FLAIL TRIMMERS -

460S 520S 580S

Edition No: 8177-02-99

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.

EC DECLARATION OF CONFORMITY

Conforming to EEC Directive 89/392/EEC

We,

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

Declare under our sole responsibility that:

The product *(type)* Tractor Mounted Hedgecutter/Trimmer

……

Product Code T315, T393, T400, T420, T455, T460, T520, T540, T580, T585, T600

Serial No. & Date ……. Type ……

Manufactured by the above company/* ……

……
(insert business name and full address if not stated above)*

Complies with the required provisions of the Directive 89/392/EEC, and AMD 91/368/EEC, AMD 93/44/EEC, AMD 93/63/EEC and conforms with European Norm. BS EN 292.

Part 1: 1991 – Safety of Machinery – Terminology, methodology.
Part 2: 1991 – Safety of Machinery – Technical Specifications.

and other national standards associated with its design and construction as listed in the Technical File.

Signed John Frank
on behalf of TWOSE of TIVERTON LIMITED *Responsible Person*

Chief Design Engineer June 2003
Status *Date*

EC DECLARATION OF CONFORMITY

Conforming to EEC Directive 89/392/EEC

We,

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

Declare under our sole responsibility that:

The product *(type)* Hydraulic Arm Mounted Flailhead

……

Product Code TWHD

Serial No. & Date ……. Type ……

Manufactured by the above company/* ……

……
(insert business name and full address if not stated above)*

Complies with the required provisions of the Directive 89/392/EEC, and AMD 91/368/EEC, AMD 93/44/EEC, AMD 93/63/EEC and conforms with European Norm. BS EN 292.

Part 1: 1991 – Safety of Machinery – Terminology, methodology.
Part 2: 1991 – Safety of Machinery – Technical Specifications.

and other national standards associated with its design and construction as listed in the Technical File.

Signed John Frank
on behalf of TWOSE of TIVERTON LIMITED *Responsible Person*

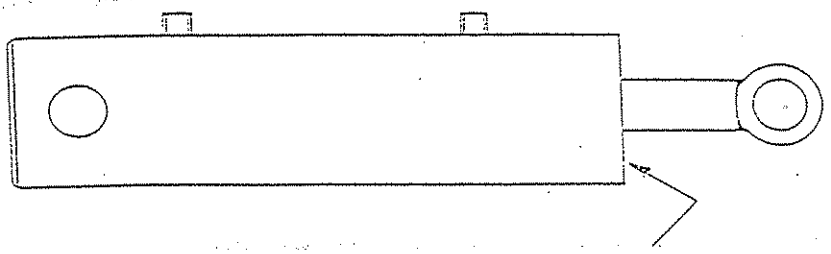
Chief Design Engineer June 2003
Status *Date*

RAM IDENTIFICATION

When ordering SEAL SETS, RAM PARTS ETC,, please follow the simple guidelines below to ensure receipt of COMPATIBLE PARTS.

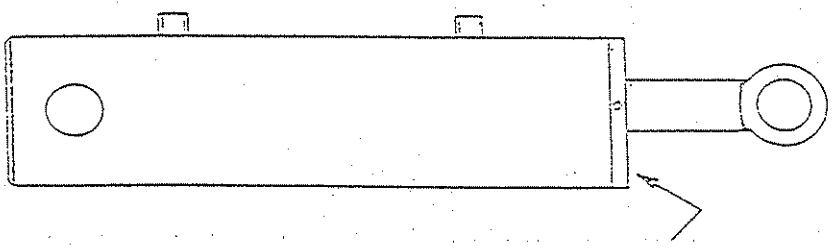
Examine the Ram in question at the GLAND NUT.. It will be one of THREE TYPES.

TYPE 'A'



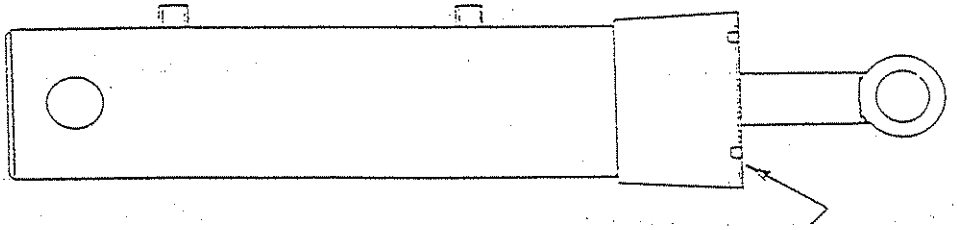
Gland nut internal and flush

TYPE 'B'



Gland nut exterior and same diameter as cylinder

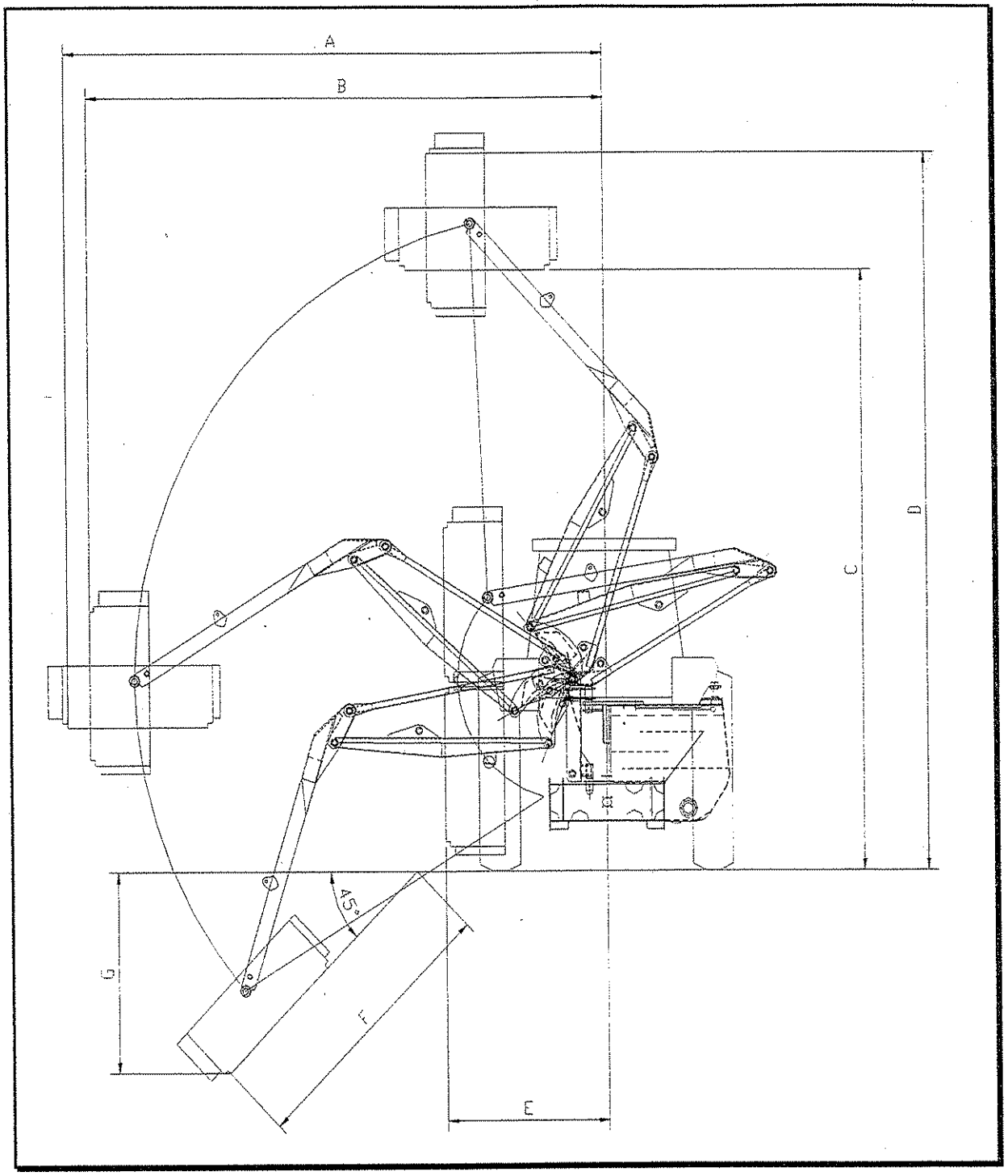
TYPE 'C'



Gland nut is 'large cast Collar type'

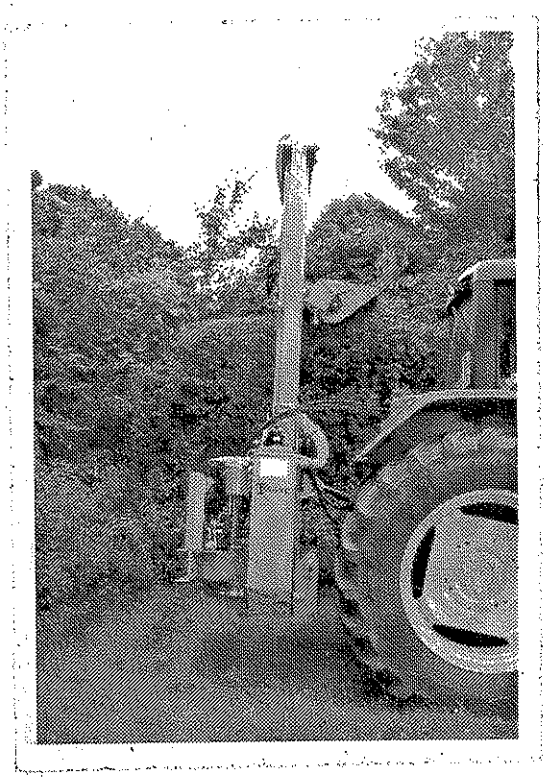
WHEN ORDERING PARTS STATE WHETHER TYPE 'A', 'B' OR 'C'

This does NOT apply when a COMPLETE RAM is required, since all ram types are FULLY INTERCHANGEABLE.



Dimension (m)	460S	520S	580S
A	4.64	5.24	5.85
B	4.45	5.05	5.66
C	4.85	5.43	6.00
D	5.79	6.37	6.93
E	1.38	1.48	1.58
F	2.30	2.93	3.62
G	1.63	2.07	2.56

BOOM FLAIL MOWERS & HEDGETRIMMERS



- Various models for Contractors and farmers.
- 14.6M (15ft 1in), 5.2m (17ft) or 5.8m (19ft) reach models left or right hand cut
- Slim tank - reduced overhung weight - more stable.
- Units have main lift float and head floatation.
- Flail head of double skin design - with wire cutter, in widths of 1.2m, 1.25m or 1.6m.
- Cable or electronic proportional joystick control.
- Pumps and valves protected behind tail bar.
- No bag or sag hydraulic pipes.
- Cutting head 250mm forward - better vision.
- Range of flails for grass or hedgecutting.
- Full range of pumps and motors 50-75HP.
- Twin 'safety' vee belt drive from motor.
- Power slew and hydraulic breakaway.
- No loose stand legs.

MODELS:- 460S, 520S, 580S

TWOSE OF TIVERTON LIMITED
BLUNDELLS ROAD
TIVERTON, DEVON, EX16 4JT
TEL: (01884) 253691, FAX: (01884) 255189

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INDEX CONTINUED

SPECIFICATIONS

460S Machine =

Total weight of machine 1.29 T

When folded - for transport whole machine is within tractor width.

Height and length of machine when folded for transport will vary according to tractor and cab.

520S machine =

Total weight of machine 1.34T

When folded - for transport whole machine is within tractor width.

Height and length of machine when folded for transport will vary according to tractor and cab.

580S Machine =

Total weight of machine 1.40T

When folded - for transport whole machine is within tractor width.

Height and length of machine when folded for transport will vary according to tractor and cab.

AIRBORNE NOISE EMISSIONS

The equivalent continuous A - weighted sound pressure level at the workstation (tractor seat) does not exceed 74dB (A). This value was achieved cutting hedges using a Dawe 1405C Sound Meter (BS 3489) on a 3090 Massey Ferguson Tractor complete with M/F Safety Cab.

Note - Dimensions are approximate and will vary from tractor to tractor.

GENERAL INFORMATION

NOTE:- The provision of this information is a requirement of the Health & Safety at Work Act 1974.

NOTE:- This handbook has been designed to help the operator and service/mechanic to use and understand the machine fully, safely and efficiently, bearing in mind the Health & Safety requirements and the new CE requirements which come into force from January 1st 1995.

NOTE:- The handbook/manual will be supplied in a waterproof plastic outer cover to prevent damage from rain, condensation etc. The cover of the handbook will include its own part number, which includes information as to machine type and issue date of manual in question.

DANGER
NOTE:- It is very important that the handbook/manual has been read thoroughly - throughout, and is completely understood before attempting to attach or use machine in any way.

CAUTION: When ordering spares, please state clearly:-

(a) Machine type and model No.
(b) Part No. of component.
(c) Description of component.
(d) Quantity required.
(e) Full address to which spares are to be sent.
(f) Method of delivery required.

CAUTION:- Always insist on genuine and correct spare parts.

NOTE:- Further copies of this handbook/manual can be obtained from:-

TWOSE OF TIVERTON LIMITED
BLUNDELLS ROAD
TIVERTON
DEVON
EX16 4JT

TEL: 01884 253691
FAX: 01884 255189

SAFETY NOTES AND WARNINGS

Throughout the handbook the following sub headings are used to draw attention to various points of importance.

DANGER
WARNING

This is to draw attention to very important instructions which MUST be followed precisely to avoid injury or death.

CAUTION

This is used to draw attention to instructions which MUST be followed to avoid damage to operator, machine, process or the environment.

NOTE:-

This is used to highlight points used for supplementary information.

ABOUT THIS MACHINE

This is a Hedge Trimmer of the type known throughout the agricultural industry as a "Flail type" Hedgetrimmer.

It is intended to be attached to an agricultural vehicle by means of the "Three-point-Linkage" couple-up system, which in turn is locked into position (to prevent movement between tractor and Hedgetrimmer) by means of a pair of adjustable tie arms - forming an 'A' frame to ensure a rigid attachment/lock system.

The purpose for its production and its sole intention is to cut/trim hedges, banks, verges etc.

AT NO TIME must this machine be used for anything other than, or to do any job - other than that for which it has been designed (see note above).

NEVER USE JIB - ARMS AS A CRANE

HEALTH AND SAFETY

DANGER
WARNING

Never attempt to assemble, couple up, or operate machinery until you understand fully the functions, controls and safety precautions required, as shown in the operators manual.

DANGER
WARNING

Always follow tractor safety operations and instructions VERY carefully.

NEVER TAKE RISKS

DANGER
WARNING

NEVER LEAVE TRACTOR SEAT WHILST ENGINE - OR MACHINE IS RUNNING

DANGER
WARNING

NEVER USE HEDGETRIMMER JIB/BOOM ARMS AS A CRANE IN ANY FORM

DANGER
WARNING

It may be found necessary to stabilise whole unit once coupled together - by ballasting tractor rear wheels and/or fitting counterbalance weights to tractor.

Tractor rear wheels could also be set out to a wider track setting as a method of increasing stability. (Check with agent).

CAUTION.

Be aware of warning stickers and instruction stickers on machine as care must be taken and instructions obeyed.

HEALTH AND SAFETY CONTINUED

CAUTION

Contact your dealer should you need advice, assistance, or if you do not understand the manual or machine. "NEVER ASSUME" - if not sure - ASK.

CAUTION

Machine MUST NOT be altered or modified in any way - without permission - No liability will be accepted in respect of a machine that has been modified without manufacturers permission.

DANGER
WARNING

Never drive machinery at speeds that could cause danger to other persons or properties, or in a manner that may cause accidents.

DANGER
WARNING

Never attempt to Service/adjust or work on any machinery in an unsupported state.

For Example:- Any three point linkage mounted machinery
Front Loaders
Digger Booms
Hedgetrimmer booms etc. etc.

Always ensure that machinery is safely supported and propped in position.

DANGER
WARNING

Always ensure that the wheels of any wheeled implement/machinery are 'chocked' firmly and implement will not move, before attempting to 'service' or 'work on' in any way or form.

CAUTION

Always "SWITCH-OFF" tractor engine before attempting to carry out adjustment or service repairs and inspections, on machinery.

HEALTH AND SAFETY CONTINUED

DANGER
WARNING

Always be aware of your surroundings - and operate machinery accordingly. Beware of confined-tight areas, low height restrictions, buildings and overhangs etc. Also drive and operate bearing in mind weather conditions such as sun, rain, ice, snow, wind etc. [Make allowances in all situations].

CAUTION

Hedges, banks etc. must always be 'inspected' before actual cutting/trimming commences - in order to find any unusual, large, unexpected or dangerous objects. Any objects found that may cause a danger or risk must be removed.

CAUTION

Never operate machine in a reckless or uncaring manner. Respect other road users and be patient.

HIGHWAY USE

When operating machinery on the Highways the "Local Highways Department" should be consulted for approval and notification, as rules and regulations vary from local authority area to area.

But the Highways Department regulations must be followed.

NOTE:- In general it is expected that the "Tractor/implement will follow (WITH) the flow of traffic" - but local Highway rules will confirm this.

Always use 'STOP'-'GO' boards or whatever system Local Highways Department advise, and ensure these are positioned correctly in relation to machine operating area.

Have respect for 'passing' traffic and keep 'passing' lane free from obstruction.

Allow time for walkers and cyclists to clear site. Also when using on the Highway consult the 'Lighting Regulations' for correct procedures.

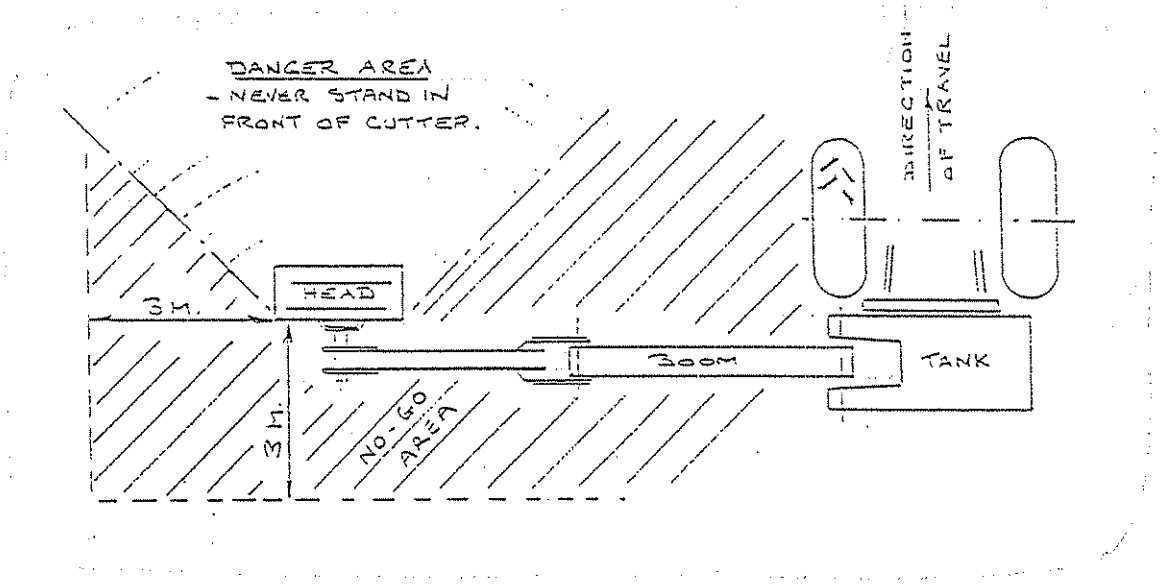
CAUTION

Never carry "passengers" on machinery or on tractor.
Ensure bystanders/onlookers are kept well away from operational area of apparatus.

HEALTH AND SAFETY CONTINUED

NOTE:- NEVER ALLOW ONLOOKERS/BYSTANDERS TO STAND IN FRONT OF CUTTER HEAD - IN LINE WITH FLYING DEBRIS.

A sideway and rearward NO-GO area should also be kept (see sketch below).



CAUTION

Never operate cutting rotor with blades looking towards operator or towards others. Cutters must always be operated towards hedge or bank/verge etc.

CAUTION

Never walk underneath the machine for any reason especially if unit is still operating.

CAUTION

'PARKING UP' MACHINE

When machine is being removed from tractor linkage and being 'parked up' it is essential that a good firm base and level site be found.

Always chock and prop machine to ensure a good firm position to leave parked. Ensure that any stand legs for the machine are correctly locked into position.

HEALTH AND SAFETY CONTINUED

CAUTION

Never allow children to play on, or around, parked machinery.

CAUTION

Never wear loose fitting or ragged clothing which could get caught in machinery or controls.

DANGER
WARNING

Ensure all cab glass is **intact** and is safety glass. Protect all work-side glass with the safety screens provided.

CAUTION

Ensure visibility is clear through cab-screens at all times.

CAUTION

Ensure workstation controls, Joysticks, (Cable levers) etc. are positioned correctly to suit operator, and not getting in the way of other driving functions.

Make sure controls do not obstruct entry and exit to cab.

CAUTION

Always dispose of discarded or worn out parts thoughtfully - by disposing of them in an approved and specified legal scrap site, bin or skip.

CAUTION

Worn out and spent waste oil, grease and other obnoxious substances must always be disposed of in suitable and legally approved dumping containers suitable for the waste in question.

HEALTH AND SAFETY CONTINUED

CAUTION

Ensure booms are folded onto rubber buffers (which are fitted) and that the whole machine is folded in as close to tractor as possible whilst transporting.

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CONTROL LEVERS (CABLE MACHINES)
(AUTOMATIC SAFETY).

The control levers which operate the hydraulic boom cylinders on cable control machines will automatically centralise themselves in the CENTRE-OFF position as soon as control lever is let go, thus preventing any chance of unwanted movement or overrun of booms.

Cutting heads are equipped with a built-in "wire cutter" member to prevent wire getting wrapped and tied onto rotor.

DANGER
WARNING

Great care must be taken when attaching Hedgetrimmer to tractor linkage due to having to actually position oneself between tractor rear and Trimmer in order to connect attachment pins, P.T.O etc. etc.

CAUTION

Flails to Rotor

Special bolts are used to attach the flails to the rotor. These are 10.9 grade and fine pitch. They must **only** be replaced with bolts and nuts of the same specification.
NOTE: - this bolt specification must not be changed.

JOYSTICK CONTROL (ELECTRIC MACHINE) (AUTOMATIC SAFETY)

The electronic-proportional control model of Hedgetrimmer, which has a single joystick as controller, will also go automatically to the "CENTRE OFF" position immediately the joystick is released - cancelling all functions.

[JOYSTICK IS NATURALLY SPRUNG LOADED TO NEUTRAL - CENTRE OFF POSITION]

CAUTION

ELECTRIC CONTROLS

The electronic controls, for either 'switch control' or 'Joystick control' Trimmers should be kept in a dry, damp free area whilst machine is 'off' tractor and being stored.

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NOTES

AMENDMENT	DATE	DETAILS

GENERAL INSTRUCTIONS

DANGER
WARNING

1. Before attaching any machine to a tractor or loader make sure that implement is still standing firmly on good solid - level site as it will be, providing unit was previously parked correctly.
- Check that any wheels are 'chocked' correctly and that supports/props are in position where necessary to prevent booms etc. dropping.

2. Before and during the manoeuvring of the tractor or vehicle in order to attach machinery/implements, - make sure that No other persons are in the vicinity. Keep other persons well clear and make known your intentions, all the while keeping a sharp lookout whilst reversing and aligning machines for coupling up.

3. Always secure tractor into selected position by ensuring that brakes are applied correctly in order to prevent vehicle moving off on its own to cause injury and damage.

4. Make sure that the lift arms and top link ball ends of the tractor are properly fitted to the machine/implement by using correct adaptor sleeves where necessary, and that retaining pins of the correct type are used on all three point linkage points. Secure pins with relevant pin and ring assembly.

5. If the machine is of the drawbar type - check that the hitch on the tractor is in good condition and that the hitch pin used is of the correct size and type, and is properly secured when fitted.

6. Should it become necessary to make any adjustments or service on machine while raised on the tractor linkage, or raised on a front end loader - trestles or suitable supports MUST be positioned to support machine to prevent accidental dropping of lift arms, loader arms or mechanical failure.
[MACHINE MUST ALWAYS BE PROPPED AND CHOCKED]

7. Never attempt to work on, adjust or service repair machinery of any kind whilst it is still running or working. Always stop the machine and STOP THE TRACTOR ENGINE - before any service/repairs begin.
(SWITCH OFF TRACTOR ENGINE BEFORE LEAVING TRACTOR SEAT)

8. In transit always use transport stays or locking devices where provided.
If, as in the case of some longer machines, the unit is transported lengthways - make sure that the front of the tractor is suitably ballasted to maintain stability.
A method of achieving this would be to add suitable weights to a correctly specified and fitted front weight frame.

9. Always use machines in a sensible and reasonable manner and do not attempt to use them in work for which they are not intended. Avoid overloading and abusing them as this can cause damage to machine and tractor and can be very dangerous.

10. When unhitching/detaching a machine from a tractor three point linkage or from a front end loader ensure that any stands or legs are securely positioned and that the machine is parked where it will not be a safety hazard or cause annoyance to others. Make sure that chosen 'parking site' is a firm and level site.

11. Carry out regular periodic maintenance. - Always with safety in mind.

12. Ensure regular maintenance procedures are maintained for the lifetime of the machine.

13. HEALTH AND SAFETY RULES AND REGULATIONS MUST BE ADHERED TO IN ALL AGRICULTURAL RESPECTS.

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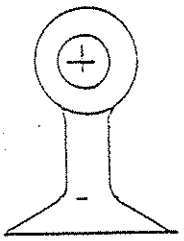
INTRODUCTION

1. 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.

2. 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.

3. The cutting flail blades offered are:-

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



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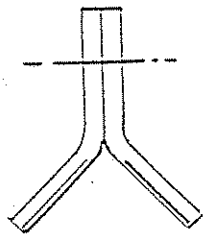
(b) Back to back 'rigid' - one piece blade (in pairs)
- For 'UP' or 'DOWN' cutting, grass/mowing and trimming.



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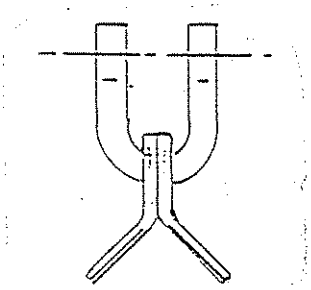
(c) Back to back (on shackle) 'in pairs'
- For 'UP' or 'DOWN' cutting grass/mowing



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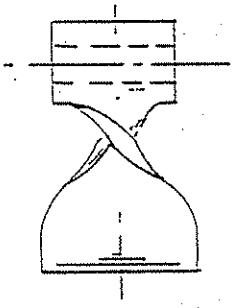
(d) Heavy single edge blade flail (twisted pattern)
For grass cutting and hedge trimming
- Cuts one direction only



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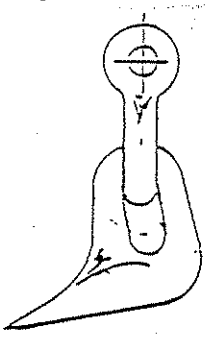
(e) Boot Flail (on shackle)
For grass cutting and hedge trimming
- Cuts one direction only.



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4. The cutter head design is of a double skin construction for greater strength and longer life. The drive from hydraulic motor to rotor is by vee belts.

5. Twin Vee belts take the drive from Motor to Rotor - giving a reliable drive with the anti-shock protection that a belt system provides.

6. 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.

7. An adjustable forward boom option allows the head to be positioned alongside the cab for best vision, in-line for maximum reach, or any desired position in-between.

8. The hydraulic hoses on these machines have been kept as unobtrusive as possible.

9. Every machine has head flotation as standard. On cable operated 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.

10. All machines have a relief valve in the primary ram system which limits the pressure which can be generated in the drop side of the cylinder. The head cannot therefore be driven into the ground in any circumstances.

11. Some degree of boom flotation is standard on all machines. Cable operated machines have a detented 'float' position (accessed in the same way as for head flotation above) which simply allows the head/arms to rest on the depth roller and the arms to then move as required. 'Power float' machines (all proportional and some switched electric machines) have the provision to apply a pressure to the lift cylinder to take most of the weight of the head and arms thereby allowing easier verge-cutting. This pressure can be varied to suit conditions.

12. For semi-independent machines (where the supply to the cylinders is from the tractor hydraulics) the rotor is engaged and disengaged using the PTO lever of the tractor, the rotor is unidirectional. For fully independent machines the rotor is controlled by a lever in the cab: giving neutral, up-cutting and down-cutting.

TRACTOR SELECTION FOR 460S, 520S AND 580S BOOM FLAILS

for 460S:-	Tractor size must be a minimum of 45kW (60 HP)
for 520S:-	Tractor size must be a minimum of 48kW (65 HP)
for 580S:-	Tractor size must be a minimum of 48kW (65 HP)

The tractor must be equipped with a power take off shaft which must run at 450 R.P.M during operation.

The P.T.O shaft should run clockwise when looking at the rear of tractor and ideally should be 1 3/8" S.A.E - 6 spline type shaft enabling a standard P.T.O shaft to be fitted.

Tractor must have counterbalance weights fitted if necessary (on approved mountings) and/or ballasted wheels may be found an advantage to ensure unit is stable.
Tractor rear wheels could also be set at a wider track setting to cure stability problem - contact agent for advice.

Four wheel drive tractors - with the extra weight inbuilt, plus larger front wheels - is an advantage in keeping machine stable.

ATTACHING MACHINE TO TRACTOR.

IMPORTANT:- Ensure machine is parked on a firm and level site without any bystanders or onlookers.

READ AND UNDERSTAND the general and Health and Safety instructions given in this manual.

1(a). FOR PIN TYPE LOWER LINKAGE EYES ONLY

Remove spring pins, lift pins and spacers 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 the lower jaws of the linkage frame and that the 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 the pins, in between the jaws and outboard of the lift arms. Spacers are provided to prevent sideways movement of link arms.

Secure lift pin into position using the 7/16" diameter pin and ring assembly.

1(b). FOR AUTOMATIC QUICK CROOK-ON ONLY LOWER LINKS

Remove spring pins, lift pins and spacers supplied with Hedgetrimmer from lower link positions of linkage frame. Then reassemble lift pin and spacer together with tractor lower link ball end onto lift pin and between ears of frame: with spacers to the outside. Then secure into position using 7/16" diameter pin and ring also supplied.

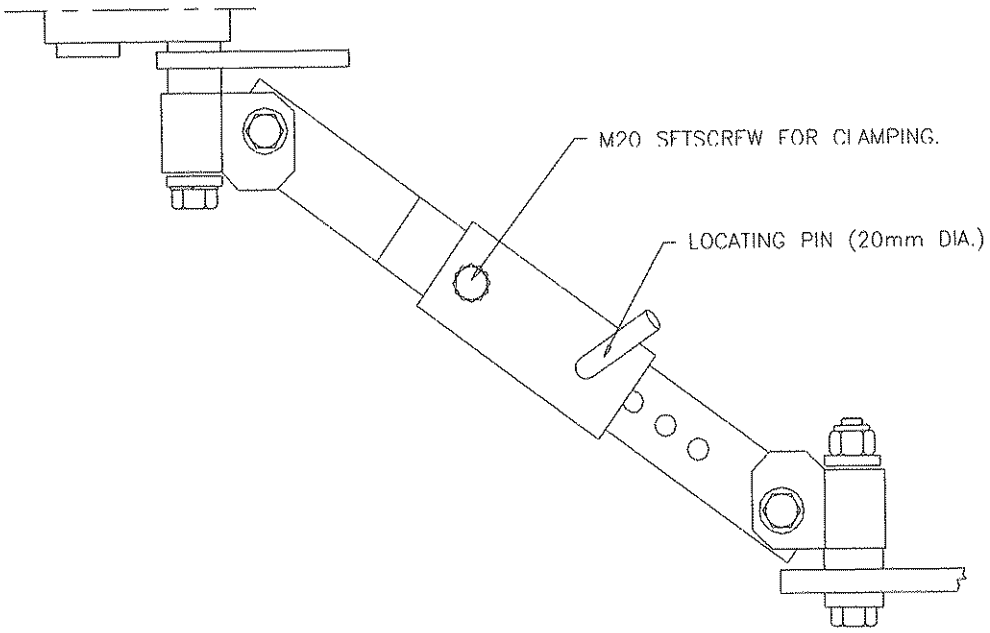
Next, slowly and very carefully reverse the tractor towards the machine's linkage frame. Carefully ensure that tractor lower links fit between the lower jaws of the linkage frame and are aligned with the relevant ball eyes (now already on lower lift pins). Raise tractor lower link arms to a position that allows the ball to engage correctly into the housing in the lift arm.

2. The main 20mm diameter locating pin which goes through both stabiliser arm assemblies should be removed after first removing its 7/16" diameter lock-pin and ring.

Next slacken off the M20 setscrews which clamp both halves together.

The pair of stabiliser arms can now be telescoped upwards and forwards to allow the top link coupler to be fitted to the tractor top link position. Secure the upper end of the stabiliser to the tractor's top link point using tractor top link pin and spring pin/linch pin and ring.

The top link stay, between Hedgetrimmer and stabiliser frame, may have to be lengthened/adjusted to suit.



3. Start up tractor. Raise the whole machine on the linkage until a height is reached which is a compromise between a horizontal path for the PTO shaft and 300mm (12") of ground clearance for the main frame.

With machine at this height the 20mm diameter locating pins for the stabiliser arms should be fitted through the nearest pair of matching holes and secured with 7/16" pins and rings. Ensure that the chosen setting is the same on both arms.

Tighten the M20 setscrews on each stabiliser arm to lock them together.

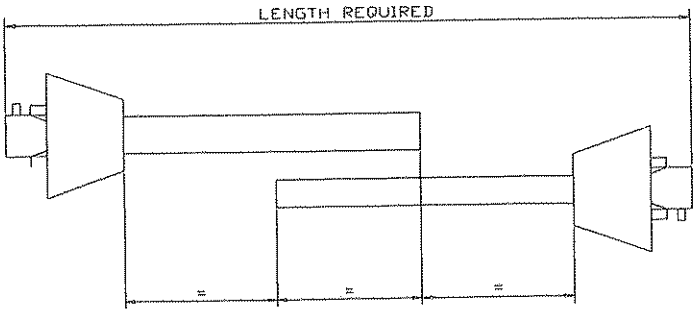
Lower the three point linkage to allow weight of machine to be taken on stabilisers.

Tractor lower linkage check chains assemblies should now be tightened to ensure that tractor arms are locked and machine is positioned centrally at rear of tractor. Loose check chains are the primary cause of machines rocking on the back of the tractor.

Top link should now be adjusted to ensure Hedgetrimmer is level from front to rear.

5. Check the length of the PTO shaft.

When connected from tractor to machine the shaft should engage by 1/3rd of the total shaft length: male part should be halfway from disengaged to fully bottomed out.



Do not use the machine until the shafts have been cut to the correct length.

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.

7.

DANGER
WARNING

All glass screens on the relevant side of cab must be protected.

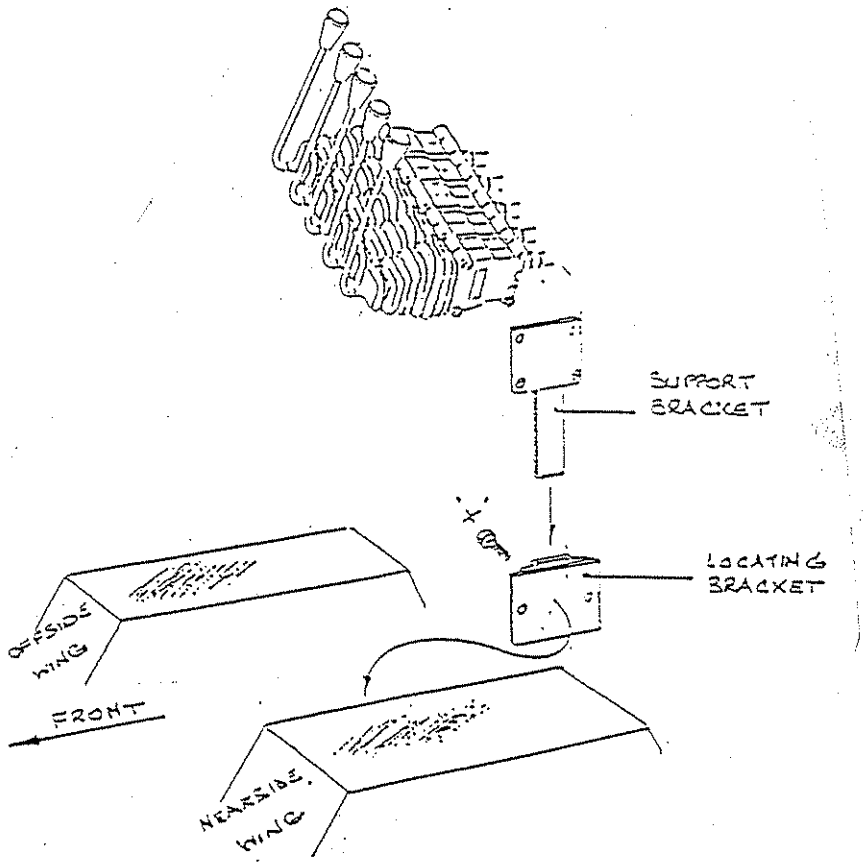
The mesh safety screens should now be cut and fitted. They are designed to be fitted to the cutting head side of tractor cab (i.e. for left-hand cut machines to left hand side of cab). Bolts, nuts and washers are supplied for fixing purposes.

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.

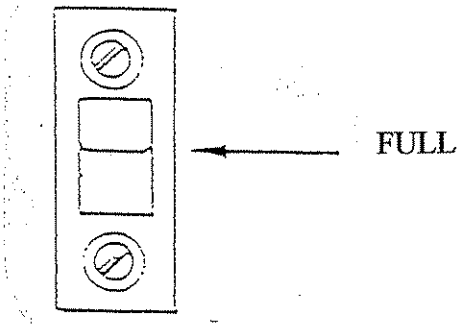
It is suggested that for four and five bank controller sets the bracket is fitted to the left-hand wing for left-hand cut machines and right-hand wing for right-hand cut machines.

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).

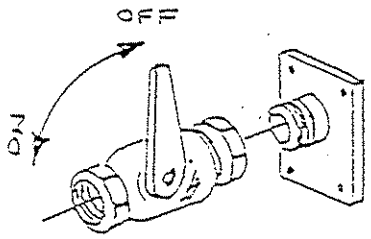
Drawing shows a bank of five controllers to be fitted to a support leg and to be fitted to a locating bracket to be fitted to the inner wing for left-hand cut machines.



9. IMPORTANT - check the level of oil within the tank, it should be halfway up the sight glass. MAXIMUM (when oil cold).



10. IMPORTANT Ensure that the ball-valve at the base of the tank is in its 'ON' position.



Never use machine with lever in OFF position.

DANGER
WARNING.

P.T.O Engagement

The tractor power Take Off can now be engaged - CAREFULLY. Check that P.T.O. is running correctly and that guard is not spinning.

Oil will now be pumping within the hydraulic system.

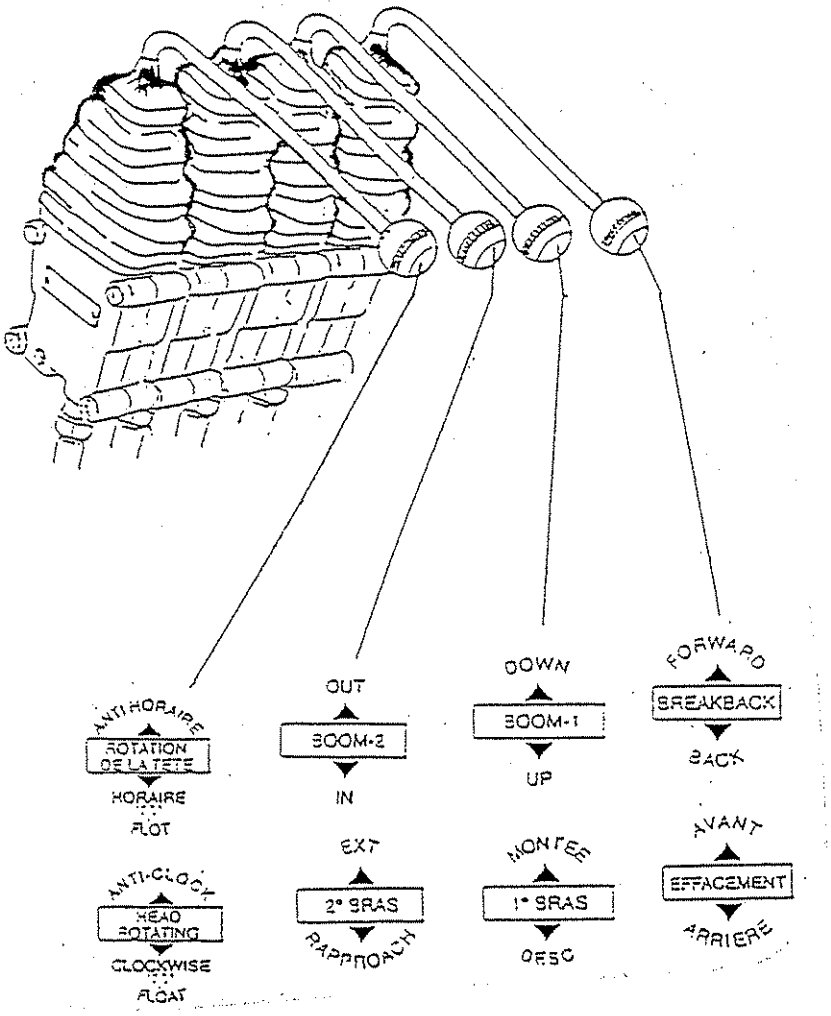
DANGER
WARNING

CONTROL LEVER OPERATION.

Test the hydraulic valves by operating the control handles. This should be done with great care until the operator gets a good 'feel' for the controls and feels competent.

Each control lever is individually labelled as to which operation it controls.

See drawing below.



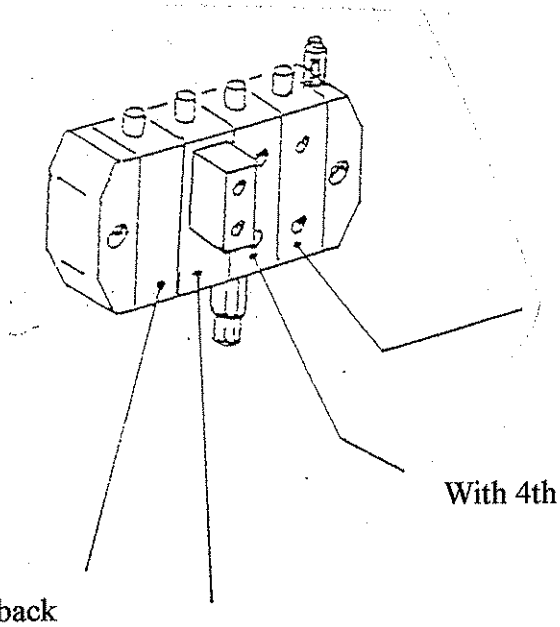
NOTE:-

The above formation of assembly can be changed to suit individual requirements.

NOTE:-

The valve slice sections are assembled in the following formation:-

MAIN BOOMS
VI SPOOL VALVE



2nd Ram

With 4th position detent float

Breakback

1st Boom (400 P.S.I) (27 Bar)
Relief (One Way)

REMOVING BOOM FLAIL FROM TRACTOR

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

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

3. Remove pin (2584) releasing Top Link from stabiliser frame.

4. Lower tractor link arms until Hedgetrimmer main frame is sitting firmly on the floor.

5. Disengage the P.T.O. drive -
STOP THE TRACTOR ENGINE.

6. Disconnect lower Take off shaft and anti-spin chains (tractor end).

7. Disconnect top link assembly from tractor by removing pin.

8. FOR PIN TYPE LOWER LINK ARMS
Remove 7/16" linch pin and washers from lower lift pins and remove pins from linkage.

or FOR QUICK HITCH CROOK ON ARMS:-
Release crook lock lever on lower link arms and lower/drop away arms.

Tractor linkage arms are now free of Trimmer.

9. Draw tractor slowly away - Many operators stop about 300mm (12") away to double-check that tractor and machine have completely parted company and that no connections or couplings have been forgotten for any reason.

Safety screens can now be removed if so desired.

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

11. Make sure tractor top link pin is replaced and secured with 7/16" linch pin.

VERY IMPORTANT

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 prior to setting off into work.

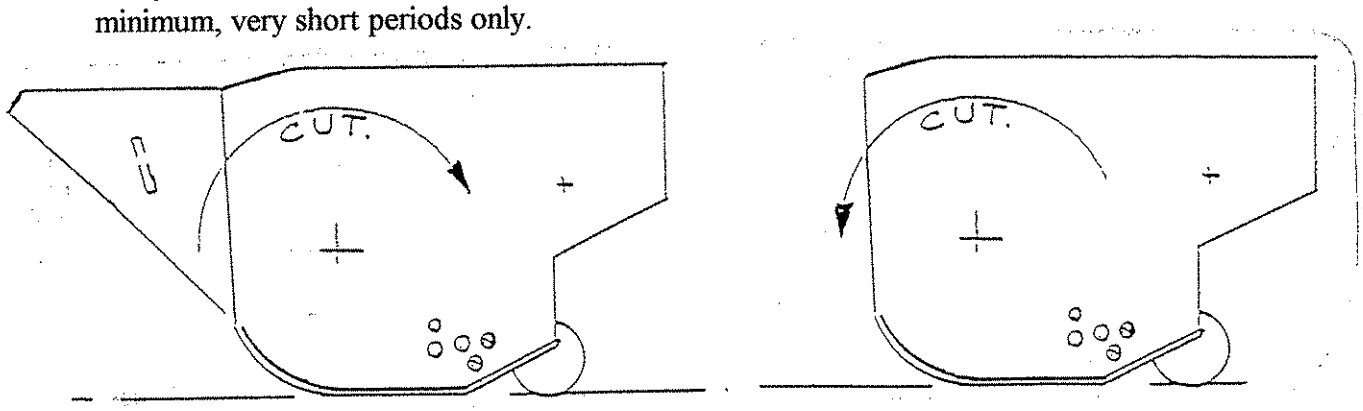
The speed of operation of Trimming will depend on the size, quantity, and type of growth to be cut. A slow speed to suit the conditions, should be selected, ensuring that engine speed gives a P.T.O speed of 450 R.P.M for general use.
This 450 R.P.M (P.T.O) is recommended for best trimming results and performance.

Variation from this recommended R.P.M should be kept to a minimum and never at any time should P.T.O 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 years 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 be limited to minimum, very short periods only.



FORWARD TRAVEL

FORWARD TRAVEL

DANGER

VERY IMPORTANT

It is very important that motor spool and motor spool control lever works one direction, from centre 'OFF' position to selected 'rotor cut' direction 'ON' position. Giving rotor - one direction of cut only, and an 'OFF' setting. Thus eliminating chance of going from cut-up to cut-down in one movement of controller and blowing the system.

Only by altering LOCK-LEVER setting can direction of control lever be changed.

VERY IMPORTANT (DANGER)

DANGER - NEVER CHANGE DIRECTION OF ROTOR CUT WHILST ROTOR IS STILL TURNING.

DANGER - ALWAYS ALLOW ROTOR TO STOP SPINNING COMPLETELY BEFORE CHANGING CUT ROTATION (DIRECTION)

IMPORTANT

When leaving factory the machine will be set for 'standard' 'upward' rotor cutting - unless specifically requested.

DANGER
IMPORTANT

In heavy going - 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 at front with front cowling removed.

ROTOR CUT DIRECTION MUST NEVER BE CHANGED IN ONE MOVEMENT

NOTE:- FOR T.M.C CONTROLLERS ONLY (BLACK CABLES)
(- FOR DOWNWARD CUTTING OF ROTOR)

Position long end of pin through "rotary control spindle" forwards and downwards. (See drawing following this text)

Control lever will now only move from NEUTRAL 'OFF' position to 'AWAY' - down position only, thus giving a down-cut system.

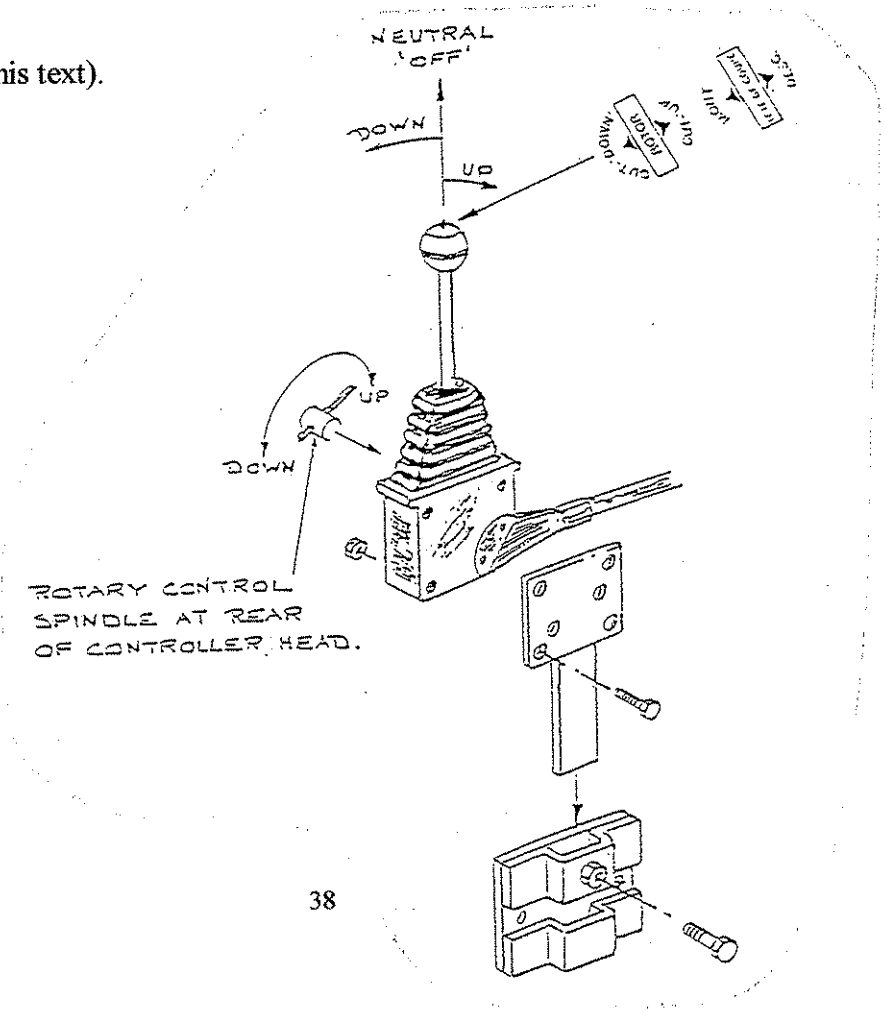
- - - * - - -

To change to UPWARD CUTTING OF ROTOR

ENSURE ROTOR IS NOT ROTATING AT ALL - MUST BE TOTALLY STOPPED (AT A STANDSTILL)

Turn rotary control spindle via - pin through shaft to a position where long end of pin is rearwards - horizontally. This will permit lever to travel from NEUTRAL-'OFF' position to 'TOWARDS' - up cut only.

(See drawing following this text).



HYDRAULIC CONTROLS - CUTTING POSITION

The cutting head must at all times be lowered gently into cut position. Never drop head into 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.

IMPORTANT: Ensure rotor and roller do not get involved in high obstacle forces such as rocks, stones, stumps etc. Keep rotor away and free from wire, as to entangle wire into rotor is very dangerous and very costly.

Should large obstacles be encountered or wire caught in rotor STOP IMMEDIATELY. Reset or clear before starting.

Normal obstacles and level variations should be overcome by operator by 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 could 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 rotor repaired/rebalanced or replaced.

TRANSPORTING

(1) Turn cutting head to vertical position with flails away from tractor.

(2) Swing machine rearwards by powering breakback ram to a position where booms are in line with tractor.

(3) Extend first ram to fold booms towards tractor cab (ensure second ram is closed). Continue to fold booms (extend first ram) until a short-safe distance remains between tractor cab and Hedgetrimmer booms.

(4) Unit now ready for transport.

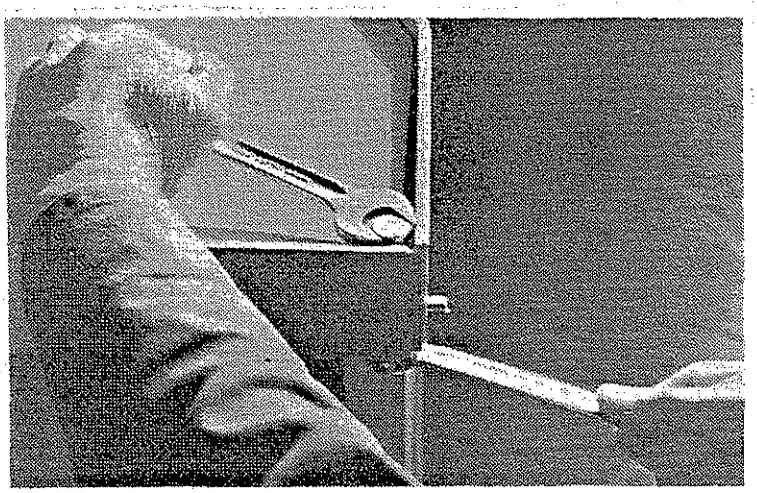
CUTTING HEAD VEE BELT ADJUSTMENT (DS HEAD)

To adjust the cutting head drive vee belts the following procedures should be followed:-

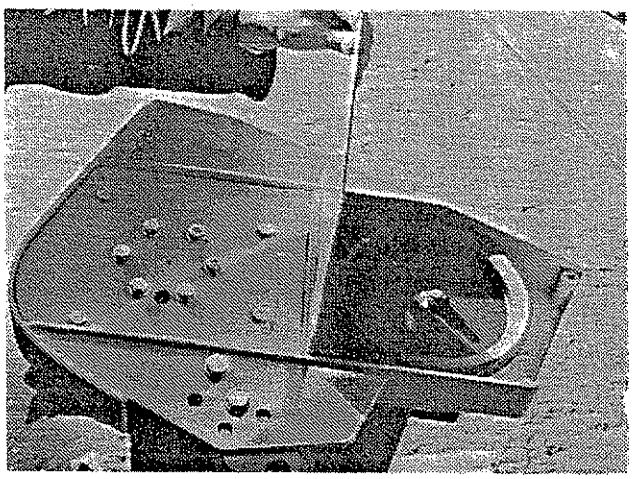
1. Place cutting head onto floor Drive end upwards.

2. Stop the tractor engine.

3. Undo - bolt at top - securing flap-door, of drive end - this will release guard flap panel.



4. Open upper-guard/inspection panel.



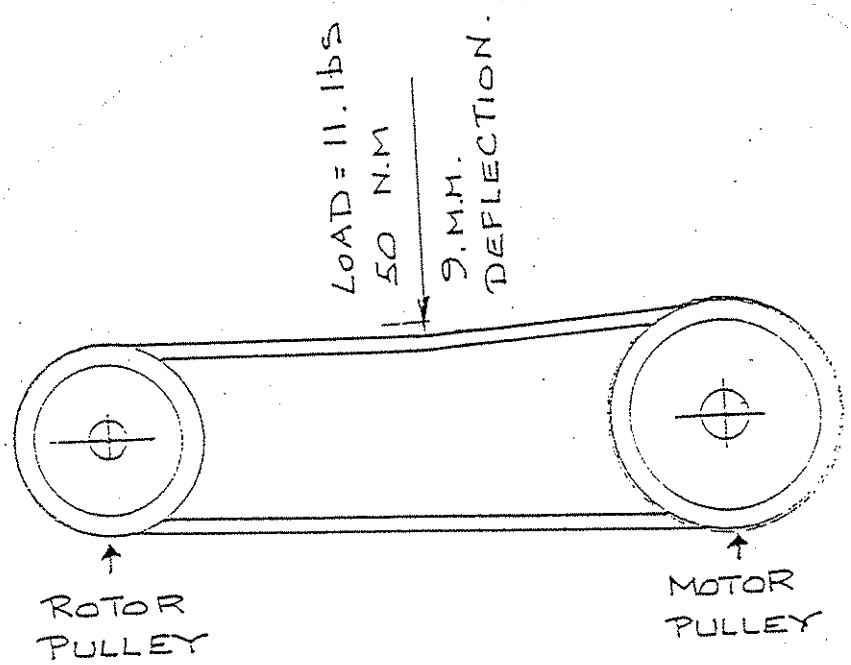
5. Slacken 2 bolts holding hydraulic motor to its mounting plate.

6. Adjust belt tension by turning nuts on tensioing screw, - clockwise to tighten, or anti-clockwise to slacken.

7. With belts tensioned as shown below the 2 adjustable nuts on tensioner screw must be locked tight, and the 2 bolts securing motor to head must be re-tightened to lock whole unit into position.

Check belts again once all bolts are re-tightened.

Note:- Correct belt tension - load of 11 lbs (50nm) with deflection distance of 9mm (see drg below)



8. Close flap-door and secure with bolt through.

TO REPLACE CUTTING HEAD

VEE BELTS (DS HEAD)

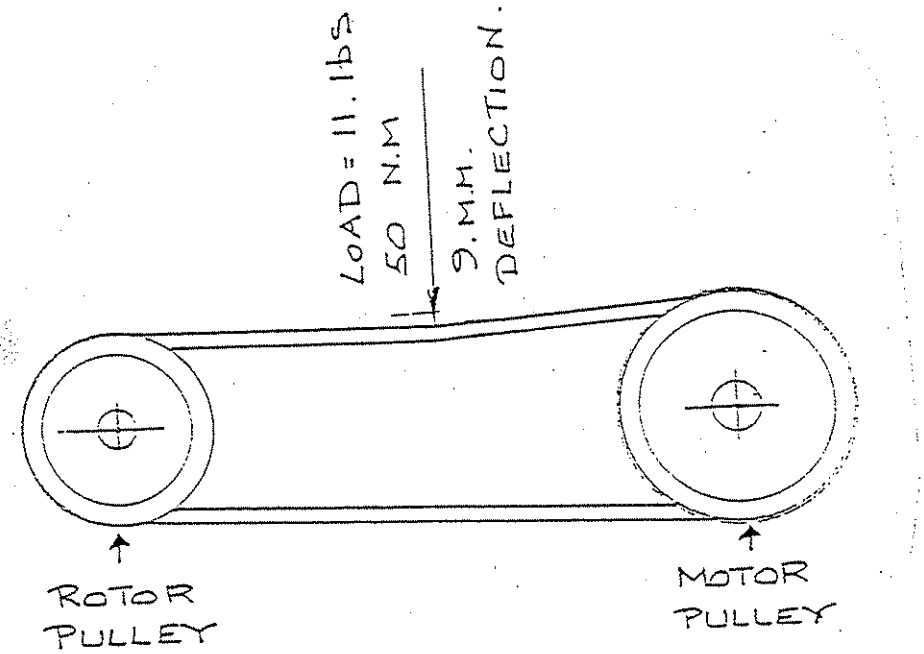
1. Hydraulically position head to stand vertically on the ground - with drive end upwards - ensure head is firm and steady in this position.

2. Stop the tractor engine.

3. Release belt tension by slackening off the motor mounting bolts, and nuts on the threaded adjuster arm.

4. Undo completely and remove the '6' bolts which hold on the main cover plate to head.

5. Undo and remove the '6' M12 x 20 setscrews which hold the bearing housing to cover plate.



6. Next the cover plate should be removed from its bolted position.

7. The drive belts can now be removed from around the pair of vee pulleys.

8. A pair of new vee belts should be fitted at this stage. Position the 2 new belts along the relevant pair of vee's on the 'driven' and 'driver' pulleys.

9. Replace the main cover plate assembly over the drive belt aperture.

10. Replace the '6' M12 x 20 Setscrews through plate and into bearing housing. Ensure all 6 screws are aligned and tighten only just, to hold bearing housing in place - NOT DEAD TIGHT.

11. Replace all of the M12 x 80 bolts through cover panel from panel side (ensuring first that holes align). Place the nyloc stiffnuts onto the threaded end of each of the bolts.

Now that all mounting bolts of both bearing to panel and panel to head have been fitted, all twelve should be tightened completely, dead tight.

12. Belts should now be adjusted to the correct tension (follow instructions as Vee Belt adjustment section) see page 41.

NOTE:- Correct belt tension setting -
with load of 11 lbs (50N) a deflection
dimension of 9mm should be obtained.

Machine now ready for start-up.

TO REMOVE ROTOR FROM CUTTING HEAD

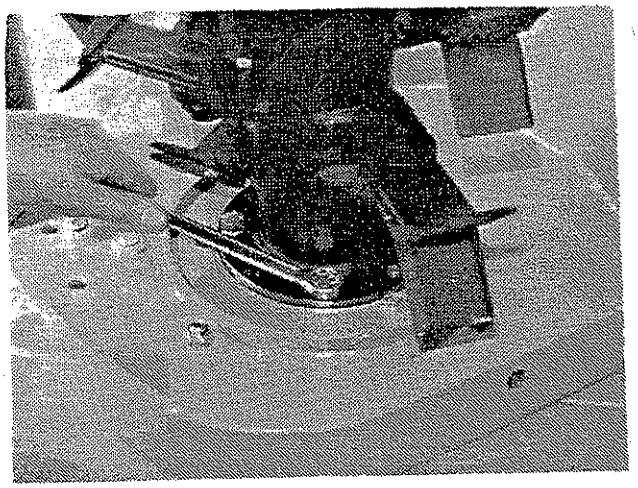
1. With Trimmer still attached to tractor - hydraulically position cutting head vertically - with drive end downwards, resting on the floor.

2. Ensure head is resting completely on the floor and is firm and steady.

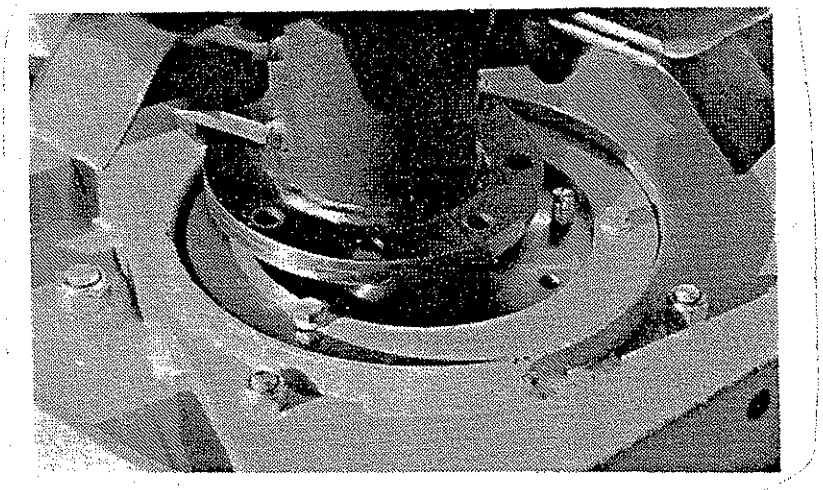
3. SWITCH OFF TRACTOR ENGINE.

4. Slacken off and remove the 2 nuts and bolts securing bearing housing to main frame at non drive end.

5. Remove the 4, M12x35 Setscrews from drive end (inside shell) - Rotor to pulley.



6. Whole rotor assembly should now be raised vertically sufficiently to allow drive end location flange to free itself from register/dowel on rotor drive pulley.



7. With rotor raised - free of drive pulley, the lower - drive end of rotor, should be swung gently out of its drive line position in a downward direction (in relation to head). With drive end of rotor swung towards base of head the rotor can now be lowered gently to allow non-drive end of rotor (complete with bearing/housing attached) to drop out of main frame and completely take away.

TO REPLACE ROTOR IN CUTTING HEAD

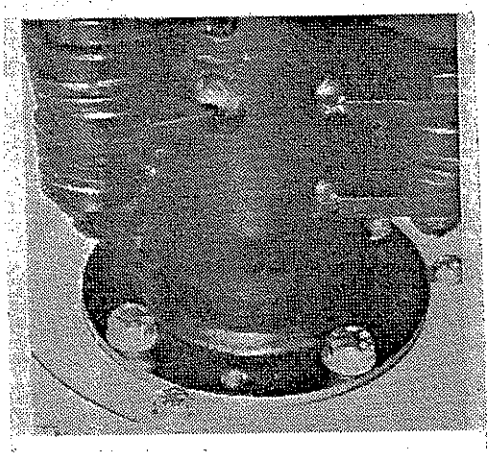
1. With Trimmer still attached to tractor - hydraulically position cutting head vertically - with drive end downwards, - resting on the floor.

2. Ensure head is resting completely on the floor and is secure, firm and steady.

3. SWITCH OFF TRACTOR ENGINE.

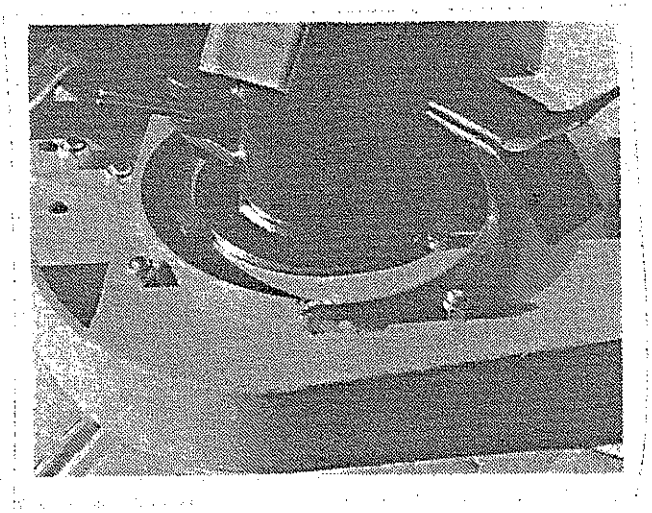
4. Hold rotor vertically - drive flange end downwards and gently swing in the upper (non drive end) towards its location position. This operation to be carried out from base face of head.

5. Locate non-drive end of rotor up through head end panel. At the same time as raising/locating non drive end of rotor the lower drive end should be swung into its drive-line position.



6. Ensure lower end of rotor (drive flange) is positioned over register and dowel of drive pulley. Lower rotor onto dowel and locating flange making sure both faces seat together correctly.

7. Replace the 4, M12 x 35 setscrews to fix rotor drive flange to drive pulley, and tighten dead tight. The drive end of rotor is now connected.



8. The upper end of rotor (the bearing housing) is now free/slack.
The nuts and bolts for bearing location should now be tightened (dead- tight), which completes the rotor fixing.

9. Spin rotor (by hand) to ensure an uninterrupted motion.

NOTE:- Check rotor mounting bolts daily and ensure all remain tight.

HYDRAULIC OIL

IMPORTANT

The hydraulic system will have been 'run-up' and checked at factory prior to machine despatch, where 'TEXACO RANDO 46' hydraulic oil is used - and is recommended for the machine.

DANGER
IMPORTANT

The hydraulic tank will have oil in it when delivered.

NOTE:- Oil tank capacity is (40 Gallon) 180 litres

DANGER
IMPORTANT

User must ensure hydraulic tank is full of 'RANDO 46' hydraulic oil (or equivalent) before attempting to start machine from new.

NOTE: The Tank top filter/breather is equipped with a strainer as standard, to ensure all oil is strained when being put into tank. For this reason the strainer basket - should never be removed and all hydraulic oil filling is to be done through the strainer.

DANGER
IMPORTANT

It is advisable NEVER to mix hydraulic oils, but if another suppliers oil is to be used a suitably compatible oil must be chosen (Check with oil supplier).

DANGER
IMPORTANT

OIL FILTER MUST BE CHANGED AT 50 HOURS INITIALLY AND EVERY 250 HOURS THEREAFTER.

HYDRAULIC PUMP - GEARBOX

The standard hydraulic gearbox will be fitted with S.A.E E.P 90 oil and this grade must be ensured when topping up. "Check oil level every 500 hours." NOTE - Gearbox capacity is 0.5 litres.

For the Hi-power gearbox (Hi-ton) universal oil should be used and this grade must be ensured when topping up. "check oil level every 500 hours" - NOTE - Gearbox capacity is 0.5 litres.

ROUTINE MAINTENANCE AND LAYING UP

DAILY

DANGER WARNING

Check oil level in main system oil tank

DANGER WARNING

Grease pivot points regularly

DANGER WARNING

Keep the cutting blades VERY SHARP - daily inspection is required here.

WEEKLY

IMPORTANT DANGER WARNING

Check all hydraulic fittings and hoses

DANGER WARNING

Check vee belt tension on cutter head drive

LAYING-UP

DANGER

Clean the machine and note any damage or repairs needed. Arrange for spares and repairs as required. Prepare for next season.

DANGER WARNING

Fully lubricate the machine totally

DANGER WARNING

Store machine in dry - undercover conditions.

DANGER WARNING

Check vee belt tension on cutter head drive.

OBSERVE THE FOLLOWING HEDGE CUTTING OPERATIONS.

WARNING P.T.O speed to be 450 RPM. Minimum/540 maximum.

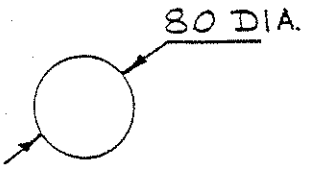
DANGER
WARNING
VERY IMPORTANT When cutting (in whatever position selected) it is very important that cutting head be kept as close to tractor as conditions and cutting position permits.
This is to ensure maximum stability of unit.

DANGER
WARNING Never operate rotor - with cutter flails directly towards operator, i.e underside of head - cutting face towards operator.

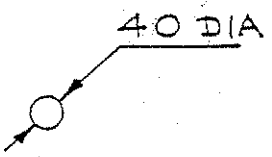
DANGER
WARNING Rotor can be set to cut upwards - at front or to cut downwards - at front. The upward cut is the generally accepted norm - and will cope with grass/verge work as well as normal periodic hedgetrimming of up to approximately 2 years growth. Only when cutting large growth does the downward cut on rotor need to be used.

WARNING 'DOWN CUTTING' is "NOT RECOMMENDED" and must only be selected for short periods only.

DANGER
WARNING



SOFTWOOD



HARDWOOD

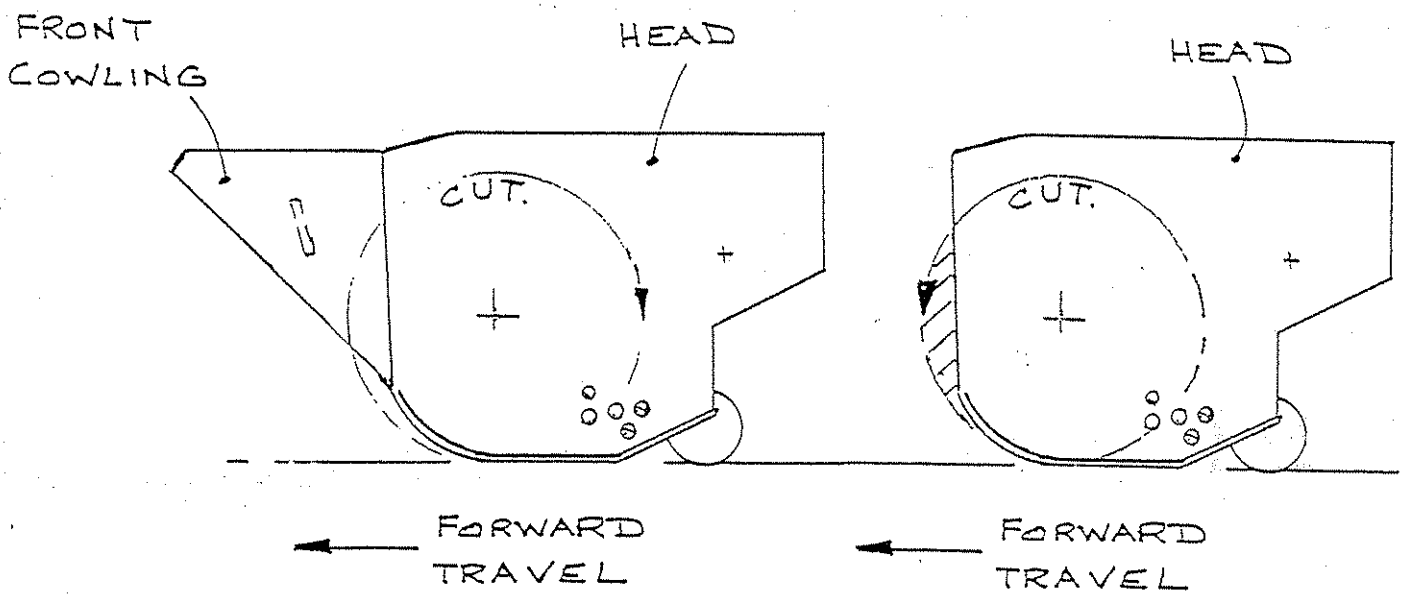
Cutting thickness limitation.

DANGER
WARNING To use the rotor - set to cut downwards (at front) the front cowling of head will need to be removed.

DANGER
WARNING

Downward Cutting:- For cutting larger material only.
Gives poor finish.
Higher Power requirements.
Greater machine wear.

For the above reasons and as stated earlier in this manual DOWNWARD CUTTING IS NOT RECOMMENDED



HEAD WITH FRONT COWLING IN PLACE - CUT UPWARDS AS INDICATED BY ARROW. (FOR GENERAL HEDGE-TRIMMING AND VERGE WORK)

HEAD WITH FRONT COWLING REMOVED, - CUT DOWNWARDS AS INDICATED BY ARROW. (FOR HEAVY CUTTING ONLY)

DANGER:- NEVER CUT UPWARDS (AT FRONT) WITH HEAD FRONT COWLING REMOVED.

WARNING Always use "UP-CUT" mode if possible.
- Down cutting is (NOT recommended) and should only be considered in very difficult situations, and even then - always keep duration period as brief as possible, before returning to the 'UP-CUT' option.

HANDLING & TRANSPORTATION OF MACHINERY

The hedgetrimmer unit is designed with its own inbuilt pair of box section members at underside of main frame/tank to enable lift and transportation by using forks/fork lift units.

Once the machinery has been moved, ensure that it comes to rest in a safe position. Supports or stay bars may be necessary to ensure stability of the machinery. Make sure the supports/stay bars are used whenever the machinery is transported.

PARTS LIST

Always order Twose genuine spares for your machine. They are correctly designed to give the best operational results.

When ordering spare parts, please specify:-

Type and Serial Number of machine
Part number, description and quantity of spares required.

Always make sure that you have ordered a sufficient quantity to complete the job.

Always make sure that you have ordered the correct parts. In some instances (eg Hydraulic Rams) parts or assemblies are, in the course of time, modified due to introduction of new materials, or improved design.

Always state by what means you wish the goods to be sent. In the absence of specific instructions consignments will be sent by post or railways goods service, if it is not possible to deliver by our own transport.

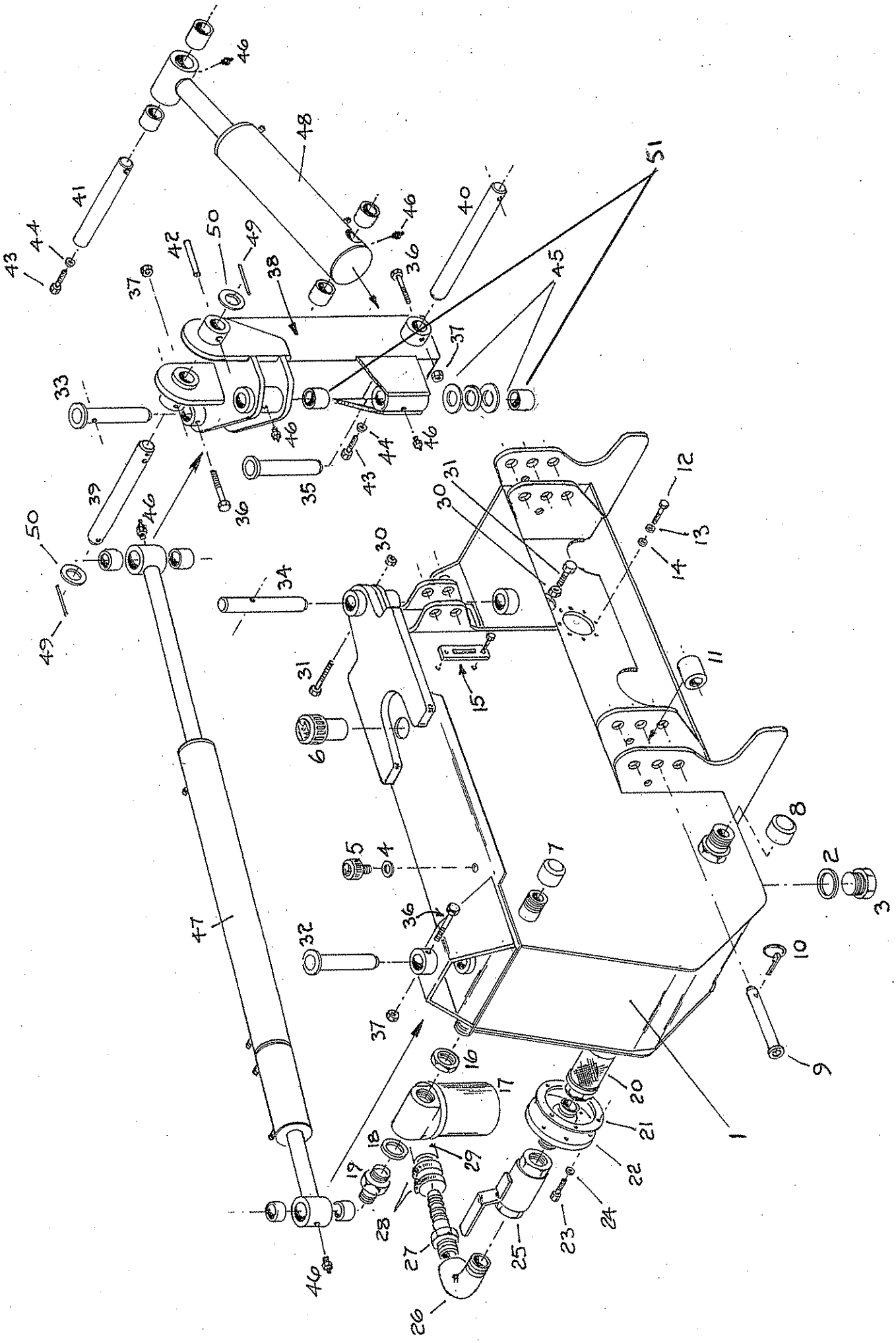
Always State the number of our Invoice or Sales Slip, and the reason for return should it become necessary to return any items for exchange or credit.

WARRANTY AND SPARE PARTS

all enquiries regarding these machines and orders for spare parts must be addressed to:-

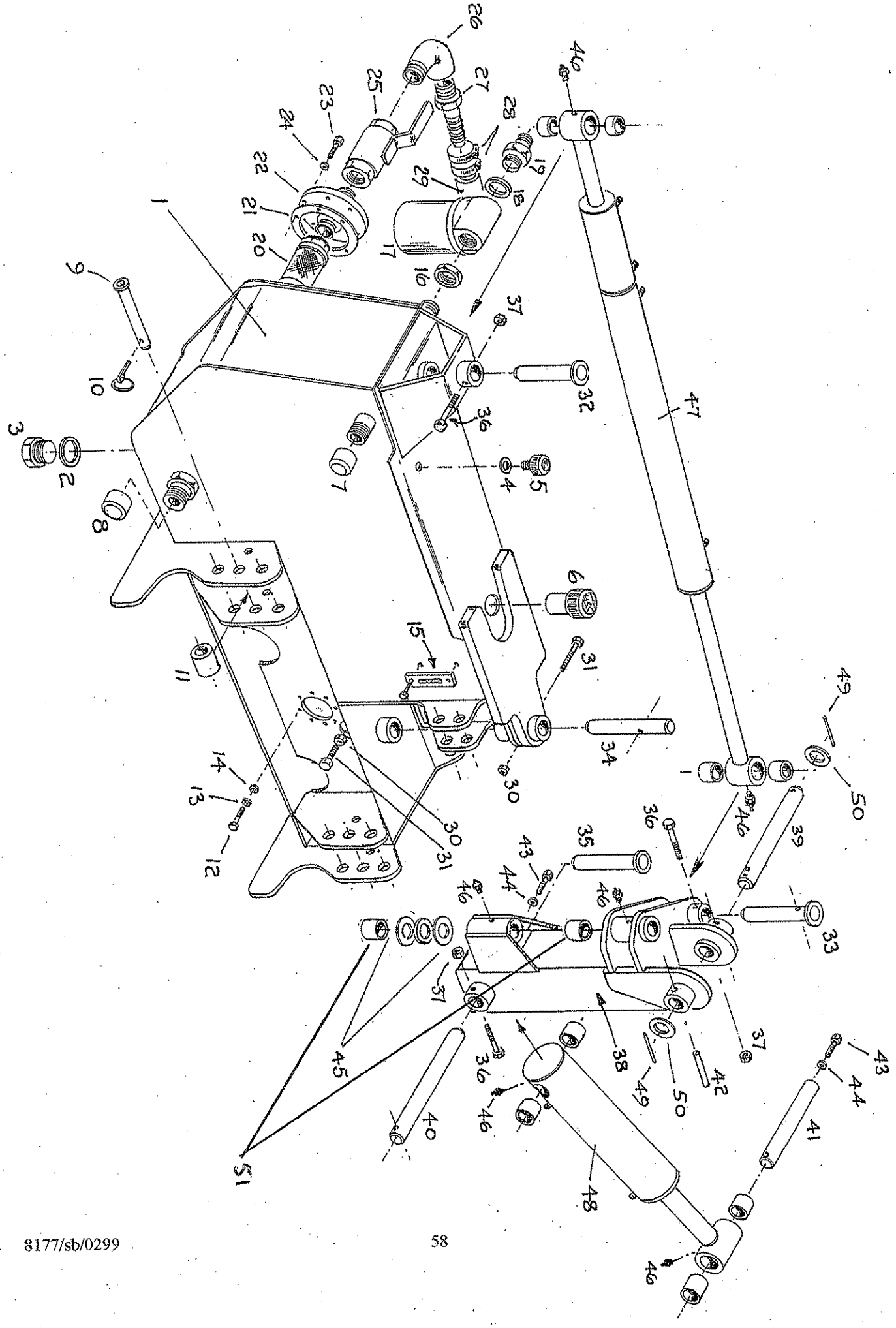
TWOSE OF TIVERTON LIMITED
BLUNDELLS ROAD
TIVERTON
DEVON
EX16 4JT

TELEPHONE (01884) 253691
FAX (01884) 255189



MAIN TANK -FRAME, AND SWIVEL

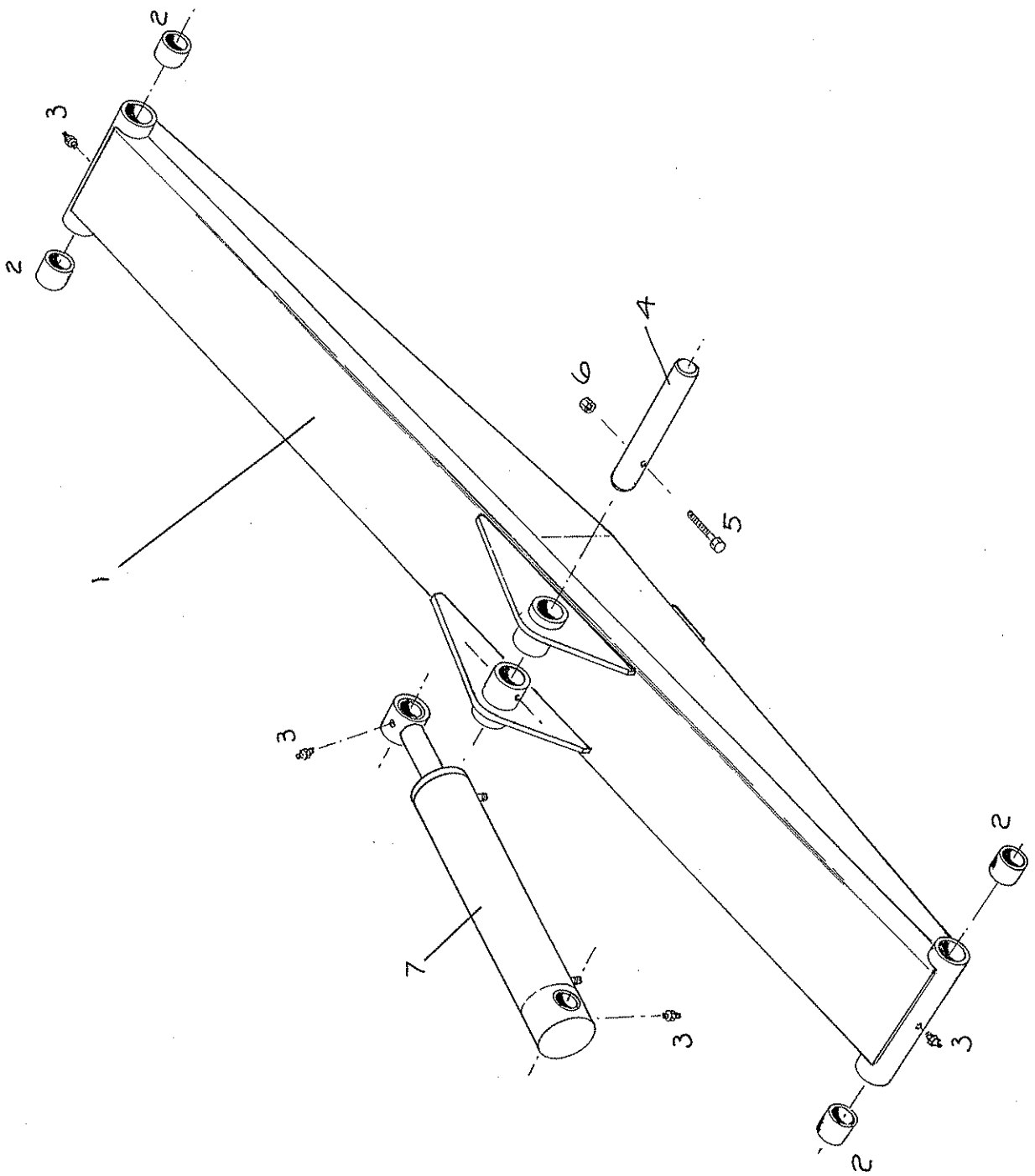
ITEM	PART NO.	DESCRIPTION			QTY
1	194.001	Maintank - frame			1
2	3078	Seal 1 1/2" BSP			1
3	7894	Plug 1 1/2" BSP			1
4	1181	Seal 1/4"			1
5	8155	Breather SAB.3101			1
6	8154	Filler/Breather, pressurised			1
7	8157	Cap 1 1/4" BSP			1
8	8158	Cap 1 1/2" BSP			1
9	194.052	Lower Link Pin			2
10	0832	Linch pin 7/16			2
11	184.308	Lower link spacer			2
12	2950	Setscrew M12 x 30 8.8	)	PTO	4
13	2729	Spring Washer M12	)	GEARBOX	4
14	2716	Flatwasher M12	)	TO FRAME	4
15	5371	Oil level gauge			1
16	8043	Backnut 1 1/2" BSP			1
17	7576	Filter 10 Micron MXA, 955.424			1
18	3155	Seal 1 1/4" BSP			1
19	5241	Adaptor 1 1/4" x 1" BSP			1
20	3717	Strainer (in tank) Suction (1 1/2" BSP)			1
21	1840402	Gasket			1
22	184.398	Cover Disc			1
23	2917	Setscrew M10 x 25 (8.8)			6
24	2728	Spring washer M10			6
25	7619	Tap			1
26	8002	Adaptor 1 1/2" BSP M-F T90			1
27	7999	Hose Tail 1 1/2 BSP			1
28	7455	Jubilee Clips			4
29	8000	Suction Hose x 560 Long			1
30	3082	Stiffnut (M12) Nyloc			2
31	3014	Bolt M12 x 90 (8.8)			2
32	194.020	Pin B.B. Ram 'Tank'			1
33	194.021	Pin B.B. Ram 'Spine'			1
34	184.011	Pin - Spine 'Top'			1
35	194.012	Pin - Spine 'Base'			1
36	2994	Bolt M10 x 75 (8.8)			3



MAIN TANK -FRAME, AND SWIVEL
CONTINUED

ITEM	PART NO.	DESCRIPTION	QTY
37	4421	Stiffnut M10 (Nyloc)	3
38	194.028	Spine	1
39	194.013	Pin (Rocker)	1
40	194.015	Pin (1st Ram) Anchor	1
41	194.014	Pin (1st Ram) Rod	1
42	8013	Roll pin M12 x 90	1
43	2917	Setscrew M10 x 25	2
44	2728	Spring Washer M10	2
*	194.057	Main ram stay	1
45	194.054	Thrust Assembly (194.054.001) x 1 + (8031) x 2	1
46	2923	Grease Nipple M10 'straight'	6
47	1940047	Breakback Ram	1
		(see separate page for breakdown of components)	
48	1940045	1st Ram (primary)	1
*	1940045.1	Seal set for 1940045	
*	1940045.2	Rod complete for 1940045	
*	1940045.3	Gland nut for 1940045	
*	1940045.4	Set of bushes for 1940045	
49	7920	Spring pin M8 x 60	2
50	6541	Washer M39 Form E	2
51	6257G	Bush 4040M Bronze/Steel	2

* = Not illustrated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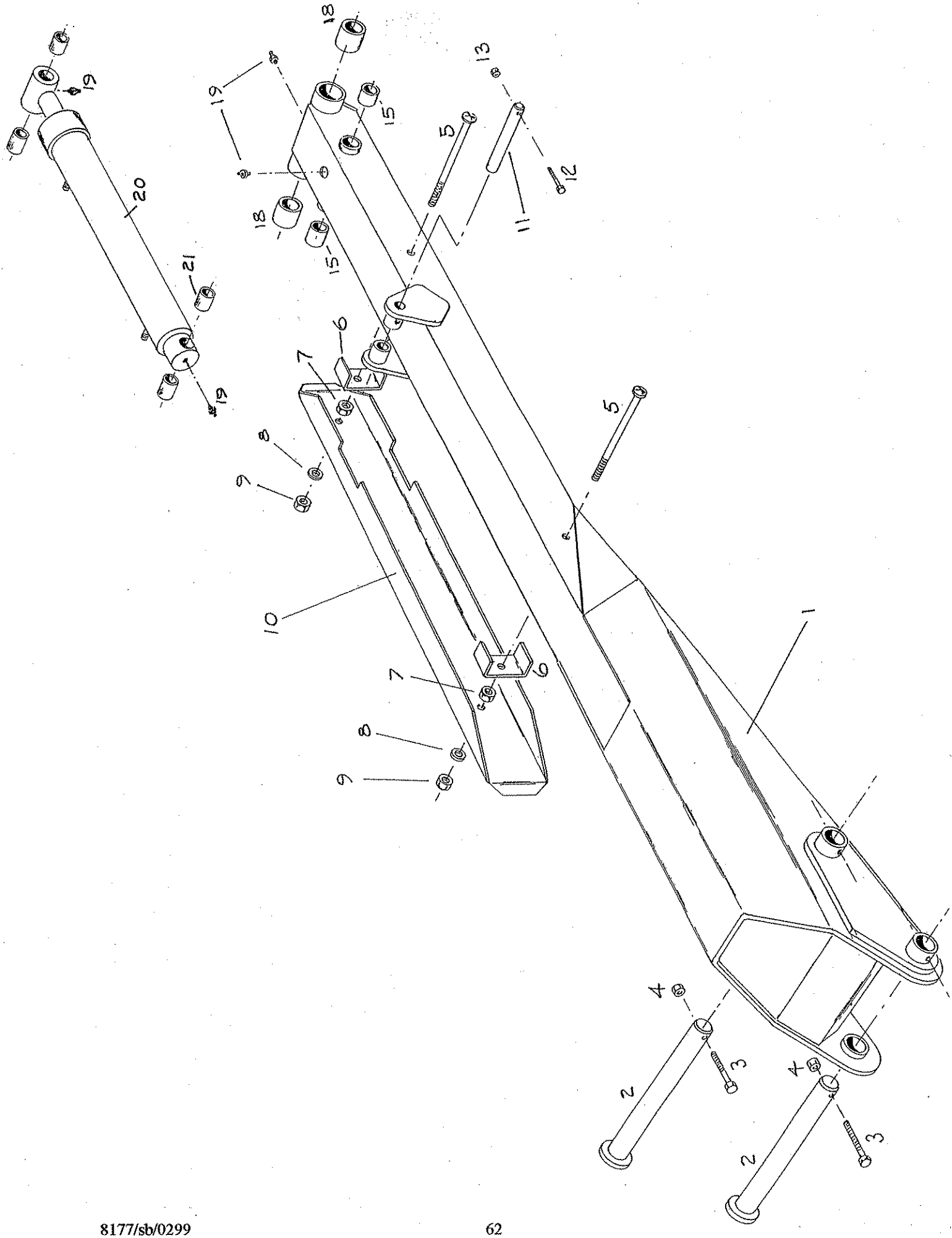
FIRST BOOM

ITEM	PART NO.	DESCRIPTION	QTY
1	194.095	1st Boom 460S	1
or	194.096	1st Boom 520S	1
or	194.097	1st Boom 580S	1
2	6257G	Bush 4040M	4
3	2923	Grease Nipple M10 straight	4
4	194.018	Pin	1
5	2994	Bolt M10 x 75	1
6	4421	Stiffnut M10 'Nyloc'	2
7	1940094	Ram 2nd	1
*	1940094.1	Seal set	
*	1940094.2	Rod complete	
*	1940094.3	Gland nut	
*	1940094.4	Set of bushes	

* = Not illustrated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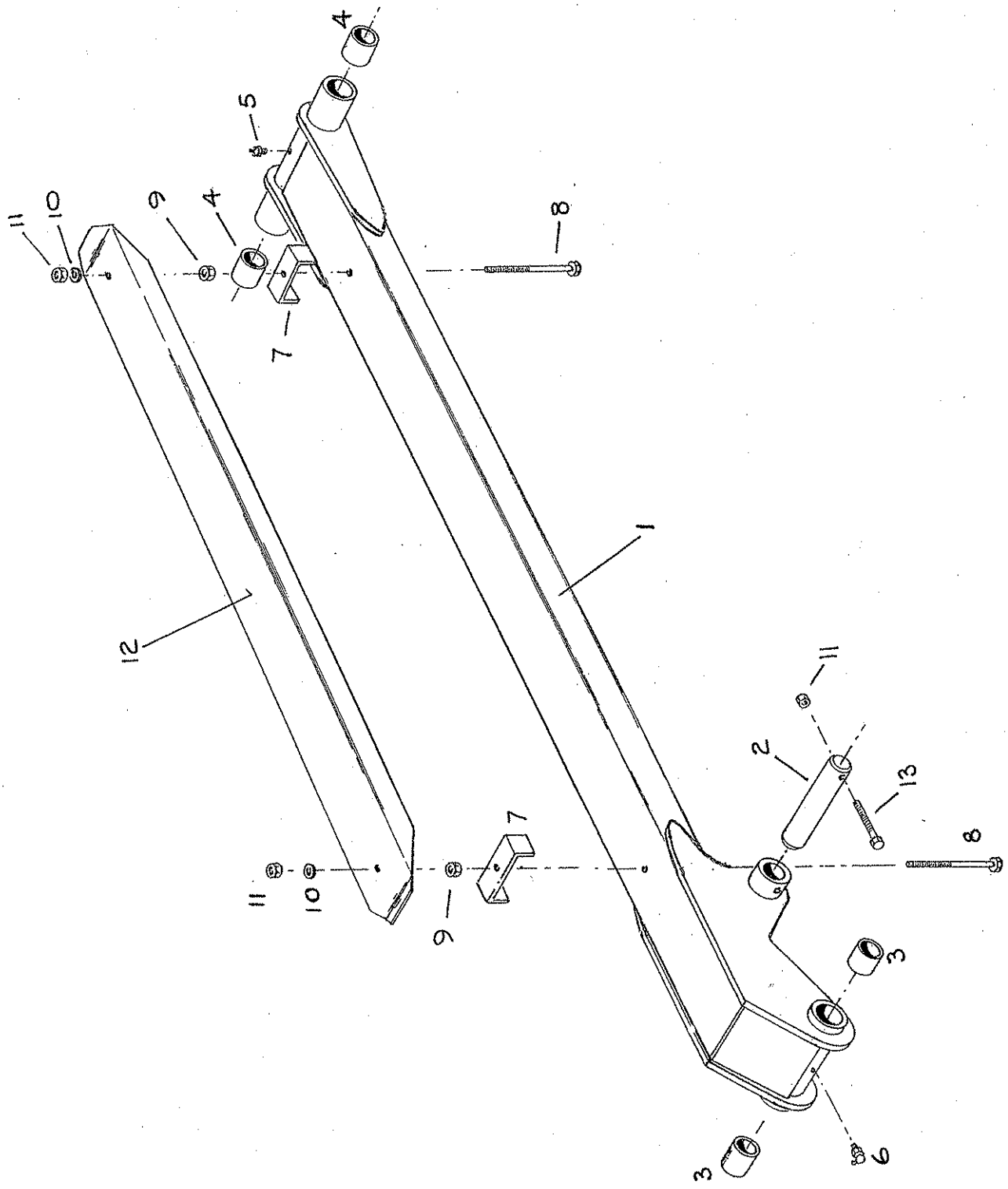
OUTER BOOM

ITEM	PART NO.	DESCRIPTION	QTY
1	194.099	2nd boom 460S	1
or	194.024	2nd boom 520S	1
or	194.027	2nd boom 580S	1
2	194.016	Pin	2
3	2994	Bolt M10 x 75 (8.8)	2
4	4421	Stiffnut M10 (Nyloc)	2
5	8069	Bolt M10 x 180 (Roofing)	2
6	194.053	Hose Clamp	2
7	2799	Nut, M10 fullnut	2
8	3332	Washer M10 flat form 'C'	2
9	4421	Stiffnut M10 (Nyloc)	2
10	194.110	Cover, 2nd Boom 460S	1
or	194.043	Cover, 2nd Boom 520S	1
or	194.041	Cover, 2nd Boom 580S	1
11	184.492C	Pin	1
12	3548	Bolt M8 x 50 (8.8)	1
13	3182	Stiffnut M8 (Nyloc)	1
15	3124	Bush 3040M	2
18	7900	Bush 5040M	2
19	2923	Grease Nipple M10 straight	4
20	1840493	Ram (head angle)	1
21	8039	Bush 2520M	4
*	1840493.1	Seal Set for ram 1840493	
*	1840493.2	Rod complete for 1840493	
*	1840493.3	Gland nut for 1840493	
*	6948	Adaptor 1/4" BSP M/FLN 91	2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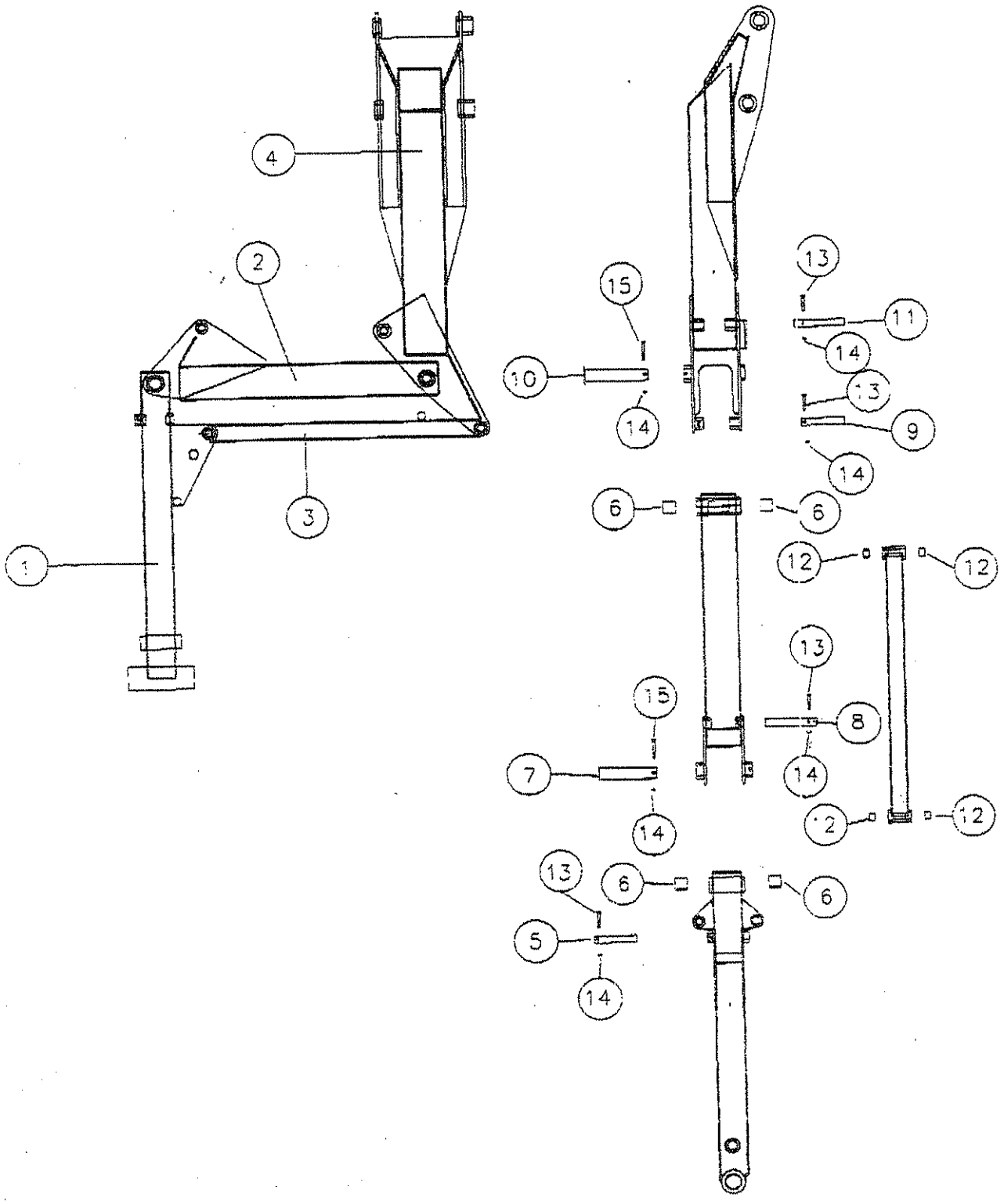
TIE ARM AND COVER

ITEM	PART NO.	DESCRIPTION	QTY
1	194.102	Tie Arm 460S	1
or	194.103	Tie Arm 520S	1
or	194.104	Tie Arm 580S	1
2	194.017	Pin	1
3	7488	Bush	2
4	6257G	Bush	2
5	2923	Grease Nipple M10 'straight'	1
6	2944	Grease Nipple M10 '90°'	1
7	194.053	Hose Clamp	2
8	3343	Bolt M10 x 110 (8.8)	2
9	2799	Nut M10 (Fullnut)	2
10	3332	Washer M10 float (form C)	2
11	4421	Stiffnut M10 (Nyloc)	3
12	194.110	Cover, tie arm 460S	1
or	194.103	Cover, tie arm 520S	1
or	194.104	Cover, tie arm 580S	1
13	2994	Bolt M10 x 75 (8.8)	1

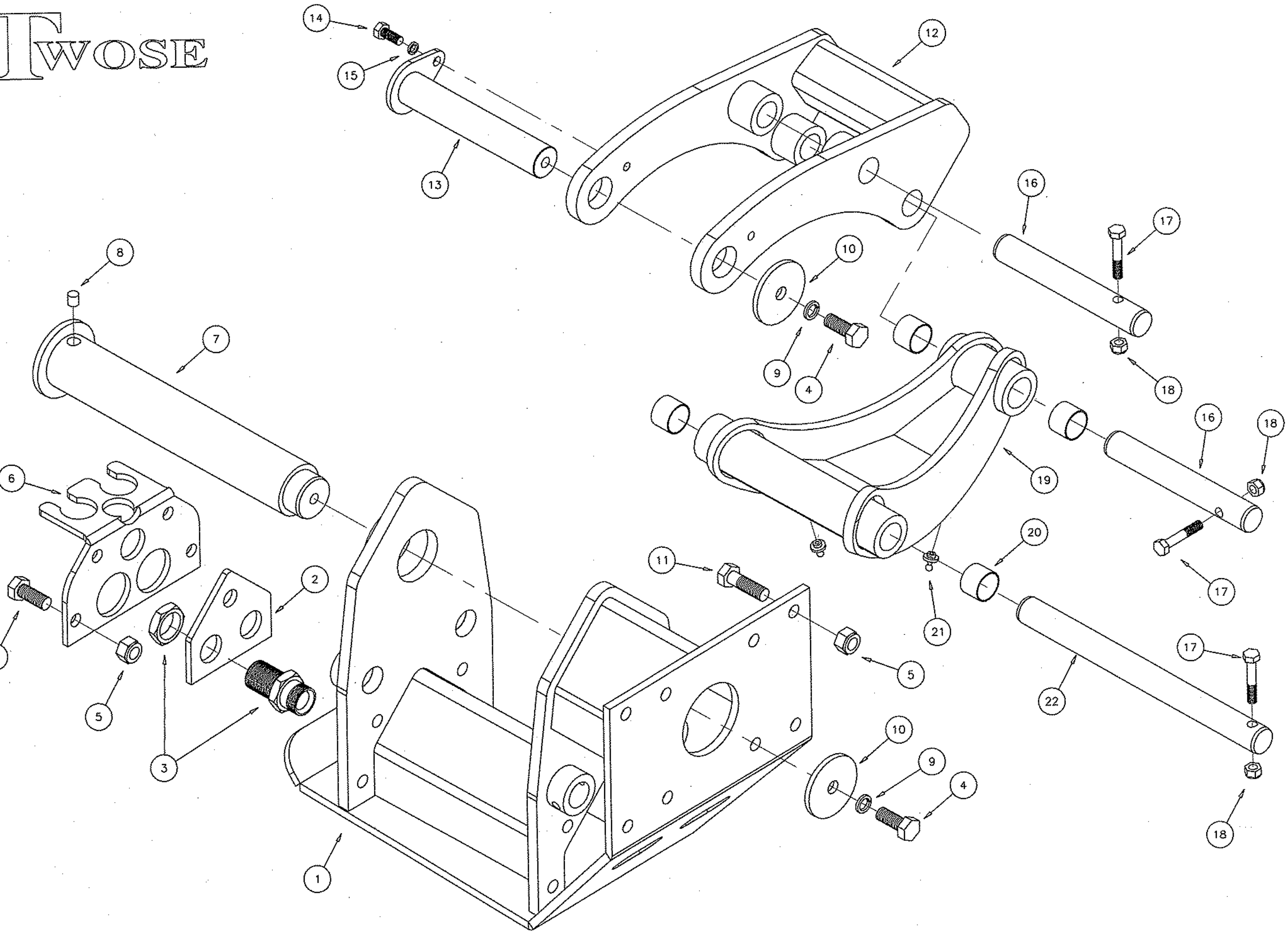
TELESCOPIC CRANKED BOOM



TELESCOPIC CRANKED BOOM

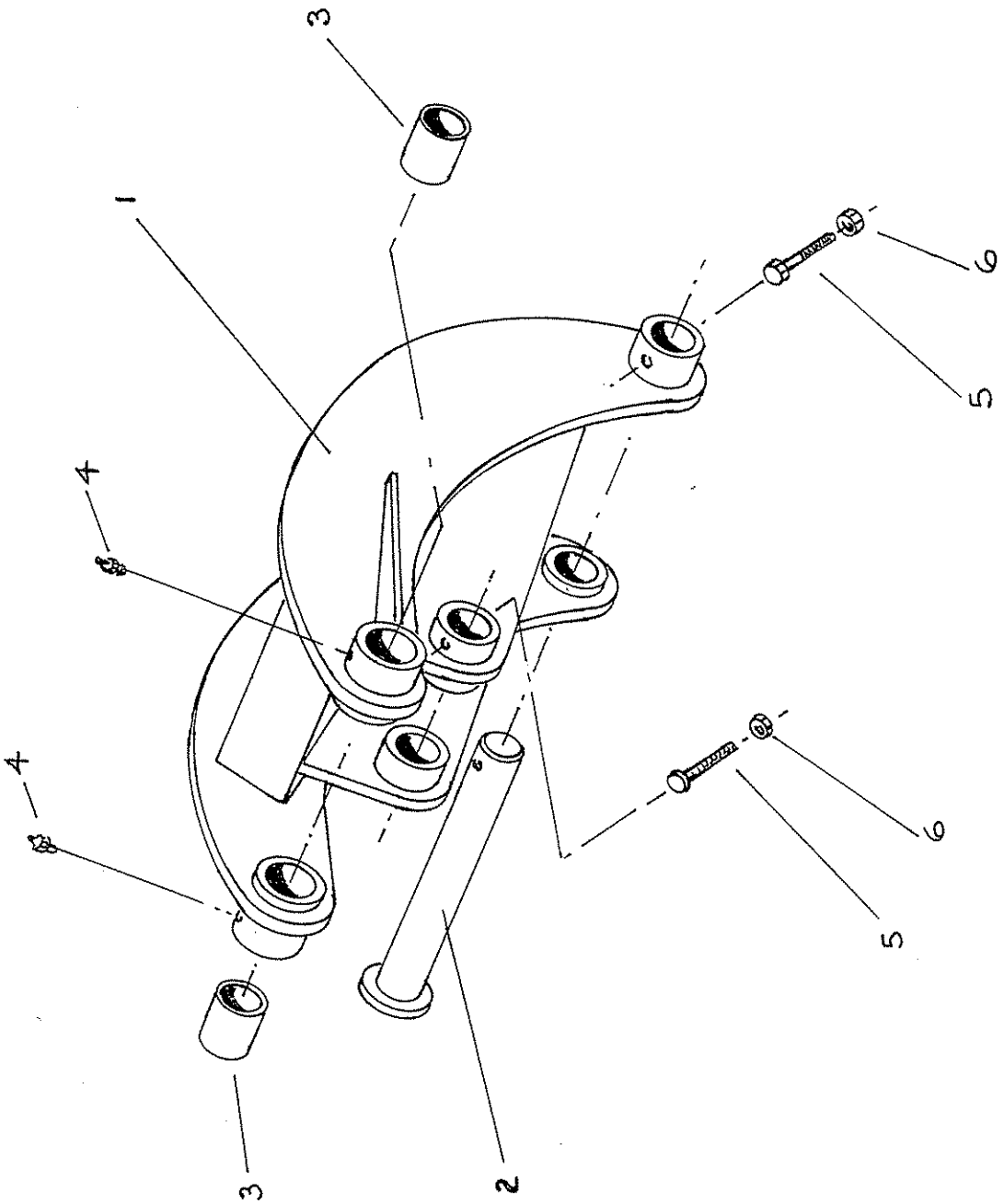
ITEM	PART NUMBER	DESCRIPTION	QTY
1	194.072L/R	OUTER BOOM	1
2	194.071	CENTRE BOOM	1
3	194.073	PARALLEL ARM	1
4	194.100L/R	INNER SECOND BOOM	1
5	194.078	ø25 EN8 x 142 9XD	1
6	6257G	BUSH 4040	4
7	194.079	ø40 EN8 x 198 9XD	1
8	194.076	ø25 EN8 x 172 9XD	1
9	194.080	ø25 EN8 x 147 9XD	1
10	194.075	ø40 EN8 PIVOT PIN	1
11	194.077	ø25 EN8 x 142 9XD	1
12	T8039	BUSH 2520M	4
13	9213104	M8 x 50	4
14	9143004	M8 NYLOCK	6
15	9213124	M8 x 60	2

TWOSE



HEAD ANGLING

ITEM	PART NO.	DESCRIPTION	QTY
1	194.105	Shoe	1
2	194-114-	Plate pipes	1
3	8085	Bulkhead fitting 3/4" c/w nut	2
4	2950	Setscrew M12 x 30 (8.8)	6
5	3082	Stiffnut M12 Nyloc	12
6	194.106	Bracket pipes	1
7	194.107	Pin Head Pivot	1
8	7760	Sock Screw M10 * 12 Dog 1 pitch	1
9	2729	Washer M12 Spring	2
10	184-461-	Washer M12 Special	2
11	2733	Bolt M12 x 40 (8.8)	8
12	194.116	Banana 1st	1
13	194.117	Pin banana pivot	1
14	4923	Setscrew M 8 x 12 (8.8)	1
15	3001	Washer M 8 Spring	1
16	194.036	Pin banana	2
17	3548	Bolt M 8 x 50 (8.8)	3
18	3182	Stiffnut M 8 Nyloc	3
19	194.109	Banana 2nd	1
20	8039	Bush 2520M	4
21	2923	G/Nipple M10 x 1.5	2
22	194.108	Pin 2nd Banana	1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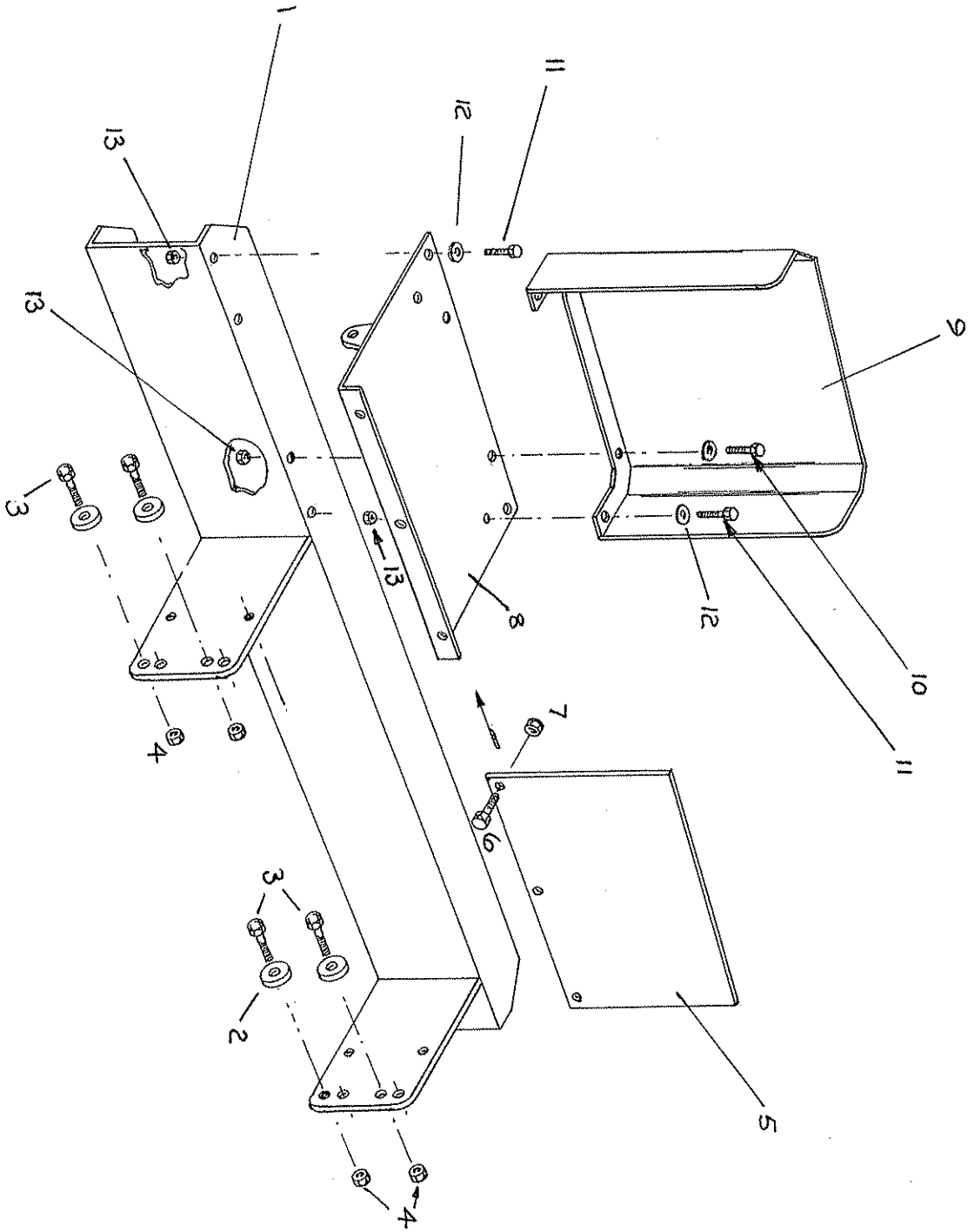
ROCKER

ITEM	PART NO.	DESCRIPTION	QTY
1	194.098	Rocker	1
2	194.016	Pin	1
3	8153	Bush (4550M)	2
4	2923	Grease Nipple (M10 straight)	2
5	2994	Bolt M10 x 75 (8.8)	2
6	4421	Stiffnut M10 (Nyloc)	2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REAR CHANNEL, VALVE MTG. PLATE AND GUARD

ITEM	PART NO.	DESCRIPTION	QTY
1	194.007	Rear Channel	1
2	194.010	Special Washer	4
3	2733	Bolt M12 x 40 (8.8)	4
4	3082	Stiffnut M12 (Nyloc)	4
5	194.051	Valve mounting plate	1
6	2917	Setscrew M10 x 25	3
7	4421	Stiffnut M10 (Nyloc)	3
8	194.008	Mounting Plate	1
9	194.009	Rear Cover for Valves etc.	1
10	3110	Setscrew M8 x 30 (8.8)	2
11	2987	Setscrew M8 x 25 (8.8)	4
12	3111	Flatwasher M8	6
13	3182	Stiffnut M8 (Nyloc)	6

TWOSE

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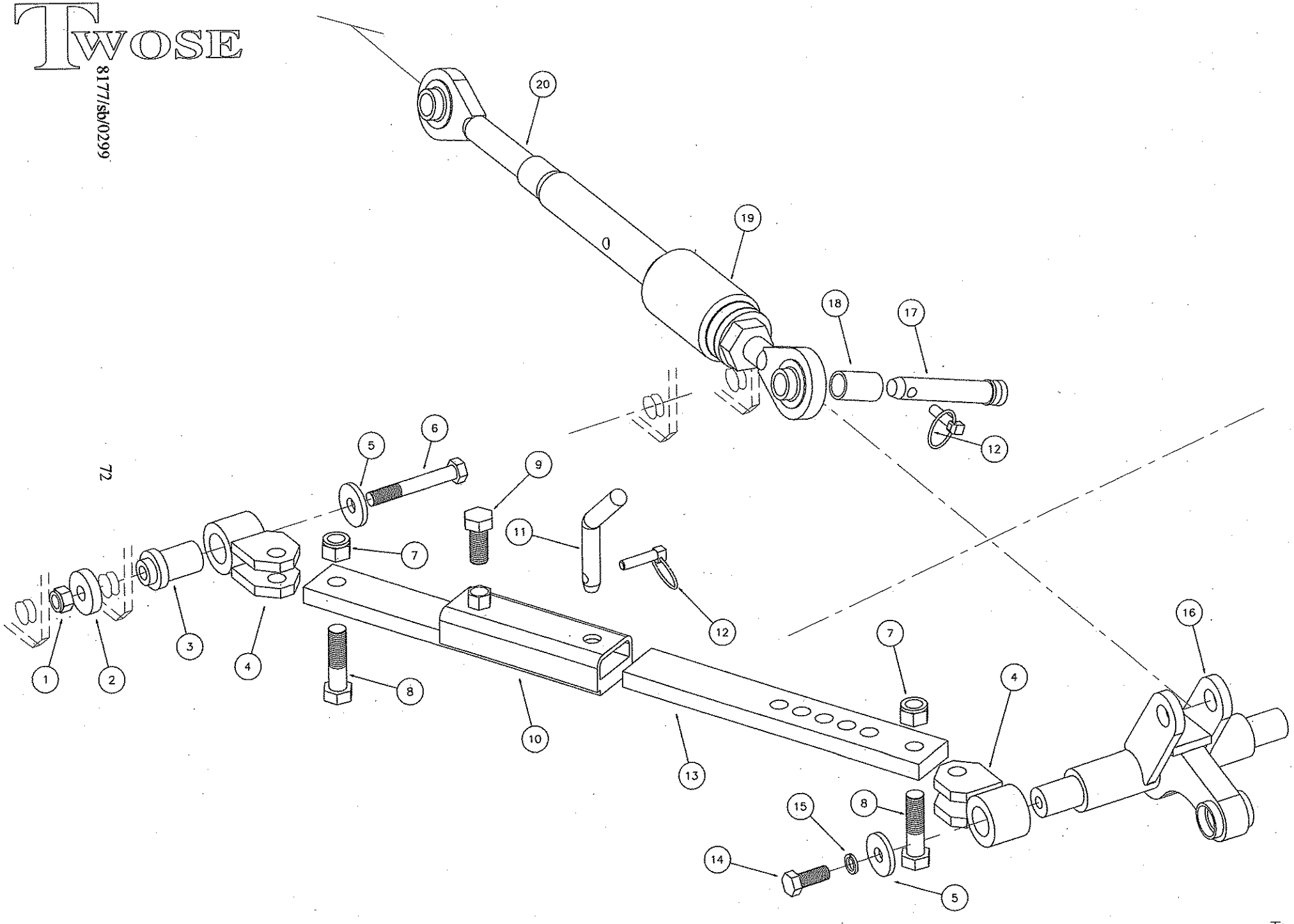
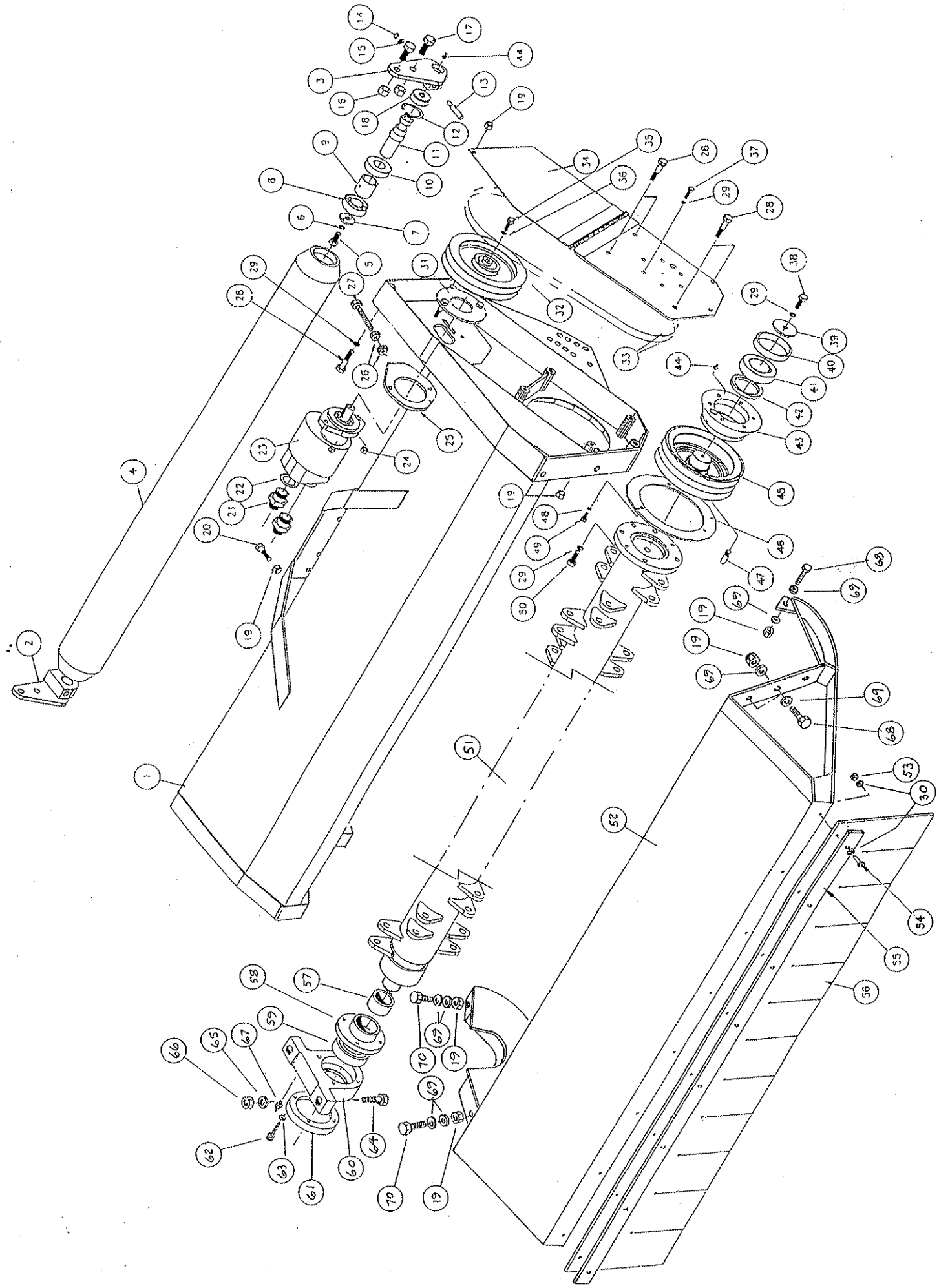


STABILISER PARTS

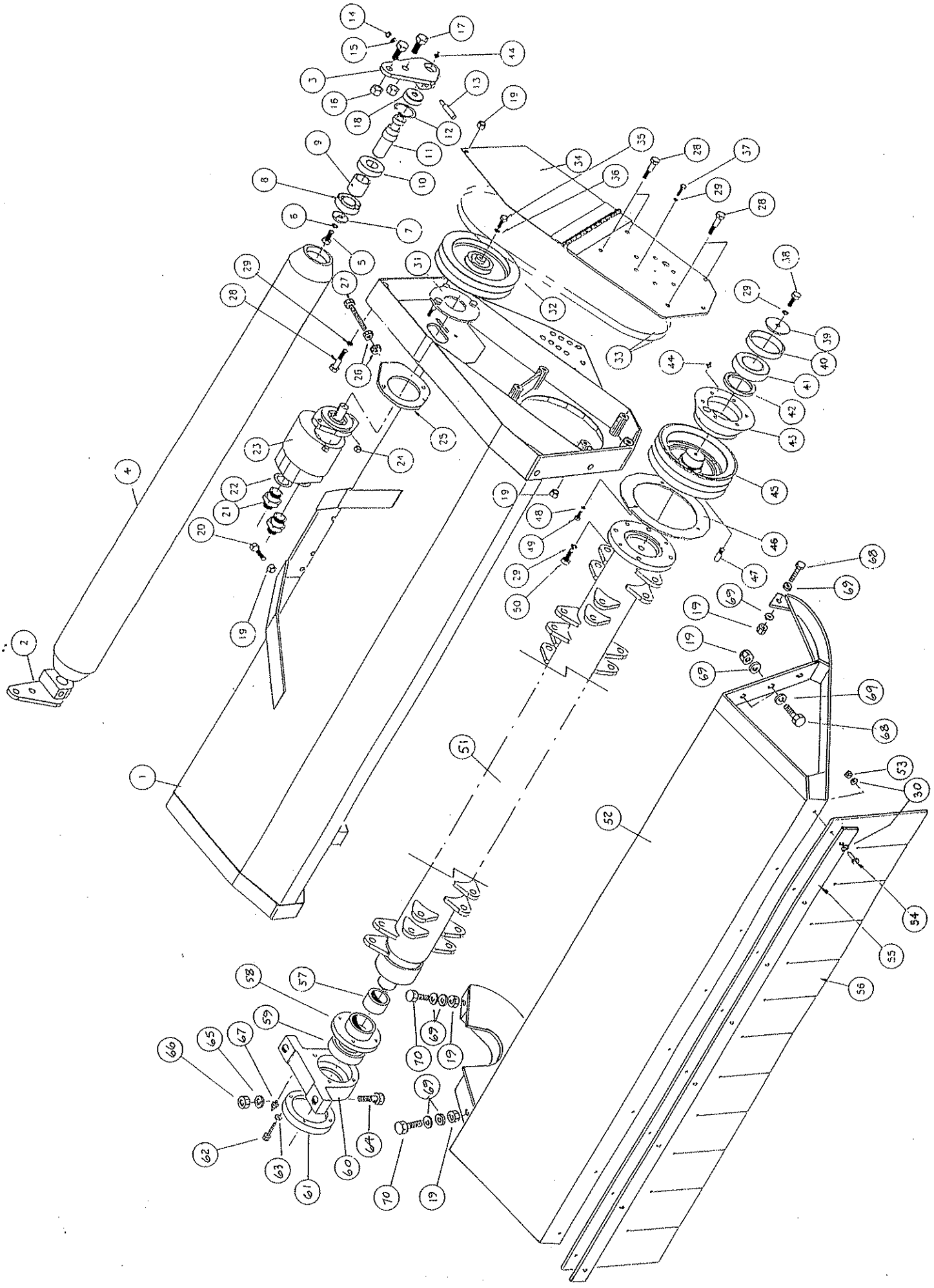
ITEM	PART NO.	DESCRIPTION	QTY
1	3747	Stiffnut M16 Nyloc	2
2	184.436	Washer M16 Special 50 Dia BDMS x 12	2
3	187.053A	Lift Pin Stabiliser 45 Dia BDMS x 69	2
4	184.430	Anchor Bracket	4
5	185.096	Washer M16 Special 50 Dia BDMS x 6	4
6	2914	Bolt M16 *110 (8.8)	2
7	3732	Stiffnut M20 Nyloc	4
8	2705	Bolt M20 * 75 (8.8)	4
9	3904	Setscrew M20 * 45 (8.8)	2
10	184.672	Slide Box	2
11	184.437	Pin 20 Dia BDMS x 160	2
12	0832	Pin Linch 7/16"	3
13	184.671	Slide Arm Inner 60x20MS x 440	2
14	3904	Setscrew M20 * 45 (8.8)	2
15	2730	Washer M16 Spring	2
16	184.435A	Top Link Coupler (Wide)	1
or	184.435B	Top Link Coupler (Narrow)	1
17	2584	Pin Linkage 1"	1
18	7956	Sleeve Top Link Cat 2-3	1
*	6956	Grease Nipple M6	1
19	186.162A	Sprung Top Link Assembly	1
20	7758.1	RH Threaded Top Link Eye	1
*	7758.4	Tommy Bar	1
*	7758.5	Locking Collar	1

* = Not illustrated



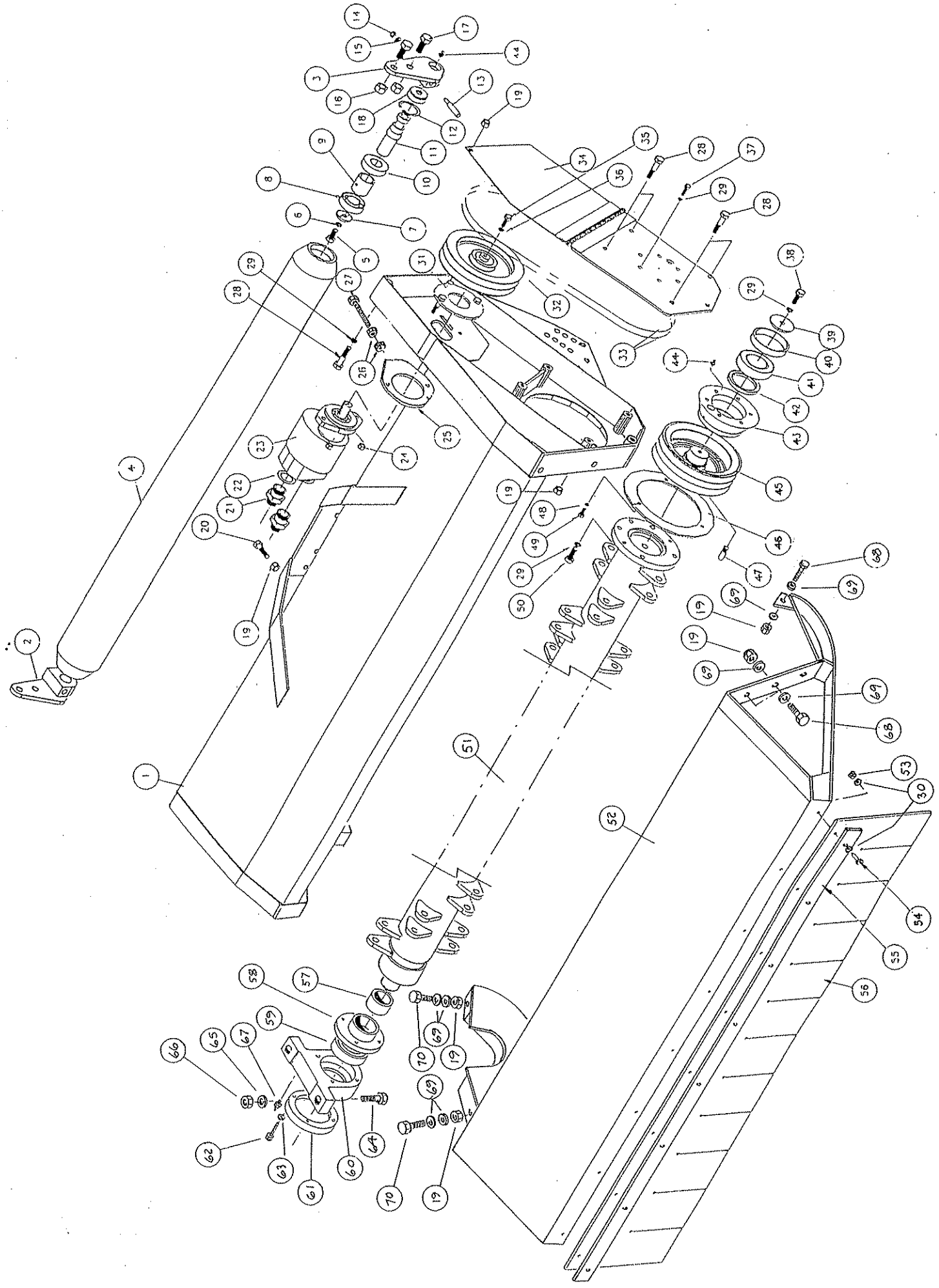
HEAD ASSEMBLY
1.2M AND 1.52M

ITEM	PART NO.	DESCRIPTION	QTY
1	184.615A	Head 1.2m Weld Assy	1
or	184.615B	Head 1.52m Weld Assy	1
2	184.622R	Bracket Roller RH	1
3	184.622L	Bracket Roller LH	1
4	184.621A	Roller Assy 1.2m	1
or	184.621B	Roller Assy 1.52m	1
5	2711	Setscrew M12 x 20 (8.8)	2
6	2729	Washer M12 Spring	2
7	174.006	Washer M12 Special	2
8	8029	Bearing	2
9	184.589	Spacer	2
10	7898	Bearing	2
11	184.588	Shaft Stub Roller	2
12	8030	Circlip	2
13	1840591	Cotter Pin Special ½"	2
14	3182	Stiffnut M8 Nyloc	2
15	3111	Washer M8 Form A	2
16	3747	Stiffnut M16 Nyloc	4
17	2901	Setscrew M16 x 35 (8.8)	4
18	184.689	Spacer 30id	2
19	3082	Stiffnut M12 Nyloc	14
20	2733	Bolt M12 x 40 (8.8)	8
21	0935	Adapter 3/4 BSP	2
22	0934	Seal 3/4"	2
23	8027	Motor Gear Type for H/T	1
24	4421	Stiffnut M10 Nyloc	2
25	184.625	Motor plate assembly	1
26	2799	Fullnut M10	2
27	8172	Setscrew M10 x 80 (8.8)	1
28	2986	Bolt M12 X 80 (8.8)	6
29	2729	Washer M12 Spring	11
30	3111	Washer M8 Form 'A' for 1.2m Head	32
or	3111	Washer M8 Form 'A' for 1.52m Head	40
31	184.463	Motor Fixing Ring	1



HEAD ASSEMBLY
(1.2M AND 1.52M)
CONTINUED

ITEM	PART NO.	DESCRIPTION	QTY
32	184.445	Pulley Motor 242 PCD	1
33	7692	Belt Vee	2
34	184.623	Drive Plate	1
35	7491	Bolt 3/8" UNF x 1"	1
36	0872	Washer Imp 3/8 Spring	1
37	2711	Setscrew M12 x 20 (8.8)	6
38	2950	Setscrew M12 x 30 (8.8)	4
39	184.461	Washer M12 Special	1
40	184.464	Spacer for Bearing	1
41	7840	Bearing	1
42	7790	Oil Seal	1
43	184.448	Bearing Housing	1
44	2923	G/Nipple M10 x 1.5	4
45	184.446	Pulley Rotor 200 PCD	1
46	184.636	Grass Ring	1
47	184.489	Dowel Pin	1
48	3001	Washer M8 Spring	3
49	2793	Setscrew M8 x 20 (8.8)	3
50	7855	Setscrew M12 x 35 FINE	4
51	184.618/9 A/B	Rotor	1
	(see following pages for specific types)		
52	184.616A	Nose Weld Assy 1.2m	1
or	184.616B	Nose Weld Assy 1.52m	1
53	3182	Stiffnut M8 (for 1.2m head)	16
or	3182	Stiffnut M8 for (1.52m head)	20
54	2987	Setscrew M8 x 25 (8.8) (for 1.2m Head)	16
or	2987	Setscrew M8 x 25 (8.8) (for 1.52m Head)	20
55	184.617A	Clamp Strip for 1.2m Head	2
or	184.617B	Clamp Strip for 1.52m Head	2
56	1840476F	Curtain for 1.2m Head	2
or	1840581	Curtain for 1.52m Head	2



HEAD ASSEMBLY (1.2M AND 1.52M) CONTINUED

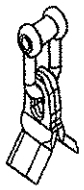
ITEM	PART NO.	DESCRIPTION	QTY
57	192.046	Spacer for bearing	1
58	192.026	Shield for Bearing	1
59	7941	Bearing	1
60	192.024	Housing for bearing	1
61	192.025	Cap for Bearing	1
62	6985	Setscrew-Socket M6 x 45 Cap	4
63	2731	Washer Spring M6	4
64	2878	Bolt M16 x 55 (8.8)	2
65	3747	Washer M16 Form 'A'	4
66	2867	Stiffnut M16	2
67	6956	Grease Nipple M6	1
68	2950	Setscrew M12 x 30 (8.8)	3
69	3192	Washer M12 Form 'C'	10
70	2962	Setscrew M12 x 35	2

PARTS LIST FOR DS HEAD

Below are shown 3 types of rotor, along with the flail options available to fit each. Part numbers are given for rotors complete with flails and end bearings and also for the flails, spacers, nuts and bolts individually.
Note - though it is possible to supply rotors balanced without flails we do not recommend this.

184.618 Type Rotor -

Back-to-back flails on shackles -



184.618A(U)	Rotor 1.2m c/w Flails and end brg	1	
184.618B(W)	Rotor 1.52m c/w Flails and end brg		1
192.053	Spacer 12.5id	30	36
1920071	Flail for shackle	60	72
8095	Stiffnut M12 Nyloc Fine	30	36
1920069	Bolt M12 x 87 (10.9)	30	36
1920052	Shackle	30	36

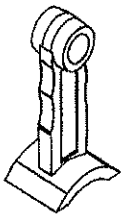
Boot flails on shackles -

184.618A(V)	Rotor 1.2m c/w Flails and end brg	1	
184.618B(X)	Rotor 1.52m c/w Flails and end brg		1
192.053	Spacer 12.5id	30	36
1840605	Flail for shackle	30	36
8095	Stiffnut M12 Nyloc Fine	30	36
1920069	Bolt M12 x 87 (10.9)	30	36
1920052	Shackle	30	36

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 an M12 bolt.

184.619 Type Rotor -

Lump flails -



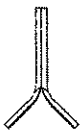
184.619A(C)	Rotor 1.2m c/w Flails and end brg	1	
184.619B(J)	Rotor 1.52m c/w Flails and end brg		1
184.106	Spacer 16.5id	24	30
1840093C	Flail Heavy Duty	24	30
7942	Stiffnut M16 Nyloc Fine	24	30
7943	Bolt M16 x 80 (10.9)	24	30

Heavy Duty Grass Flails -

184.619A(D)	Rotor 1.2m c/w Flails and end brg	1	
184.619B(K)	Rotor 1.52m c/w Flails and end brg		1
184.106	Spacer 16.5id	24	30
1840330	Flail Heavy Duty Grass	24	30
7942	Stiffnut M16 Nyloc Fine	24	30
7943	Bolt M16 x 80 (10.9)	24	30

PARTS LIST FOR DS HEAD
CONTINUED

Rigid Back-to-Back Flails -



184.619A(A)	Rotor 1.2m c/w Flails and end brg	1	
184.619B(H)	Rotor 1.52m c/w Flails and end brg		1
184.500	Spacer 16.5id	48	60
1840497	Flail back to back	48	60
7942	Stiffnut M16 Nyloc Fine	24	30
7943	Bolt M16 x 80 (10.9)	24	30

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 an M16 bolt.

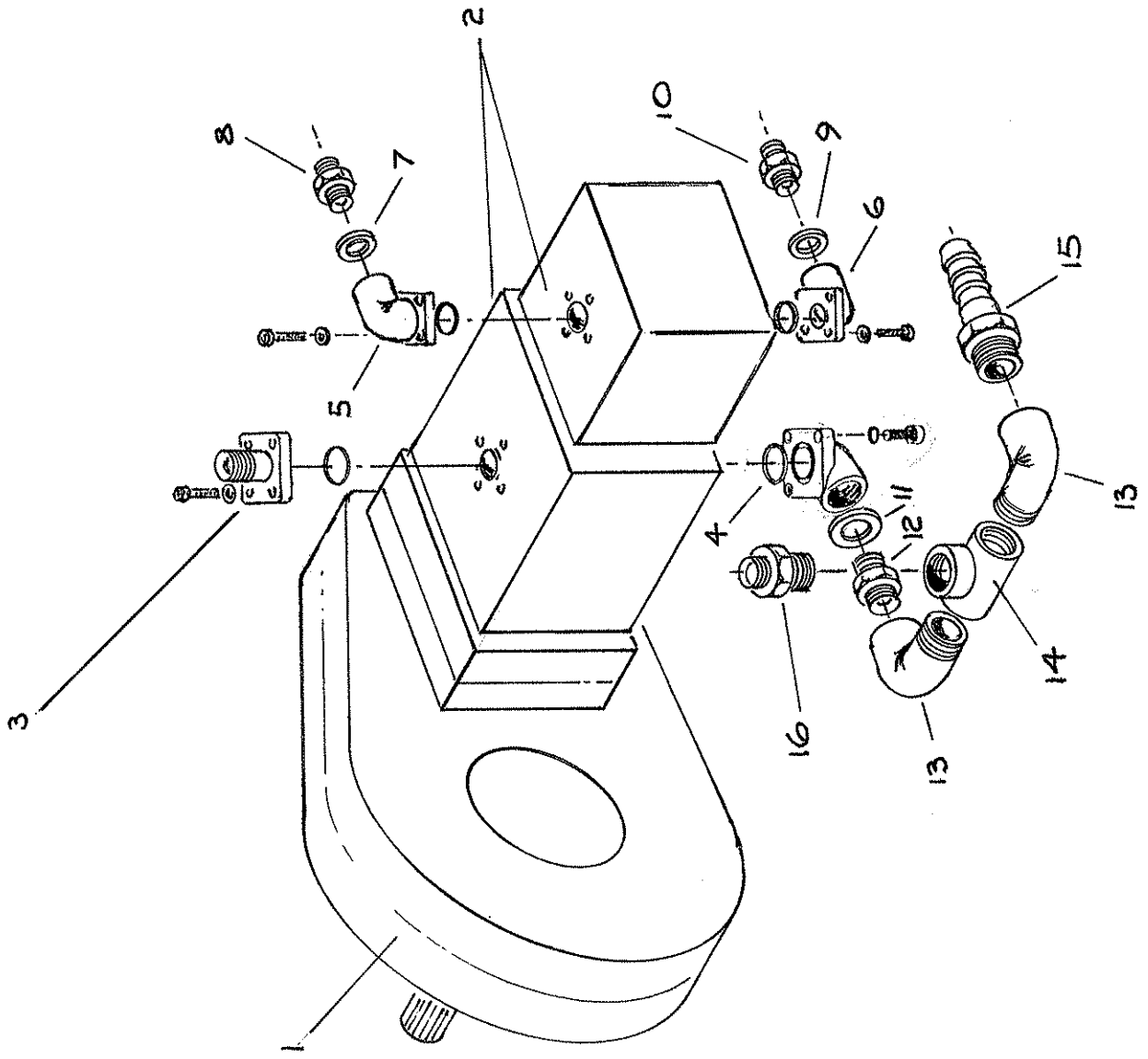
184.620 Type Rotor -

Rollicoupe flails

184.620(G)	Rotor 1.2m c/w Flails and end brg	1
184.571	Spacer 16.5id	20
1840572	Flail Rollicoupe	20
3747	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 rotor's appearance is totally different from that indicated on pages 74, 76 and 78; as the structure resembles a large cylinder into which the flails can retract.

(For balanced 'bare' rotors the part numbers are as the 'flailed-up' rotor but with 'B' replacing the letter in the brackets. Example: balanced bare 1.2m rotor suitable for HD, HDG and rigid back-to-back flails = 184.619A(B).)


1
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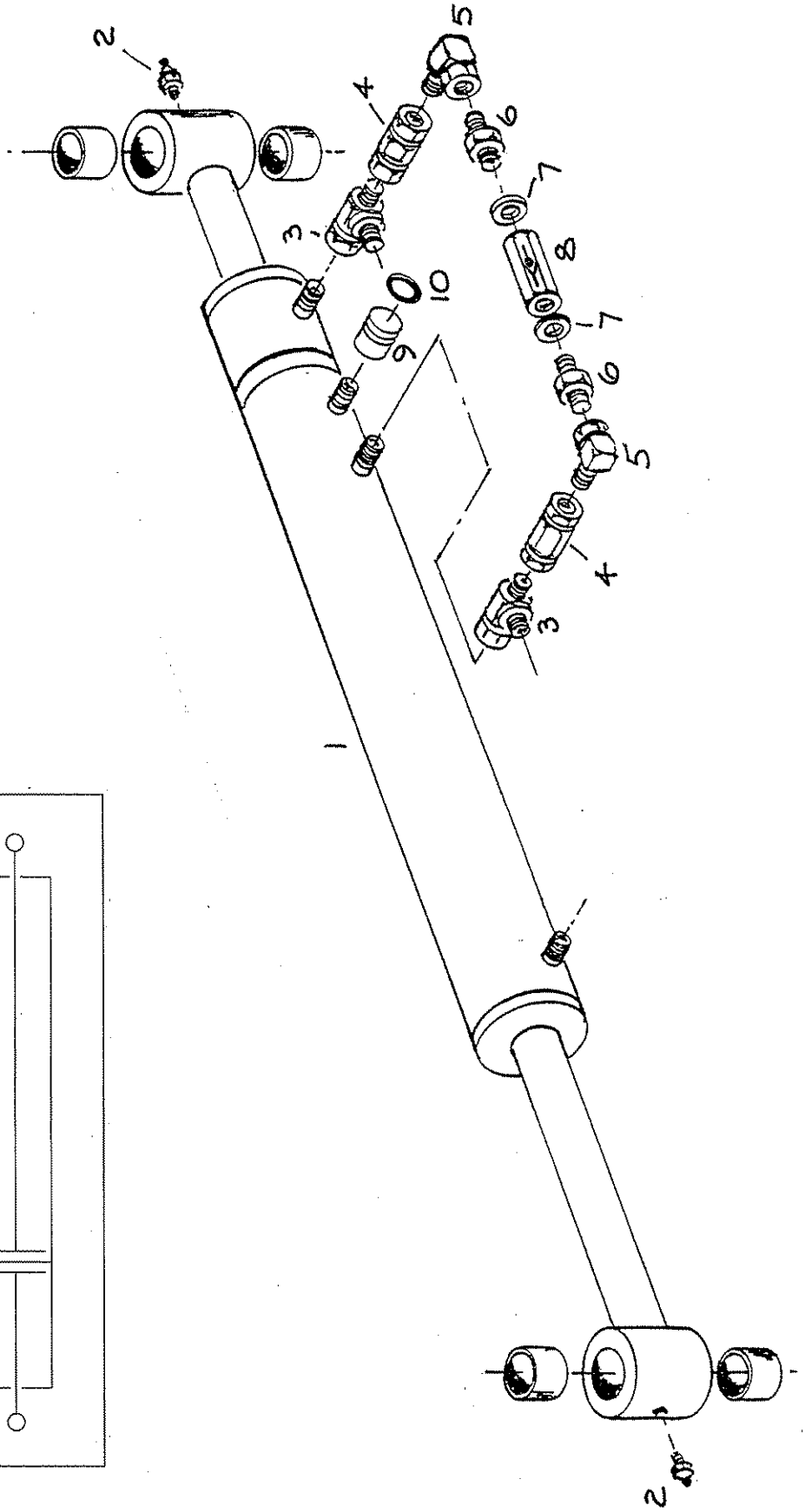
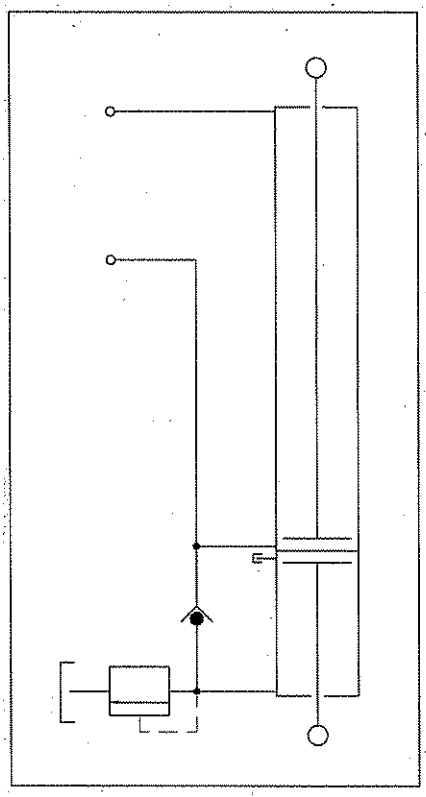
PTO Gearbox, Pump and Fittings

ITEM	PART NO.	DESCRIPTION	QTY
1	194.056	P.T.O Gearbox	1
*	8159	'O' Ring	1
2	7939 (41C.0.0)	Pump set single (R machines)	1
or	7939 (41C,8,0)	Pump set dual (RI/RIE machines)	or 1
or	7939 (41C,16,0)	Pump set dual (RIEP machines)	or 1
3	7939-E06S	Elbow 3/4" IPE6 straight + 'O' ring + 5/16" Screws	1
4	7939-E08	Elbow 1" IPE8 c/w 'O' ring + M10 screws	1
5	7939-E04	Elbow 1/2" IPE4 c/w 'O' ring + 5/16" screws	1 or 0
6	7939-E06	Elbow 3/4" IPE6 c/w 'O' ring + 5/16" screws	1 or 0
7	0909	Seal 1/2"	1 or 0
8	1826	Adaptor 1/2" x 1/2" BSP	1 or 0
9	0934	Seal 3/4"	1 or 0
10	0935	Adaptor 3/4 x 3/4 BSP	1 or 0
11	1934	Seal 1"	1
12	7559	Adaptor 1" x 1 1/2" BSPT	1
13	8002	Elbow 1 1/2" M/F BSPT	2
14	8001	Tee 1 1/2 F/F/F	1
15	7999	Hose Tail 1 1/2" BSP (Male)	1
16	8010	Adaptor 3/4" BSP x 1 1/2" BSPT	1


2
5
4
6
7
3
8
10
9
1



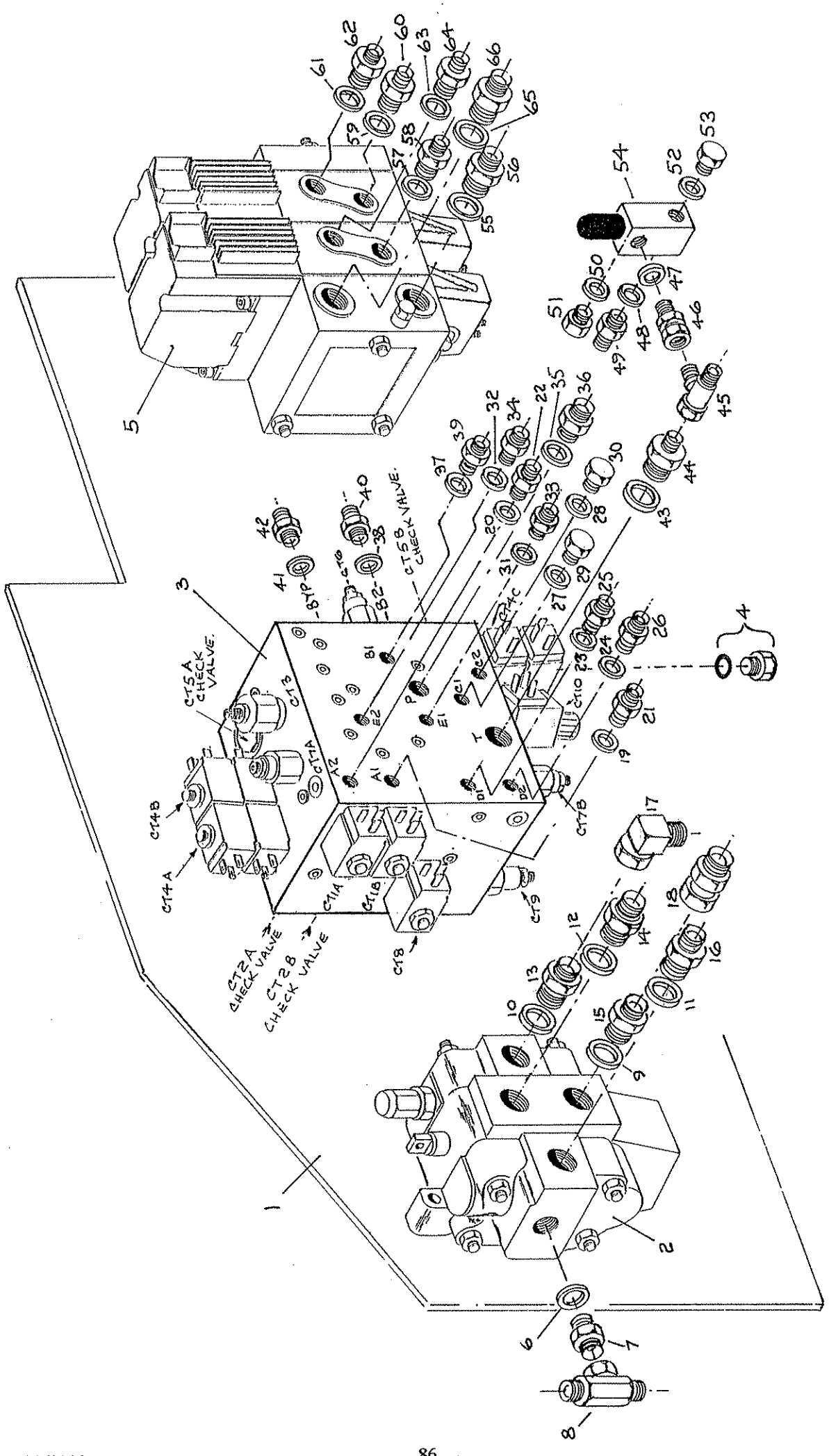
BREAKBACK RAM AND FITTINGS

ITEM	PART NO.	DESCRIPTION	QTY
1	1940047	Breakback Ram	1
2	2923	Grease Nipple M10 straight	2
3	7181	Tee 1/4" BSP M-M-F	2
4	4032	Adaptor 1/4" BSP F-FLN	2
5	6948	Adaptor 1/4" BSP M-FLN 91	2
6	1823	Adaptor 1/4" BSP	2
7	1181	Seal 1/4" BSP	2
8	6986	Check Valve FPR 3/8 o.5b	1
9	154.021	Breather	1
10	5222	'O' Ring for breather	1
*	1840047.1	Complete seal set for 1940047	
*	1940047.2	Rod complete (LONG) for 1940047	
*	1940047.3	Rod complete (SHORT) for 1940047	
*	1940047.4	Gland nut for 1940047	
*	1940047.5	Set of bushes for 1940047	

* = Not illustrated

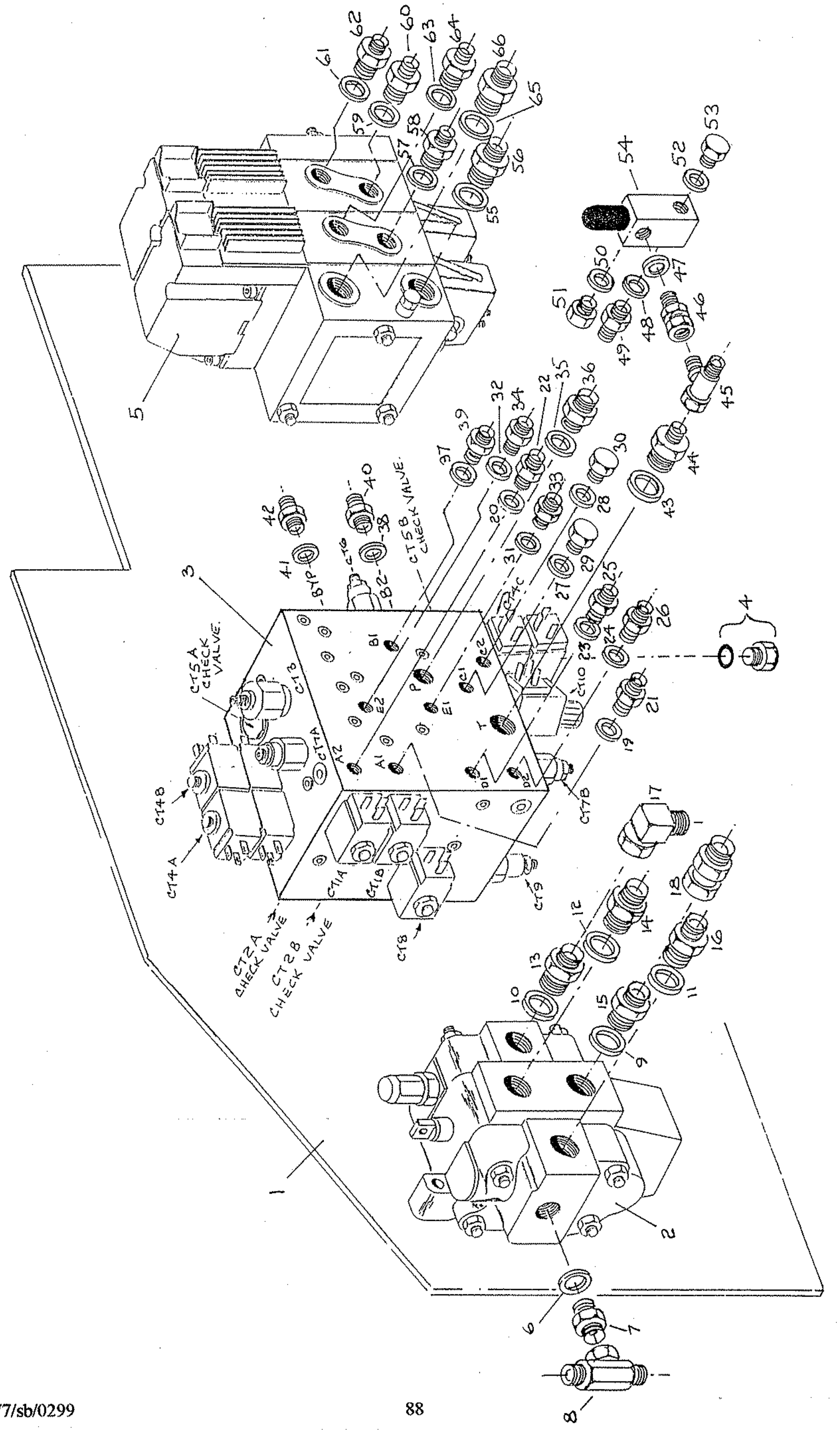
Note - On some models the check valve (8) has been moved onto the valve plate, however its relative position remains as the schematic diagram on page 84.

S20 S REP


CT5A CHECK VALVE
CT5B CHECK VALVE
CT2A CHECK VALVE
CT2B CHECK VALVE
CT4A
CT4B
CT1A
CT1B
CT1C
CT3
CT6
CT7A
CT7B
CT8
CT9
CT10
BYP
A1
A2
B1
B2
C1
C2
D1
D2
E1
E2
P
T

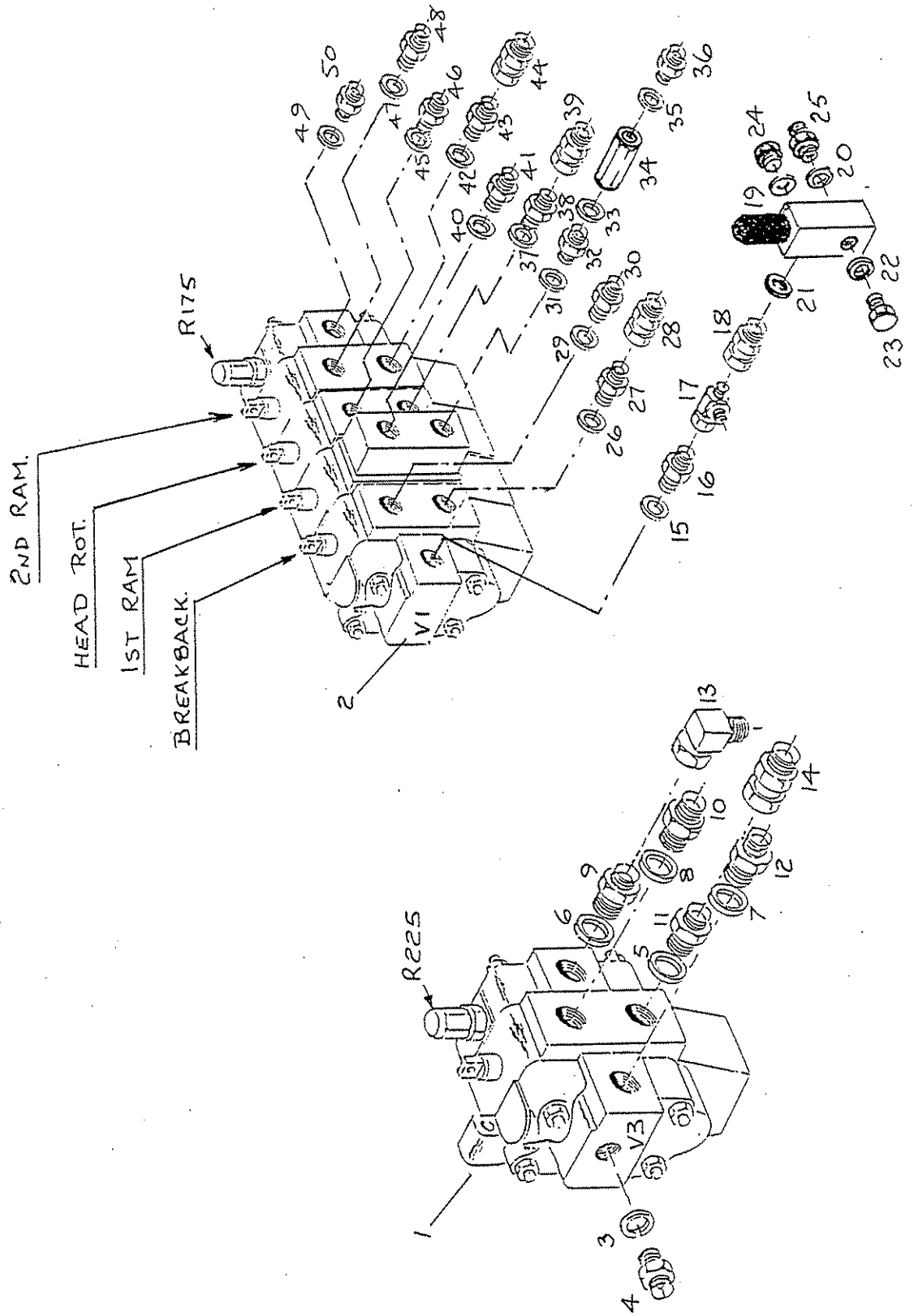
520S-RIEP MACHINES, VALVE PLATE, VALVES, VALVE MOUNTING BOLTS AND HYDRAULIC FITTINGS

ITEM	PART NO.	DESCRIPTION	QTY
1.		Valve mounting plate	1
2	7542 R225	Valve block V3, R225 BT6 MLX T6S40 225 Bar	1
*	3183	Bolt M8 x 45 (8.8)	3
*	3111	Washer M8, Form 'A'	3
*	3182	S. Nut M8 Nyloc	3
3	8123	Valve-Multi block DXP18006-01	1
4	8123.1	Cartridge blanking for telescopic cavities	2
*	2793	Setscrew M8 x 20 (8.8)	4
*	3001	S.Washer M8	4
*	3111	Flatwasher M8 (Form 'A')	4
5	7577	Valve Proportional PVG32, 2 slice code 15/N2110 115 bar	1
*	2793	Setscrew M8 x 20 8.8	4
*	3001	Washer Spring M8	4
*	3111	Flatwasher M8 Form 'A'	4
6	0909	Seal 1/2"	1
7	1826	Adaptor 1/2" x 1/2" BSP	1
8	4933	Tee, 1/2 M/M/FM	1
9	0934	Seal 3/4"	1
10	0934	Seal 3/4"	1
11	0934	Seal 3/4"	1
12	0934	Seal 3/4"	1
13	0935	Adapator 3/4" BSP	1
14	0935	Adapator 3/4" BSP	1
15	0935	Adapator 3/4" BSP	1
16	1836	Adaptor 3/4" BSP x 1" BSP	1
17	3342	Adaptor 3/4" BSP M-F 91 block	1
18	7905	Adaptor 3/4" BSP M-FLN	1
19	1181	Seal 1/4"	1
20	1181	Seal 1/4"	1
21	1823	Adaptor 1/4" BSP	1
22	1823	Adaptor 1/4" BSP	1
23	1181	Seal 1/4"	1
24	1181	Seal 1/4"	1
25	1823	Adaptor 1/4" BSP	1
26	1823	Adaptor 1/4" BSP	1
27	1181	Seal 1/4"	1


CT5A CHECK VALVE
CT5B CHECK VALVE
CT2A CHECK VALVE
CT2B CHECK VALVE
CT4A
CT4B
CT3
CT7A
CT7B
CT8
CT9
CT10
CT11A
CT11B
BYP
B1
B2
A1
A2
E1
E2
P
T
D1
D2
C1
C2

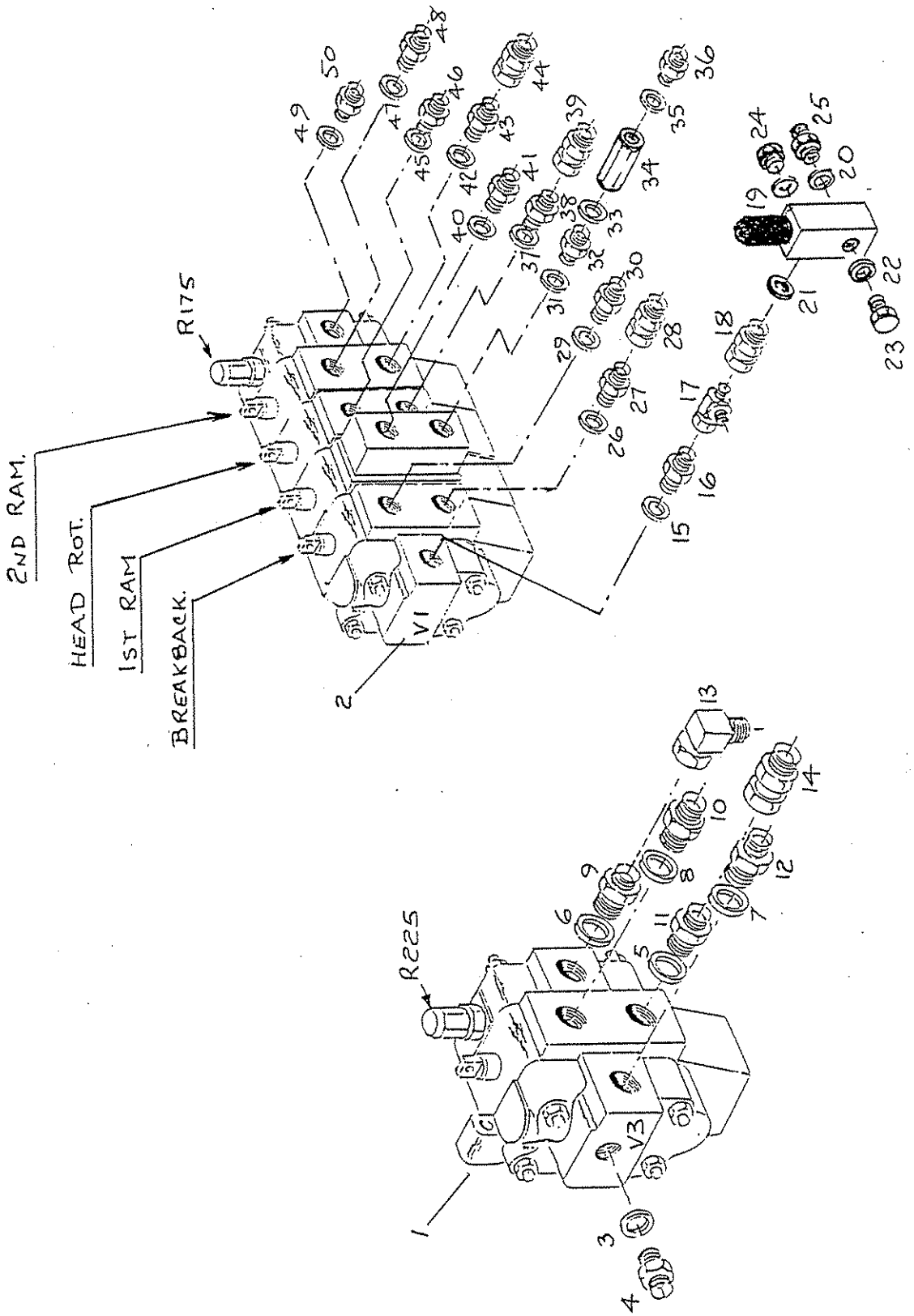
520S-RIEP MACHINES, VALVE PLATE, VALVES, VALVE MOUNTING BOLTS AND HYDRAULIC FITTINGS CONTINUED

ITEM	PART NO.	DESCRIPTION	QTY
28	1181	Seal 1/4"	1
29	3260	Plug 1/4" BSP	1
30	3260	Plug 1/4" BSP	1
31	1181	Seal 1/4"	1
32	1181	Seal 1/4"	1
33	1823	Adaptor 1/4" BSP	1
34	1823	Adaptor 1/4" BSP	1
35	0670	Seal 3/8"	1
36	0914	Adaptor 3/8" BSP x 1/2" BSP	1
37	1181	Seal 1/4"	1
38	1181	Seal 1/4"	1
39	1823	Adaptor 1/4" BSP	1
40	1823	Adaptor 1/4" BSP	1
41	0909	Seal 1/2" BSP	1
42	1826	Adaptor 1/2" BSP x 1/2" BSP	1
43	0909	Seal 1/2" BSP	1
44	1826	Adaptor 1/2" BSP x 1/2" BSP	1
45	5002	Tee 1/2" BSP FM-M-M	1
46	7832	Adaptor 1/2" FM x 1/4" M	1
47	1181	Seal 1/4"	1
48	1181	Seal 1/4"	1
49	1823	Adaptor 1/4" BSP	1
50	1181	Seal 1/4"	1
51	3260	Plug 1/4" BSP	1
52	1181	Seal 1/4"	1
53	3260	Plug 1/4" BSP	1
54	7484	Relief Valve	1
55	0934	Seal 3/4"	1
56	1834	Adaptor 1/2 x 3/4"	1
57	0909	Seal 1/2"	1
58	1825	Adaptor 1/4" x 1/2"	1
59	0909	Seal 1/2"	1
60	1825	Adaptor 1/4" x 1/2"	1
61	0909	Seal 1/2"	1
62	1825	Adaptor 1/4 x 1/2"	1
63	0909	Seal 1/2"	1
64	1825	Adaptor 1/4" x 1/2"	1
65	0934	Seal 3/4"	1
66	1834	Adaptor 1/2" x 3/4"	1


2ND RAM.
HEAD ROT.
1ST RAM
BREAKBACK.
R175
R225
V1
V3

520S-RI MACHINES, VALVE PLATE, VALVES, AND HYDRAULIC FITTINGS

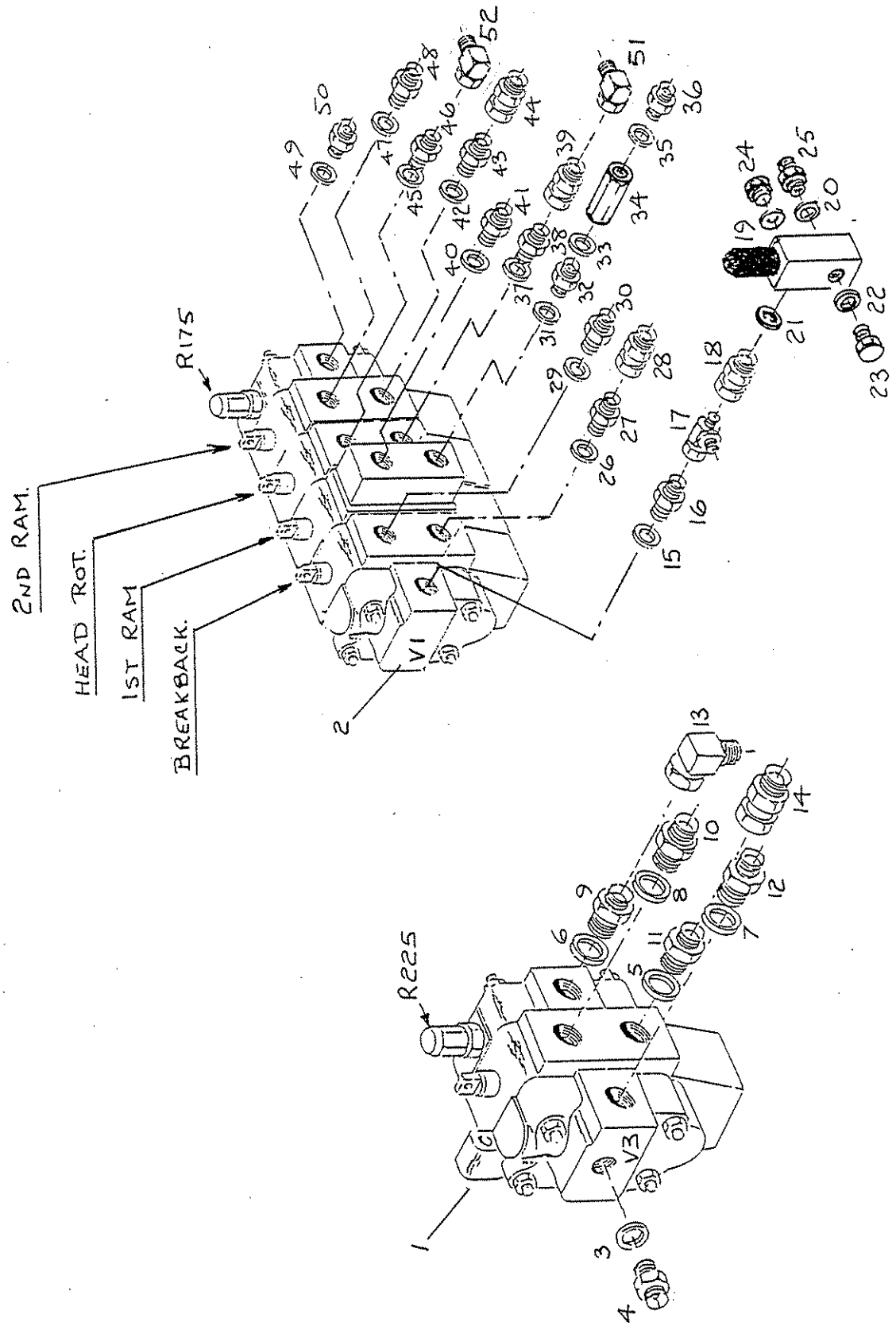
ITEM	PART NO.	DESCRIPTION	QTY
*		Valve Plate	1
1	2745 R225	Valve block V3, R225 BT6 MLX T6S40	1
*	7542.1	Relief Valve (spares only) set @ 225 Bar	
*	3183	Bolt M8 x 45 (8.8)	3
*	3111	Washer M8 (Form 'A')	3
*	3182	Stiffnut M8 (Nyloc)	3
2	7698	Valve Block V1	1
*	2793	Setscrew M8 x 20 (8.8)	4
*	3111	Washer M8 Form 'A'	4
*	3001	Washer M8 Spring	4
*	7698.4	Relief Valve (Spares only) set @ 175bar	
3	0909	Seal 1/2"	1
4	1826	Adaptor 1/2" x 1/2" BSP	1
5	0934	Seal 3/4"	1
6	0934	Seal 3/4"	1
7	0934	Seal 3/4"	1
8	0934	Seal 3/4"	1
9	0935	Adaptor 3/4" BSP	1
10	0935	Adaptor 3/4" BSP	1
11	0935	Adaptor 3/4" BSP	1
12	1836	Adaptor 3/4" BSP x 1" BSP	1
13	3342	Adaptor 3/4" BSP M-F 91 Block	1
14	7905	Adaptor 3/4" BSP M-FLN	1
15	0909	Seal 3/8"	1
16	0914	Adaptor 3/8" x 1/2"	1
17	5002	Tee 1/2" M-F-M	1
18	7832	Adpator 1/2" BSP F/M x 1/4" M	1
19	1181	Seal 1/4"	1
20	1181	Seal 1/4"	1
21	1181	Seal 1/4"	1
22	1181	Seal 1/4"	1
23	3260	Plug 1/4" BSP	1
24	3260	Plug 1/4" BSP	1
25	1823	Adaptor 1/4" x 1/4"	1


2ND RAM.
HEAD ROT.
1ST RAM
BREAKBACK.
R175
R225
V1
V3

520S-RI MACHINES, VALVE PLATE, VALVES AND HYDRAULIC FITTINGS CONTINUED

ITEM	PART NO.	DESCRIPTION	QTY
26	0909	Seal 3/8"	1
27	1180	Adaptor 1/4" x 3/8"	1
28	7305	Adaptor 1/4" BSP M/FM	1
29	0909	Seal 3/8"	1
30	1180	Adaptor 1/4" BSP x 3/8"	1
31	0909	Seal 3/8"	1
32	1180	Adaptor 1/4" x 3/8"	1
33	1181	Seal 1/4"	1
34	7813	Restrictor (1-way) 1.8 (0.5 bar)	1
35	1181	Seal 1/4"	1
36	1823	Adaptor 1/4" x 1/4"	1
37	0909	Seal 3/8"	1
38	1180	Adaptor 1/4" x 3/8"	1
39	7305	Adaptor 1/4" BSP M/FM	1
40	0909	Seal 3/8"	1
43	1180	Adaptor 1/4" x 3/8"	1
44	7305	Adaptor 1/4" BSP M/FM	1
45	0909	Seal 3/8"	1
46	1180	Adaptor 1/4" x 3/8"	1
47	0909	Seal 3/8"	1
48	1180	Adaptor 1/4" x 3/8"	1
49	0909	Seal 3/8"	1
50	0914	Adaptor 3/8" x 1/2"	1

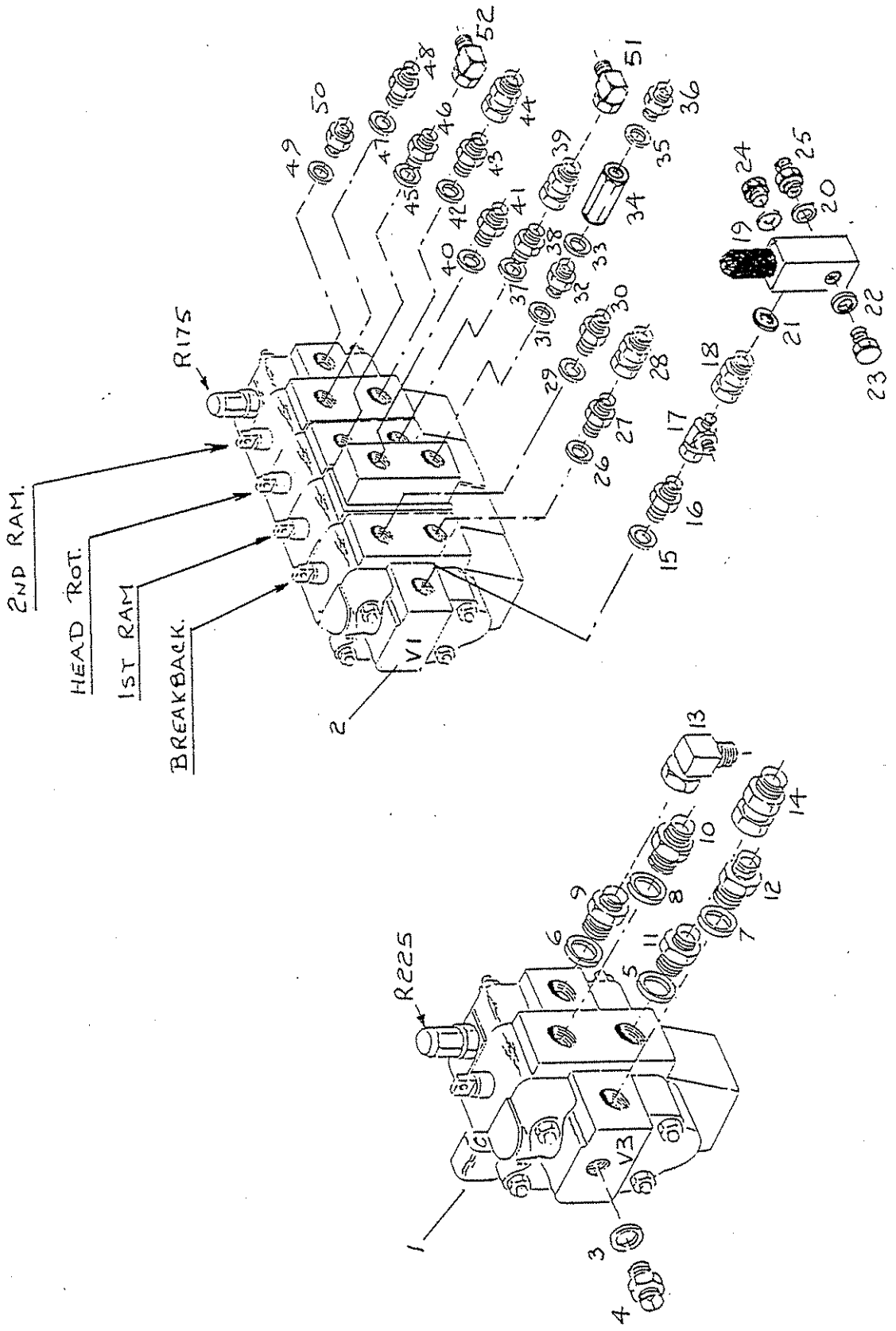
5805 RI



580S-RI MACHINES, VALVE PLATE, VALVES, AND HYDRAULIC FITTINGS

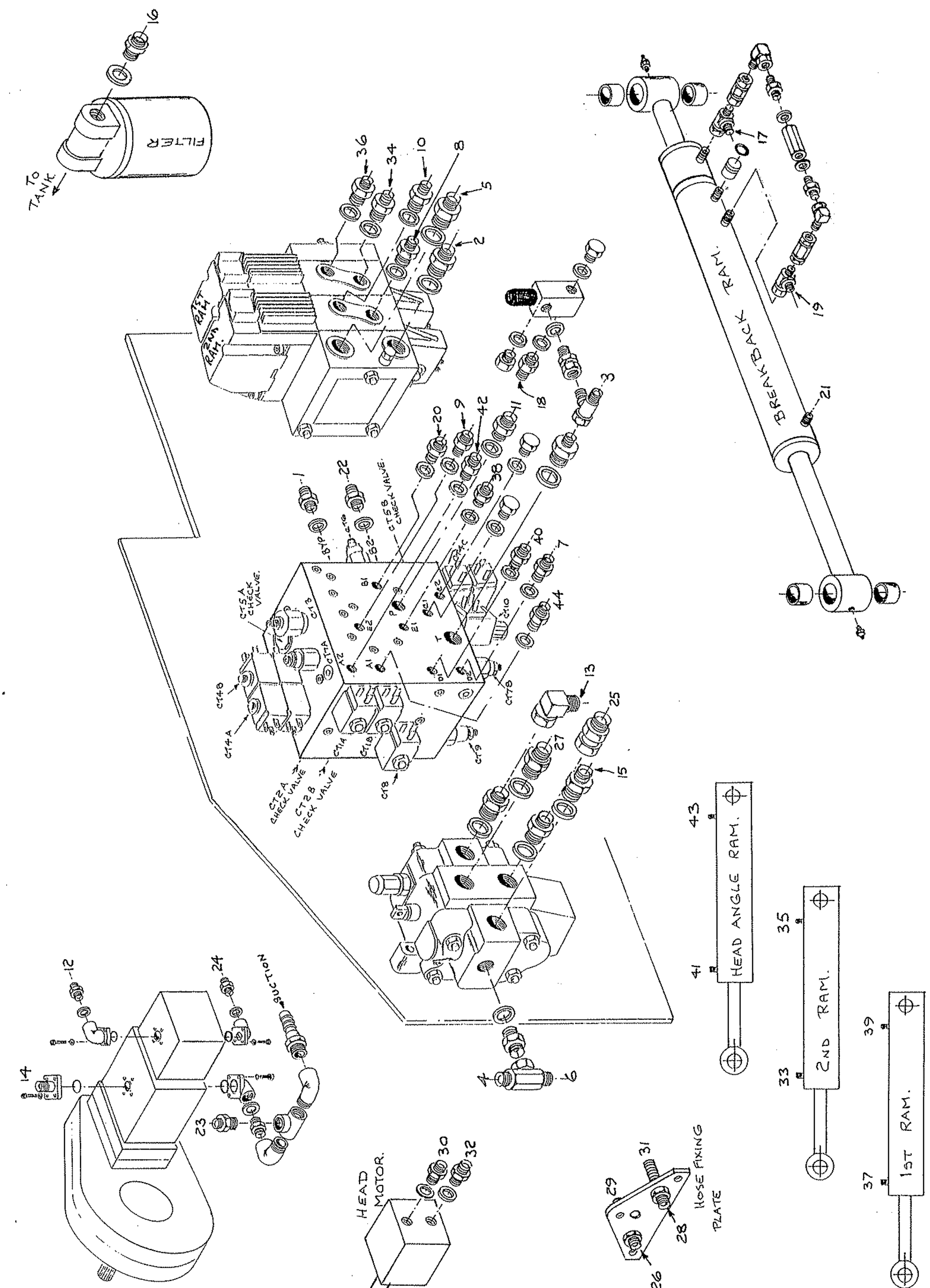
ITEM	PART NO.	DESCRIPTION	QTY
*		Valve Plate	1
1	2745 R225	Valve block V3, R225 BT6 MLX T6S40	1
*	7542.1	Relief Valve (spares only) set @ 225 Bar	
*	3183	Bolt M8 x 45 (8.8)	3
*	3111	Washer M8 (Form 'A')	3
*	3182	Stiffnut M8 (Nyloc)	3
2	7698	Valve Block V1	1
*	2793	Setscrew M8 x 20 (8.8)	4
*	3111	Washer M8 Form 'A'	4
*	3001	Washer M8 Spring	4
*	7698.4	Relief Valve (Spares only) set @ 175bar	
3	0909	Seal 1/2"	1
4	1826	Adaptor 1/2" x 1/2" BSP	1
5	0934	Seal 3/4"	1
6	0934	Seal 3/4"	1
7	0934	Seal 3/4"	1
8	0934	Seal 3/4"	1
9	0935	Adaptor 3/4" BSP	1
10	0935	Adaptor 3/4" BSP	1
11	0935	Adaptor 3/4" BSP	1
12	1836	Adaptor 3/4" BSP x 1" BSP	1
13	3342	Adaptor 3/4" BSP M-F 91 Block	1
14	7905	Adaptor 3/4" BSP M-FLN	1
15	0909	Seal 3/8"	1
16	0914	Adaptor 3/8" x 1/2"	1
17	5002	Tee 1/2" M-F-M	1
18	7832	Adpator 1/2" BSP F/M x 1/4" M	1
19	1181	Seal 1/4"	1
20	1181	Seal 1/4"	1
21	1181	Seal 1/4"	1
22	1181	Seal 1/4"	1
23	3260	Plug 1/4" BSP	1
24	3260	Plug 1/4" BSP	1
25	1823	Adaptor 1/4" x 1/4"	1

5805 E7.



580S-RI MACHINES,
VALVE PLATE, VALVES
AND HYDRAULIC FITTINGS CONTINUED

ITEM	PART NO.	DESCRIPTION	QTY
26	0909	Seal 3/8"	1
27	1180	Adaptor 1/4" x 3/8"	1
28	7305	Adaptor 1/4" BSP M/FM	1
29	0909	Seal 3/8"	1
30	1180	Adaptor 1/4" BSP x 3/8"	1
31	0909	Seal 3/8"	1
32	1180	Adaptor 1/4" x 3/8"	1
33	1181	Seal 1/4"	1
34	7813	Restrictor (1-way) 1.8 (0.5 bar)	1
35	1181	Seal 1/4"	1
36	1823	Adaptor 1/4" x 1/4"	1
37	0909	Seal 3/8"	1
38	1180	Adaptor 1/4" x 3/8"	1
39	7305	Adaptor 1/4" BSP M/FM	1
40	0909	Seal 3/8"	1
43	1180	Adaptor 1/4" x 3/8"	1
44	7305	Adaptor 1/4" BSP M/FM	1
45	0909	Seal 3/8"	1
46	1180	Adaptor 1/4" x 3/8"	1
47	0909	Seal 3/8"	1
48	1180	Adaptor 1/4" x 3/8"	1
49	0909	Seal 3/8"	1
50	0914	Adaptor 3/8" x 1/2"	1
51	6948	Adaptor 1/4" BSP M/FLN 91	1
52	6948	Adaptor 1/4" BSP M/FLN 91	1



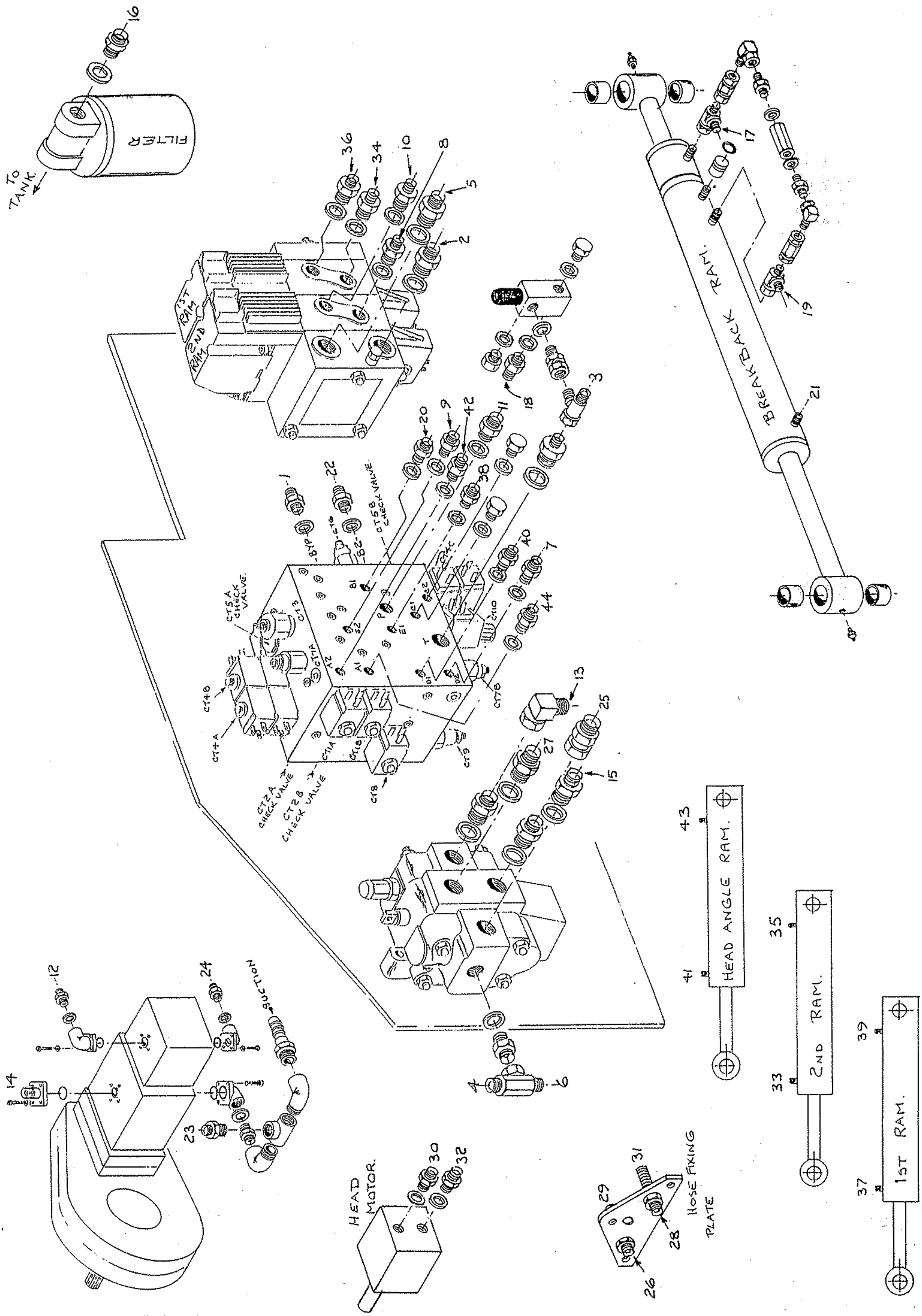
FILTER
TO TANK
BREAKBACK RAM.
1ST RAM.
2ND RAM.
HEAD ANGLE RAM.
HEAD MOTOR.
HOSE FIXING PLATE
SUCTION
CT5A CHECK VALVE.
CT5B CHECK VALVE.
CT2A CHECK VALVE
CT2B CHECK VALVE

8177/sb/0299

(520S RIE) HEDGETRIMMER
- LEFT HAND MACHINE
- HYPRO V3 MOTORSPOOL

HOSE CONNECTION POSITIONS AND HOSE DESCRIPTIONS

1-2	Integrated block 'BYP' port to Danfoss Pressure
004.749	1/2" hose 90 x 90 x 200 @ 110°
3-4	Integrated block to Motor Spool block ('Ton' Int block)
004.750	1/2" hose 90 x 90 x 500 @ 350°
5-6	Danfoss to Motor Spool block
004.751	1/2" hose 90 x 90 x 490 @ 270°
7-34	Integrated block 'D2' to Danfoss 'Bottom'
004.752	1/4" hose 90 x 90 x 380 @ 330°
9-36	Integrated block 'E2' to Danfoss 'Top'
004.753	1/4" hose 90 x 90 x 470 @ 330°
11-12	2nd Pump pressure to Integrated block 'P'
004.754	1/2" hose 90 x ST x 680
13-14	1st pump pressure to Motor Spool pressure
004.755	3/4" hose 90 x 90 x 390 @ 180°
15-16	Return from Motor Spool to Filter
004.756	1" hose 90 x 90 x 680 @ 340°
17-18	B.Back '2nd cyl.' to Relief Cartridge
004.757	1/4" hose 90 x 90 x 670 @ 90°
19-20	B-Back 'Main eye' (Anchor end) to Integrated block 'B1'
004.758	1/4" hose 90 x 90 x 500 @ 200°
21-22	B-Back 'Main Cyl.' (Rod end) to Integrated block 'B2'
004.759	1/4" hose 90 x 90 x 960 @ 250°
23-24	1st pump 'Tee' to 2nd pump suction
004.760	3/4" hose 90 x 90 x 300 @ 300°
25-26	Motor spool 'lower' to Hose mounting plate
004.746	3/4" hose 90 x 90 x 7050 @ 270°
27-28	Motor Spool 'Top' to Hose mounting plate
004.747	3/4" hose 90 x 90 x 6920 @ 270°
29-30	Hose mounting plate to Motor
004.748	3/4" hose ST x ST x 700


FILTER
TO TANK.
BREAKBACK RAM.
HEAD ANGLE RAM.
2ND RAM.
1ST RAM.
HEAD MOTOR.
HOSE FIXING PLATE
SUCTION
1ST RAM
2ND RAM
CT5A CHECK VALVE.
CT5B CHECK VALVE.
CT2A CHECK VALVE
CT2B CHECK VALVE
BYP
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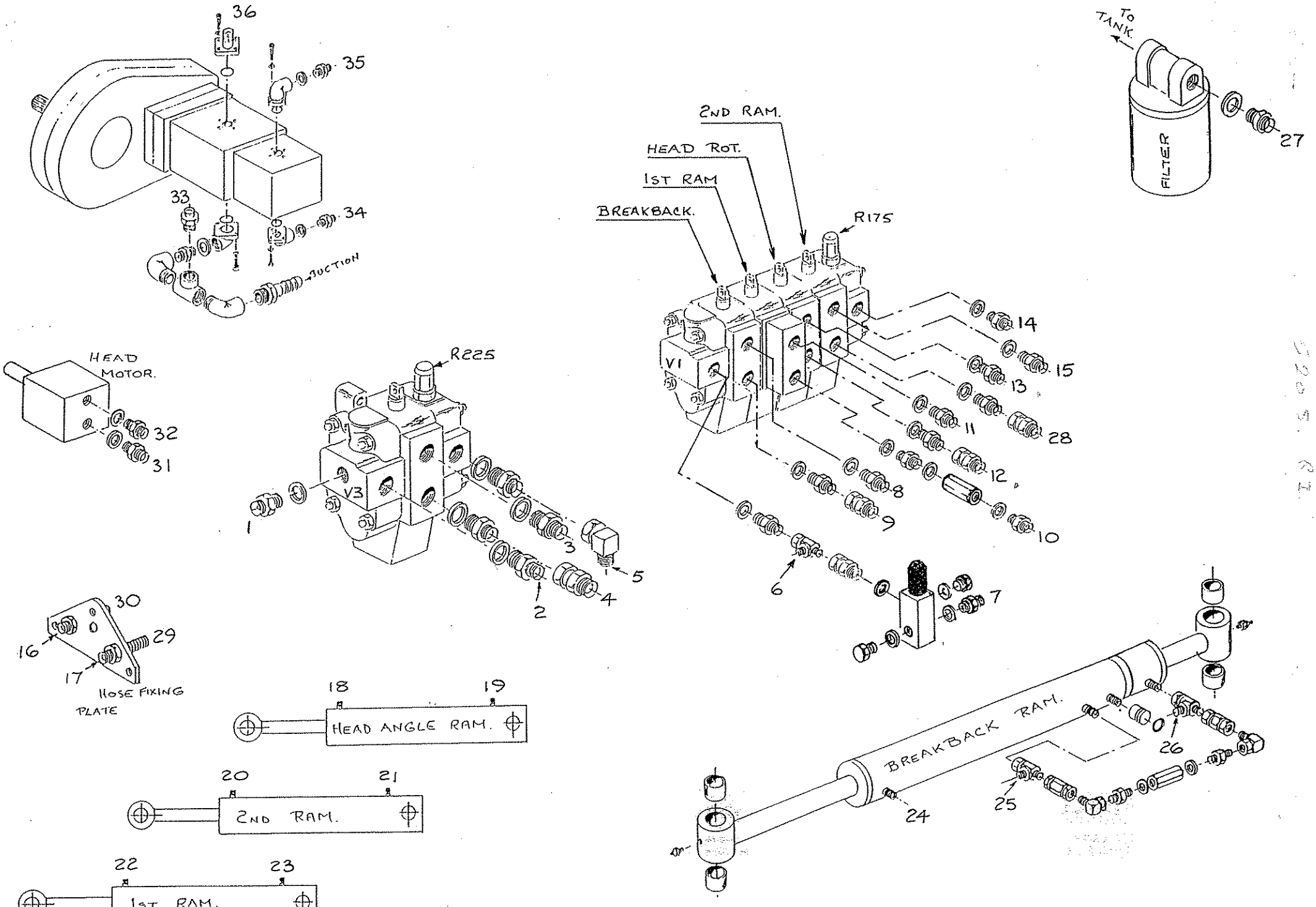
(520S RIE) HEDGETRIMMER
- LEFT HAND MACHINE
- HYPRO V3 MOTORSPOOL

HOSE CONNECTION POSITIONS AND HOSE DESCRIPTIONS CONTINUED

31-32	Hose mounting plate to Motor
004.748	3/4" hose ST x ST x 700
33-8	2nd Ram (Rod) to Danfoss
004.741	1/4" hose 90 x 90 x 2630 @ 180°
35-10	2nd Ram (Anchor) to Danfoss
004.742	1/4" hose 90 x 90 x 2080 @ 180°
37-38	1st Ram (Rod) to Integrated block 'E1'
004.761	1/4" hose 90 x 90 x 2330 @ 90°
39-40	1st Ram (Anchor) to Integrated block 'D1'
004.762	1/4" hose 90 x 90 x 2580 @ 90°
41-42	Head Angling Ram (Rod) to Integrated block 'A2'
004.745	1/4" hose 90 x 90 x 6490 @ 90°
43-44	Head Angling Ram (Anchor) to Integrated block 'A1'
004.745	1/4" hose 90 x 90 x 6490 '90°

Suction Hose 'Pump to Tank'
38mm I.D suction hose x 560 long


36
35
33
34
SUCTION
HEAD MOTOR.
32
31
R225
V3
1
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2
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2ND RAM.
HEAD ROT.
1ST RAM
BREAKBACK.
R175
V1
14
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TO TANK.
FILTER
27
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16
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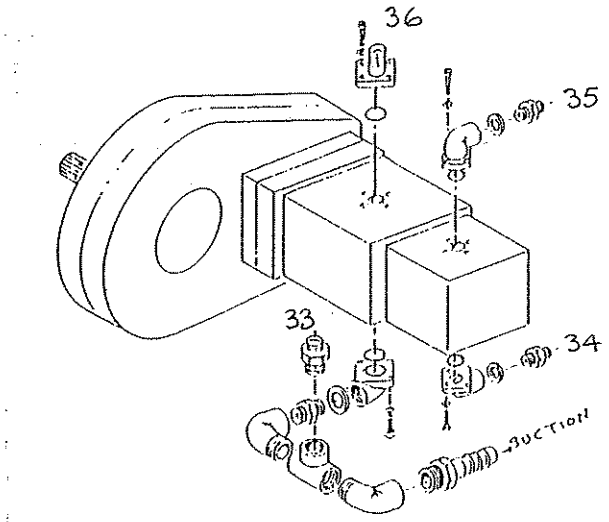
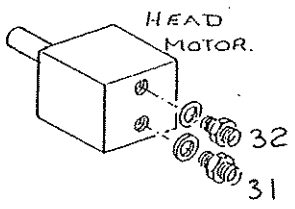
17
HOSE FIXING PLATE
18
19
HEAD ANGLE RAM.
20
21
2ND RAM.
22
23
1ST RAM.
BREAKBACK RAM.
26
24
25

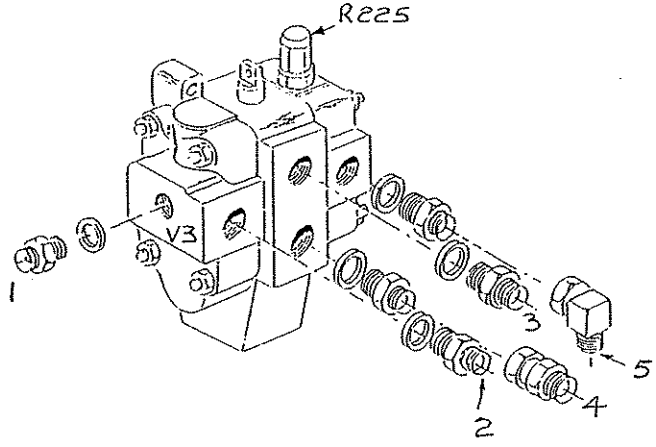
HOSES AND CONNECTIONS

520SRI L/H WITH 'DS HEAD'

PART NO	DESCRIPTION	CONNECTIONS	CONN. NOS
	38mm ID Hose x 560	Tank - 1st Pump (Suction)	
004.733	1" Hose 90-90 x 510 @ 000°	V3-Oil Filter (Return)	2-27
004.734	3/4" Hose 90-90 x 465 @ 180°	1st Pump -V3 (Pressure)	36-5
004.735	3/4" Hose 90-90 x 340 @ 270°	1st Pump (Tee) - 2nd pump (Suction)	33-34
004.736	1/2" Hose 90 ST x 740	2nd Pump - V1 (pressure)	35-14
004.737	1/2" Hose 90-90 x 300 @30°	V1-V3 (Return)	1-6
004.738	1/4" Hose 90-90 x 985 @ 000°	B.B. Rod- V1 (Lower)	24-9
004.739	1/4" Hose 90-90 x 560 @ 270°	B B Cly - V1 (Top)	25-8
004.740	1/4" Hose 90-90 x 890 @ 120°	B B Anchor - B B (Relief)	26-7
004.741	1/4" Hose 90-91 x 2630 @ 180°	2nd Ram Rod - V1 (Lower)	20-28
004.742	1/4" Hose 90-91 x 2080 @ 180°	2nd Ram Anchor - V1 (Top)	21-15
004.743	1/4" Hose 90-91 x 1840 @ 90°	1st Ram Rod - V1 (Top)	22-11
004.744	1/4" Hose 90-91 x 1500 @ 90°	1st Ram Anchor - V1 (Lower)	23-10
004.745	1/4" Hose 90-91 x 6490 @ 90°	Head Angling Rod - V1 (Lower)	18-12
004.745	1/4" Hose 90-91 x 6490 @ 90°	Head Angling Anchor - V1 (Top)	19-13
004.746	3/4" Hose 90-90 x 7050 @ 270°	V3 (Lower) - Head Pivot	4-6
004.747	3/4" Hose 90-90 x 6920 @ 270°	V3 (Top) - Head Pivot	3-17
004.748	3/4" Hose ST x ST x 700	Head Pivot - Head Motor	29-31
004.748	3/4" Hose ST x ST x 700	Head Pivot - Head Motor	30-32


36
35
33
34
SUCTION


HEAD MOTOR.
32
31


R225
V3
1
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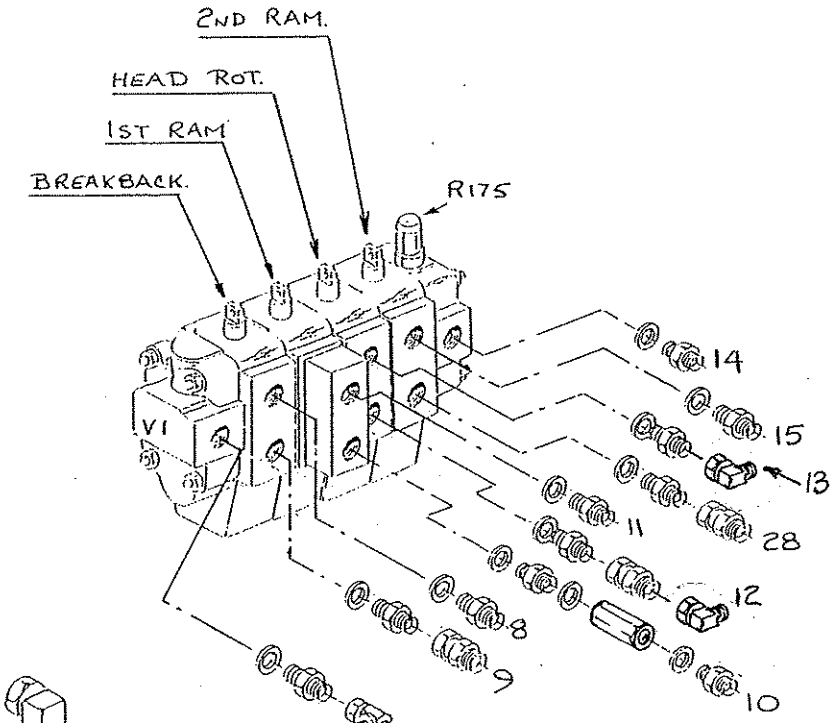
2ND RAM.
HEAD ROT.
1ST RAM
BREAKBACK.
R175
V1
14
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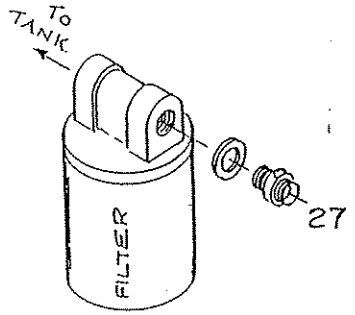
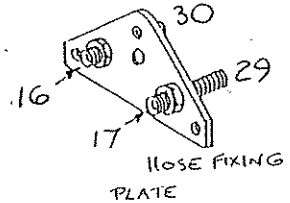

TO TANK
FILTER
27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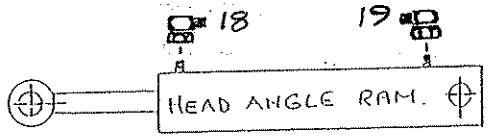
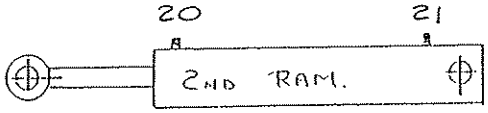
HOSE FIXING PLATE


18
19
HEAD ANGLE RAM.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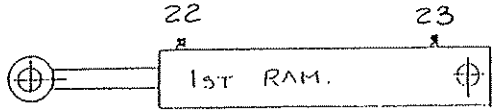
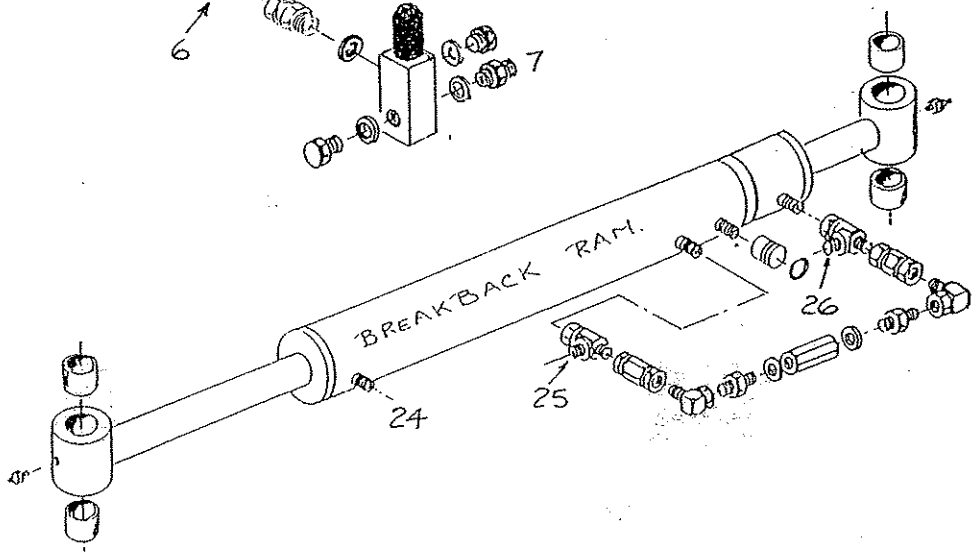
21
2ND RAM.

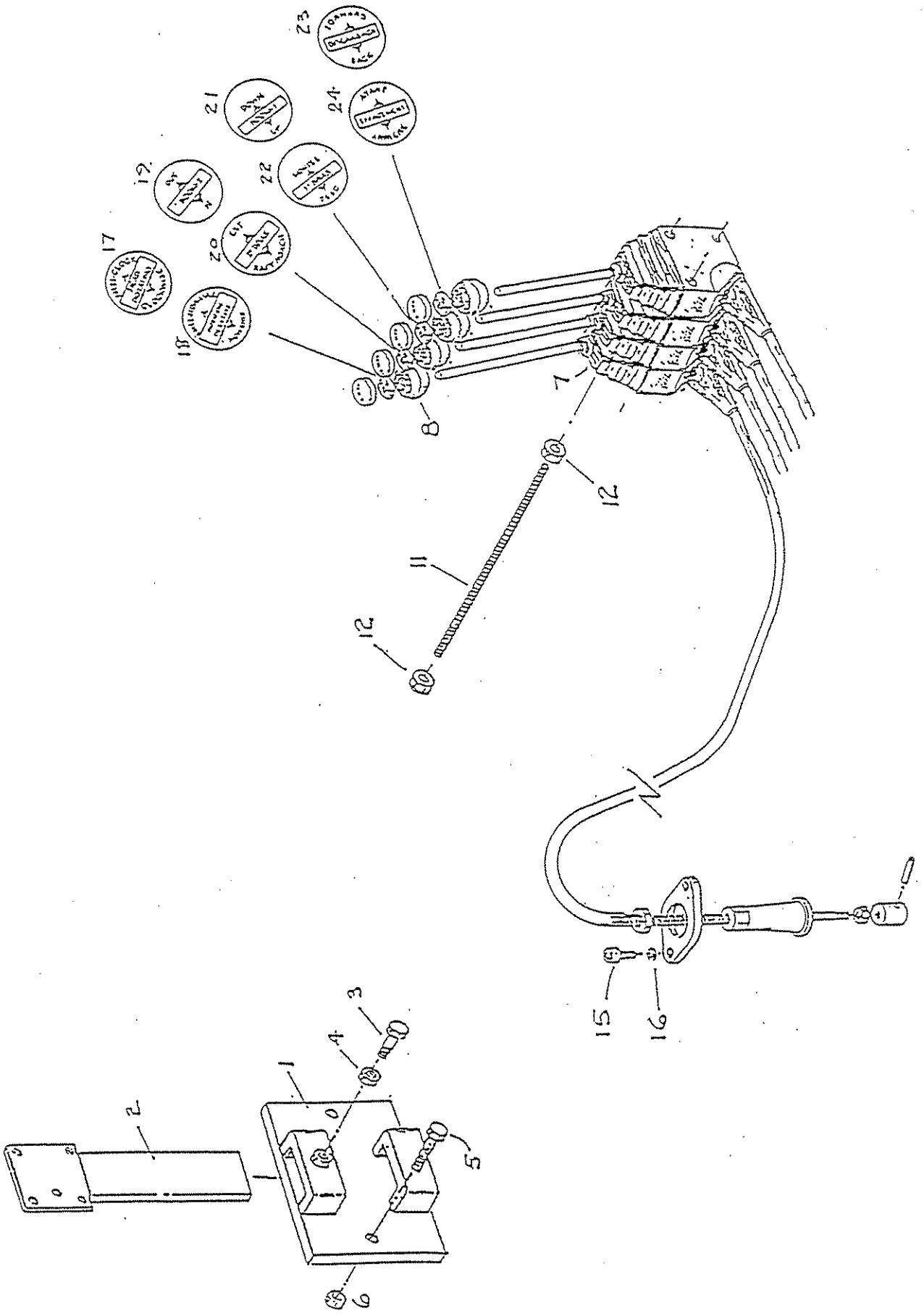

22
23
1ST RAM.


BREAKBACK RAM.
24
25
26

HOSES AND CONNECTIONS

580SRI L/H WITH 'DS HEAD'

PART NO	DESCRIPTION	CONNECTIONS	CONN. NOS
	38mm ID Hose x 560	Tank - 1st Pump (Suction)	
004.733	1" Hose 90-90 x 510 @ 000°	V3-Oil Filter (Return)	2-27
004.734	3/4" Hose 90-90 x 465 @ 180°	1st Pump -V3 (Pressure)	36-5
004.735	3/4" Hose 90-90 x 340 @ 270°	1st Pump (Tee) - 2nd pump (Suction)	33-34
004.736	1/2" Hose 90 ST x 740	2nd Pump - V1 (pressure)	35-14
004.737	1/2" Hose 90-90 x 300 @30°	V1-V3 (Return)	1-6
004.738	1/4" Hose 90-90 x 985 @ 000°	B.B. Rod- V1 (Lower)	24-9
004.739	1/4" Hose 90-90 x 560 @ 270°	B B Cly - V1 (Top)	25-8
004.740	1/4" Hose 90-90 x 890 @ 120°	B B Anchor - B B (Relief)	26-7
004.741	1/4" Hose 90-91 x 2630 @ 180°	2nd Ram Rod - V1 (Lower)	20-28
004.742	1/4" Hose 90-91 x 2080 @ 180°	2nd Ram Anchor - V1 (Top)	21-15
004.743	1/4" Hose 90-91 x 1840 @ 90°	1st Ram Rod - V1 (Top)	22-11
004.744	1/4" Hose 90-91 x 1500 @ 90°	1st Ram Anchor - V1 (Lower)	23-10
004.763	3/8" Hose (1/4 ends) ST x ST x 7090	Head Angling Rod - V1 (Lower)	18-12
004.763	3/8" Hose (1/4 ends) ST x ST x 7090	Head Angling Anchor - V1 (Top)	19-13
004.764	3/4" Hose 90-90 x 7650 @ 270°	V3 (Lower) - Head Pivot	4-6
004.764	3/4" Hose 90-90 x 7520 @ 270°	V3 (Top) - Head Pivot	3-17
004.748	3/4" Hose ST x ST x 700	Head Pivot - Head Motor	29-31
004.748	3/4" Hose ST x ST x 700	Head Pivot - Head Motor	30-32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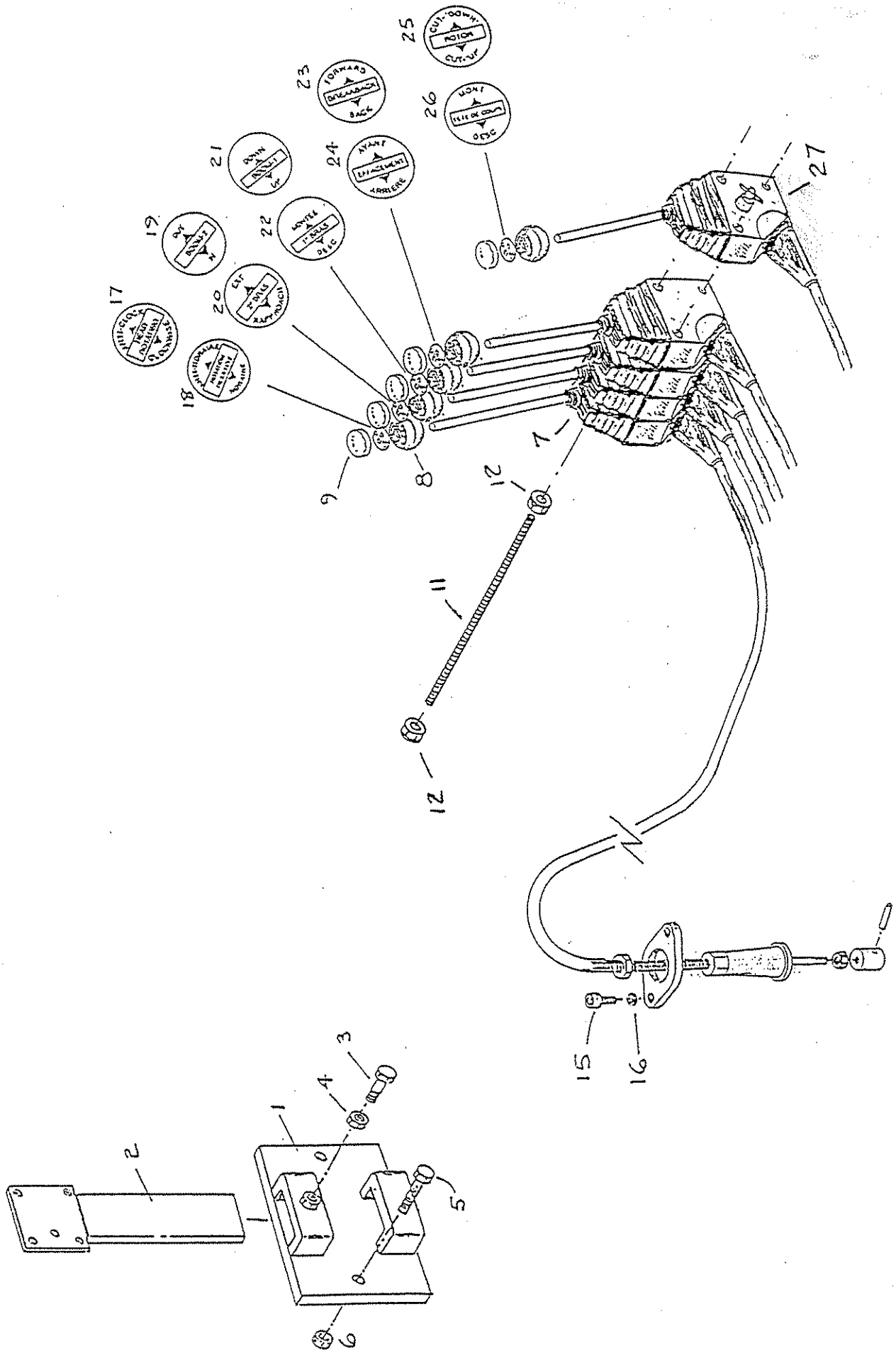
CONTROL LEVERS AND MOUNTING (T.M.C CONTROLLERS)

BLACK CABLES

ITEM	PART NO	DESCRIPTION	QTY
1	184.257	Mounting Bracket - "to tractor"	
2	184.258	Controller Support Bracket	1
3	2962	Setscrew M12 x 3 5	1
4	2721	Nut M12	1
5	3730	Setscrew M8 x 40	2
6	3182	Nyloc Nut M8	2

4 BANK CONTROLLERS ONLY (AS FOR 'R' MACHINES)

7	7822	Complete Controller	
8	7835	Knob - (black) with lens	4
11	184.481 A	Tie Bolt-Stud (M6 x 190)	3
12	4776	M8 Nyloc Stifffinut	6
15	4695	Caphead Screw M6 x 15	8
16	2731	Spring Washer M6	8
17	1840501	Head Rotating "Transfer" (English)	1
18 OR	1840501F	Head Rotating "Transfer" (French)	1
19	1840374	Boom '2' Transfer (English)	1
20 OR	1840374F	Boom '2' Transfer (French)	1
21	1840373	Boom '1' Transfer (English)	1
22 OR	1840373F	Boom '1' Transfer (French)	1
23	1840372	Breakback Transfer (English)	1
23 OR	1840372F	Breakback Transfer (French)	1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5-BANK CONTROLLERS (AS FOR RI) MACHINES (T.M.C CONTROLLERS)

BLACK CABLES

ITEM	PART NO	DESCRIPTION	QTY
7	7822	Complete Controller	
8	7835	Knob (Black) with lens	4
9	7836	Knob (Red) with lens	1
11	184.481B	Tie bolt stud (M6 x 275)	3
12	4776	M6 Nyloc Stiffhut	6
15	4695	Caphead Screw M6 x 15	10
16	2731	Spring Washer M6	10
17	1840375	Head Rotating Transfer (English)	1
18	1840375F	Read Rotating Transfer (French)	1
19	1840374	Boom '2' Transfer (English)	1
20	1840374F	Boom '2' Transfer (French)'	1
21	1840373	Boom '1' Transfer (English)	1
22	1840373F	Boom '1' Transfer (French)	1
23	1840372	Breakback Transfer (English)	1
24	1840372F	Breakback Transfer (French)	1
25	1840371	Rotation-cut Transfer (English)	1
26	1840371F	Rotation-cut Transfer (French)	1
27	7823	Controller Complete (Baulk Lock)	1

FAULT FINDING CHART

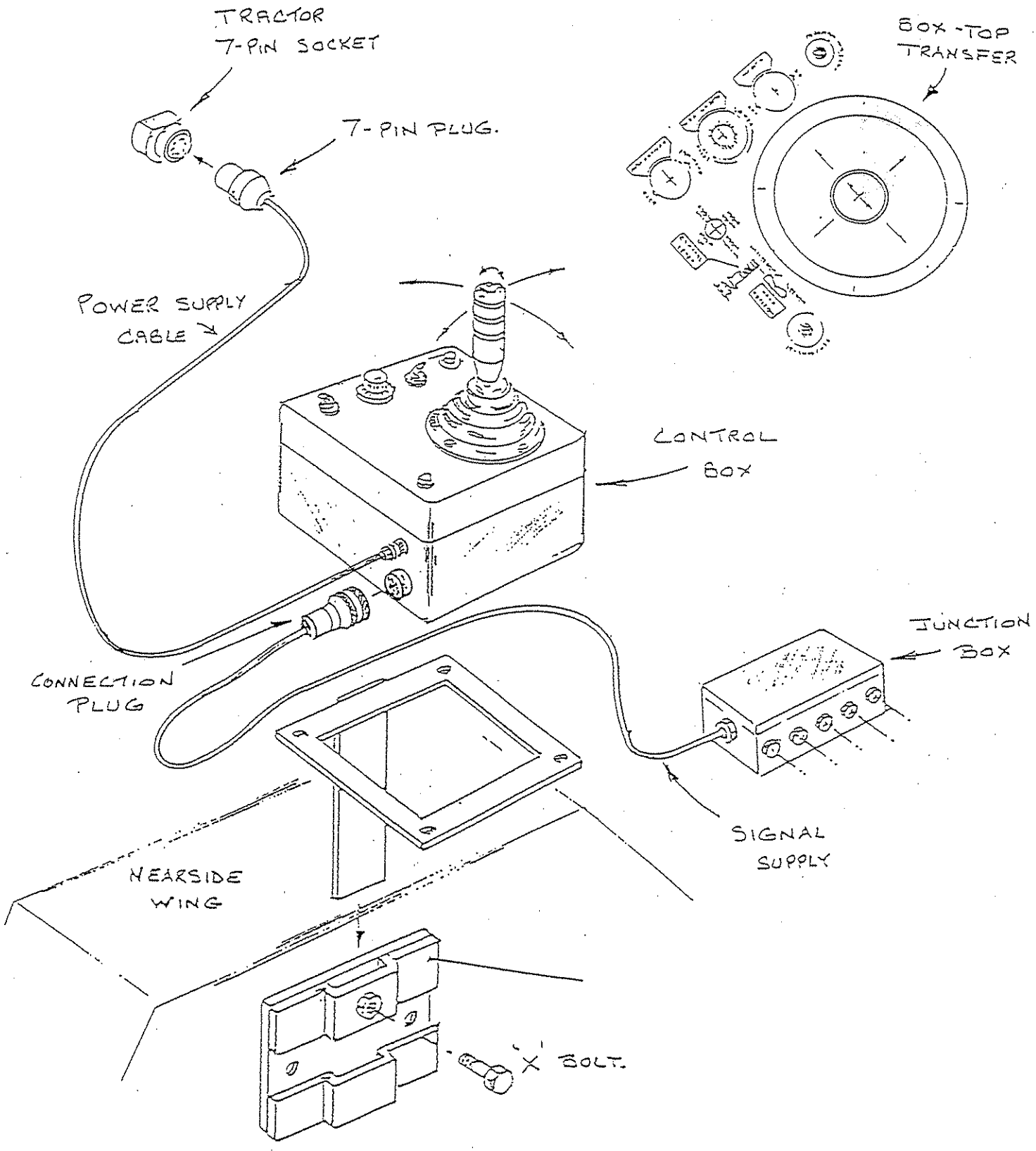
BREAKBACK RAM NOT OPERATIVE	CHECK FOR 12V ON PLUGS 3 & 4	FAULTY HYDRAULIC VALVE
		FAULTY WIRING OR SWITCH
BREAKBACK GIVES TOO EASILY	RESET RELIEF VALVE ON RAM (SHOULD BE SET TO 2000 P.S.I)(136 BAR)	
NO HEAD ROTATION	CHECK FOR 12V ON PLUGS 5 & 6	FAULTY HYDRAULIC VALVE
		FAULTY WIRING OR DANFOSS SWITCH
SLOW HEAD ROTATION OR <360°	RELIEF VALVE NEEDS RE-SETTING (SHOULD BE SET TO 2250PSI) (153 BAR)	
SECOND RAM INOPERATIVE	CHECK FOR 12V ON PIN 1 AND 3-9V ON PIN 2 OF PLUG 7	FAULTY HYDRAULIC VALVE
		FAULTY WIRING OR DANFOSS CONTROL HANDLE
MAIN RAM INOPERATIVE	CHECK FOR 12V ON PIN 1 AND 3-9V ON PIN 2 OF PLUG 8	FAULTY HYDRAULIC VALVE
		FAULTY WIRING OR DANFOSS CONTROL HANDLE
	FLOAT ON/OFF VALVE STUCK IN OPEN POSITION - SEE FLOAT SYSTEM	

FAULT FINDING CHART CONTINUED

<table>
<tr><td rowspan="4">NO FLOAT LAMP ON</td><td rowspan="4">PROPORTIONAL RELIEF VALVE NOT WORKING - CHECK VOLTAGE ON PLUG 1. SHOULD RANGE FROM OV TO 9V AS FLOAT CONTROL KNOB IS TUNED</td><td rowspan="2">IS HYDRAULIC ON/OFF VALVE 2 OPERATING.

IF MACHINE AND TRACTOR SETTLE WHEN FLOAT SWITCH IS OPERATED THEN THIS VALVE IS WORKING</td><td colspan="2">FAULTY PROPORTIONAL RELIEF VALVE</td></tr>
<tr><td rowspan="2">CHECK 12V ON PLUG 2</td><td>FAULTY HYDRAULIC VALVE</td></tr>
<tr><td rowspan="2">CHECK OUTPUT ON TERMINAL 11 ON VOLTAGE REGULATOR BOARD. (SHOULD BE 0V TO 9V)</td><td>FAULTY WIRING</td></tr>
<tr><td>FAULTY BOARD OR POTENTIO-METER</td></tr>
<tr><td rowspan="2"></td><td rowspan="2">DANFOSS VALVE NOT OPERATING CHECK FOR 12V ON PLUG 8

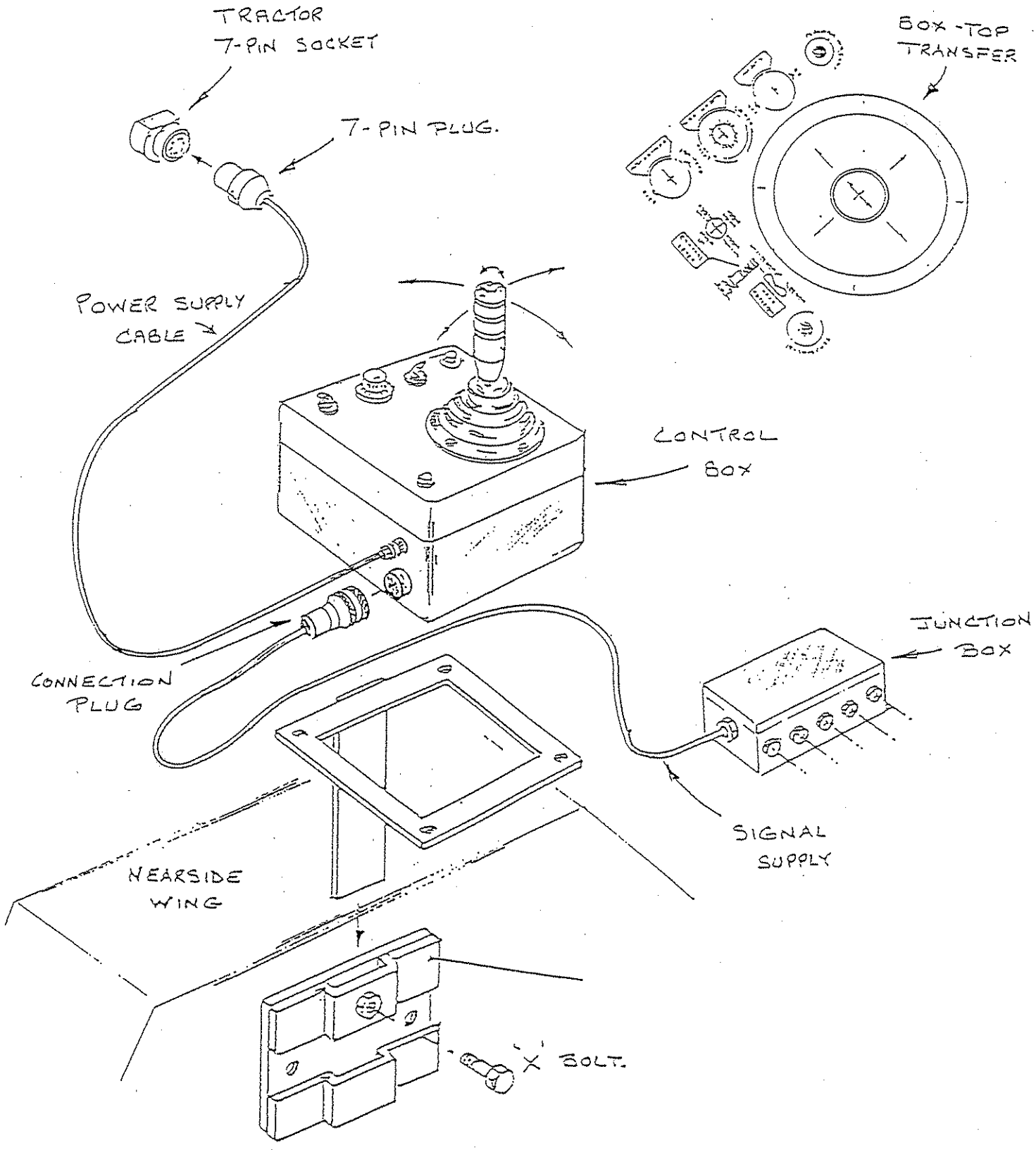
NOTE:- THIS VALVE CAN BE VISUALLY CHECKED BY FITTING AN OPERATING LEVER & "MANUAL OPERATE" LOOKING FOR MOVEMENT.</td><td colspan="3">FAULTY VALVE</td></tr>
<tr><td colspan="3">FAULTY WIRING</td></tr>
<tr><td>NO FLOAT LAMP OPER-ATE</td><td colspan="4">FLOAT SWITCH FAULTY</td></tr>
</table>


TRACTOR
7-PIN SOCKET
7-PIN PLUG.
BOX-TOP
TRANSFER
POWER SUPPLY
CABLE
CONTROL
BOX
JUNCTION
BOX
CONNECTION
PLUG
SIGNAL
SUPPLY
NEARSIDE
WING
'X' BOLT.

8177/sb/0299

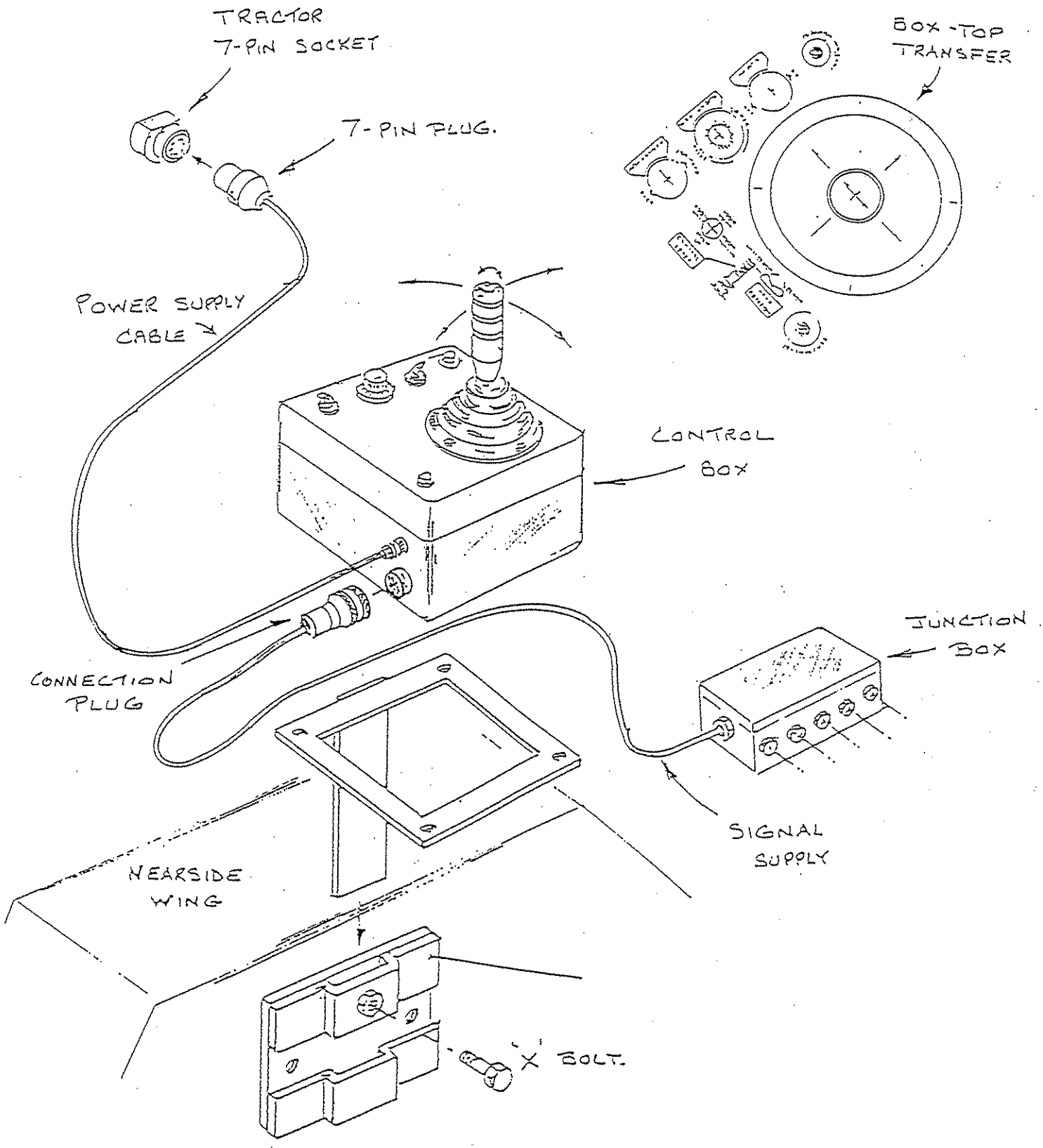
ELECTRIC MACHINE - CONTROL COMPONENTS

ITEM	PART NO	DESCRIPTION	QTY
	184.200	Wiring Harness (Mch Side)	1
		COMPRISING THE FOLLOWING:-	
	184.174	Wire Green/Yellow 85 Lg	2
	184.191	Cable Twin x 770 Lg	2
	184.192	Cable Twin x 1180 Lg	4
	184.194	Cable Twin x 1700 Lg	1
	184.197	Cable Triple x 920 Lg	2
	184.198	Cable 12 Core x 3000	1
	184.199	Box. Modified 7629	1
	1840186	Transfer for 12 Way Term	1
	1840187	Transfer for Gland 1-5	1
	1840188	Transfer for Gland 6-10	1
	7211	Plug 7 Pin Electrical	1
	7592	Diode RS: 261-306	2
	7600	Plug, electrical RS: 480-333	1
	7637	Terminal Block 12 Way RS: 425-055	1
	7637	Terminal Block 12 Way RS: 452-055	1
	7638	Cable Gland RS: 544-011	10
	7639	Cable Gland RS: 614-053	1
	7644	Fullnut M3 RS: 527-230	2
	7646	Setscrew M3 * 20 RS: 523-840	2
	7647	Tube Heatshrink 1.2m RS: 399-934	0.1
	7649	Terminal Block 12 Way RS: 425-077	1
	7722	Tie Cable Small Nylon RS: 543-428	6


TRACTOR
7-PIN SOCKET
7-PIN PLUG.
BOX-TOP
TRANSFER
POWER SUPPLY
CABLE
CONTROL
BOX
JUNCTION
BOX
CONNECTION
PLUG
SIGNAL
SUPPLY
NEARSIDE
WING
'X' BOLT.

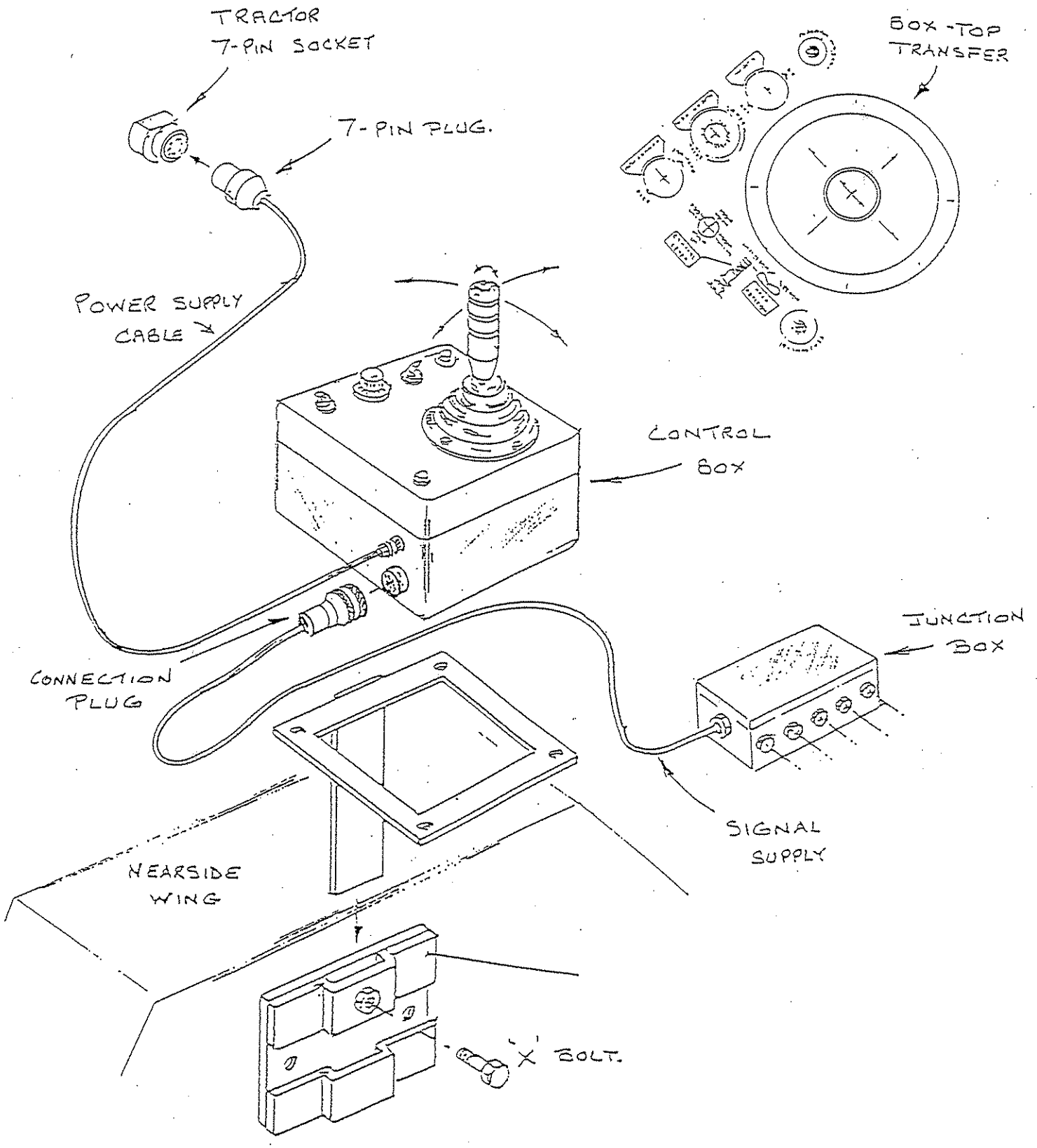
ELECTRIC MACHINE - CONTROL COMPONENTS CONTINUED

ITEM	PART NO	DESCRIPTION	QTY
	184.201	Control Box (Tractor Side)	1
		COMPRISING THE FOLLOWING:-	
	184.142	Wire Assy Red/Blue c/w conns	1
	183.153	Lid for Control Box	1
	184.154	Box Control	1
	184.155	Base for Control Box	1
	184.156	Mtg Rail Din 46277-3 75 Lg	1
	184.157	Circuit Board	1
	184.159A	Wire Assy Red/Blue c/w conns	1
	184.159B	Wire Assy Red/Blue c/w conns	1
	184.160A	Wire Assy Green/Yellow c/w conns	1
	184.160B	Wire Assy Brown c/w conns	1
	184.161	Wire Assy Red/Black c/w Conns	1
	184.162	Wire Assy Grey/Blue 440 lg c/w Conns	1
	184.163	Wire White/Red 340 Lg c/w Conn	1
	184.164	Wire Pink 400 Lg c/w Conn	1
	184.165	Wire Orange 400 Lg c/w Conn	1
	184.166	Wire Grey 400 Lg c/w Conn	1


TRACTOR
7-PIN SOCKET
7-PIN PLUG.
BOX-TOP
TRANSFER
POWER SUPPLY
CABLE
CONTROL
BOX
JUNCTION
BOX
CONNECTION
PLUG
SIGNAL
SUPPLY
NEARSIDE
WING
'X' BOLT.

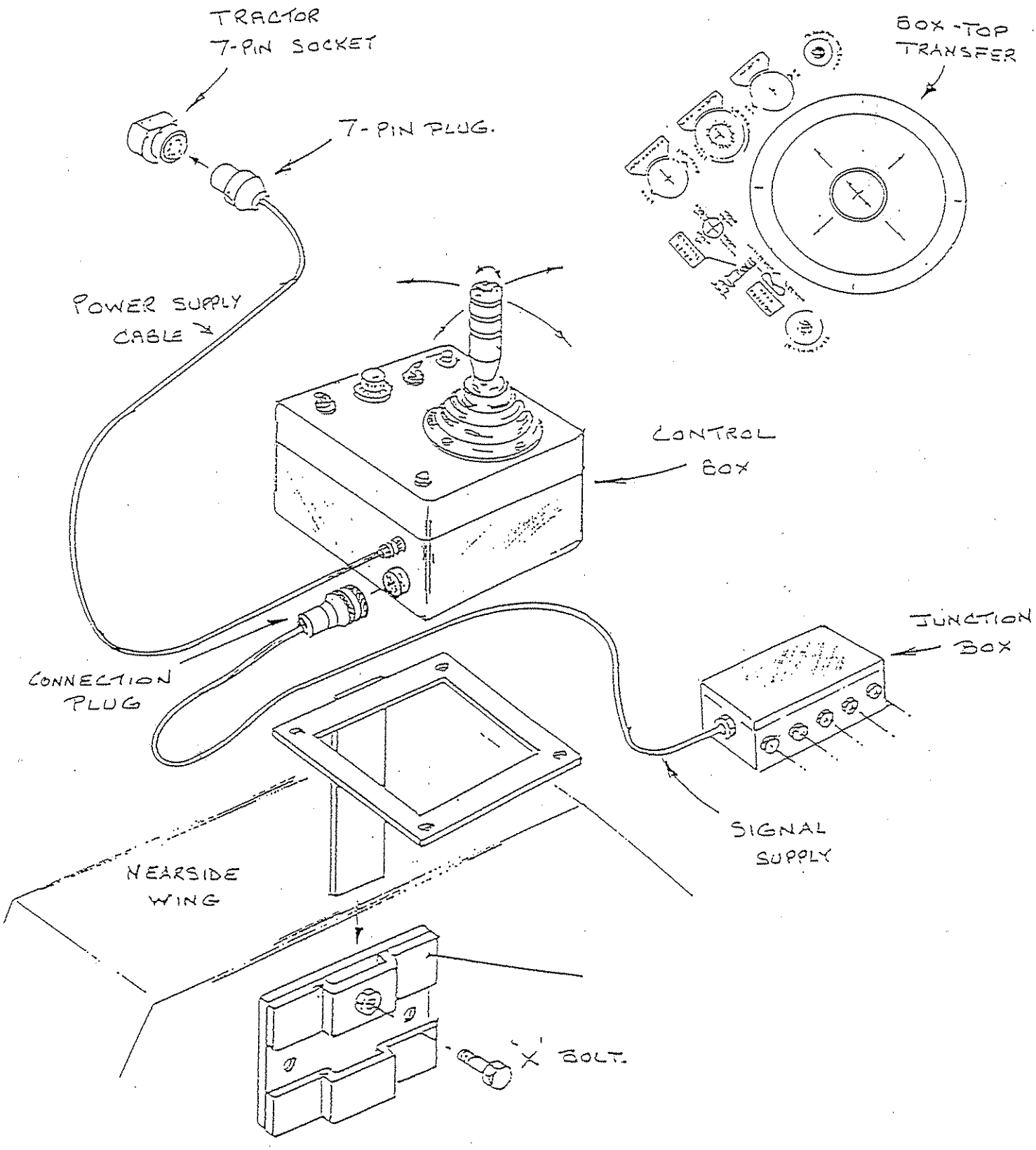
ELECTRIC MACHINE - CONTROL COMPONENTS CONTINUED

ITEM	PART NO	DESCRIPTION	QTY
	184.167	Wire Brown 400 Lg c/w Conn	1
	184.168	Wire Green/Red 400 Lg c/w Conn	1
	184.169	Wire Blue 440 Lg c/w Conn	1
	184.170	Wire Red 440 Lg c/w Conn	1
	184.171	Wire Brown 50 Lg	1
	184.172	Wire Black 140 Lg	1
	184.173	Wire Red/Blue 50 Lg	1
	184.174	Wire Green/Yellow 85 Lg	2
	184.176	Wire Pink 160 Lg	1
	184.177	Wire Orange/Black 110 Lg	1
	184.178	Wire Yellow 150 Lg	2
	184.179	Wire White 180 Lg	1
	184.180	Wire Red/Black 150 Lg	1
	184.181	Wire Red/Blue 150 Lg	1
	184.182	Wire Green/Yellow x 110 Lg	1
	184.183	Wire Green/Yellow 250 Lg	1
	184.184	Wire Brown 360 Lg	1
	184.185	Wire White/Black 320 Lg	1
	184.189	Transfer	1
	184.194	Cable Twin x 1700 Lg	1
	184.262	Bracket Joystick Mtg	1
	1840508	Transfer for Joystick	1
	3447	Washer M5 Form C Bright Plated	2


TRACTOR
7-PIN SOCKET
7-PIN PLUG.
BOX-TOP
TRANSFER
POWER SUPPLY
CABLE
CONTROL
BOX
JUNCTION
BOX
CONNECTION
PLUG
SIGNAL
SUPPLY
NEARSIDE
WING
'X' BOLT.

ELECTRIC MACHINE - CONTROL COMPONENTS CONTINUED

ITEM	PART NO	DESCRIPTION	QTY
	184.201	Control Box (Tractor Side)	1
COMPRISING THE FOLLOWING:-			
	4776	Stiffnut M6 Nyloc	2
	7211	Plug 7 pin electrical	1
	7578	Joystick 155B 4275 PVRE	1
	7588	Potentiometer 1Kohm RS 173-388	1
	7593	Knob RS 509-973	1
	7594	Relay 4PCO 12V dc RS 348-879	2
	7595	Base for Relay RS 403-257	2
	7596	Switch for BBack 3 Way Autolec 0-496-00	1
	7597	Switch for float RS 316-822	2
	7598-B	Lampholder Blue RS 564-920	1
	7598-R	Lampholder Red Rs 564-958	1
	7599	Bulb for 7598 RS 587-939	2
	7602	Toggle Cover RS 316-967	2
	7603	Fuseholder RS 414-099	1
	7634	Fuse 5 amp RS 412-576	1
	7636	Spacer Insulated RS 601-158	2


TRACTOR
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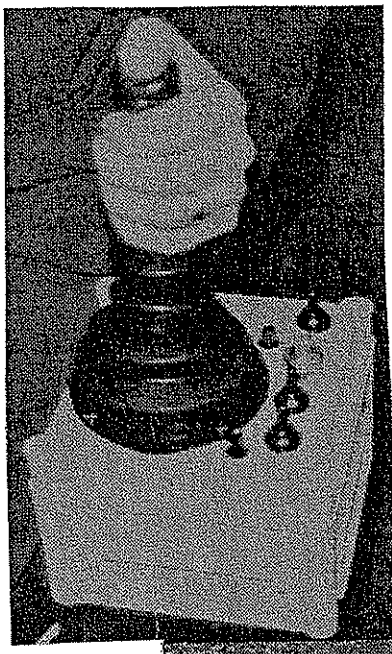
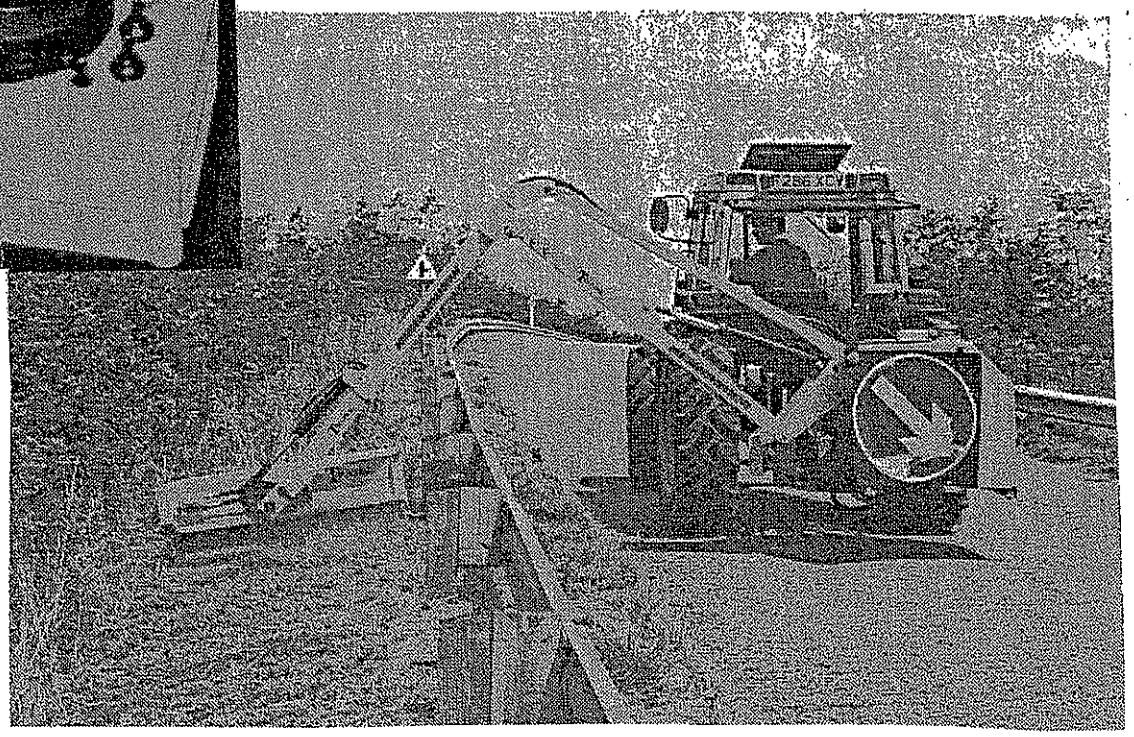
BOX
CONNECTION
PLUG
SIGNAL
SUPPLY
NEARSIDE
WING
'X' BOLT.

ELECTRIC MACHINE - CONTROL COMPONENTS CONTINUED

ITEM	PART NO	DESCRIPTION	QTY
	7638	Cable Gland RS 544-011	1
	7642	Setscrew M4 * 12 Chshd RS 523-890	4
	7643	Fullnut M4 RS 525-896	4
	7644	Fullnut M3 RS 527-230	4
	7645	Setscrew M3 * 6 RS 523-828	4
	7648	Setscrew M6 * 25 Chshd RS 523-963	4
	7649	Terminal Block (12 Way)	0.25
	7722	Tie Cable Small Nylon RS 543-428	4
	8024	Socket Electrical RS 467-201	1

ELECTRONIC PROPORTIONAL CONTROL BOOM FLAIL





7736/sl/09/99

ELECTRIC CONTROL MACHINE

The electronic - proportional valve control boom flails feature at the upper end of the Twose flail range.

These models include all basic specifications as listed for non- electric control machines but - have the added advantages of:-

1. Fingertip - Joystick control
2. Proportional valve control
3. Power float facility

The main hardmetal components - such as Tank, Booms, Head etc. remain unchanged as only controls and specification alter.

The power supply required to operate the electrical components - proportional valves etc, is taken from the tractor 7 pin rear trailer socket. The side light terminals being the contact points used as power supply, which means therefore that tractor side lights MUST be ON at all times that flail is used.

The power float system incorporated to enable 'more' or 'less' pressure to head contact to floor. This system will reduce downward weight - pressure and therefore reduce 'drag' on head, which in turn protects the booms and pivots by reducing load on each item/component.

7736/sl/09/99

ATTACHING 'ELECTRIC' BOOM FLAIL MACHINE TO TRACTOR

DANGER ENSURE AREA WHERE COUPLE-UP OPERATION IS TO TAKE PLACE IS CLEAR AND FREE FROM OBJECTS AND BYSTANDERS

DANGER
IMPORTANT ASSURE FLAIL IS PARKED ON GOOD LEVEL - SOLID SITE

NOTE The electric joystick control lever box is supplied from the factory "as a complete assembly" which will be already bolted to its mounting stand.

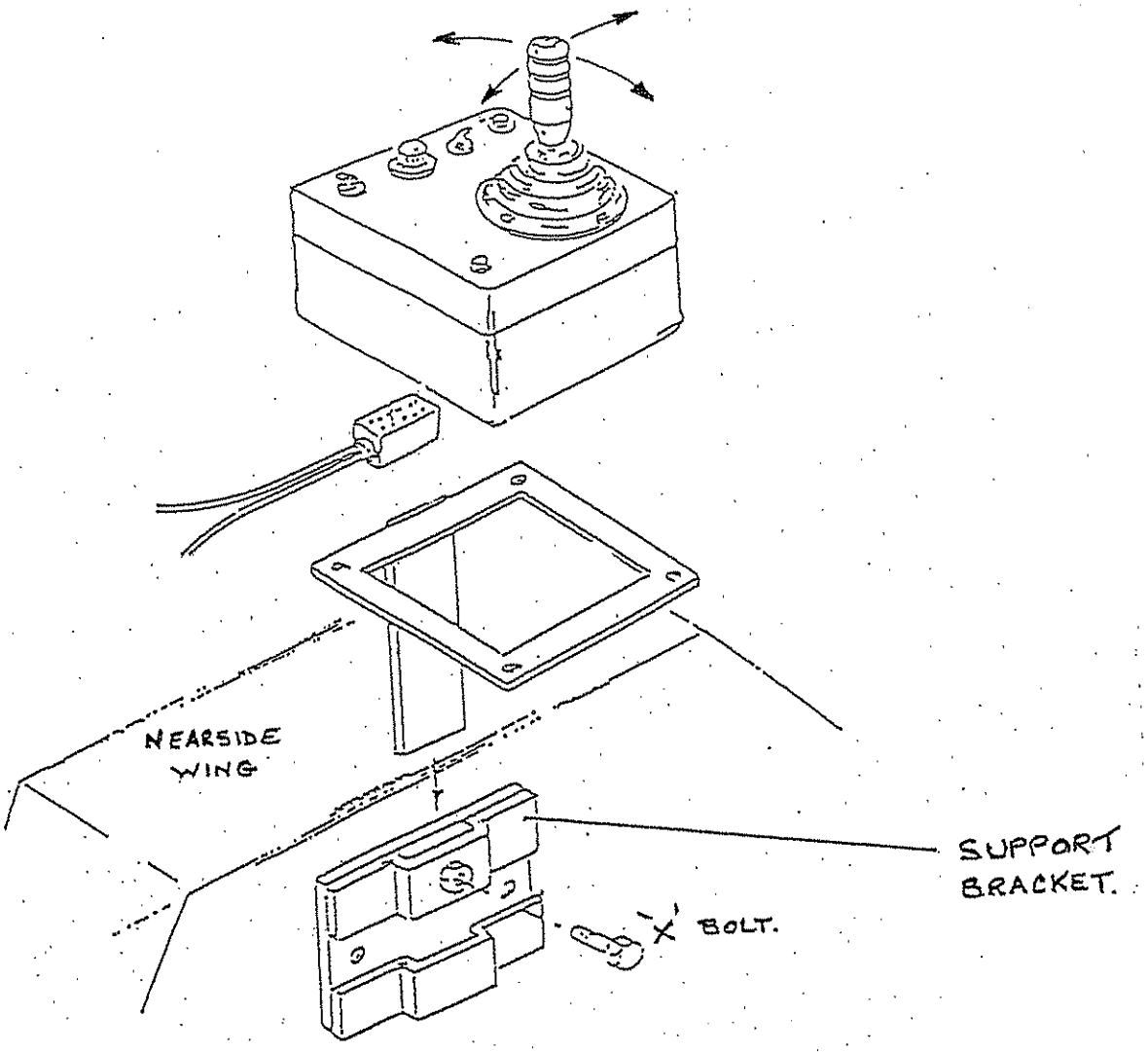
First - the control box locating bracket should be positioned to inner wing face at a suitable position to suit operator/lever operation. Secure support bracket to wing in chosen/selected position with bolts. Fixing of this bracket will depend on whether machine is L.H or R.H cut.

- For left hand cut machines - fit support bracket to inner face of nearside wing.

- For right hand cut machines - fit support bracket to inner face of offside wing.

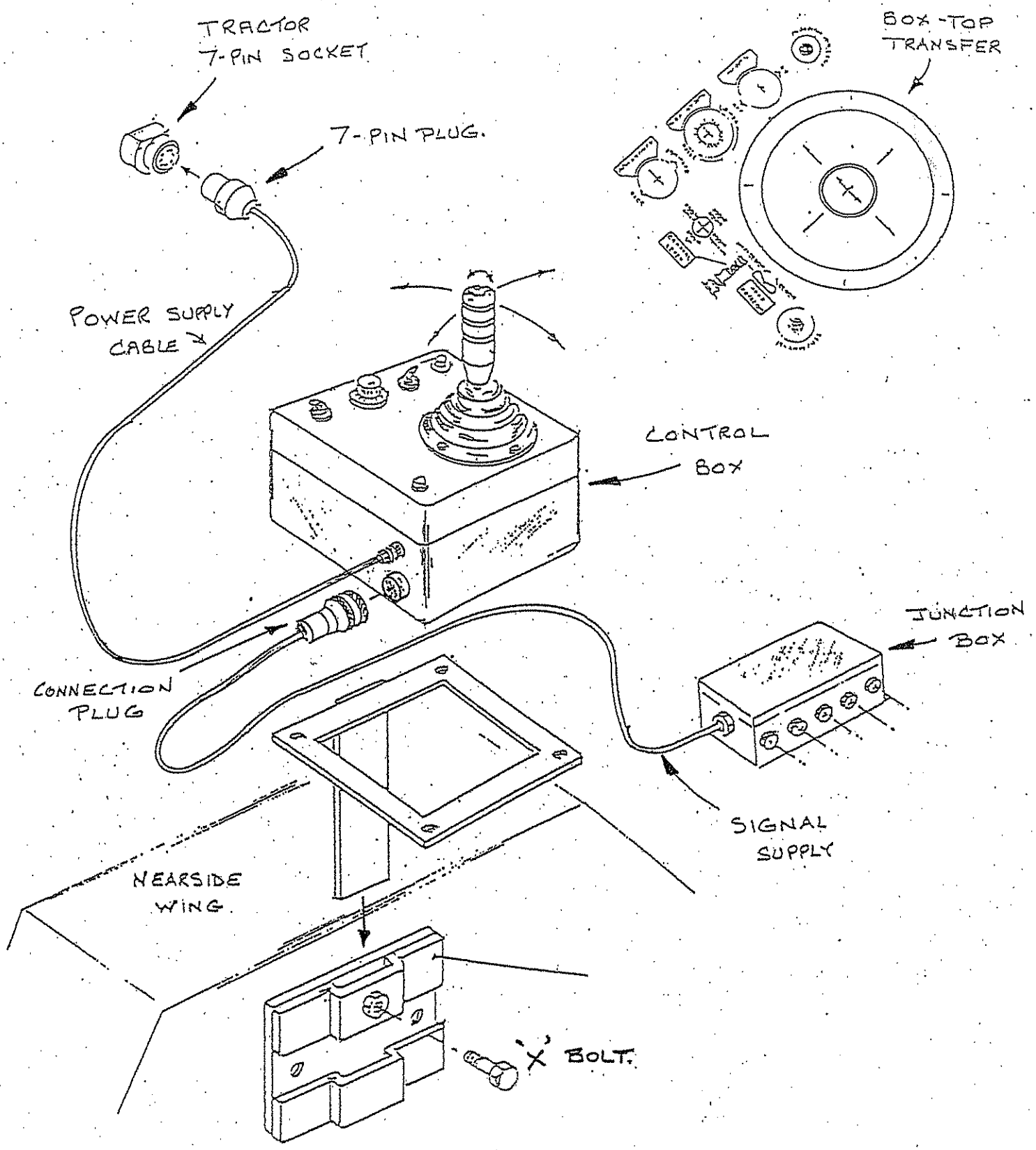
With support bracket secured into position (to inner wing) - the control box mounting leg should be lowered into slot of locating bracket (see drawing below) and secured by tightening screw 'X' clockwise.

7736/sl/09/99



Drawing shows layout of electrical control box fitted to inner nearside wing - to suit a lefthand cut machine.

7736/sl/09/99


TRACTOR
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BOX-TOP
TRANSFER
POWER SUPPLY
CABLE
CONTROL
BOX
JUNCTION
BOX
CONNECTION
PLUG
SIGNAL
SUPPLY
NEARSIDE
WING.
'X' BOLT.

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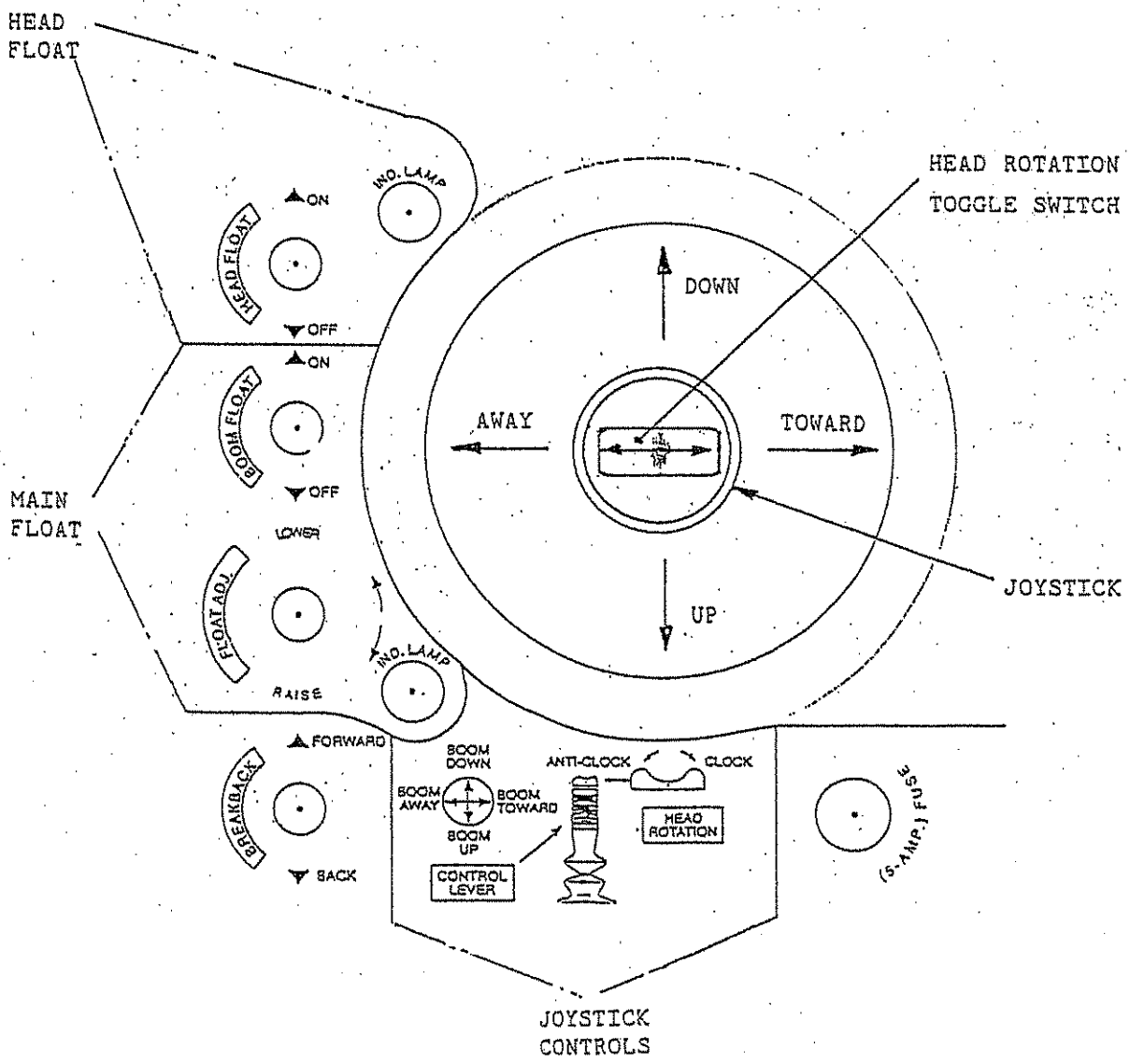
MAIN FLOAT (RED LAMP) [only required when Bank/verge cutting]

1/ Ensure head is resting on floor.

2/ Switch float ON (red light will show) see drawing below for ref. to switch and lamp.

3/ Adjust float pressure by turning potentiometer knob either clockwise for lighter/raise, or anti-clockwise for heavier/down pressure.
(Drawing below indicates float control section.)



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IMPORTANT

Note ensure setting of float gives a 'JUST HEAVY' position to prevent machine rising from work. By turning clockwise to find where machine rises and then turning anti clock to lower machine back to floor and then - add just a little more anti clock to settle (approx 1/2 of a turn).
(Final tuning must always be down to the individual operator).

Float can be overridden by moving joystick handle to raise or lower position. On returning joystick back to its neutral- central position the float will automatically come back into position.

NOTE:- If head is raised from the ground '(with float switch ON)' and handle is returned to neutral position - the head will gradually return to the floor, at this time normal float conditions will resume.

VERY IMPORTANT

Float switch must be in 'OFF' position if float not required.

HEAD FLOAT (Blue lamp)

Switch head float switch ON - (blue lamp will show)
-See drawing Page

This float allows head only to float about its centre pivot axis.

Note:- after prolonged use of float usage on banks/verges etc, a slight delay may occur when joystick top rocker switch is energised for head rotation (to recharge system).

VERY IMPORTANT

Float switch must be 'OFF' if float not required.

- - - * - - -

FUSE

Electrical system is protected by a 5 amp fuse (1in x 1/4in) BS1362.

- - - * - - -

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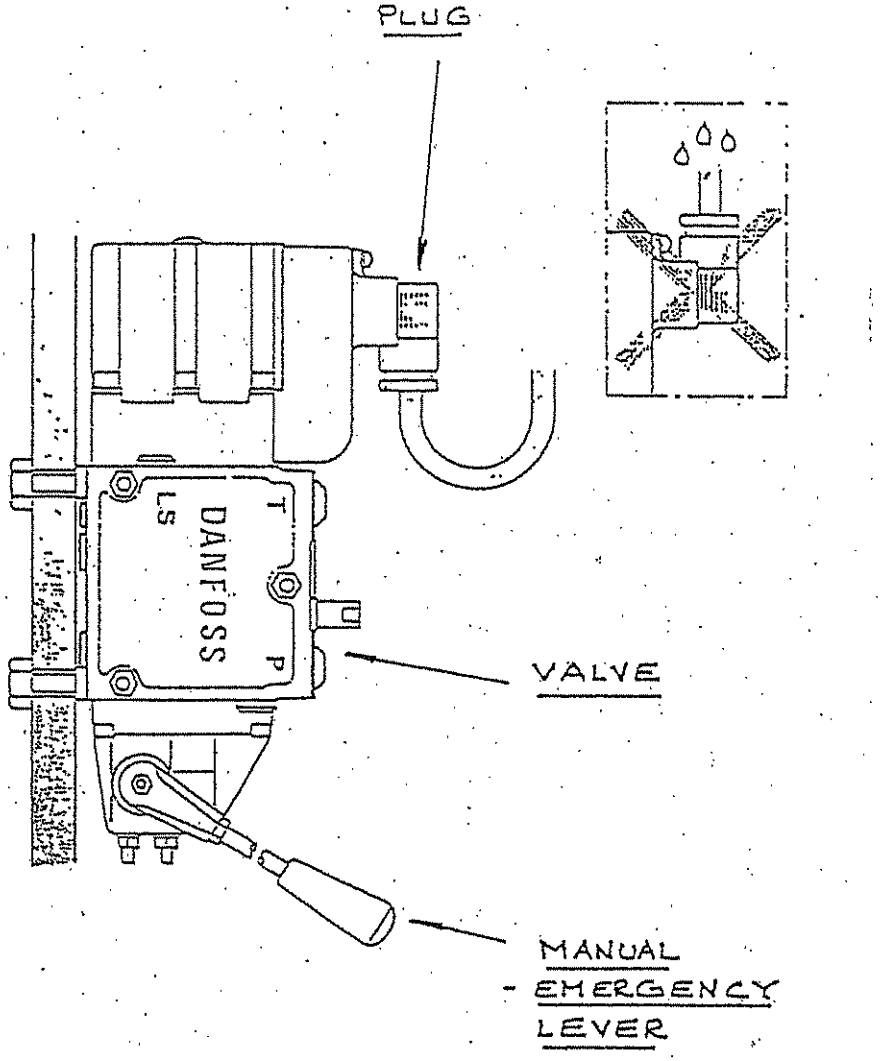
EMERGENCY - MANUAL CONTROL LEVER (ELECTRIC MACHINE)

The Hydraulic Proportional Valve has a manual - control lever (included with every Electric Control Trimmer) which can be used should the Electronic System fail and not function. This manual option enables user/operator to operate Hydraulics and fold machine in order to move from site.



NOTE:- This Emergency valve lever will only function and operate machine provided Hydraulic system is working.

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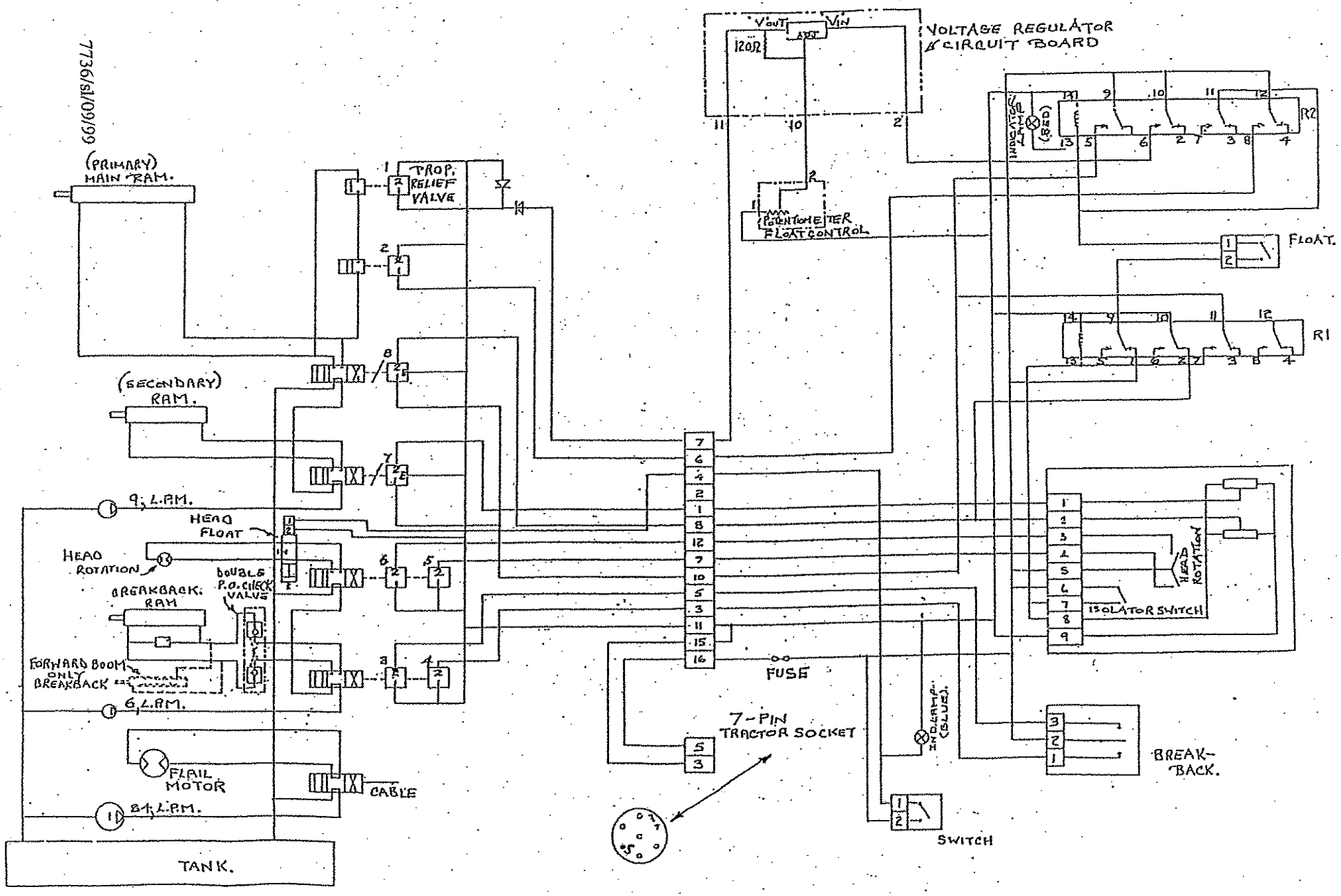
HYDRAULIC AND ELECTRICAL CIRCUIT



FAULT FINDING CHART

BREAKBACK RAM NOT OPERATIVE	CHECK FOR 12V ON PLUGS 3 & 4	FAULTY HYDRAULIC VALVE
		FAULTY WIRING OR SWITCH
BREAKBACK GIVES TO EASILY	RESET RELIEF VALVE ON RAM (SHOULD BE SET TO 2000 P.S.I)(136 BAR)	
NO HEAD ROTATION	CHECK FOR 12V ON PLUGS 5 & 6	FAULTY HYDRAULIC VALVE
		FAULTY WIRING OR DANFOSS SWITCH
SLOW HEAD ROTATION OR <360°	RELIEF VALVE NEEDS RE-SETTING (SHOULD BE SET TO 2250PSI) (153 BAR)	
SECOND RAM INOPERATIVE	CHECK FOR 12V ON PIN 1 AND 3-9V ON PIN 2 OF PLUG 7	FAULTY HYDRAULIC VALVE
		FAULTY WIRING OR DANFOSS CONTROL HANDLE
MAIN RAM INOPERATIVE	CHECK FOR 12V ON PIN 1 AND 3-9V ON PIN 2 OF PLUG 8	FAULTY HYDRAULIC VALVE
		FAULTY WIRING OR DANFOSS CONTROL HANDLE
	FLOAT ON/OFF VALVE STUCK IN OPEN POSITION - SEE FLOAT SYSTEM	

FAULT FINDING CHART CONTINUED

NO FLOAT LAMP ON	PROPORTIONAL RELIEF VALVE NOT WORKING - CHECK VOLTAGE ON PLUG 1. SHOULD RANGE FROM OV TO 9V AS FLOAT CONTROL KNOB IS TUNED	IS HYDRAULIC ON/OFF VALVE 2 OPERATING.	FAULTY PROPORTIONAL RELIEF VALVE	
		IF MACHINE AND TRACTOR SETTLE WHEN FLOAT SWITCH IS OPERATED THEN THIS VALVE IS WORKING	CHECK 12V ON PLUG 2	FAULTY HYDRAULIC VALVE
				FAULTY WIRING
		CHECK OUTPUT ON TERMINAL 11 ON VOLTAGE REGULATOR BOARD. (SHOULD BE 0V TO 9V)		FAULTY WIRING
				FAULTY BOARD OR POTENTIO-METER
	DANFOSS VALVE NOT OPERATING CHECK FOR 12V ON PLUG 8		FAULTY VALVE	
	NOTE:- THIS VALVE CAN BE VISUALLY CHECKED BY FITTING AN OPERATING LEVER & "MANUAL OPERATE" LOOKING FOR MOVEMENT.		FAULTY WIRING	
NO FLOAT LAMP OPER-ATE	FLOAT SWITCH FAULTY			

SUPPLEMENT FOR SUB-FRAME MOUNTED MACHINES ONLY.

FLAIL TRIMMERS - 460S 520S 580S

Edition No. 8177-02-99

ATTACHING MACHINE TO TRACTOR

We assume here that machine is standing on a good level and firm base, as this is the requirement for when it was last parked.

Ensure area for attaching machine to tractor is free from any bystanders or onlookers.

READ AND UNDERSTAND the general and Health and Safety instructions given in this manual.

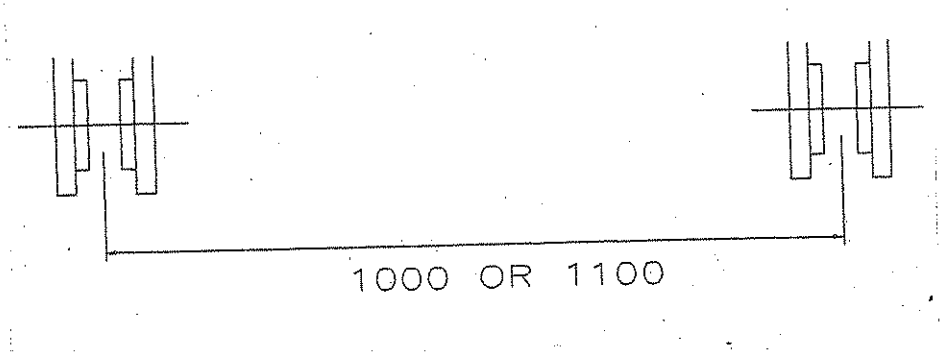
(Sub-frame Mounted Machine Only).

1. Fit rear axle brackets to the tractor (Technorton).

The brackets supplied will only be suitable for the model of tractor to which the hedge trimmer is to be fitted as they are made specifically to suit individual makes and models. For this reason it is important that the correct make and model of tractor was specified when the sub-frame kit was ordered.

A complete set of fitting instructions will accompany each set of axle brackets supplied. These instructions are supplied by the approved bracket manufacturer.

The brackets can either be fitted at 1000 or 1100 centres as shown below :



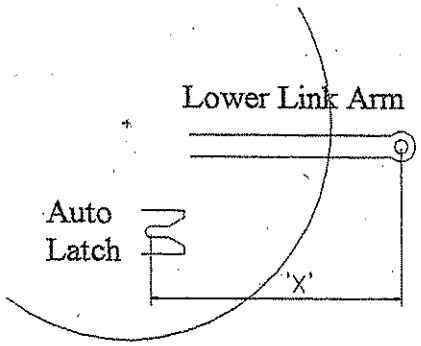
2. Setting sub-frame to suit tractor **(To be carried out by the dealer).**

The width of the brackets first needs to be set to suit the width at which the axle brackets were fitted, either 1000 or 1100 centres. This is shown in the diagram below.

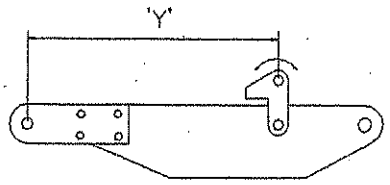
Cranked jaw assemblies set for 1000 centres.

Cranked jaw assemblies now opposite and set for 1100 centres.

2.1 The overall length of the sub-frame now needs to be set



First set tractor link arm so that it is horizontal, then measure the horizontal distance between the centre of the lower link eye and the centre of the Auto latch, distance 'X'.



The cranked jaw assemblies must now be bolted to the sub-frame using the bolts supplied ensuring that the correct width is selected and that length 'Y' is the same as length 'X' (to within 50mm).

If this not achievable using the pre drilled holes, extra holes may need drilling.

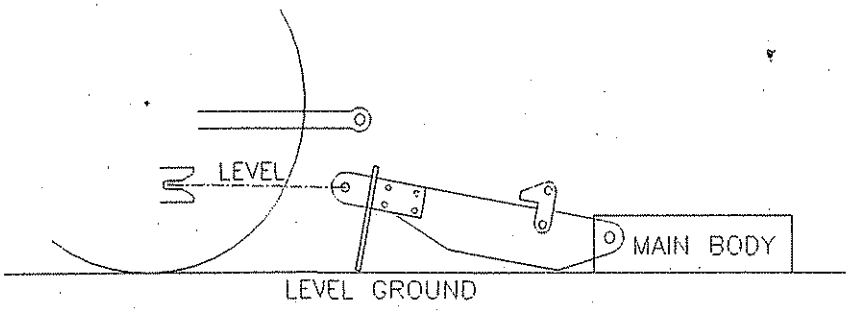
The correct width and length should now be set.
To check the settings are correct :

a) Attach sub-frame to axle bracket latches making sure that they are 'home'.
b) With the rear of the sub-frame resting on the floor attach the lower link arms to the swinging links on the sub-frame ensuring this can be easily achieved within the arc movement of the link.
c) The sub-frame should now be carefully raised until horizontal ensuring at all times that the frame does not catch anything or that the swinging link on the sub-frame never reaches the end of its arc movement (adjust if necessary).
d) Now that the correct position of the cranked jaw assemblies has been achieved these jaw assemblies must now be welded to the sub-frame **100%** by a **QUALIFIED WELDER.**

Note :

The sub-frame must be welded complete before attaching to the hedge trimmer.

3. Sub-frame stand leg height.



The sub-frame can now be attached to the hedge trimmer using the pins supplied. The height of the sub-frame stand leg can now be set so that the pins on the cranked jaws of the sub-frame are at the same height as the axle brackets (or up to 25mm below) when the hedge trimmer is parked on level ground (as shown above).

4. Attaching hedge trimmer to tractor.

A) First fit lower link balls to swing link bracket on sub-frame where tractor is fitted with automatic lower link coupling or remove the relevant pins from the swing links in the case where the tractor is fitted with conventional lower links ends.

b) Reverse tractor towards the sub-frame ensuring that it is inline while slowly lowering the link arms over the cross member towards the swing links. Ensuring the sub-frame is in the correct position for the axle brackets, keep reversing until the latches on the axle brackets are automatically tripped and locked.

c) The lower link arms should now be in the correct position for the auto hitch ends to pick up the link balls or for the bottom link pins to be inserted in the case of the conventional link ends, always use the correct pins as supplied and ensure that the auto hitch ends are used correctly.

d) The top link should now be fitted using the correct pins provided.

e) The trimmer should now be raised by operating the tractors three point linkage to a height where the PTO drive is approximately level, the arms should then be locked into position using the tractors hydraulic transport lock or the stops on the tractors quadrant control.

f) STOP TRACTOR ENGINE AND APPLY HANDBRAKE. The sub-frame stand leg can now be raised and held in position with the R-clip.