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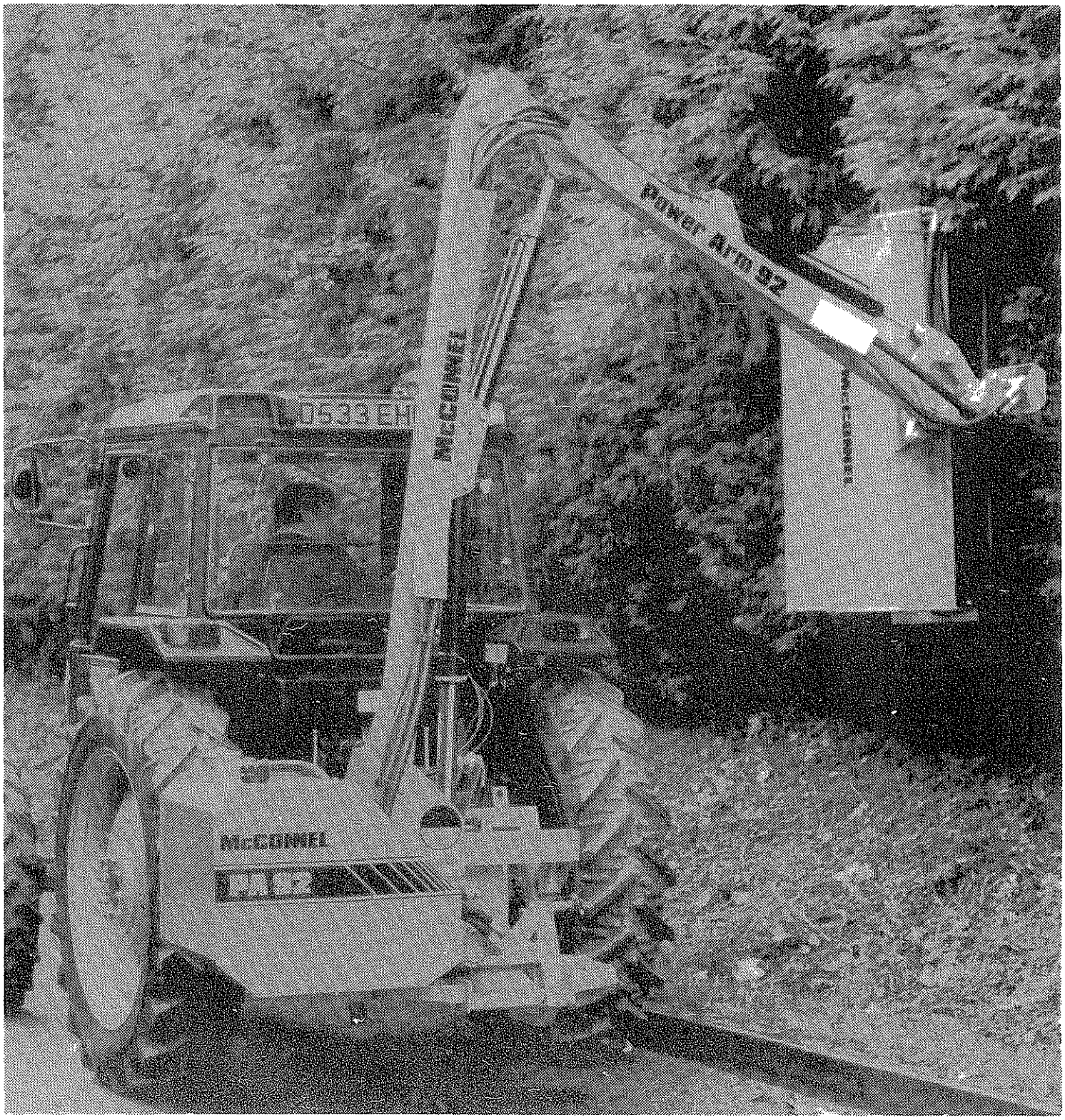
PA 92S

Operation & Spares manual



READ THE BOOK FIRST

It might save hours and pounds later

When ordering spare parts always quote the machine type and serial number as well as the part number

Factory re-built service exchange units of the major hydraulic components are available from you dealer.

NOISE

The equivalent daily personal noise exposure from this machine, measured at the operators' ear, is within the range 78 - 85 DB.

These figures apply to a normal distribution of use where noise fluctuates between zero and maximum. The figures assume that the machine is fitted to a tractor with a quiet cab with the windows closed in a generally open environment. We recommend that the windows are kept closed.

With the cab rear window open the equivalent daily personal noise exposure will increase to a figure within the range 82-88 DB.

At equivalent daily noise exposure levels of between 85 and 90 DB, ear protection is recommended, it should be used if any window is left open.

LIST OF CONTENTS

GENERAL INFORMATION

Read this manual before fitting or operating the machine. If in doubt contact your dealer or the McConnel Service Department for assistance.

Use only McConnel spare parts on McConnel equipment and machines. Refer to the parts section before ordering spares.

DEFINITION

The following definitions apply throughout this manual:

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

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

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

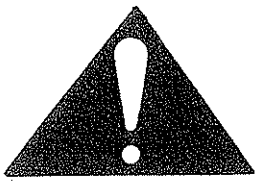
LEFT AND RIGHT-HAND

This term is applicable to the machine when fitted to the tractor and viewed from the rear. This also applies to tractor references.

Record the serial number of your machine on this page and always quote this number when ordering spares. Whenever information concerning the machine is requested remember to also state the type of tractor to which it is fitted.	
MACHINE SERIAL NUMBER	INSTALLATION DATE
MODEL DETAILS	
DEALERS NAME	
DEALERS TELEPHONE NUMBER	

SAFETY PRECAUTIONS

WARNING



NEVER ... permit inexperienced personnel to operate the machine without supervision.

... stand under the raised flail head

... cut over the far side of a hedge with the flail cutting towards the operator.

... continue to operate the flail when wire has wrapped around the rotor.

... leave the tractor seat with the flail still rotating.

... operate the flail without the correct hood properly fitted in position.

... exceed 540 rpm on the p.t.o. shaft

... stop the engine with the p.t.o. engaged

... operate the machine without a cab safety guard

... operate the machine without the p.t.o. shaft guard in position.

ALWAYS ... inspect the work area or hedgerow for wire, steel posts, large stones, bottle and other dangerous materials and remove them before starting work.

... ensure bystanders are kept away from the machine during all flailing operations.

... check frequently, nuts and bolts for tightness and also check roll pins, shackles and flails for security.

... replace missing or damaged flails as soon as possible to avoid vibration and damage to the machine.

... disengage the p.t.o. and stop the tractor engine before making any adjustments.

... Take extra care when working close to or manoevring around overhead obstructions especially power lines

CAUTION One of the features of the Power Arm is the ability to cut close to the tractor in confined spaces. This means that in some instances the flail head casing can be made to foul the tractor if reasonable care is not observed.

INTRODUCTION

The PA 92 features :-

- Three point linkage mounting
- Totally independent or semi independent hydraulic systems with 25 gallon reservoir
- 45 Hp or 50 Hp hydraulic systems
- Independent reversible rotor ON/OFF valve (Ti models only)
- Cable controls
- 1.2M Hedge or grass flail heads with options of two rotors and six flails
- Spring assisted automatic gravity resetting breakaway mechanism
- Right or left hand cut
- Operator guard

FITTING

TRACTOR SELECTION

Linkage requirements

The power Arm 92 will fit almost any tractor with a category II linkage.

Linkage isolation

Although it may be possible to operate the semi independent version of the PA92 without linkage isolation a severe strain would be put upon the attachment yoke and pins. Most modern tractors are equipped with a ready means of providing linkage isolation is not required on the fully independent model of the PA 92 and the tractors hydraulic controls should be neutralised.

Check chains/stabilisers

To hold the machine firmly in position, check chains or stabiliser bars must be fitted. It is dangerous to operate the machine without.

Tractor relief valve

The main relief valve in the hedger hydraulic control unit is set at 2000 PSI (140 Bar). Therefore if operating the PA92 in semi independent form the tractors relief valve setting must be at least a little above this figure for satisfactory operation.

Tractor hydraulic flow rates

Oil flow rates are not crucial when operating a semi independent PA 92. Flow rates of up to 10 gpm (45 l/min) should not have any adverse affect to the inching response that is sometimes required from the control valve.

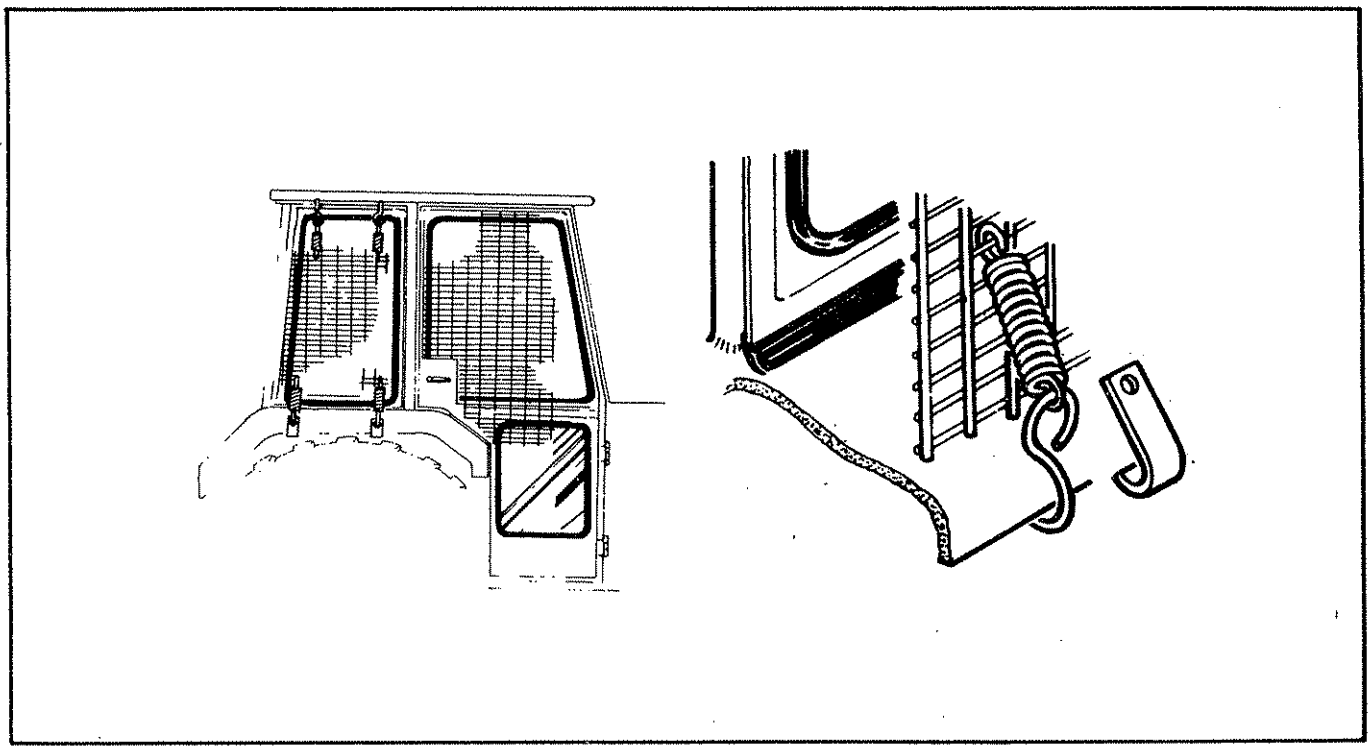
P.T.O. shaft

Tractor must be equipped with live drive independent PTO shaft to enable forward movement to be halted while the flail head continues to operate.

Draft control

Loads imposed through the draft sensing mechanism will not normally be sufficient to put a strain on the tractor, however any provision for draft control should be set to minimum response. Where a draft control rocker is fitted with a dead pin position this should be utilized.

TRACTOR PREPARATION



Fitting operator guard.

Use tractor with safety glass windows if possible and fit operator guard Part No. 73 13 324 using the hooks provided.

Shape mesh to cover all vulnerable areas. Remember the driver **must** be looking through mesh at the flail hed in **any** working position.

If windows are not laminated safety glass polycarbonate glazing must also be fitted.

If tractor has a roll bar only, a frame must be made to carry both mesh and polycarbonate glazing.

Wheel width

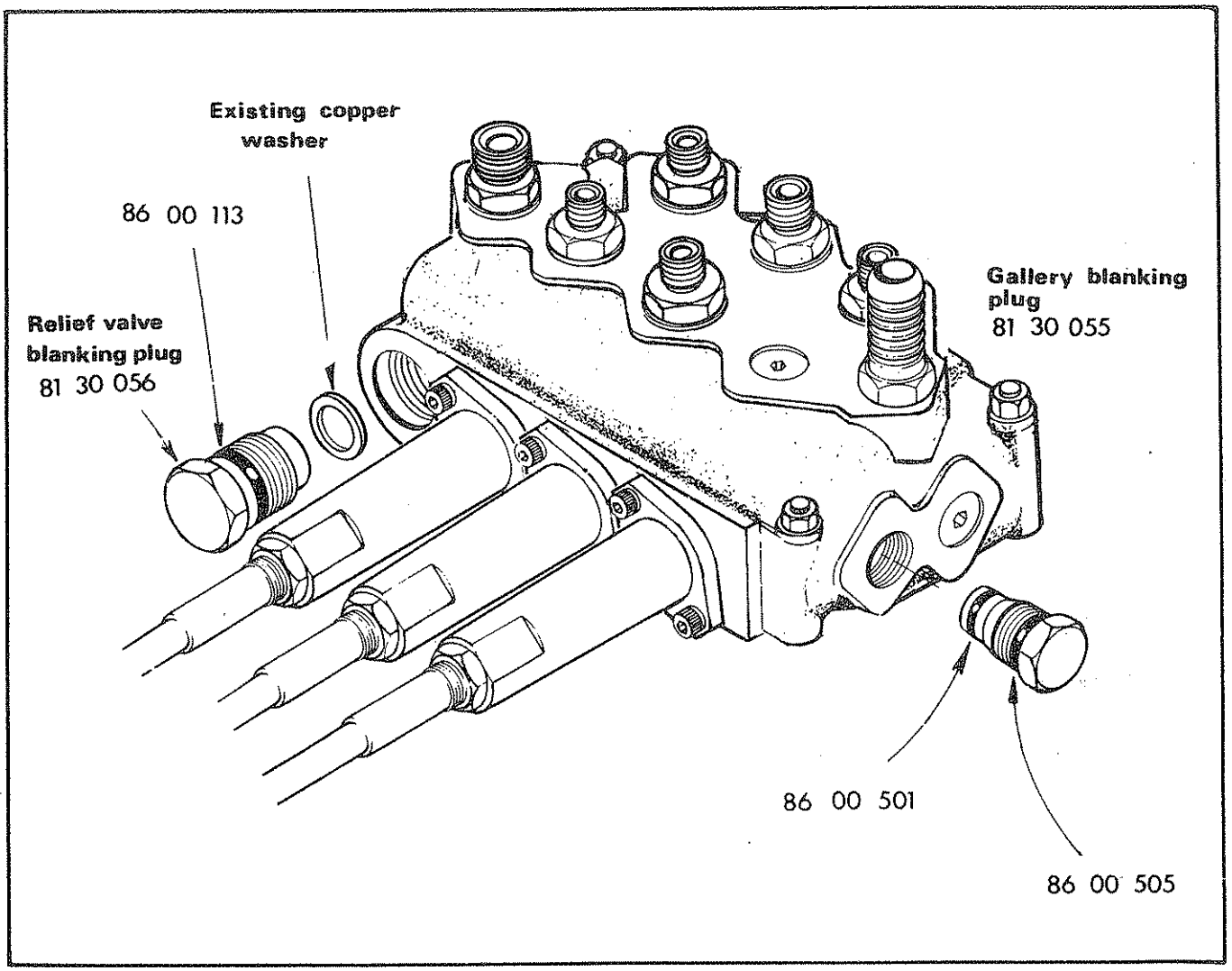
Set wheel widths as wide as possible.

Ballast weight.

Add ballast weight whenever necessary within tractor manufacturers recommended limits to ensure stability under all working conditions.

Lift links

Adjust lift links until they are equal length.



JOHN DEERE CONVERSION KIT 81 30 059 for S.i. models

John Deere

The John Deere utilises a 'closed centre' hydraulic principle and because of this it is necessary to modify either the tractors external oil supply or the flails main control valve

These are the following two alternatives.

1. A flow limiting valve manufactured by John Deere is available to provide an 'open centre' external supply. For further advice consult your John Deere dealer.

2. A control valve conversion kit Part No. 81 30 059 consists of a relief valve blanking plug which should be installed in place of the existing relief valve and a pressure gallery blanking plug which is installed in place of the standard blanking plug at the valve outlet end next to the lift ram gland connection.

Take care when extracting the relief valve not to damage the copper sealing washer as it is re-used.

When working in this mode the tractor's pressure control valve must not exceed 2500 P.S.I (170 Bar).

DELIVERY

The machine is delivered in a partially dismantled condition. To make ready for attachment to the tractor it will be necessary to:-Select a hard level surface.

*Cut the banding straps and remove loose items.

*Fill the reservoir to capacity with oil selected from the chart on page II to increase the stability of the machine.

*Remove and discard the transport strap connecting the flail head to the frame.

ATTACHMENT TO TRACTOR

*On Si model reverse the tractor up as closely as possible and connect the return and supply hoses to the tractor. Fit suitable return connection to the tractor and connect the return hose before connecting the supply hose to the tractors external services point with a suitable self seal coupling.

Ensure the lift ram tap is fully open.

*With the aid of a crowbar prise the flail head sideways until there is sufficient clearance to allow the tractor to be reversed up and the draft links connected. Assistance will be needed to simultaneously select "Reach out" and "angle down" to allow the oil to flow whilst the arms are being moved.

WARNING

As a safety precaution to prevent the possibility of the flail head slipping sideways and the arm collapsing on the fitter as he is prying the head sideways a loop of strong rope or wire, with sufficient slack to allow the required flail head movement should connect the frame and dipper. This will then act as an arrestor in the event of this happening. Leave in position until attachment is complete.

Adjust tractor drop arms to enable the draft links to lower within 15 ins (375mm) of the ground.

Remove the top link and machine yoke completely.

Reverse the tractor squarely to the front of the machine, engage draft link pins and secure.

Attach yoke to the top hitch position on the tractor ensuring the lug for the top link is uppermost.

Unlimber the machine controls from its storage position and lift into the tractor cab. see page 10

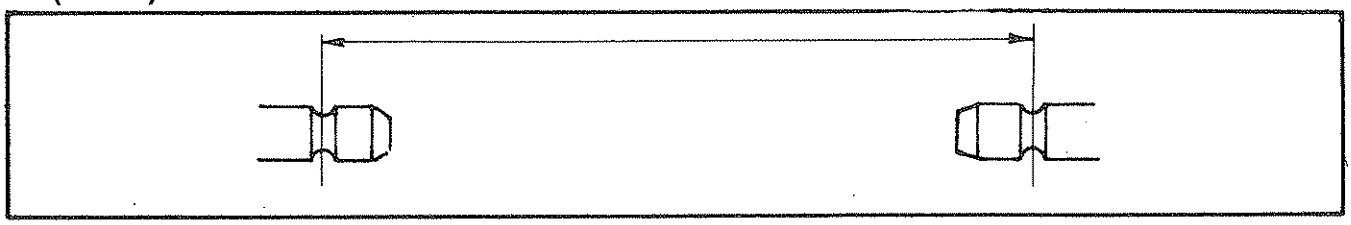
Install the top link between yoke and upper hitch position on the machine. If necessary fitting Cat. 1 sleeves into the ball ends of the top link.

* Raise the machine on its three point linkage to the working height i.e. when the PTO shaft and the gearbox stub shaft are as near as possible in a straight line.

WARNING

Do not operate quadrant lever or machine controls through the rear cab window whilst standing on or amongst linkage components. Always seek assistance.

* Measure the P.T.O. drive shaft length as shown in the diagram below and subtract 1 inch (25mm).



* This measurement which is the fully closed final length of the PTO drive shaft measured button to button should be taken carefully before the PTO drive shaft is shortened to suit by cutting off both the driving and driven members of the tube by an equal amount. Likewise the plastic shield will similarly have to be cut. Take heed that if too much is cut off it cannot be stuck back on. Measure twice and cut once. Accurate measurement is important on some close coupled tractors to ensure maximum engagement during operation.

Lower the machine to the ground and fit the P.T.O. shaft in position. Ensure that the collar locking devices on the P.T.O. shaft are fully engaged and wrap the torque chain around the tractor drawbar or any convenient point to prevent the shaft guard from rotating.

Raise the machine to the working height.

Check that the rotor control valve is in the stop position (Ti model only)

With P.T.O. engaged on Ti model or with tractor external servicesactivated on Si model (see page 12) select "Lift down" this will level the frame and enable the lower yoke pins to be fitted. Select the hole which will, as near as possible position the P.T.O. shaft horizontally in line.

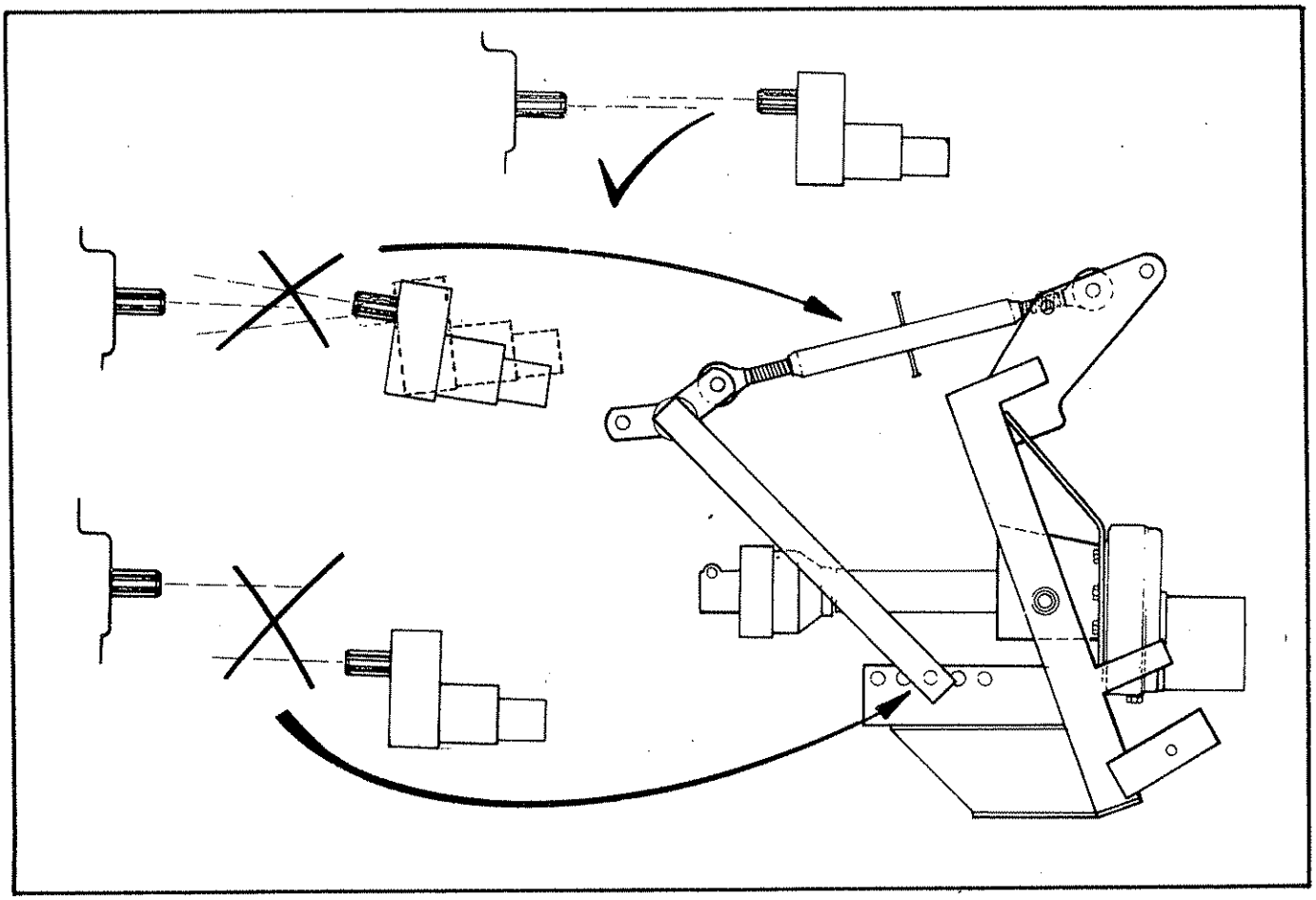
Lower the quadrant lever so that the machines weight is taken by the yoke.

Adjust the top link to bring the pillar upright.

*Remove the rope arrestor loop.

Carry out final adjustment of the tractor lift arm levelling box to bring the main frame horizontal. This should be checked with the arms at approximately half reach with the flail head clear of the ground.

Tighten up the check chains or adjustable stabilisers to hold the machine rigid with out side-sway.



Remove the parking feet, turn inward 90 degrees and re-locate in their housings.

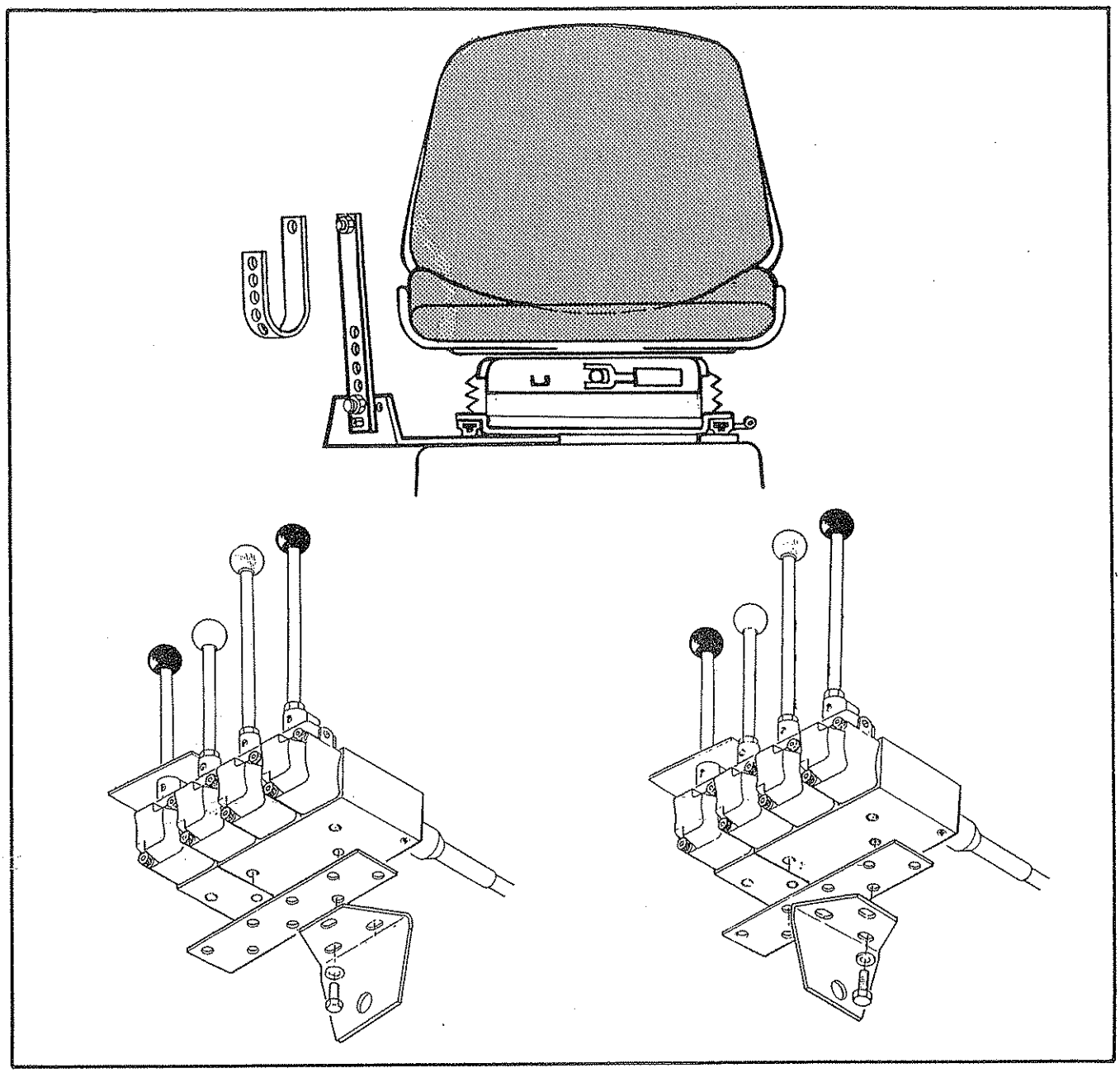
Carefully operate the machine through its full range of movement whilst checking that the hoses are not strained, pinched, chaffed or kinked and that all movements are functioning correctly.

* Assemble the cover plate and the hedge hood into position

Fold the machine into the transport position (see page 15)

The machine is now ready to procede to the work site

This procedure is for initial attachment only, for subsequent attachment paras marked * do not apply.



FITTING CONTROL UNIT IN CAB

A bracket is clamped between the seat runners and their mounting base. Attached to this is a stalk which carries the control units. Modification to either may be necessary to achieve a comfortable working position.

On tractors other than the quiet cab models the stalk can be bent and bolted to the mudwing or the cladding of the cab ensuring that no structural member of the safety frame is drilled. See 'B'.

The control unit is bolted to an angled mounting bracket in either a transverse or longitudinal position thus giving a variety of mounting positions, which in conjunction with the flexibility of the mounting pillar will enable a satisfactory working position to be achieved.

In deciding the final position of the control box remember not to exceed the minimum acceptable bend radii of 8" for the cables.

The handles may be screwed into alternative holes in the levers to give an 'in line' installation should it be desirable.

OIL REQUIREMENTS

Tank

Fill the reservoir with 25 galls (117 litres) of oil selected from the chart below or their equivalents. Do not overfill.

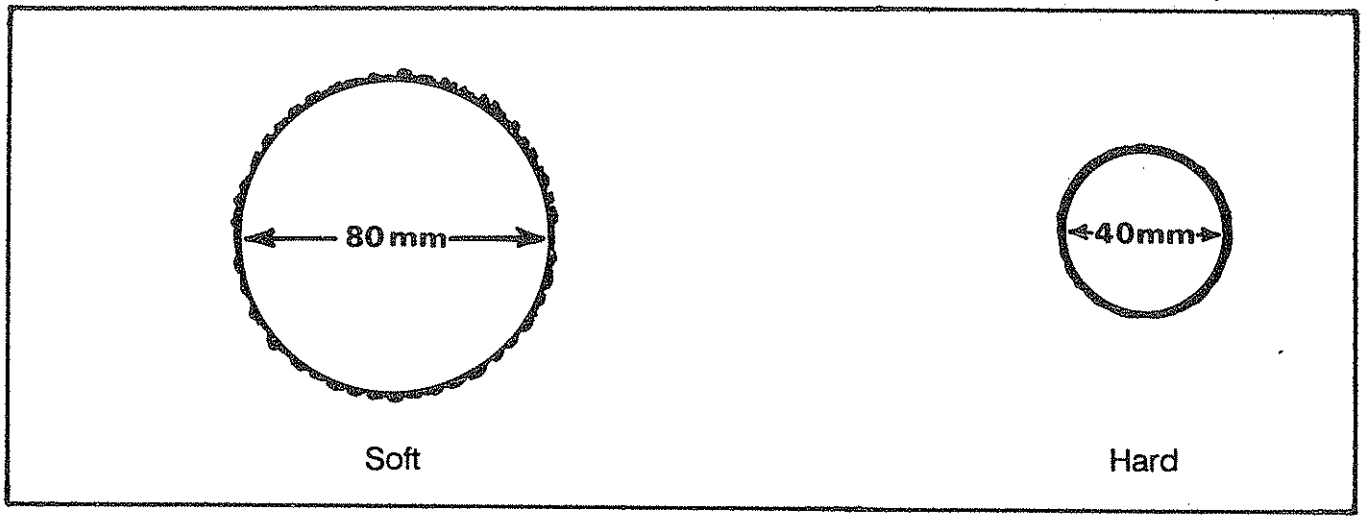
Supplier	Cold or temperate climate	Hot climate
Castrol	Agricastrol hydraulic oil Hy-spin AWS32	Hy-spin AWS68
Shell	Tellus 37	Tellus 6
Mobil	D.T.E.25	D.T.E. 26
Esso	Nuto 'H' or 'A' 32	Nuto 'H' or 'A' 68
Texaco	Rando HD 32	Rando HD 68
Gulf	Hydrasil 32	Hydrasil 68
B.P.	Energal HLP 32	Energal HLP 68
Dalton	Silkolene Dove 32 or Derwent 32	Silkolene Dove 68 or Derwent 68
Elf	Hydrelf 32	Hydrelf 68

Gearbox

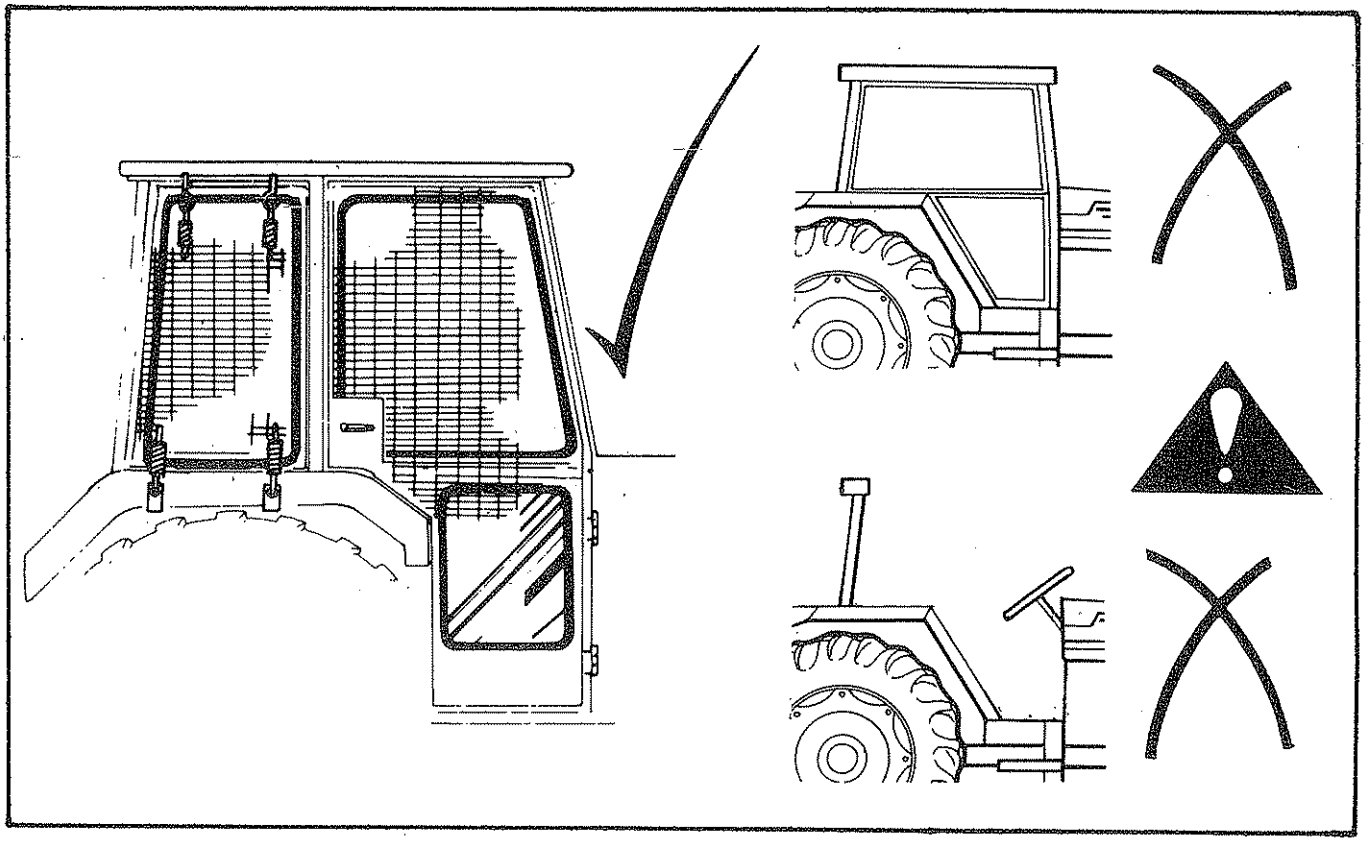
Check the gearbox oil level. On level ground gearbox should be fitted until oil dribbles out of the level plug. Top up if required with SAE 30/50 Universal tractor oil.

OPERATION

MATERIAL THICKNESS CUTTING LIMITATIONS



OPERATOR GUARD



PREPARATION

Read the book first

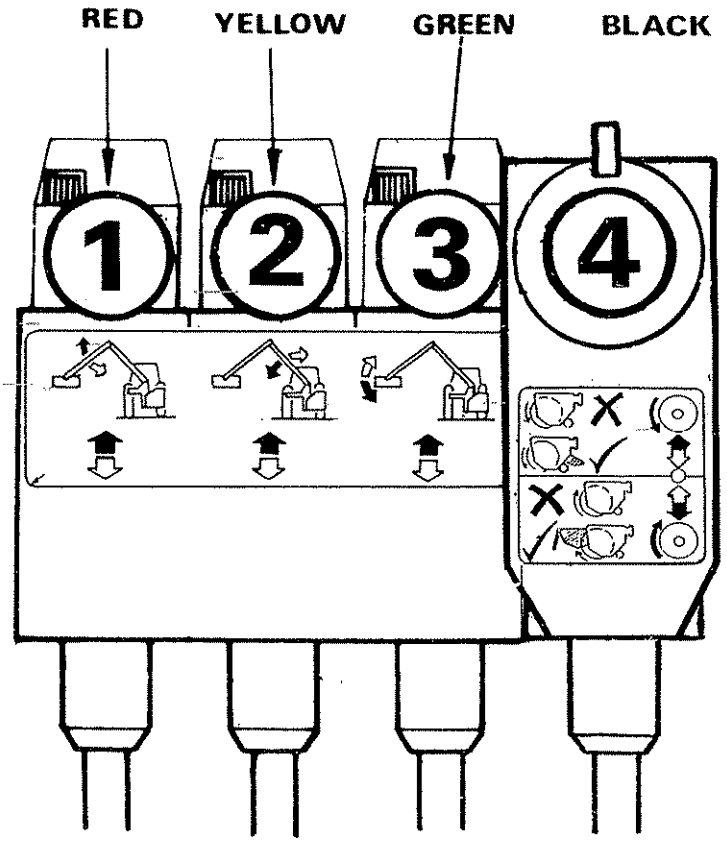
Practise in an open space without rotor running until familiar with controls.

Caution: Take care when working with the head close in as it can hit the tractor

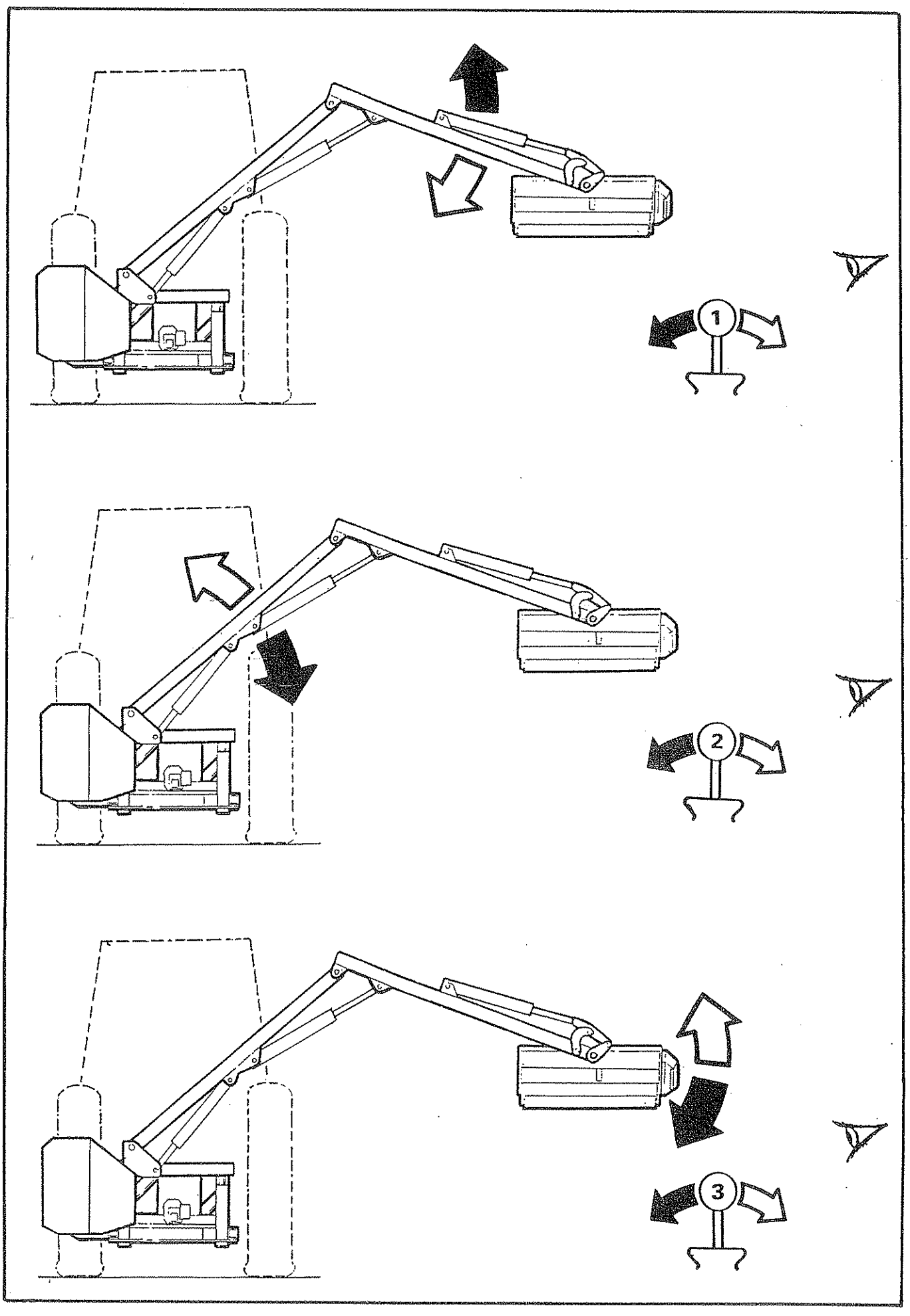
TRACTOR CONTROLS

For Si models only the tractors linkage will need to be isolated.

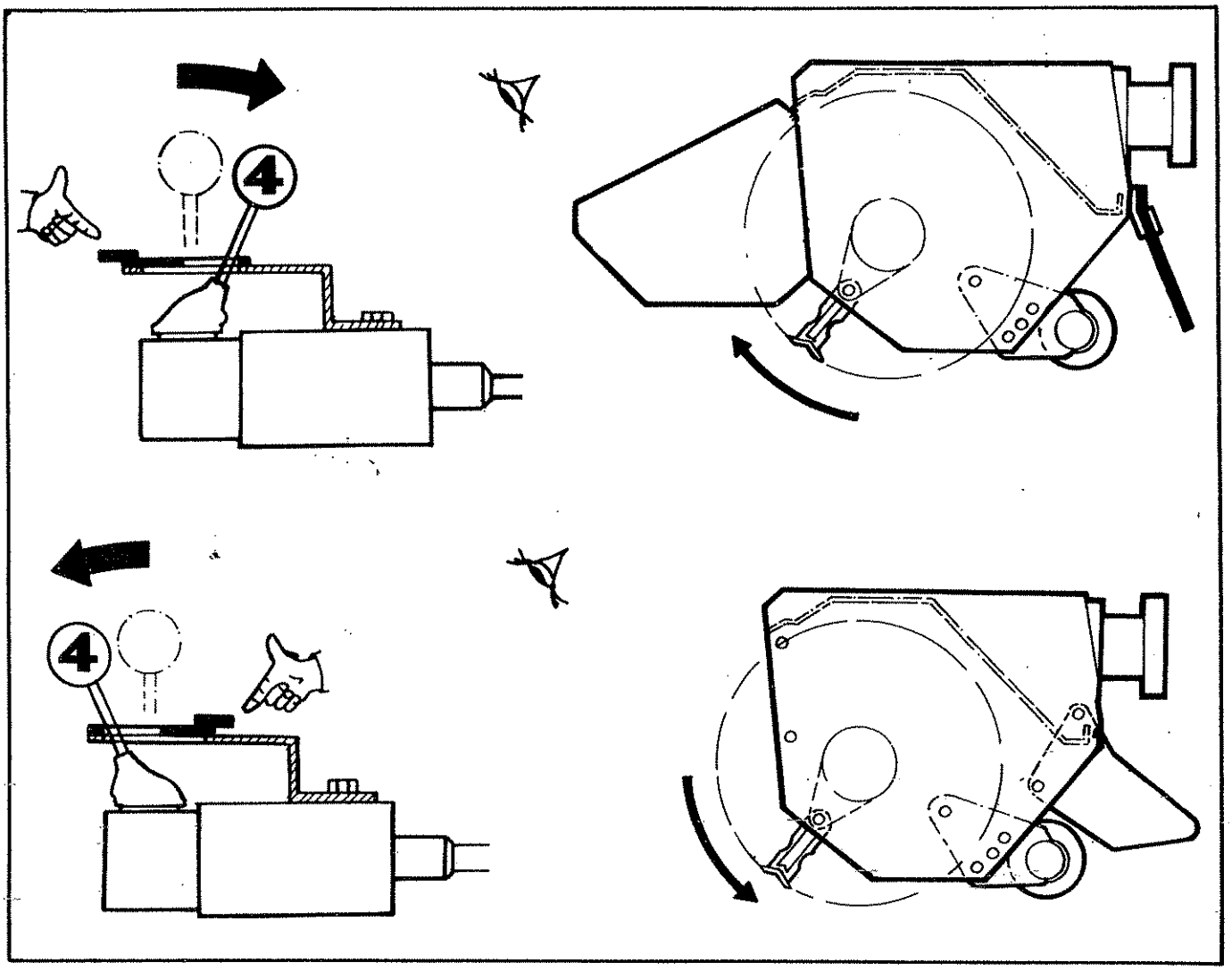
MACHINE CONTROLS



ARM CONTROLS



ROTOR CONTROLS - T.I. only



ROTOR ON/OFF - S.I. only

Rotor on/off is controlled by operation of the tractors P.T.O. lever

To start rotor :-

Bring tractor engine revs up to 1000 RPM

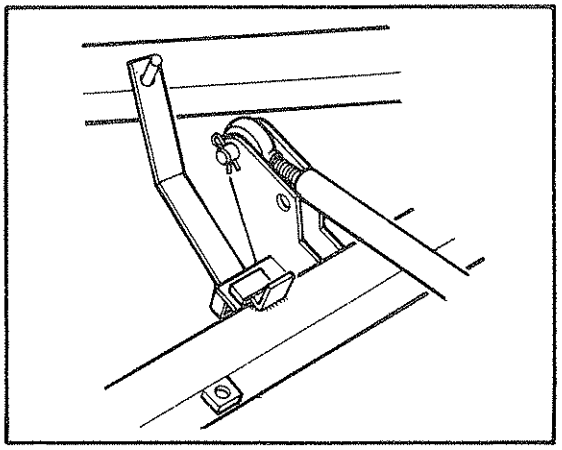
Engage P.T.O.

To stop rotor :-

Disengage P.T.O. Do not leave tractors seat until the rotor is stationary.

TRANSPORT POSITION

With the armhead in the working position at right angles to the main frame, the flail can be raised and folded to close proximity of the tractor wheel.Where it is desirable to fold the machine to within tractor's overall width it is necessary to lock the armhead back in the breakaway position by engagement of the breakaway lock pin.

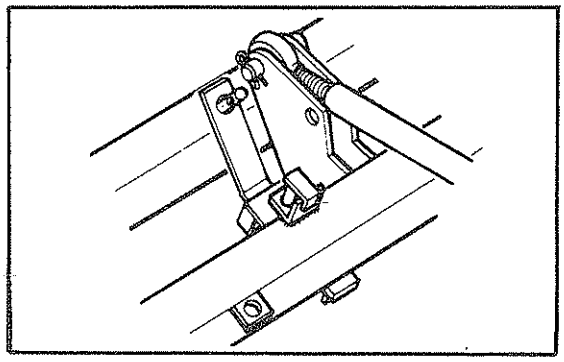


This is best done by releasing the lock pin, placing the flailhead on the ground and driving forwards, while at the same time operating the 'main arm down' lever.

The released lock pin will drop in and locate itself behind the breakaway bar when maximum position is reached. The flail head should then be angled inboard to a vertical position.

MOVING FROM THE TRANSPORT TO THE WORK POSITION

To revert back to the working position it is only necessary to place the flail head firmly on the ground, drive the tractor forward sufficiently to take the weight off the breakaway bar, when the lock pin can then be raised and turned so that its head is held against the protruding lug onthe frame.



The arm can then be returned to the work position by either reversing the tractor or by operating the 'lift' control to raise the head which allows the breakaway mechanism to position the flail head for work.

ENGAGING DRIVE

a) Fully independent model

Ensure that the rotor control lever is in the " OFF " position and the lever stop gate allows the required flail rotation.

Engage P.T.O.shaft

Allow the oil to circulate for a few minutes

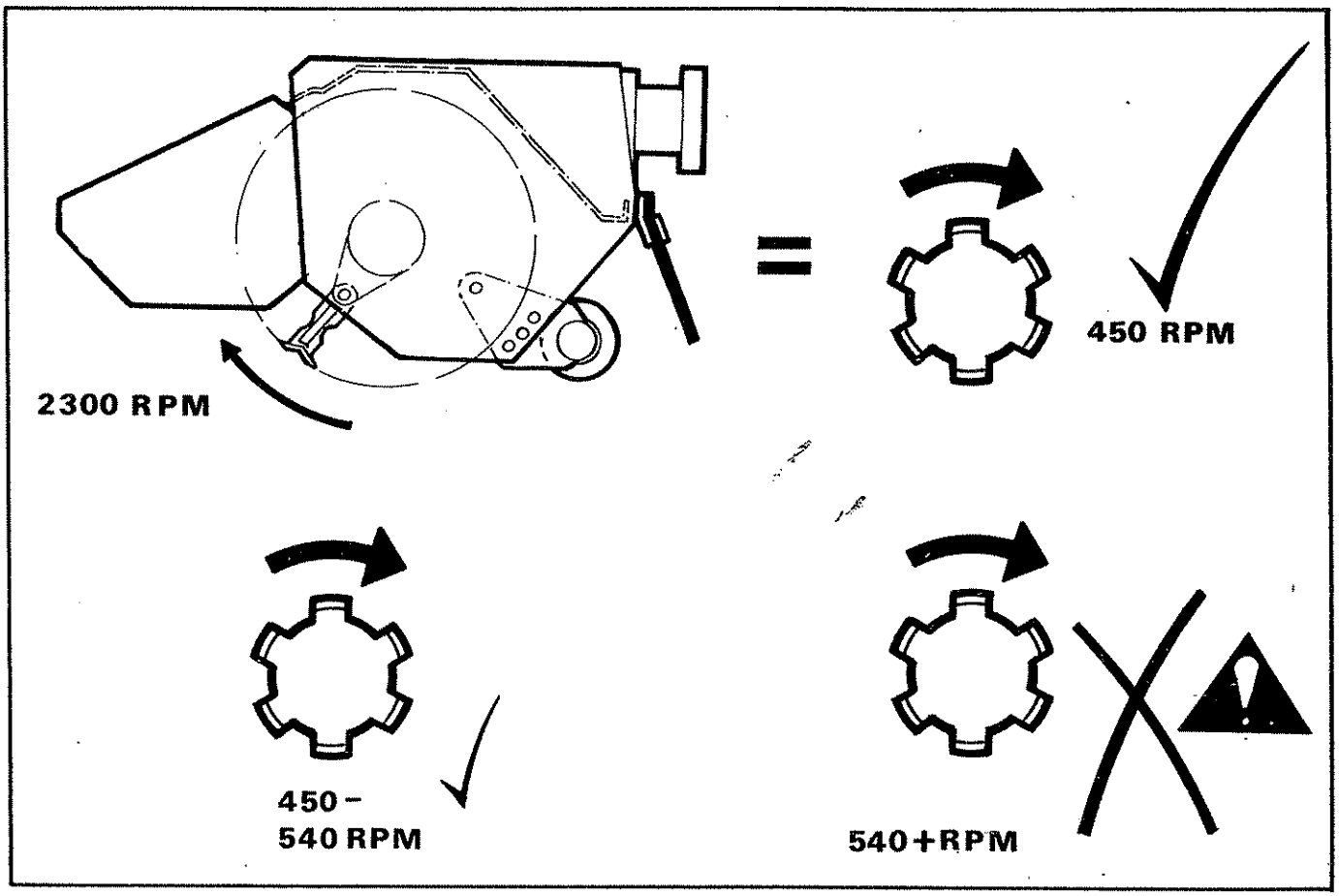
Place the flail head in a safe positiopn

Increase the engine speed to a high idle and move rotor control lever to "ON". After initial surging the rotor will run at an even speed.

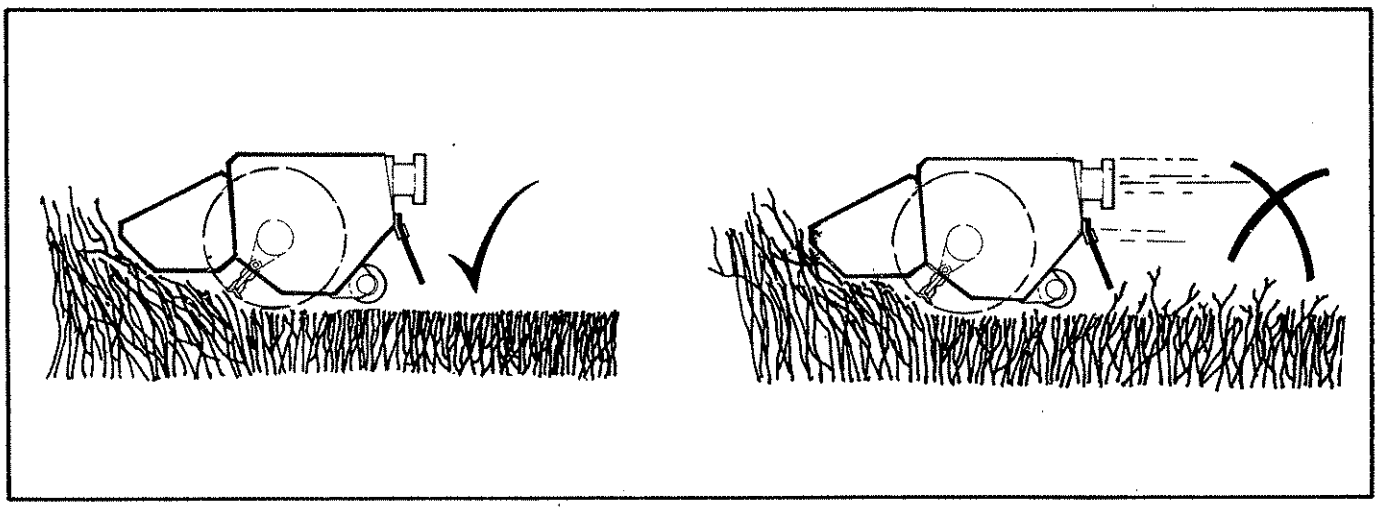
b) Tractor supply model.

Place the flail head at a safe attitude and bring the tractor engine revolutions to 1000 r.p.m. to avoid stalling when the starting load is placed on the motor. Engage the P.T.O. and slowly increase revs. until operating speeds are attained.

ROTOR OPERATING SPEED



TRACTOR FORWARD SPEED



HIGHWAY WORKING

Local highway working regulations must be observed at all times.

WARNING

It is the operators responsibility to observe these regulations and to keep bystanders at a safe distance.

GENERAL WORKING PRACTISES

It is the operators responsibility to develop safe working procedures.

Always:-

Be aware of hazards in the vicinity

Make sure **all** guards are in position and in good condition.

Disengage P.T.O. **before** stopping the engine.

Wait until the flail has stopped running **before** leaving the tractor seat.

Disengage the P.T.O. and **stop** the tractor engine **before** making any adjustments.

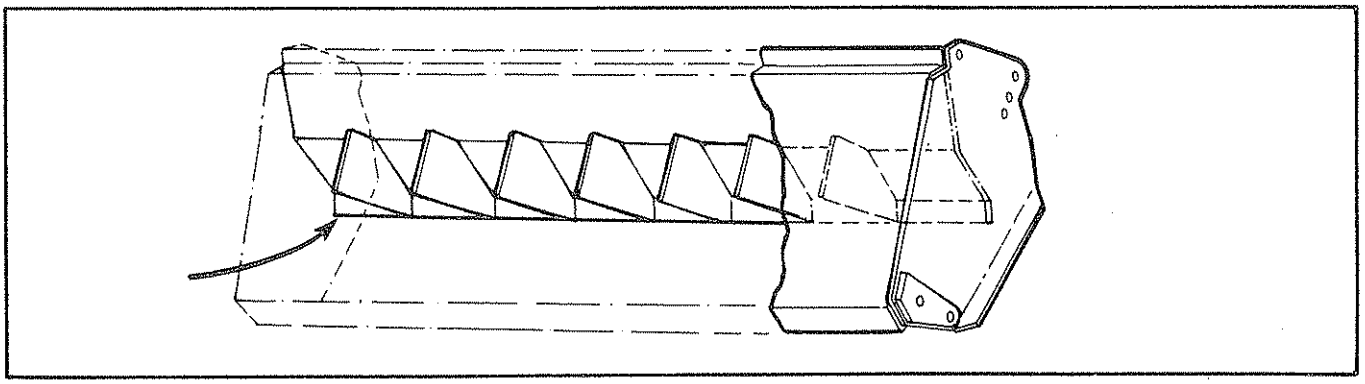
Check frequently that all nuts and bolts are tight.

Keep bystanders at a safe distance.

BREAKAWAY ACTION

When the flail head meets an obstruction and the tractor continues to move forward, the complete armhead which is hinged on the frame will be forced backwards and upwards at the same time in an effort to clear the obstruction. Resetting of the breakaway is completely automatic with the armhead returning to its working position under its own weight.
Breakaway reset forces are absorbed by rubber damper.

WIRE TRAP



Both flail hoods are equipped with a wire cutting edge welded into the underside. This plate should not be interfered with in any way.

Any wire caught in the rotor must be immediately removed.

REMOVING WIRE

Select rotor **'OFF'** and wait until it has **stopped rotating.**

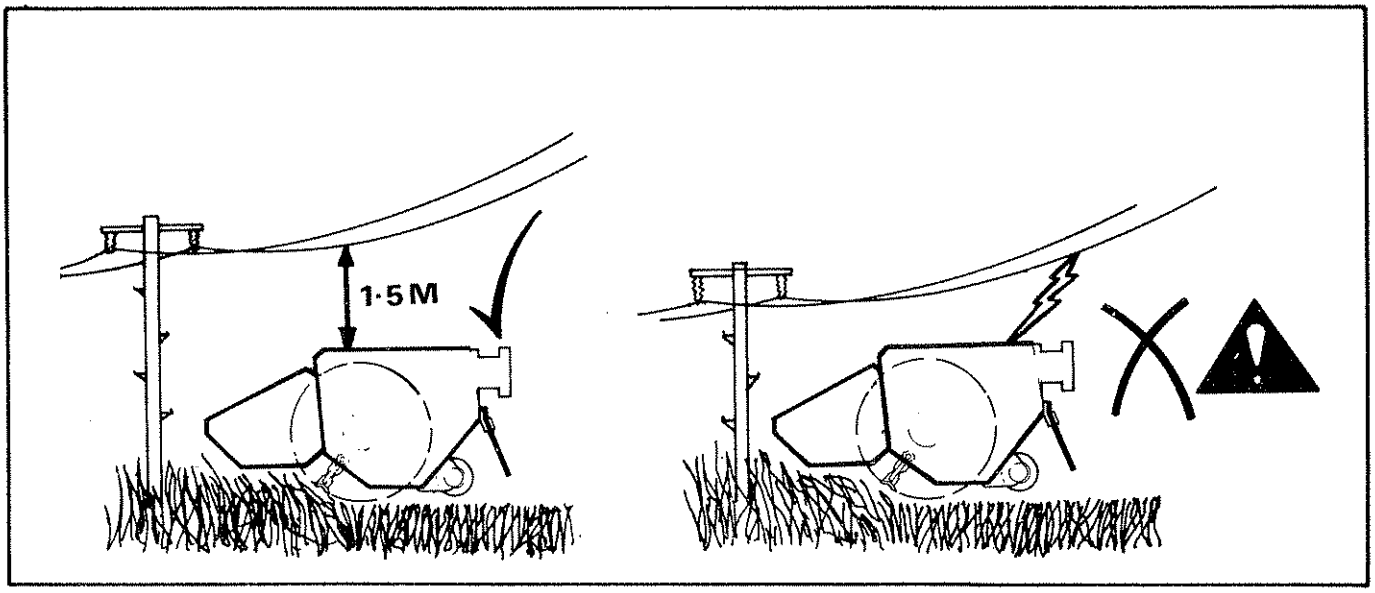
STOP the tractor and only then remove wire.

Do not reverse the rotor in an attempt to unwind any wire.

OVERHEAD OBSTRUCTIONS

Always be aware the machine is approximately 4 metres high when folded and take extra care when manoeuvring in areas with overhead obstacles especially power cables.

HIGH VOLTAGE CABLES



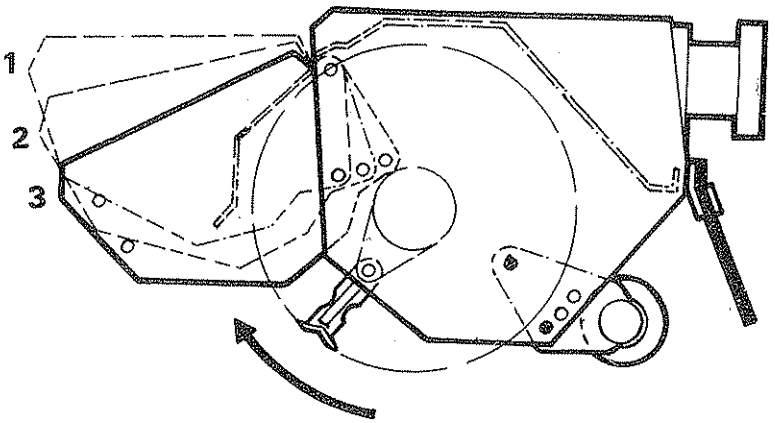
If in doubt consult your local electricity company regarding a safe procedure for work.

HEDGE CUTTING PROCEDURE

Preliminary Precautions

Inspect the work area, remove hazardous materials and note any immoveable obstructions.

Upward cutting



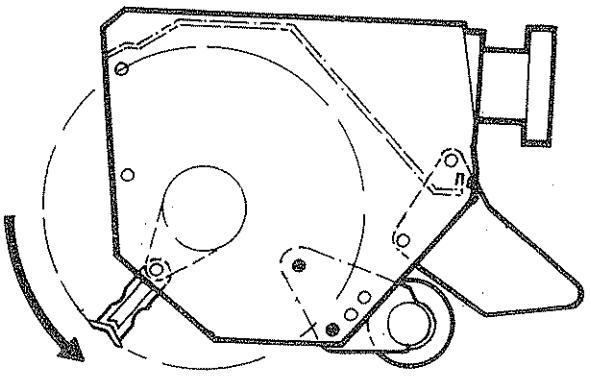
For normal trimming gives:-

Better finish

Lower power requirement

Front hood and rear flap must always be in position.

Downward cutting



For cutting larger material gives:-

Poor finish

Higher power requirements

Greater machine wear

For downward cutting a rear hood kit Part no. 71 90 310 must be fitted. The front hood may be removed to allow longer material to be cut. If this is done the rotor should never be reversed to cut upwards even momentarily

It is stressed that the rear rubber flap fitted as standard is not suitable for downward cutting.

Reversing rotation - T.I. machines only

Select Rotor **'OFF'**

Wait until rotor has **stopped** rotating

Swing lever stop gate through 180 degrees to allow opposite rotation to be selected.

Caution. Do not remove the lever stop gate.

REVERSING ROTATION (Si only)

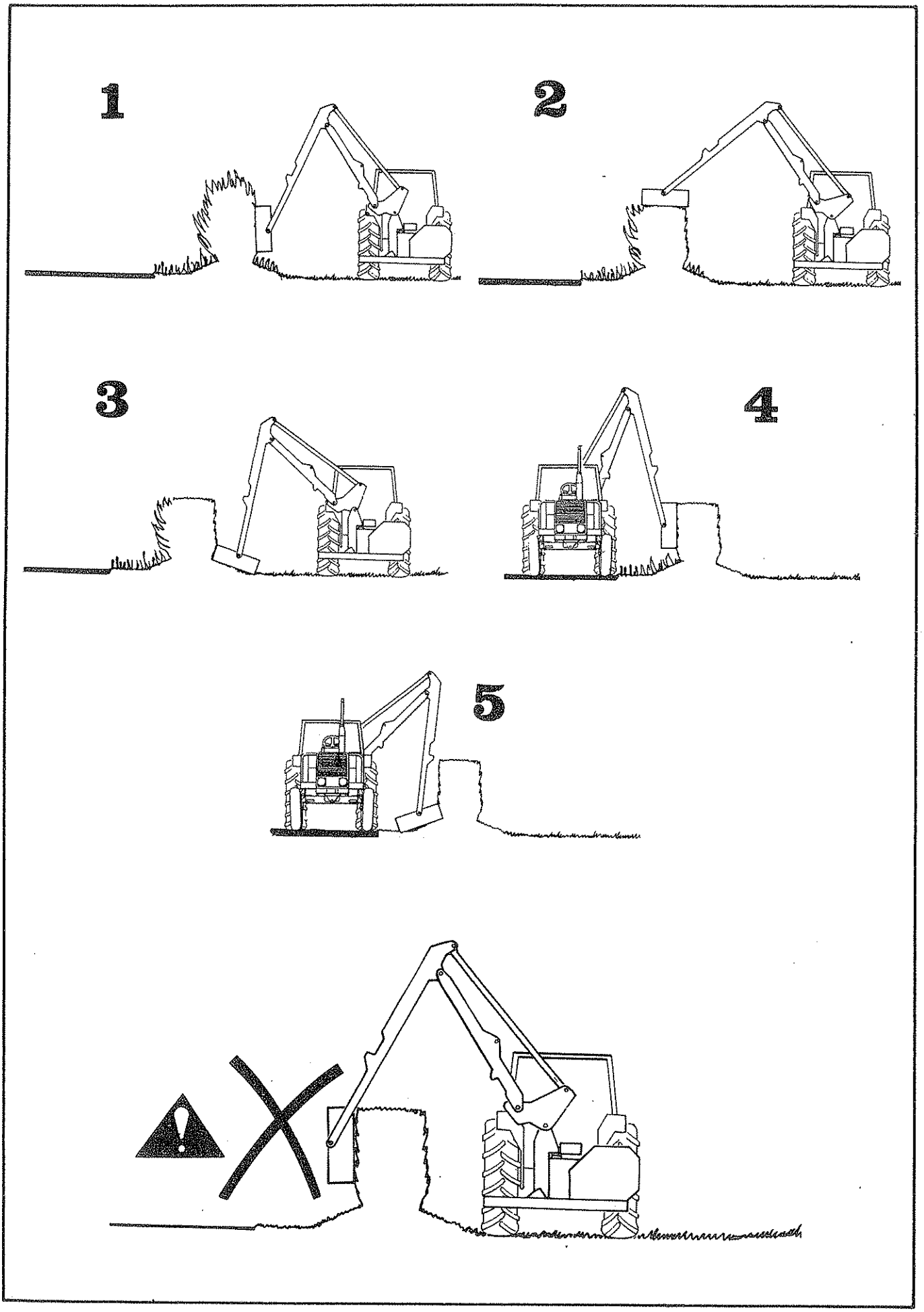
Fully extend the armhead and lower flail to the ground to minimise oil loss.
Release the hoses from the flail motor rigid pipes or the rotor control valve and interchange. Do not interchange the flail supply and return hoses at any other point as the hose routing and cross overs in the installation are necessary to allow the hoses to flex correctly during arm movements.

To ascertain the direction of cut without running the machine the following applies.

Connection MP - lower motor rigid pipe } upward cutting
Connection MR - upper motor right pipe }

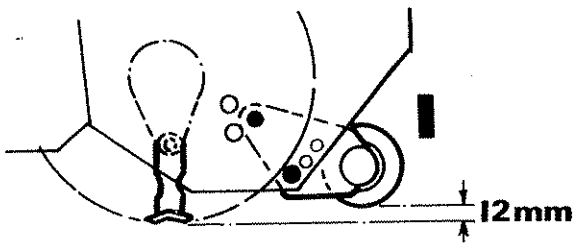
Connection MP - Upper motor rigid pipe } downward cutting
Connection MR - Lower motor rigid pipe }

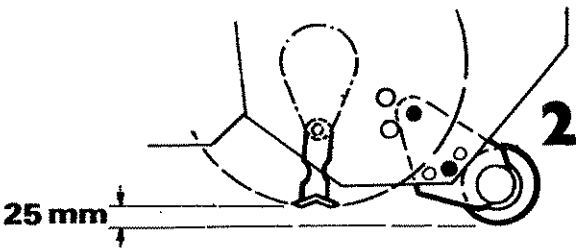
Cutting sequence

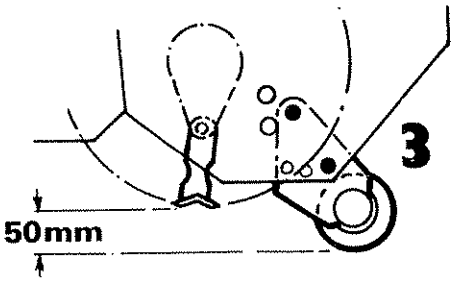


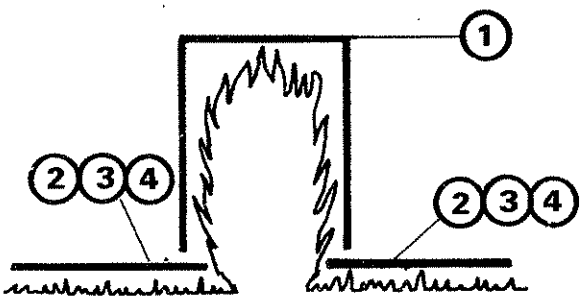
ROLLER POSITIONS

Bushed roller

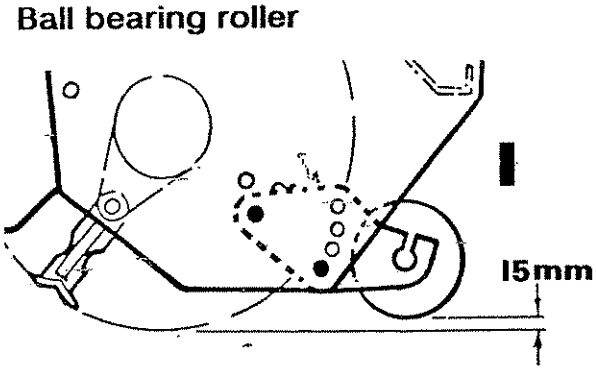


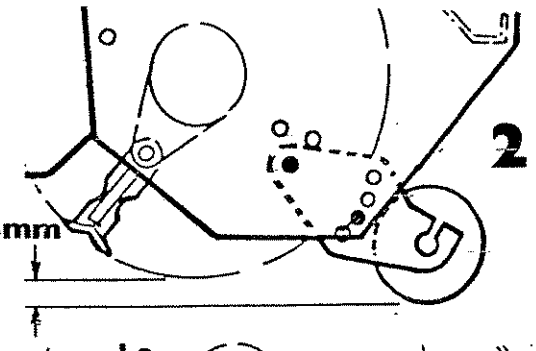


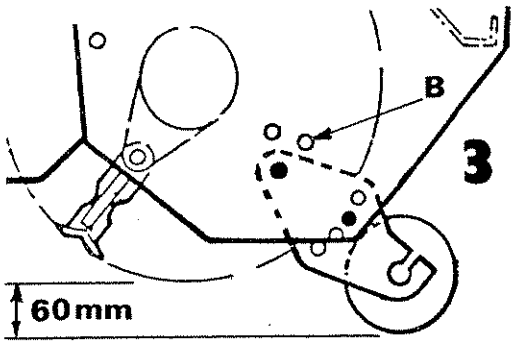


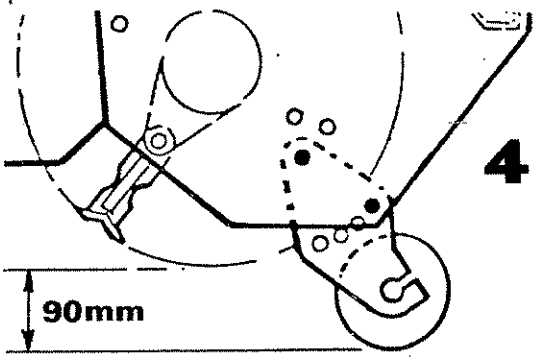


Ball bearing roller



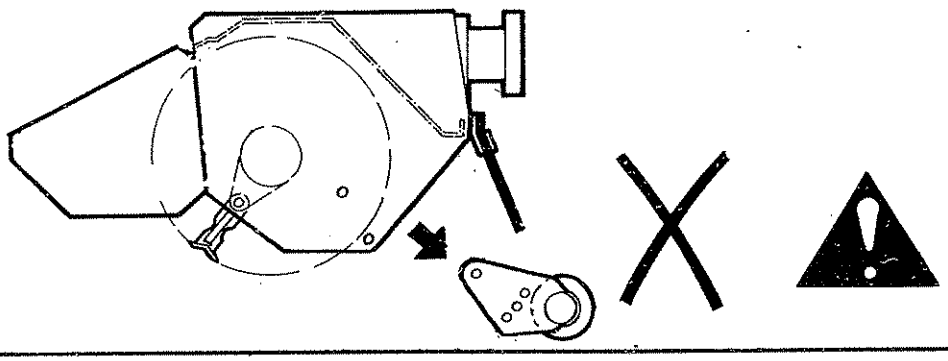




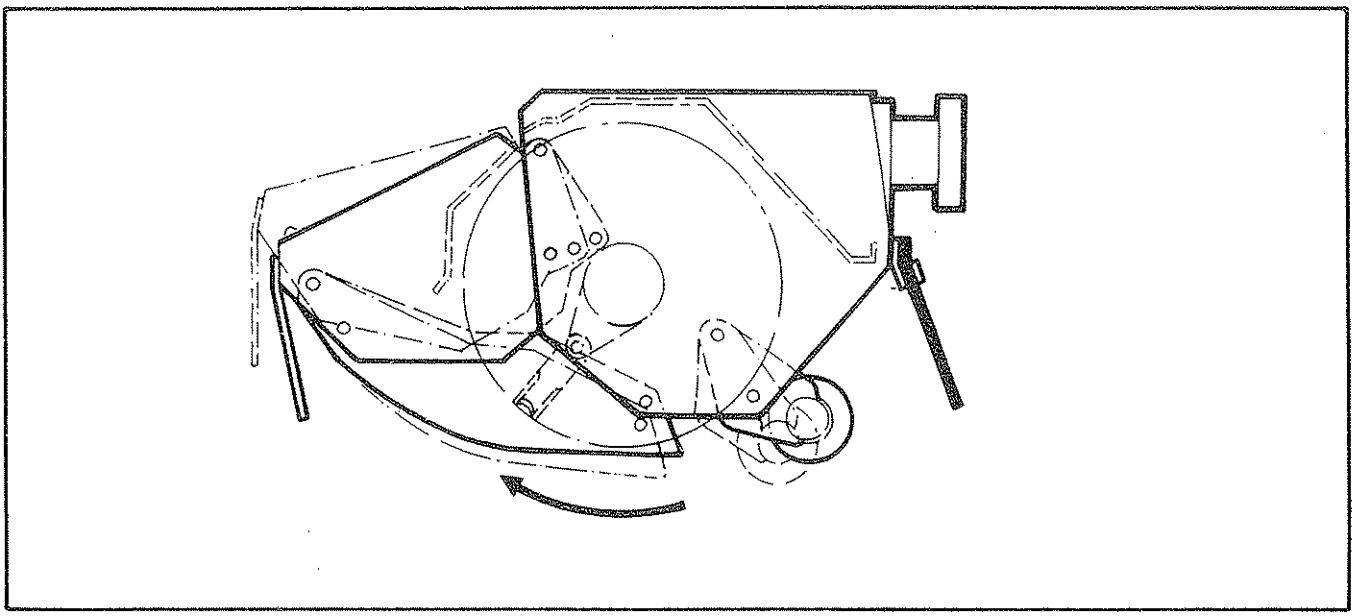


Warning

The ball bearing roller must never be mounted in position B.



GRASS CUTTING



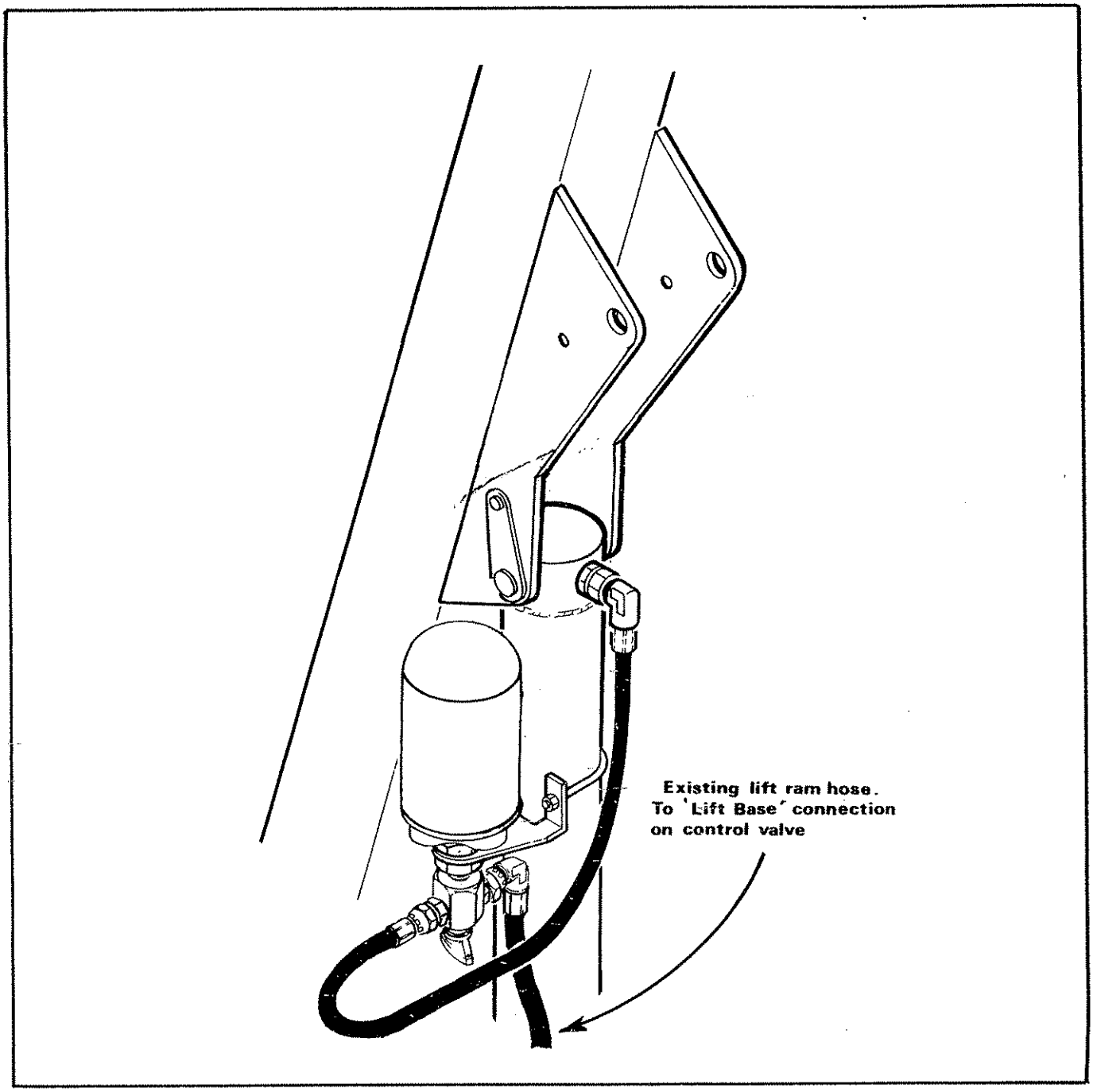
Flails must cut upwards

Front hood cw flaps, skids and rear flap must be fitted.

The mounting holes allow two positions for the front hood and two positions for the skids. Any combination of these positions may be used.

The roller can be set in positions 2 and 3 for bushed rollers or positions 2,3 and 4 for ball bearing rollers.

LIFT FLOAT KIT (optional extra)



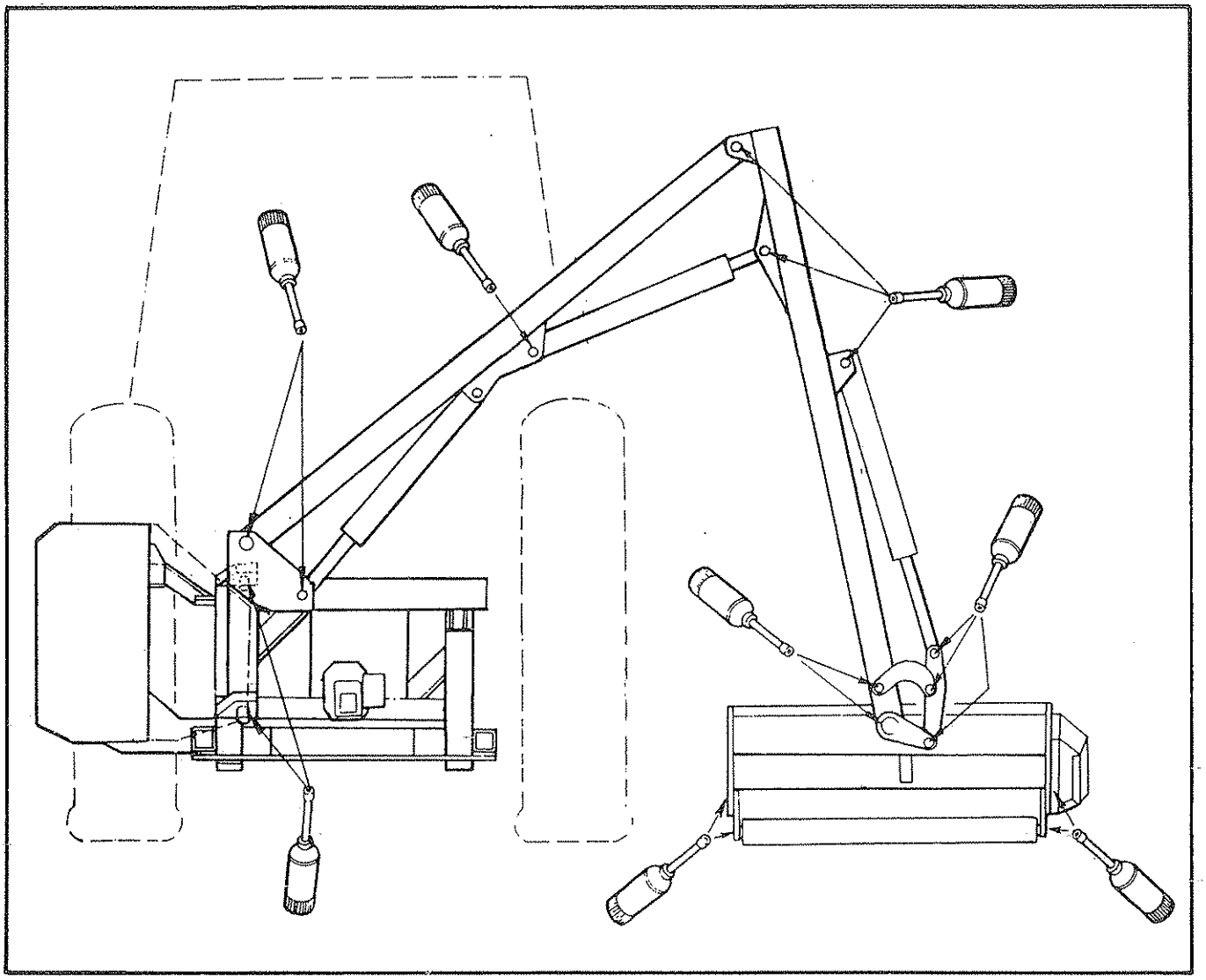
The hydraulic float kit, if fitted, should be mounted as shown in the vertical position clamped to the lift ram barrel.

In work, with the tap open the flail head automatically follows the ground contours.

The lift control should be operated to take a proportion of the flail head weight off the flail roller. This is important, too little weight on the roller will leave uncut areas of grass while with too much weight on the roller the ground will be scalped in places and increased flail wear, loss, or damage to flails could occur.

To revert to hedge cutting or to use the flail without it running along the ground the stop tap should be closed to isolate the accumulator.

MAINTENANCE



LUBRICATION

General

Grease daily all points shown.

Power take-off shaft

The P.T.O. shaft and its guards should be regularly examined. The universal joints should be greased very sparingly i.e. one shot weekly.

Note: Overgreasing a universal joint will blow-out the cork or neoprene sealing rings that exclude the dirt from the needle bearings inside.

The two halves of the plastic guard should be checked daily to ensure that they can spin freely on the shaft. The nylon slip rings which support the guard on the drive shaft should be lightly greased at weekly intervals.

The telescopic drive shaft should be similarly separated and grease applied to the internal shaft at approximately 100 hour intervals.

HYDRAULIC SYSTEM

Oil supply

Check the oil level in the reservoir daily.

No fixed time period can be quoted for oil changes as operating conditions and maintenance standards vary so widely. Burnt and scorched oil odours and the oil darkening and thickening are all signs of oxidation and indicate the oil should be changed.

Moisture which results from condensation can become entrapped in the oil and cannot be removed by filtration so that water contamination is progressive.

Contamination can be reduced by:-

1) Cleaning around the reservoir cap before removal, and keeping that area clean

11) Using clean containers when replenishing the system

111) Regular servicing of the filtration system

Filtration Maintenance

The machine is protected by a 125 micron suction strainer and a low pressure 10 micron full flow return line filter.

1) Suction strainer

The strainer is permanently fixed within the reservoir.

Should symptoms of pump cavitation or spongy intermittent operation occur the tank must be drained and flushed out with a suitable cleaning agent eg. clean diesel oil

i11) Return Line Filter

The element should be changed after the first 50 hours and thereafter at 500 hour intervals. It is important to note hours worked as if the filter becomes blocked an internal by-pass within the canister will operate and no symptoms of filter malfunction will occur to jog your memory.

HYDRAULIC HOSES

The condition of all hoses should be carefully checked during routine service of the machine. Hoses that have been chafed or damaged on their outer casing should be securely wrapped with waterproof adhesive tape to stop the metal braid from rusting. Hoses that have suffered damage to the metal braid should be changed at the earliest opportunity.

Hose replacement

a. Replace one hose at a time to avoid the risk of wrong connections.

b. When the hose is screwed to an additional fitting or union, use a second spanner on the union to avoid breaking both seals.

c. Do not use jointing compound on the threads.

d. Avoid twisting the hose. Adjust the hose line to ensure freedom from rubbing or trapping before tightening hose end connections.

Before changing hoses study the installation these are carefully calculated to prevent hose damage during operation. Always replace hoses in exactly the same manner. This is especially important for the flail hoses where they must be crossed, upper to lower, at the dipper and head pivots. The 90 degree elbows at the head bracket must point directly across the pivot and the hoses must have no slack at this point.

Two hose clips are provided at either end of the large bore suction and return hoses. These should be positioned so that their worm drive barrels are opposed at 180 degrees to reduce the possibility of air entering the system. A stop tap is provided to enable the suction hose to be changed without draining the tank.

Hose warranty

Warranty is limited to replacement of hoses which have failed due to faulty materials or manufacture. Warranty will not be considered on hoses that have suffered damage by abrasion, cuts or being pinched or trapped while in work. Neither will a claim be considered where a hose end has been damaged by a blow or where the threads or unions have been damaged by overtightening.

P.T.O. GEARBOX

The gearbox is rigidly bolted on to the main frame and has a filler plug. Oil level is correct when level with the filler plug aperture. The gearbox oil should be changed every two years or at 1000 hour intervals: whichever occurs first. The capacity of the gearbox is .25 litres (1/2 pints) S.A.E. 30/50 Tractor universal oil.

FLAILHEAD

Frequently inspect the rotor assembly for damaged or missing flails. Bolts and nuts securing the flails to the rotor should be regularly checked and kept tight. The correct torque setting for these locknuts is 135 Nm (100 lbf/ft.). Use only the correct flail bolt and locking nut. Check the flail pivot bushes for possible damage or wear. They do not require oil.

Do not attempt to run the rotor with flails missing. Im-balance will cause severe vibration and can rapidly damage the rotor shaft bearings. As an emergency measure if a flail is broken off or lost, remove another on the opposite side of the rotor to retain balance. Always replace flails in opposite pairs and never match up a new flail with a re-sharpened one which will of course be lighter.

Blunt flails absorb a lot of power and leave an untidy finish to the work. They should be sharpened on a grindstone or with a portable grinder periodically.

Wear protective gear when sharpening flails.

Ensure that the bearing housings and hydraulic mounting nuts and bolts are kept tight. They should be checked during servicing.

CABLES

The cables operate on a push/pull system with the spool centering springs always returning the spool to the neutral position when the handle is released.

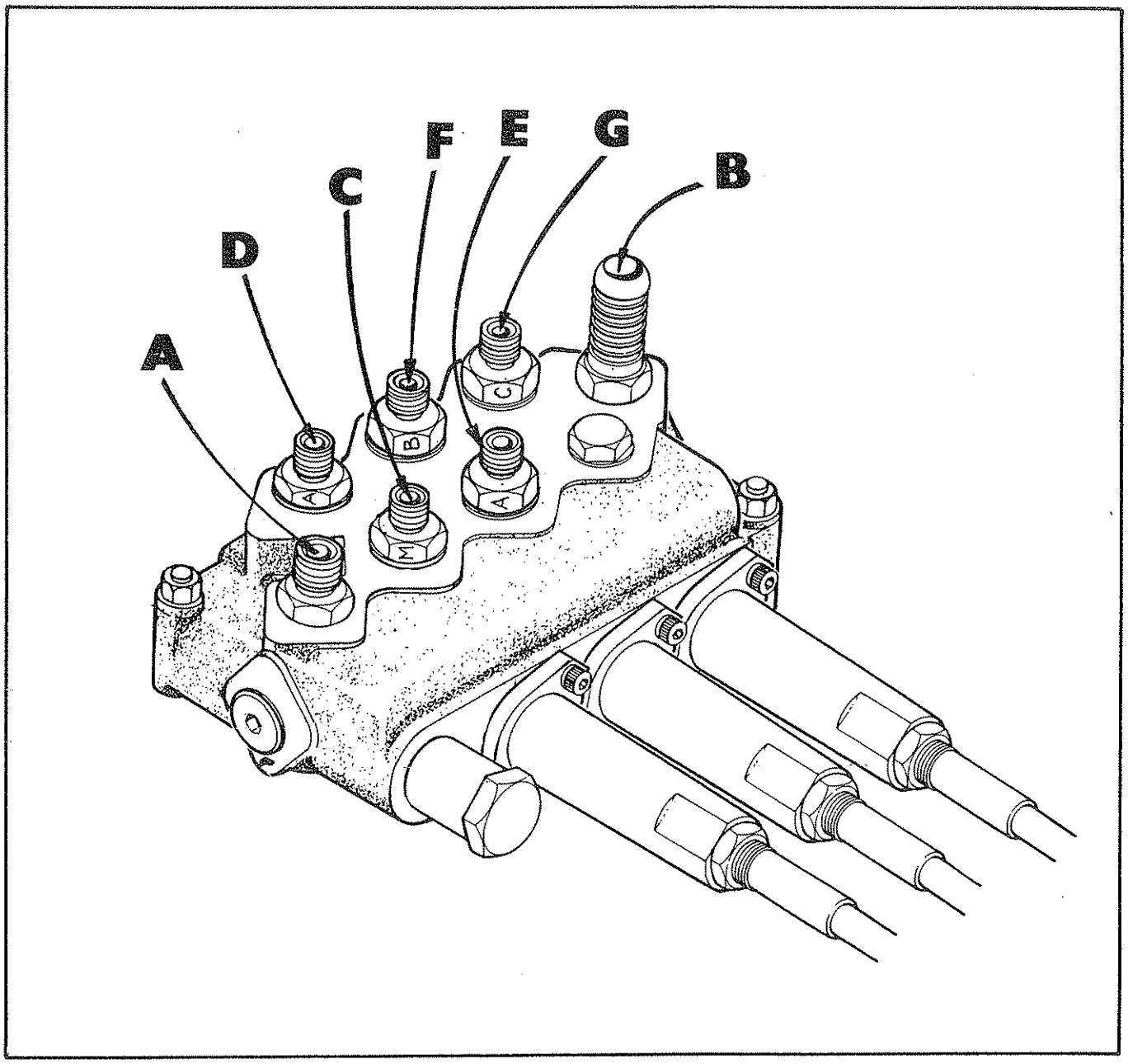
Care should be taken during installation and operation to ensure that the cables are not trapped or kinked. Any abrasion or damage to the outer casing should be sealed with plastic insulation tape to avoid moisture penetrating.

No routine adjustment of the cables are necessary as they do not stretch. The threaded collar is correctly adjusted when the lever is in a vertical position in its housing allowing an equal amount of travel in either direction

CAUTION On no account should any attempt be made to lubricate the cables which are assembled with a special lubricant during manufacture.

NOTE Take care to ascertain the correct cable connections on both the control unit and the valve in the event of cable replacement.

HOSE CONNECTIONS



Main control valve

A Supply

B Return (T.I. illustrated)

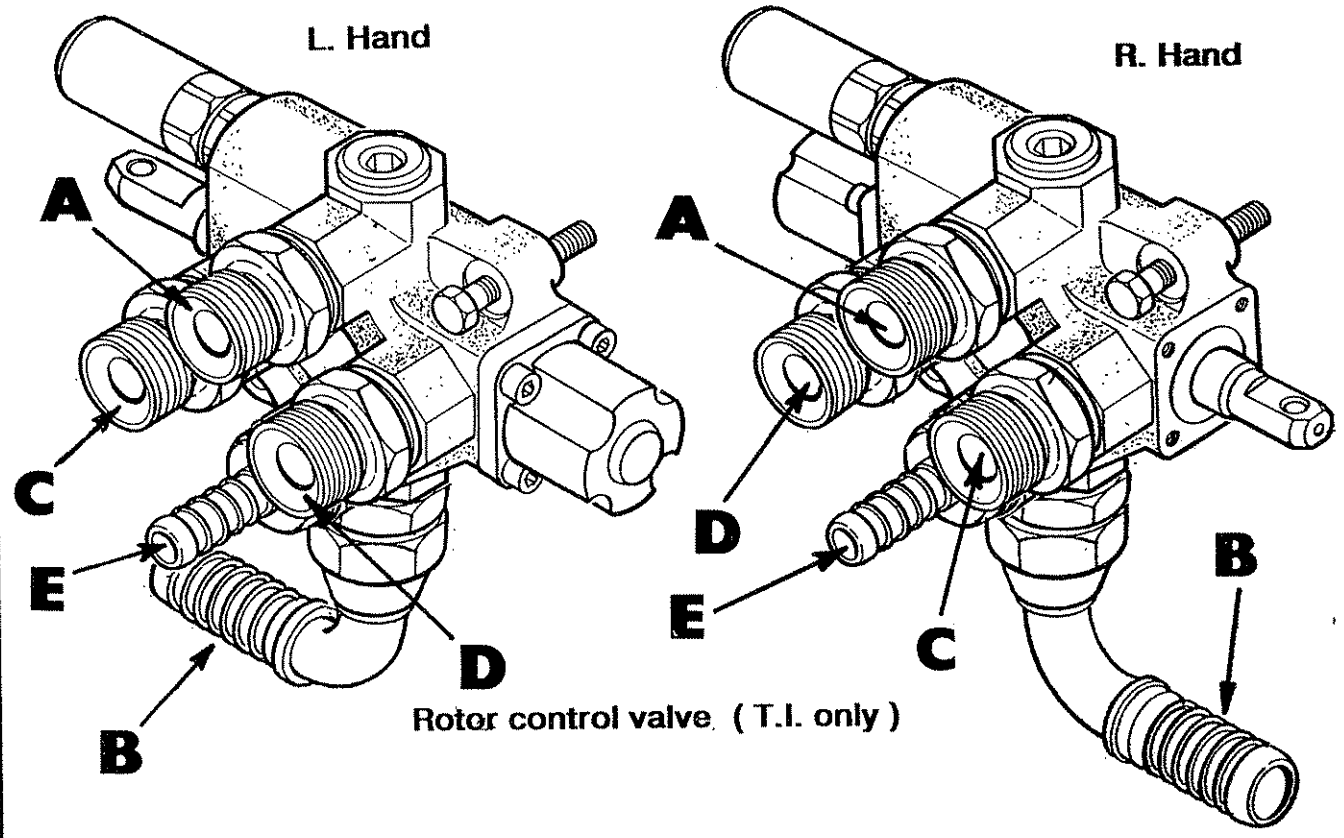
C Reach base - Restrictor M

D Reach gland - Restrictor A

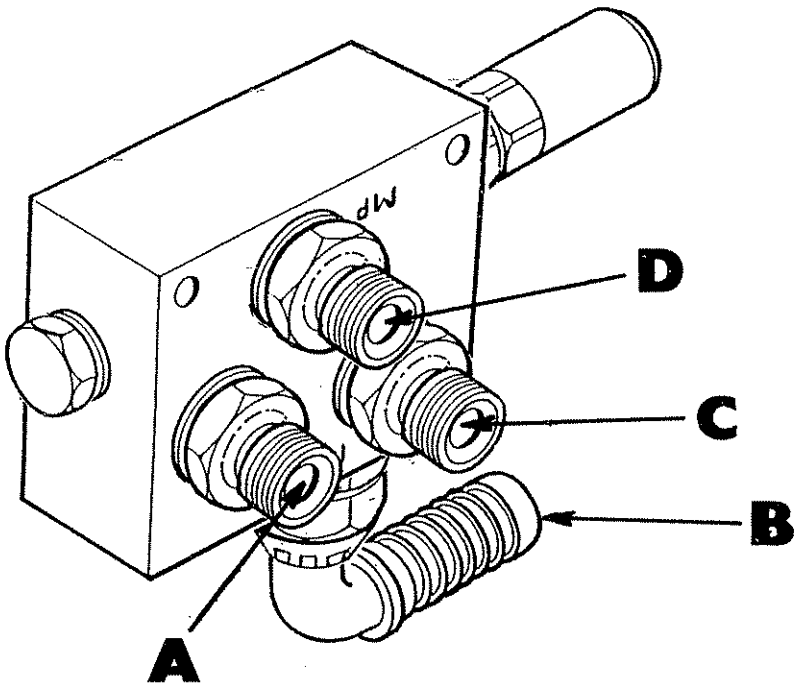
E Angle base - Restrictor A

F Angle gland - Restrictor B

G Lift base - Restrictor C



Rotor control valve (T.I. only)



Rotor relief valve (S.I. only)

- **A** Supply from pump
- **B** Return to tank
- **C** Motor upper
- **D** Motor lower
- **E** Return from main valve

SPARE PARTS MANUAL

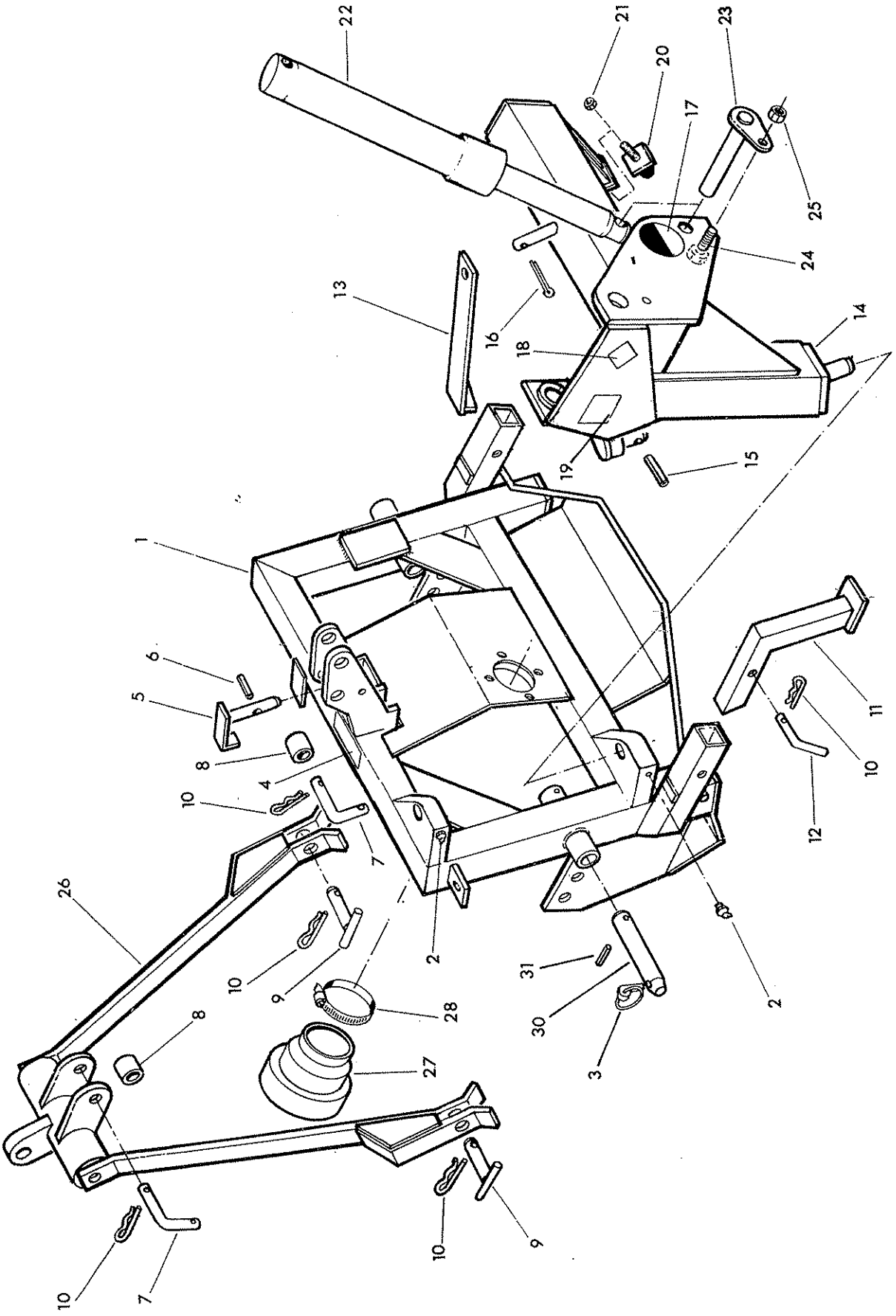
FOR BEST PERFORMANCE....

USE ONLY McCONNEL SPARE PARTS

To be assured of the latest design improvements purchase your genuine replacements from the original equipment manufacturer F.W. McConnel Ltd. through your local dealer or stockist.

Always quote machine type and serial number as well as the part number.

Design improvement may have altered some of the parts listed in this manual - The latest part will always be supplied when it is interchangeable with an earlier one.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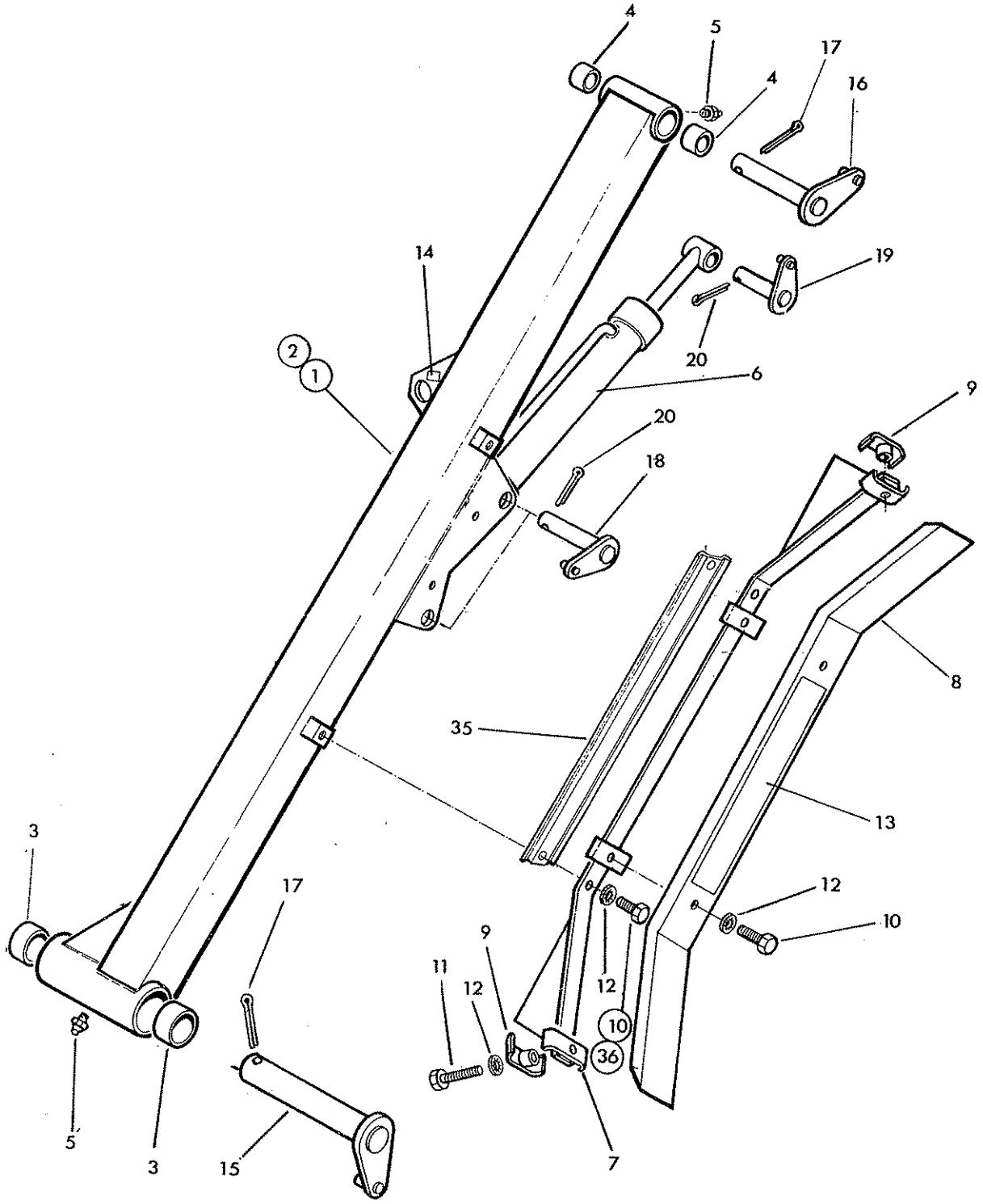
Ref.	Part No.	Qty	Description
			FRAMES AND STABILISER R. HAND
1	71 92 312	1	Main frame - R Hand
2	09 01 125	2	Greaser 1/8" BSP 67 1/2 Degrees
3	04 31 217	2	Linch pin
4	71 35 295	1	Sticker - 'Tighten check chains'
5	71 92 038	1	Breakaway lock pin
6	04 25 630	1	Spring dowel 6 Dia x 30
7	71 92 026	2	Top link pin
8	14 67 063	2	Sleeve
9	71 92 027	2	Stabiliser pin
10	04 31 105	6	Spring cotter
11	71 92 307	2	Stand leg
12	71 92 023	2	Leg pin
13	71 92 043	1	Breakaway strap R. Hand
14	71 92 317	1	'T' frame R. Hand
15	04 21 832	1	Spring dowel 1/4" dia x 2" long
16	95 01 406	1	Split pin 5 Dia x 40
17	12 90 296	1	Sticker "Logo roundel"
18	71 05 130	1	Sticker "Read instruction book"
19	12 90 033	1	Serial Number plate
20	13 37 114	1	Buffer including nut
21	01 41 003	1	Self locking nut 3/8 UNF
22	71 92 326	1	Lift ram assembly (see page)
23	71 92 040	1	Pivot pin -lift ram rod
24	93 13 066	1	Setscrew M12 x 30
25	91 43 006	1	Self locking nut M12
26	71 92 327	1	Stabiliser
27	71 11 038	1	P.T.O. guard
28	09 04 114	1	Hose clip
29	71 36 330	1	P.T.O. drive shaft - not illustrated
30	71 93 020	2	Linkage pin
31	04 22 628	2	Spring dowel 3/8" dia x 1 3/4" long
			FRAMES AND STABILISER L. HAND

The parts list is common to the above with the following exceptions

1	71 92 349	1	Main frame L. Hand
13	71 92 055	1	Breakaway strap L. Hand
14	71 92 347	1	T frame L. Hand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Ref.	Part No.	Qty.	Description
			MAIN ARM - STD POWER
1	71 92 361	1	Main arm R. Hand
2	71 92 362	1	Main arm L. Hand
3	72 13 023	2	Bush main arm pivot
4	71 01 134	2	Bush dipper arm pivot
5	09 01 121	2	Greaser - 1/8" BSP straight
6	71 92 337	1	Reach ram assembly (see page 78)
7	71 93 313	1	Hose guide
8	71 93 321	1	Hose cover
9	71 93 014	2	Hose clamp
10	93 13 055	4	Setscrew M10 x 25
11	92 13 085	2	Bolt M10 x 40
12	91 00 305	6	Internal serrated washer dia 10
13	12 90 255	1	Sticker 'McConnel'
14	60 55 002	1	Sticker ' Sling here'
15	71 92 039	1	Pivot pin - main arm
16	71 92 042	1	Pivot pin - dipper
17	95 01 509	2	Split pin dia 10 x 50
18	71 92 041	2	Pivot pin - Lift and reach ram base
19	71 92 060	1	Pivot pin - Reach ram rod
20	95-01-406	3	Split pin dia 5 x 40
			MAIN ARM - HI POWER

The parts are identical to above with the following exceptions

7	71 95 310	1	Hose guide
9	71 93 015	2	Hose clamp
21	71 95 312	1	Hose plate
22	92 13 095	2	Bolt M10 x 45

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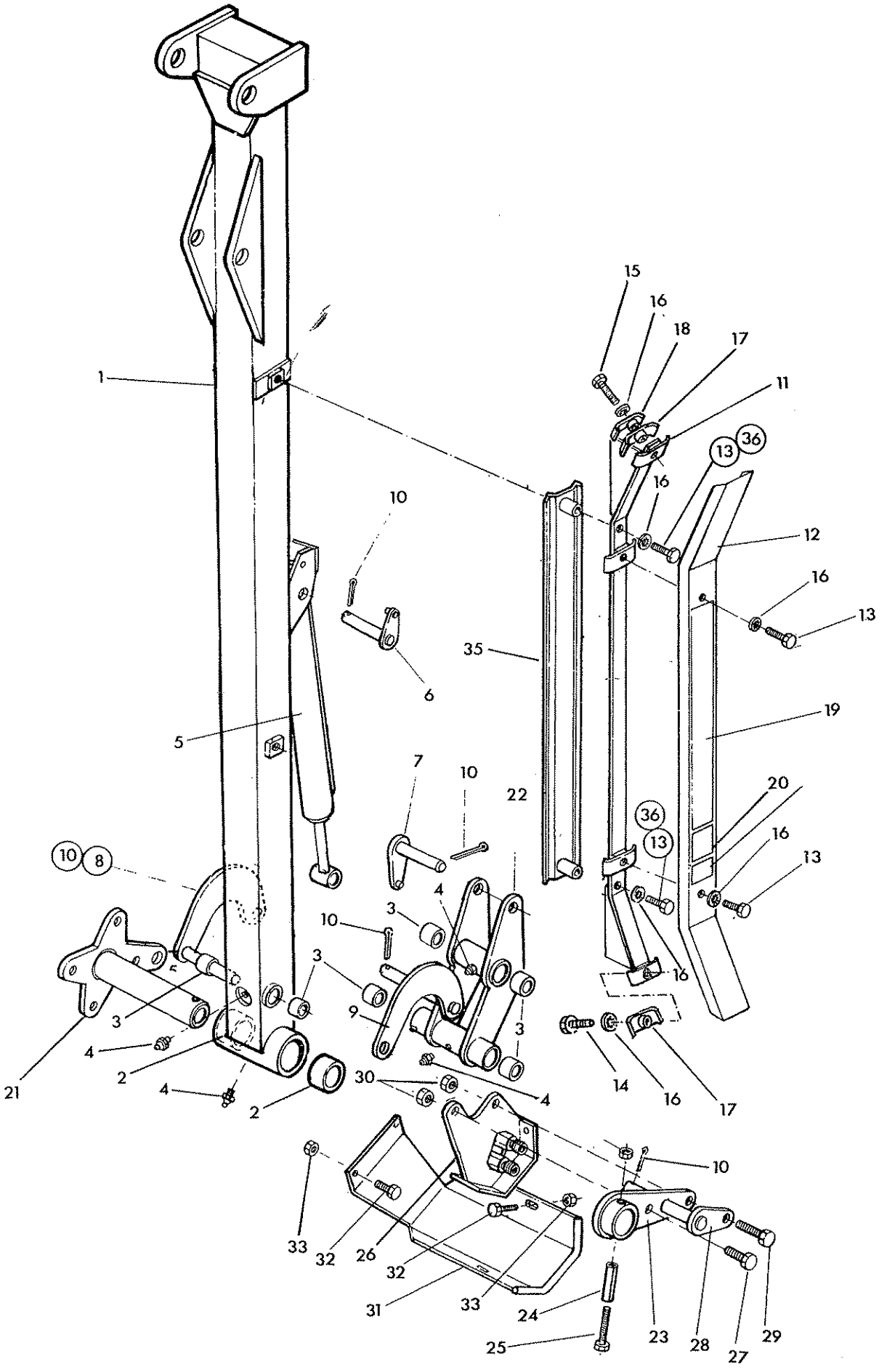
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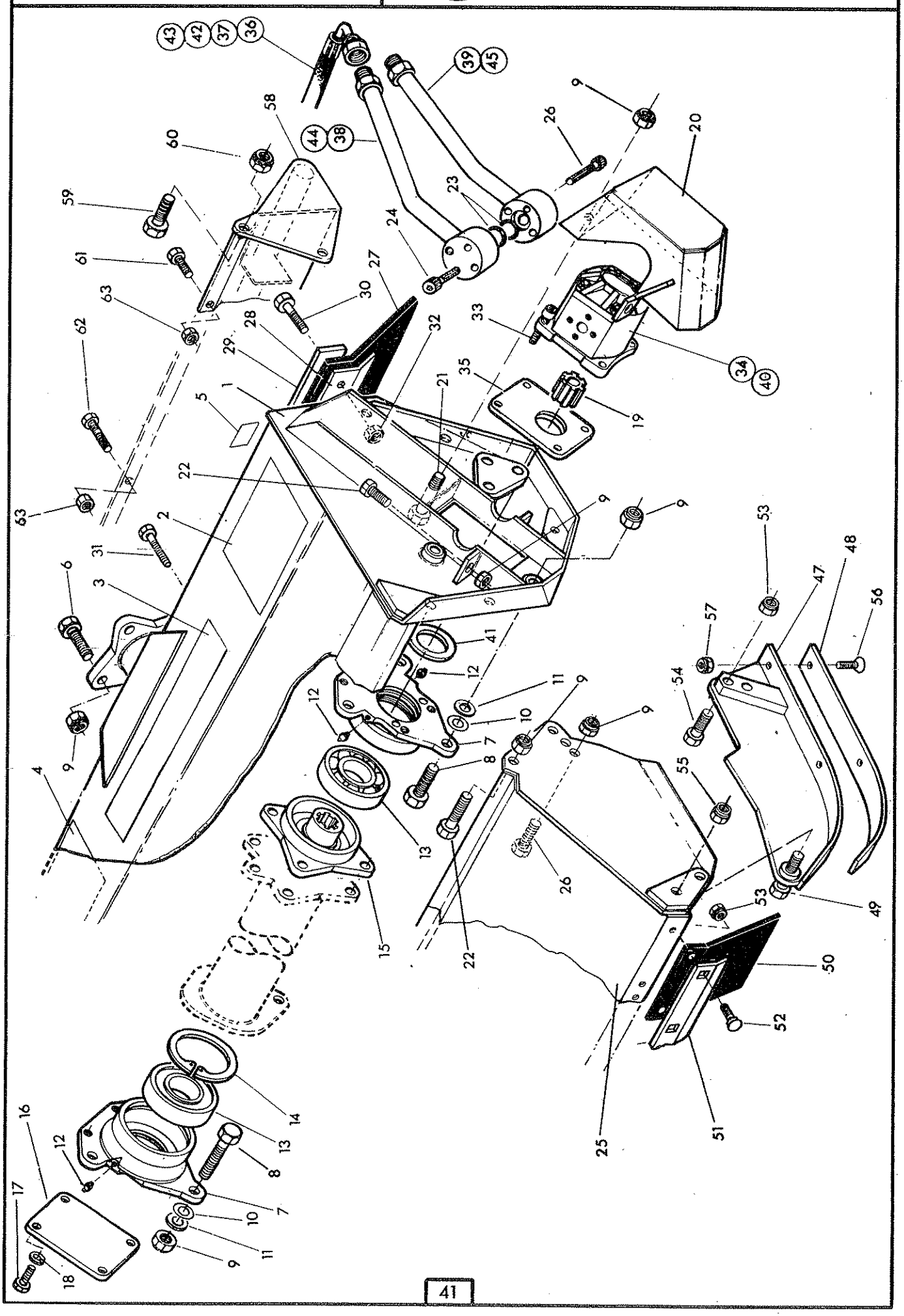
Ref.	Part No.	Qty.	Description
			DIPPER ARM AND ANGLING -STD POWER
1	71 92 363	1	Dipper arm
2	71 11 175	2	Bush - head pivot
3	71 01 083	6	Bush - radius arm and slave link
4	09 01 121	4	Graser 1/8" BSP -straight
5	75 60 344	1	Angling ram assembly (see page79)
6	71 92 024	1	Pivot pin - angle ram base
7	71 92 008	1	Pivot pin - angle ram rod
8	71 92 311	1	Radius arm - front
9	71 92 310	1	Radius arm - rear
10	95 01 406	5	Split pin dia 5 x 40
11	71 93 313	1	Hose guide
12	71 93 321	1	Hose cover
13	93 13 055	4	Setscrew M10 x 25
14	92 13 085	1	Bolt M10 x 40
15	92 13 125	1	Bolt M10 x 60
16	91 00 305	6	Internal serrated washer Dia 10
17	71 93 014	2	Hose clamp
18	71 93 019	1	Hose clip - angle hoses
19	12 90 295	1	Sticker 'Power arm'
20	12 90 294	1	Sticker '92'
21	71 92 308	1	Head pivot tube
22	71 92 309	1	Slave link
23	71 92 316	1	Jaw plate
24	04 23 548	1	Spring dowel 5/8" dia x 3" long
25	92 13 185	1	Bolt M10 x 90
26	71 92 321	1	Hose junction bracket
27	02 11 126	1	Bolt 5/8 UNF x 1 1/2" long
28	71 92 009	1	Pivot pin - slave link
29	02 11 146	1	Bolt 5/8 UNF x 1 3/4" long
30	01 41 006	2	Self locking nut 5/8 UNF
31	71 92 324	1	Hose tray
32	93 13 045	4	Setscrew M10 x 20
33	91 43 005	5	Self locking nut M10
34	12 90 047	1	Sticker 'S'
			DIPPER ARM AND ANGLING - HI POWER

The parts list is identical to above with the following exceptions.

11	71 95 310	1	Hose guide
17	71 93 015	2	Hose clamp
26	71 95 303	1	Hose junction bracket
35	71 95 312	1	Hose plate
36	92 13 095	2	Bolt M10 x 45

FLAIL HEAD CASING

McCONNEL

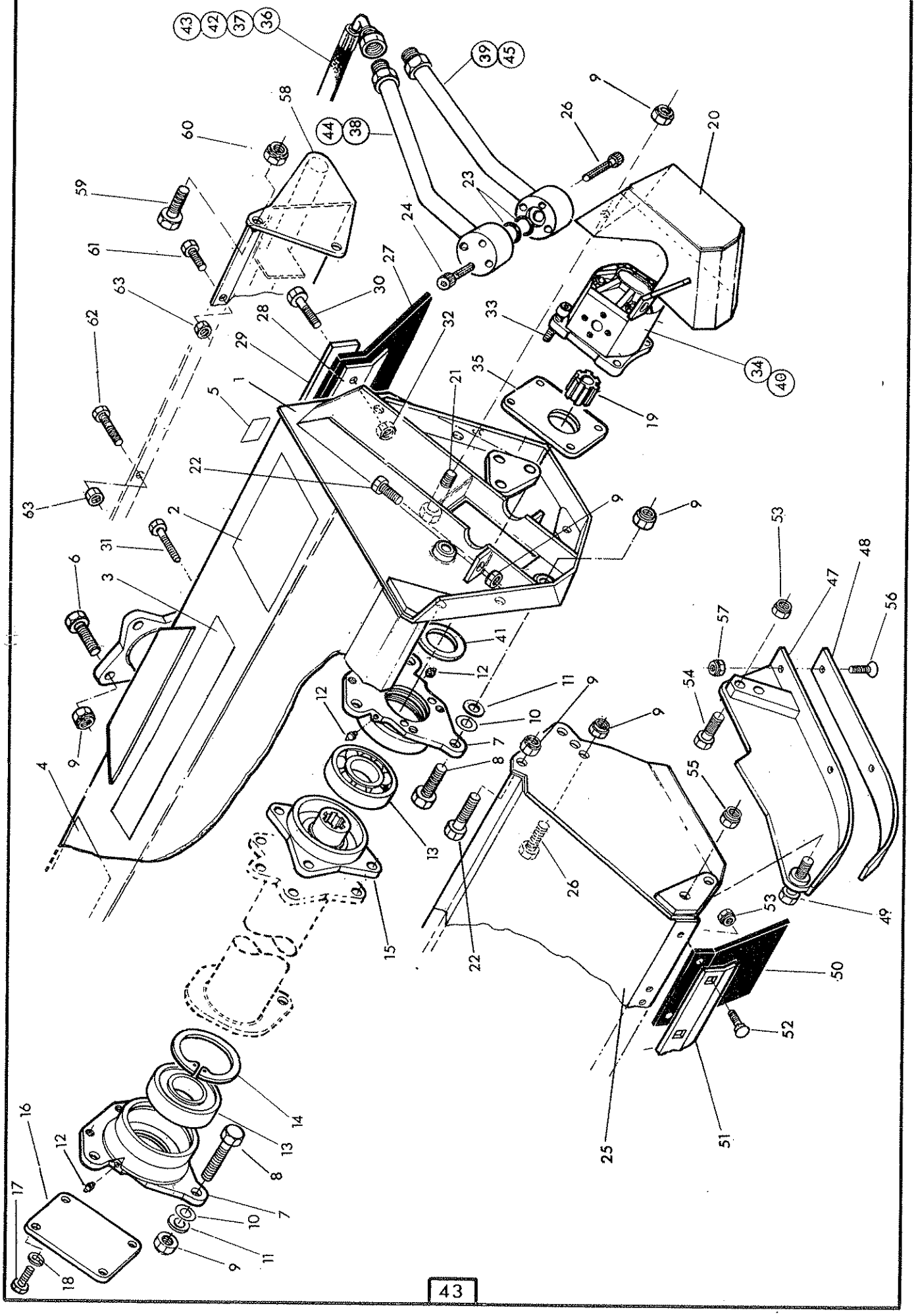


Ref.	Part No.	Qty.	Description
			FLAIL HEAD CASING
1	71 90 262	1	Flail casing
2	12 90 297	1	Sticker 'Flail head instructions
3	12 90 255	1	Sticker 'McConnel'
4	12 90 341	1	Sticker 'Flail guarding'
5	12 90 033	1	Serial No. plate
6	02 11 186	4	Bolt 5/8 UNF x 2 1/4" long
7	71 90 261	2	Bearing housing
8	02 11 166	4	Bolt 5/8 UNF x 2" long
9	01 41 006	17	Self locking nut 5/8" UNF
10	81 21 043	as reqd.	Shim .015"
11	81 21 044	as reqd	Shim .025"
12	09 01 121	4	Greaser 1/8 BSP - straight
13	06 00 018	2	Bearing
14	71 90 022	1	Internal circlip dia 120
15	71 90 280	1	Rotor hub
16	71 90 444	1	Cover plate
17	93 13 045	4	Setscrew M10 x 20
18	91 00 205	4	Spring washer dia 10
19	71 90 009	1	Drive coupling
20	71 90 282	1	Motor cover
21	02 11 266	1	Bolt 5/8 UNF x 3 1/4" long
22	03 11 126	4	Setscrew 5/8 UNF x 1 1/2" long
23	86 00 121	2	'O' ring
24	93 00 014	6	Capscrew 'wedglok' M10 x 60
25	71 90 288	1	Front hood
26	03 11 106	2	Setscrew 5/8 UNF x 1 1/4" long
27	71 90 314	1	Rear flap
28	71 90 312	1	Mounting strip
29	71 90 313	1	Clamp strip
30	93 13 065	7	Setscrew M10 x 30
31	93 13 075	2	Setscrew M10 x 35
32	91 43 005	9	Self locking nut M10
33	93 00 136	4	Capscrew wedglok M 10 x 45

See over to continue

FLAIL HEAD CASING

McCONNEL



FLAIL HEAD CASING CONTINUED

The following items 34-39 inclusive are also required for std power machines.

34*	83 01 263	1	Hydraulic motor CML 28
35	71 90 293	1	Motor spacer plate
36	85 38 015	2	Hose 3/4" BSP SF-90 deg F x 34" long for heads with motor outboard
37	85 38 025	2	Hose 3/4" BSP SF-90 deg F x 42" long for heads with motor inboard
38	71 90 295	1	Motor pipe upper
39	71 90 296	1	Motor pipe lower

The following items 40-45 inclusive are also required for Hi Power machines

40*	83 01 258	1	Hydraulic motor CML 38
41	71 90 015	1	Motor locating washer
42	85 01 097	2	Hose 1" BSP SF-90 deg F x 34" long for heads with motor outboard
43	85 01 154	2	Hose 1" BSP SF-90 deg F x 42" long for heads with motor inboard
44	71 90 297	1	Motor pipe upper
45	71 90 298	1	Motor pipe lower

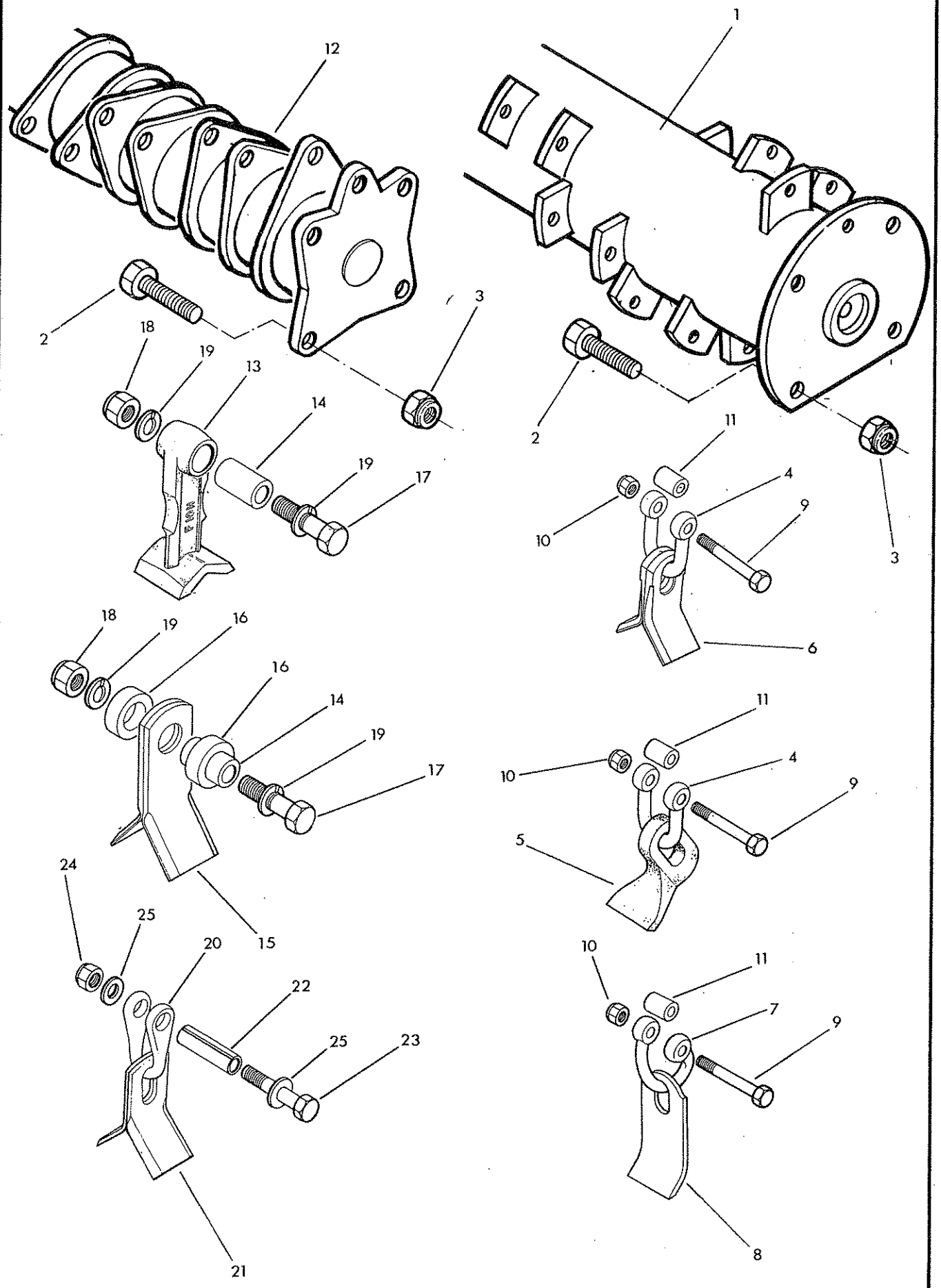
EXTRA PARTS FOR GRASS CUTTING

46	71 90 300	1	Skid R. Hand - not illus
47	71 90 301	1	Skid L. Hand
48	73 14 323	2	Replaceable skid
49	03 11 146	2	Setscrew 5/8 UNF x 1 3/4" long
50	71 90 020	8	Flap
51	71 90 304	1	Flap clamp strip
52	92 93 054	16	Cup square bolt M8 x 25
53	91 43 004	16	Self locking nut M8
54	03 11 086	2	Setscrew 5/8" UNF x 2 1/4" long
55	01 41 006	4	Self locking nut 5/8" UNF
56	93 33 065	6	Setscrew c/sunk M10 x 30
57	91 43 005	6	Self locking nut M10

EXTRA PARTS FOR DOWNWARD CUTTING

	71 90 310	1	Rear hood kit
58	71 90 285	1	Rear hood
59	03 11 106	4	Bolt 5/8" UNF x 1 1/4" long
60	01 41 006	4	Self locking nut 5/8 UNF
61	93 13 045	7	Setscrew M10 x 20
62	93 13 055	2	Setscrew M10 x 25
63	91 43 005	9	Self locking nut M10

***Check motor for model number stamping to correctly identify defore ordering.**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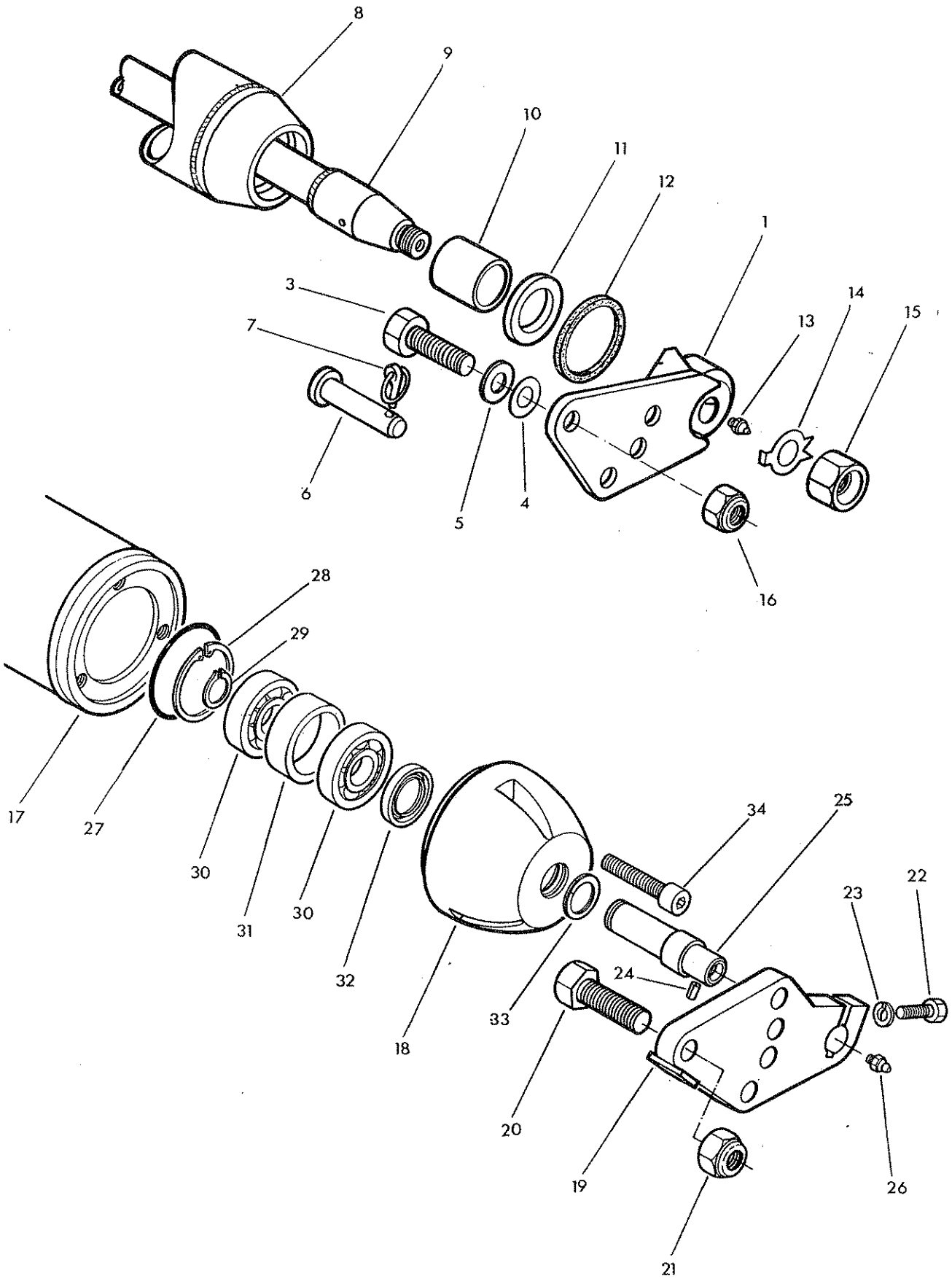
Ref.	Part No.	Qty.	Description
			ROTORS AND FLAILS
			140mm DIA ROTOR SUITABLE FOR HI POWER FLAIL HEADS ONLY
1	71 90 424	1	Rotor 1.2m
2	03 11 146	4	Setscrew 5/8 UNF x 1 3/4" long
3	01 41 006	4	Self locking nut 5/8 UNF
			FLAIL OPTIONS FOR 140mm DIA ROTORS- Quantities shown are per flail station
4	71 90 086	1	Shackle
5	71 11 172	1	Flail
6	71 90 090	2	Flail
7	71 90 089	1	Shackle
8	71 90 091	1	Flail
9	71 90 088	1	Special bolt
10	01 41 004	1	Self locking nut 7/16 UNF
11	71 90 087	1	Spacer
			100mm DIA ROTOR SUITABLE FOR STANDARD AND HI POWER FLAIL HEADS
12	71 90 320	1	Rotor
			FLAIL OPTIONS FOR 100mm DIA ROTORS - Quantities shown are per flail station.
13	73 14 366	1	Flail F10H
14	73 14 223	1	Pivot bush
15	71 90 315	2	Flail
16	71 90 010	2	Flail spacer
17	73 14 201	1	Special bolt
18	01 41 006	1	Self locking nut 5/8 UNF
19	01 00 206	2	Spring washer 5/8" dia
20	71 90 080	1	Shackle
21	71 11 022	2	Flail
22	04 28 660	1	Spring dowel dia 16 x 60
23	02 11 243	1	Bolt 3/8 UNF x 3" long
24	01 41 003	1	Self locking nut 3.8 UNF
25	01 00 103	2	Plain washer 3/8" dia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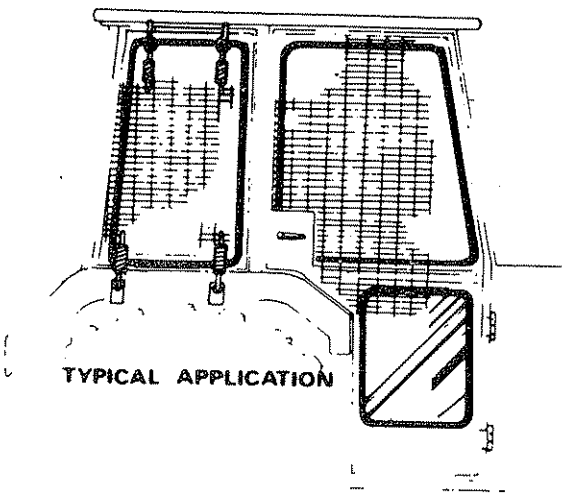
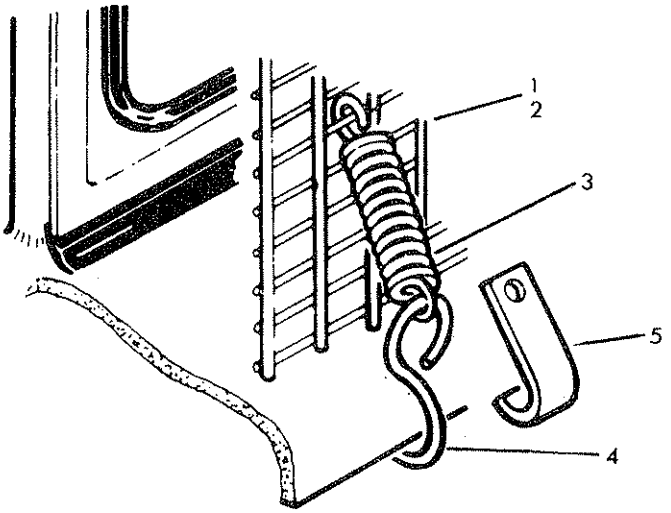
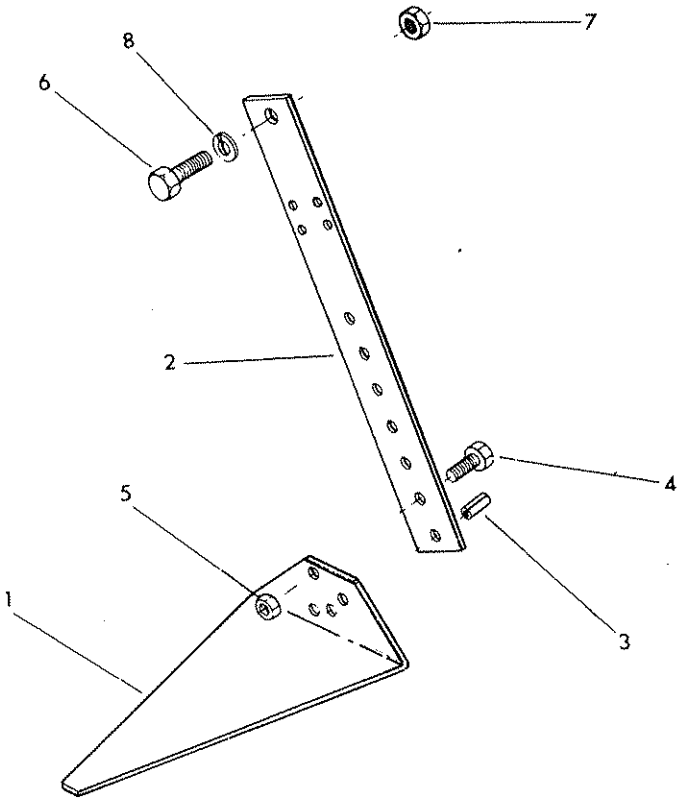
Ref.	Part No.	Qty.	Description
			ROLLERS OPTIONS FOR 1.2m FLAIL HEADS
			BUSHED ROLLER ASSEMBLY
1	71 90 306	1	Roller bracket L. Hand
2	71 90 305	1	Roller bracket R. Hand - not illus
3	02 11 166	2	Bolt 5/8 UNF x 2" long
4	81 21 043	as reqd	Shim .015"
5	81 21 044	as reqd.	Shim .025"
6	71 90 032	2	Pin
7	04 31 213	2	Linch pin
8	71 90 307	1	Roller
9	71 90 308	1	Roller tie rod
10	72 13 023	2	Bush
11	71 90 026	2	Thrust washer
12	71 90 028	2	Felt seal
13	09 01 121	2	Greaser 1/8 BSP straight
14	71 90 023	2	Tab washer dia 20
15	71 14 176	2	Special nut M20
16	01 41 006	4	Self locking nut 5/8" UNF
			BALL BEARING ROLLER ASSEMBLY
17	71 90 434	1	Roller
18	71 90 429	2	Roller end
19	71 90 428	2	Mounting bracket
20	02 11 206	4	Bolt 5/8 UNF x 2 1/2" long
21	01 41 006	4	Self locking nut 5/8 UNF
22	02 11 123	2	Bolt 3/8 UNF x 1 1/2" long
23	01 00 203	2	Spring washer 3/8" dia
24	04 25 408	2	Spring dowel dia 4 x 8
25	71 90 430	2	Stub axle
26	09 01 121	2	Greaser 1/8 BSP - straight
27	86 00 139	2	'O' ring
28	04 11 262	2	Internal circlip
29	04 01 225	2	External circlip
30	06 00 088	4	Bearing
31	71 90 082	2	Spacer
32	86 29 125	2	Seal
33	04 31 232	2	Spring ring
34	93 00 104	6	Capscrew - self locking M10 x 40



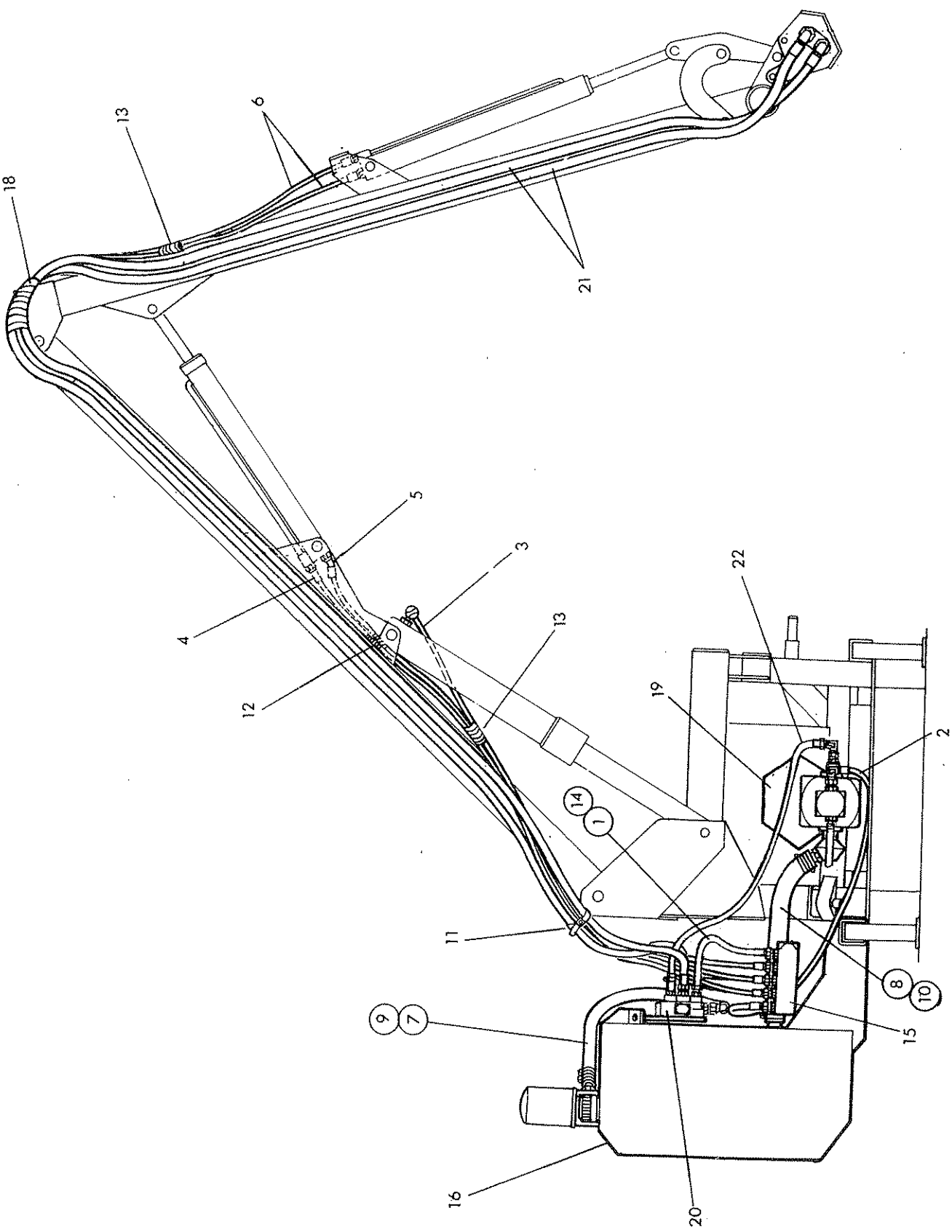


Ref.	Part No.	Qty.	Description
	73-13-324		**CAB GUARD KIT**
1	73-13-049	1	Guard panel - large
2	73-13-050	1	Guard panel - small
3	60-01-064	12	Spring
4	60-01-065	6	Hook
5	73-13-051	6	Hook



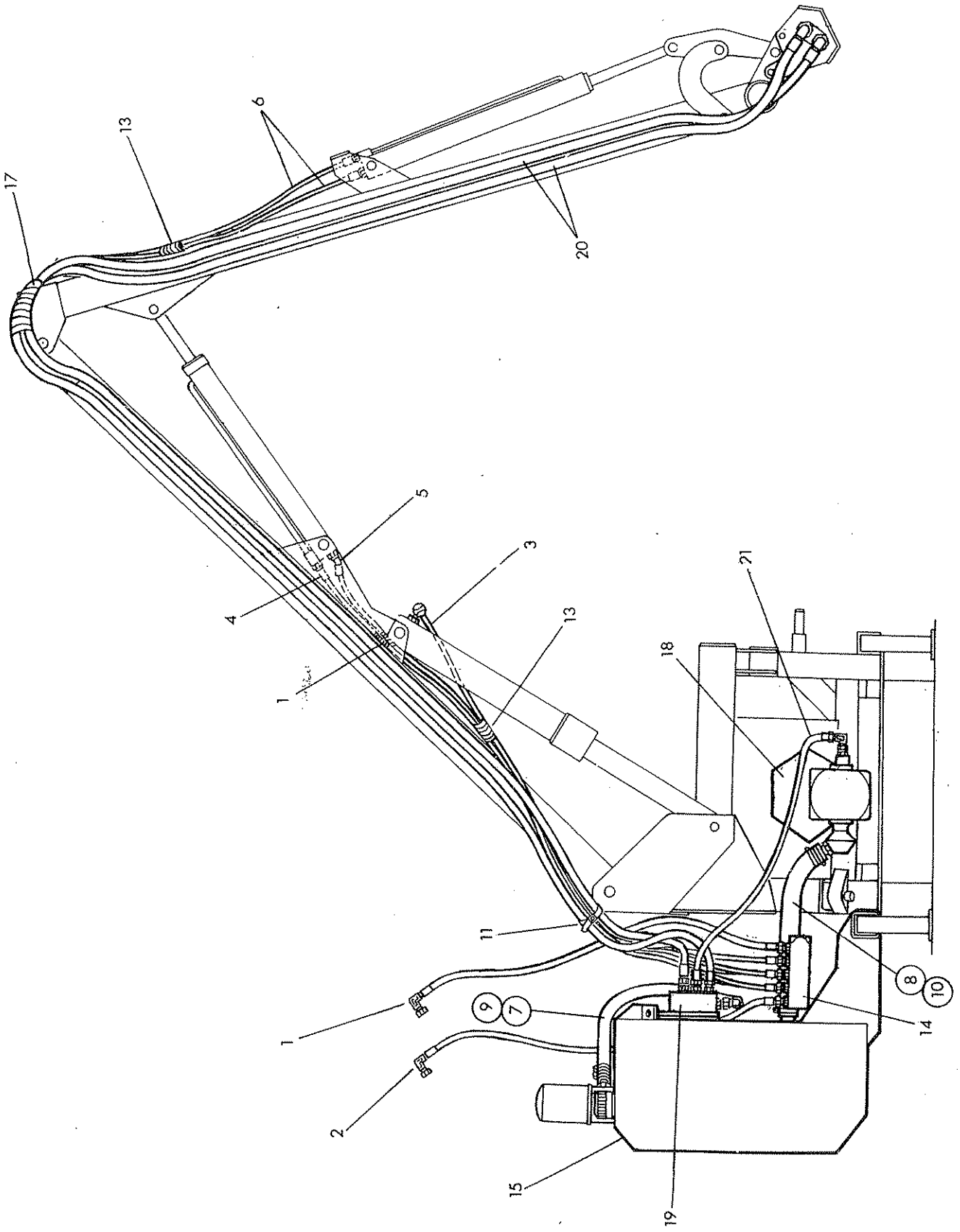
Ref.	Part No.	Qty.	Description
	71-09-319		**CONTROL MOUNTING ASSEMBLY**
1	71-09-320	1	Sandwich plate
2	71-09-146	1	Pillar including spring dowel
3	04-22-816	1	Spring dowel
4	93-13-066	1	Setscrew M12 x 30
5	91-13-006	1	Nut M12
6	93-11-086	1	Setscrew 5/8 UNF x 1" bore
7	01-11-006	1	Nut 5/8 UNF
8	01-00-206	1	Spring washer 5/8" dia

T.I. R.Hand



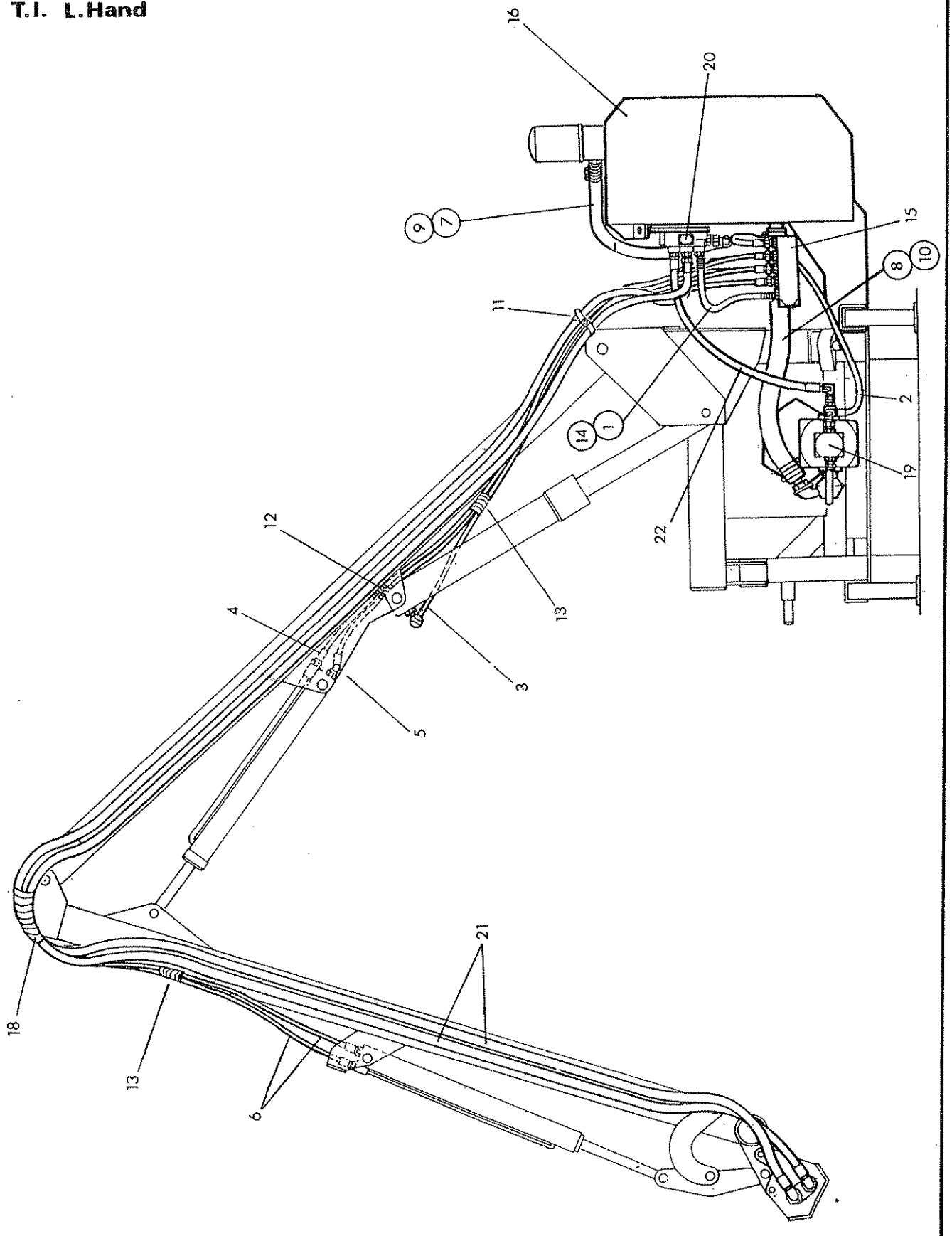
Ref.	Part No.	Qty.	Description
			PA 92 HYDRAULIC INSTALLATIONS FOR T.I. MACHINES - R. HAND
			Items 1 - 17 inclusive are common to all T.I. R.Hand hydraulic installations
1	85 01 158	1	Hose 5/8" bore x 24" long. Return to rotor valve
2	85 31 213	1	Hose 3/8" BSP-SF-90 deg F x 36"long. Supply from pump
3	85 35 072	1	Hose 1/4" BSP SF-90 deg F x 48"long. Lift
4	85 15 132	1	Hose 1/4" BSP SF-SF x 64" long. Reach gland
5	85 45 032	1	Hose 1/4" BSP SF-135 deg Fx 64" long. Reach base
6	85 15 142	2	Hose 1/4" BSP SF-SF x 144" long-Angle
7	85 00 828	1	Hose low pressure 1" bore x 28' long rotor valve tank
8	85 01 151	1	Hose 1 1/2" bore x 19" long Suction
9	09 04 106	4	Hose clip - 1" bore hose
10	09 04 107	4	Hose clip - 1 1/2" bore hose
11	71 06 187	1	Hose tie
12	71 92 044	2	Hose armour 1/4" dia x 50mm long
13	71 35 090	2	Hose armour coil 3/8" dia x 50mm long
14	09 04 204	2	Hose clip 5/8" bore
15	81 30 380	1	Hydraulic control assembly - see page 59-62
16		1	Tank assembly see page 73
17	71 09 319	1	Control mounting assembly - see page 50
			Additional items are required for the following specific installations
			HYDRAULIC INST. STD POWER R.HAND
18	71 93 026	2	Hose armour coil 3/4" dia
19	80 13 405	1	Pump/gearbox assembly R.Hand-See page 63
20	81 25 373	1	Rotor control valve assembly R.Hand-see page 69
21	85 38 065	2	Hose 3/4" BSP SF-90 deg F x 200" long-Flail motor
22	85 38 015	1	Hose 3/4 BSP SF-90deg F x 33"long-Pump-R.C. valve
			HYDRAULIC INST. HI POWER R. HAND
18	71 36 143	2	Hose armour coil 1" dia
19	80 13 424	1	Pump/gearbox assembly R.Hand -see page 63
20	81 25 375	1	Rotor control valve assembly R.Hand-see page 69
21	85 01 183	2	Hose 1" BSP SF-90deg F x 200"long.Flail motor
22	85 01 097	1	Hose 1" BSP SF-90 deg F x 34"long. Pump-R.C. Valve

S.I. R. Hand



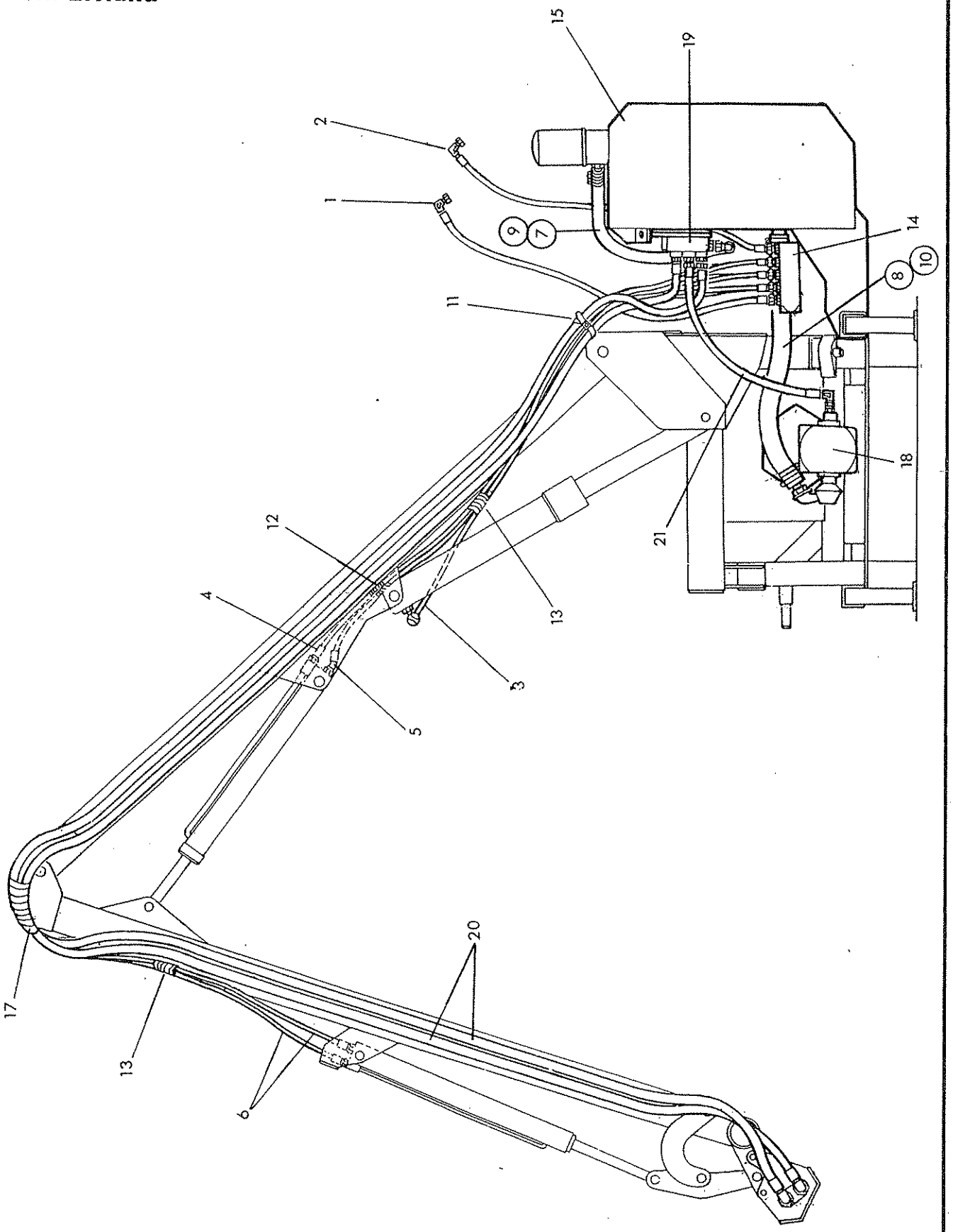
Ref.	Part No.	Qty.	Description
			PA 92 HYDRAULIC INSTALLATIONS FOR R.HAND S.I. MACHINES
			Items 1 to 16 inclusive are common to all S.I. R Hand hydraulic installations.
1	85 32 014	1	Hose 1/2" BSP SF- 90 deg F x 80" long-Return tractor
2	85 31 323	1	Hose 3/8 BSP SF-90deg F x 80"long-supply
3	85 35 072	1	Hose 1/4" BSP SF-90deg F x 48" long.Lift
4	85 15 132	1	Hose 1/4" BSP SF-SF x 64"long.Reach gland
5	85 45 032	1	Hose 1/4" BSP SF-135Deg Fx 64"long.Reach base
6	85 15 142	2	Hose 1/4" BSP SF-SF x 144" long. Angle
7	85 00 828	1	Hose low pressure 1" bore x 28'long rotor valve- tank
8	85 01 157	1	Hose 1 1/2" bore x 19" long - suction
9	09 04 106	4	Hose clip - 1" bore hose
10	09 04 107	4	Hose clip - 1 1/2" bore hose
11	71 06 187	1	Hose tie
12	71 92 044	2	Hose armour 1/4" dia x 50mm long
13	71 35 090	2	Hose armour coil 3/8" dia x 50mm long
14	81 30 380	1	Hydraulic control assembly see page 59 – 62
15		1	Tank assembly see page 73
16	71 09 319	1	Control mounting assembly see page 50
			Additional items are required for the following specific installations
			HYDRAULIC INSTALLATION - S.I. -STD POWER R HAND
17	71 93 026	2	Hose armour coil 3/4" dia
18	80 13 403	1	Pump/gearbox assembly R.Hand see page 65
19	81 25 360	1	Rotor relief valve assembly 71
20	85 38 065	2	Hose 3/4" BSP SF-90deg F x 200"long-Flail motor
21	85 38 015	1	Hose 3/4" BSP SF-90deg F X 33"long pump- RR valve
			HYDRAULIC INSTALLATON - SI-HI POWER R.HAND
17	71 36 143	2	Hose armour coil 1" dia
18	80 13 422	1	Pump/gearbox assembly R. Hand see page 65
19	81 25 400	1	Rotor relief valve assembly 71
20	85 01 183	2	Hose 1" BSP SF-90deg F x 200" long-Flail motor
21	85 01 097	1	Hose 1" BSP SF-90deg F x 34"long pump R.R. Valve

T.I. L.Hand

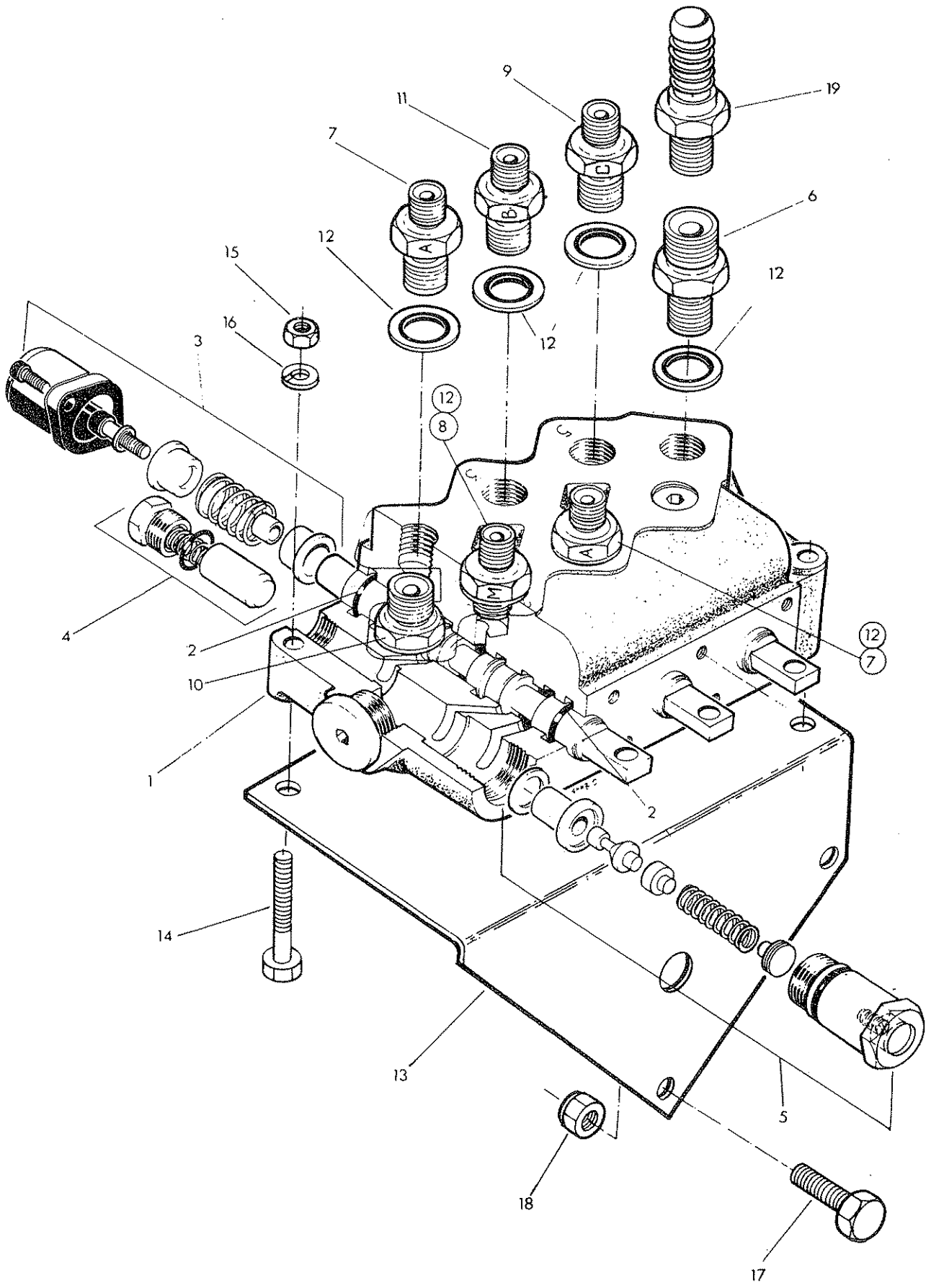


Ref.	Part No.	Qty.	Description
			PA 92 HYDRAULIC INSTALLATIONS FOR T.I. MACHINES L.HAND
			Items 1 -17 inclusive are common to all T.I. L.Hand hydraulic installations
1	85 01 158	1	Hose 5/8" bore x 24" long.Return to rotor valve
2	85 31 213	1	Hose 3/8" BSP-SF-90 deg F x 36" long.Supply from pump
3	85 35 072	1	Hose 1/4" BSP SF-90 deg F x 48" long. Lift
4	85 15 132	1	Hose 1/4" BSP SF-SF x 64" long. Reach gland
5	85 45 032	1	Hose 1/4" BSP SF-135 deg Fx 64" long. Reach base
6	85 15 142	2	Hose 1/4" BSP SF-SF x 144" long-Angle
7	85 00 828	1	Hose low pressure 1" bore x 28" long rotor valve tank
8	85 01 192	1	Hose 1 1/2" bore x 27 1/2" long-Suction
9	09 04 106	4	Hose clip - 1" bore hose
10	09 04 107	4	Hose clip - 1 1/2" bore hose
11	71 06 187	1	Hose tie
12	71 92 044	2	Hose armour 1/4" dia x 50mm long
13	71 35 090	2	Hose armour coil 3/8" dia x 50mm long
14	09 04 204	2	Hose clip 5/8" bore
15	81 30 380	1	Hydraulic control assembly -see page 59-62
16		1	Tank assembly see page 73
17	71 09 319	1	Control mounting assembly - see page 50
			Additional items are required for the following specific installations
			HYDRAULIC INST. TI STD POWER L.HAND
18	71 93 026	2	Hose armour coil 3/43" dia
19	80 13 413	1	Pump/gearbox assembly L.Hand -see page 63
20	81 25 374	1	Rotor control valve assy L.Hand-see page 69
21	85 38 065	2	Hose 3/4 BSP SF x 90 deg F x 200"long-Flail motor
22	85 38 015	1	Hose 3/4" BSP SF-90 deg F x 33"long-Pump-R.C. Valve
			HYDRAULIC INST. T.I. HI POWER L. HAND
18	71 36 143	2	Hose armour coil 1" dia
19	80 13 425	1	Pump/gearbox assembly L.Hand see page 63
20	81 25 376	1	Rotor control valve assy L.Hand see page 69
21	85 01 183	2	Hose 1" BSP SF-90 deg F x 200" long-Flail motor
22	85 01 097	1	Hose 1" BSP SF-90 deg F x 34" long.Pump R.C. valve

S.I. L. Hand



Ref.	Part No.	Qty.	Description
			PA 92 HYDRAULIC INSTALLATIONS FOR L. HAND S.I. MACHINES
Items 1 to 16 inclusive are common to all S.I.-L.Hand hydraulic installations			
1	85 32 014	1	Hose 1/2" BSP SF-90 deg F x 80"long-Return tractor
2	85 31 323	1	Hose 3/8 BSP SF 90 deg F x 80"long-Supply
3	85 35 072	1	Hose 1/4" BSP SF-90Deg F x 48"long. Lift
4	85 15 132	1	Hose 1/4" BSP SF-SF x 64"long. Reach gland
5	85 45 032	1	Hose 1/4" BSP SF-135 Deg Fx64"long.Reach base
6	85 15 142	2	Hose 1/4" BSP SF-SF x 144" long-Angle
7	85 00 828	1	Hose low pressure 1" bore x 28'long rotor valve - tank
8	85 01 192	1	Hose 1 1/2" bore x 27 1/2" long-Suction
9	09 04 106	4	Hose clip - 1" bore hose
10	09-04-107	4	Hose clip - 1 1/2" bore hose
11	71 06 187	1	Hose tie
12	71 92 044	2	Hose armour 1/4" dia x 50mm long
13	71 35 090	2	Hose armour coil 3/8" dia x 50mm long
14	81 30 380	1	Hydraulic control assembly. see page 59-62
15		1	Tank assembly see page 73
16	71 09 319	1	Control mounting assembly see page 50
Additional items are required for the following specific installations			
			HYDRAULIC INSTALLATION SI-STD POWER-L.HAND
17	71 93 026	2	Hose armour coil 3/4" dia
18	80 13 412	1	Pump/gearbox assembly L. Hand see page 65
19	81 25 360	1	Rotor relief valve assembly see page 71
20	85 38 065	2	Hose 3/4" BSP SF-90 deg F x 200"long. Flail motor
21	85 38 015	1	Hose 3/4" BSP SF- 90 deg F x 33"long-Pump-R.R. valve
			HYDRAULIC INSTALLATION-SI-HI POWER-L. HAND
17	71 36 143	2	Hose armour coil 1" dia
18	80 13 423	1	Pump/gearbox assembly L.Hand see page 65
19	81 25 400	1	Rotor relief valve assembly see page 71
20	85 01 183	2	Hose 1" BSP SF-90 deg F x 200" long.Flail motor
21	85 01 097	1	Hose 1" BSP SF-90deg F x 34"long. Pump-R.R. valve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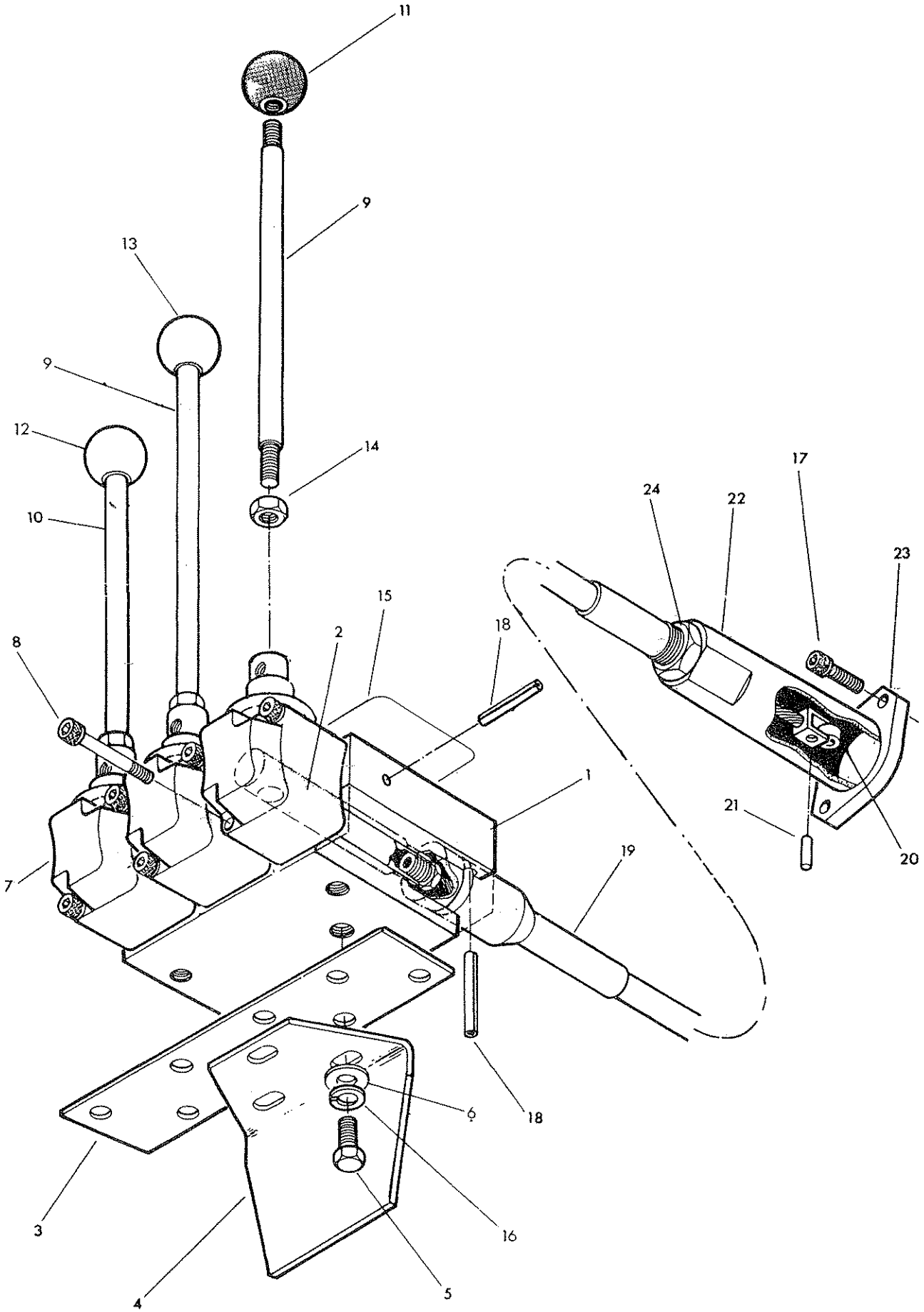
Ref.	Part No.	Qty.	Description
			HYDRAULIC CONTROL ASSEMBLY FOR PA92 SEMI INDEPENDENT MODEL
⊕	81-30-340	1	Valve c/w connections
1	81-30-252	1	Valve block c/w spools 'O' rings
2	86-00-112	6	'O' ring
3	81-30-134	3	Centering spring assembly
4	81-30-022	1	Non-return valve assembly
5	G381-2537	1	Relief valve assembly
6	60-00-112	1	Union 3/8" BSP - 1\2" BSP MM
7	81-30-046	2	Restrictor union A 1\4" BSP - 3/8 BSP-MM
8	81-30-066	1	Restrictor union m 3/8 BSP-1\4 BSP MM
9	81-30-048	1	Restrictor union 'C' 1\4"BSP-3/8 BSP MM
10	60-00-113	1	Union 3/8 BSP M-M
11	81-30-047	1	Restrictor union B 1\4" BSP 3/8 BSP MM
12	86-50-103	7	Bonded seal 3/8 BSP
13*	71-92-025	1	Valve mounting plate R. hand
14	92-13-124	3	Bolt M8 x 60
15	91-13-004	3	Nut M8
16	91-00-204	3	Spring washer
17	93-13-055	2	Setscrew M10 x 25
18	91-43-005	2	Self locking nut M10
	86-00-163		SEAL KIT
			HYDRAULIC CONTROL ASSEMBLY FOR PA 92 FULLY INDEPENDENT MODEL

The parts list is identical to above with the following exceptions ⊕ becomes

	81-30-341	1	Valve c/w connections
19	81-25-008	1	Return connection 5/8" bore
			Lever control. See following page.

*** Spares note**

13	71-92-057	1	Valve mounting plate L. hand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Ref.	Part No.	Qty.	Description
	81 30 379		**HYDRAULIC CONTROL ASSY FOR PA 92 T.I. MODELS-continued**
	81 30 380		**HYDRAULIC CONTROL ASSY FOR PA 92 SI MODELS - continued**
1	81 30 391	1	Control block
2	81 30 144	3	Control block spindle
3	71 14 071	1	Control block mounting base
4	80 17 006	1	Mounting bracket
5	93 13 034	6	Setscrew M8 x 16
6	01 00 102	6	Thin washer 5/16" diameter
7	81 30 065	3	Lever pivot box assembly
8	92 43 072	6	Socket headed capscrew M5 x 35
9	71 09 131	2	Lever handle long
10	71 09 132	1	Lever handle short
11	09 03 112	1	Lever knob Reach (Red)
12	09 03 113	1	Lever knob Angle (Green)
13	09 03 114	1	Lever knob-Lift (Yellow)
14	91 13 004	3	Hexagon nut M8
15	12 90 354	1	Operating instruction label
16	91 00 204	3	Spring washer dia 8
17	93 43 022	6	Socket headed capscrew M5 x 12
18	04 25 540	6	Spring dowel dia 5 x 40
19	81 25 046	3	Cable & spacer & pin,sleeve, flange etc
20	71 15 158	1	Spool eye bush
21	71 15 160	1	Pin
22	71 15 162	1	Sleeve
23	81 25 050	1	Flange
24	01 31 006	1	Thin locknut 5/8 UNF

*** An alternative cable assembly may be fitted depending on supply availability**

The complete assembly is interchangeable and thus retains the same assembly Part Number i.e. 81 25 046

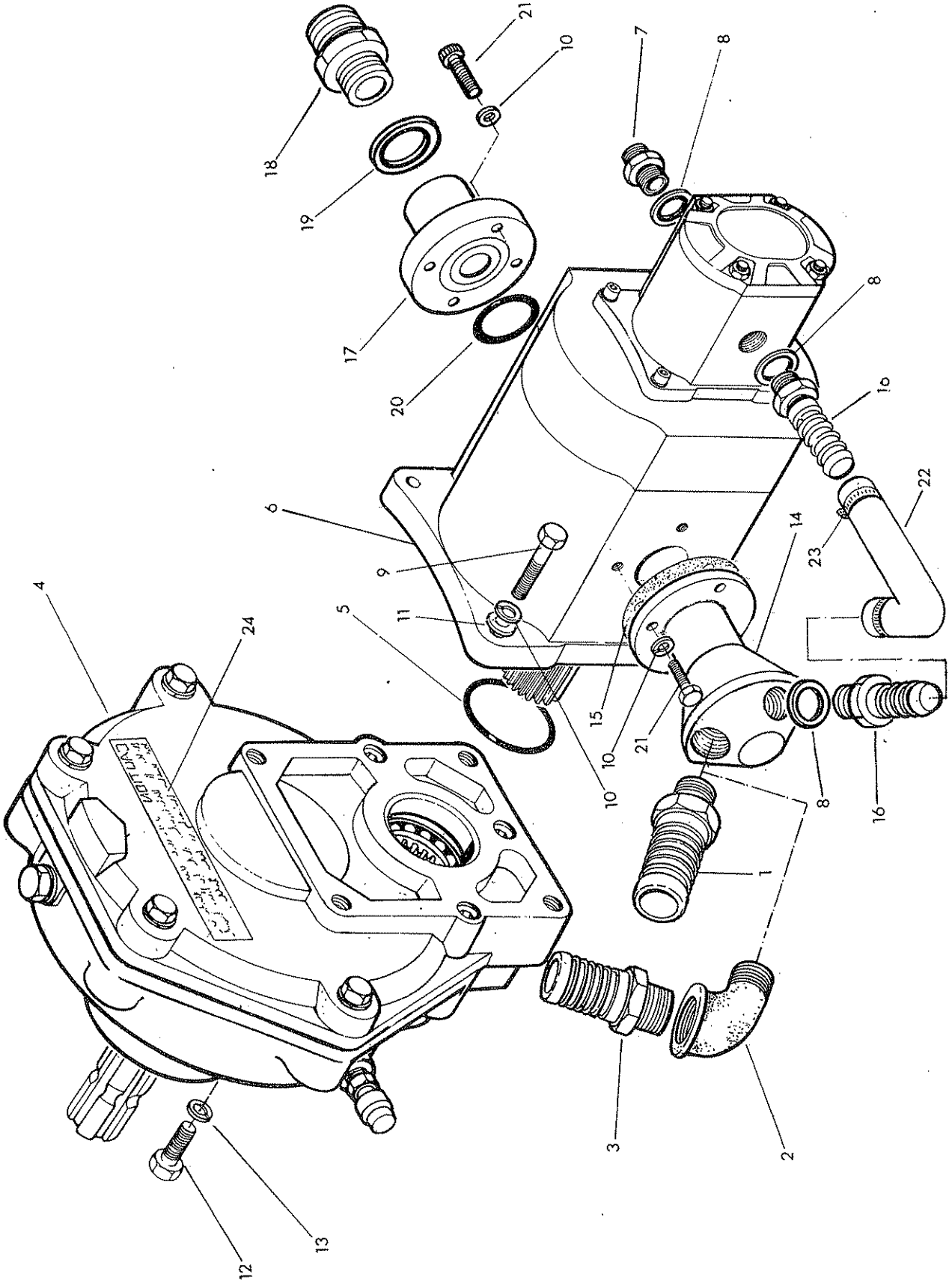
Individual cable components are not interchangeable thus before ordering spares the cable must be correctly identified.

The cable listed above is manufactured by "BOWDEN" and is BLACK

The alternative cable manufactured by "TELEFLEX MORSE" is RED and consists of

19	81 25 046	1	Cable assembly incl. sleeve, flange etc
20	81 25 049	1	Cable sleeve
21	81 25 050	1	Flange
22	81 25 051	1	Pin
23	91 00 016	1	Thin locknut M16 x 1.5 pitch
24	80 17 004	1	Spool eye bush

T.I.



Ref	Part No.	Qty.	Description
	80 13 405		**GEARBOX / PUMP ASSEMBLY - TI - R. HAND- STD POWER**
1*	85 81 282	1	Adaptor 3/4" BSP - 1 1/2" low pressure
	80-13-413		**GEARBOX/PUMP ASSEMBLY -TI - L. HAND - STD POWER**
2*	85 81 280	1	Elbow 90 deg 3/4" BSP M - 1" BSPT
3*	85 81 281	1	Adaptor 1" BSPT - 1 1/2" low pressure

The following items are common to both TI. std power pump/gearbox assemblies

4	80 13 360	1	Gearbox 4.59:1 (see page 67)
5	86 00 523	1	'O' ring
6 ◓	82 01 466	1	Tandem pump CPL 33/5.7- Cassappa - as shown
	82 01 466	1	Tandem pump - Ultra - Alternative build.
7	60 00 112	1	Union 1/2" BSP - 3/8 BSP M-M
8	86-50-104	3	Bonded seal 1/2" BSP
9	92 13 094	4	Bolt M8 x 45
10	91 00 204	12	Spring washer dia 8
11	91 00 104	4	Plain washer
12	93 13 056	4	Setscrew M12 x 25
13	91 00 206	4	Spring washer dia 12
14	80 30 398	1	Suction adaptor
15	80 13 023	1	Gasket
16	80 02 059	2	1/2" BSP - 5/8" low pressure adaptor
17	80 13 088	1	Pump flange
18	85 81 136	1	Union 3/4" BSP mm
19	86 50 106	1	Bonded seal 3/4" BSP
20	86 00 119	1	'O' ring
21	93 13 054	8	Setscrew M8 x 25
22	85 01 103	1	Connecting hose
23	09 04 204	2	Hose clip 5/8 bore hose
24	80 13 081	1	Gearbox label
	86 99 215		**PUMP SEAL KIT - Cassappa CPL 33/5.7**
	86 99 231		**PUMP SEAL KIT - Ultra**
	80 13 424		**GEARBOX/PUMP ASSEMBLY - TI - R.HAND - HI POWER**
	80 13 425		**GEARBOX/PUMP ASSEMBLY - TI - L. HAND - HI POWER**

The parts lists are identical to their std power counterparts except the following

6 ◓	82 01 660	1	Tandem pump CPL 46/9
18	80 02 086	1	Adaptor 3/4 BSP - 1" BSP MM
	86 99 189		**PUMP SEAL KIT**

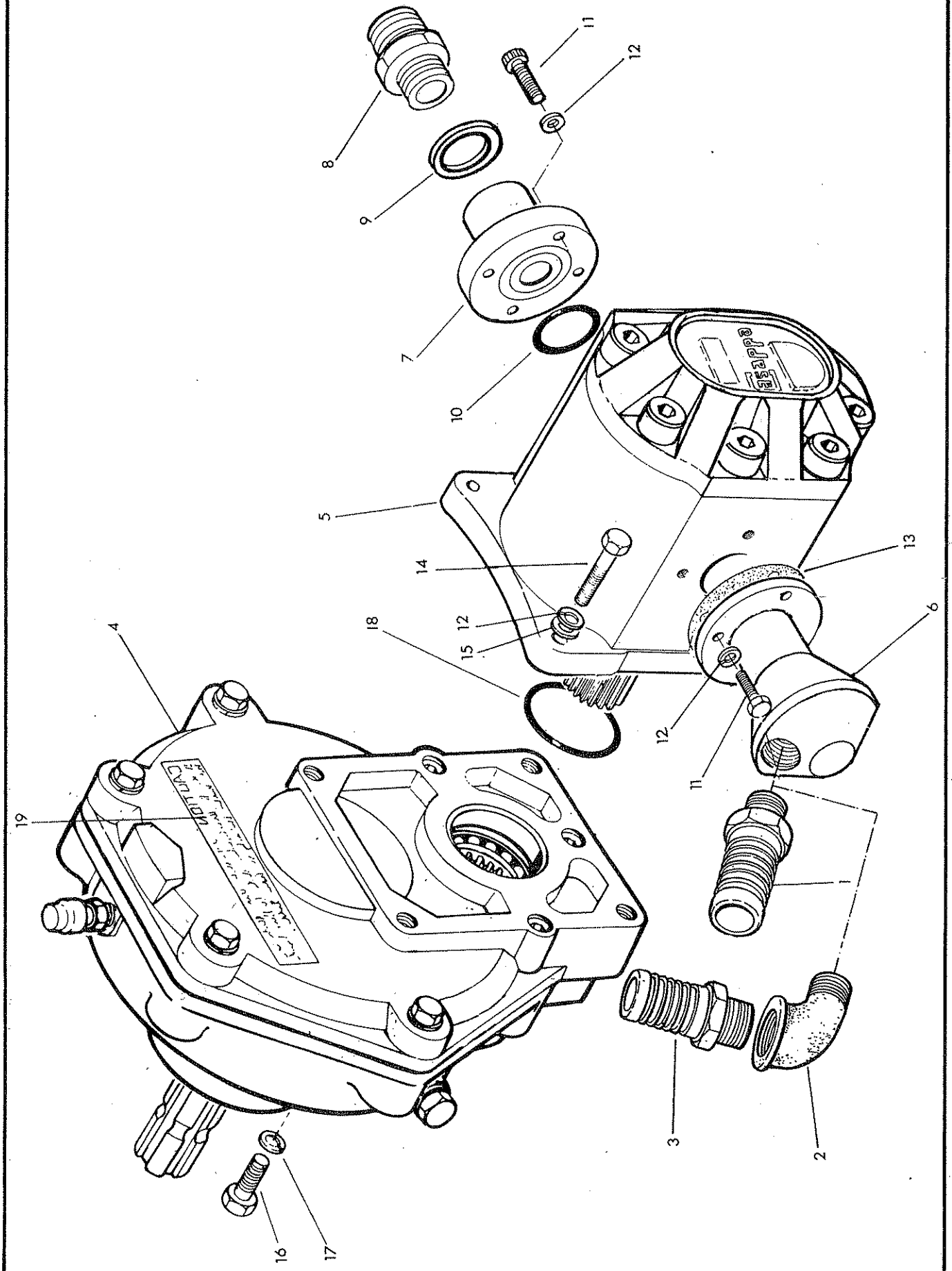
*** Assembly note**

Item 1 or items 2 and 3 to be assembled into item 14 using P.T. F.E tape

◓ Spares note

Check casing for pump model number to ensure correct identification

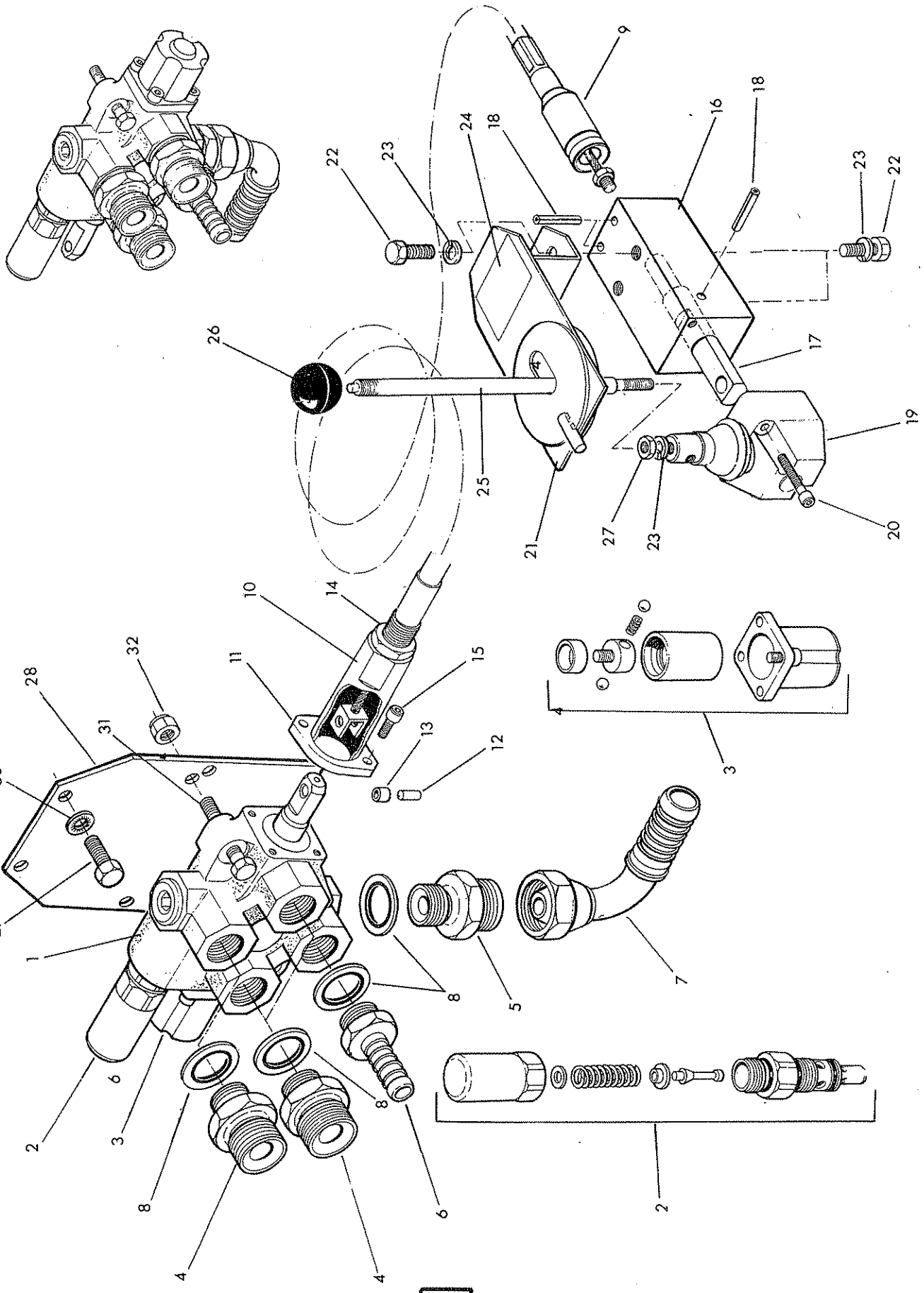
S.I.



Ref.	Part No.	Qty.	Description
	80-13-360		**GEARBOX ASSEMBLY (4.59:1)**
1	80-13-384	1	Gear 78 teeth
2	80-13-385	1	Pinion 17 teeth
3	80-13-370	1	Gearbox casing - input
4	80-13-371	1	Gearbox lid - output
5	80-13-374	1	Input Shaft 1 3/8" dia x 6 spline
6	06-00-063	1	Bearing
7	06-00-064	1	Bearing
8	06-00-065	2	Bearing
9	86-29-151	1	Shaft seal 2 1/8" x 1 3/8" x 1\2"
10	92-13-064	4	Bolt M8 x 30
11	91-00-204	4	Spring washer Dia 8
12	93-43-074	3	Capscrew socket headed M8 x 35
13	80-13-375	2	Sleeve dowel
14	80-13-376	1	Breather
15	85-81-133	2	Plug-level and drain 1\4" BSP
16	85-82-042	1	Taper plug 1\4" BSPT
17	86-50-102	2	Bonded seal 1\4" BSP

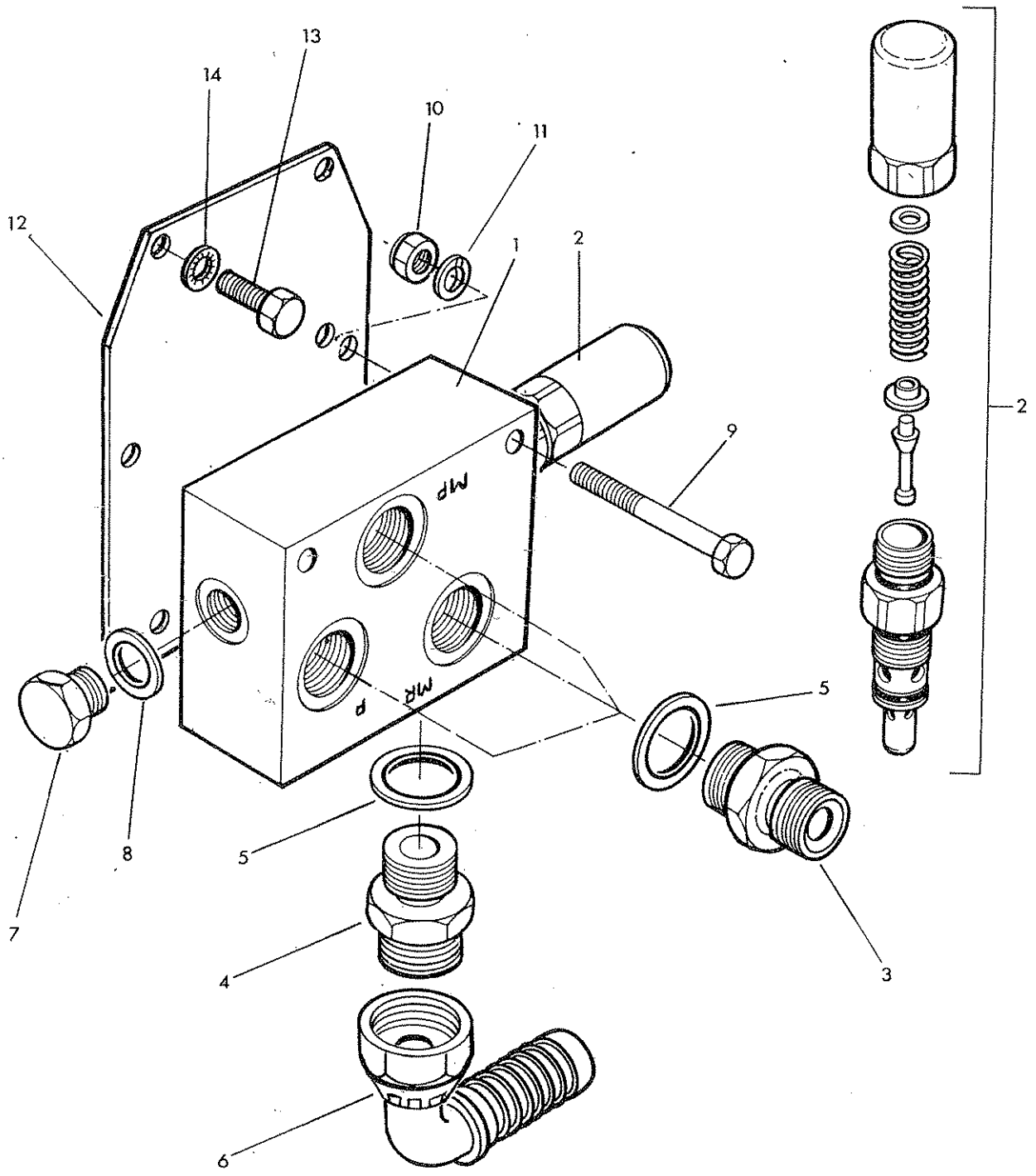
McCONNEL

T.I. only



Ref.	Part No.	Qty.	Description
	81 25 373		**ROTOR CONTROL VALVE ASSEMBLY R.HAND - STD POWER - as shown exploded**
	81 25 374		**ROTOR CONTROL VALVE ASSEMBLY L. HAND - STD POWER - as shown assembled inset**
	Individual parts for both assemblies are identical. Assemblies vary only in build		
1	81 25 355	1	Rotor control valve incl. relief valve and detent
2	81 25 107	1	Relief valve 3000 PSI (210 Bar)
3	81-25-109	1	Detent assembly
4	85 81 270	3	Union 3/4 BSP MM
5	80 02 086	1	Adaptor 3/4" BSP - 1" BSP MM
6	85 81 269	1	Adaptor 3/4" BSP x 5/8" low pressure connection
7	71 14 005	1	Elbow 1" BSP F - 1" low pressure connection
8*	86 50 106	5	Bonded seal 3/4" BSP
9	81 25 102	1	Cable assembly incl. sleeve flange etc
10	81 25 097	1	Sleeve
11	81 25 098	1	Flange
12	81 25 099	1	Pin
13	81 25 100	1	Bush
14	01 31 006	1	Thin locknut
15	93 43 033	2	Capscrew - socket headed M6 x 16
16	81 25 093	1	Control block
17	81 30 053	1	Control spindle
18	05 25 525	3	Spring dowel dia 5 x 25
19	81 30 065	1	Pivot box assembly
20	92 13 072	2	Capscrew -socket headed M5 x 35
21	81 25 089	1	Lever control gate
22	93 13 034	4	Setscrew M8 x 16
23	91 00 204	5	Spring washer dia 8
24	12 90 339	1	Operating label
25	71 14 072	1	Lever
26	09 03 121	1	Knob - black
27	91 13 004	1	Thin nut M8
	81 25 375		**ROTOR CONTROL VALVE ASSEMBLY - R. HAND - HI POWER**
	81 25 376		**ROTOR CONTROL VALVE ASSEMBLY - L. HAND - HI POWER**
	The parts lists for Hi-power rotor control valves are identical to their std power counterparts with the following exceptions.		
1	81 25 356	1	Rotor control valve incl. relief valve
2	81 25 108	1	Relief valve 190 Bar
4	80 02 086	3	Adaptor 3/4" BSP - 1" BSP MM
	86-99-218		**SEAL KIT - for all rotor control valves**
			ANCILLIARY PARTS - For all rotor control valves
28	71-92-054	1	Mounting plate
29	93-13-045	2	Setscrew M10 x 20
30	91-00-305	2	Internal serrated washer dia 10
31	93-13-085	2	Setscrew M 10 x 40
32	91-43-005	2	Self locking nut

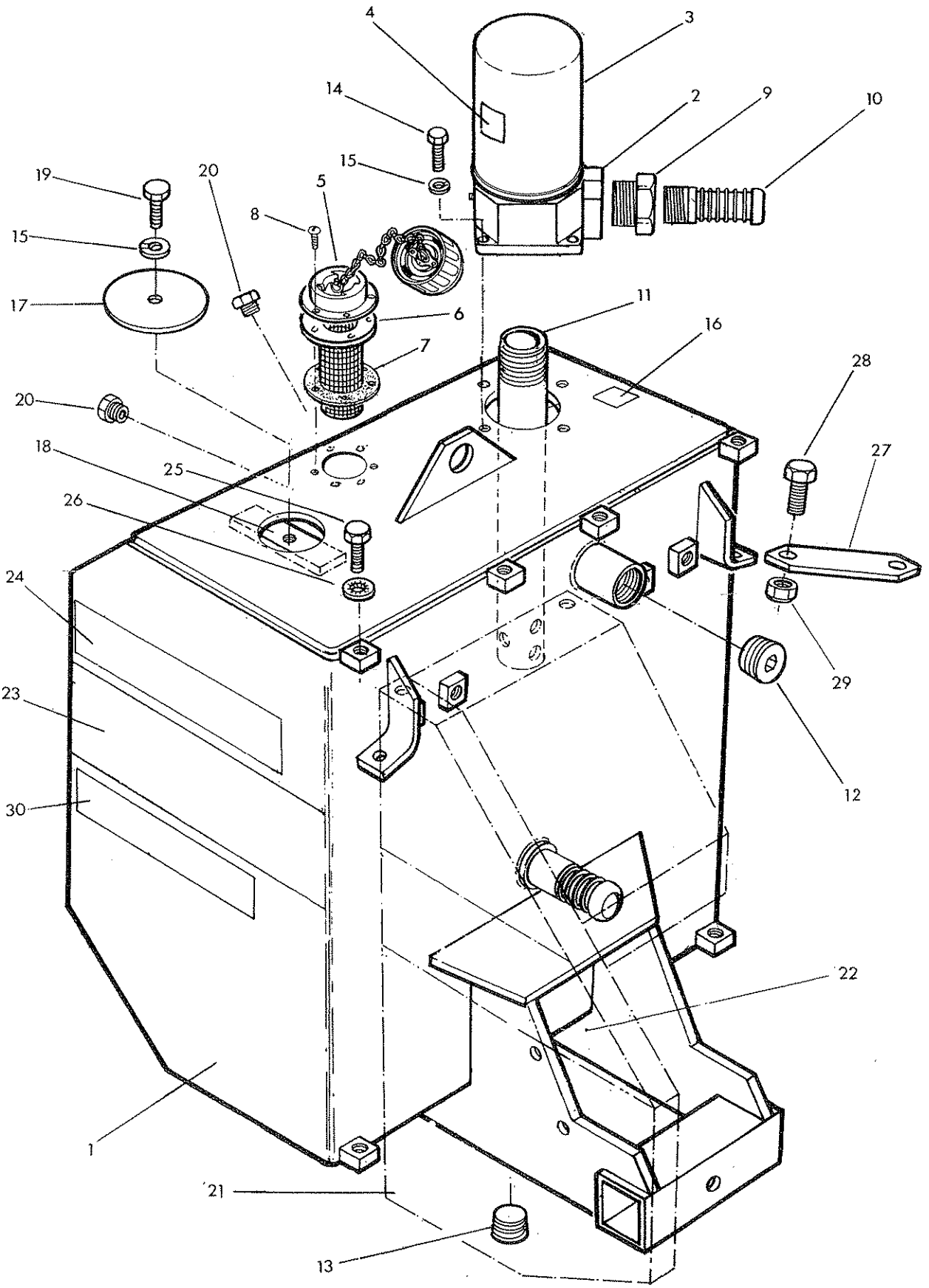
S.I. only



Ref.	Part No.	Qty.	Description
	81 25 360		**ROTOR RELIEF VALVE ASSEMBLY STD POWER S.I. MODELS ONLY**
1	81 25 352	1	Valve block
2	81 25 107	1	Relief valve cartridge incl 'O' rings-207 bar
3	85 81 136	3	Union 3/4" BSP MM
4	80 02 086	1	Adaptor 3/4" BSP - 1" BSP MM
5	86 50 106	4	Bonded seal 3/4" BSP
6	71 14 005	1	Swept 90 elbow 1" BSP F-1" low pressure
7	80 03 001	1	Plug 3/8 BSP
8	86 50 103	1	Bonded seal 3/8" BSP
9	92 13 135	2	Bolt M10 x 65
10	91 13 005	2	Nut M10
11	91 00 205	2	Spring washer dia 10
12	71 92 054	1	Mounting bracket
13	93 13 045	2	Setscrew M10 x 20
14	91 00 305	2	Internal serrated washer dia 10
	81 25 400		**ROTOR RELIEF VALVE ASSEMBLY HI -POWER S.I. MODELS ONLY**

The parts list is identical to the above with the following exceptions

2	81 25 108	1	Relief valve cartridge incl 'O' rings-190 bar
3	80 02 086	3	Adaptor 3/4" BSP-1" BSP MM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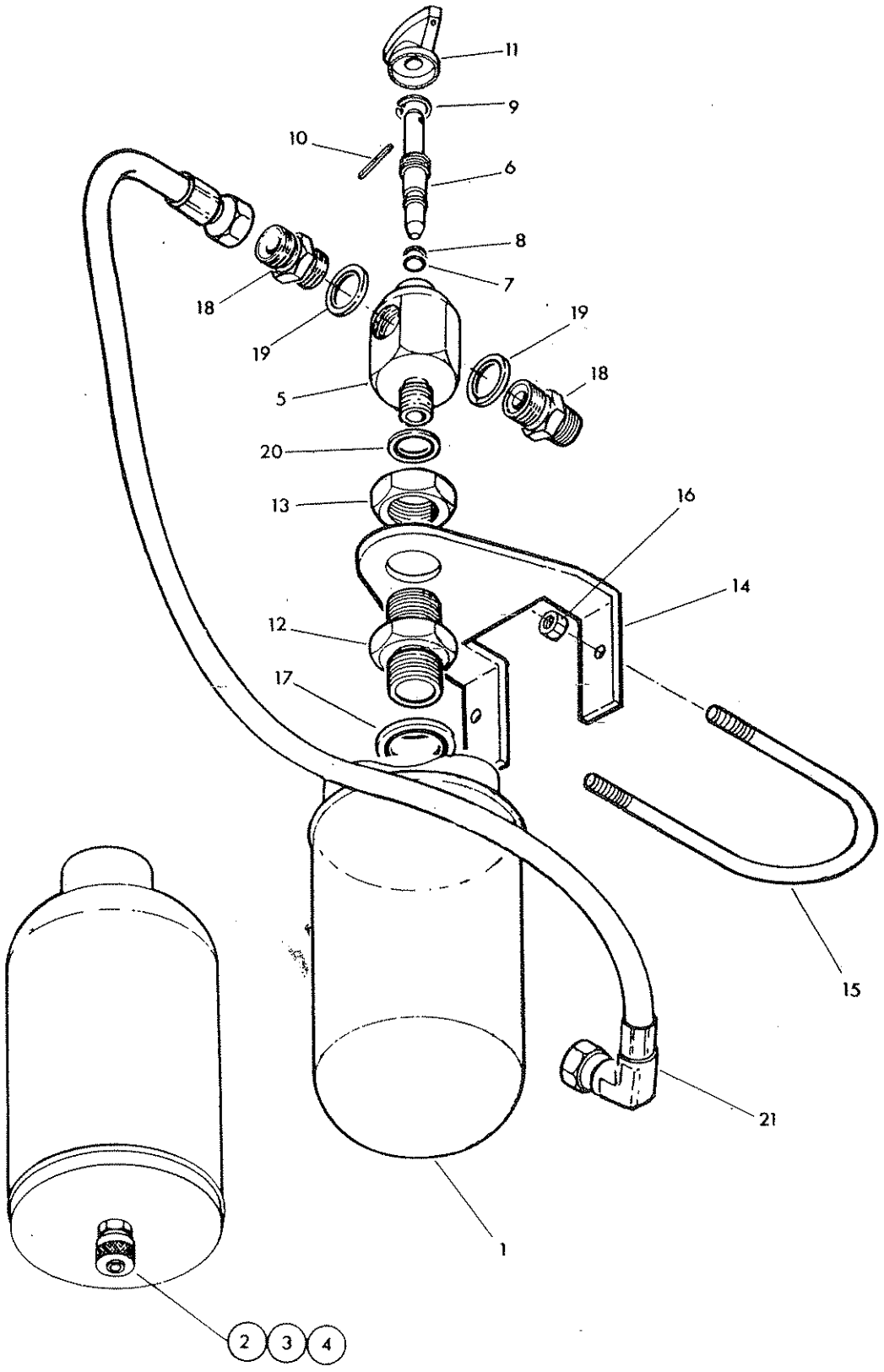
Ref.	Part No.	Qty.	Description
			HYDRAULIC TANK & COVER PLATE R.HAND
	71 92 359		**Oil tank assembly compr:-**
1	71 92 351	1	Oil tank
2	84 01 040	1	Return filter asy. incl. element
3	84 01 041	1	Element
4	12-90-023	1	Sticker - Oil filter instructions
	84 01 014	1	Filler breather assembly compr:-
5	84 01 015	1	Filler cap and neck
6	84 01 016	1	Strainer basket
7	84 01 017	1	Gasket
8	03 00 032	6	Screw-self tapping 3/16" dia x 1/2"long
9*	85 81 262	1	Adaptor 1 1/2" BSP -3/4 BSP M-F
10*	80 05 037	1	Adaptor 3/4" BSP - 1" low pressure
11*	71 96 056	1	Return pipe
12*	85 81 294	1	Plug
13*	85 81 203	1	Drain plug 1" BSP
14	93 13 054	4	Setscrew M8 x 25
15	91 00 204	5	Spring washer dia 8
16	12-90-023	1	Label Oil filter service instructions
17	71-96-036	1	Access cover
18	71-93-037	1	Clamp strip
19	92-13-064	1	Setscrew M8 x 30
20	84-01-058	2	Oil level sight glass
21	71 92 330	1	Cover plate R. Hand
22	12 90 283	1	Stripe R.Hand
23	12 90 288	1	'Tank stripe - PA92'
24	12 90 253	1	Sticker 'McConnel'
25	93 13 045	2	Setscrew M10 x 20
26	91 00 305	2	Internal serrated washer dia 10
27	71 92 029	1	Tank strap
28	93 13 056	2	Setscrew M12 x 25
29	91 43 006	2	Self locking nut M12'
30	12 90 362	1	Sticker "Hi-Power"
			HYDRAULIC TANK & COVER PLATE - L.HAND

Parts are identical to the R.Hand assembly with the following exceptions.

21	71 92 350	1	Cover plate L. Hand
22	12 90 284	1	Stripe - L .Hand

*** Assembly note**

Items 9 to 13 inclusive to be assembled using PTFE tape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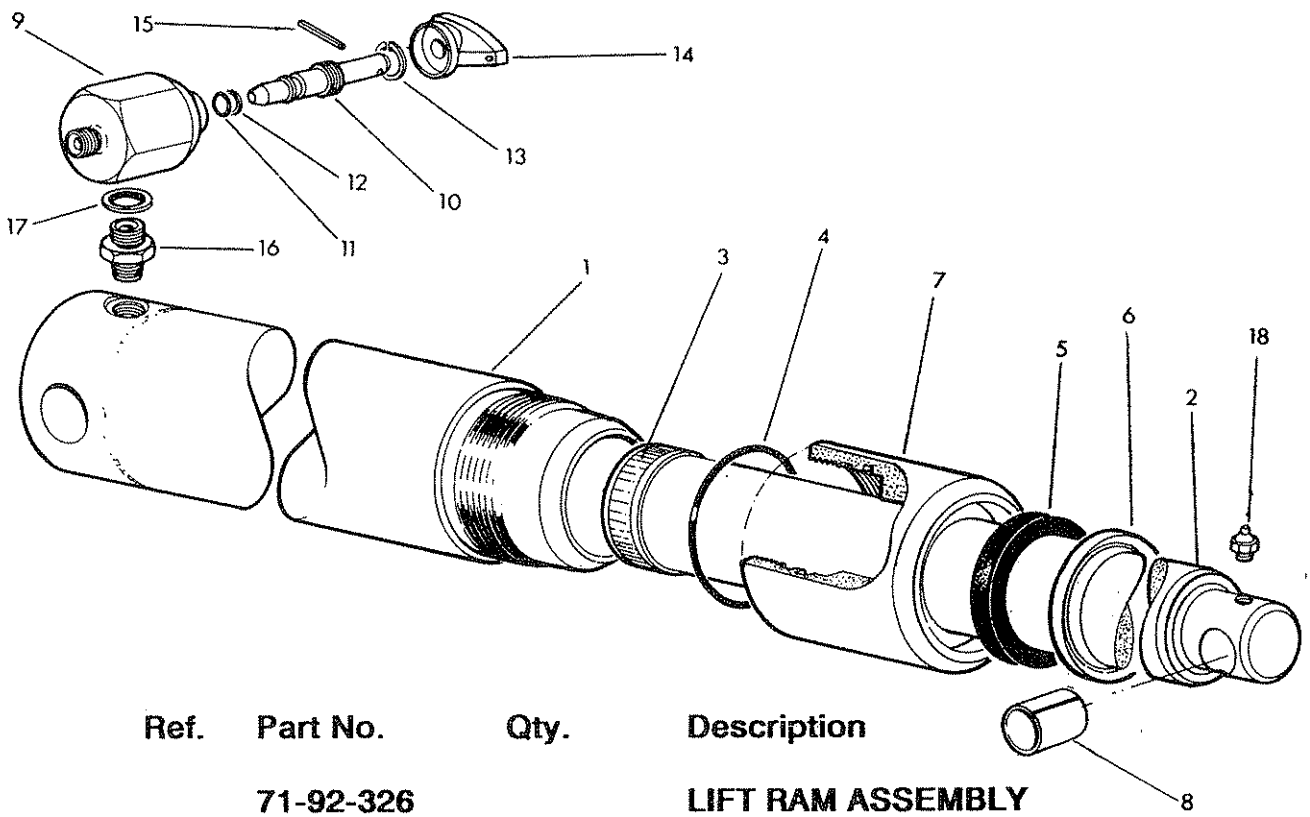
Ref.	Part No.	Qty.	Description
	81-26-273		**LIFT FLOAT KIT**
1	81-26-271	1	Accumulator (600 psi)
2	81-26-015	1	Charge valve assembly incl. 'O' ring
3	81-26-016	1	Charge valve core
4	86-00-103	1	'O' ring
	71-35-007	1	Tap assembly compr:-
5	71-35-294	1	Tap body
6	71-35-006	1	Tap spindle
7	86-00-107	1	'O' ring
8	86-09-107	1	Anti extrusion ring
9	04-16-110	1	Internal circlip
10	04-20-820	1	Spring dowel
11	81-08-006	1	Knob
12	85-81-205	1	Adaptor
13	85-81-151	1	Back nut
14	81-26-277	1	Bracket
15	81-26-031	1	'U' bolt M8
16	91-43-004	2	Self locking nut M8
17	85-50-106	1	Bonded seal 3/4" BSP
18	85-81-115	2	Adaptor 3/8 BSP 1/4" BSP M-M
19	86-50-103	2	Bonded seal 3/8 BSP
20	85-50-102	1	Bonded seal 1/4" BSP
21	85-35-062	1	Hose 1/4" BSP SF-90 degrees F x 15" long
22	12-90-029	1	Sticker - Nitrogen pressure warning



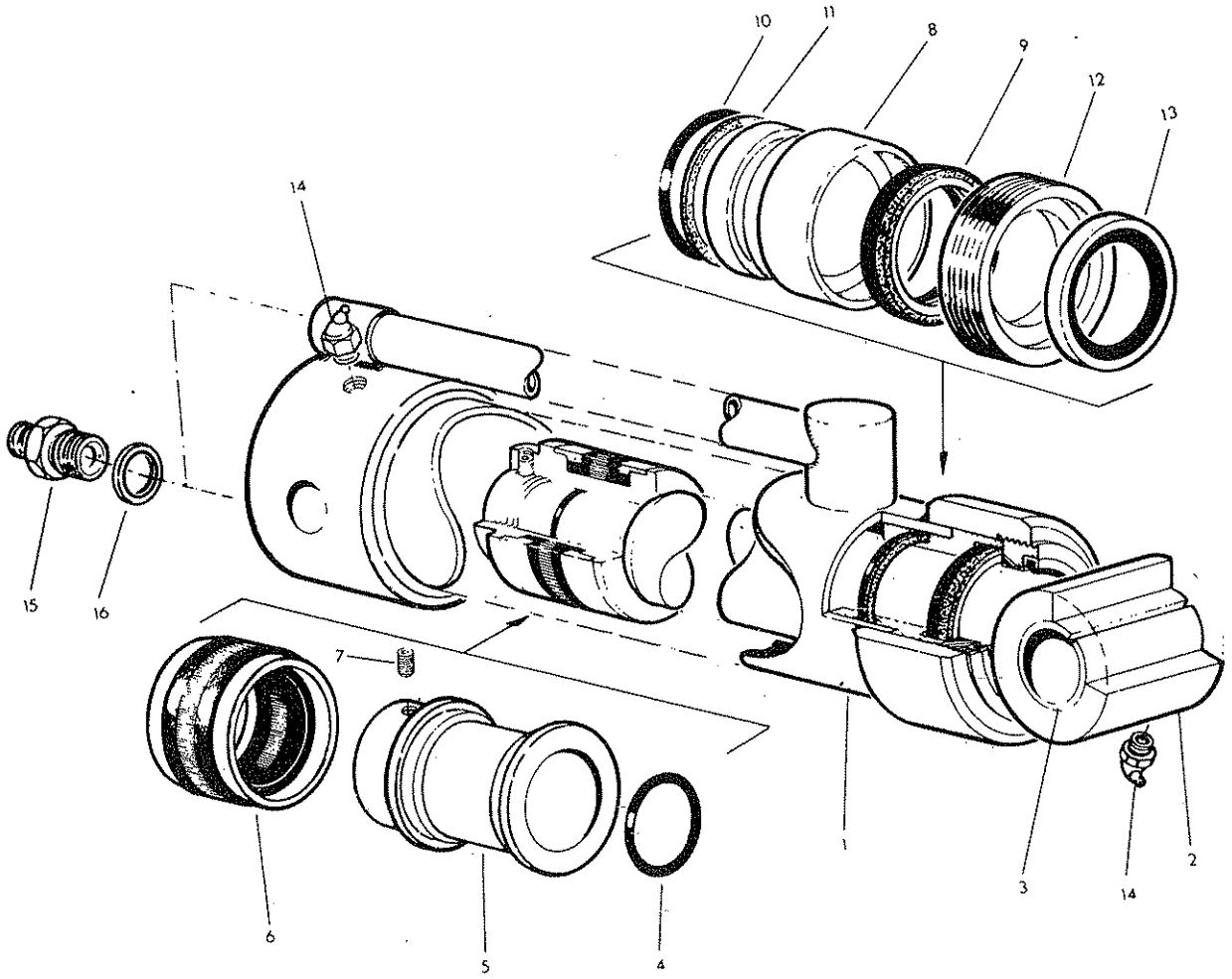
Ref.	Part No.	Qty.	Description
	71-92-326		**LIFT RAM ASSEMBLY**
	71-92-332	1	Ram assembly including:-
1	71-92-333	1	Ram cylinder
2	71-92-334	1	Ram rod
3	86-29-174	1	Wear ring
4	86-00-435	1	'o' ring
5	86-29-172	1	Rod seal
6	86-29-173	1	Rod wiper
7*	71-92-033	1	Cylinder head
8	71-05-050	1	Rod bush
	71-35-005	1	Lock tap including:-
9	71-35-284	1	Tap body
10	71-35-006	1	Tap spindle
11	86-00-107	1	'O' ring
12	86-09-107	1	Anti extrusion ring
13	04-16-110	1	Internal circlip
14	81-08-006	1	Knob
15	04-20-820	1	Spring dowel 1/8" dia x 1 1/4" long
16	80-05-007	1	Taper adaptor 3/8 BSPT
17	86-50-13	1	Bonded seal 3/8 BSP
18	09-01-121	1	Greaser 1/8 BSP - straight
	86-99-213		**SEAL KIT**

Assembly notes

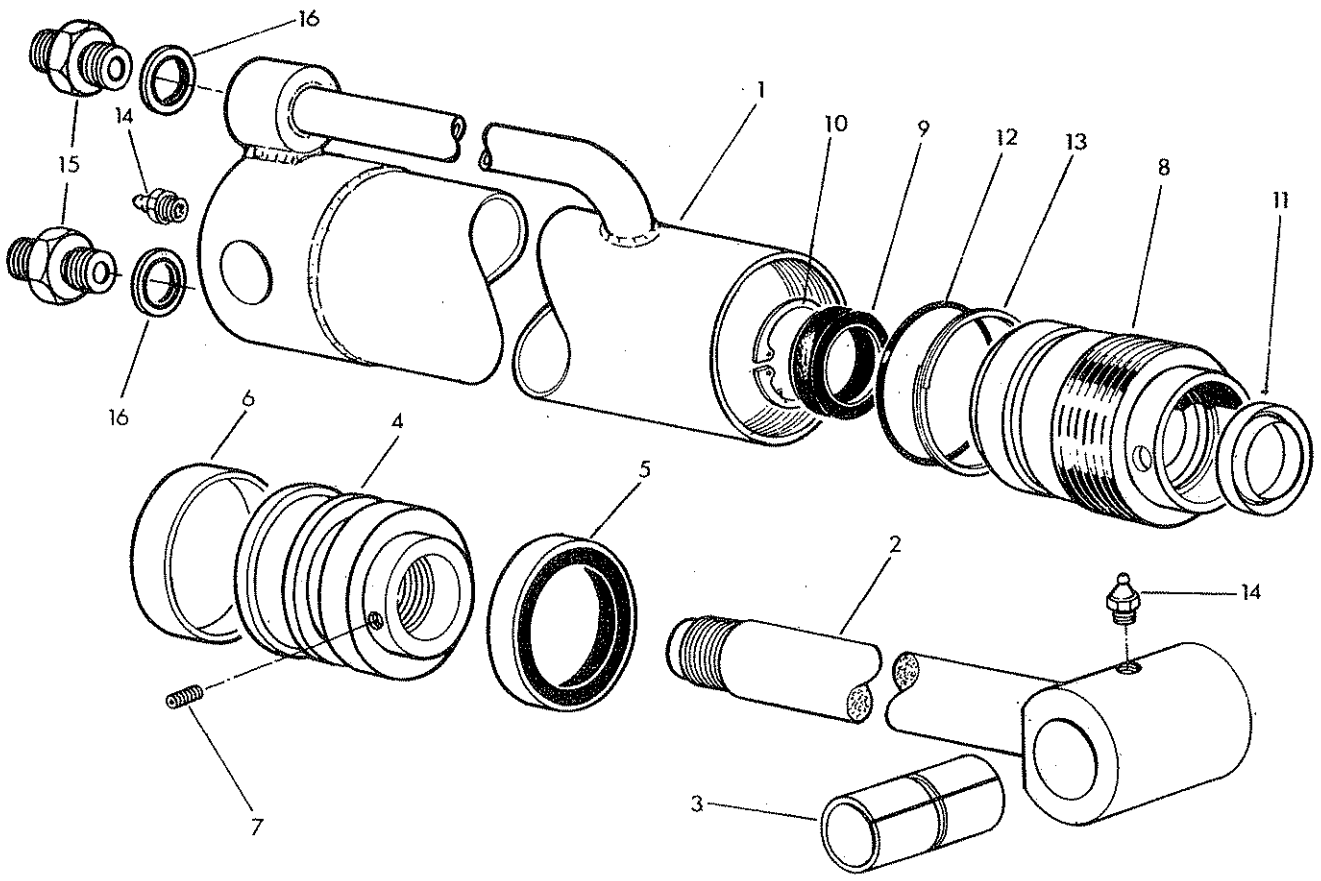
*To be assembled onto cylinder using 'Permabond A113' or equivalent

To be assembled into cylinder using 'Permabond A121' or equivalent

To be assembled with tap across the body of the ram and with knob to the rear



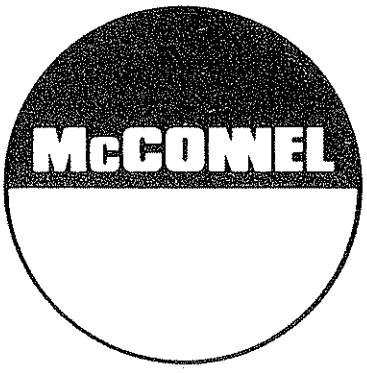
Ref.	Part No.	Qty.	Description
	71-92-337		**REACH RAM ASSEMBLY**
	71-92-336	1	Basic ram assembly
1	71-03-304	1	Ram cylinder
2	71-92-045	2	Piston rod
3	71-05-050	1	Bush
4	86-00-119	1	'O' ring
5	71-01-165	1	Piston c/w seal and grub screw
6	86-36-131	1	Piston seal
7	93-00-110	1	Grub screw M6 x 8
8	71-01-099	1	Gland housing c/w seal and 'O' ring
9	86-22-127	1	Gland seal
10	86-00-304	1	'O' ring
11	86-09-304	1	Anti extrusion ring
12	71-01-100	1	Gland nut c/w wiper
13	86-40-328	1	Piston rod wiper
14	09-01-124	2	Greaser 1/8 BSP angular 67 degree
15	85-81-145	2	Union 3/8 BSP - 1/4BSP MM
16	86-50-103	2	Bonded seal 3/8 BSP
	86-99-102		**SEAL KIT**



Ref.	Part No.	Qty.	Description
	75-60-344		**ANGLING RAM ASSEMBLY**
1	71-35-292	1	Cylinder
2	71-35-009	1	Rod
3	71-05-050	1	Bush
4	75-60-095	1	Piston
5	86-29-187	1	Piston seal
6	86-29-188	1	Bearing ring
7*	93-63-023	1	Grub screw scoket head M6 x 12
8	71-35-291	1	Gland housing
9	86-29-148	1	Gland seal
10	04-16-240	1	Internal circlip
11	86-29-149	1	Wiper seal
12	86-00-302	1	'O' ring
13	86-09-302	1	Anti extrusion ring
14	09-01-121	2	Greaser
15	85-81-169	2	Union 1/4 BSP MM
16	86-50-102	2	Bonded seal 1/4" BSP
	86-99-188		**SEAL KIT**

*** Assembly note**

Tighten fully and centre punch edge of hole to secure.



F. W. McConnel Limited, Temeside Works, Ludlow, Shropshire, SY8 1JL, England.
Telephone: (0584) 873131. Telex 35313. Facsimile: (0584) 876463.