

**Spearhead Machinery
Operator Instruction Manual For**

POWERDRIVE PRO

1.30-1.60m cut width

Vegetation control reach arm flail cutting attachment

8999189EN 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 491867.

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

Registration Verification

Model Type:		Powerdrive Pro
Model Number:		4.956
Serial Numbers:	Machine:	S
	Cutting Implement:	S
	Other:	
Name Of Owner:		
Name Of Installing Dealer:		
Dealer Address:		
Dealer Signature:		
Date Of Delivery / Installation:		
Date Of Warranty Registration:		

IMPORTANT

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

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

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

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Powerdrive Pro Flail Head Reach Arm Attachment

This manual covers the Powerdrive Pro series of reach arm mounted flail head attachments which are available in 1.3m (130 model) and 1.6m (160 model) cutting width variants.

They are fitted with heavy-duty flails, pitch adjustable front hood and adjustable rear roller to fit the requirements of the working environment and the operator.

All machines are all fitted with a hydraulic motor which through a belt drive system creates motion in the cutting rotor.

These machines are designed to be fitted to Spearhead's range of larger, professional specification reach arm mowers including the Twiga Mid, Pro and Flex models. See the specific reach arm requirement of each flail head attachment in Section 3.4.1.

Powerdrive Pro flail head attachments can be ordered with various specifications of features to suit the end user's specific requirements.

It is essential that the safety guards are always fitted during operation and that the machine is operated in line with the procedures and practices detailed in this manual.

IMPORTANT

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

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

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

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

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

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

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

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Contents List

1	Machine Description	10
1.1	Intended Usage	10
1.1.1	Allowed Uses	10
1.1.2	Improper Uses	10
1.2	General Arrangement	11
1.2.1	Standard Components	11
1.2.2	Option Components	12
1.3	Machine Identification	13
1.4	Rotation Definitions & Conventions	14
1.5	Machine Specification	15
1.5.1	Standard Specification	15
1.5.2	Machine Options	17
1.6	Compatible Base Unit Options	19
2	Safety	20
2.1	Level Of Danger	20
2.2	Terminology	20
2.3	Safe Use	21
2.3.1	Health and Safety Executive (HSE) Guide Sheets	21
2.3.2	Health and Safety Executive (HSE) Safe Stop Campaign	22
2.3.3	Operators Manual	23
2.3.4	Personnel Preparation	23
2.4	Personal Protective Equipment	24
2.5	Tractor And Machine Preparation	24
2.6	Work Site Management & Risk Assessment	28
2.7	Machine At Work And Observation	29
2.8	Working With Overhead Power Lines (OHPL's)	32
2.8.1	Dangers With Reach Arms	32
2.8.2	Height Of Powerlines And Equipment	33
2.8.3	Exclusion Zones	34
2.8.4	OHPL Risk Assessment	35
2.8.5	Contacting An OHPL	37
2.9	Working On The Highway - Lighting, Signage And Road Users	38
2.9.1	Safety Warnings & Considerations	38
2.10	Transporting The Machine	41
2.11	Transporting The Attachment On A Trailer	44
2.12	Machine Storage	45
2.13	Safe Maintenance	46
2.14	Safety & Operational Decals	49
2.14.1	Definitions	49
2.14.2	Placement	50
2.14.3	Replacement	50
2.15	Guards	51
2.15.1	Mandatory Guards	52
2.16	Sound	52
2.17	The Machine & The Environment	52
2.17.1	Disposal	52
2.18	Proposition 65	53
3	Machine Preparation	54
3.1	Lifting The Machine	54
3.2	Post-delivery/First Use Inspection	55
3.2.1	Tractor Inspection	55
3.2.2	Machine Adjustment	55
3.3	Operator Requirements	56
3.4	Tractor And Reach Arm Specification Requirements	57
3.4.1	Reach Arm Requirements	57
3.4.2	Tractor Requirements	57
3.4.3	Reach Arm And Tractor Setup Requirements	58
3.4.4	Flail Head Attachment Fitting - Standard	58
3.4.5	Flail Head Attachment Fitting – Quick Attach	59
3.5	Hydraulic Hoses – Fitting	61

3.5.1	Motor Connection Definitions	62
3.5.2	Bulkhead Fitting – Standard Type Adaptors	62
3.5.3	Bulkhead Fitting – Quick Release Adaptors (option)	65
3.5.4	Hydraulic Front Hood And Rear Roller (option)	67
3.6	Hydraulic Hoses – Routing	69
3.6.1	General Points & Hose Care	69
3.7	Electrical Connections – Fitting	70
3.7.1	Diverter Valve	70
3.8	Front Hood & Rear Roller	70
3.8.1	Hedge Cutting	70
3.8.2	Verge Mowing	71
3.9	Setting Cutting Height	72
3.9.1	Manual Adjustment (standard)	72
3.9.2	Hydraulic Adjustment (option)	73
3.10	Pulley Orientation	74
4	Using The Machine	76
4.1	Starting And Stopping The PTO	76
4.2	Forward & Power Take-off Speed	78
4.2.1	Machine Stability	78
4.2.2	Cornering	79
4.2.3	Working On Adverse Slopes, Embankments And Un-level Ground	79
4.3	Cutting Procedure	81
4.3.1	General Guidance	81
4.3.2	Hedge Cutting	81
4.3.3	Verge Mowing	83
4.3.4	Stalling The Attachment Rotor	84
4.4	Machine Features	85
4.4.1	Rotor-Reverse	85
4.4.2	Hydraulic Front Hood And Rear Roller	85
4.4.3	Skid Options	86
5	Maintenance	88
5.1	Periodic Maintenance	88
5.2	Lubrication And Greasing	88
5.2.1	Motor	88
5.2.2	Greasing Schedule	89
5.2.3	Pulley Support Bearing Housing	89
5.2.4	Rotor Shaft Bearing Housings	90
5.2.5	Rear Roller	90
5.3	Hydraulic Components – Maintenance And Adjustment	91
5.3.1	Inspection	91
5.3.2	Replacement	92
5.3.3	Hydraulic Hoses	92
5.3.4	Component Identification	93
5.4	Hydraulic Diagrams	94
5.4.1	Standard Motor Hoses	94
5.4.2	Hydraulic Front Hood Only (option)	95
5.4.3	Hydraulic Rear Roller Only (option)	96
5.4.4	Hydraulic Front Hood And Rear Roller (option)	97
5.5	Electrical Diagrams	98
5.5.1	Diverter Valve (machines with both hydraulic front hood and hydraulic rear roller only)	98
5.6	Flails & Rotor	99
5.6.1	Flail Options	99
5.6.2	Flail Inspection	99
5.6.3	Rotor Inspection	100
5.6.4	Flail Bolt Inspection	101
5.7	Belts	102
5.7.1	Belt Tension Setting	102
5.7.2	Belt Adjustment	103
5.7.3	Belt Replacement	104
5.7.4	Pulley Orientation And Rotor Speed	105
5.8	Other Key Components	107

5.8.1	Rubber Flap	107
5.8.2	Skids	107
5.9	Torque Settings	108
5.9.1	Nuts & Bolts	108
5.9.2	Hydraulic Fittings	108
5.10	Machine Inspection Record	110
5.11	Machine Storage	112
5.11.1	Preparing The Machine For Storage.....	112
5.11.2	Returning The Machine Back To Work.....	113
6	Troubleshooting	114
7	Spare Parts	116
7.1	Genuine Spare Parts	116
7.2	How To Obtain The Correct Spare Part Numbers	117
7.3	Spare Parts Ordering	118
7.4	Dealer Network	118

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1 Machine Description

1.1 Intended Usage

1.1.1 Allowed Uses

The Powerdrive Pro range of professional flail head attachments are perfect for farmers, contractors and local authorities which when combined with one of Spearhead's wide range of reach arm mowers makes a machine which is suitable to a wide range of applications with an excellent reach capability. Such applications include hedge cutting and verge mowing.

These machines are designed for use in hedge cutting and verge mowing applications and for a duty cycle of 1000 hours per annum. They have the ability to be positioned to access up-bank or down-bank applications by the capabilities of the reach arm.

The cutting capabilities of the machine are defined by the capabilities of the cutting attachment. See the attachment operators manuals for the capabilities of the attachment.

1.1.2 Improper Uses



DANGER! Spearhead declines any and all liability for damages caused by the machine to persons, animals or property, resulting from use in any other way than described in this manual, or due to damage caused by negligence or by not observing the instructions contained in this manual.

The machine, due to its typical construction, may also be suitable for uses other than from those foreseen by the manufacturer. For this reason Spearhead has selected, as non-exhaustive examples, a series of improper uses that can be reasonably foreseen, which are:

- Use the machine as a cultivator.
- Use the machine as a stump grinder.

The uses listed above and those not specifically indicated in this manual, including reasonably foreseeable improper uses, are prohibited.



Figure 1.1 Spearhead Powerdrive Pro Flail Head Attachment
(Left-hand, 130 model shown)

1.2 General Arrangement

The layout and naming convention used throughout this manual for each of the machines are shown in the table below.

Powerdrive Pro flail head attachments can be specified at manufacture to come with various flails and machine options. It is important to examine the machine and the machine order to determine what features are fitted to the specific Powerdrive Pro flail head attachment being viewed. Further guidance to the various Powerdrive Pro flail head attachment options can be seen in Section 1.5.2.

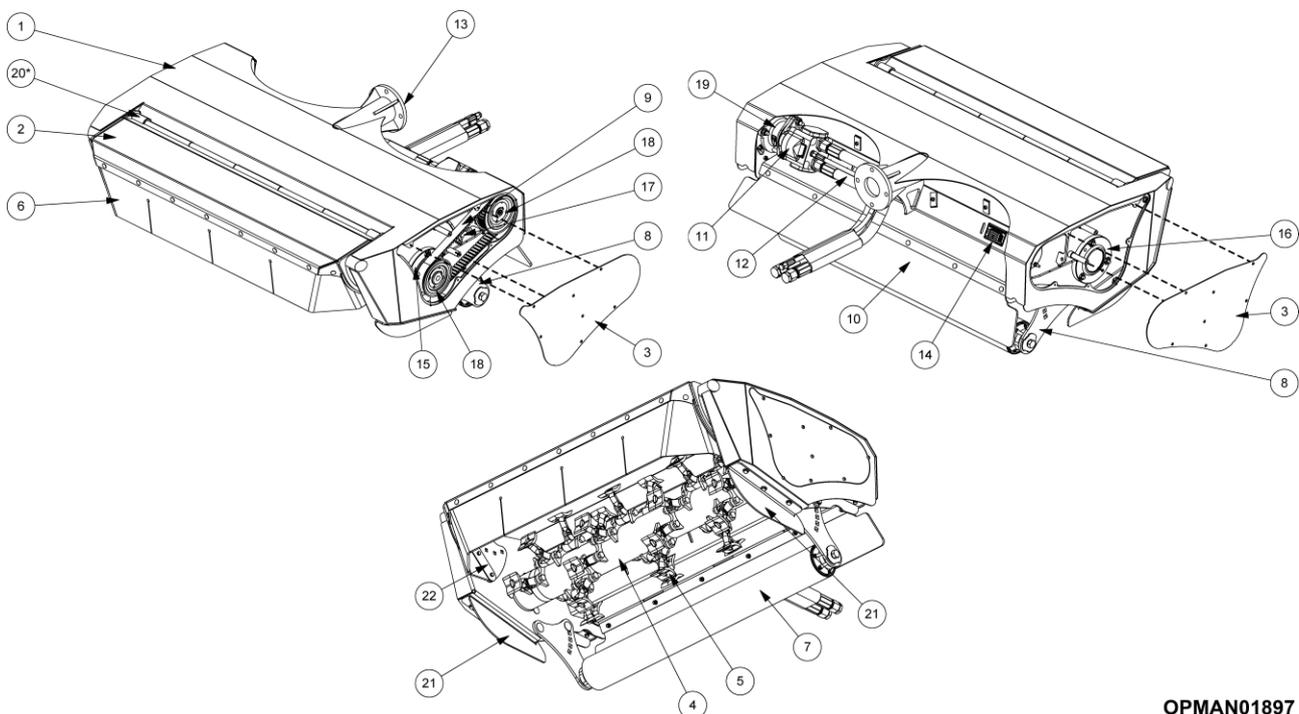
1.2.1 Standard Components

Item No.	Description.
1	Main Cowl
2	Front Hood
3	Belt/End Cover
4	Rotor Shaft
5	Flail
6	Front Rubber Flap
7	Roller
8	Roller Bracket
9	Belt
10	Rear Rubber Flap
11	Motor

Item No.	Description.
12	Hydraulic Hoses
13	Head Mount Interface
14	Serial Plate
15	Drive End Bearing Housing
16	Non-drive End Bearing Housing
17	Tensioner
18	Pulley
19	Pulley Support
20*	Hood Hinge Bar
21	Skid
22	Rubber Flap Retention Plate

*Hidden from view

Table 1.1 – Powerdrive Pro Flail Head Attachment Standard Components



OPMAN01897

Figure 1.2 – Powerdrive Pro Flail Head Attachment Standard Components

(Left-hand, 130 model shown)

1.2.2 Option Components

Item No.	Description.
23	Hydraulic Hood Ram
24	Hydraulic Roller Ram
25	Wear Skid

Item No.	Description.
26	Diverter Valve
27	PO Check Valve

Table 1.2 – Powerdrive Pro Flail Head Attachment Option Components

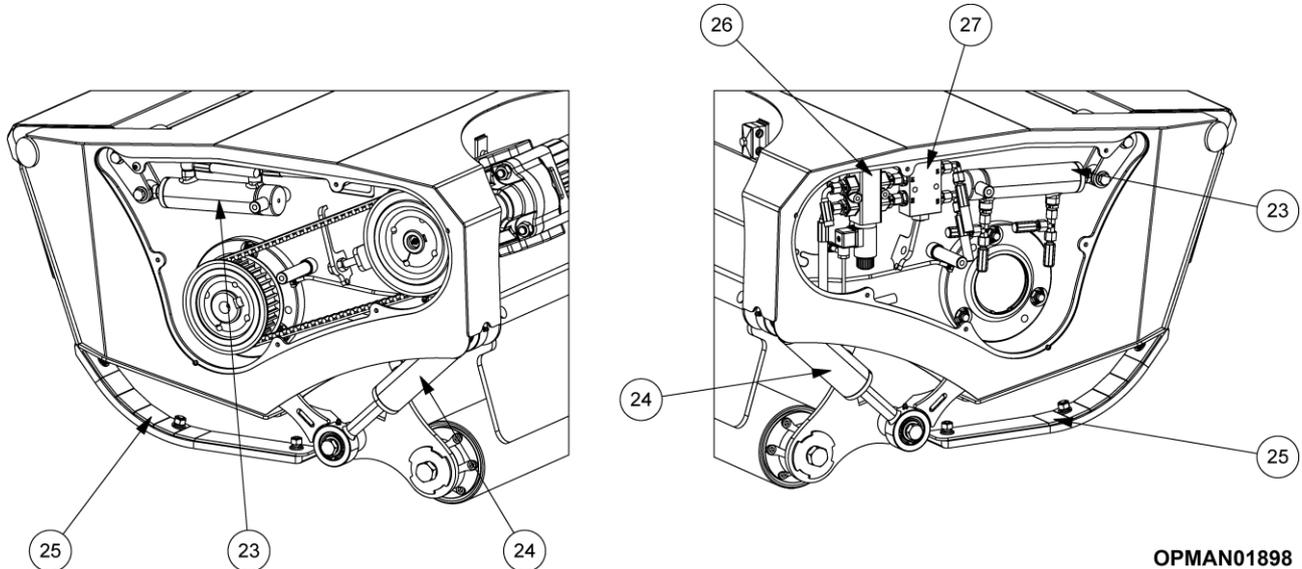


Figure 1.3 – Powerdrive Pro Flail Head Attachment Option Components
(Left-hand, 130 model shown)

OPMAN01898

1.3 Machine Identification

Each machine is equipped with a serial plate; see Figure 1.4 that includes the following data in this order:

1. UKCA Conformity Marking.
2. Machine Whole Goods Code (WGC).
3. Serial number of the machine.
4. Mass in kg.
5. Production Year (year of construction).
6. Design conformity standard.
7. Machine Product Group Code.
8. EU Authorised Representative QR scan code.
9. Manufacturer marking with name and address.
10. EAC Eurasian/Russian Conformity Marking.
11. EC European Conformity Marking.
12. Product Group Code.

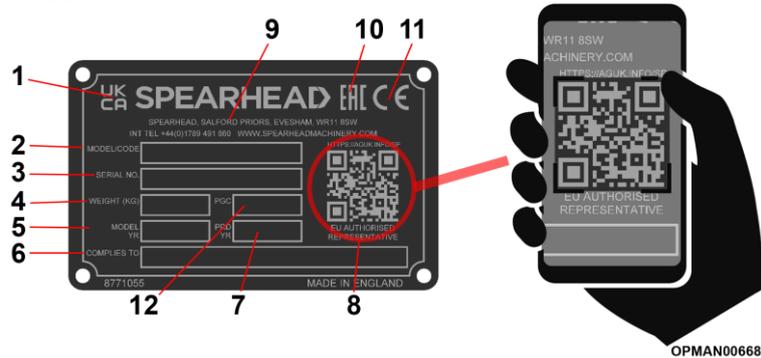


Figure 1.4 – Serial Plate

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.

By utilising a smart phone and scanning the Authorised Representative QR scan code found on the right-hand side of the serial plate (ref 8, Figure 1.4) using a suitable QR scanning App, you can find details for Spearhead Machinery authorised representatives for its various territories.

The serial plate is located on the non-drive end side of the rear of the cowl; see Figure 1.5.

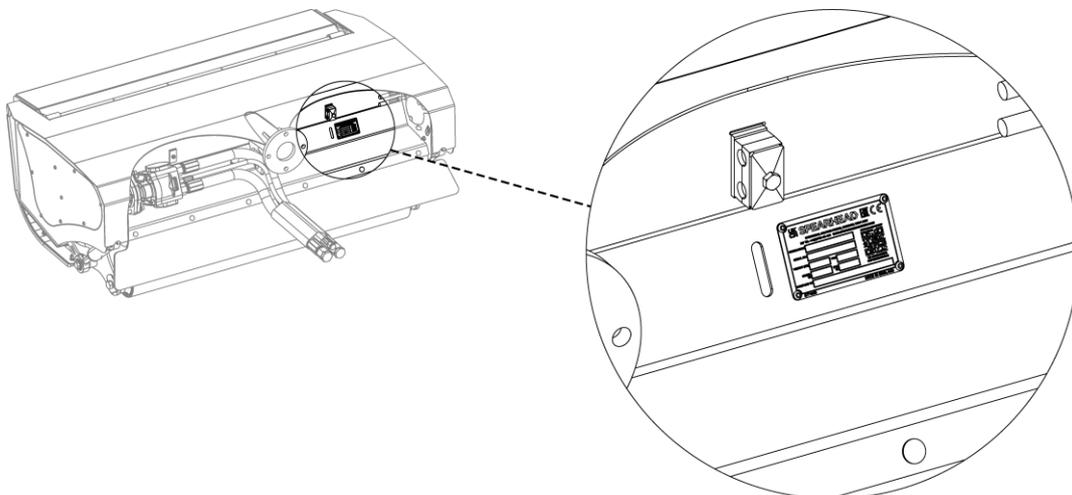


Figure 1.5 – Serial Plate Location
(Left-hand build 130 model shown)

1.4 Rotation Definitions & Conventions

This instruction manual refers to relative rotational directions. The terms clockwise and anticlockwise are defined by looking at the attachment from the left-hand side as shown in Figure 1.6. To eliminate confusion the following definitions will be used throughout this operator's manual.

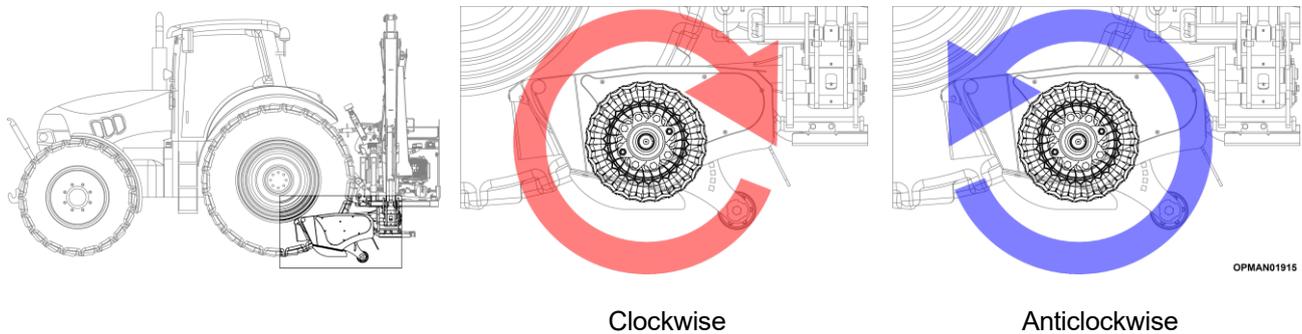


Figure 1.6 – Attachment Rotor Shaft Rotation Definitions

Additionally, other references to 'clockwise' and 'anticlockwise' actions by the operator conform to international right-hand thread conventions for 'screw down' and 'un-screw' respectively.

This convention also extends to the definition of PTO drive rotation from the prime mover, see Figure 1.7.

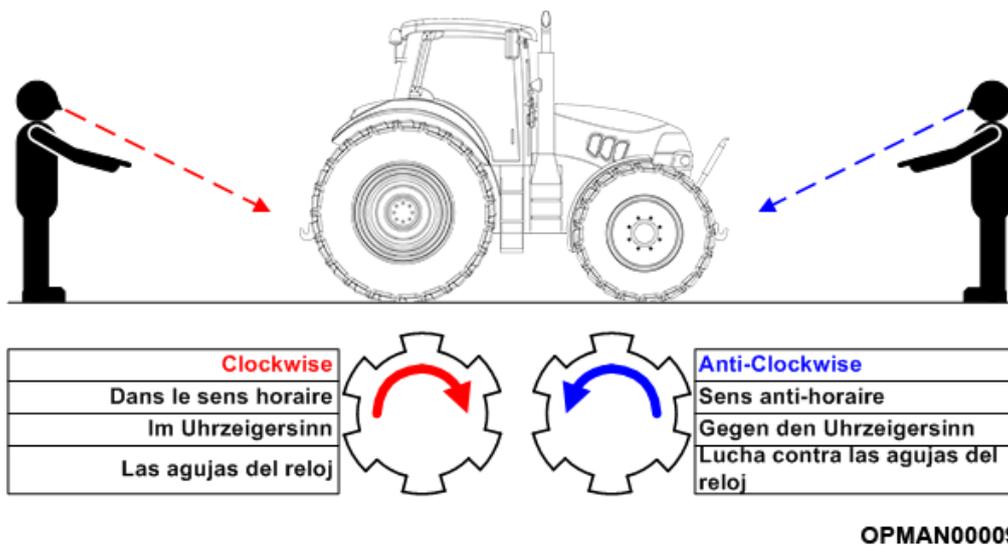


Figure 1.7 – Tractor PTO Shaft Rotation Definitions

1.5 Machine Specification

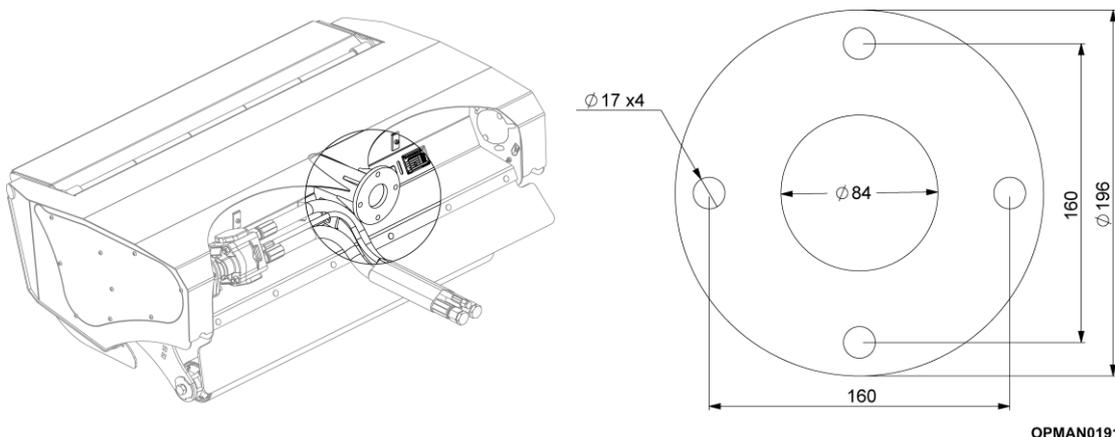
1.5.1 Standard Specification

			Powerdrive Pro	130	160	
Reach Arm			Minimum Flow	110 l/min (29 gal/min)		
			Pressure	310 bar (4497 psi)		
			Compatibility	Twiga Mid, Twiga Pro, Twiga Flex		
			Attachment	See Figure 1.8		
Attachment (1) (2)			Mass	445kg (981lbs)	510kg (1125lbs)	
			Number Of Flails	28	34	
			Drivetype	Belt drive		
	Motor			Capacity	40cc/0.04 litres per revolution	
				Speed	2750rpm	
				Hydraulic Connections	2x 1" couplings (pressure and return) 1x 3/8" coupling (case drain)	
	Rotor Speed			Standard/Fast	2986rpm	
				Alternative/Slower	2257rpm	
	Tip Speed			Standard/Fast	69m/s (13582fpm)	
				Alternative/Slower	52m/s (10236fpm)	
			Cutting Height Range (4)		26mm - 100mm (1" – 3 15/16")	
			Flail Options		T, Competition	
			Roller Diameter (standard)		140mm (5 1/2")	
Dimensions (2)(3)			Max Length (A)		1.04m (3' 5")	
			Machine Width (B)		1.61m (5' 4")	1.88m (6' 2")
			Cutting Width (5) (C)		1.29m (4' 3")	1.56m (5' 2")
	Machine Height (6)	Hood Closed	Maximum (DMaxC)		0.68m (2' 3")	
			Minimum (DMinC)		0.60m (2')	
		Hood Open	Maximum (DMaxO)		0.84m (2' 10")	
			Minimum (DMinO)		0.75m (2' 6")	
	Cowl Height (6)		Maximum (EMax)		0.61m (2')	
Minimum (EMin)			0.53m (1' 9")			

Table 1.3 – Powerdrive Pro 130, 160 Standard Specification

Notes:

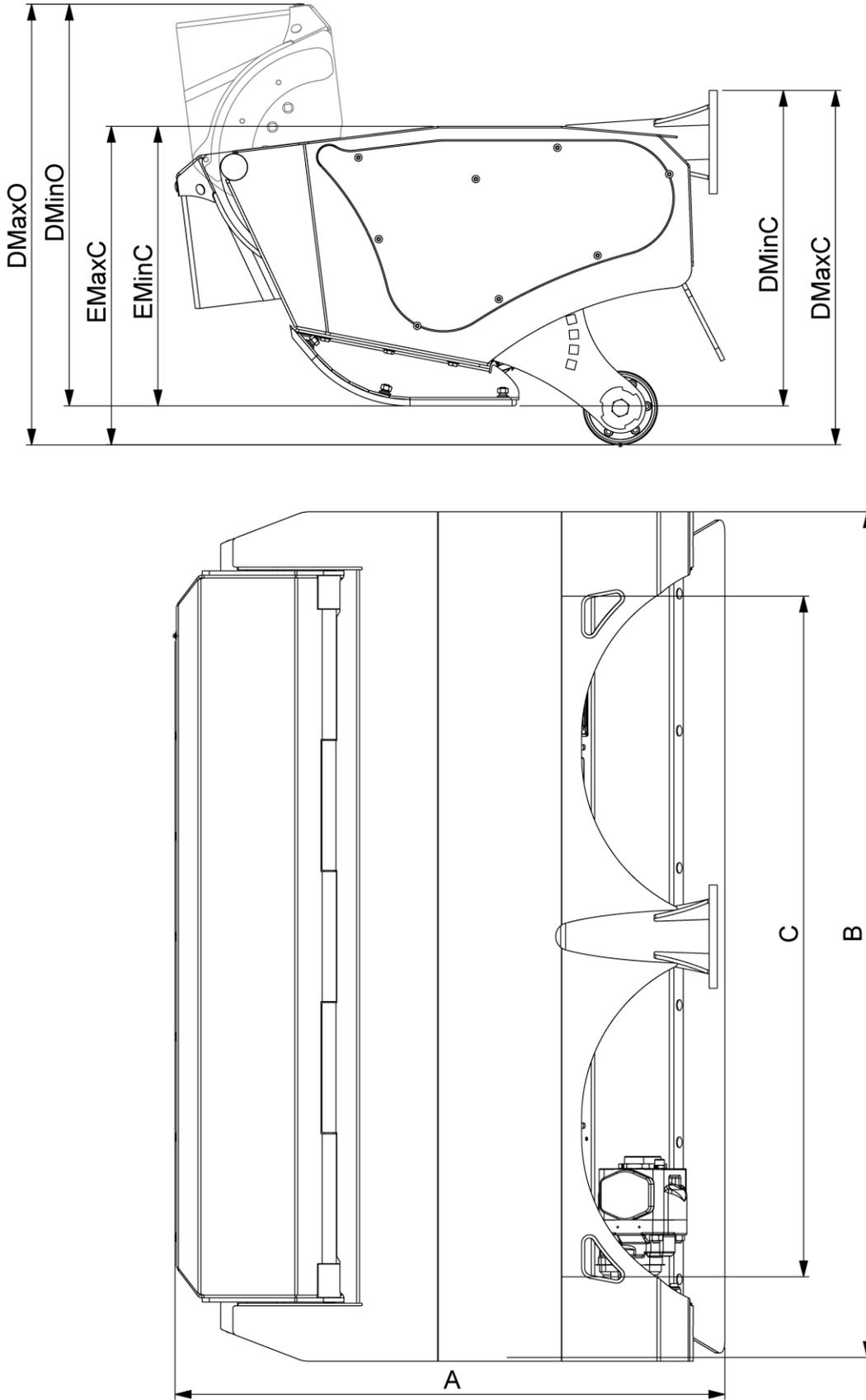
- (1) Spearhead constantly reviews and improves product designs and reserve the right to change this information. Actual machines may vary from the above specification. Contact your Spearhead Sales representative if you have any queries.
- (2) All dimensions are determined from computer models, so actual measurements may vary slightly.
- (3) Dimensions are determined from a tractor computer model. Actual measurements will be dependent on the tractor in which the reach arm is going to be fitted.
- (4) Cutting height is measured with a rotor fitted with the "T" flail option and standard rear roller option fitted. For full cutting height options see Section 3.9.
- (5) Cutting width is measured with a rotor fitted with the "T" flail option.
- (6) Machine and cowl height is measured with standard skids fitted.



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Figure 1.8 – Powerdrive Pro Flail Head Attachment Mount Interface Dimensions

The figure guide for dimensions (Figure 1.9) is illustrated using a Powerdrive Pro 130 flail head attachment.



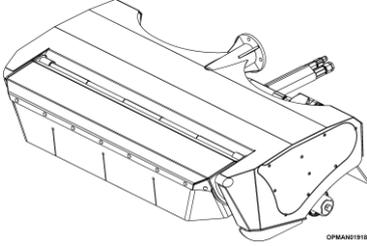
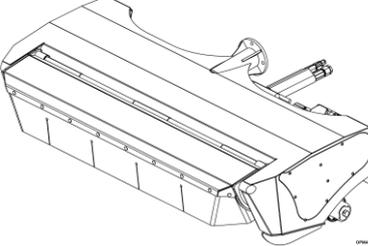
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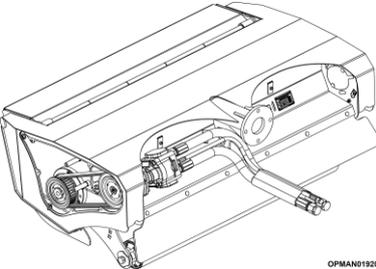
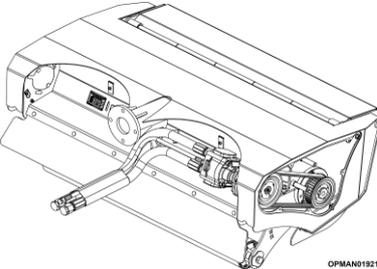
Figure 1.9 Dimensions
(Left-hand build 130 model shown)

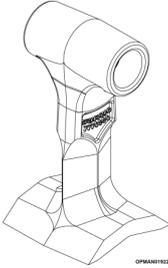
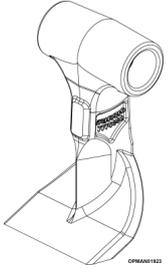
NOTE: These illustrations for dimensions are illustrated for visual purposes only.

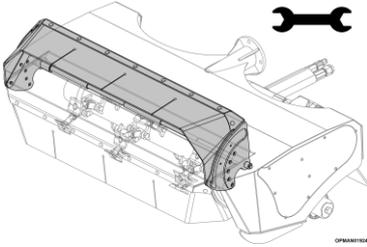
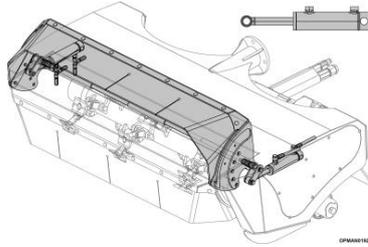
1.5.2 Machine Options

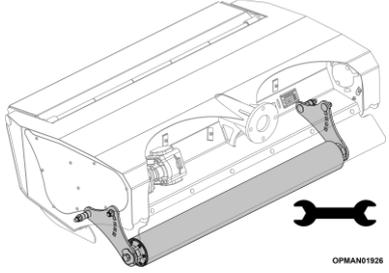
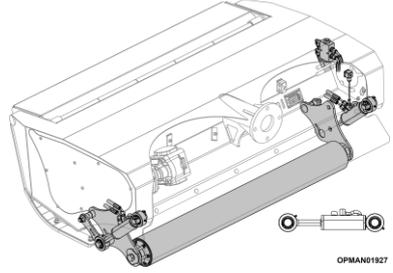
Powerdrive Pro flail head attachments can be ordered in a variety of different specifications to fit the particular user's requirements.

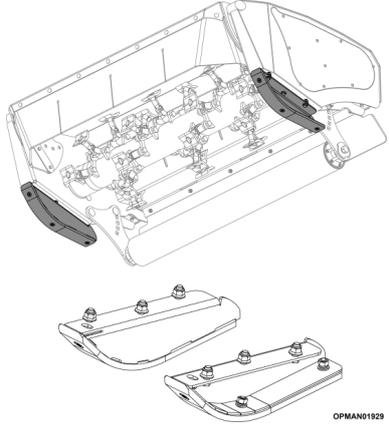
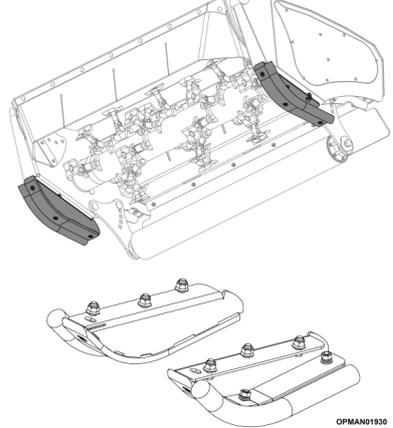
Option	Picture	
1.5.2.1 Cutting Width		
	130	160

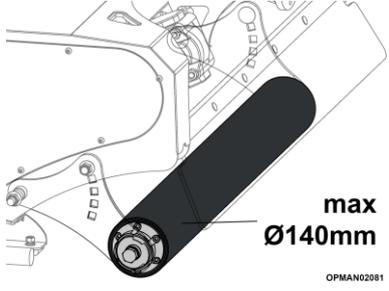
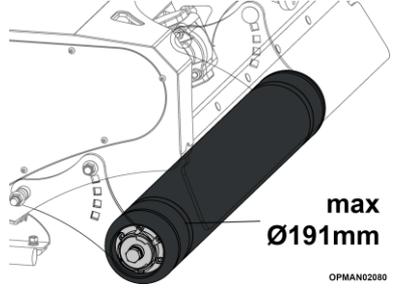
Option	Picture	
1.5.2.2 Configuration		
	Left-hand	Right-hand

Option	Picture	
1.5.2.3 Flail Type		
	T	Competition

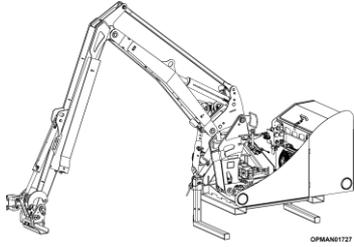
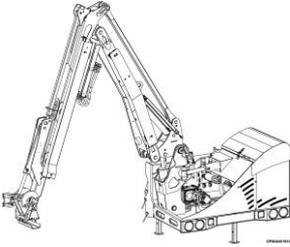
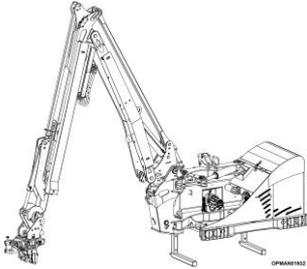
Option	Picture	
1.5.2.4 Front Hood		
	Standard	Hydraulic

Option	Picture	
1.5.2.5 Rear Roller		
	Standard	Hydraulic

Option	Picture	
1.5.2.6 Skid		
	Standard	Cowl Wear

Option	Picture	
1.5.2.7 Rear Roller		
	Standard (Hedge)	Large (Verge)

1.6 Compatible Base Unit Options

Option	Picture	
1.6.1.1 Reach Arms	 <p style="text-align: right; font-size: small;">OPMAN1727</p>	 <p style="text-align: right; font-size: small;">OPMAN1822</p>
	Twiga Mid	Twiga Pro
	 <p style="text-align: right; font-size: small;">OPMAN1822</p>	
Twiga Flex		

2 Safety

2.1 Level Of Danger

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.

IMPORTANT: Special instruction related to either the machine, tractor or the working environment

NOTE: Special instruction related to either the machine, tractor or the working environment

2.2 Terminology

The indicated levels of danger refer to specific risk situation that may occur during machine use and may involve the same machine, the operator and any exposed persons. With the purpose of highlighting situations or operations that may result in risks, the meanings of terms used in this manual are indicated here:

- **TRACTOR:** The tractor or “prime mover” which provides the mobility and power for the reach arm and attachment to operate.
- **REACH ARM:** The tractor power take-off or direct hydraulically driven boom access machine which provides hydraulic oil supply and manoeuvrability to the attachment to access and operate at the work site.
- **ATTACHMENT:** The cutting implement machine which cuts and finishes the working material. In this manual; the Powerdrive Pro flail head.
- **MACHINE:** The collective tractor, reach arm and reach arm attachment working together to carry out the work.
- **WORKING ZONE:** Any area in and/or around a machine where the presence of an exposed person constitutes a risk to the health and safety of said person.
- **BYSTANDER:** A person fully or partly in a hazardous area.
- **OPERATOR:** The person or personnel in charge of the installation, the operation, the adjusting, the cleaning, the repairing and the moving of the machine.
- **USER:** the person, entity or company, who purchased or rented the machine and intends to use it according to the intended use foreseen by the manufacturer.
- **SPECIALISED PERSONNEL:** any person specifically trained and approved to carry out maintenance or repair interventions that require particular knowledge of the machine, its operation, the installed safety devices, intervention modes. It must be capable of recognising danger present on the actual machine, therefore avoiding at risk situations.
- **RISK:** a combination of the probability and seriousness of injury or damage to health which can arise in a dangerous situation.
- **GUARD:** a part of the machine that is used to specifically guarantee protection by way of a material barrier.
- **PROTECTION DEVICE:** a device that reduces risk (unlike the guard) either on its own or together with the guard.
- **INTENDED USE:** the use of the machine in accordance with the information provided in the operators manual.
- **REASONABLE FORESEEABLE MISUSE:** the use of the machine different to the information provided in the operator's instructions, which may be the result of readily predictable human behaviour.
- **GENUINE SPEARHEAD DEALER/ AUTHORIZED TRACTOR DEALER:** The Genuine Spearhead Dealer/ Authorized Tractor Dealer, legally authorised by the Manufacturer, is formed by specialised staff able to carry out all types of assistance, maintenance and repair work, even of a certain complexity, required to maintain the machine in perfect working order.



WARNING! Carefully read the guidance as stated in this manual relating to safe use. If the instructions described are not followed, a situation may arise which causes irreparable damage to the machine or property, or injury - even severe - to people or animals. Spearhead declines all responsibility for damage caused by not complying with the safety and injury prevention regulations described below. Spearhead also declines any responsibility for damage caused by improper use of the machine and/or as a result of modifications made without prior authorisation by the manufacturer.

2.3 Safe Use



DANGER! It is prohibited to use the machine in ways that are different from the indications contained in this operators manual.

Never operate the tractor or machinery until you have read and completely understood this manual, the tractor operator's manual and the reach arm attachment operators manual and each of the safety messages given and those displayed on the tractor or implement.

Safety is of upmost importance to the manufacturer and should be of the same level of importance for the operator/owner. Spearhead machines have been designed to ensure the greatest level of protection to operating personnel and bystanders. However, in practice implementing the safety as guided in this operator manual is up to **you**. Only **you** can prevent serious injury or death from unsafe practices.

2.3.1 Health and Safety Executive (HSE) Guide Sheets

It is important to take note of the health and safety guidance given by the Health and Safety Executive (HSE) with regards to safely operating agricultural machinery safely in addition to the safety guidance given in this machine attachment operator's manual and the tractor and reach arm operator's manuals.

Health and Safety Executive (HSE) – Power take-offs and power take-off drive shafts (guide sheet)
<https://www.hse.gov.uk/pubns/ais40.pdf>

Health and Safety Executive (HSE) – Safe use of agricultural mowers (guide sheet)
<https://www.hse.gov.uk/pubns/ais25.pdf>

Health and Safety Executive (HSE) – Safe use of rotary flail hedge cutters (guide sheet)
<https://www.hse.gov.uk/pubns/ais21.pdf>

Health and Safety Executive (HSE) – Working safely near overhead electricity power lines (guide sheet)
<https://www.hse.gov.uk/pubns/ais8.pdf>

Health and Safety Executive (HSE) – Working safely with agricultural machinery (guide sheet)
<https://www.hse.gov.uk/pubns/INDG241.pdf>

Health and Safety Executive (HSE) – Using tractors safely (guide sheet)
<https://www.hse.gov.uk/pubns/indg185.pdf>

2.3.2 Health and Safety Executive (HSE) Safe Stop Campaign

Spearhead Machinery endorses the “Safe Stop” campaign promoted by the Health and Safety Executive (HSE) to give guidance on how to safely prepare the machine and personnel and operate the machine and what to do in emergency cases.

The 'Safe Stop' campaign focusses on the importance of following the 'Safe Stop' procedure:

- Engage handbrake
- Controls in neutral
- Switch off engine
- Remove key

<https://www.hse.gov.uk/agriculture/topics/machinery/safe-use-1.htm>



Figure 2.1

2.3.3 Operators Manual



2.3.3.1 **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.



2.3.3.2 **IMPORTANT:** Ensure the operator's manual is complete, readable, and easily accessed by the operator and accompanying personnel. If in doubt replace, by contacting your local Spearhead dealer or Spearhead Machinery directly.



2.3.3.3 **DANGER!** It is prohibited to use the machine in ways that are different from the indications contained in this operators manual.



2.3.3.4 **IMPORTANT:** Check the flail head attachment for condition alongside the operator's manual requirements for use and its compatibility with the reach arm and tractor.



2.3.3.5 **IMPORTANT:** It is required that all operators and personnel carrying out maintenance on this attachment familiarise themselves with the attachment and this operator manual to ensure they are aware of the dangers of incorrect use or improper or incorrect repairs.



2.3.3.6 **IMPORTANT:** Read, understand and follow the safety messages stated throughout the operator's manual for the tractor and the reach arm and its relation to the reach arm attachment. Serious injury or death may occur unless care is taken to follow the warnings.

It is important to assess each operators manual and create a safe and correct working procedure for the operation and maintenance of each of the respective machines, singularly and collectively following the safety guidance procedures stated in each of the respective operators manual.

2.3.4 Personnel Preparation



2.3.4.1 **DANGER!** It is prohibited to use or have the reach arm attachment used by personnel that are incompetent and not correctly trained in the use of the tractor and reach arm machine controls and who are in poor health and physical condition or under the use of drugs or alcohol.



2.3.4.2 **IMPORTANT:** Ensure that the operator is aware of the correct emergency stop procedure if the tractor and machine is required to stop suddenly.



2.3.4.3 **IMPORTANT:** It is required that all operators and personnel carrying out maintenance on this reach arm attachment familiarise themselves with the machine and this operator manual to ensure they are aware of the dangers of incorrect use or improper or incorrect repairs.



2.3.4.4 **CAUTION!** If the agricultural tractor has no closed cabin, the operator is required to use extra Personal Protection Equipment. Ear protectors are required and a dust mask if the working ground lifts a considerable amount of dust along with safety glasses. If your health is compromised during work or afterwards, stop immediately and seek professional medical advice immediately.



2.3.4.5 **DANGER!** Ensure you never smoke or have an open flame near the attachment.



2.3.4.6 **CAUTION!** Personnel should take regular breaks during work to minimise fatigue and ensure alertness in work.



2.3.4.7 **IMPORTANT:** Personnel and operators should make themselves aware of local and national highway laws and regulations and contact the Department of Transport of your Local Highway Authority to obtain detailed information on the subject.



2.3.4.8 **IMPORTANT:** Personnel and operators should make themselves aware of local and national laws and regulations where they can and cannot carry out works with regards to wildlife and habitats.



- 2.3.4.9 **IMPORTANT:** Ensure a full risk assessment of the work site is conducted by a qualified body before beginning the works evaluating risks to the operator, machine, bystanders and other road users if applicable.

2.4 Personal Protective Equipment



- 2.4.1.1 **CAUTION!** It is mandatory to use suitable clothing, PPE for example.



- 2.4.1.2 **CAUTION!** 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 and a facemask (depending on conditions).

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

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

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.

Ensure that non-baggy clothing is worn to reduce the chance of entanglement and snagging on components. Strictly avoid long or loose clothing that could be caught in any way by moving parts.

Wear suitable clothing and PPE to cater for the working environment. In some geographical locations, wildlife such as bees or insects or larger wildlife could impact the wellbeing of the operator, machine and other bystanders. Inspect the work location before commencing work.



OPMAN00161

Figure 2.2

2.5 Tractor And Machine Preparation

Tractor And Reach Arm Preparation



- 2.5.1.1 **IMPORTANT:** Ensure to follow the tractor and the reach arm operators manual before starting work. Safety checks on tractor and reach arm must be carried out with regard to functionality, road safety and accident prevention rules.



- 2.5.1.2 **CAUTION!** Check that the agricultural tractor fitted with the combined reach arm and attachment is of adequate power, weight and configuration, compatible with the model fitted and fitted with a seat belt.

The tractor should exceed the combined weight of the reach arm and attachment by at least 20%. For machine weights see Section 1.5.1 and the reach arm operators manual or serial plate.



- 2.5.1.3 **CAUTION!** Before proceeding to take the machine into the work area ensure that driving vision is not impaired by tractor, cab or implement for clear vision of ground hazards, bystanders and the attachment while seated in the driver's seat.

Adjust rear view mirrors in order to see clearly the machine and all items behind.

Reach Arm Attachment Fitting



- 2.5.1.4 **DANGER!** Ensure that any reach arm attachment components are correctly fixed to secure the attachment to the reach arm.



- 2.5.1.5 **DANGER!** Ensure that the hydraulic hoses, are routed and correctly fitted to secure them to the reach arm.



- 2.5.1.6 **DANGER!** Ensure that the head bracket mounting, standard or quick attach are correctly fitted between the attachment and the reach arm.



- 2.5.1.7 **WARNING!** When moving the attachment loosely from the reach arm, ensure it is lifted or carried using suitable equipment in the correct position.

A suitable forklift truck under the cowl of the attachment.

A suitable lifting crane or telehandler through the designated lifting points found on the top of the cowl of the machine using a suitable lifting strap or chain.

Machine General Inspection



- 2.5.1.8 **CAUTION!** Ensure that the tractor, reach arm and attachment are correctly inspected using their designated pre-delivery inspection (PDI) sheet before first use.



- 2.5.1.9 **IMPORTANT:** Check the reach arm attachment for condition alongside the operator's manual requirements for use and its compatibility with the reach arm and tractor.



- 2.5.1.10 **IMPORTANT:** Before returning the attachment back to work ensure the machine has been thoroughly inspected and checked using the Machine Inspection Record; see Section 5.10.

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.



- 2.5.1.11 **WARNING!** Check all key components. Inspect and replace all damaged components with genuine Spearhead parts and ensure the attachment is running correctly again before resuming cutting operations.

Fasteners



- 2.5.1.12 **IMPORTANT:** Periodically (every 8 hours) verify that the screws and bolts are tightened and secure.



- 2.5.1.13 **IMPORTANT:** Ensure that the motor fasteners are tight and to the correct torque settings.



- 2.5.1.14 **IMPORTANT:** Ensure that the rear roller are tight and to the correct torque settings.



- 2.5.1.15 **IMPORTANT:** Ensure that all flail fasteners are tight and to the correct torque settings.

Hydraulic Oil And Lubrication



- 2.5.1.16 **IMPORTANT:** Use the types of lubricating oils indicated by Spearhead and follow the recommended guidelines of the lubricant manufacturer. Check oil levels of the reach arm and grease points daily on the attachment to ensure the longevity of your components on your machine following the maintenance section of this operators manual.

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



- 2.5.1.17 **CAUTION!** Check the machine daily for hydraulic system leaks. If any component in the system is faulty, replace the component before proceeding to use the machine.



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



- 2.5.1.19 **CAUTION!** Relieve hydraulic pressure before disconnecting lines or working on the system.



- 2.5.1.20 **IMPORTANT:** Hydraulic hoses should be correctly routed so they will not become snagged or pinched in use or when the machine is prepared for work from its transport position.

Utilise the any reach arms hose guides or guards to protect hydraulic hoses connecting the reach arm attachment to the reach arm.



- 2.5.1.21 **IMPORTANT:** Warm the hydraulic oil of the reach arm at idle speed before working at the correct cutting speed. Forcing the reach arm and reach arm attachment to work at high rpm using cold oil will lead to cavitation and permanent damage to driveline and hydraulic components.



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

Guarding



- 2.5.1.23 **DANGER!** Do not operate the attachment with guards missing. Ensure that the correct guards are properly fitted to the machine and tractor at all times and that they are in good condition and function as they are intended to. If guards are missing; replace before using the machine.



- 2.5.1.24 **DANGER!** It is forbidden to alter, tamper with or bypass any of the components on the machine including the safety devices provided by the manufacturer. e.g., guarding.

Spearhead claims no responsibility to damages to operators, personnel or property by the factory fitted guards being not fitted or in poor repair.

Lighting



- 2.5.1.25 **IMPORTANT:** Before proceeding to take the machine onto the public highway ensure that all brake lights and indicators on the tractor and reach arm are working correctly.



- 2.5.1.26 **IMPORTANT:** The reach arm and tractor should be clean and bright in colour to warn others of its presence and the works in which its carrying out.



- 2.5.1.27 **IMPORTANT:** Sufficient lighting should be present at all times to ensure the reach arm attachment is operated with the upmost safety and forward hazards can be avoided. Lighting may be required to warn others of attachments presence and the works in which its carrying out.

Cleanliness



2.5.1.28 **WARNING!** It is forbidden to deposit items on the machine which can harm persons or animals, or damage property should they fall.



2.5.1.29 **IMPORTANT:** Before proceeding to take the machine onto the public highway ensure that the attachment is clear of any cut material collected.



2.5.1.30 **IMPORTANT:** Check the machine to ensure all safety and instruction decals are in position as stated in Section 2.14.2. Replace any missing or damaged decal prior to proceeding to use the machine by sourcing from a local Spearhead dealer.

Controls



2.5.1.31 **WARNING!** Ensure that all functions work correctly on the reach arm joystick before starting the reach arm attachment and taking the machine onto the public highway.



2.5.1.32 **WARNING!** Ensure that the emergency stop function works correctly on the joystick in case of the sudden requirement for it to be used in work to stop the attachment.



2.5.1.33 **WARNING!** Ensure that the joystick is correctly switched off and isolated to prevent accidental operation or movement of the reach arm and attachment when the machine is being transported out of use.



2.5.1.34 **IMPORTANT:** Do not modify or alter implement functions or components.

Transport To Work



2.5.1.35 **DANGER!** When transporting the reach arm and attachment on the road, ensure that any transport fixing brackets are fitted to ensure that the reach arm and attachment do not move and potentially cause an accident with other road users in the event when being transported.



2.5.1.36 **DANGER!** When transporting the attachment ensure the machine there is sufficient ground clearance to protect the machine from bottoming out when travelling along uneven terrain, such as speed humps.



2.5.1.37 **IMPORTANT:** Ensure the reach arm and reach arm attachment are collectively closed up in a compact transport position before taking the machine onto the public highway. The reach arm should be positioned where it takes up the least amount of space and meets local height and width traffic regulations and will not hit the tractor when either stationary or being transported.

Handling



2.5.1.38 **IMPORTANT:** Before preceding to start work ensure that steering and braking give proper operation and are in good condition.



2.5.1.39 **IMPORTANT:** Perform performance tests on the tractor/ machine combination and how it will act/perform before taking the machine onto the public highway.

Braking tests in a safe environment are required to be carried out in order to gauge the characteristics of the tractor/machine combination and how it will act/perform in an emergency stop situation.

Determine before taking the tractor and machine onto the public highway of the maximum speed the vehicle can be driven safely. Determine the safe speed the machine can be turned remembering the sharper the corner, the larger the reduction in speed required in order to ensure the machine does not turn over. The machine should not travel faster than 20 mph (32 kmh) in any case.

2.6 Work Site Management & Risk Assessment



Figure 2.3

Risk Assessment



- 2.6.1.1 **IMPORTANT:** Ensure a full risk assessment of the work site is conducted by a qualified body before beginning the works evaluating risks to the operator, machine, bystanders and other road users if applicable.

Work Site Assessment



- 2.6.1.2 **IMPORTANT:** The destined work site to use the reach arm and attachment should be thoroughly checked and familiarised 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 tractor and reach arms stability in operation.
- Items and ground characteristics which could cause a reduction in the tractors traction in operation.
- Items and ground characteristics which could cause a reduction in operator safety and ease of control in operation.
- Insufficient lighting.
- Foreign objects which could be picked up and then flung by the attachment 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 manhole covers.
- Foreign objects which could be picked up and then damage the attachment or the reach arm; for example wire.
- Low level objects which could come into collision with the tractor and/or machine.
- Items which could create a fire risk



- 2.6.1.3 **CAUTION!** Ensure the environment where the machine is required to operate has adequate lighting. Insufficient or excessive lighting may pose a risk to the operator or bystanders. Ensure you have at least 90m (300 ft) clear visibility ahead of you to identify passers-by and potential risks and disturbances to yourself and/or tractor/machine and ensure you have sufficient time to adjust/stop.



- 2.6.1.4 **WARNING!** Inspect the work area for overhead or underground electrical power lines. Gas pipes, other cables and any other kind of structure which could be detrimental to the machine or create risk for operator/personnel/bystanders. These should be either removed, marked to keep away from or if preventative methods cannot be easily placed alternative methods of landscape maintenance should be considered.

If short buried utility lines are located; contact your local utility maintenance provider responsible for the work site and do not use the machine until the issue has been addressed and made safe.



2.6.1.5 **WARNING!** Inspect to see the raised reach arm will remain at 3 metres (10 ft) or greater distance from all power lines and overhead obstructions when carrying out the works.



2.6.1.6 **WARNING!** If working in overgrown or high grass inspect for, remove or mark potential hazards, mow at an **intermediate** height. Then repeat the process of inspection and hazard prevention and mow then at the required **finished** height. Increased work site observation will be required to maintain safety through the mowing operation.

This will also bring benefits to operations with reduced power requirements to cut, reduce wear and tear on the reach arm and attachment and give a better overall finish.



2.6.1.7 **WARNING!** Any hazardous objects that cannot be removed must be clearly marked and carefully avoided by the operator. Stop mowing immediately if the machine strikes a foreign object.

Many varied objects, such as wire, cable, rope, or chains, can become entangled in the cutting area of the attachment. These items can swing outside the confines of the safe cutting area of the attachment at greater velocities than the flails/blades. Such a situation is extremely hazardous and could result in serious injury or even death.

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



2.6.1.8 **WARNING!** Ensure that there are no fire sources present or near the destined working area of the machine. Do not drive into burning debris if it is present or if the area is freshly burnt out.



2.6.1.9 **IMPORTANT:** Ensure that before carrying out work procedures that the working zone is correctly prepared to warn bystanders and road users of the works being carried out and how they should act as a response by using correct signage.



2.6.1.10 **IMPORTANT:** Ensure that all warning signs are moved at the same speed as the works are being carried out.



2.6.1.11 **IMPORTANT:** Debris material must be collected or swept away from the working zone once the works have been carried out.

2.7 Machine At Work And Observation



2.7.1.1 **DANGER!** It is prohibited to use the machine in ways that are different from the indications contained in this operators manual.

Operator



2.7.1.2 **WARNING!** All operation related to the tractor and machine should always be carried out from the driver's seat with seat belt buckled whether working or transporting the machine on the public highway.



2.7.1.3 **WARNING!** It is forbidden to leave the driver's seat on the agricultural tractor with the combustion engine running when the machine is running. The machine should always be monitored from the cab of the tractor.



2.7.1.4 **WARNING!** Never approach the machine or leave the tractors seat until the attachment has completely stopped, and the tractor has been stopped using the "Safe Stop" procedure.



2.7.1.5 **CAUTION!** Personnel should take regular breaks during work to minimise fatigue and ensure alertness in work.



2.7.1.6 **DANGER!** Do not enter the working zone of the PTO driveshaft when the machine and tractor are running. It is dangerous to approach the rotating parts of the machine.



2.7.1.7 **IMPORTANT:** Operator should use the procedure used by the “Safe Stop” campaign promoted by the Health and Safety Executive (HSE) to give guidance on how to safely prepare the machine and personnel and operate the machine and what to do in emergency cases.

<https://www.hse.gov.uk/agriculture/topics/machinery/safe-use-1.htm>

Operator Using Machine



2.7.1.8 **WARNING!** Ensure that the reach arm attachment is less than one metre from the ground and horizontal before starting the attachment.



2.7.1.9 **IMPORTANT:** Warm the hydraulic oil of the reach arm at idle speed before working at the correct cutting speed. Forcing the reach arm to work at high rpm using cold oil will lead to cavitation and permanent damage to driveline and hydraulic components.



2.7.1.10 **WARNING!** Keep the raised reach arm at 3 metres (10 ft) or greater distance from all power lines and overhead obstructions.



2.7.1.11 **DANGER!** It is forbidden to approach, stand close or touch the machine when the machine is operated. It is the operators responsibility to check before starting up the machine and during work that bystanders who may inadvertently get in the way of cut material being thrown are kept away from the tractor and machine. Machines are capable under adverse conditions of throwing objects great distances at high velocity. Stop the rotors until all bystanders are well clear (90 m/300 ft+).



2.7.1.12 **WARNING!** Never operate the machine with the rotor moving in folded transport position, even for short distances.



2.7.1.13 **WARNING!** If working in overgrown or high grass inspect for, remove or mark potential hazards, mow at an **intermediate** height. Then repeat the process of inspection and hazard prevention and mow then at the required **finished** height. Increased work site observation will be required to maintain safety through the mowing operation.



2.7.1.14 **CAUTION!** Driveline and hydraulic components can become very hot when in work. Ensure that these components are sufficiently cool before going anywhere near them.



2.7.1.15 **CAUTION!** Ensure that the machine and attachment are clear of excess debris. Driveline and hydraulic components can become hugely hot when in work and debris could cause risk of a fire hazard.



2.7.1.16 **WARNING!** Ensure that there are no fire sources present or near the destined working area of the machine. Do not drive into burning debris if it is present or if the area is freshly burnt out.



2.7.1.17 **IMPORTANT:** Ensure that the correct fire extinguisher is carried inside the tractor at all times and is easily accessible.



2.7.1.18 **WARNING!** Failure to have sufficient load over the front axle (20% +) or to drive at inappropriate speeds on undulating terrain may result in a loss of directional control.



2.7.1.19 **WARNING!** Pay special attention when working with the machine and do not allow the machine to touch fixed objects such as road drains, walls, shafts, curbs, guard rails, tracks etc. as these could break the machine and/or attachment which could cause debris to be thrown at very high speed from the machine. A fire hazard could be created in contacting objects as well. As a precaution raise the machine to ensure they do not collide when the machine is in work.



2.7.1.20 **WARNING!** Do not position the reach arm attachment with the reach arm in such a position where the cut material will get ejected towards the tractor, bystanders and road users.

The reach arm attachment should be positioned to minimise ejected material.



2.7.1.21 **IMPORTANT:** During work you may be required to adjust your mowing speed to compensate for changes and external factors such as overhead obstructions and debris/foreign objects with the fitted attachment.



2.7.1.22 **WARNING!** Keep your forward speed to a level appropriate to the operating conditions. High-speed manoeuvres are very dangerous, particularly on uneven ground where there is risk of overturning. Reduce speed in poor conditions.



2.7.1.23 **DANGER!** **Avoid wire.** It can be extremely dangerous if wire catches in the machine, and every care must be taken to ensure this will not happen. Inspect the working area before commencing.



2.7.1.24 **IMPORTANT:** Stop and do not use the machine when there is vibration or unusual mechanical noise coming from the machine, as this may cause breakage and extended serious damage. Find the cause of the vibration or noise and have it inspected by your local Spearhead dealer and do not use the machine until the cause is identified and eliminated.



2.7.1.25 **WARNING!** Check all key components. Inspect and replace all damaged components with genuine Spearhead parts and ensure the machine is running correctly again before resuming cutting operations.



2.7.1.26 **WARNING!** During work, if the tractor requires refuelling ensure the machine is stopped and the PTO is disengaged, and the tractor is stopped safely using the "Safe Stop" procedure.



2.7.1.27 **CAUTION!** Ensure on the reach arm attachment the rotor is turning in the right direction.



2.7.1.28 **DANGER!** Do not reach into the machine whilst it is working.



2.7.1.29 **DANGER!** It is forbidden to approach, stand close or touch the machine when the machine is operated. It is the operators responsibility to check before starting up the machine and during work that bystanders who may inadvertently get in the way of the moving armset and attachment are kept away from the tractor and machine. Machines have many pinch and impact point dangers whilst the machine is in operation and being used.



2.7.1.30 **WARNING!** While the tractor is running all personnel should keep well clear of the area around the machine (90m/300 ft+) as there are numerous crushing, shearing, impact dangers caused by the machine operation.



2.7.1.31 **DANGER!** When lowering the machine ensure bystanders stay clear to avoid crushing.



2.7.1.32 **WARNING!** Never carry passengers on the machine.



2.7.1.33 **IMPORTANT:** The tractor and machine will respond different between working and transport position.

A machine in work due to its design will be constantly changing its operating characteristics due to the reach arm and attachment being moved into different positions and as a result changing its mass characteristics. The operator is required to adjust their driving characteristics/speed in order to ensure safety to bystanders and other vehicles.

A machine in transport position will have a higher centre of gravity so will be more likely to become unstable at lower speeds. The operator is required to adjust their driving characteristics/speed in order to ensure safety to bystanders and other vehicles.



2.7.1.34 **IMPORTANT:** Use low speeds and smooth, gradual steering action in order to ensure safety to bystanders and other vehicles when on curves, hills, rough or uneven surfaces or wet roads.



2.7.1.35 **IMPORTANT:** Allow clearance for attachment swing while turning.

2.8 Working With Overhead Power Lines (OHPL's)

2.8.1 Dangers With Reach Arms



Figure 2.4

There are significant dangers involved when working in the vicinity of Overhead Power Lines (OHPL's). Some Twiga reach arm machines are capable of reaches in excess of 8 metres (26') which well exceeds the lowest legal minimum height of 5.2 metres from the ground for 11,000 and 33,000 volt power lines; see Figure 2.5.

If a machine comes close or in contact with an OHPL, electricity will be conducted to the earth. This can cause a fire or explosion and electric shock or burns to anyone contacts the tractor or machine. An overhead wire does not need to come in contact with the machine to cause serious injury or death as electricity can jump, or arc across small gaps.

Spearhead Machinery has listed a non-exhaustive guide of basic safe reach arm operation near OHPL's throughout Section 2.8 which should be considered before creating a thorough procedure following the safe guidance and laws given and required by the local jurisdiction and country in which the works are to be carried out.



WARNING! Spearhead declines all responsibility for damage or harm caused during work operations to road users and bystanders due to not complying with the safety and injury prevention regulations required by the local jurisdiction of the country where the works are being carried near OHPL's. It is thoroughly the responsibility of the operator, user and accompanying personnel to ensure compliance is adhered to and not Spearhead Machinery.

Spearhead also declines any responsibility for damage caused by improper use of the machine and/or as a result of modifications made without prior authorisation by the manufacturer.

It is important to adhere to the health and safety guidance given by the Health and Safety Executive (HSE) and or alternative official governing bodies and the Distribution Network Operator (DNO) in the jurisdiction with regards to safely operating the reach arm around OHPL's in addition to the safety guidance given in this reach arm operator's manual and the tractor and machine attachment operator's manuals.

Health and Safety Executive (HSE) – Working safely near overhead electricity power lines (guide sheet)
<https://www.hse.gov.uk/pubns/ais8.pdf>

Health and Safety Executive (HSE) – Avoiding danger from overhead power lines (guide sheet)
<https://www.hse.gov.uk/pubns/g6.pdf>



DANGER! All operators must gain the correct safety 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, electricity can arc from the power line to any conducting item within range. Steel reach arm mowers are ideal conductors.



DANGER! Users and operators who work near OHPL's must carry out a thorough risk assessment and manage the risks whilst the works are being carried out.



WARNING! Good management, planning and consultation with interested parties before and during any work close to OHPL's will reduce the risk of accidents.

2.8.2 Height Of Powerlines And Equipment

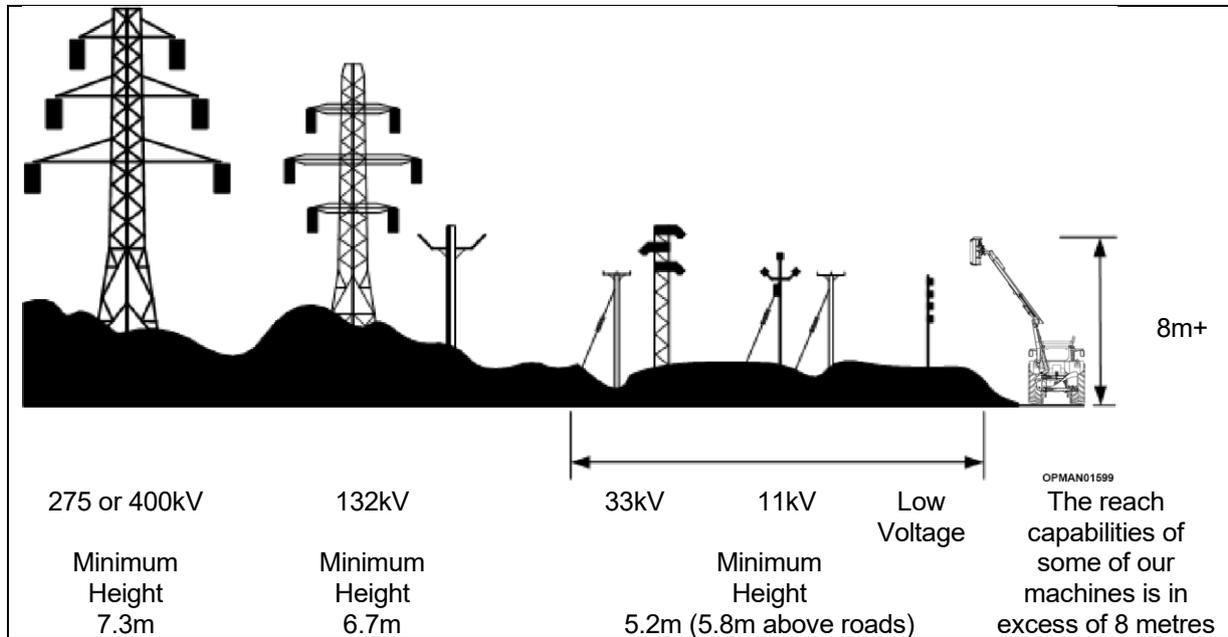


Figure 2.5
Minimum Heights For Overhead Powerlines

With reference to Figure 2.5, the height of the OHPL varies depending on the voltage being carried by it. All OHPL's must be a minimum height of 5.2m from the ground and the higher the voltage, the higher the OHPL is. Some electrical equipment mounted on poles may be lower than 5.2m, such as transformers.

Reach arms can be capable of reaches in excess of 8 metres (26') which well exceeds the lowest legal minimum height of 5.2 metres for OHPL's from the ground. Consider the overall height of other equipment in addition to the reach arm considering potential additional items fitted to the complete machine as well such as flashing beacons on the tractor cab. Consider the complete process of access to and from the work site and the work being carried out and the maximum height for the particular reach arm mounted on the tractor and folded in transport, see the reach arm operators manual.



IMPORTANT: Always follow the guidance given by the local Distribution Network Operator (DNO) who will be able to advise you the correct working practice and ensure work safety.

The height above the ground to the OHPL should be pre-measured by a suitably trained person using non-contact measuring devices before carrying out the works. Inspect the ground contours of the work area as undulating terrain may effect the stability of the machine and reduce the distance of the machine from the OHPL's during work in certain locations.



IMPORTANT: Ensure that a thorough work site risk assessment is carried out to ensure the works are carried out safely in the vicinity of OHPL's.



IMPORTANT: If a machine comes into contact with an OHPL, it is important to that the user and operator know what action to take to reduce the risk of any personal injury.



DANGER! Users and operators who work near OHPL's must carry out a thorough risk assessment and manage the risks whilst the works are being carried out.



DANGER! Always maintain a minimum distance from OHPL's with the tractor and machine and ensure bystanders maintain suitable distance from the working area of the machine.



DANGER! Always assume the OHPL is live until the owner of the OHPL is confirmed it is dead.

DANGER! Users and operators must be aware of the correct safety procedures if a machine comes in contact with an OHPL.

WARNING! Fatal electrocution can occur without contacting a power line. Due to the high electrical potential between the conductors and the ground, electricity can arc from the power line to any conducting item within range. Steel reach arm mowers are ideal conductors.

2.8.3 Exclusion Zones

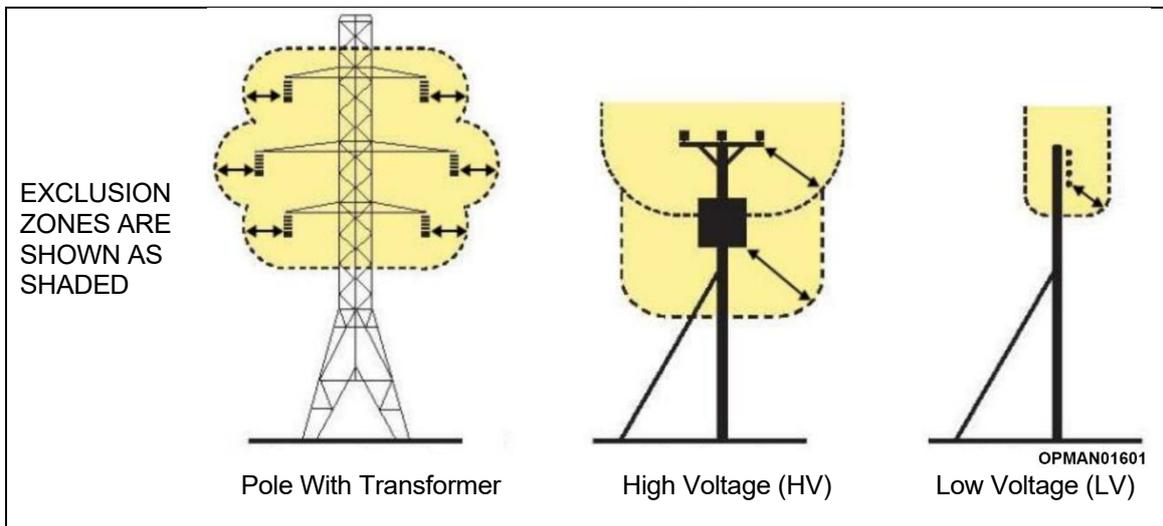


Figure 2.6
Exclusion Zone Definitions

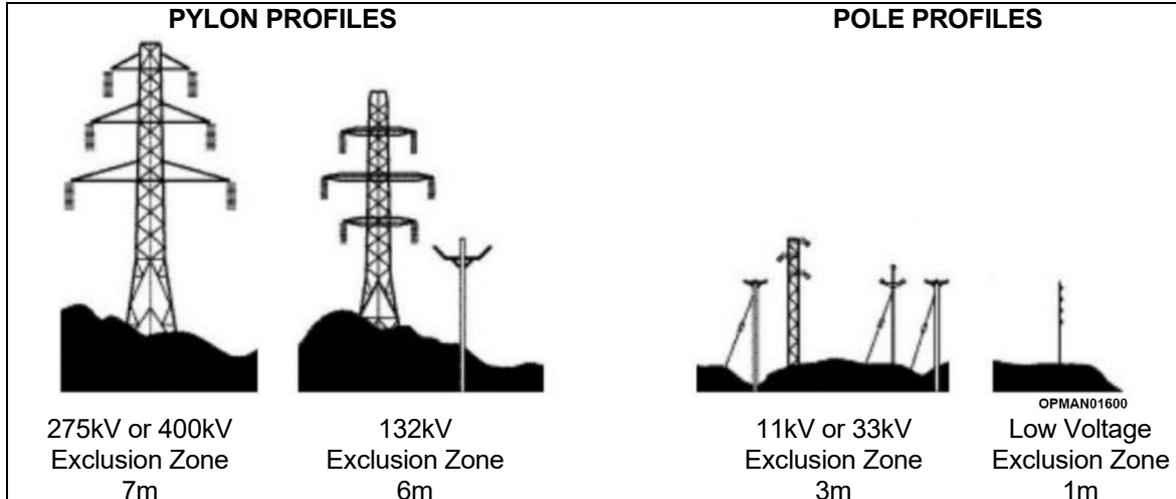


Figure 2.7
Minimum Exclusion Zones For Specific Overhead Powerlines

Risks can be reduced by maintaining a minimum horizontal distance of from an OHPL's.

With reference to Figure 2.7, the minimum safety distance or "Exclusion Zone" is 1m for low voltage OHPL's, with the distance increasing with OHPL's with greater voltages. Definitions as to where the measurements of distance are taken from are defined in Figure 2.6.

The safest procedure is always to not work around OHPL's with reach arm machines. However, if no alternative method can be used to cut inside the exclusion zone, it is important to contact the local Distribution Network Operator (DNO) who will be able to advise you the correct working practice and ensure work safety.



DANGER! Users and operators who work near OHPL's must carry out a thorough risk assessment and manage the risks whilst the works are being carried out.



DANGER! Always maintain a minimum distance from OHPL's with the tractor and machine and ensure bystanders maintain safe distance from the working area of the machine.



WARNING! Fatal electrocution can occur without contacting a power line. Due to the high electrical potential between the conductors and the ground, electricity can arc from the power line to any conducting item within range. Steel reach arm mowers are ideal conductors.

2.8.4 OHPL Risk Assessment



Figure 2.8

Before working near OHPL's, always assess the risks of the working environment by creating a work site risk assessment to maintain the safety of the machine, operator and bystanders.

Spearhead Machinery has listed a non-exhaustive guide of basic safe reach arm operation near OHPL's below which should be considered before creating a thorough procedure following the safe guidance and laws given and required by the local jurisdiction and country in which the works are to be carried out.



WARNING! Spearhead declines all responsibility for damage or harm caused during work operations to road users and bystanders due to not complying with the safety and injury prevention regulations required by the local jurisdiction of the country where the works are being carried near OHPL's. It is thoroughly the responsibility of the operator, user and accompanying personnel to ensure compliance is adhered to and not Spearhead Machinery.

Spearhead also declines any responsibility for damage caused by improper use of the machine and/or as a result of modifications made without prior authorisation by the manufacturer.

- 2.8.4.1 Follow the guidance of the health and safety guidance given by the Health and Safety Executive (HSE) and or alternative official governing bodies and the Distribution Network Operator (DNO) in the jurisdiction with regards to safely operating the reach arm around OHPL's.
- 2.8.4.2 Find out the maximum reach height for the particular reach arm mounted on the tractor in work position and transport position, see reach arm operators manual. and ensure that the reach arm and tractor remain a safe minimum distance from the OHPL meeting the safety requirements stated in Section 2.8.3.

- 2.8.4.3 Create a work site map marking out the following:
- 2.8.4.4 Find out the location and routes of all OHPL's within the work area.
- 2.8.4.5 Find out the operating voltage of all OHPL's within the work area.
- 2.8.4.6 Find out and mark the exclusion zone required from each the OHPL's, see Figure 2.7.
- 2.8.4.7 Ensure to supply the map to the operator carrying out the work.
- 2.8.4.8 Ensure to know about each OHPL in the working area and also who's responsible for the OHPL.
- 2.8.4.9 Consider how the location of OHPL's and the safety precautions required may influence traffic management methods for the works if the works are being out from the public highway.
- 2.8.4.10 Inspect the ground contours of the work area as undulating terrain may effect the stability of the machine and reduce the distance of the machine from the OHPL's in certain areas.



- 2.8.4.11 **IMPORTANT:** Know the risks of contacting OHPLs and the risk of arcing.



- 2.8.4.12 **DANGER!** Never attempt to operate the machine within an exclusion zone.

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.

- 2.8.4.13 Ensure that contact details for the local DNO is displayed clearly inside the cab of the tractor in case of emergency.



- 2.8.4.14 **DANGER!** If the works are being carried out near a railway, do not begin work until local railway authority has been contacted if works are going to be inside their responsible areas or any works could cause risk to trains and the railway infrastructure.



- 2.8.4.15 **DANGER!** Never allow machinery to impede or overhang a railway outer boundary.

- 2.8.4.16 Consider if there are alternative methods of carrying out the works to avoid risk completely.

- 2.8.4.17 Work in daylight hours and at times of good visibility. Risks increase at dusk, in darkness or in poor visibility where it is harder to see OHPL's.

- 2.8.4.18 Always work with extreme caution and pre-plan work ahead to avoid high risk areas.



- 2.8.4.19 **WARNING!** If in doubt; do not work in the area – never risk the safety of operators, bystanders or road users.



- 2.8.4.20 **WARNING!** Never park the tractor and machine underneath a OHPL.



- 2.8.4.21 **IMPORTANT:** Ensure that all operators and users are supplied with the full risk assessment explaining all hazards, risks and precautions to follow including the safety procedure if an OHPL is contacted.



- 2.8.4.22 **IMPORTANT:** Ensure that the location of OHPLs in the working area are highlighted by displaying suitable hazard warning signs in prominent positions and supplementing them with appropriate text to warn the operator and bystanders of the overhead risks. An example is shown in Figure 2.8.



- 2.8.4.23 **DANGER!** Users and operators who work near OHPL's must carry out a thorough risk assessment and manage the risks whilst the works are being carried out.



- 2.8.4.24 **DANGER!** A risk assessment must be adaptively changed to changing conditions and working environments as the works are carried out.

2.8.5 Contacting An OHPL

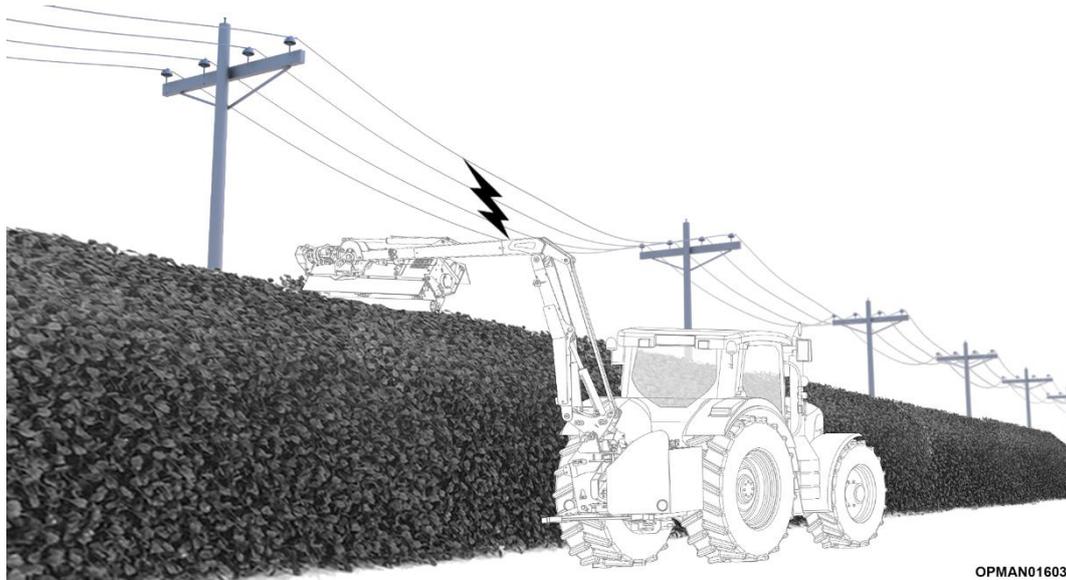


Figure 2.9 – Warning! Overhead Power Lines

OPMAN01603



DANGER! Follow the following procedure if the machine comes in contact with an Overhead Power Line (OHPL).

If for any reason the machine and reach arm come in contact with an OHPL:

- 2.8.5.1 Safely stop the reach arm and tractor as soon as possible.
- 2.8.5.2 Stay in the cab of the tractor and lower the reach arm in contact with the line or try to drive the machine clear if it is safe to do so. Ensure that the OHPL is not damaged in such a way that it could be brought down and causing further danger to others.
- 2.8.5.3 Inform the DNO immediately.
- 2.8.5.4 Electrocutation is possible if anyone touches both the machine and the ground at the same time. If you need to get out jump
- 2.8.5.5 Ensure bystanders well clear so that no simultaneous contact is made between you, the machine and the ground. Do not touch any wires. Stay clear and warn others not to approach.
- 2.8.5.6 Get the DNO to disconnect the supply. Even if the line appears dead, do not touch it, or any part of the machine. Contact with the line may cause the power supply to trip out temporarily and it may be reconnected and re-energised automatically, without warning.
- 2.8.5.7 Ensure that bystanders are made aware of the incident and remain away from the machine for their wellbeing.
- 2.8.5.8 Never touch an overhead line that has been brought down by machinery, or has fallen, e.g. in a storm. Do not try to disentangle equipment, until you have received confirmation that the line has been de-energised and made safe.



DANGER! It is prohibited to use or have the machine used by an operator who is not properly trained in the use of the tractor and machine controls.



DANGER! Operators should be aware should read and fully understand the risk assessment produced by the user and organiser of the works when working round OHPL's.



DANGER! Users and operators should know of the correct, safe procedure to be used in case the tractor and machine come in contact with an OHPL and how to safely stop and leave the machine if it is safe to do so.



WARNING! Fatal electrocution can occur without contacting a power line. Due to the high electrical potential between the conductors and the ground, electricity can arc from the power line to any conducting item within range. Steel reach arm mowers are ideal conductors.



DANGER! Ensure that contact details for the local DNO is displayed clearly inside the cab of the tractor in case of emergency.

2.9 Working On The Highway - Lighting, Signage And Road Users



Figure 2.10

Hedge cutting and verge mowing applications come into contact with public bystanders and other road users and special accommodations and considerations must be placed on the operator, user and machine to ensure the wellbeing of all parties and for the works to be carried out causing as little disruption as possible.

2.9.1 Safety Warnings & Considerations

Spearhead Machinery has listed a non-exhaustive guide of basic hedge cutting and verge mowing work considerations which should be considered before creating a thorough procedure following the safe guidance and laws given and required by the local jurisdiction and country in which the works are to be carried out.



WARNING! Spearhead declines all responsibility for damage or harm caused during work operations to road users and bystanders due to not complying with the safety and injury prevention regulations required by the local jurisdiction of the country where the works are being carried. It is thoroughly the responsibility of the operator, user and accompanying personnel to ensure compliance is adhered to and not Spearhead Machinery.

Spearhead also declines any responsibility for damage caused by improper use of the machine and/or as a result of modifications made without prior authorisation by the manufacturer.

Legal

- 2.9.1.1 Ensure that all communication has been carried out with the correct local governing bodies in working locations which require prior consultation; for example highway closures and working in the vicinity of railways.
- 2.9.1.2 Ensure that all necessary licenses/permits, approvals and temporary traffic regulation orders/notices are adhered to and gained before commencing work. From this you will be able to determine the correct traffic control equipment required.

Risk Assessment

- 2.9.1.3 Ensure that a thorough work site risk assessment is carried out to ensure the correct signage, lighting and guarding is put in place for road users and bystanders. Re-evaluate the work assessment if circumstances change.
- 2.9.1.4 Check site regularly and before/after work to ensure all safety requirements are correct and intact. Increase inspection intervals in areas of high activity, vandalism is seen to be a problem, higher risk areas (e.g. pedestrian crossings) and in poor weather conditions.

Time Of The Works

- 2.9.1.5 Roadside maintenance should be carried out in such a way to cause minimum inconvenience to road users. If emergency or extended disruption or road diversions are required, ensure that the correct warnings are put in place prior to the works beginning to minimise road user disruption and for road users to make alternative arrangements.

Signage

- 2.9.1.6 Use signing, lighting and guarding to cover all risks in the working environment, not just to warn of the works being carried out.
- 2.9.1.7 Extra advanced signage should be at locations with limited visibility – on a bend, dips in the road or brow of a hill.
- 2.9.1.8 Signage should be placed for road users and bystanders from all potential directions.
- 2.9.1.9 Ensure that signage placed on public footpaths yet still allow full, safe public access of the footpath for pedestrians.
- 2.9.1.10 Ensure that if there are OHPLs in the working area, that they are highlighted by displaying suitable hazard warning signs in prominent positions.
- 2.9.1.11 Signage should be clean, clear and level and correctly positioned from the ground.
- 2.9.1.12 Signage should be secure to ensure it does not blow away or fall over.
- 2.9.1.13 Sufficient quantity of signage should be placed in the correct sequence and distances from the work site to the recognised local standards of the jurisdiction.
- 2.9.1.14 Consider how works on multi-carriageway may require the duplication of road signs for road users in different lanes.
- 2.9.1.15 If signage needs to be removed or moved ensure that the signs are replaced as soon as possible and whilst they are removed ensure that there are sufficient supporting personnel to make sure that pedestrians do not enter the working zone.
- 2.9.1.16 Use only recognised equipment produced to the correct standards.



Figure 2.11
Always Use Correct Standard Signage

Road Users

- 2.9.1.17 Inspect the work site to see if parked cars will affect the works.
- 2.9.1.18 Consider the proximity of fixed traffic lights and roundabouts in proximity to the works. Will stationary and waiting traffic due to the works potentially back up and cause congestion issues to these areas.
- 2.9.1.19 Consider the type of road traffic and quantity, this will affect traffic control required. Queue management strategy. Different levels of traffic will require different provisions.
- 2.9.1.20 Consider the period of the works and selection of the time of day. Large quantities of traffic may influence the works, for example during school time and early morning deliveries.
- 2.9.1.21 Consider whether the works will impede on cycle lanes and the quantity of bicycles using them.
- 2.9.1.22 Will the works restrict access and exit of premises, such as residential, businesses, shopping, schools and car parks.
- 2.9.1.23 Does the road allow for sufficient passing distance between the tractor and machine and other road users. Consider the overhang of the reach arm during work. Where this cannot be achieved, traffic management must be used.
- 2.9.1.24 Where a working zone which has a restricted width which cannot be accessed by some vehicles, an alternative route will be required agreed with the local highways authority.
- 2.9.1.25 Consider the speed limit required and speed reduction methods.
- 2.9.1.26 Consider the weather conditions and the influence it will make on the works.
- 2.9.1.27 Ensure that the machine is only ever at work in the working zone.

Railways

- 2.9.1.28 Do not begin work until local railway authority has been contacted if works are going to be inside their responsible areas. National rail and heritage railway authorities are responsible for certain portions of the road within the stop lines of their railway crossings.
- 2.9.1.29 Extreme care to ensure stationary traffic does not tailback onto railway crossings when the works are being carried out.
- 2.9.1.30 Never allow machinery to impede or overhang the railway outer boundary.

Overhead Power Lines (OHPL's)

2.9.1.31 Some Twiga reach arm machines are capable of reaches in excess of 8 metres (26') which well exceeds the lowest legal minimum height of 5 from the ground for high voltage power lines; see Section 2.8.2.

Find out the maximum reach height for the particular reach arm mounted on the tractor in work position and transport position, see reach arm operators manual. and ensure that the reach arm and tractor remain a safe minimum distance from the OHPL meeting the safety requirements stated in Section 2.8.3.

2.9.1.32 Follow the guidance of the health and safety guidance given by the Health and Safety Executive (HSE) and or alternative official governing bodies and the Distribution Network Operator (DNO) in the jurisdiction with regards to safely operating the reach arm around OHPL's.

2.9.1.33 See Section 2.8 for guidance on working near OHPL's.

2.9.1.34 Consider how the location of OHPL's may require additional safety precautions put in place for road users, public bystanders and railway infrastructure when carrying out the works.

2.9.1.35 Ensure that contact details for the local DNO is displayed clearly inside the cab of the tractor in case of emergency.

2.9.1.36 Consider if there are alternative methods of carrying out the works to avoid risk completely.

Tractor And Reach Arm Specification

2.9.1.37 Tractor and reach arm must be conspicuous. High visibility chevrons are strongly recommended and a requirement in some jurisdictions.

2.9.1.38 The tractor must have one or more amber warning beacons which can be seen from any direction.

2.9.1.39 Keep left/right sign(s) must be displayed for drivers approaching the works showing which side to pass the works attached to either the reach arm or the tractor. These signs must be covered when the machine is out of use in order to ensure that road users and pedestrians are not incorrectly directed.



Figure 2.12

Pedestrians

2.9.1.40 Consider whether bus stops will be affected by the works.

2.9.1.41 Consider whether pedestrian crossings will be affected by the works.

2.9.1.42 Consider the quantity of pedestrians which may be coming in the vicinity of the works in a similar way to road users. How will this vary during the day, due to work patterns, school hours and potential special events.

2.9.1.43 How will pedestrians interact with the potential increased quantity of traffic.

2.9.1.44 Will safe routes and footpaths be affected by the works. Will alternative routes be required. Consider what will be required at junctions and multi-carriageway roads.

2.9.1.45 Are these safe routes, footpaths and potential alternative routes accessible for disabled and pushchair access.

2.9.1.46 Ensure that pedestrians never impede on the working zone. There are a number of risks, for example, tripping on loose cut material or being struck by moving equipment or debris.

2.9.1.47 If any pedestrians or road users enter the working zone, stop the machine immediately and escort them back to the safe route.

2.9.1.48 If the works are to be carried out for an extended period or with high levels of disruption, provide information to affected residents and businesses in good time.

Lighting

- 2.9.1.49 Consider the time of day when the works are to be carried out.
- 2.9.1.50 Consider the lighting requirements of the tractor and machine.
- 2.9.1.51 Requirements of cones and warning lights.
- 2.9.1.52 Stop/Go boards are restricted to daytime use.
- 2.9.1.53 Signs placed closed to railway lines could be interpreted as signals.



Figure 2.13

Other Safety Precautions

- 2.9.1.54 Always use the correct type of fire extinguisher which can be quickly accessed.
- 2.9.1.55 Consider the proximity of emergency services. Police, medical and fire.
- 2.9.1.56 Consider the communication methods with multiple personnel carrying out the works to ensure road user and pedestrians are remained safe, for example the use of two-way radios.

Unattended Works

- 2.9.1.57 If the work site is required to be left unattended, remove as many hazards as possible when they are not in use. Safely secure and immobilise all machinery so it cannot be tampered with or nothing can fall over/off.

2.10 Transporting The Machine

Tractor Preparation Before Transport



- 2.10.1.1 **IMPORTANT:** Before starting, safety checks on tractor and machine must be carried out with regard to functionality, road safety and accident prevention rules.



- 2.10.1.2 **CAUTION!** Check that the agricultural tractor on which the machine is installed is of adequate power, weight and configuration, compatible with the model fitted and fitted with a seat belt.

The tractor should exceed the combined weight of the reach arm and attachment by at least 20%. For machine weights see Section 1.5.1 and the reach arm operators manual or serial plate.



- 2.10.1.3 **IMPORTANT:** Before preceding to start work ensure that steering and braking give proper operation and are in good condition.



- 2.10.1.4 **WARNING!** Failure to have sufficient load over the front axle (20% +) or to drive at inappropriate speeds on undulating terrain may result in a loss of directional control.



- 2.10.1.5 **CAUTION!** If the agricultural tractor has no closed cabin, the tractor must be equipped with a "Rollover Protection Structure" (ROPS) which must always be locked in position.



- 2.10.1.6 **IMPORTANT:** The tractor independent brakes should be locked together and the differential lock should be disengaged.



Figure 2.14



2.10.1.7 **IMPORTANT:** Ensure the reach arm and attachment are raised sufficiently off the ground in order to give ground clearance over road obstacles, yet low enough to maintain on road stability and clear all low access areas to and from the work site at a safe margin. An example are railway bridges.



2.10.1.8 **IMPORTANT:** Ensure that all brake lights, turning signals and any other lights work correctly on the machine.



2.10.1.9 **IMPORTANT:** Ensure that the tractor PTO is disengaged using the relevant tractor button/handle and the reach arm controls are switched off, to ensure there is no accidental operation of the machine in transport by the operator.



2.10.1.10 **IMPORTANT:** 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.



2.10.1.11 **IMPORTANT:** 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.



2.10.1.12 **IMPORTANT:** It is of upmost 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.

Operator



2.10.1.13 **CAUTION!** Before proceeding to take the machine into the work area ensure that driving vision is not impaired by tractor, cab or implement for clear vision of ground hazards and bystanders while seated in the driver's seat.

Adjust rear view mirrors in order to see clearly the machine and all items behind.



2.10.1.14 **IMPORTANT:** Ensure that permissible axle loads are not exceeded.



2.10.1.15 **WARNING!** All operation related to the tractor and machine should always be carried out from the driver's seat with seat belt buckled whether working or transporting the machine on the public highway.



2.10.1.16 **WARNING!** Never carry passengers in the tractor unless it is fitted with an approved seat and seat belt.



2.10.1.17 **WARNING!** Never carry passengers on the machine.



2.10.1.18 **CAUTION!** Personnel should take regular breaks during work to minimise fatigue and ensure alertness in work.



2.10.1.19 **IMPORTANT:** Operator should use the procedure used by the “Safe Stop” campaign promoted by the Health and Safety Executive (HSE) to give guidance on how to safely prepare the machine and personnel and operate the machine and what to do in emergency cases.

<https://www.hse.gov.uk/agriculture/topics/machinery/safe-use-1.htm>

Folding



2.10.1.20 **WARNING!** Ensure that the rotors have completely stopped before folding the machine between working and transport position.



2.10.1.21 **DANGER!** When the reach arm is folded for transport, the arm is placed close to the rear of the cab of the tractor. Inspect and judge to ensure that the arm remains at a safe distance when folded against the “flip over bracket” considering the movement of the arm whilst it is being transported by the tractor potentially on uneven terrain.



2.10.1.22 **IMPORTANT:** Ensure that the reach arm “flip over bracket” and slew locking pin are correctly positioned and fitted to secure the machine in position when being transported.

Transportation In Progress



2.10.1.23 **IMPORTANT:** Stop and do not use the machine when there is vibration or unusual mechanical noise coming from the machine, as this may cause breakage and extended serious damage. Find the cause of the vibration or noise and have it inspected by your local Spearhead dealer and do not use the machine until the cause is identified and eliminated.



2.10.1.24 **DANGER!** When transporting the machine do not engage the tractor PTO.



2.10.1.25 **WARNING!** Never operate the machine with the rotor moving in the transport position.



2.10.1.26 **IMPORTANT:** The tractor and machine will respond different between working and transport position.

A machine in work due to its design will be constantly changing its operating characteristics due to the reach arm and attachment being moved into different positions and as a result changing its mass characteristics. The operator is required to adjust their driving characteristics/speed in order to ensure safety to bystanders and other vehicles.

A machine in transport position will have a higher centre of gravity so will be more likely to become unstable at lower speeds. The operator is required to adjust their driving characteristics/speed in order to ensure safety to bystanders and other vehicles.



2.10.1.27 **IMPORTANT:** Use low speeds and smooth, gradual steering action in order to ensure safety to bystanders and other vehicles when on curves, hills, rough or uneven surfaces or wet roads.



2.10.1.28 **WARNING!** 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.

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.



2.10.1.29 **IMPORTANT:** Allow clearance for implement swing while turning.



2.10.1.30 **IMPORTANT:** When driving on public roads respect other road users and obey the highway laws of the local jurisdiction.



2.10.1.31 **IMPORTANT:** 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.



2.10.1.32 **IMPORTANT:** Ensure the tractor is fitted with flashing warning beacons and they are switched on, if required. Contact the local jurisdiction authority for guidance on machine preparation.



2.10.1.33 **CAUTION!** Ensure that the machine and attachment are clear of excess debris. Driveline and hydraulic components can become hugely hot when in work and debris could cause risk of a fire hazard.



2.10.1.34 **WARNING!** Keep the raised reach arm at 3 metres (10 ft) or greater distance from all power lines and overhead obstructions.

2.11 Transporting The Attachment On A Trailer

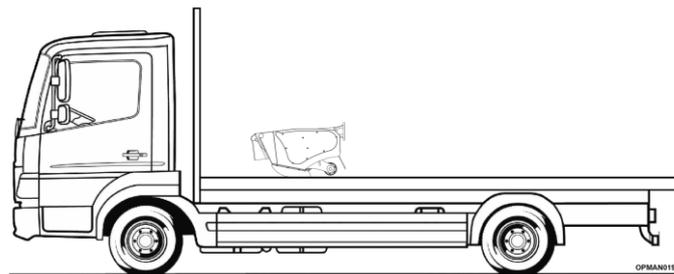


Figure 2.15
Transporting Attachment On A Trailer

Before transporting a machine (potentially plus tractor), measure the height and width dimensions and gross weight of the complete loaded unit. Ensure that the load will be in compliance with the legal limits set for the areas that will be travelled through during transit.

Powerdrive Pro flail head attachments can have their rear roller positioned in different positions to allow for stable securement when transporting the attachment on a trailer.



2.11.1.1 **IMPORTANT:** Use adequately sized and rated trailers and equipment to transport the attachment. Consult an authorized dealer to determine the proper equipment required. Using adequately sized chains, heavy duty straps, cables and/or binders, securely tie down the attachment to ensure it does not move in transport.

Arrange the straps so that when tightened, the straps are pulling downward and against themselves. Carefully tighten the securing strap or other fasteners to apply maximum tension and to ensure that no attachment components get damaged. Use extreme care when attaching and removing the securing devices as the extreme tension involved when released has the potential to inflict serious injury.

While hauling the attachment, make occasional stops to check that the attachment has not moved or shifted and that the securing devices have maintained tension. If during transport a hard braking, sharp turning or swerving action was performed, stop at the next safe location to inspect the security of the load.

2.12 Machine Storage

Moving Machine



2.12.1.1 **WARNING!** While the attachment is being transported by the tractor and reach arm 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.



2.12.1.2 **WARNING!** When moving the attachment not fitted to the tractor ensure the attachment is lifted or carried using suitable equipment in the correct position.

A suitable forklift truck forks can be placed between the rear roller and the cowl in the direction of the attachment front to back to support the machine.

A suitable lifting crane or telehandler through the designated lifting points found on the top of the cowl of the machine using a suitable lifting strap or chain.

Hydraulics



2.12.1.3 **DANGER!** Lower the attachment to the ground when not in use in order to protect personnel and bystanders from hydraulic or mechanical failure.



2.12.1.4 **WARNING!** Do not leave the reach arm attachment parked near a building, hay bale stack or similar to ensure the machine is not climbed upon or fallen onto.



2.12.1.5 **CAUTION!** Relieve hydraulic pressure before disconnecting hydraulic hoses connecting to the tractor, if fitted.



2.12.1.6 **CAUTION!** Disconnect all hydraulic and mechanical connections between the tractor and machine when not in use so it is not used inadvertently out of work.



2.12.1.7 **IMPORTANT:** Ensure to cap ends of the hydraulic hoses of the attachment if they are disconnected from each other to prevent contamination and dirt. Contamination and dirt can cause failure in hydraulic components and premature wear.



2.12.1.8 **CAUTION!** Keep the disconnected hydraulic hoses from the attachment off the floor when the attachment is disconnected from the tractor and reach arm to ensure not to cause a trip hazard.

Items Left On Machine/Left Machine



2.12.1.9 **WARNING!** It is forbidden to deposit items on the machine which can harm persons or animals, or damage property should they fall.



2.12.1.10 **CAUTION!** When the machine is not in use, ensure the attachment is supported on a level ground to make sure the attachment will not move or suddenly fall down.



2.12.1.11 **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.

2.13 Safe Maintenance

Personnel Preparation



2.13.1.1 **IMPORTANT:** It is required that all operators and personnel carrying out maintenance on the attachment familiarise themselves with the attachment and this operator manual to ensure they are aware of the dangers of incorrect use or improper or incorrect repairs.



2.13.1.2 **IMPORTANT:** Maintenance on the attachment 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.



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



2.13.1.4 **CAUTION!** Ensure maintenance personnel wear suitable PPE clothing when maintaining the attachment 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.



2.13.1.5 **IMPORTANT:** Ensure that the correct suitable fire extinguisher is available at all times and is easily accessible.

Crushing & Impact



2.13.1.6 **DANGER!** When lowering the attachment ensure bystanders stay clear to avoid crushing.



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



2.13.1.8 **DANGER!** Attachments have many pinch and impact point dangers whilst the attachment is being maintained. Be conscious of these dangers when conducting maintenance on the attachment.

Lifting



2.13.1.9 **DANGER!** When required to work on the attachment with any components or the complete attachment raised, ensure that the attachment is supported with fixed stands/supports to ensure it doesn't suddenly drop and potentially crush maintenance personnel in the event of a mechanical or hydraulic failure.



2.13.1.10 **WARNING!** When moving the attachment not fitted to the tractor ensure the attachment is lifted or carried using suitable equipment in the correct position.

A suitable forklift truck forks can be placed between the rear roller and the cowl in the direction of the attachment front to back to support the machine.

A suitable lifting crane or telehandler around the attachment mounting interface using a suitable lifting strap or chain.



2.13.1.11 **DANGER!** When conducting maintenance on the attachment, many components are very heavy and unable to be carried by one personnel. Use additional personnel assistance and correct sufficient lifting gear to prevent accident and injury.

Working Environment



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



2.13.1.13 **DANGER!** 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 2.18 with regards to Proposition 65.



2.13.1.14 **DANGER!** If the attachment is required to be worked on ensure that the ground is level, sturdy and solid and that the attachment is suitably chocked in order to ensure it doesn't move or fall.

Hydraulic



2.13.1.15 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.



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



2.13.1.17 CAUTION! Relieve hydraulic pressure before disconnecting lines or working on the system.



2.13.1.18 CAUTION! Before carrying out work on the attachment, place the attachment on the floor. Once this has been completed and then suitable safety glasses and impenetrable gloves have been put on, the hydraulic hoses can be removed from various components of the machine. Gently loosen hydraulic hose connections at first as the system will need to be relieved of its pressure.

If attached to the reach arm, place the reach arm in its most outstretched position with the attachment on the floor to ensure the least amount of reactive movement with the hydraulic pressure being relieved from the system.

Ensure any other unrequired bystanders and specialised personnel are kept clear of the machine during this procedure.



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



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

Modification



2.13.1.21 **IMPORTANT:** Do not modify or alter implement functions or components.



2.13.1.22 **DANGER!** Do not weld any important structural components. They may cause other component failures and accident and injury.

Heat



2.13.1.23 CAUTION! Components such as motors and drivebelts can become hugely hot when in work. Ensure that components are sufficiently cool before going anywhere near the machine for maintenance. As a precaution though wear gloves and safety glasses when servicing these potentially hot items or any other potentially hot item on the machine.



2.13.1.24 **WARNING!** It is forbidden to deposit items on the machine which can harm persons or damage property should they fall.



2.13.1.25 **WARNING!** It is mandatory to switch the combustion engine off and disengage PTO, ensure that the attachment has completely stopped, and the tractor is stopped safely using the “Safe Stop” procedure. Only mount or dismount the tractor when machine/tractor are at standstill and stopped before engaging in maintenance operations.

Storage Afterwards



2.13.1.26 **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.



2.13.1.27 **IMPORTANT:** Store the attachment 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.



2.13.1.28 **IMPORTANT:** Before returning the attachment back to work ensure the attachment has been thoroughly inspected and checked using the Machine Inspection Record; see Section 5.10.

Ensure that when the attachment inspection is carried out that the attachment 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.

2.14 Safety & Operational Decals

Powerdrive Pro flail head attachments are equipped with safety and operational decals warning about residual risks present on the machines that were not possible to eliminate. Some give guidance in how to best operate and care for the machine. Safety decals are yellow in colour and placed in strategic positions around each of the respective dangers. Operational decals are generally white in colour and are placed in locations close to the respective item required to be maintained. Section 2.14.1 specifies the meaning of each of the symbols contained in the decals and their particular positioning on the machine is stated in Section 2.14.2. The operator must memorise the meaning of these decals.

All decals should be kept clean and replaced immediately if they are fully/partially detached or damaged by purchasing them through a local Spearhead dealer.

2.14.1 Definitions

1

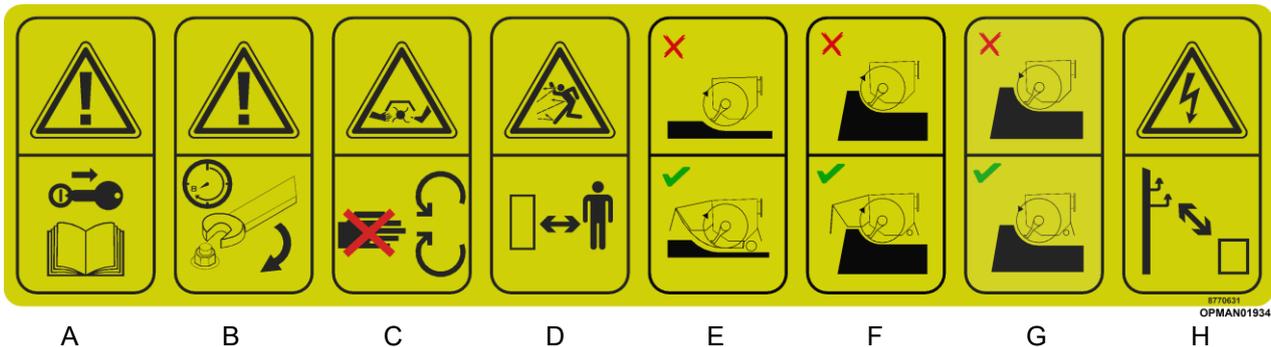


Figure 2.16 – 8770631 Safety Decal

a	Warning: - Remove key, read instruction manual	The original machine operators manual should be read before using the machine giving guidance to operation and maintenance
b	Instruction: - Check the tightness of fasteners	The tightness of all fasteners around the machine should be checked at least once every 8 hours
c	Danger: - Cutting hazard from rotating flails	Personnel should keep at distance from the machine when the machine is operating
d	Danger: - Flying debris	Personnel should keep at distance from the machine when the machine is operating due to the risk of items being flung from the machine
e	Caution: - Grass/Verge mowing	The front hood, front flap, rear roller and rear flap must be fitted and correctly adjusted when using the machine for grass and verge mowing. Flaps must be in good condition.
f	Caution: - Hedge cutting (uphill/clockwise direction)	The front hood, front flap and rear flap must always be fitted and correctly adjusted. Rear roller should be placed into the raised position. Flaps must be in good condition.
g	Caution: - Hedge cutting (downhill/anti clockwise direction)	The front hood may be removed, rear flap must be fitted and rear roller placed into the raised position. Flap must be in good condition.
h	Danger: - Keep clear of overhead power lines	Ensure you maintain a safe distance with the reach arm and attachment from overhead power lines. Where doubt exists contact your local power company for advice.
i	Instruction: - P65 cancer and reproductive harm	Operating, servicing and maintaining this equipment can expose you to chemicals which are known to the State of California to cause cancer and birth defects or other reproductive harm.

Table 2.1 – 8770631 Safety Decal Definitions

2.

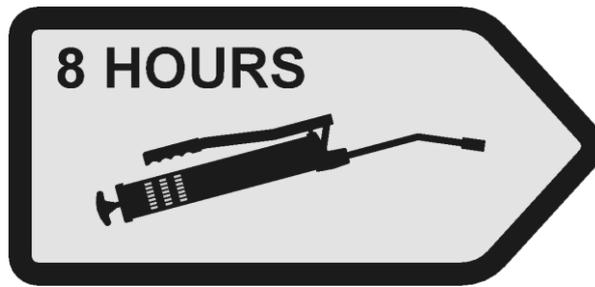


Figure 2.17 – Other Safety & Instruction Decal

2	Instruction: - Grease every 8 hours	Placed and pointed towards components of the machine which should be greased at least once every 8 hours
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Table 2.2 – Other Safety & Instruction Decal Definitions

For the placement of these decals on each of these machines, please refer to Section 2.14.2.

2.14.2 Placement

Figure 2.18 states the particular positions safety and instruction decals are placed on each of the Powerdrive Pro flail head attachments.

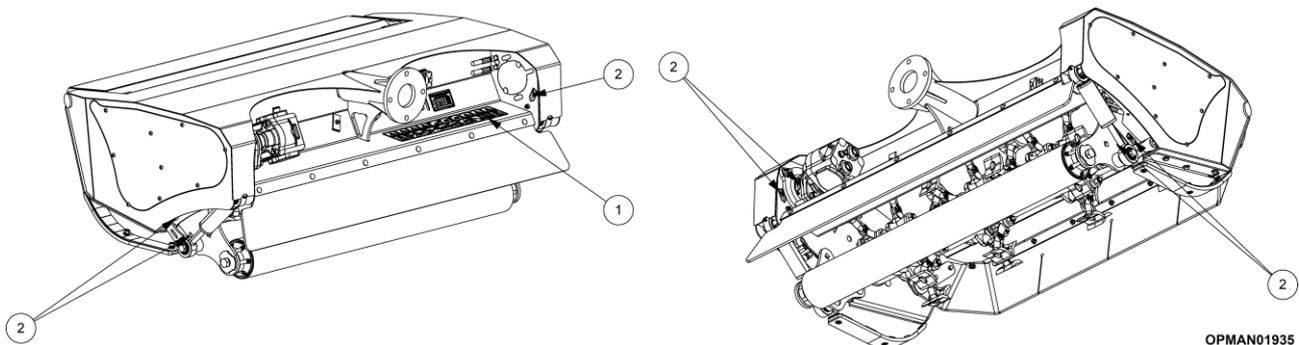


Figure 2.18 – Powerdrive Pro Flail Head Attachment Safety & Instructional Decal Placement

(Left-hand build 130 with hydraulic rear roller option model shown)

NOTE: Machines fitted with the hydraulic rear roller option, as shown in Figure 2.18 feature two extra grease decals to show the requirement to grease the rod end of the hydraulic rear roller ram.

2.14.3 Replacement

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.

Spearhead safety decals have the replacement part number found in the bottom right of the decals.

For more extensive guidance on ordering spare parts and how to go about finding the correct part number; see Section 7.

2.15 Guards



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



DANGER! When hedge cutting or verge mowing 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 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.

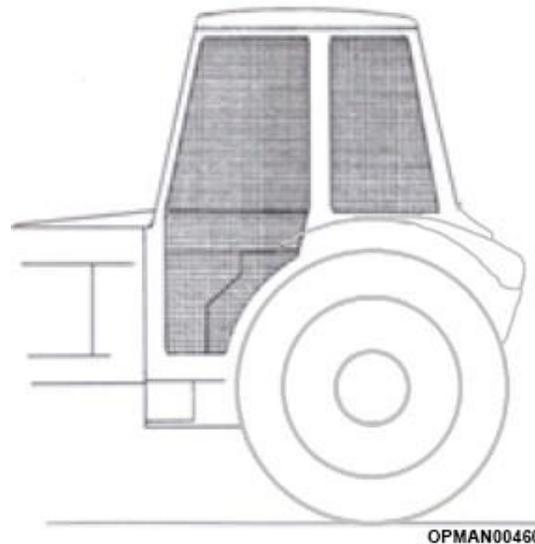


Figure 2.19

The attachment features an 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.

Always replace guards that have damage or wear which could impair their performance. Typical damage to inspect for is as follows;

Item.	Description.
Front and rear rubber flaps	Missing, missing sections or excessively worn.
Front hood	Missing.
Belt guards	Missing or distorted.
Cowl skids (all types)	Missing, distorted or excessively worn.
Rear roller	Missing.

Table 2.3 – Permanent Protection Guard Damages

2.15.1 Mandatory Guards

The General arrangement figure found in Section 1.2 and the list below show the mandatory guards required. These along with the danger decals and warning decals are necessary for safe cutting operations with this attachment:

- Front rubber flap
- Rear rubber flap
- Front hood
- Nearside and offside belt guards
- Cowl skirts (all types)
- Rear roller

2.16 Sound

The air noise level created by the attachment under operating conditions was detected using a sound level meter with integrator.

The measurements were carried out in accordance with ISO 1680-2 with the attachment. Tests performed under the conditions indicated by the standard produced the following results:

Attachment	Tractor With Open Cab		Tractor With Closed Cab	
	130	160	130	160
Powerdrive Pro	TBC		TBC	

Table 2.4 – Powerdrive Pro Flail Head Attachment Sound Readings

2.17 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 attachment:

- 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 machine 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 machine 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.

2.17.1 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 2.5 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 2.5 – Machine Breakdown Component Disposal

2.18 Proposition 65



Figure 2.20 – P65 Cancer And Reproductive Harm Decal

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

Suitable overhead lifting equipment with a minimum Safe Working Load (SWL) in excess of the attachment's overall weight should be used for handling the attachment. Ensure the attachment 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 attachment.

Powerdrive Pro flail head attachments should be lifted using a suitable lifting strap or chain round the lifting slots found on the top of the attachment cowl; see Figure 3.1. It could be alternatively lifted using a suitable forklift truck forks placed between the rear roller and the cowl from the front to rear direction to support the attachment or alternatively it could be placed on a pallet.

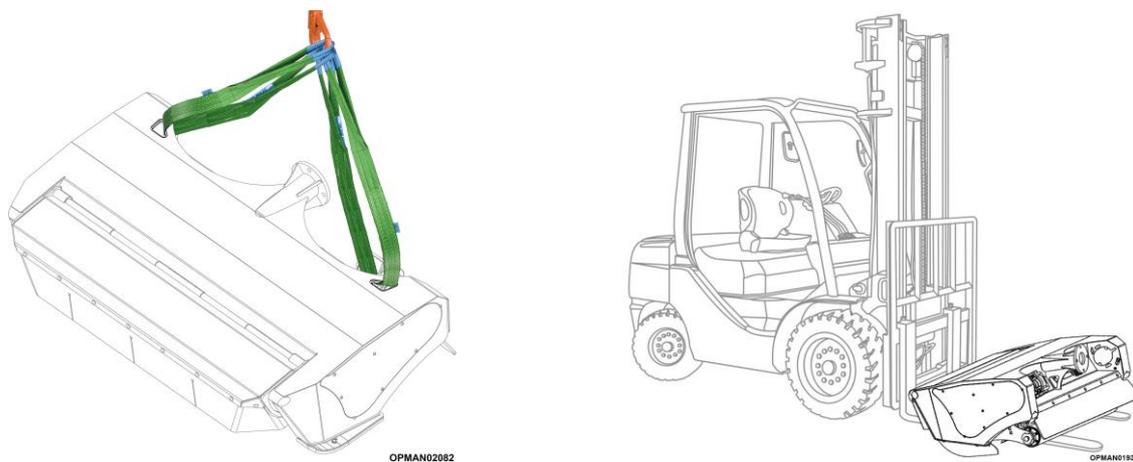


Figure 3.1 Lifting – Powerdrive Pro Flail Head Attachment
(Left-hand build 130 model shown)

Ensure that the attachment is guided by personnel when positioning the attachment to where it is required to be placed. This is to ensure that other equipment/personnel do not get hit by the attachment.

Ensure that wherever the attachment is going to be positioned afterwards is sturdy and level, so that the attachment remains stable and still.

Powerdrive Pro flail head attachments should be left on a sturdy and level ground utilising suitable chocks in front and behind of the rear roller to ensure the attachment doesn't move; see Figure 3.2.

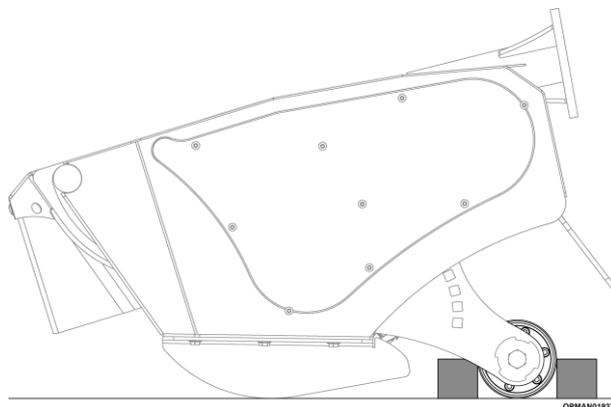


Figure 3.2 – Powerdrive Pro Flail Head Attachment Storage

3.2 Post-delivery/First Use Inspection

3.2.1 Tractor Inspection

It is important to read the tractor and reach arm manufacturer's operators manual to ensure that a complete inspection to the manufacturer's recommendations is carried out on both machines ensuring they are in correct working condition and have the correct safety measures in place for use. It is important before use to check the suitability of the tractor and reach arm using the manufacturer's manuals to ensure they meet the requirements to fit and operate correctly with the attachment.

3.2.2 Machine Adjustment

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

It is important to assess the attachment to ensure that it is of the correct specification ordered from Spearhead or local Spearhead dealer. Information with regards to the specification of the attachment can be found on the machines 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 attachment following the guidance in this operators manual to ensure it is correctly set-up and is suitable for the attaching tractor using the inspection guidance sheet in Section 5.10.

3.3 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 Powerdrive Pro flail head attachment is down to the responsibility of the qualified operator. A qualified operator has thoroughly read and understood the attachment, reach arm and 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 attachment; see Section 2.14.2. The reach arm and connecting tractor will also have them as well with information given in their respective operator's manual.

If any part of the operation safe use of the attachment 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.

Personal Protection Equipment (PPE)

See Figure 3.3

- 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 3.3 - PPE Items



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

Before operating the tractor and machine, 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 3.4 – Do Not Use Drugs Or Alcohol

3.4 Tractor And Reach Arm Specification Requirements

The reach arm and tractor used to operate the attachment must have sufficient capacity to lift, carry and operate at the attachments required flow rate and pressure while travelling at a working ground speed for the conditions and quantity of material of the work site in a stable manner. Operating the machine with a tractor which does not meet the requirements set by Spearhead may cause the tractor and/or machine damage, potentially risking danger to the operator and bystanders.

The working tractor and reach arm **MUST** effectively offer the following characteristics to fit the Powerdrive Pro flail head attachment.

3.4.1 Reach Arm Requirements

Reach Arm Requirement (1)		Attachment	
		130	160
Compatible Reach Arm (1)		Spearhead Twiga Mid, Pro, Flex, Orbital or alternative manufacturer equivalent.	
Mounting Interface		4x 17mm holes distributed equally around 160mm diameter centre on 196mm outside diameter flange plate	
Hydraulic (1)	Connections	2x 1" couplings (pressure and return) 1x 3/8" coupling (case drain) 2x M12 couplings (For attachments fitted with hydraulic hood and/or hydraulic rear roller only)	
	Min Flow	110 l/min (29 gal/min)	
	Pressure	310 bar (4497 psi)	
Tank Weights (2)		May be required in order to maintain the reach arm operating balance On Spearhead Twiga Pro and Flex tank weights are available.	

Table 3.1 – Reach Arm Requirements and Capabilities

3.4.2 Tractor Requirements

Tractor Requirement (1)		Attachment	
		130	160
Driver Protection		Approved cab (for country of use) with protective structure or Roll Over Protection Structure (ROPS) and seat belt. See local tractor standards (3)	
Safety Devices		Slow Moving (SMV) emblem, lighting, PTO master shield, mesh window guarding. See local tractor standards (4)	
Minimum Tractor Weight (5)		See reach arm operators manual	
Hydraulic	Spools	One single, double acting hydraulic spool valves (For attachments fitted with hydraulic hood and/or hydraulic rear roller only)	
Electrical		12 volt power supply (For attachments fitted with hydraulic hood and/or hydraulic rear roller only)	
Front/Rear End /Wheel Weights		Required in order to maintain the 20% weight required on the front or rear axle (6)	
Power Take Off (PTO)		See reach arm operators manual	

Table 3.2 - Tractor Requirements and Capabilities

Notes:

- (1) Spearhead constantly reviews and improves product designs and reserve the right to change this information. Contact your Spearhead Sales representative if you have any queries.
- (2) Stable reach arm weight is critical to maintain stability and prevent the tractor, reach arm and attachment from toppling over. Additional weight may be required to ensure the collective machines are kept stable.
- (3) The tractor must be fitted with a locally approved cab or Roll Over Protection Structure (ROPS) and have a seat belt to protect the operator from falling from the tractor or during a rolling over incident. Only operate the tractor when seated in the operator's seat with the seat belt securely fastened.
- (4) All guarding must be maintained to perfect working condition. Always replace shields and guards that were removed for access to service or repair the tractor, reach arm or attachment. Never operate machine/tractor without all safety devices in position.
- (5) Tractor weight is critical to maintain stability and prevent the tractor from toppling over.

- (6) Front end weight is critical to maintain steering control and prevent the tractor from rearing up. Front weight and weight carriers can be purchased through an authorized tractor dealership.

3.4.3 Reach Arm And Tractor Setup Requirements

To ensure the best operating performance of the Powerdrive Pro attachment ensure:

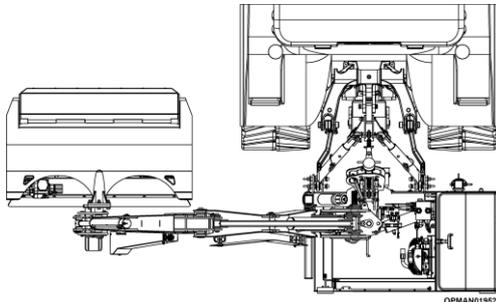


Figure 3.5

Work Position

- 3.4.3.1 Ensure that the reach arm when it is folded from transport position into work position that the reach arm is parallel with the rear of the tractor.

On Twiga reach arm machines, a slew stop bolt is found on the mainframe of the machine to limit the slewing distance of the reach arm slew post when its folded out. The reach arm should be slewed to ensure the attachment will work “square on” with the direction of travel.

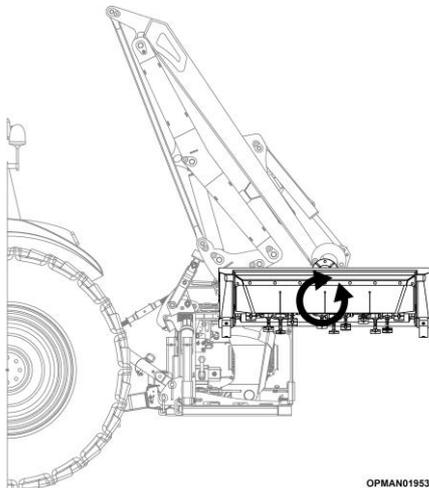


Figure 3.6

Transport

- 3.4.3.2 Adjust the position of the reach arm attachment so it's put into a compact and safe position for transport by operating the dipper ram.
- 3.4.3.3 Ensure that the joystick is correctly switched off and isolated to prevent accidental operation or movement of the machine when the machine is being transported out of use.

3.4.4 Flail Head Attachment Fitting - Standard

The below procedure is written showing the correct fitment of a Powerdrive Pro flail head range of attachments to a Spearhead Twiga Pro reach arm.

Spearhead Machinery cannot give detailed specific guidance to the fitment of all potential reach arm attachments as the list of attachments which can be adapted to fit the Powerdrive Pro flail head range of attachments is exhaustive. For detailed guidance refer to the specific operators manual for the reach arm attachment and check its compatibility against the requirements of the Powerdrive Pro flail head attachment.

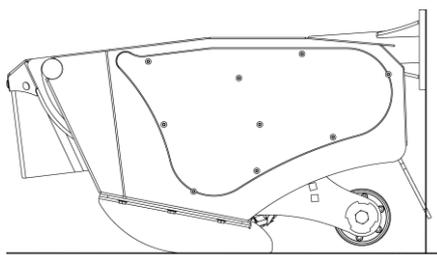
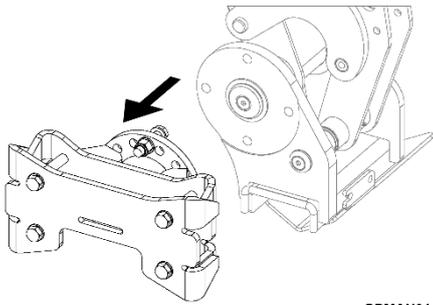


Figure 3.7

- 3.4.4.1 Place the attachment in a secure and stable state on a flat, hard surface where it will not move.

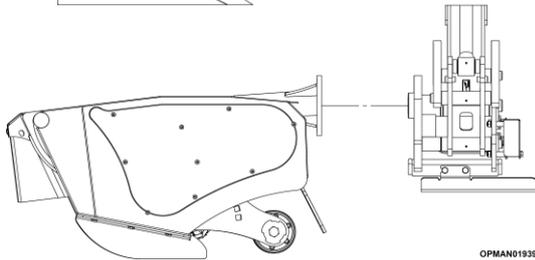
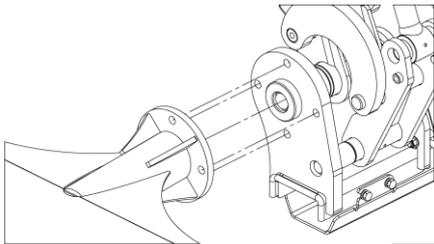
Raise the attachment to a position where the mounting interface plate is sitting vertical to the ground so the reach arm will be able to easily fit to the attachment.



OPMAN01414

Figure 3.8

- 3.4.4.2 If fitted, on Spearhead Twiga reach mowers, loosen and remove the four securing bolts and nuts and their accompanying flat washers from the reach arm and remove the complete standard clamping bracket assembly.



OPMAN01939

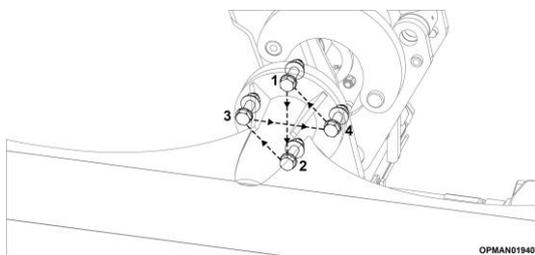
Figure 3.9

- 3.4.4.3 Carefully bring the tractor and reach arm to the attachment positioning the reach arm so the bolt holes on the reach arm mounting interface line up with the mounting interface on the attachment.

- 3.4.4.4 Switch off the tractor and apply the handbrake.

- 3.4.4.5 Fit the four bolts, flat washers and nuts between the reach arm and the attachment.

- 3.4.4.6 Gradually tighten up each of the four fasteners in a cross pattern to pull in and fully secure the attachment to the reach arm. Fully torque each of the fasteners to the correct torque settings given in Section 5.9.



OPMAN01940

Figure 3.10

- 3.4.4.7 Proceed to connect the hydraulic hoses.

3.4.5 Flail Head Attachment Fitting – Quick Attach

The below procedure is written showing the correct fitment of a Powerdrive Pro flail head range of attachments to a Spearhead Twiga Pro reach arm.

Spearhead Machinery cannot give detailed specific guidance to the fitment of all potential reach arm attachments as the list of attachments which can be adapted to fit the Powerdrive Pro flail head range of attachments is exhaustive. For detailed guidance refer to the specific operators manual for the reach arm attachment and check its compatibility against the requirements of the Powerdrive Pro flail head attachment.

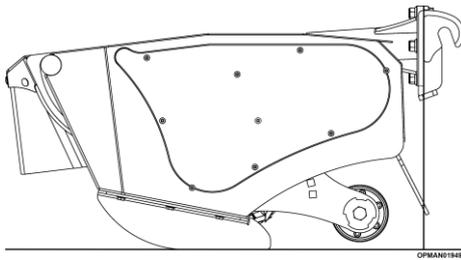


Figure 3.11

- 3.4.5.1 Place the attachment in a secure and stable state on a flat, hard surface where it will not move.

Raise the attachment to a position where the female quick release hook is sitting in a position where the reach arm will be able to easily fit to the attachment.

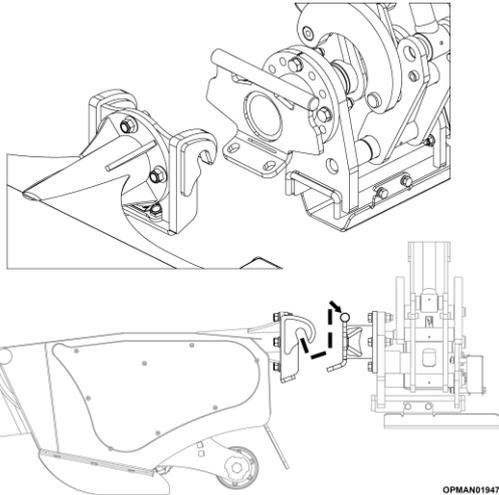


Figure 3.12

- 3.4.5.2 Carefully bring the tractor and reach arm to the attachment positioning the reach arm so the male quick release bracket on the reach arm lines up with the hook on the female quick release mounting interface on the attachment.

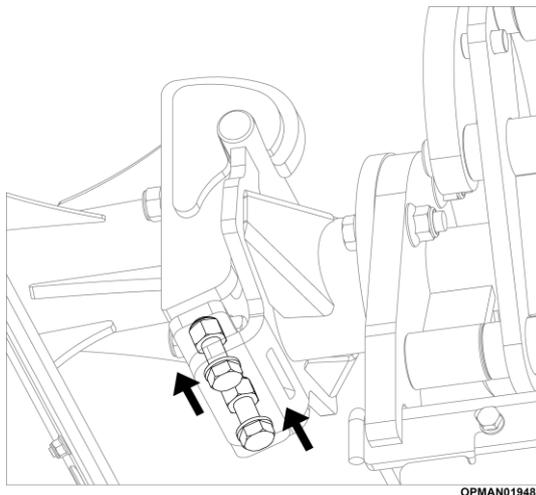


Figure 3.13

- 3.4.5.3 Switch off the tractor and apply the handbrake.
- 3.4.5.4 Fit the two bolts and flat washers to connect the reach arm and the attachment.
- 3.4.5.5 Gradually tighten up each of the bolts to pull in and fully secure the attachment to the reach arm. Fully torque each of the fasteners to the correct torque settings given in Section 5.9.
- 3.4.5.6 Proceed to connect the hydraulic hoses.

3.5 Hydraulic Hoses – Fitting



CAUTION! Ensure maintenance personnel wear suitable PPE clothing when working with the attachment to ensure a reduced risk of 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. Use paper or cardboard to search for leaks and not hands or any other body parts.

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



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



CAUTION! Relieve hydraulic pressure before disconnecting lines or working on the system. This is carried out by safely stopping the attachment and reach arm and leaving it for at least 30 minutes to naturally depressurise. Only once this has been completed and suitable safety glasses and impenetrable gloves have been put on can the hydraulic hoses connecting the reach arm and attachment be removed.

IMPORTANT: Inspect the attaching reach arm and its accompanying operators manual and compare it against the specification of the Powerdrive Pro flail head attachment for compatibility before operating the attachment.

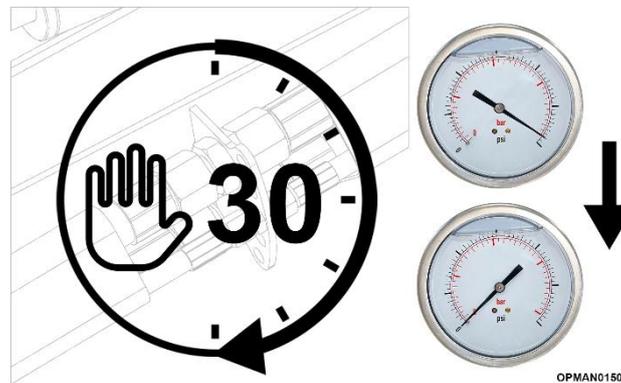


Figure 3.14

Reach arms have a closed hydraulic system, with the operator unable to quickly relieve pressure from the system when the attachment is stopped. It is important to stop the tractor and reach arm and wait for at least 30 minutes to allow the hydraulic system to depressurise before trying to disconnect the attachment from the reach arm.

Spearhead Powerdrive Pro flail head attachments come as standard with “spanner fit” BSP hydraulic hose fittings on the attachment to connect to the reach arm bulkhead, however the attachment can be specified with quick release hydraulic hose couplings.

3.5.1 Motor Connection Definitions

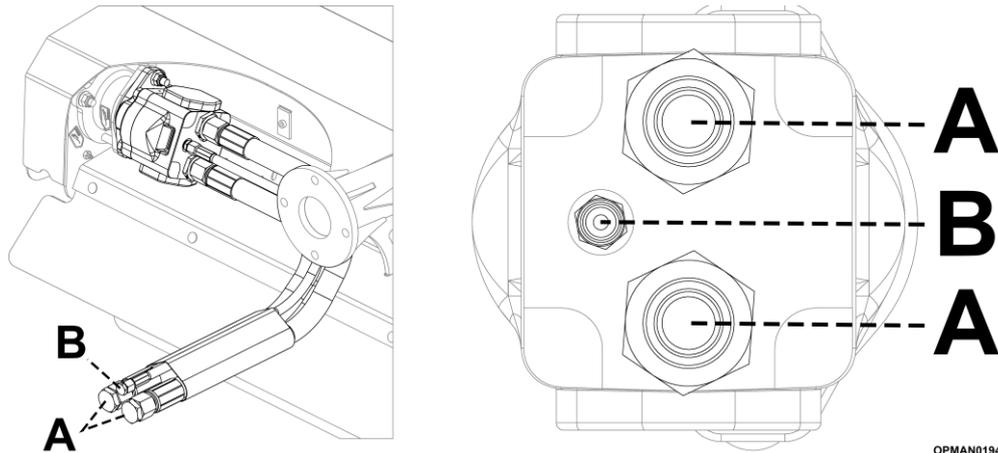


Figure 3.15

Powerdrive Pro Hose Fittings

Item	Use	Bulkhead Size
A/B	Pressure/Return	1"
C	Case Drain	3/8"

Table 3.3

With reference to Figure 3.15, Powerdrive Pro flail head attachments hydraulic motors feature two large 1" hydraulic hoses and one 3/8" hydraulic hose to connect to the reach arm base unit. The two 1" hydraulic hoses (A) from the attachment are for the main pressure and return hydraulic oil supply hoses to the attachment hydraulic motor and the single, smaller 3/8" hydraulic hose (B) is a "case drain" hydraulic hose to protect the hydraulic motor in use.

3.5.2 Bulkhead Fitting – Standard Type Adaptors



Figure 3.16

Spearhead Powerdrive Pro flail head attachments come as standard with "spanner fit" BSP hydraulic hose fittings on the reach arm bulkhead to connect the attachment to the reach arm. When connecting the hoses from the attachment to the reach arm bulkhead it is important to keep the hydraulic hoses and adaptors free of contamination and dirt. If any component is dirty, ensure that it is cleaned with some clean rag before proceeding to fit the hoses. On an attachment fitted with standard "spanner fit" hydraulic hoses, never disconnect a attachment hydraulic hose and leave the ends exposed. Utilise the threaded blanking caps supplied on the hydraulic hoses with the attachment. It is also of upmost importance to fit threaded blanking caps on the reach arm bulkhead adaptors once the attachment has been removed to ensure there will be no large oil leak at very high pressure once the reach arm is placed back into work.

It is important that all hydraulic hoses are installed without being twisted or kinked and are routed to allow for possible movements with the reach arm and attachment without them becoming chafed, pinched or stretched.

It is important to assess the reach arm for its specification and options fitted to understand the uses of each of the hydraulic hoses and its operators manual for the reach arm attachment to gain full clarity on the correct way to connect the attachment to the reach arm base to ensure it works correctly.

The following procedure gives guidance to fitting hydraulic hoses to a Twiga Pro reach arm. Similar procedures are used to fit other compatible Spearhead reach arm base units. It is important to read the reach arm operators manual for any further attachment fitting guidance.

Fitting

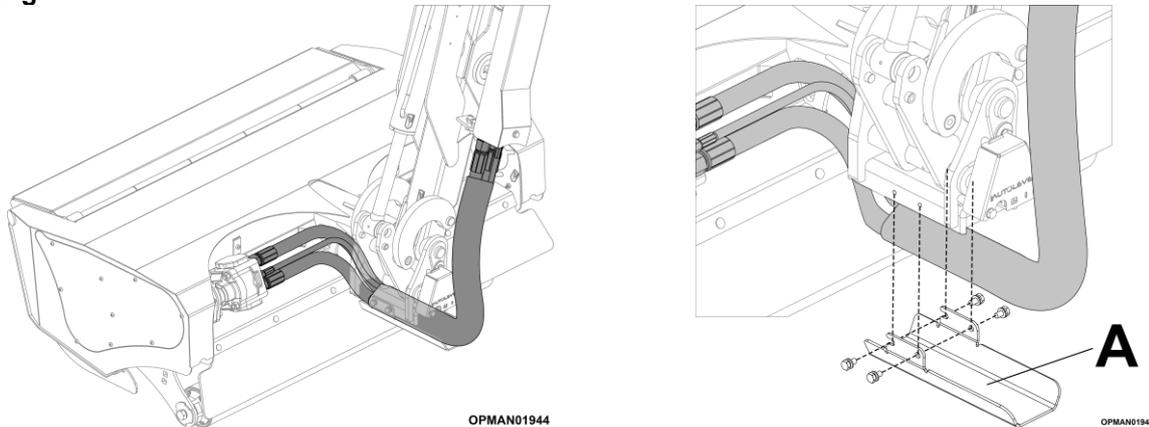
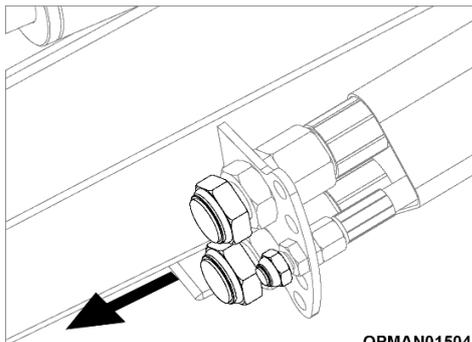


Figure 3.17

- 3.5.2.1 On the Powerdrive Pro flail head attachment, thread the hydraulic hoses from the reach arm attachment underneath the head mount bracket and through the hose carrier plate bolted to the bottom of the reach arms head crowd bracket to position the hydraulic hoses towards the reach arm bulkhead connection point.

Depending on the quantity of hydraulic hoses coming from the attachment may require the removal and refitting of the carrier plate; see Figure 3.17 (A). Ensure that the hydraulic hoses are placed through suitable hose sleeve to keep them together.

Note that depending on the specification and quantity of hydraulic hoses coming from the attachment, not all hydraulic hoses may be possible to be placed through the hose carrier plate found at the bottom of the reach arms head crowd bracket. The hose carrier plate should be used where possible.



OPMAN01504

Figure 3.18

- 3.5.2.2 Place a suitable oil catch tray below the reach arm and gently loosen and remove each of the blanking plugs found on the hose bulkhead and the attachment hoses.

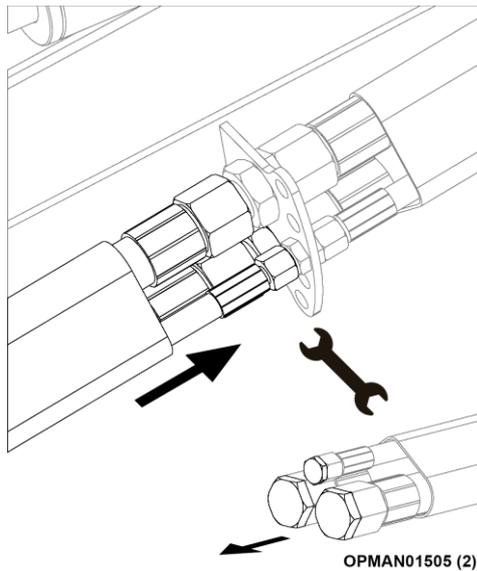


Figure 3.19

- 3.5.2.3 Remove the attachment hose blanking caps and ensuring both the hose and adaptor are clean, carefully fit the attachment hydraulic hoses to the reach arm hose bulkhead.

Check that all hydraulic hoses are installed without being twisted or kinked and are routed to allow for the movements possible with the reach arm and attachment without them become chafed, pinched or stretched. See guidance in Section 3.6.1.

Gain assistance if required to raise the collective hydraulic hoses and fit the couplings to the reach arm bulkhead. The collective hydraulic hoses may be heavy.

- 3.5.2.4 Torque the hydraulic connections to the correct torque settings as stated in Section 5.9.

- 3.5.2.5 Start the tractor and gently operate the reach arm. There may be an initial delay in response due to the hydraulic hoses draining of oil when the blanking plugs were removed. These need to refill.

Safely stop the tractor and inspect the hydraulic connections for leaks.

Removing



CAUTION! Relieve hydraulic pressure before disconnecting lines or working on the system. This is carried out by safely stopping the attachment and leaving it for at least 30 minutes to naturally depressurise. Only once this has been completed and suitable safety glasses and impenetrable gloves have been put on can the hydraulic hoses connecting the reach arm and attachment be removed.



Figure 3.20

- 3.5.2.6 To remove the attachment hydraulic hoses from the reach arm it is important to stop the tractor and attachment and wait for at least 30 minutes to allow the hydraulic system to depressurise before trying to disconnect the attachment from the reach arm.

Ensure that the flail head attachment and reach arm are sufficiently supported to ensure that they do not move as the system depressurises.

- 3.5.2.7 Place suitable containers and equipment below the reach arm bulkhead to collect hydraulic oil.

- 3.5.2.8 Gently loosen each of the hydraulic hoses and fit blanking caps to the exposed ends on the attachment hydraulic hoses and bulkhead fittings on the reach arm.

3.5.3 Bulkhead Fitting – Quick Release Adaptors (option)

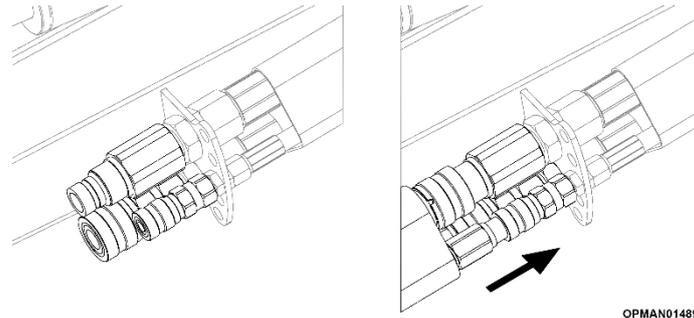


Figure 3.21
Powerdrive Pro Quick Release Fittings

Spearhead Powerdrive Pro flail head attachments in combination with the mechanical quick attachment option, see Section 3.4.5, can be optioned with quick release hydraulic fittings to connect the attachment to the reach arm. When connecting the hoses from the attachment to the reach arm bulkhead it is important to keep the hydraulic hoses and flat face couplings free of contamination and dirt. If any component is dirty ensure that it is cleaned with some clean rag before proceeding to fit the hoses. If any flat face quick release hydraulic fittings are removed from the hydraulic hose of the attachment or reach arm bulkhead, utilise threaded blanking caps to cover the exposed ends on the hydraulic hoses. It is of upmost importance to use threaded blanking caps to cover exposed ends on hydraulic hoses to ensure there will be no large oil leak at very high pressure once the reach arm is placed back into work.

To remove or the quick release hydraulic fittings from the reach arm bulkhead hoses, it is important to stop the tractor and attachment and wait for at least 30 minutes to allow the hydraulic system to depressurise before trying to loosen the blanking caps/fittings from the reach arm.

The following procedure gives guidance to fitting hydraulic hoses to a Twiga Pro reach arm. Similar procedures are used to fit other compatible Spearhead reach arm base units. It is important to read the reach arm operators manual for any further attachment fitting guidance.

Fitting

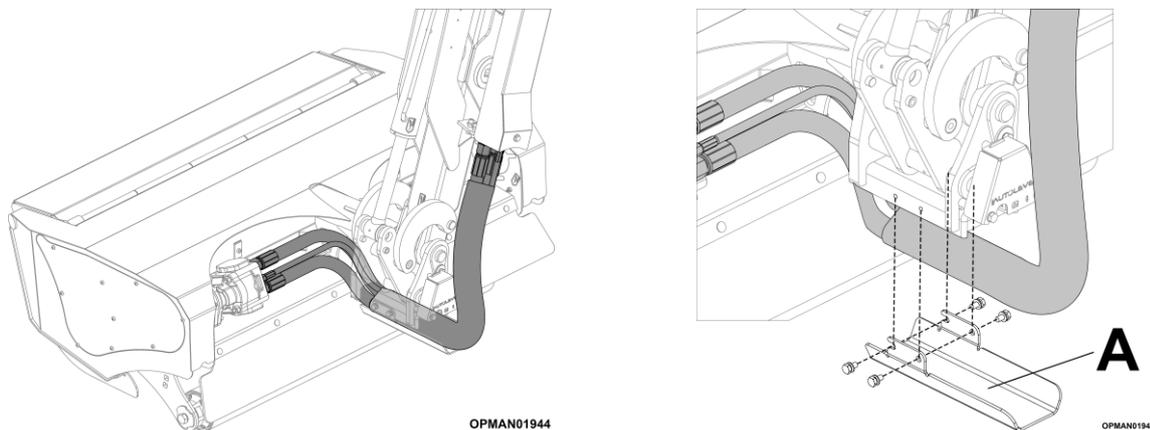
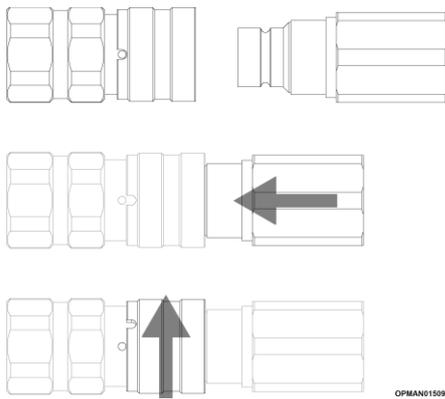


Figure 3.22

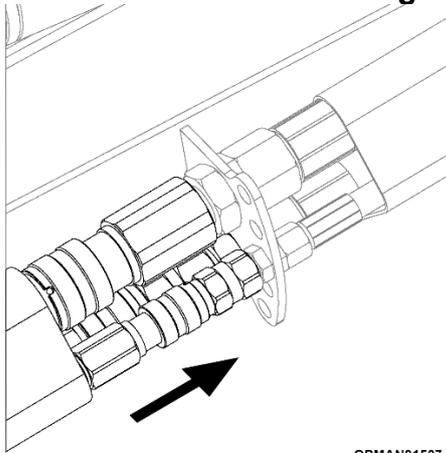
- 3.5.3.1 On the Powerdrive Pro flail head attachment, thread the hydraulic hoses from the reach arm attachment underneath the head mount bracket and through the hose carrier plate bolted to the bottom of the reach arms head crowd bracket to position the hydraulic hoses towards the reach arm bulkhead connection point.

Depending on the quantity of hydraulic hoses coming from the attachment may require the removal and refitting of the carrier plate; see Figure 3.22 (A). Ensure that the hydraulic hoses are placed through suitable hose sleeve to keep them together.

Note that depending on the specification and quantity of hydraulic hoses coming from the attachment, not all hydraulic hoses may be placed through the hose carrier plate found at the bottom of the reach arms head crowd bracket. The hose carrier plate should be used where possible.



OPMAN01509
Figure 3.23



OPMAN01507

Figure 3.24

- 3.5.3.2 Ensuring both the male and female quick release adaptors are clean, carefully push on the attachment hydraulic hoses to the reach arm hose bulkhead quick release adaptors. An audible click should be heard when the male and female hydraulic couplings are engaged correctly.

Check that all hydraulic hoses are installed without being twisted or kinked and are routed to allow for the movements possible with the reach arm and attachment without them become chafed, pinched or stretched. See guidance in Section 3.6.1.

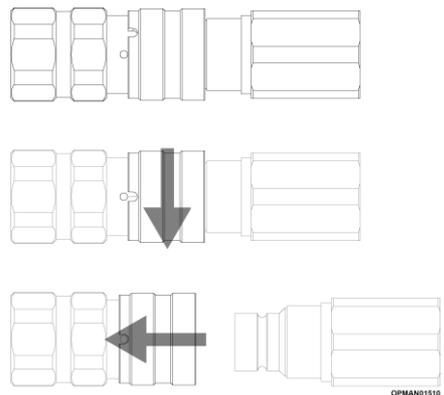
Gain assistance if required to raise the collective hydraulic hoses and fit the couplings to the reach arm bulkhead. The collective hydraulic hoses may be heavy.

- 3.5.3.3 Rotate the collar on each of the female quick release couplings once the attachment has been made to lock couplings and ensure that they cannot come apart; see Figure 3.23.

- 3.5.3.4 Start the tractor and gently operate the reach arm.

- 3.5.3.5 Safely stop the tractor and inspect the hydraulic connections for leaks.

Removal



OPMAN01510
Figure 3.25

- 3.5.3.6 To remove the attachment hydraulic hoses from the reach arm rotate the collar on each of the female quick release couplings so the slot lines up with the ball on the coupling; see Figure 3.25.

- 3.5.3.7 Firmly supporting the hydraulic hose pull the collar back on the female quick release coupling which will release the female coupling from the male coupling.

- 3.5.3.8 With reference to Figure 3.22 (A), carefully slide the hydraulic hoses through the hose carrier plate and leave the hydraulic hoses off the floor and on the attachment.

3.5.4 Hydraulic Front Hood And Rear Roller (option)

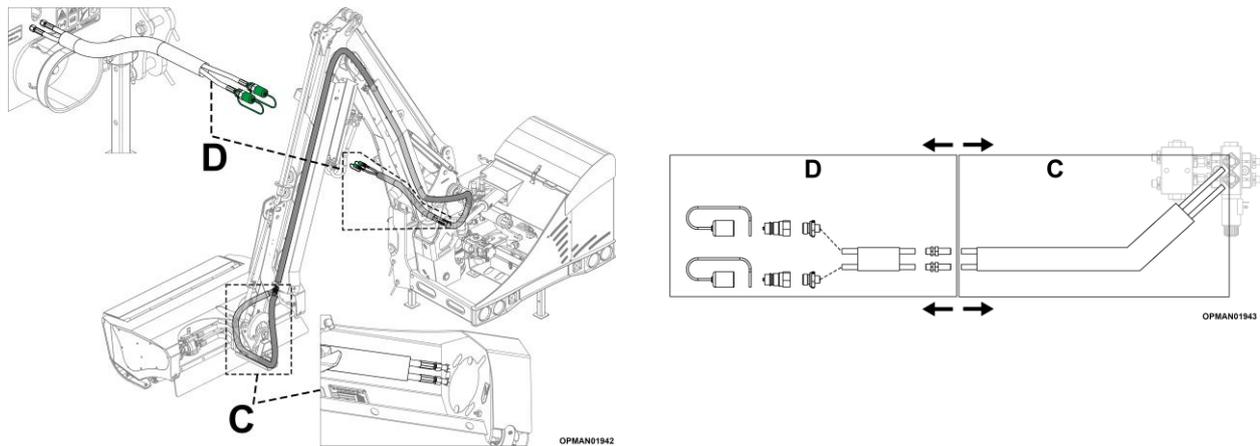


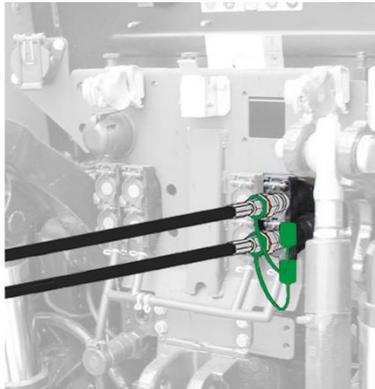
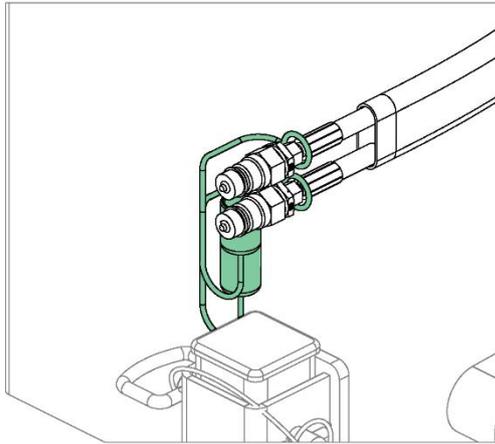
Figure 3.26
Hydraulic Front Hood And Rear Roller Hose Routing

For Powerdrive Pro flail head attachments fitted with the hydraulic front hood and/or hydraulic rear roller option there are an additional two 1/4" hydraulic hoses which need to be connected back to the hydraulic spools on the tractor; see Figure 3.26 (C/D).

The pair of hydraulic hoses when supplied with the attachment to supply the hydraulic front hood and/or hydraulic rear roller option are fully assembled in order to protect the system from the ingress of foreign material.

With reference to Figure 3.26, the "kit" of parts needs to be split which then provides sufficient parts to allow for the fitment of the hydraulic hoses between the attachment and the reach arm bulkhead (C) and between the reach arm tank bulkhead and the hydraulic services on the rear of the tractor (D). Spearhead Twiga reach arms feature pre-fitted auxiliary hydraulic hoses between the reach arm head bulkhead and the tank bulkhead for options such as these to be fitted. Alternative manufactured reach arms may not have these hydraulic hoses supplied, so suitable hydraulic hoses will need to be sourced and fitted by the operator.

- 3.5.4.1 It should be inspected to ensure the hydraulic front hood/roller hoses are routed to take the same path down to the attachment as the rest of the attachment hydraulic hoses. They should be ideally fitted underneath each of the arm guards and placed through any relevant hose guides before reaching the diverter valve inside the attachment.
- 3.5.4.2 Check that all hydraulic hoses are installed without being twisted or kinked and are routed to allow for the movements possible with the reach arm and attachment without them become chafed, pinched or stretched. See guidance in Section 3.6.1.
- 3.5.4.3 Ensure the hydraulic hoses and kept together by being placed through the supplied hose sleeving between the tractor, reach arm and attachment.



OPMAN01514

Figure 3.27

- 3.5.4.4 Under the preference of the operator and which service they wish to use on the tractor, fit the pair of hydraulic hoses to one bank of services on the tractor.

It is not critical as to which service the hose is fitted to as long as it's from the same bank. Swapping the hoses over will cause the action in the tractor to be mirrored opposite; it is down to the preference of the operator in how they wish to operate the controls in the tractor.

The hydraulic hoses feature male quick release hydraulic couplers and when connecting the hoses to the tractor it is important to keep the hoses free of contamination and dirt. Ensure that the tractors hose ports are capped or clean before connecting the hydraulic hose to the tractor.

- 3.5.4.5 Start the tractor and gently operate the hydraulic front hood/roller using the correct spool control on the tractor. There may be an initial delay in response due to the hydraulic hoses, rams and system components filling with oil.

If the response from the hydraulic front hood/roller is slow, inspect the flow rate for the specific spool on the tractor and increase if necessary.

- 3.5.4.6 Safely stop the tractor and inspect the hydraulic connections for leaks.

Removal

Before switching off the tractor ensure that if fitted the hydraulic front hood and the hydraulic rear roller are moved into their closed/lowered position.

Switch off the tractor and secured in position on level ground, relieve the hydraulic pressure from the tractor by placing the specific tractor hydraulic service into float.

The hydraulic front hood/roller hydraulic hoses feature quick release hydraulic couplers so they can be removed by first pushing in and then pulling out the connections. When disconnecting the hoses to the tractor it is important to keep the hoses, quick couplers and swivels free of contamination and dirt. Never disconnect a hydraulic hose and leave the quick coupler end exposed. Utilise the coloured plastic caps supplied on the hoses to keep them contaminant free. Ensure that the tractors hose ports are capped and clean before leaving the hydraulic hoses with the attachment. If any component is deemed dirty ensure that it is cleaned with some clean rag.

See Section 5.4 for full guidance on hydraulic circuit diagrams of the various attachment options.

Adaptors

There may be the requirement for the alteration of the hydraulic hose adaptors found on the reach arm hose bulkhead to allow for the correct connections to be made between the reach arm and attachment. Use the minimum number of adaptors to create the correct connections of the two machines. It is important to thoroughly read the specific section in the reach arm operators manual for complete clarity on the operation and hydraulic oil supply to the attachment from the reach arm base unit.

IMPORTANT: It is important that all hydraulic hoses are placed and safely secured underneath any arm guards and placed through any other guides on the reach arm if possible to ensure that they are correctly routed and protected when in work from damage.

3.6 Hydraulic Hoses – Routing

3.6.1 General Points & Hose Care

Spearhead Machinery cannot give specific guidance to the correct hose routing of all potential Powerdrive Pro flail head attachments to the reach arms as the list of reach arms which can be adapted to fit Spearhead's Powerdrive flail head attachment range is exhaustive.

It is important that all hydraulic hoses are installed without being twisted or kinked and are routed to allow for the movements possible with the reach arm and attachment without them become chafed, pinched or stretched.

Twists

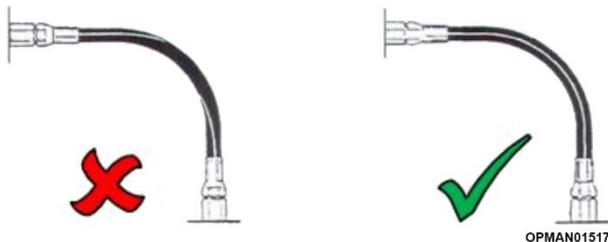


Figure 3.28

When routing the hydraulic hoses between the reach arm bulkhead and the attachment think of the operations and positions which could be made and simulate how the hydraulic hoses will move as a result when the attachment is being used.

Hydraulic hoses are severely weakened when twisted and can cause hydraulic pressure pulses through the hoses potentially loosening hydraulic connections.

Sharp Bends

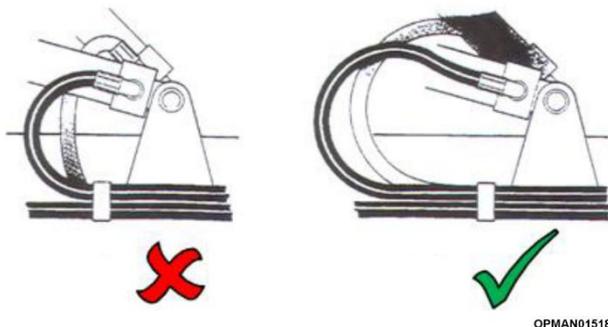


Figure 3.29

Spearhead recommends fitting hoses loosely at each end fitting when being initially installed and inspect to see the hydraulic hose is not twisted before being correctly tightened. The majority of Spearhead hydraulic hoses feature a coloured line or writing down the length of the hose to give indication that the hydraulic hose is straight and correctly orientated.

Install hydraulic hoses ensuring that they are not too tightly bent; see Figure 3.29. Ensure that hydraulic hoses are sufficiently long enough to allow for safe loop to be created considering how this may change when at the extreme ends of work.

Chafed Hoses



Figure 3.30

Hydraulic hoses should always be fitted ensuring that they are not chafed on any objects. Always give plenty of clearance around sharp objects and reposition if possible; see Figure 3.30.

Cable ties can be used to safely secure and guide hydraulic hoses in safe paths from obstructions when in use.

Always use hydraulic hose sleeving to cluster groups of hydraulic hoses going to nearby locations on the attachment. Using hydraulic hose sleeving protects the rubber coating on hydraulic hoses and can extend hydraulic hose life.

Ensure that all hydraulic hoses are kept off the ground and away from rotating and moving parts of the reach arm and attachment.

Always torque the hydraulic connections to the correct torque settings as stated in Section 5.9.

3.7 Electrical Connections – Fitting

3.7.1 Diverter Valve

For Powerdrive Pro flail head attachments fitted with both hydraulic front hood and hydraulic rear roller options, an electric diverter valve connection is required to be connected to the diverter valve connection at the reach arms bulkhead. Factory built compatible Twiga reach arm mowers will already have a pre-fitted diverter valve loom found at the reach arm bulkhead which gains power from the reach arms power supply. Alternative hedge cutters will require a diverter valve power supply and earth connection to be made between the tractor and attachment to allow for the feature to be able to be used by the operator.

The diverter valve electrical connection should be grouped with the hydraulic hoses and placed through the hydraulic hose sleeve to the reach arm bulkhead electrical connection. Ensure that the cable is installed without being twisted or kinked and is routed to allow for the movements possible with the reach arm and attachment without it becoming chafed, pinched or stretched.

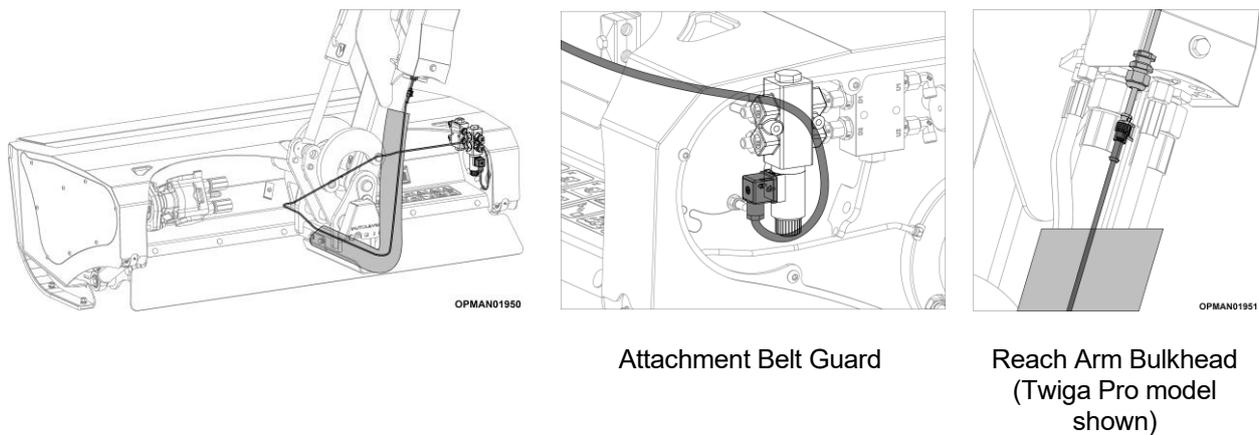


Figure 3.31
Diverter Valve Electrical Connection

3.8 Front Hood & Rear Roller

3.8.1 Hedge Cutting

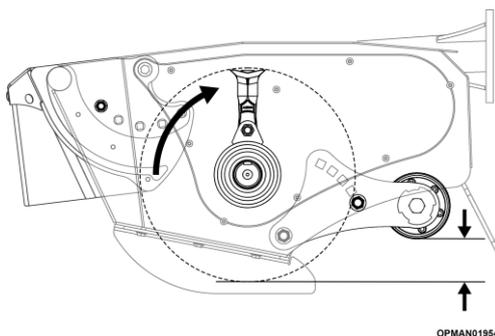


Figure 3.32

Roller Set-Up

The attachment rear roller should be raised sufficiently so that it clears the top of the hedge.

The adjustable front hood should be positioned as low as possible without restricting the ability of the hedge to be cut to enter the attachment.

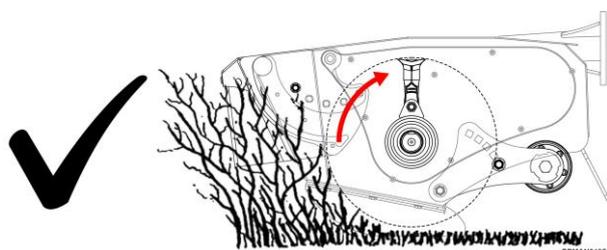


Figure 3.33

Normal Hedge Cutting

For normal cutting, the flail should be cutting in an upwards (clockwise) direction, reducing the amount of flying debris to a minimum and leaving a tidy finish.

The adjustable front hood can be opened and adjusted as required.

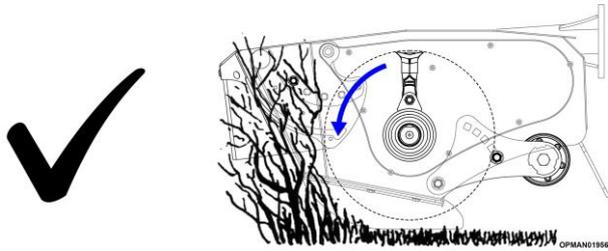


Figure 3.34

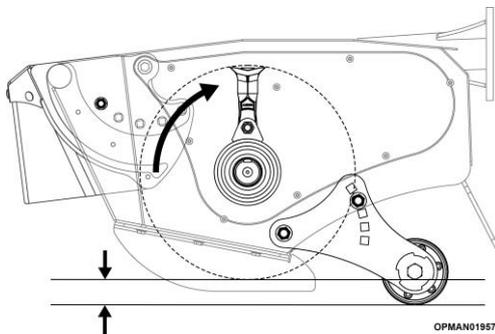
Rough Cutting

For rough cutting, the flail can be reversed to cut in a downwards (anti-clockwise) direction if necessary. Downwards cutting is not good for the hedge and leaves an untidy finish and should only be cut in this direction when rough cutting in heavy growth.

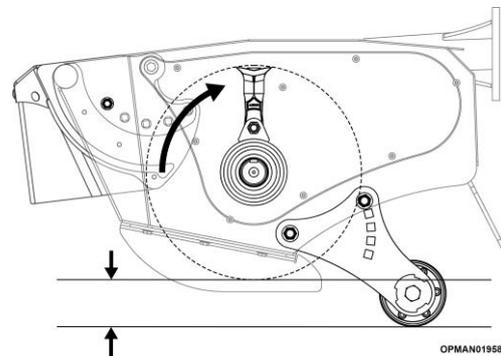
NOTE: Reverse cutting is only available to Powerdrive flail head attachments fitted to reach arms with the ability to reverse its direction of hydraulic flow to the attachment.

IMPORTANT: Reverse rotation cutting should only be carried out with attachments fitted with correct flails with two cutting edges.

3.8.2 Verge Mowing



Lowest Cutting Height
(standard, manual adjustment rear roller shown)



Highest Cutting Height

Figure 3.35

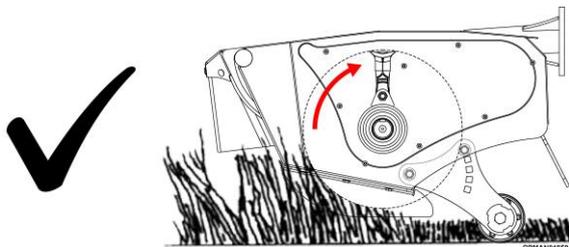


Figure 3.36

Roller Set-Up

Do not operate without a rear roller fitted.

The attachment rear roller should be positioned to the desired cutting height which should be lower than the flail on the rotor.

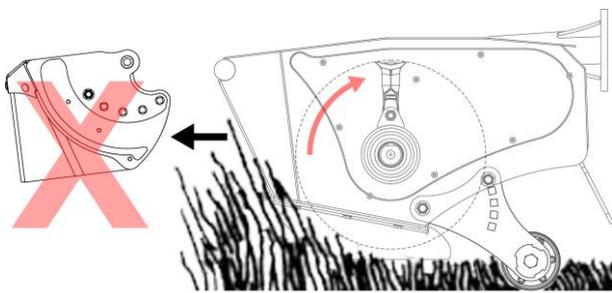


Figure 3.37

Front Hood

Do not operate without the adjustable front hood fitted.

The adjustable front hood should always be fitted and positioned in a low as possible position without restricting the ability of the grass to be cut to enter the attachment.

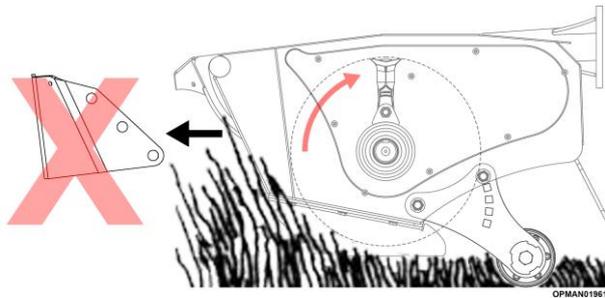


Figure 3.38

Front And Rear Flap

Do not operate without front or rear flap fitted.

The addition of a rubber flap fitted to the front and rear of attachment reduces flying debris to a minimum in combination with the front good.

3.9 Setting Cutting Height

3.9.1 Manual Adjustment (standard)

IMPORTANT: Ensure that the PTO is disengaged, reach arm controls relieve hydraulic pressure from the system and are then isolated, and the tractor is safely stopped before proceeding to adjust the rear roller of the attachment.

With reference to Figure 3.39, to alter the minimum height of cut:

- 3.9.1.1 Place the attachment on sufficient and stable blocks under the skids, with consideration to the final position required for the rear roller.
 - 3.9.1.2 Using a suitable tool, firmly support and slightly raise the rear roller to relieve the weight off the coach bolts.
 - 3.9.1.3 Loosen and remove the coach bolt and nut from both ends of the roller adjuster plate; see Figure 3.39 (A).
 - 3.9.1.4 Firmly support and raise or lower the rear roller until the adjuster plate slots in the rear roller brackets line up with the bolt hole in the main cowl fabrication to gain the desired guide cutting height required.
- See Table 3.4 for guidance on how to gain a desired guide height with the attachment.
- 3.9.1.5 Refit the coach bolt and nut on both sides. Tighten to the required torque setting.
 - 3.9.1.6 Relieve support on the rear roller.
 - 3.9.1.7 Test the attachment to see if the desired cutting height is achieved.
 - 3.9.1.8 If the desired cutting height is not achieved; repeat the process on another setting.

Powerdrive Pro flail head attachments come as standard with a five position adjustable rear roller giving the operator five fixed positions of cutting height. The adjustment is carried out manually and requires support of the attachment and the rear roller in order to safely adjust the rear rollers position.

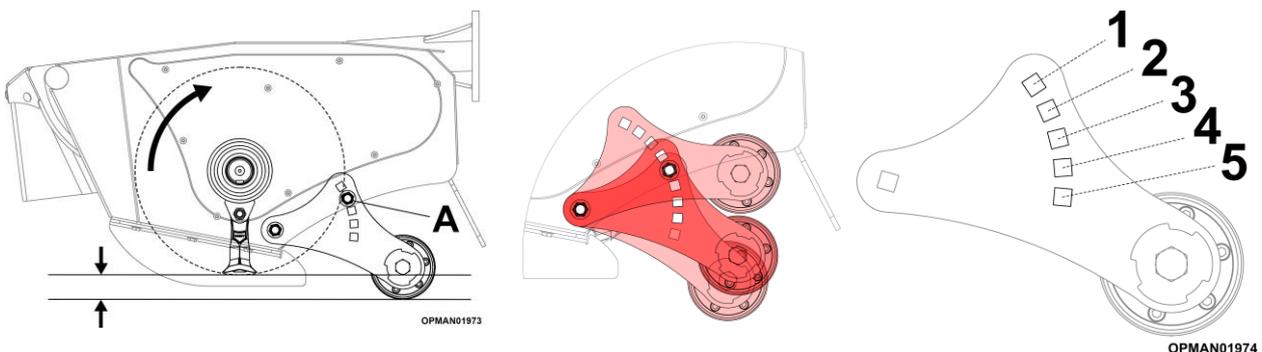


Figure 3.39
(Hedge roller shown)

Hole Position	Cutting Height		Position
	Hedge Roller	Verge Roller	
1 (lowest)	100mm (4 1/16")	115mm (4 1/2")	Attachment On Roller
2	55mm (2 3/16")	70mm (2 3/4")	Attachment On Roller
3	26mm (1")	26mm (1")	Attachment On Skid*
4	26mm (1")	26mm (1")	Attachment On Skid*
5 (highest)	26mm (1")	26mm (1")	Attachment On Skid*

Table 3.4

Powerdrive Pro Flail Head Attachment With Standard Rear Roller Adjustment Cutting Heights

It is important to note that hole position 3 and higher cause the rear roller to be positioned higher than bottom of the skid on the attachment cowl. When in use the attachment will be running on the wear skids rather than the rear roller, creating the minimum cutting height of the attachment. Hole positions 3 and higher are suitable for using the attachment for hedge cutting procedures. However, it is important to remain in the lower hole positions 1 and 2 when using the attachment for verge cutting procedures.

IMPORTANT: It is important to observe the guidance given in Section 3.8 with regards to the correct setup for the rear roller for the attachment depending on if the attachment is going to be used for hedge cutting or verge mowing.

3.9.2 Hydraulic Adjustment (option)

Powerdrive Pro flail head attachments can be optioned with a hydraulic rear roller which unlike the standard rear roller gives the operator an infinite level of adjustment between the fully retracted and extended positions of the hydraulic ram.

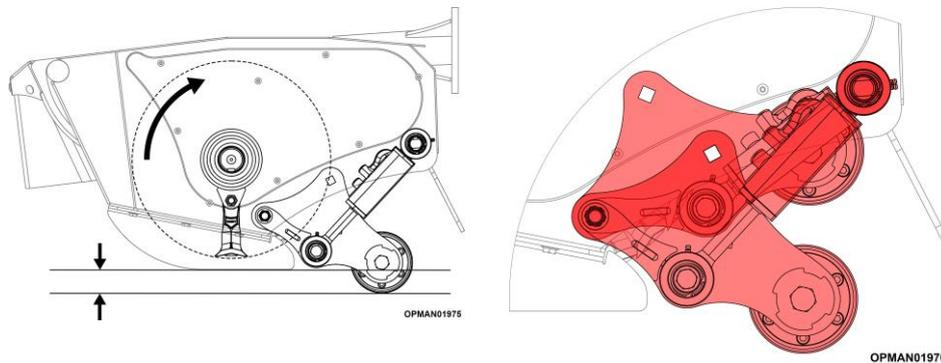


Figure 3.40
(Hedge roller shown)

Position	Cutting Height		Position
	Hedge Roller	Verge Roller	
Lowest Position	81mm (3 3/16")	95mm (3 3/4")	Attachment On Roller
Highest Position	26mm (1")	26mm (1")	Attachment On Skid*

Table 3.5

Powerdrive Pro Flail Head Attachment With Standard Rear Roller Adjustment Cutting Heights

It is important to note that the hydraulic rear roller can be retracted into a position where the rear roller can be positioned higher than bottom of the skid on the attachment cowl. When in use the attachment will be running on the wear skids rather than the rear roller, creating the minimum cutting height of the attachment. Placing the rear roller in a high position is suitable for using the attachment for hedge cutting procedures. It is important to remain in lower rear roller position holes to use the attachment for verge cutting procedures.

IMPORTANT: It is important to observe the guidance given in Section 3.8 with regards to the correct setup for the rear roller for the attachment depending on if the attachment is going to be used for hedge cutting or verge mowing.

3.10 Pulley Orientation

The Powerdrive Pro flail head attachment features a cogged V-belt driveline to connect power between the input motor pulley and the rotor drive pulley. The two pulleys are not of equal size so depending on their assembly orientation allow for the drive to be increased or decreased from the output rotating speed of the motor.

By configuring the pulleys so that the smaller pulley is on the input/motor, you will be able to get the slower rotor speed available for the Powerdrive Pro flail head attachment; see Figure 3.41 (1). Spearhead Machinery recommends this for verge mowing applications.

By configuring the pulleys so that the larger pulley is on the input/motor, you will be able to get the faster rotor speed available for the Powerdrive Pro flail head attachment; see Figure 3.42 (2). Spearhead Machinery recommends this for hedge cutting applications.

To exchange the position of the pulleys requires the removal of the cogged V-belt and pulley clamping elements, then the complete reassembly and correct tensioning of the belt once again. For full guidance of this procedure; see Section 5.7.

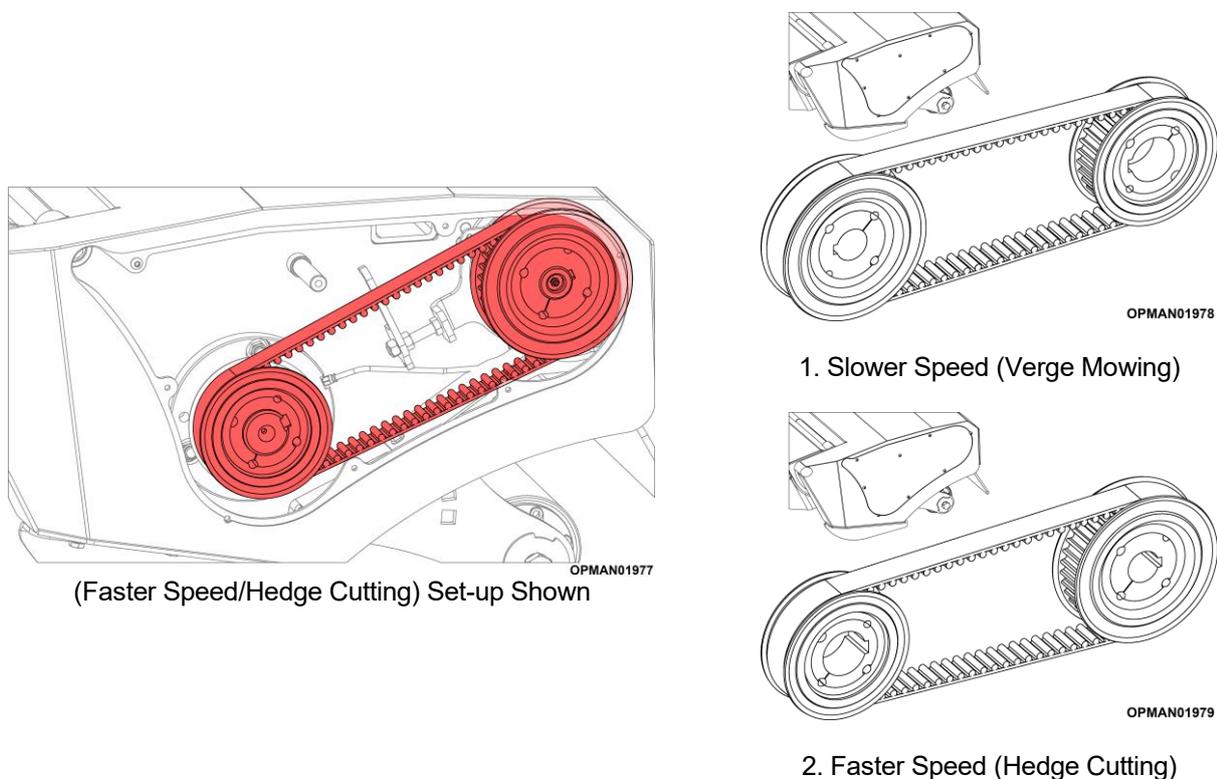


Figure 3.41
Powerdrive Pro Drive Pulley Set-up

Pulley Configuration.	Input Pulley (Motor).	Output Pulley (Rotor).	Output (Rotor) Speed.	Tip Speed.	Use.
Slower	Smaller	Larger	2257rpm*	69m/s (13582fpm)	Verge mowing
Faster	Larger	Smaller	2986rpm*	52m/s (10236fpm)	Hedge cutting

Table 3.6

*Listed speeds have been determined by fitted the Powerdrive Pro flail head attachment to a Twiga Pro reach arm operating at 540RPM.

Spearhead constantly reviews and improves product designs and reserve the right to change this information. Actual attachments may vary from the above specification. Contact your Spearhead Sales representative if you have any queries.

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4 Using The Machine

4.1 Starting And Stopping The PTO

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.



DANGER! Do not let anyone stand in between the tractor and reach arm whilst the tractor engine and PTO is running. Serious chance of entanglement, crushing and death may occur.



DANGER! Stop the PTO when the reach arm and attachment are not being operated. Reach arm machines can be left with the PTO being driven without the attachment working. Ensure the machine is completely stopped when the operator is not sat on the tractor's seat.



WARNING! Do not let the attachment flails turn when the reach arm is raised when not working in material for any reason; including clearance or for turning. Raising the reach arm exposes the flails which creates a potentially serious hazard and could cause serious injury or even death from objects thrown from the attachment.



WARNING! Do not put hands or feet anywhere near the operating machine or attachment. Flail contact can result in serious injury or even death. Stay away until all motion has stopped.

The below guidance gives an example on how to safely start and stop the PTO. However, it is important the specific reach arm operators manual in order for the operator to familiarise themselves with the correct procedure in safely starting and stopping the PTO and engaging the cutting rotor of the attachment correctly.

Starting

- 4.1.1.1 Ensure that the operator is fully familiar with the correct operation of the reach arm and tractor.
- 4.1.1.2 Ensure that all operational features of the reach arm are in correct working order and correctly connected.
- 4.1.1.3 Inspect that all mechanical reach arm controls are placed into their neutral position in order to prevent any automatic engagement and movement responses coming from the reach arm or attachment when the reach arm power is switched on.

Take particular note that if the reach arm is fitted with a rotor forward/rotor reverse or a similar function that it is switched off.

- 4.1.1.4 Inspect the attachment to see that the pulleys are correctly assembled to give the correct operating speed for the working application when the reach arm is working at the correct speed; see Section 3.10.
- 4.1.1.5 Ensure that if fitted the red power/emergency stop button is released up. There may be light or button which will illuminate indicating that power is supplied to the system and is working.
- 4.1.1.6 Ensure the joystick is not touched and is in its neutral position.
- 4.1.1.7 Start the tractor and keep the engine at idle RPM.
- 4.1.1.8 Using the reach arm controls, engage the tractor PTO and allow the reach arm to idle for at least 15 minutes to let the hydraulic oil come up to correct operating temperature. Operating the reach arm and attachment without thoroughly warming the system can cause damage to the system. This can lead to costly repairs.
- 4.1.1.9 Once up to temperature the reach arm hydraulic controls can now be operated, and the reach arm and attachment can be moved as required. Carefully operate the arms through the full amount of travel; check all movements are functioning correctly.
- 4.1.1.10 Safely stop the machine again and inspect the reach arm and attachment for oil leaks. Inspect the oil level on the reach arm to ensure it is correct.

All Spearhead machines have been run-up and checked thoroughly. However, hose connections can become loose in transit, and these should be checked again before the machine is put to work.

Check all hoses for kinks, pinching and chafing. Resolve any issues following the guidance in Section 3.6.

- 4.1.1.11 Safely repeat the process of starting the machine again and after safely assessing the work environment following the guidance given in Section 2 and placed the reach arm in a suitable position close to the ground but in a position where it will be free of external load being put upon it, operate the reach arm rotor control to start the rotor on the attachment.

Allow for the attachment rotor to come up to speed and maintain the rotor at idle speed.

- 4.1.1.12 Evaluate to see the attachment is operating the correct direction.

If the direction is incorrect. Switch off the reach arm rotor control and allow the attachment to come to a complete stop. Inspect to find the cause of error. Some reach arms have the ability to all the rotor to operate in both a rotor forward and rotor reverse directions, so inspect the reach arm controls to determine if this may be the cause of fault. Otherwise, inspect to see that the hydraulic hoses supplying oil to the attachment motor are installed correctly.

- 4.1.1.13 Safely restart the machine if the required, letting the rotor come up to speed. Once a steady, constant speed is maintained, finally slowly increase the PTO speed required for the reach arm to the correct speed to bring the attachment rotor up to its correct operating speed. Rapid increase of the PTO speed can seriously damage the reach arm hydraulic pump and attachment motor.

Stopping

- 4.1.1.14 Bring the tractor RPM gently down to idle.

IMPORTANT: Do not engage or disengage the machine at a high RPM unless there is an emergency situation. Failure to start and stop the rotor at a low PTO speed will result very quickly in severe motor and/or pump damage to the reach arm and attachment.

- 4.1.1.15 Switch off the reach arm rotor control and allow the attachment to come to a complete stop.

- 4.1.1.16 Press the tractor control button to disengage the PTO to the reach arm.

IMPORTANT: If you hear unusual noises or see or feel abnormal vibrations, disengage the PTO immediately. Inspect the reach arm and tractor to determine the cause of the noise or vibration and repair the abnormality before proceeding to use the machine or attachment.

4.2 Forward & Power Take-off Speed

Once the power take-off has been engaged following the guidance given in Section 4.1, start off driving at a slow speed and gradually increase while maintaining complete control of the tractor.

Moving slowly at first will prevent the tractor from rearing up and loss of steering control. The tractor should never be operated at speeds that cannot be safely handled, or which will prevent the operator from stopping quickly during an emergency. If the power steering or engine ceases operating, stop the tractor immediately as the tractor will be difficult to control.

Spearhead's range of reach arm attachments are designed to cut a range of material in a wide range of applications and working environments. Travel at a speed that allows the attachment sufficient time to cut through the vegetation and maintain its operating speed to prevent overloading the attachment.

Speed for cutting will depend upon the work environment application, type, and density of the material to be cut. In locations which are uneven or bumpy, advance the tractor at a slower speed in order to protect the reach arm and attachment from metal fatigue and premature damage to components.

Never attempt to operate the machine while going backwards. It will immediately damage the arms and possibly the attachment. Remember, before selecting reverse gear always lift the attachment out of work and retract the arms towards the tractor.



Figure 4.1 – Tractor Driving Guidance

Always operate the reach arm and attachment at its full rated PTO speed, to maintain correct operation of the reach arm and cutting rotor speed for the attachment. Inspect the reach arm operators manual to find out the required PTO operating speed for the reach arm and inspect that the attachment to see that is correctly compatible for the reach arms hydraulic flow rate; see Section 1.5.1/3.4.

Never operate above the recommended PTO speed. Failure to follow this warning can result in severe damage to the reach arm and the attachment such as reduced belt and pulley life, increased stress and oil temperature to the attachment motor and reach arm pump and increased risk of the cutting rotor of the attachment going out of balance. Collectively these issues will reduce the life of the reach arm and attachment and cause expensive repairs.

Refer to the tractor operator's manual or the tractor instrument panel for the engine speed and gear to provide the required PTO and desired ground speed. Make sure that the machine is operating at its full rated speed before entering the reach arm attachment into the vegetation to be cut. If it becomes necessary to temporarily regulate engine speed, increase or decrease the throttle gradually.



WARNING! Do not exceed the rated PTO speed for the machine. Excessive PTO speed can cause hydraulic system or attachment failures resulting in serious injury or death. See the front of the mainframe of the machine for guidance on the correct operating PTO speed for the machine.

Forward speed is achieved by transmission gear selection and not by the engine operating speed. The operator may be required to experiment with several gear range combinations to determine the best gear and range which provides the most ideal performance from the mower and most efficient tractor operation. As the severity of cutting conditions increase, the ground speed should be decreased by selecting a lower gear to maintain the proper operating PTO speed.

4.2.1 Machine Stability

With the reach arm and attachment being infinitely moveable into different positions, this will regularly change the centre of gravity and stability of the machine and require the upmost of concentration and reaction from the operator.

Before beginning work, extend the reach arm out slowly to its maximum reach and ensure that the opposite tyre of the tractor is still on the ground. It is advisable to have additional personnel to check this. If the tyre lifts, retract the reach arm and safely add additional ballast in the form of wheel weights to the raised wheel until the tyre is

showing evidence of bearing some load. Some Spearhead reach arm models have an option of oil tank ballast weights to add as an alternative.

Repeat the process of inspection, after placing the reach arm and attachment into transport position and taking the machine onto the public highway. Front end weight is critical to maintain steering control and prevent the tractor from rearing up. Front weight and weight carriers can be purchased through an authorized tractor dealership. If additional weight ballast is added to the tractor, ensure that the maximum permissible axle loads are not exceeded.

Ensure that the combined reach arm and attachment are only ever fitted to a tractor that meets the minimum weight requirements as stated in the relevant section in the reach arm operators manual. The tractor should exceed the combined weight of the reach arm and attachment by at least 20%.



WARNING! 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.

4.2.2 Cornering

Perform turns with the tractor and reach arm with attachment at slow speeds to determine how the tractor handles with the attached reach arm when at work and during transport. Determine the safe speed to maintain proper control of the tractor when making turns.

When turning the machine, the centre of gravity is raised making the complete machine less stable. To avoid overturns, drive the tractor with care and at safe speeds, especially when operating over rough ground, crossing ditches or slopes, and turning corners. Sudden, abrupt movements can induce overturning reactions.

Ensure that the reach arm is always fully slewed into its transport position and each of the arm fabrications are fully retracted as compact as possible to maintain the reach arms position before transporting the machine out of work. Ensure that any slew locking devices are working if fitted to secure the slew post from moving.

Use extreme caution when operating on steep roads. Keep the tractor in a low gear when going downhill. **Do not** coast or free-wheel downhill.

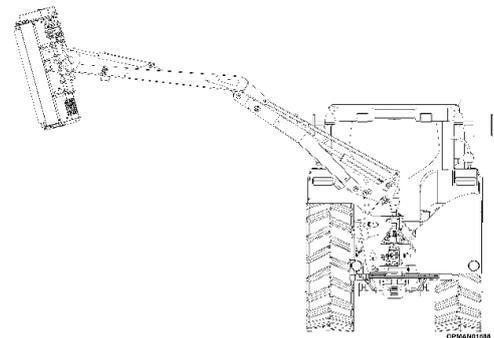
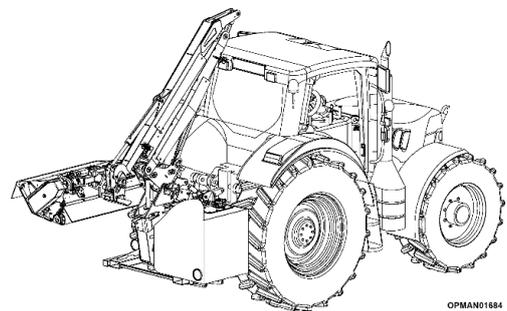
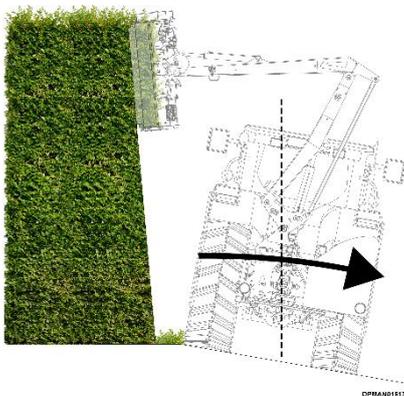
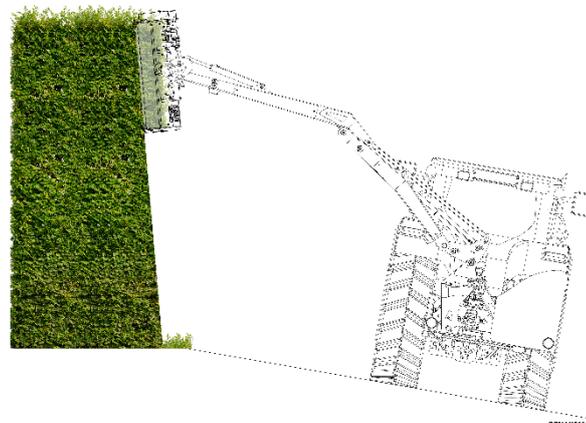


Figure 4.2 – Tractor Stability
(left-hand build machine shown)

4.2.3 Working On Adverse Slopes, Embankments And Un-level Ground



Incorrect Procedure
Figure 4.3



Correct Procedure
Figure 4.4

(left-hand build machines shown)

When working with the reach arm and attachment in a high cutting position and closely in it is possible for the reach arm to go over centre and make the reach arm and tractor unstable and potentially fall over; see Figure 4.3.

To overcome this and improve stability and safety, if possible, move the tractor further away from the hedge and extend the arm to bring the arm before centre and maintain stability; see Figure 4.4.

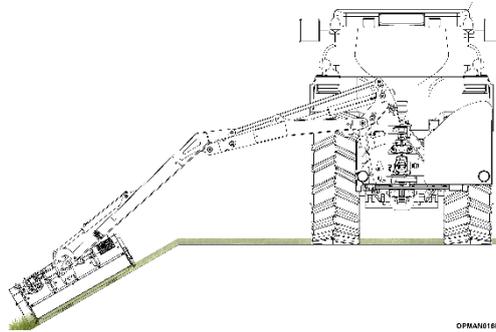


Figure 4.5
(left-hand build machine shown)

Likewise when cutting with the reach arm in low positions, in areas such as embankments or dykes extend the reach arm and bring the tractor away from the edge of the embankment if possible to increase the stability of the machine when in work; see Figure 4.5. Benefits are also brought in an improved view of the attachment at work.

Stability can be greatly maintained by ensuring that the reach arm is only ever fitted to a tractor that meets the minimum weight requirements as stated in Section 1.5.1. The tractor should exceed the weight of the combined reach arm and attachment by at least 20%.

It is always best practice whilst at work and during transport, to carry out major arm adjustments slowly in order to ensure the stability of the machine. Sudden, abrupt movements can induce excessive overturning reactions.



DANGER! When working with the machine avoid high speed hydraulic movements which could cause overturning.

Sudden changes in ground contours, such as potholes and undulating ground can change the tractors balance and cause a change in direction. This can be very dangerous and could lead to overturning especially working on areas such as embankments.

4.3 Cutting Procedure



Figure 4.6

4.3.1 General Guidance

- 4.3.1.1 **DO NOT** angle the attachment in such a way as to throw cut material towards the tractor.
- 4.3.1.2 Keep the tractor at the correct PTO operating speed required by the reach arm to maintain the correct rotor speed of the attachment.
- 4.3.1.3 Inspect the attachment to see the machine is set correct for the application. Some applications require different rotor operating speeds to others. Powerdrive Pro flail head attachments have the ability to have their drive pulleys to be configured in two different ways to suit the cutting application required.

Hedge cutting generally benefits from a slightly faster rotor cutting speed in comparison to verge mowing. For full clarity to the potential rotor cutting speed

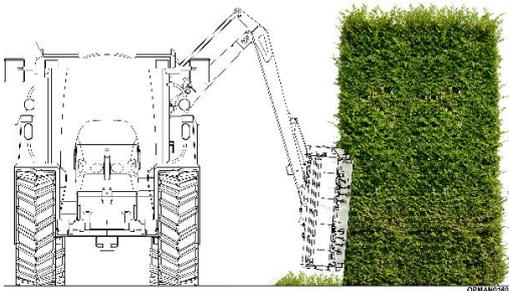
- 4.3.1.4 Avoid rushing into the work and maintain an even, steady speed to ensure a clean cut. Do not use excessive force when positioning the head into heavy branches or stumps. Damage to the machine may result. It is best to let the head 'eat away' slowly at heavy cutting jobs.

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.

- 4.3.1.5 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.
- 4.3.1.6 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.

4.3.2 Hedge Cutting

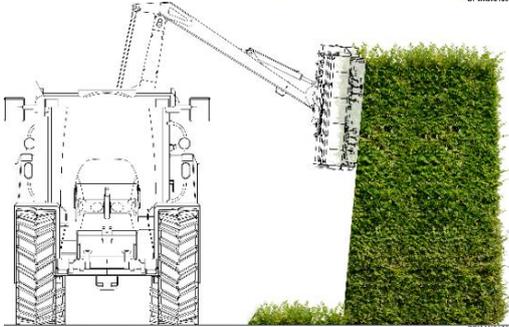
- 4.3.2.1 Consider how the job should be done before commencing work, as every hedge has a different height, width, thickness and density of growth. Hedges that have previously been cut by machine tend to have denser growth, and although they can be cut to any desired shape, it is advisable to trim to the same shape and height as before.
- 4.3.2.2 Before beginning work, inspect the attachment to see the machine is set correct for verge mowing operations. For full requirements see the attachment operators manual.



- 4.3.2.3 Begin cutting the hedge from the “field side”, beginning from the bottom and then working up to the top.

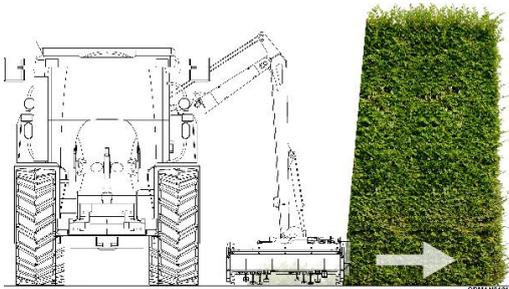
Use the attachment to “trim” the hedge down to the previous cut, as the old growth will be very thick and strong and can cause premature wear to the flails and cause the machine to stall.

Repeat cutting of the hedge causes the new growth to ‘tiller’ (spread out) and thicken up the hedge. 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; see Figure 4.7.



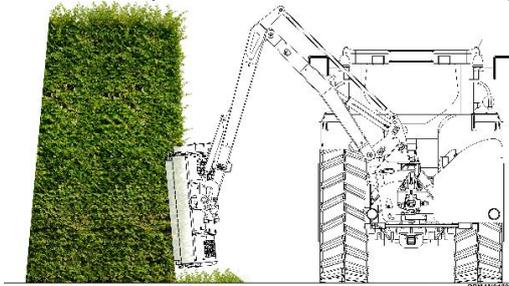
- 4.3.2.4 If during any time of the cutting procedure the tractor becomes unstable due to cut material falling on it, disengage the rotor of the attachment and gently bring the tractor away from the hedge and push the arm gradually outward. Lower the attachment to the floor and safely stop the tractor. Wearing suitable PPE, remove the cut material from the attachment.

Figure 4.7
(left-hand build machine shown)



- 4.3.2.5 Cut the base of the hedge to tidy up and chop the hedge side debris and to force it back into the base of the hedge. This leaves the maximum thickness of hedge on the “road side” to prevent the possibility of any debris being thrown through the hedge into the path of oncoming vehicles.

Figure 4.8
(left-hand build machine shown)



- 4.3.2.6 Proceed to cut the “road side”, beginning from the bottom and then working up to the top.

Use the same procedure as the “field side” cutting the hedge at a slight angle to maintain the wellbeing of the hedge.

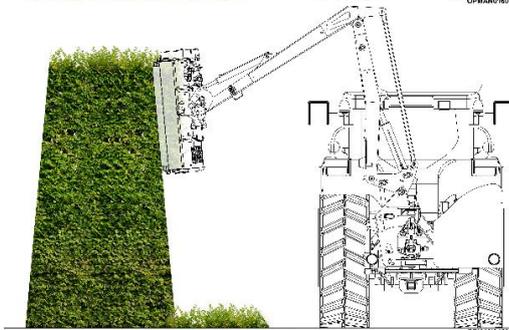


Figure 4.9
(left-hand build machine shown)

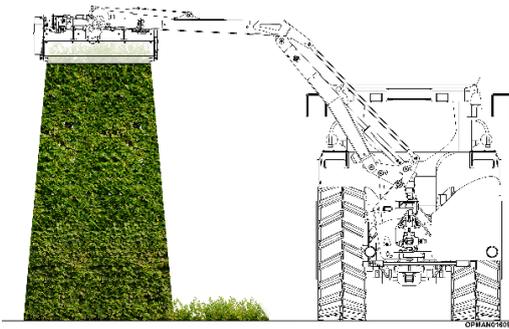


Figure 4.10
(left-hand build machine shown)

- 4.3.2.7 Trim the top of the hedge down to the height of the previous year's trim.

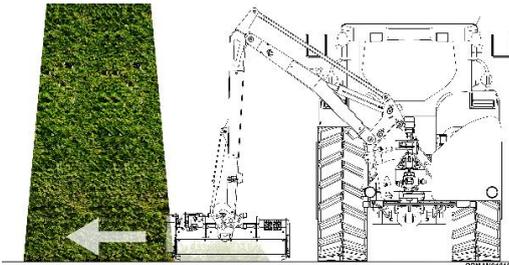


Figure 4.11
(left-hand build machine shown)

- 4.3.2.8 Cut the base of the hedge finally to tidy up and chop the hedge side and top debris and to force it back into the base of the hedge.

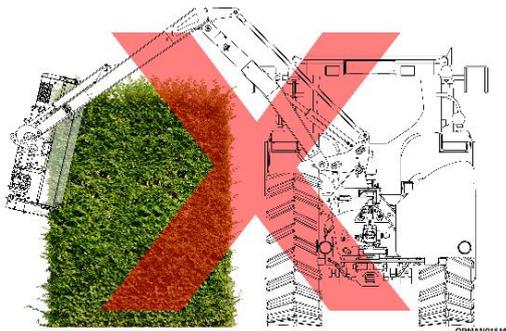


Figure 4.12
(left-hand build machine shown)



DANGER! NEVER CUT TO THE BLIND SIDE OF A HEDGE!

It is impossible to see any potential hazards or dangers and the position of the reach arm attachment would allow debris to be propelled through the hedge towards the tractor and operator.

4.3.3 Verge Mowing

- 4.3.3.1 Run the motor of the reach arm at the correct PTO operating speed required by the reach arm to maintain the correct rotor speed of the attachment.
- 4.3.3.2 Inspect the attachment to see the machine is set correct for verge mowing operations. For full requirements see the attachment operators manual.
- 4.3.3.3 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.
- 4.3.3.4 Advance the machine at a rate which is suitable for the attachment. Avoid taking in too much grass into the attachment as it will be increased strain on the machine and reach arm, along with reducing the resulting finish left by the machine after it has been cut.

If the rotor slows down or begins to choke up with grass, raise the attachment up a little and allow grass to fall clear of the attachment.

Before returning to cutting let the rotor speed recover and increase to the correct operating speed again.

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

Dragging the attachment will increase the side loads on the reach arm and decreasing the horsepower available to the attachment 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 attachment 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 attachment 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.

- 4.3.3.6 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.
- 4.3.3.7 Never force the head into heavy branches or stumps - damage to the unit may result.
- 4.3.3.8 When working alongside or clearing ditches, take a first cut along the edge of the ditch so that the ditch limits can be seen.

4.3.4 Stalling The Attachment Rotor

If the attachment rotor becomes choked and stalls, the tractor will potentially stall, and the belts may slip found inside the belt guard.

To safely handle the machine in a stall:

- 4.3.4.1 If the tractor hasn't stalled, use the tractor controls to immediately disengage the tractor PTO to the reach arm and bring the tractor to a stop and RPM gently down to idle.

If the tractor has stalled, use the tractor controls to disengage the tractor PTO to the reach arm and reset the tractor throttle to idle.

- 4.3.4.2 Utilise the main power button to switch off the reach arm controls and rotor engagement. Consult the reach arm operators manual for the correct way to do this.
- 4.3.4.3 Allow the attachment rotor to come to a complete stop.
- 4.3.4.4 If the tractor engine has remained running, safely stop the tractor.
- 4.3.4.5 Safely leave the tractor and inspect the reach arm and attachment and see the cause of the blockage.

Depending on the cause of the blockage and stalling of the machine will determine on whether the machine can be safely unblocked in situ or will be needing to be raised and cleared of the worksite.

- 4.3.4.6 If the attachment can be removed from the worksite to be cleared without compromise to the safety of the machine and operator/bystanders, safely restart the tractor engine and reach arm controls. Engage the tractor PTO and gently lift the attachment off the obstruction using the reach arm controls.
- 4.3.4.7 Safely stop the tractor again.
- 4.3.4.8 If a blocking foreign component has caused the machine to suddenly operate incorrectly or altogether ensuring that all the correct levels of Personal Protection Equipment (PPE) are worn for safety purposes, with extreme caution, try and remove the foreign component using suitable tools and equipment. Consider gaining extra personnel for assistance.



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Figure 4.13



WARNING! Use extreme caution to clear the attachment considering any reaction movements of the reach arm and attachment with the foreign component being removed.



WARNING! Never in any circumstances restart and run or reverse the rotor to clear the attachment of any blockage.

- 4.3.4.9 If the cause of sudden incorrect running of the machine is due to the machine colliding or hitting a foreign object, inspect the work area for the cause of the blockage. Any other similar items should be removed from the work area. Unremovable items should be marked of their location so they cannot be hit again by the reach arm and attachment.
- 4.3.4.10 Inspect the condition of the attachment, reach arm and tractor and make any needed repairs before proceeding to use the machine again. Make sure the flails and belts are not damaged or broken and the machine is intact and undamaged before resuming operation. If in doubt; do not restart.
- 4.3.4.11 Safely prepare and restart the machine.

4.4 Machine Features

4.4.1 Rotor-Reverse

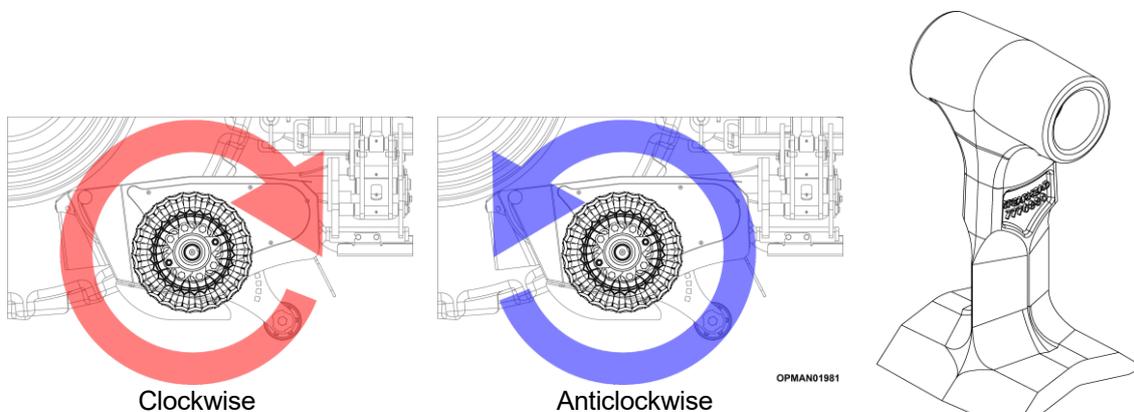


Figure 4.14

Some reach arms, such as Spearhead Machinery's Twiga range have a rotor reverse rotation function which by using the relevant reach arm controls allow the reach arm to change the direction of hydraulic flow to the attachment, changing the direction in which the rotor rotates. By doing this, the attachment can be made suitable for verge mowing (standard, clockwise direction) and hedge cutting (alternative, anticlockwise direction) with no requirements for any physical alterations required to the reach arm and attachment.

The rotor reverse function is compatible with Powerdrive Pro flail head attachments fitted with T flails.

IMPORTANT: Reverse rotation cutting should only be carried out with attachments fitted with correct flails with two cutting edges.

4.4.2 Hydraulic Front Hood And Rear Roller

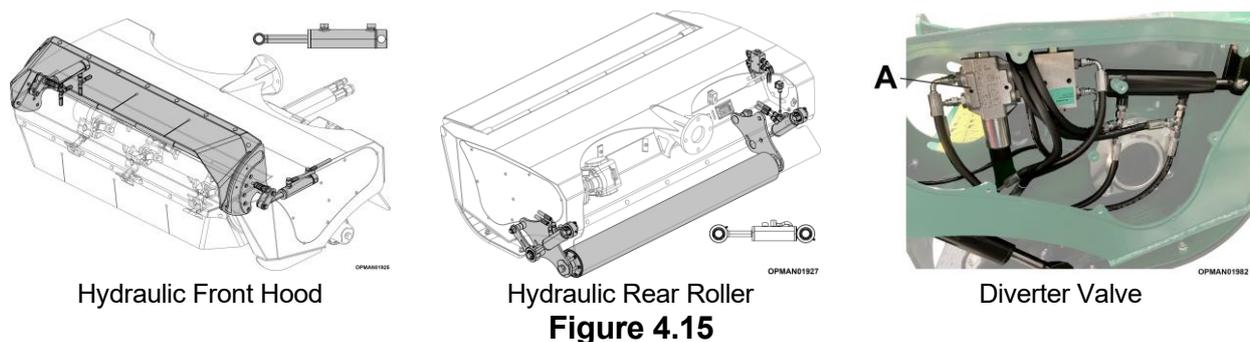


Figure 4.15

Powerdrive Pro flail head attachments can be specified with a hydraulic front hood and rear roller.

With the diverse range of cutting applications in which the Powerdrive Pro flail head attachments can be applied to, reduced machine downtime can be gained by optioning the attachment with a hydraulic front hood and/or hydraulic rear roller to allow for the machine to be set up and adjusted for different working requirements without the need for tools.

With reference to Figure 4.15, the hydraulic front hood and the hydraulic rear roller each utilize two hydraulic rams to operate their function which are connected by a pair of hydraulic hoses directly to the tractor hydraulic spools. The hydraulic front hood rams are located inside of each end of the machine cowl.

For machines fitted with both a hydraulic front hood and hydraulic rear roller, two hydraulic hoses are still directly connected to the tractor hydraulic spools, with the addition of a diverter valve (A) to allow for the control of both systems separately. The diverter valve (A) is electronically operated and needs to have a control switch provided either by the reach arm controls or an external switch. See Sections 5.4 and 5.5 for guidance to the hydraulic and electric circuit diagrams.

4.4.3 Skid Options

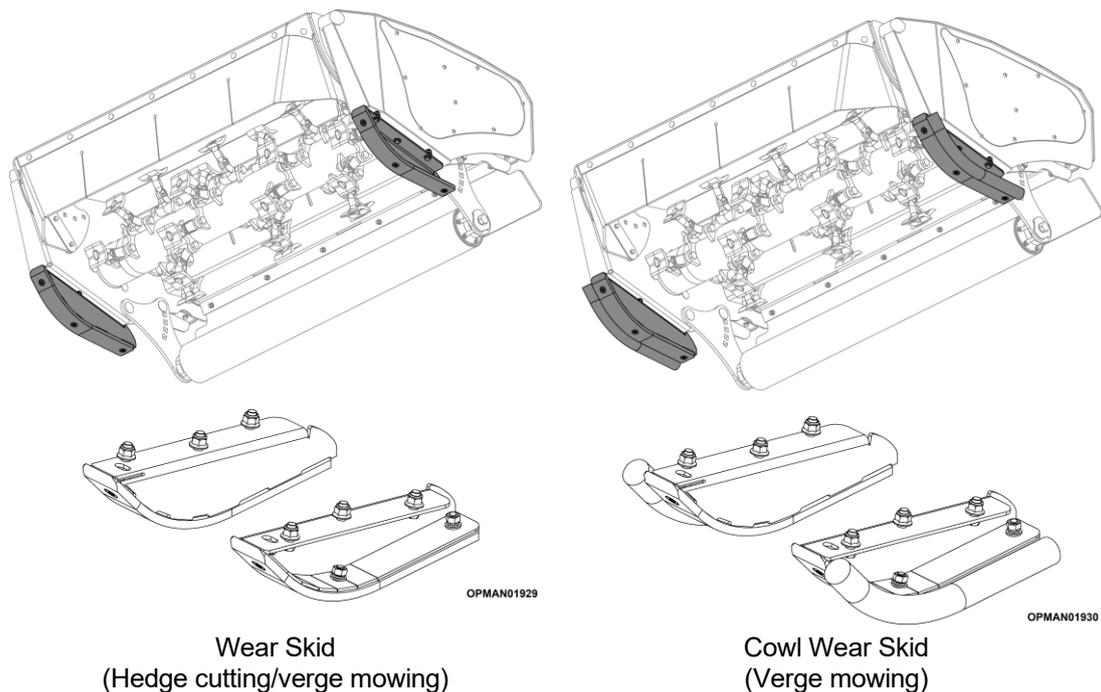


Figure 4.16 - Skid Options

Powerdrive Pro flail head attachments can be optioned with two different skid options:

- The skid shoe is a competent middle ground for machines being used for both hedge cutting and verge mowing purposes. The additional replaceable bolt on skid gives cost effective increased protection from ground wear during verge mowing applications.
- The cowl wear skid gives increased durability, designed for intense verge mowing applications with additional side wear bars to give long service against abrasion wear being dragged along tarmacked and stoned verge areas.

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5 Maintenance



WARNING! Before proceeding to carry out maintenance on the machine, ensure that you have thoroughly read and understand the list of safety warnings in Section 2. This section gives safe guidance to ensure the wellbeing on all personnel working with or near the machine as well as the machine itself during the maintenance process.

5.1 Periodic Maintenance

Perform service, repairs, lubrication and maintenance procedures outlined throughout Section 5 to ensure the longevity and reliability of the reach arm attachment, reach arm and the tractor.

In general:

- 5.1.1.1 Inspect for loose or missing fasteners, worn or broken parts, leaky or loose fittings, excessively worn or missing flails 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 machine specified by the lubrication schedule as stated in Section 5.2.
- 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 in Section 5.10.

5.2 Lubrication And Greasing

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 hydraulic motors, 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.

5.2.1 Motor

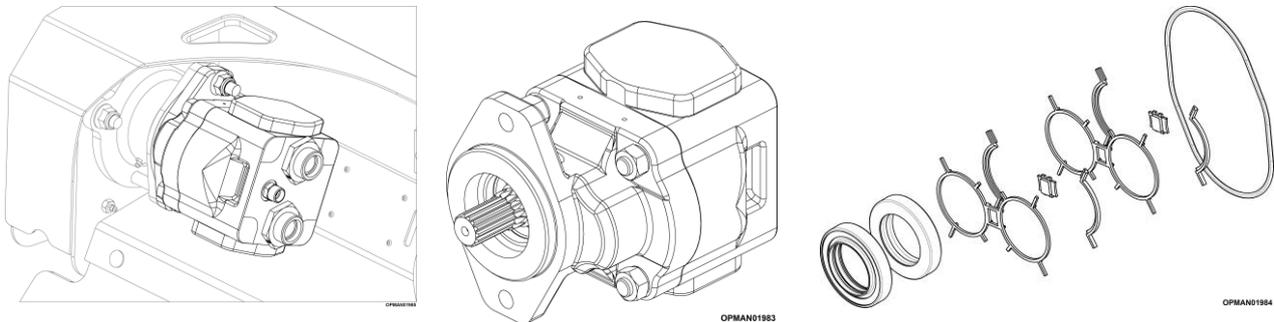


Figure 5.1 – Powerdrive Pro Flail Head Attachment Motor

The hydraulic motor found on the Powerdrive Pro flail head attachment has no regular maintenance requirements, however there are ways of ensuring maximum and reliable longevity of the motor.

Inspect the hydraulic motor oil seal and the potential of oil seals failing increases with the attachments age and will require nothing more than the disassembling the motor and replacing the failed seal components; Figure 5.1.

It is important that the attachment hydraulic oil is not provided at any higher than its maximum hydraulic flow or pressure:

- **Maximum Hydraulic Flow** = 110 l/min (29/gal min)
- **Maximum Hydraulic Pressure** = 310 bar (4497 psi)

Due to its connection to the closed hydraulic system of the reach arm when in use, to ensure the longevity of the hydraulic motor it is important to ensure that the correct levels of maintenance are carried out to the reach arm hydraulic system.

Ensure that the hydraulic oil in the reach arm is changed at the correct intervals, the correct oil grade is used and the correct level of oil is maintained when the reach arm and attachment are in work. Ensure that any hydraulic

system filters which are required to be changed are changed in a timely manner and the wellbeing of all hydraulic components in the reach arms closed hydraulic system are regularly checked to ensure they are in good condition. This includes items such as pumps and gearboxes (including any of their gaskets and seals) and hydraulic hoses. Inspect the hydraulic hoses to see they are routed correctly in all their positions; see Section 3.6. Any failing components could add issues such as foreign debris or increasing pressure into the hydraulic system, potentially causing damage to the motor. Consider the operating temperature of the hydraulic oil and if the machine is running hot in hard working or hot conditions, consider fitting an oil cooler to the reach if not fitted already.

Ensure that the attachment is only ever used for what it is intended.

These tips are only for a guide and for complete clarity, thoroughly read the reach arm operators manual to gain the correct maintenance requirements and intervals for the reach arm.

The potential of oil seals failing increases with the attachments age and will require nothing more than the disassembling the motor and replacing the failed seal components.

5.2.2 Greasing Schedule

With reference to the position of grease points in Section 5.2.2 – 5.2.5, the following greasing schedule should be adhered to, to ensure reliability and longevity in components.

IMPORTANT: With extended and harder working conditions, these greasing times may need to be shortened to compensate for the machine more intensive work requirements.

NOTE: All values throughout this section are given on the assumption that a **manually operated grease gun** is used to carry out the greasing procedures giving a **predicted quantity of 0.8-1.0g of grease per pump**.

Grease Point	Qty (pumps)	Frequency	Further Information
Pulley Support Bearing Housing - Centre	3	8 hours	See Section 5.2.3/Figure 5.2 (A)
Pulley Support Bearing Housing - External	3	8 hours	See Section 5.2.3/Figure 5.2 (B)
Rotor Shaft Bearings	5	8 hours	See Section 5.2.4/Figure 5.3 (A)
Rear Roller – Standard Version	2	8 hours	See Section 5.2.5/Figure 5.4 (A)
Rear Roller – Hydraulic Version	2	8 hours	See Section 5.2.5/Figure 5.4 (B)

Table 5.1
Greasing Schedule For Various Components

5.2.3 Pulley Support Bearing Housing

The pulley support bearing housing found on the Powerdrive Pro flail head attachment connects between the hydraulic motor and the input drive pulley clamping element and requires no regular maintenance requirements other than regular greasing.

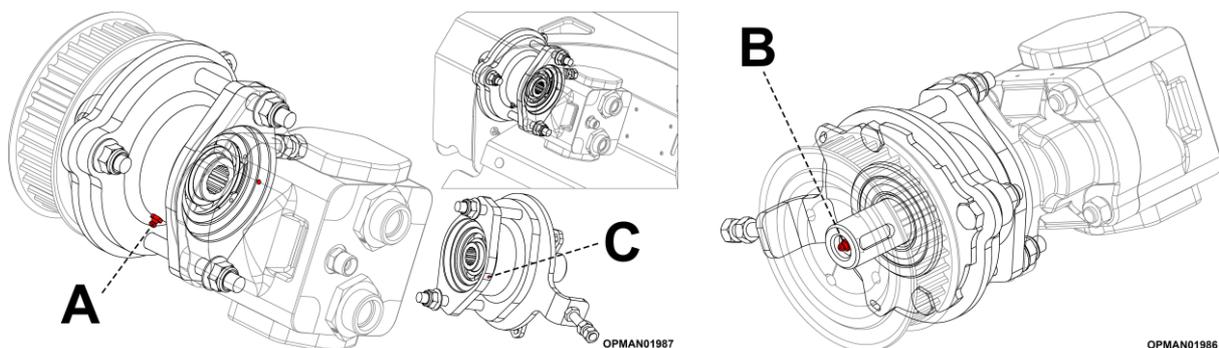


Figure 5.2 – Powerdrive Pro Pulley Support Bearing Housing

There are two grease nipples located on the pulley support bearing housing assembly which require regular greasing; reference Figure 5.2. The one on the pulley support bearing housing casing (A) greases the pair of ball bearings found inside. The second one is found on the end of the stub shaft (B), to lubricate the engagement splines between the stub shaft and output shaft of the hydraulic motor.

The pulley support bearing housing casing (A) needs to be greased regularly in order to ensure that the bearings are thoroughly lubricated. Using a manual pump grease gun, pump grease until oil escapes from the purge hole (C) found underneath the bearing housing.

The interference fit driveshaft needs to be greased regularly (B) in order to lubricate the surfaces in which the splines of each driveshaft mesh.

For the guide greasing quantity of the pulley support bearing housings and all other greasing requirements of the Powerdrive Pro flail head attachment; see Section 5.2.2.

5.2.4 Rotor Shaft Bearing Housings

There is a remote grease nipple to supply grease to each of the rotor bearing housings on the Powerdrive Pro flail head attachment. Other than regular greasing, the bearing housings require no other regular maintenance requirements.

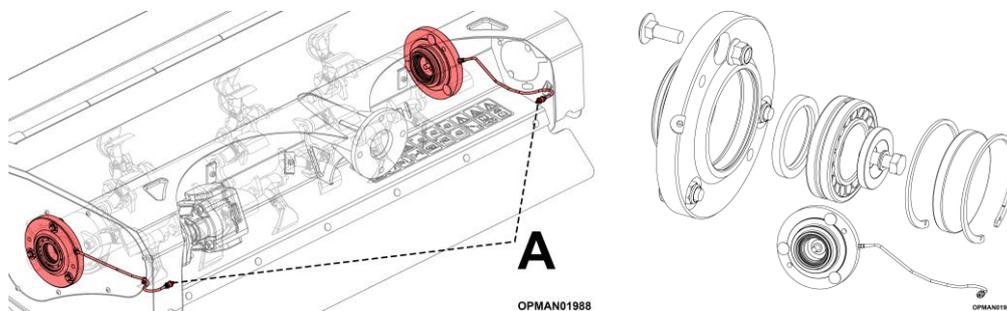


Figure 5.3 – Powerdrive Pro Rotor Shaft Bearing Housings

With reference to Figure 5.3 (A), grease nipples are found on the inside of rear of both sides of the main cowl fabrications which need to be greased at least everyday, and even more frequently in hard working applications.

For the guide greasing quantity of the rotor shaft bearing housings and all other greasing requirements of the Powerdrive Pro flail head attachment; see Section 5.2.2.

5.2.5 Rear Roller

The rear roller has variation in the quantity of greasing points depending on if the attachment is fitted with the standard or the optional hydraulic rear roller.

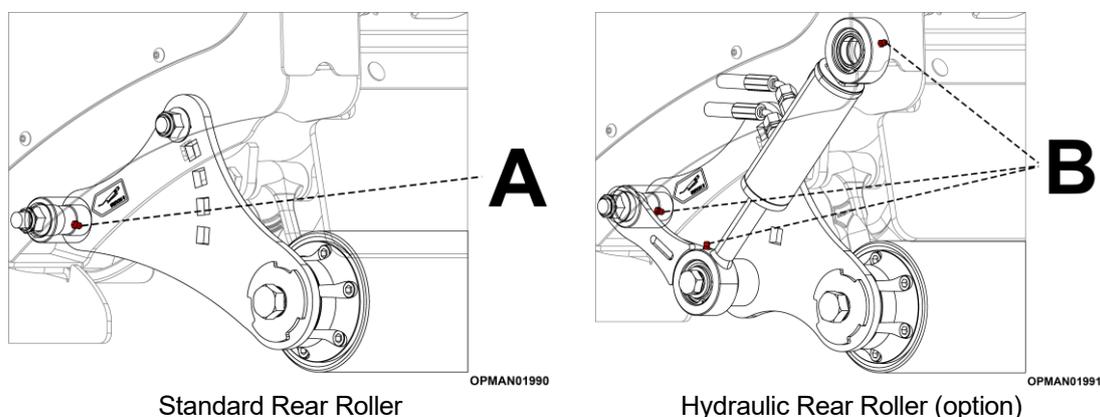


Figure 5.4 – Powerdrive Pro Rear Roller

The standard rear roller features one grease point which needs to be greased on a daily basis on the main pivot hinge on each roller bracket mounting point; see Figure 5.4 (A).

The hydraulic rear roller option features three grease points which need to be greased on a daily basis. The main pivot hinge, and one at either end of the hydraulic rams on each roller bracket mounting point; see Figure 5.4 (B).

For the guide greasing quantity of the rear roller pivot points and all other greasing requirements of the Powerdrive Pro flail head attachment; see Section 5.2.2.

5.3 Hydraulic Components – Maintenance And Adjustment

Before proceeding to carry out any maintenance requirements on the hydraulic system, ensure that you have thoroughly read and understood Section 2.13 on how to safely go about carrying out maintenance requirements to the machine, including how to approach the hydraulic system and its components. Section 2.3 should also be read to understand how to safely operate and use the machine in general.

5.3.1 Inspection

5.3.1.1 Hydraulic Motor

The hydraulic motor should be inspected on a daily basis before commencing work. Ensure all hydraulic hoses, lines and connections are in good condition and tight before operating the motor.

The design and type of hydraulic motor fitted to the Powerdrive Pro flail head attachment requires no maintenance and features no replacement parts other than the seal kit; see Section 5.2.1. Due the location of the hydraulic motor inside the attachment cowl, determining any problems issue with the hydraulic motor as the cause can be hard.

Spearhead Machinery recommends inspecting the attachment (and reach arm) on a daily basis:

- Around the motor and round the inside of the attachment cowl for any oil leaks or spray. If there is oil present, determine the cause; for example, broken internal motor oil seals.
- Listen to the hydraulic motor and see how it sounds, at idle and at full operating speed. The motor should not be excessively mechanically noisy; if it is stop and inspect.
- See how the attachment is performing when it is at work. If the attachment is working at reduced performance, stop the machine and inspect the motor and other hydraulic reach arm system components to find the cause.
- Inspect the hydraulic oil in the reach arm oil tank for its condition. If the oil is discoloured and grey in colour, troubleshoot to see whether the motor is the cause of discolouration. If it isn't, inspect other components in the hydraulic system to find the cause.

It is important to operate the attachment in the correct manner as shown in Section 4. Maintain the oil in the reach arm correctly, let the hydraulic oil warm up before commencing work and operate the machine in the correct manner.

5.3.1.2 Hydraulic Rams (if fitted)

Hydraulic rams (if fitted) should be inspected on a daily basis before commencing work. Ensure all hydraulic hoses, lines and connections are 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; see Section 7.

5.3.2 Replacement

5.3.2.1 Hydraulic Rams (if fitted)

Hydraulic hoses can be replaced easily using standard tools. It is important to replace components with genuine Spearhead parts and correctly tighten neighbouring connections and fittings to the correct torque.

Replacing complete hydraulic rams and carrying out other hydraulic ram maintenance tasks are more specialist work requiring specialist lifting and supporting equipment to ensure the work is carried out safely. This work should be carried out in a clean environment by a Spearhead Machinery dealer.

Ensure the reach arm and attachment are safely stopped and disconnected from the tractor (hydraulically and electrically) and that the hydraulic system is fully depressurised before carrying out maintenance tasks. The reach arm and attachment should be safely supported to ensure that the machine does not inadvertently move when components are removed and personnel are working with the machine.

When carrying out work on the hydraulic system and replacing components, ensure that exposed hydraulic component ends and hoses are kept clean and are covered to ensure foreign objects and dirt are not introduced into the hydraulic system of the machine. Foreign objects can cause permanent damage to hydraulic system components. Maintaining a clean working environment to further reduce the chance of foreign objects being introduced into the machine.

It is important to protect hydraulic components if the attachment is going to be potentially exposed to high temperature heat and risk of fire in some maintenance operations, for example during welding. High temperatures can permanently damage hydraulic components and loose sparks can start a fire. Hydraulic oil is highly flammable. Ensure the attachment is free from leaks and is clean before beginning maintenance operations. If increased risk maintenance applications are required to be carried out near hydraulic components, ideally remove the components and refit once the maintenance operations are completed. Ensure a suitable fire extinguisher is available at all times.



CAUTION! Follow specialist professional guidance and the safety section with regards to working with and handling hydraulic oil and hydraulic components.

5.3.3 Hydraulic Hoses

Replace pinched and broken hydraulic hoses at once. Tighten any hydraulic fitting with fluid leaking from it. If fluid still leaks, loosen the fitting, apply a pipe thread compound to the threads and tighten. Care must be exercised when tightening hydraulic fittings. Too much tightening can cause the fittings to crack and require replacement fittings.

Hydraulic hose fitting torque setting are found in Section 5.9.2.

Although a small amount of oil will present from bleeding at all hydraulic fittings, significant amount of oil leaking from around the breather plug on the cylinder indicates that the seal in the cylinder is worn out. Replace the seals in the cylinder immediately before the cylinder is damaged or too much hydraulic fluid is lost.



CAUTION! Do not use the machine if the tractor hydraulic oil temperature exceeds 93° (200°F).

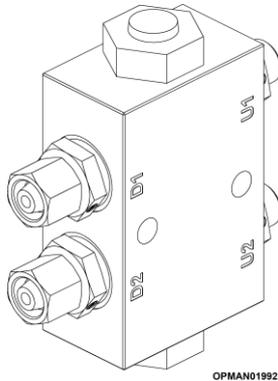
Ensure that all hydraulic hoses are correctly routed following the guidance given in Section 3.6.

Ensure that all machine guarding is reinstated on the machine to protect hydraulic components where required before using the machine again.

5.3.4 Component Identification

Powerdrive Pro flail attachments can come with a multitude of components in order to allow for the machine to operate the functions it required to offer.

5.3.4.1 PO Check Valve (machines fitted with hydraulic rear roller hood only)

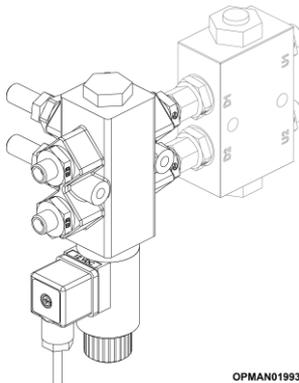


The double PO check valve featured on Powerdrive Pro flail head attachments fitted with hydraulic rear roller option allows input hydraulic oil to flow in two directions yet maintains back flow in the reverse direction when hydraulic flow and pressure is removed.

The double PO check valve ensures the hydraulic rear roller does not fall in work.

Figure 5.5 – Double PO Check Valve

5.3.4.2 Diverter Valve (machines fitted with both hydraulic front hood and hydraulic rear roller only)

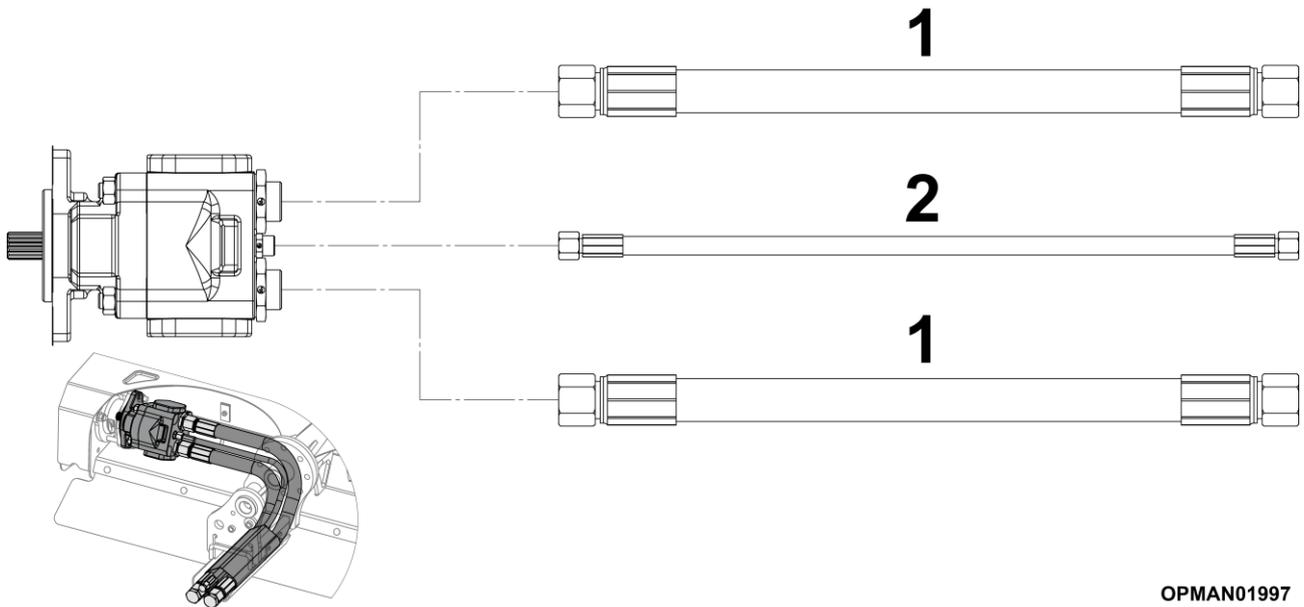


The diverter valve featured on Powerdrive Pro flail head attachments fitted with both hydraulic front hood and hydraulic rear roller option allows the operation of the hydraulic front hood and hydraulic rear roller circuits independently through an electric control cable switch using a single hydraulic oil input from the spool on the tractor.

Figure 5.6 – Diverter Valve

5.4 Hydraulic Diagrams

5.4.1 Standard Motor Hoses



OPMAN01997

Figure 5.7 - Powerdrive Pro Standard Motor Hose Diagram

Item.	Hose.		Hose Size.
	End 1.	End 2.	
1	Hydraulic Motor Pressure Or Return	Reach Arm Bulkhead	1"
2	Hydraulic Motor Case Drain	Reach Arm Bulkhead	3/8"

Table 5.2 - Powerdrive Pro Standard Motor Hose Definitions

5.4.2 Hydraulic Front Hood Only (option)

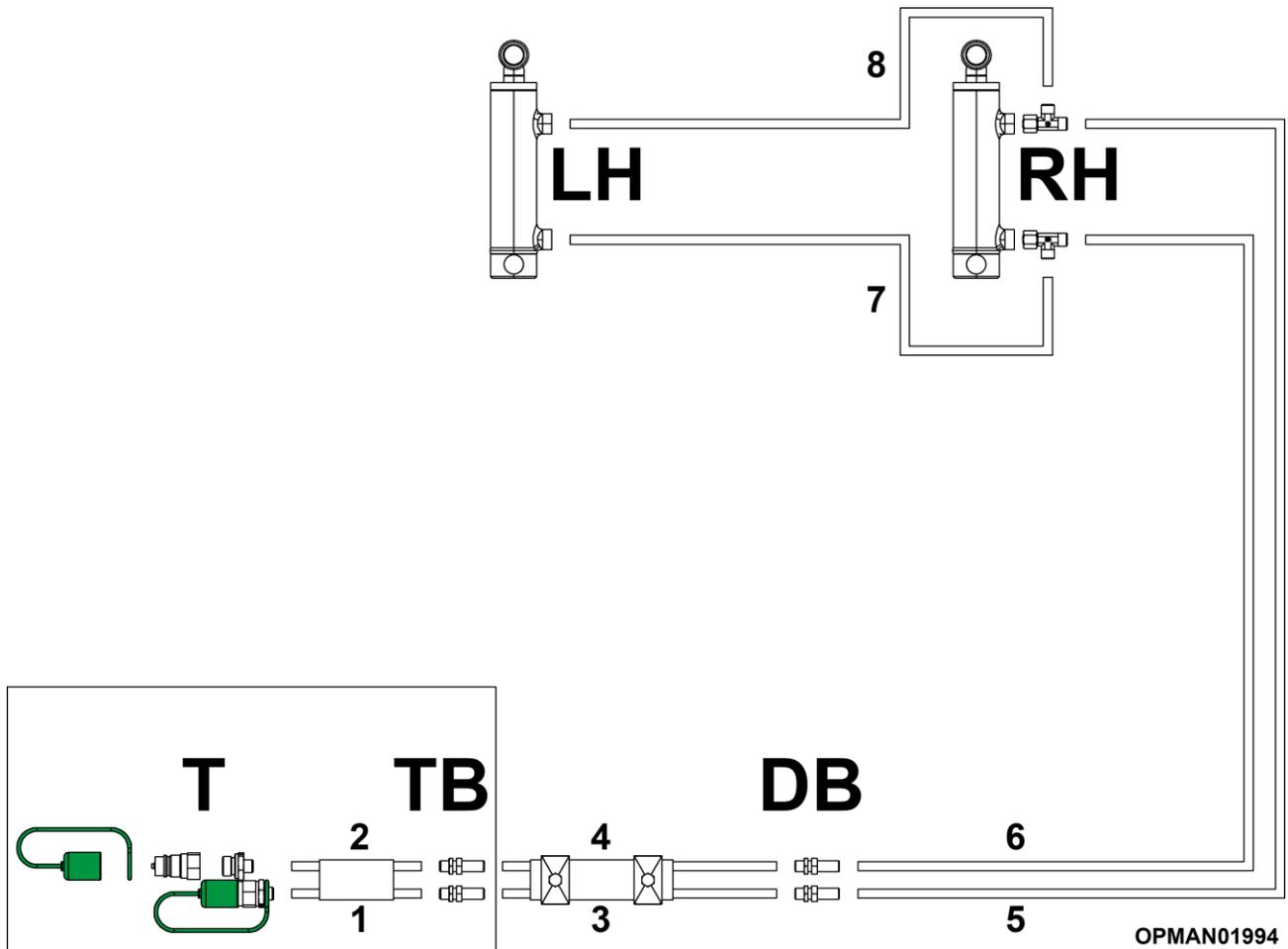


Figure 5.8 - Powerdrive Pro Hydraulic Front Hood Only Diagram

Item.	Description.
DB	Reach Arm Dipper Arm Bulkhead Adaptor Fittings
LH	Nearside (LH) Hydraulic Ram
RH	Offside (RH) Hydraulic Ram
T	Tractor Fittings & Blanking Caps
TB	Reach Arm Tank Bulkhead Adaptor Fittings

Item.	Hose.		Hose Size.
	End 1.	End 2.	
1	Tractor (T)	Reach Arm Tank Bulkhead (TB)	1/4"
2	Tractor (T)	Reach Arm Tank Bulkhead (TB)	1/4"
3	Reach Arm Tank Bulkhead (TB)	Reach Arm Dipper Arm Bulkhead (DB)	1/4"
4	Reach Arm Tank Bulkhead (TB)	Reach Arm Dipper Arm Bulkhead (DB)	1/4"
5	Reach Arm Dipper Arm Bulkhead (DB)	Offside Hydraulic Ram Base End Tee (RH)	1/4"
6	Reach Arm Dipper Arm Bulkhead (DB)	Offside Hydraulic Ram Rod End Tee (RH)	1/4"
7	Offside Hydraulic Ram Base End Tee (RH)	Nearside Hydraulic Ram Base End (LH)	1/4"
8	Offside Hydraulic Ram Rod End Tee (RH)	Nearside Hydraulic Ram Rod End (LH)	1/4"

Table 5.3 - Powerdrive Pro Hydraulic Front Hood Only Definitions

5.4.3 Hydraulic Rear Roller Only (option)

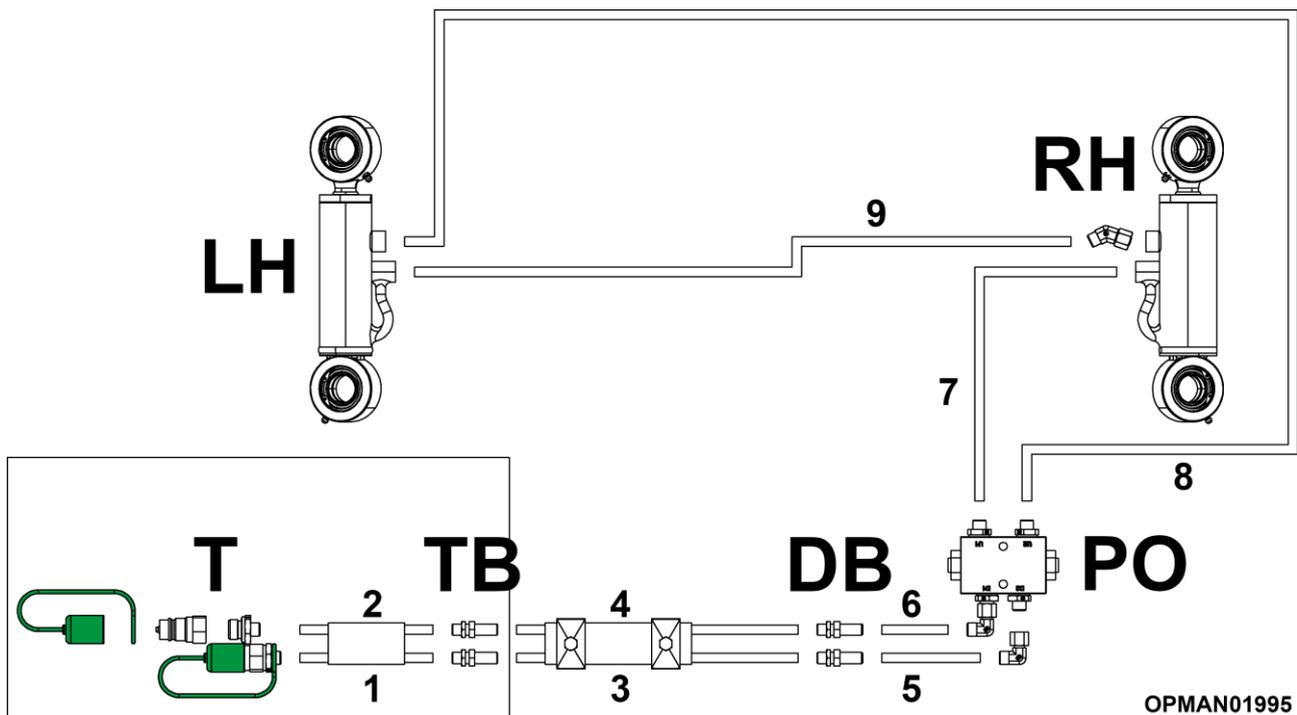


Figure 5.9 - Powerdrive Pro Hydraulic Rear Roller Only Diagram

OPMAN01995

Item.	Description.
DB	Reach Arm Dipper Arm Bulkhead Adaptor Fittings
LH	Nearside (LH) Hydraulic Ram
PO	Double PO Check Valve
RH	Offside (RH) Hydraulic Ram
T	Tractor Fittings & Blanking Caps
TB	Reach Arm Tank Bulkhead Adaptor Fittings

Item.	Hose.		Hose Size.
	End 1.	End 2.	
1	Tractor (T)	Reach Arm Tank Bulkhead (TB)	1/4"
2	Tractor (T)	Reach Arm Tank Bulkhead (TB)	1/4"
3	Reach Arm Tank Bulkhead (TB)	Reach Arm Dipper Arm Bulkhead (DB)	1/4"
4	Reach Arm Tank Bulkhead (TB)	Reach Arm Dipper Arm Bulkhead (DB)	1/4"
5	Reach Arm Dipper Arm Bulkhead (DB)	Double PO Check Valve (PO) – Port "D2"	1/4"
6	Reach Arm Dipper Arm Bulkhead (DB)	Double PO Check Valve (PO) – Port "D1"	1/4"
7	Double PO Check Valve (PO) – Port "U1"	Offside Hydraulic Ram Base End (RH)	1/4"
8	Double PO Check Valve (PO) – Port "U2"	Nearside Hydraulic Ram Rod End (LH)	1/4"
9	Offside Hydraulic Ram Base End (RH)	Nearside Hydraulic Ram Base End (LH)	1/4"

Table 5.4 - Powerdrive Pro Hydraulic Rear Roller Only Definitions

5.4.4 Hydraulic Front Hood And Rear Roller (option)

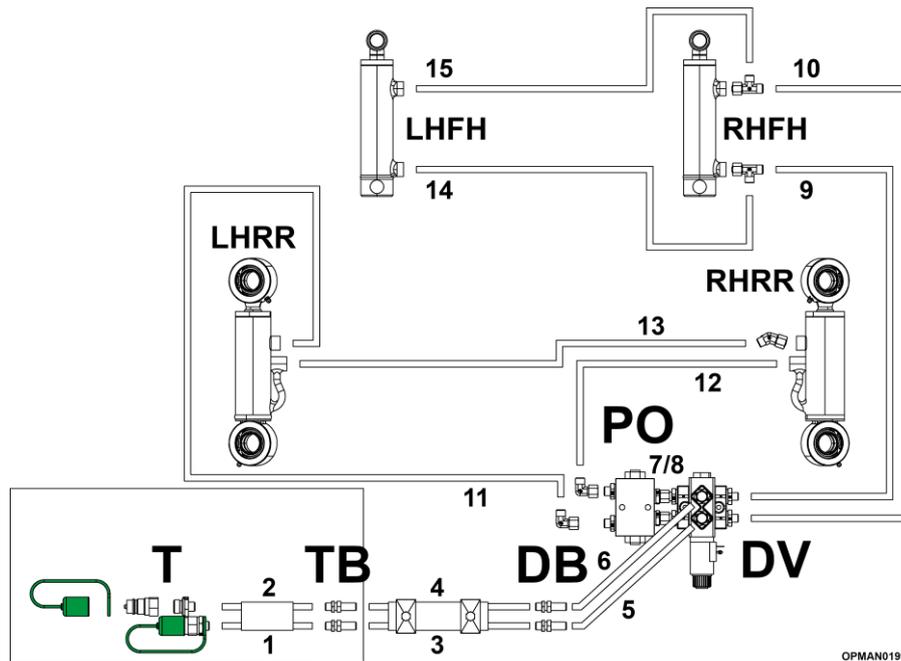


Figure 5.10 - Powerdrive Pro Hydraulic Front Hood And Rear Roller Diagram

Item.	Description.
DB	Reach Arm Dipper Arm Bulkhead Adaptor Fittings
DV	Diverter Valve
LHFH	Nearside (LH) Front Hood Hydraulic Ram
LHRR	Nearside (LH) Rear Roller Hydraulic Ram
PO	Double PO Check Valve
RHFH	Offside (RH) Front Hood Hydraulic Ram
RHRR	Offside (RH) Rear Roller Hydraulic Ram
T	Tractor Fittings & Blanking Caps
TB	Reach Arm Tank Bulkhead Adaptor Fittings

Item.	Hose.		Hose Size.
	End 1.	End 2.	
1	Tractor (T)	Reach Arm Tank Bulkhead (TB)	1/4"
2	Tractor (T)	Reach Arm Tank Bulkhead (TB)	1/4"
3	Reach Arm Tank Bulkhead (TB)	Reach Arm Dipper Arm Bulkhead (DB)	1/4"
4	Reach Arm Tank Bulkhead (TB)	Reach Arm Dipper Arm Bulkhead (DB)	1/4"
5	Reach Arm Dipper Arm Bulkhead (DB)	Diverter Valve (DV) – Port "B"	1/4"
6	Reach Arm Dipper Arm Bulkhead (DB)	Diverter Valve (DV) – Port "A"	1/4"
7	Diverter Valve (DV) – Port "E"	Double PO Check Valve (PO) – Port "D1"	1/4"
8	Diverter Valve (DV) – Port "F"	Double PO Check Valve (PO) – Port "D2"	1/4"
9	Diverter Valve (DV) – Port "C"	Offside Front Hood Hydraulic Ram Base End (RHFH)	1/4"
10	Diverter Valve (DV) – Port "D"	Offside Front Hood Hydraulic Ram Rod End (RHFH)	1/4"
11	Double PO Check Valve (PO) – Port "U2"	Nearside Rear Roller Hydraulic Ram Base End (LHRR)	1/4"
12	Double PO Check Valve (PO) – Port "U1"	Offside Rear Roller Hydraulic Ram Rod End (RHRR)	1/4"
13	Offside Rear Roller Hydraulic Ram Base End (RHRR)	Nearside Rear Roller Hydraulic Ram Rod End (LHRR)	1/4"
14	Offside Front Hood Hydraulic Ram Base End (RHFH)	Nearside Front Hood Hydraulic Ram Base End (LHFH)	1/4"
15	Offside Front Hood Hydraulic Ram Rod End (RHFH)	Nearside Front Hood Hydraulic Ram Rod End (LHFH)	1/4"

Table 5.5 - Powerdrive Pro Hydraulic Front Hood And Rear Roller Definitions

5.5 Electrical Diagrams

5.5.1 Diverter Valve (machines with both hydraulic front hood and hydraulic rear roller only)

For description on the definition of the diverter valve; see Section 5.3.4.2.

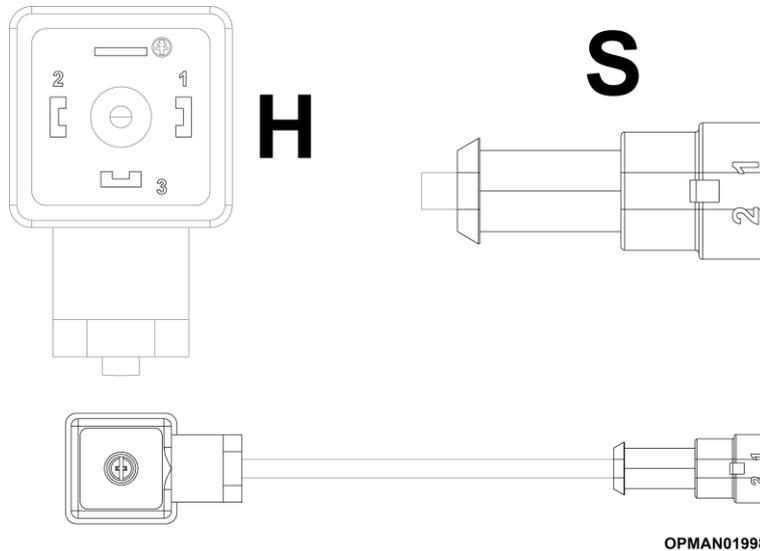


Figure 5.11 - Powerdrive Pro Diverter Valve Loom Diagram

Plug	Pin	Colour	Use.
Hirschmann (H)	1	Brown	Live (Positive)
	2	Blue	Negative
	3	Not Used	
Superseal (S)	1	Brown	Live (Positive)
	2	Blue	Negative

Table 5.6 - Powerdrive Pro Diverter Valve Loom Definitions

5.6 Flails & Rotor

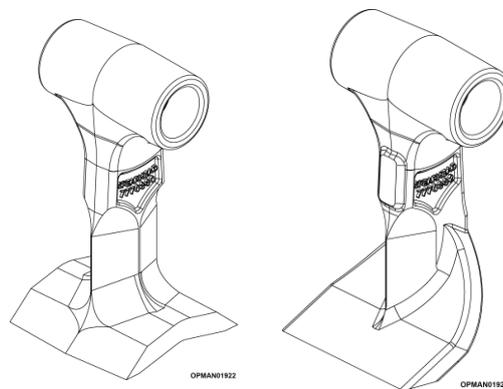
The design of the mower is such that during work the rotor unit cuts in reverse rotation and raises the cut material over the rotor towards the back of the body. In doing so material falls back into the rotor and is cut again several times until it is small enough to be discharged from the rear of the machine.

5.6.1 Flail Options

Powerdrive Pro flail head attachments can be specified with two different flail options as shown in Figure 5.12.

The T flail is suited to heavy duty hedge cutting and verge mowing, with a heavier weight flail giving greater momentum and impact into the hedge material. With two cutting edges, allow for the rotation of the cutting rotor in upwards and downwards cutting directions.

The Competition flail is suited to both hedge cutting and verge mowing. The sharp cutting edge followed by the smooth incline rear face on the back of the flail giving an angled, professional finish after cut. Only suitable for uphill rotor cutting.



T Flail

Competition Flail

Figure 5.12 – Powerdrive Pro Flail Options

5.6.2 Flail Inspection

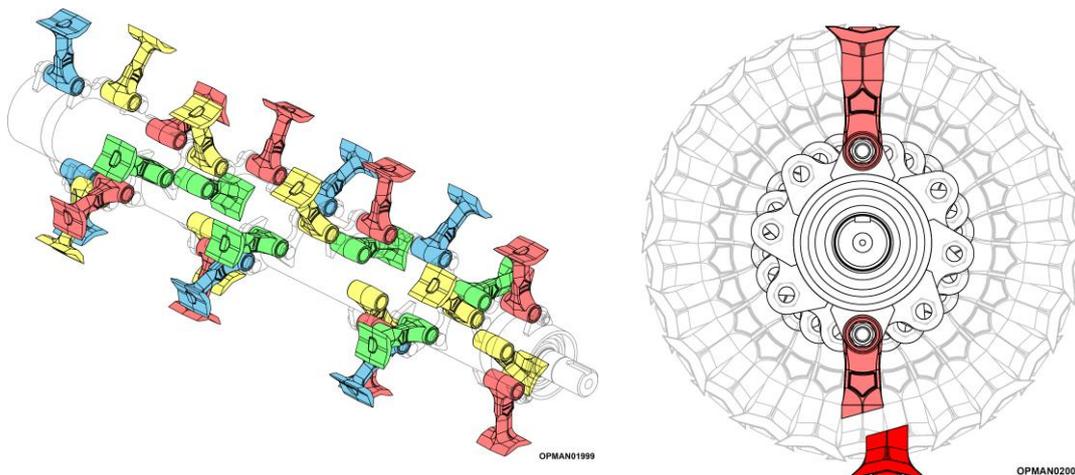


Figure 5.13 – Replace Opposite Pairs Of Flails

The attachment should be inspected prior to work on a daily basis to check for damaged or missing flails – always replace damaged or missing flails immediately. Flail bolts should be checked for tightness on a regular basis and re-tightened as required before attempting to use the machine. See Section 5.9 for torque settings. **Flail fasteners should be checked after the first hour and then every 8 hours thereafter.**

IMPORTANT: When tightening flail fasteners ensure that the flail doesn't become pinched and is still allowed to freely rotate. Do not overtighten and compress the flail rotor lugs.

IMPORTANT: When replacing worn or broken flails, **always replace opposing pairs and use a new bolt, locknut and bush** with every installation. This minimizes rotor out of balance and ensures nut retention.

Spearhead **does not** recommend sharpening worn flails. **It is important that all the flails on a rotor, are of the same weight and length and are all present** to ensure the rotor remains balanced. By sharpening flails there is a chance of them overheating, which will affect the hardness of the blades; compromising safety to the operator, machine and bystanders.

On machines fitted with the Competition flail option, see Figure 5.12, it is important to ensure that the flails are fitted to the rotor in the correct orientation for the rotating direction of the rotor.



WARNING! Never attempt to weld the flails, as this will make them very brittle and dangerous. Do not take risks with cutting flails – **if in doubt replace**.



WARNING! Checking of rotor components should only be carried out with tractors engine switched off, reach arm power and controls switched off, starting key removed and the PTO driveshaft disconnected. Always 'prop up' the attachment using suitable supports before attempting to inspect or work on components underneath it.



WARNING! Avoid personal injury. **Never work** under the machine without fixed support stands to ensure that the body does not fall.

IMPORTANT: Inspect the area before mowing. Foreign objects should be removed from the site prior to beginning work to prevent machine damage and/or operator, bystander or the environment. Any objects that cannot be removed must be clearly marked and carefully avoided by the operator.



WARNING! Pay special attention when working with the machine and do not allow the machine to touch fixed objects such as road drains, walls, shafts, curbs, guard rails, tracks etc. as these could break the flails and other driveline components which could cause debris to be thrown at very high speed from the machine. As a precaution raise the cutting height of the machine to 150mm (6 inches) to ensure they do not collide when the machine is in work.

IMPORTANT: Always use genuine Spearhead parts when carrying out repairs and maintenance with thoughts to longevity and reliability of the machine and personnel safety. Spearhead flails are made of special heat-treated alloy steel. Substitute flails may not meet specifications and may fail in a hazardous manner that could cause injury.

Spearhead declines all responsibility for damage and/or injury caused by use of **anything** other than the flail and rotor components which are supplied with the machine as new or sold as a spare part replacement sold by a genuine Spearhead parts dealer on Powerdrive Pro flail head attachments.

See Section 7 for guidance on spare parts. The machine serial number will be required to be quoted. Serial plate location guidance can be found in Figure 1.4.

5.6.3 Rotor Inspection

If a flail rotor becomes damaged, such as losing a flail lug; the rotor should be completely removed from the body. The rotor should then be de-flailed, repaired where required and then rebalanced by a professional rotor balancing company with a complete new set of flails before refitting it to the machine. **It is important to have the rotor rebalanced** to ensure other machine components do not get damaged when the machine is put back into work.

It is important to make note before disassembling the rotor assembly, the direction in which the flails rotate.

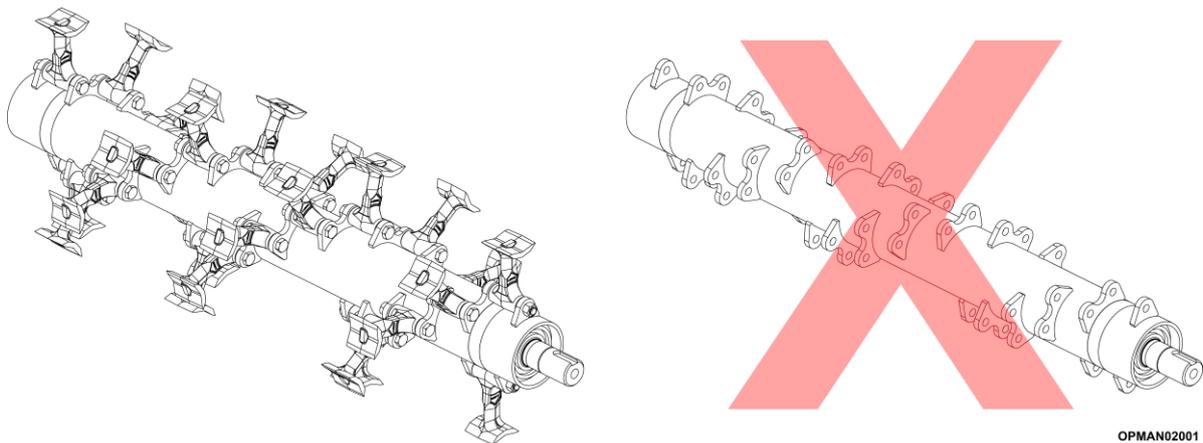


Figure 5.14 – Spearhead Only Supply Complete Flail Rotor With Flails

Spearhead Machinery does not supply welded rotor assemblies; only rotors with a complete set of new flails; this is due to them needing to be balanced.



WARNING! Checking of rotor components should only be carried out with tractors engine switched off, starting key removed and the PTO driveshaft disconnected. Always 'prop up' the machine using suitable supports before attempting to inspect or work on components underneath it.



WARNING! Avoid personal injury. **Never work** under the machine without fixed support stands to ensure that the body does not fall.

IMPORTANT: Always use genuine Spearhead parts when carrying out repairs and maintenance with thoughts to longevity and reliability of the machine and personnel safety. Spearhead flails are made of special heat-treated alloy steel. Substitute flails may not meet specifications and may fail in a hazardous manner that could cause injury.

Spearhead declines all responsibility for damage and/or injury caused by use of **anything** other than the flail and rotor components which are supplied with the machine as new or sold as a spare part replacement sold by a genuine Spearhead parts dealer on Powerdrive Pro flail head attachments.

See Section 7 for guidance on spare parts. The machine serial number will be required to be quoted. Serial plate location guidance can be found in Figure 1.4.

5.6.4 Flail Bolt Inspection

Flail bolts are prone to getting damaged when coming in contact with foreign or solid objects which can seriously compromise the wellbeing of machine, the operator and bystanders. Neglecting damaged flail bolts can cause serious injury or death.

Inspect the heads of flail bolts daily for:

- Visible cracks
- Wear on the recessed area of the head of the bolt
- Gouges and chipped areas



DANGER! Failure to inspect daily and replace worn or damaged flail bolts may lead to catastrophic failure of the flails and ejection of the broken part which may cause serious bodily injury or death.

If any of these visual damages are found, replace **all flail bolts, nuts and bushes (if applicable)** on the rotor **immediately**.

IMPORTANT: Always replace flail bolts, nuts and bushes (if applicable) with new components whenever the attachment flails are removed and/or replaced.



WARNING! Inspect the area before mowing. Foreign objects should be removed from the site prior to beginning work to prevent machine damage and/or operator, bystander or the environment. Any objects that cannot be removed must be clearly marked and carefully avoided by the operator.



WARNING! Pay special attention when working with the machine and do not allow the machine to touch fixed objects such as road drains, walls, shafts, curbs, guard rails, tracks etc. as these could break the blades which could cause debris to be thrown at very high speed from the machine. As a precaution raise the cutting height of the machine to 150mm (6 inches) to ensure they do not collide when the machine is in work.

5.7 Belts

The Powerdrive Pro flail head attachment transfers power from the motor pulley to the rotor shaft drive pulley through a cogged v-belt. The rotor and drive pulley have different diameters allowing for two different operating speeds of the rotor at work when configured and operated at the correct speed to allow the attachment to operate in different work environments.

5.7.1 Belt Tension Setting

It is important for both optimal machine performance and long-lasting belt life that belts are correctly tensioned at all times. On the Powerdrive Pro flail head attachment, the belt must be tensioned manually and should be re-checked periodically.

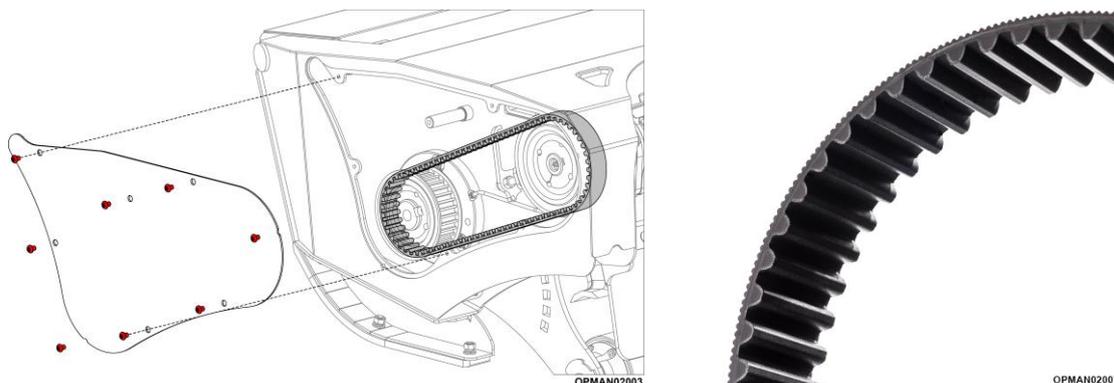


Figure 5.15



The drivebelt is located behind the belt guard cover plate which is able to be taken off by removing the eight torx head screws; see Figure 5.15.

Check the condition of the belt, if there is any sign of melting, wear or cracking; replace with new. Do not attempt to use the machine with a damaged belt.

With reference to Figure 5.16, measure the distance between the tensioner plate (T) and the tensioner bolt plate (P) found in the attachment cowl fabrication. The correct belt tension setting (D) is reached when the distance is set to the distance as shown in Table 5.7.

To adjust the belt tension if required; see Section 5.7.2.

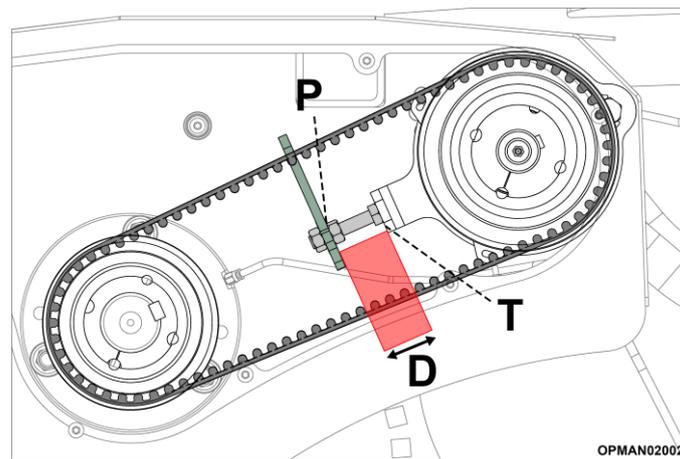


Figure 5.16 – Powerdrive Pro Drive Belt Tension Overview

Belt.	Belt Tension Setting “D”
Powerdrive Pro 130/160	48mm – 50mm (1 7/8”-2”)

Table 5.7 – Powerdrive Pro Belt Tension Settings

5.7.2 Belt Adjustment

To adjust drivebelt tension:

- 5.7.2.1 Remove the drivebelt cover plate from the main machine cowl by removing the eight torx head screws; see Figure 5.15.

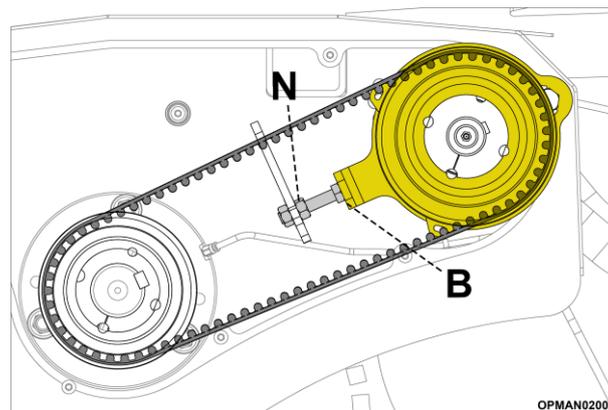


Figure 5.17

- 5.7.2.2 With reference to Figure 5.17, sufficiently loosen the locking nut (N).
- 5.7.2.3 Turn the tensioning bolt (B) either inwards (to decrease belt tension) or outwards (to increase belt tension) to move the pulley support towards/away from the rotor, altering the tension placed on the belt.
- 5.7.2.4 With reference to Figure 5.16, measure the distance between the tensioner plate (T) and the tensioner bolt plate (P) found in the attachment cowl fabrication until the correct belt tension setting (D) is reached as shown in Table 5.7.
- 5.7.2.5 Retighten the locking nut (N) to secure the position of the pulley support and refit the drivebelt cover plate.
- 5.7.2.6 After the first 2 hours of work re-check the belt tension and pulley taper locks to ensure they are tight.

5.7.3 Belt Replacement

To replace the drivebelt:

- 5.7.3.1 Following the guidance given in Section 5.7.2, sufficiently remove tension from the drivebelt.

When a ample amount of drivebelt tension has been taken off and the pulley support has sufficiently moved, the drivebelt should then be slipped off from both of the drive pulleys.

- 5.7.3.2 Slip on the new replacement drivebelt, ensuring the teeth on the belt and pulley are engaged properly.



Figure 5.18

- 5.7.3.3 With reference to Figure 5.18, ensure that the rotor remote grease hose and for machines fitted with the hydraulic front hood and/or hydraulic roller option that the supplying hydraulic hoses are kept routed and secured away from the rotating drivebelt and pulleys. Ensure that they are routed through their respective holes in the hose guide/shield found as part of the cowl fabrication; see Figure 5.18 (A).
- 5.7.3.4 Tension the new drivebelt correctly following the guidance in Section 5.7.2 and then refit the drivebelt cover plate.
- 5.7.3.5 After the first 2 hours of work re-check the belt tension and pulley taper locks to ensure they are tight.

5.7.4 Pulley Orientation And Rotor Speed

The Powerdrive Pro flail head attachment features a cogged V-belt driveline to connect power between the input motor pulley and the rotor drive pulley. The two pulleys are not of equal size so depending on their assembly orientation allow for the drive to be increased or decreased from the output rotating speed of the motor.

To alternate the position of the two pulleys to gain the correct rotor speed required, requires the slackening and removal of the drivebelt and the removal of the pulley clamping elements.

To exchange the position of the pulleys:

5.7.4.1 Remove the belt guard cover plate from the side of the cowl.

5.7.4.2 With reference to Section 5.7.2, slacken the tension and remove the drivebelt.

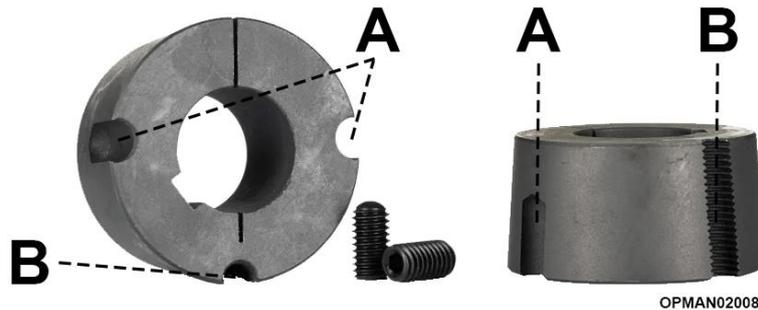


Figure 5.19

5.7.4.3 With reference to Figure 5.19, select one of the pulleys and loosen both of the grub screws (A) using a suitable allen key from the pulley clamping element.

The clamping element at this point should pull clear to leave a loose pulley. If necessary, tap the screws lightly with a soft hammer.

If the clamping element still doesn't release, insert one of the removed grub screws into the fully threaded removal hole (B) and tighten it down to draw the clamping element away from the pulley. Remove the grub screw from the threaded removal hole once the clamping element is removed and reinstall into its original tightening hole.

5.7.4.4 Inspect to see the stub shaft keyway remains in its slot.

5.7.4.5 Repeat the removal process on the other pulley assembly.

5.7.4.6 Inspect each of the removed interference fitting drive components with each other. Clean off dirt and corrosion with suitable tools and equipment.

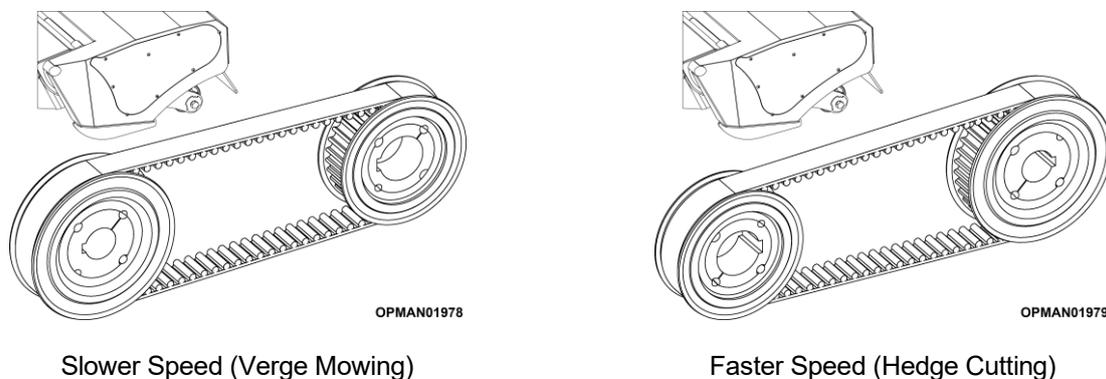


Figure 5.20

- 5.7.4.7 Reinstall each of the keyways, if removed, and then both of the pulleys and pulley clamping elements onto the required pulley support and rotor shafts stub shafts for the correct speed orientation required; see Figure 5.20.

For guidance on the pulley orientation and estimated rotor speeds achieved by each of the two pulley set-ups; see Section 3.10.

- 5.7.4.8 Loosely reinstall the grub screws into each of the pulley clamping elements tightening holes.

Spearhead Machinery recommends lubricating each of the grub screws with a light machine oil to prevent them from the potential of seizure due to corrosion.

- 5.7.4.9 Reinstall the drivebelt over the pair of pulleys.

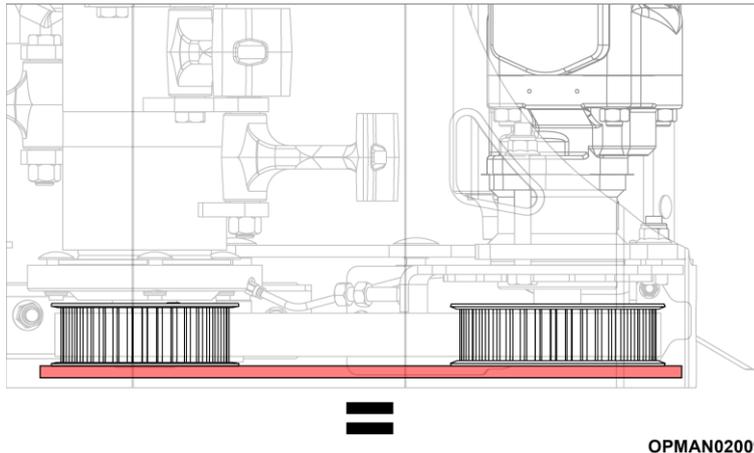


Figure 5.21

- 5.7.4.10 Check the alignment of the pulleys using a straight edge to ensure that the drivebelt is working parallel with the side of the attachment cowl; see Figure 5.21.

Adjust the position of the combined pulleys/pulley clamping elements to bring the drivebelt into the correct working alignment.

- 5.7.4.11 Once the correct alignment is reached, secure their position by tightening each of the taper locks to the correct torque of 48Nm (35lbft).
- 5.7.4.12 Tension the drivebelt correctly following the guidance given in Section 5.7.2
- 5.7.4.13 Reinstall the belt guard cover plate and tighten each of the screws.
- 5.7.4.14 After the first 2 hours of work re-check the belt tension and pulley taper locks to ensure they are tight.

5.8 Other Key Components

5.8.1 Rubber Flap

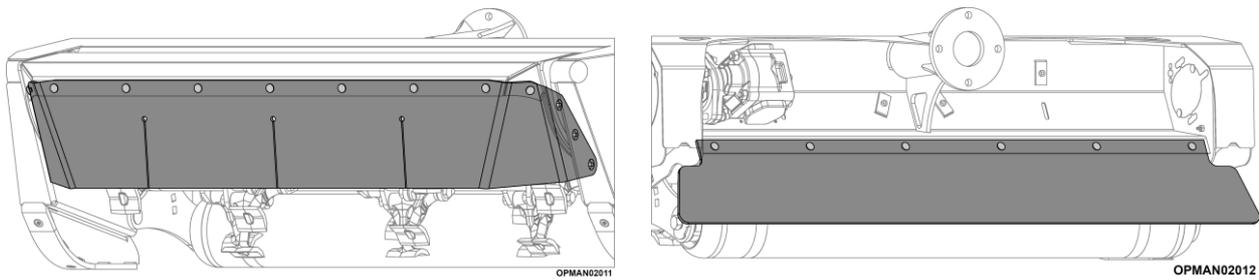


Figure 5.22

Rubber protection flaps are fitted to the front and rear of the attachment to aim at preventing the machine from ejecting debris .

Premature wear can be caused to the skids through the attachment being set 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 attachment. Replace worn skids as required. **Failure to replace skids and using the attachment without skids will cause permanent damage to the deck fabrications.**

Skids are fitted to the attachment to protect the machine deck from permanent damage. Premature wear can be caused to the skids through the attachment being set 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 attachment. Replace worn skids as required. **Failure to replace skids and using the attachment without will cause permanent damage to the deck fabrications.**

5.8.2 Skids

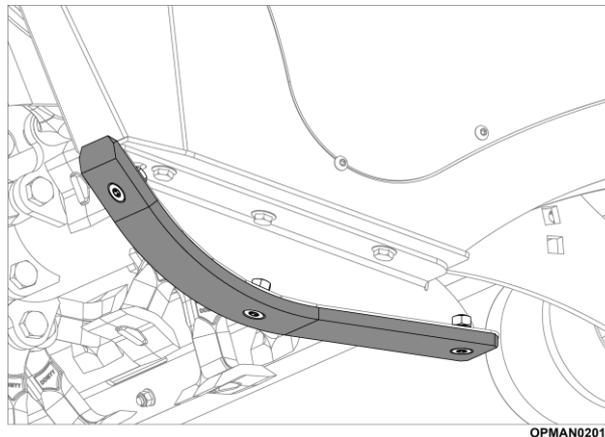


Figure 5.23 – Powerdrive Pro Skid
(standard skid shown)

Skids are fitted to the attachment to protect the machine deck from permanent damage. Premature wear can be caused to the skids through the attachment being set 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 attachment. Replace worn skids as required. **Failure to replace skids and using the attachment without will cause permanent damage to the deck fabrications.**

5.9 Torque Settings

5.9.1 Nuts & Bolts

Specific Fastener Requirements

On Powerdrive Pro flail head attachments, there are some special fasteners/components which require specific torque settings to ensure they operate safely.

Use.	Size.	Grade.	Torque Setting.	
			Nm.	Lbft.
Pulley Taper Locks	½" Whitworth	-	48	36
Flail Bolt	M16	12.9	250	184

Table 5.8 – Powerdrive Pro 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 5.9 – Standard Fastener Torque Settings

5.9.2 Hydraulic Fittings

Throughout all Powerdrive Pro flail head attachments, metric BSP 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 and metric port adaptors found on Powerdrive Pro flail head attachments.

Size.	Thread.	Torque Setting.	
		Nm	Ft-lb
3/8"	BSP	47	35
M14	Metric	45	33
M18	Metric	70	52
M36	Metric	330	244

Table 5.10 – Powerdrive Pro Adaptor Torque Settings

Hydraulic Hoses

The below tables give reference to the maximum recommended tightening torques for standard, hydraulic hoses on Powerdrive Pro flail head attachments.

Size.	Thread.	Torque Setting.	
		Nm	Ft-lb
M14	BSP	16	12
M18	BSP	37	27
M36	BSP	179	132

Table 5.11 – Powerdrive Pro Hydraulic Hose Torque Settings

5.10 Machine Inspection Record

	MACHINE INSPECTION RECORD (For Powerdrive Pro 130/160)	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 operator's instruction manual is filled in and serial number is present and matches the serial number of the machine.			
Warning decals are present, clean and in good order			
Inspect main fabrications and damage – bodies, axles, drawbar e.t.c.			
Inspect all hosing for damage – kinks, twists, chafing or weeping			
Ensure hydraulic hoses are routed correctly to the reach arm			
On machines fitted with hydraulic front hood and hydraulic rear roller, ensure the hydraulic hose connections are correctly seated in the spools of the tractor			
If fitted, inspect all hydraulic rams for damage, corrosion and oil leaks			
Inspect to see there are no oil leaks on any hydraulic fittings, components and hoses			
On machines fitted with hydraulic front hood and hydraulic rear roller, inspect the diverter valve and double PO check valve to ensure all its hydraulic and electrical connections are in good condition			
Inspect to see both front and rear rubber protection flaps are present and in good condition			
Inspect to see both of the belt guards are present and correctly secured			
Inspect the drive belts for condition against the operator's manual			
Check the drive pulleys for cracks			
Inspect flail and flail nut condition against the operator's manual			
Inspect that the flails are fitted for the given rotor direction against the operator's manual			
Inspect that the rotor shaft is not damaged or missing lugs			
Inspect that the rear roller is in position, secure and is not bent			
Inspect that the rear roller adjuster plate is in place and tightened			
Inspect both of the wear skids are present and in good condition			
Inspect the condition of the reach arm and tractor against their operators manual			
Mechanical Checks		Comments	OK
Check all hydraulic hoses and adaptors for tightness and tighten to the correct torque setting given in the operator's instruction manual			
Ensure the oil quantity is sufficient in the hedge cutter/hydraulic supply. Consult the maintenance schedule to see if an oil change is needed.			
Check the motor mounting fasteners are tight			
Check the pulley tension bracket fasteners are tight			

Check the drive belt to ensure that it is correctly tensioned		
Randomly test for loose nuts and bolts. Tighten to manual settings		
Check that the pulley clamping elements bolts are torqued to the correct operator's manual values		
Grease all grease points in accordance with the operator's manual		
Inspect the skids for condition and tightness of its fasteners		
Check that all roller end cap bolts are correctly tightened		
Check rear roller bearings for play and movement		
Check that rear roller brackets fasteners are tight		
Check that the rear roller is correctly positioned for the job requirement of the attachment		
Check that the fasteners between the attachment and the reach arm are tight		
Tractor and reach spec meets spec requirement of the attachment (PTO rpm/HP/weight)		
Inspect flail bolts for condition and tightness against operator's manual torque values		
Ensure that the flails are free-swinging		
On attachments fitted with a manual opening front hood ensure that the hood is correctly positioned and fasteners are tight		

Running Checks	Comments	OK
Once all visual and mechanical checks have been made, follow the running checks below		
Pressurise hydraulic rams (if fitted) and inspect for leaks		
On attachments fitted with a hydraulic opening front hood option, ensure that the hood is opens and closes easily and equally without restriction		
On attachments fitted with a hydraulic rear roller option, ensure that the rear can be raised and lowered easily and equally without restriction		
Ensure reach arm operation joystick controls work as intended		
Fully raise, lower and rotate the attachment to maximum left and right extremities to check for pinch points		
Run the attachment to operating speed to check for vibration and noise. If vibration is present check the "Troubleshooting" section in the operator's manual		
Test run the attachment to see the attachment cuts correctly		
Check for excess noise and heat build-up in components		

Other comments:

Disclaimer: All guidance and maintenance advise to be carried out on the machine 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.

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5.11 Machine Storage

Follow the following sections for guidance to correctly storing Powerdrive Pro flail head attachments out of working use and preparing back into correct working condition.

5.11.1 Preparing The Machine For Storage

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:

5.11.1.1 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.

5.11.1.2 Ensure that all hydraulic hose ends are capped with suitable blanking caps to protect the hydraulic hoses from the ingress of dirt and debris.

5.11.1.3 Remove the belt guard cover and inspect the drivebelt for condition. Ensure that the drivebelt is correctly tensioned. If there is any sign of overheating, wear or cracking; replace with new before recommencing work.

5.11.1.4 Grease all grease points following the guidance given in Section 5.2.

5.11.1.5 On machines fitted with hydraulic rear roller and hood, retract hydraulic rams to protect chromed rods from moisture and corrosion.

5.11.1.6 Inspect the flails and fasteners for condition.

5.11.1.7 Tighten all fasteners, pins and hoses to the recommended torque.

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

5.11.1.9 Ideally store the machine in the dry indoors, on a firm surface or stands, 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 5.10) as well as other specific maintenance task sections to see what could be required to be done to the machine.

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.



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Figure 5.24 – Prepare For Storage

Where parts are broken, damaged and deemed not fit for use; replace with genuine Spearhead parts; see Section 7.

Spearhead Powerdrive Pro flail head attachments 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 a speed in excess of its maximum operating speed on the PTO.

5.11.2 Returning The Machine Back To Work

Returning the machine back to work, in most cases, is similar to preparing the machine for storage shown in Section 5.11.1. If the procedure shown in that section is adhered to, a lot of the preparation work will have already been done to quickly reintroduce the machine back into work condition.

Follow the following points:

- 5.11.2.1 Depending on the period of the machine being unused and whether the machine has been stored outside, the machine may require cleaning.

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.

- 5.11.2.2 Ensure that all hydraulic hose ends are reinstalled onto the reach arm with suitable, clean hydraulic fittings.
- 5.11.2.3 Remove the belt guard cover and inspect the drivebelt for condition. Ensure that the drivebelt is correctly tensioned. If there is any sign of overheating, wear or cracking; replace with new before recommencing work.
- 5.11.2.4 If not carried out before storage, grease all grease points following the guidance given in Section 5.2.
- 5.11.2.5 If not carried out before storage, tighten all fasteners, pins and hoses to the recommended torque.
- 5.11.2.6 On machines fitted with hydraulic rear roller and hood, extend hydraulic rams to inspect the chromed rods for damage and condition.
- 5.11.2.7 Inspect the flails and fasteners for condition. If flails need replacing, follow the correct procedure and tighten the fasteners correctly.
- 5.11.2.8 Inspect the reach arm and tractor for condition, using the correct maintenance procedure. Carry out service maintenance if required. Inspect the hydraulic oil for condition, ensuring it is changed at the correct interval and is at the correct oil level.
- 5.11.2.9 Carry out a full attachment inspection, using the Machine Inspection Record guide sheet found in Section 5.10.

Where parts are broken, damaged and deemed not fit for use; replace with genuine Spearhead parts; see Section 7.

Spearhead Powerdrive Pro flail head attachments 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 a speed in excess of its maximum operating speed on the PTO.

6 Troubleshooting

	Symptom	Possible cause	Remedy
6.1	Irregular cut	a) Worn, bent or broken flails	Replace flails immediately
		b) PTO Input speed too low	Check PTO input speed and increase to maximum indicated.
		c) Machine is not level to the ground	Ensure that the reach arm is pitched correctly by adjusting the top link of the tractor.
			Inspect reach arm for worn head bracket and pins.
d) Clogged material due to excessive ground speed	Reduce tractor speed over ground and check correct PTO input speed.		
Error! Reference source not found..2	Machine noise	a) Loose bolts	Check and tighten.
		b) Damage to cowl structure or cracks	Repair cowl in specialised workshops or replace.
		c) Vibration	See vibration below
6.3	Motor noise	a) Lack of oil	Fill reach arm tank to level
		b) Worn gears	Replace gears
		c) Worn bearings	Replace bearings
		d) Contaminated oil	Inspect to find cause of contamination. Replace if required.
6.4	Vibration – Investigate quickly!	a) Lost flail(s)	Replace any missing flails in opposed pairs immediately
		b) Broken or worn flails	Replace flails in opposed pairs immediately
		c) Bent or Unbalanced rotor	Replace rotor or contact Spearhead shaft reconditioning service.
		d) Worn rotor bearings	Replace in authorised workshops.
		e) PTO speed too high	Reduce PTO speed to the correct operating speed
		f) Reach arm	Inspect reach arm for cause
6.5	Premature flail wear	Flails touching the ground	Adjust the height of cut using the roller
6.6	Hydraulic rear roller	a) Lack of oil	Fill reach arm tank to level
		b) Diverter valve	Check electrical connections and reach arm controls
		c) PO check valve	Check PO check valve to see springs and balls are correctly closing the valve
		d) Rear roller brackets tight	Tighten rear roller brackets sufficiently, but not excessively
		e) Tractor controls and spools	Check tractor controls and spools are operating correctly
		f) Hydraulic ram seals	Check individual operation of each hydraulic ram and investigate condition of internal seals
6.7	Hydraulic front hood	a) Lack of oil	Fill reach arm tank to level
		b) Diverter valve	Check electrical connections and reach arm controls
		c) PO check valve	Check PO check valve to see springs and balls are correctly closing the valve
		d) Front hood fabrication tight	Check fabrication alignment

		e) Tractor controls and spools	Check tractor controls and spools are operating correctly
		f) Hydraulic ram seals	Check individual operation of each hydraulic ram and investigate condition of internal seals
6.8	Roller breakage	Violent impact with ground	Lower the machine gently to the ground. Inspect damage. Replace or repair in authorised workshops.
6.9	Bearing function poor	a) Damage due to violent impact with ground	Replace in authorised workshops. Always lower machine gently.
		b) Wear due to lack of lubrication	Replace in authorised workshops. Follow grease maintenance schedule
6.10	Belts overheating	a) Belts slipping on pulleys	Check and adjust belt tension.
		b) Flail touching ground	Adjust the height of cut using the roller
		c) Working speed unsuitable for the material to be cut	Reduce tractor speed over ground and check correct PTO input speed.
6.11	Poor cutting performance	a) Flails worn out	Replace blades once the performance has dropped below an acceptable level
6.12	Poor power transmission	b) Drive belts slipping - low belt tension	Check and adjust belt tension
		c) Drive belts slipping - check for wear and or oil on drive belts	Replace when worn/oily and or shredded
6.13	Rotor continually stalls	a) Forward cutting speed too fast	Reduce forward cutting speed
		b) Cutting too close to the ground	Lower the roller to cut less. For shorter cut make more than one cut.
		c) Wrong PTO speed	If PTO speed is too low then the cutting inertia is reduced. Increase PTO rpm to correct cutting speed.
		d) Belts slipping - low belt tension	Check and adjust belt tension
		e) Belts slipping – oil on belts or belt wear	Replace when worn/oily and or shredded

7 Spare Parts

7.1 Genuine Spare Parts



Cost savings associated with the purchase of non-genuine spare parts can be difficult to dismiss, however it is essential to consider the potential safety and longer term performance of the machine and not just the short term financial gains when setting out to repair or refurbish a Spearhead product.

Spearhead Machinery consider all parts not supplied or manufactured by Spearhead Machinery as imitation or copied, it is impossible to guarantee their reliability and they may cause damage to your machine. Genuine Spearhead parts are made to specific standards to give performance and safety. Substitute components may not meet specifications and may fail in a hazardous manner that could cause injury.

Not only can non-genuine spare parts cause damage to the machine, but they may also result in lower performance and invalidate the machine's warranty. To maintain the Spearhead Machinery warranty requires the use of genuine Spearhead Machinery parts.

Spearhead Machinery utilises an interactive parts manual system which uses the machines serial number to give the exact parts required for the that particular machine. Section 7.2 gives guidance on how to use the Spearhead Machinery interactive parts manual system and find correct replacement parts.

It is important to state that **Spearhead Machinery does not sell directly to end users** but instead uses an extensive dealer network to provide to its customer base. Section 7.4 gives guidance to find your nearest Spearhead Machinery dealer.

Purchasing Genuine Spearhead Parts will give you peace of mind that your machines performance won't be compromised and can cost less than you think, so contact your local dealer for a quote before buying non-genuine spare parts.

7.2 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 1.4.

7.2.1.1 Enter the serial number.



Figure 7.1 – Type In Serial Number

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

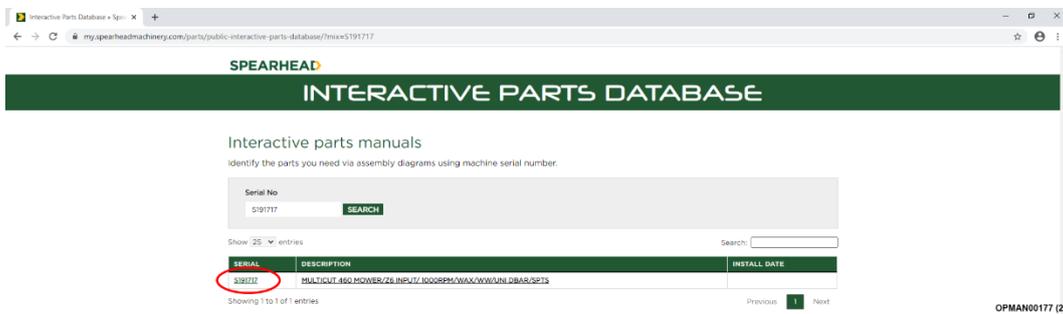


Figure 7.2 – Click On Serial Number

7.2.1.3 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.

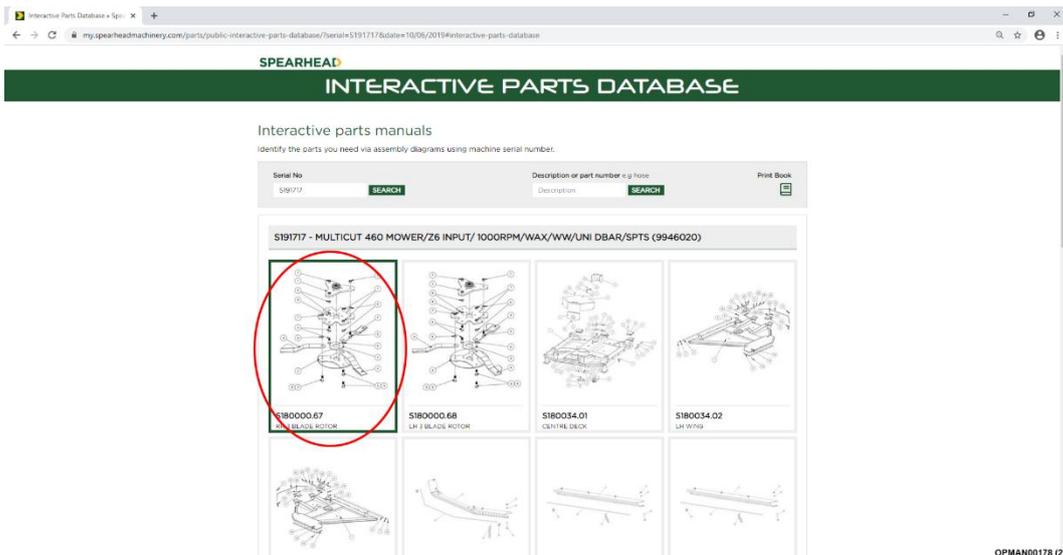


Figure 7.3 – Click On Assembly

7.2.1.4 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.

Interactive parts manuals
Identify the parts you need via assembly diagrams using machine serial number.

Serial No: 526717 Description or part number e.g. Item:

MULTI 460 MOVI BLADE INPUT 1000RPM/3000W/UNI DEAR/SPTS (9946002)
RH 3 BLADE ROTOR (39000047)

Ref	Part No	Description	QTY
1	1770602-3-40	CTR BLADE CARRIER UPPER ONLY	1
2	1770609	LOWER BLADE CARRIER LOWER	1
3	1770604-3	SPACER	1
4	7770700	BLADE - RH C/W FIN 25	3
5	277042	BOLT	6
6	7770307	BLADE BUSH	6
7	277044	NUT	6
8	0460501	CARRIER	1
9	2770464	WASHER	3

OPMAN00179 (2)

Figure 7.4 – Exploded Parts Breakdown With Bill Of Materials

7.3 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.

7.4 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.

DEALER LOCATOR

Your location: Search radius: 25 mi Results: 25

Map Satellite

United Kingdom

Evesham Worcestershire WR11 2QT United Kingdom

OPMAN00175

Figure 7.5 – Dealer Locator

Notes