TS 465 & TS 525

Operation & Parts Manual

Publication No.433 April 2003

IMPORTANT

VERIFICATION OF WARRANTY REGISTRATION

DEALER WARRANTY INFORMATION & REGISTRATION VERIFICATION

It is imperative that the selling dealer registers this machine with Twose of Tiverton Limited before delivery to the end user – failure to do so may affect the validity of the machine warranty.

To register machines go to the Twose web site at **www.twose.com**, log onto '**Dealer Inside**' and select the '**Machine Registration button**' which can be found in the Service Section of the site. Confirm to the customer that the machine has been registered in the section below.

Should you experience any problems registering a machine in this manner please contact the Twose Office on 01884 253691.

Registration Verification

Dealer Name: ……

Dealer Address: ……

Customer Name: ……

Date of Warranty Registration: ……/……/..…… Dealer Signature: ……

NOTE TO CUSTOMER / OWNER

Please ensure that the above section above has been completed and signed by the selling dealer to verify that your machine has been registered with Twose of Tiverton Limited.

IMPORTANT: During the initial 'bedding in' period of a new machine it is the customer's responsibility to regularly inspect all nuts, bolts and hose connections for tightness and re-tighten if required. New hydraulic connections occasionally weep small amounts of oil as the seals and joints settle in – where this occurs it can be cured by re-tightening the connection – *refer to torque settings chart below.* The tasks stated above should be performed on an hourly basis during the first day of work and at least daily thereafter as part of the machines general maintenance procedure.

TORQUE SETTINGS FOR HYDRAULIC FITTINGS

HYDRAULIC HOSE ENDS		
BSP	**Setting**	**Metric**
1/4"	18 Nm	19 mm
3/8"	31 Nm	22 mm
1/2"	49 Nm	27 mm
5/8"	60 Nm	30 mm
3/4"	80 Nm	32 mm
1"	125 Nm	41 mm
1.1/4"	190 Nm	50 mm
1.1/2"	250 Nm	55 mm
2"	420 Nm	70 mm

PORT ADAPTORS WITH BONDED SEALS		
BSP	**Setting**	**Metric**
1/4"	34 Nm	19 mm
3/8"	47 Nm	22 mm
1/2"	102 Nm	27 mm
5/8"	122 Nm	30 mm
3/4"	149 Nm	32 mm
1"	203 Nm	41 mm
1.1/4"	305 Nm	50 mm
1.1/2"	305 Nm	55 mm
2"	400 Nm	70 mm

WARRANTY POLICY

WARRANTY REGISTRATION

All machines must be registered, by the selling dealer with Twose of Tiverton Limited before delivery to the end user. On receipt of the goods it is the buyer's responsibility to check that the Verification of Warranty Registration in the Operator's Manual has been completed by the selling dealer.

1. LIMITED WARRANTIES

1.01. All machines supplied by Twose of Tiverton Limited are warranted to be free from defects in material and workmanship from the date of sale to the original purchaser for a period of 12 months, unless a different period is specified.

1.02. All spare parts supplied by Twose of Tiverton Limited are warranted to be free from defects in material and workmanship from the date of sale to the original purchaser for a period of 6 months.

1.03. The manufacturer will replace or repair for the purchaser any part or parts found, upon examination at its factory, to be defective under normal use and service due to defects in material or workmanship. Returned parts must be complete and unexamined.

1.04. This warranty does not apply to any part of the goods, which has been subjected to improper or abnormal use, negligence, alteration, modification, fitment of non-genuine parts, accident damage, or damage resulting from contact with overhead power lines, damage caused by foreign objects (e.g. stones, iron, material other than vegetation), failure due to lack of maintenance, use of incorrect oil or lubricants, contamination of the oil, or which has served its normal life. This warranty does not apply to any expendable items such as blades, flails, flap kits, skids, soil engaging parts, shields, guards, wear pads or pneumatic tyres.

1.05. Temporary repairs and consequential loss - i.e. oil, downtime and associated parts are specifically excluded from the warranty.

1.06. Warranty on hoses is limited to 12 months and does not include hoses which have suffered external damage. Only complete hoses may be returned under warranty, any which have been cut or repaired will be rejected.

1.07. Machines must be repaired immediately a problem arises. Continued use of the machine after a problem has occurred can result in further component failures, for which Twose of Tiverton Limited cannot be held liable, and may have safety implications.

1.08. Except as provided herein, no employee, agent, dealer or other person is authorised to give any warranties of any nature on behalf of Twose of Tiverton Limited.

1.09. For machine warranty periods in excess of 12 months the following additional exclusions shall apply:

1) Hoses, external seals, exposed pipes and hydraulic tank breathers.
2) Filters.
3) Rubber mountings.
4) External electric wiring.

N.B. Warranty cover will be invalid if any non-genuine parts have been fitted or used. Use of non-genuine parts may seriously affect the machine's performance and safety. Twose of Tiverton Limited cannot be held responsible for any failures or safety implications that arise due to the use of non-genuine parts.

2. REMEDIES AND PROCEDURES

2.01. The warranty is not effective unless the Selling Dealer registers the machine, via the Twose web site and confirms the registration to the purchaser by completing the Verification of Warranty Registration in the operator's manual.

2.02. Any fault must be reported to an authorised Twose dealer as soon as it occurs. Continued use of a machine, after a fault has occurred, can result in further component failure for which Twose of Tiverton Limited cannot be held liable.

2.03. Repairs should be undertaken within two days of the failure. Claims submitted for repairs undertaken more than 2 weeks after a failure has occurred, or 2 days after the parts were supplied will be rejected, unless the delay has been authorised by Twose of Tiverton Limited.

2.04. All claims must be submitted, by an authorised Twose Service Dealer, within 30 days of the date of repair.

2.05. Following examination of the claim and parts the manufacture will pay, at their discretion, for any valid claim the cost of any parts and an appropriate labour allowance if applicable.

2.06. The submission of a claim is not a guarantee of payment.

2.07. Any decision reached by Twose of Tiverton Limited is final.

3. LIMITATION OF LIABILITY

3.01. The manufacturer disclaims any express (except as set forth herein) and implied warranties with respect to the goods including, but not limited to, merchantability and fitness for a particular purpose.

3.02. The manufacturer makes no warranty as to the design, capability, capacity or suitability for use of the goods.

3.03. Except as provided herein, the manufacturer shall have no liability or responsibility to the purchaser or any other person or entity with respect to any liability, loss, or damage caused or alleged to be caused directly or indirectly by the goods including, but not limited to, any indirect, special, consequential, or incidental damages resulting from the use or operation of the goods or any breach of this warranty. Notwithstanding the above limitations and warranties, the manufacturer's liability hereunder for damages incurred by the purchaser or others shall not exceed the price of the goods.

3.04. No action arising out of any claimed breach of this warranty or transactions under this warranty may be brought more than one (1) year after the cause of the action has occurred.

4. MISCELLANEOUS

4.01. The manufacturer may waive compliance with any of the terms of this limited warranty, but no waiver of any terms shall be deemed to be a waiver of any other term.

4.02. If any provision of this limited warranty shall violate any applicable law and is held to be unenforceable, then the invalidity of such provision shall not invalidate any other provisions herein.

4.03. Applicable law may provide rights and benefits to the purchaser in addition to those provided herein.

THIS MANUAL IS TO BE HANDED TO THE CUSTOMER BEFORE THE MACHINE IS TO BE USED FOR THE FIRST TIME.

THIS MANUAL *(OR A COPY OF)* MUST BE USED AND READ BY ALL OPERATORS OF THIS MACHINE.

TWOSE OF TIVERTON LIMITED

6 CHINON COURT
LOWER MOOR WAY
TIVERTON BUSINESS PARK
TIVERTON
DEVON
EX16 6SS

Telephone: 01884 253691
Fax: 01884 255189

All dimensions and capacities mentioned in this book are approximate. In pursuance of the company's policy of constant development, the right is reserved to depart, without notice, from any detail illustrated or specified in this book, without incurring the obligation to provide such modifications on the machine previously delivered.

No responsibility will be accepted by Twose of Tiverton Limited for any injury, damage or loss arising from the improper use of or lack of maintenance of any machinery supplied by them or from any failure of the user to comply with all instructions published by Tractor or Loader Manufacturers, particularly with the regard to maximum load capacities, tyre pressures and stability, or with instructions and regulations pertaining to Tractor Cabs.

DECLARATION OF CONFORMITY

Conforming to EU Machinery Directive 2006/42/EC

We,

TWOSE of TIVERTON LIMITED,
6 Chinon Court, Lower Moor Way,
Tiverton Business Park, Tiverton, Devon, EX16 6SS, UK

Hereby declare that:

The Product; Tractor Mounted Hedgecutter / Grass Mower

Product Code; T460, T520

Serial No. & Date …… Type ……

Manufactured in; United Kingdom

Complies with the required provisions of the Machinery Directive 2006/42/EC
The machinery directive is supported by the following harmonized standards;

- BS EN ISO 14121-1 (2007) Safety of machinery - Risk assessment, Part 1: Principles Part 2: practical guide and examples of methods.
- BS EN ISO 12100-1 (2010) Safety of machinery - Part 1: Basic terminology and methodology Part 2: Technical principles.
- BS EN 349(1993)+ A1 (2008) Safety of machinery - Minimum distances to avoid the entrapment with human body parts.
- BS EN 953 (1998) Safety of machinery - Guards General requirements for the design and construction of fixed and movable guards.
- BS EN 982(1996)+ A1 (2008) Safety requirements for fluid power systems and their components. Hydraulics

Signed …….. *Responsible Person*
on behalf of TWOSE of TIVERTON LIMITED

Status: General Manager *Date:* May 2011

DECLARATION OF CONFORMITY

Conforming to EU Machinery Directive 2006/42/EC

We,

TWOSE of TIVERTON LIMITED,
6 Chinon Court, Lower Moor Way,
Tiverton Business Park, Tiverton, Devon, EX16 6SS, UK

Hereby declare that:

The Product; Hydraulic Arm Mounted Flailhead

Product Code; TWHD

Serial No. & Date ……. Type …….

Manufactured in; United Kingdom

Complies with the required provisions of the Machinery Directive 2006/42/EC
The machinery directive is supported by the following harmonized standards;

- BS EN ISO 14121-1 (2007) Safety of machinery - Risk assessment, Part 1: Principles Part 2: practical guide and examples of methods.
- BS EN ISO 12100-1 (2010) Safety of machinery - Part 1: Basic terminology and methodology Part 2: Technical principles.
- BS EN 349(1993)+ A1 (2008) Safety of machinery - Minimum distances to avoid the entrapment with human body parts.
- BS EN 953 (1998) Safety of machinery - Guards General requirements for the design and construction of fixed and movable guards.
- BS EN 982(1996)+ A1 (2008) Safety requirements for fluid power systems and their components. Hydraulics

Signed …….. *Responsible Person*
on behalf of TWOSE of TIVERTON LIMITED

Status: General Manager *Date:* May 2011

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SPECIFICATIONS

TS465 MODELS

Width folded:
For transport the whole machine is within tractor width.

Height and length:
When folded for transport these dimensions will vary according to tractor and cab.

TS525 MODELS

Width folded:
For transport the whole machine is within tractor width.

Height and length:
When folded for transport these dimensions will vary according to tractor and cab.

NOISE

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

GENERAL INFORMATION

Read this manual before fitting or operating the machine. Whenever any doubt exists contact your dealer or Twose Service Department for advice and assistance.

Use only Twose 'Genuine Service Parts' on Twose equipment and machines.

DEFINITIONS: The following definitions apply throughout this manual:

WARNING:
An operating procedure, technique etc., which can result in personal injury or loss of life if not observed carefully.

CAUTION:
An operating procedure, technique etc., which can result in the damage of either machine or equipment if not observed carefully.

NOTE:
An operating procedure, technique etc., which is considered essential to emphasize.

LEFT AND RIGHT HAND:
This term is applicable to the machine when fitted to the tractor and viewed from the rear, this also applies to tractor references.

To be assured of the latest design improvements purchase your **'Genuine Replacements'** from the **Original Equipment Manufacturer**: **TWOSE of TIVERTON LIMITED** through your local Dealer or Stockist.

Always quote:

- ***Machine Type***
- ***Serial Number***
- ***Part Number***

Record the Serial No. of your machine on this page and always quote this number when ordering spares along with the type and model of tractor your machine is fitted to.		
Machine Serial No.	Model Details:	Installation Date:
Dealer Name:	Dealer Telephone:	
Dealer Address:		

FEATURES

TS 465 & TS 525

Cable Controls.
Linkage Mounted.
Right or Left Hand Cutting.
1.2m Double Skin Belt Drive Head.
200 litre Hydraulic Reservoir.
Independent Hydraulics.
Option of Standard or Hi Power.
245° of Head Angle – Constant Motion.
Built in Head Floatation.
Optional Lift Float.
100° Power Slew with Hydraulic Breakback.

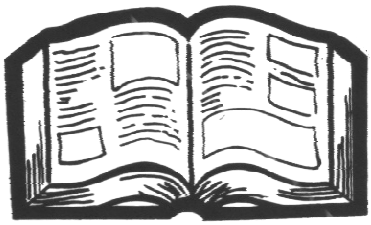
TS 465 E & TS 525 E

Choice of Mono Lever or Multi Lever Electric Controls.
Linkage Mounted.
Right or Left Hand Cutting.
1.2m Belt Drive Head.
200 litre Hydraulic Reservoir.
Independent Hydraulics.
Option of Standard or Hi Power.
245° of Head Angle – Constant Motion.
Built in Head Floatation.
Optional Lift Float.
100° Power Slew with Hydraulic Breakback.

TS 465 EP & TS 525 EP

Proportional Armrest Controls.
4 Proportional Services.
Linkage Mounted.
Right or Left Hand Cutting.
1.2m Belt Drive Head.
200 litre Hydraulic Reservoir.
Independent Hydraulics.
Option of Standard or Hi Power.
245° of Head Angle – Constant Motion.
Built in Head Floatation.
Adjustable Hydraulic Boom Flotation.
100° Power Slew with Hydraulic Breakback.

SAFETY INFORMATION



SAFETY INFORMATION

This machine has the potential to be extremely dangerous, in the wrong hands it can kill or maim. It is therefore imperative that the owner, and the operator of this machine, read the following section to ensure that they are both fully aware of the dangers that do, or may exist, and their responsibilities surrounding its use.
The operator of this machine is responsible not only for their own safety but equally for the safety of others who may come into the close proximity of the machine, as the owner you are responsible for both.

POTENTIAL SIGNIFICANT DANGERS ASSOCIATED WITH THE USE OF THIS MACHINE:

▲ *Being hit by debris thrown by rotating components.*

▲ *Being hit by machine parts ejected through damage during use.*

▲ *Being caught on a rotating power take-off (PTO) shaft.*

▲ *Being caught in other moving parts i.e.: belts, pulleys and cutting heads.*

▲ *Electrocution from Overhead Power Lines (by contact with or 'flashover' from).*

▲ *Being hit by cutting heads or machine arms as they move.*

▲ *Becoming trapped between tractor and machine when hitching or unhitching.*

▲ *Tractor overbalancing when machine arm is extended.*

▲ *Injection of high pressure oil from hydraulic hoses or couplings.*

▲ *Machine overbalancing when freestanding (out of use).*

▲ *Road traffic accidents due to collision or debris on the road.*

BEFORE USING THIS MACHINE YOU MUST:

▲ *Ensure you read all sections of the operator handbook.*

▲ *Ensure the operator is, or has been, properly trained to use the machine.*

▲ *Ensure the operator has been issued with and reads the operator handbook.*

▲ *Ensure the operator understands and follows the instructions in operator handbook.*

▲ *Ensure the tractor front, rear and side(s) are fitted with metal mesh or polycarbonate guards of suitable size and strength to protect the operator against thrown debris or parts.*

▲ *Ensure tractor guards are fitted correctly, are undamaged and kept properly maintained.*

▲ *Ensure that all machine guards are in position, are undamaged, and are kept maintained in accordance with the manufacturer's recommendations.*

▲ *Ensure flails and their fixings are of a type recommended by the manufacturer, are securely attached and that none are missing or damaged.*

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

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

▲ *Check that the machine fittings and couplings are in good condition.*

▲ *Ensure the tractor meets the minimum weight recommendations of the machine manufacturer and that ballast is used as necessary.*

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

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

▲ *Ensure the operator is protected from noise. Ear defenders should be worn and tractor cab doors and windows must be kept closed. Machine controls should be routed through proprietary openings in the cab to enable all windows to be shut fully.*

▲ *Always work at a safe speed taking account of the conditions i.e.: terrain, highway proximity and obstacles around and above the machine.*

▲ *Extra special attention should be applied to Overhead Power Lines. Some of our machines are capable of reach in excess of 8 metres (26 feet) this means they have the potential to well exceed, by possibly 3 metres (9' 9"), the lowest legal minimum height of 5.2 metres from the ground for 11,000 and 33,000 volt power lines. It cannot be*

stressed enough the dangers that surround this capability, it is therefore vital that the operator is fully aware of the maximum height and reach of the machine, and that they are fully conversant with all aspects regarding the safe minimum distances that apply when working with machines in close proximity to Power Lines. (Further information on this subject can be obtained from the Health & Safety Executive or your Local Power Company).

▲ *Always disengage the machine, kill the tractor engine, remove and pocket the key before dismounting for any reason.*

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

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

WHEN NOT TO USE THIS MACHINE:

▲ *Never attempt to use this machine if you have not been trained to do so.*

▲ *Never uses a machine until you have read and understood the operator handbook, are familiar with, and practiced the controls.*

▲ *Never use a machine that is poorly maintained.*

▲ *Never use a machine if guards are missing or damaged.*

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

▲ *Never fit, or use, a machine on a tractor that does not meet the manufacturer's minimum specification level.*

▲ *Never use a machine fitted to a tractor that does not have suitable front, rear and side(s) cab guarding made of metal mesh or polycarbonate.*

▲ *Never use the machine if the tractor cab guarding is damaged, deteriorating or badly fitted.*

▲ *Never turn a machine cutting head to an angle that causes debris to be ejected towards the cab.*

▲ *Never start or continue to work a machine if people are nearby or approaching - Stop and wait until they are at a safe distance before continuing.*

▲ *Never attempt to use a machine on materials in excess of its capability.*

▲ *Never use a machine to perform a task it has not been designed to do.*

▲ *Never operate the tractor or machine controls from any position other than from the driving seat, especially whilst hitching or unhitching the machine.*

▲ *Never carry out maintenance of a machine or a tractor whilst the engine is running – the engine should be switched off, the key removed and pocketed.*

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

▲ *Never leave a tractor with the key in or the engine running.*

▲ *Never carry out maintenance on any part or component of a machine that is raised unless that part or component has been properly substantially braced or supported.*

▲ *Never attempt to detect a hydraulic leak with your hand – use a piece of cardboard.*

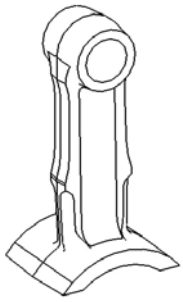
▲ *Never allow children near to, or play on, a tractor or machine under any circumstances.*

INTRODUCTION

The Twose range of Boom Flail Trimmers has been designed with both the farmer and the contractor in mind - which has resulted in a boom flail with a very high specification - with many features not found on other machines.
The construction is of welded steel fabricated assemblies - with many and varied options available covering such things as controls, hydraulics, heads, booms etc. The cutting head is of a 'double skin' construction.

The cutting flail blades offered for your Twose machines are: -

a) Heavy, double edged design (one piece).
   - For 'Upward' or 'Downward' cutting.
   - Suitable for all types of conditions and growth.



b) Back to Back 'rigid' one piece blade (in pairs).
   - For 'Upward' or 'Downward' cutting.
   - Suitable for grass/mowing and trimming.

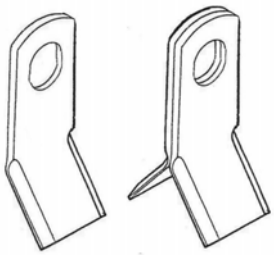
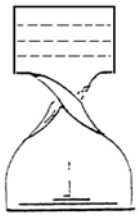
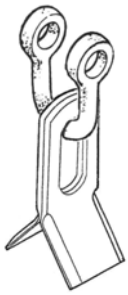


Illustration shows both a single blade and pair of blades back to back.

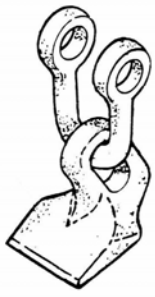
c) Heavy single edge blade flail (twisted pattern).
   - Cuts one direction only.
   - For grass cutting and hedge trimming.



d) Back to Back - on shackle (in pairs).
   - For 'Upward' or 'Downward' cutting.
   - Suitable for grass/mowing.



e) Boot flail - on shackle.
   - Cuts one direction only.
   - For grass cutting and hedge trimming.



The cutter head design is of a ‘double skin’ construction for greater strength and longer life. The drive is by means of ‘vee’ belts from the hydraulic motor to the rotor, with the drive completely contained within the width of head for a cleaner cut.
Twin ‘vee’ belts take the drive from the motor to the rotor - giving a reliable drive with the added benefit of anti-shock protection that a belt drive system provides.

A hydraulically powered ‘breakback’ system is built into all models. This is primarily to protect components when encountering obstructions, but also acts as an aid when cutting in difficult and awkward corners.

Two parking stand legs are fitted to the machine, which once the machine has been attached to the tractor should be folded away in the ‘stow’ position.

A hydraulically powered breakback system (100° max slew) is built into all models - this is primarily to protect machine components should obstructions be encountered whilst working, but also acts as an aid when cutting in difficult and awkward corners.

Every machine has ‘angle head flotation’ as standard – on cable machines this is engaged by moving the head rotation lever beyond the normal actuation range into a detented ‘float’ position, on electric machines a switch engages the head float.
‘Lift float’ is available as an option on the machine.

All machines have a relief valve in the primary ram system, this limits the pressure which can be generated in the drop side of the cylinder – the cutting head cannot therefore be ‘driven’ into the ground in any circumstances.

TRACTOR SELECTION

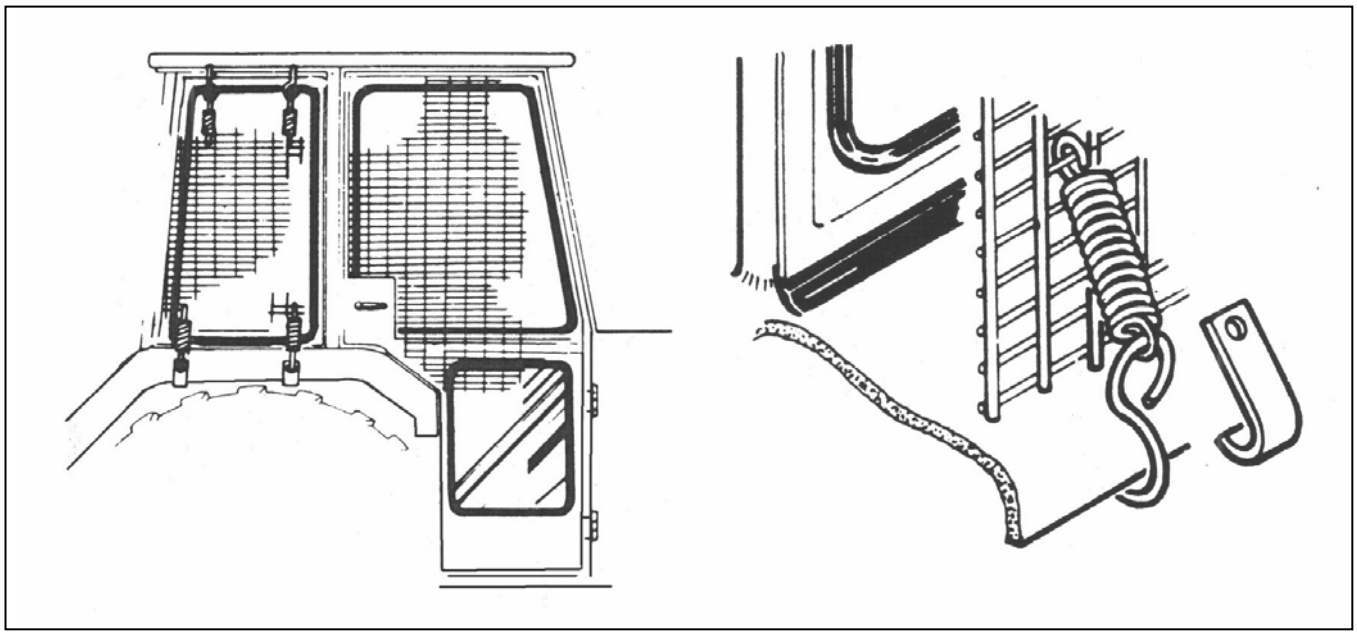
Tractor Specifications

TS465 – Tractor size must be a minimum of 45kW (60 HP)
TS525 – Tractor size must be a minimum of 48kW (65 HP)

Tractors must be equipped with a power take off (PTO) shaft that must run at 450 rpm during operation. The PTO shaft should run clockwise when viewed from the rear of the tractor and ideally be of a 1⅜" S.A.E. – 6 spline shaft type to enable a standard PTO shaft to be connected.

The tractor should have counterbalance weights *(on approved mountings)* fitted if necessary and/or ballasted wheels to ensure stability of the unit at all times.
Stability may be further increased with a wider track setting on the tractors rear wheels – *contact your local dealer or tractor agent for specific advice on this subject.*
Four wheel drive tractors have extra weight inbuilt plus larger front wheels, this is an advantage in keeping the unit stable.

TRACTOR/OPERATOR GUARDING



Use a tractor with 'safety glass' windows if possible and fit **Operator guard** *(Part No.7313324)* using the hooks provided.
Shape 'safety protection material' to cover all vulnerable areas. Remember the driver must be looking through 'safety protection' at the flail head in any working position.
If the windows are not laminated safety glass polycarbonate glazing must also be fitted.
If the tractor has a roll bar only, a frame must be made to carry both mesh and polycarbonate glazing.
Ensure the operator is guarded by 'safety protection' whatever position the machine is in and that the protection is such that it does not interfere with tractor and machine functions or obstruct the operator's vision.

HYDRAULIC OIL

IMPORTANT

The hydraulic system will have been 'run-up' and checked at the factory prior to the machines despatch, where 'Texaco Rando 46' hydraulic oil is used - and is recommended for the machine.
The hydraulic tank will have oil in it when delivered.

Oil tank capacity for the TW465 & TW525 is 200 Litres

The user must ensure the hydraulic tank is full of 'RANDO 46' hydraulic oil (or an equivalent recommended oil – refer to oil chart below) before attempting to start the machine from new.

Recommended Oils

Manufacturer	Cold or Temperate Climate	Hot Climate
BP	*Bartran 46* *Energol HLP-HM 46*	*Bartran 68* *Energol HLP-HM 68*
CASTROL	*Hyspin AWH-M 46*	*Hyspin AWH-M 68*
COMMA	*Hydraulic Oil LIC 15*	*Hydraulic Oil LIC 20*
ELF	*Hydrelf HV 46* *Hydrelf XV 46*	*Hydrelf HV 68*
ESSO	*Univis N 46*	*Univis N 68*
FUCHS **(UK/Non UK markets*)**	*Renolin 46* *Renolin HVZ 46* *Renolin CL46/B15** *Renolin AF46/ZAF46B**	*Renolin 68* *Renolin HVZ 68* *Renolin CL68/B20** *Renolin AF68/ZAF68B**
GREENWAY	*Excelpower HY 68*	*Excelpower HY 68*
MILLERS	*Millmax 46* *Millmax HV 46*	*Millmax 68* *Millmax HV 68*
MORRIS	*Liquimatic 5* *Liquimatic HV 46* *Triad 46*	*Liquimatic 6* *Liquimatic HV 68* *Triad 68*
SHELL	*Tellus 46* *Tellus T46*	*Tellus 68* *Tellus T68*
TEXACO	*RandoHD 46* *Rando HDZ 46*	*Rando HD 68* *Rando HDZ 68*
TOTAL	*Equivis ZS 46*	*Equivis ZS 68*

The tank top filter/breather is equipped with a strainer to ensure all oil is strained when being put into tank. The strainer basket - should never be removed, all hydraulic oil filling is to be done through the strainer.

WARNING

Never mix hydraulic oils - if another supplier's oil is to be used ensure it is suitably compatible oil - *Check with your oil supplier or machine manufacturer first.*

ATTACHING THE MACHINE TO THE TRACTOR

IMPORTANT: -
Ensure the machine is parked on a firm and level site away from bystanders or onlookers. Read and understand all instructions in this manual regarding Health, Safety and the use of this machine.

FOR PIN TYPE LOWER LINKAGE EYES ONLY

- Remove spring pins, lift pins and spacers as supplied with Hedgetrimmer from lower link positions of linkage frame.
- Slowly and very carefully reverse the tractor towards the machine linkage frame.
- With care - ensure that tractor lower link ball eyes fit between lower jaws of linkage frame and that pin holes are aligned.

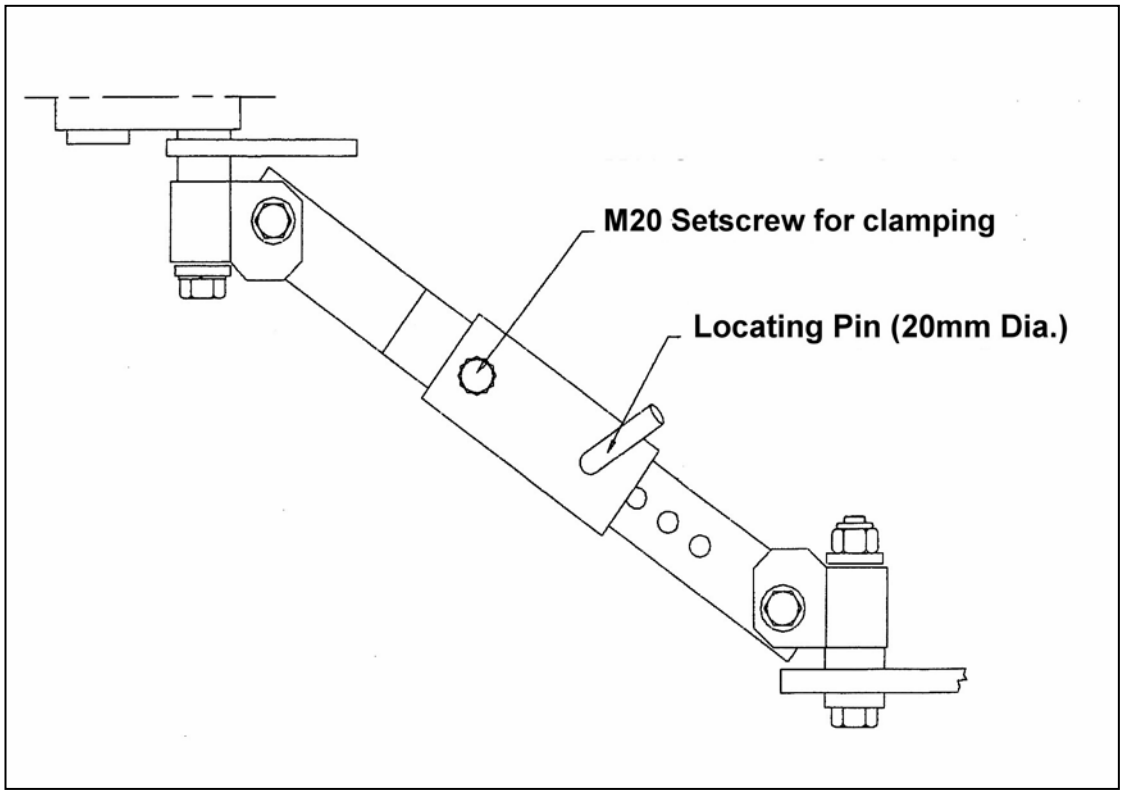
SWITCH OFF TRACTOR ENGINE AND ENSURE HANDBRAKE IS ON

- With holes of tractor lower link eyes in line with lower jaw holes of frame - the lower linkage pins should now be refitted - with spacers 'in position - on pin, between jaws and outboard'
- Spacer is provided to prevent side movement of link arms.
- Secure lift pin into position using the 7/16" dia. pin and ring assembly.

FOR AUTOMATIC QUICK CROOK-ON LOWER LINK ONLY

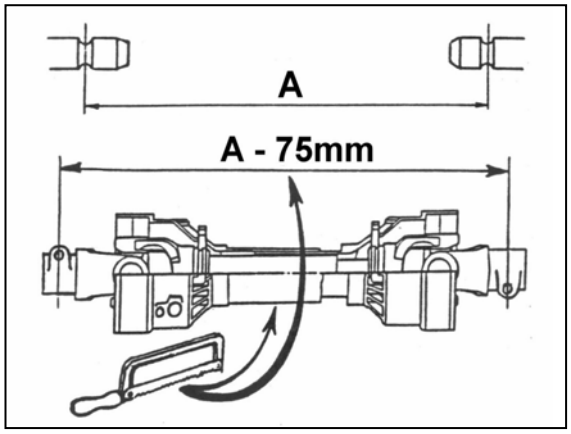
- Remove spring pins, lift pins and spacers as supplied with Hedgetrimmer from lower link positions of linkage frame. Then reassemble lift pin, spacer together with tractor lower link ball end eye - all onto lift pin (between ears of frame) - with spacers to the outside. Then secure into position using 7/16" diameter pin and ring.
- Slowly and very carefully reverse the tractor towards the machine linkage frame.
- With care - ensure that tractor lower links fit between lower jaws of linkage frame and are aligned with relevant ball eyes now already on lower lift pins.
- Raise tractor lower link arms to a position that allows the ball to engage correctly into its own housing in arm.
- The adjustable 'A' frame - stabiliser arms should now be set to required length to suit tractor.
- The main 20mm diameter locating pin - through both assemblies should be removed after first disconnecting its 7/16" diameter lock-pin and ring.
- Slacken off the M20 setscrew (clamping both halves together)

- The pair of stabiliser arms can now be telescoped upwards/forwards to allow the top link coupler to be fitted to the tractor top link position. Secure upper end of stabiliser to tractor top link point using tractor top link pin and spring pin.
- The top link stay - between Hedgetrimmer and stabiliser frame may have to be lengthened/adjusted to suit.



START-UP TRACTOR

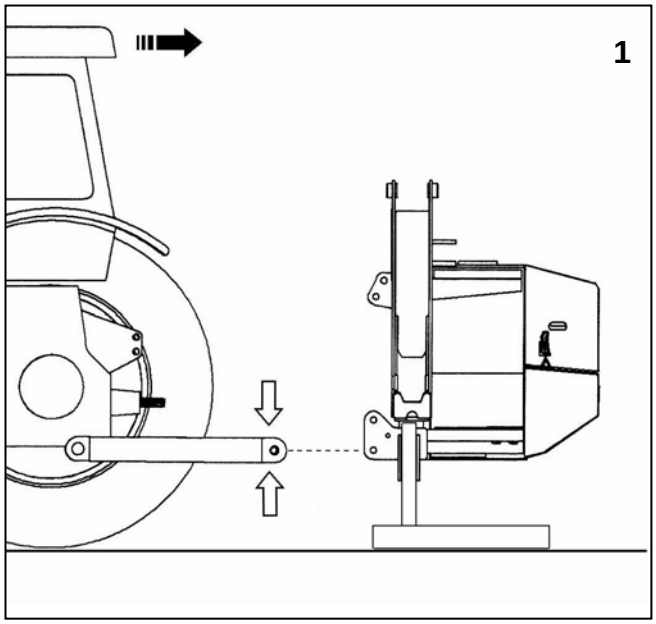
- Raise whole machine on linkage until a height is reached which gives a reasonably horizontal path for the P.T.O shaft and approximately 300mm.
- With machine at this height setting the 20mm diameter locating pin for stabiliser arms should be fitted through pair of nearest matching holes, and secured with 7/16" pin and ring (both arms) - *Ensure chosen setting is same on both arms.*
- Tighten M20 setscrew to each stabiliser arm - to lock together.
- Lower three-point linkage to allow weight of machine to be taken on stabilisers.
- Tractor lower linkage check chains assemblies should now be tightened to make sure tractor arms are locked and machine is positioned centrally at rear of tractor.
- Top link should be adjusted to ensure hedgetrimmer is upright.
- Check the P.T.O shaft length.
  When connected from tractor to machine it should engage by 1/3rd of the total shaft length, i.e. male part should be halfway from the end to fully 'bottomed' out. Do not use the machine until this has been cut to the correct length.



*Measure the PTO shaft and cut to the dimension shown – the finished length of the PTO shaft should be 75mm (3") less than the measured distance '**A**' -between tractor shaft and gearbox stub shaft – to enable fitting.*
NOTE:
For subsequent use with different tractors measure again, there must be a minimum shaft overlap of 150mm (6").

- Fit the P.T.O shaft.
- Ensure the shaft is correctly fitted to the correct splines - at both ends.
- Fit the anti-spin chains of P.T.O guard to a rigid non-turning assembly.
- Remove both stand legs - one on sub-frame and one on tank.
  The sub-frame mounted stand leg is to be stored where and as indicated below.
- The plate stand at outer face of tank, once removed - should be inverted and located back onto the same mounting pins and secured by same 7/16" lynch pins.
- Tank stand leg can be used as a warning triangle to warn traffic etc. near the worksite (use in the position shown in left hand drawing)
- The mesh safety screens should now be cut and fitted. They are designed to be fitted to the cutting head side of tractor cab (i.e. for left-hand cut machines to left-hand side of cab). Bolts, nuts and washers are supplied for fixing purposes.

  All glass screens on the relevant side of cab must be protected.
- Fix valve control handles into position:-
- Control levers are supplied bolted together as a unit complete with a support leg to slot into a bracket supplied for fitting to the tractor.
- Depending on model there may be 4, 5 or even only one controller in the set. The locating bracket should be positioned on the inner wing face of the tractor cab in a suitable position for easy operation. Bolts, nuts and washers are supplied for fixing.
- It is suggested that for four and five bank controller sets the bracket is fitted to the left-hand wing for left-hand cut machines and right-hand wing for right- hand cut machines.
- In the case of single-bank controllers, it is suggested that the bracket is fitted to the opposite side for the control of the cutting direction and that the joystick mounting bracket is fitted to the cutting side (both brackets are however the same). Once the bracket is fitted to the cab side the controller unit can be lowered into the brackets slot and secured by tightening screw 'X' (clockwise).
- Drawing shows a bank of five controllers to be fitted to a support leg and to be fitted to a locating bracket to be fitted to the inner wing for left-hand cut machines.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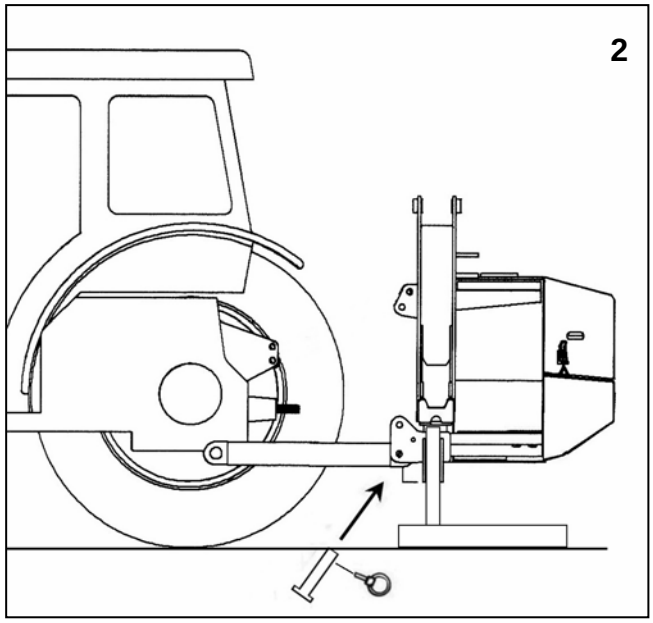
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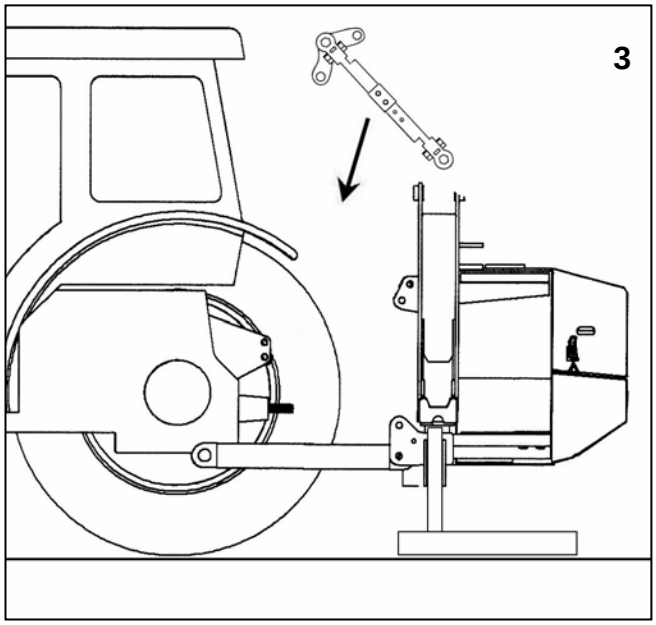
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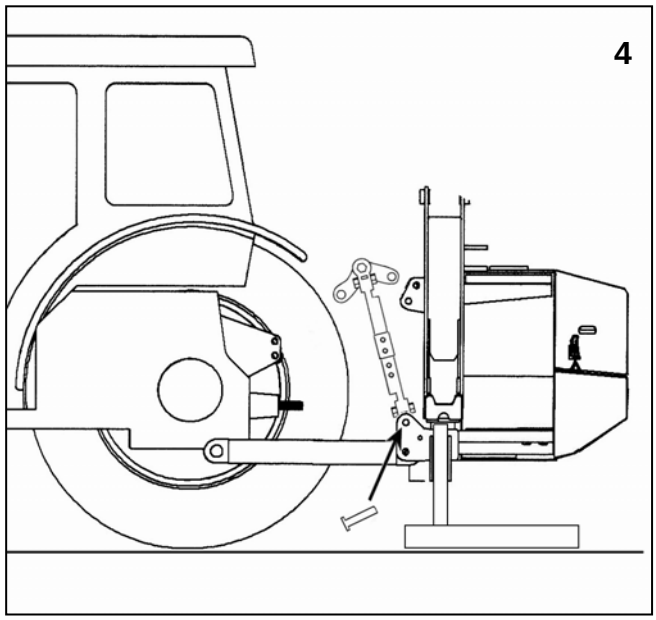
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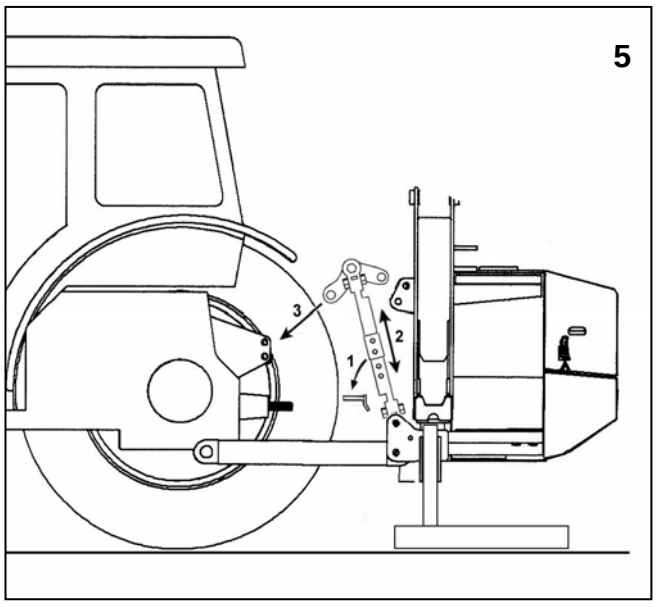
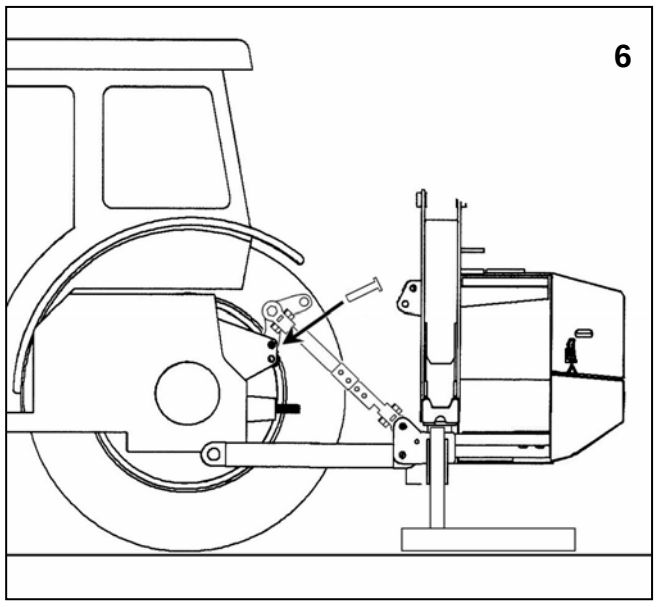

5
3
2
1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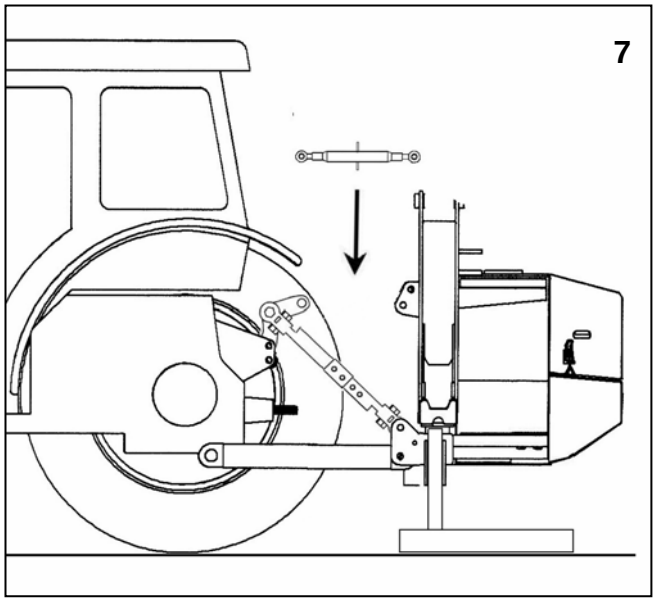
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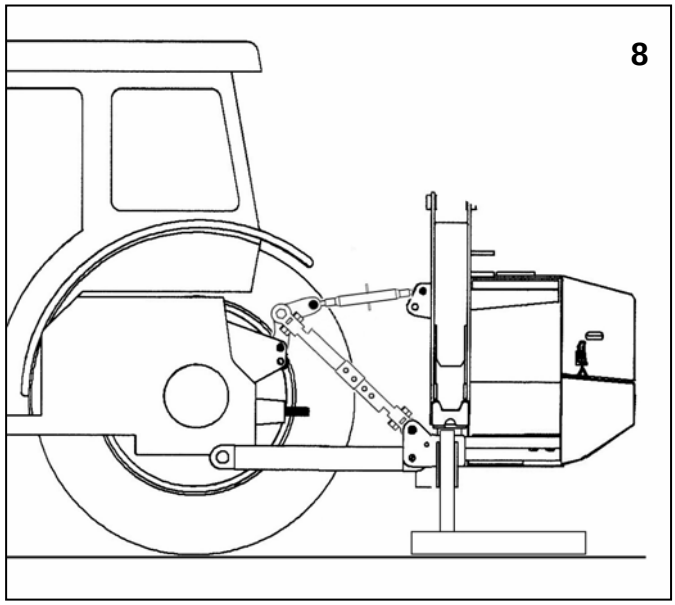
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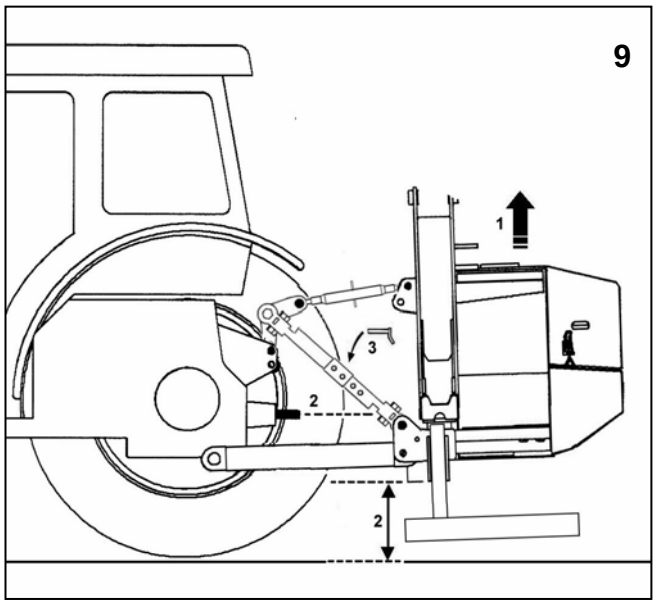
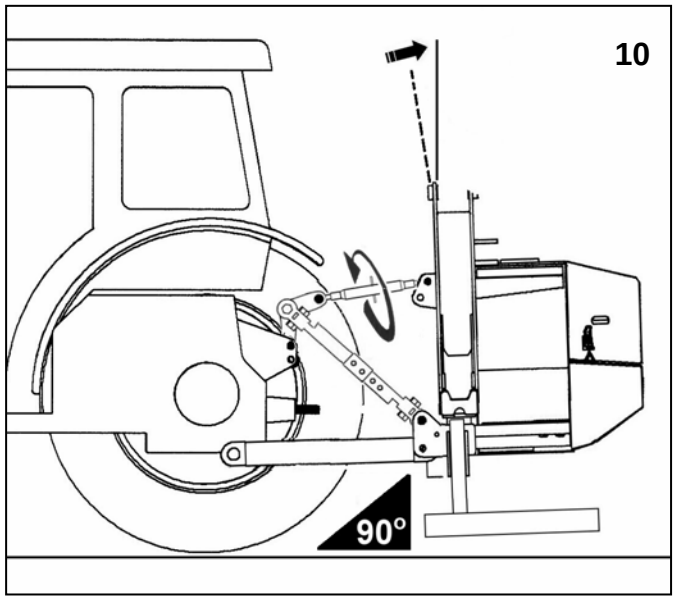
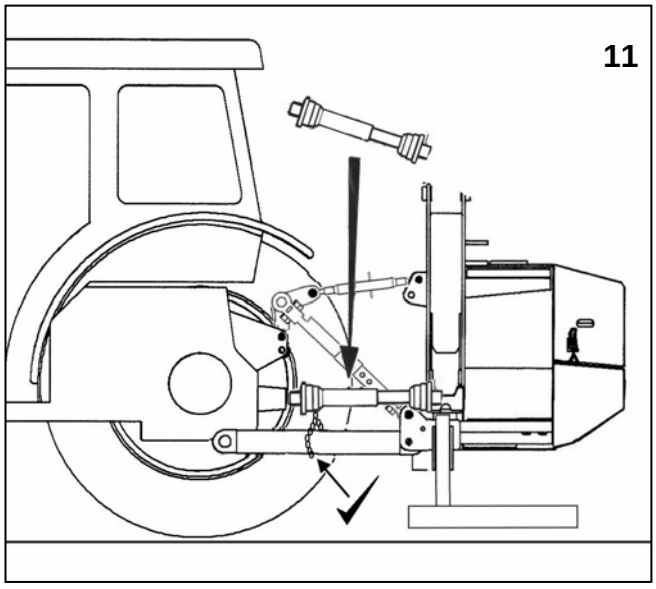

9
1
3
2
2


10
90°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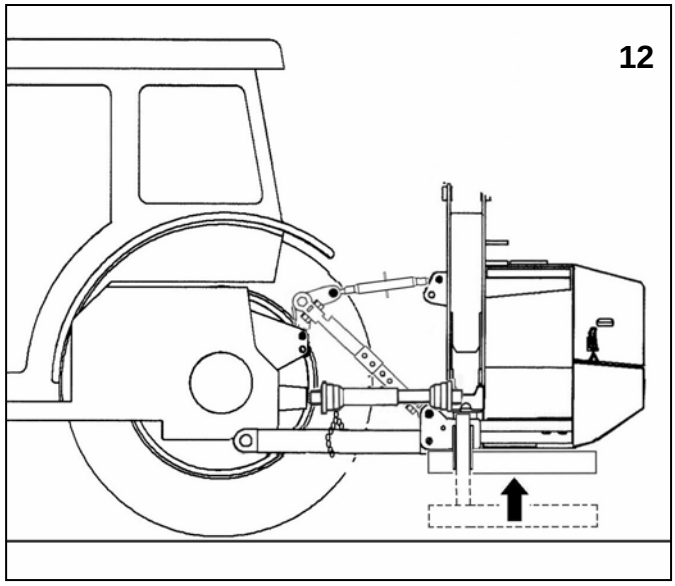

12

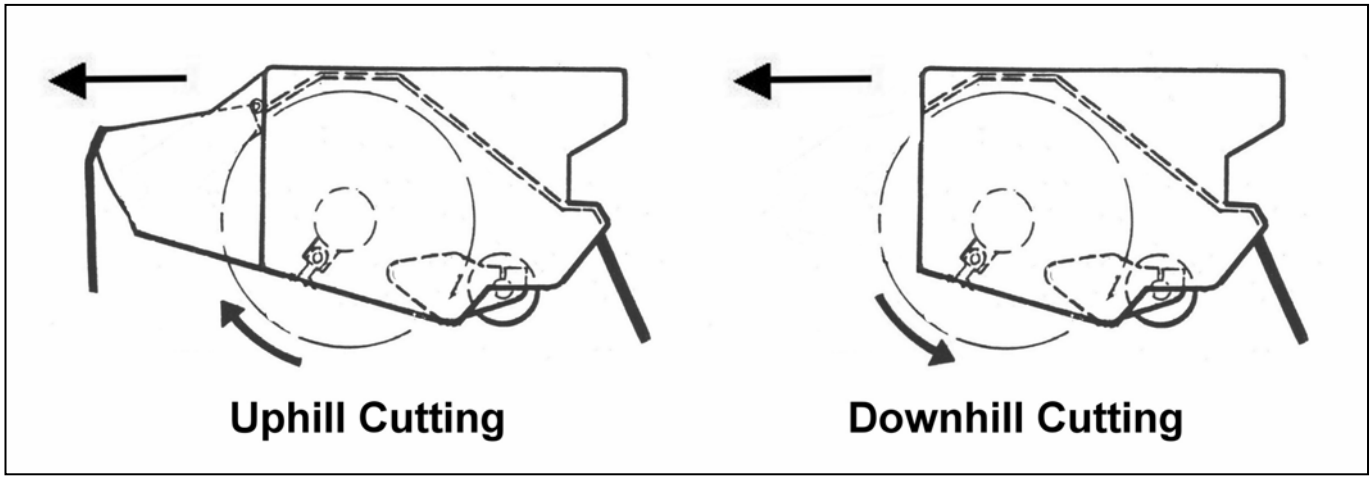
FLAIL TRIMMER- OPERATION INFORMATION

The vehicle driver should be conversant with all tractor controls and capabilities.
It is always advisable for the tractor driver to practice the controls and operations of the Flail Trimmer, in a safe open location away from potential hazards, prior to setting off into work.
The speed of operation of Trimming will depend on the size, quantity, and type of growth to be cut. A slow speed to suit conditions should be selected, ensuring that engine speed gives a P.T.O speed of 450 R.P.M for general use - *this 450 R.P.M (PTO) is recommended for best trimming results and performance, variation from this recommended R.P.M should be kept to a minimum and never at any time should PTO R.P.M exceed 540 R.P.M.*

ROTOR ROTATION DIRECTION

Depending on the type of hedge to be cut, an option of rotation direction is offered.
The 'upward' cut is recommended for trimming grass, light growth such as one/two year's growth.

DOWNWARD CUTTING IS NOT RECOMMENDED - and should only be considered for really heavy, large diameter, growth cutting - even then, it is important that down cutting is kept to the minimum, very short periods, only.



DANGER - IMPORTANT

In heavy conditions when cutting large diameter growth with front cowling removed, the rotor MUST ALWAYS CUT DOWNWARDS AT FRONT. **At no time should the rotor be cutting upwards with the front cowling removed.**

DANGER VERY IMPORTANT

It is very important that motor spool and motor spool control lever works in one direction only - From centre (OFF) position to selected (ON) 'rotor cut' direction position – permitting the rotor one direction of cut and the 'OFF' setting only. This eliminates the chance of going from 'cut-up' to 'cut-down' in one movement of controls and blowing the system. Only by altering LOCK-LEVER setting can direction of control lever be changed.

WARNING

<u>DANGER</u> - NEVER CHANGE DIRECTION OF ROTOR CUT WHILST ROTOR IS STILL TURNING.

<u>DANGER</u> - ALWAYS ALLOW ROTOR TO STOP SPINNING COMPLETELY BEFORE CHANGING CUT ROTATION DIRECTION.

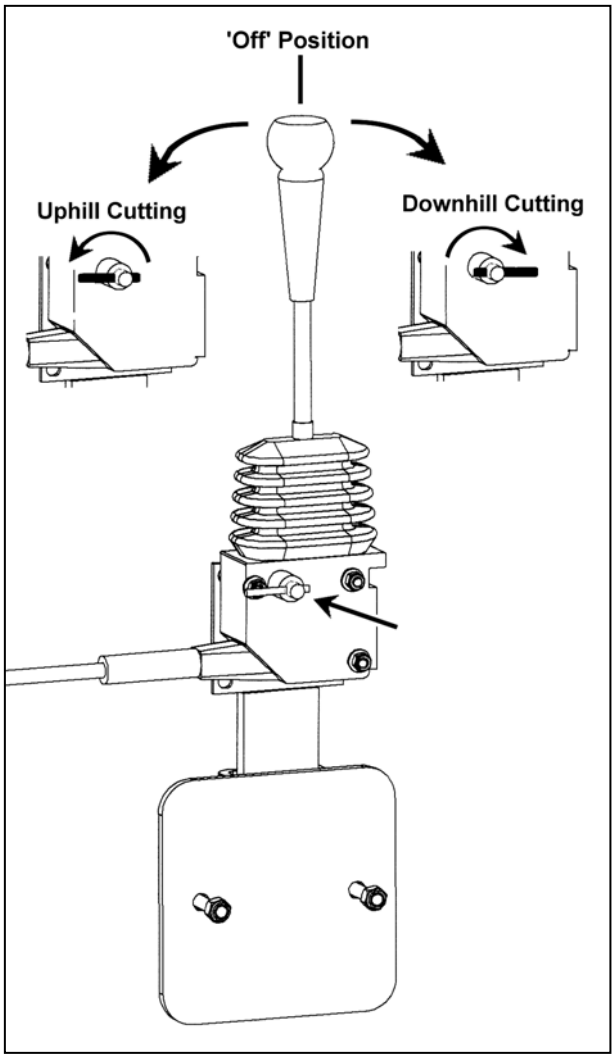
On despatch from the manufacturer the machine will be supplied set as standard for 'upward' rotor cutting unless specifically requested otherwise.

<u>ROTOR CUT DIRECTION MUST NEVER BE CHANGED IN ONE MOVEMENT</u>

The controller lever head for motor spool control is designed with a "LOCK-ARM LEVER" which is operated by rotating and positioning as follows: -

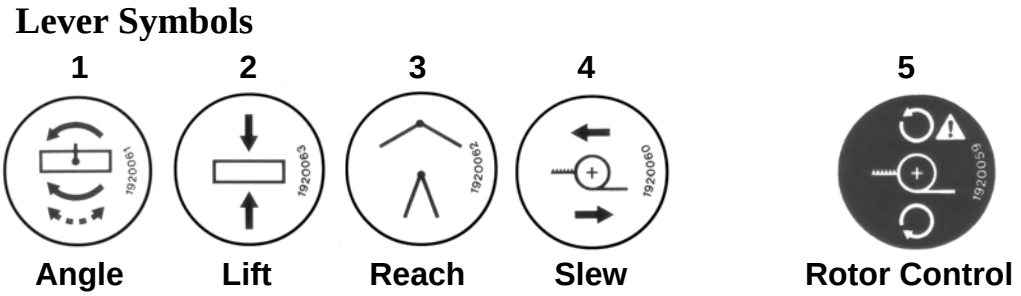
Uphill Cutting
Lever positioned with long end of pin rearwards
- 9.00 o'clock when viewed from the side -
Control lever will now only be permitted to travel in the neutral to the uphill cutting mode (Off and Towards).
Refer to diagram opposite.

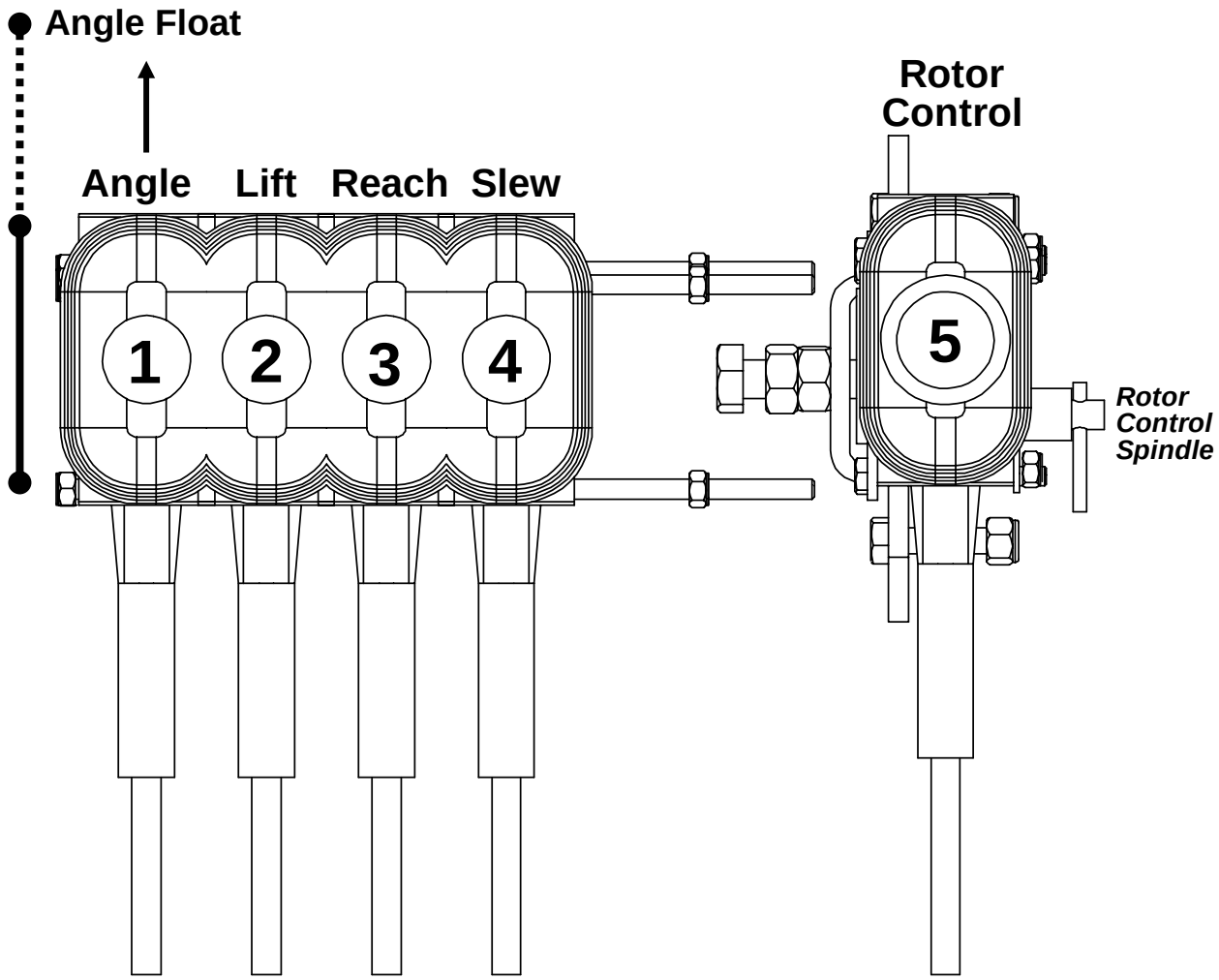
Downhill Cutting
Lever positioned with long end of pin forwards
- 3.00 o'clock when viewed from the side -
Control lever will now only be permitted to travel in the neutral to the downhill cutting mode (Off and Away).
Refer to diagram opposite.



WARNING:
Ensure rotor is stationary before switching from one cutting mode to another.

CABLE CONTROLS

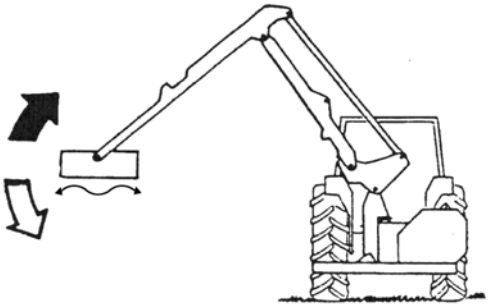




CABLE CONTROLS – LEVER FUNCTIONS

1

Angle



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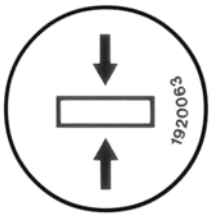
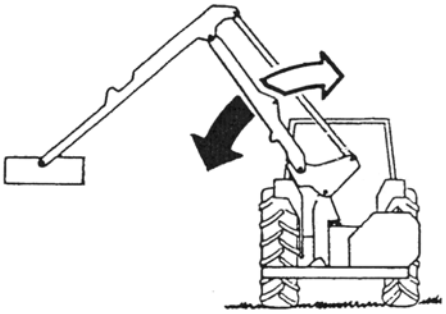
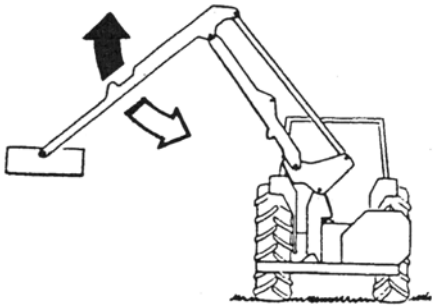


Lift



3

Reach



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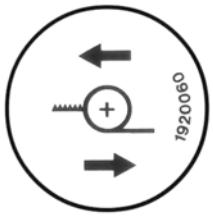
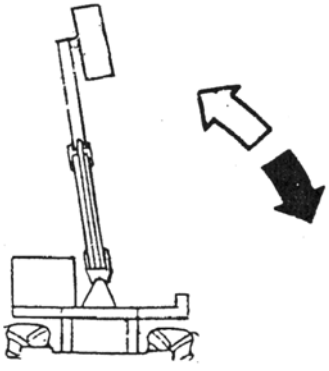
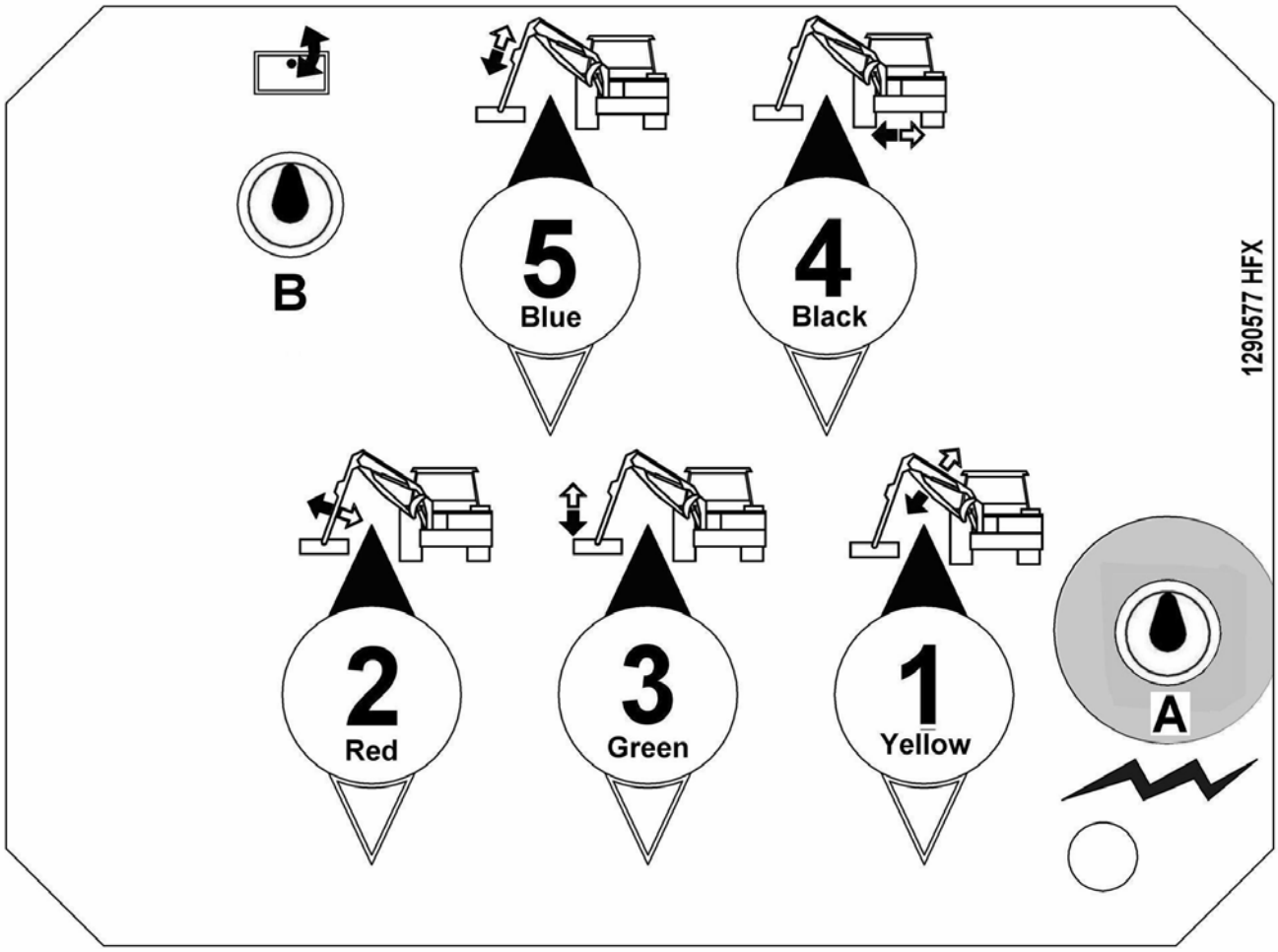
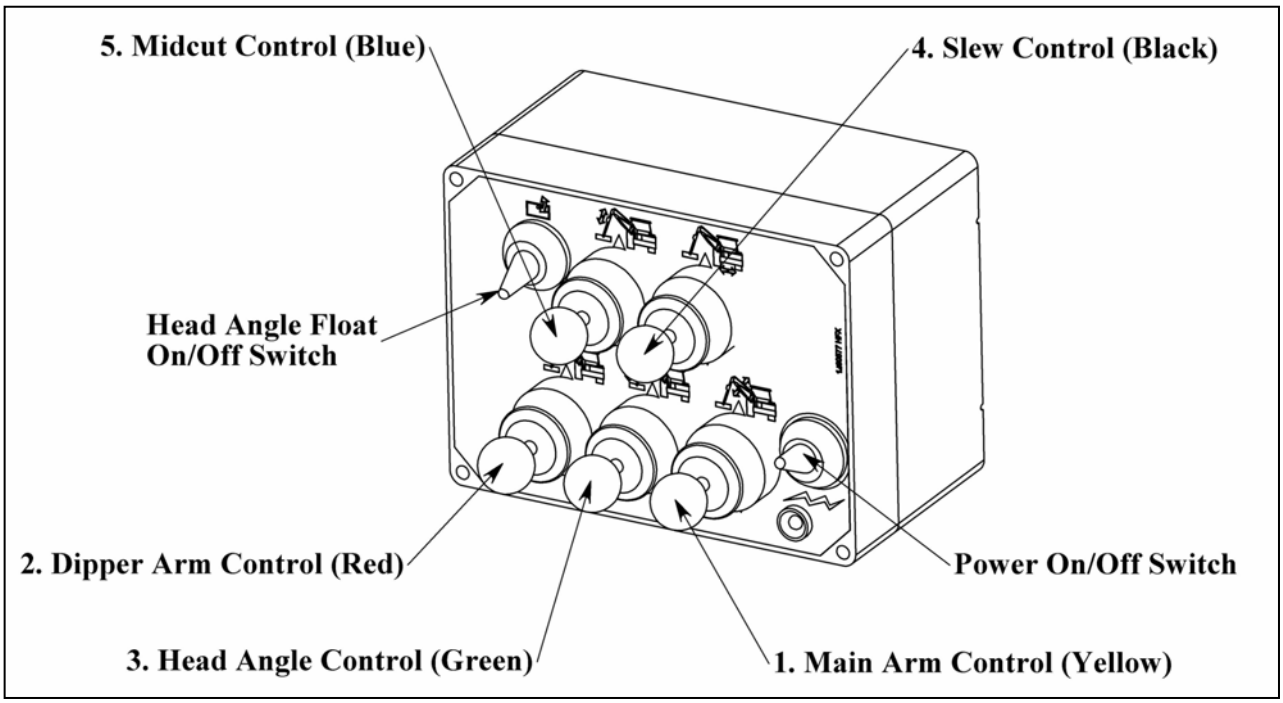


Slew



SWITCHBOX CONTROLS – Operation and Functions





SWITCHBOX CONTROLS – Operation and Functions *(Refer to diagrams)*

SWITCH 'A'

Power On/Off – Power to the control unit is controlled via the On/Off Switch (**A**), a red l.e.d light will be illuminated in the 'Power On' mode.
Switch Up – Power On (red light lit).
Switch Down – Power Off (red light off).

SWITCH 'B'

Head Angle Float – 'On/Off' Switch for selecting or deselecting Head Angle Float.
Switch Up – Head Angle Float selected.
Switch Down – Head Angle Float deselected.

SWITCH LEVER FUNCTIONS

1. **Yellow Switch Lever** - Movement of this lever in a 'Forward' and 'Backward' direction operates the Main Arm:
   Forwards – Lowers the Main Arm.
   Backwards – Raises the Main Arm.

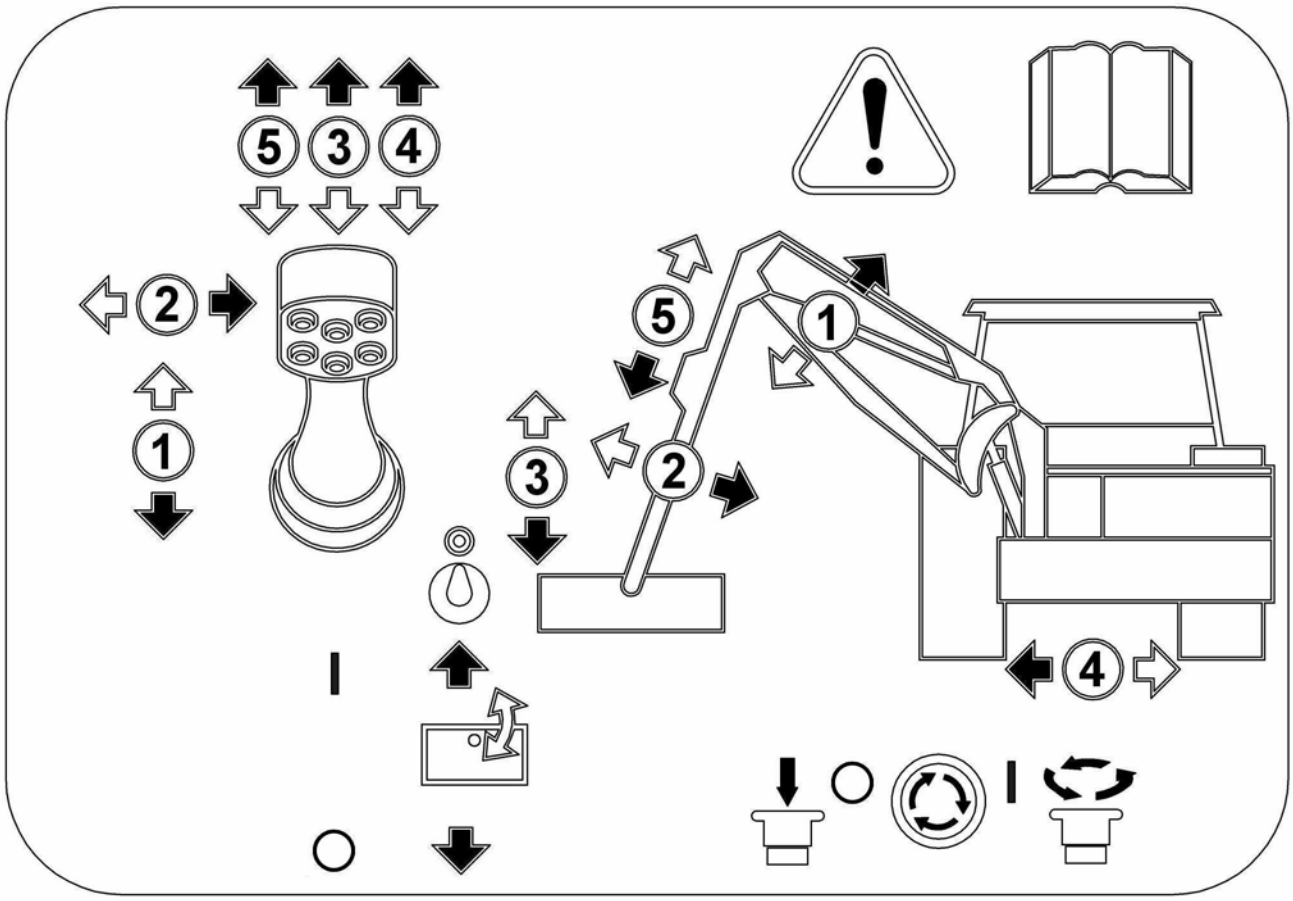
2. **Red Switch Lever** - Movement of this lever in a 'Forward' and 'Backward' direction operates the Dipper Arm:
   Forward – Moves Dipper Arm away from the operator.
   Backward – Moves Dipper Arm towards the operator.

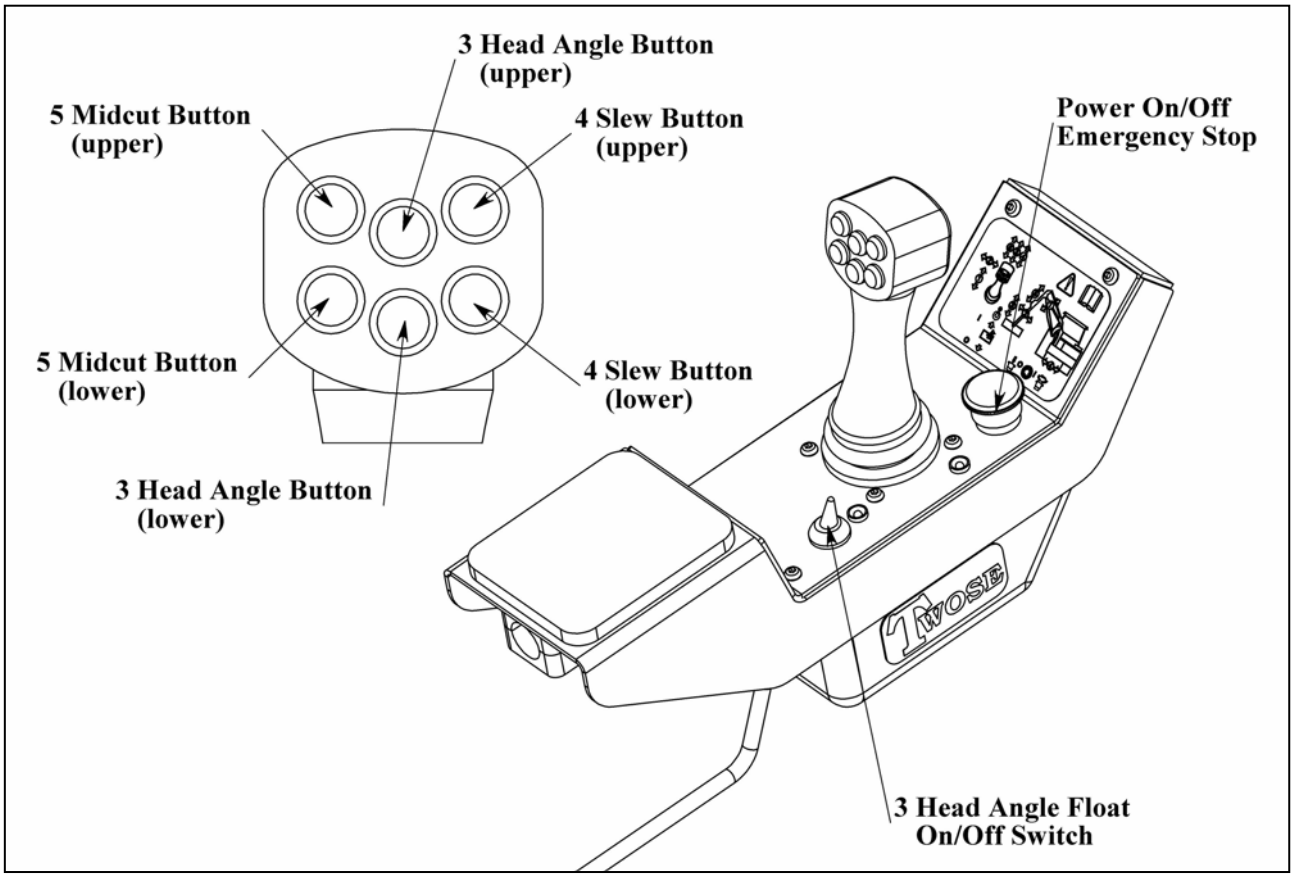
3. **Green Switch Lever –** Movement of this lever in a 'Forwards' and 'Backwards' direction operates the 'Head Angle' function:
   Forward – Lowers the 'Outer' end of the flail head and raises the 'Inner' end.
   Backward – Raises the 'Outer' end of the flail head and lowers the 'Inner' end.

4. **Black Switch Lever** – Movement of this lever in a 'Forward' and 'Backward' direction operates the 'Slew' function:
   Forward – Slews the machine into the 'working' position.
   Backward – Slews the machine into the 'transport' position.
   Note: this function can be utilized for repositioning the machine to work in difficult positions such as corners and for negotiating around, or avoiding, obstacles.

5. **Blue Switch Lever –** Movement of this lever in a 'Forward' and 'Backward' direction operates the 'Midcut' function (Cranked Arm models only):
   Forward – Straightens the Cranked Arm away or out of the 'Midcut' position.
   Backward – 'Cranks' the Arm towards or to the 'Midcut' position.
   Note: On Standard Arm models this lever performs no function.

MONOLEVER CONTROLS – Operation and Functions

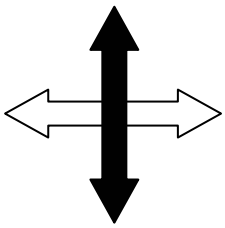




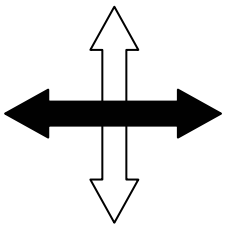
MONOLEVER CONTROLS – Operation and Functions *(Refer to diagrams)*

POWER ON/OFF – Power to the control unit is controlled via the master On/Off button.
Power ON – Rotate button to Power on the Control Unit (button will 'spring' out).
Power OFF – Press button in to Power off or for Emergency Stop.

LEVER FUNCTIONS



1. **Lever** - Movement of the lever in a 'Forward' and 'Backward' direction operates the Main Arm:
   Forwards – Lowers the Main Arm.
   Backwards – Raises the Main Arm.



2. **Lever** - Movement of the lever in a 'Sideways' direction operates the Dipper Arm:
   Left – Moves Dipper Arm away from the operator.
   Right – Moves Dipper Arm towards the operator.

SWITCH FUNCTION

3. **Head Angle Float Switch –** standard 'On/Off' switch for selecting or deselecting of Head Angle Float mode with red l.e.d. light indication:
   Switch Up – to select Head Angle Float mode (red light on).
   Switch Down – to deselect Head Angle Float mode (red light off).

BUTTON FUNCTIONS

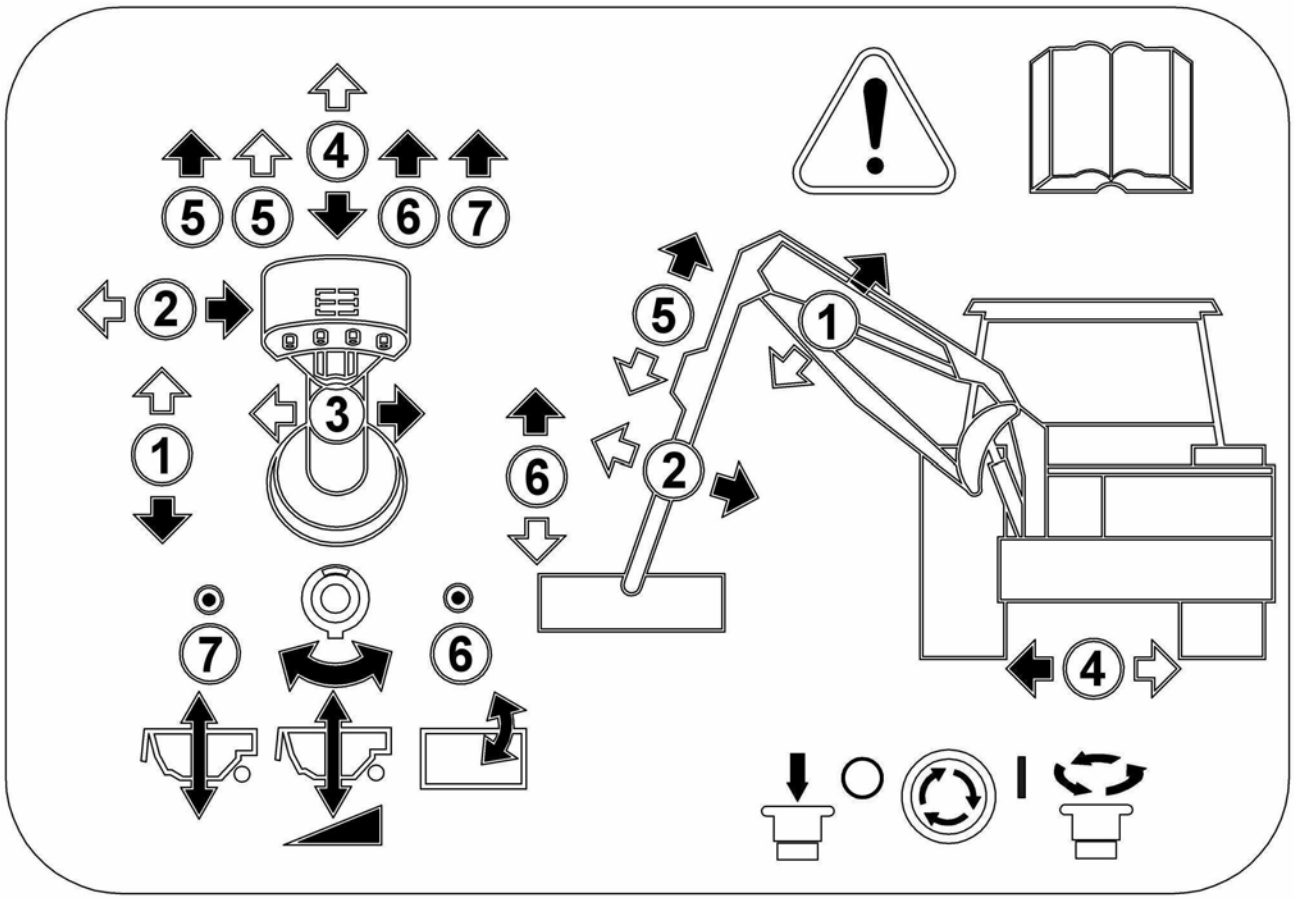
Note: with all the following buttons movement is dictated by the length of time the button is held – releasing the button will halt the movement in that function.

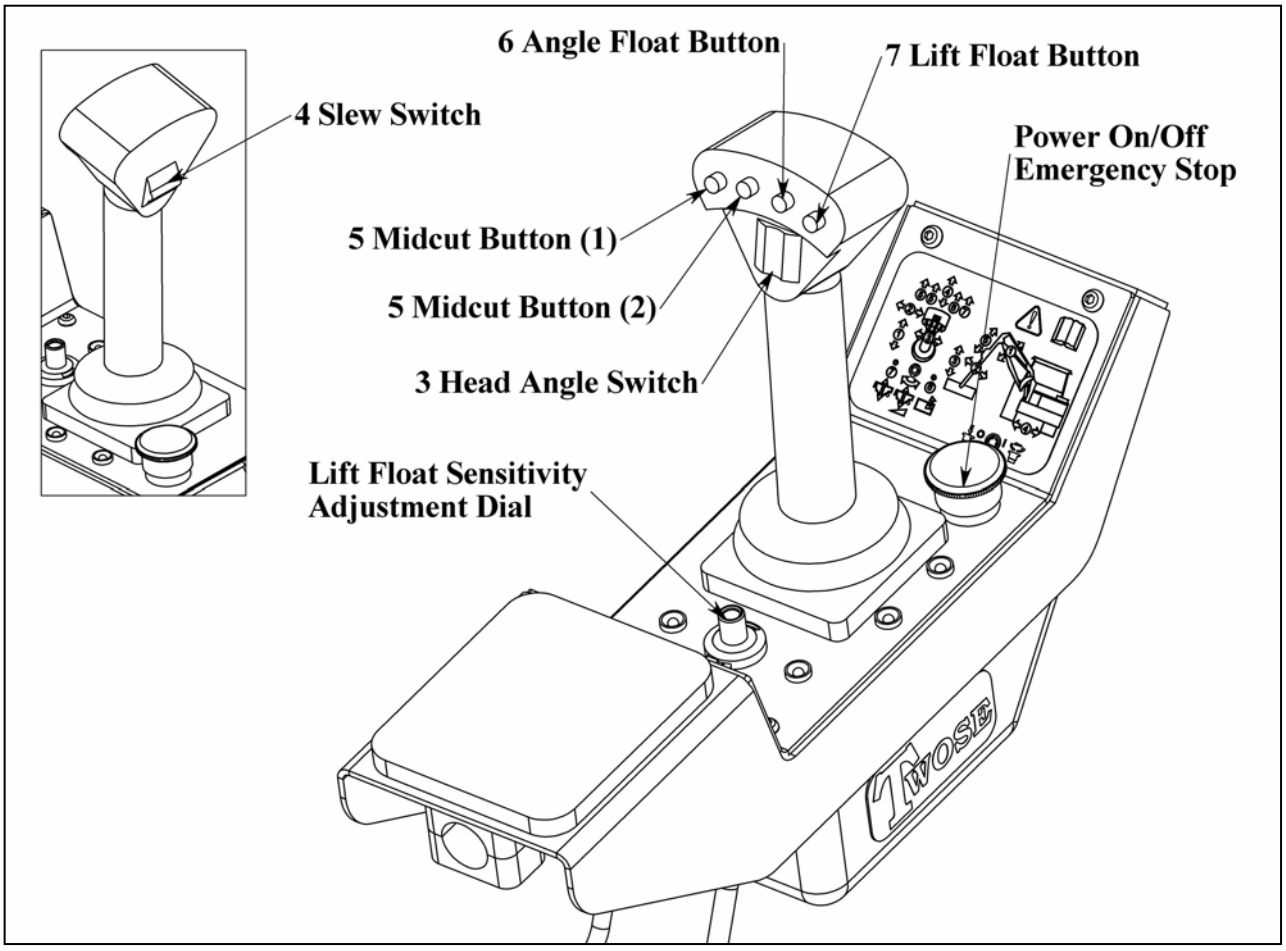
3. **Head Angle Buttons** – 2 'press and hold' buttons (top & bottom) for adjustment of the head angle:
   Top Button – Lowers 'Outer' end of the flail head and raises 'Inner' end.
   Bottom Button – Raises 'Outer' end of the flail head and lowers 'Inner' end.

4. **Slew Buttons** – 2 'press and hold' buttons (top & bottom) for 'slew' operation:
   Top Button – Slews the machine into the 'working' position.
   Bottom Button – Slews the machine into the 'transport' position.
   Note: this function can be utilized for repositioning the machine to work in difficult positions such as corners and for negotiating around, or avoiding, obstacles.

5. **Midcut Buttons** (Cranked Arm models only) – 'press and hold' buttons for positioning of the Midcut/Cranked Arm:
   Top Button – Straightens the Cranked Arm away or out of the 'Midcut' position.
   Bottom Button – 'Cranks' the Arm towards or to the 'Midcut' position.
   Note: On Standard Arm models these Midcut buttons serve no function.

PROPORTIONAL CONTROLS – Operation and Functions

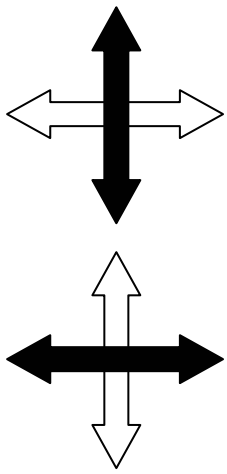




PROPORTIONAL CONTROLS – Operation and Functions *(Refer to diagrams)*

POWER ON/OFF – Power to the control unit is controlled via the master On/Off button.
Power ON – Rotate button to Power on the Control Unit (button will 'spring' out).
Power OFF – Press button in to Power off or for Emergency Stop.

LEVER FUNCTIONS



1. **Lever -** Movement of the lever in a 'Forward' and 'Backward' direction operates the Main Arm:
   Forwards – Lowers the Main Arm.
   Backwards – Raises the Main Arm.

2. **Lever -** Movement of the lever in a 'Sideways' direction operates the Dipper Arm:
   Left – Moves Dipper Arm away from the operator.
   Right – Moves Dipper Arm towards the operator.

SWITCH FUNCTIONS

3. **Head Angle Switch** – a 'Thumb' operated rocker switch for adjustment of the head angle:
   Left – Lowers the 'Outer' end of the flail head and raises the 'Inner' end.
   Right – Raises the 'Outer' end of the flail head and lowers the 'Inner' end.

4. **Slew Switch** – a 'Trigger finger' operated rocker switch for slew operation:
   Down – Slews the machine into the 'working' position.
   Up – Slews the machine into the 'transport' position.
   Note: this function can be utilized for repositioning the machine to work in difficult positions such as corners and for negotiating around, or avoiding, obstacles.

BUTTON FUNCTIONS

5. **Midcut Buttons** (Cranked Arm models only) – 'press and hold' buttons for positioning of the Midcut/Cranked Arm – movement is dictated by the length of time the buttons are held.
   Left Button – Straightens the Cranked Arm away or out of the 'Midcut' position.
   Right Button – 'Cranks' the Arm towards or to the 'Midcut' position.
   Note: On Standard Arm models these Midcut buttons serve no function.

6. **Head Angle Float Button** – 'press select and deselect' toggle button for Head Angle Float function – mode selection indicated by red l.e.d. light.
   Press Button – Selects Head Angle Float mode (red light on).
   Press Button – Deselects Head Angle Float mode (red light off).

7. **Lift Float Button -** 'press select and deselect' toggle button for Lift Float function – mode selection indicated by red l.e.d. light.
   Press Button – Selects Lift Float mode (red light on).
   Press Button – Deselects Lift Float mode (red light off).
   Lift Float sensitivity is adjusted by means of the 10 turn analogue dial mounted on the control console– sensitivity is increased or decreased depending on direction rotated.

HYDRAULIC CONTROLS - CUTTING POSITION

The cutting head must at all times be lowered gently into the cutting position. Never ‘drop’ a flailhead into a hedge at speed.
When cutting at ground level (grass etc.) the head must be lowered gently to give a slight contact pressure of roller to ground.

WARNING:
Ensure flailhead does not come into contact with obstacles such as rocks, stones, stumps etc. Keep rotor away and free from wire, as to entangle wire in a rotor is both dangerous and costly.
Should large obstacles be encountered or wire become entangled in the rotor **stop immediately** and reset or clear before continuing.

DANGER WARNING
Always stop machine, switch off engine and pocket the key before attempting to remove any items that foul the flailhead.

Normal obstacles and level variations should be overcome by the operator slowing 'forward motion' and raising/lowering the booms of trimmers to suit.

CUTTING HEAD

The cutting head rotor has been balanced prior to fitting; this will ensure a vibration free cutting unit.
Should the rotor become blocked for any reason, hit an obstacle, loose a blade or blades, the rotor may be put into a state of unbalance. This will result in vibration from the rotor being transmitted through the head. Should this happen **stop immediately**, as to continue may have serious consequences.
Once stopped clean rotor and check for loss of blades and bolts, replace as required.
As a result of hitting solid objects with serious force the rotor can be bent, this will obviously cause vibrations. In such cases the only answer will be to get the rotor repaired/rebalanced or replaced.

Keep the cutting blades VERY SHARP: the flailhead should be inspected daily. Bolts and nuts holding flails to rotor should be checked frequently and kept **tight.** Missing or broken flails should be replaced immediately, as the imbalance will rapidly harm bearings and structure. When a flail is renewed its opposing flail (or pair if using Back to Back flails) should be renewed also in order to maintain balance.
Check ‘vee’ belt tension on cutter head daily: a load of 5 Kgs *(10 lbs.)* should give a deflection of 9mm at these pulley centres. Access to the belts is by removing the guard panel on the side of the drive end. Tension is adjusted by first slackening the bolts mounting the motor *(nuts are held from turning on the inside).* The nuts on the threaded adjuster can now be turned to give the required tension and then re-tightened and the motor mounting bolts then tightened also.

TRANSPORTING

- Turn cutting head to vertical position with flails away from tractor.
- Swing machine rearwards by powering breakback ram to 'open' position.
- Fold 'in' second/outer boom with cutting head, until boom main tube contacts rubber buffer fixed to first boom.

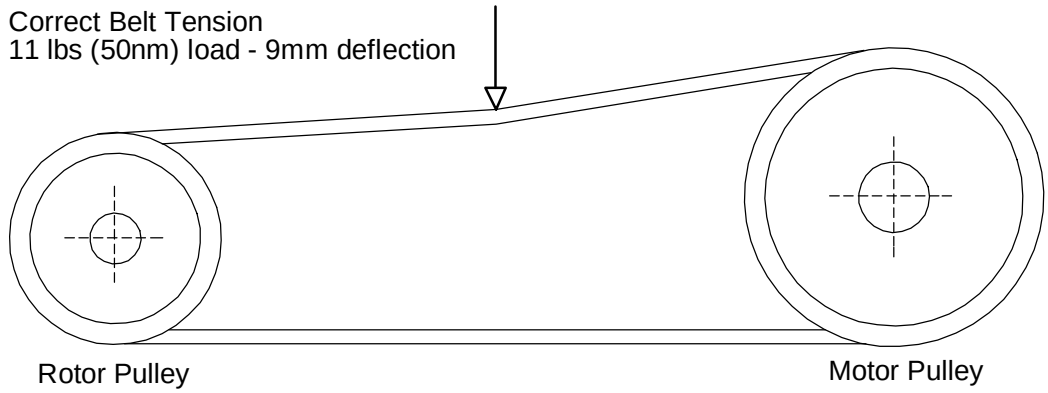
The cutting head should now be positioned behind and slightly inside tractor rear tyre.
The unit is now ready for transport.

WARNING
Never transport a machine with the Booms open -
Ensure Booms are in contact with each other at all times.

CUTTING HEAD ‘VEE’ BELT ADJUSTMENT

To adjust the cutting head ‘vee’ belts the following procedure should be followed: -

- Position the cutting head on the ground in a safe level location with the drive end uppermost.
- Switch off the tractor engine, remove and pocket the key.
- Remove bolt securing the ‘flap-door’ of the drive end, this will release the guard flap panel.
- Open upper guard/inspection panel.
- Slacken the 2 bolts holding hydraulic motor to its mounting plate.
- Adjust belt tension by turning the nuts on the tensioning screw
  - *clockwise will tighten the belt, anti-clockwise will slacken the belt.*
- When the correct belt tension is achieved *(refer to diagram below)* the 2 adjustable nuts on the tensioner screw must be locked tight and the 2 bolts securing the motor to the head re-tightened to lock the whole unit into position.



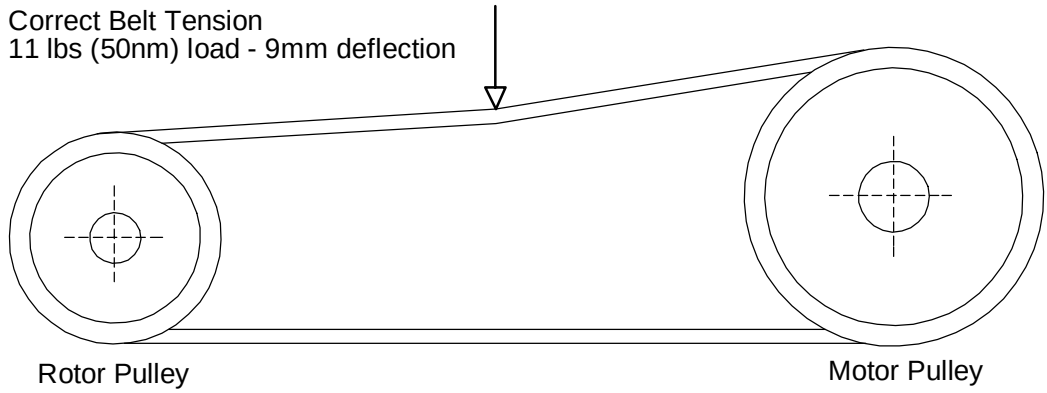
- Re-check tensions when all bolts have been tightened.
- Close flap door and secure with bolt.

NOTE: Belt tension should be checked on a weekly basis.

CUTTING HEAD 'VEE' BELT REPLACEMENT

To replace the cutting head 'vee' belts the following procedure should be followed: -

- Hydraulically position cutting head to stand vertically on the ground with the drive end uppermost - *this should be done on a firm and level location to ensure the cutting head is steady and safe in this position.*
- Stop tractor engine, remove and pocket the key.
- Slacken off the motor mounting bolts and nuts on the threaded adjuster arm to release the belt tension.
- Undo completely, and remove, the 6 bolts that attach the main cover plate to the head.
- Undo, and remove, the 6 M12 x 20 setscrews that hold the bearing housing to the cover plate.
- Remove the cover plate from its bolted position.
- The drive belts can now be removed from around the pair of 'vee' pulleys.
- New belts can now be fitted – position each belt in the respective 'vee's' on both the driven and the driver pulleys.
- Replace the main cover plate assembly over the drive belt aperture.
- Replace the 6 M12 x 20 setscrews through the plate and into the bearing housing. *Ensure all 6 screws are aligned correctly and tightened sufficient only to hold the bearing housing in place.* DO NOT TIGHTEN FULLY.
- Replace all of the M12 x 80 bolts through the cover panel from the panel side – *ensuring first that the holes align* – and place the 'nyloc' stiffnuts onto each bolt.
- With all mounting bolts of both bearing to panel, and panel to head now in position all 12 bolts should be tightened until fully dead tight.
- Belts should now be adjusted to the correct tension as per the diagram below – *refer to belt adjustment section for details.*



- When belts have been tensioned correctly and all covers replaced, the machine is ready for start up.

ROTOR REMOVAL & REPLACEMENT

Removal procedure:

- With the machine attached to the tractor, hydraulically position the cutting head vertically with the drive end downwards resting on the ground – *select a firm level location and ensure the weight of the head is fully rested on the ground.*
- Switch off tractor engine, remove and pocket the key.
- Slacken off and remove the 2 nuts and bolts securing the bearing housing to the flail head main frame at the non-drive end.
- Remove the 4 M12 x 35 setscrews from the drive end (inside shell) - rotor to pulley.
- The whole rotor assembly should now be raised vertically a sufficient amount to allow the drive end location flange to free itself from the locating dowel on the rotor drive pulley.
- With the rotor raised and free of the drive pulley, the drive end of the rotor can be swung gently out of its drive line position in a downward direction relative to the head. With drive end of rotor swung towards base of head the rotor can now be gently lowered to allow non-drive end of rotor, complete with bearing/housing attached, to drop out of main frame and removed.

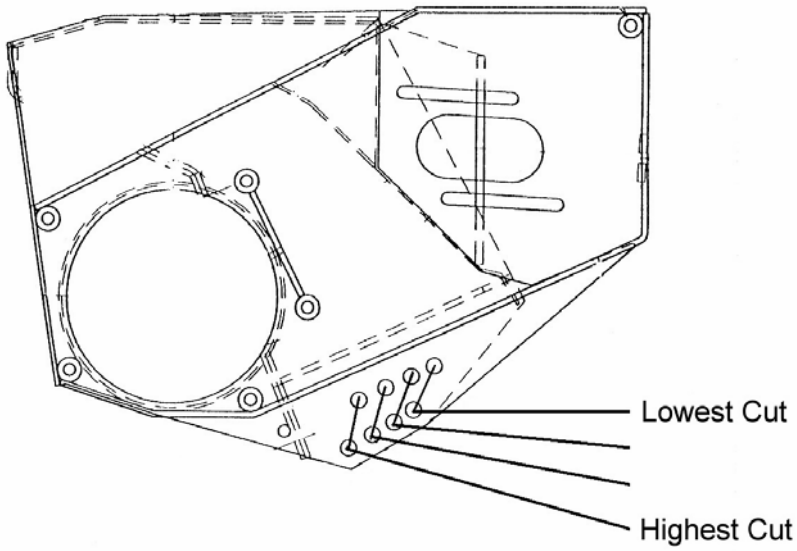
Replacement procedure:

- Position flail head as described for removal procedure – *see above.*
- Position rotor vertically with the drive flange end downwards and gently swing in the upper (non-drive end) towards its location position – *this operation is to be carried out from the base face of the head.*
- Locate non-drive end of the rotor up through the head end panel – at the same time as raising and locating the non-drive end of the rotor the lower drive end should be swung into its drive-line position.
- Ensure lower end of rotor (drive flange) is positioned to register with the locating dowel of the drive pulley. Lower rotor onto dowel to locate with the flange making sure both faces seat together correctly.
- Replace the 4 M12 x 35 setscrews to fix the rotor drive flange to the drive pulley and tighten fully. The drive end of the rotor is now connected.
- The upper end of the rotor (bearing housing) is now free/slack. The nuts and bolts for the bearing location should now be fully tightened to complete the rotor fixing.
- Spin the rotor by hand to ensure free, uninterrupted motion.

NOTE: Rotor mounting bolts should be checked daily to ensure they remain tight.

ROLLER HEIGHT ADJUSTMENT

The cutting height of the flail head may be adjusted to cut at 4 different heights; this is achieved by altering the mounting position of the roller on the flail head - *refer to diagram below.*



To alter the roller position, each end bracket of the roller and the relative securing bolts will need to be positioned at either of the four position height options offered. Ensure that same opposing location holes on the flail head are chosen.

NOTE:
The flail head roller is generally required only when bank or verge mowing and not when hedgetrimming.

REMOVING THE MACHINE FROM THE TRACTOR

Select a good clear, level and firm site on which to detach and store the machine.

IMPORTANT
Use the hydraulics to lower the head onto the ground *horizontally (as if you were cutting grass).*

- Disengage the PTO drive.
- **STOP THE TRACTOR ENGINE.**
- *Take the 'T' stand leg from its 'stored' position and put it into its 'down' position, securing it with the lynch pins provided.*

NOTE: -
Long-foot of 'T' stand MUST be furthest from tractor to ensure maximum stability.

- Slacken both M20 setscrews on stabiliser arms, remove the 7/16" diameter lynch pins from the stabiliser locating pins, and remove pins. It may be necessary to slightly raise three-point linkage to 'free' pins, for removal.
- Lower hedgetrimmer so stands are on the floor, by means of lowering tractor three-point linkage. *(Top link may have to be adjusted to ensure trimmer is upright and safe).*
- When you are sure that trimmer is properly settled and safe on its stands, operate boom '1' lever to release hydraulic pressure from ram.

NOTE: -
If the machine is semi-independent *(one pump)* you may have to stop tractor engine to facilitate this.

- Disconnect top link assembly from stabiliser end.
- Uncouple stabiliser 'A' frame from tractor top link position - by removing 7/16" lynch pin and tractor top link pin.
- Remove control handles from tractor and ‘stow’ off the ground in a location where it is protected from damage.

NOTE: -
For semi-independent machines – the 2 hoses *(supply and return)* must be uncoupled from tractor aux. ports and stowed on machine.

- Disconnect Power Take off shaft and anti-spin chains *(tractor end).*

For Pin Type Lower Link Arms
- Remove 7/16" lynch pins from lower lift pins and remove pins from linkage.

For Quick Hitch Crook on Arms
- Release crook lock levers on lower link arms and lower/drop arms away.

Tractor linkage arms are now free of the machine.

- Draw tractor slowly away - Many operators stop about 300mm (12") away to double-check that tractor and machine have completely separated and that no connections or couplings remain connected.

  Safety screens can now be removed if so desired.

- Replace location pins back through arms of stabiliser assembly and secure in position with 7/16 lynch pins.

- Re-connect top link bar assembly back onto stabiliser with pin and lynch pin provided.

- Replace lower linkage pins back into relevant positions on mounting frame and secure with 7/16 diameter lynch pins.

- Ensure tractor top link pin is replaced and secured with 7/16" lynch pin.

MAINTENANCE

OIL FILTER CHANGE

Oil filter should be replaced initially after the first 50 hours and every 250 hours thereafter.

HYDRAULIC PUMP - GEARBOX

Gearbox oil level should be checked every 500 hours and topped up if required.
Oil capacity for both Standard and Hi-Power Gearboxes is **0.5 Litres.**

Standard Hydraulic Gearbox use **S.A.E EP 90** oil - always ensure the same grade of oil is used for 'topping up' when required.

Hi-power Hydraulic Gearbox (Hi-ton) use **universal oil** - always ensure the same grade of oil is used for 'topping up' when required.

ROUTINE MAINTENANCE AND LAYING UP

Daily Maintenance

- Check oil level in main system oil tank.
- Grease pivot points regularly.
- Check cutting blade sharpness – always keep the cutting blades very sharp.
- Check all machine and safety guarding is in place and in good condition – replace or repair if required. **Never operate a machine with missing or damaged guarding.**
- Check hoses and connections for wear damage or leaks and replace immediately if required. **Never check for hydraulic leaks with your hand – use a piece of card.**

Weekly Maintenance

- Check all hydraulic fittings and hoses.
- Check 'vee' belts tension on cutter head drive.

Laying up Maintenance

- Clean the machine and note any damage or repairs needed - arrange for spares and/or repairs as required in preparation for next season.
- Fully lubricate the machine totally.
- Store machine in a safe dry location - ideally in an 'undercover' location.
- Check 'vee' belts tension on cutter head drive.

A full inspection to all components of your machine should be made prior to starting a new season's work after a period of 'laying up'.

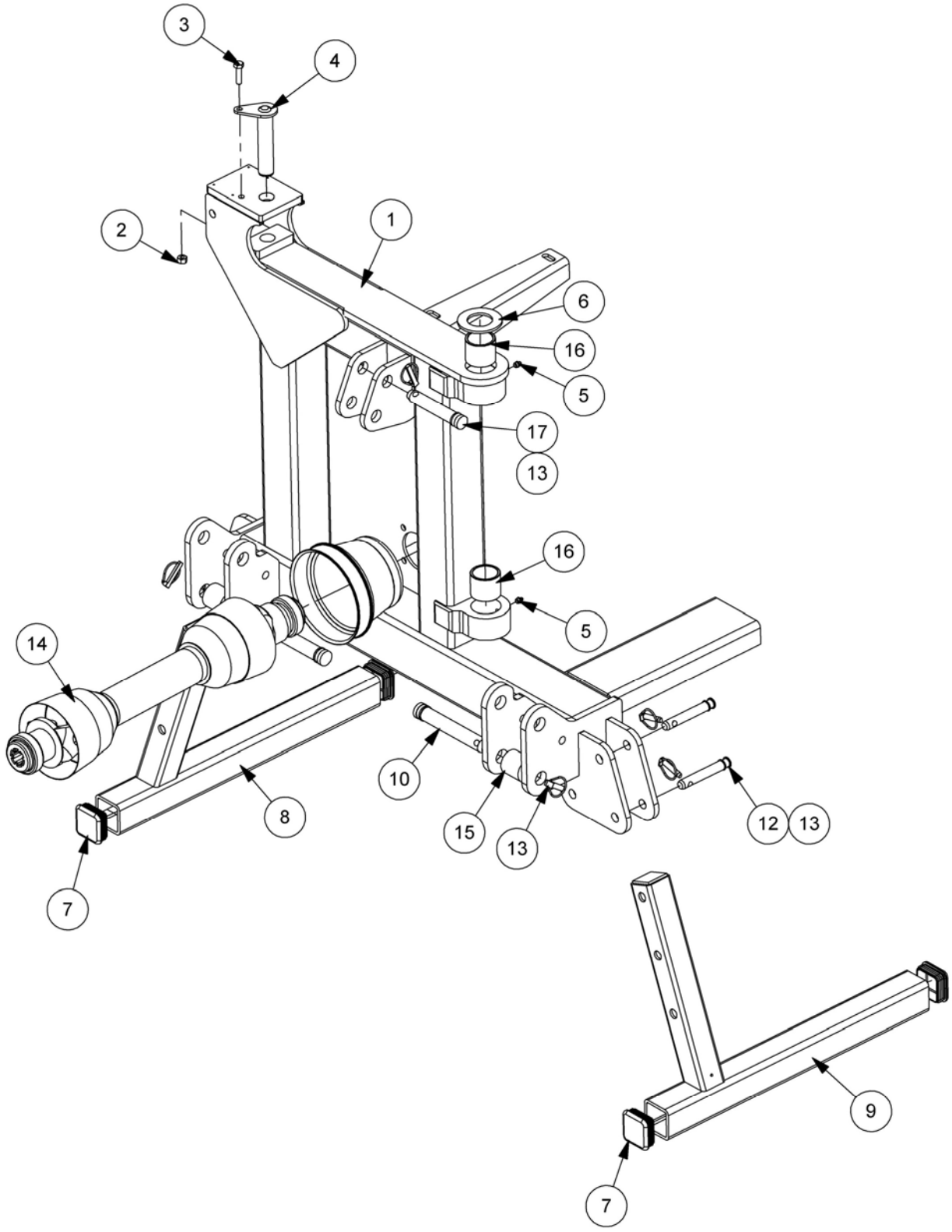
TS 465 & TS 525

Parts Section

MAIN FRAME ASSEMBLY

Modules:
199.105 – L/H build
199.134 – R/H build

Illustrated in Left-Hand build

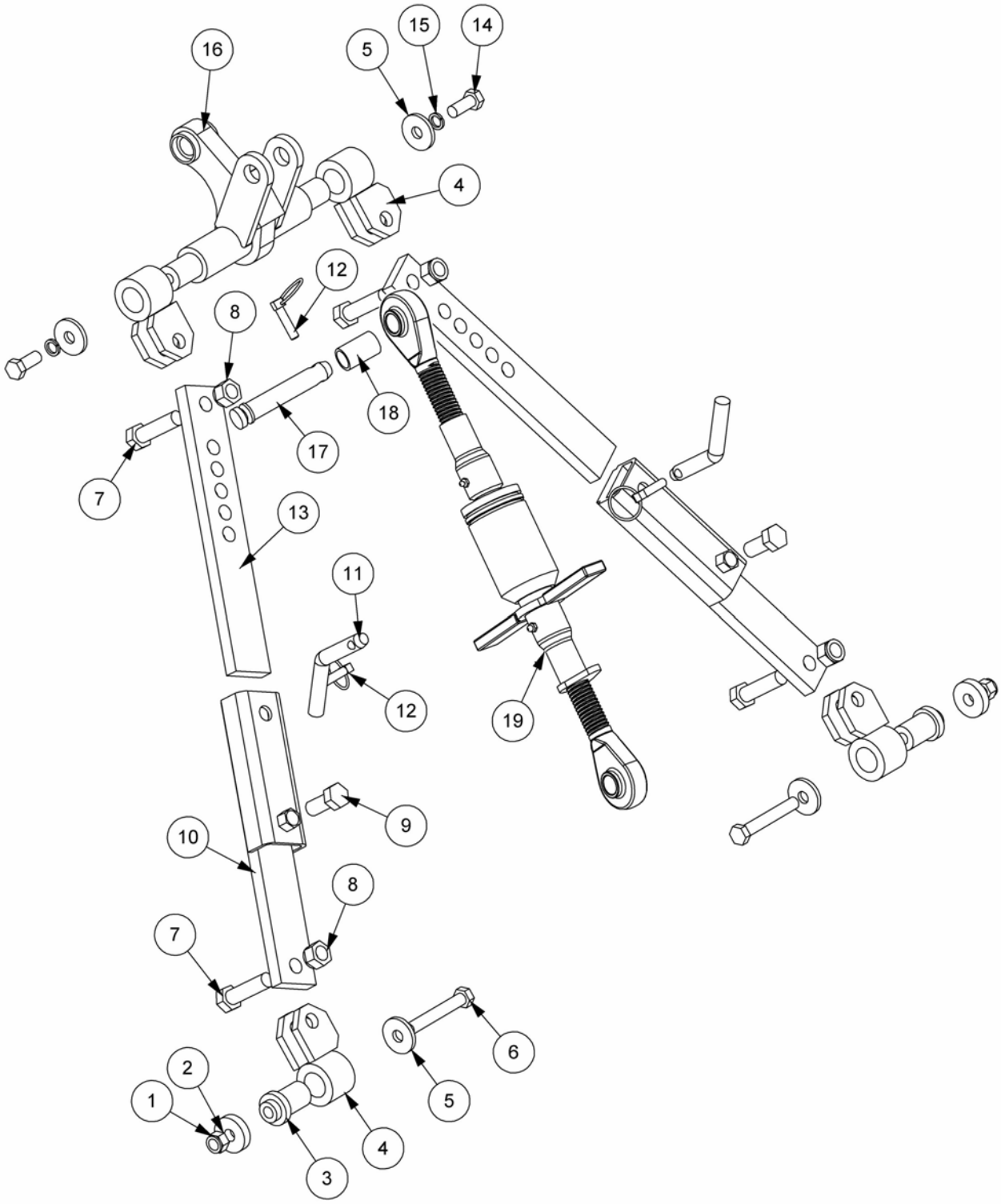


MAIN FRAME ASSEMBLY

REF.	QTY.	PART No.	DESCRIPTION
		199.105	**MAIN FRAME ASSEMBLY - L/H BUILD**
		199.134	**MAIN FRAME ASSEMBLY - R/H BUILD**
1	1	199.001	MAIN FRAME - L/H
	1	199.050	MAIN FRAME - R/H
2	1	9143005	SELF-LOCKING NUT
3	1	9213085	BOLT
4	1	199.040	SLEW PIN
5	2	05.953.03	GREASE NIPPLE
6	1	7560056	THRUST WASHER
7	4	45210.01	PLASTIC PLUG
8	1	199.011L	SUPPORT LEG - LEFT
9	1	199.011R	SUPPORT LEG - RIGHT
10	2	T7482	LOWER LINK PIN
11	1	T6385	PTO GUARD
12	4	T1657	PIN LINKAGE
13	7	0431217	LINCH PIN
14	1	T7749	PTO SHAFT
15	2	184.308	SPACER
16	2	08.297.01	BUSH
17	1	T2584	TOP LINK PIN

STABILISER ASEMBLY

Modules:
MK520S0200 – Standard
MK520SF0200 – French Market



STABILISER ASSEMBLY

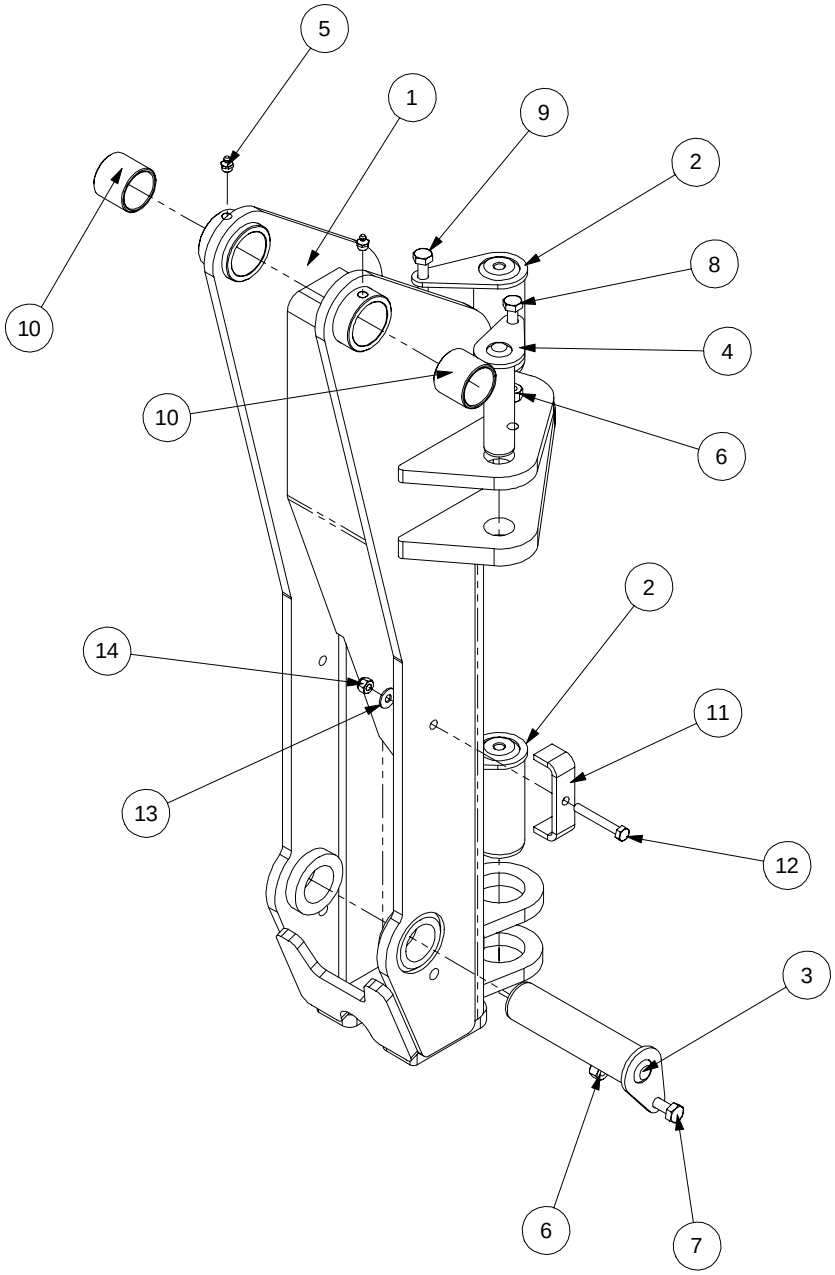
REF.	QTY.	PART No.	DESCRIPTION
		MK520S0200	**STABILISER - Standard Build**
		MK520SF0200	**STABILISER - French Build**
1	2	3747	STIFFNUT - NYLOC
2	2	184.436	WASHER - SPECIAL
3	2	187.053A	LIFT PIN STABILISER
4	4	184.430	ANCHOR BRACKET
5	4	185.096	WASHER - SPECIAL
6	2	2914	BOLT
7	4	3732	STIFFNUT - NYLOC
8	4	2705	BOLT
9	2	3904	SETSCREW
10	2	184.672	SLIDE BOX
11	2	184.437	PIN
12	3	0832	LINCH PIN
13	2	184.671	SLIDE ARM INNER
14	2	3904	SETSCREW
15	2	2730	SPRING WASHER
16	1	184.435A	TOP LINK COUPLER (WIDE)
	1	184.435B	TOP LINK COUPLER (NARROW)
17	1	2584	LINKAGE PIN
18	1	7956	SLEEVE - TOP LINK CAT. 2-3
*	1	6956	GREASE NIPPLE
19	1	199.213	TOP LINK ASSEMBLY

* *Not illustrated*

PILLAR ASSEMBLY

Modules:
199.106 – L/H build
199.135 – R/H build

Illustrated in Left-Hand build

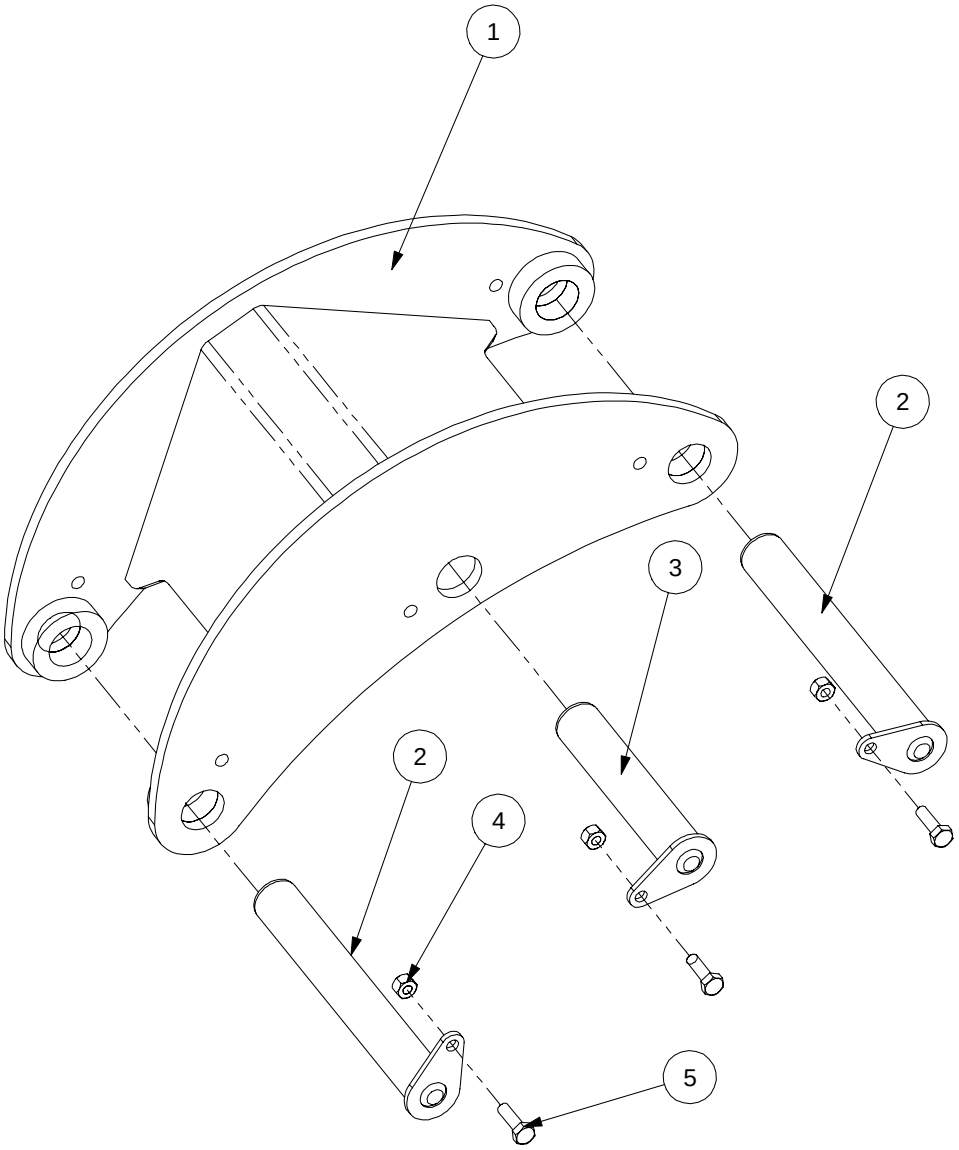


PILLAR ASSEMBLY

REF.	QTY.	PART No.	DESCRIPTION
		199.106	**PILLAR ASSEMBLY - L/H BUILD**
		199.135	**PILLAR ASSEMBLY - R/H BUILD**
1	1	199.002	PILLAR - L/H
	1	199.052	PILLAR - R/H
2	2	199.023	PIVOT PIN
3	1	199.041	PIN - LIFT BASE
4	1	199.025	PIVOT PIN
5	2	05.953.03	GREASE NIPPLE
6	4	9143005	SELF-LOCKING NUT
7	1	9213095	BOLT
8	2	9213075	BOLT
9	1	9213085	BOLT
10	2	08.297.02	BUSH
11	1	187.059	HOSE CLAMP
12	1	9313124	SETSCREW
13	1	9100104	FLAT WASHER
14	1	9163004	NYLOC NUT

ROCKER ASSEMBLY

Module:
199.104

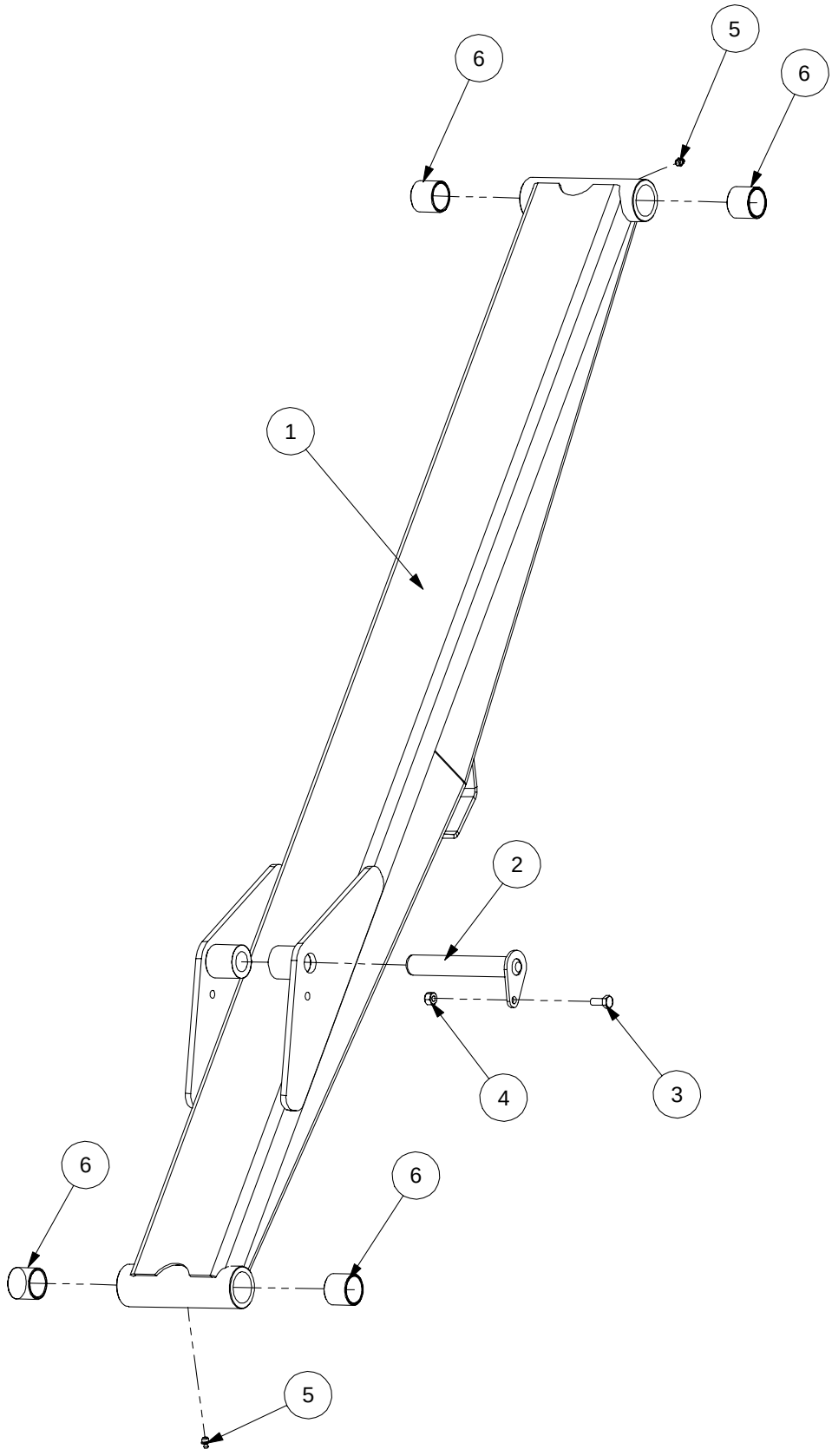


ROCKER ASSEMBLY

REF.	QTY.	PART No.	DESCRIPTION
		199.104	**ROCKER ASSEMBLY**
1	1	199.003	ROCKER
2	2	199.018	PIVOT PIN - ROCKER
3	1	199.021	PIVOT PIN - LIFT RAM
4	3	9143005	SELF-LOCKING NUT
5	3	9213075	BOLT

MAIN ARM ASSEMBLY

Modules:
199.100 – TS 525 L/H & R/H builds
199.108 – TS 465 L/H & R/H builds

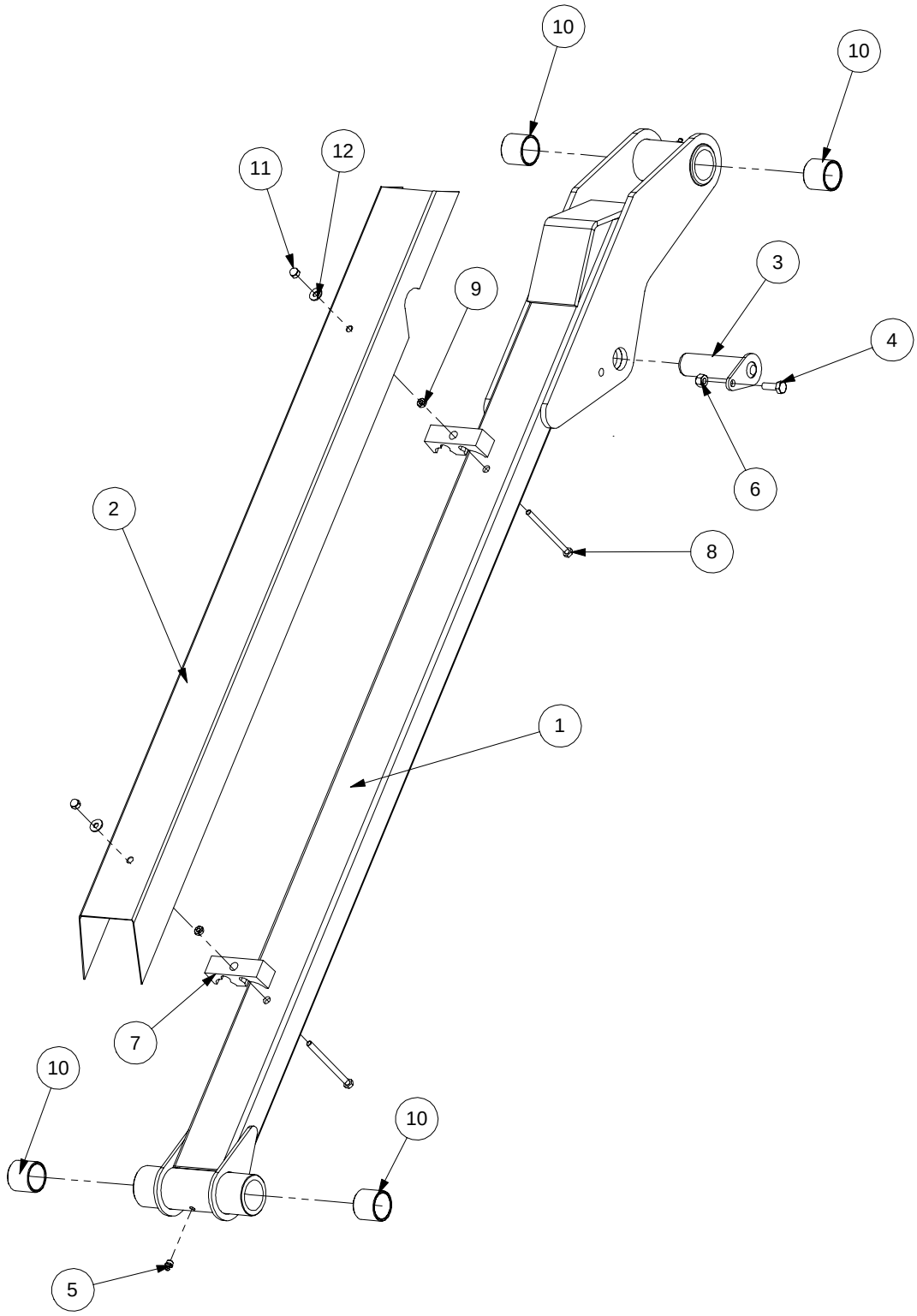


MAIN ARM ASSEMBLY

REF.	QTY.	PART No.	DESCRIPTION
		199.100	**TS 525 MAIN ARM ASSEMBLY**
		199.108	**TS 465 MAIN ARM ASSEMBLY**
1	1	199.004	MAIN ARM - TS 525 models
	1	199.033	MAIN ARM - TS 465 models
2	1	199.020	PIVOT PIN
3	1	9313055	SETSCREW
4	1	9143005	SELF-LOCKING NUT
5	2	05.953.03	GREASE NIPPLE
6	4	08.297.02	BUSH

TENSION LINK ASSEMBLY

Modules:
199.102 – TS 525 L/H & R/H builds
199.110 – TS 465 L/H & R/H builds



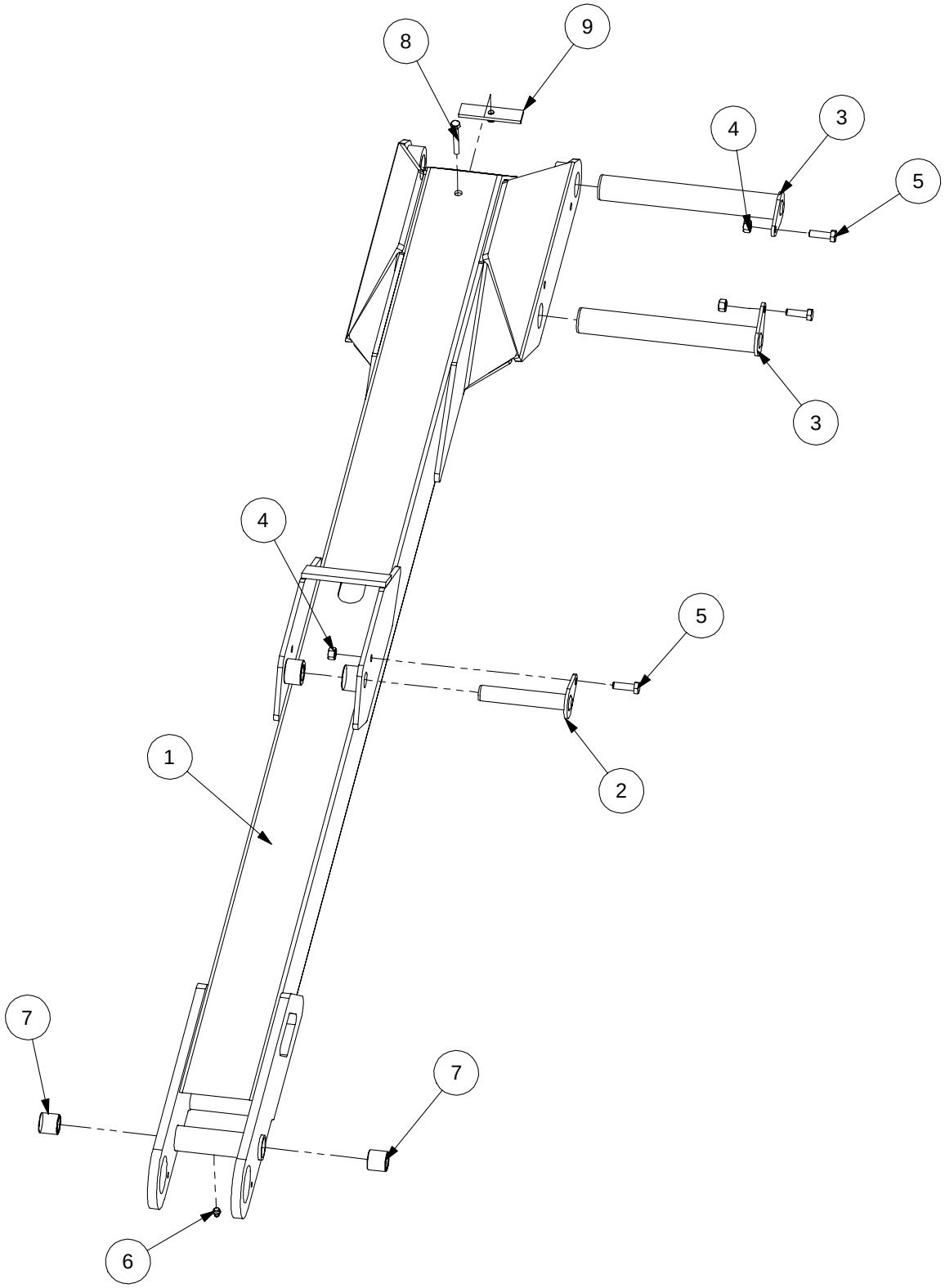
TENSION LINK ASSEMBLY

REF.	QTY.	PART No.	DESCRIPTION
		199.110	**TS 465 TENSION LINK ASSEMBLY**
1	1	199.034	TENSION LINK
2	1	199.036	HOSE COVER
3	1	199.022	PIVOT PIN
4	1	9313065	SETSCREW
5	2	05.953.03	GREASE NIPPLE
6	1	9143005	SELF-LOCKING NUT
7	2	45630.01	HOSE CLAMP - PLASTIC
8	2	05.292.05	BOLT
9	2	9133004	SELF-LOCKING NUT
10	4	08.297.02	BUSH
11	2	9100031	DOMED NUT - PLATED
12	2	9100104	FLAT WASHER

REF.	QTY.	PART No.	DESCRIPTION
		199.102	**TS 525 TENSION LINK ASSEMBLY - ► 07/02/04**
		199.224	**TS 525 TENSION LINK ASSEMBLY - 08/02/04 ►**
1	1	199.005	TENSION LINK - ► 07/02/04
	1	199.064	TENSION LINK - 08/02/04 ►
2	1	199.012	HOSE COVER - ► 07/02/04
	1	199.062	HOSE COVER - 08/02/04 ►
3	1	199.022	PIVOT PIN - ► 07/02/04
	1	199.111	PIVOT PIN - 08/02/04 ►
4	1	9313065	SETSCREW
5	2	05.953.03	GREASE NIPPLE
6	1	9143005	SELF-LOCKING NUT
7	2	45630.01	HOSE CLAMP - PLASTIC
8	2	05.292.05	BOLT
9	2	9133004	SELF-LOCKING NUT
10	4	08.297.02	BUSH
11	2	9100031	DOMED NUT - PLATED
12	2	9100104	FLAT WASHER

DIPPER ARM ASSEMBLY

Modules:
199.101 – TS 525 L/H & R/H builds
199.109 – TS 465 L/H & R/H builds



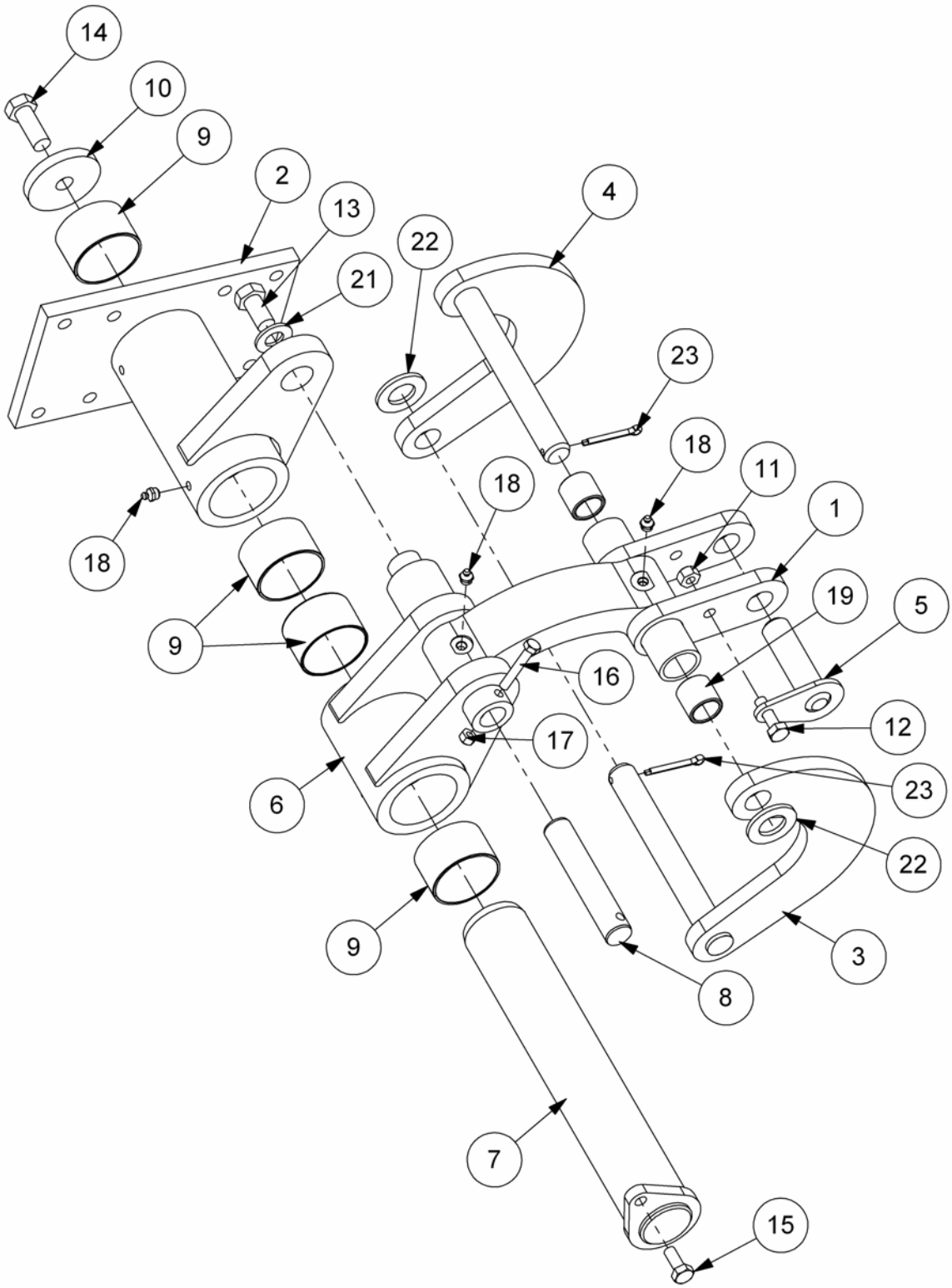
DIPPER ARM ASSEMBLY

REF.	QTY.	PART No.	DESCRIPTION
		199.101	**TS 525 DIPPER ARM ASSEMBLY**
		199.109	**TS 465 DIPPER ARM ASSEMBLY**
1	1	199.006	DIPPER ARM - 525 models
	1	199.035	DIPPER ARM - 465 models
2	1	199.017	PIVOT PIN - ANGLE BASE
3	2	199.018	PIVOT PIN - ROCKER
4	3	9143005	SELF-LOCKING NUT
5	3	9213075	BOLT
6	1	05.953.03	GREASE NIPPLE
7	2	30.207.70	BUSH
8	1	9313124	SETSCREW
9	1	187.048	HOSE CLAMP BRACKET
10	1	9163004	NYLOC NUT

HEAD ANGLING MECHANISM

Modules:
199.103 – L/H build
199.136 – R/H build

Illustrated in Left-Hand build



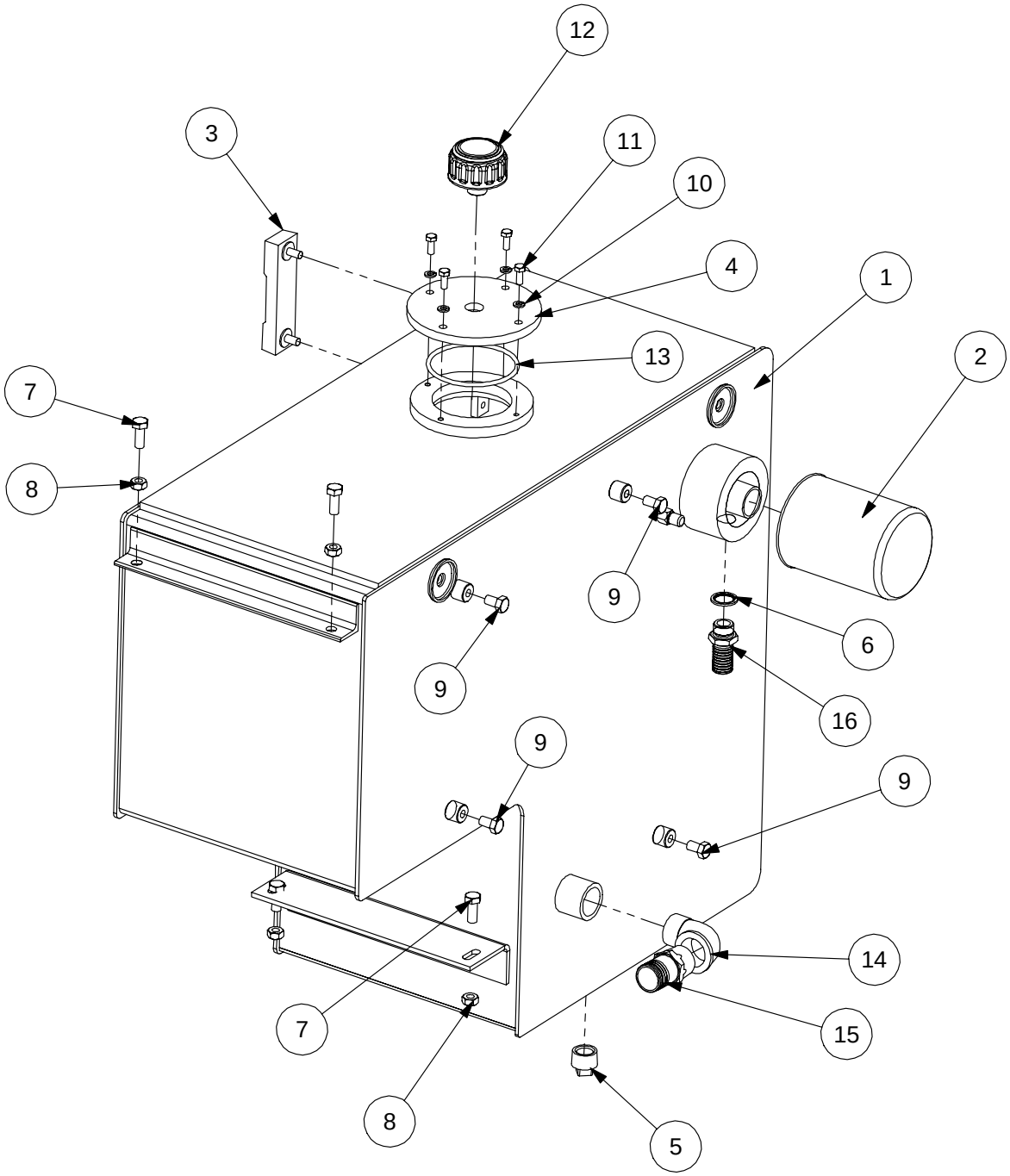
HEAD ANGLING MECHANISM

REF.	QTY.	PART No.	DESCRIPTION
		199.103	**HEAD ANGLING MECHANISM - L/H**
		199.136	**HEAD ANGLING MECHANISM - R/H**
1	1	199.007	SLAVE LINK
2	1	199.008	PIVOT MOUNTING BRACKET - L/H build
	1	199.053	PIVOT MOUNTING BRACKET - R/H build
3	1	199.169	RADIUS ARM OUTER ASSEMBLY
4	1	199.170	RADIUS ARM INNER ASSEMBLY
5	1	199.016	ANGLE PIN
6	1	199.042	PIVOT BRACKET - ASSEMBLY
7	1	199.013	PIVOT PIN
8	1	199.045	ANGLE PIN
9	4	T6935	BUSH
10	1	184-488	WASHER - SPECIAL
11	1	9143005	SELF-LOCKING NUT
12	1	9313075	SETSCREW
13	3	9313067	SETSCREW
14	1	9313087	SETSCREW
15	1	9313055	SETSCREW
16	1	9213104	BOLT
17	1	9143004	SELF-LOCKING NUT
18	4	05.953.03	GREASE NIPPLE
19	2	30.207.70	BUSH
20	1	08.297.09	BUSH
21	1	0100106	FLAT WASHER
22	2	05.281.16	FLAT WASHER
23	2	05.284.14	SPLIT COTTER

HYDRAULIC TANK ASSEMBLY

Modules:
199.107 – L/H build
199.137 – R/H build

Illustrated in Left-Hand build



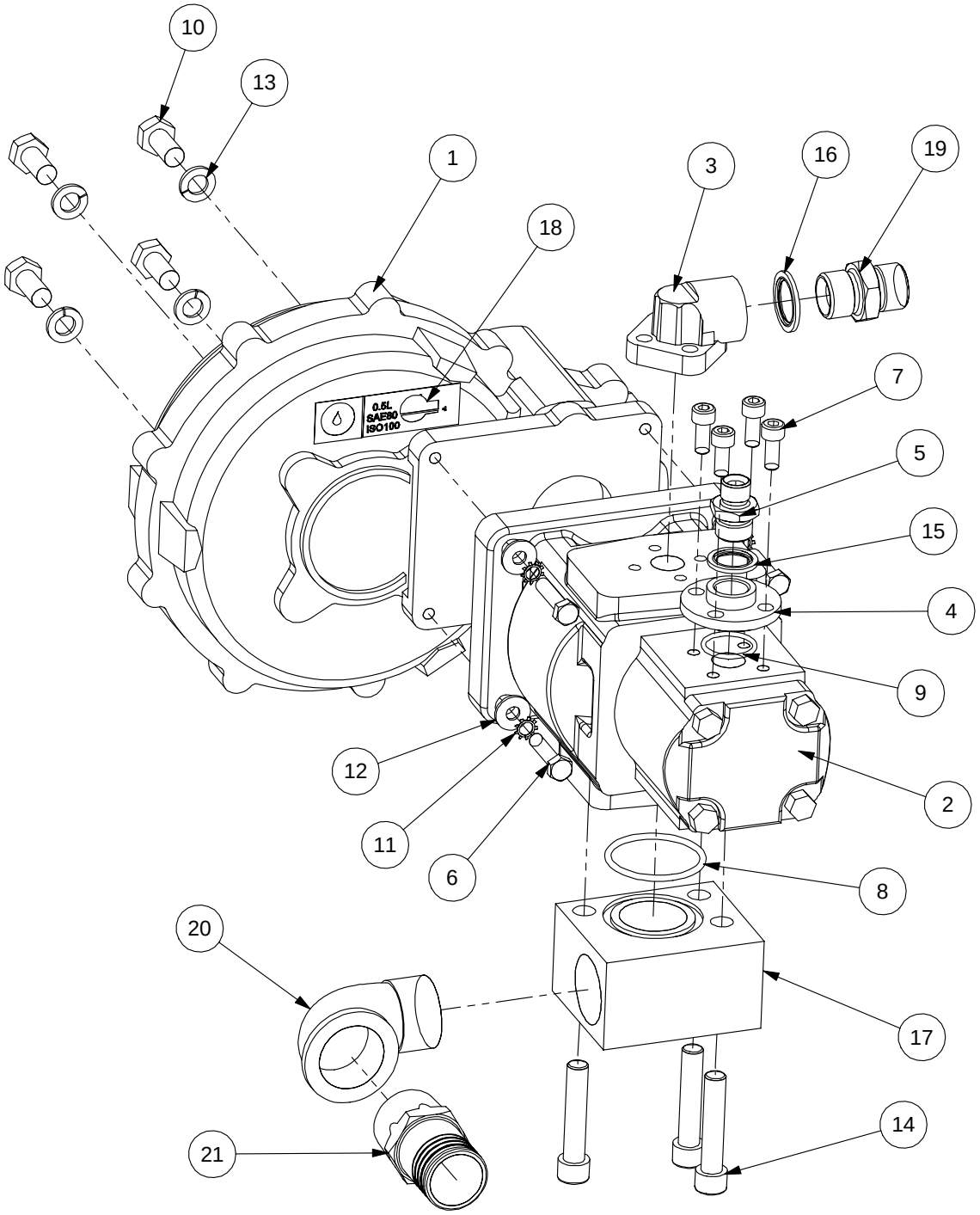
HYDRAULIC TANK ASSEMBLY

REF.	QTY.	PART No.	DESCRIPTION
		199.107	**HYDRAULIC TANK ASSEMBLY - L/H**
		199.137	**HYDRAULIC TANK ASSEMBLY - R/H**
1	1	199.031	TANK - L/H build
	1	199.051	TANK - R/H build
2	1	8401062	FILTER ELEMENT
3	1	8401048	LEVEL GAUGE 127CRS
4	1	7192063	COVER PLATE
5	1	8581203	TAPER PLUG
6	1	8650106	BONDED SEAL
7	4	9313066	SETSCREW
8	4	9143006	SELF-LOCKING NUT
9	4	9313046	SETSCREW
10	4	9100204	SPRING WASHER
11	4	9313044	SETSCREW
12	1	8401063	TANK BREATHER
13	1	8600151	O RING 348
14	1	8581261	ADAPTOR
15	1	8581367	ADAPTOR
16	1	8581246	ADAPTOR

PUMP & GEARBOX ASSEMBLY – Standard Power

Modules:
199.146 – L/H build
199.142 – R/H build

Illustrated in Left-Hand build



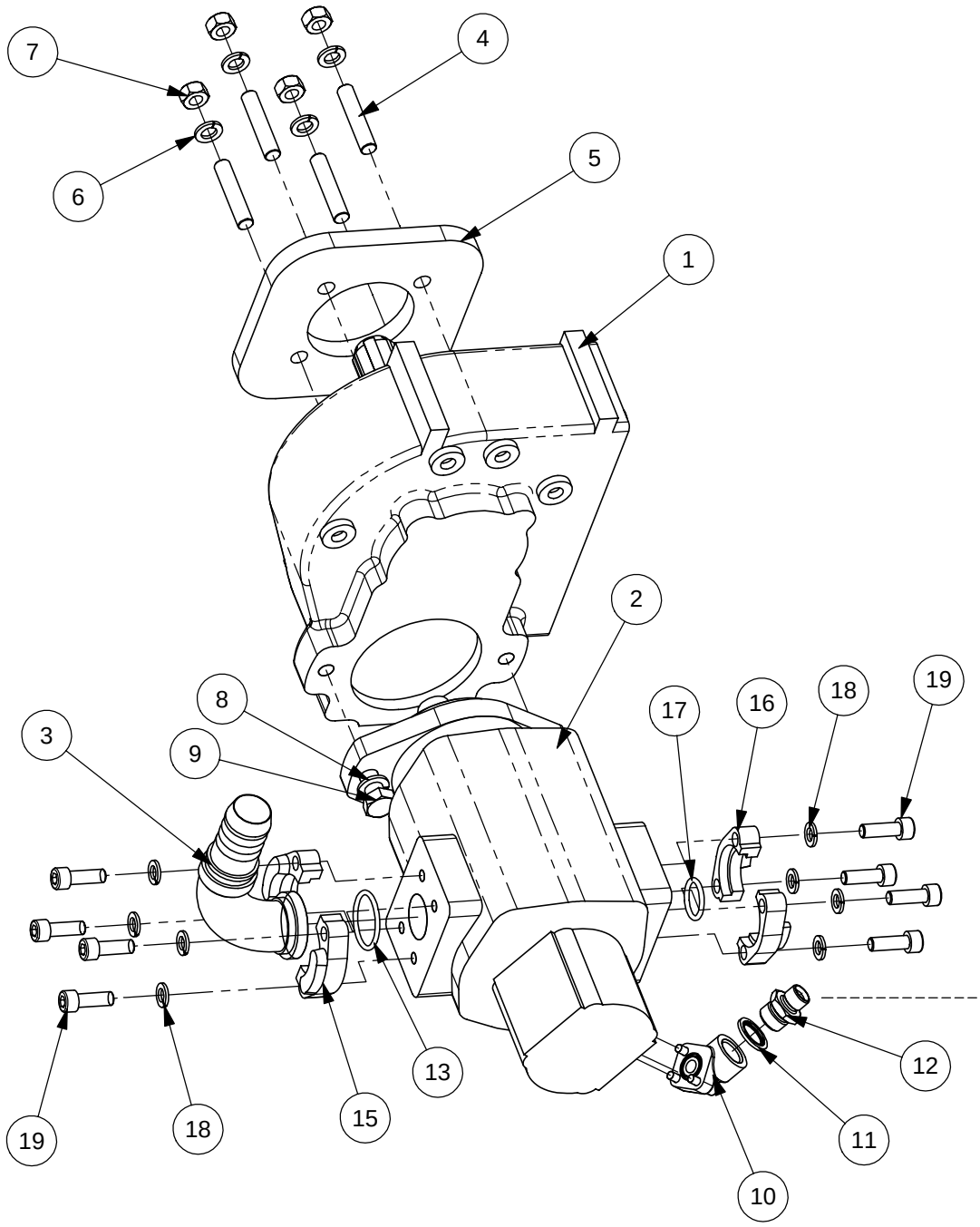
PUMP & GEARBOX ASSEMBLY – Standard Power

REF.	QTY.	PART No.	DESCRIPTION
		199.146	**PUMP & GEARBOX - STANDARD POWER - L/H**
		199.142	**PUMP & GEARBOX - STANDARD POWER - R/H**
1	1	T8119	GEARBOX LABEL LS
2	1	8201714	PUMP - IRON TI
3	1	8005052	PRESSURE CONNECTION KIT
4	1	42029.01	PORT PLATE
5	1	6000112	ADAPTOR
6	4	9313074	SETSCREW
7	4	9300147	CAPSCREW
8	1	8600304	O RING
9	1	8600405	O RING
10	4	9313056	SETSCREW
11	4	9100404	SHAKEPROOF WASHER
12	4	9100104	FLAT WASHER
13	4	9100206	SPRING WASHER
14	3	9243126	CAPSCREW
15	1	8650104	BONDED SEAL
16	1	8650106	BONDED SEAL
17	1	42142.02	BLOCK - SUCTION TAPER
18	1	1290054	GEARBOX LABEL
19	1	8581136	ADAPTOR
20	1	8581261	ADAPTOR
21	1	8581367	ADAPTOR
22	1	8013097	COUPLING
23	1	42415.01	SPACER

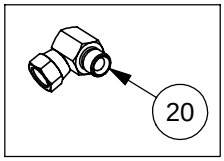
PUMP & GEARBOX ASSEMBLY – High Power

Modules:
199.154 – L/H build
199.155 – R/H build

Illustrated in Left-Hand build



NOTE: Right Hand build requires the addition of 'Elbow' item 20 - attached to item 12



PUMP & GEARBOX ASSEMBLY – High Power

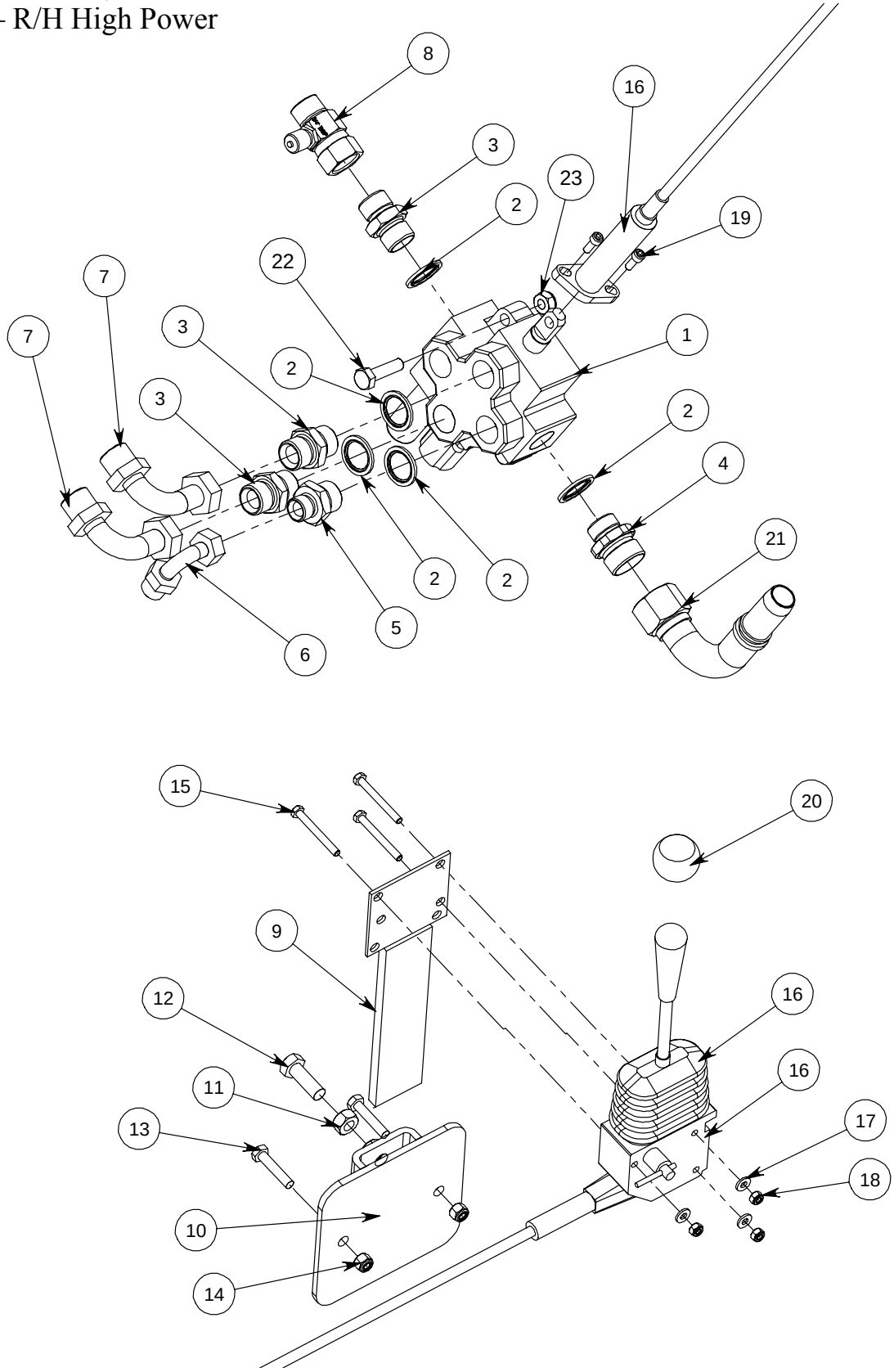
REF.	QTY.	PART No.	DESCRIPTION
		199.154	**PUMP & GEARBOX - HIGH POWER - L/H**
		199.155	**PUMP & GEARBOX - HIGH POWER - R/H**
1	1	42693.08	GEARBOX
2	1	809852,8	PUMP - HIGH POWER
3	1	T8103	HOSE TAIL
4	4	04.282.65	STUD
5	1	199.049	GEARBOX SPACER PLATE
6	4	9100206	SPRING WASHER
7	4	9113006	NUT
8	2	05.282.08	SPRING WASHER
9	2	05.839.01	BOLT
10	1	8301045	ELBOW c/w CAPSCREWS & 'O' RING
11	1	8650104	BONDED SEAL
12	1	6000112	ADAPTOR
13	1	T8150	O RING
14	1	7550316	GASKET
15	2	7989.1	SPLIT FLANGE
16	2	7988.1	SPLIT FLANGE
17	1	8600119	O RING
18	8	9100205	SPRING WASHER
19	8	9343065	CAPSCREW
20	1	8581117	ELBOW - *Right Hand build only*

ROTOR CONTROL VALVE - CABLE

Modules:

Illustrated in Left-Hand build

199.124 – L/H Std. Power
199.139 – R/H Std. Power
199.150 – L/H High Power
199.151 – R/H High Power



ROTOR CONTROL VALVE - CABLE

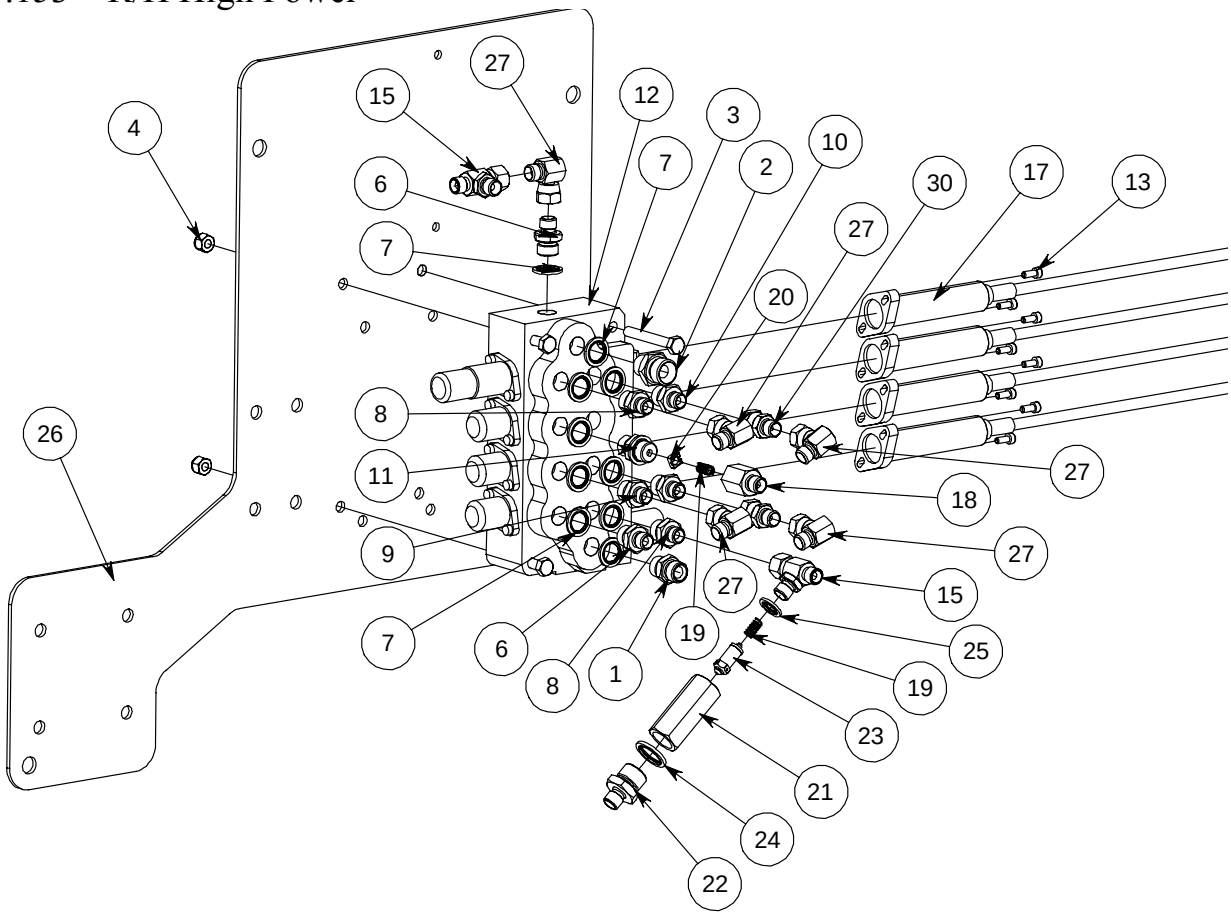
REF.	QTY.	PART No.	DESCRIPTION
		199.124	**ROTOR CONTROL VALVE - L/H STANDARD POWER**
		199.139	**ROTOR CONTROL VALVE - R/H STANDARD POWER**
		199.150	**ROTOR CONTROL VALVE - L/H HIGH POWER**
		199.151	**ROTOR CONTROL VALVE - R/H HIGH POWER**
1	1	8125420	ROTOR CONTROL VALVE - **SP for L/H build machines** *fitted with Standard Power Relief Valve - 8125121*
	1	8125421	ROTOR CONTROL VALVE - **SP for R/H build machines** *fitted with Standard Power Relief Valve - 8125121*
	1	8125422	ROTOR CONTROL VALVE - **HP for L/H build machines** *fitted with High Power Relief Valve - 8125122*
	1	8125423	ROTOR CONTROL VALVE - **HP for R/H build machines** *fitted with High Power Relief Valve - 8125122*
2	5	8650106	BONDED SEAL
3	3	8581136	ADAPTOR
4	1	8002086	ADAPTOR
5	1	8581130	ADAPTOR
6	1	8581215	ELBOW - 90 SWEPT
7	2	T3400	ELBOW - 90 SWEPT
8	1	T7810	TEST POINT
9	1	184.258	CONTROL MOUNT BRACKET
10	1	184.257	FIXING BRACKET
11	1	9113006	NUT
12	1	9313076	SETSCREW
13	2	9313084	SETSCREW
14	2	9163004	NYLOC NUT
15	3	9213113	BOLT
16	1	8017041	ROTOR CONTROL HEAD & CABLE - 3.5m
17	3	9100103	FLAT WASHER
18	3	9163003	NYLOC NUT
19	2	9343033	CAPSCREW
20	1	T7836	RED KNOB & LENS
21	1	7114005	ADAPTOR ELBOW
22	2	9213085	BOLT
23	2	9163005	NYLOC NUT
24	1	T1840371	ROTOR DECAL

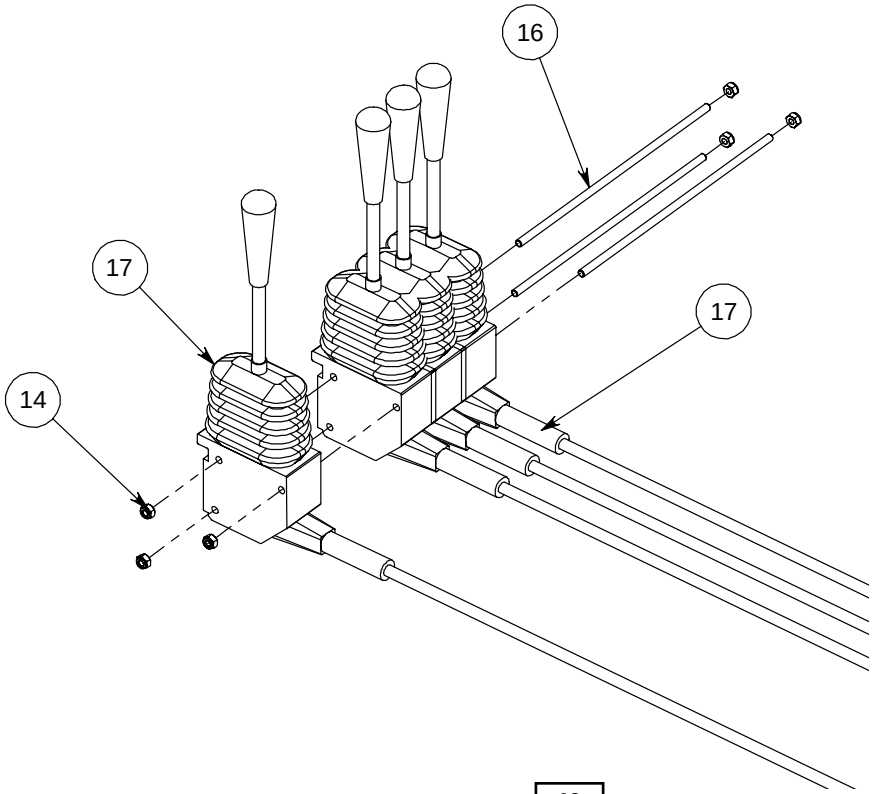
CABLE CONTROL ASSEMBLY

Modules:

Illustrated in Left-Hand build

199.145 – L/H Std. Power
199.144 – R/H Std. Power
199.152 – L/H High Power
199.153 – R/H High Power





CABLE CONTROL ASSEMBLY

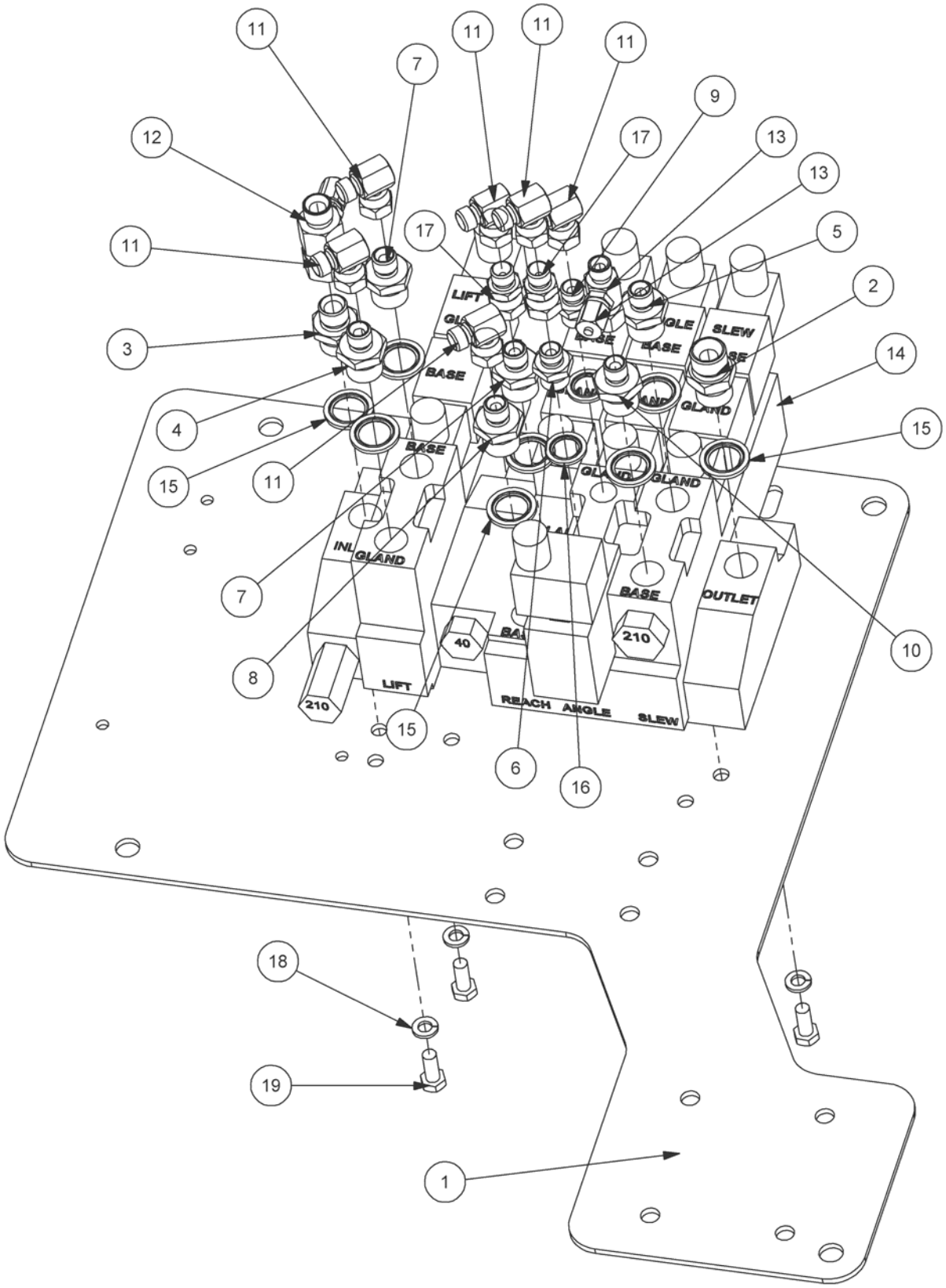
REF.	QTY.	PART No.	DESCRIPTION
		199.145	**CABLE CONTROLS ASSEMBLY - L/H STD. POWER**
		199.144	**CABLE CONTROLS ASSEMBLY - R/H STD. POWER**
		199.152	**CABLE CONTROLS ASSEMBLY - L/H HIGH POWER**
		199.153	**CABLE CONTROLS ASSEMBLY - R/H HIGH POWER**
1	1	6000113	ADAPTOR
2	1	6000112	ADAPTOR
3	3	9213124	BOLT
4	3	9163004	NYLOC NUT
5	1	8130047	ADAPTER RESTRICTOR 1.8 'B'
6	2	8581115	ADAPTOR
7	11	8650103	BONDED SEAL
8	2	8130066	ADAPTER RESTRICTOR 1.15 'M'
9	1	8130046	ADAPTER RESTRICTOR 1.5 'A'
10	1	8130048	ADAPTER RESTRICTOR 1.3 'C'
11	1	8581209	ADAPTOR
12	1	8130466	VALVE - 4 SPOOL
13	8	9343022	CAPSCREW
14	6	9163003	NYLOC NUT
15	2	8581254	ADAPTOR TEE
16	3	04.282.71	STUD
17	4	8017037	ARM CONTROL HEAD & CABLE 3.2m
18	1	8581214	ADAPTOR
19	2	8116011	SPRING
20	1	8123044	RESTRICTOR DISC 1.8 YELLOW
21	1	8130156	ADAPTOR RELIEF HOUSING
22	1	8130083	ADAPTOR RELIEF BODY
23	1	8130092	RELIEF VALVE 190BAR
24	1	8650104	BONDED SEAL
25	1	8650102	BONDED SEAL
26	1	199.030	VALVE MOUNT PLATE
27	5	8581190	ADAPTOR ELBOW - 90
28	4	T7835	BLACK KNOB & LENS
29	1	10.002.08	HOSE - 1/4" BSP FS/F90 x 400mm
30	2	8581309	ADAPTOR - SWIVEL
31	1	T1920059	ROTOR DIRECTION SYMBOL
32	1	T1920060	BREAKBACK SYMBOL
33	1	T1920061	HEAD ANGLE SYMBOL
34	1	T1920062	REACH SYMBOL
35	1	T1920063	LIFT SYMBOL

ELECTRIC CONTROL VALVE ASSEMBLY

Modules:

Illustrated in Left-Hand build

199.167 – L/H Standard Power
199.166 – R/H Standard Power
199.168 – L/H High Power
199.165 – R/H High Power



ELECTRIC CONTROL VALVE ASSEMBLY

REF.	QTY.	PART No.	DESCRIPTION
		199.167	**ELECTRIC CONTROL VALVE - L/H Standard Power**
		199.166	**ELECTRIC CONTROL VALVE - R/H Standard Power**
		199.168	**ELECTRIC CONTROL VALVE - L/H High Power**
		199.165	**ELECTRIC CONTROL VALVE - R/H High Power**
1	1	199.03	VALVE MOUNT PLATE
2	1	8581110	ADAPTOR
3	1	6000112	ADAPTOR
4	1	8124096	ADAPTOR RESTRICTOR - 1.3 'D'
5	1	8124097	ADAPTOR RESTRICTOR - 1.15 'S'
6	1	8130048	ADAPTOR RESTRICTOR - 1.3 'C'
7	2	8124093	ADAPTOR RESTRICTOR - 1.6 'A'
8	1	8124094	ADAPTOR RESTRICTOR - 1.8 'B'
9	1	8130066	ADAPTOR RESTRICTOR - 1.15 'M'
10	1	8581172	ADAPTOR
11	6	8581190	ADAPTOR ELBOW
12	1	T7815	TEST POINT
13	1	T7814	TEST POINT
14	1	8134253	VALVE HYPRO 4 SPOOL - 210 BAR
15	8	8650104	BONDED SEAL
16	2	8650103	BONDED SEAL
17	2	8581309	ADAPTOR - SWIVEL/STRAIGHT
18	4	9100204	SPRING WASHER
19	4	9313044	SETSCREW
20	1	41844	LOOM - 19 CORE 4 SERVICE B/B
21*	1	199.124	ROTOR CONTROL VALVE - L/H Standard Power
	1	199.139	ROTOR CONTROL VALVE - R/H Standard Power
	1	199.150	ROTOR CONTROL VALVE - L/H High Power
	1	199.151	ROTOR CONTROL VALVE - R/H High Power

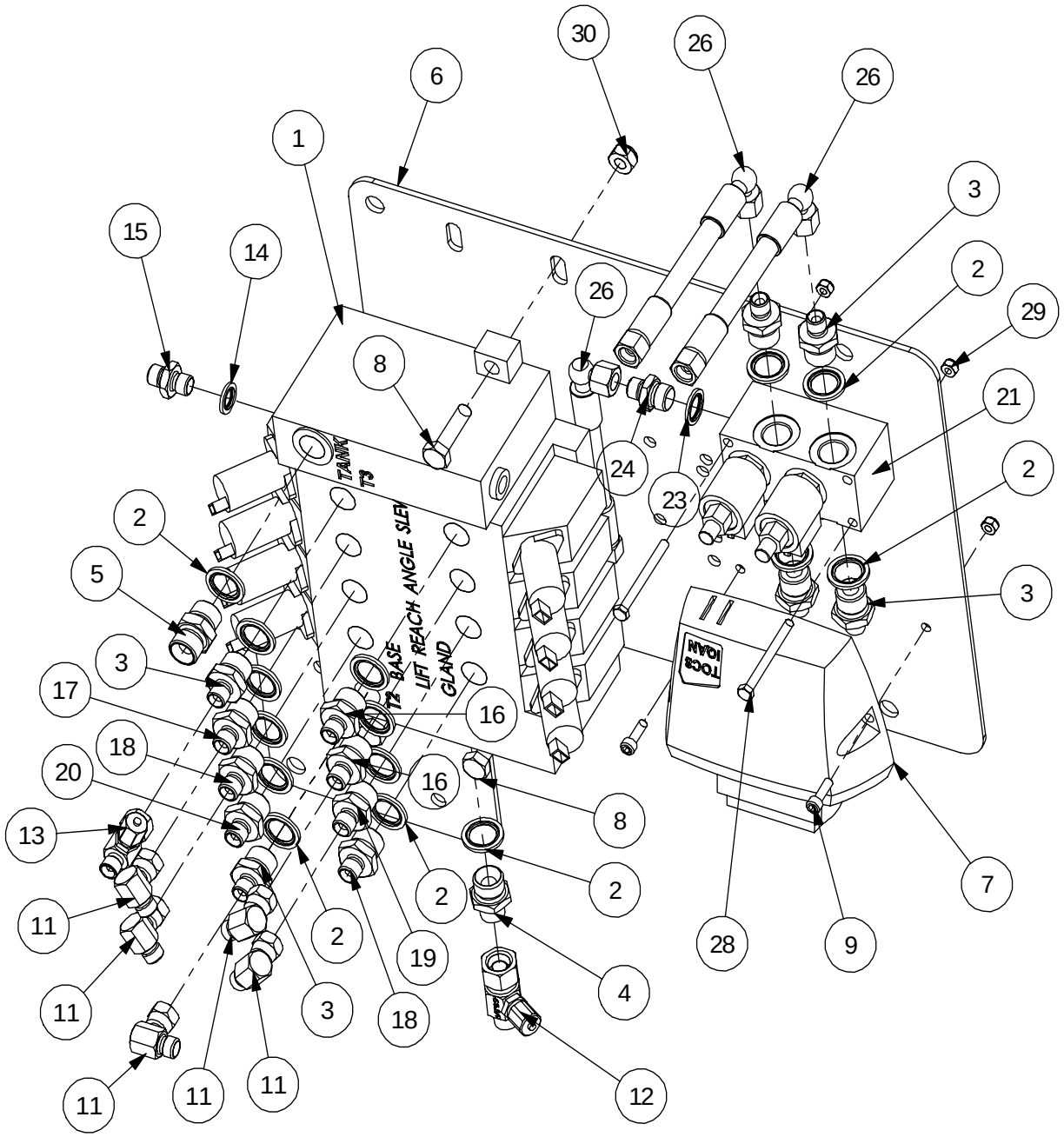
***** ***Not shown - refer to Rotor Control Valve page for illustration & parts listing.***

PROP. CONTROL VALVE ASSEMBLY – Early Models

Modules: *Illustrated in Right-Hand build*

199.143 – R/H Standard Power
199.160 – L/H Standard Power
199.162 – L/H High Power
199.163 – R/H High Power

Fitted to machines manufactured prior to 12/03



PROP. CONTROL VALVE ASSEMBLY – Early Models

REF.	QTY.	PART No.	DESCRIPTION
		199.143	**PROP. CONTROL VALVE - R/H Standard Power**
		199.160	**PROP. CONTROL VALVE - L/H Standard Power**
		199.162	**PROP. CONTROL VALVE - L/H High Power**
		199.163	**PROP. CONTROL VALVE - R/H High Power**
1	1	8135251	VALVE 4 SPOOL
2	15	8650104	BONDED SEAL
3	6	8581172	ADAPTOR
4	1	6000112	ADAPTOR
5	1	8581110	ADAPTOR
6	1	199.030	VALVE MOUNT PLATE
7	1	8135260	VALVE DRIVER
8	3	9213085	BOLT
9	2	9343043	CAPSCREW
10	1	21121.03	LOOM - ANGLE FLOAT *(not illustrated)*
11	5	8581190	ADAPTOR ELBOW
12	1	T7815	TEST POINT
13	1	T7814	TEST POINT
14	1	8650102	BONDED SEAL
15	1	8581169	ADAPTOR
16	2	8124097	ADAPTOR RESTRICTOR 1.15 'S'
17	1	8124096	ADAPTOR RESTRICTOR 1.3 'D'
18	2	8124094	ADAPTOR RESTRICTOR 1.8 'B'
19	1	8124093	ADAPTOR RESTRICTOR 1.6 'A'
20	1	8124099	ADAPTOR RESTRICTOR 2.0 'F'
21	1	8132285	BLOCK - ANGLE FLOAT
22	2	8130183	VALVE POPPET
23	1	8650103	BONDED SEAL
24	1	8581115	ADAPTOR 3/8" x 1/4" BSP MM
25	3	10.001.X1	HOSE - 1/4" BSP FS
26	3	10.001.X2	HOSE END 1/4" BSP F90
27	3	10.001.XX	HOSE 1/4" BORE
28	2	9213133	BOLT
29	4	9163003	NYLOC NUT
30	3	9163005	NYLOC NUT
31*	1	199.124	ROTOR CONTROL VALVE - L/H Standard Power
	1	199.139	ROTOR CONTROL VALVE - R/H Standard Power
	1	199.150	ROTOR CONTROL VALVE - L/H High Power
	1	199.151	ROTOR CONTROL VALVE - R/H High Power

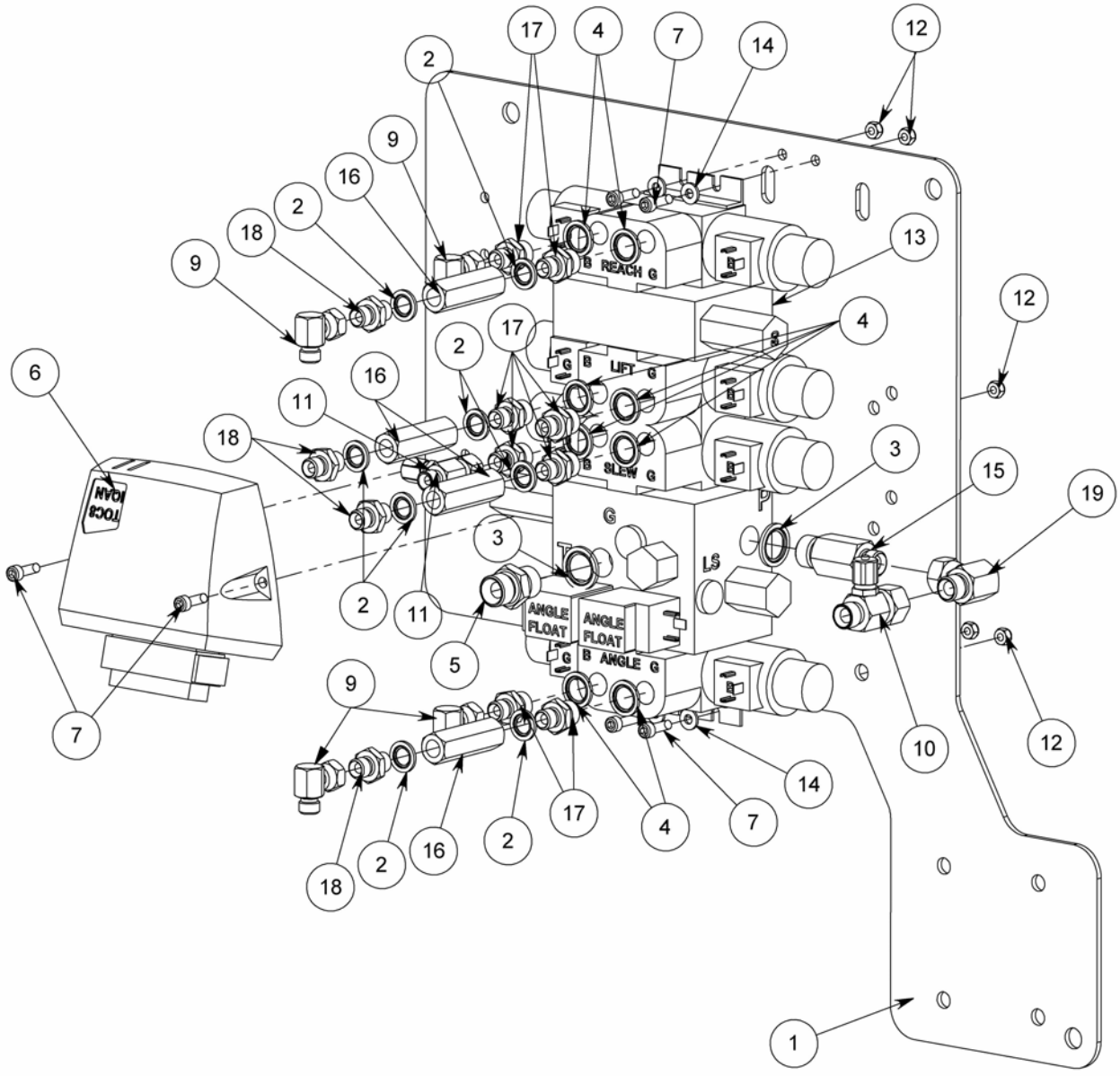
**** Not shown - refer to Rotor Control Valve page for illustration & parts listing.***

PROP. CONTROL VALVE ASSEMBLY – Later Models

Modules: *Illustrated in Left-Hand build*

199.260 – L/H Standard Power
199.243 – R/H Standard Power
199.262 – L/H High Power
199.263 – R/H High Power

Fitted to machines manufactured 12/03 onwards



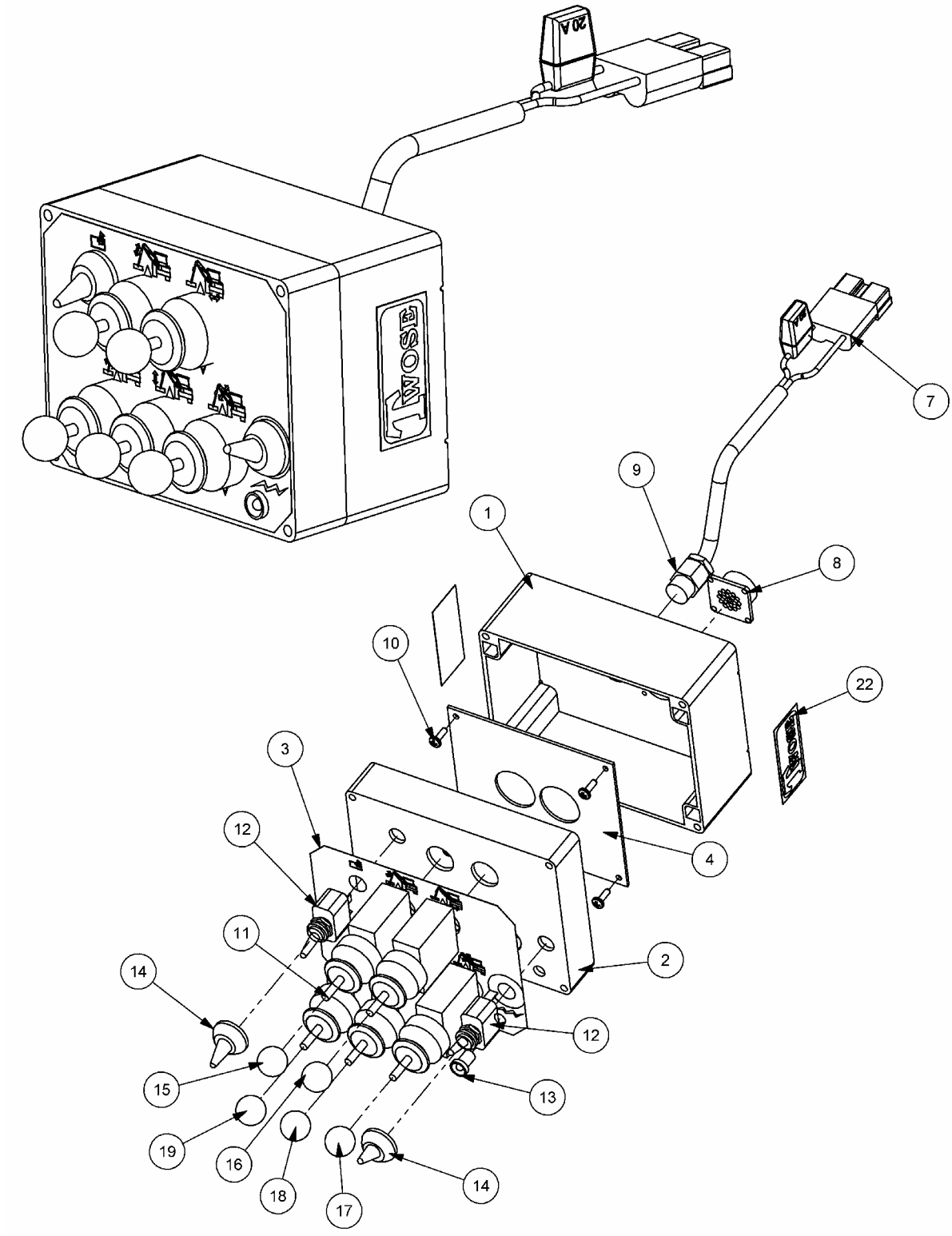
PROP. CONTROL VALVE ASSEMBLY – Later Models

REF.	QTY.	PART No.	DESCRIPTION
		199.260	**PROP. CONTROL VALVE - L/H Standard Power**
		199.243	**PROP. CONTROL VALVE - R/H Standard Power**
		199.262	**PROP. CONTROL VALVE - L/H High Power**
		199.263	**PROP. CONTROL VALVE - R/H High Power**
1	1	199.030	VALVE MOUNT PLATE
2	8	8650102	BONDED SEAL
3	2	8650104	BONDED SEAL
4	8	8650103	BONDED SEAL
5	1	8581110	ADAPTOR
6	1	8135260	VALVE DRIVER
7	6	9343043	CAPSCREW
8	1	21121.06	LOOM *(not illustrated)*
9	4	8581190	ADAPTOR ELBOW - 90°
10	1	T7815	TEST POINT
11	1	T7814	TEST POINT
12	6	9163003	NYLOC NUT
13	1	8135255	VALVE - 4 SERVICE
14	4	9100103	FLAT WASHER
15	1	8124053	ADAPTOR
16	4	T7813	RESTRICTOR - ONE WAY
17	8	8581115	ADAPTOR
18	4	8581169	ADAPTOR
19	1	8581117	ADAPTOR ELBOW
20*	1	199.124	ROTOR CONTROL VALVE - L/H Standard Power
	1	199.139	ROTOR CONTROL VALVE - R/H Standard Power
	1	199.150	ROTOR CONTROL VALVE - L/H High Power
	1	199.151	ROTOR CONTROL VALVE - R/H High Power

**** Not shown - refer to Rotor Control Valve page for illustration & parts listing.***

ELECTRIC CONTROL BOX – 5 Lever

Module:
41845.06

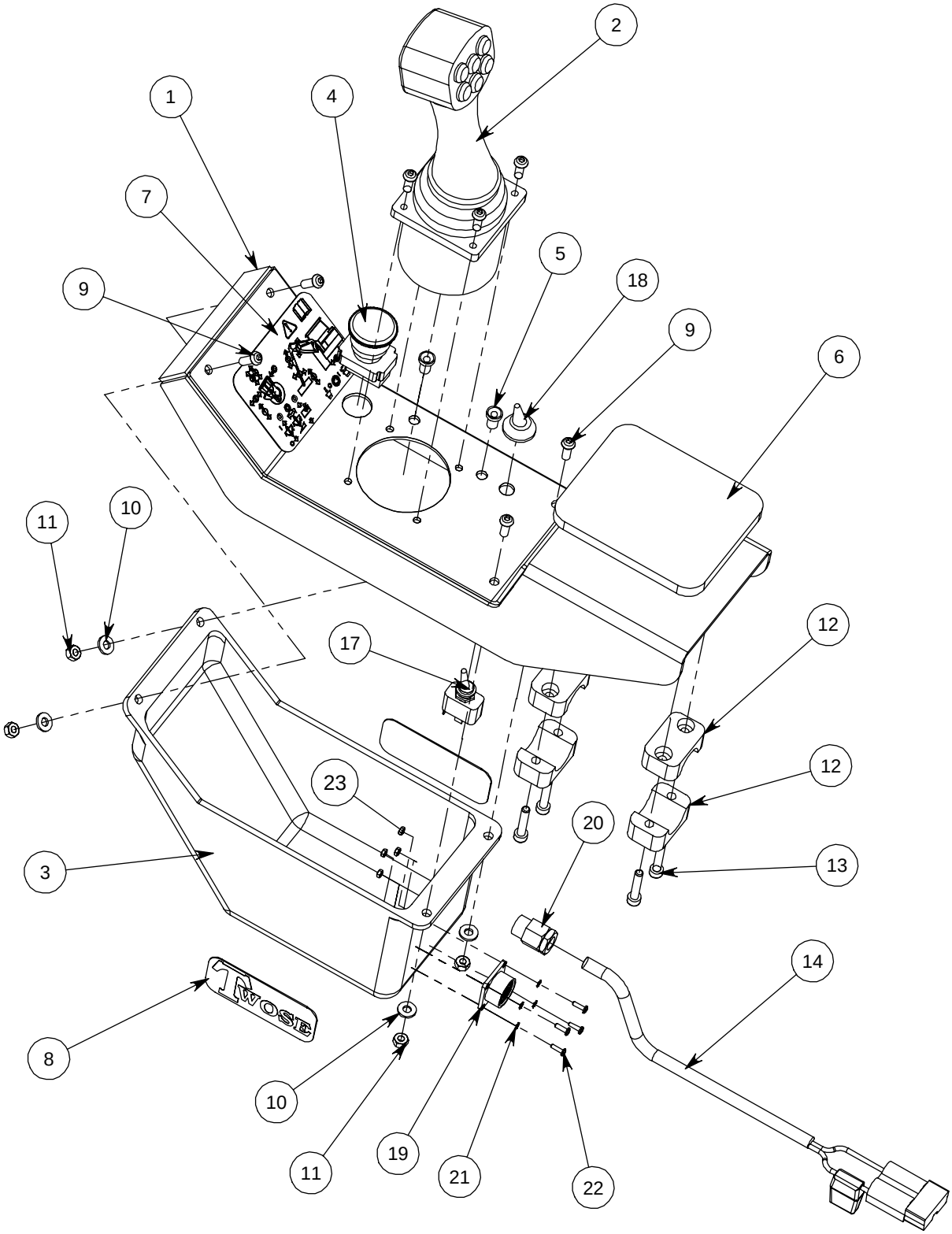


ELECTRIC CONTROL BOX – 5 Lever

REF.	QTY.	PART No.	DESCRIPTION
		41845.06	**ELECTRIC CONTROL BOX - 5 Lever**
1	1	41845.32	BOX BASE
2	1	41845.42	BOX LID
3	1	1290577 HFX	DECAL - 5 LEVER SWITCH BOX
4	1	41845.43	CIRCUIT BOARD
5	5	41845.34	LOOM - SWITCH UNIT
6	1	41845.37	LOOM - FLOAT SWITCH
7	1	43022.49	CONNECTOR c/w 20A FUSE
8	1	8402189	PANEL MOUNTING SHELL
9	1	8402149	GLAND - PLASTIC
10	4	2800203	SCREW
11	5	8402122	SWITCH UNIT
12	2	8402023	SWITCH - PUMP POWER/RESET
13	1	21010.40	RED L.E.D.
14	2	8402024	SWITCH COVER
15	1	8402198	KNOB - BLUE
16	1	8402056	KNOB - BLACK
17	1	8402028	KNOB - YELLOW
18	1	8402027	KNOB - GREEN
19	1	8402026	KNOB - RED
20	1	8402237	LOOM - POWER SUPPLY
21	14	8402192	SOCKET CONTACT
22	2	21010.49	DECAL - SMALL TWOSE

MONOLEVER ARMREST CONTROLS

Module:
21010.04

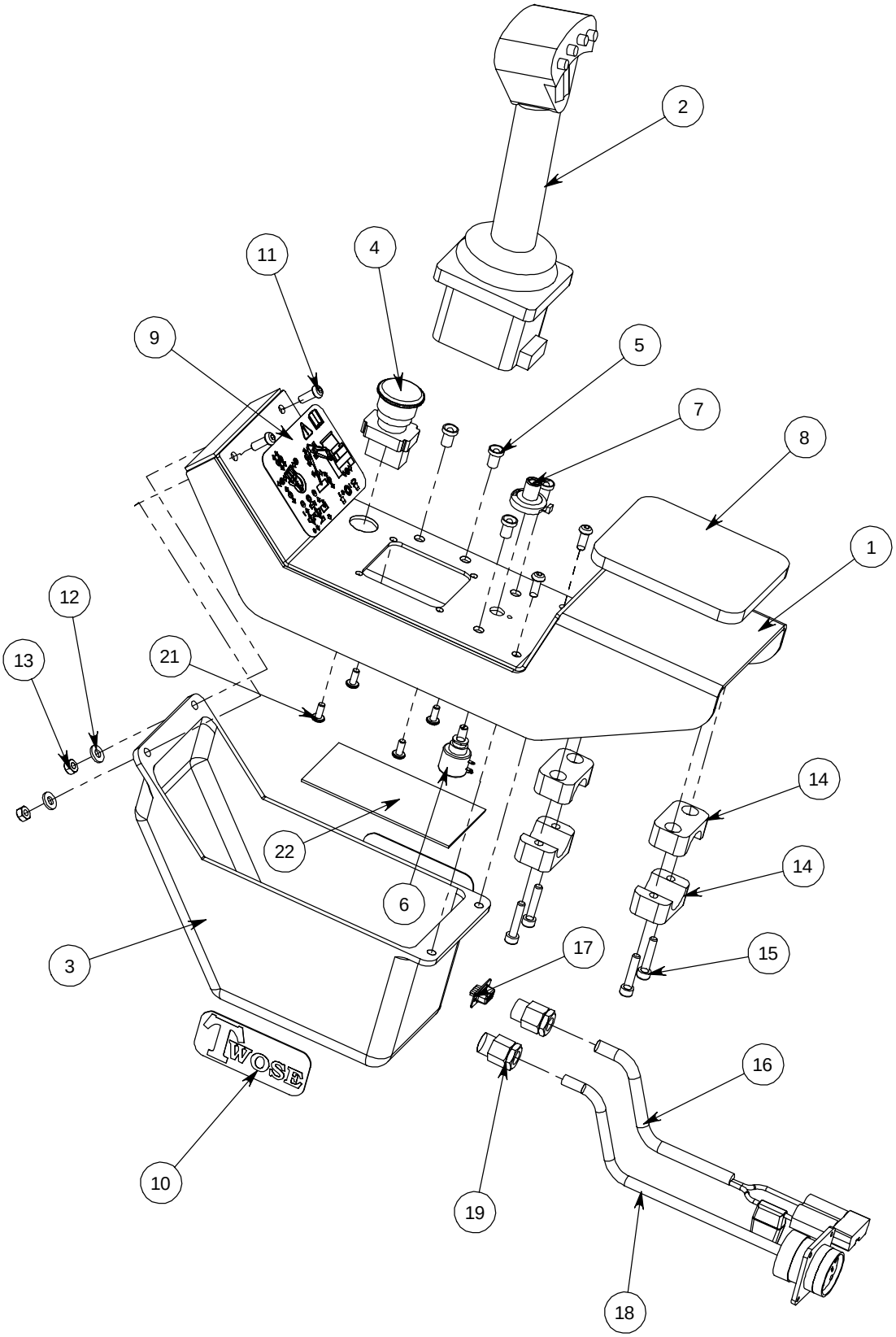


MONOLEVER ARMREST CONTROLS

REF.	QTY.	PART No.	DESCRIPTION
		21010.04	**MONOLEVER ARMREST CONTROLS**
1	1	21009.11	ARMREST HOUSING
2	1	41590.33	JOYSTICK - 6 BUTTON
3	1	21010.42	ARMREST COVER BOX
4	1	41786.33	SWITCH E/STOP
5	2	21010.40	RED L.E.D.
6	1	21010.45	FOAM ARMREST PAD
7	1	21010.53	MONO CONTROLS DECAL
8	2	21010.48	TWOSE NAME DECAL
9	8	9300125	BUTTON HEAD CAP SCREW
10	4	9100103	FLAT WASHER
11	4	9113003	NUT
12	4	30.209.71	PIPE CLAMP
13	4	9343063	CAPSCREW
14	1	43022.49	CONNECTOR - 1 x 20A FUSE
15	2	43022.56	CABLE GLAND
16	1	8402237	LOOM POWER SUPPLY
17	1	8402023	TOGGLE SWITCH
18	1	8402024	SWITCH COVER
19	1	8402189	PANEL MOUNTING SHELL
20	1	8402149	GLAND - PLASTIC
21	4	9100400	SHAKEPROOF WASHER - EXTERNAL
22	4	9200007	SCREW - PAN HEAD
23	4	9113000	NUT

PROPORTIONAL ARMREST CONTROLS

Module:
21010.03



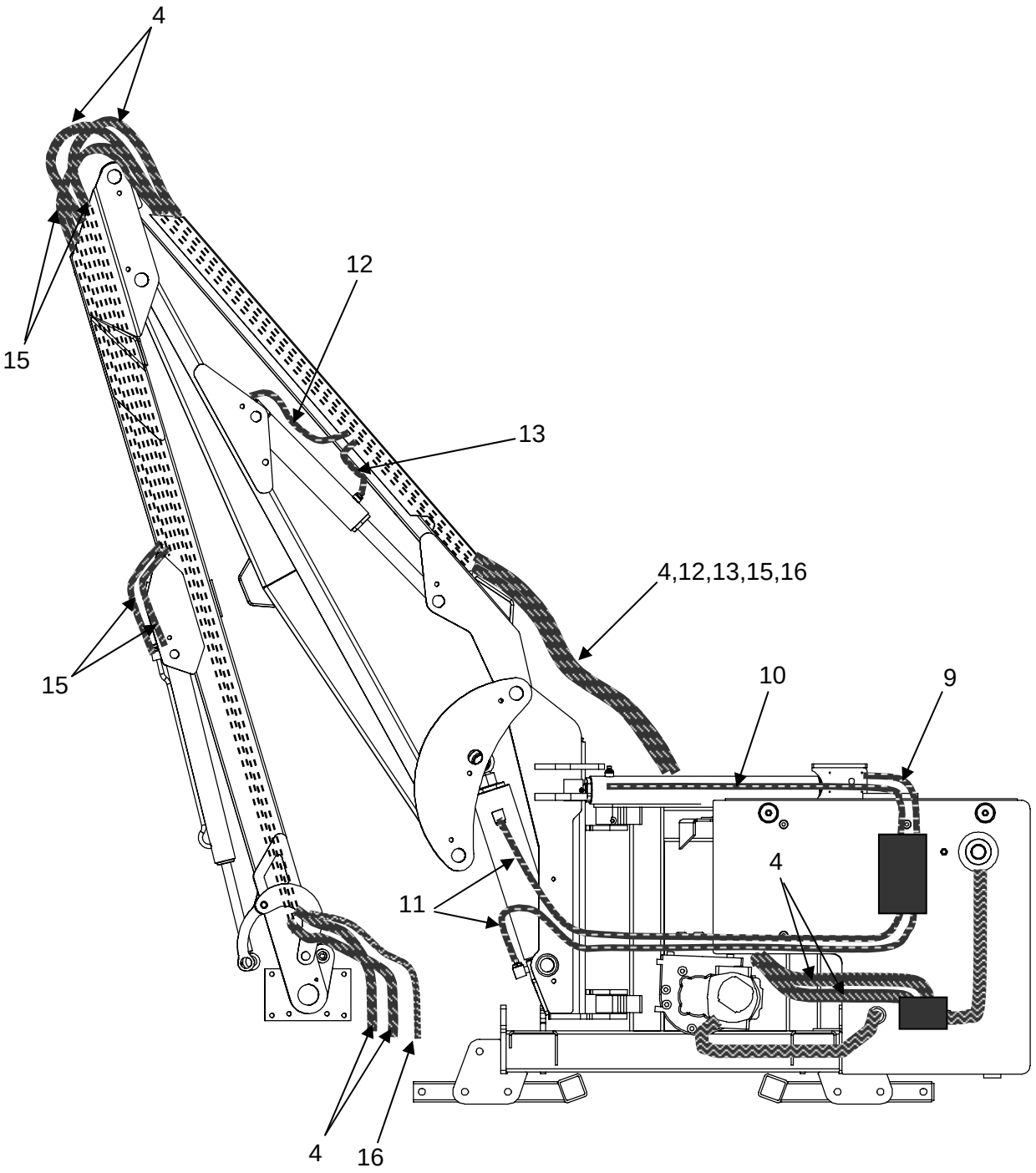
PROPORTIONAL ARMREST CONTROLS

REF.	QTY.	PART No.	DESCRIPTION
		21010.03	**PROPORTIONAL ARMREST CONTROLS**
1	1	21009.10	ARMREST HOUSING
2	1	21010.50	JOYSTICK - PROPORTIONAL
3	1	21010.42	ARMREST COVER BOX
4	1	41786.33	SWITCH E/STOP
5	4	21010.40	RED L.E.D.
6	1	21010.38	10 TURN POTENTIOMETER
7	1	21010.39	ANALOGUE DIAL
8	1	21010.45	FOAM ARMREST PAD
9	1	21010.55	CONTROL DECAL
10	2	21010.48	TWOSE NAME DECAL
11	4	9300125	BUTTON HEAD CAP SCREW
12	4	9100103	FLAT WASHER
13	4	9113003	NUT
14	4	30.209.71	PIPE CLAMP
15	4	9343063	CAPSCREW
16	1	43022.49	CONNECTOR - 1 x 20A FUSE
17	1	43022.39	CONNECTOR 9 WAY
18	1	43022.46	CONNECTOR & LEAD
19	2	8402149	GLAND - PLASTIC
20	1	8402237	LOOM POWER SUPPLY
21	4	9300142	SELF TAPPING SCREW
22	1	21010.51	CIRCUIT BOARD

HYDRAULIC HOSE INSTALLATION – TS465 Models

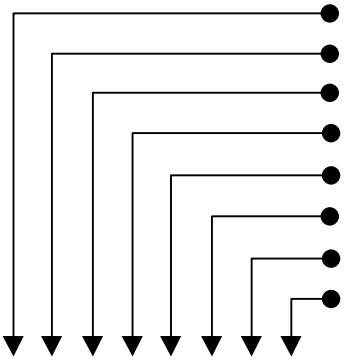
Modules: *Illustrated in Left-Hand build*

Refer to parts list for specific model.



The illustration above serves only as a general guide to hose positions and locations, it is therefore advisable when replacing hoses to run the replacement alongside the old one prior to removal to ensure the correct route and location.

HYDRAULIC HOSE INSTALLATION – TS465 Models



REF.	QUANTITY									PART No.	DESCRIPTION
										199.7221	**TS465 HOSE KIT - L/H CABLE SP**
										199.7223	**TS465 HOSE KIT - L/H CABLE HP**
										199.7225	**TS465 HOSE KIT - R/H CABLE SP**
										199.7227	**TS465 HOSE KIT - R/H CABLE HP**
										199.7229	**TS465 HOSE KIT - L/H ELEC./PROP. SP**
										199.7231	**TS465 HOSE KIT - L/H ELEC./PROP. HP**
										199.7233	**TS465 HOSE KIT - R/H ELEC./PROP. SP**
										199.7235	**TS465 HOSE KIT - R/H ELEC./PROP. HP**
1	-	-	1	-	1	-	1	-	**A**	10.010.12	HOSE 3/4" FS/F90 600mm Long
2	-	1	-	1	-	1	-	1	**A**	85 01 303	HOSE/FLANGE 1" SAE x 3/4" BSP FS 550mm Long
3	1	-	-	-	-	-	-	-	**A**	10.010.10	HOSE 3/4" FS/F90 500mm Long
4	2	2	2	2	2	2	2	2	**B**	10.009.83	HOSE 3/4" FS/F90 7300mm Long
5	1	1	1	1	1	1	1	-	**C**	10.004.14	HOSE 3/8" FS/F90 700mm Long
6	-	-	-	-	-	-	-	1	**C**	10.003.12	HOSE 3/8" FS/FS 600mm Long
7	-	-	-	-	-	-	1	1	**D**	10.006.12	HOSE 1/2" FS/F90 600mm Long
8	1	1	1	1	1	1	-	-	**D**	10.006.10	HOSE 1/2" FS/F90 500mm Long
9	1	1	1	1	1	1	1	1	**E**	10.002.22	HOSE 1/4" FS/F90 1200mm Long
10	1	1	1	1	1	1	1	1	**F**	10.002.24	HOSE 1/4" FS/F90 1400mm Long
11	2	2	2	2	2	2	2	2	**G**	10.002.25	HOSE 1/4" FS/F90 1500mm Long
12	-	1	1	1	1	1	1	1	**H**	10.001.36	HOSE 1/4" FS/FS 2600mm Long
13	-	1	1	1	1	1	1	1	**I**	10.001.43	HOSE 1/4" FS/FS 3300mm Long
14	2	-	-	-	-	-	-	-	**J**	10.002.43	HOSE 1/4" FS/F90 3300mm Long
15	2	2	2	2	2	2	2	2	**K**	10.001.63	HOSE 1/4" FS/FS 5300mm Long
16	-	1	-	1	-	1	-	1	**L**	10.001.87	HOSE 1/4" FS/FS 7700mm Long
17	-	-	-	-	1	1	-	-	**M**	10.002.10	HOSE 1/4" FS/F90 500mm Long
18	-	-	-	-	-	-	1	1	**M**	10.001.05	HOSE 1/4" FS/FS 250mm Long

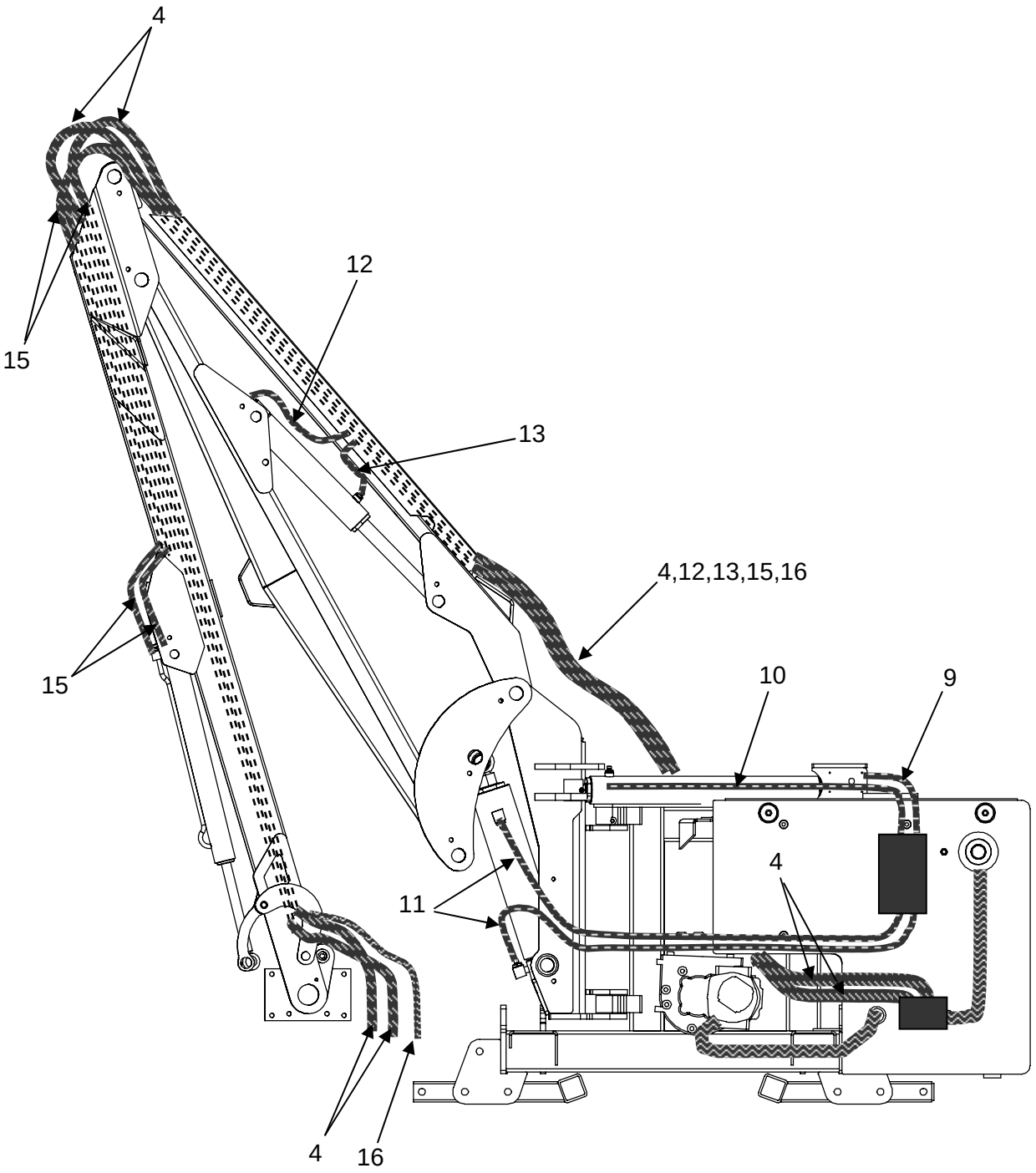
HOSE LOCATIONS

A ***FLAIL PUMP TO RCV***
B ***RCV TO HEAD***
C ***CONTROL PUMP TO VALVE***
D ***CONTROL VALVE TO RCV***
E ***SLEW BASE***
F ***SLEW GLAND***
G ***LIFT BASE & GLAND***
H ***REACH BASE***
I ***REACH GLAND***
J ***REACH BASE & GLAND***
K ***ANGLE BASE & GLAND***
L ***DRAIN LINE***
M ***VALVE DRAIN***

HYDRAULIC HOSE INSTALLATION – TS525 Models

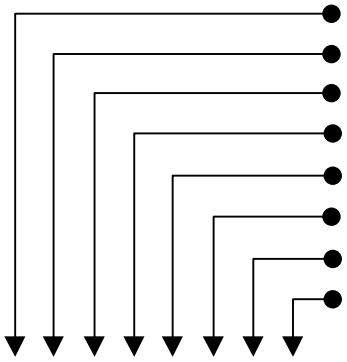
Modules: *Illustrated in Left-Hand build*

Refer to parts list for specific model.



The illustration above serves only as a general guide to hose positions and locations, it is therefore advisable when replacing hoses to run the replacement alongside the old one prior to removal to ensure the correct route and location.

HYDRAULIC HOSE INSTALLATION – TS525 Models



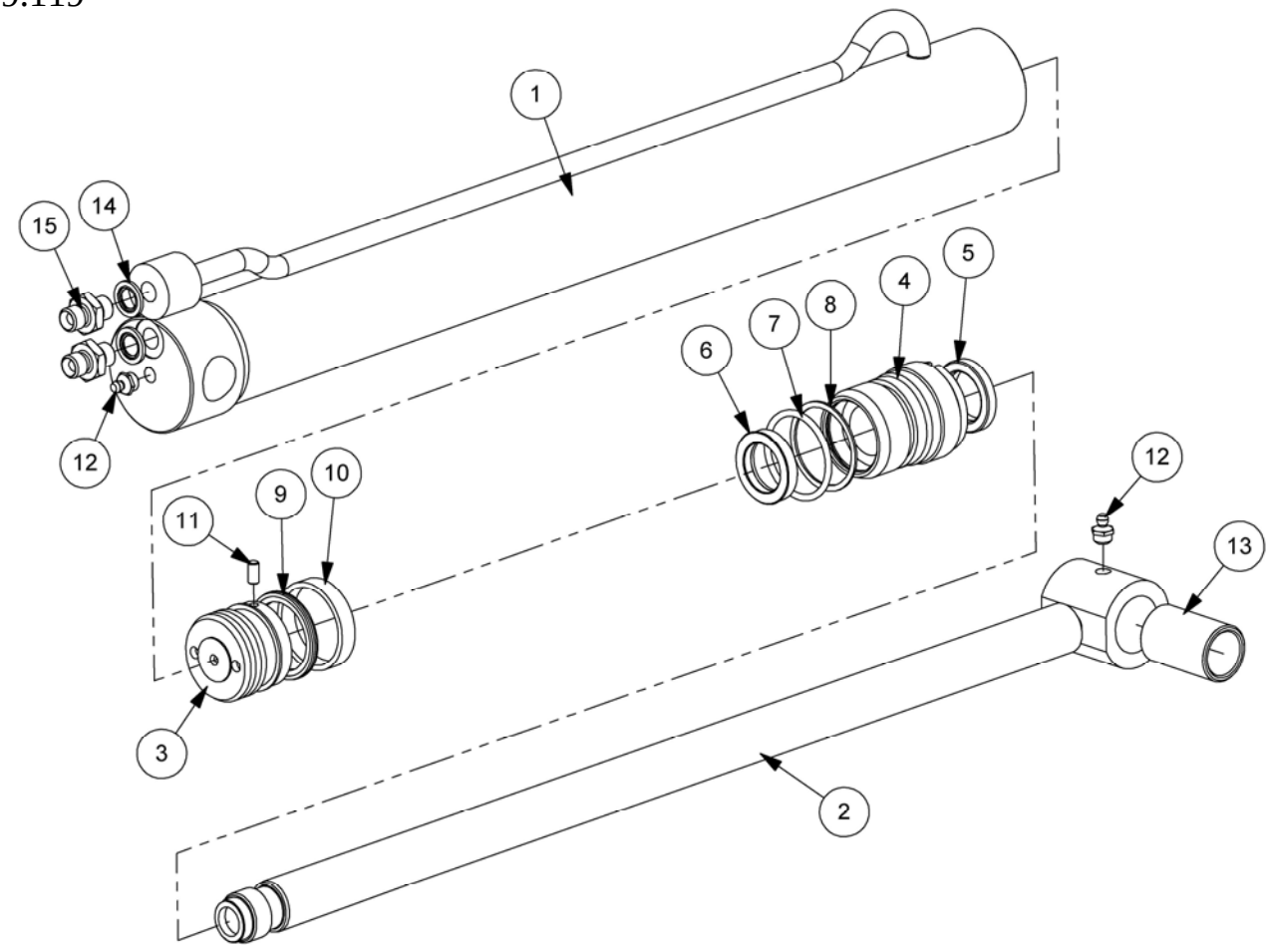
REF.	QUANTITY									PART No.	DESCRIPTION
										199.7222	**TS525 HOSE KIT - L/H CABLE SP**
										199.7224	**TS525 HOSE KIT - L/H CABLE HP**
										199.7226	**TS525 HOSE KIT - R/H CABLE SP**
										199.7228	**TS525 HOSE KIT - R/H CABLE HP**
										199.7230	**TS525 HOSE KIT - L/H ELEC./PROP. SP**
										199.7232	**TS525 HOSE KIT - L/H ELEC./PROP. HP**
										199.7234	**TS525 HOSE KIT - R/H ELEC./PROP. SP**
										199.7236	**TS525 HOSE KIT - R/H ELEC./PROP. HP**
1	-	-	1	-	1	-	1	-	**A**	10.010.12	HOSE 3/4" FS/F90 600mm Long
2	-	1	-	1	-	1	-	1	**A**	85 01 303	HOSE/FLANGE 1" SAE x 3/4" BSP FS 550mm Long
3	1	-	-	-	-	-	-	-	**A**	10.010.10	HOSE 3/4" FS/F90 500mm Long
4	-	2	2	2	2	2	2	2	**B**	10.009.89	HOSE 3/4" FS/F90 7900mm Long
	2	-	-	-	-	-	-	-	**B**	10.009.87	HOSE 3/4" FS/F90 7700mm Long
5	1	1	1	1	1	1	1	-	**C**	10.004.14	HOSE 3/8" FS/F90 700mm Long
6	-	-	-	-	-	-	-	1	**C**	10.003.12	HOSE 3/8" FS/FS 600mm Long
7	-	-	-	-	-	-	1	1	**D**	10.006.12	HOSE 1/2" FS/F90 600mm Long
8	1	1	1	1	1	1	-	-	**D**	10.006.10	HOSE 1/2" FS/F90 500mm Long
9	1	1	1	1	1	1	1	1	**E**	10.002.22	HOSE 1/4" FS/F90 1200mm Long
10	1	1	1	1	1	1	1	1	**F**	10.002.24	HOSE 1/4" FS/F90 1400mm Long
11	2	2	2	2	2	2	2	2	**G**	10.002.25	HOSE 1/4" FS/F90 1500mm Long
12	-	1	1	1	1	1	1	1	**H**	10.001.36	HOSE 1/4" FS/FS 2600mm Long
13	-	1	1	1	1	1	1	1	**I**	10.001.43	HOSE 1/4" FS/FS 3300mm Long
14	2	-	-	-	-	-	-	-	**J**	10.002.43	HOSE 1/4" FS/F90 3300mm Long
15	2	2	2	2	2	2	2	2	**K**	10.001.69	HOSE 1/4" FS/FS 5900mm Long
16	-	1	-	1	-	1	-	1	**L**	10.001.93	HOSE 1/4" FS/FS 8300mm Long
17	-	-	-	-	1	1	-	-	**M**	10.002.10	HOSE 1/4" FS/F90 500mm Long
18	-	-	-	-	-	-	1	1	**M**	10.001.05	HOSE 1/4" FS/FS 250mm Long

HOSE LOCATIONS

A ***FLAIL PUMP TO RCV***
B ***RCV TO HEAD***
C ***CONTROL PUMP TO VALVE***
D ***CONTROL VALVE TO RCV***
E ***SLEW BASE***
F ***SLEW GLAND***
G ***LIFT BASE & GLAND***
H ***REACH BASE***
I ***REACH GLAND***
J ***REACH BASE & GLAND***
K ***ANGLE BASE & GLAND***
L ***DRAIN LINE***
M ***VALVE DRAIN***

ANGLE RAM ASSEMBLY

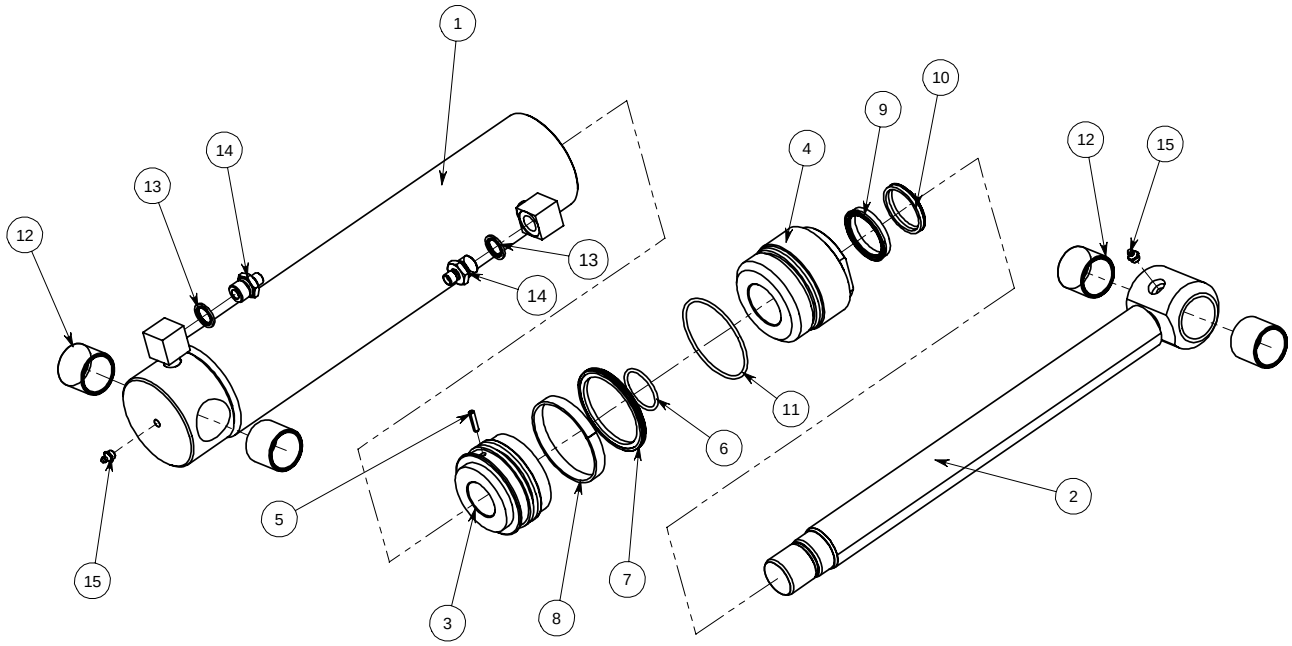
Module:
199.119



REF.	QTY.	PART No.	DESCRIPTION
		199.119	**ANGLING RAM ASSEMBLY**
1	1	199.119.31	RAM BARREL
2	1	199.119.34	PISTON ROD
3	1	7560095	PISTON
4	1	7135291	GLAND HOUSING
5	1	8629149	SCRAPER RING
6	1	8629148	GLAND SEAL
7	1	8600302	O RING
8	1	8609302	AE RING
9	1	8629187	PISTON SEAL
10	1	8629188	GUIDE RING
11	1	9363023	GRUB SCREW
12	2	0901121	GREASE NIPPLE
13	1	21149.04	BUSH
14	2	8650102	BONDED SEAL
15	2	8581169	ADAPTOR
		199.119.1	**SEAL KIT**

LIFT RAM ASSEMBLY

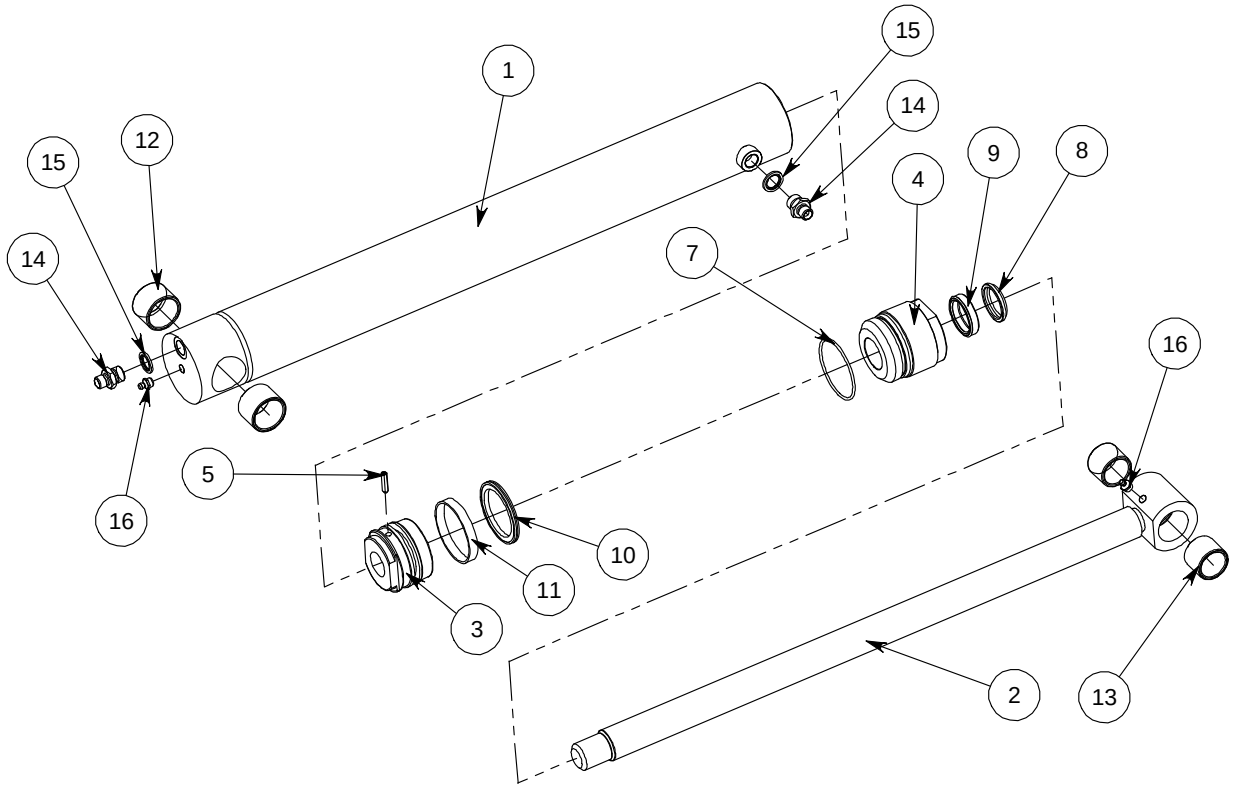
Module:
199.122



REF.	QTY.	PART No.	DESCRIPTION
		199.122	**LIFT RAM ASSEMBLY**
1	1	199.122.31	BARREL
2	1	199.122.34	PISTON ROD
3	1	42655.31	PISTON
4	1	42655.48	GLAND HOUSING
5	1	42775.01	DOWEL
6	1	8600302	O RING 224
7	1	8629182	PISTON SEAL
8	1	8629183	BEARING RING
9	1	8629184	SEAL
10	1	8629227	SEAL - ROD SCRAPER
11	1	8600317	O RING 239
12	4	08.297.02	BUSH
13	2	8650104	BONDED SEAL
14	2	8581172	ADAPTOR
15	2	0901121	GREASE NIPPLE
		199.122.1	**SEAL KIT**

REACH RAM ASSEMBLY – Machines up to 12/03

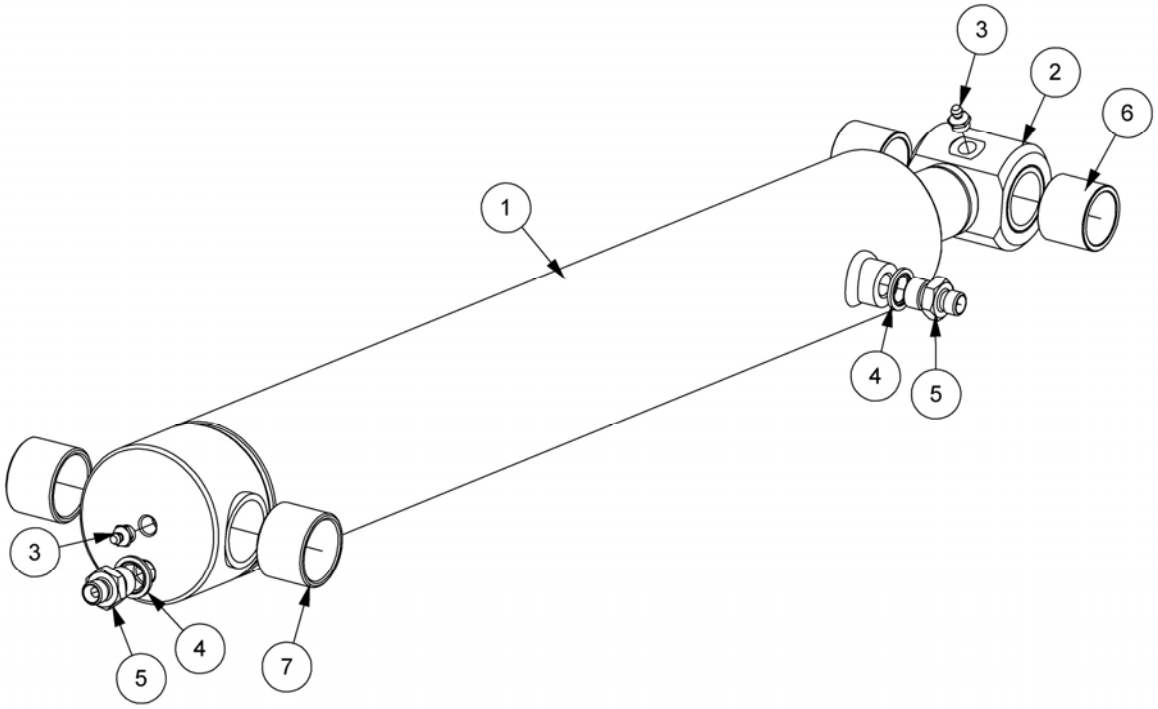
Module:
199.121



REF.	QTY.	PART No.	DESCRIPTION
		199.121	**REACH RAM ASSEMBLY**
1	1	199.121.31	BARREL
2	1	199.121.34	PISTON ROD
3	1	199.121.36	PISTON
4	1	45441.01	GLAND HOUSING
5	1	42775.01	DOWEL
6	1	8600125	O RING 220
7	1	8600429	O RING 145
8	1	8629230	SCAPER RING
9	1	8629229	ROD SEAL
10	1	8629189	PISTON SEAL
11	1	8629190	GUIDE RING
12	2	08.297.05	BUSH
13	2	08.297.04	BUSH
14	2	8581115	ADAPTOR
15	2	8650103	BONDED SEAL
16	2	0901121	GREASE NIPPLE
		199.121.1	**SEAL KIT**

REACH RAM ASSEMBLY – Machines 12/03 onwards

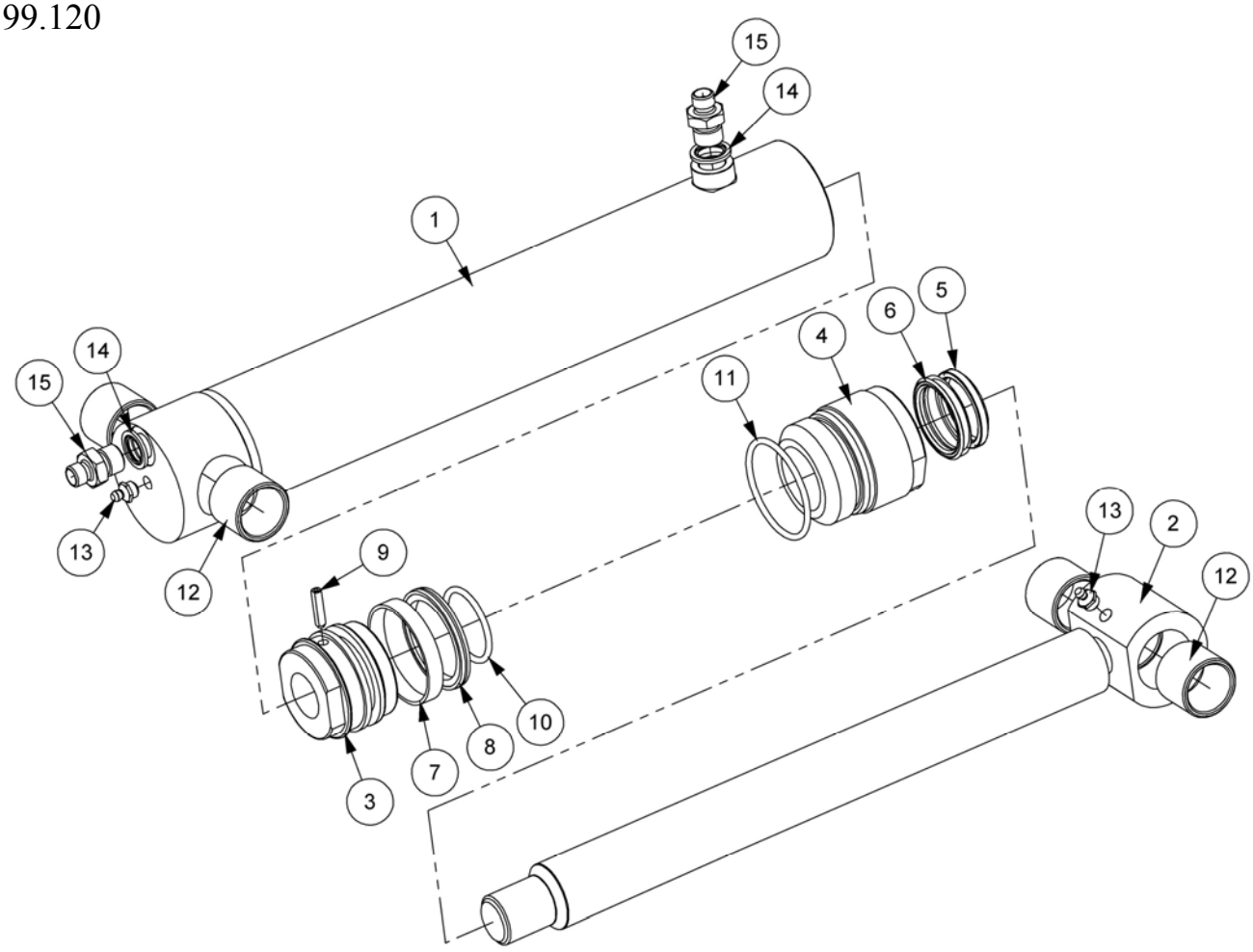
Module:
199.227



REF.	QTY.	PART No.	DESCRIPTION
		199.227	**REACH RAM ASSEMBLY**
1	1	199.227.01	RAM BORE
2	1	199.227.02	RAM ROD
3	2	0901121	GREASE NIPPLE
4	2	8650103	BONDED SEAL
5	2	8581115	ADAPTOR
6	2	08.297.04	BUSH
7	2	08.297.05	BUSH
		199.227.1	**SEAL KIT**

SLEW RAM ASSEMBLY – Machines up to 10/09 only

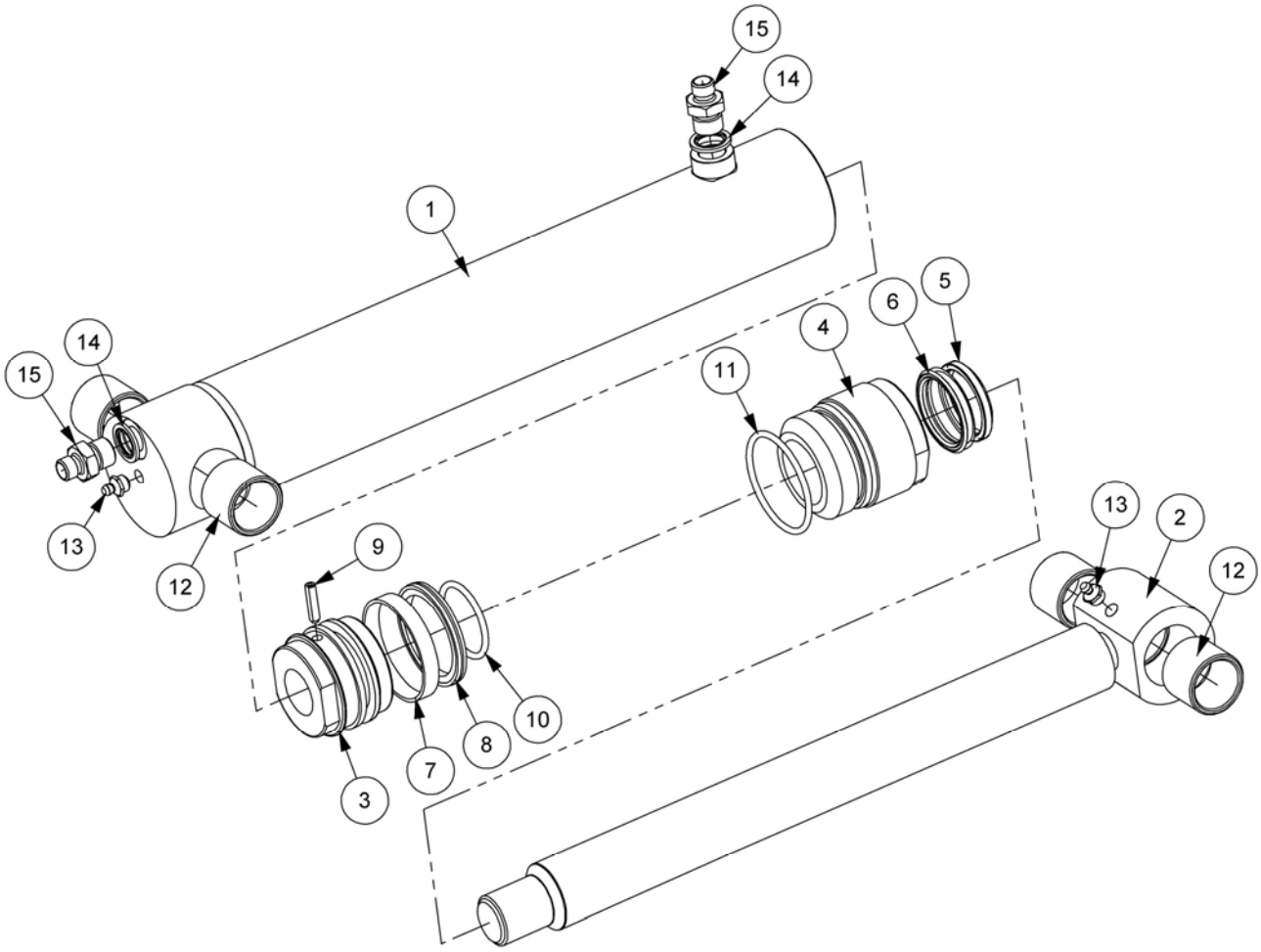
Module:
199.120



REF.	QTY.	PART No.	DESCRIPTION
		199.120	**SLEW RAM ASSEMBLY**
1	1	199.120.31	BARREL
2	1	199.120.33	PISTON ROD
3	1	43317.31	PISTON
4	1	43317.32	GLAND HOUSING
5	1	8629208	SCRAPER RING
6	1	8629225	GLAND SEAL
7	1	8629157	GUIDE RING
8	1	8629156	PISTON SEAL
9	1	42775.01	DOWEL
10	1	8600301	O RING
11	1	8600306	O RING
12	4	08.297.04	BUSH
13	2	0901121	GREASE NIPPLE
14	2	8650103	BONDED SEAL
15	2	8581115	ADAPTOR
		43317.01	**SEAL KIT**

SLEW RAM ASSEMBLY – Machines 10/09 onwards

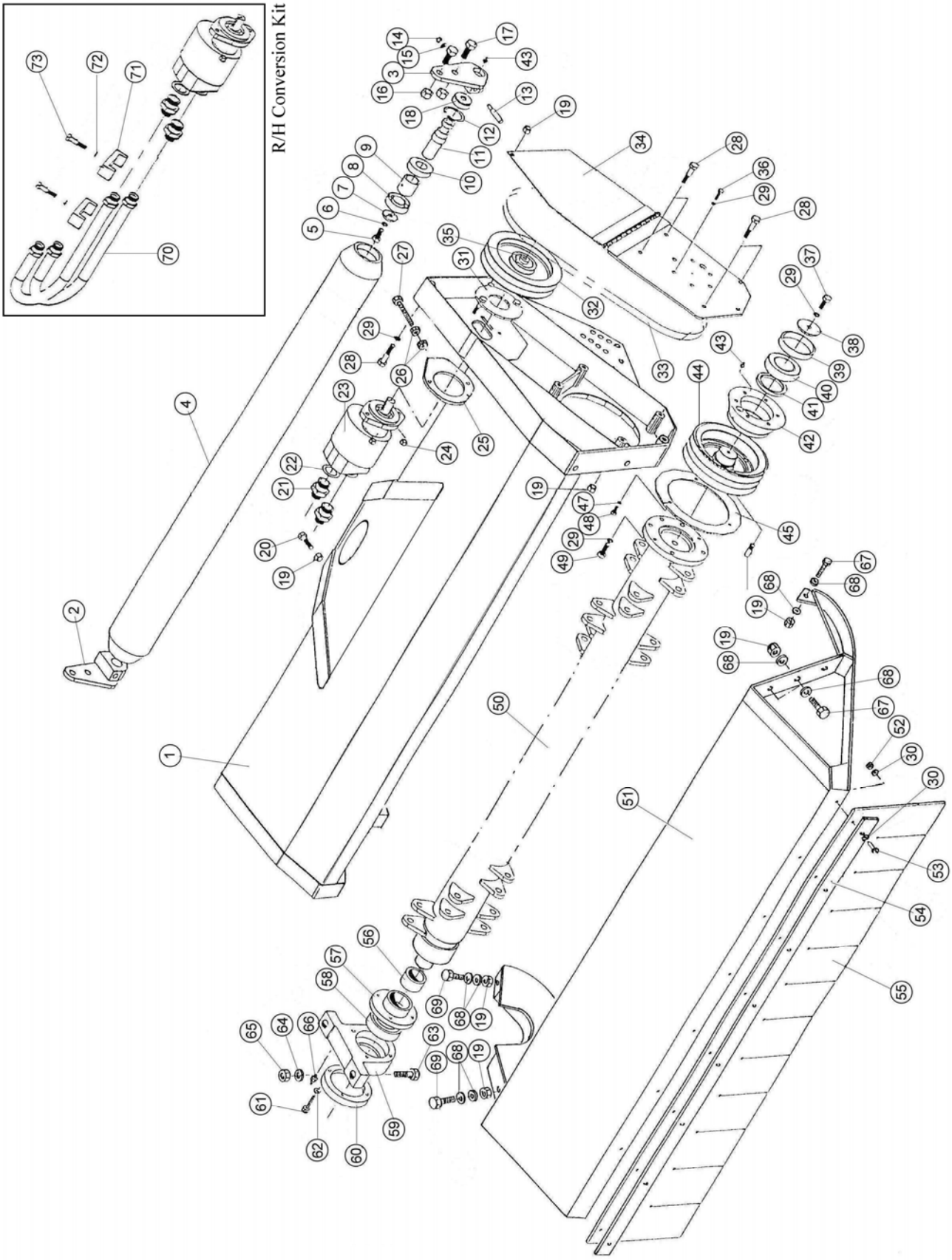
Module:
199.205



REF.	QTY.	PART No.	DESCRIPTION
		199.205	**SLEW RAM ASSEMBLY**
1 - 4		199.205AP	RAM ASSEMBLY
5	1	8629230	SCRAPER RING
6	1	8629229	GLAND SEAL
7	1	8629190	GUIDE RING
8	1	8629189	PISTON SEAL
9	1	42775.01	DOWEL
10	1	8600125	O RING
11	1	8600429	O RING
12	4	08.297.04	BUSH
13	2	0901121	GREASE NIPPLE
14	2	8650103	BONDED SEAL
15	2	8581115	ADAPTOR
		8699258	**SEAL KIT**

FLAIL HEAD ASSEMBLY – DS120 (Double Skinned)

Illustrated in Left-Hand build

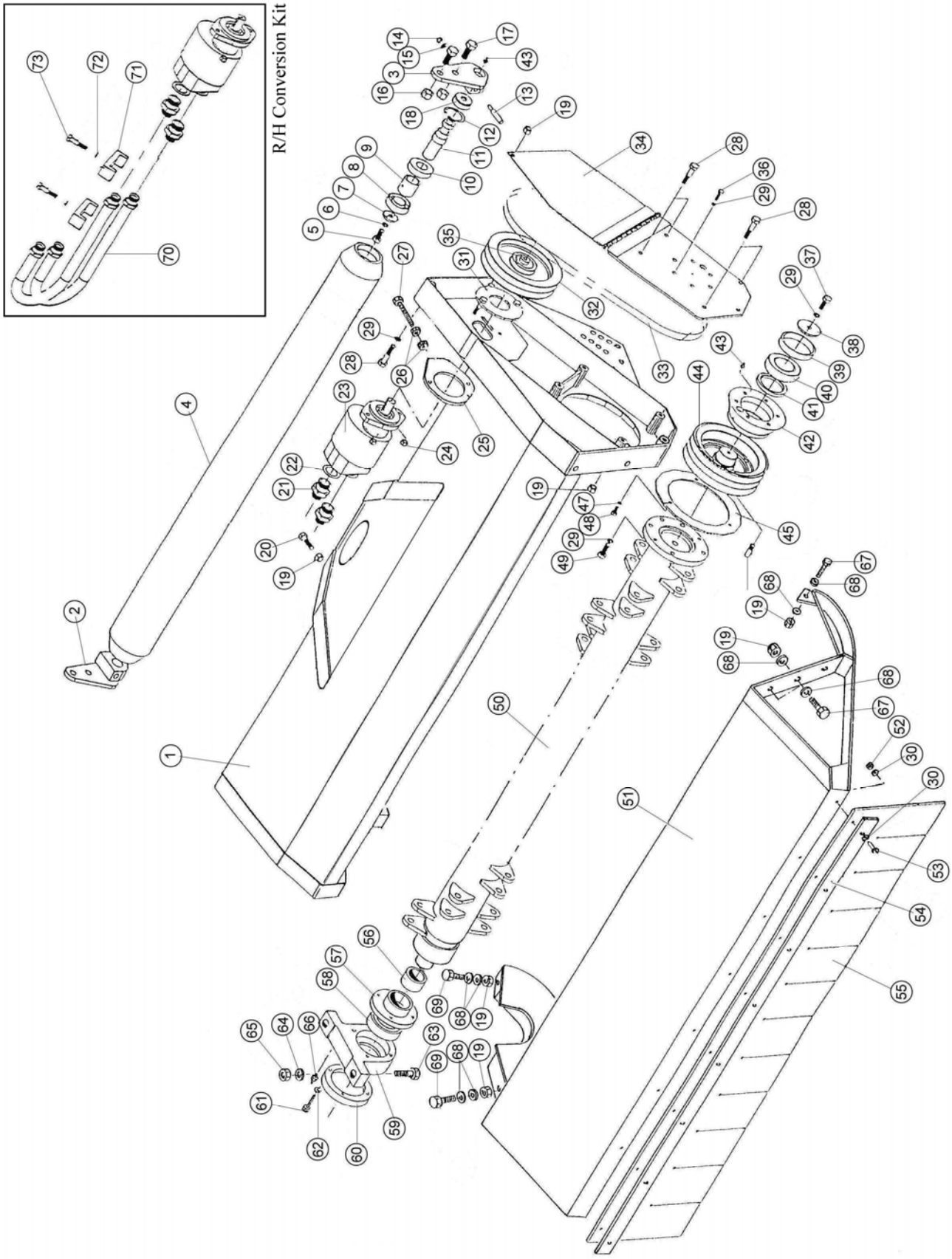


FLAIL HEAD ASSEMBLY – DS120 (Double Skinned)

REF.	QTY.		PART No.	DESCRIPTION
				1.2M HEAD ASSEMBLY - Std. Power
				1.2M HEAD ASSEMBLY - High Power
1	1	1	184.615A	HEAD ASSEMBLY - 1.2M
2	1	1	184.622R	BRACKET ROLLER - R/H
3	1	1	184.622L	BRACKET ROLLER - L/H
4	1	1	184.621A	ROLLER ASSEMBLY - 1.2M
5	2	2	9313046	SETSCREW
6	2	2	9100206	WASHER - SPRING
7	2	2	174.006	WASHER - SPECIAL
8	2	2	T8029	BEARING
9	2	2	184.589	SPACER
10	2	2	T7898	BEARING
11	2	2	184.588	SHAFT STUB ROLLER
12	2	2	0411262	CIRCLIP
13	2	2	T1840591	COTTER PIN - SPECIAL
14	2	2	9163004	STIFFNUT - NYLOC
15	2	2	T3111	WASHER
16	4	4	9163007	STIFFNUT - NYLOC
17	4	4	9313117	SETSCREW
18	2	2	184.689	SPACER
19	14	14	9163006	STIFFNUT - NYLOC
20	8	8	9213086	BOLT
21	2	2	8581136	ADAPTER
22	2	2	8650106	SEAL
23	1	-	T8027	MOTOR - STANDARD POWER
	-	1	T8097	MOTOR - HIGH POWER
24	2	2	9163005	STIFFNUT - NYLOC
25	1	1	184.624	MOTOR PLATE - STANDARD POWER
	1	1	184.625	MOTOR PLATE - HIGH POWER
26	2	2	9113005	FULLNUT
27	1	1	T8172	SETSCREW
28	6	6	9213166	BOLT
29	11	11	9100206	WASHER - SPRING
30	32	32	T3111	WASHER
31	1	-	184.463	MOTOR FIXING RING - STANDARD POWER
	-	1	188.145	MOTOR FIXING RING - HIGH POWER
32	1	1	188.061	PULLEY MOTOR
33	2	2	T7692	BELT VEE
34	1	1	184.623	DRIVE PLATE
35	1	-	184.691	TAPERLOCK - STANDARD POWER
	-	1	7990.2	TAPERLOCK - HIGH POWER
36	6	6	9313046	SETSCREW
37	4	4	9313066	SETSCREW

FLAIL HEAD ASSEMBLY – DS120 (Double Skinned)

Illustrated in Left-Hand build



FLAIL HEAD ASSEMBLY – DS120 (Double Skinned)

REF.	QTY.		PART No.	DESCRIPTION
				1.2M HEAD ASSEMBLY - Std. Power
				1.2M HEAD ASSEMBLY - High Power
38	1	1	184.461	WASHER - SPECIAL
39	1	1	184.464	SPACER FOR BEARING
40	1	1	T7840	BEARING
41	1	1	T7790	OIL SEAL
42	1	1	184.448	BEARING HOUSING
43	4	4	T2923	GREASE NIPPLE
44	1	1	184.446	PULLEY ROTOR
45	1	1	184.636	GRASS RING
46	1	1	184.489	DOWEL PIN
47	3	3	9100204	WASHER - SPRING
48	3	3	9313044	SETSCREW
49	4	4	T7855	SETSCREW - FINE
50	1	1	184.618/9 A/B	ROTOR
51	1	1	184.616A	NOSE WELD ASSEMBLY - 1.2M
52	16	16	9163004	STIFFNUT
53	16	16	9313054	SETSCREW
54	2	2	184.617A	CLAMP STRIP
55	2	2	1840476F	CURTAIN
56	1	1	192.046	SPACER FOR BEARING
57	1	1	192.026	SHIELD FOR BEARING
58	1	1	T7941	BEARING
59	1	1	192.024	HOUSING FOR BEARING
60	1	1	192.025	CAP FOR BEARING
61	4	4	T6985	SETSCREW - SOCKET
62	4	4	T2731	WASHER - SPRING
63	2	2	9213117	BOLT
64	4	4	T3747	WASHER
65	2	2	9163007	STIFFNUT
66	1	1	T6956	GREASE NIPPLE
67	3	3	9313066	SETSCREW
68	10	10	9100106	WASHER
69	2	2	9213086	SETSCREW
R/H BUILD MACHINES ONLY				
70	2	2	186.058	HYDRAULIC STEEL PIPE
71	2	2	184.517	PIPE CLAMP
72	2	2	9213105	BOLT
73	2	2	9100205	WASHER - SPRING

ROTOR & FLAIL OPTIONS FOR THE DS FLAILHEAD

Below are 3 types of rotors and the flail options available to fit each. Part numbers are given for the rotors complete with flails and end bearings whereas flails, spacers, nuts and bolts are individual items. Note: although it is possible to supply rotors balanced without flails we do not recommend this.

184.618 TYPE ROTOR - 30 Stations

Back to Back Flails on Shackles		**Qty.**
184.618AU	1.2M ROTOR c/w FLAILS & END BEARING	1
192.053	SPACER - 12.5id	30
T1920071	FLAIL FOR SHACKLE	60
T8095	STIFFNUT M12 - NYLOC FINE	30
T1920069	BOLT M12 x 87 (10.9)	30
T1920052	SHACKLE	30

Boot Flails on Shackles		**Qty.**
184.618AV	1.2M ROTOR c/w FLAILS & END BEARING	1
192.053	SPACER - 12.5id	30
09.902.01	BOOT FLAIL	60
T8095	STIFFNUT M12 - NYLOC FINE	30
T1920069	BOLT M12 x 87 (10.9)	30
T1920052	SHACKLE	30

Both the above flail options can be fitted to the same rotor. This rotor is distinguishable from others in that the distance between lugs (inside to inside) is 53mm and the holes are for M12 bolts.

184.619 TYPE ROTOR - 24 Stations

Lump Flails		**Qty.**
184.619AC	1.2M ROTOR c/w FLAILS & END BEARING	1
184.106	SPACER - 16.5id	24
1840093C	FLAIL - HEAVY DUTY	24
T7942	STIFFNUT M16 - NYLOC FINE	24
T7943	BOLT M16 x 80 (10.9)	24

Heavy Duty Grass Flails		**Qty.**
184.619AD	1.2M ROTOR c/w FLAILS & END BEARING	1
184.106	SPACER - 16.5id	24
T1840330	FLAIL - HEAVY DUTY GRASS	24
T7942	STIFFNUT M16 - NYLOC FINE	24
T7943	BOLT M16 x 80 (10.9)	24

Rigid Back to Back Flails		**Qty.**
184.619AA	1.2M ROTOR c/w FLAILS & END BEARING	1
184.500	SPACER - 16.5id	48
1840497	FLAIL - BACK TO BACK	48
T7942	STIFFNUT M16 - NYLOC FINE	24
T7943	BOLT M16 x 80 (10.9)	24

All the above 3 flail options can be fitted to the same rotor. This rotor is distinguishable from others in that the distance between lugs (inside to inside) is 40mm and the holes are for M16 bolts.

184.620 TYPE ROTOR - 20 Stations

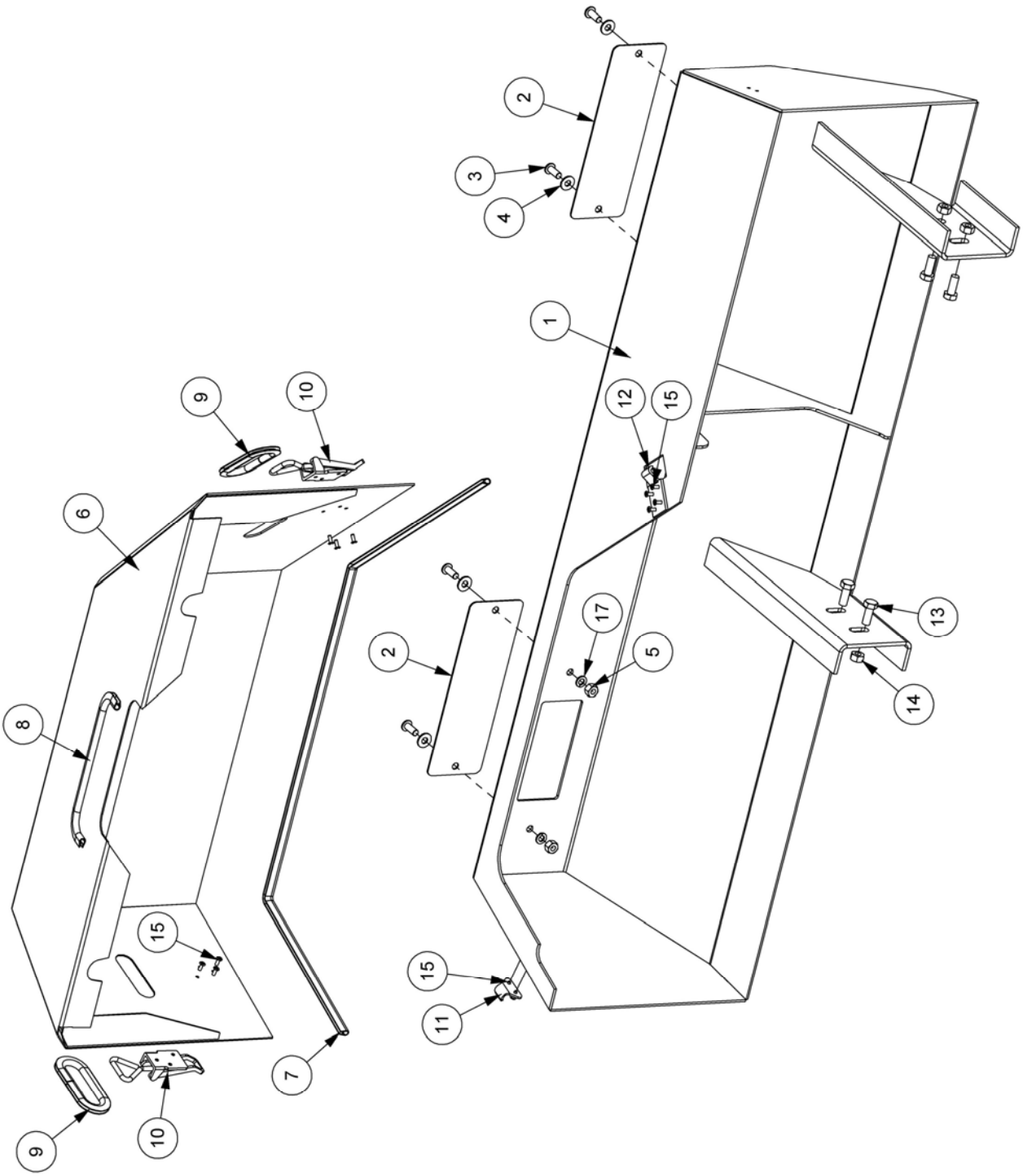
Rollicoupe Flails		**Qty.**
184620G	1.2M ROTOR c/w FLAILS & END BEARING	1
184.571	SPACER - 16.5id	20
1840572	FLAIL - ROLLICOUPE	20
9163007	STIFFNUT M16 - NYLOC	20
8092U	BOLT M16 x 110 (10.9)	20

This is a highly specialised rotor which accepts only the type of flail listed. The rotors appearance is totally different from those illustrated in the flail head diagrams in this publication as the structure resembles a large cylinder into which the flails can retract.

COVERS ASSEMBLY

Modules:
199.129 – L/H build
199.141 – R/H build

Illustrated in Left-Hand build

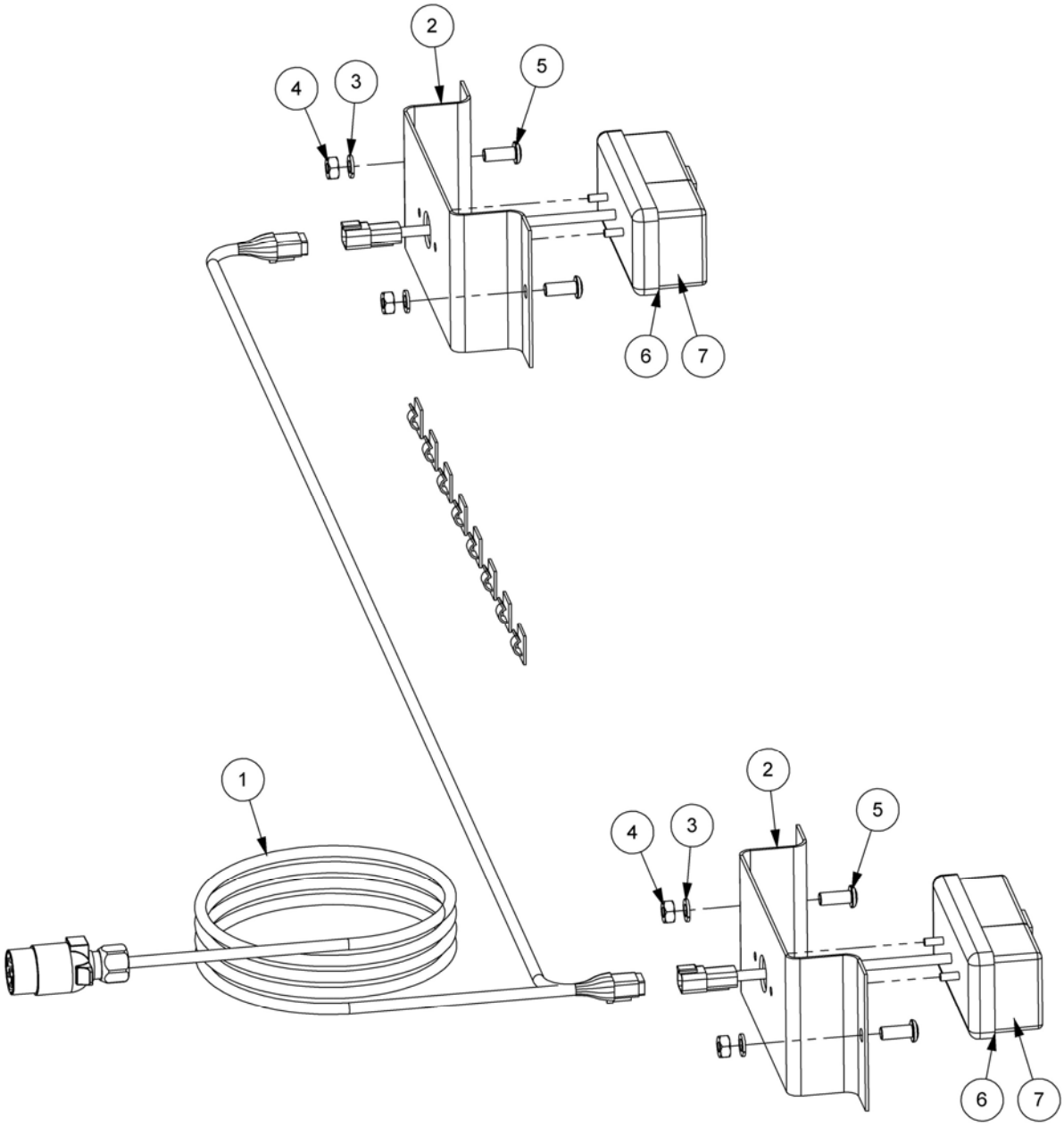


COVERS ASSEMBLY

REF.	QTY.	PART No.	DESCRIPTION
		199.129	**REAR COVERS ASSEMBLY - L/H Builds**
		199.141	**REAR COVERS ASSEMBLY - R/H Builds**
1	1	199.029	REAR COVER - L/H Build
	1	199.054	REAR COVER - R/H Build
2	2	199.043	BLANKING PLATE
3	4	9300154	BUTTON HEAD SOCKET SCREW
4	4	9100105	FLAT WASHER
5	4	9143005	SELF-LOCKING NUT
6	1	199.027	VALVE COVER - L/H Build
	1	199.055	VALVE COVER - R/H Build
7	1	43468.07	EDGING STRIP (1315mm)
8	1	43468.08	EDGING STRIP (480mm)
9	2	43468.03	EDGING STRIP (230mm)
10	2	43449.01	OVERCENTRE FASTENER
11	1	46007.03	HOOK-OVERCENTRE FASTENER
12	1	46007.02	HOOK (LARGE)
13	4	9313066	SETSCREW
14	4	9143006	SELF-LOCKING NUT
15	12	1069088	POP RIVET
16	1	03.231.01	RUBBER EDGE MOLDING
17	4	9100205	SPRING WASHER

REAR LIGHTING KIT – Optional Extra

Module:
199.130

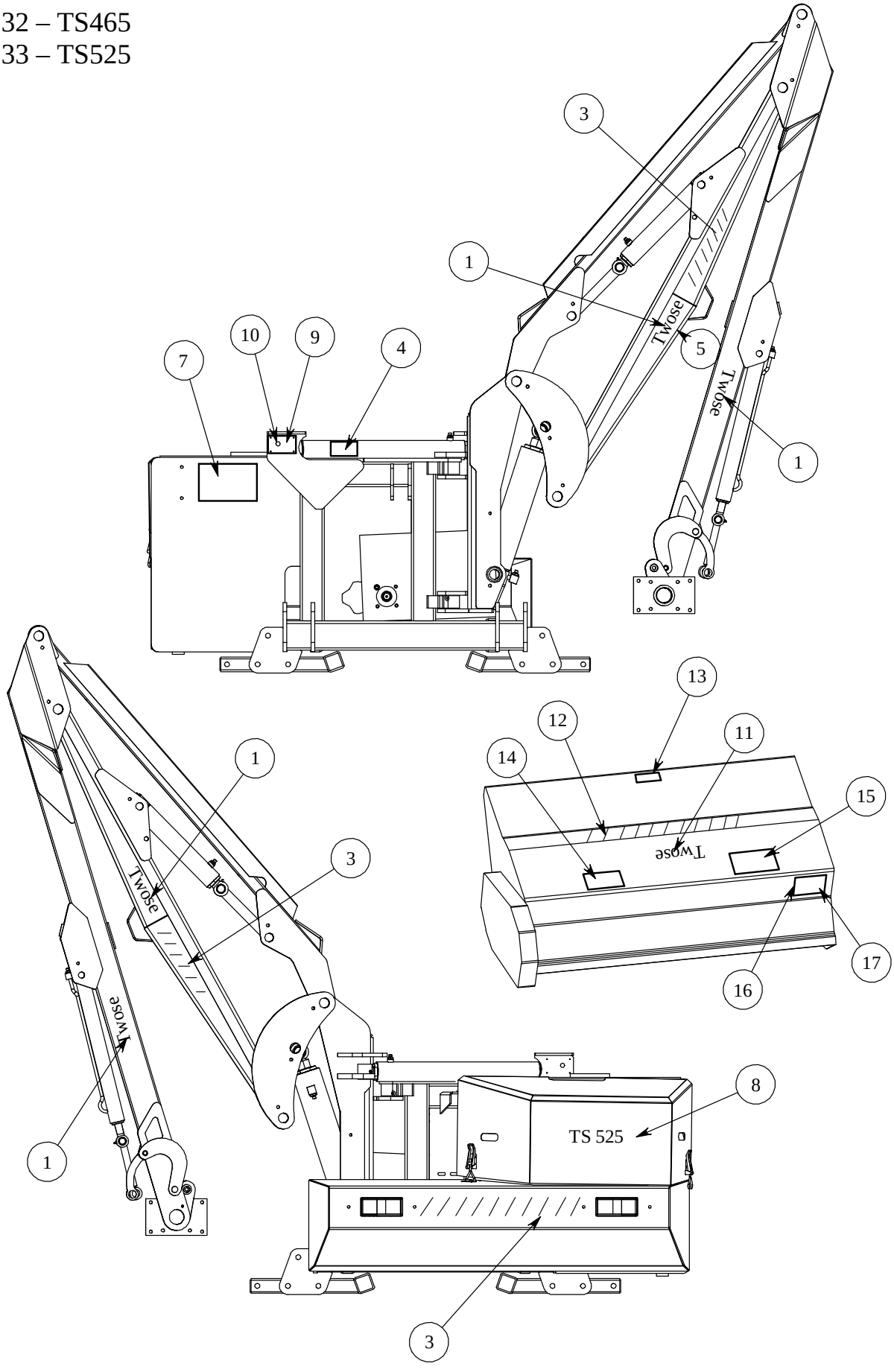


REAR LIGHTING KIT – Optional Extra

REF.	QTY.	PART No.	DESCRIPTION
		199.130	**REAR LIGHTING KIT**
1	1	45900.01	LIGHTING KIT - RECTANGULAR
2	2	199.044	MOUNTING
3	4	9100205	SPRING WASHER
4	4	9113005	PLAIN NUT
5	4	9300154	BUTTON HEAD SOCKET SCREW
6	2	45642.01	TAIL LAMP ASSEMBLY (REPLACEMENT)
7	2	45642.39	TAIL LAMP LENS (REPLACEMENT)

MACHINE DECALS

Modules:
199.132 – TS465
199.133 – TS525



MACHINE DECALS

REF.	QTY.	PART No.	DESCRIPTION
		199.132	**DECAL KIT - TS465**
		199.133	**DECAL KIT - TS525**
1	4	T410186	DECAL - TWOSE (SMALL)
2	1	T410185	DECAL - TWOSE (LARGE)
3	5	T410184	DECAL - CHEVRON
4	2	T1850152	DECAL - WARNING DANGER AREA
5	1	T1840209	DECAL - CLOSE BOOM
6	12	T410201	DECAL - GREASE GUN
7	1	T7714	DECAL - ATTENTION TRIANGLE
8	1	T19904702	DECAL - TS 465 (WHITE)
		T19904704	DECAL - TS 525 (WHITE)
9	1	45429.01	SERIAL No. PLATE - TWOSE LIMITED
10	4	7103230	POP RIVETS
			DECAL KIT - ZD120 FLAIL HEAD
11	1	T410185	DECAL - TWOSE
12	1	T410184	DECAL - CHEVRON
13	1	T1850152	DECAL - WARNING DANGER AREA
14	1	T1850151	DECAL - IMPORTANT (CUTTING BLADES INFO)
15	1	T1840280	DECAL - DANGER (COWLING REMOVED INFO)
16	1	45429.01	SERIAL No. PLATE - TWOSE LIMITED
17	4	7103230	POP RIVETS