.
- 4.8.4.6 With extreme caution, if a blocked foreign component has caused the machine to suddenly operate incorrectly or altogether ensure that all the correct levels of Personal Protection Equipment (PPE) is worn for safety purposes. Consider gaining extra personnel for assistance.
- 4.8.4.7 If the cause of sudden incorrect running of the machine is due to the machine colliding or hitting a foreign object, inspect the area and remove, or mark the location of the debris so it's not hit again.
- 4.8.4.8 Inspect the condition of the machine, reach arm and tractor and make any needed repairs before proceeding to use the machine again. Make sure the blades or chains are not damaged or broken and the machine is intact and undamaged before resuming operation. If in doubt; do not restart.



DANGER! Never attempt to disentangle the machine by inverting the direction of the blades and starting up the head!

4.9 General Cutting Hints

- 4.9.1.1 **DO NOT** angle the attachment in such a way as to throw cut material towards the tractor.
- 4.9.1.2 Avoid rushing into the work and maintain an even, steady speed to ensure a clean cut. Do not use excessive force when positioning the head into heavy branches or stumps. Damage to the machine may result. It is best to let the head 'eat away' slowly at heavy cutting jobs.

NOTE Working speed will be dependant on the particular machine and model that this accessory is being operated on; refer to the operation manual for that machine for details.

- 4.9.1.3 Always give the blades or chains enough material to 'bite' into, particularly when a hedge has a lot of leaf and very flexible thin stems.
- 4.9.1.4 When using the head for trimming trees and shrubs, let the head 'saw' into them. Do not lower the head down directly onto a tree or stump. The blades or chains are designed to cut with the end, any misuse can cause damage to the blade and risks foreign objects or blades/chains and other parts being ejected from the machine causing risk to bystanders, operator, tractor or the nearby environment.

4.9.2 Hedge Cutting Hints

- 4.9.2.1 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.
- 4.9.2.2 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.
- 4.9.2.3 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.
- 4.9.2.4 Stalling the blades in heavy growth is likely to cause damage to the machine.
- 4.9.2.5 Next trim the sides to the previous trim but not into it.
- 4.9.2.6 If cut material falls on top of head causing tractor to become unstable, move the reach arm 'Forward' and 'Out' to relieve tipping of the tractor. Lower the head to the ground and stop the machine. Stop the tractor engine, remove and pocket the starting key. Remove cut material from the head.

4.9.3 Verge Mowing Hints

- 4.9.3.1 When verge mowing on the ground, the head should always be 'carried' rather than 'dragged' on the skids.

Dragging the head will increase the side loads on the reach arm, decrease the horsepower available to the head, and reduce the ability of the accumulator to carry part of the weight of the reach arm during mowing operations. It is recommended that the head is carried in such a way that a proportion of its weight is supported by the reach arm it is attached to, and a proportion is carried by the head skids.

When worked in this manner the skids, in combination with the pivoted mounting on the head, will allow it the freedom to follow the contours of the ground better.

- 4.9.3.2 During verge mowing operations the correct operating speed should be maintained to prevent sudden changes in head motor spindle speeds, reducing risk of motor damage.
- 4.9.3.3 Never force the head into heavy branches or stumps - damage to the unit may result.

4.9.4 Hydraulic Front Hood

The machine is fitted as standard with a hydraulically opening front hood; the hood can be opened (up to 90°) to allow access to denser materials. For safety reasons the machine should be operated with the hood set at the lowest position that still allows the material to be cut to freely enter the head.

4.9.5 Pivoted Mounting

The mounting bracket is pivoted to permit the unit deviation from the horizontal by:

- $\pm 8.5^\circ$ on SP15 machines
- $+8.5^\circ$ on SP12 machines

This is to allow the machine to follow the contours of the terrain on ground cutting work, thus providing a cleaner finish.



Figure 4.11
(SP15 model illustrated)

4.10 Transporting The Rotary Head

In order to safely transport the reach arm mower and attachment when not in work with the tractor requires the operator to have a thorough knowledge and experience of the tractor they're using and safety precautions they should take.



Figure 4.12

After finishing work, the reach arm with the rotary head needs to be pulled close to the vehicle where it takes up the least room.

Once the reach arm is placed in the transport position:

- 4.10.1.1 Close the outer arm in fully to the inner arm and slew the arm from work position into transport position.
- 4.10.1.2 The inner arm needs to be lifted until the transportation stop is met or close to the vehicle.
- 4.10.1.3 Angle the attachment in order to take up the least amount of space.
- 4.10.1.4 For Spearhead machines with slewing ability the reach arm should be slewed behind the tractor. Be mindful, if the reach arm is lifted to the transportation stop that it doesn't hit the cab of the vehicle or will hit the cab during transportation.
- 4.10.1.5 All hoses are sufficiently clear of the tyres to prevent contact during bounce and sway on braking, turning and undulating ground.
- 4.10.1.6 It is an essential requirement that when the machine is in the transport position all the isolator valves are closed.

Otherwise:

- 4.10.1.7 Ensure the tractor has been properly serviced and maintained. Do not operate the tractor with weak/faulty brakes or worn tyres.
- 4.10.1.8 Ensure the tractor has the capacity to handle the weight of the reach arm and attachment.

Failure to have at least 20% sufficient load over the front axle or to drive at inappropriate speeds on undulating terrain may result in a loss of directional control.

- 4.10.1.9 Ensure the tractor operating and reach arm controls are set for safe transport. Consult the tractor and reach arm manufacturers operators manual.



WARNING! Transport only at speeds where the reach arm and attachment and tractor can be maintained in control. Drive **conservatively**. Serious accidents and injuries can result from operating this equipment at high speeds.

- 4.10.1.10 Before using the tractor and reach arm and attachment ensure that the machine is only operated at safe speeds; on and off road (including work).



DANGER! Steering should be taken at slow speeds to maintain machine stability. Violently changing direction will greatly reduce machine stability resulting in loss of steering control, potentially turning over the machine and/or tractor causing serious injury, or even death

- 4.10.1.11 The operator should start at slow speeds and familiarise themselves of the operating and handling characteristics of the tractor in combination with the reach arm and attachment off road before proceeding to drive the machine onto the public highway. Gentle steering and braking should be adhered to maintain control and overall stability
- 4.10.1.12 Tractor independent brakes should be locked together and the differential lock should be disengaged.
- 4.10.1.13 Before transporting the tractor and reach arm and attachment, determine the legal maximum transport speeds for the equipment conforming to local jurisdictions and comfortable transport speeds for the operator. Only increase speeds safely when conditions allow or the operator is comfortable to do so.



Figure 4.13 – Follow Safe Driving Practices

Transport the machine only at safe speeds which allow you to properly control the machine and at a **maximum** speed of 20 mph (32 kph). Drive for the conditions and reduce speed if required. Increasing speeds, operating down a hill or on wet or rain slick roads; increases stopping distances.

- 4.10.1.14 Make certain that the local jurisdiction legal safety requirement items are fitted. For example a "Slow Moving Vehicle" (SMV) sign is installed and tractor flashing warning lights. Check the local jurisdiction

to determine whether the flashing warning beacons are required to be switched on when the machine is working.

Make sure all these safety awareness items are clearly visible and legible and follow all local traffic regulations. If the item is in anyway not working correctly or is faded; replace.



DANGER! The reach arm may be taller and wider than the tractor. Be careful when operating or transporting the reach arm and attachment to prevent the machine from running into or striking sign posts, barriers, walls, cars or any other solid objects. Such an impact could cause the tractor and reach arm to violently change direction or balance resulting in loss of steering control, serious injury, or even death.

- 4.10.1.15 Be aware of other road users and bystanders and make the machine aware to other users. Check your side view mirrors frequently and remember vehicles will approach quickly because of the tractor's slower speed. Gain eye contact with other people to gauge they've seen the tractors presence.
- 4.10.1.16 When operating on public roads, have consideration for other road users. Pull to the side of the road occasionally to allow all following traffic to pass. Do not exceed the legal speed limit set in your local jurisdiction for agricultural tractors. Always stay alert when transporting the tractor and reach arm on public roads. Use caution and reduce speed if other vehicles or pedestrians are in the area.
- 4.10.1.17 Make sure all tractor and reach arm lighting are functioning correctly. Older tractors may not feature as many/bright lights as modern tractors. Consider upgrading the lights by consulting your authorized tractor dealer to ensure that the tractor and machine presence is seen.
- 4.10.1.18 It is of utmost importance that safety decals are kept clean and replaced if they are no longer legible, damaged or lost completely. Safety decals can be purchased readily from a local Spearhead dealer.
- 4.10.1.19 After work and all debris is swept away from footpaths and highways ensure that the work site is tidied. The operator is liable for any resulting damage or injury.

(This page is left blank intentionally)

5 Maintenance



WARNING! Before proceeding to carry out any maintenance on the machine, ensure that you have thoroughly read and understand Section 2.3 “Safe Maintenance” with regards to the correct and safe maintenance procedures of looking after the machine. This section gives safe guidance to ensure the wellbeing on the maintenance personnel as well as the machine itself.

5.1 Periodic Maintenance

Perform service, repairs, lubrication and maintenance procedures outlined throughout Section 5 to ensure the longevity and reliability of the rotary head.

In general:

- 5.1.1.1 Inspect for loose or missing fasteners, worn or broken parts, leaky or loose fittings, worn bushes and any other moving parts which are worn or missing.
- 5.1.1.2 Replace any worn or broken parts with genuine Spearhead parts under the guidance of the specific section stated in Section 5.
- 5.1.1.3 Lubricate the head specified by the lubrication schedule.
- 5.1.1.4 **Never** lubricate, adjust or remove material while it is running or in motion.
- 5.1.1.5 Torque all bolts and nuts to the settings specified.

5.2 Blades & Blade Carrier



WARNING! Checking or replacement of blade or chain components should only be carried out with the tractors engine switched off, starting key removed and the PTO shaft disconnected. Do not restart the machine until all personnel and bystanders have escaped the 90m exclusion area sufficiently and the working area has been reassessed



WARNING! Avoid personal injury. Never work under the rotary head without fixed supports to ensure that the head does not fall. This applies if the rotary head is attached to the reach arm or is detached.

5.2.1 Inspection

Before proceeding to carry out any maintenance on the machine, ensure that you have thoroughly read and understand Section 5 “Maintenance” and Section 2.3 “Safe Maintenance with regards to the correct and safe maintenance procedures of looking after the machine. This section gives safe guidance to ensure the wellbeing on the maintenance personnel as well as the machine itself.

Blades should be replaced if they have:

- Distortion
- Cracks
- Teeth missing

For safety and performance only use genuine Spearhead blades and blade components. When replacing blades it is important that new blade bolts are fitted.

Inspect the blades before each use to determine that they are properly installed, secure and in good condition. Blades that are bent, excessively nicked, worn or have any other damage should be replaced, with high importance that both blades are replaced in order to retain the balance of the rotor. Failure to replace such abnormally damaged blades may lead to catastrophic failure of the blade and ejection of the broken part which may cause bodily injury or death.

Due to close proximity between the blade bolt nut and the inside of the head cowl, a removable plastic cap is located on the top of the cowl of the machine to allow access to the blade bolt nut.

5.2.2 Blade Removal & Replacement



Equipment Required

- 36mm spanner or socket x 2

Before proceeding to carry out any maintenance on the machine, ensure that you have thoroughly read and understand Section 5 “Maintenance” and Section 2.3 “Safe Maintenance with regards to the correct and safe maintenance procedures of looking after the machine. This section gives safe guidance to ensure the wellbeing on the maintenance personnel as well as the machine itself.

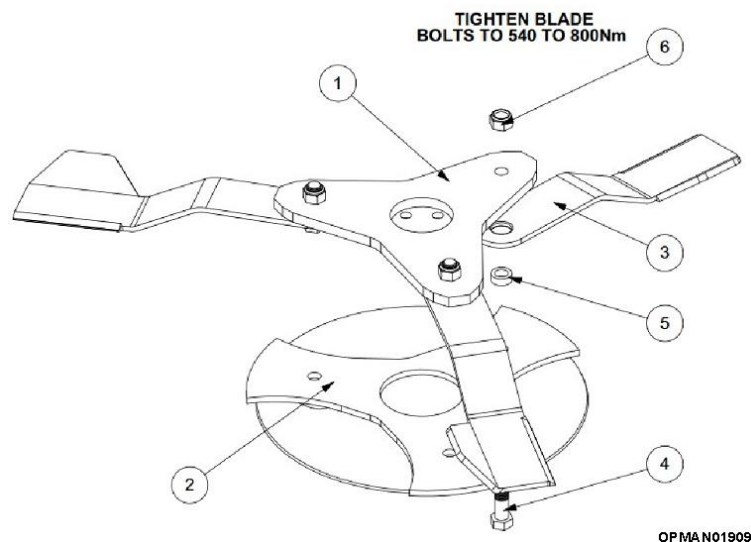


WARNING! Always check tightness of blade bolts prior to using the machine.



WARNING! Blades must be mounted to cut in a downward direction only.

Standard Blade Carrier - SP12 and SP15 Rotary Head



Starcut Blade Carrier – SP12 and SP15 Rotary Head

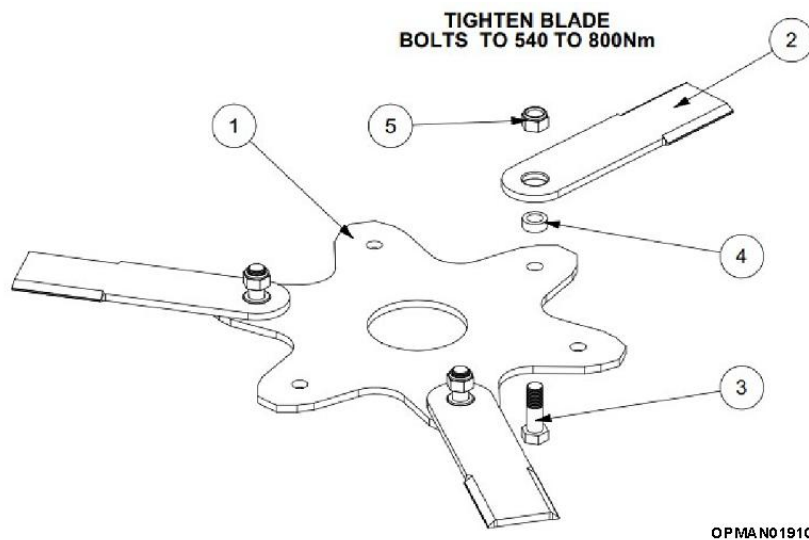
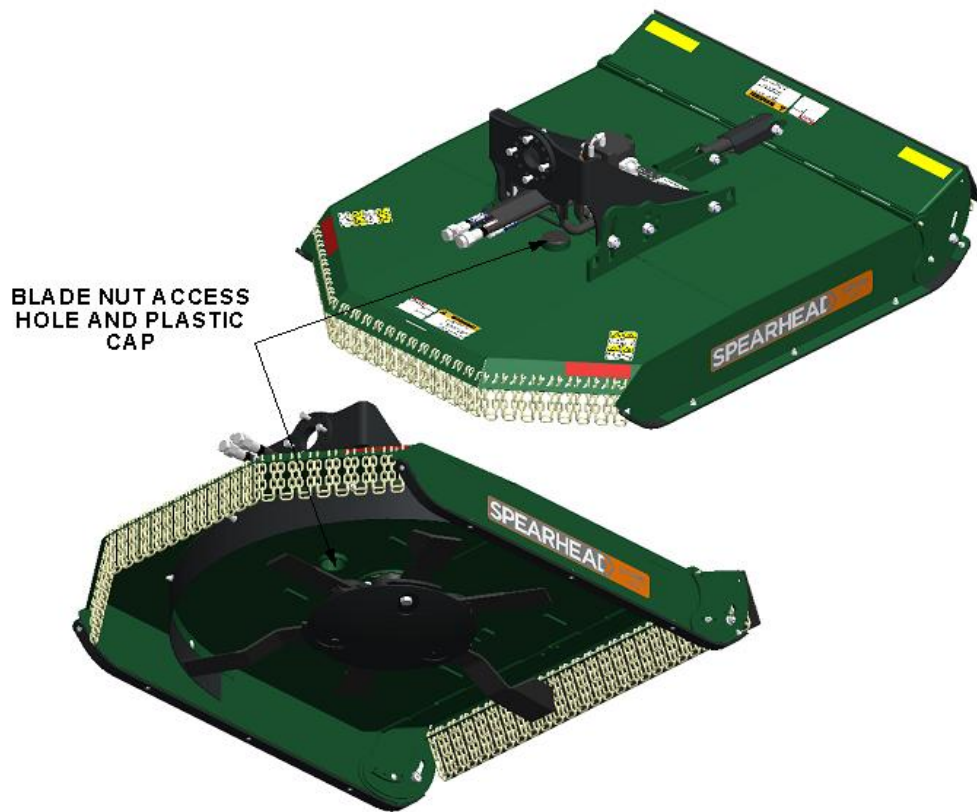


Figure 5.1



OPMAN01911

Figure 5.2

In order to remove the blades:

- 5.2.2.1 Ensure that the machine is disconnected from the tractor and reach arm hydraulic supply to ensure that the blades do not move during maintenance. Support the machine with fixed supports.
- 5.2.2.2 Due to close proximity between the blade bolt nut and the inside of the head cowl, a removeable plastic cap is located on the top of the cowl of the machine to allow access to the blade bolt nut.
Remove bolts
- 5.2.2.3 Place a block of wood under the cowl of the machine in order to stop the blades from rotating and allow you to easily remove a blade.
- 5.2.2.4 Undo the securing nut of the blade. Support the blade from dropping. Retain the blade bush.
- 5.2.2.5 Remove and replace with new blade ensuring the blade is mounted in the correct cutting direction for the machine build; see Figure 4.4. Blades should be orientated to cut downwards.
- 5.2.2.6 Install new blade bolts and nuts and torque to settings given in Figure 5.1.
- 5.2.2.7 Repeat procedure on the other blade.
- 5.2.2.8 Refit plastic cap.

5.3 Chains (option)

5.3.1 Inspection

Before proceeding to carry out any maintenance on the machine, ensure that you have thoroughly read and understand Section 5 "Maintenance" and Section 2.3 "Safe Maintenance with regards to the correct and safe maintenance procedures of looking after the machine. This section gives safe guidance to ensure the wellbeing on the maintenance personnel as well as the machine itself.

For safety and performance only use genuine Spearhead chain and chain carrier components. When replacing chains it is important that new securing bolts are fitted.

Inspect the chains before each use to determine that they are properly installed, secure and in good condition. Chains that are excessively worn or have any missing link or any other damage should be replaced in order to retain the balance of the rotor. Failure to replace such abnormally damaged chains may lead to catastrophic failure of the chain and ejection of the broken part which may cause bodily injury or death.

Ensure chain wear does not exceed the following limits;

- For 13mm chains all links must have a minimum thickness of 10mm.

If in any doubt; replace.

5.3.2 Chain & Chain Carrier Removal

	Equipment Required • 36mm spanner or socket x 2
--	---

Please see the below Figure diagram for the chain and chain carrier assemblies for the various HD rotary head models.

SP12 HD 13mm chain & SP15 HD 13mm chain

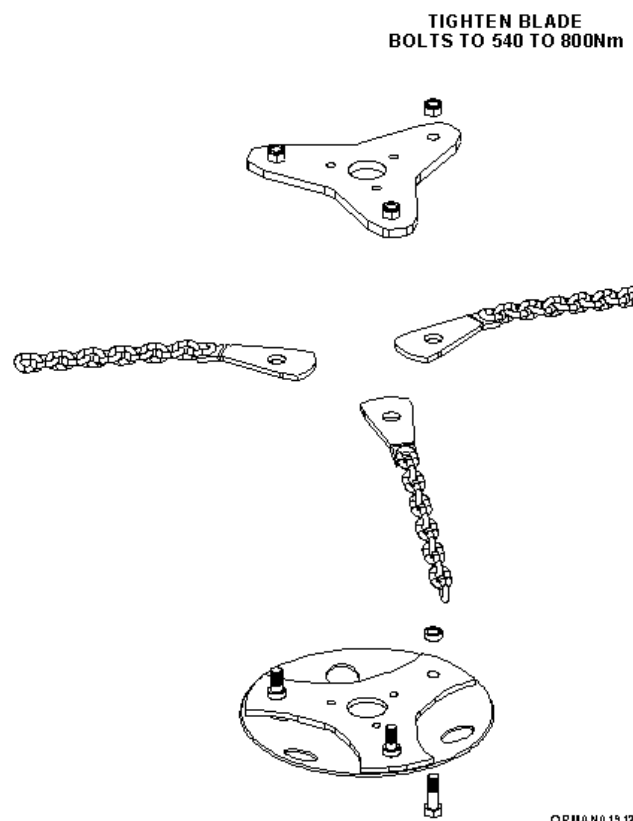


Figure 5.3

Throughout all disassembly and reassembly procedures ensure:

- 5.3.2.1 That the machine is disconnected from the tractor and reach arm hydraulic supply to ensure that the chain carrier assembly does not move during maintenance. Support the machine with fixed supports.
- 5.3.2.2 Place a block of wood under the cowl of the machine in order to stop the chain carrier from rotating and allow you to easily remove the carrier.
- 5.3.2.3 Whenever removing any heavy chain assemblies or chain carriers ensure the components are supported sufficiently with fixed stands to ensure they do not suddenly drop and cause physical harm.
- 5.3.2.4 In reassembly tightening torque figures are adhered to.
- 5.3.2.5 All chain fasteners are replaced with new items every time the chain carrier assembly is removed and then replaced.
- 5.3.2.6 Inspect the chain assemblies under the guidance given in Section 5.3.1. Replace if a chain assembly does not meet the required safety requirements.

5.4 Hydraulic Components

Before proceeding to carry out any maintenance requirements on the hydraulic system, ensure that you have thoroughly read and understood Section 2.3 on how to safely go about carrying out maintenance requirements to the head, including how to approach the hydraulic system and its components. Section 2.1 should also be read to understand how to safely operate and use the machine in general.



CAUTION! Relieve hydraulic pressure before disconnecting the hydraulic hoses or working on the system. This can be done by pulling/pushing the selected tractor lever/button. Only once this has been completed and then suitable safety glasses and impenetrable gloves have been put on can the hydraulic hoses be removed from the tractor.



CAUTION! When working with/checking the hydraulic system on the rotary head or reach arm always wear safety glasses and impenetrable gloves. This also applies when working with motor and motor oil. Use paper or cardboard to search for leaks and not hands or any other body parts.



CAUTION! Keep hands and body away from pin holes and nozzles ejecting hydraulic fluid. Ingested or penetrated hydraulic fluid in the body can become gangrenous. Removal must be carried out professionally by a suitable Doctor.



CAUTION! Ensure all hydraulic hoses, lines and connections in good condition and tight before applying pressure.



CAUTION! Do not change any factory-set hydraulic settings to avoid component or equipment failures.



CAUTION! Ensure maintenance personnel wear suitable PPE clothing when maintaining the machine to ensure risk of impact or skin injuries. Suitable footwear and gloves are an example. For example frequent or prolonged contact with hydraulic oil may cause dermatitis and other skin disorders including (more rarely) skin cancer when not wear impenetrable gloves. Worn parts may have sharp edges.



CAUTION! Follow the guidance of the lubricant manufacturer with regards to handling oils, solvents, cleansers and other chemical agents.

5.4.1 Hoses

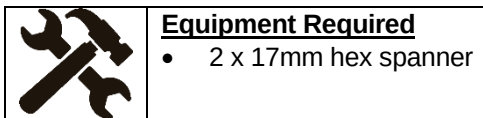


WARNING! Relieve hydraulic pressure before disconnecting lines or working on the machine. This can be done by pulling/pushing the selected tractor lever/button.

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:

- 5.4.1.1 Check that all hoses and their connections are in good condition and that there are no leaks or damage. Replace any hose that is leaking or damaged.
- 5.4.1.2 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 using the guidance given in Section 4.6.3.
- 5.4.1.3 Check to ensure that hoses are fitted without kinks or sharp bends using the guidance given in Section 4.6.
- 5.4.1.4 If in doubt about the condition of any hose replace. When replacing hoses, be sure to tighten to the correct torque setting, see Section 5.8.

5.4.2 Ram Inspection



Hydraulic rams should be inspected on a daily basis before commencing work. Ensure all hydraulic hoses, lines and connections in good condition and tight before applying pressure.

Inspect the ram and the accompanying fitted items to it:

- Check for play and wear in either end of the ram pear pin bushes and replace if necessary.
- Replace the ram immediately if there is any apparent distortion or corrosion on the plated ram rod.

If there is a leak apparent, determine where the cause of this leak is from. Causes could be due to the hydraulic ram, hose adaptors or the hydraulic hoses. **Replace the component at fault if in any doubt before proceeding to use the machine.** Hydraulic ram seal spares kits are available.

Where parts are broken, damaged and deemed not fit for use; replace with genuine Spearhead parts using the online Interactive Parts facility at:

<https://my.spearheadmachinery.com/parts/public-interactive-parts-database/>

You will require the machine serial number. Assistance to its location can be found in Section 1.3.

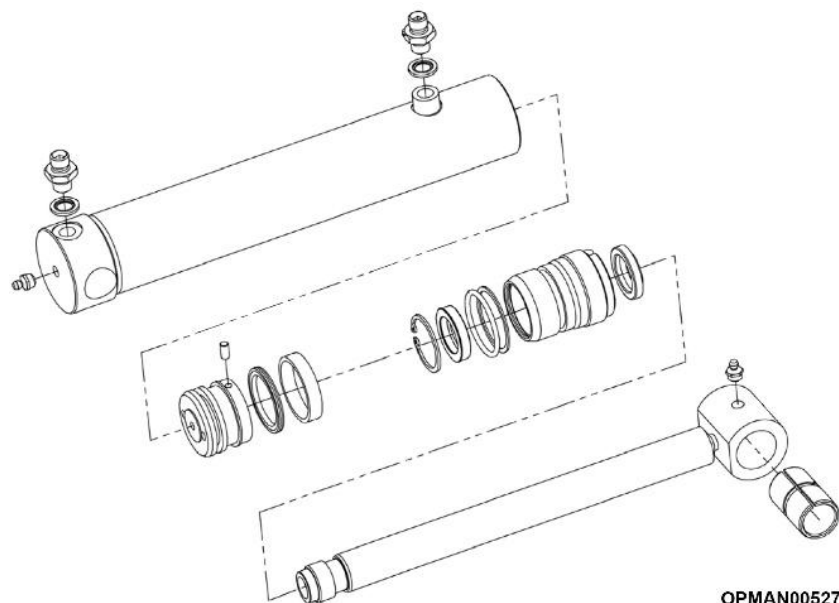


Figure 5.4

5.5 Lubrication & Greasing



CAUTION! When working with/checking the hydraulic system on the head always wear safety glasses and impenetrable gloves. This also applies when working with gearboxes and gearbox oil. Use paper or cardboard to search for leaks and not hands or any other body parts.



CAUTION! Keep hands and body away from pin holes and nozzles ejecting hydraulic fluid. Ingested or penetrated hydraulic fluid in the body can become gangrenous. Removal must be carried out professionally by a suitable Doctor.



Equipment Required

- Manually operated grease gun supplying NLGI #2 Molybdenum Disulphide Grease to M6/M8 grease nipples
- 13mm hex socket/spanner

The mechanical components of the machine in use must be lubricated to avoid wear and heat build-up. Lubrication may be through the use of grease or oil. Oil allows higher relative speeds of items such as gearboxes, whereas grease is generally used to lubricate items such as bearings or bushes. In both cases it is important to ensure lubrication is given to these various items to ensure their longevity and reliability in use.

The bearing housing has been filled to the correct quantity prior to shipment. It is important to fill and maintain the bearing housing with the correct quantities of oil. Overfilling the bearing housing with oil does not improve lubrication and may cause overheating. Using an under filled bearing housing can cause overheating and premature wear to components such as seals.

Fill oil up to plug level (as required) using SAE EP80-90W or GL-4/GL-5 oil in the bearing housing. Check oil leaks around the spindle assembly on a daily basis. The bearing housing should not require additional lubricant unless the housing is cracked or a seal is leaking.

Changing the oil regularly prevents problems associated with deterioration, moisture build up in the oil and the potential presence of metallic particles. Oil changes are recommended on machines **after the first 50 hours**, and **then every 500 hours thereafter**.

There are several grease points located around the machine and these should be lubricated on a daily basis prior to work and level of oil in the bearing housing checked.

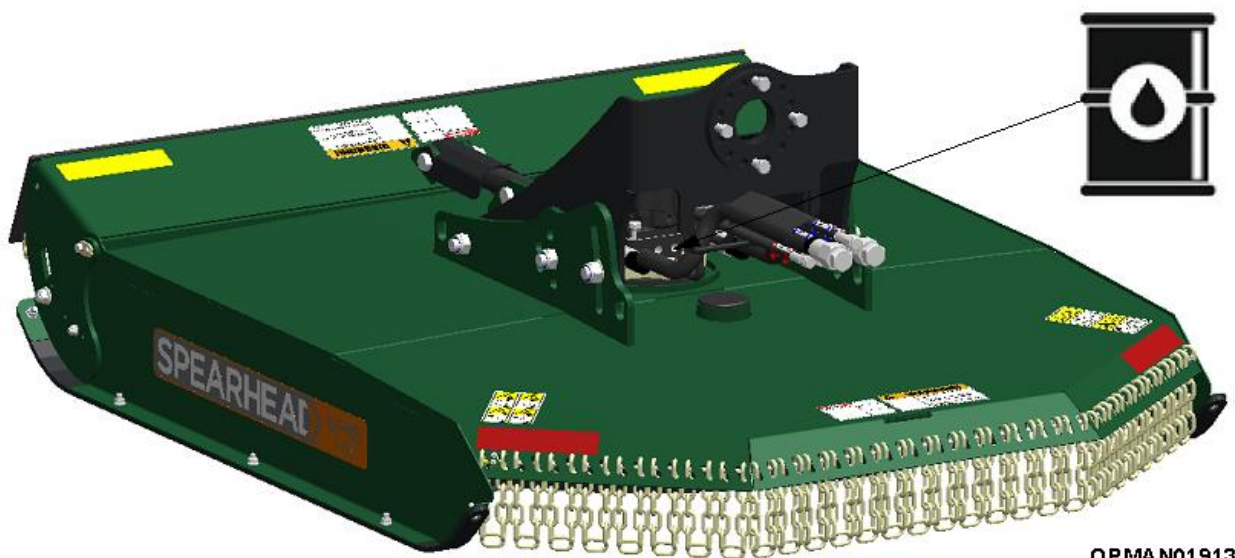


Figure 5.5

5.6 Pins & Bushes

Pins

Pins should be inspected regularly to ensure they are not worn, damaged or loose.

Ensure all pins and accompanying fasteners are tight and routinely checked following the guidance given on the Maintenance Sheet; see Section 5.9.

Ensure that the pins have not been worn in such a way to create a step. Make sure the pin is not bent and the head is not damaged. If in any doubt, replace.

Bushes

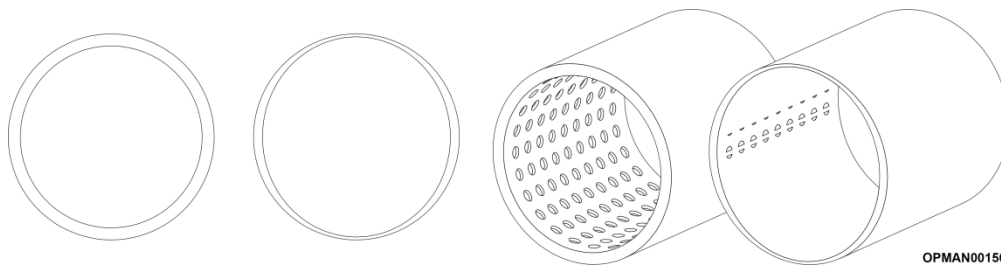


Figure 5.6 – New & Worn Bush Comparison

The machine should be inspected regularly to ensure the bushes are not worn. Worn bushes should be replaced when there is excess movement. Bushes will wear oversize or oval with indication on the interior showing the oil galleries being worn away.

5.7 Skids



Equipment Required

- 1 x 17mm hex socket/spanner
- 1 x 6mm allen key

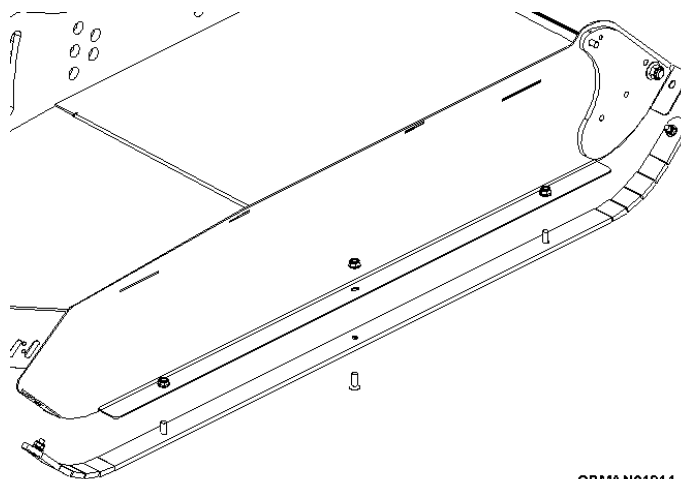


Figure 5.7 – HD Rotary Head Skid

Spearhead machine skids are fitted to protect the machine deck fabrications from permanent damage. Premature wear can be caused to the skids through the machine being set too low, allowing the skids to drag along the ground causing an earlier requirement for replacement. Dragging the skids on the ground or running the skids into solid objects can contribute to early frame failure of the rotary head. Replace worn skids as required. **Failure to replace skids and using the machine without will cause permanent damage to the cowl fabrication.**

5.8 Torque Settings

5.8.1 Nuts & Bolts

Specific Fastener Requirements

On HD rotary heads, there are some special fasteners/components which require specific torque settings to ensure they operate safely.

Use	Machine	Size	Grade	Torque Setting	
				Nm	Ft-lb
Motor to Bearing Housing	All	M14	8.8	116	86
Cowl to Bearing Housing	All	M20	8.8	460	340
Blade Carrier to Bearing Housing	All	¾" UNC	8.8	542 (2)	400 (2)
Upper Blade Carrier to Lower Blade Carrier	All	M36	8.8	540-800	398-590
Blade Bolts	All	M36	8.8	540-800	398-590

Table 5.2 – HD Rotary Head Specific Fastener Torque Settings

Non-specific Fastener Requirements

The below tables give reference to the **maximum** recommended tightening torques for standard, zinc plated finished bolts on Spearhead machines. **These settings can be applied to hex, socket countersunk and socket button screws.**

Size	Grade					
	8.8		10.9		12.9	
	Nm	Ft-lb	Nm	Ft-lb	Nm	Ft-lb
M5	5	3	7	5	8	6
M6	14	10	12	9	14	10
M8	34	25	29	21	34	25
M10	68	50	57	42	68	50
M12	119	88	99	73	119	88
M14	189	139	158	116	189	139
M16	295	218	246	181	295	218
M18	406	299	338	249	406	299
M20	576	424	480	354	576	424
M22	783	577	652	481	783	577
M24	995	734	829	612	995	734
M30	1977	1458	1647	1215	1977	1458

Table 5.3 – Standard Fastener Torque Settings

5.8.2 Hydraulic Fittings

Throughout all HD rotary heads, BSP/Metric adaptors and hoses are used. See the relevant headings for adaptors and hoses.

Port Adaptors With Bonded Seals

The below tables give reference to the **maximum** recommended tightening torques for standard, BSP port adaptors found on HD rotary heads.

Size	Thread	Torque Setting		Spanner Size
		Nm	Ft-lb	
1/4"	BSP	34	25	19mm
1"	BSP	203	150	41mm

Table 5.4 – HD Rotary Head Adaptor Torque Settings

Hydraulic Hoses

The below tables give reference to the **maximum** recommended tightening torques for standard, hydraulic hoses on HD rotary heads.

Size	Thread	Torque Setting		Spanner Size
		Nm	Ft-lb	
M18	Metric	55-60	40-44	22mm
M36	Metric	180-200	133-148	41mm

Table 5.5 – HD Rotary Head Hydraulic Hose Torque Settings

(This page is left blank intentionally)

5.9 Machine Inspection Record

	MACHINE INSPECTION RECORD (For HD Rotary Head)	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 cowl mainframe for any structural problems or excessive damage			
Look for any evidence of motor oil leaks			
View the blades/chains for any damage, distortion or missing links			
If fitted with blades ensure they are orientated correctly for the configuration in which the machine is set up			
Review all the operational guards fitted to the machine and tractor, check with the instruction book if unsure.			
Inspect to see all protection chains are present			
Inspect all hydraulic hood ram for damage and oil leaks			
Inspect the pivoted mounting rubber cushions are in good condition and giving sufficient suspension and ride cushioning			
Check hoses for damage, kinks, twists, chafing or weeping.			
Check that the tractor is equipped to supply the correct hydraulic flow and pressure			
Ensure that all safety decals are located on the machine and are clean and readable			
Mechanical Checks		Comments	OK
All mounting fasteners to between attachment and reach arm need to be checked for tightness and integrity.			
Check blade/chain fasteners for tightness			
Ensure the quick hitch pin is fitted and secure between machine and reach arm			
Check the security of any hose fittings for tightness			
Grease hydraulic ram and pivoting mounting points			
Ensure that the attaching reach arm and tractor meet the requirements of the machine			
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 with regards to powering the machine			
Run the blades up to operating speed and check for vibration. If vibrating check with the instruction book for reasons.			

Other comments:

Disclaimer: All guidance and maintenance advise to be carried out on the rotary head 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

5.10 Machine Storage

Follow the following sections for guidance to correctly storing the HD rotary machines out of working use and preparing back into correct working condition.

5.10.1 Preparing The Machine For Storage & Reintroduction Into Work

Following seasonal use it is important to prepare the machine for storage, thinking of the preservation of parts condition and ease of reintroduction when bringing the machine back into work after periods of no use.

Follow the following points:

5.10.1.1 Thoroughly wash the machine removing all traces of grass and dirt.

Great care should be taken when using pressure washers. **Do not** hold the pressure washer lance close to the paintwork and items containing seals as this can cause damage and discolouration.

Spearhead does not recommend using steam cleaners.

5.10.1.2 Grease all grease points following the guidance given in Section 5.5.1.

5.10.1.3 Liberally place oil on each of the blades and chains to prevent corrosion.

5.10.1.4 Liberally smear grease along the length of the exposed plate hydraulic hood ram.

5.10.1.5 Tighten all fasteners to the recommended torque.

5.10.1.6 Plug all open ended hydraulic hoses to keep the ends free of contamination and dirt.

5.10.1.7 Drain and replace bearing housing oil.

5.10.1.8 Use touch up paint available from Spearhead where necessary to preserve the appearance of the machine.

5.10.1.9 Ideally store the machine in the dry indoors, on a firm surface or a on a pallet, away from the elements. This will greatly preserve the machines physical appearance and condition.

It is also best practice to inspect the machine for worn/damaged items which will be required to be replaced before entering work again in the new season. Consult the maintenance schedule for the machine (Section 5.9) as well as other specific maintenance task sections to see what could be required to be done to the machine.



Figure 5.8 – Prepare For Storage

Ordering replacement parts at the beginning of this period with plenty of time will potentially reduce the delays of reintroduction into work with out of stock items. Many other local operators will be carrying out the same procedure at the same time.

Where parts are broken, damaged and deemed not fit for use; replace with genuine Spearhead parts using the online Interactive Parts facility at:

<https://my.spearheadmachinery.com/parts/public-interactive-parts-database/>

You will require the machine serial number. Assistance to its location can be found in Section 1.3.

Spearhead rotary heads are designed to withstand the most rigorous conditions and with a little care and attention will give many years of trouble free service. So as not to invalidate the warranty and to avoid problem, use only genuine Spearhead parts and make sure the machine is not driven at excess speed (3 mph/5 kmh).

(This page is left blank intentionally)

6 Troubleshooting

Problem	Cause	Solution
Machine noise	Loose fasteners	Check and tighten to correct torque
	Damage to fabrication or cracks	Repair fabrication or replace component with genuine part
	Vibration	See "Vibration!"
Motor noise	Worn gears	Replace gears with genuine part
	Worn bearings	Replace bearings with genuine part
	Worn bearing housing bearing	Remove motor and inspect bearing housing for oil quantity and bearing condition
Motor leak	Too high return oil pressure	Check oil pressure. Free to tank. Change washer.
	Too high leak oil pressure	Check oil pressure. Free to tank. Change washer.
	Return hose not correctly mounted or has fallen off	Install correctly or reinstall. Change seals and/or lid on the valve.
Overheating	Incorrect machine speed	Test RPM on machine.
	Wrong oil level	Check oil level.
	Wrong oil type	Empty the tank and refill with correct oil type.
	Blockage of blades	Remove cuttings/debris.
	Air temperature is too high	Install a hydraulic oil cooler. Reduce operating speed.
Hydraulic failure	Oil level too low	Refill with oil to the correct level.
	Oil leak in pressure hose	Check machine for leaks.
	Oil pump filter is blocked	Replace the filter element.
Branches get "frayed" or irregular cut grass	Larger branches than recommended	Never exceed the recommended maximum branch sizes of the hedge cutter.
	Working during winter time	Work during growth season.
	Worn, bent or broken blades/chains	Replace blades/chains immediately. - Remove/avoid obstacles such as rocks - Check oil flow rate - Ensure steady initial starting of the machine
Cutting result skewed/hacked	Defective motor or bearing housing bearing	Change bearing.
	Rotor or blade damaged/bent	Change rotor/blade and only work on suitable material.
	Missing chains	Replace the chain.
	Forward drive too fast	Adjust speed.
Vibration!	Blade damaged/bent	Change blade.
	A blade/chain is stuck	Loosen the blade/chain.
	A blade/chain is broken	Replace the blade/chain.
Cuttings are thrown towards the cab	Attachment is angled so the blades/chains are facing the cab	Only operate as recommended by Spearhead Machinery.
Metal fatigue in fabrication	Too fast working/transportation speed	Slow down! Operate/transport the machine following the guidance given in the operators manual.
	Used in a poor manner/condition	Operate machine in the manner described in the attachment and reach arm manual

(This page is left blank intentionally)

7 Spare Parts

7.1 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; see Figure 1.7.

7.1.1.1 Enter the serial number.

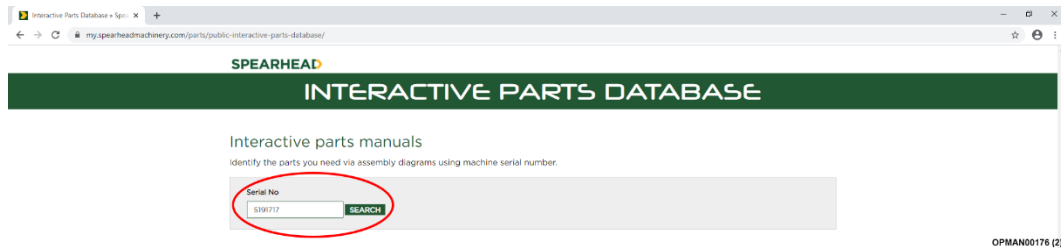


Figure 7.1 – Type In Serial Number

7.1.1.2 After entering the serial number a specification for the machine will appear. Click on the serial number; see Figure 7.2.

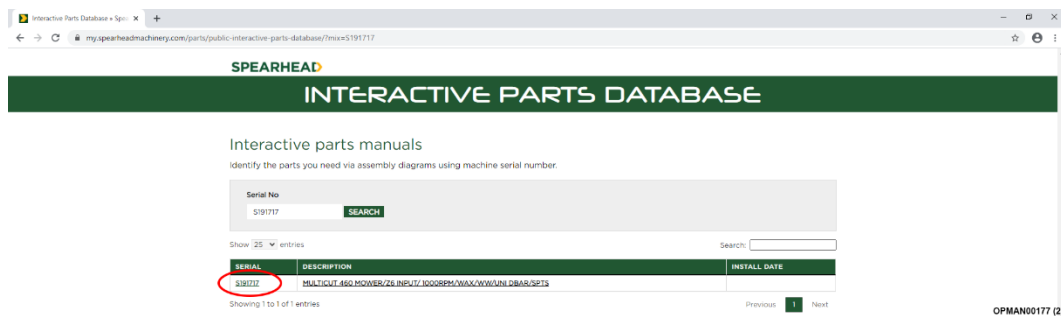


Figure 7.2 – Click On Serial Number

7.1.1.3 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 7.3.

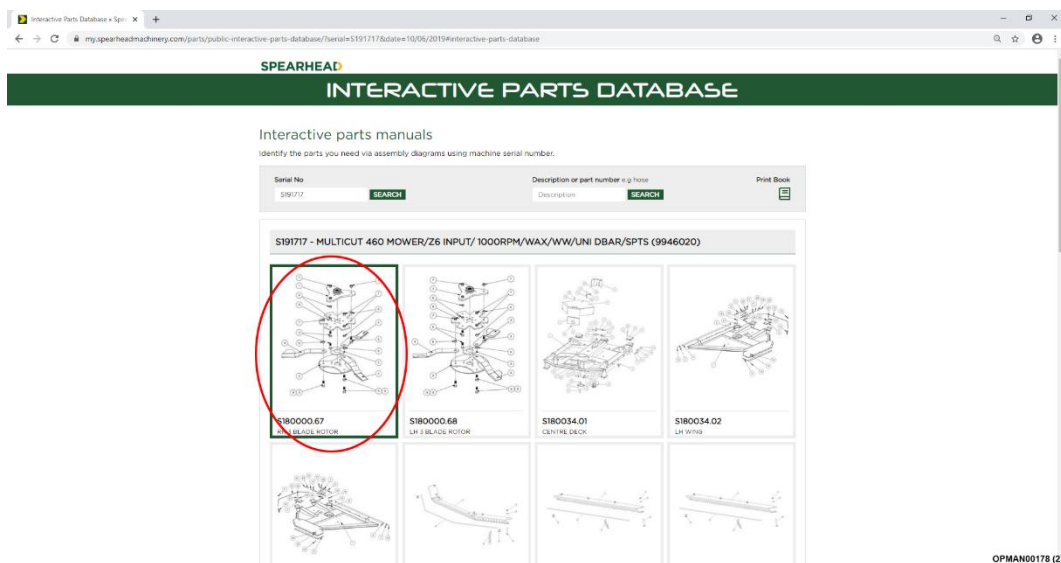


Figure 7.3 – Click On Assembly

- 7.1.1.4 You will finally be presented with a full exploded parts breakdown for that particular assembly, giving part numbers and the quantities required; see Figure 7.4.

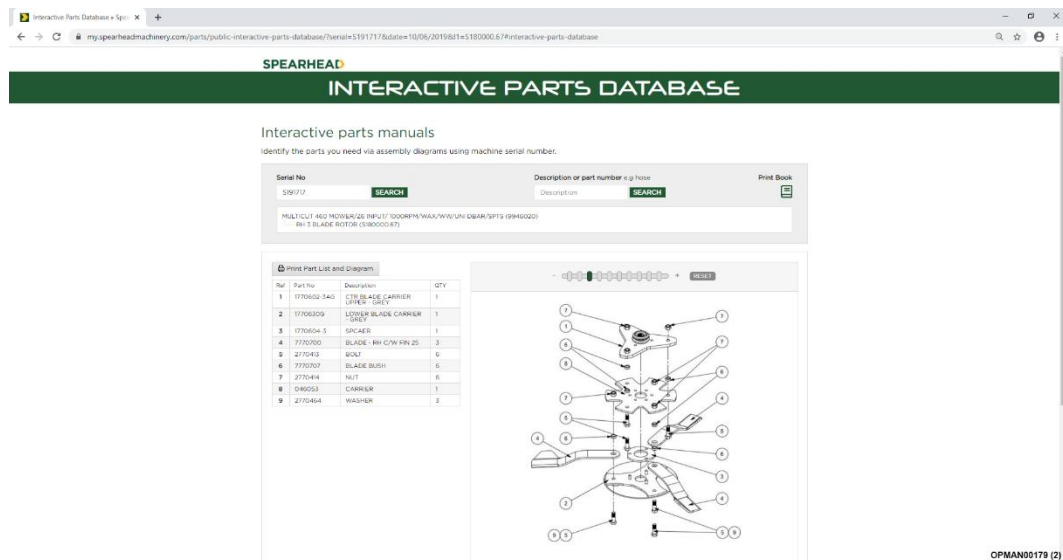


Figure 7.4 – Exploded Parts Breakdown With Bill Of Materials

7.2 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 7.3.

7.3 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 7.5.

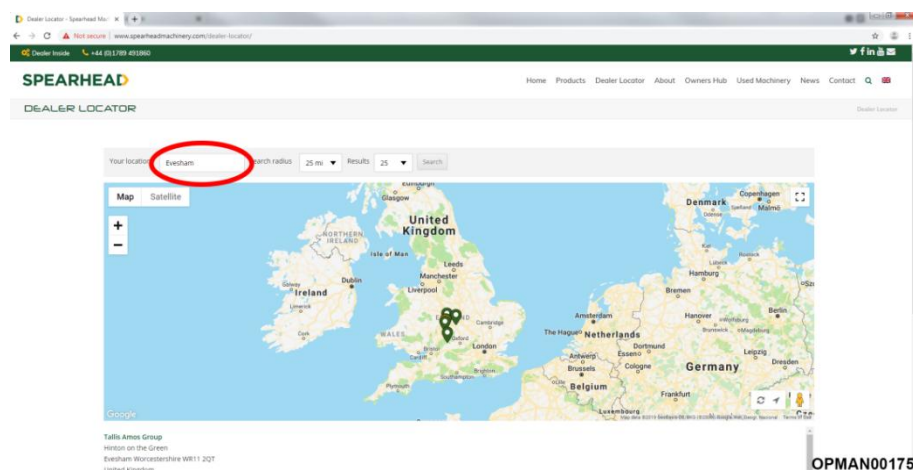


Figure 7.5 – Dealer Locator

Notes

Notes