FLAIL TRIMMERS -

459 460 520

Edition No: 7736-06-93

Part No. 7490 REPLACED BY 7713·1 + 7713·2

7713.1	1st Head	-	BEARING HOUSING FROM DRAWING 184.284
7713.2	Old type		BEARING 1726210-2RS
T7799	2nd Head	-	BEARING WITH ECCENTRIC RING
	Old type		MFC50ECR 1250-50 EGC & MFC45FC GP4

D.S HEADS ONLY

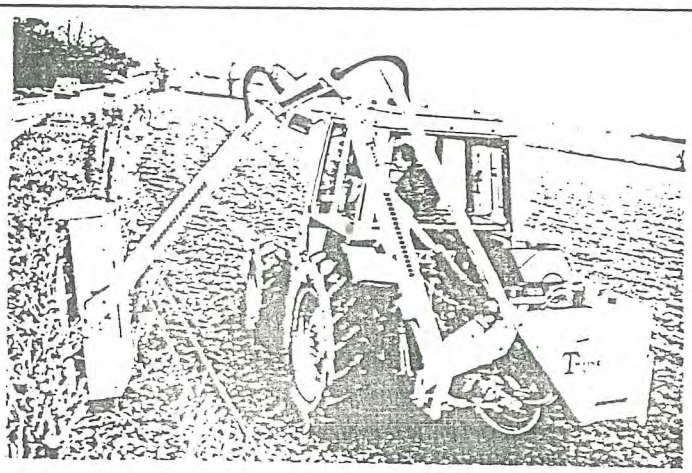
T7840	BEARING 22210 E33 Dated out of production build on	-	"U"-Bolt 14-01-96	Round Bearing Housing
7940.1 7940.2	BEARING 22210K E33 ADAPTOR SLEEVE H310 Dated into production build on	-	12 mm Bolts Fixing 15-01-96	Clock Face Bearing Housing 184·546
7940.1 7940.2	BEARING 22210K E33 ADAPTOR SLEEVE H310 Dated out of production build on	-	12mm Bolts Fixing 13-04-97	Clock Face Bearing Housing 184·546
T7941	BEARING 1050 - 45Kg c/w Adaptor, sleeve, washer and L/nut. Dated into production build on	-	12mm Bolts Fixing 14-04-97	Clock Face Housing 184·594
T7941	Bearing 1050 - 45K c/w Adaptor, sleeve, washer and l/nut.	-	16mm Bolts Fixing 04/09/99 to date	Clock Face Bearing Housing 192·024.

276 CASTING NO = MSF 5 SF8

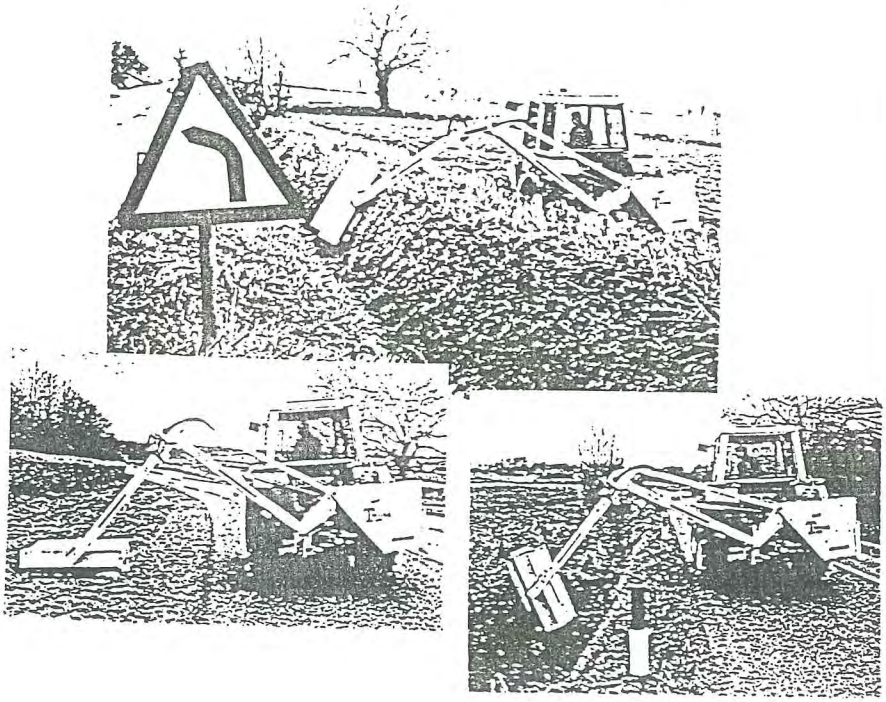
276 BEARING NO 1050KGC4 RR AR

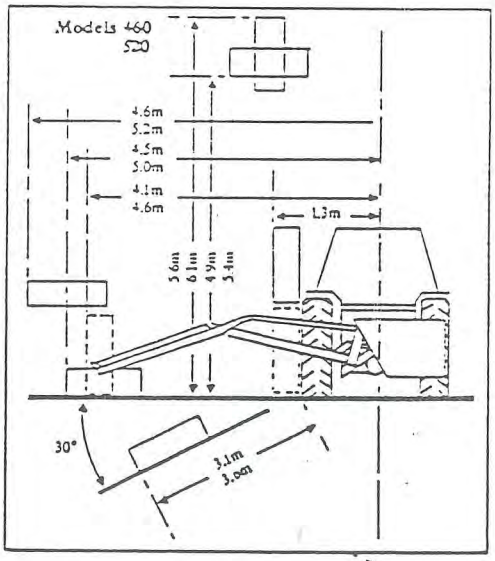
TWOSE

BOOM FLAIL MOWERS & HEDGETRIMMERS



• 11 models for contractors and farmers • 14.6m (15ft 1in) or 5.2m (17ft) reach models • Right or left hand cut • All booms have free or powered flotation • Boom design leaves most of machine's weight between tractor wheels for greater stability • Hoses fed through boom elements allows clear reach • Flail head will rotate through 360° • Parallel or double parallel linkage boom geometry to keep flail head level • Cable or electronic proportional joystick valve control • Stands level on screw jacks • 1.2m (48in) flail head with barbwire trap • Twin safety belt drive from motor to rotor • Power slew and hydraulic breakaway • Flail cutting direction reversible on most models by remote control





TWOSE

TWOSE OF TIVERTON LTD.
LOWMAN GREEN
TIVERTON, DEVON, ENGLAND EX16 4JT
TELEPHONE: (0884) 253691 FAX: (0884) 255189

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

All dimensions and capacities mentioned in this book are approximat 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 machines previously delivered.

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

Index.

SPECIFICATIONS.

459 and 460 Machines.

Overall Height (machine folded for transport)	2.97m
Overall Width (machine folded for transport - taken from tractor's centre-line)	1.3 m
Overall length of machine (less PTO shaft)	0.85m
Total weight of machine	0.91T.

520 Machine.

Overall Height (machine folded for transport)	3.18m
Overall Width (machine folded for transport - taken from tractor's centre-line)	1.3 m
Overall length of machine (less PTO shaft)	0.85m
Total weight of machine	0.99T

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 and Safety at Work Act 1974.

NOTE: This Handbook has been designed to help the operator to use the machine safely and efficiently.

NOTE: This book MUST be read thoroughly and completely understood before attempting to use the machine.

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.

SAFETY NOTES AND WARNINGS.

The following labels are used throughout the book.

DANGER WARNING — This is to draw attention to instructions which must be followed precisely to avoid injury or death.

CAUTION — This is to draw attention to instructions which must be followed precisely to avoid damage to the machine, process or the environment.

NOTE — This is used for supplementary information

Further copies of this book can be obtained from

Twose of Tiverton Limited,
Lowman Green,
Tiverton,
Devon,
EX16 4JT.

HEALTH AND SAFETY

Do not attempt to start or operate the machine until you understand fully the functions, controls and safety precautions required as shown in the operators manual.

CAUTION Contact your dealer should you need advice, assistance, or if you do not understand the manual or machine.

CAUTION Machine must NOT be altered or modified - NO liability will be accepted in respect of a machine that has been modified without our permission.

CAUTION Never drive machine at a speed that is likely to endanger others.

CAUTION Never attempt to adjust machine whilst raised on the tractor linkage or front mounted loader.

CAUTION Always switch off tractor engine before attempting to carry out adjustments or repairs.

CAUTION Never operate machine in a reckless or uncaring manner.

CAUTION Always be aware of your surroundings.

CAUTION Check machine regularly for damaged worn or loose parts.

CAUTION Never carry "passengers" on machinery.

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.

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.

NOTES.

AMENDMENT	DATE	DETAILS

GENERAL INSTRUCTIONS

1. Before attaching any machine to a tractor or loader make sure that the machine/implement is standing on firm level ground and that it is adequately supported where necessary.

2. Before and whilst manoeuvring a tractor or loader to attach machinery make sure that any other persons in the vicinity are well clear and aware of your intentions. Keep a sharp look out while reversing and manoeuvring.

3. Always secure the tractor so that it cannot move off on its own and cause injury or damage.

4. Make sure that the lift arms and top link of the tractor are are properly fitted to the machine using adaptor sleeves where necessary and that retaining pins of the correct type are used on all three point linkage and front end loader machines.

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 right size and type and is properly secured when fitted.

6. If it becomes necessary to make any adjustments to the machine while raised on the tractors linkage or the front end loader stops, trestles or other suitable supports should be positioned to support the machine in case of accidental lowering of the lift arms or mechanical failure.

7. Never attempt to work on, adjust or repair machinery of any kind whilst it is running or working. Always stop the machine AND STOP THE TRACTOR ENGINE before maintenance or repairs begin.

8 In transit always use transport stays or locking devices 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, adding suitable weights to a correctly specified and fitted weight frame.

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

10. When detaching the machine from the tractor front loader or three point linkage 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.

11. Carry out regular maintenance.

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.

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 controls, hydraulics, heads, booms etc.

(3) The cutting flail is of a heavy double edge design for 'UP' or 'DOWN' cutting and is suitable for all types of conditions and growth. Standard rotor width is 48" (1.2m).

(4) 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.

(5) A parallel linkage or a double parallel linkage system is offered (depending on model) which is designed to keep the cutting head in the position selected throughout the machines range of reach.

(6) Twin vee belts take the drive from head motor to rotor - giving a reliable drive with the anti-shock protection of a belt drive.

(7) The machine has two parking stand legs - one of which is in the form of a folded plate and is situated at the outer face of the hydraulic oil tank, the second stand is "T" shaped and is located on the lower linkage plate.

(8) Two head rotation methods are available - either by ram operation or by worm and wheel, but both types are equipped with a slip clutch safety system to protect components from being overloaded during selection and setting of cutting positions.

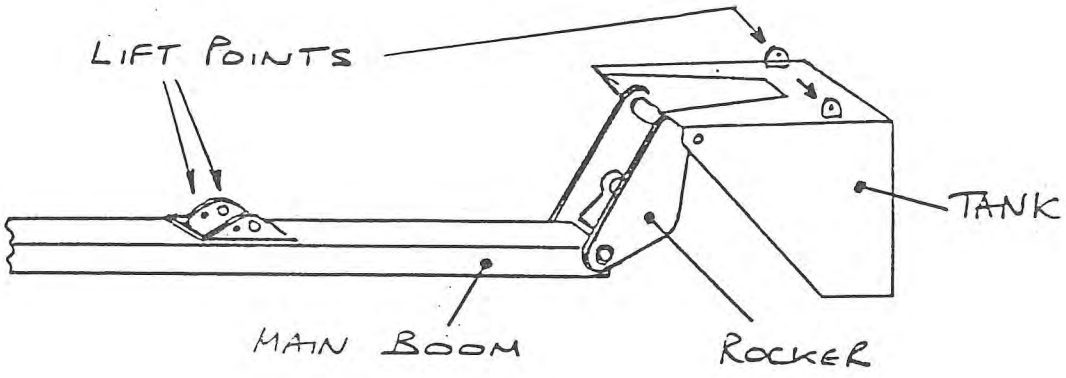
(9) The hydraulic hoses on the machines have been kept as unobtrusive as possible - few are visible. The Booms have been designed to allow the hoses to run through them. This together with the Twose method of feeding head hydraulic oil through the main pivot pin produces a trimmer with a very tidy appearance.

(10) A forward looking boom option is available giving a mid-cut position (alongside tractor) as opposed to the standard in-line boom.

(11) Machines have either free flotation or powered flotation depending on model selected.

(12) Machine operation is controlled remotely by either cable via lever, or electronically through a proportional valve system - with joystick controller. On all fully independant machines direction of Rotor rotation is controlled by cable.

(13) Lifting points are provided on all machines:-
1. On top of tank - One lug for L.H. and another for R.H. machines
2. A hole at ram clevis on first boom.
'D' shackles should be fixed through these holes to allow the use of suitable ropes/slings.

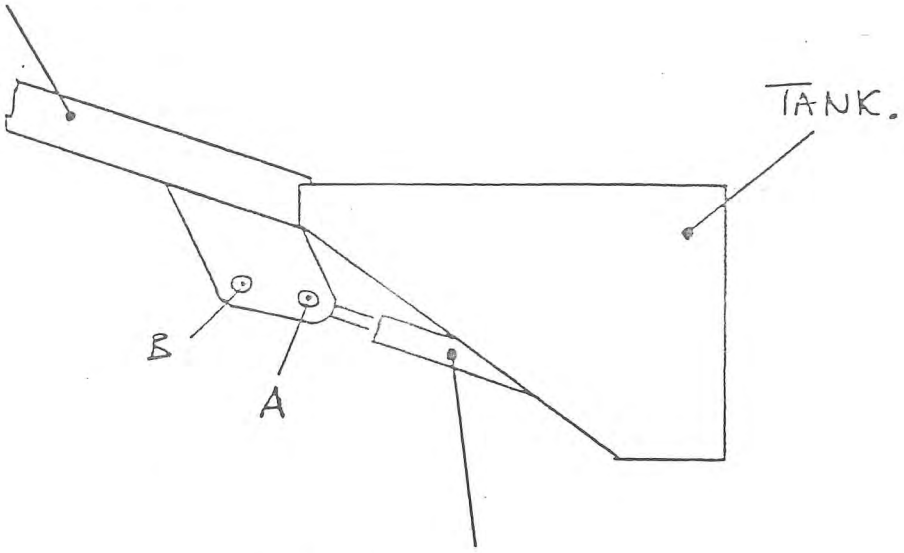


(14) Transport/delivery stay bars are fitted at factory prior to despatch to customer/agent. These tie bars are fitted to ensure that main frame, booms and head remain locked in constant position and do not move. This is for safety as well as ease of handling, loading and transportation.

The 459 Boom Flail is the unit at the basic end of the Twose range. The main components of the machine are as for the 460 & 520 models in that main frame/oil tank, stand legs, 'A' frame and outer boom are identical.

The machine differs in that it does not include a rocker assembly to couple first boom to tank frame (as 460 & 520 does) - but the boom couples directly to the tank - See drawing below.

459 PRIMARY BOOM.



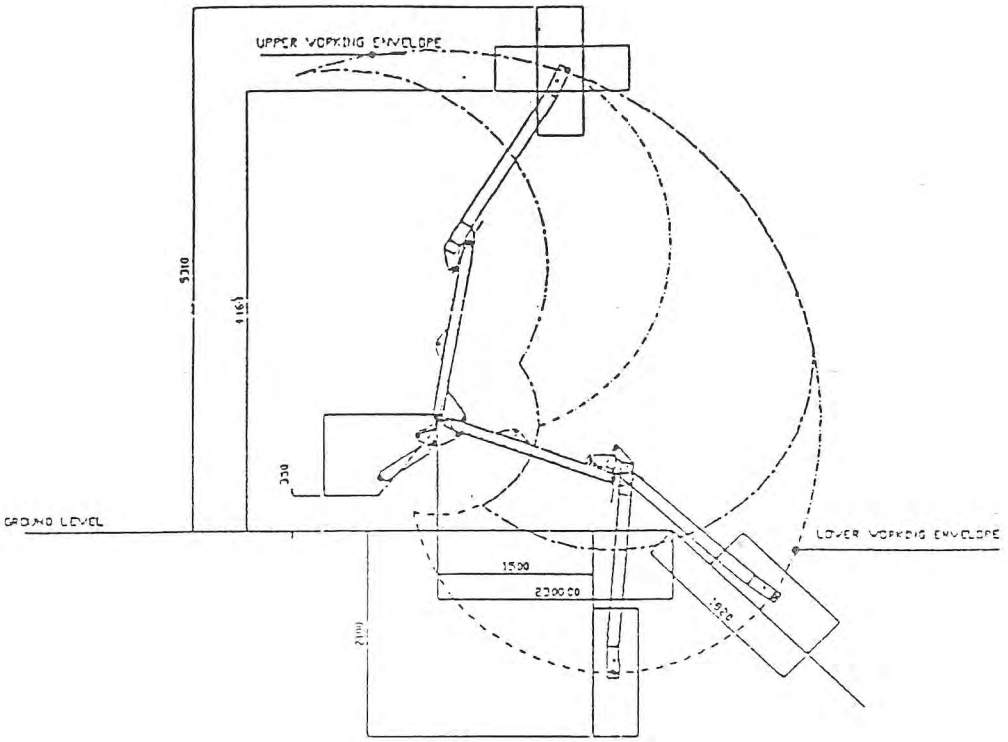
The main boom (primary boom) is therefore special for the 459.

The 459 machine offers the choice of 2 positions in which to attach the rod end of the primary ram to the primary boom.

Set the ram end to position 'A' and machine will be set to cut in the upper working envelope shown below.

Set the ram end to position 'B' and machine will be set to cut in the lower working envelope shown below - this position will be ideal for verge and bank work.

See diagram over page for range of movement in each setting.



NOTE :- All fitting, attaching, cutting and removal instructions apply as listed for 460 and 520 machines.

Tractor Selection for 459, 460 and 520 Boom Flails.

For 459 :- Tractor size must be a minimum of 60 H.P.

For 460 :- Tractor size must be a minimum of 60 H.P.

For 520 :- Tractor size must be a minimum of 65 H.P.

Tractor must be equipped with 3 point linkage attachment facility.

The tractor must be equipped with a power take-off shaft which must run at the generally accepted standard speed of 540 R.P.M.

The P.T.O. shaft should run clockwise when looking at the rear of tractor, and should be an 1-3/8" SAE 6 splined shaft enabling a standard P.T.O. shaft to be fitted.

A four wheel drive tractor - with its extra weight and larger wheels on the front axle - is an advantage in keeping the machine stable.

Attaching Machine to Tractor.

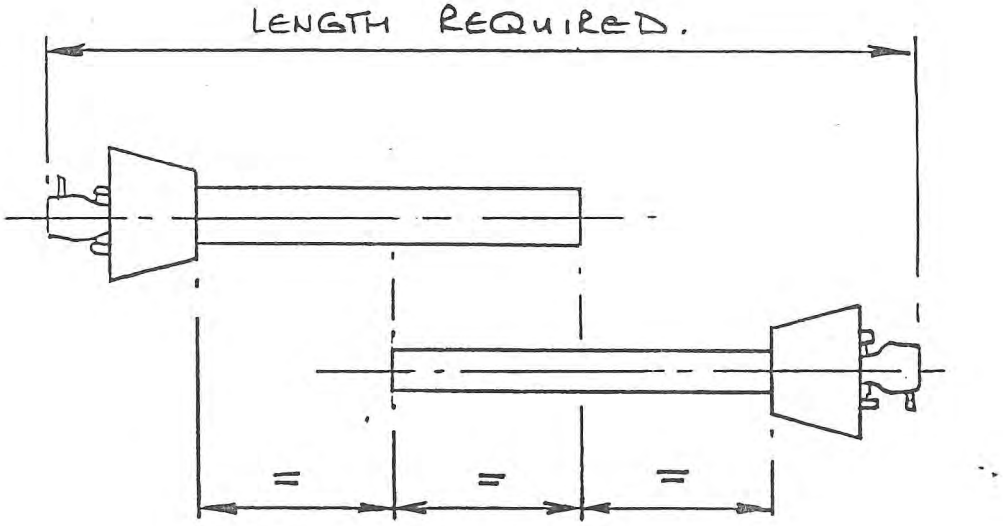
IMPORTANT - Ensure machine is parked on a firm and level site without bystanders. Read and understand the General Instructions on safety on page 8 of this manual.

(1) Reverse the tractor to the machine. Connect the lower links, using the spacers provided if necessary to ensure that the tractors check chains/stabilizers can be tightened. SWITCH OFF the tractor and apply the handbrake. Tighten the check chains/stabilizers.

(2) Remove the 1/2" clevis pins from the hedgetrimmer stabilizers - these can now be telescoped upwards/forwards to allow the top link coupler to be fitted to the tractors top link fixing. Lengthen the top link if necessary.

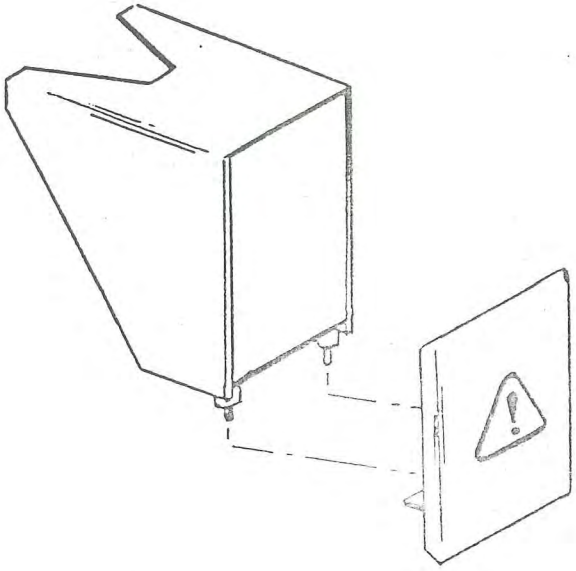
(3) Raise machine on the linkage until a compromise between a horizontal path for the P.T.O. shaft and approximately 300mm (12") clearance from tank to ground is reached. Fit 1/2" clevis pins again in nearest hole. Lower linkage to put weight of machine onto the stabilizers.

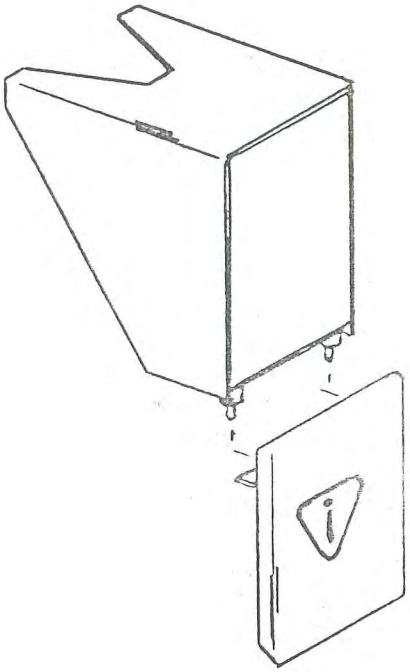
(4) CHECK THE P.T.O.'S LENGTH. When connected from tractor to machine it should engage by 1/3rd of the total shaft length i.e. male part should be halfway from the end to fully bottomed out. Do not use the machine until this has been cut to the correct length.



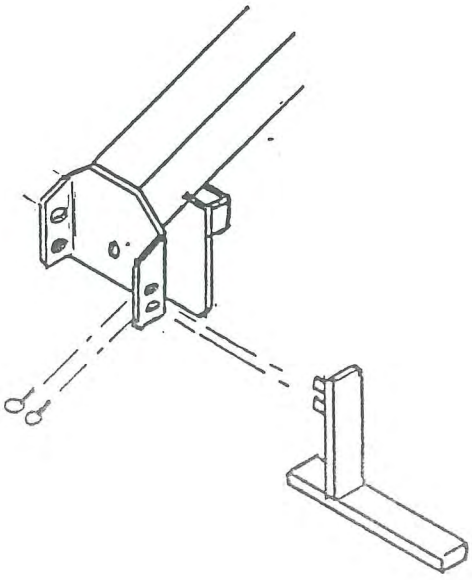
(5) Fit the P.T.O. Ensure the shaft is correctly fitted to the correct splines - at both ends. Fit the anti-spin chains.

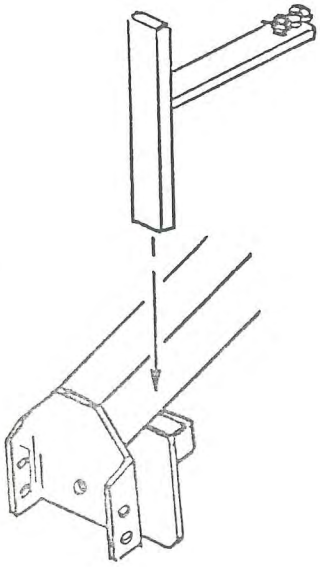
(6) Remove the two stand legs. Each is secured by two 7/16" linch pins. Each can be stowed as shown -





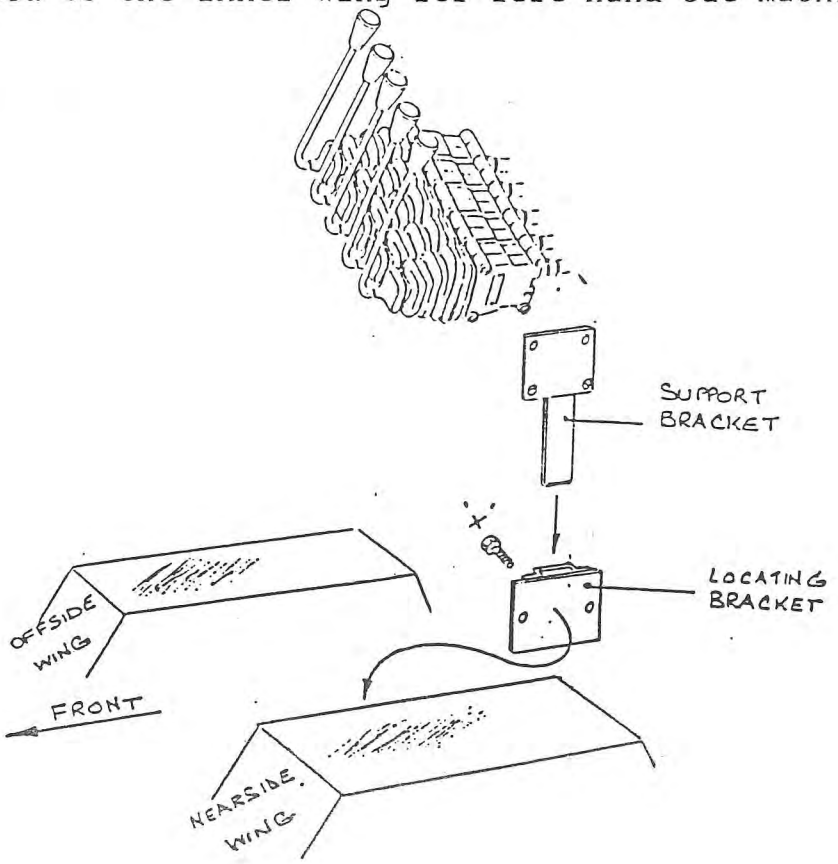
Tank end stand leg can be used as a warning triangle to warn traffic etc near the worksite (use in the position shown in the left hand drawing).



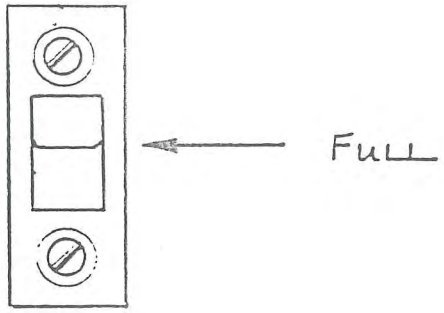


(7) IMPORTANT
The mesh safety screen should now be fitted. It is designed to be fitted to the cab side on the cutting head side of the cab (i.e. for left-hand cut machine to left-hand side of cab). Bolts nuts and washers are supplied for fixing.

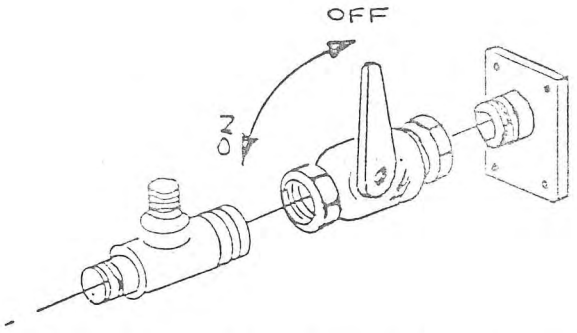
(8) Fix Valve Control Handles into position :
Control levers are supplied bolted together as a unit complete with a support leg to slot into a bracket supplied for fitting to the tractor.
Depending on model there may be 4, 5 or even only one controller in the set. The locating bracket should be positioned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



(9) IMPORTANT - Check the level of oil within the tank - it should be halfway up the sight glass.



(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.

TRANSPORT STAY BAR REMOVAL :-

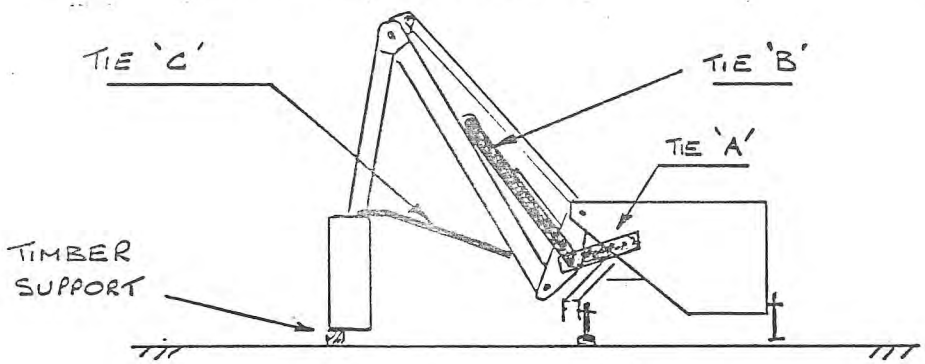
It is at this time that the three transport - delivery safety stays should be removed from machine.

'A' - First stay bar - "fitted between tank and rocker assembly". Remove by unscrewing bolt and nut where fixed to tank, and then unscrew nut and bolt where fixed to rocker. This nut and bolt also locks lower end of 2nd stay.

'B' - Second stay bar - next unscrew nut of bolt securing secondary ram rod end to main boom. Remove stay and replace nut.

'C' - Third stay bar - this stay will be seen attached to cutting head. Inner end of stay can be released by removing top link pin from 'A' frame. Release stay end and replace top link pin. Unscrew nut and bolt at head where stay attached - stay bar can now be removed completely. The bolt taken from head in order to release stay bar - should now be replaced back in same hole and same nut tightened to secure roller bracket at non-drive end. The head will be resting on a piece of timber when delivered. This will be held into position by a M12 x 130 bolt and nut remove nut/bolt and in turn remove timber support. Replace 130 long bolt by standard M12 x 50 bolt (which will be found in sundries bag of parts). This bolt once in position can be locked by screwing on nut from the 130 long bolt, and this will secure roller bracket at drive end.

The M12 x 130 bolt now becomes obsolete.



DANGER
P.T.O. Engagement

The tractor P.T.O. 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.

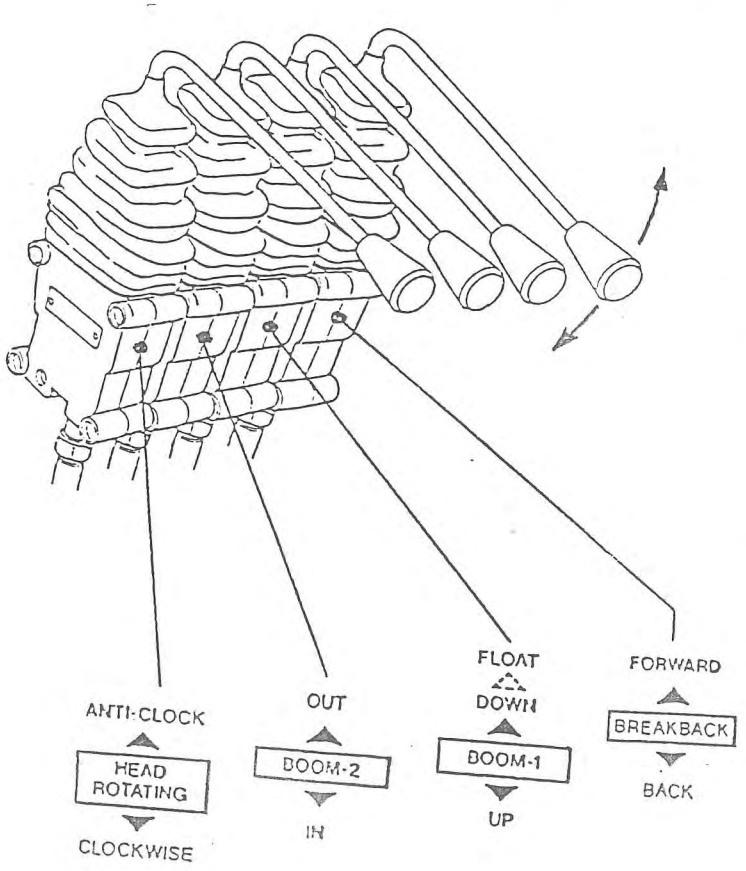
DANGER
WARNING

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.

The valve slice sections are assembled in the following manner -



Removing Boom Flail from Tractor.

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

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

3. Disengage the PTO drive. STOP THE TRACTOR.

4. Take the 'T' stand leg from its 'stored' position and put it into its 'down' position, securing it with the linch pins provided. (If this information is unclear refer to page 16)

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

5. Similarly plate stand leg should be removed and replaced in its 'down' position also. Secure with linch pins provided.

6. Remove the clevis pins from the telescoping stabilizers - The weight of the machine must first be taken on the tractors lower links the machine can then be lowered onto is stands. When you are sure it is properly on these operate the "BOOM 1" lever to remove hydraulic pressure from the ram(s). If the machine is semi-independent (one pump) you may have to switch the tractor off first to facilitate this.

7. Remove control handles from tractor and stow them on the trimmer.

8. Disconnect PTO shaft.

9. Remove linkage pins. Check tractor and machine are fully separated. Refit clevis pins to stabilizers.

10. Draw tractor slowly away - Many operators stop about 300mm (12") away to double-check that tractor and machine have not forgotten to undo connections masked previously by cab or other obstacles.

    Safety screen can now be removed if so desired.

V E R Y I M P O R T A N T

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.

IMPORTANT: MAXIMUM P.T.O. SPEED IS 540 R.P.M.

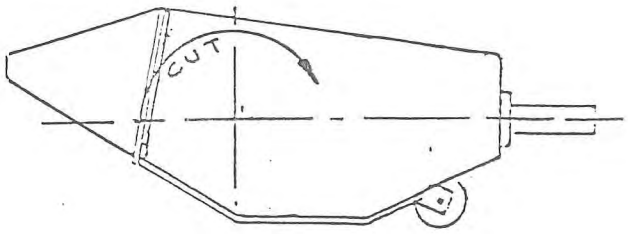
WARNING NEVER EXCEED 540 P.T.O. R.P.M.

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.

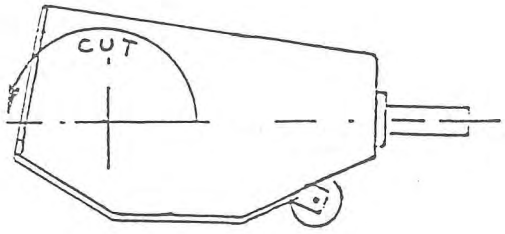
For heavier going such as larger sticks and thick untrimmed hedges the rotor must be set to cut 'downwards'.

For heavier cutting refer to Page 32



← FORWARD MOTION

Rotor Cut Direction
- For Grass & Light Trimming.
(With Front Cowling In Place)



← FORWARD MOTION

Rotor Cut Direction
- For Heavy Going.
(And With Front Cowling Removed)

DANGER

IMPORTANT

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

IMPORTANT

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

DANGER

IMPORTANT

In heavy going - cutting large diameter growth, sticks etc and 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

The controller lever head for motor spool control is especially designed to prevent this happening and must be operated and set as follows :-

---

For DOWNWARD CUTTING OF ROTOR :-

Use screwdriver and -

Unscrew anti-clockwise - screw 'X' $2\frac{1}{2}$ turns

Screw clockwise - screw 'Y' $2\frac{1}{2}$ turns

Lever now should move from neutral / Off position to 'away' - down position only.

To change to UPWARD CUTTING OF ROTOR :-

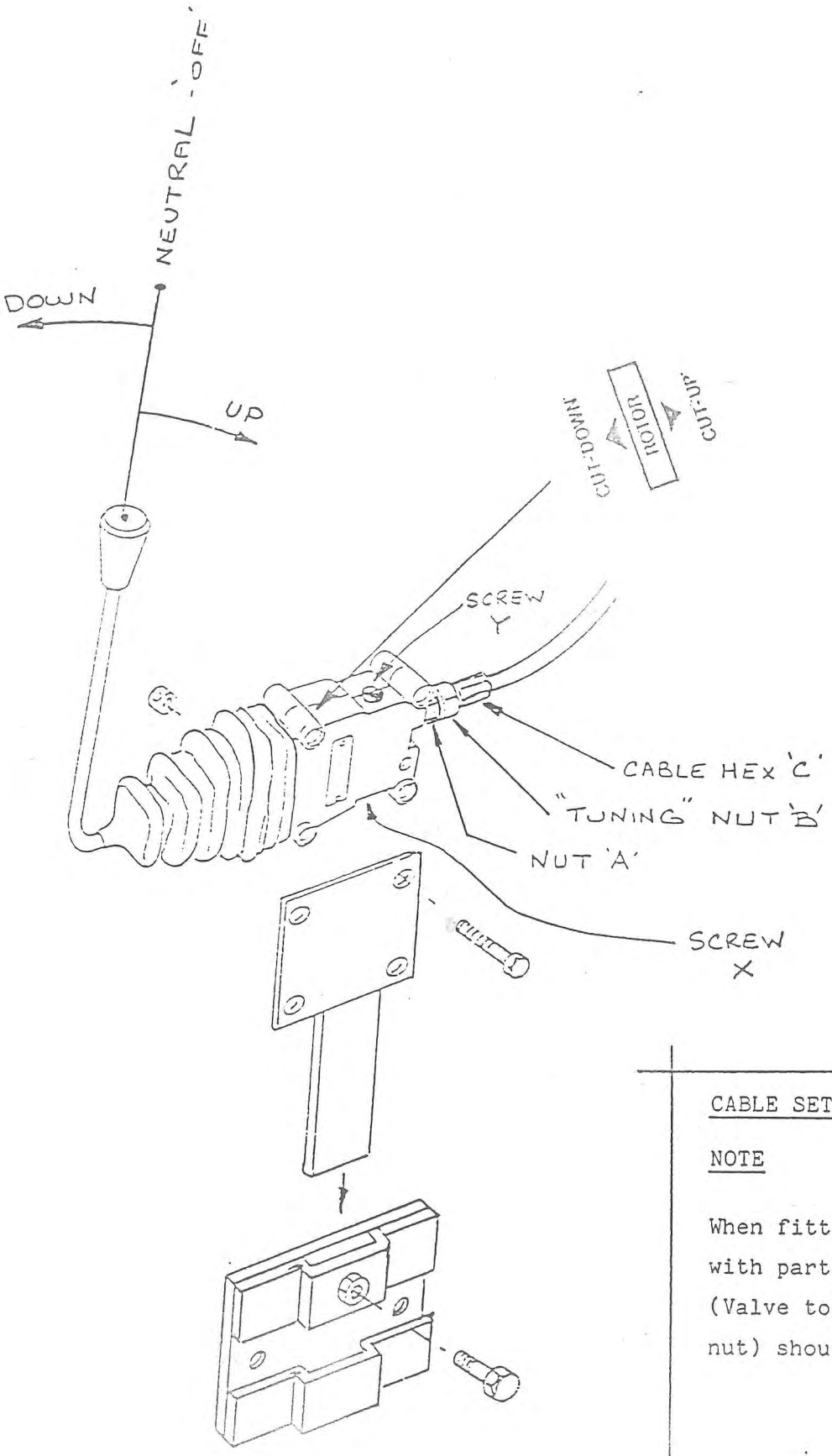
Use screwdriver and -

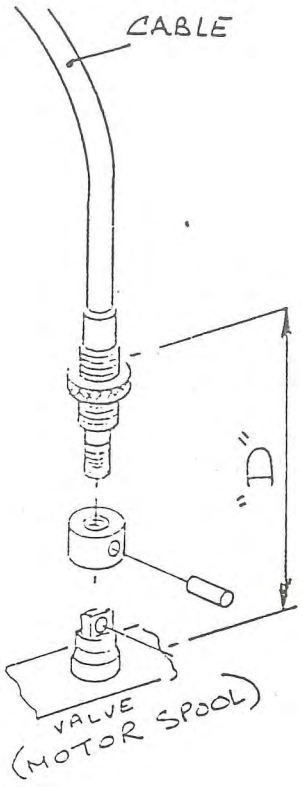
Unscrew anti-clockwise - screw 'Y' $2\frac{1}{2}$ turns

Screw clockwise - screw 'X' $2\frac{1}{2}$ turns

Lever now will only move from neutral / Off position to 'towards' - up position only.

To check the setting of control head (DOWN-NEUTRAL) (UP-NEUTRAL) operation - first screw in fully (clockwise) both screws 'X' and 'Y' then adjust as detailed above.





CABLE SETTING

NOTE

When fitting cable to valve spool - with parts connected - dimension 'D' (Valve top face to top of knurled ring nut) should be 67mm (2 5/8")

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.

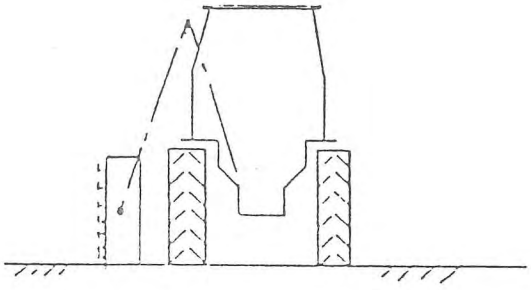
Should this happen STOP IMMEDIATELY, as to continue could have serious consequences.

Once stopped clean rotor and check for loss of blades and bolts, replace as required.

Insecure cases and 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.

STANDARD STRAIGHT BOOM MACHINE

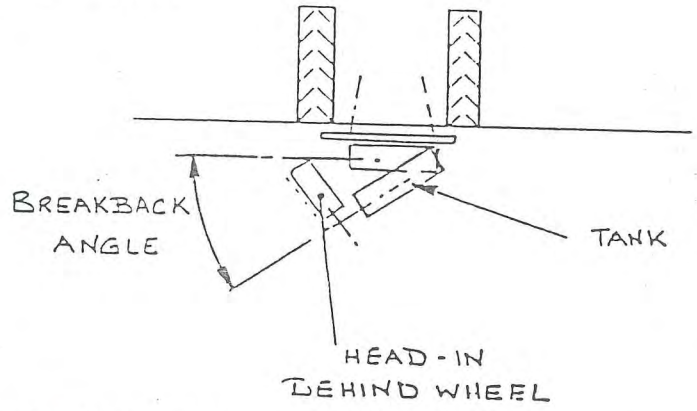
(1) Turn cutting head to vertical position with flails away from tractor.



(2) Swing machine rearwards by powering breakback ram to 'open' position.

(3) Fold 'in'second/outer boom with cutting head,untill boom main tube contacts rubber buffer fixed to first boom.

(4) The cutting head should now be positioned behind and slightly inside tractor rear tyre.



(5) Unit now ready for transport.

TRANSPORTING CONT. :-

FORWARD BOOM MACHINES

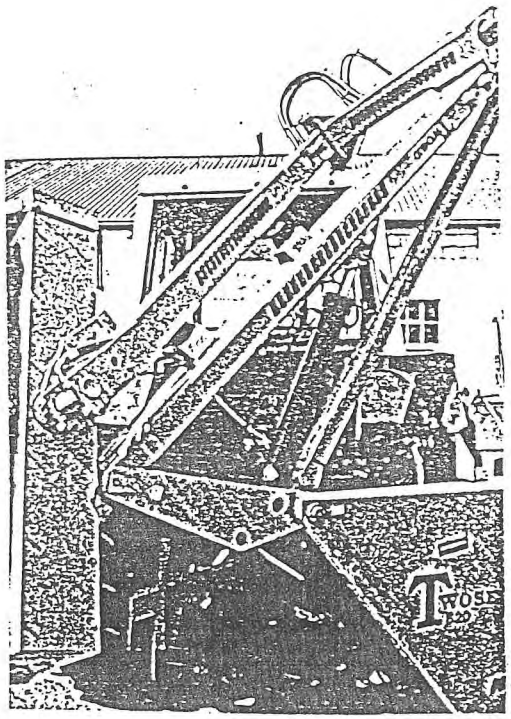
1. Ensure main breakback ram (Tank to sub frame) is opened to full extent.

2. The smaller breakback at point where (Forward boom meets outer boom) should be extended to its full extent also.

3. With both of these rams opened to there maximum, the machine will be folded rearwards to its transport position. Only the up and down movement of booms in relation to tank give will the optimum position for transport be found to suit individual tractors.

4. Booms should be positioned by operating boom rams to give a cutting head storage position which should be behind nearside rear tractor wheel (On L/H cut machine) and will give approx. 600 mm head lower face to floor.
   NOTE :- HEAD STORED VERTICALLY (Flails pointing away from tractor.)

(See Drawing Below)



5. To obtain transport position - The main boom will be automatically folded over top of hydraulic oil tank and the outer boom will fold down to meet and rest upon buffer position (On bottom end of main boom). This is important and booms must always fold so as outer boom is in contact with buffer, for transport.
   NEVER TRANSPORT MACHINE WITH BOOMS 'OPEN' AND NOT IN CONTACT WITH EACH OTHER.

DANGER

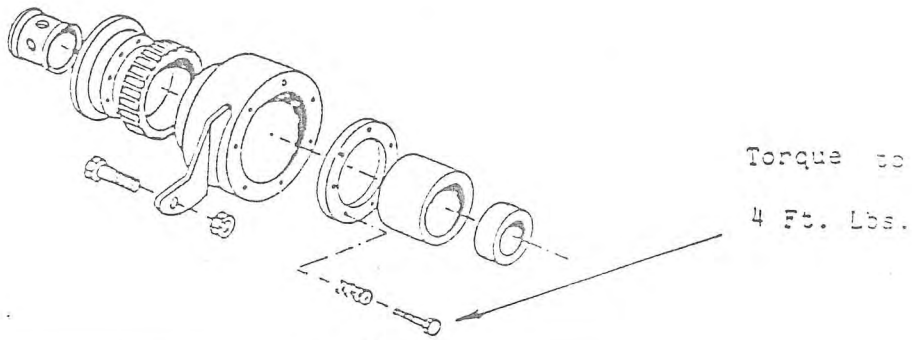
WARNING - VERY IMPORTANT

CUTTING HEAD CLUTCH SETTING

IT MUST BE EMPHASISED THAT THE TORQUE SETTINGS GIVEN BELOW ARE VERY IMPORTANT FOR BOTH THE 360° ROTATION - GALLERIED HEAD PIVOT, AND THE RAM OPERATED HEAD ROTATION UNIT.

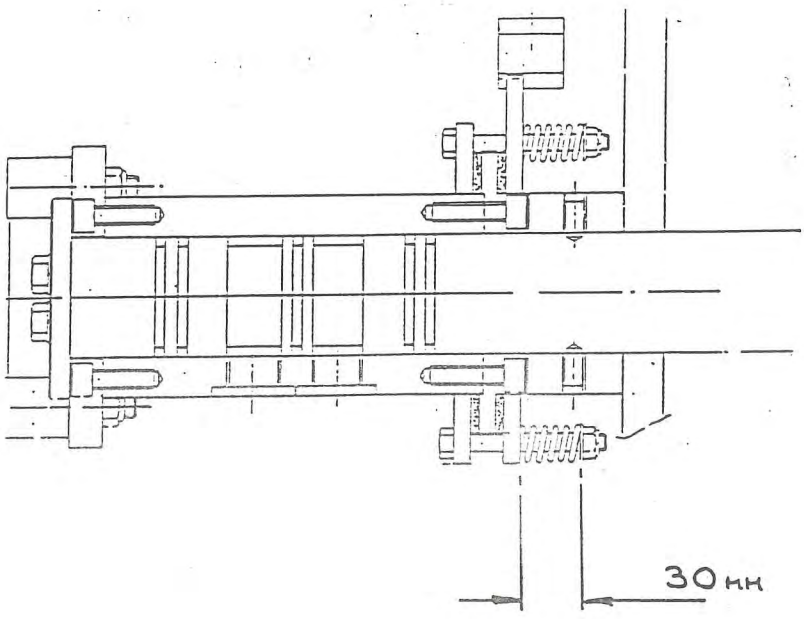
IMPORTANT

The Torque setting for the galleried head pivot is 4 Ft. Lbs.



IMPORTANT

For ram operated head pivot the setting dimensions 'A' should be 30mm to ensure correct tension of spring against slip clutch plates.



HEAD VEE BELT ADJUSTMENT

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

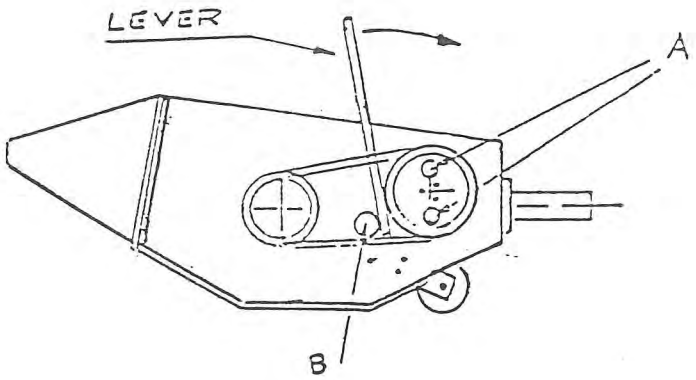
(1) Remove belt/Pulley guard from side of head after first removing locating nuts.

(2) Turn rotate pulley on drive motor to align 2 holes in pulley centre flange to correspond with motor mounting screws. (See sketch below indicated 'A')

(3) Insert socket through pulley holes and slacken slightly screws which hold motor in place.

(4) With a lever bar placed between head motor pulley and lever pin (Shown as 'B') move motor away from rotor pulley to tighten belt. With belt at selected tension, the 2 screws holding head motor should be re-tightened by feeding socket through pulley holes (Indicated 'A') to reach bolt heads.

(5) Replace guard and secure with locating nuts.



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 be EMPTY of oil when delivered. Only the systems hydraulic components such as valves, rams, hoses, etc will have oil in following factory machine test. HYDRAULIC OIL TANK WILL BE DRAINED. Oil tank capacity is (25 gallon) 114 litres.

DANGER
IMPORTANT

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

DANGER
IMPORTANT

It is advisable NEVER to mix hydraulic oils, but if another supplier 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 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.

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.

DANGER
WARNING

Check all nuts and bolts for tightness.

WEEKLY

IMPORTANT
DANGER
WARNING

Check Torque setting of cutter head friction clamp bolts.
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 contitions

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 (MAX 540 RPM)

DANGER WARNING — 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 - cut with cutter flails directly towards operator, i.e. underside of head - cutting face towards operator.

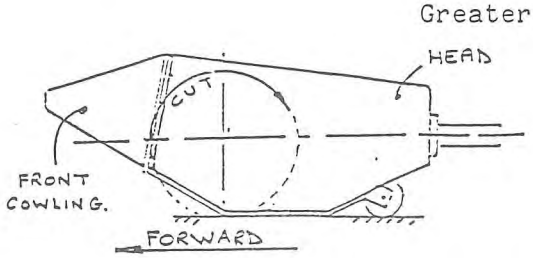
DANGER WARNING — Rotor can be set to cut upwards - at front or to cut downwards - at front. The upward cut is the generally accepted norm. - and will cope with grass/verge work as well as normal periodic hedgetrimming of up to approximately 2 years growth. Only when cutting large growth does the downward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

DANGER WARNING

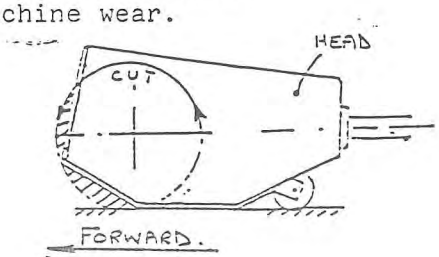
Cutting thickness limitation.

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.

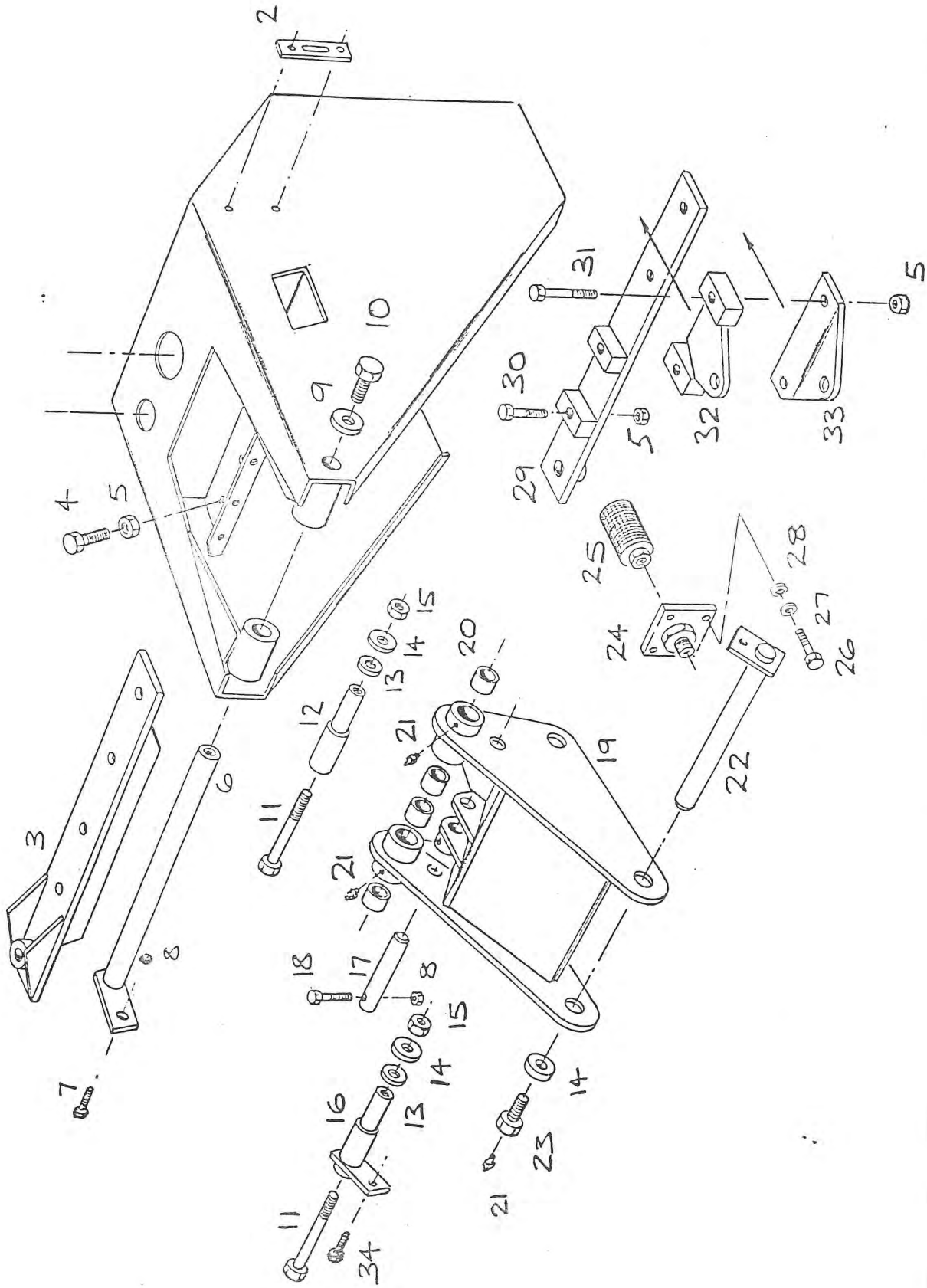


HEAD WITH FRONT COWLING IN PLACE - CUT UPWARDS AS INDICATED BY ARROW.
(FOR GENERAL HEDGETRIMMING & VERGE WORK)



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.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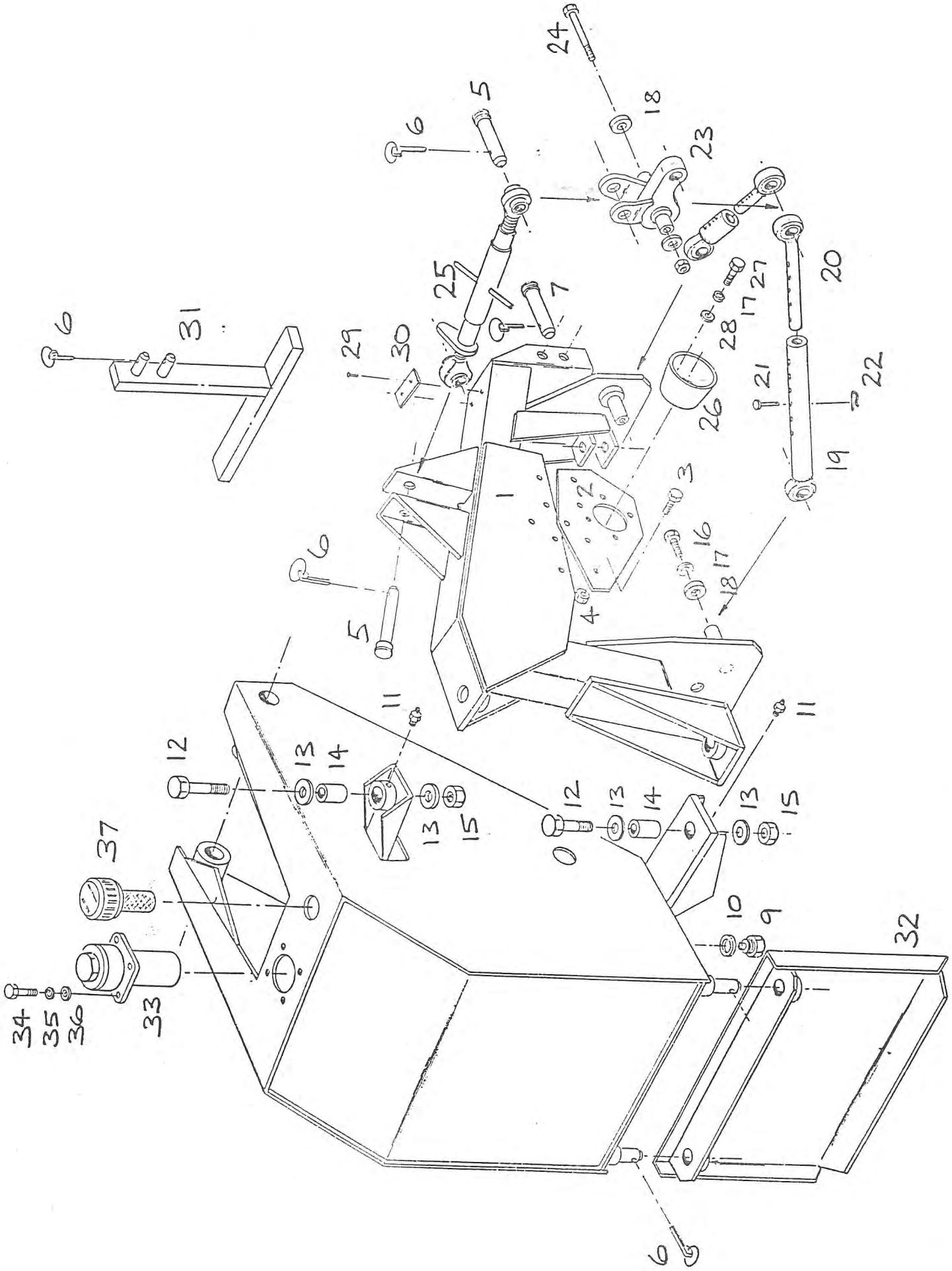
Tank, A Frame Supports and Rocker.

Item	Part No.	Description	Quantity
1	184.300	Tank Assy	1.0
2	5371 SHORT 130MM OE→10	Gauge Oil Level	1.0
3	184.302	A Frame Support Upper	1.0
4	2704	Bolt M16 * 50 (8.8)	4.0
5	3747	Stiffnut M16 Nyloc	8.0
6	184.296	Pin Main Pivot	1.0
7	3059	Setscrew M10 * 35 (8.8)	1.0
8	4421	Stiffnut M10 Nyloc	3.0
9	184.098	Washer 25id	2.0
10	7568	Setscrew M24 * 40 (8.8)	1.0
11	4398	Bolt M12 * 140 (8.8)	2.0
12	184.297	Pin	1.0
13	2725	Washer M30 Form A Plated	3.0
14	184.064	Washer M12 Special	2.0
15	3082	Stiffnut M12 Nyloc	2.0
16	184.315	Pin Assy 1st Ram Rod	1.0
17	184.238	Pin, 2nd Ram Anchor 30 Dia BDMS x 156	1.0
18	3136	Bolt M10 * 60 (8.8)	1.0
19	184.227	Rocker Arm	1.0
20	7488	Bush 4540M (part of 184.227)	4.0
21	2923	G/Nipple M10 x 1.5	4.0
22	184.065	Pin, First Boom	1.0
23	184.089	Setscrew M24 * 40 Tapped	1.0
24	184.070	Filter and Tap Mtg. Plt.	1.0
25	7754	Strainer Suction 1.1/2 BSP UC-SE-1323	1.0
26	2710	Setscrew M10 * 30 (8.8)	4.0
27	2728	Washer M10 Spring	4.0
28	3219	Washer M10 Form A Bright	4.0
29	184.301	A Frame Support Lower	1.0
30	2915	Bolt M16 * 80 (8.8)	2.0
31	2872	Bolt M16 * 90 (8.8)	2.0
32	184.303	Support BBack Ram Anch	1.0
33	184.304	Support BBack Ram Anch 10MS x 220x 140	1.0
34	2710	Setscrew M10 * 30 (8.8)	2.0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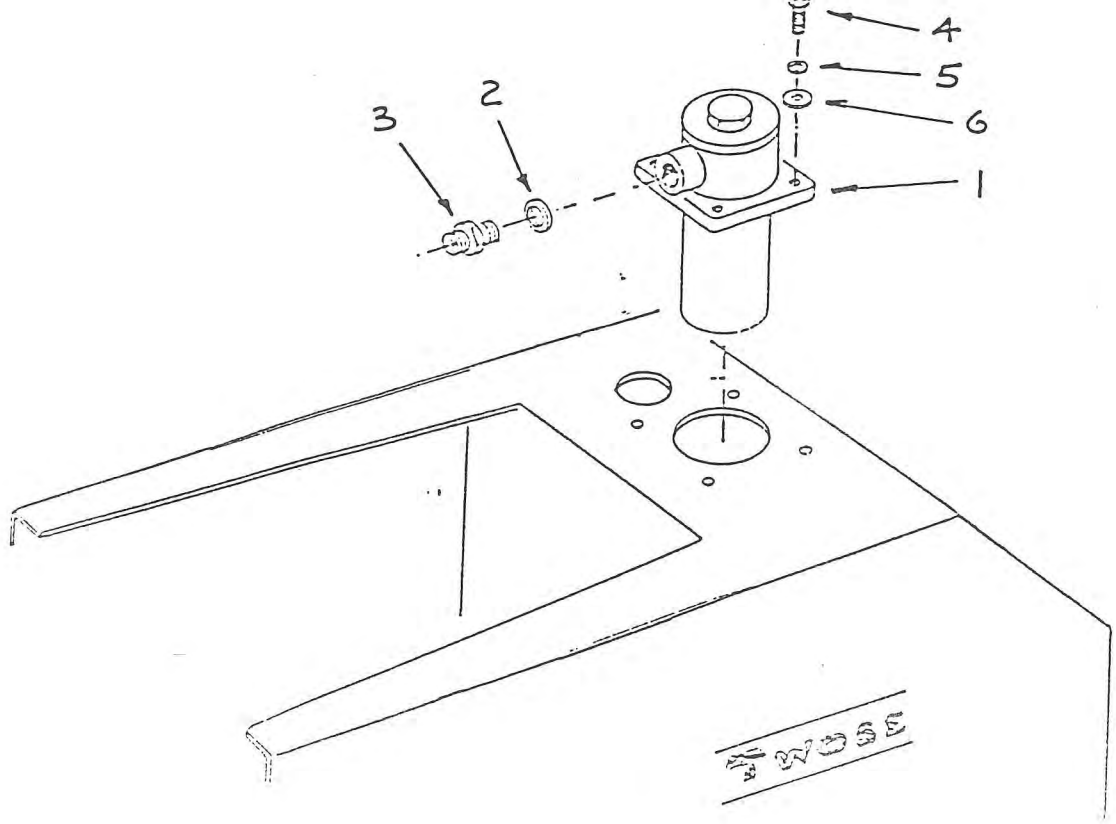
A Frame and Stabilizers.

	Item	Part No.	Description	Quantity
	1	184.005	A Frame	1.0
	2	184.006	Pump Mounting Plate 15MS x 305x 245	1.0
	3	2733	Bolt M12 * 40 (8.8)	5.0
	4	3082	Stiffnut M12 Nyloc	5.0
	5	2584	Pin Linkage 1"	2.0
	6	0832	Pin Assy 7/16" Linch Pin	8.0
	7	7482	Pin Linkage 1.1/8"	2.0
	8	184.308	Spacer 29id (not illustrated - for Lower Link Arms)	2.0
	9	7753	Plug 1/2 BSP Magnetic	1.0
	10	0909	Seal 1/2" Dowty Bonded	1.0
	11	2923	G/Nipple M10 x 1.5	2.0
	12	3138	Bolt M24 * 100 (8.8)	2.0
	13	1351	Washer Imp 1 Flat Bright	4.0
	14	184.205	Spacer 24id	2.0
	15	2992	Stiffnut M24 Nyloc	2.0
	16	2748	Setscrew M12 * 40 (8.8)	4.0
	17	2729	Washer M12 Spring	6.0
	18	174.006	Washer M12 Special	4.0
	19	184.337	Stabilizer Outer	2.0
	20	184.338	Stabilizer Inner	2.0
	21	184.293	Pin Clevis 1/2"	2.0
	22	2435	Clip for 2433 Shackle	2.0
	23	184.336	Top Link Coupler	1.0
	24			
	25	7758	Top Link Assembly Cat2	1.0
	26	6385	PTO Guard	1.0
	27	2962	Setscrew M12 * 35 (8.8)	4.0
	28	2716	Washer M12 Form A Bright	4.0
	29	0460	Screw ST No.6*3/8 Type U	2.0
	30	6900	Plate Serial No.	1.0
	31	184.294	Stand Leg A Frame	1.0
	32	184.295	Stand Leg Tank End	1.0
	33	7752	Filter Return - Cable Controls	1.0
		7752.1	Element 25 micron - Cable Controls	
OR	33	7761	Filter Return - Elect Controls	1.0
		7761.1	Element 10 micron - Elect Controls	
	**	184.312	Drop Tube - Bayonet	1.0
	**	7759	O Ring BS0593-57	1.0
	34	3110	Setscrew M8 * 30 (8.8)	4.0
	35	3001	Washer M 8 Spring	4.0
	36	3111	Washer M 8 Form A	4.0
	37	6334	Filler/Breather	1.0
	**	7714	Transfer "/!\"	
	**	1840310	Transfer "Change Oil Filter..."	
	**	410184	Transfer "<<<<<<<>>>>>>>"	
	**	410185	Transfer "TWOSE"(Lg Blk)	
	**	410186	Transfer "twose"(Sm Blk)	
	**	410190	Transfer "/\" G.Nipple	
	**	410191	Transfer "->" G.Nipple	
	**	410192	Transfer "<-" G.Nipple	
	**	410201	Transfer "Grease Gun"	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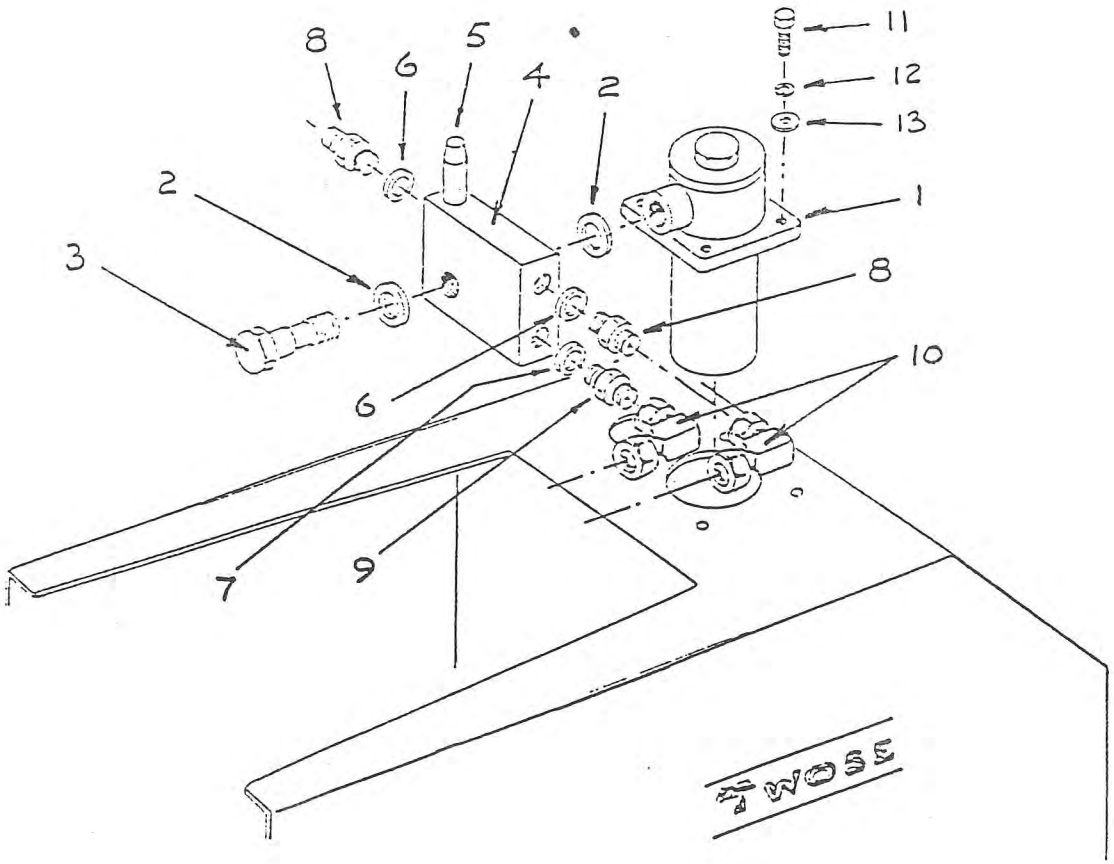
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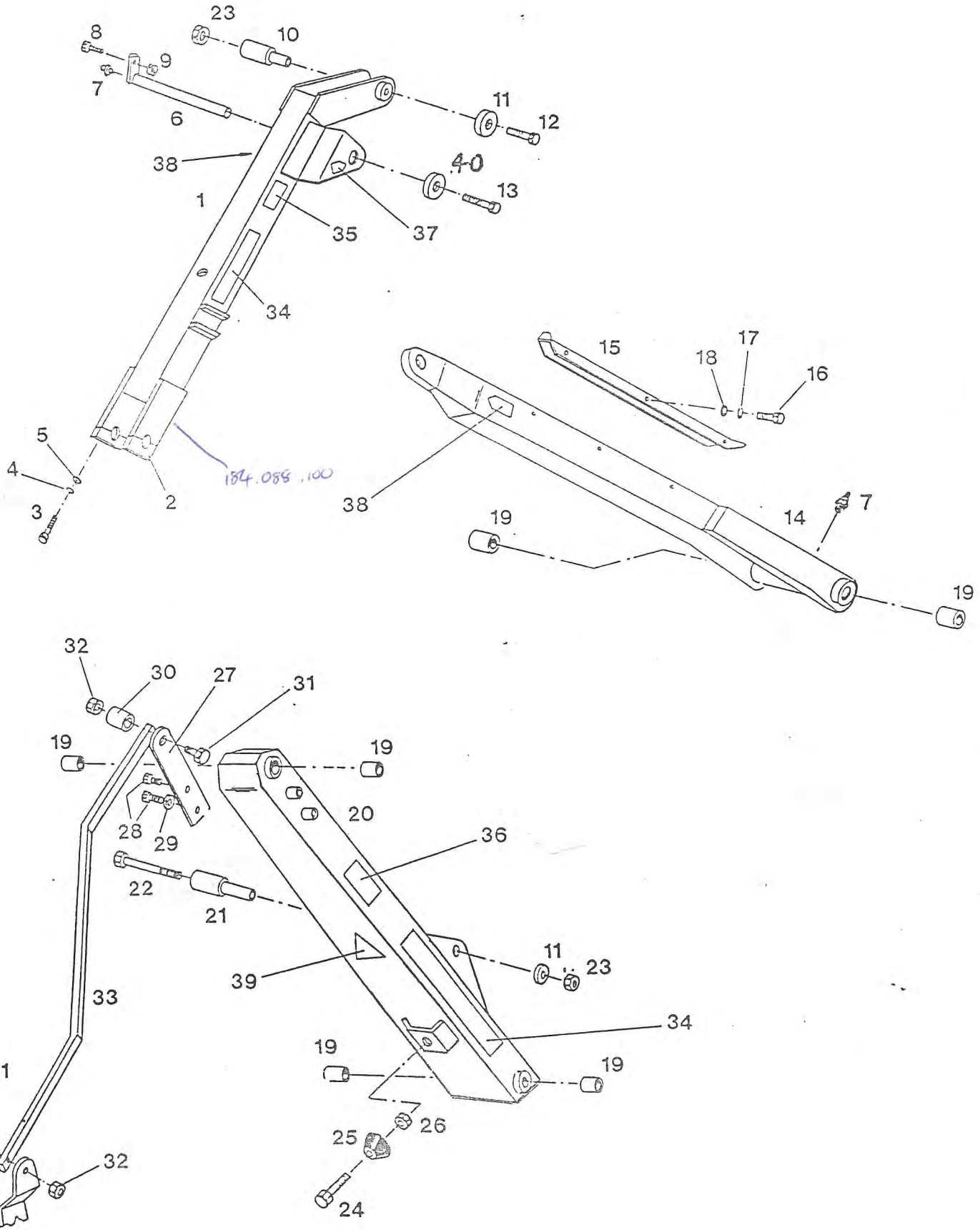
Return Filter and Connections.

Item	Part No.	Description	Quantity
Fully Independant Hydraulics-			
For Cable Machines -			
1	7752	Filter Return	1.0
	7752.1	Element 25 micron	
For Elect Machines -			
1	7761	Filter Return	1.0
	7761.1	Element 10 micron	
2	3155	Seal 1.1/4" Dowty Bonded	1.0
3	5241	Adaptor 1 bsp x 1.1/4	1.0
4	3110	Setscrew M8 * 30 (8.8)	4.0
5	3001	Washer M 8 Spring	4.0
6	3111	Washer M 8 Form A	4.0
Tractor Dependant Hydraulics-			
1	7752	Filter Return	1.0
	7752.1	Element 25 micron	
2	3155	Seal 1.1/4" Dowty Bonded	1.0
3	071.418	Banjo Bolt 1.1/4" BSP	1.0
4	3154	Valve Relief/Anti-Cav.	1.0
5	7541	Relief Cart. 200 Bar	1.0
6	0934	Seal 3/4" Dowty Bonded	2.0
7	1934	Seal 1" Dowty Bonded	1.0
8	0935	Adaptor 3/4 bsp	2.0
9	1836	Adaptor 3/4 bsp x 1	1.0
10	3342	Adaptor 3/4 bsp m/f 91	2.0
11	3110	Setscrew M8 * 30 (8.8)	4.0
12	3001	Washer M 8 Spring	4.0
13	3111	Washer M 8 Form A	4.0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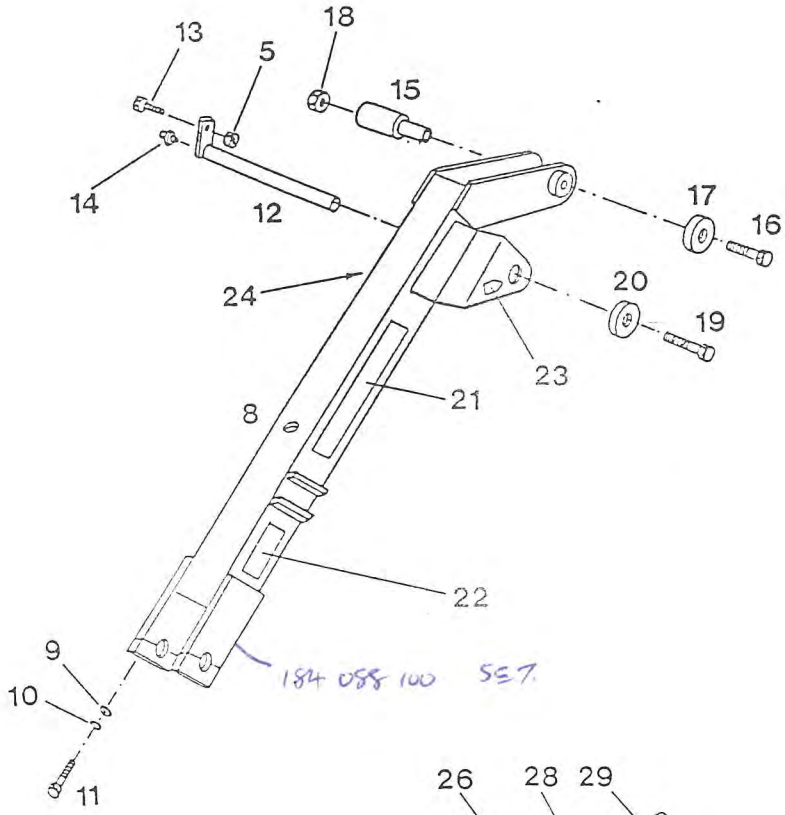
Boom Arms 460 and 520 (straight Arms)

Item	Part No.	Description	Quantity
1	184.236	Second Boom 520	1.0
or	184.237	Second Boom 460 + 459	1.0
2	184.058	Head Clamp	2.0
3	2986	Bolt M12 * 80 (8.8)	2.0
4	2729	Washer M12 Spring	2.0
5	3192	Washer M12 Form C	2.0
6	184.065	Pin, First Boom	1.0
7	2923	G/Nipple M10 x 1.5	4.0
8	2710	Setscrew M10 * 30 (8.8)	1.0
9	4421	Stiffnut M10 Nyloc	1.0
10	184.298	Pin	1.0
11	184.064	Washer M12 Special 40 Dia EN8 x 180 Sh30	3.0
12	7684	Bolt M12 * 200 (8.8)	1.0
13	184.089	Setscrew M24 * 40 Tapped	1.0
14	184.233	Tie Arm 520	1.0
or	184.234	Tie Arm 460	1.0
15	184.059	Pipe Guard 2MSx1220x 150	1.0
or	184.097	Pipe Guard 2MSx1028x 150	1.0
16	3731	Setscrew M8 * 16 (8.8)	6.0
17	3001	Washer M 8 Spring	6.0
18	3111	Washer M 8 Form A	6.0
19	7488	Bush 4540M	4.0
20	184.231	First Boom 520	1.0
or	184.232	First Boom 460	1.0
21	184.297	Pin	1.0
22	3229	Bolt M12 * 150 (8.8) 40 Dia EN8 x 112 Sh30	1.0
23	3082	Stiffnut M12 Nyloc	2.0
24	2935	Bolt M10 * 45 (8.8)	1.0
25	1492	Buffer Rubber	1.0
26	4421	Stiffnut M10 Nyloc	1.0
27	184.068	Self level Link Anch Plt	1.0
28	2892	Setscrew M16 * 40 (8.8)	2.0
29	2730	Washer M16 Spring	2.0
30	184.057	Spacer 16id 1/2" NB Med.x 31	2.0
31	2902	Bolt M16 * 60 (8.8)	2.0
32	3747	Stiffnut M16 Nyloc	2.0
33	184.056	Self Level Link Bar	1.0
34	410184	Transfer "<<<<<<<>>>>>>>"	4.0
35	410185	Transfer "TWOSE"(Lg Blk)	2.0
36	410186	Transfer "twose"(Sm Blk)	2.0
37	410191	Transfer "->" G.Nipple	1.0
38	410192	Transfer "<-" G.Nipple	2.0
39	1840209	Transfer "Close Boom..."	1.0
40	184.098	Washer 25id	1.0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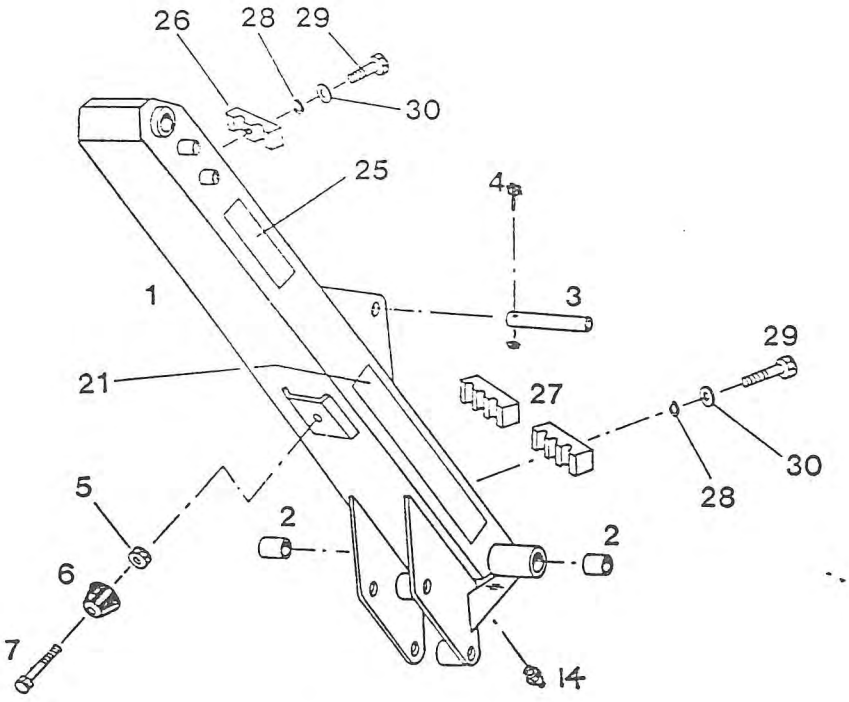
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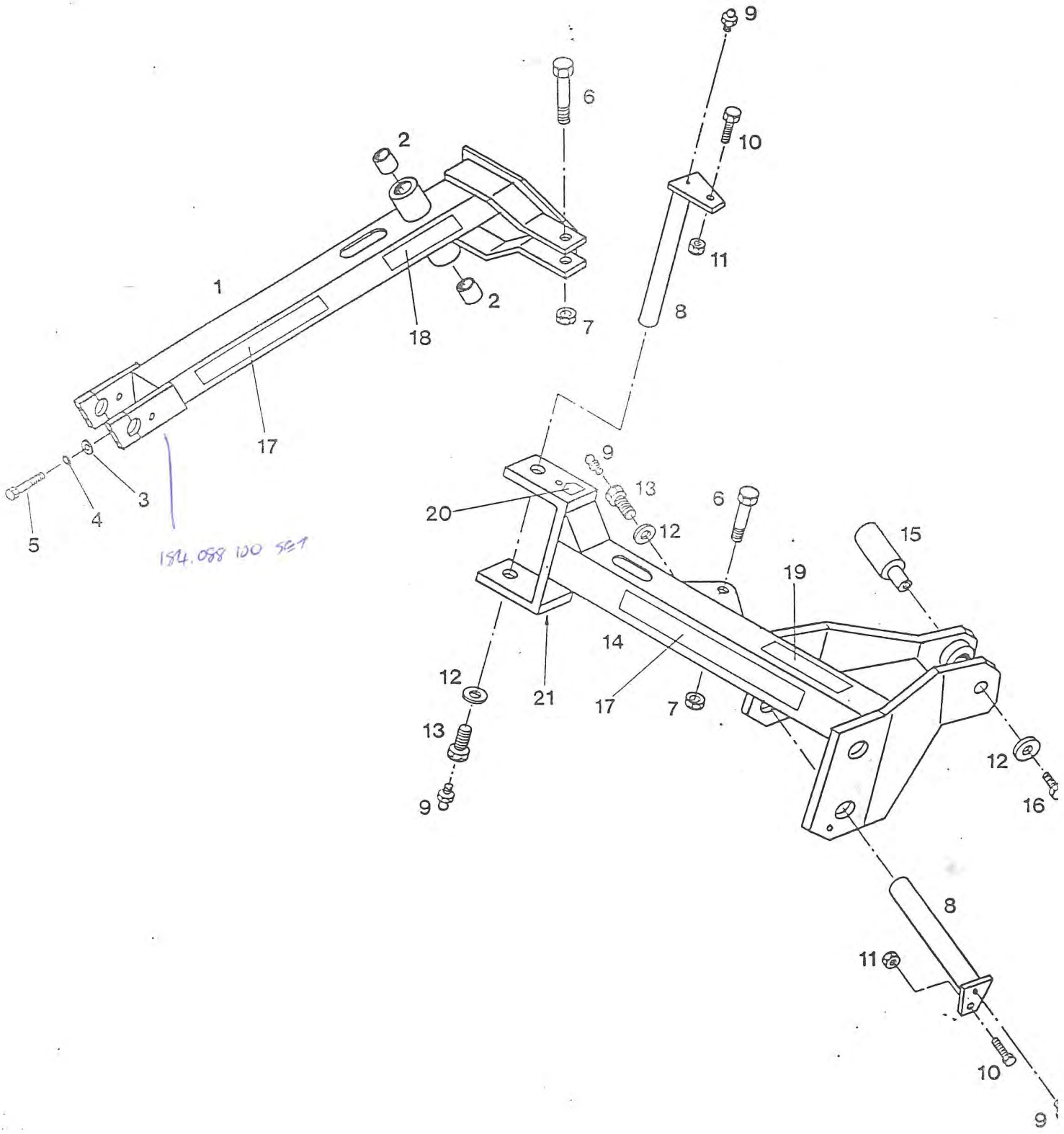
Boom Arms for 459

Item	Part No.	Description	Quantity
1	184.235	First Boom 459 (1810crs)	1.0
2	7488	Bush 4540M	2.0
3	184.238	Pin, 2nd Ram Anchor	1.0
4	3136	Bolt M10 * 60 (8.8)	1.0
5	4421	Stiffnut M10 Nyloc	2.0
6	1492	Buffer Rubber	1.0
7	2935	Bolt M10 * 45 (8.8)	1.0
8	184.237	Second Boom 460 + 459	1.0
9	3192	Washer M12 Form C	4.0
10	2729	Washer M12 Spring	4.0
11	2986	Bolt M12 * 80 (8.8)	4.0
12	184.065	Pin, First Boom	1.0
13	2710	Setscrew M10 * 30 (8.8)	1.0
14	2923	G/Nipple M10 x 1.5	5.0
15	184.298	Pin	2.0
16	7755	Bolt M12 * 220 (8.8)	2.0
17	184.064	Washer M12 Special 40 Dia EN8 x 180 Sh30	2.0
18	3082	Stiffnut M12 Nyloc	2.0
19	184.089	Setscrew M24 * 40 Tapped M10 with Greaseway	1.0
20	184.098	Washer 25id 60 Dia BDMS x 6	1.0
21	410184	Transfer "<<<<<<<>>>>>>"	4.0
22	410185	Transfer "TWOSE"(Lg Blk)	2.0
23	410191	Transfer "->" G.Nipple	1.0
24	410192	Transfer "<-" G.Nipple	2.0
25	410186	Transfer "twose"(Sm Blk)	2.0
26	184.282	Pipe Clamp 3/4 + 1/4	2.0
27	184.281	Pipe Clamp 3/4 + (2)1/4	4.0
28	3001	Washer M 8 Spring	6.0
29	3548	Bolt M8 * 50 (8.8)	10.0
30	3111	Washer M 8 Form A	10.0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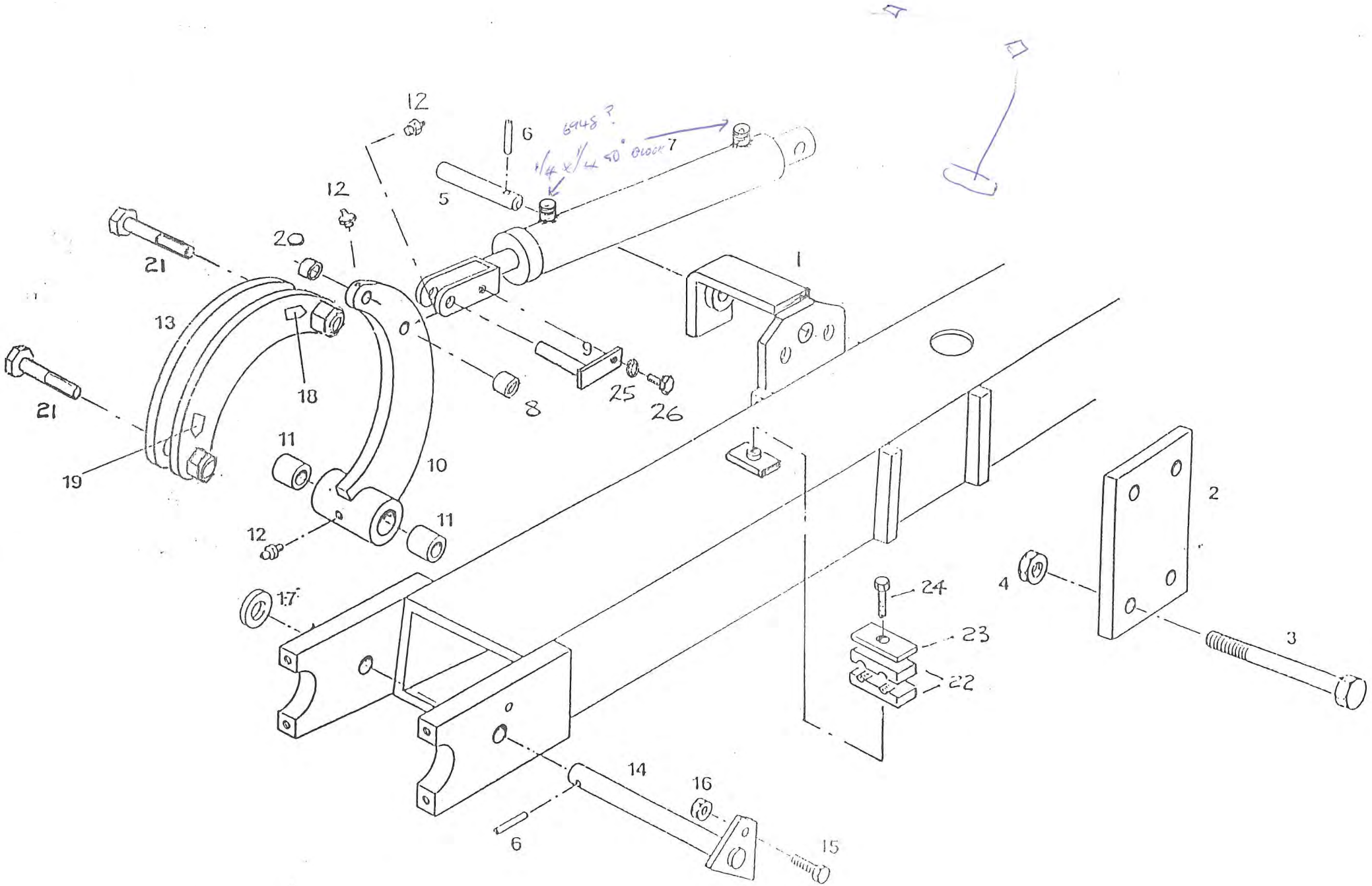
FORWARD BOOM

Item	Part No	Description	Qty
1	184.286A/L	OUTER BOOM (L.H.) 520 MACHINE	1
OR	184.286A/R	OUTER BOOM (R.H.) 520 MACHINE	1
OR	184.286B/L	OUTER BOOM (L.H.) 460 MACHINE	1
OR	184.286B/R	OUTER BOOM (R.H.) 460 MACHINE	1
2	7488	BUSH	2
3	3192	WASHER M12 (FORM C)	2
4	2729	WASHER M12 SPRING	2
5	2703	BOLT M12 x 70 (8.8)	2
6	4769	BOLT M20 x 90 (8.8)	2
7	3082	STIFFNUT M20 NYLOC	2
8	184.065	PIVOT PIN	2
9	6956	GREASE NIPPLE M10	4
10	2710	SETSCREW M10 x 30	2
11	4421	STIFFNUT M10 (NYLOC)	2
12	184.064	WASHER	3
13	184.089	SETSCREW M24 x 40 SPECIAL	2
14	184.285L	FORWARD BOOM L/H MACHINE	1
OR	184.285R	FORWARD BOOM R/H MACHINE	1
15	184.239	PIN	1
16	2950	SETSCREW M12 x 40	1
17	410.184	TRANSFER (CHEVRON)	3
18	410.185	TRANSFER (TWOSE) LARGE	2
19	410.186	TRANSFER (TWOSE) SMALL	1
20	410.192	TRANSFER (GREASE)	1
21	410.191	TRANSFER (GREASE)	2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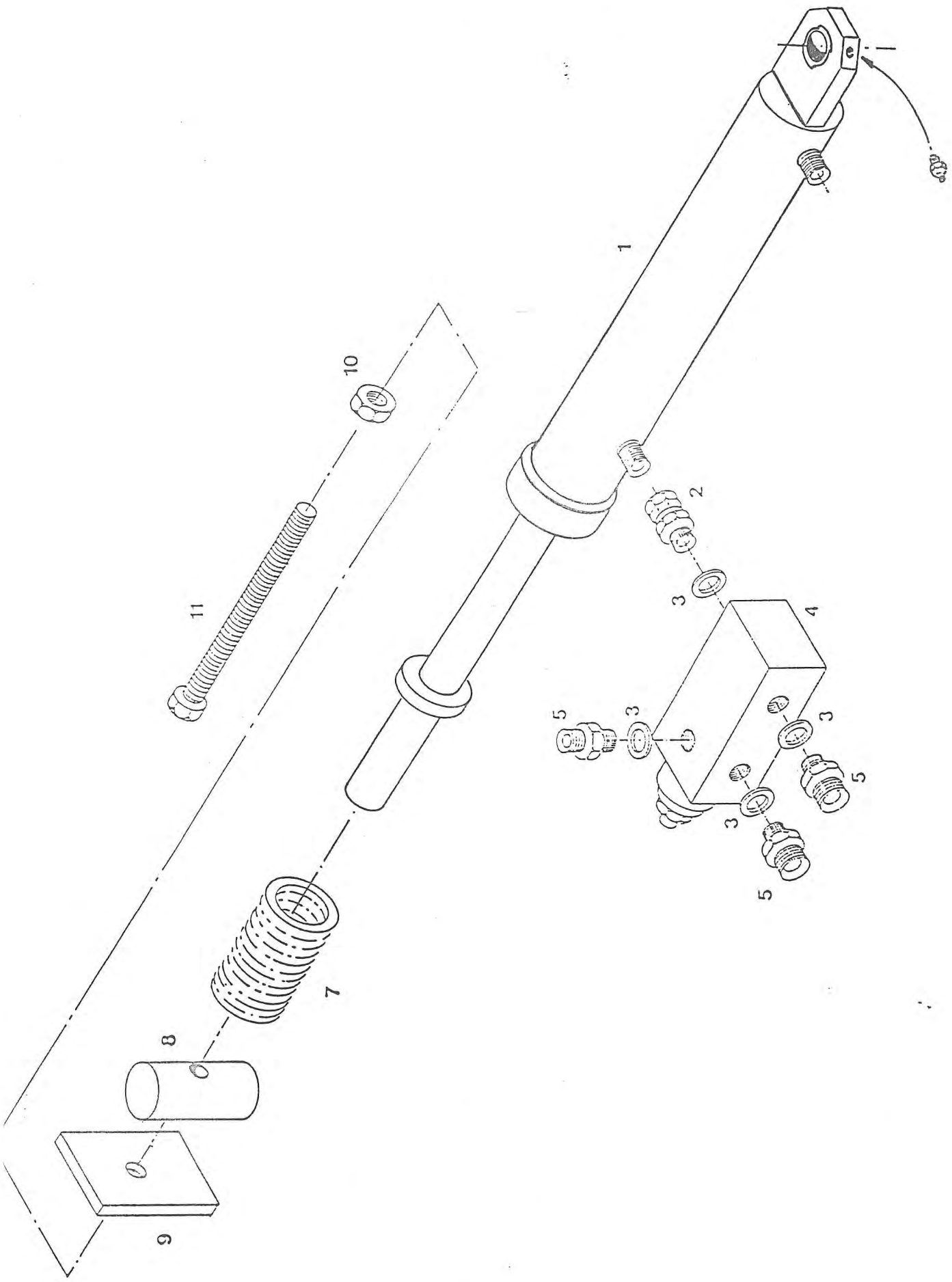
Pivot Linkage for Ram Head.

Item	Part No.	Description	Quantity
1	184.309	Bracket Head Angle Ram	1.0
2	184.246	Clamp Plate 10MS x 158x 100	1.0
3	3444	Bolt M12 * 160 (8.8)	4.0
4	3082	Stiffnut M12 Nyloc	4.0
5	184.247	Pin - Ram Anchor	1.0
6	3713	Spring Pin M 6 * 50	2.0
7	710975	Ram Head Angle (710810) Seal Set= 3818	1.0
8	3495	Bush 30x25x20 wide	1.0
9	184.331	Pin for Angling Ram	1.0
10	184.327	Banana Link (Single)	1.0
11	5178	Bush 3030M	2.0
12	2923	G/Nipple M10 x 1.5	4.0
13	184.328	Banana Link (Double)	1.0
14	184.243	Pin - Anchor for Banana	1.0
15	2698	Bolt M10 * 40 (8.8)	1.0
16	4421	Stiffnut M10 Nyloc	1.0
17	2725	Washer M30 Form A Plated	1.0
18	410191	Transfer "->" G.Nipple	1.0
19	410192	Transfer "<-" G.Nipple	1.0
20	1984	Bush L1212	1.0
21	7786	Bolt M20 * 80 Structural	2.0
22	5351.2	Clamp	2.0
23	5351.1	Top Plate	1.0
24	6393	Bolt M8 * 35 (8.8)	1.0
25	2729	Washer M12 Spring	1.0
26	2950	Setscrew M12 * 30 (8.8)	1.0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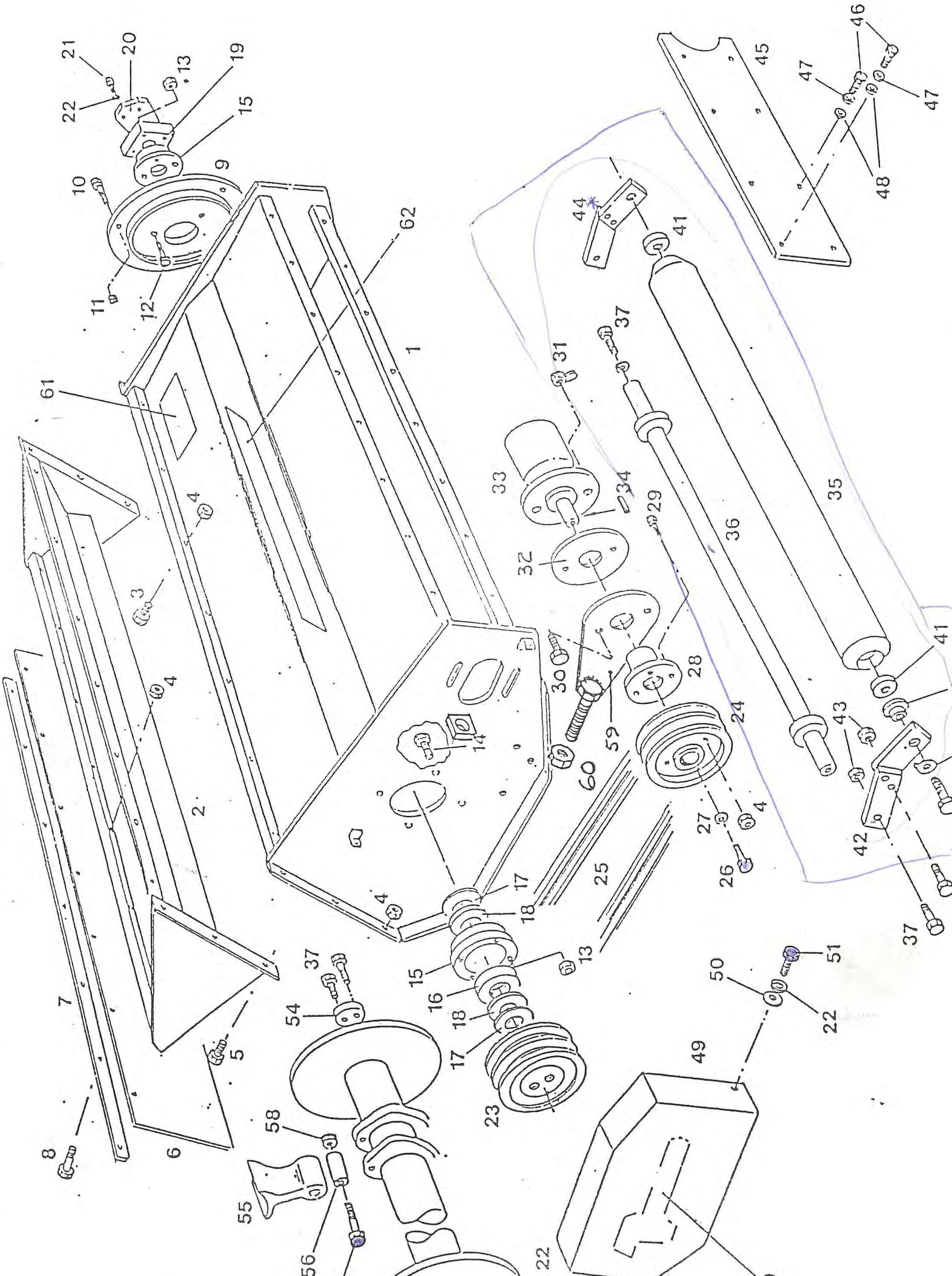
Breakback Ram.

Item	Part No.	Description	Quantity
1	1840299	Ram Breakback Seal Set = 1840299.1	1.0
2	7305	Adaptor 1/4 BSP M-FLN	1.0
3	1181	Seal 1/4" Dowty Bonded	4.0
4	7484 R2000	Relief Block @2000psi	1.0
	Note - For Forward Boom machines this block is set to 3200 psi (221 bar) - Part no is then 7484 R3200		
5	1823	Adaptor 1/4 bsp	3.0
7	7710	Spring, Die Blue	1.0
8	184.305	Pin Pivot Breakback 40 Dia BDMS x 100 22xd	1.0
9	184.306	Plate Pivot Pin 6MS x 68x 50	1.0
10	2726	Locknut M20	2.0
11	7756	Setscrew M20 * 130 (8.8)	1.0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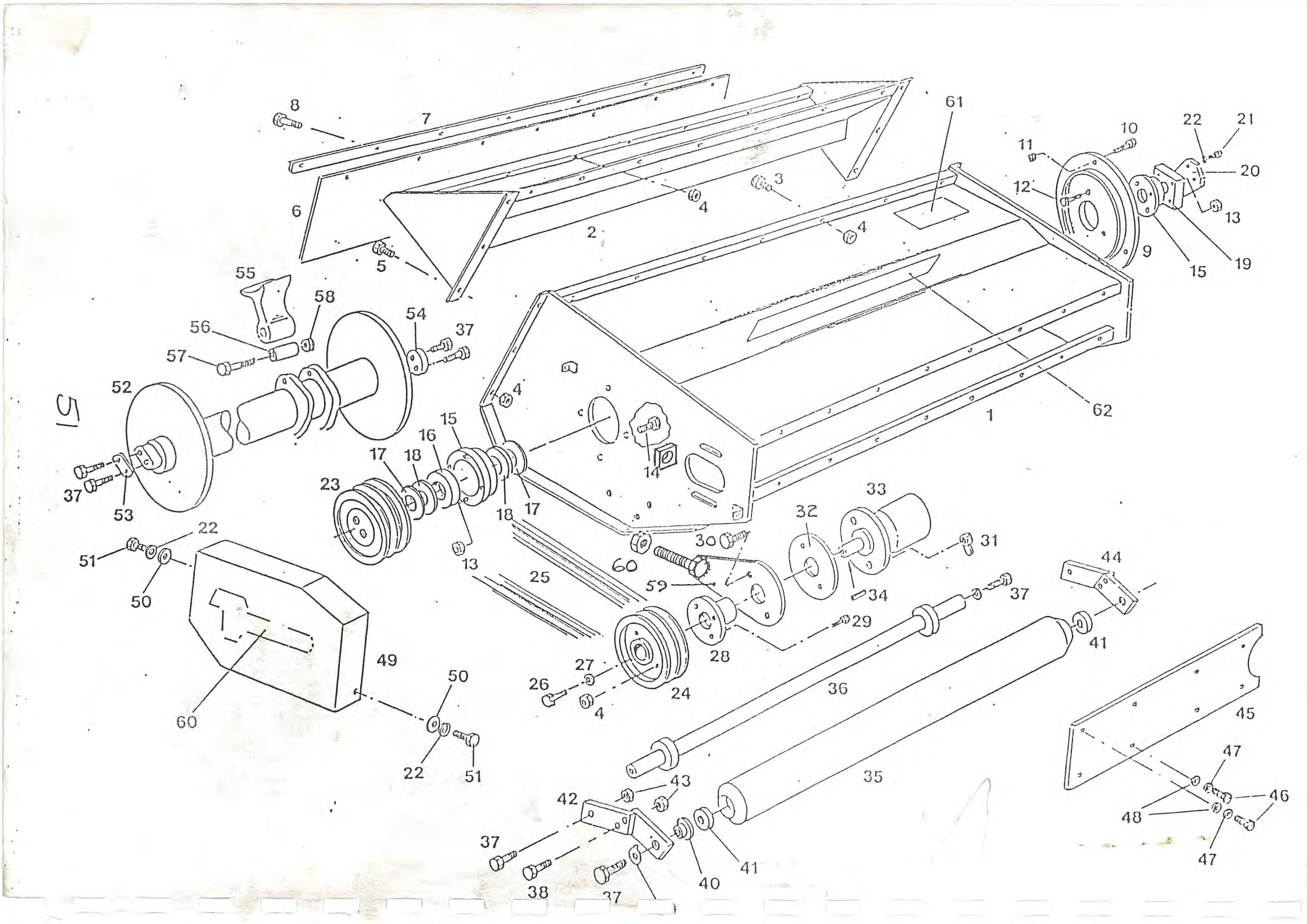
Cutting Head and Rotor.

Item	Part No.	Description	Quantity
1	184.220	Head WA	1.0
2	184.~~221~~ 326	Head Front	1.0
3	3183	Bolt M8 * 45 (8.8)	7.0
4	3182	Stiffnut M8 Nyloc	23.0
5	2793	Setscrew M8 * 20 (8.8)	6.0
6	1840218	Curtain H/T Front	1.0
7	184.217	Curtain Clamp Strip	1.0
8	3548	Bolt M8 * 50 (8.8)	7.0
9	184.036	Disc Assy.	1.0
10	2709	Setscrew M10 * 20 (8.8)	6.0
11	4421	Stiffnut M10 Nyloc	6.0
12	7688	Bolt M14 * 70 (8.8)	4.0
13	7689	Stiffnut M14 Nyloc	8.0
14	7687	Bolt M14 * 50 (8.8)	4.0
15	7713.1	Bearing FCX09 Cast Housg.	2.0
16	7713.2	Bearing 1726210-2RS Insert (Metal Cage)	2.0
17	184.268	Spacer 50id	4.0
18	7713.3	Seal Ring Nilos 6210 2AV	4.0
19	184.031	Bearing Plate 20MS x 120x 120	1.0
20	184.032	Bearing Cover 3MS x 105x 105	1.0
21	3731	Setscrew M8 * 16 (8.8)	4.0
22	3001	Washer M 8 Spring	4.0
23	184.035	Pulley, Rotor (200 pcd)	1.0
24	184.219	Pulley Motor 242 PCD	1.0
25	7692	Belt Vee SPB1400	2.0
26	7491	Bolt 3/8 UNF x1"	1.0
27	2728	Washer M10 Spring	1.0
28	184.040	Hub for Motor	1.0
29	3110	Setscrew M8 * 30 (8.8)	3.0
30	3137	Bolt M10 * 50 (8.8)	2.0
31	184.113	Nut M10 for Flail Motor	2.0
32	184.039	Washer 83id	1.0
33	7077	Motor Gear Type for H/T	1.0
34	7720	Key 1/4" x 1/4" x 1"	1.0
35	184.225	Roller	1.0
36	184.224	Roller Axle Shaft	1.0
37	2962	Setscrew M12 * 35 (8.8)	8.0
38	2701	Bolt M12 * 50 (8.8)	2.0
39	7530	Washer Tab M12	2.0
40	184.046	Roller Axle Spacer	2.0
41	7494	Bearing 6304 2RS 1 SKF	2.0
42	184.223L	Roller Bracket LH	1.0
43	3082	Stiffnut M12 Nyloc	4.0
44	184.223R	Roller Bracket RH	1.0
45	184.222	Guard Rear for Head	2.0
46	2707	Setscrew M6 * 20 (8.8)	14.0
47	2731	Washer M 6 Spring	14.0
48	2715	Washer M 6 Form A Bright	14.0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Item	Part No.	Description	Quantity
49	184.226	Guard Drive for Head	1.0
50	3111	Washer M 8 Form A	2.0
51	2987	Setscrew M8 * 25 (8.8)	2.0
52	184.091	Rotor, Balanced, inc. 24 Heavy Duty Flails.	1.0
or	184.092	Rotor, Balanced Bare.	
53	184.034	Washer Tab	2.0
54	184.033	Washer M12 Special	1.0
55	1840093	Flail Heavy Duty	24.0
56	184.106	Spacer for HD Flail	24.0
57	7751	Bolt M16 * 80 (8.8)	24.0
58	3747	Stiffnut M16 Nyloc	24.0
59	184.316	Adjuster Head Motor	1.0
60	2724	Locknut M16	1.0

184.091 ROTOR NO LONGER AVAILABLE

USE 184.400 A 184.502 A

PLUS

7799 × 2

7713.3 × 1 STORES

BLOCK 184.379 × 1 M/C

184.380B × 2 ASSY

184.380A × 2 ASSY

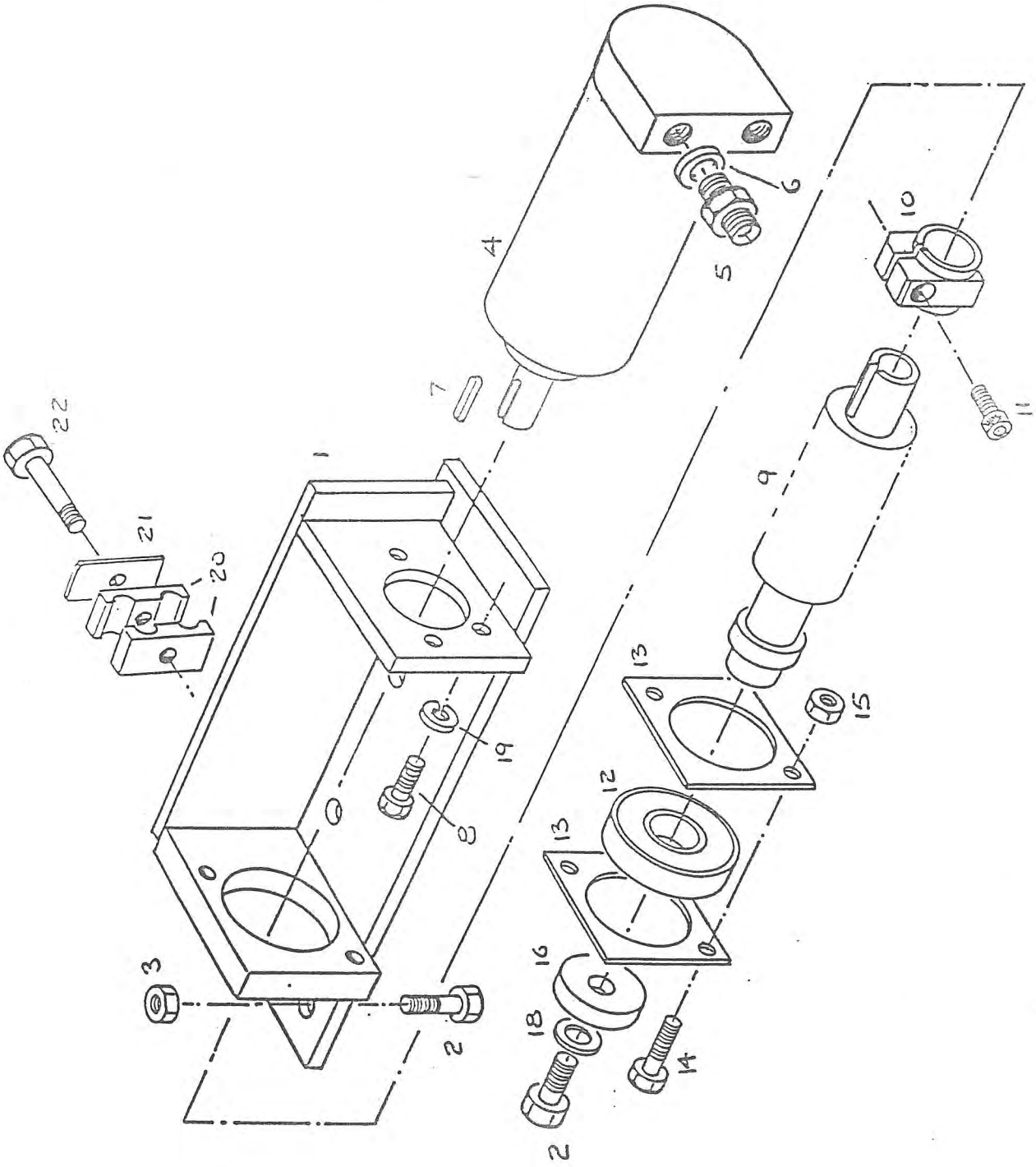
184.034 × 1 A/C T/W MACHINE

PLUS 184.401 PULLEY × 1 ?? STORES

8 - NYLOC NUTS 10MM. ASSY

1 - 7818 G/NIPPLE ASSY

~~184.091~~ 379 BLOCK.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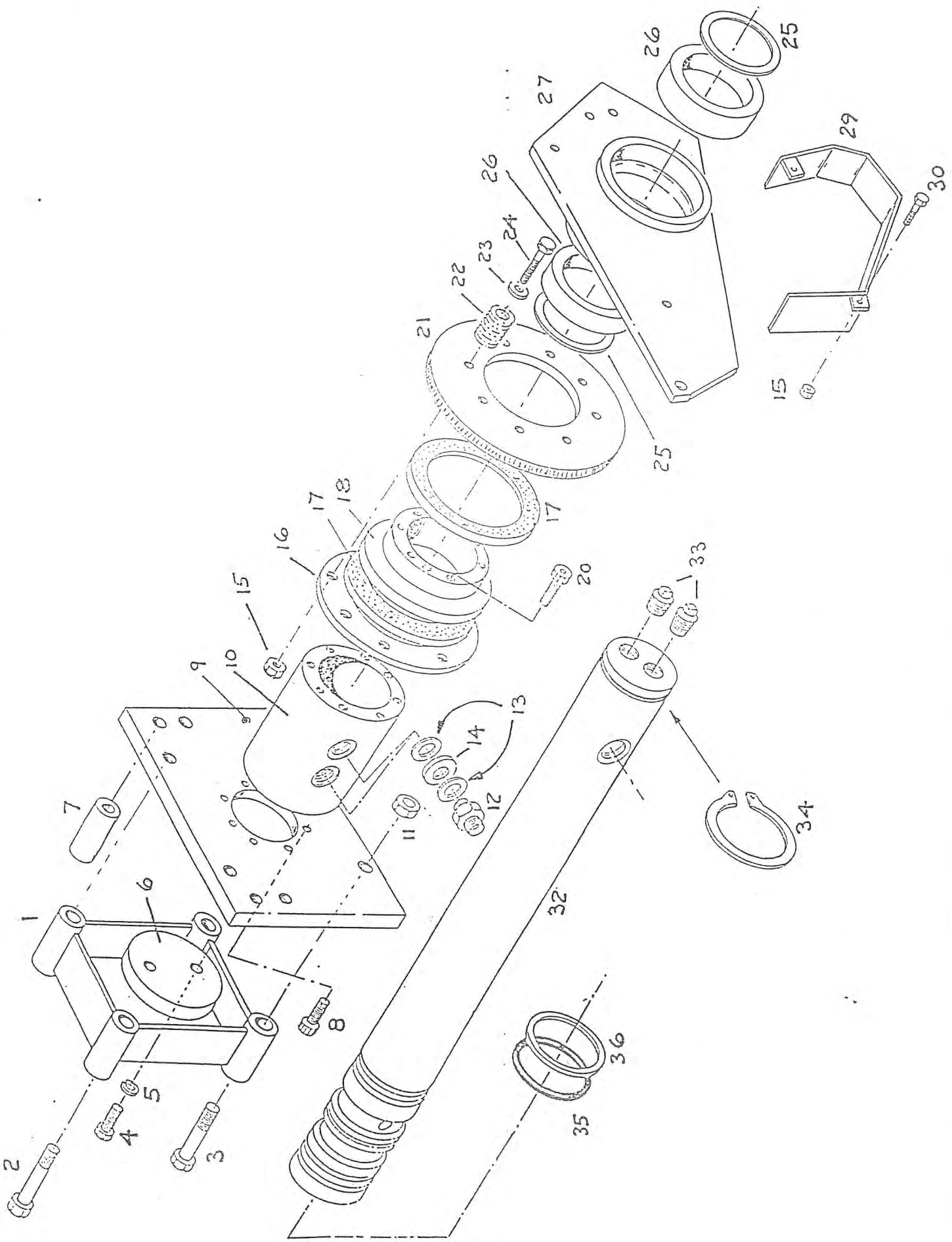
WORM DRIVE

1	184.345	Mounting Bracket	1
2	3110	Setscrew M8 x 30	4
3	3182	Nyloc (M8) Nut	3
4	7533	Motor OMM 20	1
5	1180	Adaptor 3/8" BSP x ¼" BSP	2
6	0670	Seal 3/8" BSP	2
7	7534	Key	1
8	2707	Setscrew M6 x 20 (8.8)	3
9	184.344	Worm Shaft	1
10	184.347	Hub	1
11	3494	Caphead M6 x 25	1
12	7505	Bearing 6005 2RS	1
13	184.346	Bearing Retainers	2
14	2708	Setscrew M6 x 25	2
15	4776	M6 Nyloc S/ Nut	2
16	184.352	Clamp Washer	1
17			
18	3001	M8 Spring Washer	1
19	2731	M6 Spring Washer	3
20	5351B	Pipe Clamp (Plastic)	2
21	5351A	Pipe Clamp Cover	1
22	3183	Bolt M8 x 45	1

NOTE :- (LOCTITE SCREW (3122) INTO WORM SHAFT)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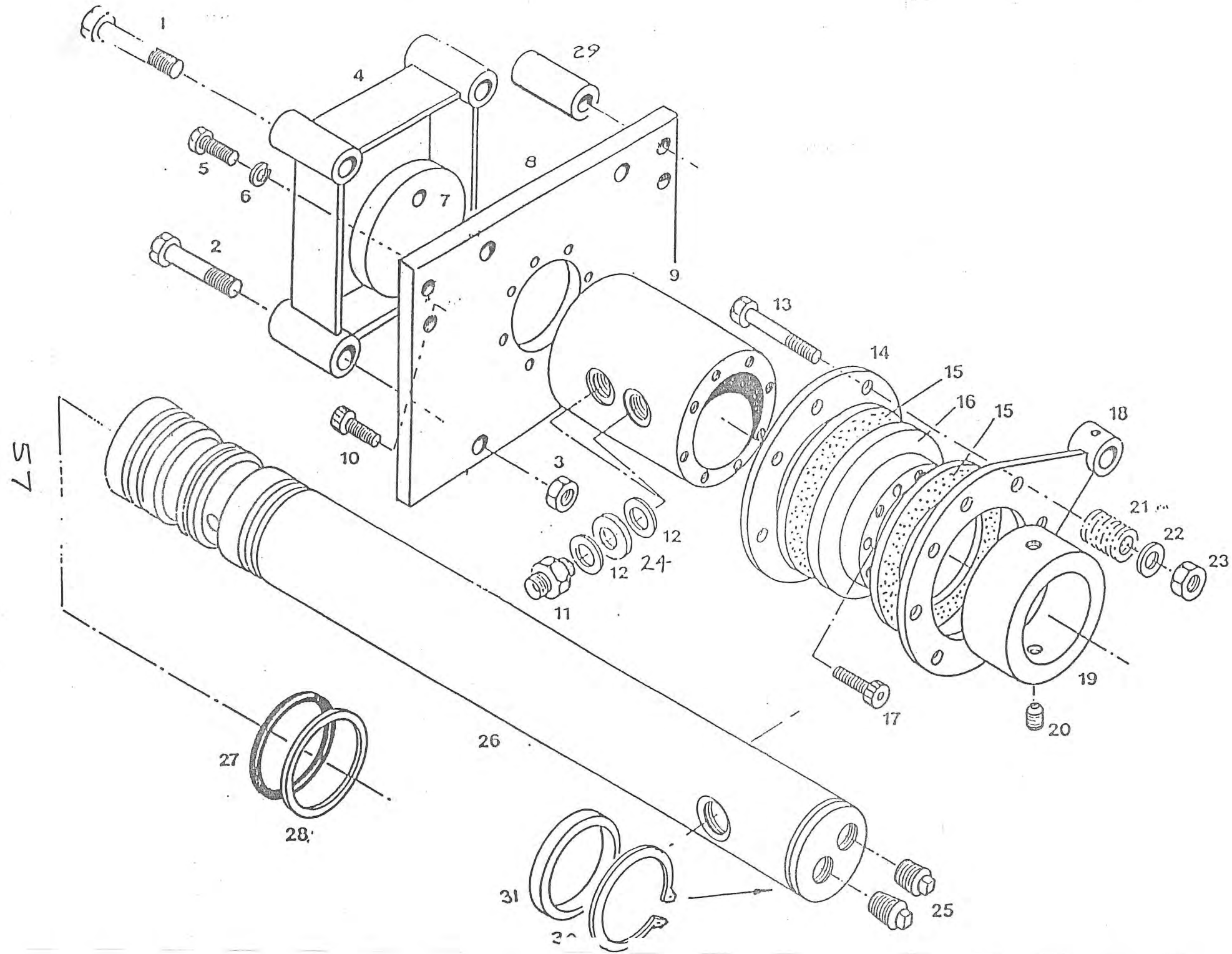
GALLERIED HEAD PIVOT

ITEM	PART NO.	DESCRIPTION	QUANT.
1	184.256	Spacer Cluster	1
2	4398	Bolt M12 x 140 (8.8)	6
3	3064	Bolt M12 x 110 (8.8)	2
4	2962	Setscrew M12 x 35 (8.8)	2
5	2729	Washer M12 Spring	2
6	184.252	Washer M12 (Special)	1
7	184.256.001	Spacer	4
8	5570	Caphead Setscrew M10 x 25	8
9	184.255	End Plate for Pivot Housing	1
10	184.248	Pivot Housing	1
11	3082	Stiffnut M12 Nyloc	8
12	0935	Adaptor 3/4" B.S.P.	4
13	0934	Seal 3/4" B.S.P.	8
14	184.313	Spacer 27 I.D.	4
15	3182	Stiffnut M8 Nyloc	10
16	184.250	Clutch Clamp Ring	1
17	184.272	Clutch Ring	2
18	184.249	Clutch Locating Disc	1
19			
20	4234	Setscrew M10 x 30 Caphead	8
21	184.343	Worm Wheel	1
22	7696	Spring	8
23	3186	Washer Flat M8(Form C)	8
24	7041	Bolt M8 x 75 (8.8)	8
25	184.353	D.X. Washer	2
26	7616	Bearing 6012 2RS	2
27	184.349	Bracket	1
28			
29	184.351	Guard	1
30	2987	Setscrew M8 x 25 (8.8)	2
31			
32	184.253	Pivot Spindle	1
33	7712	Plug (1/2" B.S.P.T.)	2
34	7784	Circlip	1
35	7693	'O' Ring - BS 832	5
36	7694	Seal Composite P.T.E.E.	5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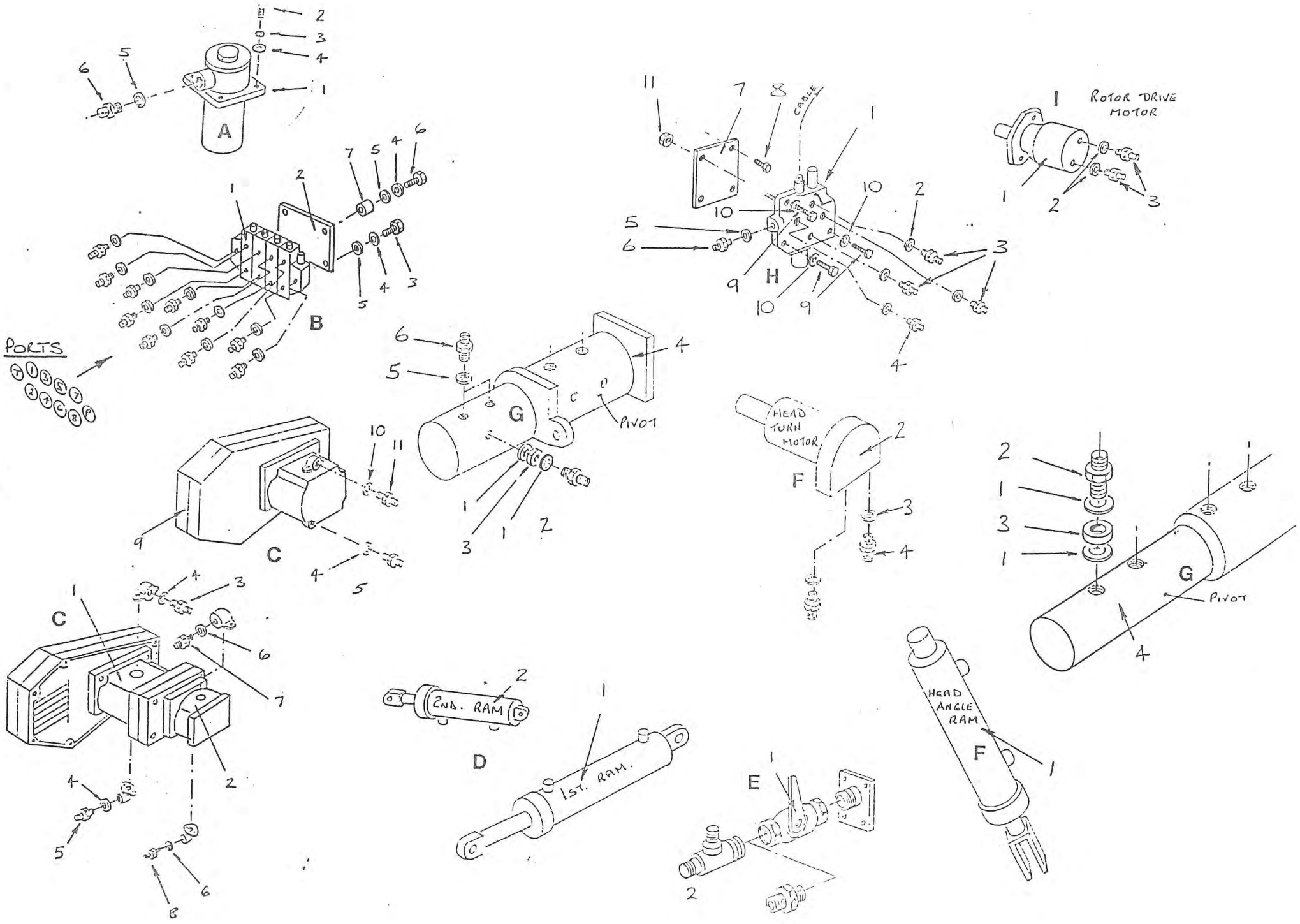
Ram Head Pivot Assembly.

Item	Part No.	Description	Quantity
1	4398	Bolt M12 * 140 (8.8)	6.0
2	3064	Bolt M12 * 110 (8.8)	2.0
3	3082	Stiffnut M12 Nyloc	8.0
4	184.256	Spacer Cluster	1.0
5	2962	Setscrew M12 * 35 (8.8)	2.0
6	2729	Washer M12 Spring	2.0
7	184.252	Washer M12 Special	1.0
8	184.349	End Plate for Pivot Hsg	1.0
9	184.248	Pivot Housing	1.0
10	5570	Setscrew M10 * 25 Caphd	8.0
11	0935	Adaptor 3/4 bsp	4.0
12	0934	Seal 3/4" Dowty Bonded	8.0
13	7041	Bolt M8 * 75 (8.8)	8.0
14	184.250	Clutch Clamp Ring	1.0
15	184.272	Clutch Ring - Mod 7695	2.0
16	184.249	Clutch Locating Disc	1.0
17	4234	Setscrew M10 * 30 caphd	8.0
18	184.329	Arm - Clutch to Banana	1.0
19	184.251	Spacer 60id	1.0
20	7697	Sock Screw M10 * 16 Dog	2.0
21	7696	Spring for Clutch	8.0
22	3186	Washer M 8 Form C	8.0
23	3182	Stiffnut M8 Nyloc	8.0
24	184.313	Spacer 27id	4.0
25	7712	Plug 1/2 BSPT Sq Drive	2.0
26	184.253	Pivot Spindle	1.0
27	7693	O Ring - BS 832	5.0
28	7694	Seal Composite PTFE	5.0
29	184.256.001	Spacer 12.5id 30 Dia BDMS x 31	4.0
30	7784	Circlip Ext 0600	1.0
31	184.368	Spacer 61id 75 Dia BDMS x 6.5	1.0

Note - Pivot Assembled as shown, but WITHOUT items 1 to 4, 29, 30 and 31 is available - Part no. = 184.261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HEAD ANGLE RAM
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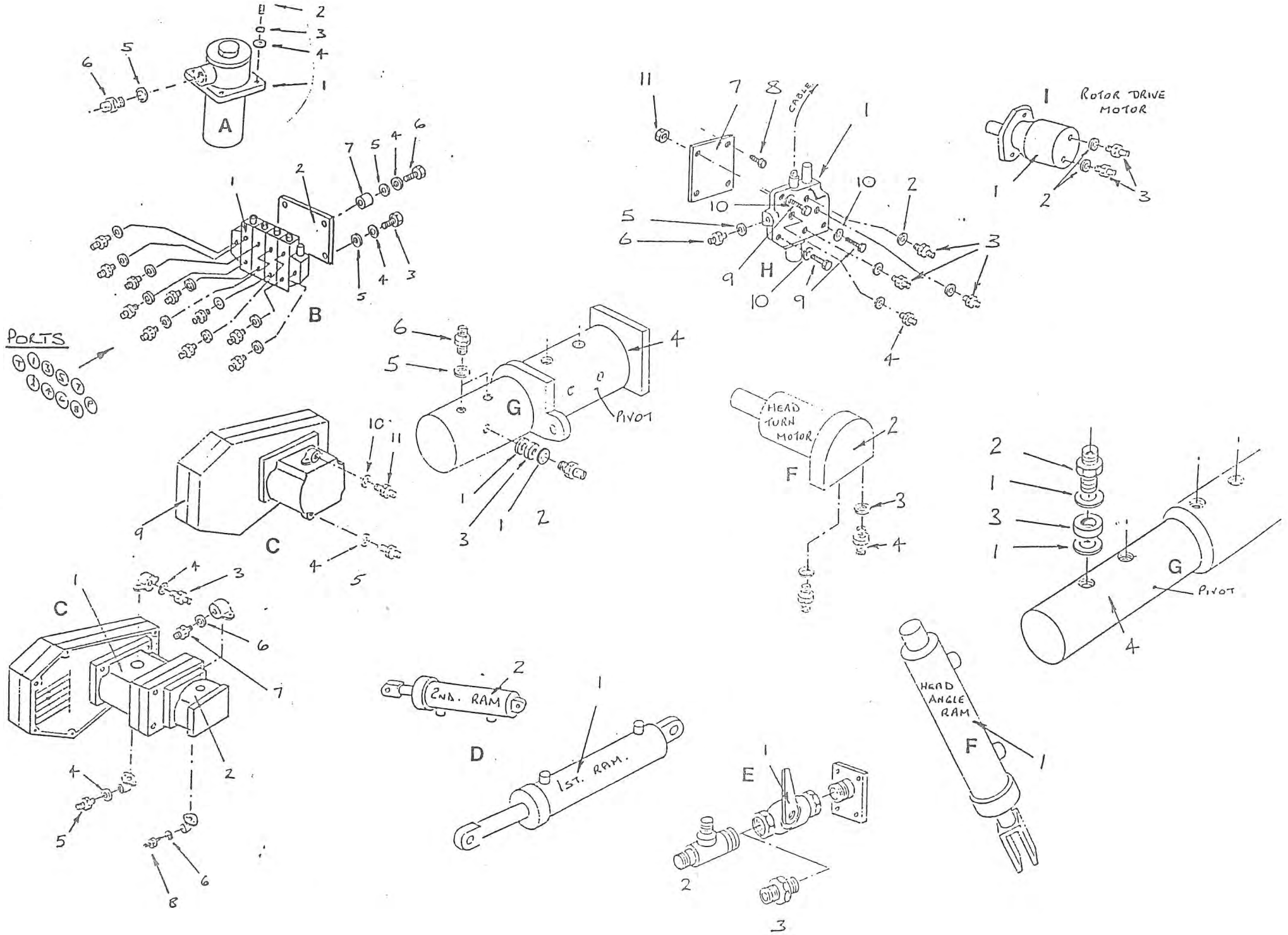
2ND. RAM
D
1ST. RAM.
E

Hydraulic Components.

Item	Part No.	Description	Quantity
Section A:			
1	7752	Filter Return (Element only = 7752.1)	1.0
2	3110	Setscrew M8 * 30 (8.8)	4.0
3	3001	Washer M 8 Spring	4.0
4	3111	Washer M 8 Form A	12.0
Dual Pump (Independant Hydraulics) -			
5	3155	Seal 1.1/4" Dowty Bonded	1.0
6	5241	Adaptor 1 bsp x 1.1/4	1.0
Single Pump (Semi-Independant Hydraulics) -			
5	3155	Seal 1.1/4" Dowty Bonded	2.0
6	071.418	Banjo Bolt 1.1/4" BSP	1.0
Section B:			
1	7698	Valve Block V1	1.0
2	184.307	Plate Valve Mtg	1.0
3	2793	Setscrew M8 * 20 (8.8)	2.0
4	3001	Washer M 8 Spring	4.0
5	3111	Washer M 8 Form A	4.0
6	3038	Bolt M8 * 40 (8.8)	2.0
7	178.061	Spacer 8.5id	2.0
8	0670	Seal 3/8" Dowty Bonded	10.0
Dual Pump (Independant Hydraulics) -			
PORT			
PT	0914	Adaptor 3/8 bsp x 1/2	2.0
12378	7740	Adaptor 1/4 BSP x 3/8 Rest. Restriction = 1.5mm	4.0
456	1180	Adaptor 1/4 bsp x 3/8	3.0
Single Pump (Semi-Independant Hydraulics) -			
PORT			
P	0665	Adaptor 3/8 bsp	1.0
T	0914	Adaptor 3/8 bsp x 1/2	1.0
1278	7739	Adaptor 1/4 BSP x 3/8 Rest Restriction = 1mm	4.0
3456	7740	Adaptor 1/4 BSP x 3/8 Rest Restriction = 1.5mm	4.0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2ND. RAM
1ST. RAM.
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Section C:

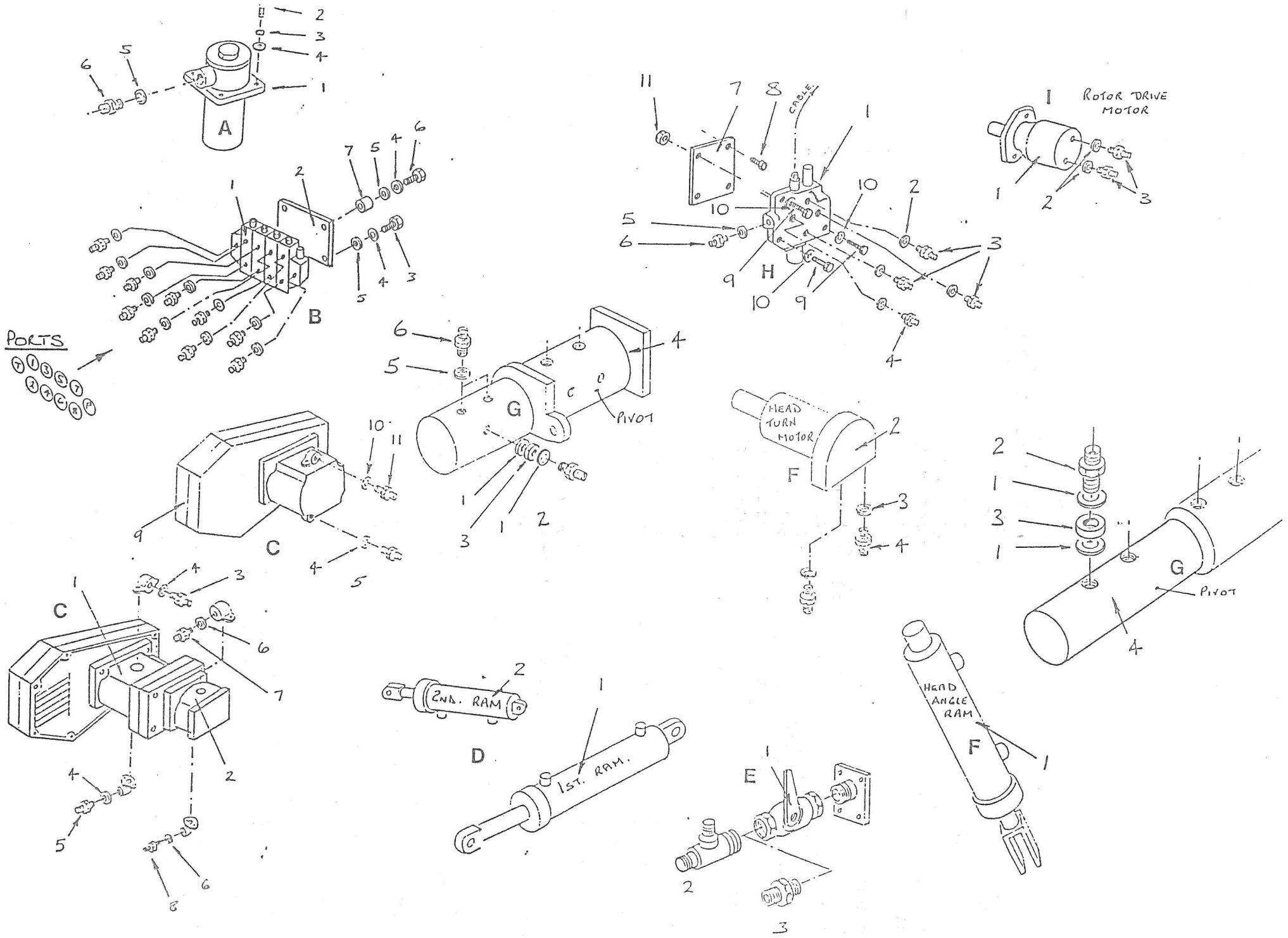
Dual Pump (Independant Hydraulics) -				
	7700		Pump/Gearbox Complete	1.0
	Comprises -			
	7549	(1)	Pump TAP22-90/55.0 D	1.0
	7550		Centre Kit (Dual)	1.0
	7551		Coupling GR3 TAPER/1	1.0
	7552		Elbow 1/2" T30/13.5 c/w O Ring + M6 Screws	1.0
	7552		Elbow 1/2" T30/13.5 c/w O Ring + M6 Screws	1.0
	7554		Elbow 1" T51/27 c/w O Ring + M10 Screws	2.0
	7556		Gearbox 70351 (1:3.4)SS	1.0
	7573	(2)	Pump TFP200/6.0 D SC51	1.0
3	1836		Adaptor 3/4 bsp x 1	1.0
4	1934		Seal 1" Dowty Bonded	2.0
5	2450		Adaptor 1 bsp	1.0
6	0909		Seal 1/2" Dowty Bonded	2.0
7	1826		Adaptor 1/2 bsp	1.0
8	1834		Adaptor 1/2 bsp x 3/4	1.0
Single Pump (Semi-Independant Hydraulics) -				
4	1934		Seal 1" Dowty Bonded	1.0
5	2450		Adaptor 1 bsp	1.0
9	6973		Pump/Gearbox Assy.	1.0
	Comprises -			
	7551		Coupling GR3 TAPER/1	1.0
	7556		Gearbox 70351 (1:3.4)SS	1.0
	7630		Pump part of 6973	1.0
	7631		Elbow 1" SS-550102933 c/w O Ring + 3/8" Bolts	1.0
	7632		Elbow 3/4" SS-550102436 c/w O Ring + 5/16" Bolts	1.0
	7662		Hub Retaining Kit -	1.0
10	0934		Seal 3/4" Dowty Bonded	1.0
11	0935		Adaptor 3/4 bsp	1.0

Section D:

1	1840001	Ram primary, 520/460 Seal Set= 7621	1.0
2	1840229	Ram 2nd - 460/520	1.0
or	1840228	Ram 2nd - 459 Seal Set = 3291 or 6252	1.0

Section E:

1	7619	Ball Valve 1.1/2" BSP	1.0
Dual Pump (Independant Hydraulics) ONLY -			
2	184.147	Tee 1.1/2 x 1 x 3/4 BSP Males	1.0
Single Pump (Semi-Independant Hydraulics) ONLY -			
3	7559	Adaptor 1 bsp * 1.1/2T	1.0


A
B
PORTS
C
C
D
2ND. RAM
1ST. RAM.
E
F
HEAD ANGLE RAM
G
PIVOT
H
CABLE
I
ROTOR DRIVE MOTOR
G
PIVOT
F
HEAD TURN MOTOR

Section F:

Ram Head Machines Only:			
1	710975	Ram Head Angle Seal Set= 3818 or 710975.2	1.0
Gear Head Machines Only:			
2	7533	Motor OMM 20 Danfoss.	1.0
3	0670	Seal 3/8" Dowty Bonded	2.0
4	1180	Adaptor 1/4 bsp x 3/8	2.0

Section G:

1	0934	Seal 3/4" Dowty Bonded	8.0
2	0935	Adaptor 3/4 bsp	4.0
3	184.313	Spacer 27id	4.0
Gear Head Machines Only:			
4	184.014	Head Pivot Assy (includes fittings 1-3)	1.0
5	1181	Seal 1/4" Dowty Bonded	4.0
6	1823	Adaptor 1/4 bsp	4.0
Ram Head Machines Only:			
4	184.261	Head Pivot Assy Ram Type (includes fittings 1-3)	1.0

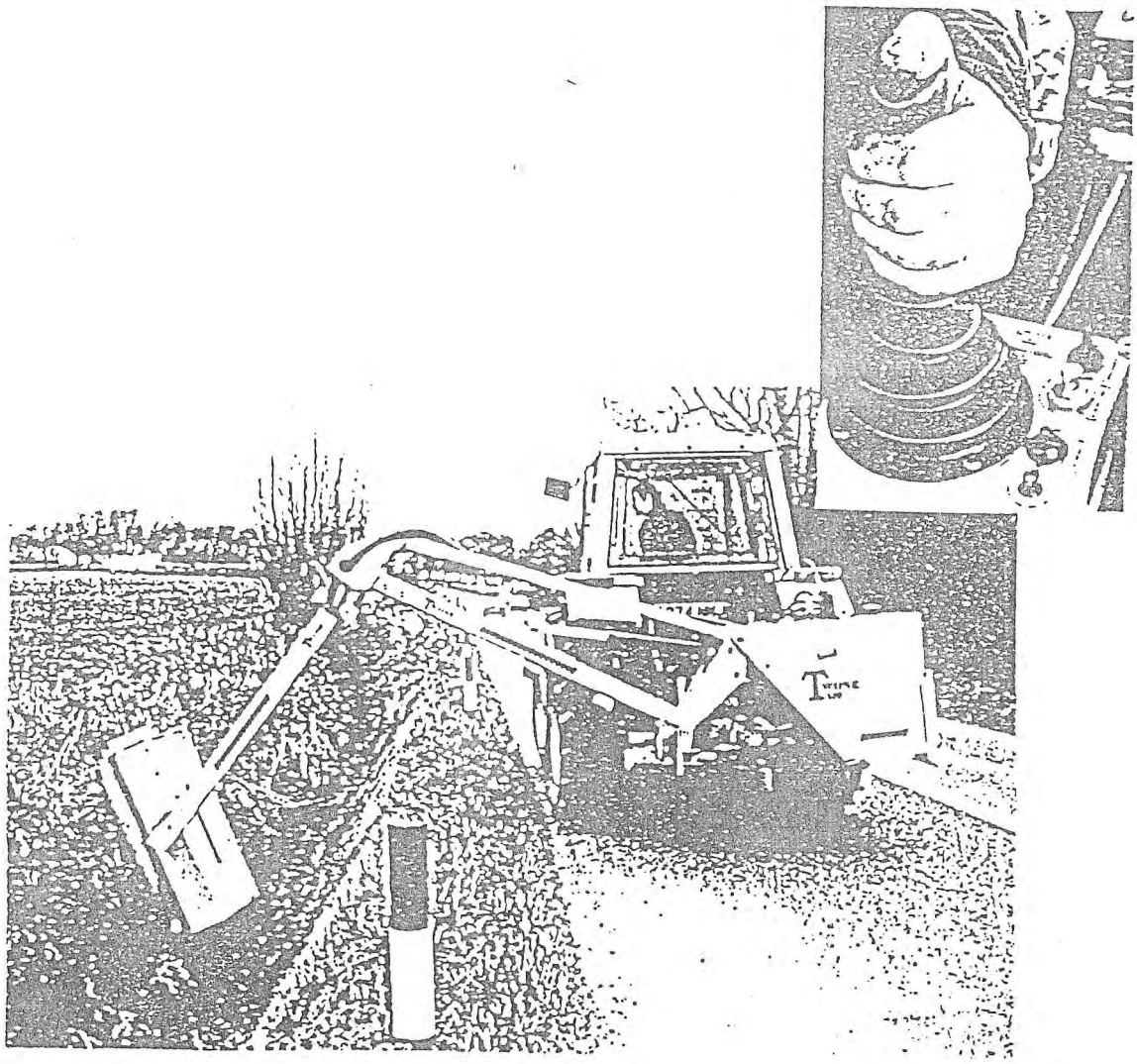
Section H:

Dual Pump (Independant Hydraulics) ONLY -			
1	7542	Valve Block V3	1.0
2	0934	Seal 3/4" Dowty Bonded	4.0
3	0935	Adaptor 3/4 bsp	3.0
4	1836	Adaptor 3/4 bsp x 1	1.0
5	0909	Seal 1/2" Dowty Bonded	1.0
6	1826	Adaptor 1/2 bsp	1.0
7	184.307	Plate Valve Mtg 5MS x 180x 90°	1.0
8	2987	Setscrew M8 * 25 (8.8)	1.0
9	3183	Bolt M8 * 45 (8.8)	3.0
10	3111	Washer M 8 Form A	3.0
11	3182	Stiffnut M8 Nyloc	4.0

Section I:

1	7077	Motor - Rotor Drive	1.0
2	1934	Seal 1" Dowty Bonded	2.0
3	1836	Adaptor 3/4 bsp x 1	2.0

ELECTRONIC PROPORTIONAL CONTROL BOOM FLAIL.



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.

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.

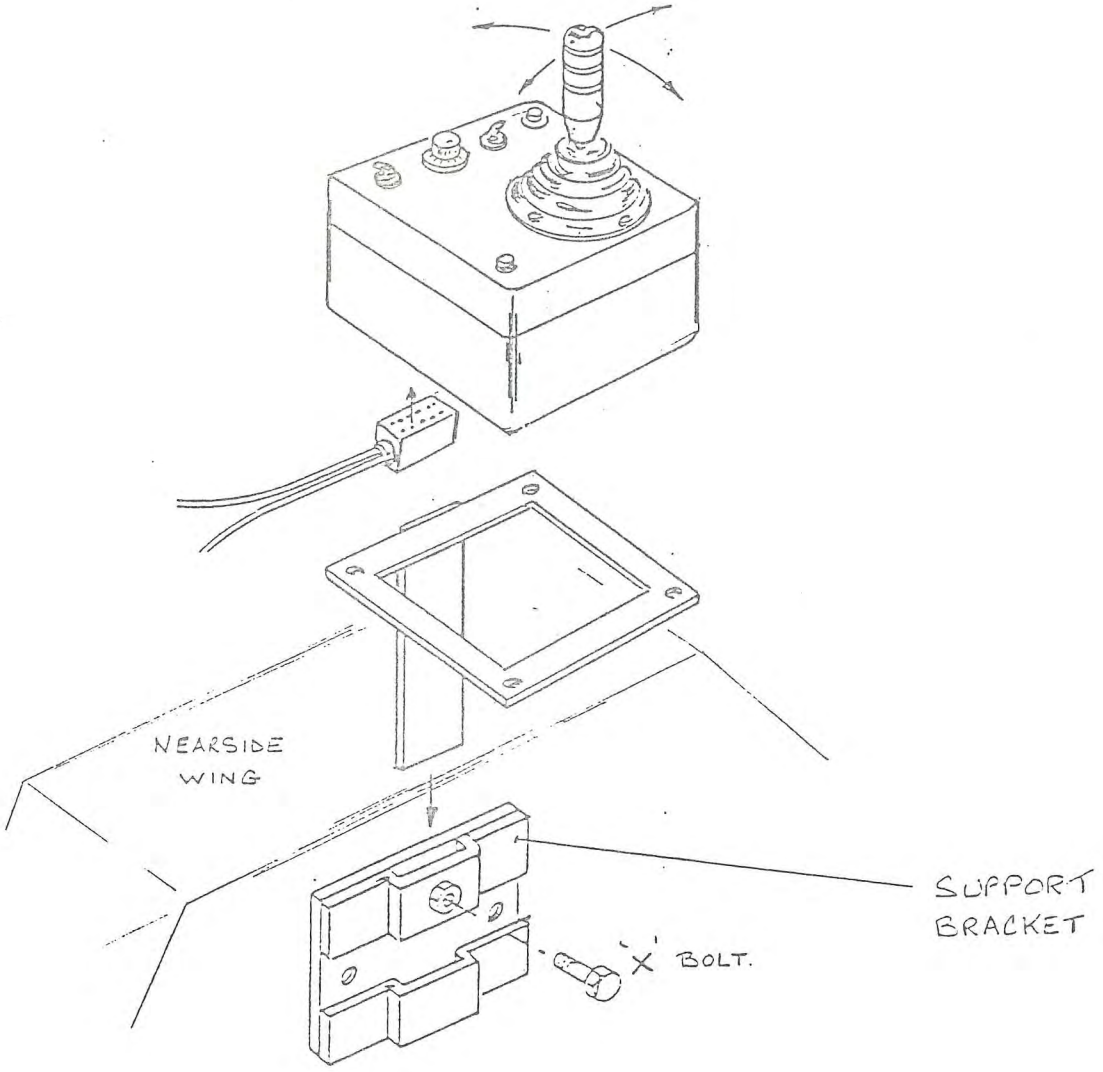
DANGER IMPORTANT ASSURE FLAIL IS PARKED ON GOOD LEVEL-SOLID SITE.

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.

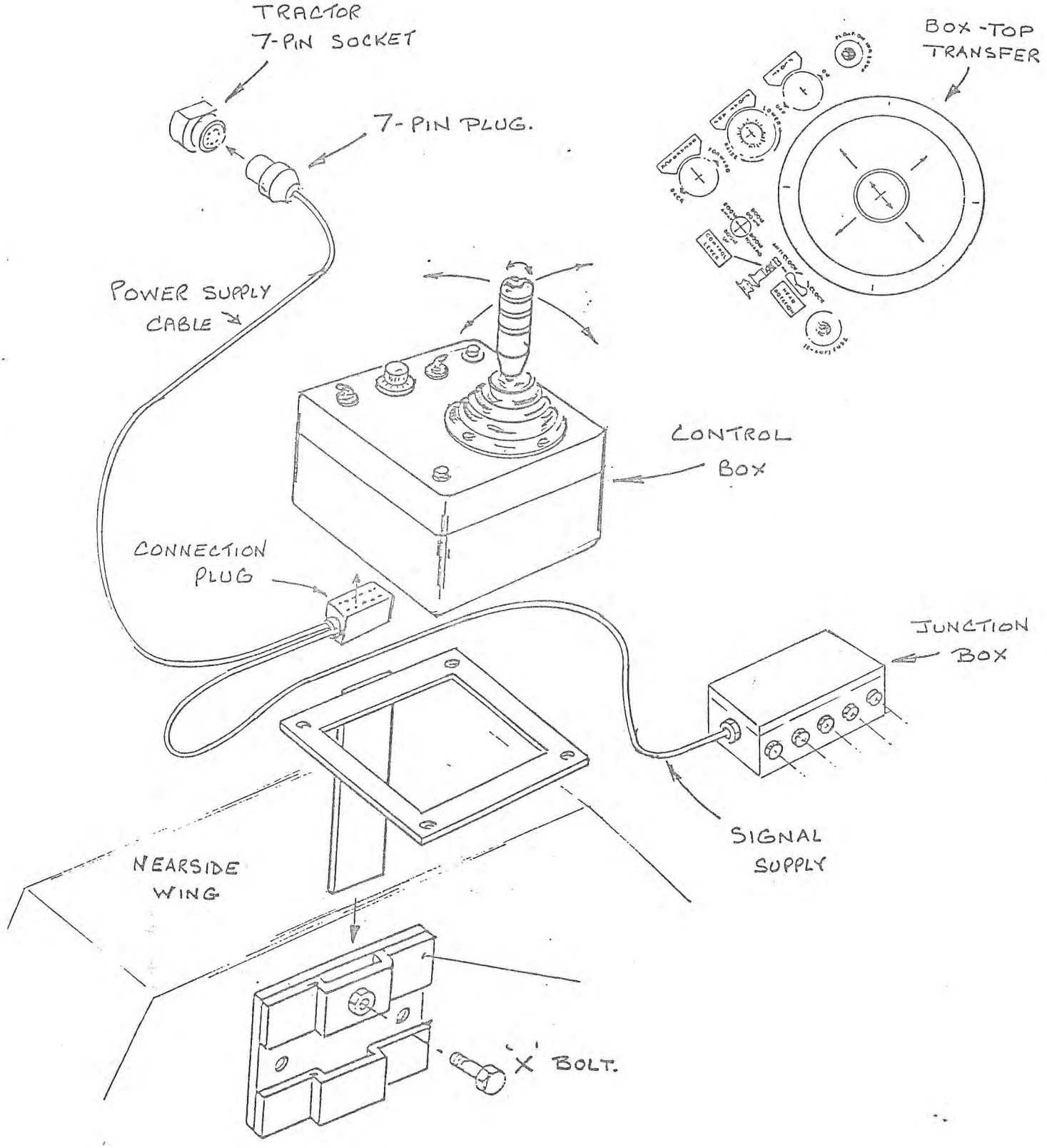
First - the control box locating bracket should be positioned to inner wing face at a suitable position to suit operator / lever operation. Secure support bracket to wing in chosen / selected position with bolts. Fixing of this bracket will depend on whether machine is L.H. or R.H. cut.

- 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.



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


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

DANGER

P.T.O. ENGAGE

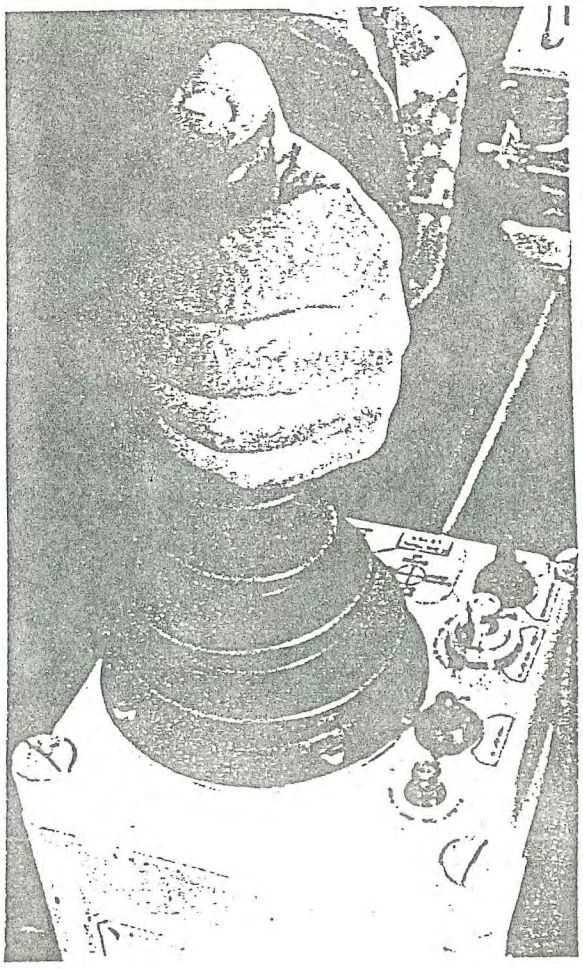
The tractor P.T.O. drive should be engaged very carefully. Ensure that shaft guard safety chains have been correctly located and that guard is not allowed to spin with shaft. Hydraulic oil will be pumping within the hydraulic system once the P.T.O. drive shaft is running.

DANGER

WARNING

JOYSTICK LEVER OPERATION

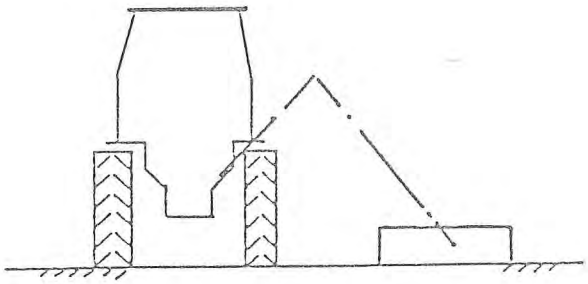
Test the hydraulic control systems of machine by operating the joystick control lever. This should be done with great care to ensure smooth and gentle movements of booms and rams etc. The controls should be operated and tested until operator gets a good feel for all operational movements.



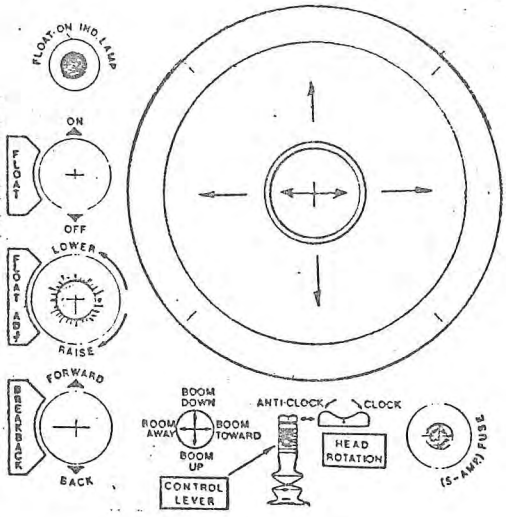
TO SET POWER FLOAT

1. Switch float switch to ON

2. Lower head to contact floor (Once head onto floor, pressure reduced) and float - red light will come on.



3. Adjust float pressure by turning potentiometer knob either clockwise for lighter/raise or anti clockwise for heavier down pressure.

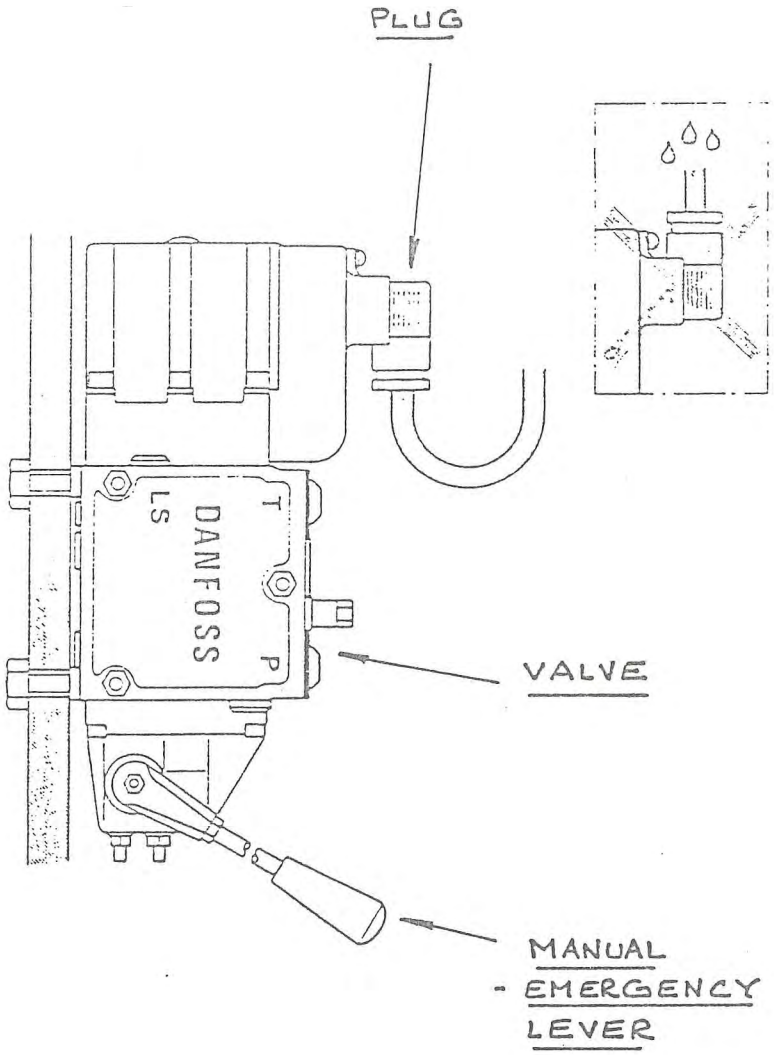


Note ensure setting of float gives a "JUST HEAVY" position to prevent machine rising from work. By turning clockwise to find where machine rises and then turning anti clock to lower machine back to floor and then - add just a little more anti clock to settle (approx $\frac{1}{2}$ of a turn).

(Final tuning must always be down to the individual operator)

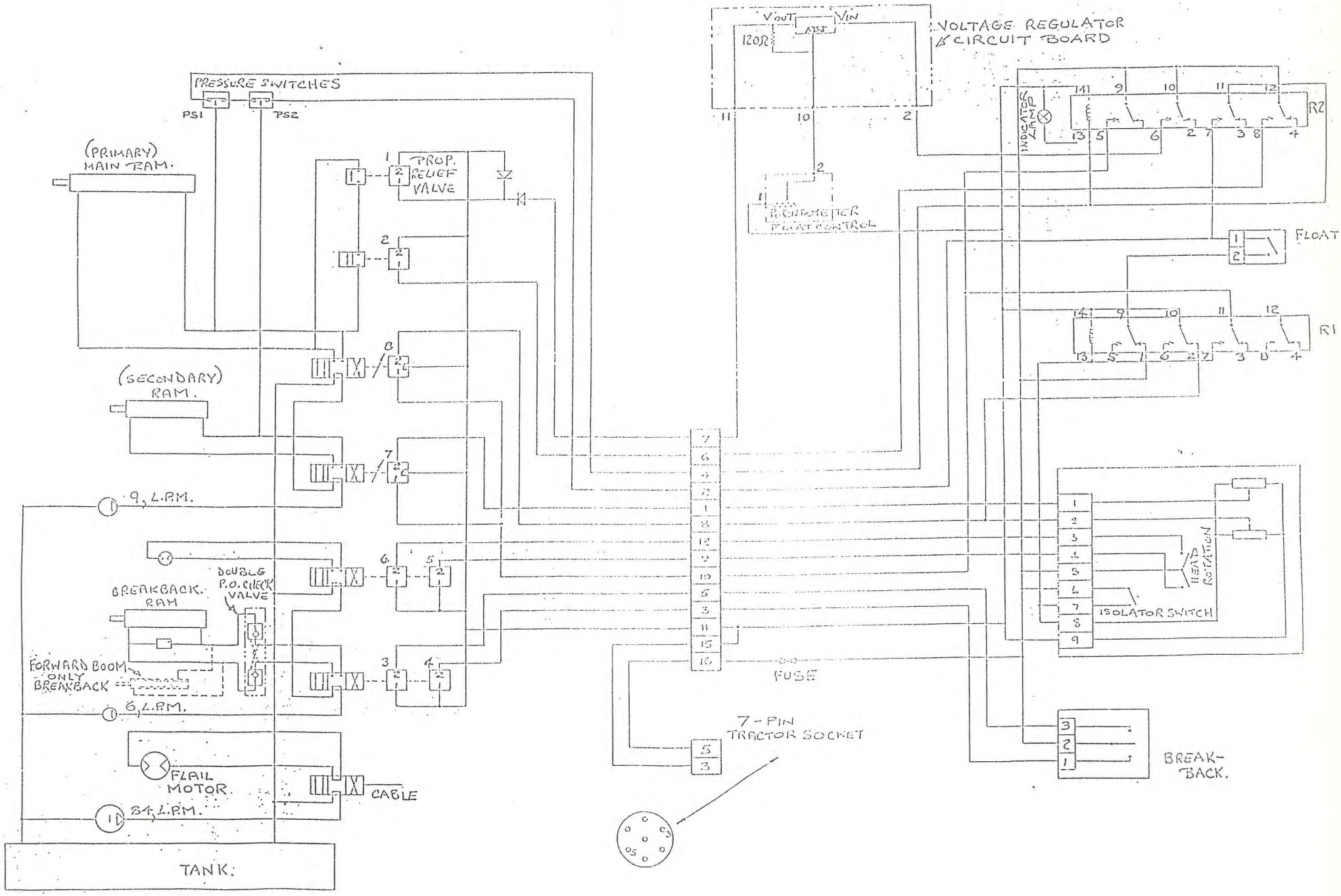
EMERGENCY - MANUAL CONTROL LEVER (ELECTRIC MACHINE)

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.

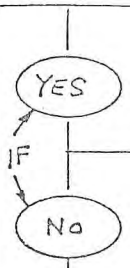
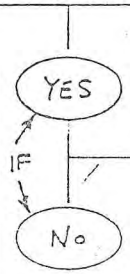
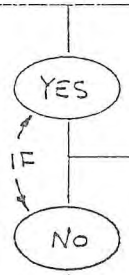
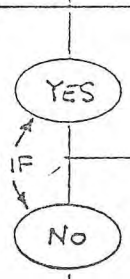


NOTE :- THIS EMERGENCY VALVE LEVER WILL ONLY FUNCTION AND OPERATE MACHINE PROVIDED HYDRAULIC SYSTEM IS WORKING.

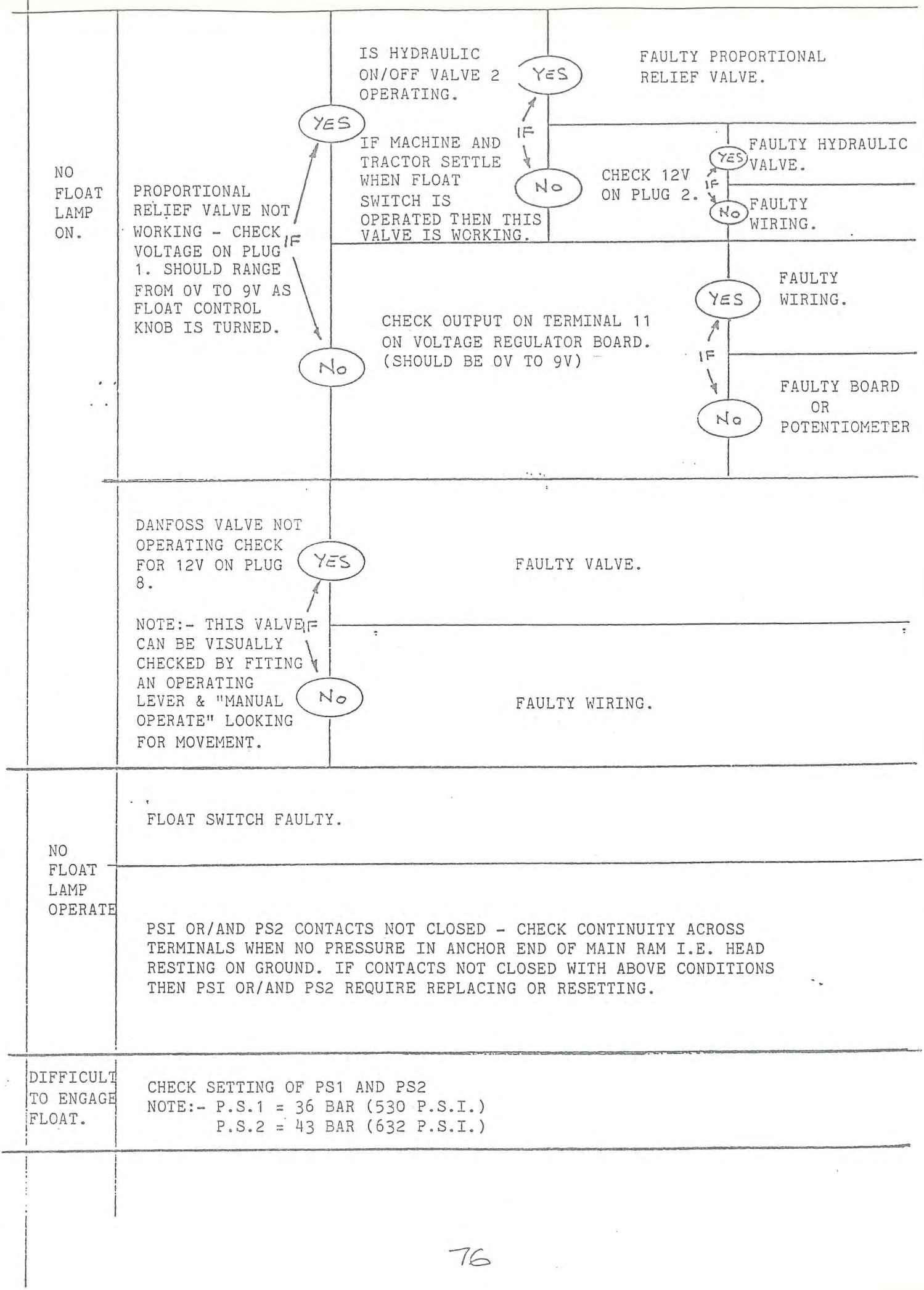
HYDRAULIC AND ELECTRICAL CIRCUIT

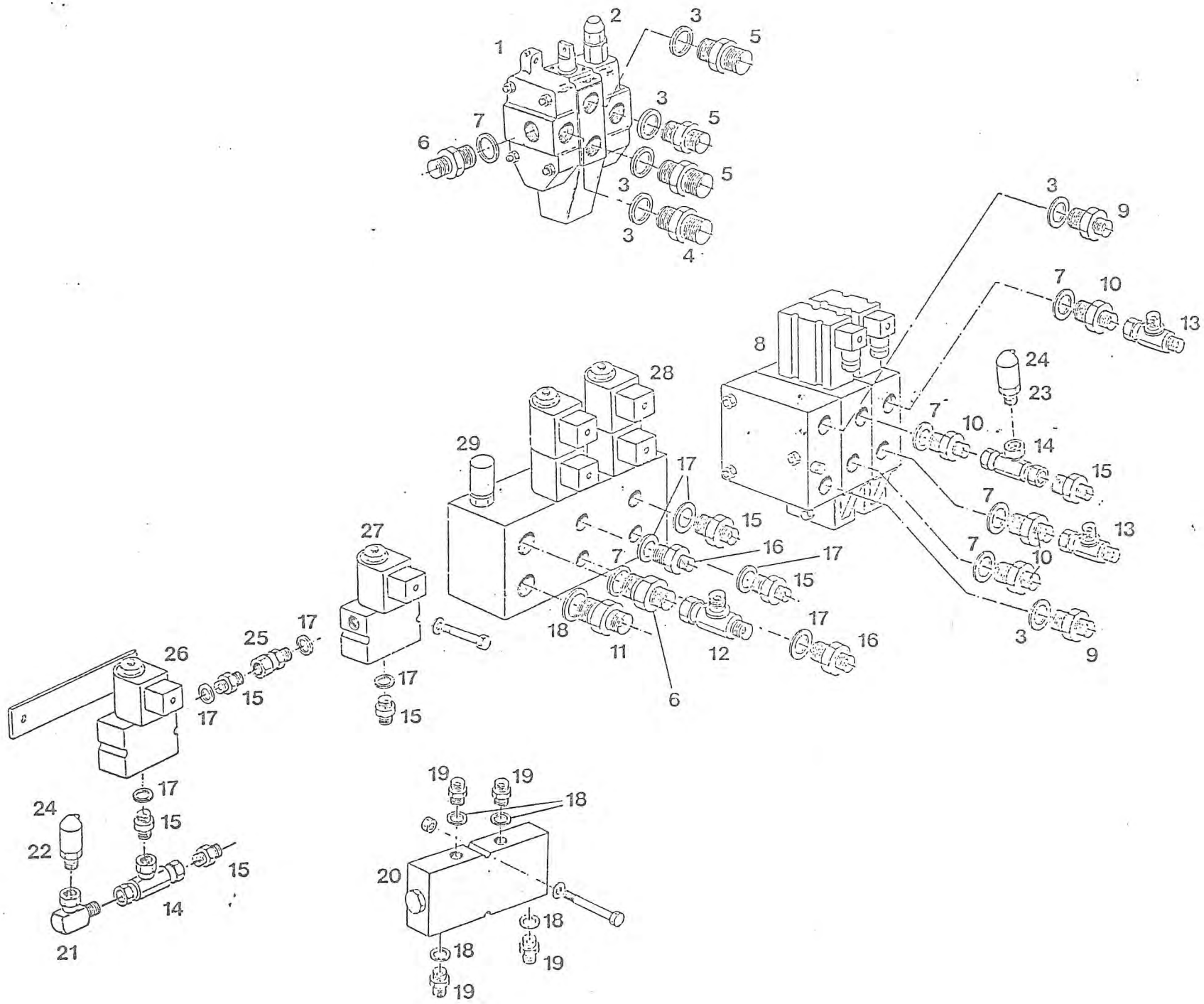


FAULT FINDING CHART

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 $\angle$ 360°	RELIEF VALVE NEEDS RE-SETTING (SHOULD BE SET TO 2250 P.S.I.) (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

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ELECTRONIC VALVES AND VALVE FITTINGS.

REF	PART NO	DESCRIPTION	QTY
1	7542	VALVE BLOCK V3, R210B , T6 MLX T6S4	1
2	7542.1	RELIEF CARTRIDGE (175 BAR) 2500 PSI	1
3	0934	SEAL ¾ " BSP	6
4	1836	ADAPTOR ¾" x 1" BSP	1
5	0935	ADAPTOR ¾" BSP x ¾" BSP	3
6	1826	ADAPTOR ½" BSP x ½" BSP	2
7	0909	SEAL ½" BSP	6
8	7577	VALVE PROPORTIONAL "DANFOSS"	1
9	1834	ADAPTOR ¾" BSP x ½" BSP	2
10	1825	ADAPTOR ½" BSP x ¼" BSP	4
11	0665	ADAPTOR 3/8 BSP x 3/8 BSP	1
12	5002	TEE ½" BSP F-M-M	1
13	7323	TEE ¼" BSP F-M-M	2
14	7604	TEE ¼" BSP F-F-F	2
15	1823	ADAPTOR ¼" BSP x ¼" BSP	7
16	7708	ADAPTOR ¼" BSP x ¼" BSP (RESTRICTED 1MM DIA)	2
17	1181	SEAL ¼" BSP	8
18	0670	SEAL 3/8 " BSP	5
19	1180	ADAPTOR 3/8 BSP x ¼" BSP	4
20	7716	CHECK VALVE - DOUBLE P.O.	1
21	6948	ADAPTOR ¼" M-FLN 91	1
22	7678	PRESSURE SWITCH (SET TO 38 BAR)	1
23	7585	PRESSURE SWITCH (SET TO 43 BAR)	1
24	7586	COVER FOR (7678 & 7585)	2
25	7305	ADAPTOR ¼" BSP M-FLN	1
26	7583	RELIEF VALVE FLOAT / PROP	1
27	7584	VALVE ON / OFF FLOAT C/W SCREEN	1
28	7706	BLOCK ASSY VMA 1035 CONSISTING OF :-	1
29	7580	RELIEF CARTRIDGE (125 BAR) 1812 PSI	1
*	7581	SOLENOID VALVE (SV 910A 012)INC SCREEN	2
*	7579	BLOCK ONLY	1
*	7582	PLUG ELECTRICAL, 710775	2