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Part No.
71·36·850

HY-REACH EXTRA & EXTRA PLUS

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 your dealer

List of contents

GENERAL INFORMATION

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

Use only McConnel spare parts on McConnel equipment and machines. This manual includes an illustrated spare parts breakdown and the interpretation which precedes it should be read before ordering replacement components.

DEFINITIONS

The following definitions apply throughout this manual:

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

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

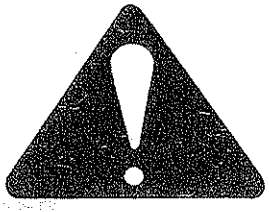
NOTE — An operating procedure, technique etc., which is considered essential to emphasise.

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

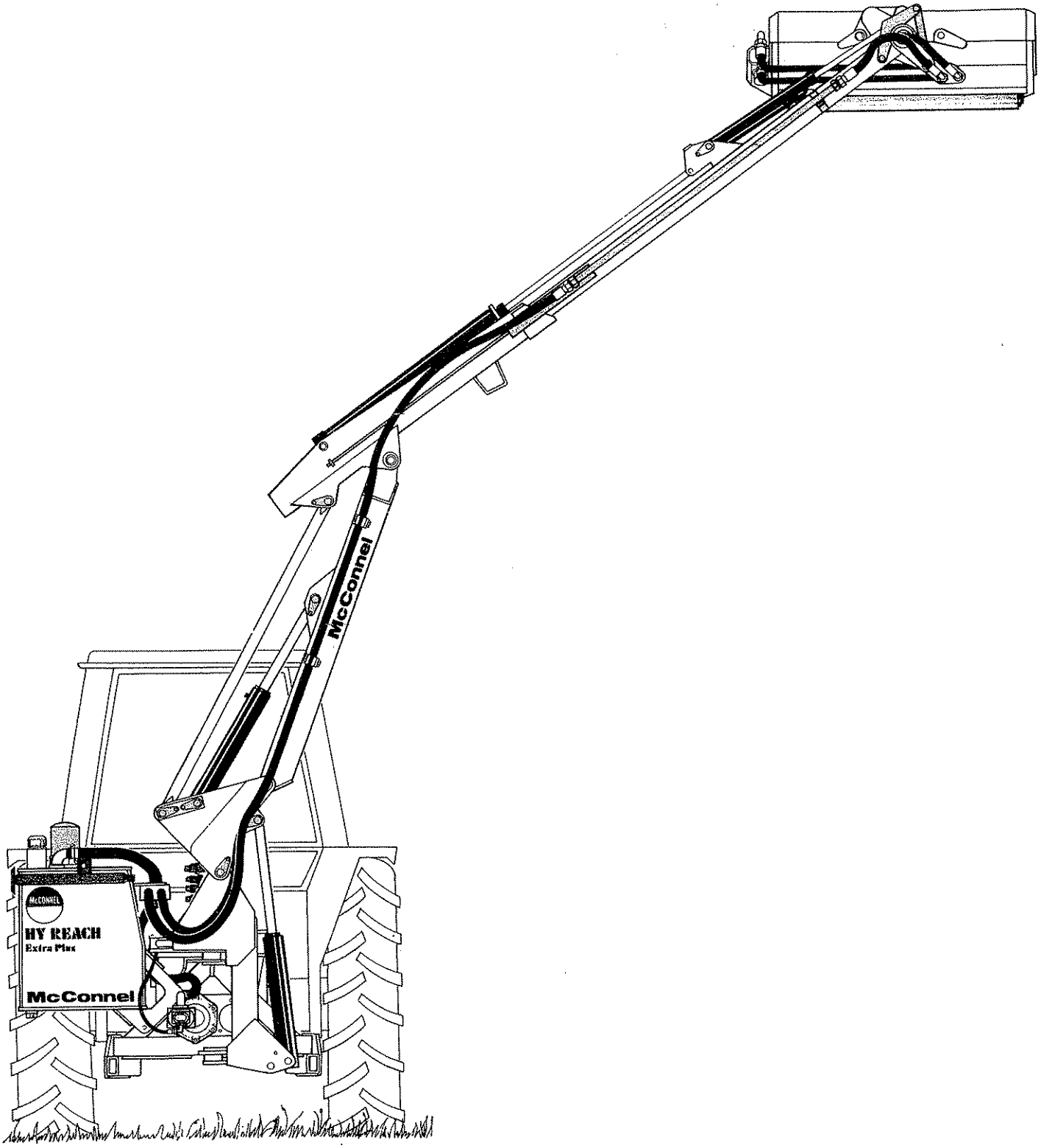


WARNING

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 pto shaft.
	...	stop the engine with the pto engaged.
	...	operate the machine without a cab safety guard.
	...	operate the machine without the pto shaft guard in position.
ALWAYS	...	inspect the work area or hedgerow for wire, steel posts, large stones, bottles and other dangerous materials and remove them before starting work.
	...	ensure bystanders are kept away from the machine during all flailing operations.
	...	check frequently, nut 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 pto and stop the tractor engine before making any adjustments.
	...	ensure that the slew mode is selected when in transport.
	...	remember the Hy Reach is approximately 11'6" high when folded for transport and that extra care is needed when manoevering in enclosed area or beneath overhead obstructions.

CAUTION — One of the features of the Hy Reach 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.

GENERAL VIEW (Extra Plus model illustrated)



INTRODUCTION

The Hy Reach is a fully independent hydraulically driven flail which is supplied in two basic forms, the standard build Hy Reach Extra and the Hy Reach Extra plus which is fitted with a telescopic dipper arm. In addition each model can be supplied in either a hedge cutting or grass cutting format and can be fitted onto a wide range of tractors using series 40 tractor mounting brackets.

The machine has been designed in such a way that it can be constructed to work on either the right or left side of the tractor and in addition flail rotation can be altered for an upward or downward cutting motion.

All power for operation of the flail rotor and for the movement of the arms is provided by a frame mounted tandem pump unit that is powered from the tractor P.T.O shaft. The machine carries its own 40 gallon (183 litre) oil reservoir which incorporates an oil strainer and a 10 micron return flow filter.

The flail head is despatched with the flails to cut in an upward motion and is equipped with a mounted hood to minimise flying debris. An additional hood for the rear of the flail head is available should the rotation of the flails be reversed. The operator is further protected by a mesh guard which attaches to the tractor.

The in cab controls for movement of the arms and flail head are electric solenoid operated while the rotor is started and stopped by a cable operated on/off valve.

The machine is equipped with an hydraulically actuated breakaway system which links the slew and lift services to give a simultaneous upward and backward motion when the "Auto reset" mode on the control box is selected.
By selecting "Slew" the machine can be folded within the tractors wheel width for transport on the highway.

The hydraulic system is equipped with check valves on all services which prevents any movement of the arms without pressure being available

Screw jack legs are provided to aid stability when the machine is unhitched from the tractor.

Section 1

FITTING

TRACTOR SELECTION

The tractor selected should be 75 hp. minimum and equipped with Category II linkage.

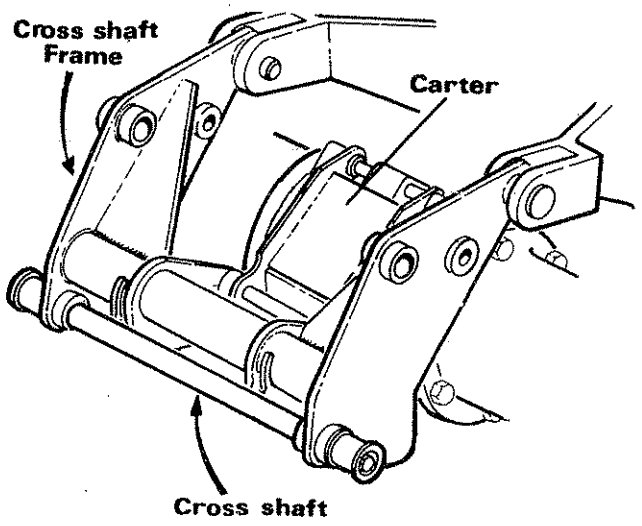
In addition the tractor must be equipped with a live drive P.T.O. to enable forward motion to be halted while the flail head continues to operate.

TRACTOR PREPARATION

Irrespective of the size of the tractor it must be stable whilst operating the Hy-Reach under all conditions. Front end ballast as well as rear wheel weights to counterbalance the overhang of the flail head should be added as appropriate. Due regard must always be paid to stability especially when working on slopes as it may not be sufficient to depend on the counterbalances afforded by the oil reservoir.

In addition rear wheel track should be as wide as practicable to increase stability. It will also increase the clearance to the reservoir.

Tractor mounting brackets
A typical series 40 fitting is illustrated showing the assembly of the cross shaft frame and Carter. Detailed fitting sheets are supplied with individual sets of fittings.
It is recommended that the Hy-Reach is fitted with the cross shaft in the lower position.



Series 40
These fittings provide a horizontal cross shaft rigidly mounted across the rear of the tractor in two alternative positions. As far as possible the lower position is a standard height of 30" to 34" above ground level; the higher position gives the maximum possible increment of height for each range of tractor models.
The two ends of the crossbar in conjunction with the standard tractor draft links, provide a rigid 4 point mounting base for the Hy-Reach.

Use of any fitting set means the removal of tractor drop links and locking of the hydraulic lift arms by the cross shaft frame.

For reversion to normal 3 point linkage operation, it should only be necessary to remove the cross shaft frame and reconnect the drop links to the lift arms. Carters, brackets etc., can usually be left in place on the tractor after checking that they do not interfere with the normal operation of the linkage pick-up hitch etc.

Fitting operator guard

The Hy-Reach is supplied with an operator guard kit part number 73 13 324 which must be fitted to the tractor before commencing work.

It consists of two areas of wire mesh which can be shaped to suit and secured against the cab window with spring loaded hooks, the upper edge being anchored around the cab gutter and the lower edge around the mudwing.

Owing to the great range of cabs it may be necessary to adapt or make brackets to secure the mesh.

A tractor fitted with a cab that has safety glass windows should be used whenever possible. This is a basic safety precaution applicable to the use of all flail-type hedge trimmers.

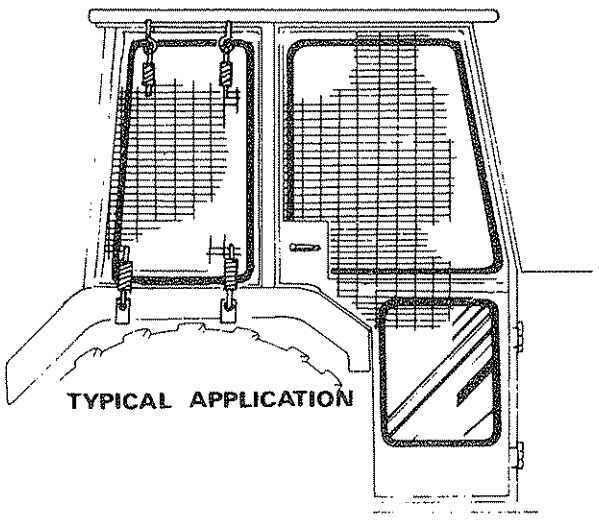
Where the flail is operated on a tractor that is equipped with a safety frame or roll bar only, then an additional frame must be made and fixed to the tractor on to which the guard mesh can be secured. In addition to the guard mesh, a sheet of Polycarbonate transparent glazing must be fitted to the frame to provide further operator protection. This material must also be used when the cab does not have safety glass installed.

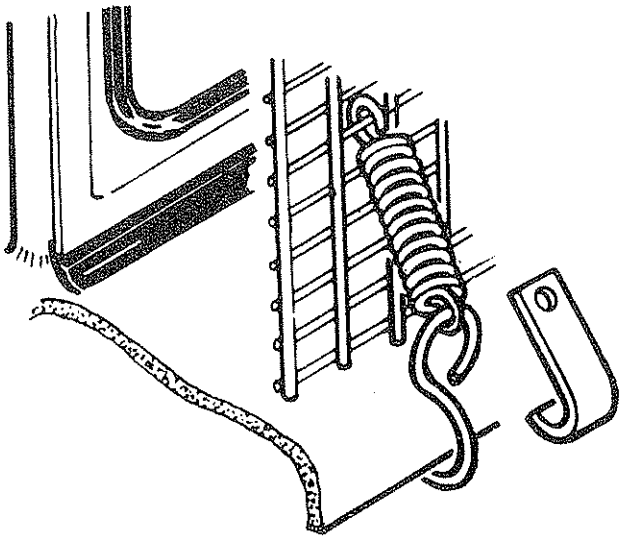
Polycarbonate transparent sheeting is an impact resistant material which can be readily sawn and shaped to requirements. Unfortunately it is susceptible to surface damage and scratching, therefore it is advisable to place the material on the inside of the window for protection. No attempt should be made to wipe the sheeting with dirt engrained cloth.

Toughened grades of polycarbonate sheeting are available under the brand names of "Makrolon", "Tuffak", and "Lexan".

In case of difficulty in obtaining this material locally, contact F.W. McConnel Ltd through your normal dealer.

CAB GUARD





Installation of cab controls

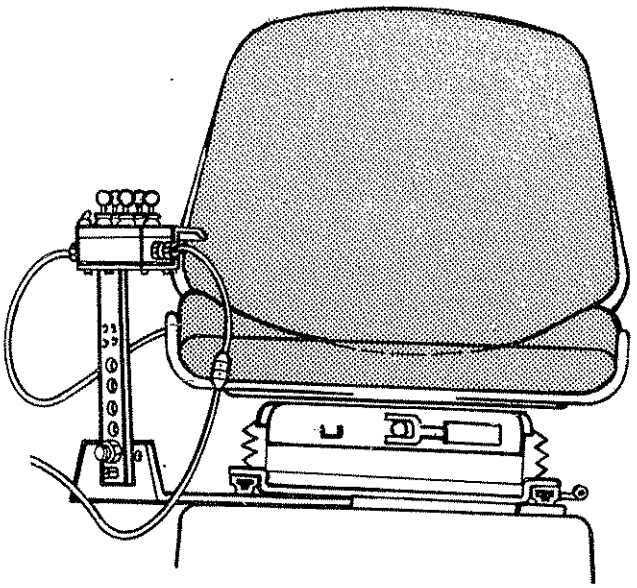
The electrically operated control box eliminates the presence of any hydraulic equipment within the cab. Instead a single multicore cable which can be easily routed to the implement behind simplifies the task of hitching and demounting.

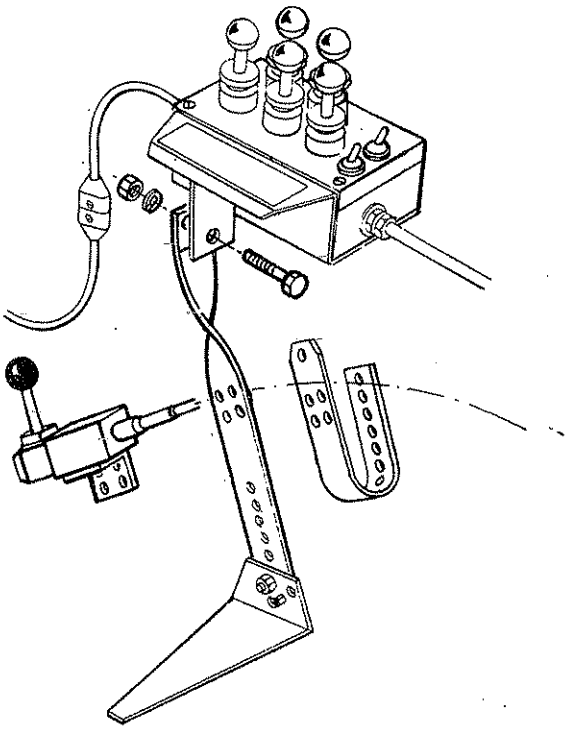
The control box is mounted as required in the cab on a seat bracket and stalk which can be bent to achieve a good operator position.

The seat bracket which is of universal design for mounting in many models of tractor is normally trapped between the seat runners and their mounting base. It may sometimes be necessary to drill extra holes in the seat bracket to find the ideal operator position.

On tractors other than quiet cab models it is permissable to attach the control box to the mud wing or the cladding of the cab observing the precaution that no structural member of the safety frame should be drilled.

For this purpose the mounting stalk can be bent round in a 'U' shape.



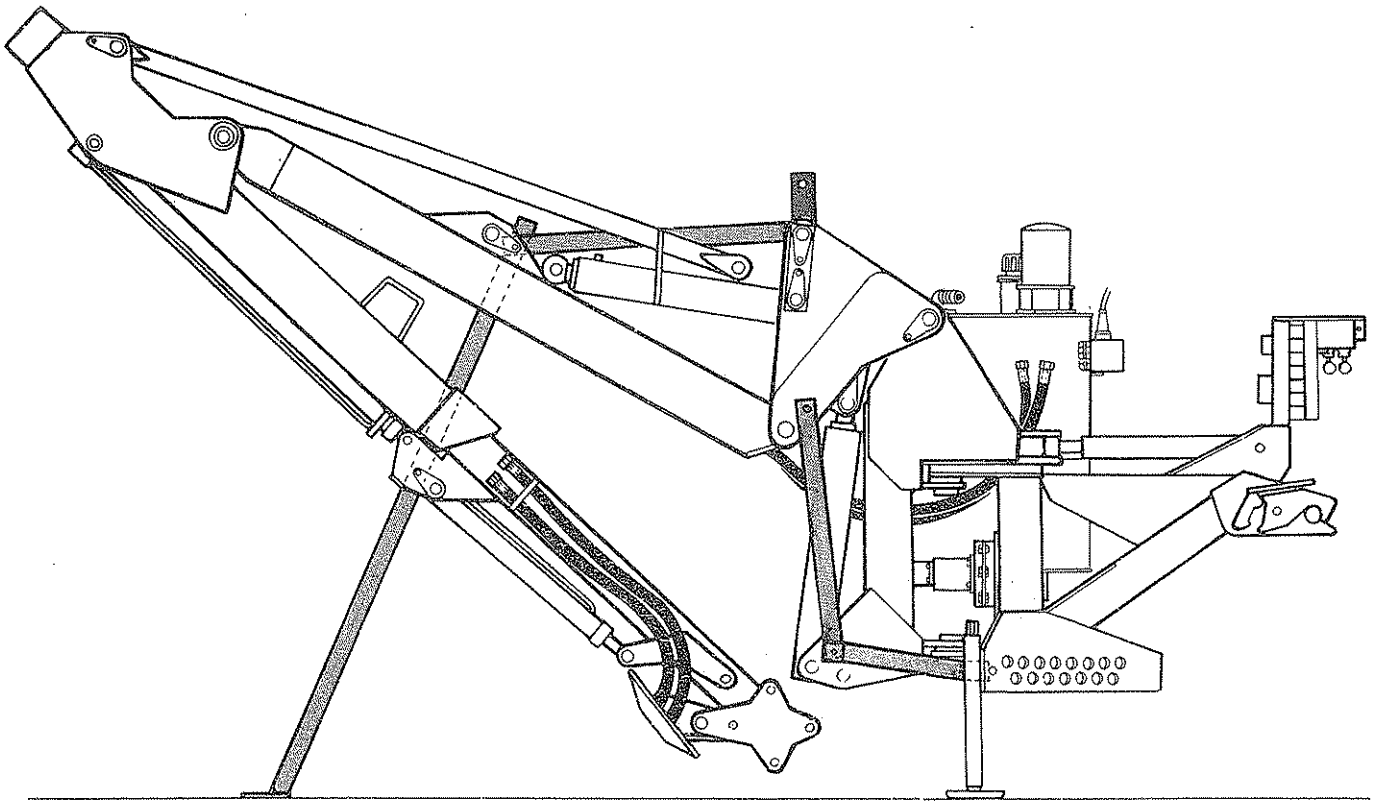


The supply cable with the disconnect plug should be connected to the tractor's electrical system prefereably at the fuse box or the ignition switch where it can be switched off with the tractor's isolation key.

The control is 12 volt D.C. operated; the brown lead is Positive and the blue lead is Negative.

The control lever for the cable operated Flail rotor on/off valve is then bolted into position on the mounting stalk using the mounting holes provided.

The control handle can be fitted at right angles to the cable run as shown or in line with the cables as required. In addition the four mounting holes are equi-spaced which allows a variety of mounting angles.



DELIVERY

The machine is despatched from the factory with the flail head, the flail head adaptor bracket, the operator guard and the switchbox mounting equipment packed separately. The arms are locked securely with packing straps to prevent the machine collapsing during transport. In addition the reach ram rod is disconnected and also the tension link at the rocker end, likewise the flail hoses are disconnected at the rotor control valve and the valve blanked off with two 3/4"BSP plugs.

On delivery, check that all parts are present and that they are undamaged

INITIAL ATTACHMENT TO TRACTOR

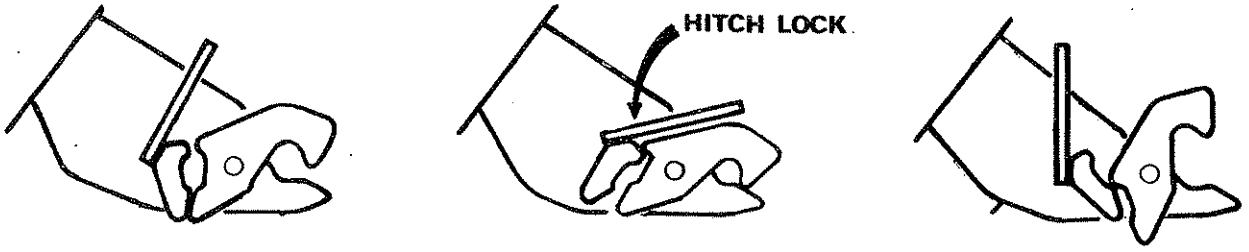
Attaching the Hy Reach to the tractor is best carried out on firm level ground and the 'Slew' mode must be selected on the switchbox. The procedure can be carried out by one man.

Fit the Series 40 tractor fittings onto the tractor as detailed in the sheet accompanying the fittings. Also refer to page

Fit operator guard (see page 6)

Reverse the tractor centrally up to the machine and offer up the cross shaft of the fittings to the locking catches of the machine.

LOCKING-CATCH POSITIONS



HITCH **LOCK** **RELEASE**

Set the locking catches to the hitch position.

Extend the screw jack legs to raise the machine and bring the locking catches horizontally in line with the cross shaft of the tractor fittings.

Reverse the tractor and engage the locking catches on the outer ends of the cross shaft. Lock in position.

Use the screw jack legs to level the machine

Offer up the draft links to the linkage block and attach with the linkage pin in the hole that lines up with the draft link ends, or the nearest hole forward of that. Further use of the screw jack legs may be necessary to achieve alighment.

Remove the screw jack legs and stow, using the existing leg pins, in the stowage sockets on the front and rear top edge of the hydraulic tank.

Remove the guard around the gearbox stub shaft and install P.T.O. drive shaft. Cutting the shaft to the correct length may be necessary and it is essential that the shaft is not allowed to 'bottom out' There should be a minimum of 25mm (1") of further travel before the shaft is fully closed. This measurement should be taken carefully before 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.

Refit the Gearbox stub shaft guard.

Fill the hydraulic tank (see chart page 11). In addition the circuit will have to be primed, this is done by releasing the hose which runs from the tank top to the pump at the tank connection and filling it to approximately 6" from the top. Re-fit the hose onto the suction connection and tighten the hose clips ensuring that their worm drive barrels are opposed at 180 degrees.

Check gearbox oil level see page 11

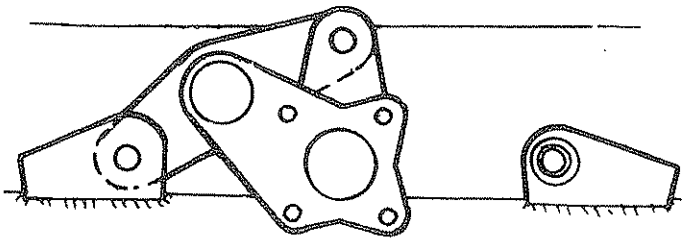
Install the electric switchbox, the flail stop/start lever and their mounting bracket assembly into the tractor cab. (see page 7)

Check that the flail lever is in the stop position; start the tractor, engage the P.T.O and allow the oil to circulate for about 20 minutes without operation of the armhead control valve . This will allows the oil to thoroughly circulate through the return line filter.

Extend the reach ram and connect up the rod end.

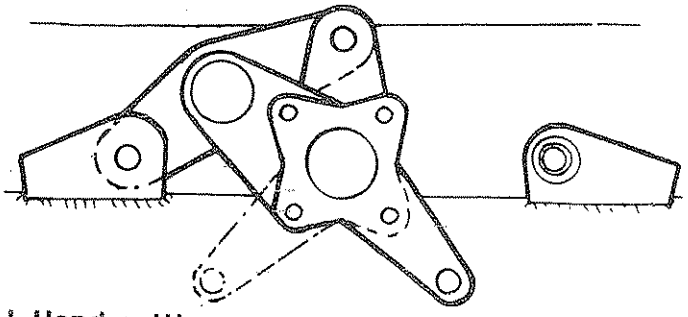
Remove the packing straps, all straps may be discarded except the lift ram locking strap which is retained for when subsequently parking themachine. Remember the nose of the dipper arm is suspended clear of the ground and it will fall when the connecting strap is released. KEEP FEET WELL CLEAR. It may be necessary to operate the control slightly to take the tension off the packing straps to facilitate removal.

Select reach in, raise the main arm and connect up the tension link to the rocker.



Pin the flail head adaptor backet to the flail head in the position shown. Note. If the 1.6M flail head is supplied the adaptor is not required. The head is bolted directly to the head pivot tube.

Reverse the machine up the flail head. Release the flail hoses and position them along the hose tray and pointing towards the flail motor rigid pipes.



L.Hand cutting R.Hand cutting

Using the hydraulics, manoevre the machine until the head pivot tube can be bolted to the flail head adaptor. Position the extended lug on the flail head tube in the position shown for either right or left hand cutting

Bolt the hose tray to the lip on the rear of the flail head.

Connect the flail hoses at the rotor control valve and the flail motor rigid pipes. Refer to page 19 for correct routeing for flail rotation required.

Run up the flail circuit as outlined in Page 11 "Running up" para 3.

Carefully operate the machine through its full range of movements while checking that the hoses are not strained, pinched, chafed or kinked.

Recheck the oil level in the tank and top up if necessary.

SUBSEQUENT ATTACHMENT TO TRACTOR

Providing the machine has been parked in a stable position as outlined in "removal" page 12 subsequent attachment is a simple matter of reversing the tractor into the locking catches; attaching the draft links, connecting the p.t.o. shaft, re-mounting the switchbox and the flail stop/start lever into the tractor cab and removing the lift ram locking strap.

OIL REQUIREMENTS

The Hy Reach is delivered from the factory without oil.
Fill the reservoir with a light hydraulic oil as recommended in the chart until the oil level is approximately half way up the sight tube. The total capacity is approximately 180 litres (40 galls).
Do not overfill.

Supplier	Cold or temperate climate	Hot climate
Castrol	Agricastrol hydraulic oil Hy-spin AWS32	Hy-spin AWS68
Shell	Tellus 27	Tellus 33
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

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

RUNNING UP

Ensure that the rotor control is in "STOP" position, start tractor, engage p.t.o. and allow the oil to circulate for about 20 minutes without operation of the armhead control lever. This will allow all the oil to thoroughly circulate through the return line filter.

Operate the armhead levers, ensuring that all movements are functioning correctly.

Place the flail head at a safe attitude and move the rotor control to "START" position. After initial fluctuation due to priming, the rotor should settle to a steady speed. Increase p.t.o. speed to approximately 360 rpm and run for a further 5 minutes before disengaging and stopping tractor.

Check the hose runs and observe that they are free from any pinching and chafing. Re-check the oil level in the tank and top up as necessary.

REMOVAL

Select a firm level site for parking the machine.

Extend the arms to about one quarter reach and lower the flail head to the ground.

Remove the screw jack legs from their stowage position and refit them in their sockets on the main frame. The legs, when fitted must be splayed outwards from their sockets to aid stability.

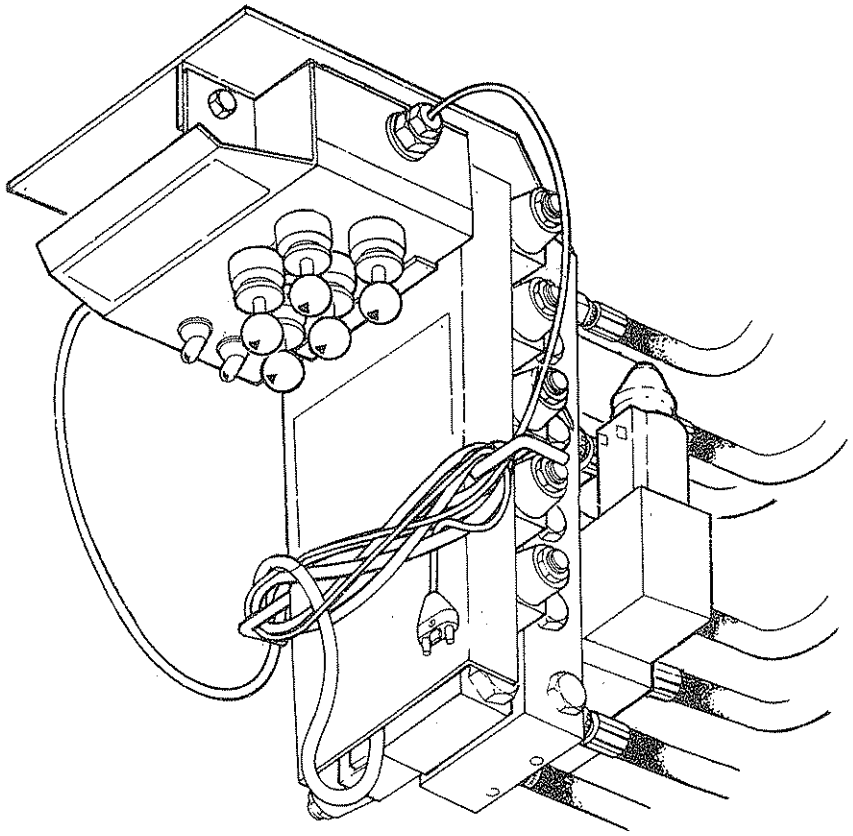
Fit the lift ram locking stay. On completion the flail head must be on the ground

Disconnect the electrical plug within the cab. Unbolt the Switch box from its mounting pillar and stow in position under the shroud of the solenoid/manifold valve as shown.

Unbolt the rotor control lever and stow conveniently on the machine

Unhitch the tractor draft links and disconnect the p.t.o. shaft.

Set the cross shaft locking catch to the 'release' position and drive the tractor forward.



STORAGE

If the machine is to be left standing for an extended period of time, lightly coat the exposed positions of the ram rods with grease. Subsequently this grease, which becomes contaminated with dust and grit should be wiped off before the rams are next moved.

If the machine is to be stored outside tie a piece of tarpaulin or canvas over the control assemblies - do not use a plastic fertilizer bag which encourages condensation and could lead to rapid corrosion.

In addition lubricate all grease points and the tele dipper wear pads if fitted.

OPERATION

HIGHWAY WORKING

If it is intended to cut roadside hedges or to work in the vicinity where the public have access, it is a statutory requirement that suitable warning signs are placed at both ends of the work area. These signs should not be more than ½ mile apart (.8 Km). To further promote highway safety, the use of headlamps and a flashing beacon on the cab roof would be beneficial. Hazard warning lamps should not be used since an oncoming vehicle could easily misjudge braking distance in presuming the tractor approaching them is stationary.

OPERATOR GUARD

Owners are reminded that it is illegal to use a flail without an efficient operator guard. The guard supplied as standard equipment with each machine attaches to the tractor cab with spring loaded hooks.

PREPARATION

Before commencing work, the operator should read the instruction manual thoroughly, paying particular attention to the SAFETY PRECAUTIONS printed in the front of the manual. It is the operator's responsibility to ensure that a safe code of practise is followed.

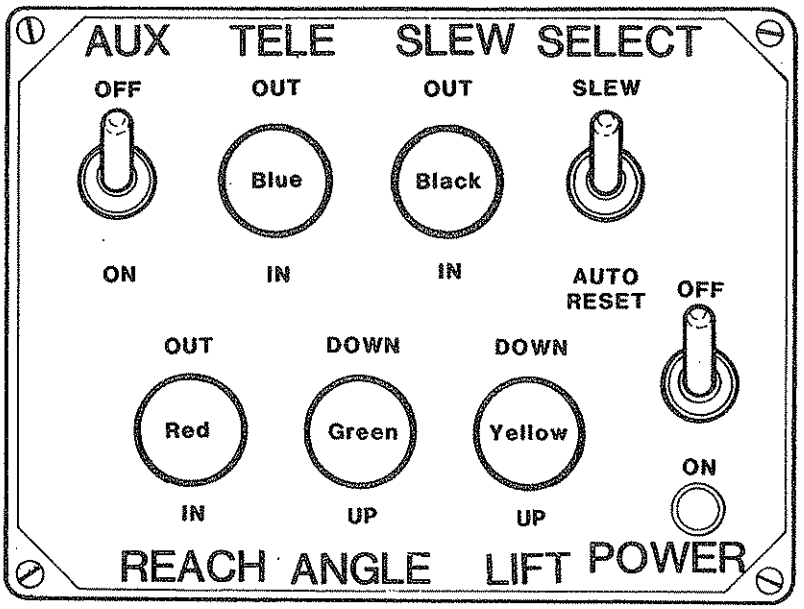
If the operator is unfamiliar with the control levers and thus the reach, height and angling of the flail head, a worthwhile exercise is to make a dummy run alongside a hedgerow with the rotor stationary.

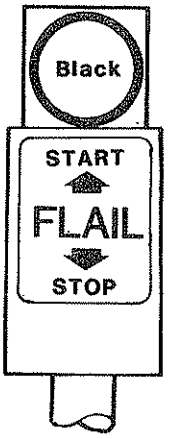
The work area or hedgerow should be carefully inspected for wire, steel posts, large stones, bottles and other dangerous materials and removed. The position of any immovable objects should be particularly noted or identified i.e. with a fragment of plastic sack to avoid running into them with the flail. Should the rotor accidentally strike anything of a hazardous nature, the machine should be immediately stopped and the rotor examined for damaged or missing flails which should be replaced to retain rotor balance. Continuing to work the flail head with the rotor out of balance will cause vibration which can rapidly damage the rotor bearings and break up the flail casing.

Finally do spend some time operating the machine to become familiar with the controls before moving the flail head into the work. It is also recommended that the work chosen to begin with is of a light straight forward nature.

CAUTION

The ability for the flail head to work closely alongside the tractor wheel in narrow lanes and for transport to fold within the overall tractor width can present a possible hazard for the flail head to contact the mudwing, rear lamp cluster etc, and cause damage.
Caution should be exercised when operating under these conditions and particularly when folding within the tractors width for transport.





MACHINE CONTROLS

Shown above is the control unit for both Hy-Reaches, Note that for the Extra the 'Tele' function lever although supplied in the interests of commonisation is non operational.

TRANSPORT POSITION

When transporting the machine the p.t.o. must be dis-engaged ,the power to the switchbox must be off and the armhead positioned to the rear of the tractor. To swing the arm to the rear select "slew" mode on the control box and operate the control lever.

Caution: Take care when slewing as the geometry of the arms may enable them to hit the tractor cab when fully folded.

It is a wise precaution to extend the arms to about half reach before slewing to the rear, and then,fold the arms in and up carefully.

> W A R N I N G
>
> During transport and parking the 'slew' mode must remain selected on the control box. Cancellation of this will result in the armhead auto resetting to the work position which may cause injury or damage as it does so.

ENGAGING DRIVE

Ensure that the rotor control lever is moved to the "STOP" position before engaging the pto shaft. Allow the oil to circulate for a minute or so before operating the armhead levers. Position the flail head in a safe position, increase engine speed to high idle and move rotor control lever to "START". After initial surging the rotor will run at an even speed. Starting the rotor in this way reduces starting loads imposed on the hydraulic motor and drive splines.

OPERATING SPEED

It is not recommended to run the PTO at 540 RPM. The machine should be run at a speed no higher than is needed to make a clean cut with no fall off in rotor speed. The recommended rotor speed is 2300 RPM.

All rotors are fitted with a Casappa CML 38 motor which requires a pump output of 19.2 GPM (85.5 litres/min) to run the rotor at the recommended 2300 RPM. This will be accomplished with a P.T.O. speed of approximately 400 RPM.

Cutting downwards in heavy growth with excessive speed will result in shattering and splitting of the stems to give an untidy finish. The rotor and flails are also subjected to unnecessarily rough treatment.

FORWARD SPEED

Tractor ground speed is determined by common sense and experience. It should be slow enough to allow sufficient time for the flails to cut the work without overloading. It is obviously better to make a second pass or more in heavier growth to avoid undue strain.

TRACTOR POSITION

Tractor position in relation to the hedgerow should be such as to allow the reach ram to be in mid-stroke when driving alongside the hedgerow. This allows the reach to extend or shorten as circumstances require. A tip worth passing on when using the machine for the first time is to make a 'dummy run' along the hedgerow without the rotor in action. Another idea worth mentioning is when operating from a ploughed or cultivated field, to drive round with the flail stationary and so making a pair of wheel tracks which can be followed on the subsequent pass, allowing the operator to concentrate more on the working flail. The rolling action of the wheels will further assist in producing a straighter hedge top.

BREAKAWAY ACTION IN AUTO RESET MODE

When an obstruction is met by the flail head and the tractor continues to move forward the arm is forced back and at the same time is also lifted.
This is achieved hydraulically by the oil in the base end of the lift ram causing the arm to rise when clear, the arm can drop back down and forwards, oil being discharged back to the breakaway ram until the rod is fully extended and the work position is reached. A one-way restrictor limits the speed of oil flowing out of the gland end of the breakaway/slew ram so that the arm does not return violently.

BREAKAWAY ACTION IN SLEW MODE

The Hy-Reach can be operated in the 'slew' mode. In this case when the flail head meets an obstruction the arm is forced back but does not lift. Also the auto reset feature is lost. Resetting is carried out manually by operating the slew lever. This system is primarily to prevent damage to the arm during accidental use in the slewing mode but can be used for normal operation should the operator prefer to be able to control the breakaway reset.

Extra plus only - before commencing slewing for transport fully retract the telescopic dipper.

POWERED SLEW

To enable the hedges in the corners of fields to be cut more effectively both Hy-Reach models are equipped with a powered slew facility. On selecting 'slew' mode on the control box the arms can be swung through 97° which together with tractor positioning will allow the operator greater access to cut those awkward areas

The 97° arc of the slew extends from 90° to the tractor, i.e., the work position back to 7° past the centre line of the tractor. This extra 7° allows the flail, in the majority of cases to be folded within the tractors wheel width for transport.

WORKING ON ADVERSE SLOPES

When working on adverse slopes with the reach fully in the comprehensive range of the arm geometry may allow the main arm balance to go over centre thus taking the weight off the lift ram. To return the machine to a lower position the reach ram must be extended sufficiently to return the centre of balance onto the lift ram which will then retract when lift down is selected.

TELESCOPIC DIPPER (Extra Plus Only)

The Hy Reach Extra Plus is equipped with an hydraulically operated telescopic dipper which gives 1.05 metres extra reach

Normally the amount of tele would be pre-set and then the machine operated using the normal 'Reach' Lift and Angle functions. In some circumstances, the 'Tele' function could be used in place of 'Reach' but a slower response to the controls must be expected.

Also, use of the 'tele' affects the parallel motion reach geometry of the arms. With the 'tele' fully out the parallel motion is at its most effective at ground level With the 'tele' fully in the parallel motion is at its most effective at 4-5 feet i.e. normal hedge topping height.

ALTERNATIVE LIFT RAM LOCATION

The slew column is provided with alternative mounting points for the base of the lift ram. For general conditions the rear most and highest position is used.
For optimum performance when working in dykes or down banks the lower and most forward location will allow the flail to operate down a 45° slope up to the tractor tyre and give increased depth of 'below ground level' cut.

HEDGE CUTTING

Hedge-shape

Local practice and customs as well as the requirement; be it a stockproof barrier, a windbreak to resist soil erosion or as a sanctuary to protect wild life will each have their part to play in influencing the desired finished shape of the hedgerow.

A hedge cut in the shape of an 'A' although rather wider and so taking up more ground will be encouraged to send out new growth from the bottom. The stubbly ends from the ground to the top can further discourage stock and the wide dense bottom will promote conservation of wild life.

A hedge with vertical sides and an apex top is an alternative which has found favour in many parts of the country. The sloping top encourages light to penetrate and promote growth in the lower regions of the hedge. The sloping top also assists to shed heavy falls of snow which can accumulate and break a hedge down.

Although a box-shaped hedge, flat across the top and with square corners may look very tidy in its early stages it is prone to dying off in the bottom while being encouraged to grow in the top. After a few years this type of hedge can become 'buck-headed' and is always susceptible to damage by snow.

Cutting sequence

Operator preference will ultimately decide on the order of cutting. Where it is difficult to determine the original hedge line because of overgrowth, a recommended method is to start by siding up the hedge first, if necessary making more than one pass.

A second cut should then be taken at an incline along the hedge top and again if there is prolific growth it may be necessary to make more than one pass until the hedge is reduced to the height and contour required.

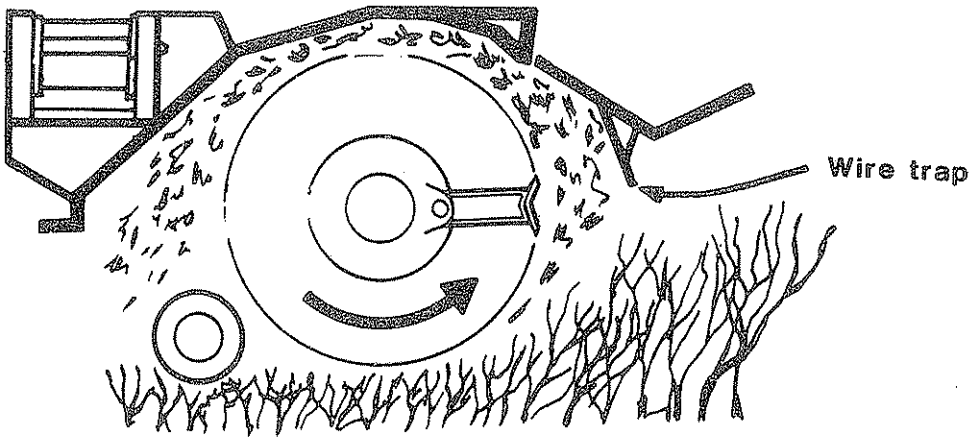
Finally, finish with a ground cut and for this, the roller should be lowered. This ground cut defines the base line of the hedge, severs brambles and rubbish that encroach out from the bottom, and further mulches the toppings that have fallen.

Note: Flails are more prone to accidental damage and blunting by stones on a ground cut. Therefore when convenient this should be left to the last.

Where the hedge has been well maintained in the past it may be found better to cut the top before siding up.

> **WARNING**
>
> Do not be tempted to make a vertical cut on the far side of the hedge. This would entail cutting 'blind' and the rotating flail would be capable of throwing debris through the hedgerow in line with the operator.

Where both sides of a roadside hedge are to be cut, always cut the field side first. The uncut roadside helps to reduce the amount of debris being flung through the hedge into the road. Also by sloping the vertical cut to give an 'A' shape, debris is thrown down into the hedge bottom and the spread of material is reduced.



Upward Cutting.

The flail head is despatched from the factory with the flails to cut with an upward motion. Upward cutting gives a shearing action which produces a cleaner, sliced finish to the cut material which helps to minimise ' die back' caused by frost entering the stems. This arrangement is ideal for light to medium hedges, that have been well maintained. If attempting to cut upward in heavy growth the depth of cut and the number of passes required will be determined by the amount of material which can pass beneath the front of the hedging cowl.

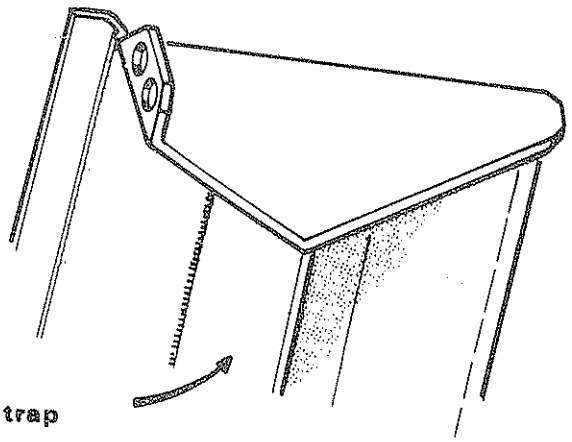
Optional Extra.

If, in light hedges, flying debris causes a problem especially on the highway a purpose designed light hedging cowl, part no. 73 14 423, is available which will reduce the spread of cut material and minimise the danger to road users. The light hedging cowl is bolted to the front of the flail head in place of the standard hedging cowl. The supporting struts are not required.

Wire trap

A steel plate is welded across the underside of the hedging cowl, to cut any loose ends of wire that are picked up on the rotor. This plate should not be interfered with or modified in any way.

This wire trap does not relieve the operator of the responsibility of checking and cleaning the flail when it is suspected that wire has been caught up in the rotor.



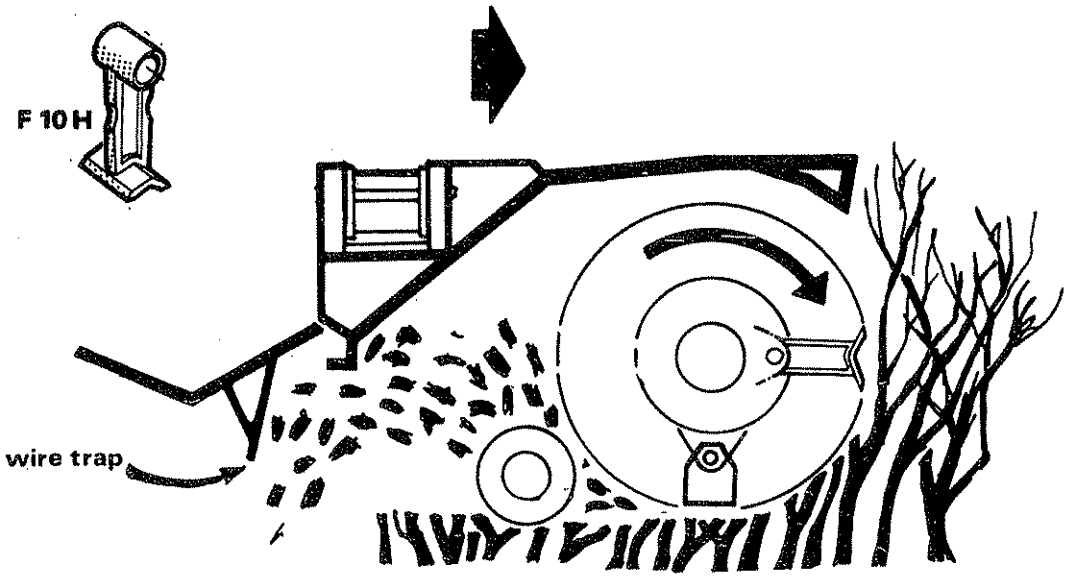
Roller adjustment

Do not use the flail with the roller removed. Long lengths of cut material are liable to be thrown. When hedging, the roller should be set a little higher than the flail. This shields the flail and helps to prevent it bouncing and sinking into the hedge. It also assists in maintain a level cut.

WARNING

Hedging cowls, whether at the front or rear of the flail head should be firmly in position at all times.

Extreme care must be taken to ensure that bystanders are kept well clear of any area where they may be hit by flying debris.



Optional Downward cutting.

The rotation of the flail can be reversed for downward cutting and for this an additional rear cowl is necessary which is bolted to the rear of the flail head to deflect the cut material downwards into the base of the hedge . The front cowl can be removed if cutting heavy growth, which then allows more material to be cut in one pass. Cutting downward contains the debris more successfully than cutting up and because of this it may be necessary to use this arrangement when cutting on the highway. The chopping action however subjects the rotor to violent usage and should be avoided whenever possible.

> W A R N I N G
>
> Never operate the flail without the correct hood being fitted in the correct position for the work being done.

Changing Rotation.

Extend the arm fully and lower to the ground, stop tractor engine.
Prepare for spillage and interchange the two flail hoses at the rotor control valve at the connections marked MP and MR
To ascertain the direction of cut without running the machine the following applies.

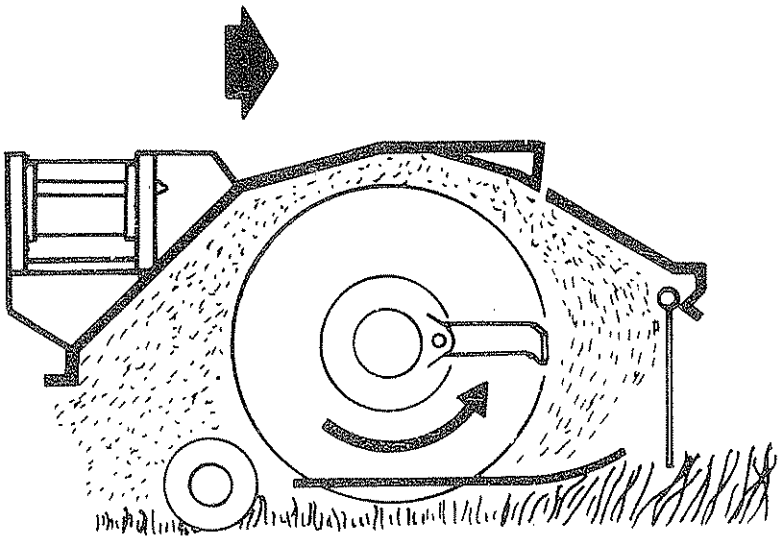
Connection MP - lower connection on motor)
Connection MR - upper connection on motor) upward cutting.

Connection MP - upper connection on motor)
Connection MR - lower connection on motor) downward cutting.

Before commencing work, allow the flail to operate under a 'no load' condition for a few minutes to vent the air which entered the flail hoses on changeover.

GRASS CUTTING

The flail must rotate in an upward motion for grass cutting. The vacuuming effect created by the rotating flails causes the grass to stand erect. The grass cutting cowl which consists of a number of hinged flaps is always mounted on the front of the flail head. It completely shields the rotor at the front and directs all cut material up under the hood discharging it down on to the ground at the rear.



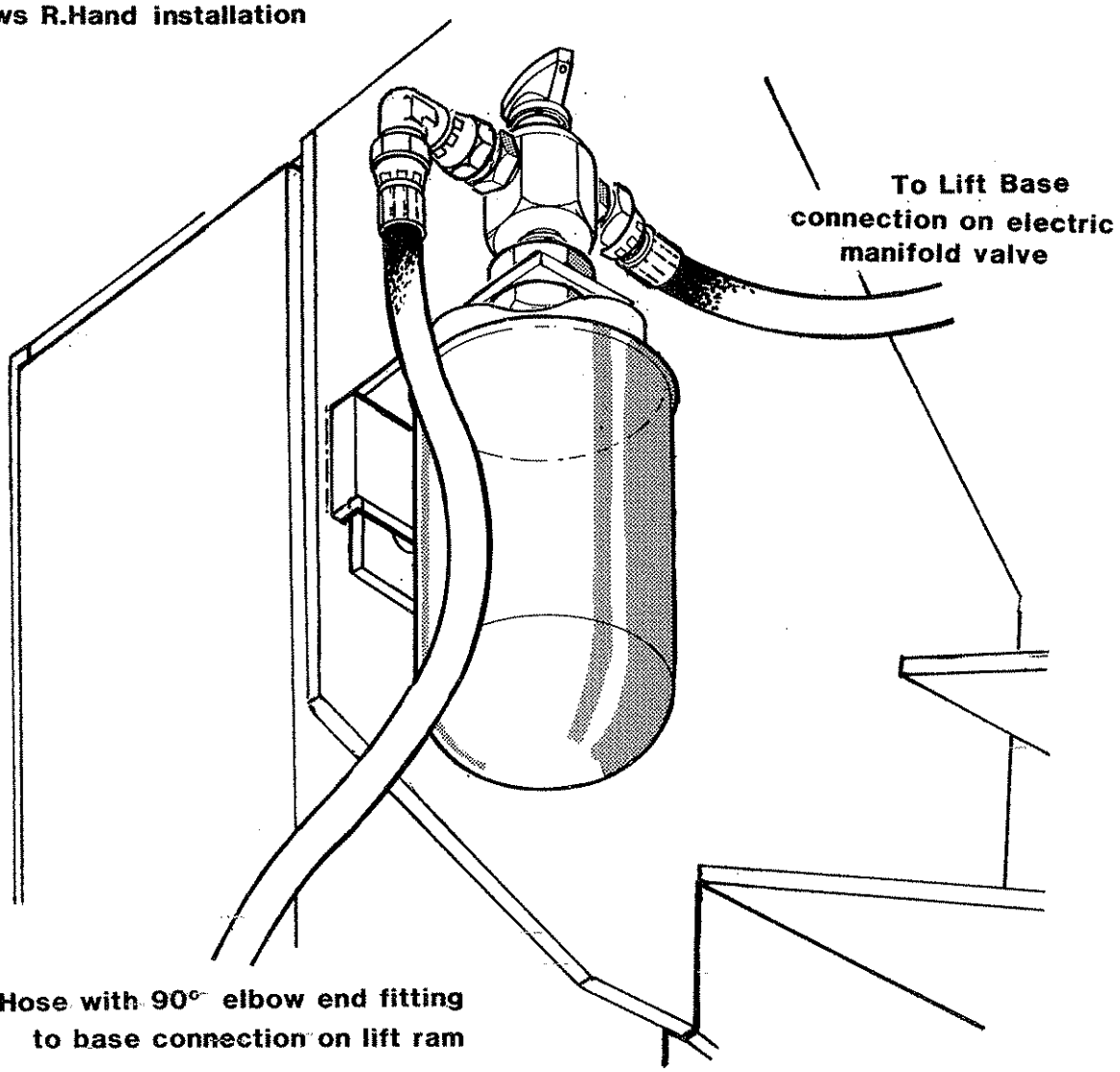
WARNING

Do not attempt to use the grass flail without the grass cowl in its correct position.

Grass roller adjustment

When flailing grass, the roller should be set lower than the flails to prevent them from 'scalping' the ground.

Illustration shows R.Hand installation



Lift Float Kit (Optional extra)

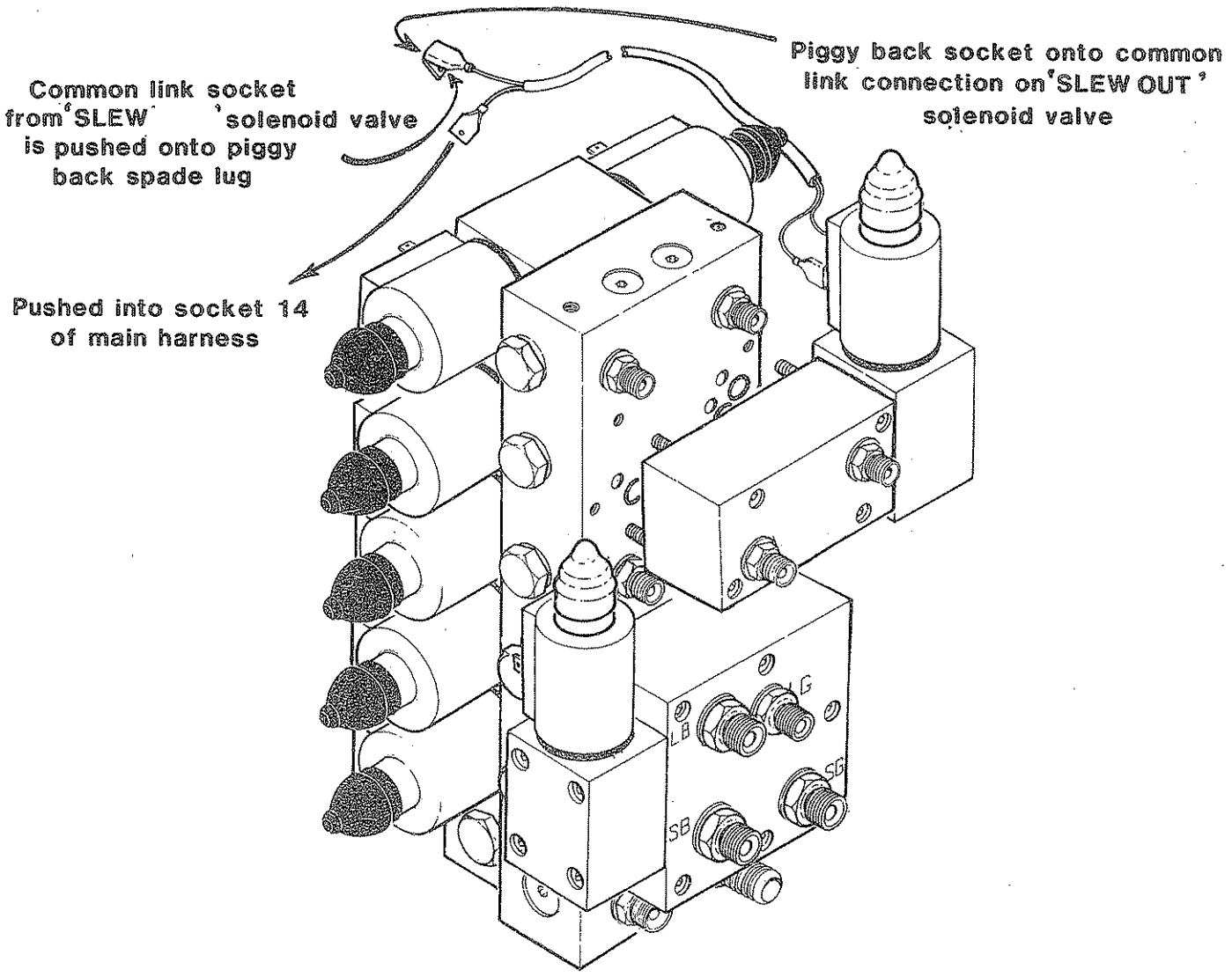
Grass flailing can be a slow tedious task requiring a high degree of operator concentration especially when working in rough or undulating ground.A hydraulic kit is available which is located as shown through the staple on the opposite side of the slew column to the tank.The existing hose to the lift ram base is discarded and replaced by a hose , the 90° end fitting of which attaches to the lift ram base connection while the straight end connects to the 90° elbow on the float tap assembly. The remaining straight – straight hose connects the straight union on the float tap to the lift base connection on the electric manifold valve.

In work, with the stop tap open the flail runs along the ground automatically lifts and rides over any bumps. Any shock loads are absorbed by the accumulator which is pre-charged with nitrogen to 800 p.s.i.

The accumulator pressure has been chosen to give best performance at medium to full reach. If the majority of work is at shorter reaches a better action will be obtained if the accumulator pressure is reduced to 600 p.s.i.This should only be done using the correct fitting and pressure guage .Consult your dealer.

To obtain optimum working performance the lift control should be operated to take approx. fifty per cent of the flail head weight off the flail roller. This is important as with too little weight on the roller the flail head will tend to remain in the air after riding over a bump and leave uncut areas of grass while with too much weight on the roller the float will be inoperative; 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.

Floating head angle facility. (optional extra for grass flails)

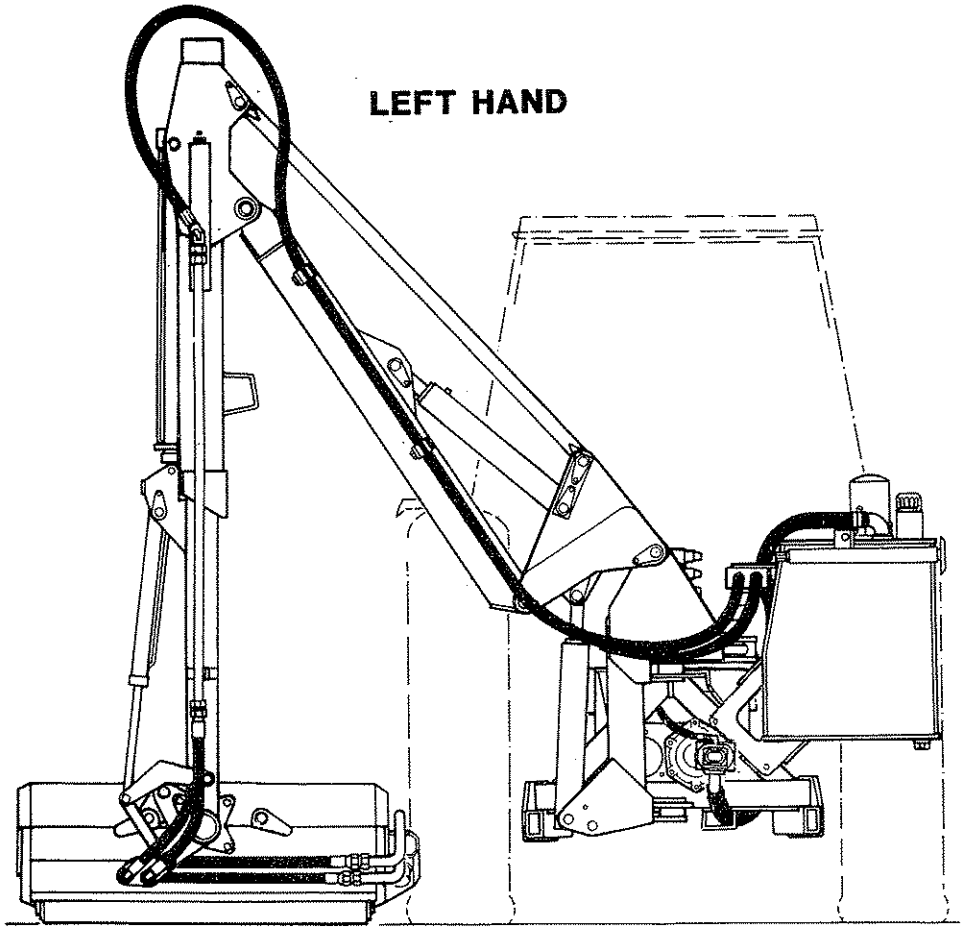


A kit is available Part No. 81 26 261 which when fitted will allow the flail head to angle itself automatically to suit the contours of the ground.

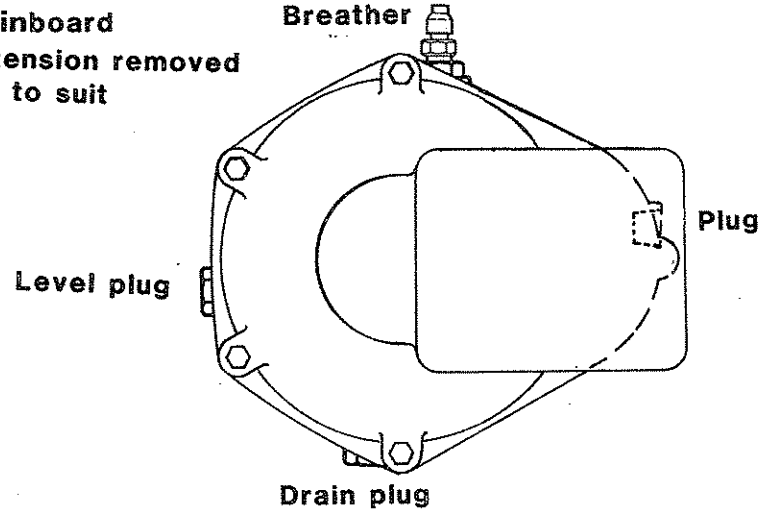
The kit is bolted to the manifold block in place of the angle section hose plate.

The kit is supplied with a two core cable the spade connection of which fits into the socket connection 14 of the harness. The remaining socket/spade 'piggy back' connection is fitted to the common link connection on the 'Slew out' solenoid valve in place of the existing common link socket which is then connected to the spade end of the 'piggy back'

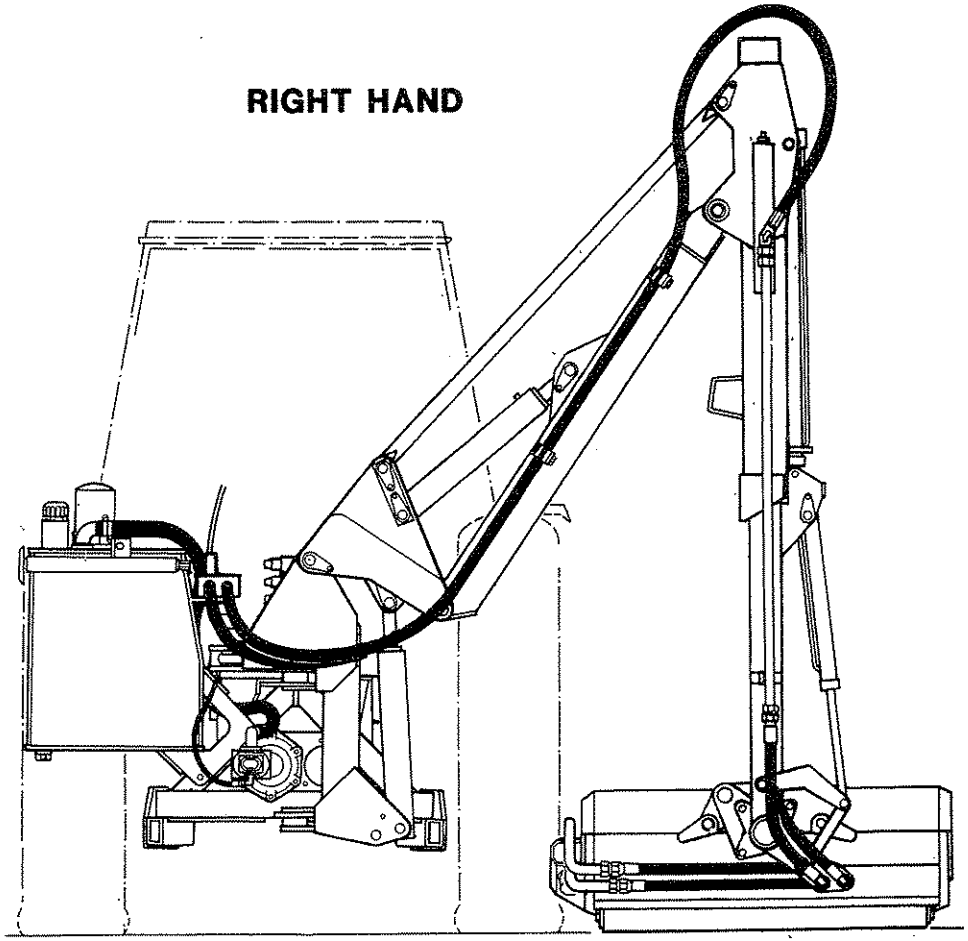
LEFT HAND



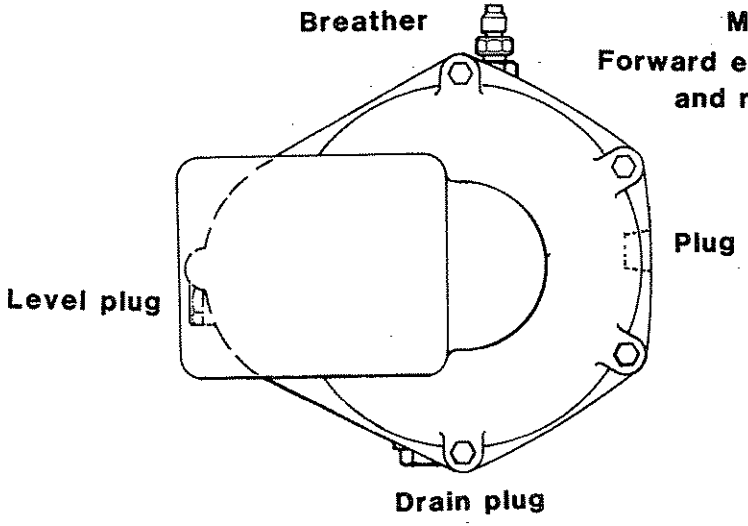
FLAIL HEAD
Motor inboard
Forward extension removed
and rotated to suit

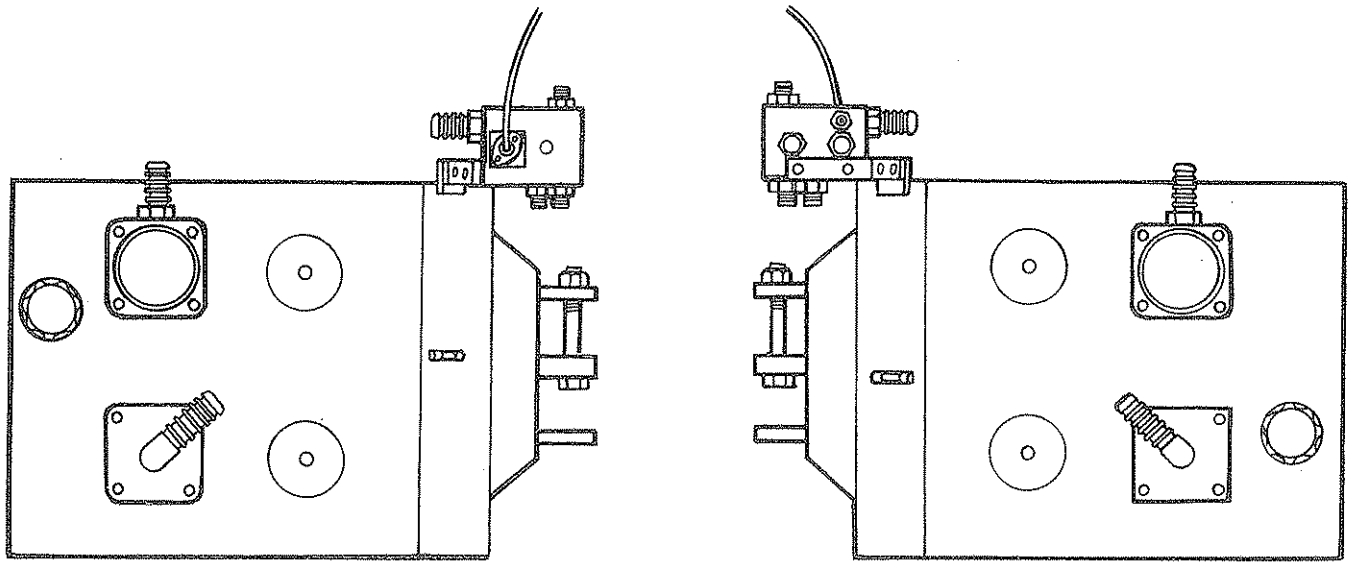


RIGHT HAND



FLAIL HEAD
Motor inboard.
Forward extension removed
and rotated to suit





R HAND

L HAND

View of tank top and rotor control valve

RIGHT OR LEFT HAND BUILDS

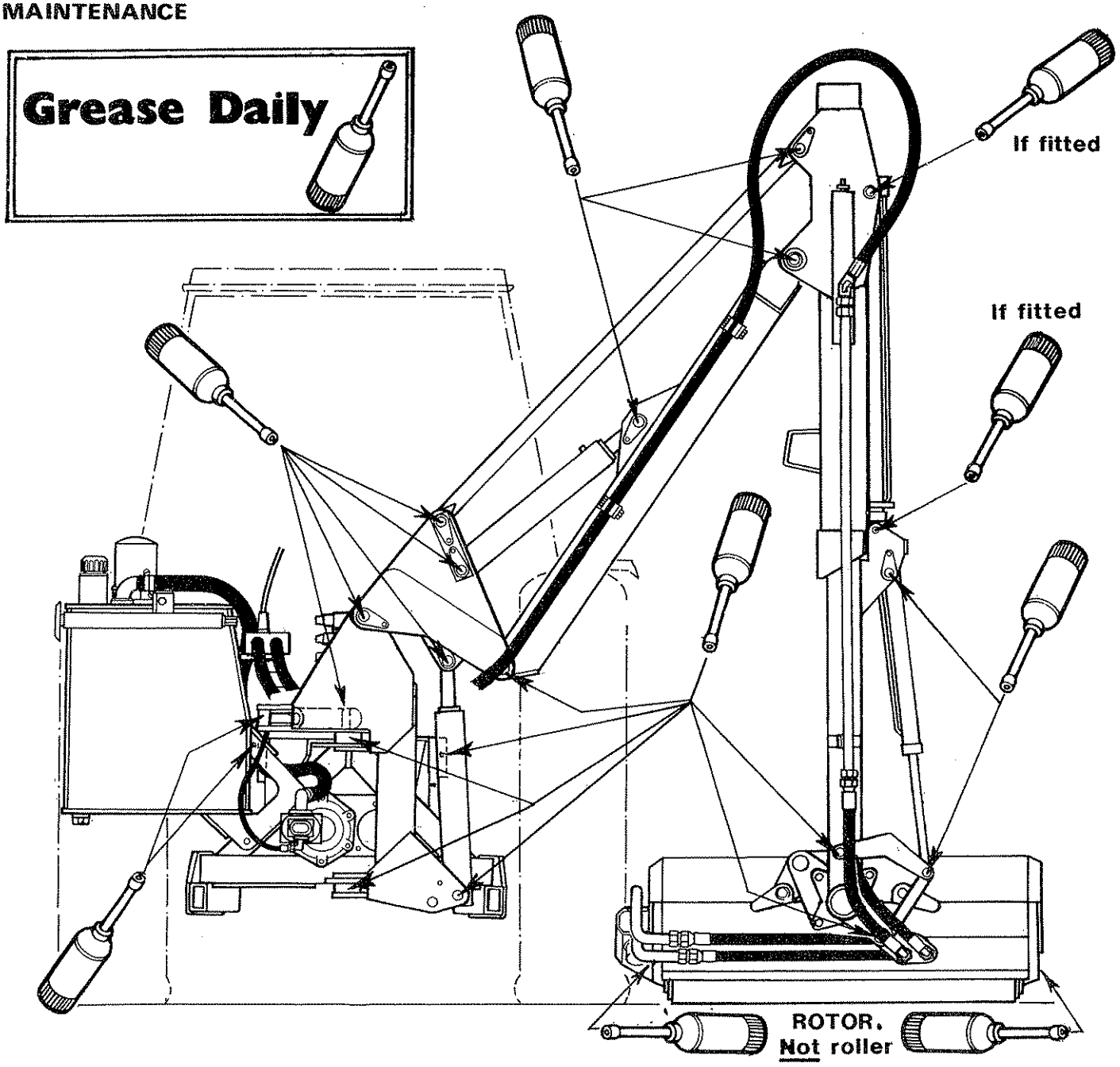
The Hy-Reach is supplied in either specification to order and has been designed such that conversion can be carried out with only the minimum of handed components i.e., upper and lower flail head rigid pipes. However it must be stressed that conversion is a major operation and not an in field adjustment. It is possible for two people to carry out conversion.

The major steps are

Disconnect flail head, drain hydraulics and remove tank, dicconnect and remove gearbox, dosconnect the slew ram and re-connect in the opposite pair of lugs on the slew column. Remove hoses and re-build on the opposite side of the arm. Remove and re-build tank to opposite hand specification. Re-assemble tank on the opposite side of the frame. re-fit the gearbox/pump assemblyto the opposite mounting position, note that it is turned round and over and that the large suction connection projects downwards and back. Re- connect all hoses. Re-fill the hydraulic system. Re-build the flail head to opposite hand specification and attach to the arm.

Before commencing drain the hydraulic system and empty the reservoir. Study the drawings of the Gearbox/pump assembly, the hydraulic tank assembly and the Rotor control valve, their position and the positions of individual components. Components on the tank top which are interchanged must be resealed on assembly with 'Permabond A121' or similar sealing compound. Note also that the flail motor remains inboard and is therefore mounted on the other end of the flail rotor. New rigid pipes for the flail head will be required - see parts list.

MAINTENANCE



LUBRICATION

Refer to the lubrication diagram above and grease daily all points shown. Pay particular attention to the rotor shaft bearings; in arduous conditions these should be greased more often.

In addition the tele dipper wear pads (if fitted) should be greased weekly

POWER TAKE OFF SHAFT

The PTO shaft should be regularly examined to ensure that it is in good condition together with the guards. 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

a) Oil supply

Check daily the oil level in the reservoir.

No fixed time period can be quoted for oil changes as operating conditions and maintenance standards vary so widely. Although the oil does not wear out, it does eventually break down through contamination, oxidation and condensation. Continual operation of the machine beyond its rated capacity to almost the stall point of the rotor can cause overheating which produces insoluble gums, sludge, varnish and acids. Overheated oil thins to give a sluggish performance and causes earlier failure of seals and '0' rings. 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 contamination is a progressive factor.

Contamination can be reduced by :-

i) Carrying out all hydraulic servicing in clean, dust-free surroundings.
ii) Cleaning off around the reservoir cap before removal, and keeping that area clean.
iii) Using clean containers when replenishing the system.
iv) Regular servicing of the filtration system.

b. Filtration Maintenance

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

i) Suction strainer

The strainer which is located on the lower end of the suction line within the reservoir should be removed and cleaned if any symptoms of pump cavitation, or spongy intermittent operation develops.

To service the strainer the complete suction line has to be withdrawn from the reservoir after releasing the bolts. The strainer is screwed onto the suction pipe. Remove and wash in clean diesel fuel and shake dry before re-installing. When re-assembling, the tank cover and its mating surface should be thoroughly cleaned off and re-jointed with a good quality non-hardening gasket compound.

ii) 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 the filter becomes blocked an internal by-pass within the canister will operate and no symptons of filter malfunction will occur to jog your memory.

FLOAT KIT ACCUMULATOR (When fitted)

The accumulator is charged with 800 psi of Nitrogen. No maintenance is required other than a visual check for oil leakage at the unions.

If a leak of Nitrogen is suspected, a test with soapy water around the valve thread and core area should be carried out.

A replacement charge valve assembly can be fitted after the accumulator has been fully discharged. It is essential that this work is carried out by the dealer or distributor who must have the facilities for re-charging. The accumulator can be removed for this purpose. If oil is leaking from the area of the charge valve then the internal butyl bag is damaged and the accumulator is scrap. It cannot be dismantled to replace the bag.

HYDRAULIC RAMS

a) Ram seal replacement - general information.

i) Whenever possible the ram should be removed from the machine and cleaned-off before dismantling on a clean work-bench.

ii) When using a bench vice do not apply excessive pressure to the ram cylinder - use soft metal jaws when grasping the ram-rod.

iii) Remove scores and nicks on the ram-rod by using a fine oil stone.

Do not use a file or emery cloth.

b) Lift, slew Reach and Angling Ram. Tele ram if fitted.

Unscrew the gland and withdraw the complete rod assembly. Slacken piston grub screw, unscrew the piston and slide off the gland housing.

Gland Seals.
Replace as necessary. Ensure seals are replaced in the position from which they were removed.

Piston Seal.
Remove split members of the piston seal and then, using a soft lever which will not scratch the piston lift the remaining seal components from the piston. Replace with new seals in reverse order.

Renew the 'O' ring on the piston rod (lift and reach ram only) . The piston rod is sealed on the slew , tele , and angle rams by applying 'Permabond A121' or alternative thread sealing compound to the piston rod screw threads prior to assembly.

Lubricate all new seals prior to assembly.

Refit gland housing on the rod taking care when easing the wiper seal over the piston rod shoulder.

Screw the piston firmly back onto the rod, re-tighten the grub screw and centre pop the access hole to secure.

Fitting new piston on all slew rams and later angling and tele rams fitted with a longitudinally locking grub screw.

The locking grub screw on the slew ram is longtitudinal; it fits into the pre drilled hole in the piston and keys into mating threads on the rod. On fitting a new piston it is unlikely the holes will be in line and a new mating thread will have to be formed on the ram rod. Tighten the piston and using the pre drilled hole as a jig,run down with an M6 plug tap until the tap bottoms. Remove any swarf from the hole and lock piston in place with M6 grub screw.

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 (½ pints) S.A.E. 30/50 Tractor universal oil

HYDRAULIC PUMPS

All pumps are clockwise rotation. No routine maintenance is necessary other than a periodical check for tightness of the mounting bolts and a visual check for oil leakage especially around the pump supply and pressure unions. Where two hose clips are used on the pump supply hose, their worm drive barrels should be placed opposite each other at 180°. When fitted with tandem pump assembly do not attempt to operate the armhead rams without the 1" BSP flail hoses being interconnected. The tandem pumps share a common seal drain and both circuits must be intact before the pumps are run.

Pump servicing is limited to replacing seals, gaskets and '0' rings. Servicing should take place under clean dust free conditions. Pumps should be thoroughly washed and their end plates and body lightly identified with scribe marks to ensure correct re-assembly.

When re-assembling, lubricate all components with clean oil and tighten down the securing bolts in a diagonal sequence to pull the pumps squarely together, finally tightening to a torque load of 4 - 5 Kgm (30-37 lbs/ft) M10 Setscrew
2½-3 Kgm (18-22 lbs/ft) M8 Setscrew

Check for freedom of rotation. The pumps should turn freely under a hand load applied on a 6" radius arm. If tight, the lobe seals and/or backing washers have been trapped and the unit must be dismantled to rectify this.

After installation, the serviced pumps should be run for several minutes under a 'no load' condition before load is gradually applied. During this time frequent checks should be made of the pump casing temperature. An excessive temperature rise will indicate that the pump has been assembled incorrectly.

Generally it is unwise to replace major components since they have to be matched in sets. Unless this is done the pump will be inefficient, resulting in overheating and power loss. No detailed parts breakdown is shown, but factory reconditioned units are available within our service exchange scheme.

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.

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° to reduce the possibility of air entering the system.

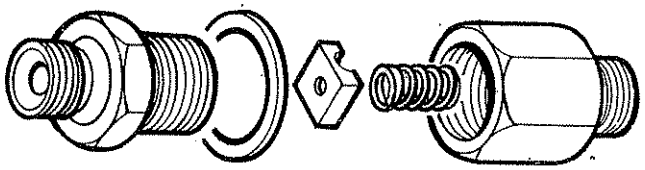
Hose warranty

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.

HYDRAULIC RESTRICTORS

Solid two way restrictors.

Solid drilled hole restrictor unions control oil flow in both directions. Letter coded and situated in the reach and angle sections of the manifold block they are carefully calibrated for correct speed of operation. The restricted hole should not be enlarged or the restrictors interchanged.



One Way Restrictors.

Spring loaded one way restrictor assemblies are situated in the following locations. Lift base and Slew base end connections on the slew circuit valve and at the gland connection of the Slew/breakaway ram.

The restrictor discs are colour coded and should not be enlarged or interchanged.

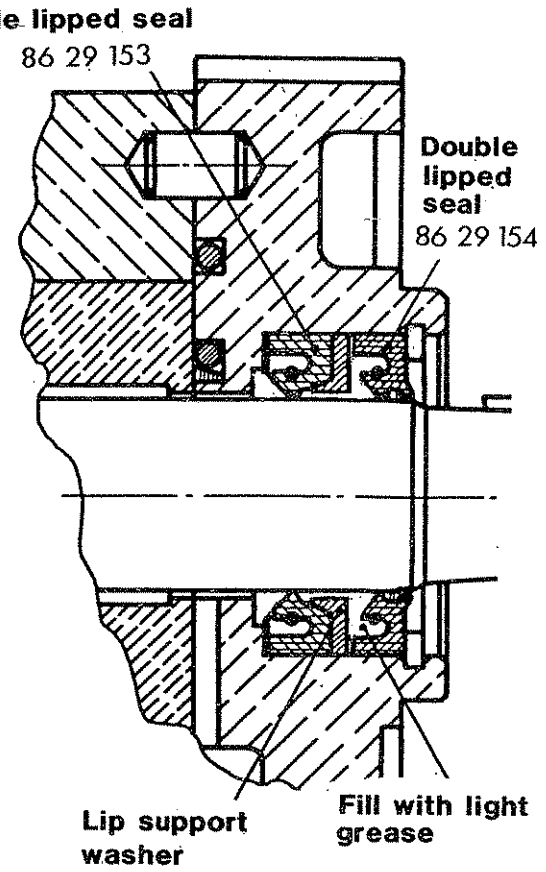
HYDRAULIC MOTOR

Servicing of the hydraulic motor should be limited to replacing seals, gaskets and O rings. Components of the motor are matched to close tolerancesand are therefore not replaceable as individual parts.

The torque setting of the cap screws is 6-7Kgm (40 - 47 lbs ft)

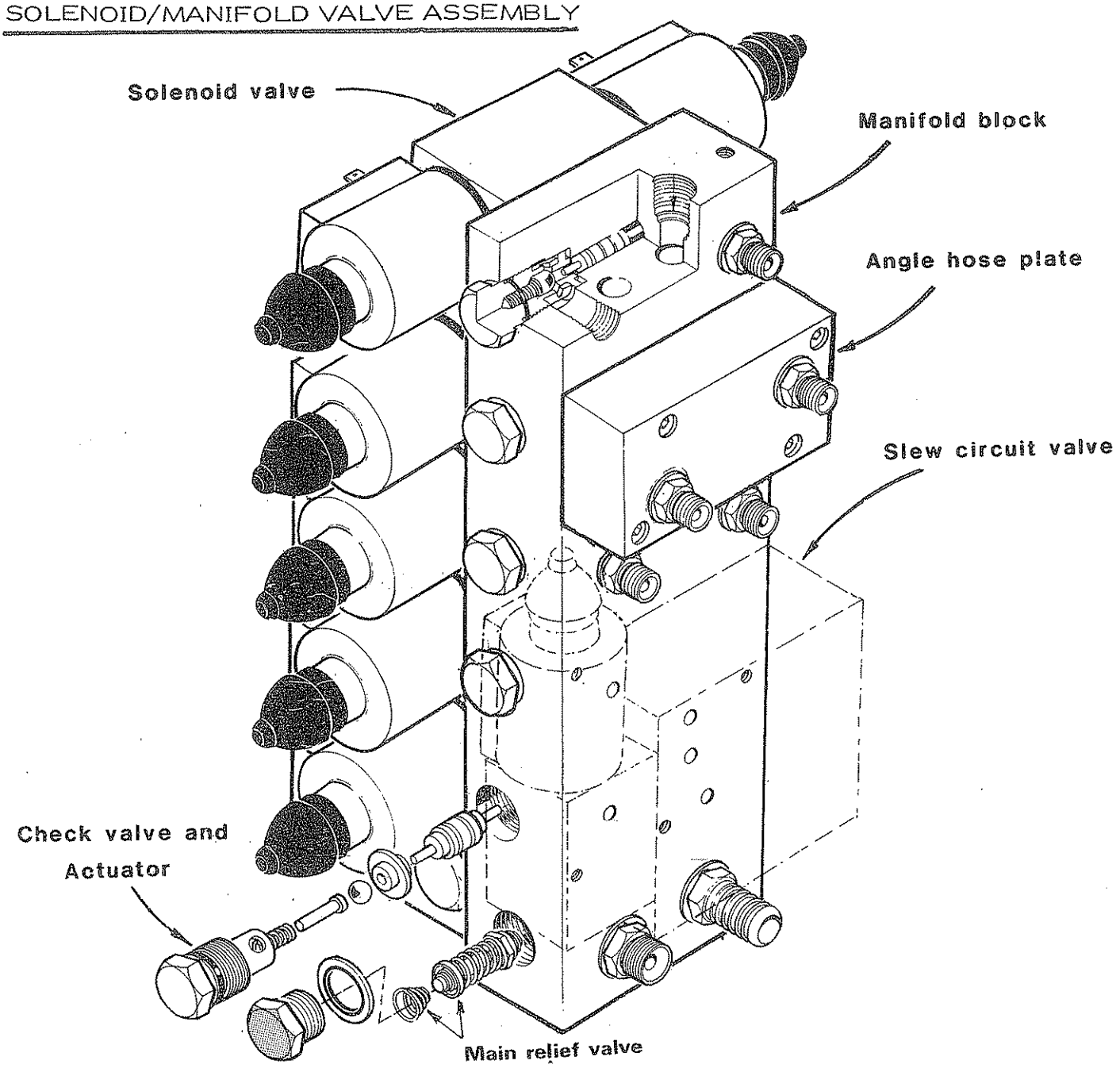
To remove the drive coupling from the shaft use a tool of the sprocket type to remove it. Do not attempt to remove the coupling by hammering or leverage as this will damage the motor internally.

Replacing shaft seals
The double shaft seal assembly must be assembled with the 7 m.m. wide single lip seal fitted first with the 1m.m. thick lip support washer on top. The back of the double lip seal should be filled with a light grease before fitting with the wiper lip outermost.



The seal kit , Part No. 86 99 166 is a universal Cassapa motor sealkit. It may contain more seals than are necessary ; care must be taken in selecting the correct seal to use. The seals for servicing the hydraulic motor used on the HY-Reach Extra and the Hy - Reach Extra Plus are 7m.m. wide.

SOLENOID/MANIFOLD VALVE ASSEMBLY



This valve assembly consists of four separate sections bolted together and comprises

a) Manifold block
b) Solenoid operated valves.
c) Slew circuit block.
d) Angling section hose plate or optional head angle float valve.

a) Manifold block.

This contains the main relief valve and the pilot operated check valves

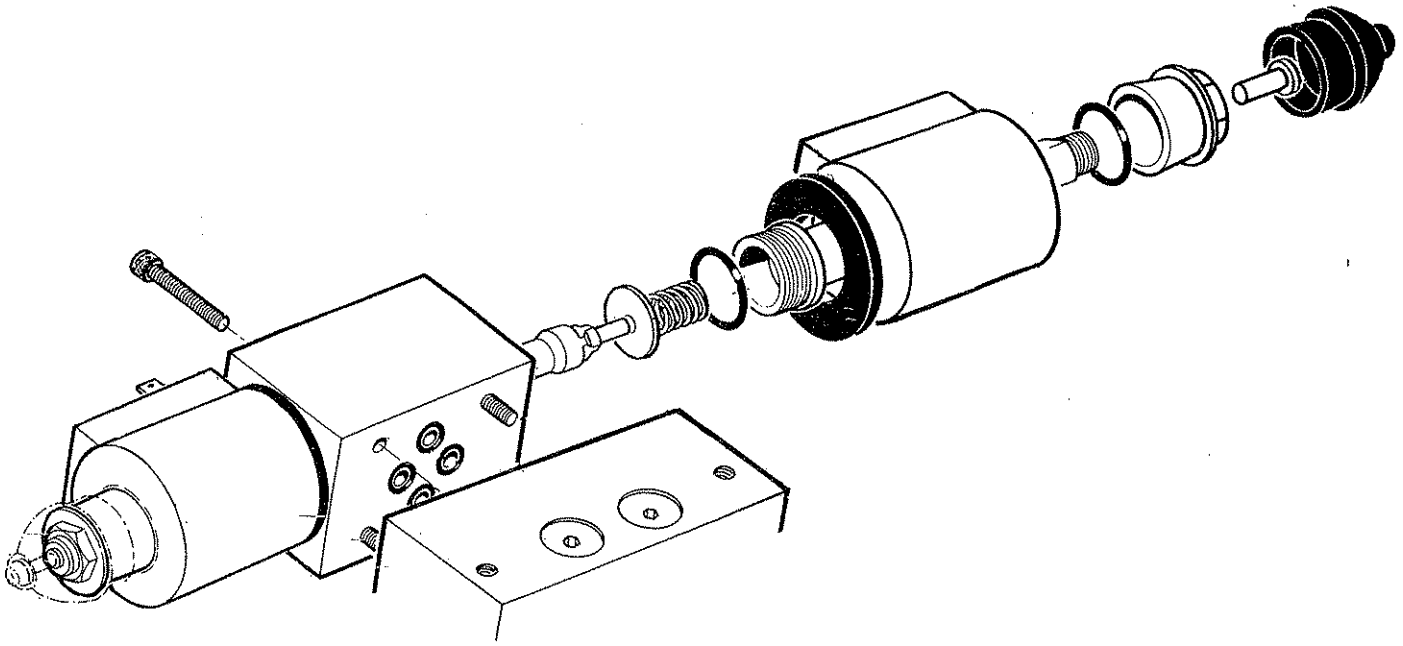
The main relief valve is situated in the horizontal gallery at the bottom of the block, is non adjustable and calibrated to 2100 PSI (145 Bar). On no account should this valve be replaced with one of a higher pressure rating.

The ball check valves which are opened by a double ended sliding actuator allow the oil to flow from the ram whenever pressure oil is being supplied to the alternative port.

The check valves are all identical, no selective assembly is used in their construction. Individual components are supplied as separate spares.

Removal of a check valve invariably damages the '0' ring which seals it. It is essential that a new '0' ring is installed if the check valve is removed for inspection and cleaning.

'Creeping of any of the rams could be caused by a loose check valve, dirt in the check valve, damaged or badly worn ball seat, or damage to the check valve seating in the manifold body.



Solenoid operated valves.

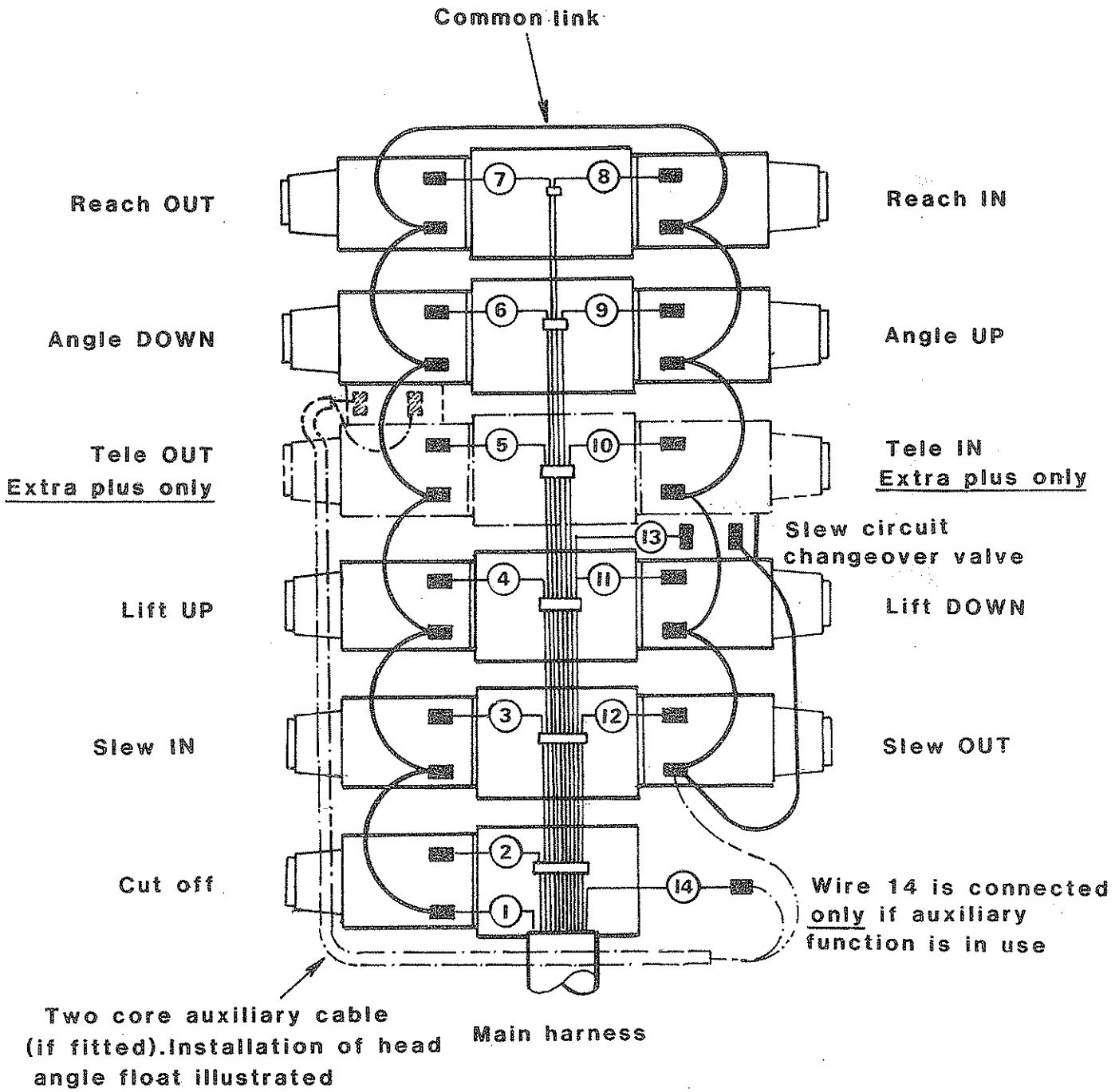
The valves are fastened to the manifold block by four cap screws. Each consists of a cast iron body with a hardened spool. The 12 volt 28 watt solenoids push the spool to give flow out of the port furthest from the solenoid. The spool is returned to its central neutral position by a spring.

The solenoid operated valves are double acting on all service circuits and connect the supply to and from the appropriate ram. A separate single acting valve operates a 'cut-off' simultaneously with the directional valves and closes the normal free return line back to the reservoir.

A 'push-pin' in the end of the solenoid armature allows manual operation of the valve in the event of failure of electrical supply. When investigating power failure the 'push-pin' can be operated to ascertain that the hydraulic system is working correctly, and a 12 v bulb wired across the terminals will show whether the fault is an electrical one.

Note Sparking the leads could blow the fuse.

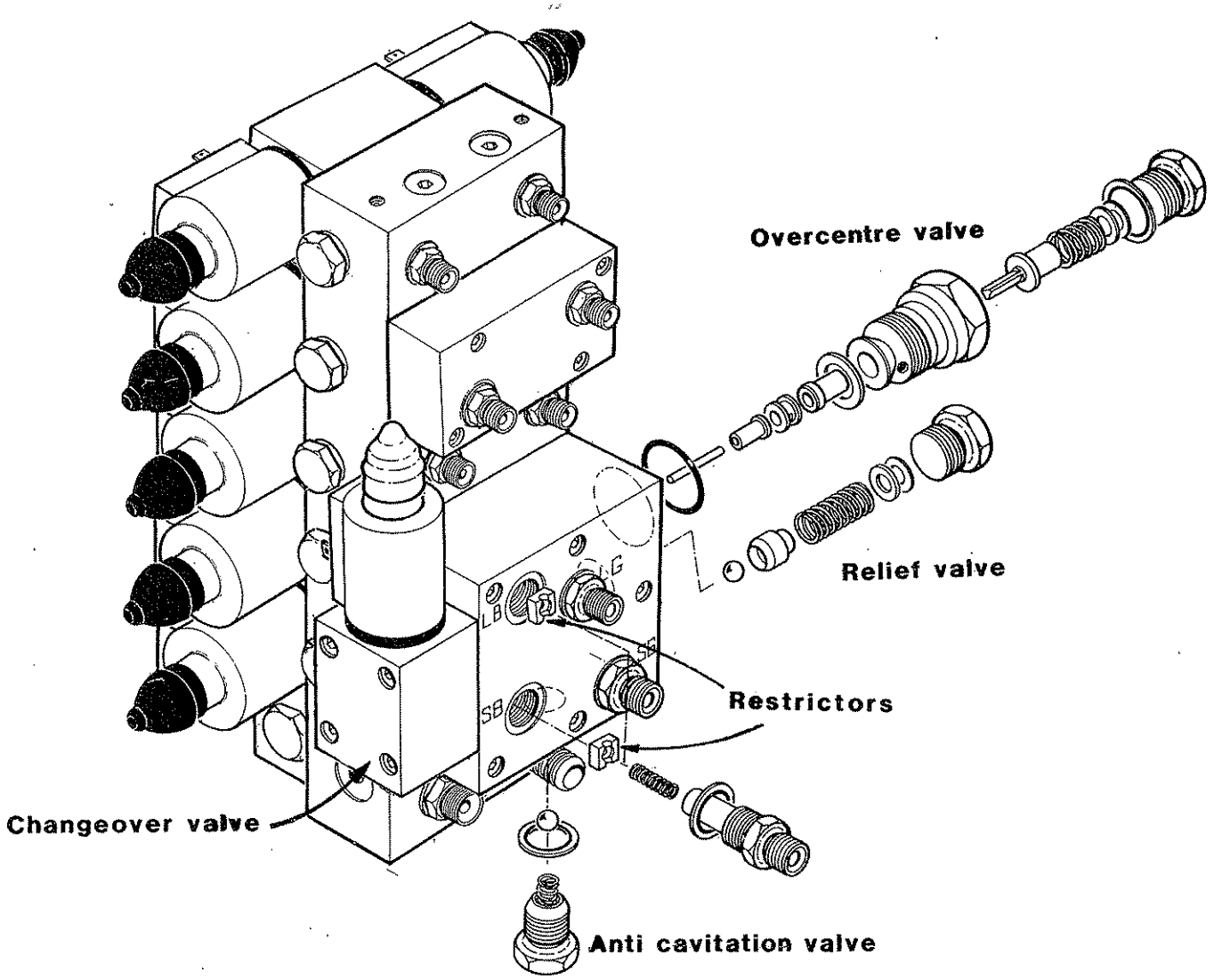
For spares purposes, the valve bodies and spools are supplied as matched components only. Solenoids can also be individually replaced. To release the solenoid from the valve-block undo the lock nut and slide the solenoid off the armature tube which is screwed into the block. If the armature tube is also removed, ensure that the hexagon push rod and spring are in place and the '0' ring in position on re-assembly. Caution should be exercised that the minimum of force is used in screwing the armature tube back into place. Likewise when re-assembling the solenoid ensure the rubber sealing gasket is in place and do not overtighten the locking nut.



Wiring circuit

A common link lead identified by a number 1 on its sleeve is wired in parallel to all the solenoids. The individual circuit leads are similarly identified with numbered sleeves.

For carrying out maintenance work on the machine when the protective cover is removed, disconnect the power supply at the jack plug on the electric control box. This will avoid any accidental short circuiting and possible fuse failure.



c) Slew circuit valve block.

This valve has three functions

i) The change over valve,bolted to the side of the slew valve block, controls the connection or the isolation of the lift and slew base ends. If manual 'slew' mode is selected the lift and slew base ends are isolated and if 'auto reset' is selected they are connected to allow the breakaway mechanism to operate. Servicing this valve is as for the other solenoid valves see page

On failure of the ' slew' or 'auto reset' functions to operate properly a sticking spool in the changeover valve may be suspected. The valve may be stripped and cleaned or, in the case of irrepairable damage, the block and spool replaced as one mated unit. Before commencing check that it is a valve malfunction and not the solenoid by attempting to activate the valve manually by depressing the push pin the extreme end of the Solenoid weather gaiter.

ii) The slew base end relief valve is situated under the lower hexagon cap on the right hand side of the valve block and is shim calibrated to 2000–2200 psi (138 – 152 bar) This valve,in conjunction with an anti cavitation valve in the slew gland circuit situated in the bottom of the block allows breakaway to occur against the relief valve when the machine is being operated in the manual 'slew' mode.

Symptons of a sticking relief valve are:-

Slew creep - when manual slew selected
Main arm droop - when auto reset selected.

Service is restricted to dismantling and cleaning. If the condition persists,reform the ball seat by impacting the ball with a soft metal drift. Damage to the ball requires replacement. Do not add or subtract shims unless new parts are fitted, then, check pressure with a guage and shim to the pressure tolerances specified.

Symptons of sticking anti cavitation valve.

'Slew' mode selected - the arm will creep from the park position to the work position which will be especially noticeable, when in transport.
'Auto reset' mode selected - There will be no apparent symptom.

This ball valve is spring loaded onto its seat but has no specific pressure setting. Service is restricted to cleaning, re-forming the ball seat or replacement of the ball.

iii) Overcentre valve.

This valve is situated under the upper hexagon on the right hand side of the slew valve block
Its function is to maintain pressure in the gland end of the lift ram to ensure that the main arm does not flop over centre when operating on adverse slopes with the reach fully in. The valve is shim calibrated to 400-600 PSI (28 - 41 Bar)

Symptomof Sticking Valve

Nothing will be apparent on level ground but when working on adverse slopes with the reach fully in the main arm could go over centre before it reaches the end of ram stroke. In this case the arm will lurch backwards unchecked until geometry limitations are reached.

Servicing this valve is as for the main relief valve see page

Note: For all hydraulic servicing it is always worthwhile to replace the 'O' rings on re-assembly.

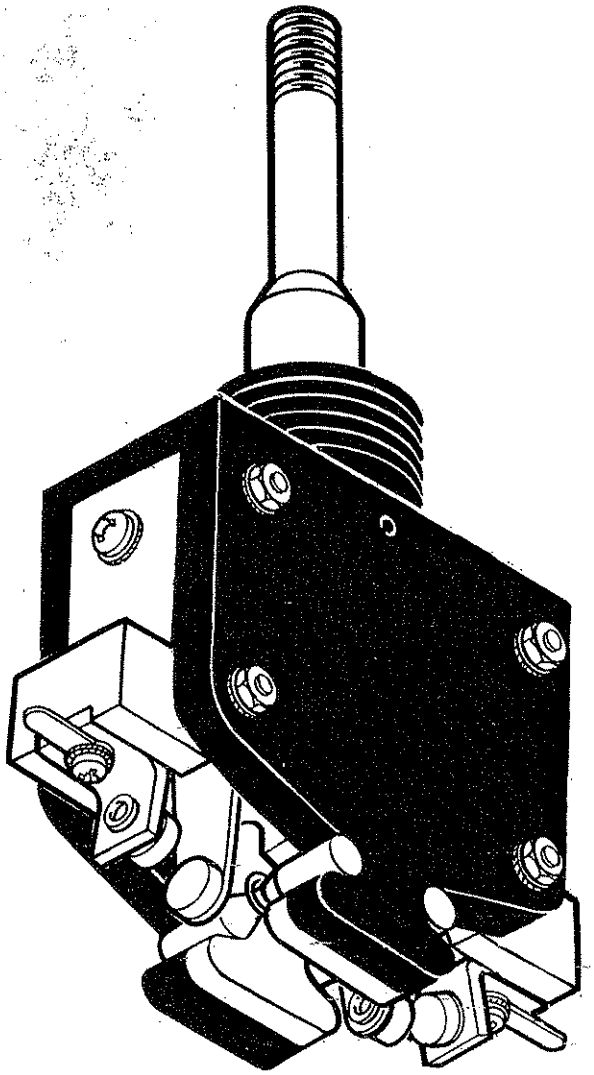
SWITCH BOX

The control unit contains five lever switch units (the 'tele' switch is non operational on Hy Reach extra) each comprising two contact breaker assemblies. Little maintenance should be required other than cleaning of the contact points with a suitable file or changing if necessary if switching becomes intermittent. The ten contact assemblies are easily accessible after the switch box lid has been carefully removed.

In addition the unit is equipped with three toggle switches, a power isolator switch, slew/breakaway selection switch and an auxiliary service switch. The latter is used for activating the automatic head angle float if fitted.

The complete assembly is protected by a 20 amp fuse in the power supply harness.

For investigating machine failure the manual 'push pins' on the ends of the solenoid valves can be operated to ascertain that hydraulic supply is available, remebering that the cut-off solenoid pin must be operated simultaneously. A 12volt bulb wired across the terminals will determine whether electrical current is reaching the solenoid. Attempting to 'spark' the lead will result in a blown fuse.



ROTOR CONTROL VALVE

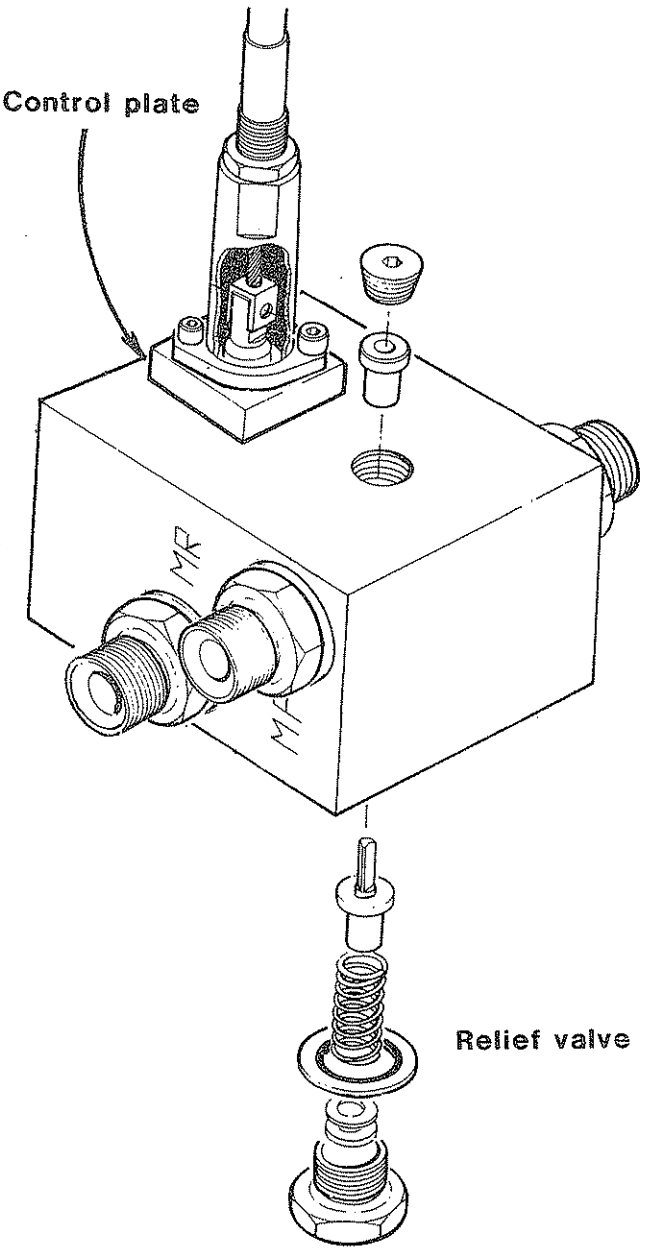
Servicing the rotor control valve is limited to stripping and cleaning. The relief valve within the block is shim calibrated to 2750 PSI (190 Bar) and on no account should this pressure be exceeded. Servicing the relief valve is, as the main relief valve in the manifold block, see page 30 .
Damage to the spool requires renewal of the block c/w spool as they are mated components and cannot be supplied separately.

The cable operates on a push/pull system and is spring loaded into a detent at both extremes of travel to hold it in either the 'stop' or 'start' position.

Care should be taken during installation and operation to ensure that the cable is not trapped or kinked. Also the installation should be such that bends are as sweeping as possible and that a minimum radius of 4½ inches is not exceeded.

After initial setting no routine adjustments of the cable is necessary as it does not stretch. Maintenance is restricted to sealing any abrasion or damage to the outer casing with plastic insulation tape to prevent moisture penetrating the cable.

CAUTION: On no account should any attempt be made to lubricate the cable which is assembled with special lubricant during manufacture.



Setting new cable.

To correctly set a new cable the following steps must be followed.

Assemble cable end in Stop/start lever block.
Pull the Return control valve spool out until it stops.
Set flail control lever in 'stop position.
Attach cable to spool end.
Screw cable sleeve towards the valve until it lightly touches the face of the control plate.
Screw the cable sleeve flange to the control plate.
Tighten the cable locknut.
Operate the stop/start lever to ensure correct operation of the detents in both positions.

TELESCOPIC DIPPER WEARING PADS (Extra Plus Only)

The telescopic dipper slides on two sets of low friction self lubricating pads, one set of which attaches around the top of the dipper and the other around the inner jaw of the 'tele' dipper socket. These pads are shimmed to a free sliding fit with minimum play and must be checked periodically for wear.

The flail head tilting forward is evidence that wear has taken place . There is a tendency for the pads to wear unevenly and to counteract this and increase pad life they can be turned round, moved from one position to another, interchanged top to bottom or more shims added . They can not be turned over.

Although the pads are manufactured with self lubricating material the life of the pads can be further extended by greasing liberally and frequently. Access to the pads at the top of the tele dipper is by removal of the end cover plate in the tele dipper socket.

The pads and their carriers in the jaws of the 'tele'socket are easily accessible by removing the mounting bolts. The carriers/pads can then be withdrawn for adjustment or renewal without removal of the 'tele'dipper. Work and refitting should be carried out on one pad at a time. The majority of wear will occur on the top and side pads but, should the bottom set need attention the dipper must be supported to ensure easy refitting of the pad/carrier assembly. To carry out work on the pads located at the top of the 'tele'dipper it must be removed completely from its housing. Regular maintenance of the pads at the mouth of the 'tele' dipper socket will greatly increase service intervals for this lengthy operation.

FLAIL HEAD

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 and ensure that the spring washer is in good condition. 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 motor mounting nuts and bolts are kept tight. They should be checked during servicing.

Rotor shaft bearing failure is usually attributed to misalignment caused by distortion of the flail head. This may happen by hitting the hood or casing a violent blow against an obstruction or dropping the flail head heavily to the ground. Procedure for re-assembly is as follows :-

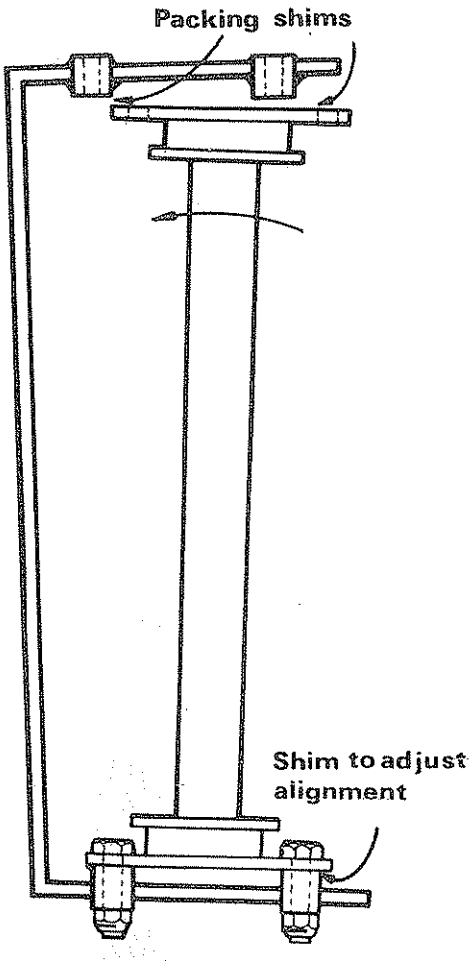
a) Press the new bearing fully into the housing and then press the complete assembly onto the rotor shaft until the bearing inner race is firmly against the rotor shoulder.

b) Support the head off the ground in a vertical position. Offer up the complete rotor shaft into the casing and locate the lower mounting bolts. Tighten the nuts sufficiently to take out all movement and then check the hole alignment at the top end of the casing. If the mounting bolts will not readily fit into place, release the lower bolts and shim between the casing boss and bearing housing until the top holes are aligned.

c) Locate the three top mounting bolts and then tighten the three lower bolts and nuts completely to a torque setting of approximately 120 ft. lbs.

d) Check for clearance between the top bearing housing and casing and completely shim all gaps before tightening the three mounting bolts to the same torque. Failure to shim all gaps will tend to draw the bearing from the shaft when the bolts are tightened.

e) Finally with the flail head horizontal turn the rotor over by hand. There should be no binding or tight spots.



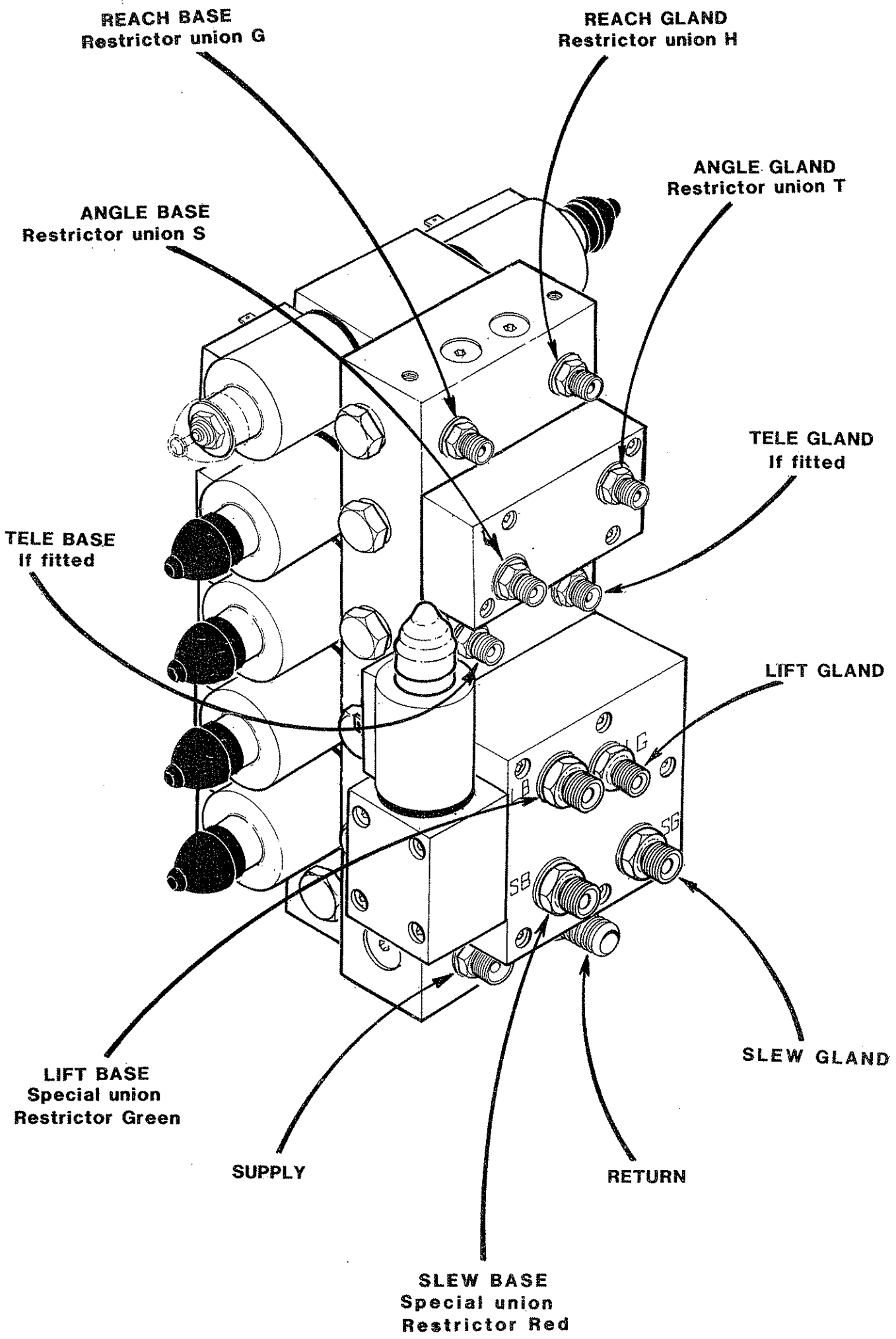
Note:

1. Two sizes of shim are available from F.W.McConnel under part no. 81 21 043 for .015" and 81 21 044 for .025". Alternatively use thin spacing washers.
2. The welded bosses in the casing may be of varying depths. This is a jigging requirement during manufacture and should not be regarded as a fault.
3. To lengthen the serviceable life of the rotor shaft particularly where signs of wear are apparent at the motor end, the rotor can be turned end for end.

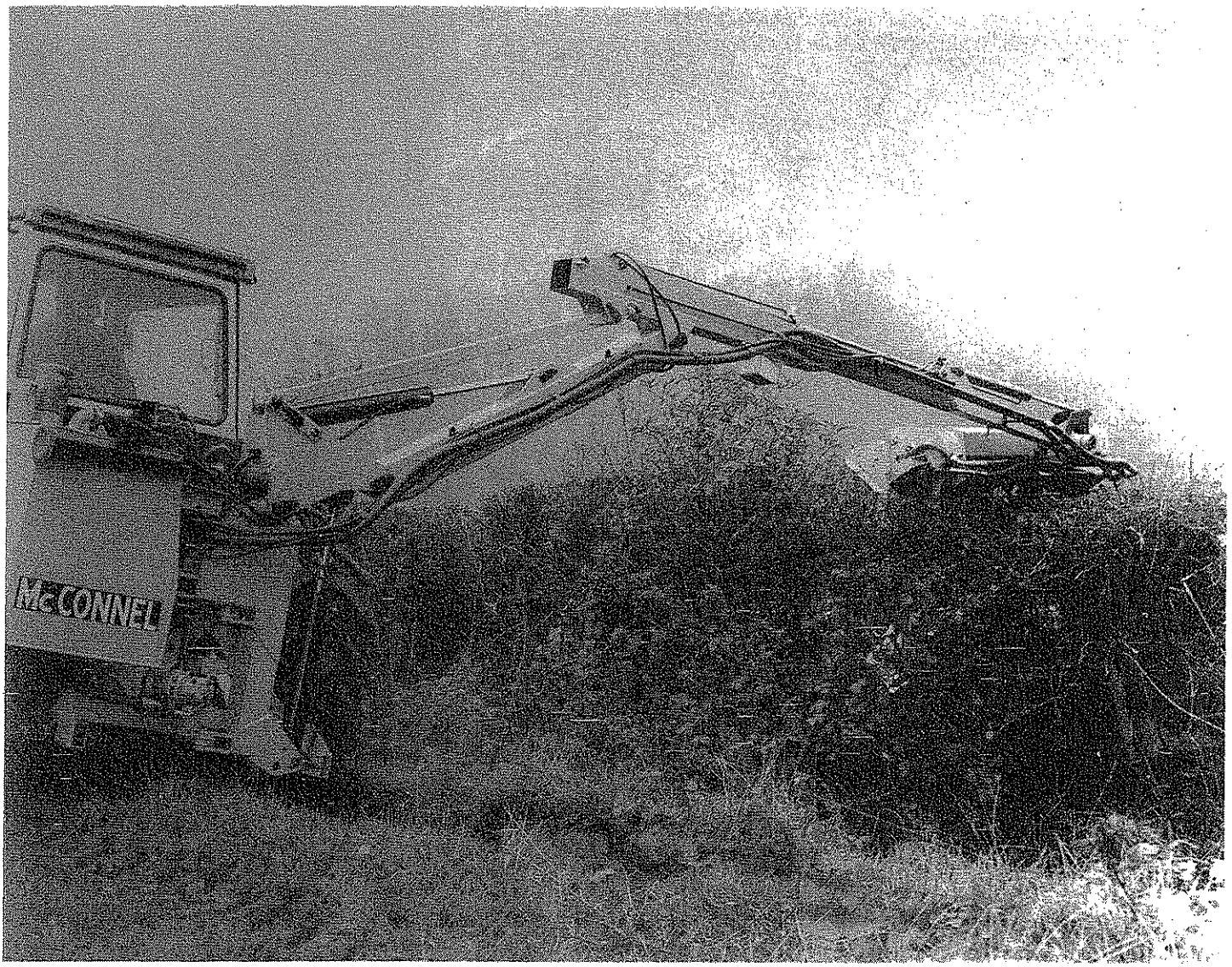
Roller bushes

Do not attempt to oil or grease the roller bushes. They should be left dry. The case-hardened bearing surfaces of the roller brackets run within spring steel bushes. Any lubricant will attract dust and grit into the bearing surfaces and accelerate wear by a grinding paste action.

HOSE CONNECTIONS



SPARE PARTS MANUAL



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.

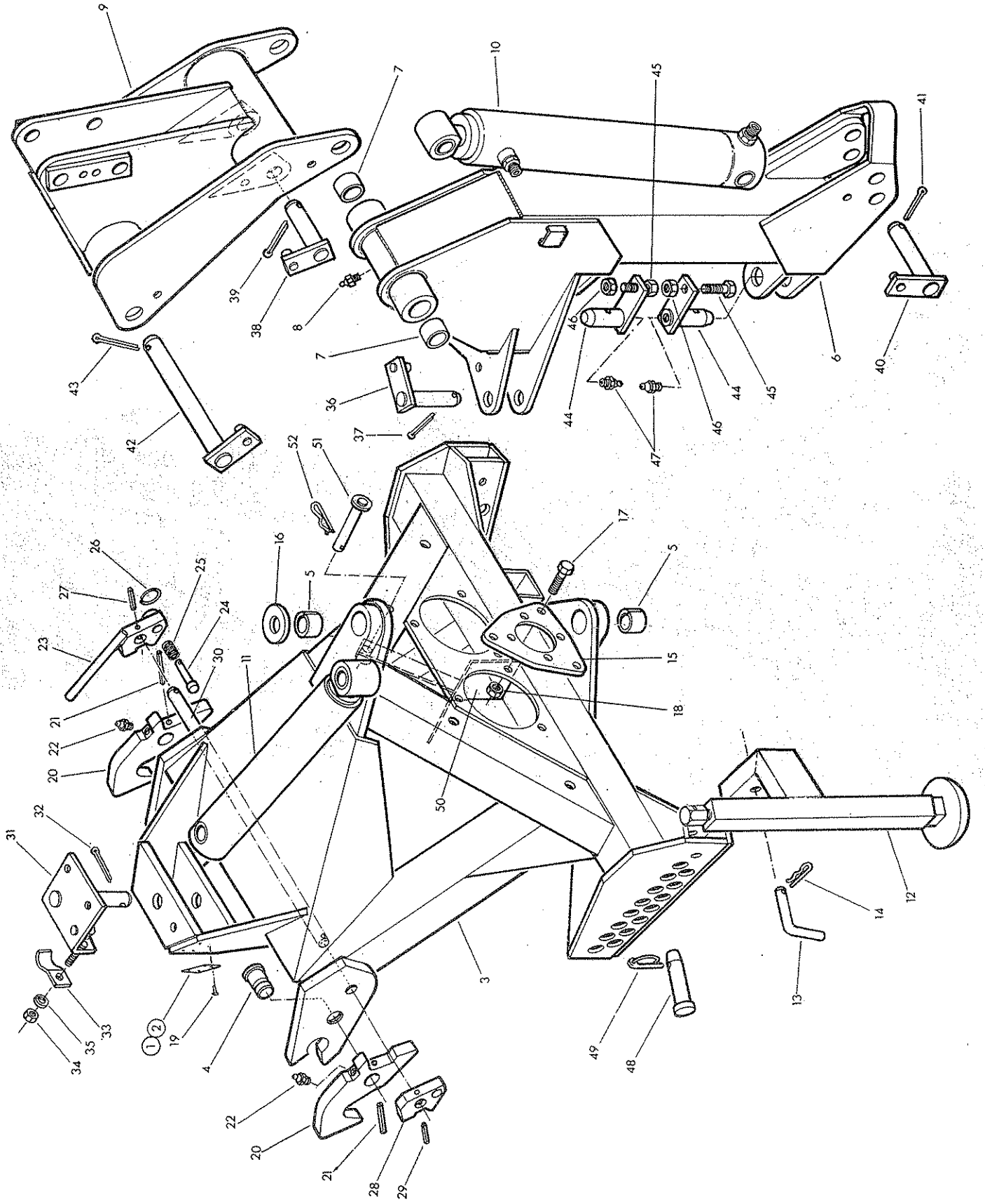
Design improvements may have altered some of the parts listed in this manual - the latest part will always be supplied when it is interchangeable with an earlier one.

THE DOT SYSTEM

Many spares are supplied as Assemblies or as Sub-assemblies and, to help the customer determine the composition of an Assembly, the Dot System is used. The Main Assembly will not show a dot preceding its description and is printed in BLOCK CAPITALS. Subsequent listed parts are preceded by one or more dots until the next major assembly is reached. An increase in the number of preceding dots indicates that the item is an associated part of the preceding item. Whenever the number of dots are decreased by one this indicates the termination of an assembly.

MAIN FRAME, SLEW COLUMN & ROCKER

Shown assembled for R hand cutting



Ref	Part No.	Qty	Description.
	71 36 250		HY REACH EXTRA R. HAND.
	71 36 251		HY REACH EXTRA L.HAND
1	71 36 083	1	.Serial plate.
	71 36 260		HY REACH EXTRA PLUS R. HAND.
	71 36 261		HY REACH EXTRA PLUS L. HAND.
2	71 36 084	1	.Serial plate.

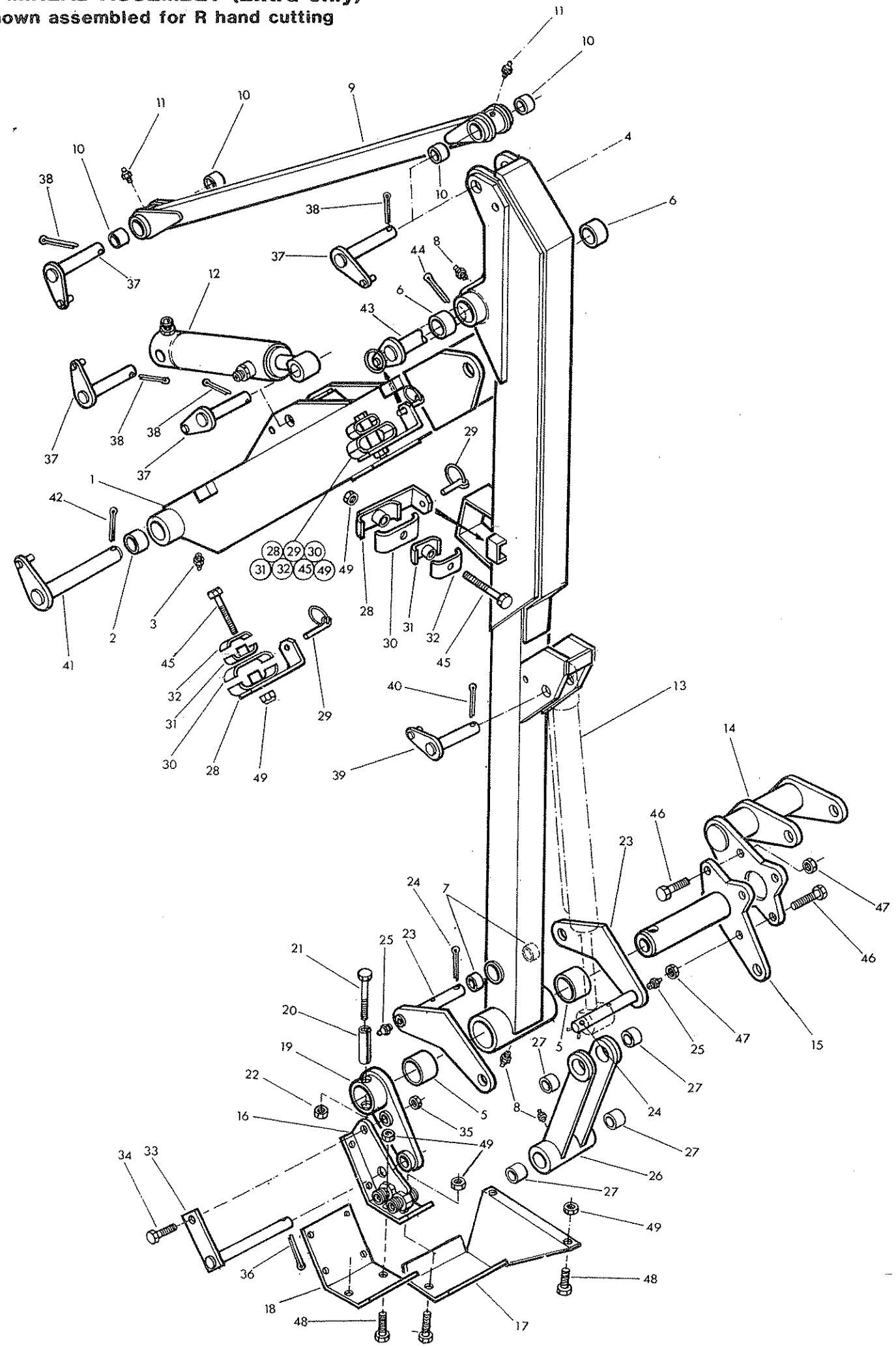
The following items are common to all Hy Reache's

3	71 36 290	1	.Main frame c/w bushes greaser etc.
4	71 06 061	2	..Pivot pin
5	70 16 010	2	..Bush
6	71 36 282	1	.Slew column c/w bush greaser
7	70 16 010	2	..Bush
8	09 01 121	1	..Greaser 1/8 BSP - straight.
9	71 36 277	1	.Rocker.
10	71 36 270	1	Lift ram assembly (see page 81)
11	71 36 274	1	.Slew/Breakaway ram assy. (see page 82)
12	71 36 309	1	.Screw jack leg L.Hand c/w pin
13	71 09 060	1	..Leg pinc/w spring cotter.
14	04 31 105	1	...Spring cotter.
	71 36 329	1	.Screw jack leg R.Hand c/w pin
	71 09 060	1	..Leg pin c/w spring cotter
	04 31 105	1	...Spring cotter
15	71 36 310	1	.Gearbox adaptor plate
16	60 01 136	1	.Thrust washer.
17	93 13 066	3	.Setscrew M12 x 30
18	91 43 006	3	.Self locking nut M12
19	71 03 230	4	.Pop rivet 1/8 dia.
20	71 06 063	2	.Cross shaft latch c/w spring dowel & greaser. .
21	04 21 836	1	..Spring dowel ¼" dia x 2¼" long.
22	09 01 121	1	..Greaser 1/8 BSP straight.
23	71 06 064	1	.Hand operated locking catch c/w sp. dowel,plunger
24	71 06 192	1	..Plunger
25	81 11 009	1	..Spring.
26	71 05 094	1	..Ring.
27	04 22 524	1	..Spring dowel 5/16 dia x 1½" long.
28	71 06 066	1	.Slave locking catch c/w spring dowel & greaser.
29	04 21 836	1	..Spring dowel ¼" dia x 2¼" long.
30	71 06 067	1	.Locking rod.
31	71 36 094	1	.Slew/Breakaway ram base pin c/w clamp etc.
32	95 01 406	1	..Split pin Ø5 x 40
33	71 09 151	1	..Cable clamp
34	91 13 004	1	..Nut M8
35	91 00 204	1	..Spring washer Ø8
36	71 36 097	1	.Slew/breakaway ram rod pin c/w split pin
37	95 01 406		..Split pin Ø5 x 40
38	71 36 087	1	.Lift ram rod pin c/w split pin
39	95 01 507	1	..Split pin Ø6 x 50
40	71 18 082	1	.Lift ram base pin c/w split pin
41	95 01 507	1	..Split pin Ø6 x 50
42	71 36 098	1	.Rocker pivot pin c/w split pin
43	05 03 166	1	..Split pin ¼" dia x 2" long.
44	71 36 086	2	.Slew column pivot pin c/w nut, bolt & greaser.
45	93 13 087	1	..Setscrew M16 x 40
46	91 43 007	1	..Self locking nut M16
47	09 01 125	1	..Greaser 1/8 BSP
48	71 36 091	2	.Linkage pin c/w linch pin
49	04 31 217	1	..Linch pin
50	71 36 332	1	.PTO guard c/w pin
51	71 36 100	1	..Pin c/w spring cotter.
52	04 31 105	1	... Spring cotter.
	71 36 330	1	.P.T.O. shaft assembly not illustrated.

not illustrated

ARMHEAD ASSEMBLY (Extra only)

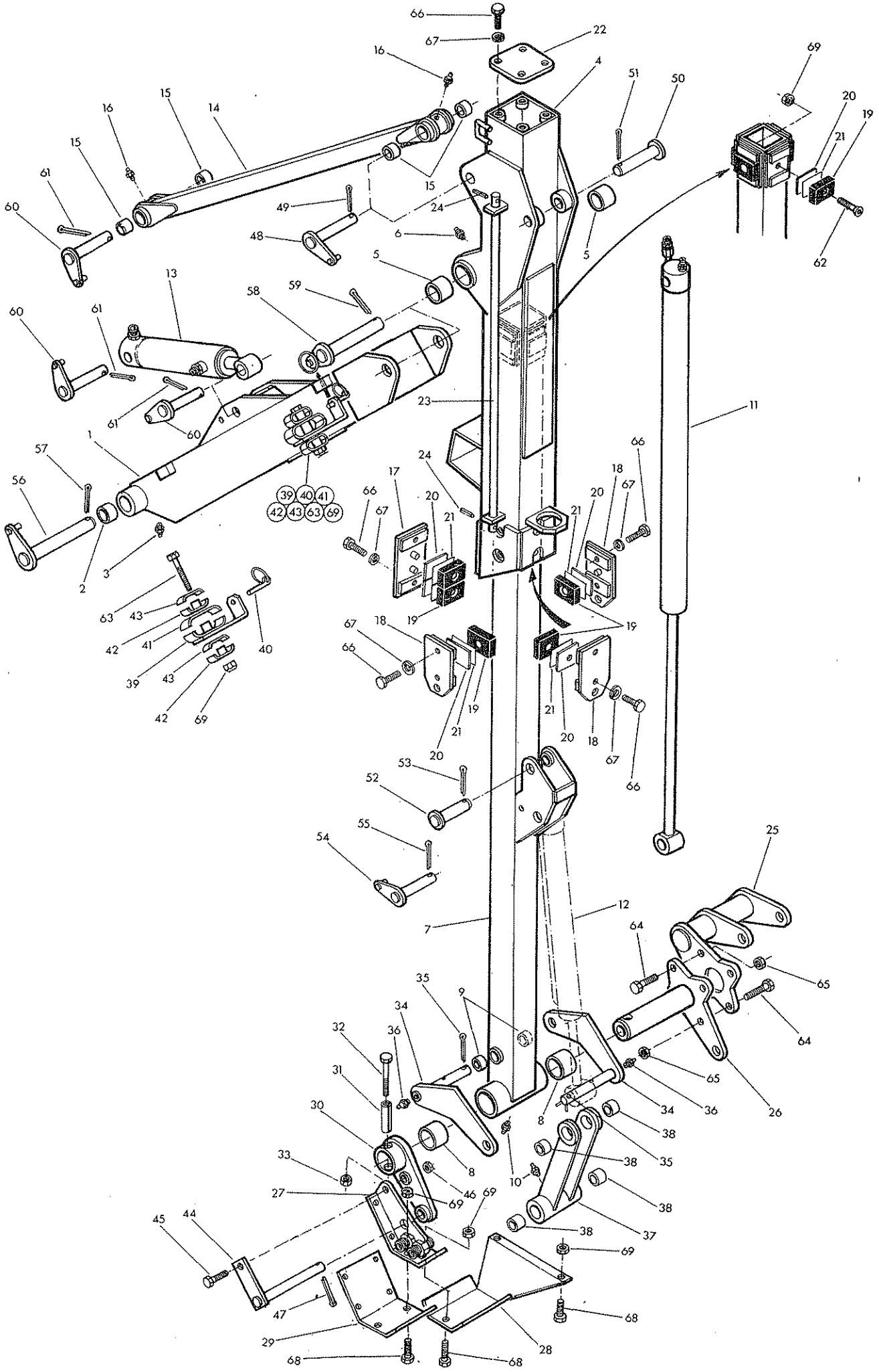
Shown assembled for R hand cutting



Ref	Part No	Qty	Description.
	71 36 250		HY REACH EXTRA R. HAND -Continued
	71 36 251		HY REACH EXTRA L. HAND - Continued.
1	71 36 280	1	.Main arm c/w bushes, greaser etc.
2	70 16 010	2	..Bush
3	09 01 121	1	..Greaser 1/8 BSP straight.
4	71 36 299	1	.Dipper arm c/w bushes etc.
5	71 36 035	2	..Bush
6	70 16 010	2	..Bush
7	71 01 083	2	..Bush
8	09 01 121	1	..Greaser 1/8 BSP straight.
9	71 36 273	1	.Tension link c/w bushes greaser etc.
10	60 12 032	4	..Bush
11	09 01 121	1	..Greaser 1/8 BSP straight.
12	71 36 270	1	.Reach ram assembly. (See page 81)
13	71 35 290	1	.Angling ram assembly. (See page 83)
* 14	71 36 316	1	.Flail head adaptor
15	71 36 317	1	.Pivot tube.
16	71 36 319	1	.Hose connection bracket.
17	71 36 321	1	.Hose shield tray.
18	71 36 079	1	.Hose shield tray extension.
19	71 36 075	1	.Jaw plate c/w nut, bolt and spring dowel.
20	04 23 548	1	..Spring dowel 5/8 dia x 3" long.
21	92 13 185	1	..Bolt M10 x 90
22	91 43 005	1	..Self locking nut M10
23	71 36 311	2	.Radius arm c/w plit pin & greaser.
24	95 01 406	1	..Split pin Ø5 x 40
25	09 01 121	1	..Greaser 1/8 BSP straight.
26	71 14 340	1	.Slave link c/w bushes.
27	71 01 083	4	..Bush
28	71 36 095	3	.Hose bracket c/w linch pin
29	04 31 217	1	..Linch pin
30	73 13 130	3	.Hose clamp large - upper
31	71 14 076	3	.Hose clamp small - lower
32	71 14 075	3	.Hose clamp small - upper
33	71 36 076	1	.Slave link pin c/w nuts, bolt, etc.
34	93 13 106	1	..Bolt M12 x 50
35	91 43 006	1	..Self locking nut M12
36	95 01 406	1	..Split pin Ø5 x 40
37	71 18 082	4	.Pivot pin c/w split pin - Reach ram & tension link
38	95 01 507	1	..Split pin Ø6 x 50
39	71 18 087	1	.Angle ram base pin c/w split pin
40	95 01 406	1	..Split pin Ø5 x 40
41	71 36 098	1	.Main arm pivot pin c/w split pin
42	05 03 166	1	..Split pin ¼" dia. x 2" long.
43	71 36 089	1	.Dipper pivot pin c/w split pin
44	05 03 166	1	.Split pin ¼" dia x 2" long.
45	92 13 185	3	.Bolt M10 x 90
46	02 11 206	4	.Bolt 5/8 UNF x 2½" long.
47	01 42 006	4	.Self locking nut 5/8 UNF
48	93 13 045	6	.Setscrew M10 x 20
49	91 43 005	9	.Self locking nut M10

* Note. For machines supplied with 1.6M head item 14 is not required

ARMHEAD ASSEMBLY (Extra Plus only) Shown assembled for R hand cutting

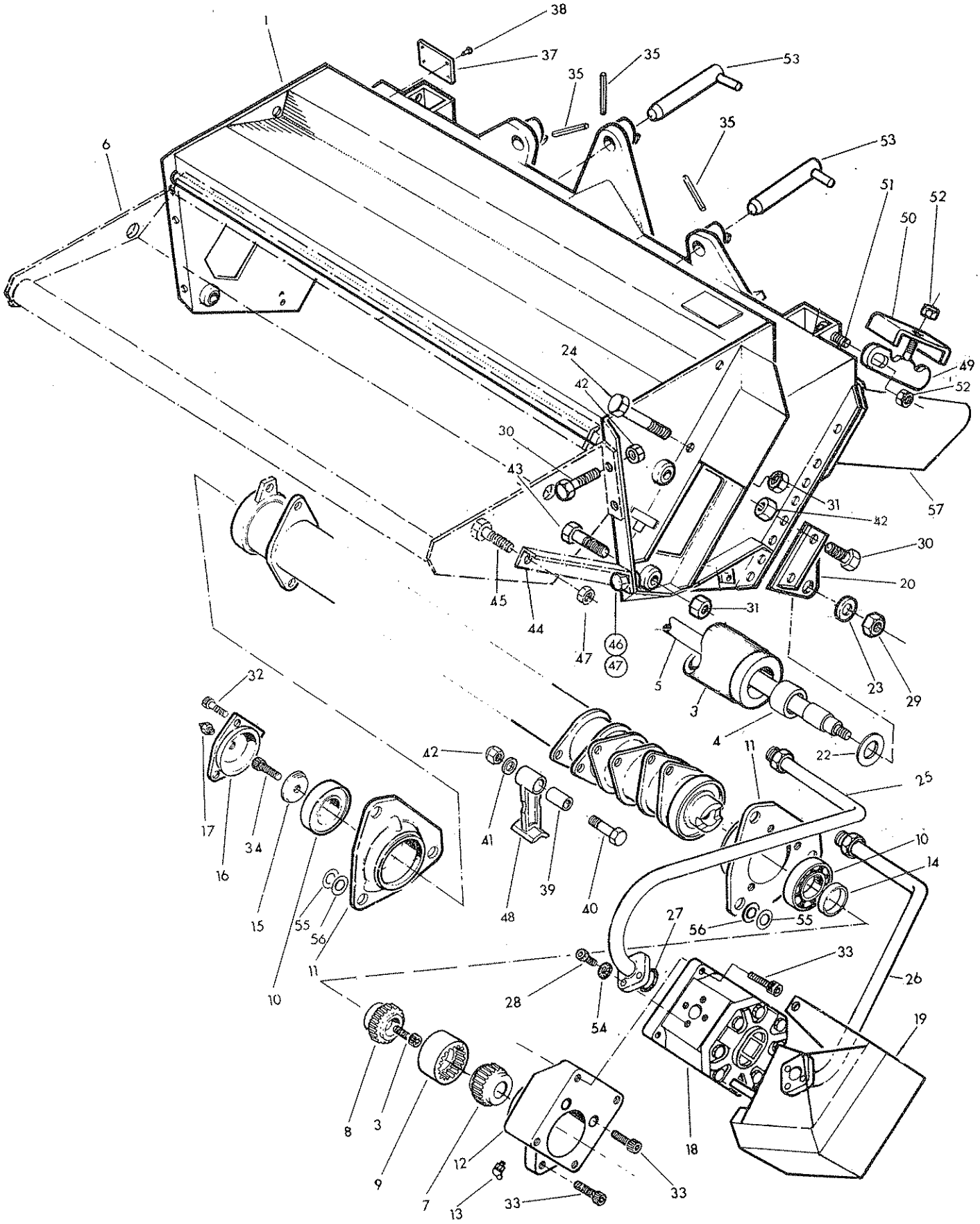


Ref	Part No	Qty	Description.
	71 36 260		HY REACH EXTRA PLUS R. HAND - Continued.
	71 36 261		HY REACH EXTRA PLUS L. HAND - Continued.
1	71 36 280	1	.Main arm c/w bushes, greaser etc.
2	70 16 010	2	..Bush
3	09 01 121	1	..Greaser 1/8 BSP - straight.
4	71 36 305	1	.Dipper socket c/w bushes.
5	70 16 010	2	..Bush
6	09 01 121	1	...Greaser 1/8 BSP
7	71 36 308	1	.Telescopic dipper c/w bushes.
8	71 36 035	2	..Bush
9	71 01 083	2	..Bush
10	09 01 121	1	..Greaser 1/8 BSP straight.
11	71 36 275	1	.Tele ram assembly see page 84
12	71 35 290	1	.Angling ram ass embly, see page 83
13	71 36 270	1	.Reach ram assembly See page 81
14	71 36 273	1	.Tension link c/w bushes.
15	60 12 032	4	..Bush
16	09 01 121	2	..Greaser 1/8 BSP straight.
17	71 36 315	1	.Wear pad carrier - bottom
18	71 36 314	3	.Wear pad carrier - side and top.
19	71 36 001	9	.Wear pad
20	71 36 059	As reqd	. Shim 1mm
21	71 36 058	As reqd.	.Shim 0.25mm
22	71 36 069	1	.Cover plate.
23	71 36 096	1	.Guide bar c/w spring dowels.
24	04 21 616	2	.Spring dowel 3/16" dia x 1" long.
* 25	71 36 316	1	.Flail head adaptor.
26	71 36 317	1	.Pivot tube
27	71 36 319	1	.Hose connection bracket.
28	71 36 321	1	.Hose shield tray.
29	71 36 079	1	.Hose shield tray extension.
30	71 36 075	1	.Jaw plate c/w nut bolt and spring dowel.
31	04 23 548	1	..Spring dowel 5/8 dia x 3" long.
32	92 13 185	1	..Bolt M10 x 90
33	91 43 005	1	..Self locking nut M10
34	71 36 311	2	.Radius arm c/w split pin & greaser.
35	95 01 406	1	..Split pin Ø5 x 40
36	09 01 121	1	..Greaser - 1/8 BSP straight.
37	71 14 340	1	.Slave link c/w bushes.
38	71 01 083	4	..Bush
39	71 36 095	2	.Hose bracket c/w linch pin
40	04 31 217	1	..Linch pin
41	73 13 130	2	.Hose clamp large - upper
42	71 14 076	4	.Hose clamp small - lower
43	71 14 075	4	.Hose clamp small - upper
44	71 36 076	1	.Slave link pin c/w nut, bolt etc.
45	93 13 106	1	..Bolt M12 x 50
46	91 43 006	1	..Self locking nut M12
47	95 01 406	1	..Split pin Ø5 x 40
48	71 36 092	1	.Pivot pin - Tension link upper - c/w split pin
49	95 01 507	1	..Split pin Ø6 x 50
50	71 36 090	1	.'Tele' ram base pin c/w split pin
51	95 01 406	1	..Split pin Ø5 x 40
52	70 14 063	1	. 'Tele' ram rod pin c/w split pin
53	95 01 406	1	..Split pin Ø5 x 40
54	71 18 087	1	.Angle ram base pin c/w split pin
55	95 01 406	1	..Split pin Ø5 x 40
56	71 36 025	1	.Main arm pivot pin c/w split pin
57	05 03 166	1	..Split pin ¼" dia x 2" long.
58	71 36 089	1	.Dipper arm pivot pin c/w split pin
59	05 03 166	1	..Split pin ¼" dia x 2" long.
60	71 18 082	3	.Pivot pin - Reach base & rod tension link lower
61	95 01 507	1	..Split pin Ø6 x 50
62	93 53 075	4	.Socket headed counter sunk screw M10 x 35
63	92 13 225	2	.Bolt M10 x 110
64	02 11 206	4	.Bolt 5/8 UNF x 2½" long.
65	01 42 006	4	.Self locking nut 5/8 UNF
66	03 11 065	12	. Setscrew ½" UNF x 3/4" long.
67	01 00 205	12	.Spring washer ½" dia
68	93 13 045	6	.Setscrew M10 x 20
69	91 43 005	12	.Self locking nut M10

* Note. For machines supplied with 1.6M head item 25 is not required

1·2 METRE MULTICUT HEDGE FLAIL

Shown assembled for R hand cutting

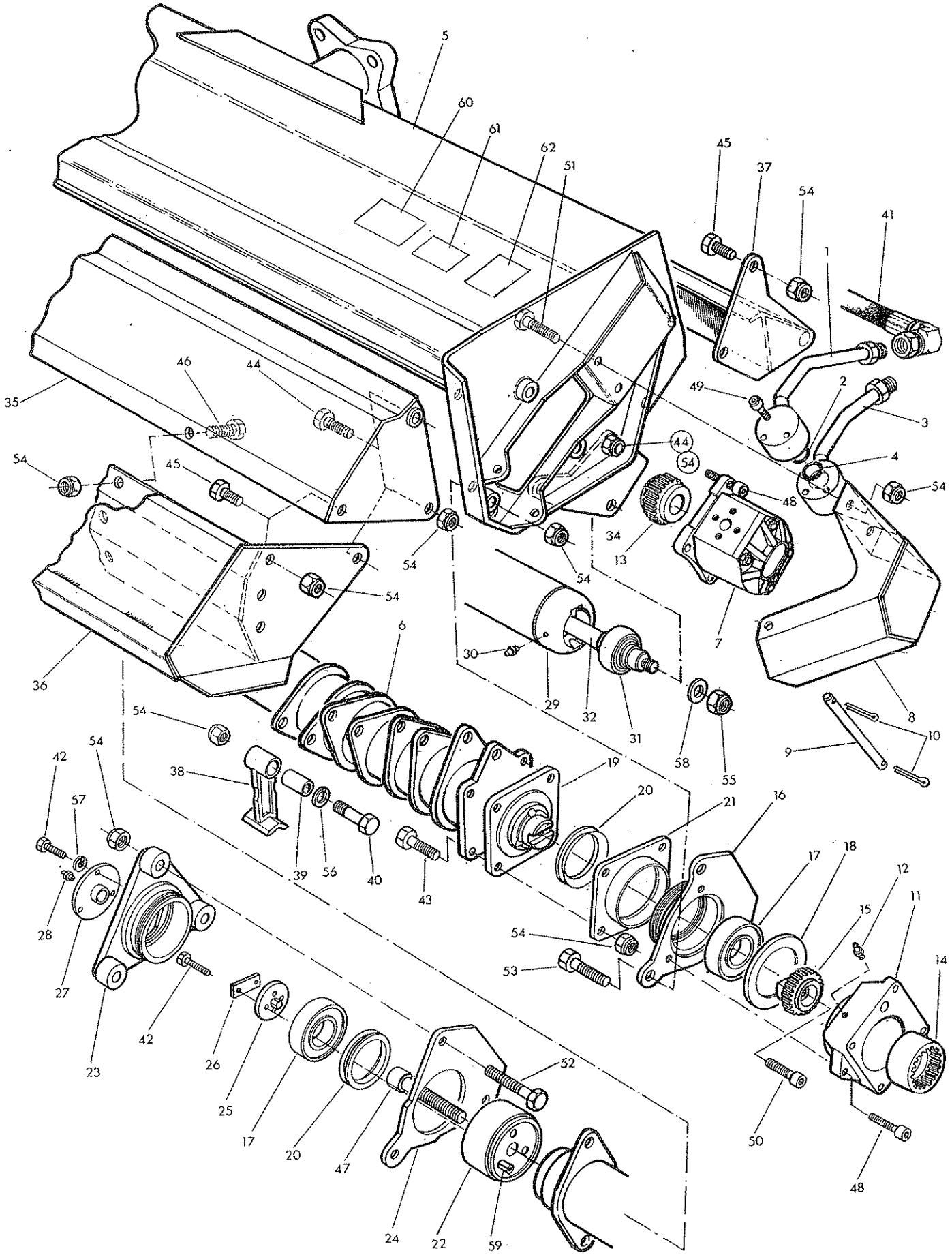


Ref	Part No.	Qty	Description.	
	73 14 380		1.2 METRE (48") MULTICUT HEDGE FLAIL	
1	73 14 305	1	.Main casing.	
2	73 14 434	1	.Rotor	
3	73 14 429	1	.Roller c/w bush	
4	72 13 023	2	..Bush	
5	73 14 431	1	.Roller tie rod	
6	73 14 325	1	.Hedge hood	
	73 14 206	1	.Coupling	
7	73 14 204	1	..Coupling motor half	
8	73 14 203	1	..Coupling rotor half	
9	73 14 205	1	..Coupling sleeve	
10	06 00 018	2	.Ball bearing	
11	73 14 436	2	.Bearing housing	
12	73 14 369	1	.Spacer block c/w greaser.	
13	09 01 125	1	.Greaser 1/8 BSP 35°	
14	73 14 214	1	.Coupling spacer	
15	73 14 211	1	.Clamp washer	
16	73 14 370	1	.Rotor end cover c/w greaser	
17	09 01 121	1	..Greaser 1/8"BSP straight.	
18	73 14 426	1	.Motor assembly c/w coupling half	
19	73 14 422	1	.Motor cover	
20	73 14 195	1	.Roller bracket LH c/w spring dowel.	
21	73 14 196	1	.Roller bracket RH c/w spring dowel (not illus.)	
	04 21 810	1	..Spring dowel	
22	60 01 136	2	.Thrust washer	
23	91 00 108	2	.Washer Ø20	
24	92 13 347	1	.Bolt M16 x 170	
25	73 14 418	1	.Rigid pipe upper — For R.Hand build with motor mounted on LH end of flail rotor	All c/w '0' rings.
26	73 14 420	1	.Rigid pipe lower — For R.Hand build with motor mounted on LH end of flail rotor	All c/w '0' rings.
	73 14 419	1	.Rigid pipe upper — For LH build with motor mounted on the RH end of the Flail rotor	All c/w '0' rings.
	73 14 421	1	.Rigid pipe lower — For LH build with motor mounted on the RH end of the Flail rotor	All c/w '0' rings.
27	86 00 121	1	..'0' ring	
28	93 43 055	6	.Capscrew M10 x 25	
29	91 00 005	2	.Hexagon nut M20	
30	03 11 106	8	.Setscrew 5/8 UNF x 1¼	
31	91 43 007	7	.Hexagon nut self-locking M16	
32	93 13 055	3	.Setscrew M10 x 25	
33	93 00 104	7	.Capscrew M10 x 40	
34	73 14 221	2	.Self-locking capscrew M12 x 50	
35	04 22 648	3	.Spring dowel 3/8 dia x 3" long	
36	73 14 224	1	.Flail speed sticker	
37	73 14 087	1	.Serial plate	
38	28 00 020	4	.Pop rivet 1/8" dia	
39	73 14 223	24	.Flail pivot bush	
40	73 14 222	24	.Special flail bolt	
41	01 00 206	24	.Spring washer 5/8" dia	
42	01 41 006	32	.Hexagon nut self-locking 5/8 UNF	
43	73 14 146	6	.Bolt M16 x 50	
	73 14 361	1	.Strut RH c/w nuts & bolts (Not illus.)	
44	73 14 362	1	.Strut LH c/w nuts & bolts	
45	03 11 106	1	..Setscrew 5/8 UNF x 1¼	
46	03 11 126	1	..Setscrew 5/8 UNF x 1½	
47	01 41 006	2	..Hexagon nut self locking 5/8 UNF	
48	73 14 366	24	.F10H Hedger flail	
49	73 14 219	1	.Pipe clamp assy. c/w screws, nuts & clamp	
50	73 14 158	1	..Clamp	
51	93 13 065	1	..Setscrew M10 x 30	
52	91 43 005	2	..Hexagon nut self locking M10	
53	71 06 138	2	.Flail pivot pin	
54	91 00 305	6	.Serrated washer	
	73 13 324	1	.Flail guard kit (not illus) See Page 85	
55	81 21 043	To suit	.Shim .015"	
56	81 21 044	"	.Shim .025"	
	86 99 166		SEAL KIT for Casappa Motor.	

OPTIONAL EXTRA

	73 14 423	1	Light hedger hood (not illustrated)
57	71 36 325	1	Rear hood for downward cutting.

1·6 METRE HEDGE FLAIL (Shown in L hand build to cut on the R-hand side of the tractor)



Ref	Part No	Qty	Description
	71 36 300		1.6 METRE HEDGE FLAIL R. HAND

(When viewed from the rear with motor on R hand end of the rotor the assembly cuts on L hand side of tractor)

	71 36 389	1	.Rigid pipe upper c/w O ring
	86 00 121	1	..O ring
	71 36 387	1	.Rigid pipe lower c/w O ring
	86 00 121	1	..O ring

Not illustrated

	71 36 301		1.6 METRE HEDGE FLAIL L. HAND

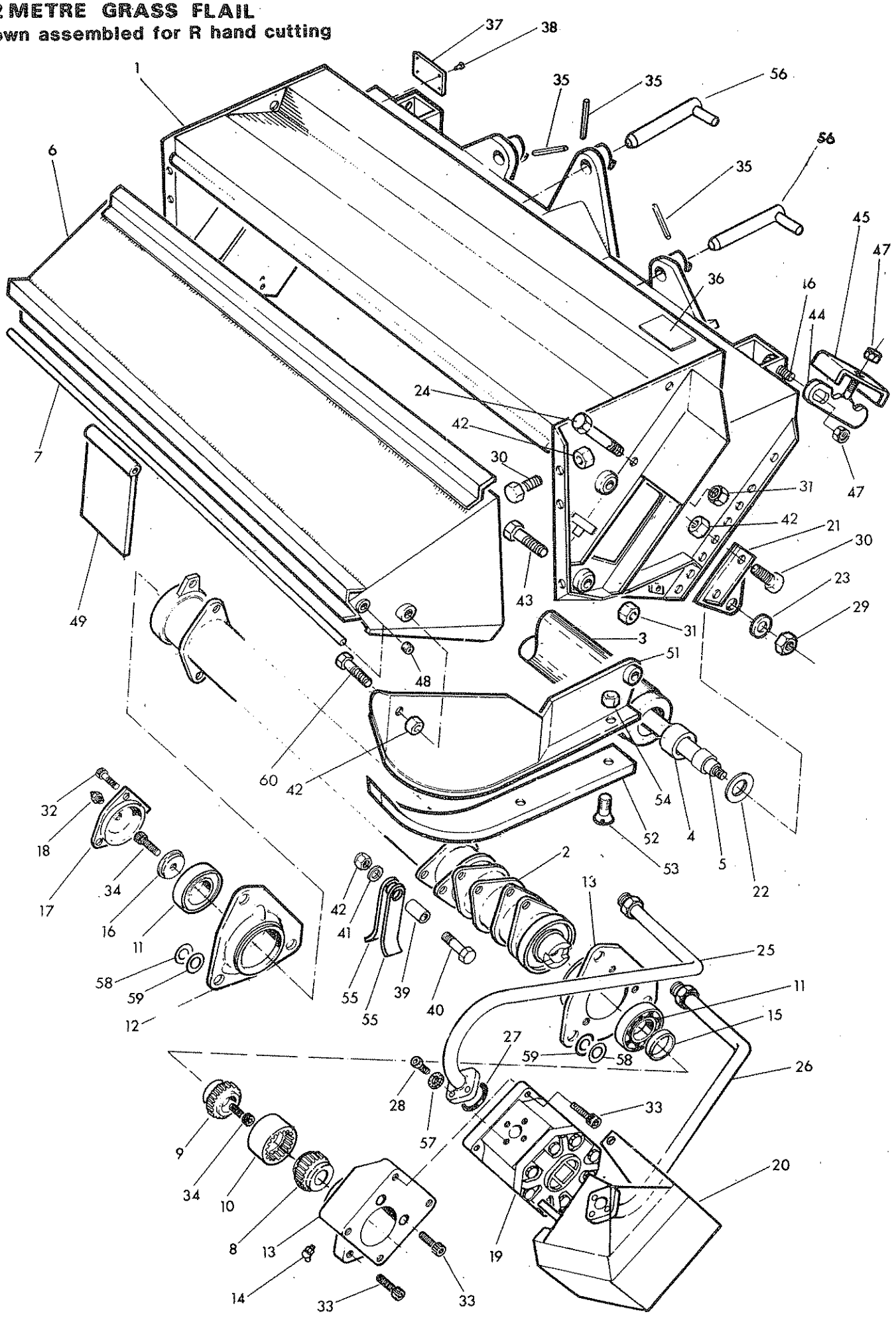
(When viewed from the rear with motor on L hand end of the rotor the assembly cuts on the R hand side of the tractor)

1	71 36 390	1	.Rigid pipe upper c/w O ring
2	86 00 121	1	..O ring
3	71 36 388	1	.Rigid pipe lower c/w O ring
4	86 00 121	1	..O ring

The remaining items are common to both flail head assemblies.

5	71 36 344	1	.Flail casing
6	71 36 367	1	.Rotor
7	83 01 264	1	.Hydraulic motor
8	71 36 373	1	.Motor cover
9	73 14 202	1	.Motor cover mounting pin c/w split pin
10	05 03 095	2	..Split pin 3/16" dia x 1 1/8" long
11	71 36 384	1	.Coupling spacer block c /w greaser
12	09 01 124	1	..Greaser 1/8 BSP straight
13	73 14 204	1	.Coupling - motor half
14	73 14 205	1	.Coupling sleeve
15	73 14 203	1	.Coupling - rotor half
16	71 36 350	1	.Bearing housing - motor end
17	06 00 070	2	.Spherical roller bearing
18	71 36 145	1	.Bearing retainer
19	71 36 353	1	.Rotor hub - motor end
20	86 29 155	2	.Face seal
21	71 36 354	1	.Shroud ring
22	71 36 352	1	.Rotor hub - free end
23	71 36 351	1	.Bearing housing - free end
24	71 36 349	1	.Shield plate
25	71 36 128	1	.Lock plate
26	71 36 129	1	.Tab plate
27	71 36 126	1	.Cover plate c/w greaser
28	09 01 121	1	..Greaser 1/8 BSP straight
29	71 36 376	1	.Roller c/w greaser
30	09 01 111	1	..Greaser ¼ BSF straight
31	06 00 071	2	.Bearing insert
32	71 36 380	1	.Roller tie rod
33	71 36 379	1	.Roller bracket R hand -Not illustrated
34	71 36 378	1	.Roller bracket L hand
35	71 36 360	1	.Front hood - fixed
36	71 36 363	1	.Front hood adjustable
37	71 36 355	1	.Rear hood
38	73 14 366	32	.Hedge flail F1OH
39	71 36 133	32	.Flail pivot bush
40	73 14 222	32	.Special bolt 5/8 UNF
41	85 01 142	2	.Hose 1" BSP SF 90°F x 58" long
42	03 11 062	5	.Set screw 5/16 UNF x 3/4" long
43	03 11 146	4	.Set screw 5/8 UNF x 1¾" long
44	03 11 126	8	.Set screw 5/8 UNF x 1½" long
45	03 11 106	6	.Set screw 5/8 UNF x 1¼" long
46	03 11 086	2	.Set screw 5/8 UNF x 1" long
47	03 41 207	1	.Socket headed set screw 3/4 UNF x 2½" long
48	93 00 104	7	.Socket headed screw M10 x 40 self locking
49	93 00 014	8	.Socket headed screw M10 x 60 self locking
50	73 14 221	1	.Socket headed screw M12 x 50 self locking
51	02 11 286	2	.Bolt 5/8 UNF x 3½" long
52	02 11 246	3	.Bolt 5/8 UNF x 3" long
53	02 11 166	3	.Bolt 5/8 UNF x 2" long
54	01 41 006	60	.Self locking nut 5/8 UNF
55	01 41 007	2	.Self locking nut 3/4 UNF
56	01 00 206	32	.Spring washer 5/8" dia
57	01 00 202	3	.Spring washer 5/16" dia
58	01 00 107	2	.Plain washer 3/4" dia
59	04 22 516	1	.Spring dowel 5/16" dia x 1" long
60	71 14 481	1	.Safety sticker - Bolt tightness
61	73 14 399	1	.Safety sticker - Rotating cutters
62	73 14 088	1	.Safety sticker - Rotor speed
	86 99 166		SEAL KIT FOR HYDRAULIC MOTOR

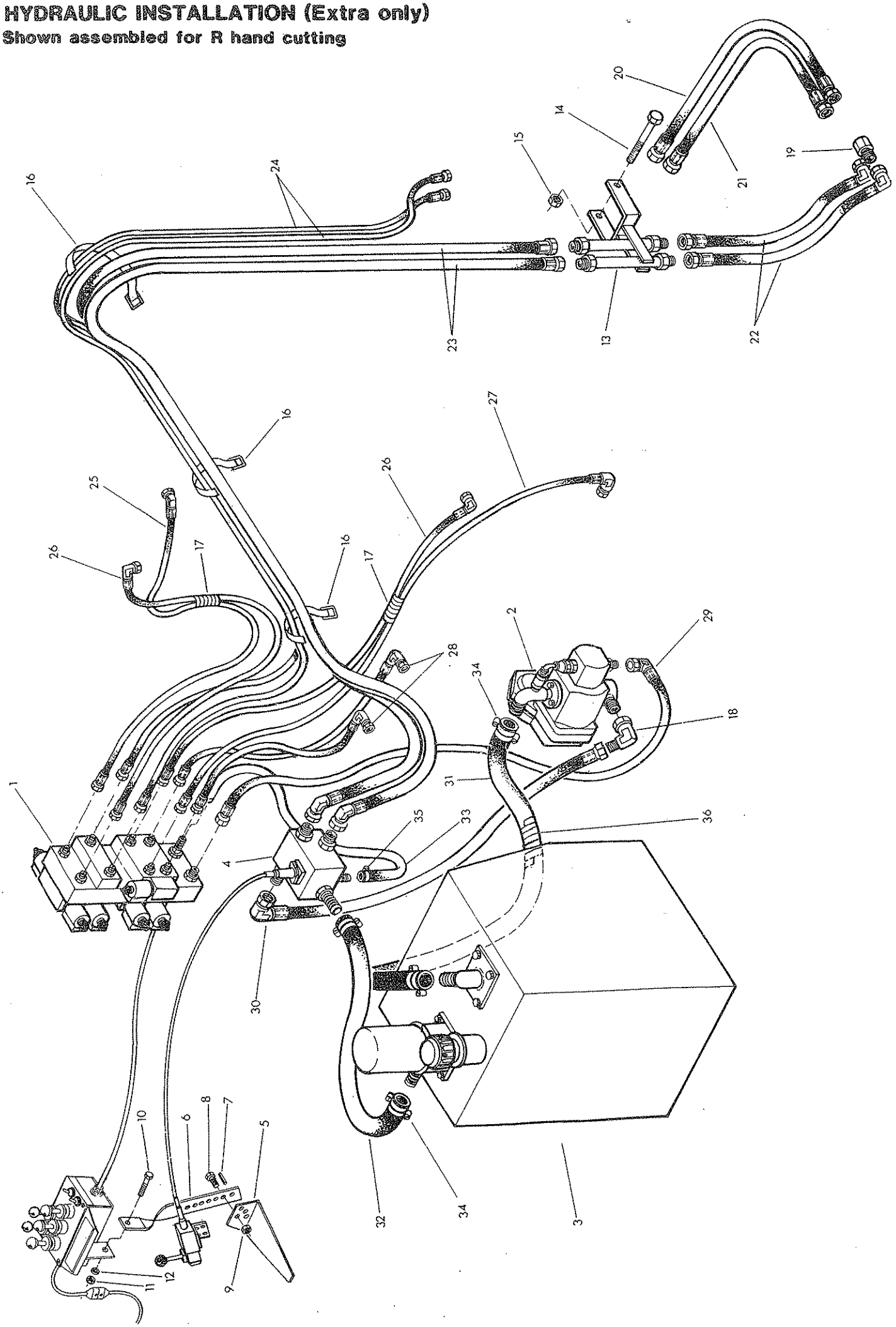
1·2 METRE GRASS FLAIL
Shown assembled for R hand cutting



Ref	Part No.	Qty	Description
	73 14 381		1.2METRE (48") MULTICUT GRASS FLAIL
1	73 14 305	1	.Main Casing
2	73 14 434	1	.Rotor
3	73 14 429	1	.Roller c/w bush
4	72 13 023	2	..Bush
5	73 14 431	1	.Roller tie rod
6	73 14 315	1	.Grass hood
7	73 14 143	1	.Flap bar
	73 14 206	1	.Coupling assembly
8	73 14 204	1	..Coupling motor half
9	73 14 203	1	..Coupling rotor half
10	73 14 205	1	..Coupling sleeve
11	06 00 018	2	.Ball bearing.
12	73 14 436	2	.Bearing housing
13	73 14 369	1	.Spacer block c/w greaser
14	09 01 125	1	.Greaser 1/8 BSP 35°
15	73 14 214	1	.Coupling spacer
16	73 14 211	1	.Clamp washer
17	73 14 370	1	.Rotor end cover c/w greaser
18	09 01 121	1	..Greaser 1/8 BSP straight
19	73 14 426	1	.Motor assembly c/w coupling half
20	73 14 422	1	.Motor cover
21	73 14 195	1	.Roller bracket LH c/w spring dowel
	73 14 196	1	.Roller bracket RH c/w spring dowel (not illus.)
	04 21 810	1	..Spring dowel
22	60 01 136	2	.Thrust washer
23	91 00 108	2	.Washer Ø20
24	92 13 347	1	.Bolt M16 x 170
25	73 14 418	1	.Rigid pipe upper — For R.H build with motor mounted on LH end of flail rotor
26	73 14 420	1	.Rigid pipe lower — For R.H build with motor mounted on LH end of flail rotor
	73 14 419	1	.Rigid pipe upper — For LH build with motor mounted on the RH end of the flail rotor
	73 14 421	1	.Rigid pipe lower — For LH build with motor mounted on the RH end of the flail rotor
			All c/w '0' rings
27	86 00 121	1	..'0' ring
28	93 43 055	6	.Capscrew M10 x 25
29	91 00 005	2	.Hexagon nut M20
30	03 11 106	8	.Setscrew 5/8 UNF x 1¼
31	91 43 007	7	.Hexagon nut self locking M16
32	93 13 055	3	.Setscrew M10 x 25
33	93 00 104	7	.Capscrew M10 x 40
34	73 14 221	2	.Self locking capscrew M12 x 50
35	04 22 648	3	.Spring dowel 3/8 dia x 3" long
36	73 14 224	1	.Flail speed sticker
37	73 14 087	1	.Serial plate
38	28 00 020	4	.Pop rivet 1/8" dia.
39	73 14 223	24	.Flail pivot
40	73 14 222	24	.Special flail bolt
41	01 00 206	24	.Spring washer 5/8" dia.
42	01 41 006	36	.Hexagon nut self locking 5/8" UNF
43	73 14 146	6	.Bolt M16 x 50
44	73 14 219	1	.Pipe clamp assy c/w screws, nuts & clamp
45	73 14 158	1	..Clamp
46	93 13 065	1	..Setscrew M10 x 30
47	91 43 005	2	..Hexagon nut self locking M10
48	85 82 041	2	.Hexagon plug 1/8" BSP
49	73 14 125	7	.Flap
50	73 14 320	1	.Skid Right Hand (Not illus)
51	73 14 319	1	.Skid Left Hand
52	73 14 323	2	.Replaceable skid
53	93 33 065	6	.Setscrew countersunk M10 x 30
54	91 43 005	6	.Hexagon nut self locking M10
55	73 14 390	48	.Grass flail F10G
56	71 06 138	2	.Flail pivot pin
57	91 00 305	6	.Serrated washer
	73 13 324	1	.Flail guard kit (not illus) see page 85
58	81 21 043	To suit	.Shim .015"
59	81 21 044	"	.Shim .025"
60	03 11 166	4	.Setscrew 5/8 UNF x 2"
	86 99 166		SEAL KIT for Casappa Motor

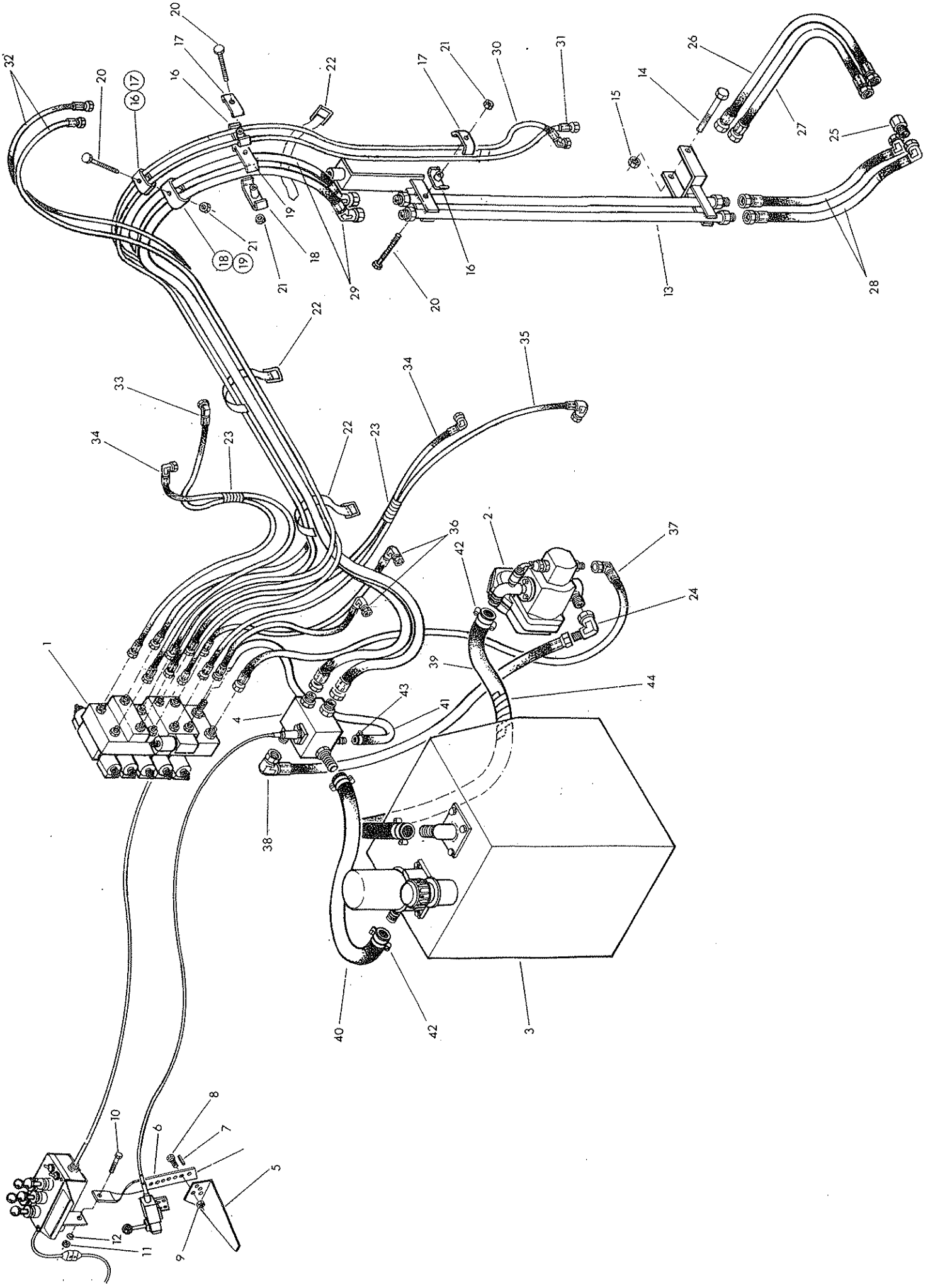
HYDRAULIC INSTALLATION (Extra only)

Shown assembled for R hand cutting



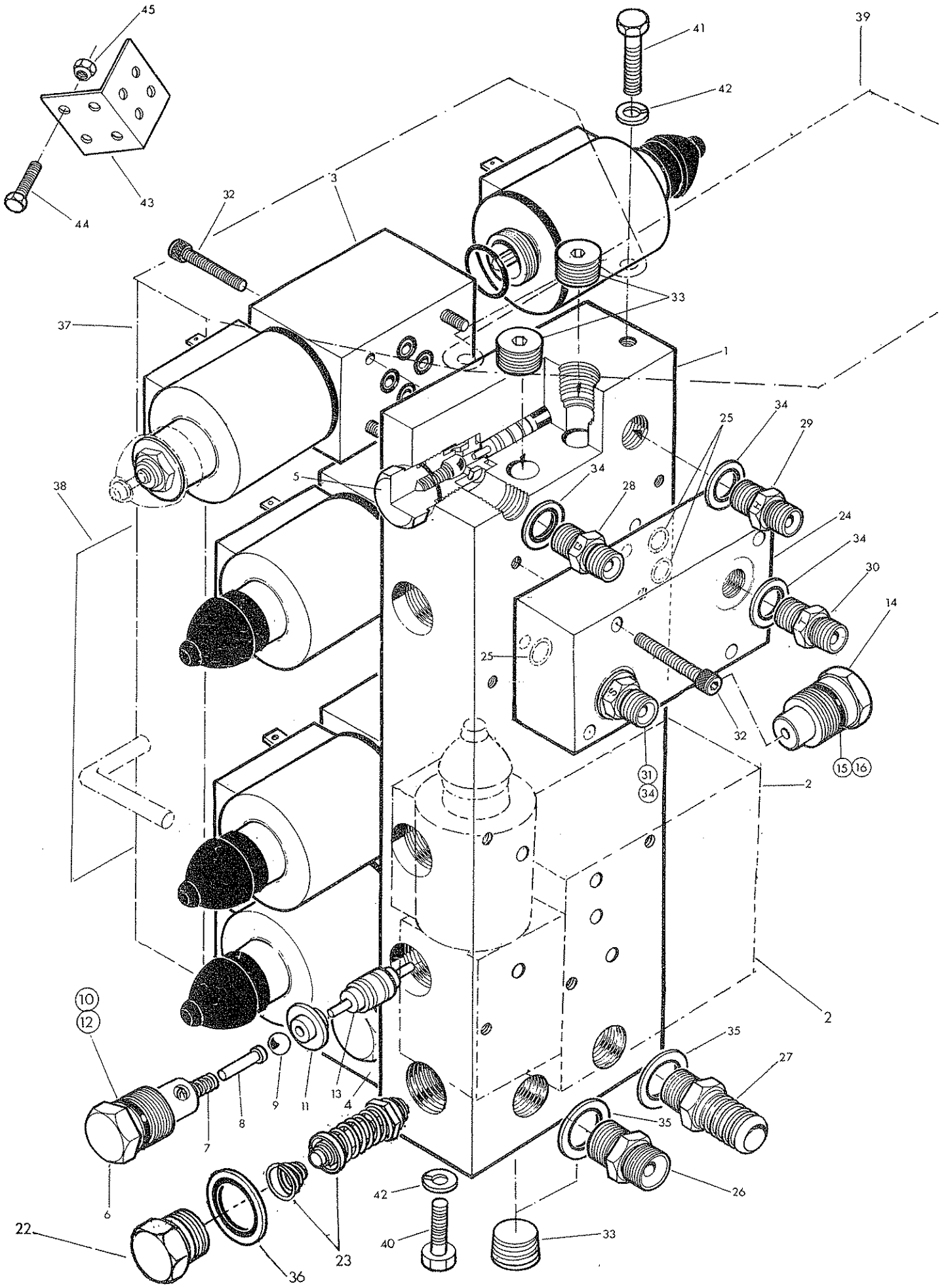
Ref	Part No.	Qty	Description.
	71 36 250		HY REACH EXTRA R. HAND - continued
	71 36 251		HY REACH EXTRA L. HAND - continued.
1	81 30 352	1	.Electric control pack - see page 59 & 67
2	80 13 366	1	.Pump /Gearbox assembly see page 69
3	71 36 289	1	.Hydraulic tank assembly - see page 73
4	81 25 324	1	.Rotor control valve assembly - see page 75
	71 09 319	1	.Valve mounting plate & pillar compr:
5	71 09 320	1	..Sandwich plate.
6	71 09 146	1	..Pillar c/w spring dowel.
7	04 22 816	1	...Spring dowel
8	93 13 066	1	..Setscrew M12 x 30
9	91 13 006	1	..Plain nut M12
10	03 11 086	1	..Setscrew 5/8 UNF x 1" long.
11	01 11 006	1	..Plain nut 5/8 UNF
12	01 00 206	1	.Spring washer 5/8" dia.
13	71 36 327	1	.Rigid pipe assembly c/w nut & bolt.
14	02 11 403	1	.Bolt 3/8 UNF x 5" long.
15	01 41 003	1	.Self locking nut 3/8 UNF
16	71 06 187	3	.Hose tie strap
17	71 35 090	2	.Hose armour coil
18	85 81 212	1	.Elbow 90° 1" BSP M-F
19	85 81 211	1	.Extension union 1" BSP M-F
20	85 01 137	1	.Hose 1" BSP SF-SF x 33" long) across back of
21	85 01 136	1	.Hose 1" BSP SF-SF x 30"long)flail head
22	85 01 097	2	.Hose 1" BSP SF-90°F x 34" long Rigid pipe - flail head.
23	85 01 140	2	.Hose 1" BSP SF-135°F x 158" long. R.C.valve rigid pipes.
24	85 15 072	2	.Hose ¼" BSP SF-SF x 170" long. E.Valve - angle.
25	85 35 112	1	.Hose ¼" BSP SF-90°F x 66"long E Valve- reach gland.
26	85 35 022	2	.Hose ¼ BSP SF-90°F x 48" long. Reach base and lift gland.
27	85 35 052	1	.Hose ¼BSP SF-90°F x 70" long E. Valve - lift base
28	85 35 012	2	.Hose ¼BSP SF-90°F x 18"long. E. Valve - Slew
29	85 31 243	1	.Hose 3/8 BSP Sf-90°F x 51" long. Small pump - E. valve.
30	85 01 135	1	.Hose 1" BSP SF-90°F x 40" long Large pump - R.C. valve.
31	85 01 138	1	.Hose 1½bore x 82"long.Suction Tank -large pump.
32	85 01 139	1	.Hose 1¼"bore x 25" long. Return,R.C.valve -tank
33	85 01 106	1	.Hose 5/8"bore x 27"long Return,E.Valve -R.C valve.
34	09 04 107	8	.Hoseclip 1½" & 1¼" bore hoses.
35	09 04 204	2	.Hoseclip 5/8 bore hoses.
36	71 36 143	1	.Armour cable.

HYDRAULIC INSTALLATION (Extra Plus only) Shown assembled for R hand cutting



Ref	Part No.	Qty	Description.
	71 36 260		HY REACH EXTRA PLUS R. HAND-Continued.
	71 36 261		HY REACH EXTRA PLUS L. HAND-Continued.
1	81 30 353	1	.Electric control pack - see page 61 & 67
2	80 13 366	1	.Pump and gearbox assembly see page 69
3	71 36 289	1	.Hydraulic tank assembly see page 73
4	81 25 324	1	.Rotor control valve assembly see page 75
	71 09 319	1	.Valve mounting plate and pillar compr:
5	71 09 320	1	..Sandwich plate.
6	71 09 146	1	..Pillar c/w spring dowel.
7	04 22 816	1	...Spring dowel.
8	93 13 066	1	..Setscrew M12 x 30
9	91 13 006	1	..Nut M12
10	03 11 086	1	..Setscrew 5/8 UNF x 1" long.
11	01 11 006	1	..Nut 5/8 UNF
12	01 00 206	1	..Spring washer 5/8" dia.
13	71 36 322	1	.Rigid pipe assembly c/w nut & bolt.
14	02 11 403	1	..Bolt 3/8 UNF x 5" long.
15	01 41 003	1	..Self locking nut 3/8 UNF
16	71 14 076	3	.Hose clamp small - lower
17	71 14 075	3	.Hose clamp small - upper
18	71 09 084	2	.Hose clamp large - lower
19	73 13 130	2	.Hose clamp large - upper
20	92 13 185	3	.Bolt M10 x 90
21	91 43 005	3	.Self locking nut M10
22	71 06 187	3	.Hose tie strap.
23	71 35 090	2	.Hose armour coil
24	85 81 212	1	.Elbow 90° 1" BSP M-F
25	85 81 211	1	.Extension union 1" BSP M-F
26	85 01 137	1	.Hose 1" BSP Sf-SF x 33" long) Across back of
27	85 01 136	1	.Hose 1" BSP Sf-SF x 30" long)flail head.
28	85 01 097	2	.Hose 1" BSP Sf-90°F x 34" long - Rigid pipe- flail head.
29	85 01 140	2	.Hose 1" BSP Sf-135°F x 158°long R.C. valve - rigid pipe.
30	85 45 012	1	.Hose ¼BSP SF-135°F x 208 long. E. Valve -Angle gland.
31	85 15 022	1	.Hose ¼BSP SF-SF x 208"long. E.Valve -Angle base
32	85 15 012	2	.Hose ¼ BSP SF-SF x 156" long E.Valve - Tele
33	85 35 112	1	.Hose ¼BSP SF-90°F x 66"long E.Valve-reach gland
34	85 35 022	2	.Hose ¼BSP SF-90°F x 48" long. Reach base & lift gland.
35	85 35 052	1	.Hose ¼BSP SF-90°F x 70"long.E Valve -lift base.
36	85 35 012	2	.Hose ¼BSP SF-90°F x 18"long. E.Valve - slew
37	85 31 243	1	.Hose 3/8 BSP SF-90°F x 51" long. Small pump - E valve.
38	85 01 135	1	.Hose 1" BSP SF-90°F x 40"long. Large pump - R.C. valve.
39	85 01 138	1	.Hose 1½"bore x 82" long Suction tank - large pump.
40	85 01 139	1	.Hose 1¼ bore x 25long -Return R.C.valve - tank.
41	85 01 106	1	.Hose 5/8"bore x 27"long -Return E.Valve - R.C valve.
42	09 04 107	8	.Hose clip 1½" & 1¼" bore hoses.
43	09 04 204	2	.Hose clip 5/8 bore hose.

ELECTRIC SOLENOID/MANIFOLD VALVE (Extra only)

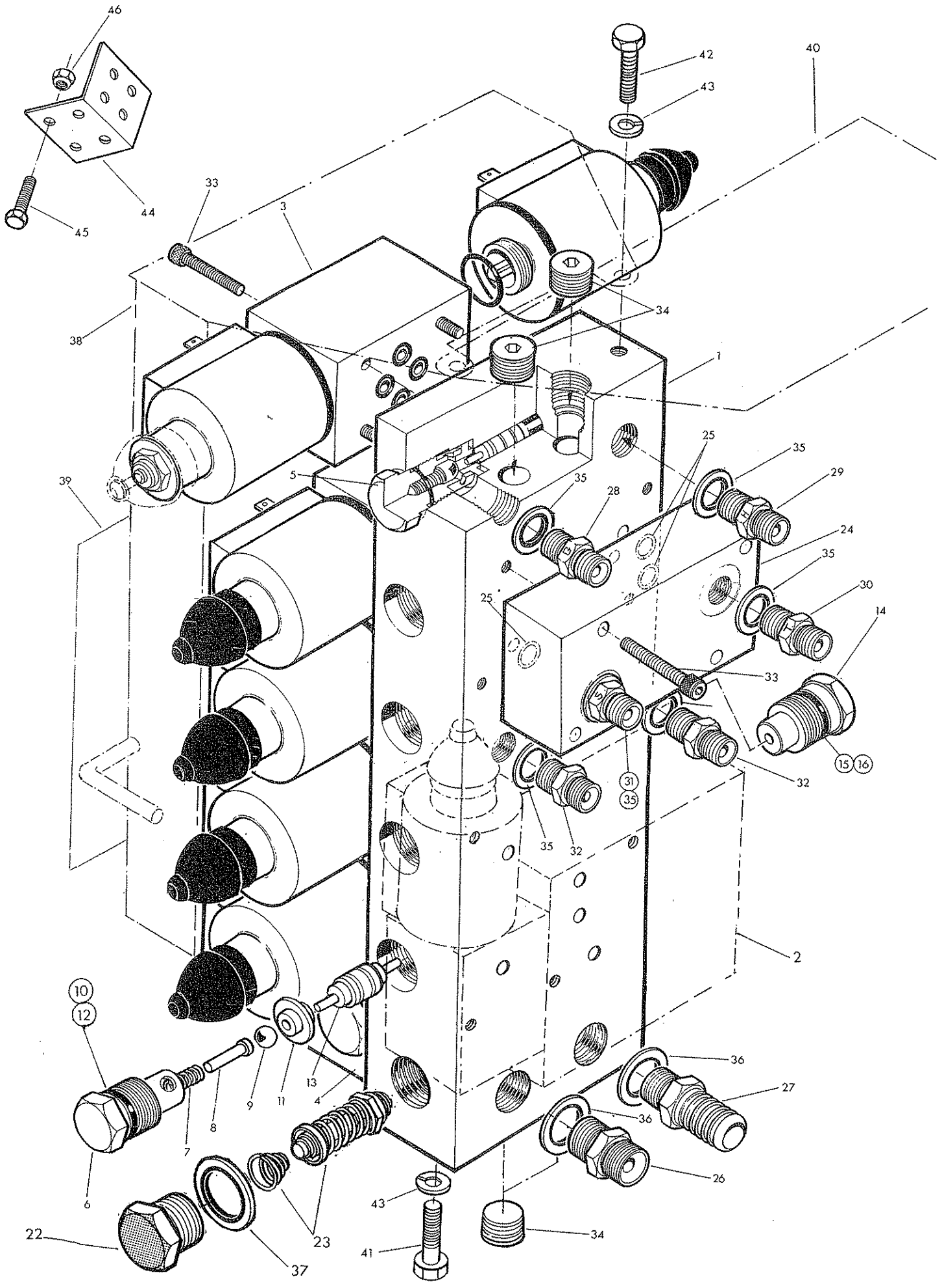


Ref	Part No	Qty	Description.
	81 30 352		ELECTRIC CONTROL PACK - Hy Reach Extra.
	81 30 351		.Solenoid/Manifold valve assembly compr:
1	81 30 346	1	..Manifold block
2	81 30 349	1	..Slew circuit valve assembly see page 63
3	81 30 301	4	..Double solenoid valve - see page 65
4	81 30 302	1	..Single solenoid valve - see page 65
5	81 30 090	7	..Check valve assembly compr:
6	81 30 025	1	...Check valve cap
7	81 14 045	1	...Check valve spring.
8	81 30 089	1	...Spring guide.
9	09 05 509	1	...Steel ball Ø9
10	87 00 644	1	... '0' ring.
11	81 30 088	1	...Check valve seat.
12	87 09 644	1	...Anti extrusion ring.
13	81 30 087	4	..Actuator
14	81 30 078	1	..Check valve blank.
15	87 00 644	1	..'0' ring.
16	87 09 644	1	..Anti extrusion ring.
17	81 25 076	1	..Relief valve needle assembly.

Items 18 - 21 inclusive deleted April 1986 replaced by item 23.

22	81 30 032	1	..Relief valve cap.
23	81 30 124	1	..Relief valve cartridge c/w spring
24	81 30 322	1	..Hose plate c/w '0' rings.
25	87 00 511	3	...'0' ring.
26	60 00 113	1	..Union 3/8 BSP MM - supply
27	81 25 008	1	..Return connection
28	81 30 104	1	..Restrictor union 'G' reach base
29	81 30 105	1	..Restrictor union 'H' reach gland.
30	81 30 103	1	..Restrictor union 'T' angle gland.
31	81 30 037	1	..Restrictor union 'S' angle base
32	92 43 082	24	..Socket headed capscrew M5 x 40
33	85 82 042	4	..Taper plug ¼" BSPT
34	86 50 102	4	..Bonded seal ¼ BSP
35	86 50 103	2	..Bonded seal 3/8 BSP
36	86 50 103	1	..Bonded seal 3/8 BSP
37	71 36 328	1	.Solenoid cover c/w label.
38	84 02 136	1	..Solenoid wiring label,
39	71 36 334	1	..Bracket
40	93 13 055	2	.Setscrew M10 x 25
41	93 13 035	2	.Setscrew M10 x 16
42	91 00 205	4	.Spring washer Ø10
43	81 25 070	1	.Flail on/off lever mounting bracket.
44	93 13 034	2	.Setscrew M8 x 16
45	91 43 004	2	.Self locking nut M8

ELECTRIC SOLENOID/MANIFOLD VALVE (Extra Plus only)

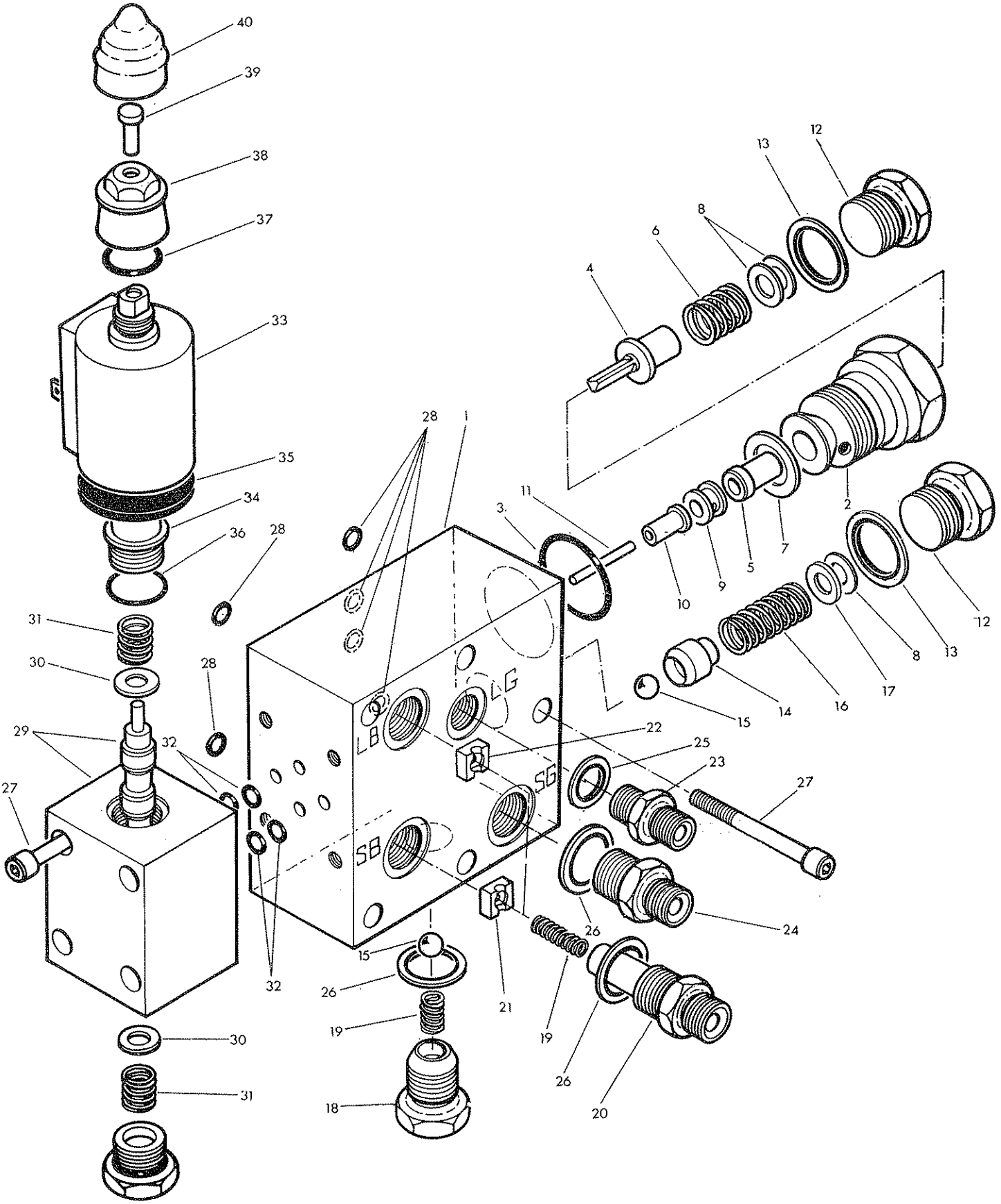


Ref	Part No.	Qty	Description.
	81 30 353		ELECTRIC SOLENOID PACK - HyReach Extra Plus
	81 30 350	1	.Solenoid/manifold valve assembly compr:
1	81 30 347	1	..Manifold block
2	81 30 349	1	..Slew circuit valve assembly see page 63
3	81 30 301	5	..Double solenoid valve see page 65
4	81 30 302	1	..Single solenoid valve
5	81 30 090	9	..Check valve assembly compr:
6	81 30 025	1	...Check valve cap.
7	81 14 045	1	... Check valve spring.
8	81 30 089	1	...Spring guide
9	09 05 509	1	...Steel ball Ø9
10	87 00 644	1	...'0' ring
11	81 30 088	1	...Check valve seat.
12	87 09 644	1	...Anti extrusion ring.
13	81 30 087	5	..Actuator.
14	81 30 078	1	..Check valve blank
15	87 00 644	1	..'0' ring
16	87 09 644	1	..Anti extrusion ring.

Items 18 - 21 inclusive deleted April 1986 replaced by item 23.

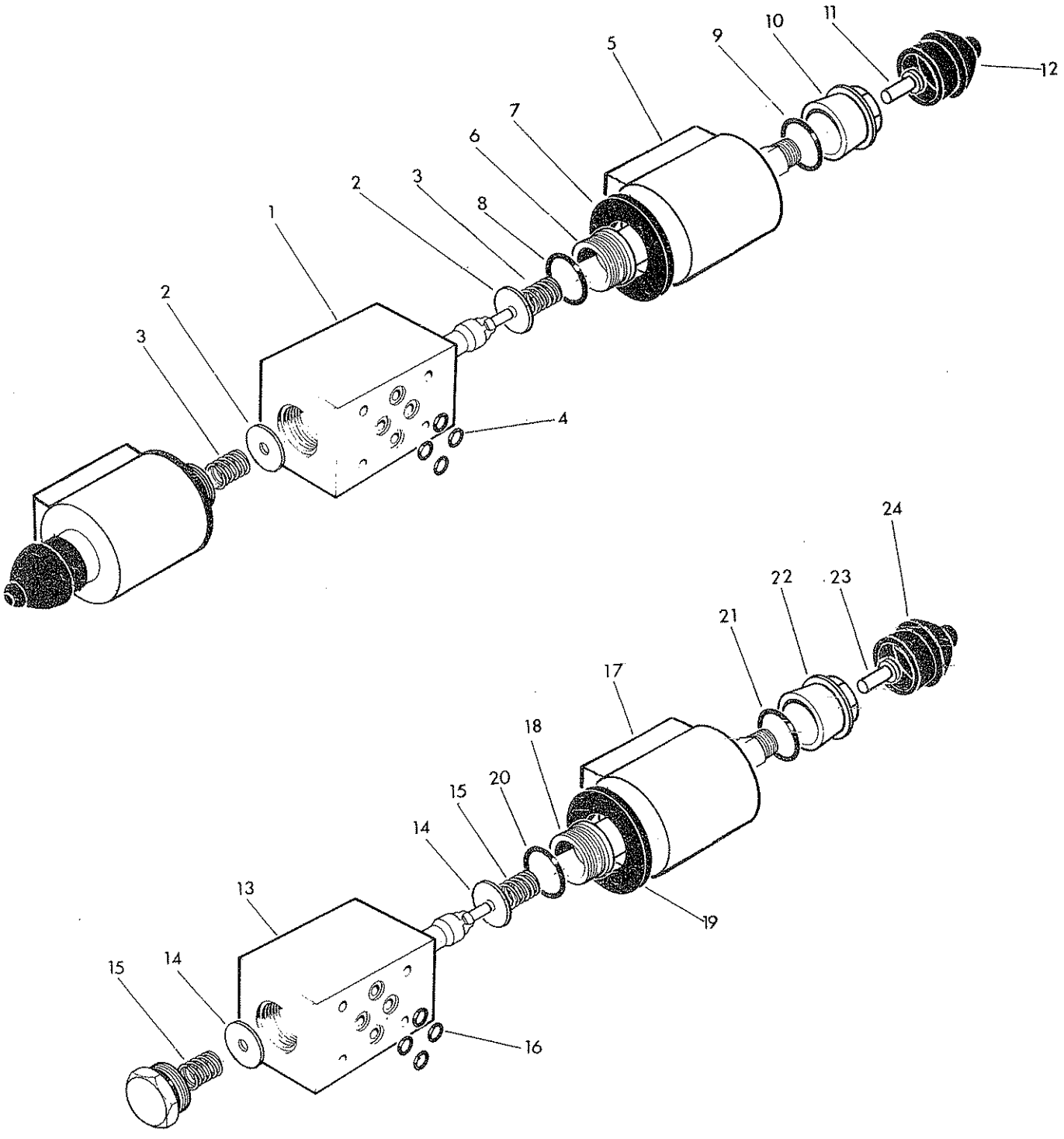
22	81 30 032	1	..Relief valve cap.
23	81 30 124	1	.Relief valve cartridge c/w spring
24	81 30 322	1	..Hose plate c/w '0' rings.
25	87 00 511	3	...'0' ring.
26	60 00 113	1	..Union 3/8 BSP MM - supply
27	81 25 008	1	..Return connection.
28	81 30 104	1	..Restrictor union 'G' reach base
29	81 30 105	1	..Restrictor union 'H' Reach gland.
30	81 30 103	1	..Restrictor union 'T' angle gland.
31	81 30 037	1	..Restrictor union 'S' angle base.
32	80 02 177	2	..Union ¼ BSP M-M
33	92 43 082	28	..Capscrew - socket headed M5 x 40
34	85 82 042	4	..Taper plug ¼BSPT
35	86 50 102	6	..Bonded seal ¼BSP.
36	86 50 103	2	..Bonded seal 3/8 BSP
37	86 50 103	1	..Bonded seal 3/8 BSP
38	71 36 328	1	.Solenoid cover c/w label
39	84 02 136	1	..Solenoid wiring label
40	71 36 334	1	..Bracket
41	93 13 055	2	.Setscrew M10 x 25
42	93 13 035	2	.Setscrew M10 x 16
43	91 00 205	4	.Spring washer Ø10
44	81 25 070	1	.Flail on/off lever mounting bracket.
45	93 13 034	2	.Setscrew M8 x 16
46	91 43 004	2	.Self locking nut M8

SLEW CIRCUIT VALVE ASSEMBLY



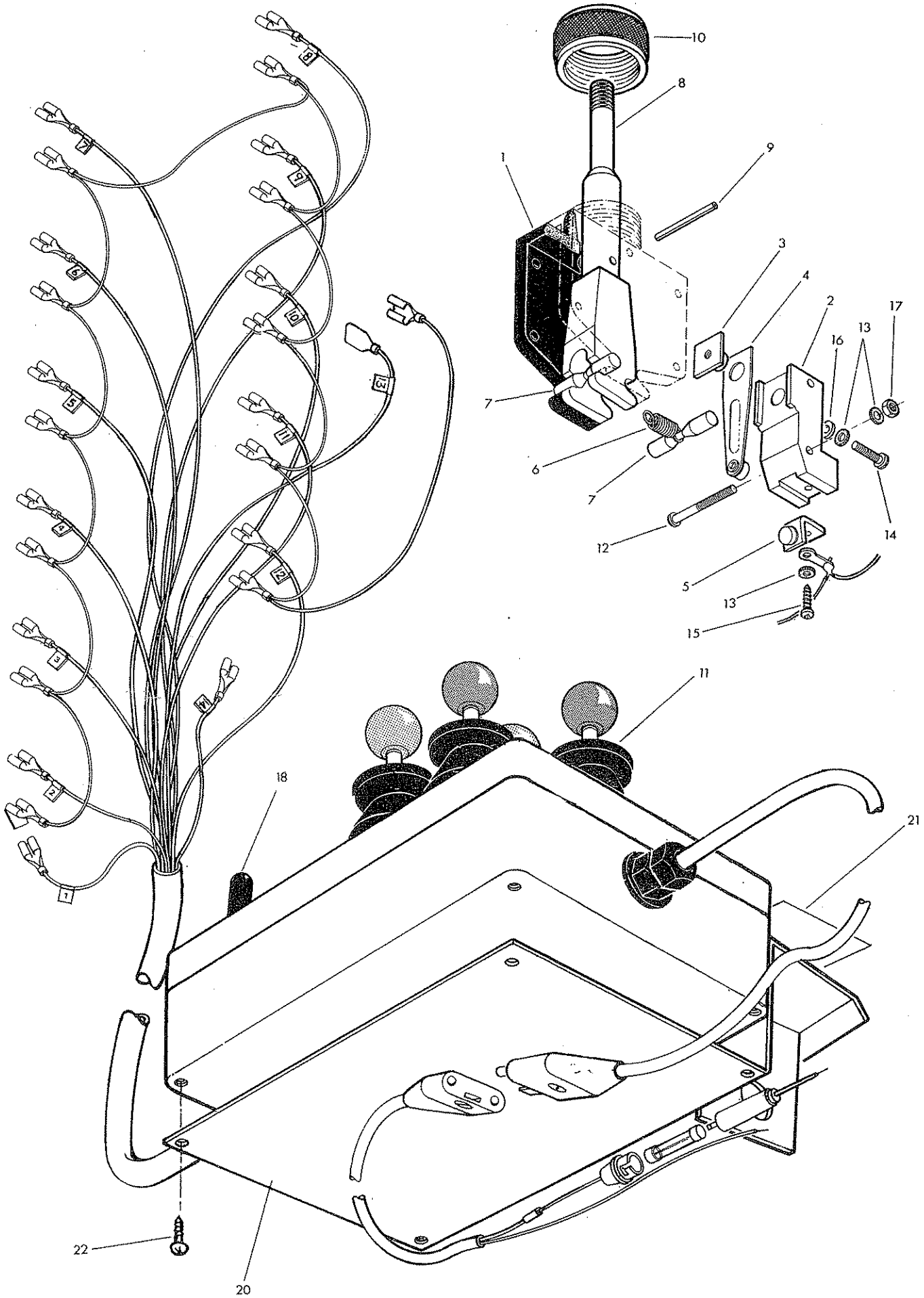
Ref	Part No.	Qty	Description
	81 30 349		SLEW VALVE ASSEMBLY
1	81 30 348	1	.Valve block
2	81 30 110	1	..Overcentre valve body
3	87 00 775	1	.'0' ring.
4	81 25 041	1	.Valve needle assembly
5	81 25 048	1	.Drill bush Ø5
6	81 30 111	1	.Valve spring.
7	81 30 079	1	.Copper sealing washer
8	01 00 102	As reqd	.Shim washer.
9	81 30 113	1	.Bush retainer
10	81 30 112	1	.Drill bush Ø3.5
11	09 05 905	1	.Needle roller Ø3.5 x 23.8
12	81 03 001	2	.Valve cap
13	86 50 104	2	.Bonded seal.
14	81 30 114	1	.Ball carrier.
15	09 05 509	2	.Steel ball Ø9
16	60 00 110	1	.Relief valve spring.
17	60 01 232	As reqd	.Shim
18	81 30 115	1	.Ball carrying plug
19	81 16 011	3	.Spring.
20	85 81 210	2	.Special union 3/8 BSP - ¼BSP
21	81 23 041	1	.Restrictor - red - slew base
22	81 23 043	1	.Restrictor - green - lift base
23	80 02 177	1	.Union ¼BSP M-M - lift gland.
24	85 81 145	1	.Union 3/8 BSP ¼BSP MM - slew gland.
25	86 50 102	1	.Bonded seal ¼BSP
26	86 50 103	3	.Bonded seal 3/8 BSP
27	92 43 082	9	.Capscrew - socket head M5 x 40
28	87 00 511	6	.'0' ring.
29	81 30 117	1	..Block c/w spool,
30	84 02 123	2	..Washer
31	84 02 124	2	..Spring.
32	87 00 511	4	..'0' ring.
	84 02 125	1	..Solenoid
33	84 02 126	1	...Coil
34	84 02 127	1	...Solenoid tube
35	84 02 128	1	...Gasket
36	86 00 507	1	...'0' ring.
37	84 02 088	1	...'0' ring.
38	84 02 129	1	...Shroud nut
39	84 02 086	1	...Push pin
40	84 02 087	1	...Weather gaiter.

DOUBLE & SINGLE SOLENOID VALVES



Ref	Part No.	Qty	Description.
	81 30 352		SOLENOID MANIFOLD ASSY continued
	81 30 353		SOLENOID MANIFOLD ASSY continued
	81 30 301	as reqd	.Double solenoid valve compr:-
1	84 02 072	1	..Block c/w spool
2	84 02 123	2	..Washer.
3	84 02 124	2	..Spring.
4	87 00 511	4	.. '0' ring.
	84 02 125	2	..Solenoid compr:-
5	84 02 126	1	...Coil
6	84 02 127	1	...Solenoid tube
7	84 02 128	1	...Gasket.
8	86 00 507	1	...'0' ring.
9	84 02 088	1	...'0' ring.
10	84 02 129	1	...Shroud nut.
11	84 02 086	1	...Push pin
12	84 02 087	1	...Weather gaiter.
	81 30 302	1	.Single solenoid valve compr:-
13	84 02 073	1	..Block c/w spool.
14	84 02 123	2	..Washer
15	84 02 124	2	..Spring.
16	87 00 511	4	.. '0' ring.
	84 02 125	1	..Solenoid compr:-
17	84 02 126	1	...Coil
18	84 02 127	1	...Solenoid tube
19	84 02 128	1	...Gasket
20	86 00 507	1	... '0' ring.
21	84 02 088	1	...'0' ring.
22	84 02 129	1	...Shroud nut.
23	84 02 086	1	...Push pin
24	84 02 087	1	...Weather gaiter.

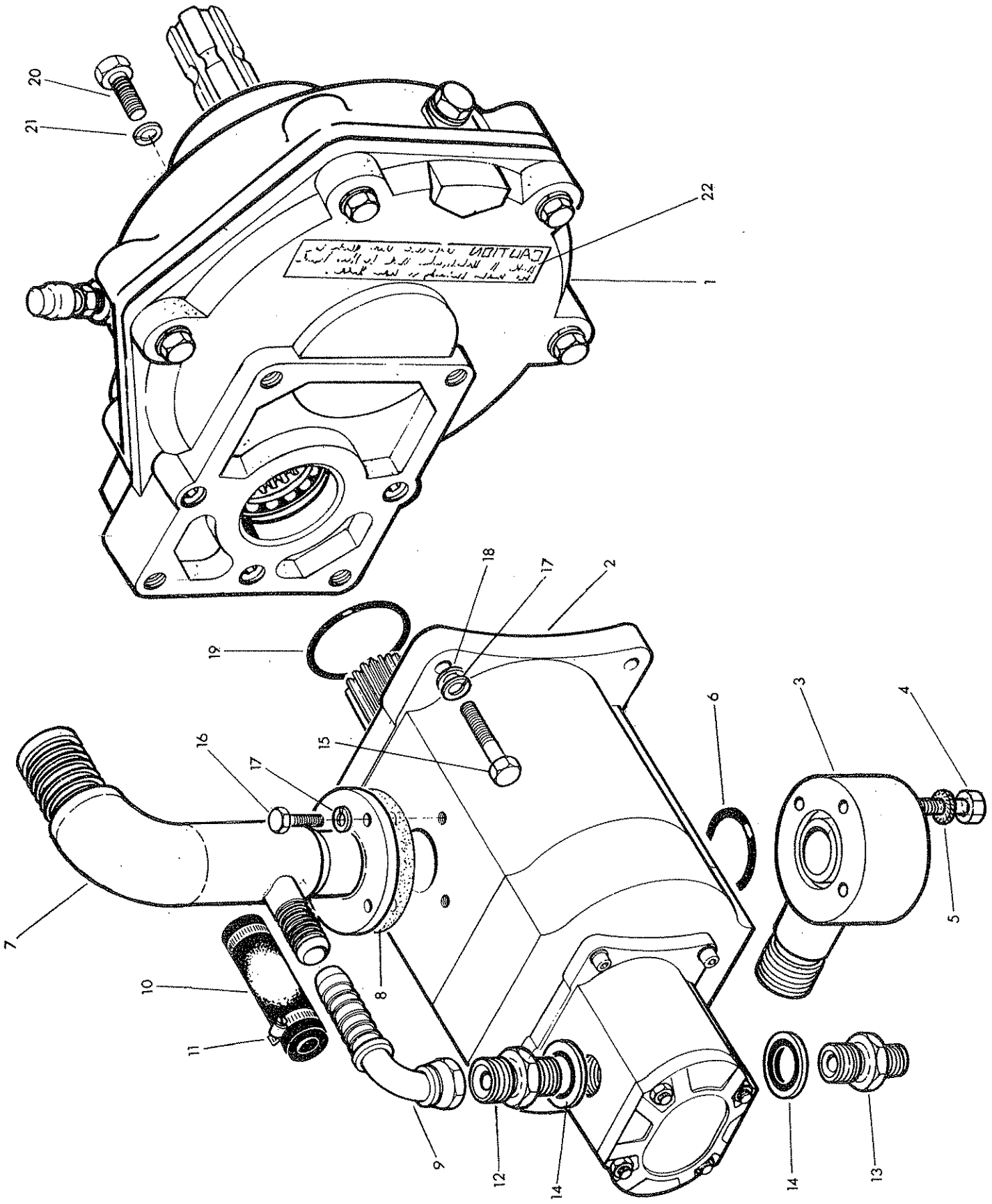
SWITCHBOX ASSEMBLY



Ref	Part No	Qty	Description
	81 30 352		ELECTRIC CONTROL PACK HY REACH EXTRA Cont.
	81 30 353		ELECTRIC CONTROL PACK HYREACH EXTRA PLUS Cont.
	84 02 290	1	.Switch box assembly compr:
	84 02 122	5	..Switch unit compr:
1	84 02 285	1	...Switch body
2	84 02 106	2	...Contact holder
3	84 02 109	2	...Spring contact retainer
4	84 02 113	2	...Spring contact
5	84 02 108	2	...Fixed contact
6	84 02 101	1	...Spring
7	84 02 111	2	...Bar
8	84 02 256	1	...Lever
9	04 25 320	1	...Spring dowel Ø3 x 20
10	84 02 051	1	...Bazel ring
11	84 02 022	1	...Lever gaiter
12	92 00 006	4	...Screw -posidrive - panhead M3 x 25
13	91 00 400	8	...External serrated washer Ø3
14	92 00 005	2	...Screw - posidrive - panhead M3 x 12
15	84 02 119	2	...Self tapping screw No.4 type B x 10mm long
16	84 02 280	2	...Plain washer Ø3
17	91 00 013	2	...Hexagon nut - plated M3
18	84 02 024	3	..Toggle switch weather gaiter
19	84 02 291	1	..Operating label - not illustrated.
20	84 02 294	1	.Switch box mounting bracket c/w label
21	84 02 135	1	..'Slew caution' label
22	28 00 203	4	.Self tapping screw No.10 x ½" long.

PUMP/GEARBOX ASSEMBLY

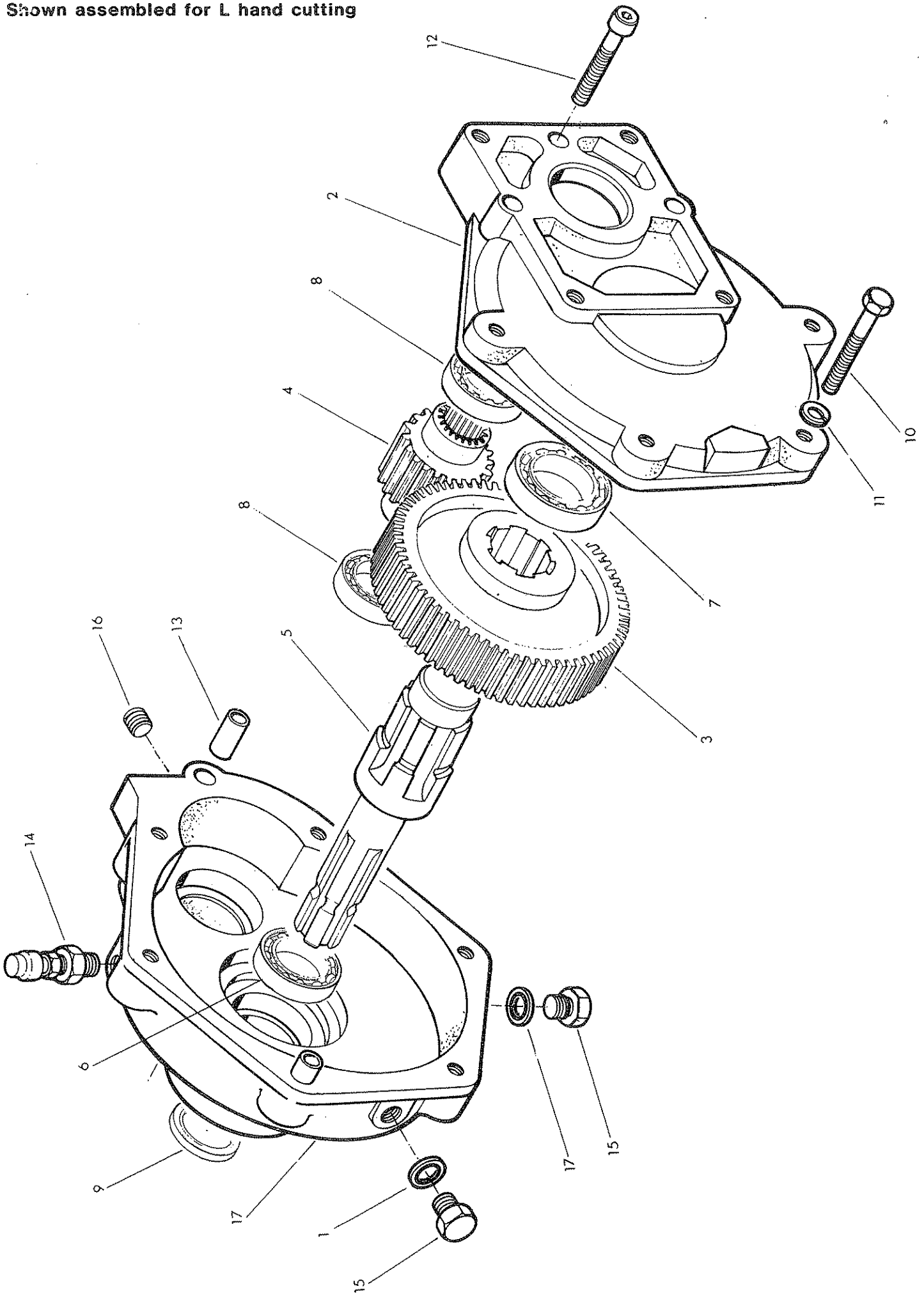
Shown assembled for R hand cutting



Ref	Part No.	Qty	Description
	71 36 250		HY REACH EXTRA R.HAND - continued.
	71 36 251		HY REACH EXTRA L.HAND - continued.
	71 36 260		HY REACH EXTRA PLUS R.HAND-continued.
	71 36 261		HY REACH EXTRA PLUS L.HAND-continued.
	80 13 366	1	.Pump/Gearbox assembly compr:
1	80 13 360	1	..Gearbox 4.94:1 (see page 71)
2	82 01 660	1	..Tandem pump CPL46/CPL 9
3	80 05 049	1	..Pressure connection c/w bolts & '0' ring etc.
4	92 13 124	3	...Bolt M8 x 60
5	91 00 404	3	...Shakeproof washer Ø8
6	86 00 121	1	...'0' ring
7	71 36 029	1	..Suction junction connection
8	80 13 023	1	..Gasket.
9	85 81 173	1	..Swept elbow connection.
10	85 01 103	1	..Connecting hose.
11	09 04 204	2	..Hose clip 5/8 bore hose.
12	85 81 180	1	..Union ½"BSP 5/8 BSP MM
13	60 00 112	1	..Union ½" BSP 3/8 BSP MM
14	86 50 104	2	..Bonded seal ½" BSP
15	92 13 094	4	..Bolt M8 x 45
16	93 13 044	4	..Setscrew M8 x 20
17	91 00 204	8	..Spring washer Ø8
18	91 00 104	4	..Plain washer Ø8
19	86 00 253	1	..'0' ring.
20	93 13 056	4	..Setscrew M12 x 25
21	91 00 206	4	..Spring washer.
22	80 13 081	1	..Gearbox instruction label.

GEARBOX ASSEMBLY

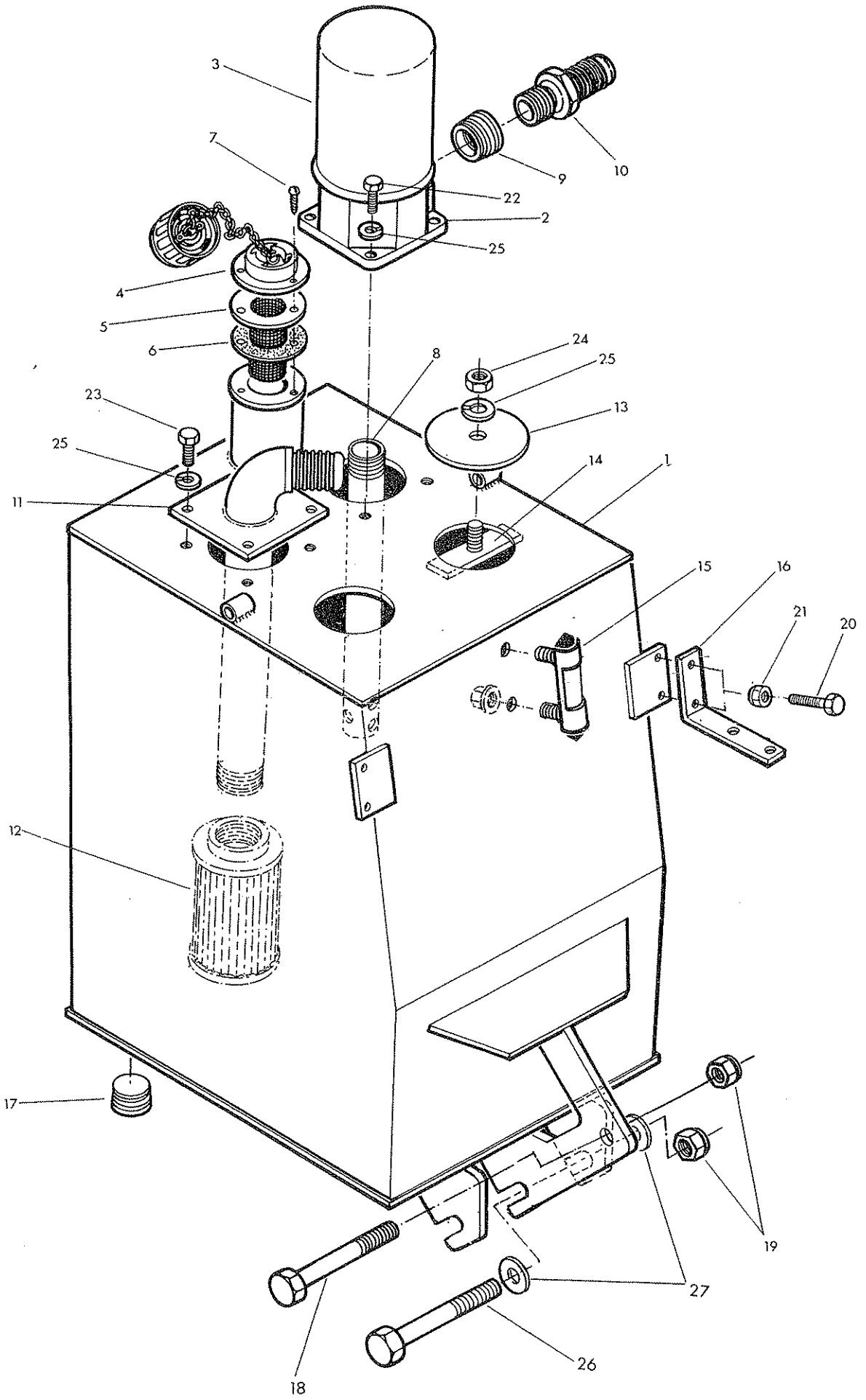
Shown assembled for L hand cutting



Ref	Part No.	Qty	Description
	80 13 360		GEARBOX ASSEMBLY (RATIO 4.94:1)
1	80 13 370	1	.Gearbox casing - input
2	80 13 371	1	.Gearbox lid - output
3	80 13 372	1	.Gear
4	80 13 373	1	.Pinion
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 Ø 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 ¼BSP
16	85 82 042	1	.Taper plug ¼BSPT
17	86 50 102	2	.Bonded seal ¼"BSP

HYDRAULIC TANK ASSEMBLY

Shown assembled for R hand cutting

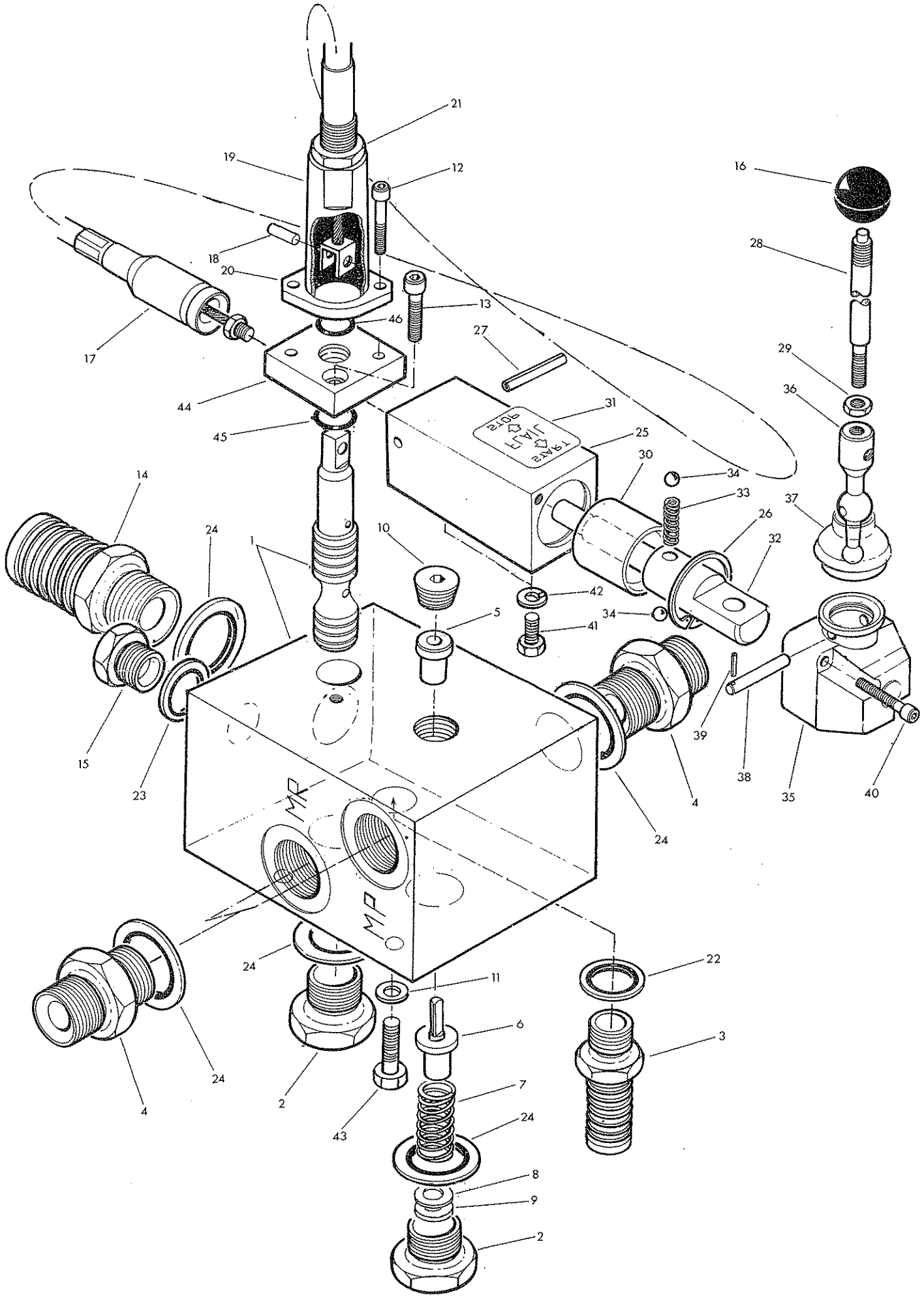


Ref	Part No	Qty	Description
	71 36 289		HYDRAULIC TANK ASSEMBLY
1	71 36 288	1	Hydraulic tank
2	84 01 040	1	.Filter c/w element
3	84 01 141	1	..Canister filter element.
	84 01 014	1	.Filler breather assembly compr:
4	84 01 015	1	..Filler cap and neck
5	84 01 016	1	..Strainer basket
6	84 01 017	1	..Gasket
7	03 00 032	3	..Screw self tapping 3/16 dia x ½" long.
8	71 36 024	1	.Return pipe
9	85 81 202	1	.Adaptor 1½ BSPT M - 1" BSP F
10	81 21 051	1	.Return connection.
11	71 36 026	1	.Suction pipe
12	84 01 047	1	.Suction strainer.
13	71 14 122	2	.Inspection cover
14	71 14 123	2	.Clamp - inspection cover.
15	84 01 048	1	.Fluid sight level c/w nuts.
16	71 36 023	1	.Mounting bracket - R.C. valve.
17	85 81 203	1	.Drain plug 1" BSPT
18	92 13 267	1	.Bolt M16 x 130
19	91 43 007	2	.Self locking nut M16
20	93 13 045	2	.Setscrew M10 x 20
21	91 43 005	2	.Self locking nut M10
22	93 13 054	4	.Setscrew M8 x 25
23	93 13 034	4	.Setscrew M8 x 16
24	91 13 004	2	.Plain nut M8
25	91 00 204	10	.Spring washer Ø8
26	92 13 307	1	.Bolt M16 x 150
27	91 00 107	2	. Plain washer 5/8"

*Spares Assembly note

Adaptor assembled into filter and return connection into adaptor using 'Permabond A121' or similar sealing compound.

ROTOR CONTROL VALVE ASSEMBLY



Ref	Part No.	Qty	Description,
	81 25 324		ROTOR CONTROL VALVE
1	81 25 078	1	.Valve body c/w spool - not supplied separately.
		1	Spool - reference only
2	81 25 031	2	.Relief valve cap
3	81 25 008	1	.Return connection.
4	80 02 086	3	.Union 1" BSP - 3/4 BSP M-M
5	81 25 075	1	.Drill bush
6	81 25 076	1	.Relief valve needle assembly
7	81 10 003	1	.Relief valve spring.
8	60 01 232	As reqd	.0.4 Shim washer.
9	01 00 102	"	. 5/16 dia bright washer.
10	85 82 044	1	.Plug ½" BSPT
11	91 00 205	2	.Spring washer Ø10
12	93 43 022	2	.Capscrew M5 x 12
13	93 43 023	2	.Capscrew M6 x 12
14	81 25 061	1	.Return connection
15	81 03 001	1	.Plug ½" BSP
16	09 03 121	1	.Knob - black
▨ 17	80 17 003	1	.Cable assembly c/w sleeve, flange etc.
* 18	80 17 005	1	..Pin Ø6
19	81 25 049	1	..Sleeve
20	81 25 050	1	..Flange
21	91 00 016	1	..Thin locknut Ø16 x 1.5 pitch
22	86 50 103	1	.Bonded seal 3/8 BSP
23	86 50 104	1	.Bonded seal ½BSP
24	86 50 106	6	.Bonded seal 3/4 BSP
25	71 14 069	1	.Control block c/w spring dowel & circlip
26	04 11 118	1	..Internal circlip
27	04 25 540	1	..Spring dowel Ø5 x 40
28	71 14 072	1	.Lever
29	91 13 004	1	.Thib nut M8
30	71 14 067	1	.Detent cage.
31	71 14 073	1	.Instruction label
32	71 14 070	1	.Spindle
33	71 14 068	1	.Spring
34	09 05 108	2	.Steel ball ¼" dia.
	81 30 065	1	.Lever pivot box assembly compr:-
35	81 30 107	1	..Lever pivot box.
36	81 30 019	1	..Lever
37	81 30 106	1	..Lever weather gaiter.
38	81 30 009	1	..Lever pivot.
39	81 30 021	1	..Spring dowel
40	92 43 072	2	.Capscrew socket headed M5 x 35
41	93 13 034	2	.Setscrew M8 x 16
42	91 00 204	2	.Spring washer Ø8
43	93 13 065	2	.Setscrew M10 x 30
44	81 25 039	1	.Control plate c/w '0' rings.
45	86 00 503	1	..'0' rings.
46	86 00 502	1	..'0' rings.

* Assembly and spares note pin alternative for TELEFLEX MORSE cables.

81 25 051	1	.Pin ¼" dia.

To minimise backlash in cable operation it is important to fit correct pin.

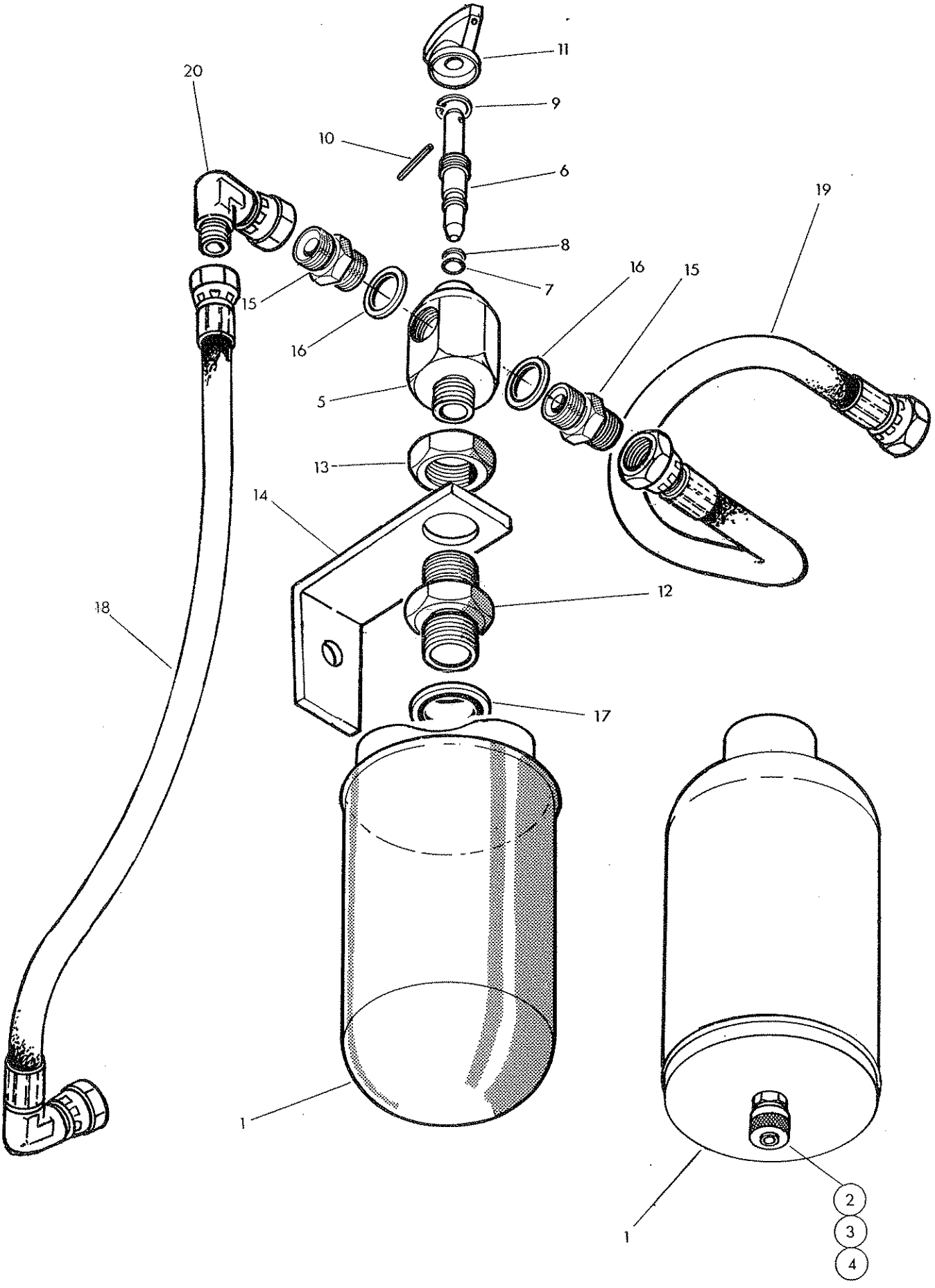
Spares Note.

▨ An alternative cable assembly may be fitted depending on supply availability.
The complete assembly is interchangeable and thus retains the same assembly part No. i.e. 80 17 003
Individual cable components are not interchangeable thus before ordering spares the cable must be correctly identified.

The cable listed above is manufactured by TELEFLEX MORSE and is red.
The alternative cable manufactured by BOWDEN is black and consists of:-

80 17 003		.CABLE ASSEMBLY
71 15 160	1	..Pin
71 15 162	1	..Slave
81 25 050	1	..Flange
01 31 006	1	..Thin locknut 5/8 UNF

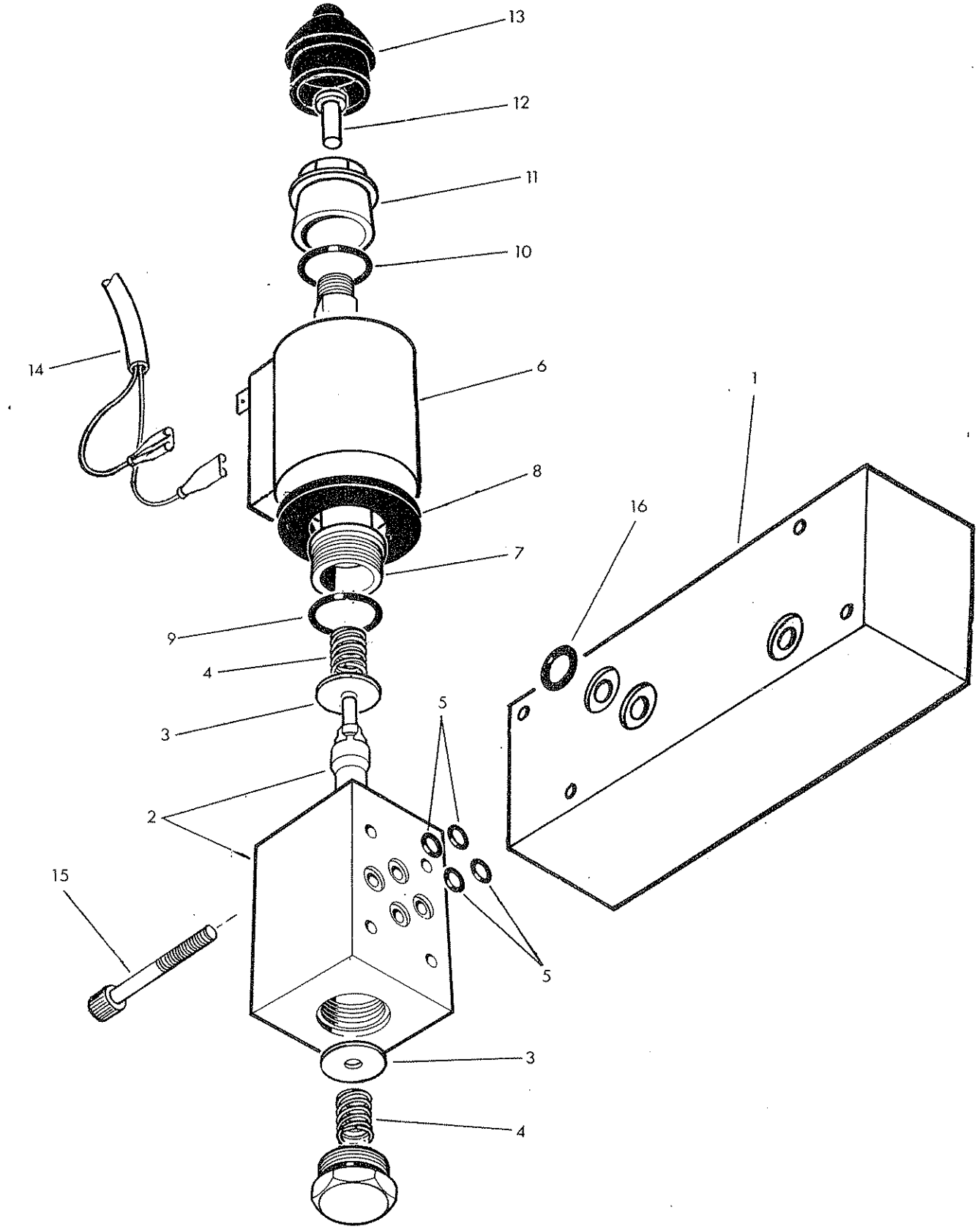
LIFT FLOAT KIT (Optional extra for grass flailing)



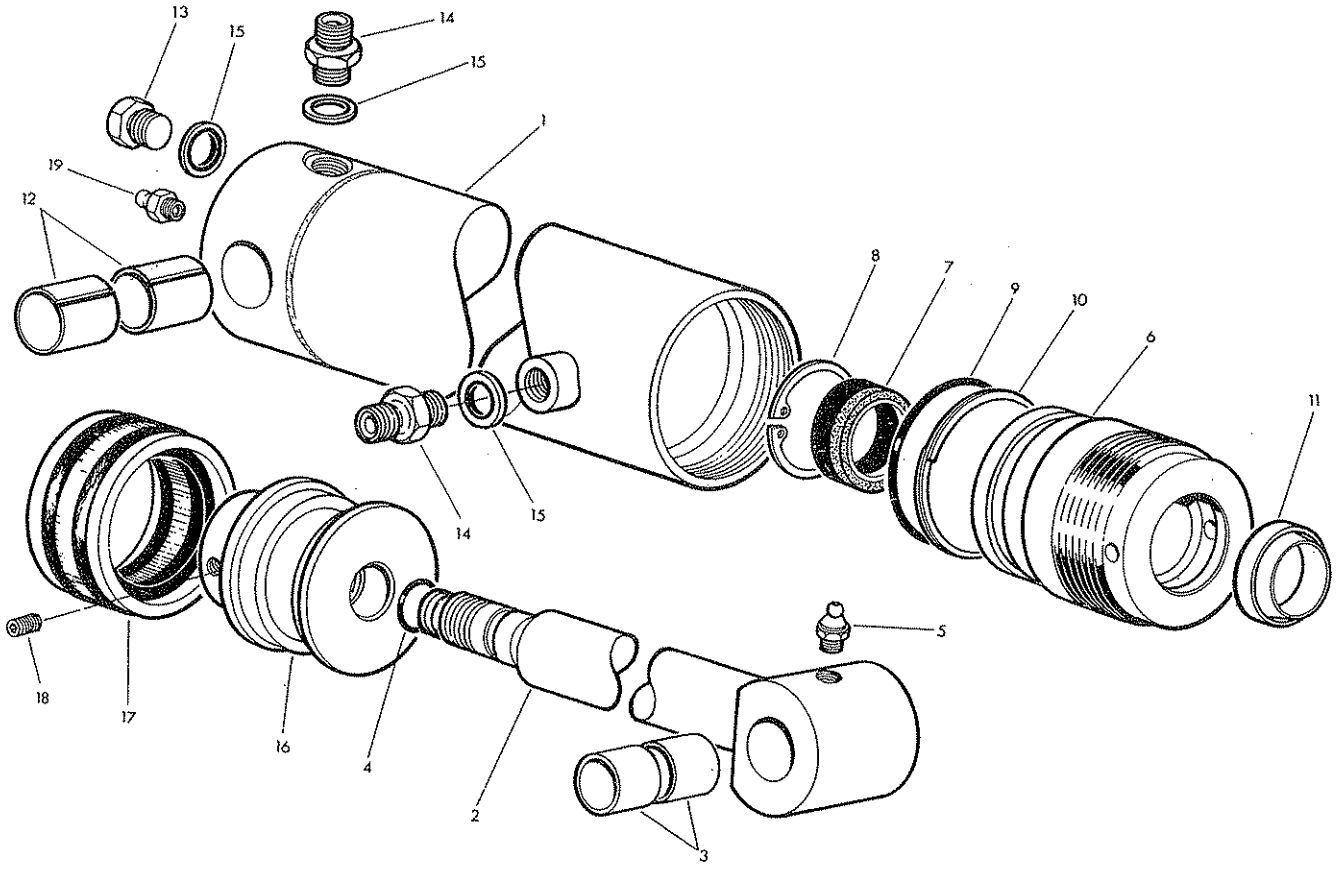
Ref	Part No	Qty	Description
	81 26 265		LIFT FLOAT KIT
1	81 26 251	1	.Accumulator (800 psi) c/w charge valve
2	81 26 015	1	..Charge valve assembly c/w '0' ring.
3	81 26 016	1	...Charge valve core
4	86 00 103	1	...'0' ring.
	71 35 007	1	.Tap assembly compr:-
5	71 35 294	1	..Tap body
6	71 35 006	1	..Tap spindle
7	86 00 107	1	..'0' ring.
8	86 09 107	1	..Anti extrusion ring.
9	04 16 110		..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	71 35 096	1	.Mounting bracket.
15	85 81 145	2	.Union 3/8 BSP - ¼BSP M-M
16	86 50 103	2	.Bonded seal 3/8 BSP
17	86 50 106	1	.Bonded seal 3/4 BSP
18	85 36 082	1	.Hose ¼ BSP 90°F St.F x 29ins long. Lift base-tap
19	85 15 082	1	.Hose ¼ BSP St-F St-F x 32 ins long.Tap E.valve L.B.
20	85 81 190	1	.Elbow ¼BSP M-F

Two alternative accumulators may be supplied under the same part number depending on supply availability.
The two accumulators are directly interchangeable and have a common charge valve assembly.

AUTOMATIC HEAD ANGLE FLOAT KIT (Optional extra for grass flails only)

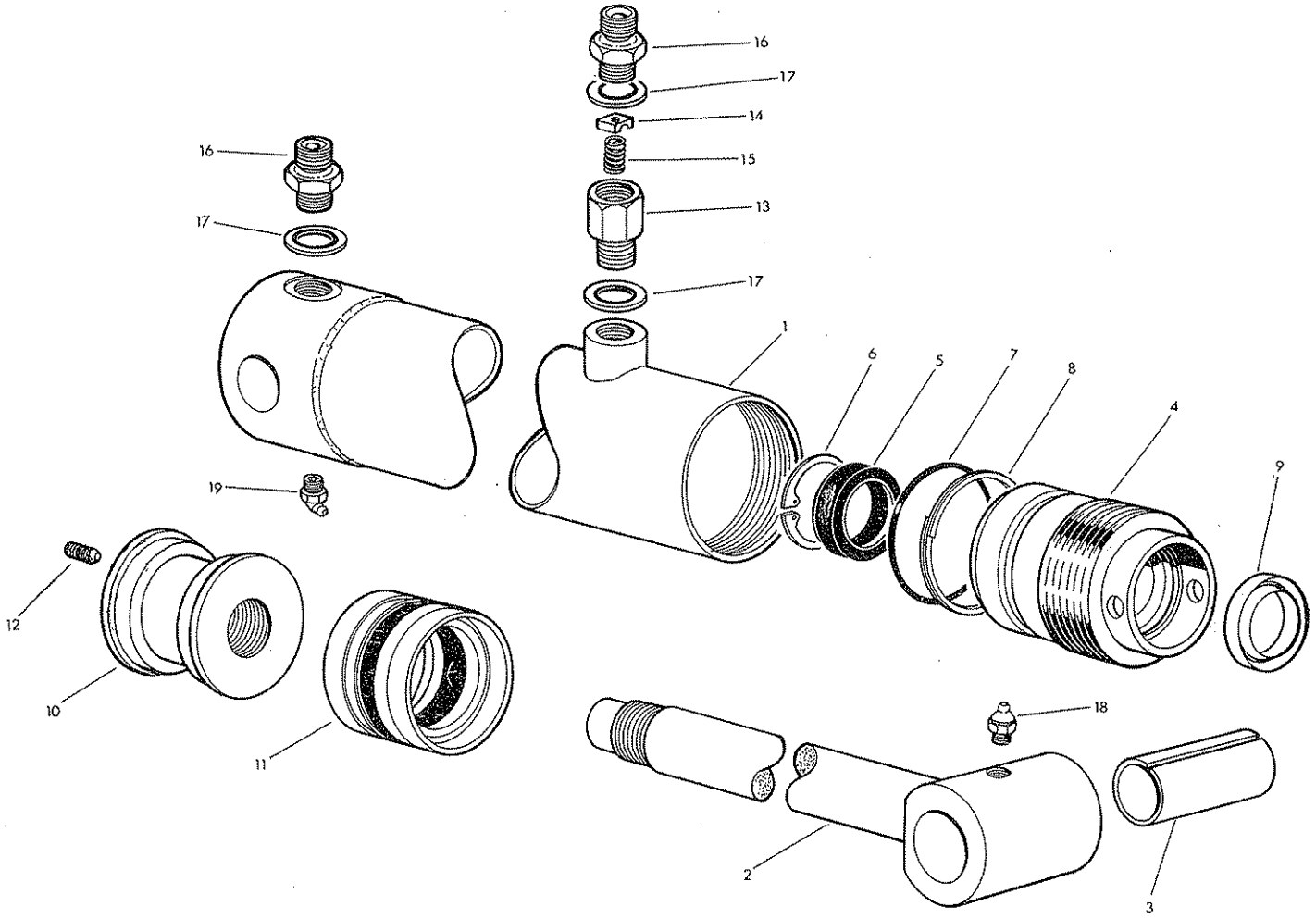


Ref	Part No.	Qty	Description.
	81 26 261		ANGLE FLOAT KIT
1	81 30 323	1	.Float valve block
	81 30 314	1	.Angle float solenoid compr:-
2	81 30 091	1	..Block c/w spool
3	84 02 123	2	..Washer
4	84 02 124	2	..Spring
5	87 00 511	4	..'0' ring.
	84 02 125	1	..Solenoid compr:-
6	84 02 126	1	...Coil.
7	84 02 127	1	...Solenoid tube.
8	84 02 128	1	...Gasket
9	86 00 507	1	...'0' ring.
10	84 02 088	1	...'0' ring.
11	84 02 129	1	...Shroud nut
12	84 02 086	1	...Push pin
13	84 02 087	1	...Weather gaiter.
14	84 02 059	1	.Connecting wire.
15	92 43 082	4	.Set screw socket headed M5
16	87 00 511	3	.'0' ring.



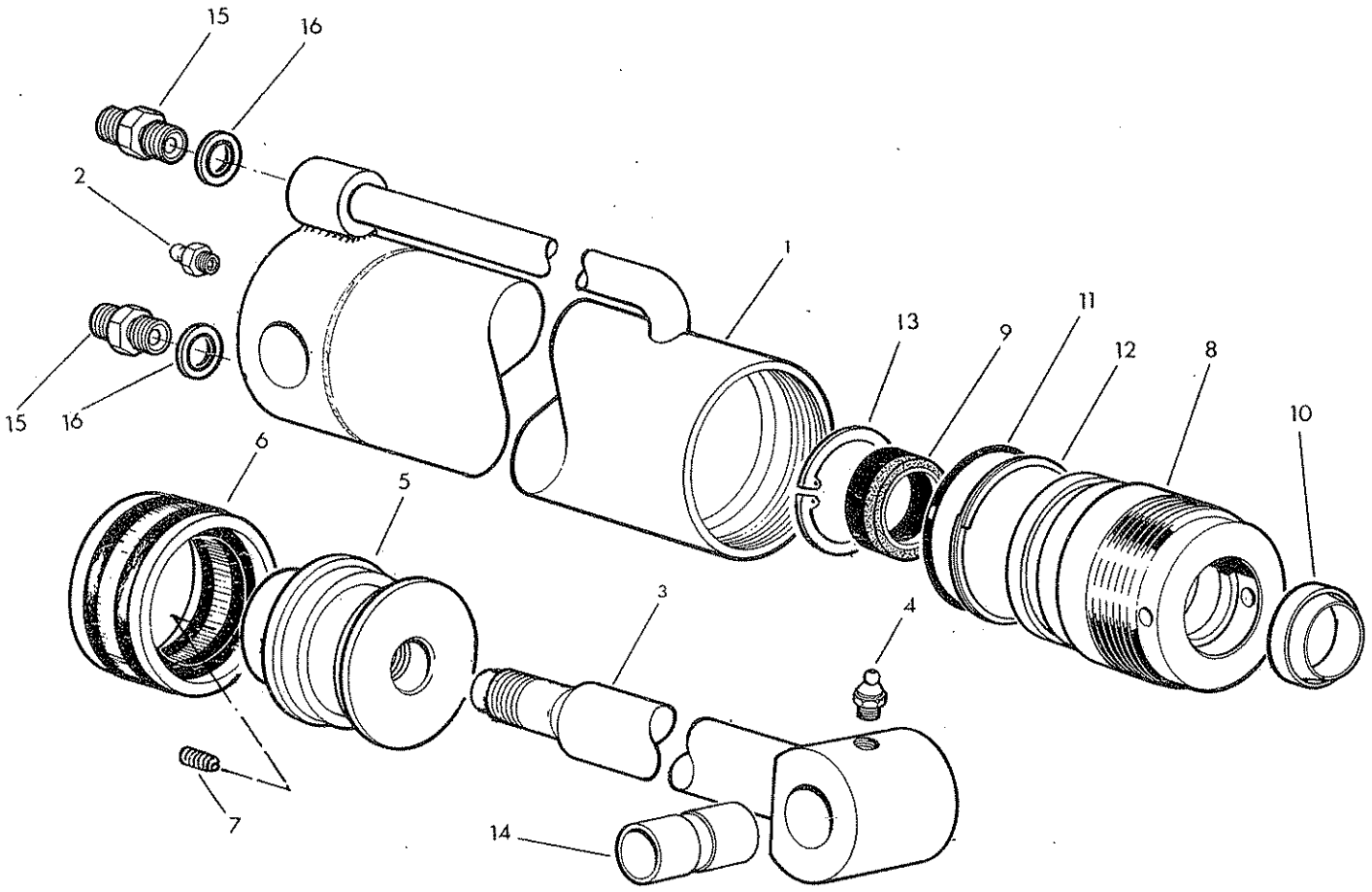
Ref	Part No.	Qty	Description
	71 36 270		LIFT AND REACH RAM ASSEMBLY
1	71 36 271	1	.Ram cylinder.
2	71 36 333	1	.Piston rod c/w bush etc.
3	60 12 032	2	..Bush
4	86 00 119	1	..'0' ring.
5	09 01 121	1	..Greaser 1/8 BSP straight.
6	71 35 282	1	.Gland housing c/w seals etc.
7	86 22 127	1	..Gland seal.
8	04 11 132	1	..Internal circlip
9	87 00 740	1	..'0' ring.
10	87 09 740	1	..Anti extrusion ring.
11	86 29 147	1	..Piston rod wiper ring.
12	71 01 134	2	.Bush
13	80 03 001	1	.Plug
14	85 81 115	2	.Union ¼ BSP - 3/8 BSP M-M
15	86 50 103	3	.Bonded seal 3/8 BSP
16	71 35 004	1	.Piston c/w seal and grub screw.
17	86 38 740	1	..Piston seal.
18	93 00 110	1	.. Grub screw M6 x 8 socket headed.
19	09 01 121	1	.Greaser 1/8 BSP straight.

SLEW/BREAKAWAY RAM ASSEMBLY



Ref	Part No.	Qty	Description
	71 36 274		SLEW/BREAKAWAY RAM ASSEMBLY
	71 36 061	1	.Ram assembly
1	71 36 065	1	..Ram barrel
2	71 36 062	1	..Piston rod c/w bush
3	71 05 050	1	...Bush
4	71 36 312	1	..Gland housing c/w seals.
5	86 29 148	1	...Gland seal.
6	04 16 240	1	...Internal circlip
7	86 00 306	1	...'0' ring.
8	86 09 306	1	...Anti extrusion ring.
9	86 29 149	1	...Rod wiper ring.
10	71 36 063	1	..Piston c/w seal etc.
11	86 36 001	1	...Piston seal
12	93 63 033	1	...Grub screw M6 x 16
13	85 81 208	1	.Restrictor body.
14	81 23 047	1	.Restrictor disc - green and white.
15	81 16 011	1	.Spring.
16	85 81 145	2	.Union 3/8 BSP - ¼BSP MM
17	86 50 103	3	.Bonded seal 3/8 BSP
18	09 01 121	1	.Greaser 1/8 BSP - straight.
19	09 01 124	1	.Greaser 1/8 BSP - angular 45°

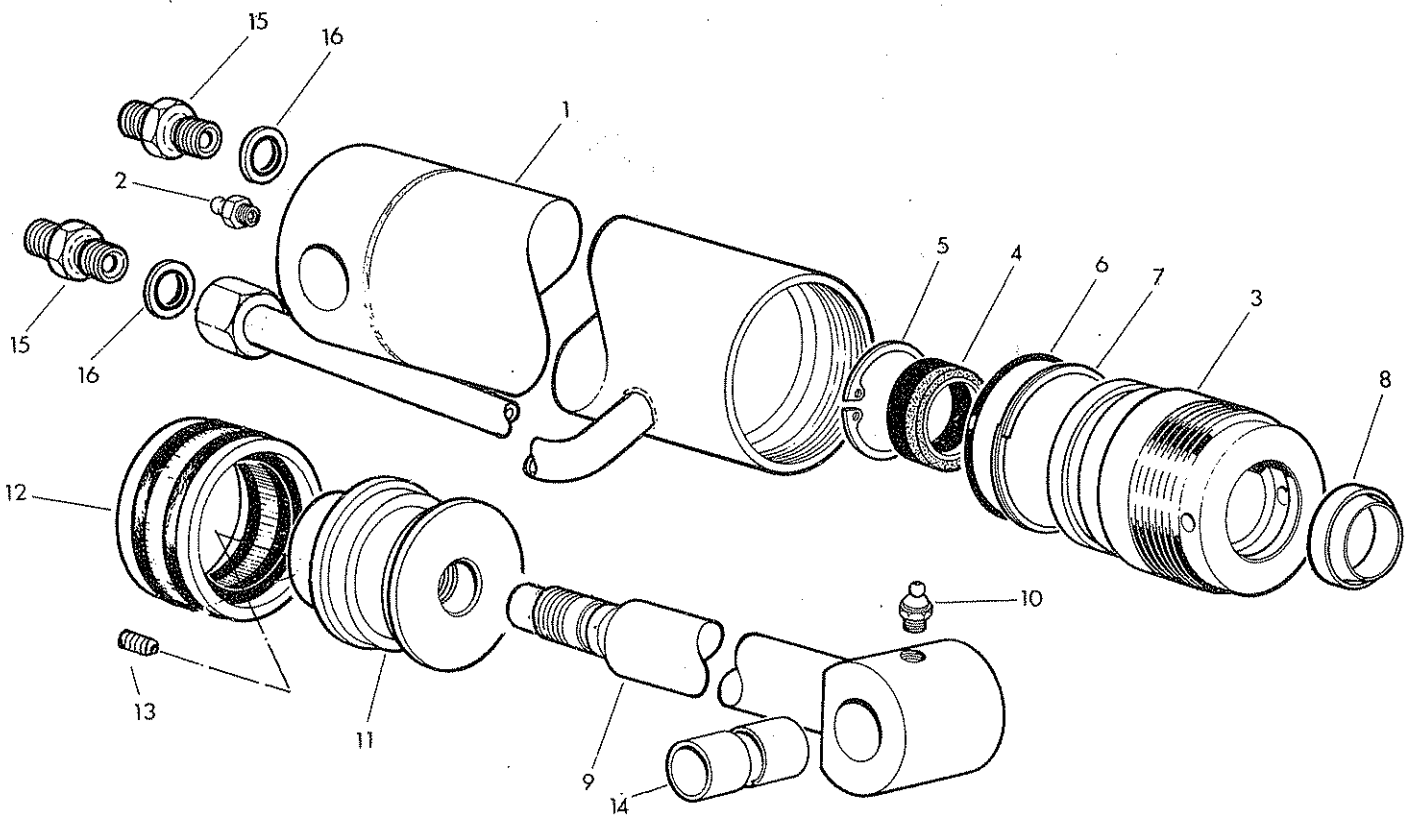
ANGLING RAM ASSEMBLY



Ref	Part No.	Qty.	Description
	71 35 290		ANGLING RAM ASSEMBLY
1	71 35 292	1	.Ram Cylinder c/w greaser
2	09 01 121	1	..Greaser 1/8 BSP-straight
* 3	71 35 009	1	.Piston rod c/w '0' ring & greaser
4	09 01 121	1	.Greaser 1/8 BSP-straight.
* 5	71 35 008	1	.Piston c/w seal & grub screw
6	86 38 788	1	..Piston seal
7	93 63 033	1	..Grub screw M6 x 16 socket headed.
8	71 35 291	1	.Gland housing c/w seals etc.
9	86 29 148	1	..Gland seal
10	86 29 149	1	..Piston rod wiper seal.
11	86 00 302	1	..'0' ring.
12	86 09 302	1	..Anti extrusion ring
13	04 16 240	1	..Internal circlip
14	71 05 050	1	.Piston rod bush.
15	85 81 169	2	.Union ¼ BSP M-M
16	86 50 102	2	.Bonded seal ¼BSP
	86 99 188		SEAL KIT

* Spares Note. (For early rams with radially locking piston grub screws). When replacing a piston or piston rod the sub assembly Part No. 71 35 106 is now required.

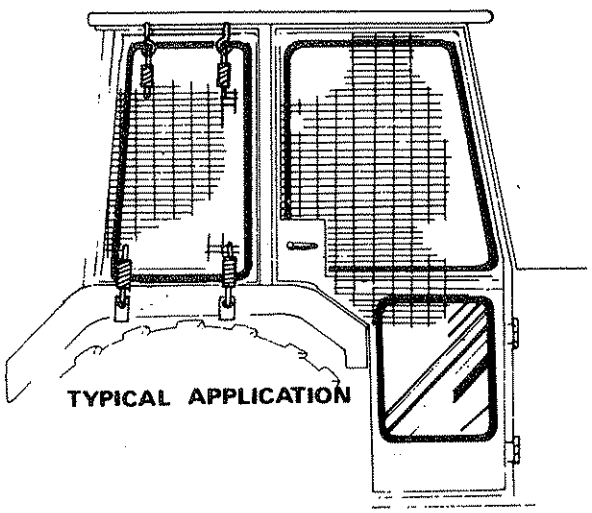
TELE RAM ASSEMBLY (Extra Plus only)

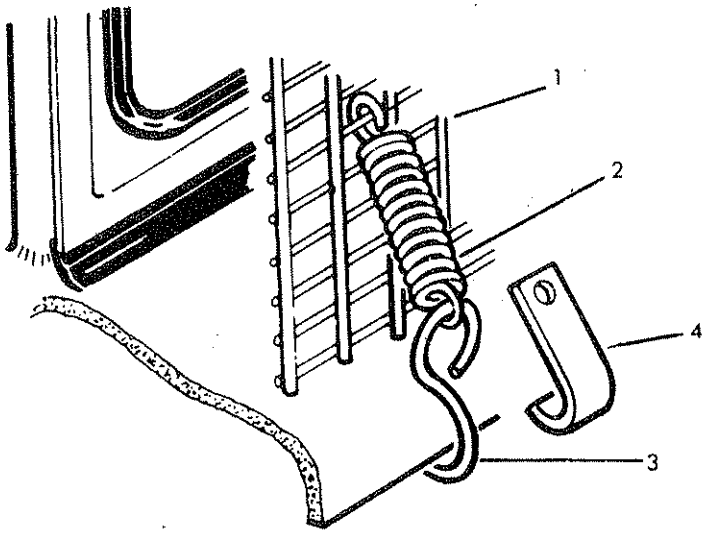


* Spares Note. (For early rams with radially locking piston grub screws). When replacing a piston or piston rod the sub assembly Part No. 71 35 105 is now required.

Ref	Part No.	Qty	Description
	71 36 275		'TELE' RAM ASSEMBLY
1	71 36 276	1	.Ram cylinder c/w greaser.
2	09 01 121	1	..Greaser 1/8 BSP - straight.
3	71 35 291	1	.Gland housing c/w seals.
4	86 29 143	1	..Gland seal
5	04 16 240	1	..Internal circlip
6	86 00 302	1	..'0' ring.
7	86 09 302	1	..Anti extrusion ring.
8	86 29 149	1	..Piston rod wiper seal.
* 9	71 36 104	1	.Piston rod c/w '0' ring and greaser.
10	09 01 121	1	..Greaser 1/8 BSP - straight.
* 11	71 35 008	1	.Piston c/w seal and grub screw.
12	86 38 788	1	..Piston seal.
13	93 63 033	1	..Grub screw M6 x16 socket headed.
14	71 05 050	1	.Bush
15	85 81 169	2	.Union ¼ BSP MM
16	86 50 102	2	.Bonded seal ¼ BSP.
	86 99 188		SEAL KIT.

CAB GUARD





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

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