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HY REACH XL

Operation & Spares manual

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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 emphasize.

Left and Right Hand

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

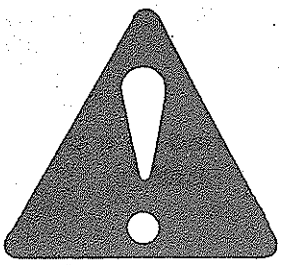
Record the serial number of your machine on this page and always quote this number when ordering spares. Whenever information concerning the machine is requested remember to also state the type of tractor to which it is fitted.

MACHINE SERIAL NUMBER		INSTALLATION DATE:
MODEL DETAILS		
DEALER'S NAME		
DEALER'S TELEPHONE NUMBER		

LIMITATIONS

The McConnel Warranty specifically excludes any hydraulic pump and controls supplied with the machine if they are used to power equipment other than the McConnel machine for which they were supplied. Prior confirmation and warranty cover that the pump is suitable for any other purposes must be obtained from the hydraulic component manufacturers.

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.

.... 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 safety guard.

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

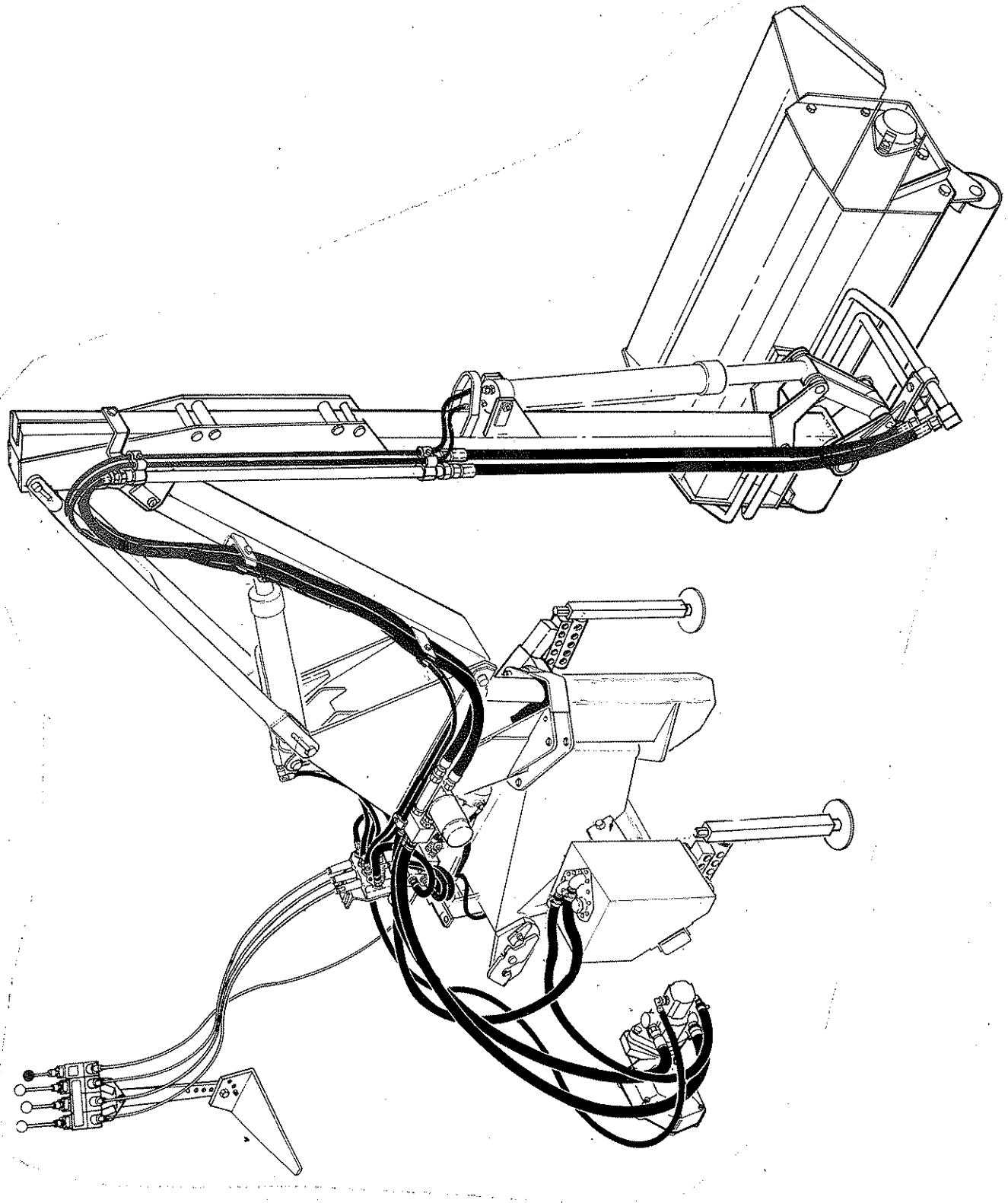
.... ensure bystanders are kept away from the machine during all flailing operations.

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

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

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 ASSEMBLY



HY-REACH XL

1. General Information

The Hy-Reach XL is supplied to operate completely independent of the tractor's hydraulic system. It is equipped with its own pto operated tandem pumps and independent oil reservoir.

The flail head may be mounted for either left or right hand operation and a choice of flail heads is available for hedge or grass work.

The Hy-Reach XL has an extending dipper arm which allows the reach of the flail head to be increased by 30" approx (.75 metre). The adjustment is simply carried out, nothing has to be disconnected or added.

2. Tractor preparation

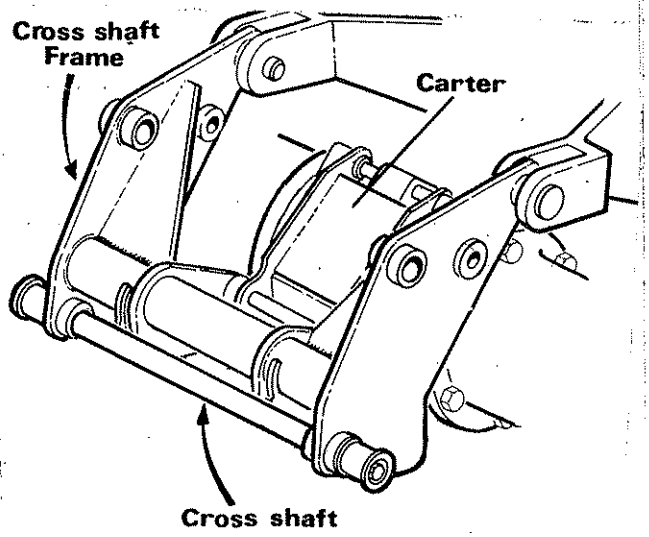
The Hy-Reach XL when fully extended has a reach in excess of 18 feet, so from the point of view of stability, only tractors of 70 HP or more should be considered.

Additionally, ballast weight at the tractor front end as well as rear wheel weights should be fitted as appropriate. Rear wheel track should be set as wide as practicable to increase stability. It is essential that the tractor selected is equipped with live-drive pto shaft.

3. 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.

The fitting provides a horizontal cross shaft rigidly mounted across the rear of the tractor in two alternative positions. It is recommended that the Hy-Reach is fitted with the cross shaft in the lower position whenever possible which will give an approximate height from ground level of 30" - 34". The two ends of the cross-shaft in conjunction with the standard tractor draft links, provide a rigid four point mounting for the Hy-Reach.



CAUTION

Ensure that clearance exists between the PTO pump and gearbox assembly and the Hy-Reach main frame.

ASSEMBLY INSTRUCTIONS

1. 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.

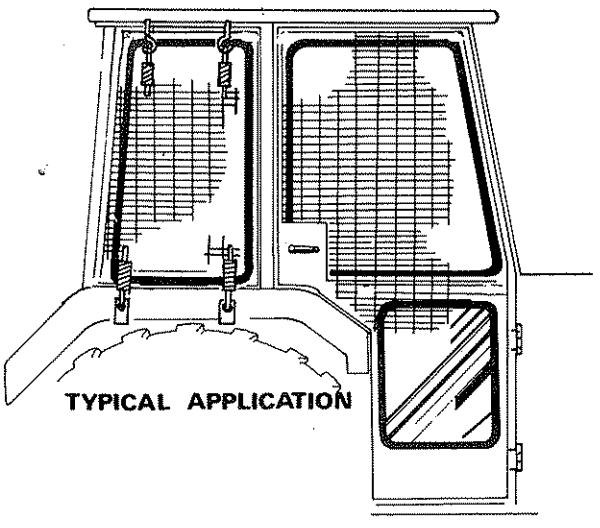
Where the flail is operated on a tractor that is equipped with a safety frame or roll bar only, then an additional frame must be made and fixed to the tractor on to which the guard mesh can be secured. In addition to the guard mesh, a sheet of Polycarbonate transparent glazing must be fitted to the frame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

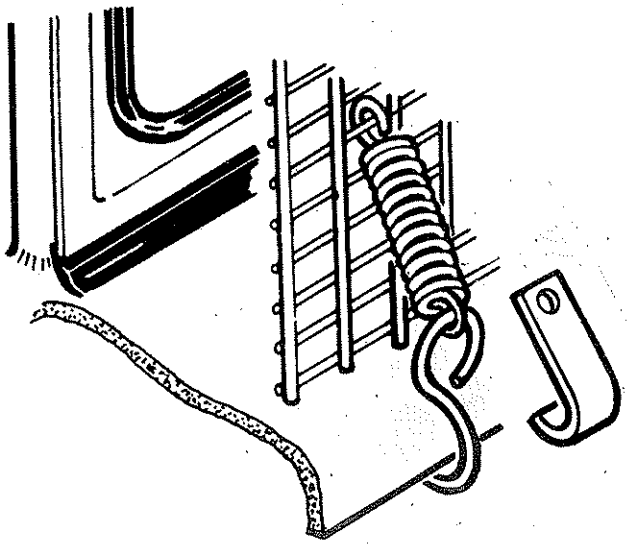
Polycarbonate transparent sheeting is an impact resistant material which can be readily sawn and shaped to requirements. Unfortunately it is susceptible to surface damage and scratching, therefore it is advisable to place the material on the inside of the window for protection. No attempt should be made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

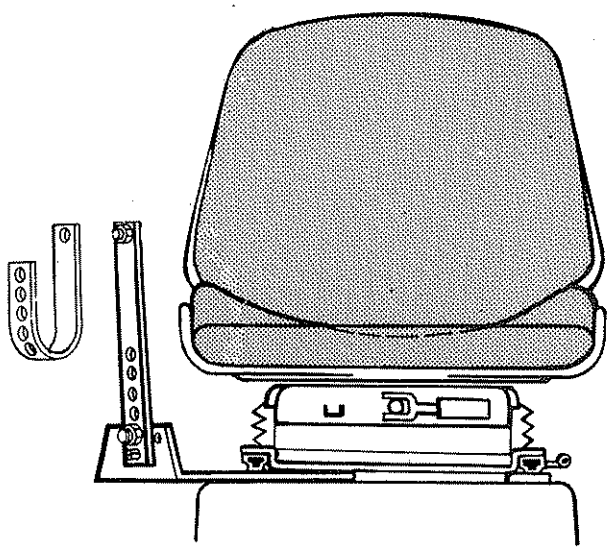
CAB GUARD





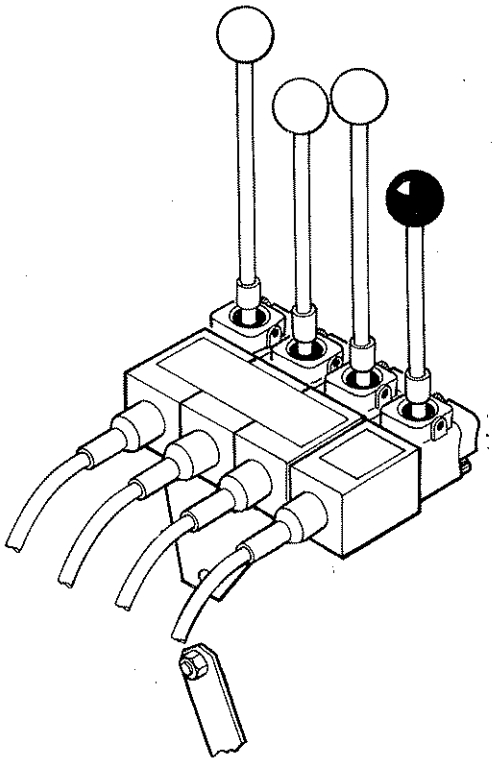
2. Fitting of control unit in cab.

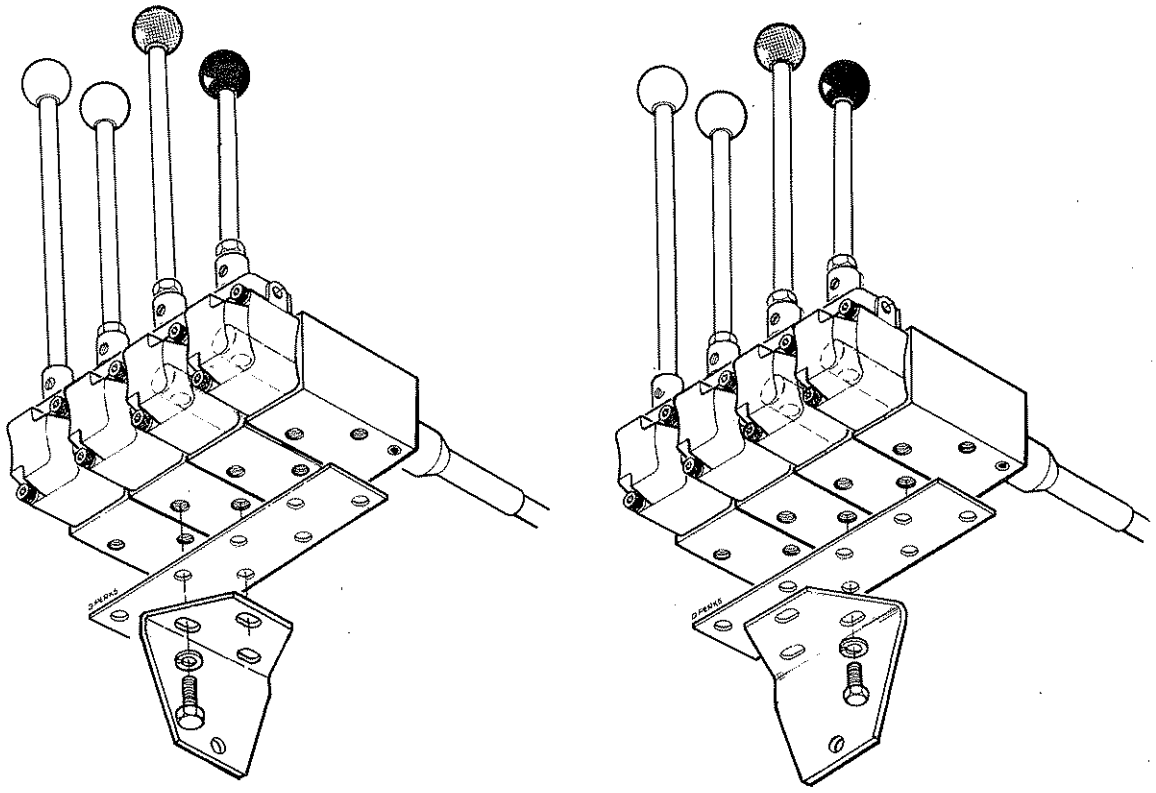
The control box is mounted on an adjustable stalk that is attached to a seat bracket which is of universal design for mounting in many models of tractor. The bracket is normally trapped between the seat runners and their mounting base. It may sometimes be necessary to drill extra holes in the seat bracket to find the ideal operator position.



On tractors other than silent cab models it is permissible to attach the control unit 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 control unit itself is bolted to an angled mounting bracket in either a transverse or longitudinal position thus giving a variety of mounting positions, which in conjunction with the flexibility of the mounting pillar will enable a satisfactory working position to be achieved.





Shown above is detail of alternative fitting of the mounting spigot. In deciding the final position of the control box, remember that tight bends in the cables will reduce their operational life. Do not exceed the minimum acceptable bend radii of 8".

Recommended Oil

Supplier	Cold and Temperate	Hot
Castrol	Hyspin AWS32	Hyspin 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

ATTACHMENT TO TRACTOR

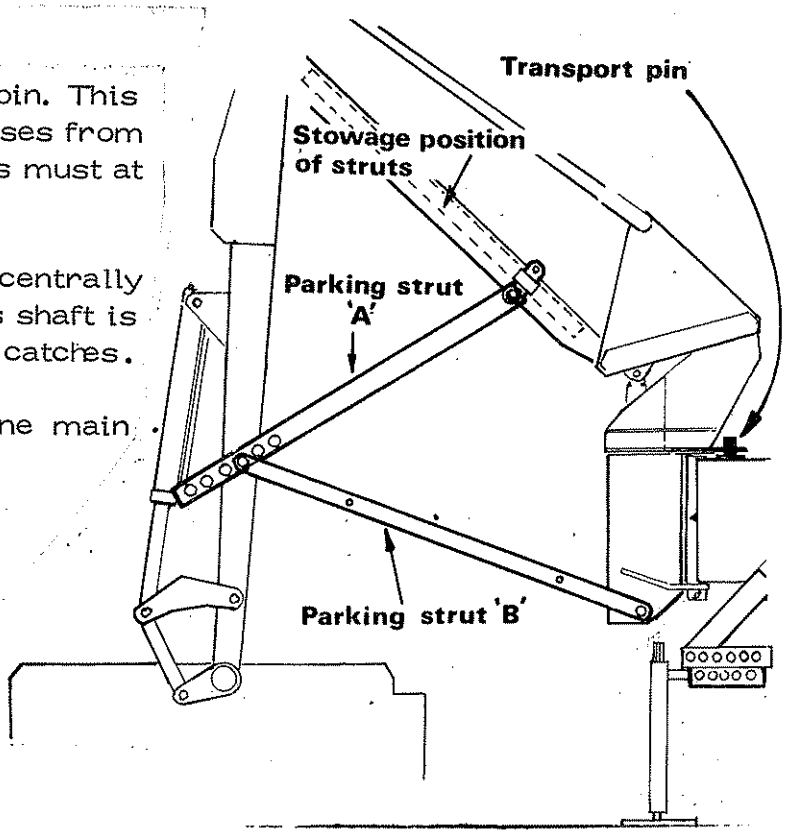
a) Attaching and removing the Hy-Reach from the tractor must be carried out on firm level ground with the machine in transport or "PARK" position.

b) Fit tractor fittings onto the tractor as detailed on the sheet accompanying the fittings.

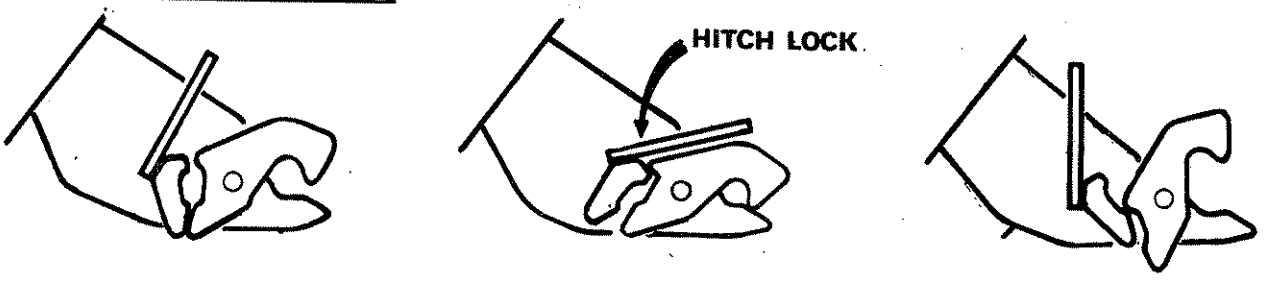
c) Remove and discard the transport pin. This pin is only used for shipping purposes from the factory. The two parking struts must at this stage be left in position.

d) Reverse the tractor squarely and centrally to the machine until the cross shaft is approximately 18" from the locking catches.

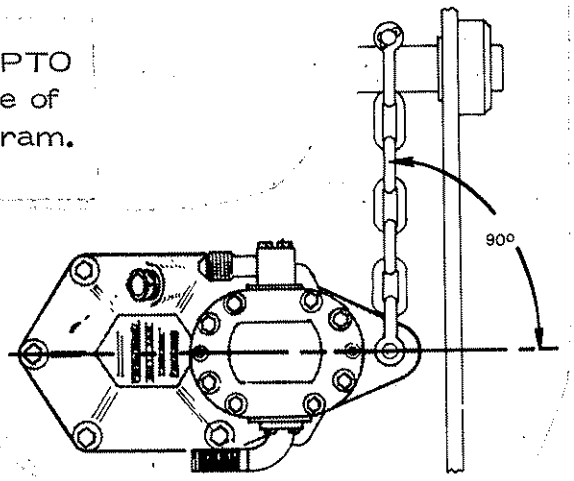
e) Set the locking catch on the machine main frame to the Hitch position.



LOCKING-CATCH POSITIONS



f) Fit pump and gearbox assembly to PTO shaft. Fit the torque chain at an angle of 90° to the gearbox as shown in the diagram.



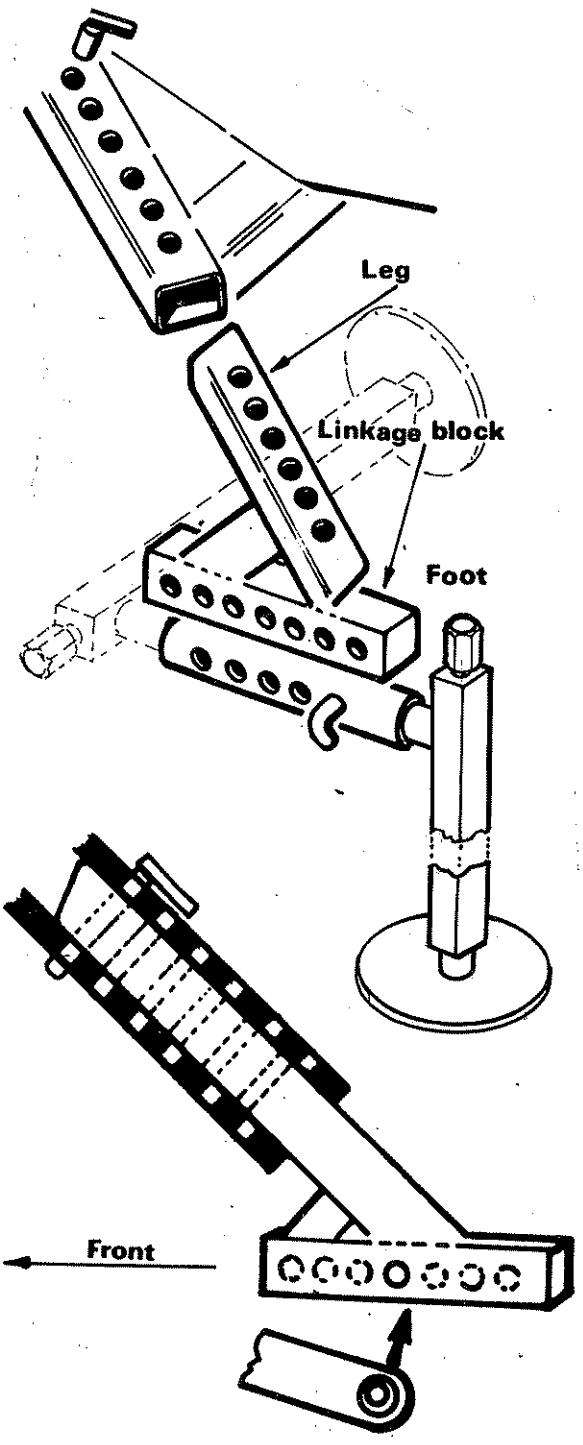
g) Fill tank with a light hydraulic oil as recommended in the chart on page The complete system holds approximately 50 litres (11 gallons). Check that all hose clips and connections are tight.

h) The hoses supplied with the pto driven pump are of sufficient length to allow fitting to the tractor before the machine is mounted. Two hose clips are provided at either end of the large bore suction hose and these should be positioned so that their worm-drive barrels are opposed at 180° to reduce the possibility of air entering the system. It is recommended that these hose clips are checked and further tightened after the machine has been run up to operating temperature and after a further few hours of operation they should be checked again.

i) Remove and stow the parking strut 'A' leaving the strut 'B' in position. Operate the screw jacks to align the locking catches to the cross-shaft and reverse tractor, snapping shut the hitch lock when the catches are engaged.
Use the screw jacks to raise the machine on the tractor until the main frame is just above the horizontal position. Fit the linkage pin in the nearest hole of the linkage block that is forward of the draft link ends and connect up the draft links. Hole alignment is achieved by removing the leg pin and extending the leg from the frame until the draft links can be fitted and the leg pin re-engaged.

The screw jacks may now be removed and stored at the inboard end of their mounting tubes as shown in the illustration.

j) Remove parking strap and stow in position on the side of the boom. Any tension on the strap can be relieved by use of the lift and reach rams.

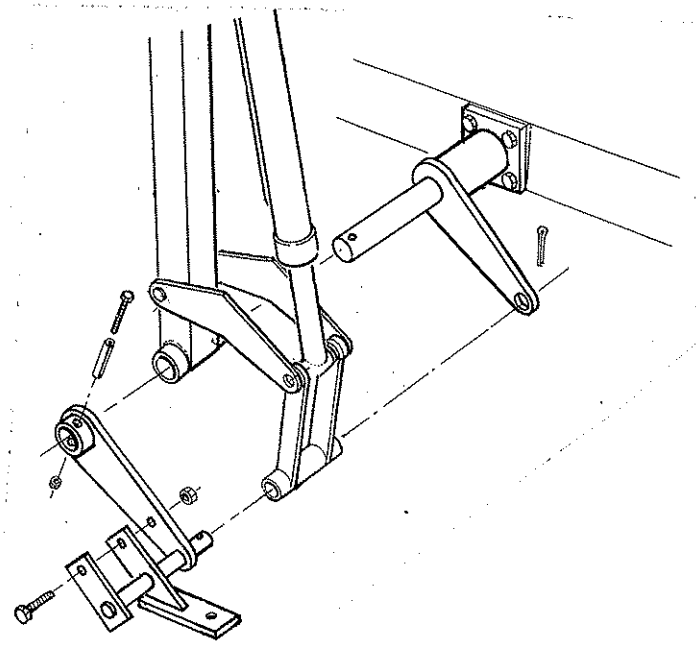


CAUTION

The leg needs the maximum amount of support within the frame when in the working position. Do not extend it further than 2" from its fully closed position. Use the next hole in the linkage block instead. With all the weight carried by the tractor, the machine is correctly fitted when the main frame is horizontal.

k) Ensure rotor control lever is at "STOP" position, start tractor, engage pto to run approximately 250-300 rpm and allow the oil to circulate for about 20 minutes without operation of the armhead control levers. This is most important as it allows all the oil to thoroughly circulate through the return line filter under a 'no load' condition, adding considerably to the expected life of the pumps and the hydraulic system generally. To prevent oil loss during this initial installation the two large flail hoses are inter-connected by a union.

l) Release the bolt and remove large roll pin that passes through the flail head mounting tube. The jaw plate can be withdrawn from the tube after undoing the retaining bolt and nut. Slide the boom into position over the tube and re-assemble the jaw plate, roll pin, bolt and nut, after attaching the angling slave link to the jaw plate with the large pin provided.



m) Disconnect the two flail hoses that are joined together by the 1" male/male union and re-connect the hoses to the 90° elbows on the flail head. For upward cutting, the hose/rigid pipe run from the connection marked MP (motor pressure) on the rotor control valve should be fitted to the lower connection on the hydraulic motor.

n) Raise flail head off the ground and carefully operate it through its full range of movement while checking that the hoses are not strained, pinched, chafed or kinked. Adjustment of the hoses at the clamps should be made to relieve any of these conditions.

o) Finally, place the flail head at a safe attitude and bring tractor engine revolutions to approximately 1000 rpm to avoid stalling when the starting load is placed on the motor. Move flail control lever to 'start' position and allow the rotor to run for several minutes during which time it would be inadvisable to leave the tractor's cab to approach the flail head. Similarly, do not allow anyone else to approach the machine while it is running.

p) Move flail control lever to 'stop' position, disengage pto and stop tractor engine. Check rotor bearings, hydraulic motor, etc., for signs of over-heating and rectify before proceeding.

OPERATION

1. Preparation

Before commencing work, the operator should read the instruction manual thoroughly, paying particular attention to the WARNING page in the front of the book. In addition if working on a public highway or in the vicinity where the public have access it is a statutory requirement that suitable warning signs are posted at both ends of the work area. It is the operators responsibility to ensure that a safe code of practise is followed.

Carefully inspect the work area or hedgerow for wire, steel posts, large stones, bottles and other dangerous material and remove them.

Check that all nuts and bolts are tight and that spring cotters, roll pins etc, are firmly in place.

Examine flails and their mountings for security and any damage. Replace any that are suspect, remembering that to maintain rotor balance fitting a new flail will require fitting a further new one on the opposite side.

2. 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. The guard can be fitted to either side of the cab.

3. Moving from transport to working position

To move the flail head from the transport or 'park' position behind the tractor to the 'work' position at right angles to the tractor the flail head must be on the ground. Fully screw in the white tap on the armhead valve assembly i.e. in a clockwise direction. Operation of the lift lever in the cab will now cause the flail head and arm to swing round to the working position.

> WARNING
>
> If assistance is being given by a second person operating the white tap, they should stand well clear of the armhead before the lift lever is operated.

To revert back to the transport position, the flail head should again be placed on the ground, the white tap fully opened and the lift lever operated.

Note:

If the tap is neither fully open or closed the lift circuit remains open to reservoir and no movement of the armhead will occur.

4. Engaging drive

Reduce tractor engine to high idling speed and engage the p.t.o. Move the flail operation lever to the 'start' position. Never engage the flail lever when the tractor is running at the full rated p.t.o. speed, which only puts excessive and unnecessary torque loads on the hydraulic motor. Only after the flail is rotating should engine speed be increased to the recommended working speed.

The priming circuit flow is a lot less than the rotor circuit therefore the rotor speed will fluctuate for a minute or so before settling down to a steady rotation once the system has become fully charged. No 'bleeding' is necessary as any air in the system is automatically purged as the system fills.

5. 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. A pto speed of approximately 460 rpm will operate the rotor at the recommended speed of 2300 rpm. Do not exceed this, excessive speeds will result in shattering and splitting stems to give an untidy finish especially when cutting downwards in heavy growth. Excessive rotor speeds under these conditions will also mean a higher ground speed and this may cause the operator to be constantly 'riding' the clutch. The rotor and flails are also subjected to unnecessary rough treatment.

6. 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 heavy work to avoid undue strain.

7. 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 be extended or shortened 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. Obviously, to begin with, the work chosen should be of a light straightforward nature. Another idea worth mentioning when operating on a ploughed or cultivated field is to drive round without the flail in action. The wheel tracks made, may then be followed on the subsequent pass, allowing the operator to concentrate more on the working flail.

8. Breakaway action

When an obstruction is met by the flail head and the tractor continues to move forward the arm is forced back and lifted at the same time. This is achieved by the oil in the gland end of the breakaway ram being forced into 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 original position rod fully closed, is reached. A one-way restrictor limits the speed of the oil flowing back into the gland end of the breakaway ram so that the arm does not return violently.

9. Transport position

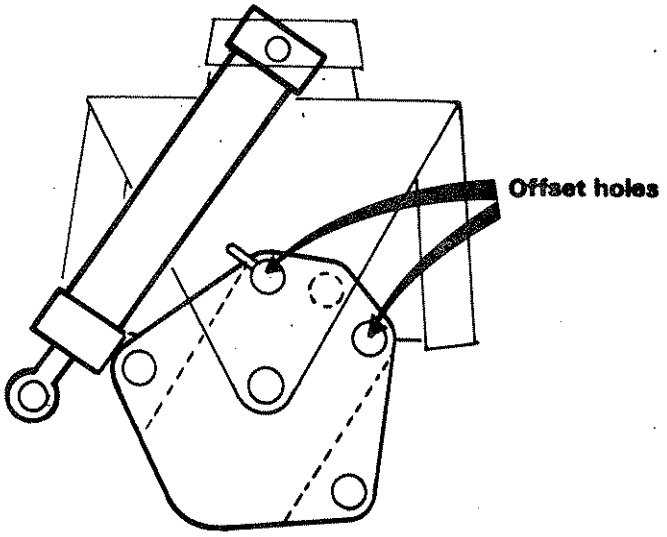
The armhead is positioned to the rear of the tractor for travelling or when parking the machine before removal. When the white tap on the armhead valve is fully open both the gland and base ends of the breakaway ram are connected to the base end of the lift ram. When the lift lever is operated, the weight of the arm pressurizes the oil in both ends of the breakaway ram. Because of uneven displacement the breakaway ram will extend thus swinging the arm round. The armhead will drop as this exercise is carried out and it may be necessary to operate the lift lever again to give the armhead sufficient height for the movement to be completed.

This facility can sometimes be usefully exploited when there is a risk of the tractor becoming 'bogged down' by the offset armhead. Swinging the arm round behind the tractor transfers weight to the 'land wheel'.

10. Minimum transport width

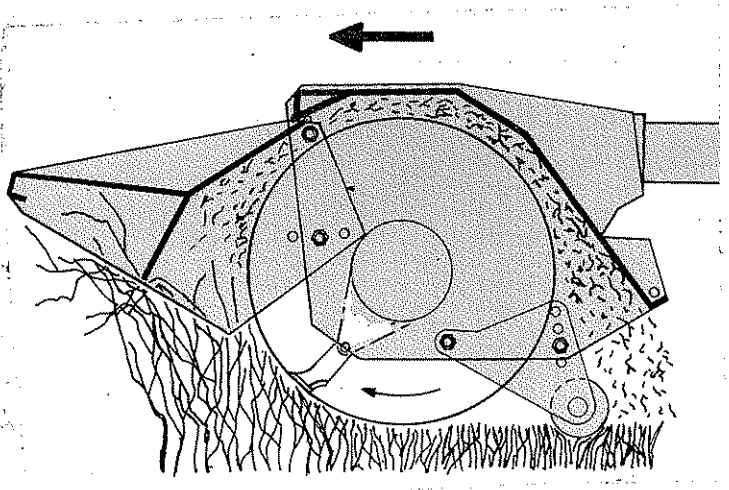
In circumstances where it is necessary to reduce the width of transport to a minimum i.e. travel along narrow roads, the main boom can be further offset enabling the flail head to be carried within the tractors wheel width. Utilize the breakaway ram rod pin to fasten the pillar to the main frame in either of the offset holes in the pillar quadrant.

This exercise should be carried out on level ground to avoid the risk of the pillar swinging round on its own when the rod pin is released.



11. Upward Cutting

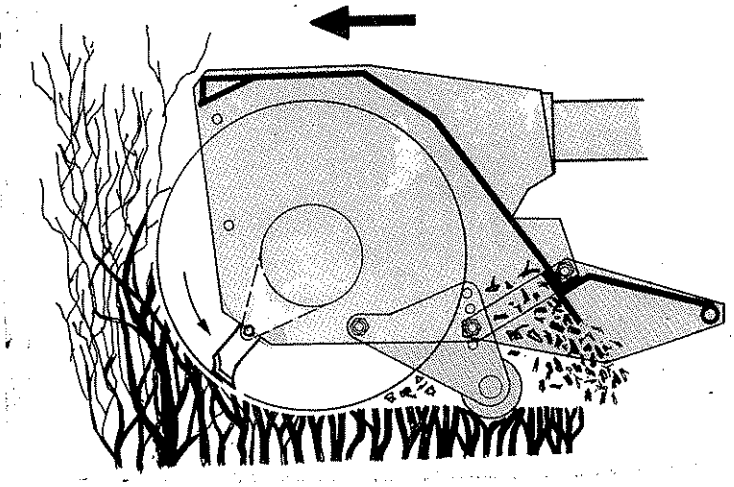
The flail head is assembled at the factory for the flails to cut with an upward motion . Upward cutting produces a cleaner finish, minimises split stems and is ideal for a light hedge that has been regularly maintained.



12 Optional Downward Cutting

It is possible to reverse the rotation of the flail for downward cutting in heavy growth. This chopping action subjects the rotor to violent usage and should therefore be avoided whenever possible.

For downward cutting a rear hood is necessary and should be obtained under Part No. 71 14 297. It is permissable to remove the front hood to allow larger material to pass under the flail head.



13. Reversing rotation

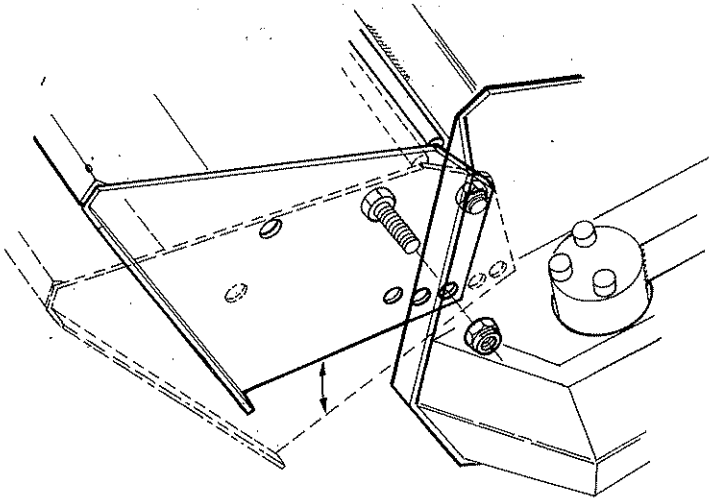
Fully extend armhead and lower flail to ground to minimise oil loss. Release and interchange the two flail drive hoses at the rotor control valve. The flails mounted on the rotor must also be individually turned round by releasing the locknut and withdrawing the flail pivot bolt. The flail may then be reversed. On re-assembly, ensure that the spring washers are located beneath the bolt head as well behind the locknut. Tightening torque of the locknuts is 100 ft/lbs.

WARNING

If any wire is picked up by the rotor, the machine should be stopped immediately and the rotor cleared before proceeding.

14. Flail hoods

Both the flail hoods are hinge mounted by bolts to the front and rear of the head and provision is made for the front hood to be adjusted in three working positions. To minimise the throwing of debris particularly when roadside working the hood should be adjusted to its lowest position. When the front hood is fully raised, larger growth can pass underneath but with the greater tendency for material to be thrown.
The front hood must always be in place for upward cutting and the rear hood must always be in place for downward cutting.

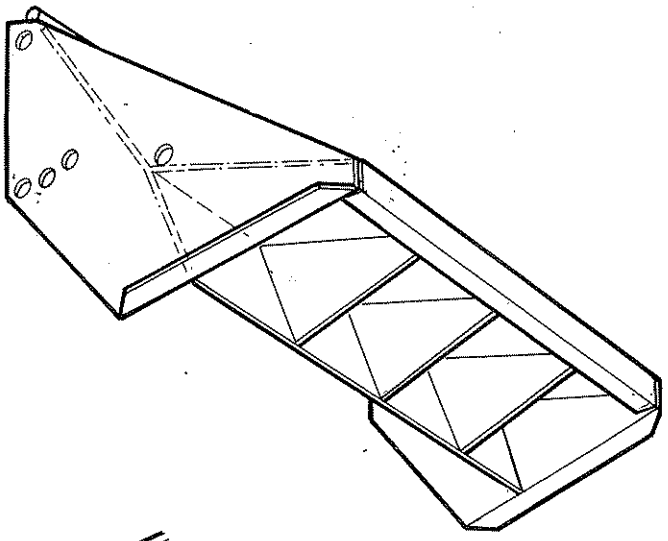


Note: The two hoods are not interchangeable on the flail head.

15. Wire trap

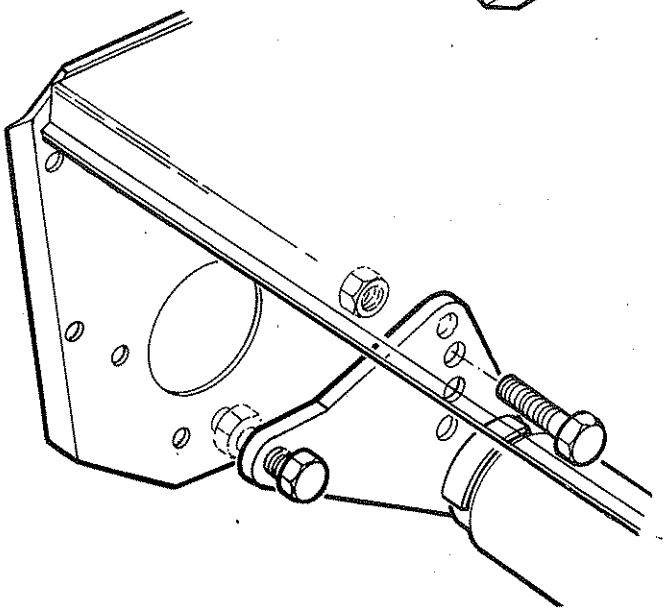
Both flail hoods are equipped with a wire trap. The trap consists of a steel plate welded across the underside. Any loose ends of wire which are picked up and carried round by the rotor are cut by the edge of the metal plate and fall harmlessly to the ground. This plate should not be interfered with or modified in any way.

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



16. Roller

The roller is adjustable vertically to four positions, when hedge cutting the roller should be set higher than the flails. The roller helps to prevent the flail head from bouncing and sinking into the hedge and so assists in maintaining a level cut.
For making a ground cut the roller should be lowered below the cutting level of the flails. This helps prevent 'scalping' the ground and picking up stones which are injurious to the flails.



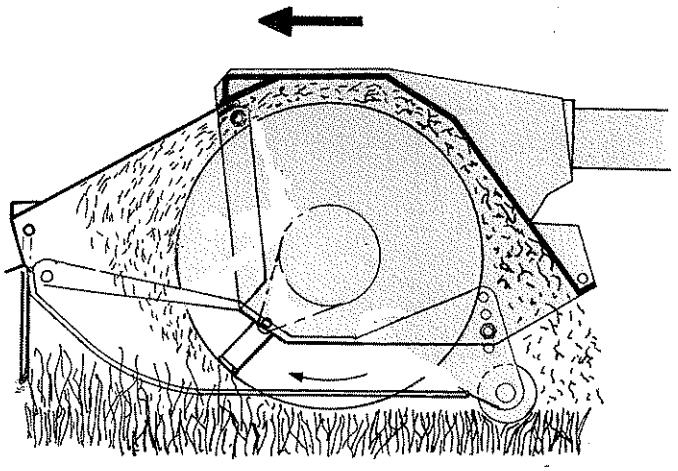
Never attempt to operate the flail without the roller in position. It shields the flails and reduces the chances of long lengths of cut material being thrown.

17. Machine limitation

Bear in mind that the Spirocut hedging flail is a maintenance tool designed to deal with up to two years growth of material. Badly neglected hedges should be tackled with a sawhead and heavy timber in a hedgerow should be felled with a chain saw.

18. 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.



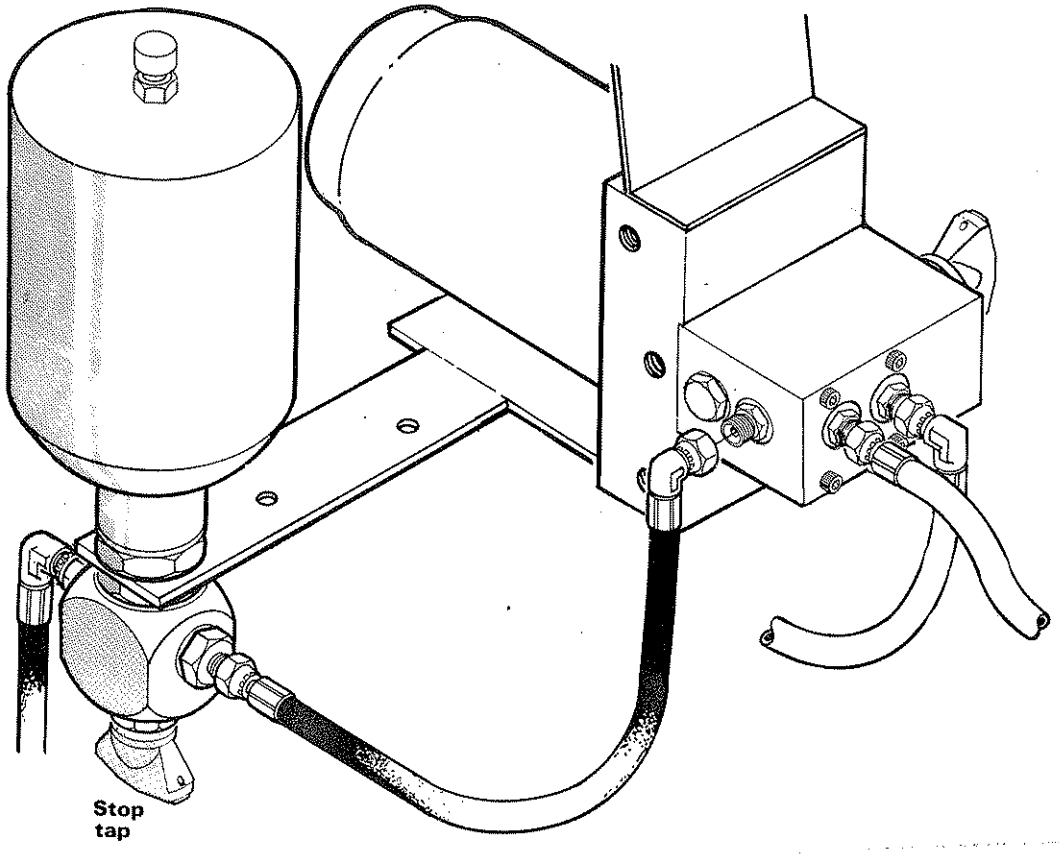
19. Grass roller adjustment

When grass cutting, the weight of the flail head will be carried by the roller for much of the time. It is therefore necessary for the rollers to be reinforced for increased stability. For this reason, a tie-bar passes right through the roller and is secured to the grass skids at either side. The skids are hinged at the front of the flail hood and a three position bolt mounting at the rear allows the roller to be adjusted vertically to control height of cut. Whenever possible the roller should be set in its lowest position to avoid the flails 'scalping' the ground as well as suffering damage from stones etc.

20 Float kit

Grass flailing can be a slow tedious task requiring a high degree of operator concentration especially when working on rough or undulating ground. Supplied as standard equipment with the grass flail, the hydraulic float kit mounts on an extended bracket adjacent to the priming circuit filter. In work, with the stop tap open, the flail runs along the ground and automatically lifts and rides over any bumps. Any shock loads are absorbed by the accumulator which is pre-charged with nitrogen to 500 psi and sealed.

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 spool For machines after serial no. 34 HL 38

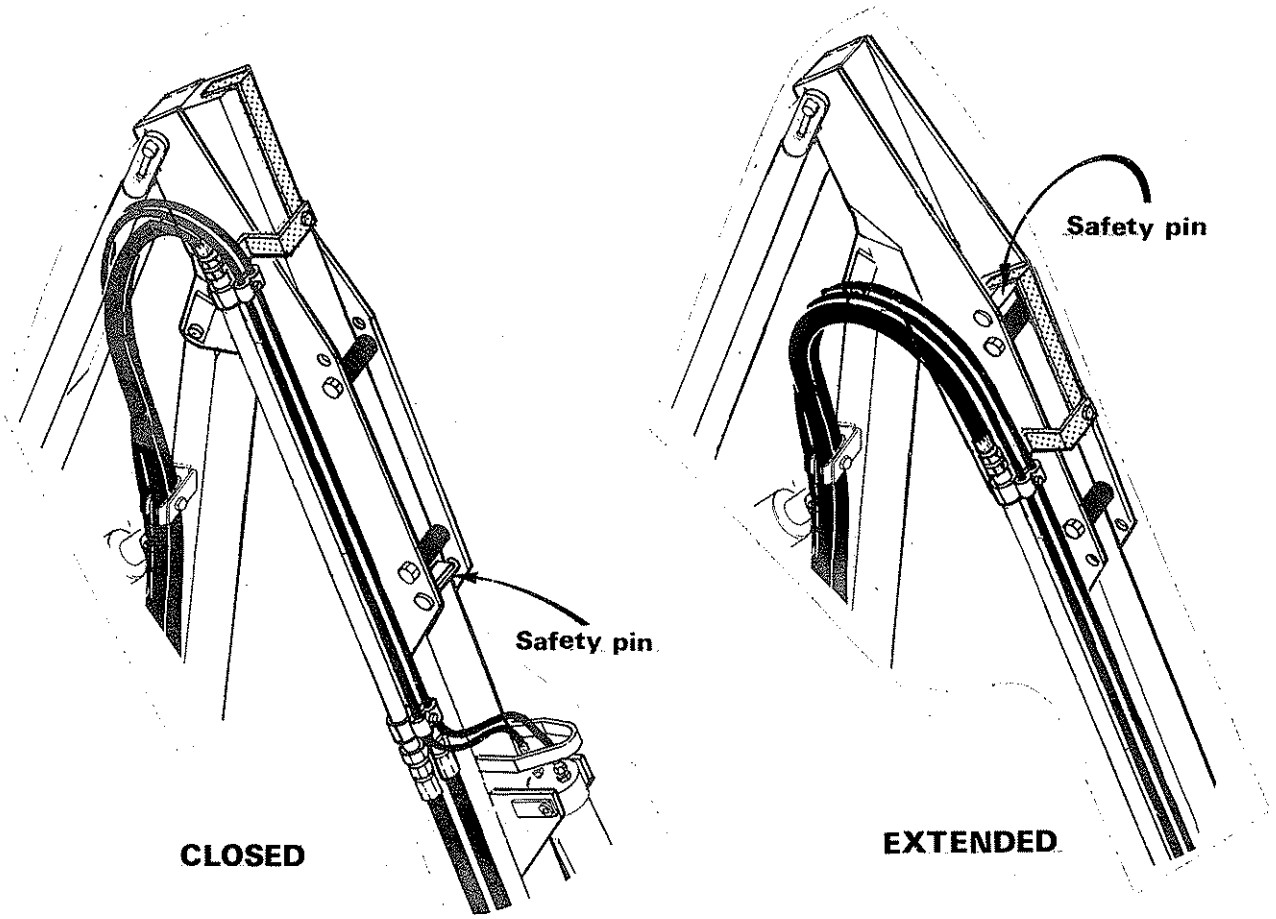
The control valve is assembled with a 'floating' spool in the angling section for use when grass cutting which allows the flail head to angle itself automatically to suit the contours of the ground. To select this float position the control lever must be pushed away from the operator beyond its normal range of movement, until it locks into the float position.

21. Extending dipper arm

The armhead is easily extended by the use of two spanners. Place the flail head flat upon the ground with the dipper arm at a height where the upper clamp bolt can be reached. Remove the safety pin and re-engage it in the upper hole position before loosening the two clamp bolts. Operate the controls to raise the main arm together with the dipper arm. The lower section of the dipper arm will slide out by gravity to the end of its travel. Tighten up the lower clamp bolt. Lower main arm and extend the dipper arm so that the upper clamp bolt can be reached and tightened.

When carrying out this exercise it is not necessary to re-adjust the hydraulic hose positions within their clamps though care should be taken to ensure that hoses are not inadvertently caught up on the top of the dipper arm.

Closing up the dipper arm is the reverse of the above, the safety pin being transferred to the lower position. Do not attempt to operate the machine with the extension in mid-stroke or with the safety pin missing. Although the arm would not fall out completely should the clamp bolts work loose, the flail head could fall to the ground with resultant damage when for instance in transport position on the highway.

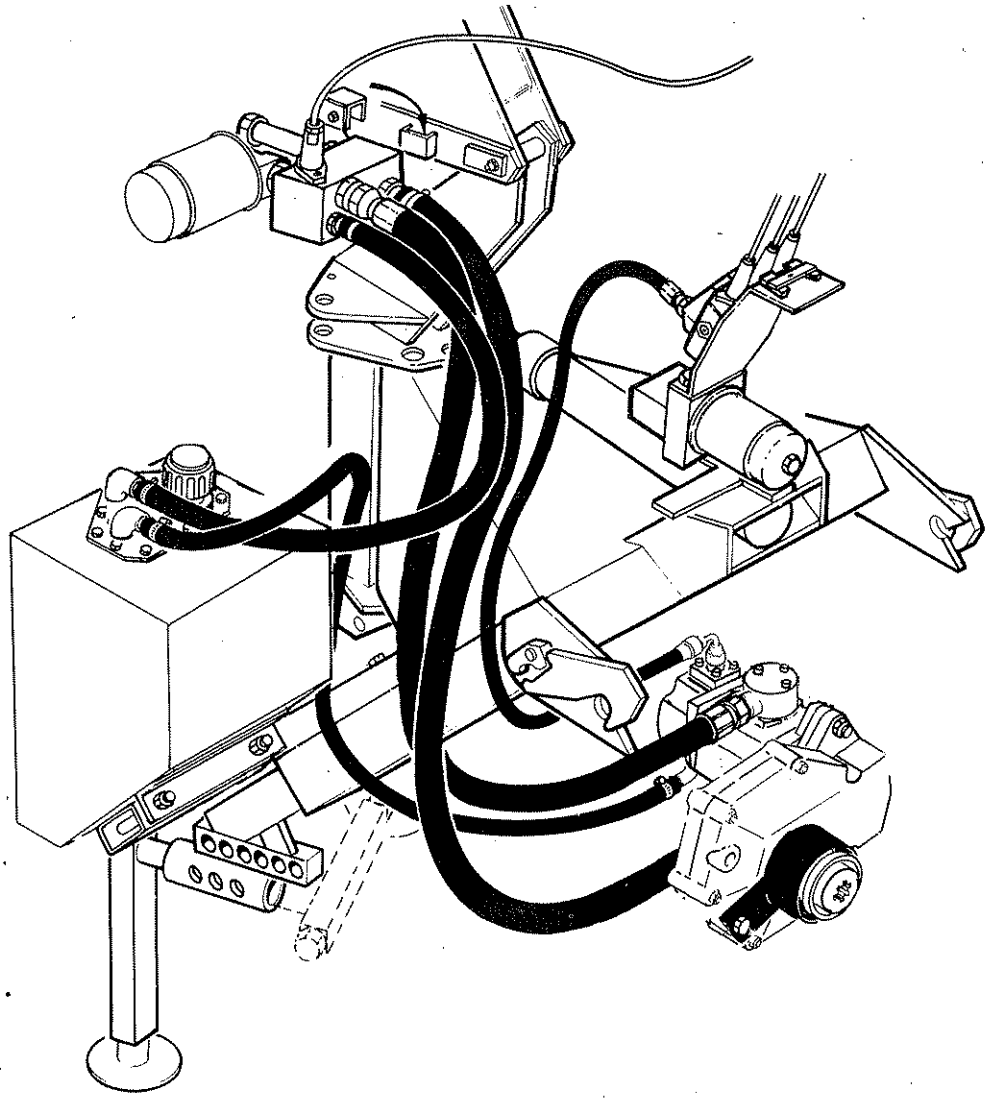


22 Conversion from right to left hand operation

The Hy-Reach XL is normally despatched from the factory with the flail head assembled for working on the right hand side of the tractor i.e. with the hydraulic motor mounted on the left hand end of the rotor shaft nearest the operator. In this position, with the motor in view, it is considered less likely to be damaged by hitting an obstruction.

Alternatively, the flail head can be mounted for left hand working in which case it will be necessary to obtain two flail pipes. Part Nos 71 14 344 and 71 14 345. One off each.
Work should be carried out on firm level ground with the machine in the 'park' position.

When contemplating a changeover, access to the pto pumps is more readily obtained without the machine being mounted to the tractor. Pump connections to the hoses must be moved through 180°, being re-directed to the right.
It will also be necessary to remove the reservoir from the main frame and re-position it on the right hand side.



Assembly for left hand operation

1. Disconnect the flail hoses at the 90° elbows, making sure you have a suitable receptacle to catch the oil. Connect together the two hose ends using a 1" BSP male/male coupler union.

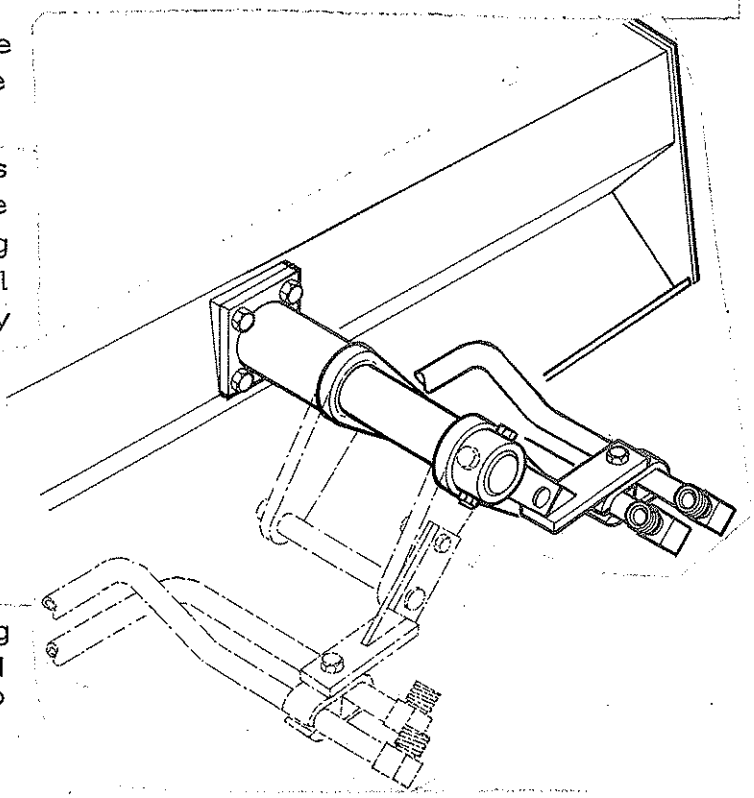
   Note:- Oil would be discharged from these hoses even with flail lever in 'stop' position when the pto pump is operated.

2. Dismantle the pipe clamps on the head and remove the two metal pipes from the motor.

3. Fit the two L. Hand pipes to the motor and loosely assemble the pipe clamps.

4. Release the retaining bolt from the outer jaw plate and withdraw the slave link pin.

5. Remove locking bolt that passes through the large roll pin securing the outer jaw plate to the head mounting tube. Drive out the roll pin. The flail head may now be withdrawn completely from the boom pivot.



6. Remove the four set screws securing the forward extension tube to the head casing and rotate the plate through 90° Re-fit the set screws.

7. Remove hoses and clips from the main arm, boom and rocker fixing points. Attach the rotor control valve to the arm on the other side and re-assemble the hoses.

8. Remove breakaway ram rod end pin. Retract breakaway ram by screwing in the white tap of the armhead control valve and operating the lift lever. When fully closed, the ram can be swung across behind the pillar. Re-extend the breakaway ram by screwing out the white tap and again operating the lift lever. Re-connect the rod end between the lugs on the pillar.

9. Turn flail head 180° to face in opposite direction and re-assemble to the forward extension mounting tube. Fit outer jaw plate and roll pin and make secure. Refit slave link and secure with the retaining bolt and nut.

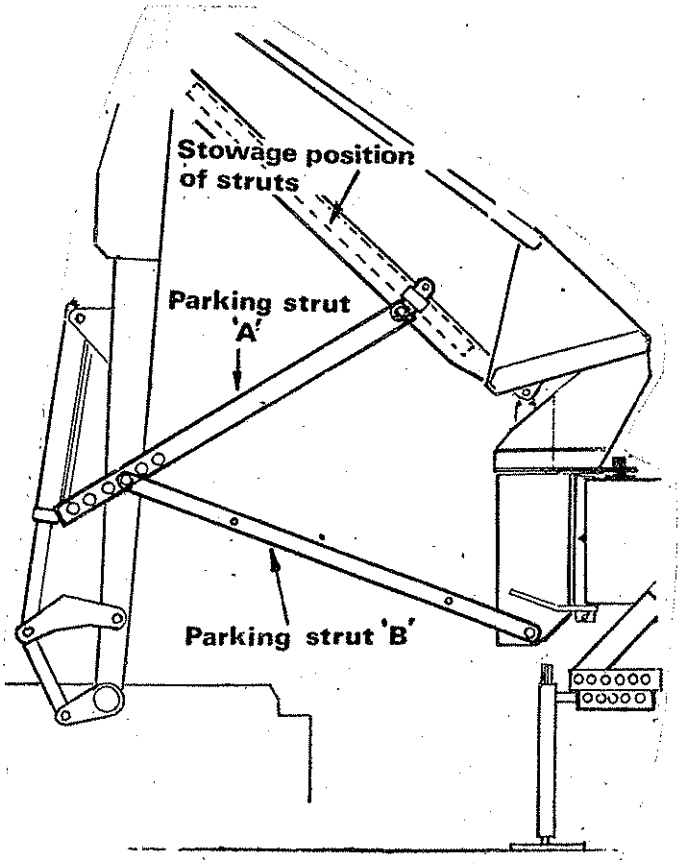
10. Release the two hoses from the coupler union and assemble them to the rigid pipes. Check the rotation of the rotor; for upward cutting the hose run from the connection marked M.P. (motor pressure) on the rotor control valve should be connected to the lower pipe on the motor.

11. With the flail stationery, carefully raise, lower and angle the head throughout its operating range, observing that no hoses can be trapped, strained or chafed before finally tightening all hose clamps.

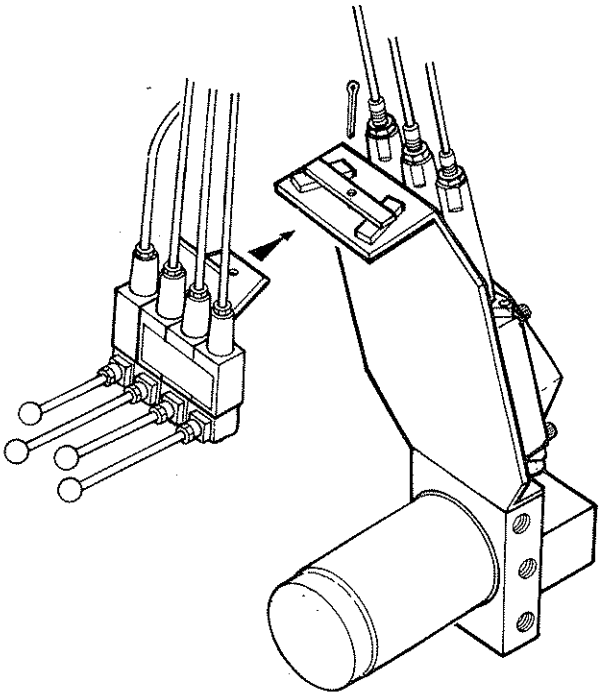
23. REMOVAL FROM TRACTOR

The Hy-reach should only be removed from the tractor on firm level ground with the armhead swung round into the transport position behind the tractor. Place flail head flat upon the ground and instal parking strut 'B'. Remove screw jacks from their storage positions and re-locate in the working positions. Operate jacks to remove weight off the draft links which can then be disconnected.

Open the hitch locks to the release position (see page 9) and drive tractor forward about 18". Fit parking strut 'A' and stop tractor engine. Disconnect torque chain and release the pto pump assembly by retracting the retaining collar.



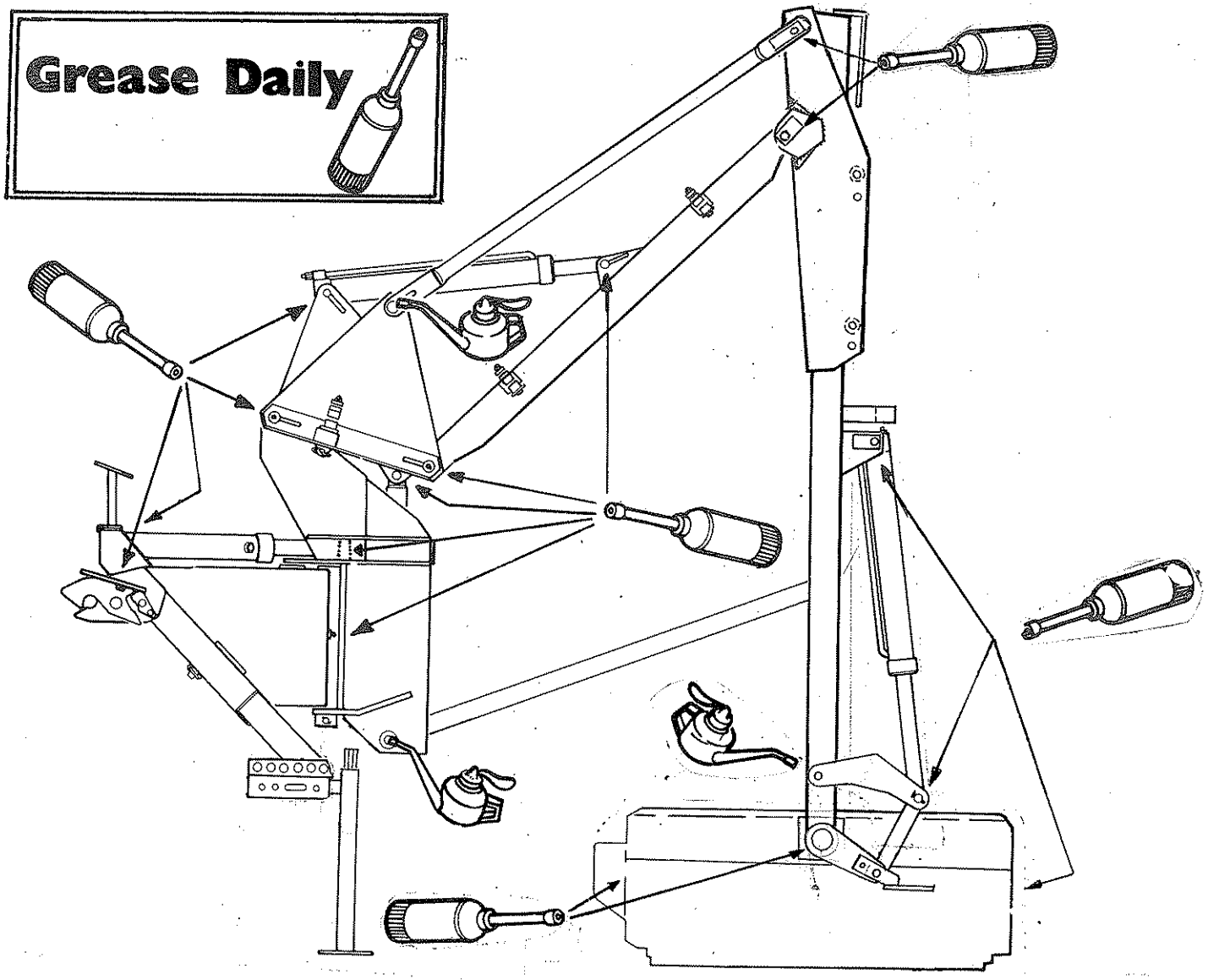
Lift off the lever assembly from the operating spigot within the tractor cab and re-locate it on its parking spigot on top of the armhead control valve. The assembly is held in this position by a split pin passed through the spigot.



STORAGE

If machine is to be left standing for an extended period of time, lightly coat the exposed portions 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 has to be stored outside, tie a piece of tarpaulin or canvas over the control assembly - do not use a plastic fertilizer bag which could lead to rapid corrosion.



1. LUBRICATION

Refer to the lubrication diagram above and grease daily all the points shown. Pay particular attention to the rotor shaft bearings; in arduous conditions these should be greased more often.
Use an oil can once weekly where indicated at other pivot points.

2. 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 13.8 kgf/m (100 lbf/ft.) Use only the correct flail bolt and locking nut. Ensure that spring washers are in position under the bolt head as well as beneath the lock nut. Check the condition of 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 will rapidly damage the rotor bearings and the motor coupling. 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 pairs and never match up a new flail with a re-sharpened one which will of course be lighter.

An exercise which may be worth carrying out when vibration is a serious problem is to weigh the flails individually on a set of kitchen scales, pairing them off as near as possible to the same weight before attaching them to the rotor opposite each other.

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 the bearing housing and hydraulic motor mounting nuts and bolts are kept tight. They should be checked during routine servicing.

3 Hydraulic System

a) Oil supply

The total capacity of the system is approximately 50 litres (11 gallons). The oil level should be checked daily. Visually check at the filler cap. The level should be approximately 80 mm (3 inches) below the top of 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 'O' 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.

3b) Filter Maintenance

The machine is protected by a 125 micron suction strainer within the reservoir and two low pressure 10 micron full flow return line filters mounted on the machine.

i) Suction strainer

The suction strainer in the tank should be cleaned annually. The oil tank cover plate is removed to give access and should be re-joined with a gasket compound when re-fitting. The strainer does not have a by-pass thus giving complete protection from dirt to the pump and system.

Blockage of the strainer will cause poor system operation, i.e. spongy or intermittent operation of the arms or the flail drive, some pump noise may be noticed particularly with cold oil; if these systems develop the strainer must be serviced. Unscrew the strainer from the suction pipe and wash thoroughly in clean diesel fuel or solvent. Shake to dry, alternatively if an air line is available apply to the inside of the strainer. Do not direct an air blast against the exterior surface.

ii) Priming circuit filter

A full flow canister type filter of 10 micron rating is fitted on the top of the main frame. Its function is to filter priming oil before it enters the main flail circuit. The filter should be changed after the first fifty hours of working and thereafter at 250 hour intervals.

If the filter element is neglected and allowed to become choked, then a by-pass valve within the filter will lift off its seat and allow unfiltered oil and the accumulated rubbish to circulate into the system.

iii) Flail circuit filter

A canister type low pressure filter of 10 micron rating is situated just upstream of the rotor control valve. The filter is a full flow type and is equipped with a by-pass. Blockage of this filter will allow the by-pass to operate with no external indication of filter failure. The result would be reduced pump and motor life by unfiltered oil and accumulated debris entering the system. It could also lead to mal-function of the rotor control valve.

It is most important therefore that this filter is changed after fifty hours of operation and thereafter at 500 hour intervals or annually, whichever occurs first.

IMPORTANT NOTE

It is earnestly recommended that any work necessary on hydraulic components is entrusted to your dealer who is equipped to carry out this work.

4 Armhead control valve assembly

a) Replacing damaged or worn spool 'O' rings

i) Release the locknut located on the cable at the back of the sleeve. Remove the two allen headed capscrews that secure the sleeve to the valve block and screw the sleeve back down the threaded portion of the cable to reveal the clevis pin which is then withdrawn from the end of the spool. Take care not to lose the roller in the eye of the spool end.

ii) Remove the spring cover at the opposite end of the spool and remove the setscrew to release the return spring assembly.

iii) Pull the spool through the block from the cable end until 'O' ring marked 'A' is accessible. Remove the 'O' ring from its groove using a smooth edged hook.

iv) Completely remove the spool from the block out of the return spring end.

v) Remove 'O' ring marked 'B' and refit a new 'O' ring.

vi) Lightly oil the spool and replace it in the block from the return spring end pushing it through just far enough to clear 'O' ring groove at 'A'.

vii) Fit new 'O' ring in groove 'A'.

viii) Push the spool back through from the cable end far enough to re-assemble the return spring assembly and cover.

ix) Replace the clevis pin in the spindle eye and re-assemble the sleeve. Adjustment of the threaded section being correct when the handle on the control box is in a vertical position. Re-tighten the locknut.

Note: 1. Owing to the sharp edges in the design of the spool, failure to follow the above procedure could result in damage to the new 'O' rings resulting in external leakage.

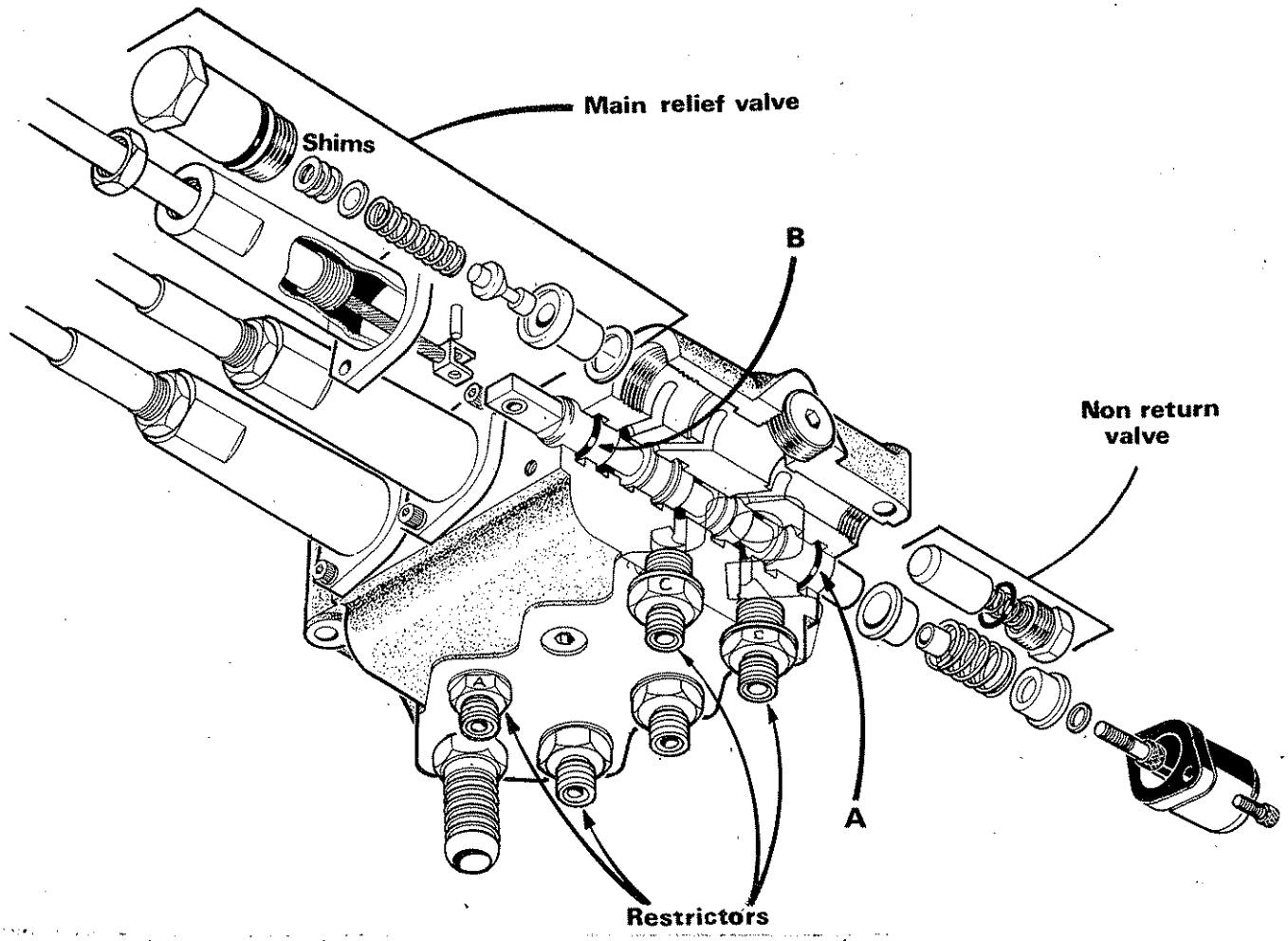
2. The spools are selectively assembled, matched with their mating bores in the block and should not be interchanged.

4b) Relief valve

The relief valve setting is 177 Kg/m^2 (2,600 psi).

A sticking relief valve will probably cause overheating and/or loss of power. If this is suspected it should be dismantled and examined for dirt and damage.

If any part of the valve is damaged a new relief valve assembly should be fitted. A pressure gauge in the supply circuit must be used to check the relief valve pressure which can be adjusted by adding or removing shims in the relief valve cap. Under no circumstances should shims be added without the use of a reliable pressure gauge otherwise serious damage to the pump could result.



For hose connections prior to serial no. 34 HL 39 see page

c) Non-return valve

The non-return valve prevents the feed back of oil from the service ports to the pump. It is unlikely to need attention but if removed for cleaning a new '0' ring should be fitted.

d) Restrictors

Restrictor unions which are identified by code letters are calibrated for correct speed of operation. The restricted hole should not be enlarged or the unions interchanged in the block.

5. Cable control system

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

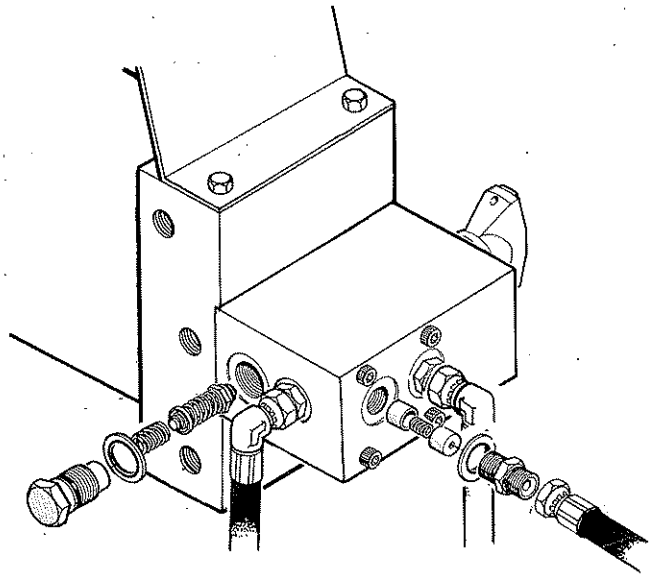
Care should be taken during installation and operation to ensure that the cables are not trapped or kinked. Any abrasion or damage to the outer casing should be sealed with plastic insulation tape to avoid moisture penetrating the cable.

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

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

6 Work transport valve

This valve identified with a white tap is immediately adjacent to the priming circuit filter block. The lift ram hose is connected via this valve and a service relief valve within the valve block pre-set to 210 bar (3000 psi) protects the ram if the breakaway operates and the flail head is trapped and unable to lift.

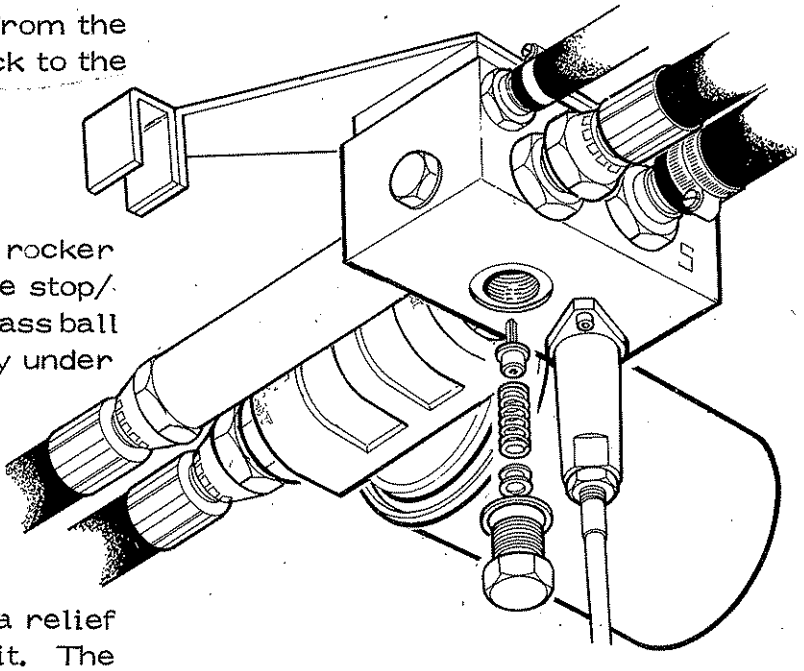


Beneath the ¼" BSP union for the breakaway ram gland hose are 'one-way' restrictors. The innermost controls the rate of drop of the lift ram and the outer one controls the rate of slewing during changeover from Transport to Work position.

Creep of the lift ram can be caused by the tap not being fully closed, dirt in the service relief valve, or the service relief valve not seating properly within the block.

7 Rotor control valve

Oil from the armhead control valve is fed via the primary filter block into the main flail circuit at the rotor control valve. It there mixes with the returning oil being discharged from the hydraulic motor before being drawn down to the large pto driven pump. The same quantity of oil that is delivered from the armhead valve is then bled off back to the reservoir.



This valve which is mounted on the rocker frame is cable operated to control the stop/start action of the rotor through a by-pass ball valve which is operated automatically under over-run conditions.

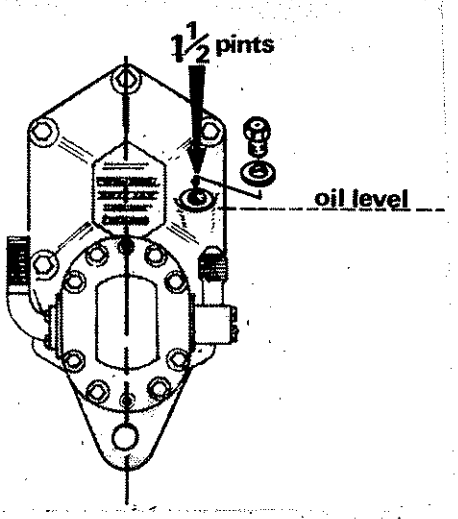
The rotor control valve also contains a relief valve to protect the main flail circuit. The relief valve uses a bush, needle and spring fitted directly into the body and shimmed on assembly to 170 bars (2500 psi).

Note:

The cable operated spool within the valve is selectively assembled to the valve body and cannot be supplied separately.

8. PTO Driven Gearbox

The gearbox holds approx. 1½ pints (.75 litre) of E.P.90 grade gear oil. It should be changed at 1000 hour intervals.



The oil level should be checked when carrying out routine maintenance on the machine and preferably when the machine has been at rest for some time. If the gearbox is mounted horizontally release the torque chain to allow the filler/level plug to adopt a vertical position.

If it appears that the gearbox is overfilled; then leakage past the hydraulic pump shaft seal must be suspected. The symptom will usually show itself as oil forcing its way past the pto shaft seal at the back of the gearbox or being expelled through the atmospheric breather valve which is incorporated in the filler plug.

9. PTO Driven 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 pump squarely together finally, tightening to a torque load of 34 - 36 lbf/ft. If servicing the tandem pump, both large and small pumps should be pulled down to the same tolerance of 34 - 36 lbf/ft.

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.

10. Hydraulic motor

Servicing of the hydraulic motor should be limited to replacing seals, gaskets and '0' rings. Components of the motor are matched to close tolerances and therefore are not replaceable as individual parts.

Should it be found necessary to replace a leaking shaft seal, the drive coupling will have to be removed from the shaft. Do not attempt to remove the coupling by hammering or leverage as this could damage the motor internally. Use a tool of the sprocket puller type. Remove the end cover by releasing the socket head cap screws. The seal can now be knocked out taking care not to damage the housing. On re-assembly the cap screws should be tightened to a torque figure of 6 kgm (43.5 lbf/ft).

11. 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) Angling, Reach and Breakaway Rams

Unscrew gland nut and withdraw the complete rod assembly.
Remove locking wire from groove of ram nut and unscrew nut.
Remove piston, piston seals and gland housing assembly from rod.
Renew all seals including the '0' ring behind piston.
Lubricate all seals on assembly and do not overtighten ram nut.
The piston seals should be capable of being rotated.
Tighten gland nut securely - if the gland nut has any tendency to become unscrewed, retighten and centre-pop the thread joint.

c) Lift Ram

This is a single-acting displacement type ram. To dismantle, grip the cylinder in a bench vice and rotate the gland retainer to expose the tail of the locking wire. Pry-up with a file tang or similar tool and counter rotate to wind the wire completely out of the groove. The gland retainer together with gland seal housing can now be withdrawn with the rod.
(See exploded parts diagram).

12. 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) Where 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.

Hose warranty

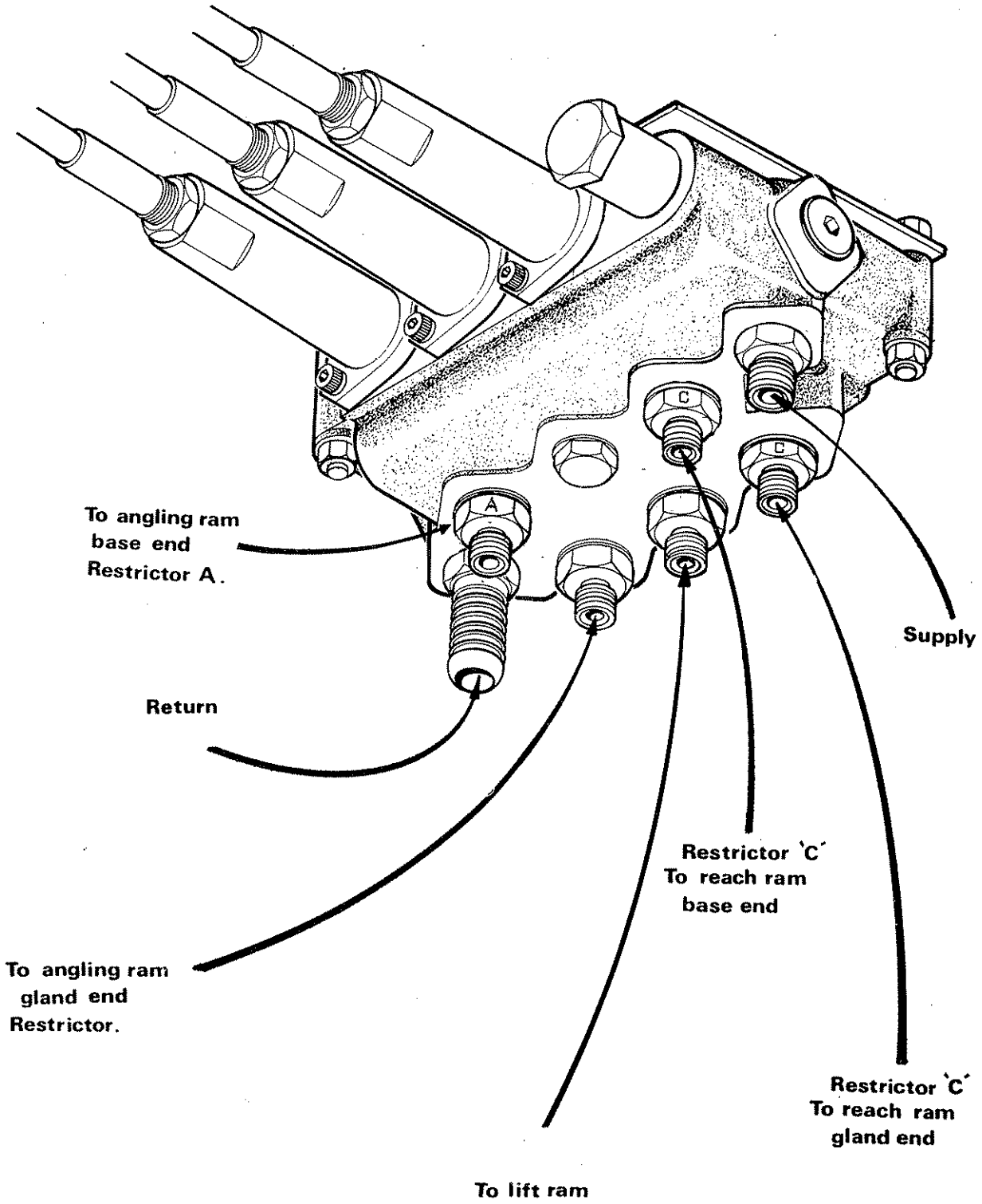
Warranty is limited to replacement of hoses which have failed due to faulty materials or manufacture. Warranty will not be considered on hoses that have suffered damage by abrasion, cuts or being pinched or trapped while in work. Neither will a claim be considered where a hose end has been damaged by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

13. FLOAT KIT ACCUMULATOR TEST

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 recharging.
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.

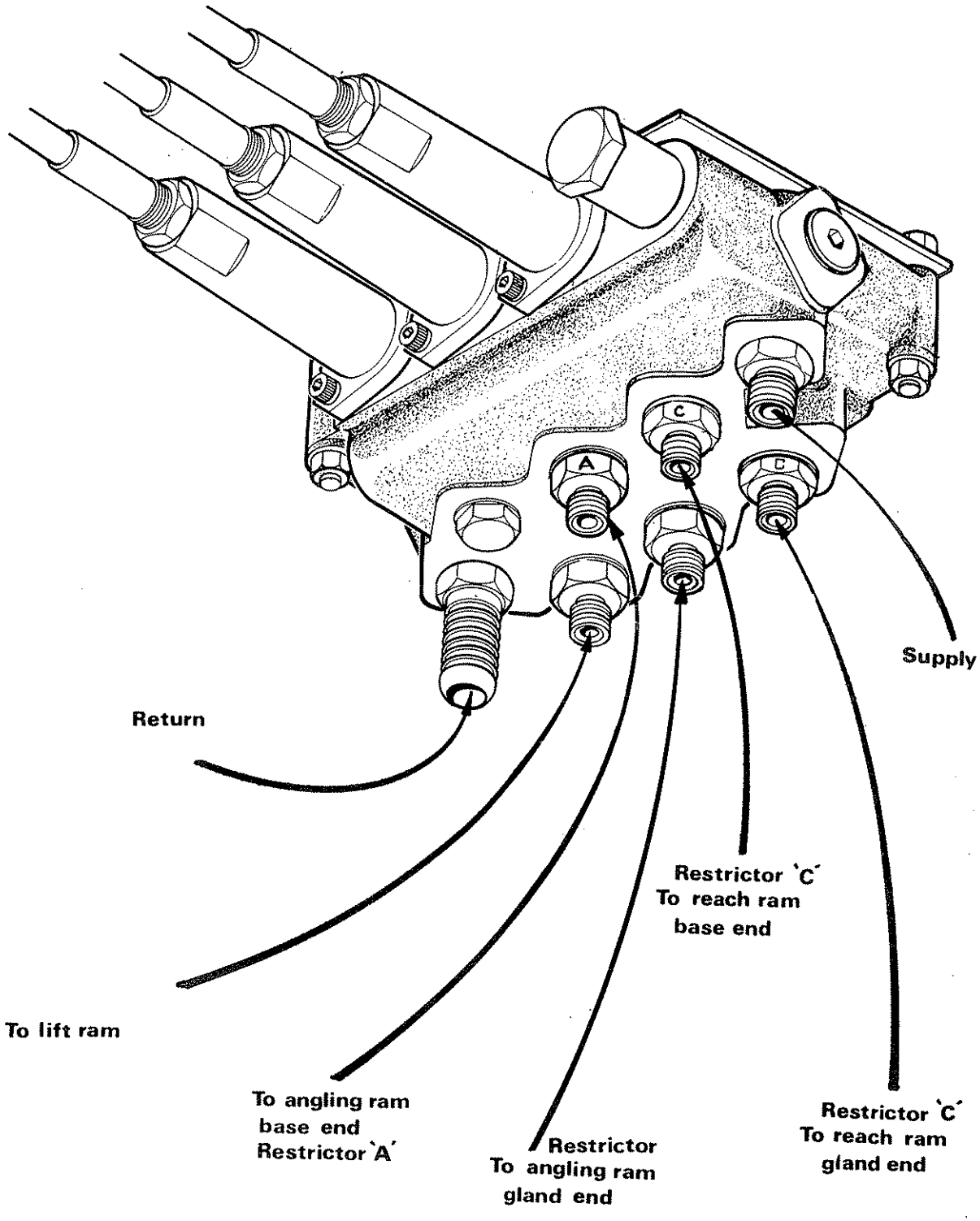
HOSE CONNECTIONS

For hose connections prior to serial no. 34 HL 39 see page 33



HOSE CONNECTIONS

Hose connection for machines prior to serial no. 34 HL 39



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.

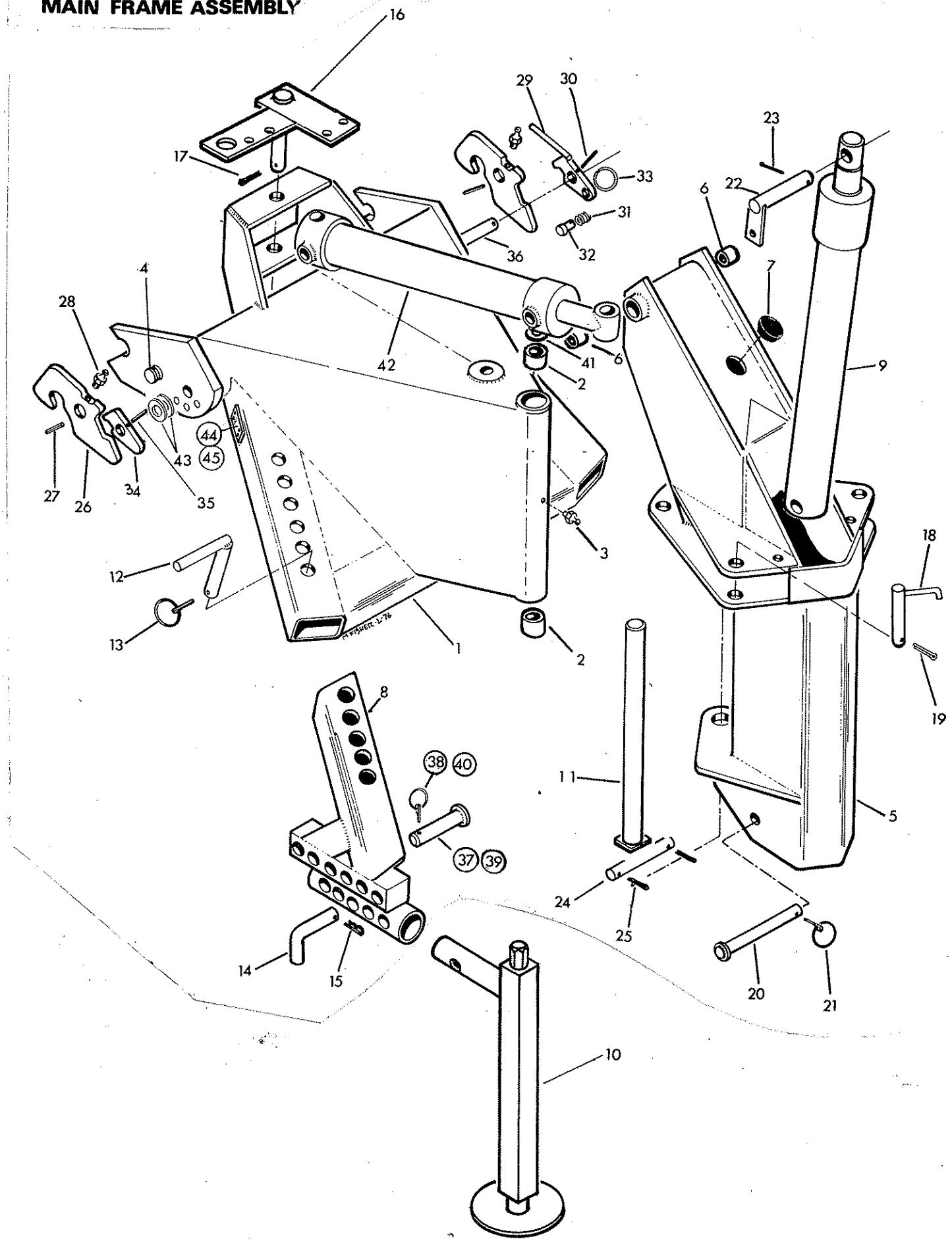
Always quote machine type and serial number as well as the part number.

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

THE DOT SYSTEM

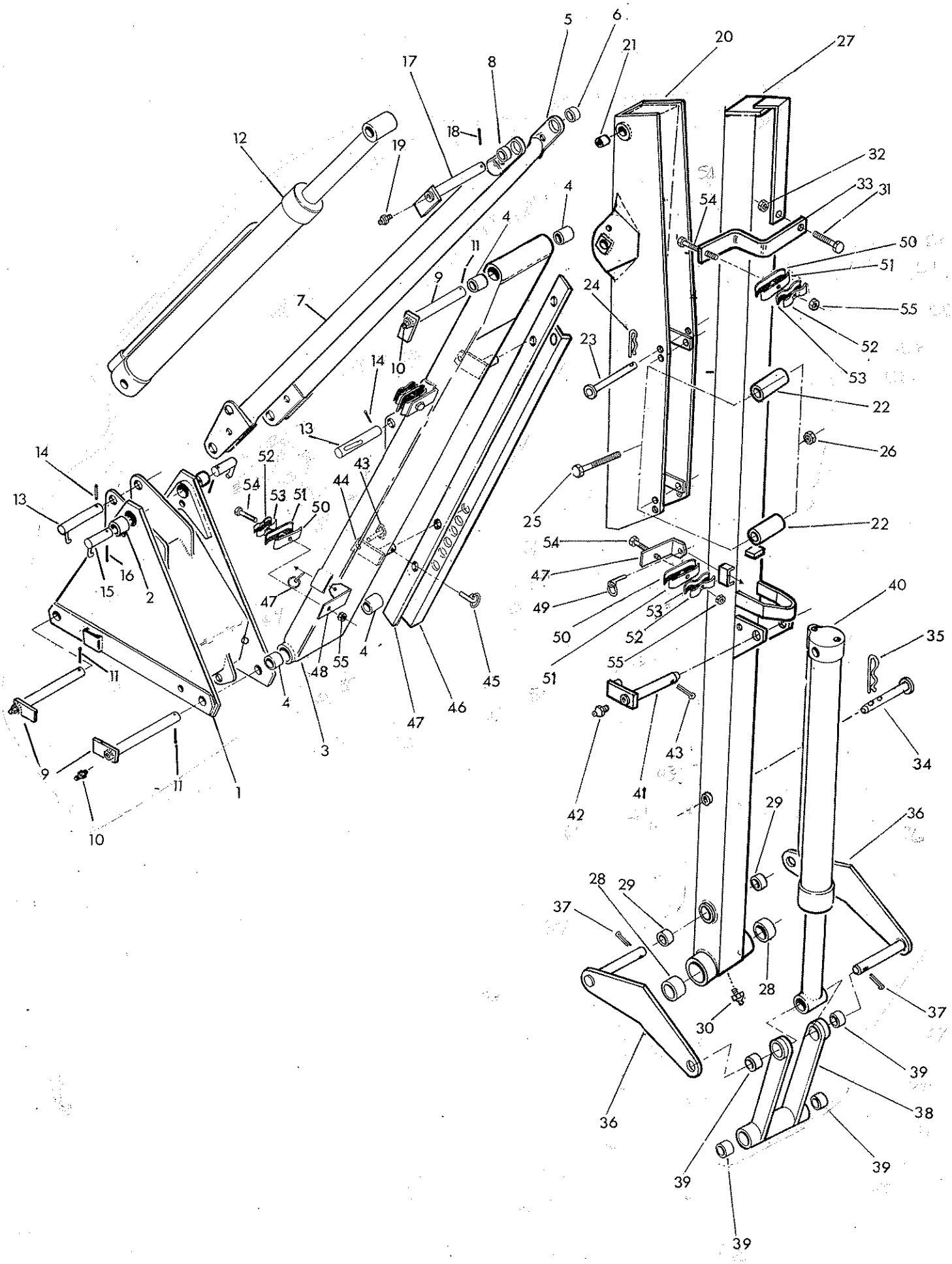
Many spares are supplied as Assemblies or as Sub-assemblies and, to help the customer determine the composition of an Assembly, the Dot System is used. The Main Assembly will not show a dot preceding its description and is printed in BLOCK CAPITALS. Subsequent listed parts are preceded by one or more 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 ASSEMBLY

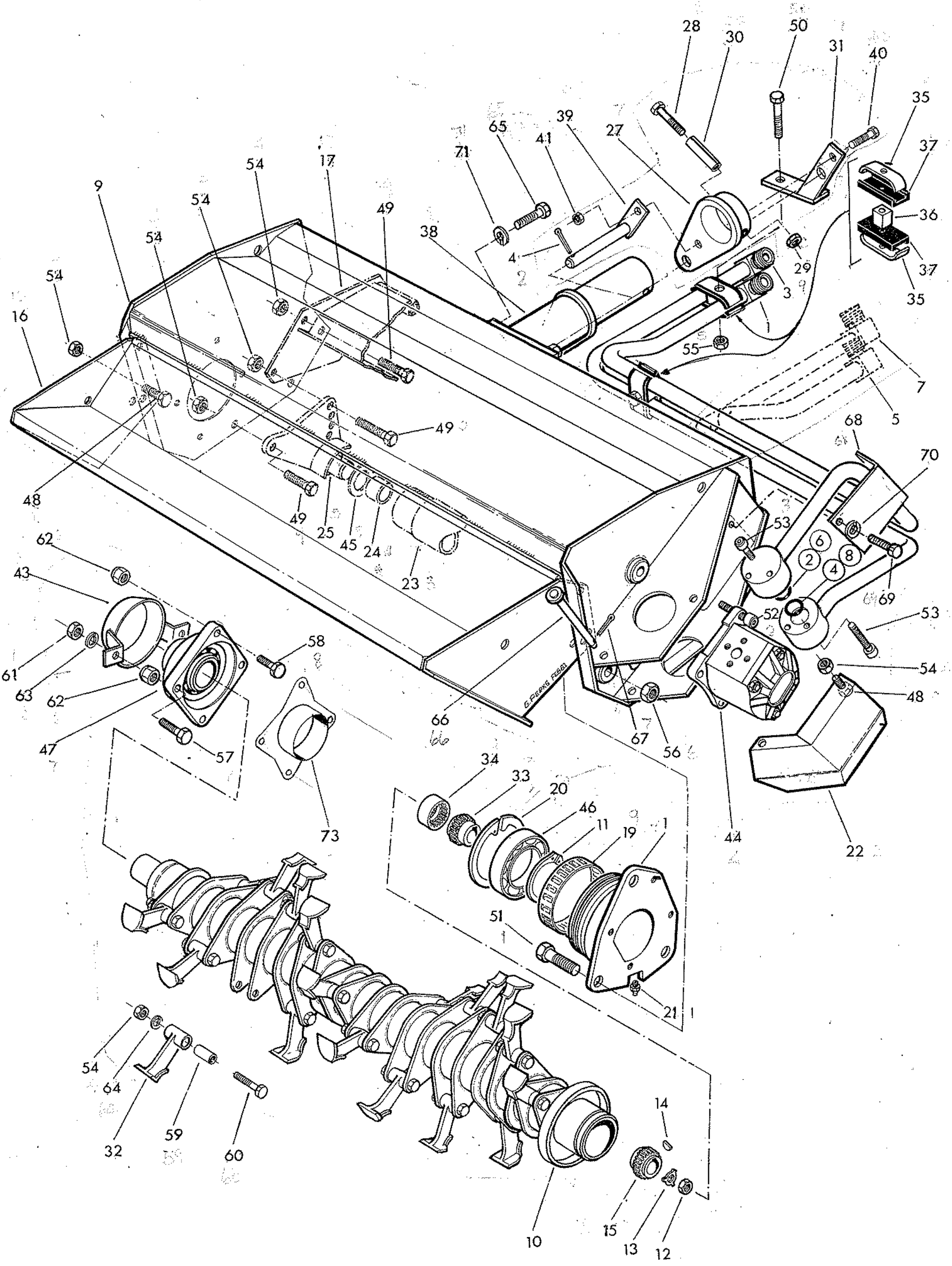


Ref	Part No.	Qty	Description
	71 09 410		HY REACH XL GENERAL ASSEMBLY
1	71 09 294	1	.Main Frame c/w bushes pin & greaser
2	60 01 003	2	..Bush
3	09 01 121	1	..1/8" BSP Greaser
4	71 06 061	2	..Pivot pin
5	71 09 257	1	.Pillar c/w bushes
6	71 01 134	2	..Bush
7	71 09 090	1	..Bung
8	71 09 295	1	.Welded Leg Assembly left hand
	71 09 296	1	.Welded Leg Assembly right hand, not illustrated.
9	71 09 263	1	.Lift ram
10	71 09 315	2	.Screw jack leg
11	71 09 031	1	.King post
12	71 09 059	2	.Leg pin
13	04 31 217	1	..Linch pin
14	71 09 060	2	.Stand pin c/w spring cotter
15	04 31 105	1	..Spring cotter
16	71 09 163	1	.Ram base pin c/w split pin
17	05 03 126	1	..Split pin
18	71 09 062	1	.Rod end pin c/w split pin
19	05 03 126	1	.Split pin
20	71 09 063	1	.Lift ram base pin
21	04 31 217	1	..Linch pin
22	71 09 064	1	.Lift ram rod end pin
23	05 03 126	1	..Split pin
24	71 09 065	1	.King post retainer pin c/w split pins
25	05 03 095	2	..Split pin
26	71 06 063	2	.Cross shaft locking latch c/w spring dowel
27	04 21 836	1	..Spring dowel ¼" x 2¼"
28	09 01 121	1	..1/8" BSP Greaser
29	71 06 064	1	.Hand operated catch c/w spring dowel
30	04 22 524	1	..Spring dowel 5/16" x 1½"
31	81 11 009	1	..Spring
32	71 06 192	1	..Plunger
33	71 01 111	1	..Ring
34	71 06 066	1	.Slave locking catch c/w spring dowel
35	04 21 836	1	..Spring dowel ¼" x 2¼"
36	71 06 067	1	.Locking rod
37	71 06 085	2	.Linkage pin category 1
38	04 31 217	1	..Linch pin
39	68 03 012	2	.Linkage pin category 11
40	04 31 217	1	..Linch pin
41	60 01 136	1	.Thrust washer
42	71 09 274	1	.Breakaway ram assembly
43	71 05 115	To suit	.Shim 7/8" diameter special
44	71 09 233	1	.Serial plate
45	28 00 020	4	.Pop rivet 1/8" dia
	73 13 324	1	.Guard kit - not illustrated See page 62

ARM ASSEMBLY



Ref	Part No.	Qty	Description
	71 09 410		HY-REACH XL GENERAL ASSEMBLY cont.
1	71 09 267	1	.Rocker c/w bushes
2	71 01 083	2	..Bush
3	71 09 361	1	.Main arm c/w bushes
4	71 01 134	4	..Bush
5	71 09 365	1	.Tension link R. Hand c/w bush
6	70 12 037	1	..Bush
7	71 09 366	1	.Tension link L.Hand c/w bush
8	70 12 037	1	..Bush
9	71 09 066	3	Rocker pivot pin c/w greaser & split pin
10	09 01 121	1	..Greaser 1/8" BSP St
11	05 03 166	1	..Split pin ¼" x 2" long
12	71 09 275	1	.Reach ram assembly see page 61
13	71 09 071	1	.Reach ram base pin c/w s/pin
14	05 03 126	1	..Split pin ¼" dia x 1½" long
15	71 09 067	2	.Tension link pin c/w split pin
16	05 03 126	1	..Split pin ¼" dia x 1½" long
17	71 09 095	1	.Tension link pin c/w greaser & split pin
18	05 03 126	1	..Split pin ¼" dia. x 1½" long
19	09 01 121	1	..Greaser 1/8" BSP St
20	71 09 363	1	.Dipper arm upper c/w bush, roller etc
21	71 01 083	2	..Bush
22	71 09 177	2	..Roller
23	71 09 178	1	..Safety pin c/w spring cotter
24	04 31 105	1	...Spring cotter
25	02 11 446	2	..Bolt 5/8" UNF x 5½" long
26	01 41 006	2	..'Clevelok' nut 5/8" UNF
27	71 09 360	1	.Dipper arm lower c/w bushes, greaser etc
28	71 11 175	2	..Bush
29	71 01 083	2	..Bush
30	09 01 121	1	..Greaser 1/8" BSP- St
31	93 13 065	1	..Setscrew M10 x 30
32	91 43 005	1	..'Clevelok' nut M10
33	71 09 180	1	..Hose bracket
34	71 09 181	1	..Stowage pin c/w spring cotter
35	04 31 105	1	...Spring cotter
36	71 11 053	2	.Radius arm pin c/w split pin
37	95 01 406	1	..Split pin Ø5 x 40
38	71 14 340	1	.Slave link c/w bushes
39	71 01 083	1	..Bush
40	71 14 342	1	.Angling ram assembly see page 61
41	71 14 080	1	.Angling ram base pin c/w split pin & greaser
42	09 01 121	1	..Greaser 1/8" BSP - St
43	05 03 126	1	..Split pin ¼" dia x 1½" long
44	71 09 133	2	.Park stay bracket c/w linch pins
45	04 31 217	2	..Linch pin
46	71 09 311	1	.Stowage strap
47	71 09 102	1	.Stand strap
48	71 09 073	1	.Hose bracket c/w linch pin
49	04 31 217	1	..Linch pin
50	71 09 084	4	.Hose clip lower (large)
51	73 13 130	4	.Hose clip (large)
52	71 14 075	4	.Hose clamp upper - small
53	71 14 076	4	.Hose clamp lower - small
54	92 13 185	4	.Bolt M10 x 90
55	91 00 002	4	.Clevelok nut M10



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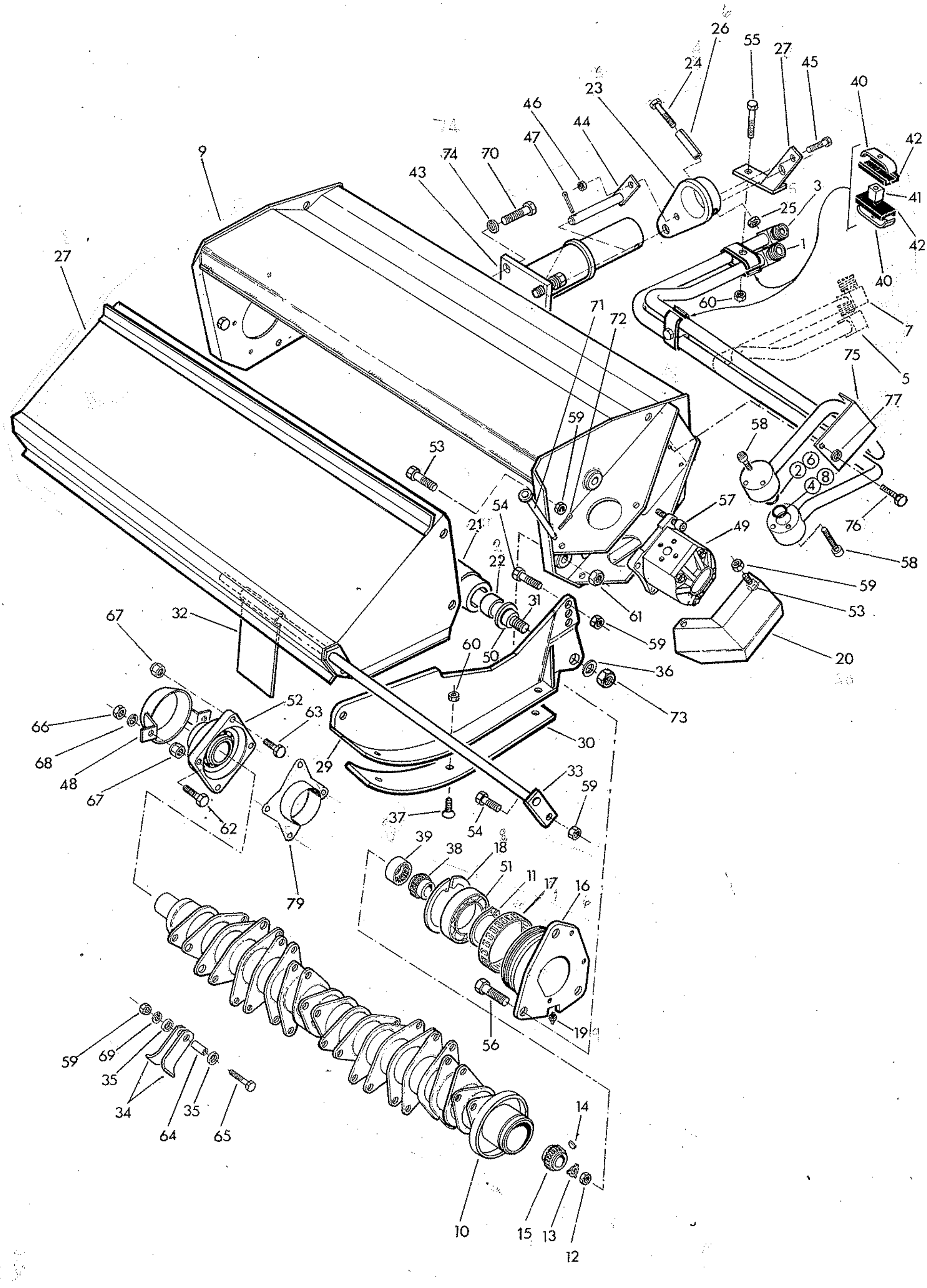
Ref	Part No	Qty	Description
	71 14 326		HEDGE FLAIL HEAD R. HAND
1	71 14 320		.Rigid pipe upper c/w 'O' ring (for R. Hand working)
2	86 00 121		..'O' ring
3	71 14 321		.Rigid pipe lower c/w 'O' ring (for R. Hand working)
4	86 00 121		..'O' ring
	71 14 328		HEDGE FLAIL HEAD L. HAND
5	71 14 344		.Rigid pipe upper c/w 'O' ring (for L. Hand working)
6	86 00 121		..'O' ring
7	71 14 345		.Rigid pipe lower c/w 'O' ring (for L. Hand working)
8	86 00 121		..'O' ring
	The following items are common to both flail heads		
9	71 14 325	1	.Flail casing
10	71 14 331	1	.Flail rotor c/w nut, washer, woodruff key, circlip & coupling half
11	04 01 290	1	..External circlip Ø 90
12	91 00 015	1	..Hexagon nut M14
13	82 01 139	1	..Tab washer Ø 14
14	83 01 010	1	..Woodruff key
15	71 14 104	1	..Coupling half
16	71 14 335	1	.Front hood
17	71 14 336	1	.Rear hood
18	71 14 298	1	.Bearing housing c/w tolerance ring circlip & greaser
19	71 14 042	1	..Tolerance ring
20	71 14 043	1	..Internal circlip Ø 140
21	09 01 125	1	..Greaser 1/8" BSP - 45°
22	71 14 337	1	.Motor cover
23	71 14 096	1	.Roller c/w bushes
24	72 13 023	2	..Bush
25	71 1 090	1	.Roller bracket R. Hnad
26	71 11 091	1	.Roller bracket L. Hand (not illustrated)
27	71 14 109	1	.Jaw plate c/w nut bolt & spring dowel
28	92 13 185	1	..Bolt M10 x 90
29	91 43 005	1	..'Clevelok' nut M10
30	04 23 548	1	..Spring dowel 5/8" dia x 3" long
31	71 14 100	1	.Pipe mounting bracket
32	71 14 312	24	.Flail F12 H
	71 14 105	1	.Coupling assembly comprising:-
33	71 14 104	2	..Drive coupling half
34	71 14 103	1	..Coupling sleeve
35	71 14 046	4	.Rigid pipe clamp
36	71 14 048	2	.Pipe spacer
37	71 14 047	4	.Pipe clamp strip
* 38	71 14 341	1	.Forward extension
39	71 14 099	1	.Slave link pin c/w split pin, nut & bolt
40	92 13 075	1	..Bolt M10 x 35
41	91 43 005	1	..'Clevelok' nut M10
42	95 01 046	1	..Split pin Ø 5 x 40
43	71 14 339	1	.Bearing cover
44	83 01 258	1	.Hydraulic motor
45	60 01 136	2	.Thrust washer
46	06 00 043	1	.Bearing (6018 - Z)
47	06 00 062	1	.Flange bearing
48	03 11 085	6	.Setscrew ½" UNF x 1" long
49	03 11 105	4	.Setscrew ½" UNF x 1¼" long
50	92 13 135	2	.Bolt M10 x 65
51	73 14 146	3	.Special bolt M16 x 50
52	93 00 104	4	.'Wedglok' capscrew M10 x 40
53	93 00 014	6	.'Wedglok' capscrew M10 x 60
54	01 41 005	34	.'Clevelok' nut ½" UNF
55	91 43 005	3	.'Clevelok' nut M10
56	91 43 007	3	.'Clevelok' nut M16
57	02 11 186	2	.Bolt 5/8" UNF x 2¼" long
58	03 11 146	2	.Setscrew 5/8" UNF x 1¾" long
59	71 14 108	24	.Flail pivot bush
60	71 14 082	24	.Special bolt
61	01 31 006	2	.Thin hexagon nut 5/8" UNF
62	01 41 006	4	.'Clevelok' nut 5/8" UNF
63	01 00 206	2	.Spring washer 5/8" dia.
64	01 00 205	24	.Spring washer
65	03 11 106	4	.Setscrew 5/8" UNF x 1¼" long
66	71 14 049	1	.Motor cover mounting pin c/w split pin
67	05 03 095	1	.Split pin 3/16" dia x 1 1/8" long
68	71 14 145	1	.Pipe guard
69	03 11 065	2	.Setscrew ½" UNF x ¾" long
70	01 00 205	2	.Spring washer
71	01 00 406	4	.External serrated washer 5/8" UNF dia
72	73 14 399	1	.Flail warning sticker - not illustrated
73	71 14 464	1	.Shroud ring

86 99 166	SEAL KIT HYDRAULIC MOTOR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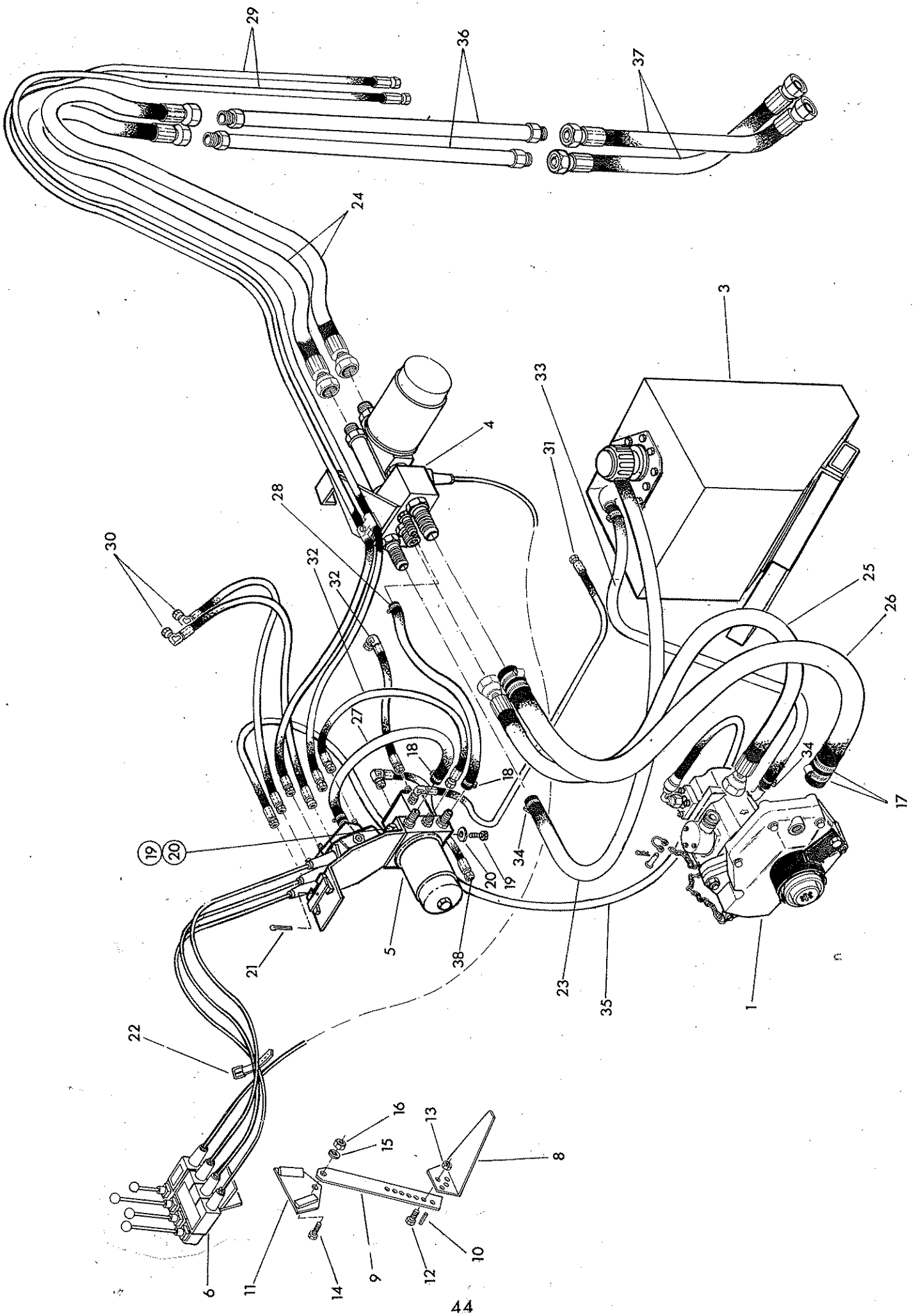
Ref	Part No	Qty	Description
	71 14 327		GRASS FLAIL HEAD R. HAND
1	71 14 320	1	.Rigid pipe upper c/w 'O' ring (for R. Hand working)
2	86 00 121	1	..'O' ring
3	71 14 321	1	.Rigid pipe lower c/w 'O' ring (for R. Hand working)
4	86 00 121	1	..'O' ring
	71 14 329		GRASS FLAIL HEAD L. HAND
5	71 14 344	1	.Rigid pipe upper c/w 'O' ring for(L. Hand working)
6	86 00 121	1	..'O' ring
7	71 14 345	1	.Rigid pipe lower c/w 'O' (for L.Hand working)
8	86 00 121	1	..'O' ring
	The following items are common to both flail heads		
9	71 14 325	1	.Flail casing
10	71 14 331	1	.Flail rotor c/w nut, washer, woodruff key, circlip & coupling half.
11	04 01 290	1	..External circlip Ø 90
12	91 00 015	1	..Hexagon nut M14
13	82 01 139	1	..Tab washer Ø 14
14	83 01 010	1	..Woodruff key
15	71 14 104	1	..coupling half
16	71 14 298	1	.Bearing housing c/w tolerance ring circlip & greaser
17	71 14 042	1	..Tolerance ring
18	71 14 043	1	..Internal circlip Ø 140
19	09 01 125	1	..Greaser 1/8 BSP - 45°
20	71 14 337	1	.Motor cover
21	71 14 096	1	.Roller c/w bushes
22	72 13 023	2	..Bush
23	71 14 109	1	.Jaw plate c/w nut, bolt & spring dowel
24	92 13 185	1	..Bolt M10 x 90
25	91 43 005	1	..'Clevelok' nut M10
26	04 23 548	1	..Spring dowel 5/8" dia x 3'long
27	71 14 100	1	.Pipe mounting bracket
28	71 14 374	1	.Grass hood
	71 14 375	1	.Skid R. Hand
29	71 14 376	1	.Skid L . Hand
30	73 14 323	2	.Skid runner
31	71 14 377	1	.Roller tie rod
32	71 14 378	8	.Flap
33	71 14 119	1	.Flap bar
34	71 14 120	48	.Flail F12G
35	71 14 121	48	.Flail spacer
36	91 00 108	2	.Plain washer Ø 20
37	93 33 065	6	.C/Sunk setscrew M10 x 30
38	71 14 105	1	.Coupling assembly comprising:-
	71 14 104	2	..Drive coupling half
39	71 14 103	1	..Coupling sleeve
40	71 14 046	4	.Rigid pipe clamp
41	71 14 048	2	.Pipe spacer
42	71 14 047	4	.Pipe clamp strip
43	71 14 341	1	.Forward extension
44	71 14 099	1	.Slave link pin c/w split pin, nut & bolt
45	92 13 075	1	..Bolt M10 x 35
46	91 43 005	1	..'Clevelok' nut M10
47	95 01 406	1	..Split pin Ø x 40
48	71 14 339	1	.Bearing cover
49	83 01 258	1	.Hydraulic motor
50	60 01 136	2	.Thrust washer
51	06 00 043	1	.Bearing (6018 - Z)
52	06 00 062	1	.Flange bearing
53	03 11 085	6	.Setscrew ½" UNF x 1" long
54	03 11 105	4	.Setscrew ½" UNF x 1¼" long
55	92 13 135	2	.Bolt M10 x 65
56	73 14 146	3	.Special bolt M16 x 50
57	93 00 104	4	.'Wedglok' capscrew M10 x 40
58	93 00 014	6	.'Wedglok' capscrew M10 x 60
59	01 41 005	34	.'Clevelok' nut ½" UNF
60	91 43 005	8	.'Clevelok' nut M10
61	91 43 007	3	.'Clevelok' nut M16
62	02 11 185	2	.Bolt 5/8" UNF x 2¼" long
63	03 11 146	2	.Setscrew 5/8" UNF x 1¾" long
64	71 14 108	24	.Flail pivot bush
65	71 14 082	24	.Special bolt
66	01 31 006	2	.Thin hexagon nut 5/8" UNF
67	01 41 006	4	.'Clevelok' nut 5/8" UNF
68	01 00 206	2	.Spring washer 5/8" dia
69	01 00 205	25	.Spring washer
70	03 11 106	4	.Setscrew 5/8" UNF x 1¼" long
71	71 14 049	1	.Motor cover mounting pin c/w split pin
72	05 03 095	1	.Split pin 3/16" dia x 1 1/8" long
73	91 43 008	2	.'Clevelok' nut M20
74	01 00 406	4	.External serrated washer 5/8 dia
75	71 14 145	1	.Pipe guard
76	03 11 065	2	.Setscrew ½" UNF x ¾" long
77	01 00 205	2	.Spring washer ½" dia
78	73 14 399	1	.Flail warning sticker - not illustrated
79	71 14 464	1	.Shroud ring

86 99 166	SEAL KIT HYDRAULIC MOTOR

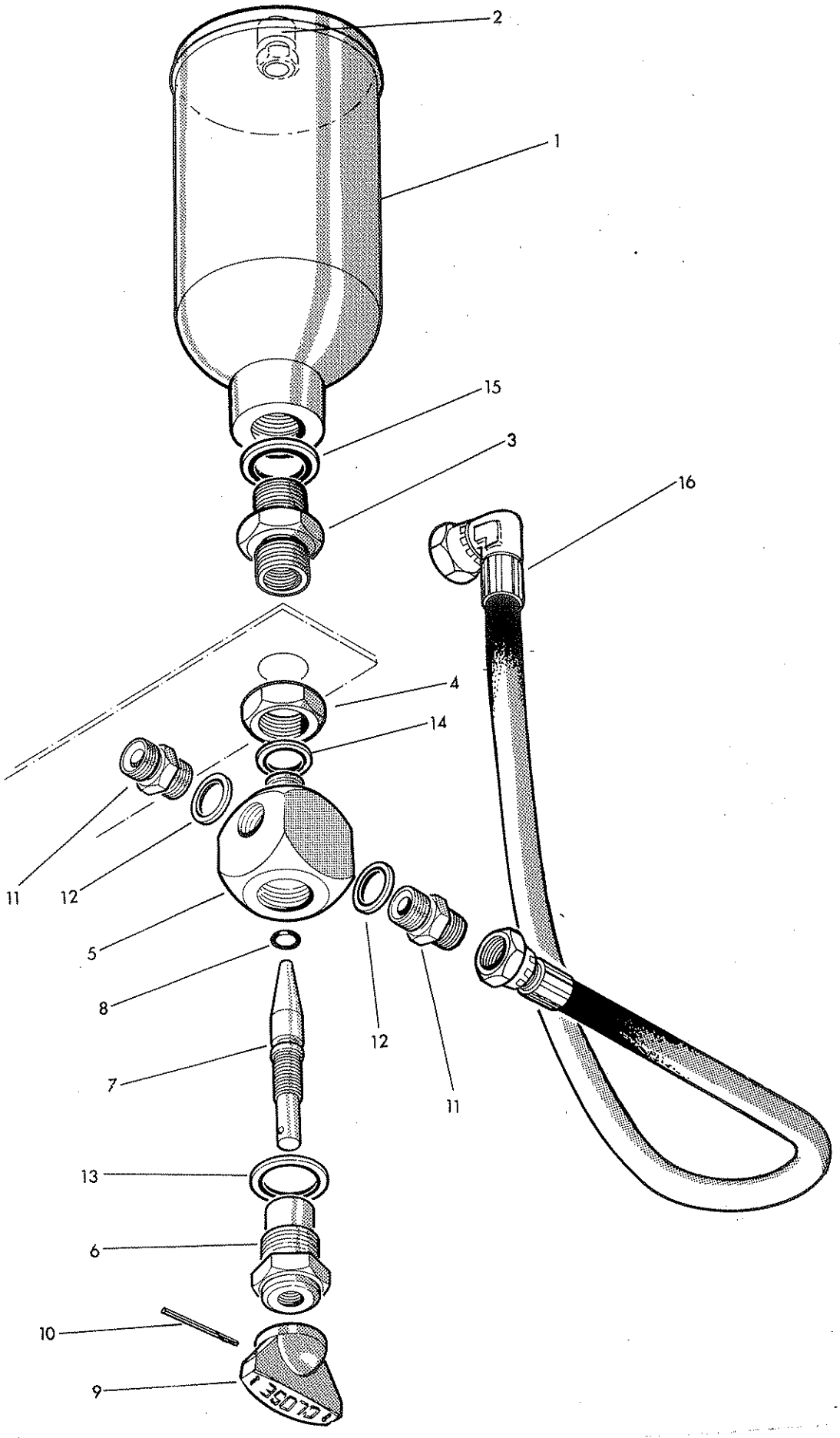
HYDRAULIC INSTALLATION



Ref	Part No.	Qty	Description
	80 17 265		HYDRAULIC INSTALLATION R. HAND
1	82 01 503	1	.Gearbox double pump assembly (see page 56)
	80 17 266		HYDRAULIC INSTALLATION L. HAND
2	82 01 504	1	.Gearbox double pump assembly (see page 56)
	The following items are common to both hydraulic installations		
3	71 09 312	1	.Oil tank assembly (see page 57)
4	81 25 312	1	.Rotor control valve assembly (See page 48)
5	81 30 309	1	.Filter/park work valve assembly (see page 54)
6	81 30 259	1	.Control assembly (see pages 50, 48)
7	71 09 319	1	.Universal socket and pillar compr:-
8	71 09 320	1	..Sandwich plate
9	71 09 146	1	..Pillar c/w spring dowel
10	04 22 816	1	..Spring dowel
* 11	71 09 147	1	..Socket
12	93 13 066	1	..Setscrew M12 x 30
13	91 13 006	1	..Hexagon nut M12
14	03 11 086	1	..Setscrew 5/8" UNF x 1" long
15	01 00 206	1	..Spring washer 5/8" diameter
16	01 11 006	1	.Hexagon nut 5/8" UNF
17	09 04 108	4	.Hose clip 1¼" bore hose
18	09 04 204	4	.Hose clip 5/8" bore hose
19	93 13 034	4	.Setscrew M8 x 16
20	91 00 204	4	.Spring washer Ø8
21	05 03 083	1	.Split pin 1/8" dia x 1" long
22	71 02 208	As req'd	.Plastic hose strap
23	85 00 859	1	.Hose 1" dia bore x 59" long
24	85 01 107	2	.Hose 1" BSP S-F S-F x 111" long
25	85 01 059	1	.Hose 1" BSP S-F S-F x 78" long
26	85 01 039	1	.Hose 1¼" bore x 78" long
27	85 01 106	1	.Hose 5/8" bore x 27" long
28	85 01 090	1	.Hose 5/8" bore x 44" long
29	85 15 022	2	.Hose ¼" BSP S-F S-F x 208" long
30	85 35 042	2	.Hose ¼" BSP S-F 90° F x 40" long
31	85 35 052	1	.Hose ¼" BSP S-F 90° F x 70" long
32	85 35 062	3	.Hose ¼" BSP S-F 90° F x 15" long
33	85 00 866	1	.Hose rubber 66" long x 1" bore
34	09 04 106	4	.Hose clip (1" bore hose)
35	85 31 233	1	.Hose 3/8" BSP S-F 90° F 75" long
36	71 09 367	2	.Rigid flail pipe
37	85 01 060	2	.Hose 1" BSP S-F S-F 43" long
38	85 15 032	1	.Hose ¼BSP S-F 90°F

* Item11 deleted after September 1983.

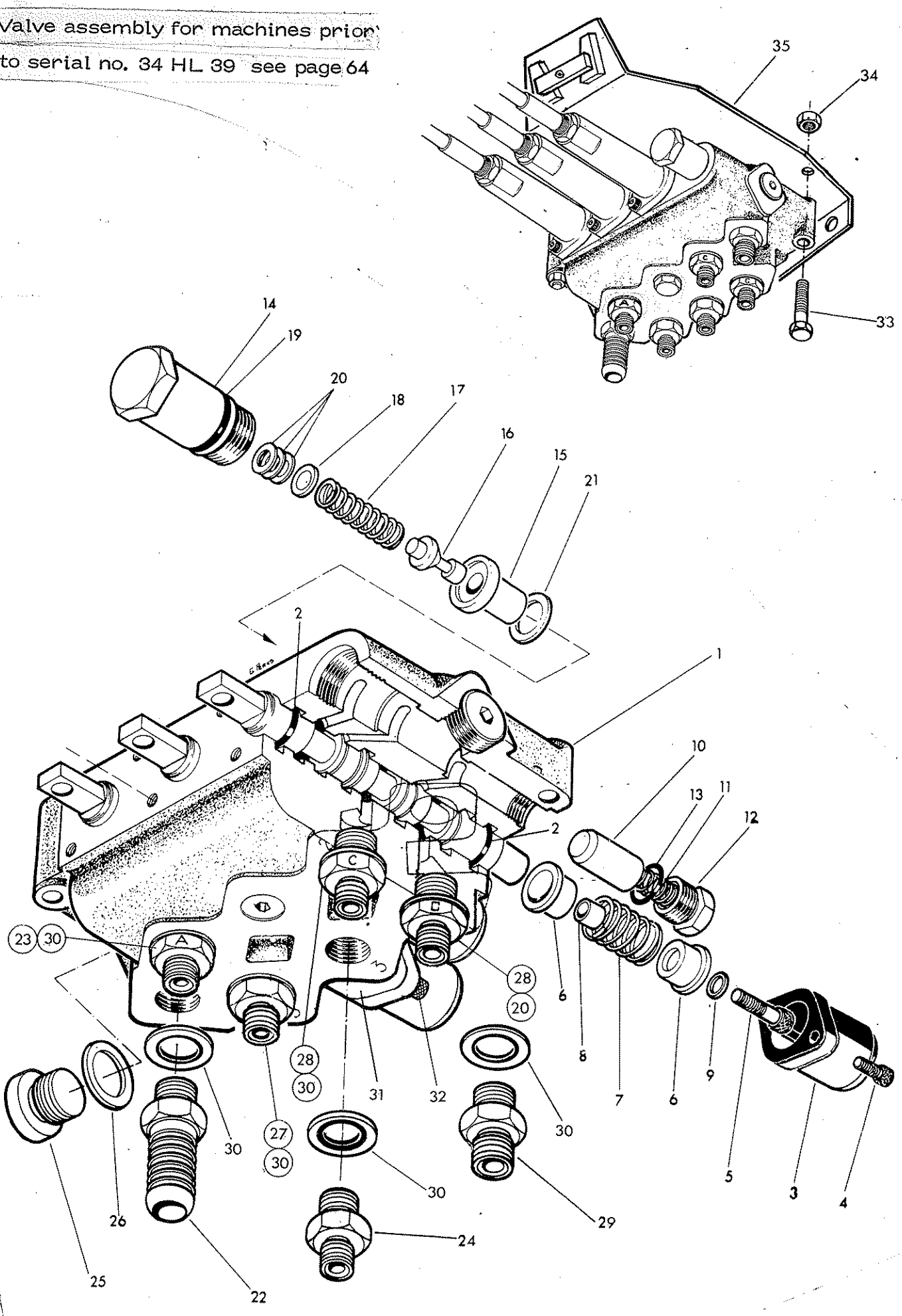
HYDRAULIC FLOAT KIT (For grass flails)



Ref	Part No.	Qty	Description
	81 26 256		HYDRAULIC FLOAT KIT
1	81 26 254	1	.Accumulator 500 psi pre-charge Nitrogen
2	81 26 015	1	..Charge valve assembly c/w '0' ring
	81 26 016	1	...Charge valve core
	86 00 103	1	...'0' ring
3	85 81 150	1	.Adaptor
4	85 81 151	1	.Backnut
	81 26 010	1	.Tap assembly comprising:-
5	13 37 133	1	..Tap body
6	81 06 043	1	..Gland nut
7	81 06 044	1	.. Spindle c/w '0' ring
8	81 06 045	1	...'0' ring
9	81 08 006	1	..Knob
10	04 20 820	1	..Spring dowel 1/8" diameter x 1¼" long
11	85 81 145	2	..Union ¼" BSP - 3/8" BSP M - M
12	86 50 103	2	..Bonded seal 3/8" BSP
13	86 50 104	1	..Bonded seal ½" BSP
14	86 50 103	1	.Bonded seal 3/8" BSP
15	86 50 106	1	.Bonded seal ¾" BSP
16	85 35 042	1	.Hose ¼" BSP Straight Female - 90° F

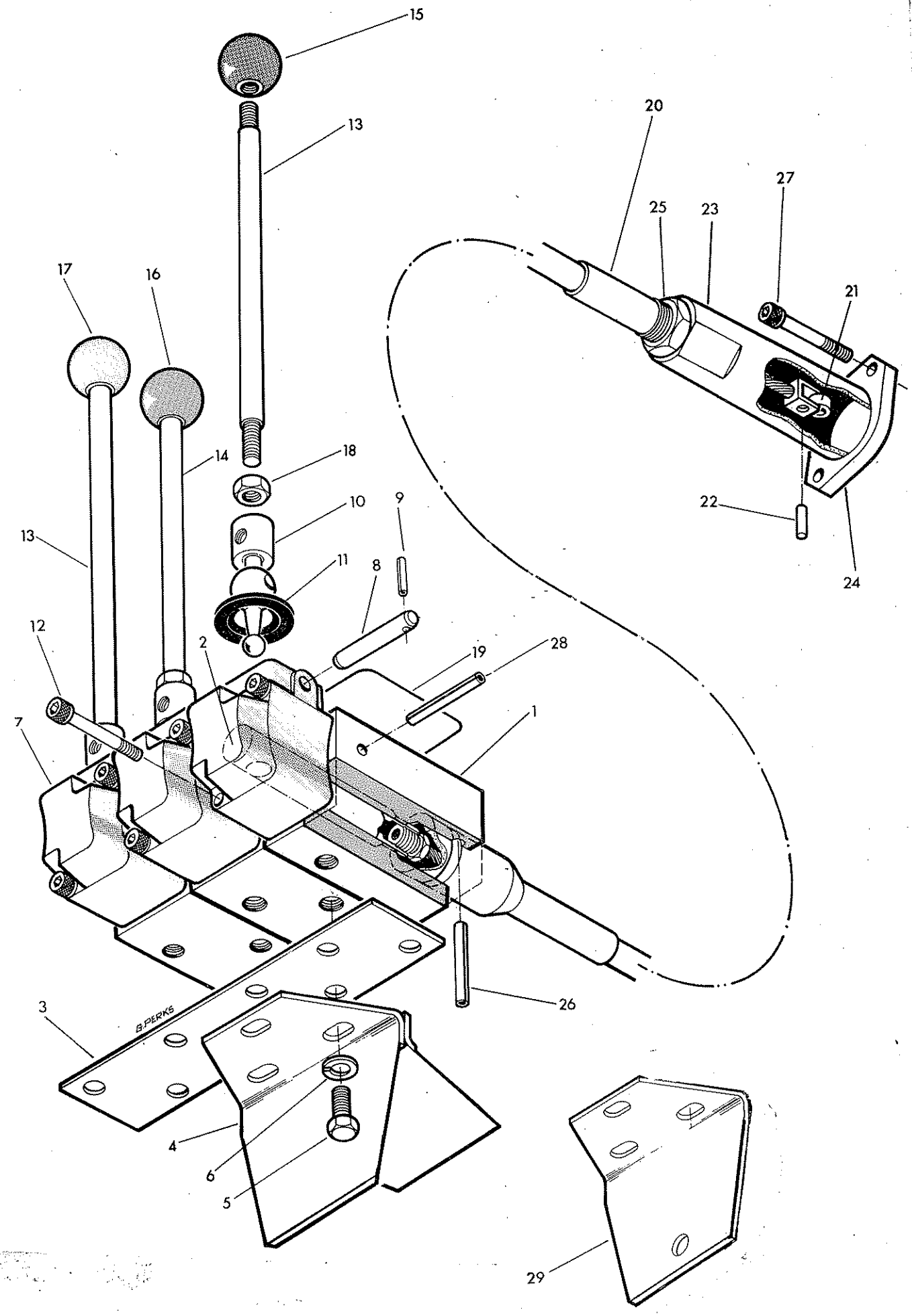
CONTROL VALVE

Valve assembly for machines prior to serial no. 34 HL 39 see page 64



Ref	Part No.	Qty	Description
	81 30 259		HYDRAULIC CONTROL ASSEMBLY
	81 30 258	1	.Valve c/w connections
1	81 30 313	1	..Valve block c/w spools '0' rings
2	86 00 112	6	...'0' ring
3	81 30 002	3	..Centring spring cover
4	93 43 022	4	..Socket headed capscrew M5 x 12
5	93 83 043	3	..Set screw M6 x 20
6	81 30 003	6	..Centring spring cup
7	81 30 004	3	..Centring spring
8	81 30 005	3	..Distance piece
9	81 30 020	3	..Washer
	81 30 022	1	..Non-return valve assembly comprising:-
10	81 30 006	1	...Supply check valve
11	81 30 007	1	...Spring
12	81 30 008	1	...Plug
13	86 00 501	1	...'0' ring
	81 30 023	1	..Relief valve assembly
14	81 30 045	1	...Relief valve body
15	81 30 016	1	...Relief valve seat housing
16	81 30 015	1	...Relief valve needle
17	81 30 011	1	...Relief valve spring
18	81 30 044	1	...Washer
19	86 00 113	1	...'0' ring
20	81 30 043	As req'd	...Shim
21	81 30 017	1	...Sealing washer
22	81 25 008	1	..Return connection 5/8" bore
23	81 30 046	1	..Restrictor union 'A' ¼ BSP - 3/8 BSP
24	85 81 145	1	..Union 3/8" BSP - ¼" BSP M-M
25	81 30 061	1	..Cap
26	81 30 064	1	...Copper sealing washer
27	81 30 066	1	..Restrictor union ¼" BSP - 3/8" BSP
28	81 30 048	2	..Restrictor union 'C' ¼" BSP - 3/8" BSP
29	60 00 113	1	..Union 3/8" BSP M - M
30	86 50 103	7	..Bonded seal 3/8" BSP
31	81 30 084	1	..Angling float detent assembly
32	92 43 102	2	..Socket headed capscrew M5 x 50
33	92 13 114	3	.Bolt M8 x 55
34	91 43 004	3	.'Clevelok nut M8
35	81 30 080	1	.Valve mounting bracket
	86 99 163		SEAL KIT

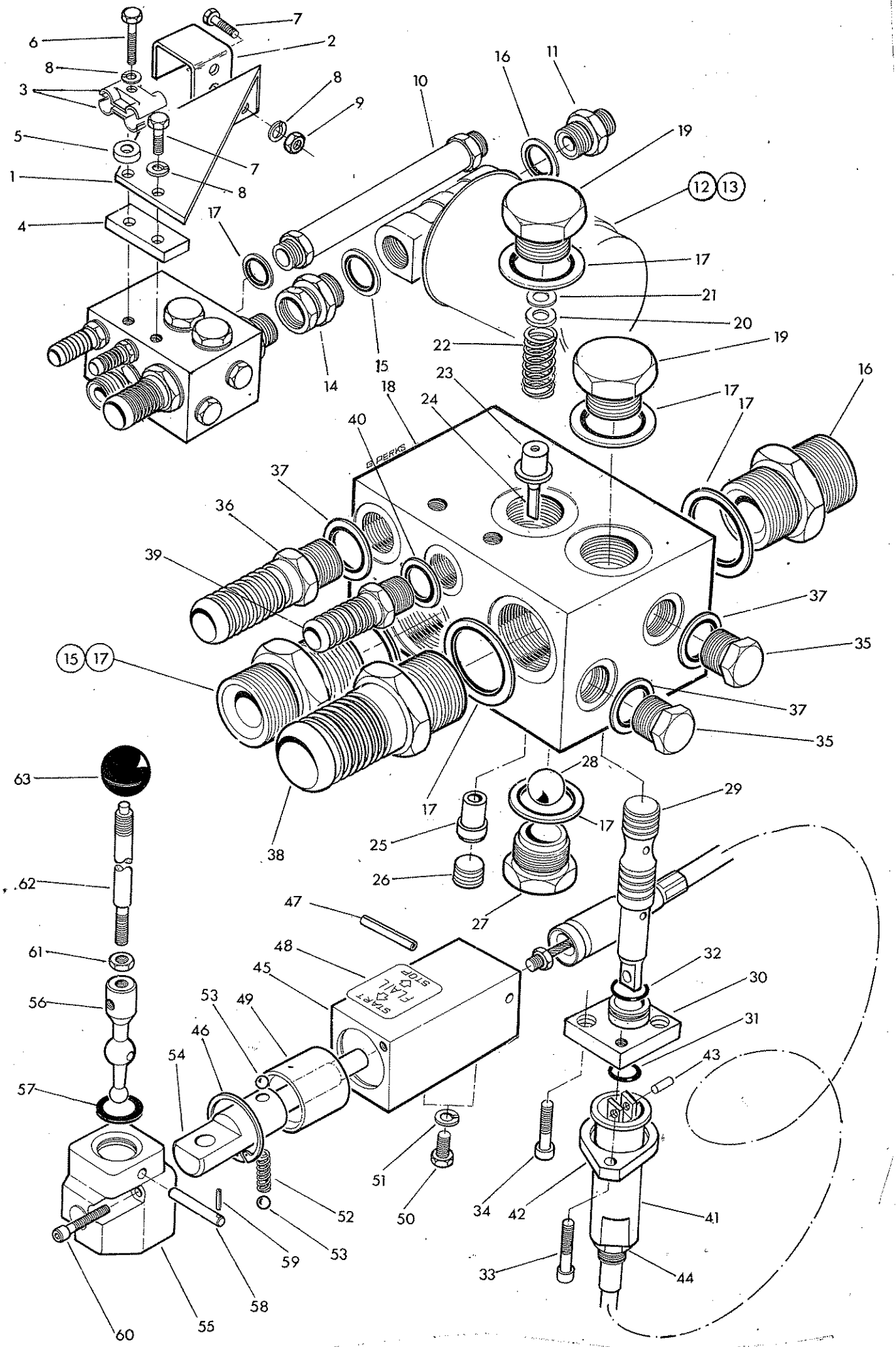
LEVERS & CABLES



Ref	Part No.	Qty	Description
	81 30 259		HYDRAULIC CONTROL ASSEMBLY (continued)
1	81 30 052	3	.Control block
2	81 30 053	3	.Control block spindle
3	71 14 071	1	.Control block mounting base
* 4	80 17 301	1	.Wedge plate
5	93 13 034	6	.Setscrew M8 x 16
6	01 00 102	6	.Thin washer 5/16" diameter
	81 30 065	3	.Lever pivot box assembly comprising :-
7	81 30 001	1	..Lever pivot box
8	81 30 009	1	..Lever pivot spindle
9	81 30 021	1	..Spring dowel
10	81 30 019	1	..Lever
11	81 30 013	1	..Lever seal ring
12	92 43 072	6	.Socket headed capscrew M5 x 35
13	71 09 131	2	.Lever handle long
14	71 09 132	1	.Lever handle short
15	09 03 112	1	.Lever knob - Reach (Red)
16	09 03 113	1	.Lever knob - Angle (Green)
17	09 03 114	1	.Lever knob - Lift (Yellow)
18	91 13 004	3	.Hexagon nut M8
19	81 19 010	1	.Operating instruction label
20	80 17 003	3	.Cable c/w spacer and pin, sleeve, flange, etc.
21	80 17 004	1	..Spacer
22	80 17 005	1	..Pin
23	81 25 049	1	..Sleeve
24	81 25 050	1	..Flange
25	91 00 016	1	..Thin locknut Ø16 x 1.5 pitch
26	04 25 522	3	.Spring dowel Ø5 x 22
27	93 43 032	6	.Socket headed capscrew M5 x 16
28	04 25 540	3	.Spring dowel Ø5 x 40
29	80 17 006	1	.Mounting bracket - bolt on

* Wedge mounting bracket replaced by item 29 from August 1983.

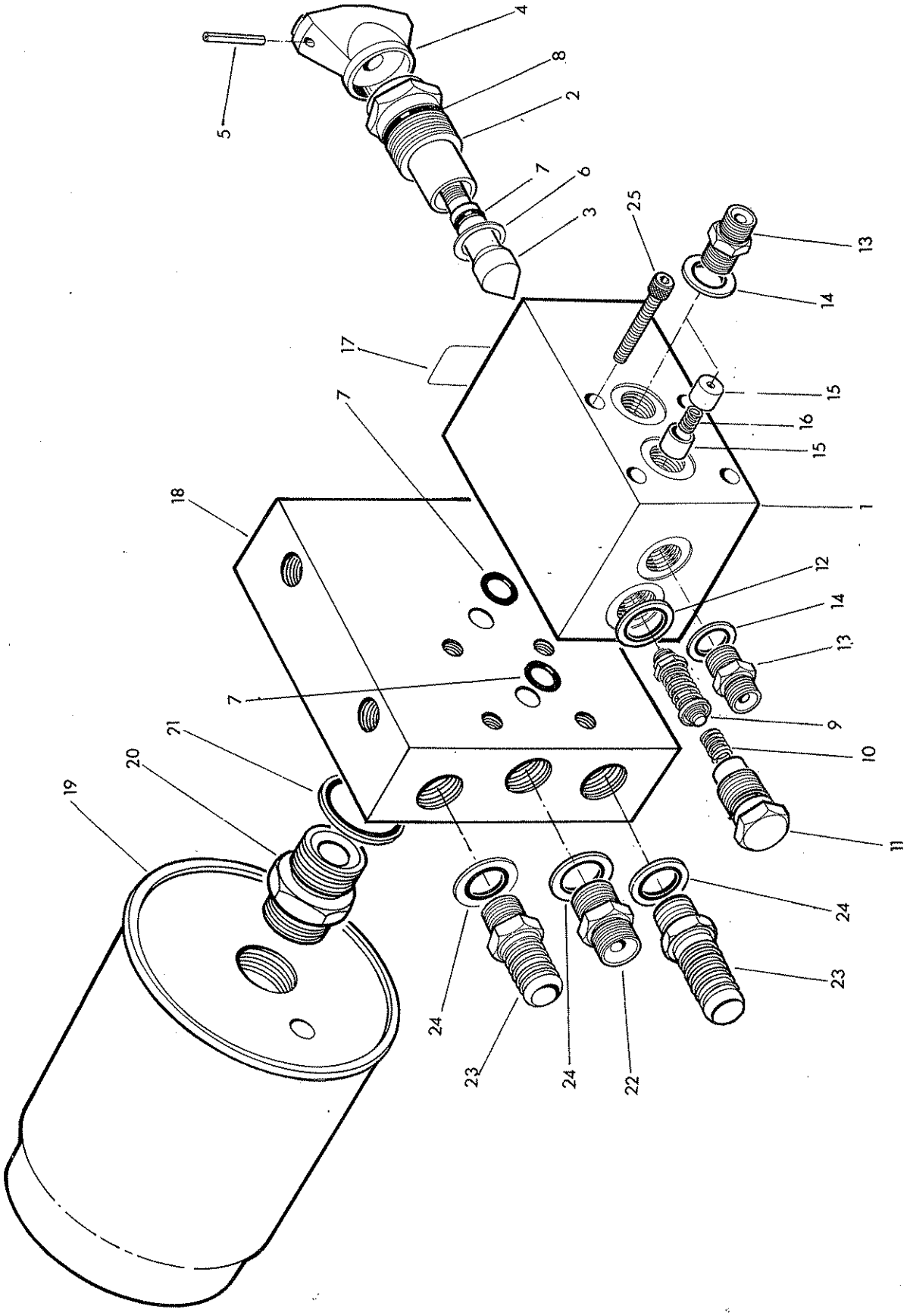
ROTOR CONTROL VALVE



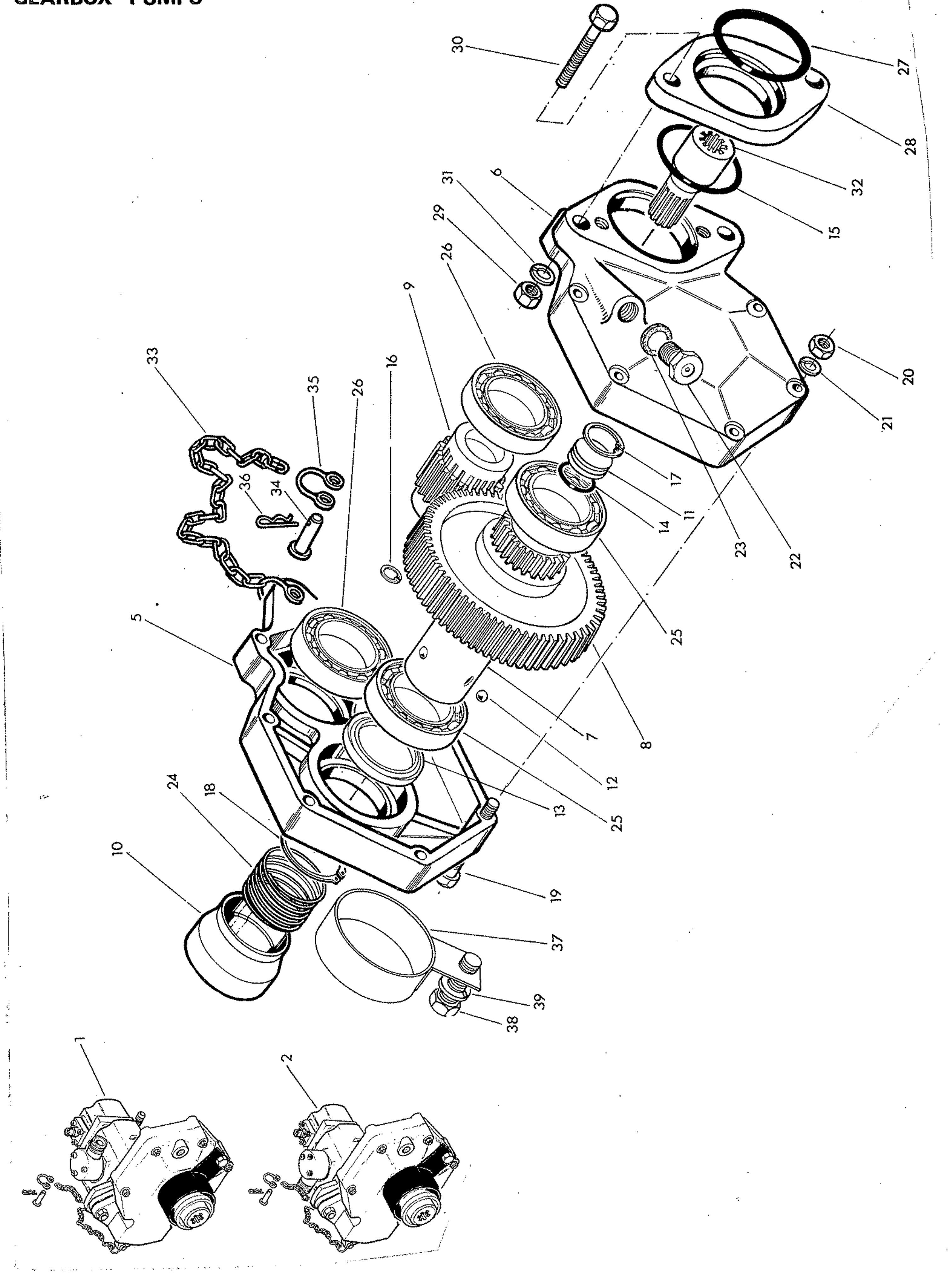
Ref	Part No.	Qty	Description
	81 25 312		ROTOR CONTROL VALVE ASSEMBLY
1	71 09 158	1	.Valve carrier bracket
2	71 09 159	1	.Valve mounting bracket
3	60 12 026	2	.Hose clamp
4	81 25 057	1	.Packing spacer
5	81 25 062	1	.Hose clamp spacer
6	92 13 125	1	.Hexagon bolt M10 x 60
7	93 13 055	3	.Setscrew M10 x 25
8	91 00 205	4	.Spring washer Ø10
9	91 13 005	2	.Hexagon nut M10
10	71 09 161	1	.Tube adaptor 1" BSP M-M
11	80 02 104	1	.Union 1¼" BSP - 1" BSP M-M
12	84 01 265	1	.Filter assembly
13	84 01 033	1	..Filter - canister element 10 micron
14	85 81 183	1	.Captive nut adaptor
15	86 50 109	2	.Bonded seal 1¼" BSP
	81 25 314	1	.Valve compr:-
16	80 02 086	2	..Union 1" BSP - ¾" BSP M-M
17	86 50 106	7	..Bonded seal ¾" BSP
18	81 25 065	1	..Valve body c/w spool - matched pair
19	81 25 031	2	..Relief valve cap
20	01 00 102	As req'd	..Bright washer 5/16" dia.
21	60 01 232	As req'd	..Shim washer 0.4
22	81 10 003	1	..Relief valve spring
23	81 09 006	1	..Spring register
24	81 09 005	1	..Needle
25	81 09 004	1	..Drill bush Ø 5
26	85 82 043	2	..Taper plug 3/8 BSPT
27	81 25 052	1	..Ball valve cap
28	09 05 124	1	..Steel ball ¾" dia.
29		1	By-pass spool - assembly ref. only
30	81 25 039	1	..Control plate c/w 'O' rings
31	86 00 502	1	...'O' ring
32	86 00 503	1	...'O' ring
33	93 43 022	2	..Socket headed capscrew M5 x 12
34	93 43 023	2	..Socket headed capscrew M6 x 12
35	81 03 001	2	..Blank plug ½" BSP
36	81 27 059	1	..Return connection
37	86 50 104	3	..Bonded seal ½" BSP
38	81 25 061	1	..Return connection
39	85 81 189	1	..Return connection
40	86 50 103	1	..Bonded seal 3/8" BSP
	81 25 046	1	.Cable assembly c/w sleeve, flange, etc.
41	81 25 049	1	.Sleeve
42	81 25 050	1	.Flange
43	81 25 051	1	.Pin
44	91 00 016	1	.Thin locknut Ø16 x 1.5 pitch
45	71 14 069	1	.Control block c/w spring dowel & circlip
46	04 11 118	1	..Internal circlip
47	04 25 540	1	..Spring dowel Ø 5 x 40
48	71 14 073	1	.Instruction label
49	71 14 067	1	.Detent cage
50	93 13 034	2	.Setscrew M8 x 16
51	91 00 204	2	.Spring washer
52	71 14 068	1	.Spring
53	09 05 108	2	.Steel ball ¼" dia.
54	71 14 070	1	.Spindle
	81 30 065	1	.Lever pivot box assembly compr:-
55	81 30 001	1	..Lever pivot box
56	81 30 019	1	..Lever
57	81 30 013	1	..Lever seal ring
58	81 30 009	1	..Lever pivot
59	81 39 021	1	..Spring dowel
60	93 43 072	2	.Socket head capscrew M5 x 35
61	91 13 004	1	.Thin hexagon nut M8
62	71 14 072	1	.Lever handle
63	09 03 121	1	.Lever knob - black

Pre-assembled
Not supplied separately

FILTER/PARK- WORK ASSEMBLY

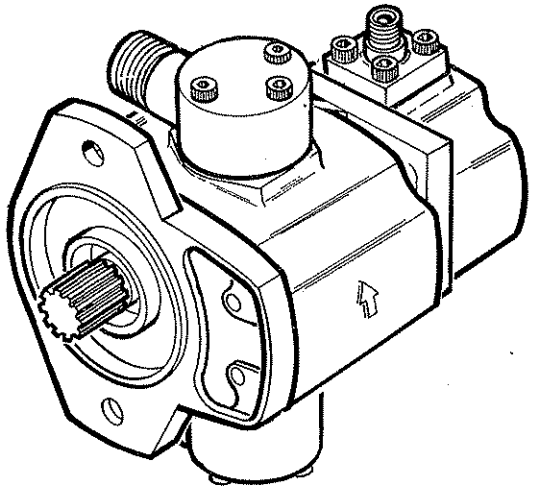


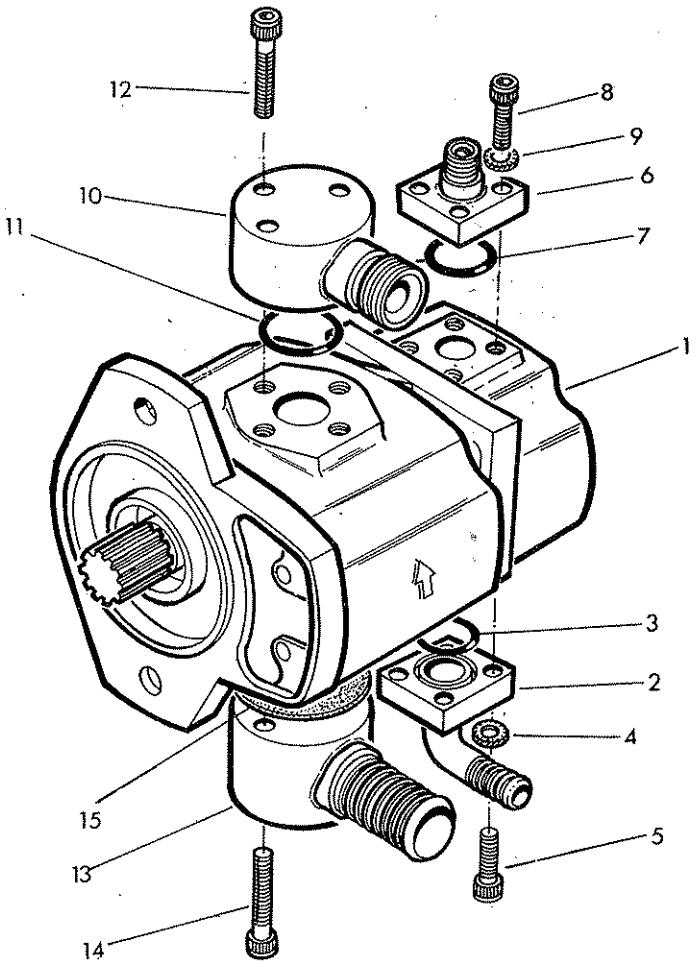
Ref	Part No.	Qty	Description
	81 30 309		FILTER/PARK-WORK VALVE ASSEMBLY
	81 30 305	1	.Park-work assembly
1	81 30 304	1	..Valve block
2	81 30 027	1	..Tap body
3	81 40 028	1	..Tap spindle
4	81 30 033	1	..Knob
5	04 20 820	1	..Spring dowel 1/8" dia.
6	81 30 079	1	..Copper washer
7	87 00 510	3	..'0' ring
8	86 00 402	1	..'0' ring
9	81 30 077	1	..Relief valve
10	81 16 011	1	..Spring
11	81 30 031	1	..Relief valve cap
12	86 50 103	1	..Bonded seal 3/8" BSP
13	86 02 177	3	..Union ¼" BSP M-M
14	86 50 102	3	..Bonded seal ¼" BSP
15	81 30 039	2	..Restrictor Piston
16	81 14 045	1	..Spring
17	71 09 141	1	..Instruction label
18	81 30 308	1	.Filter mounting block
19	84 01 045	1	.Filter
20	85 81 174	1	.Union ½" BSP - 1" UNF M-M
21	86 50 104	1	.Bonded seal
22	85 81 145	1	.Union 3/8" BSP - ¼" BSP M-M
23	81 25 008	2	.Low pressure connection
24	86 50 103	3	.Bonded seal 3/8" BSP
25	92 43 082	4	.Socket Setscrew M5 x 40



Ref	Part No.	Qty	Description
1	82 01 503		GEARBOX/TANDEM PUMP ASSEMBLY R. HAND
2	82 01 501		.Tandem pump assembly R. Hand (see page 58)
3	82 01 504		GEARBOX/TANDEM PUMP ASSEMBLY L. HAND
4	82 01 502		.Tandem pump assembly L. Hand (see page 58)
	The following items are common to all pumps and gearbox assemblies		
	80 13 290	1	.High ratio gearbox comprising:-
5	80 13 291	1	..Case input side
6	80 13 292	1	..Case output side
7	80 13 263	1	..Take off shaft
8	80 13 294	1	..Gear 77 teeth
9	80 13 293	1	..Gear 18 teeth
10	80 13 030	1	..Ball retainer
11	80 13 031	1	..Bung
12	09 05 116	3	..Steel ball ½" diameter
13	86 29 116	1	..Oil seal
14	86 00 409	1	..'O' ring
15	86 00 435	1	..'O' ring
16	04 16 112	1	..Circlip ¾" internal
17	04 16 124	1	..Circlip 1½" internal
18	04 06 250	1	..External circlip Ø 50
19	02 11 242	7	..Bolt 5/16" UNF
20	01 11 002	7	..Hexagon nut 5/16" UNF
21	01 00 002	7	..Spring washer 5/16" diameter
22	80 13 033	1	..Breather valve
23	01 00 903	1	..Fibre washer
24	80 13 032	1	..Ball retaining spring
25	06 03 650	2	..Bearing
26	06 04 640	2	..Bearing
27	86 00 436	1	.'O' ring
28	80 13 025	1	.Adaptor flange c/w bolts, nuts etc.
29	01 11 005	2	.Hexagon nut ½" UNF
30	02 11 225	2	.Bolt ½" UNF x 2¾" long
31	01 00 205	2	.Spring washer
32	80 13 028	1	.Splined adaptor
33	09 02 330	1	.Chain
	60 00 087	2	.Shackle assembly comprising:-
34	60 00 089	1	..Shackle pin
35	60 00 088	1	..Shackle
36	04 31 105	1	..Spring cotter
37	80 13 266	1	.P.T.O. guard
38	03 11 066	1	..Setscrew 5/8" UNF x ¾" long
39	01 00 206	1	..Spring washer 5/8" dia.

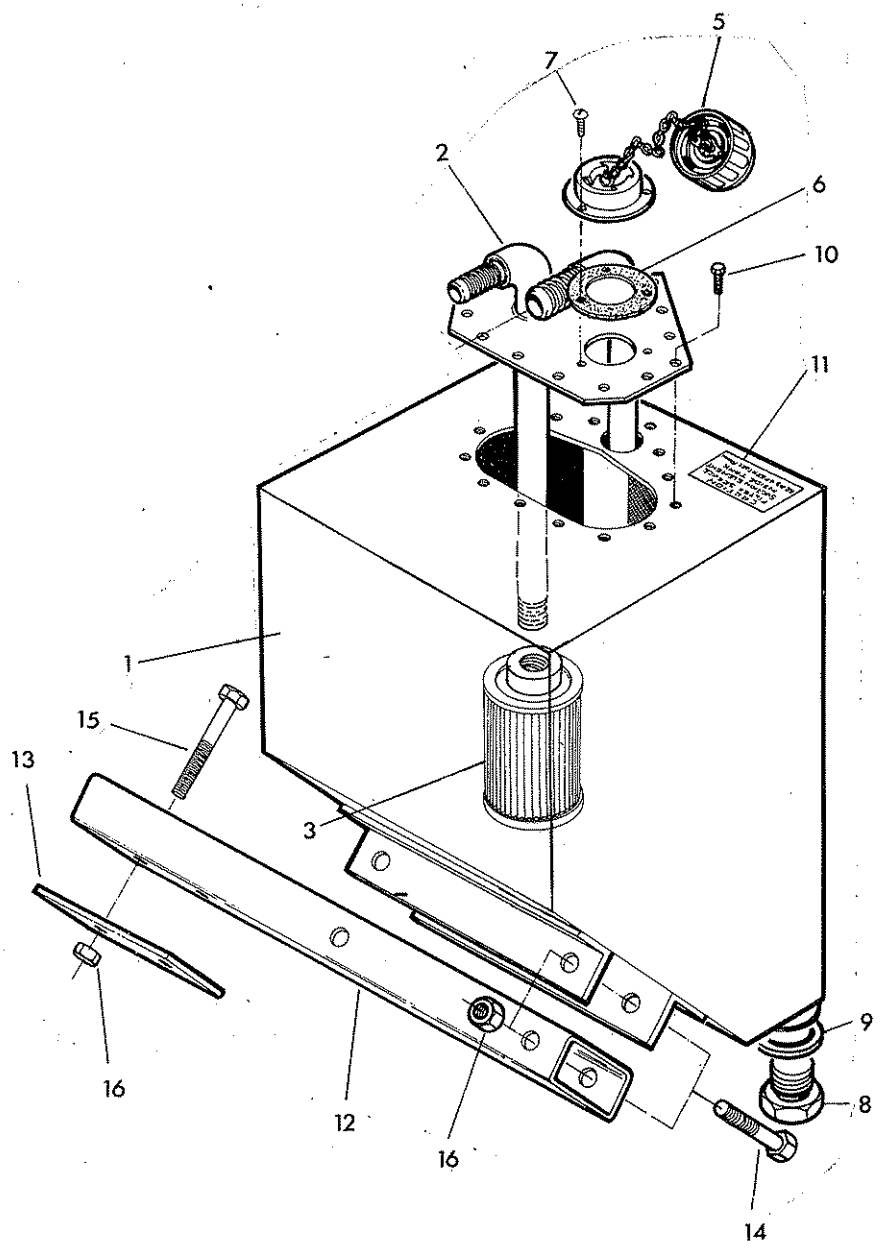
TANDEM PUMP





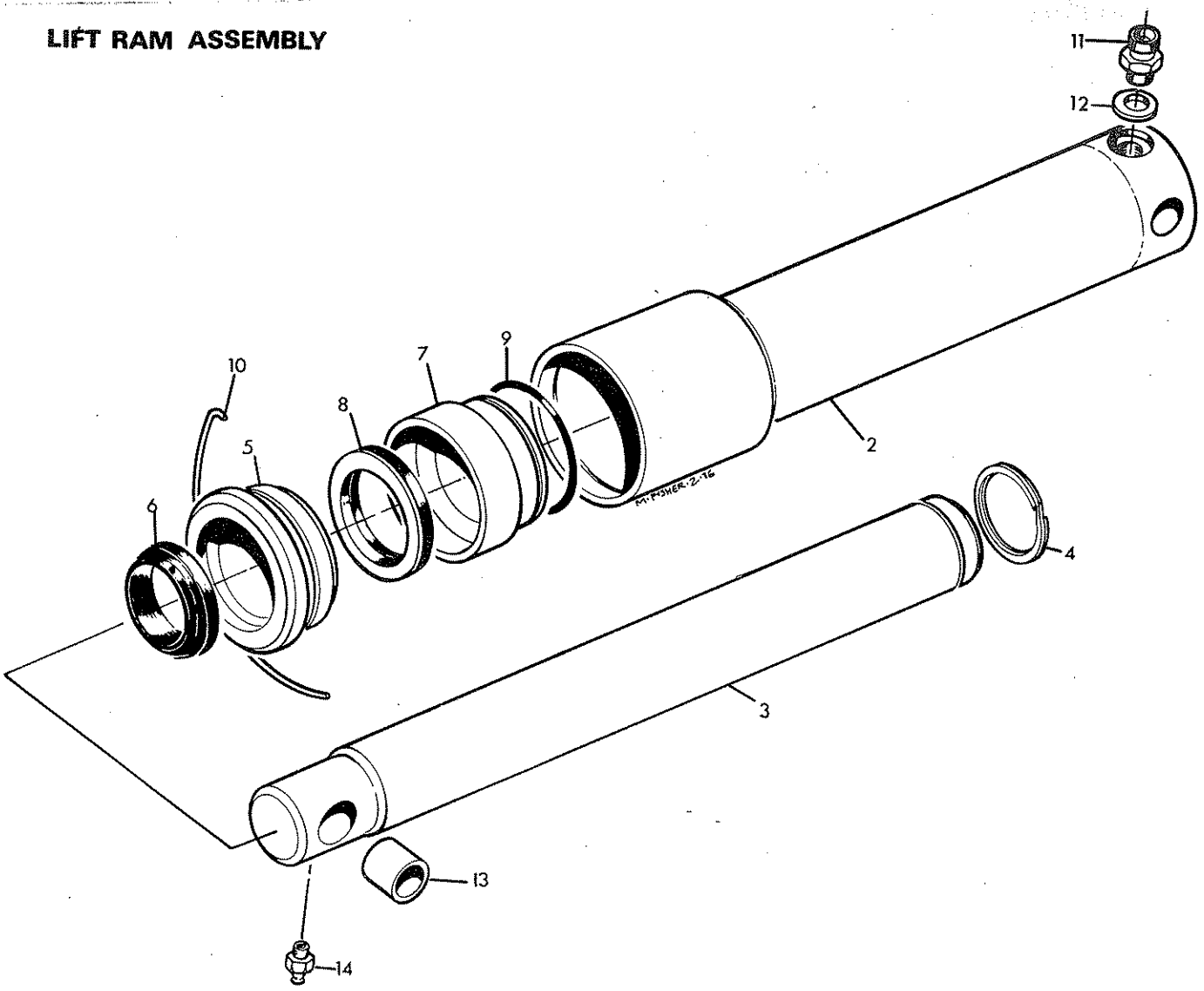
Ref	Part No.	Qty	Description
	82 01 501		TANDEM PUMP ASSEMBLY R. HAND (as shown exploded)
	82 01 502		TANDEM PUMP ASSEMBLY L. HAND (as shown assembled)
	Spares are identical for both tandem pumps and are as follows.		
1	82 01 500	1	.Tandem pump
2	80 05 035	1	.Suction union c/w screws & 'O' ring - washer
3	86 00 405	1	.. 'O' ring
4	01 00 302	4	..Shakeproof washer 5/16" dia
5	03 42 062	4	..Capscrew 5/16" UNC x ¾" long
6	80 05 027	1	. Pressure connection c/w screws & 'O' ring
7	86 00 405	1	..'O' ring
8	03 42 062	3	..Capscrew 5/16" UNC x ¾" long
9	01 00 302	3	..Shakeproof washer 5/16" dia
10	80 05 029	1	.Pressure connection c/w screws & 'O' ring
11	86 00 121	1	..'O' ring
12	02 00 021	3	..Capscrew 5/16" UNC x 2" long 'Tuflok'
13	80 13 022	1	.Suction connection c/w screws
14	02 00 022	2	..Capscrew 5/16" UNC x 2½" long 'Tuflok'
15	80 13 023	1	.Gasket
	86 99 172		Pump seal kit

OIL TANK



Ref	Part No.	Qty	Description
	80 17 265		HYDRAULIC INSTALLATION R. HAND
	80 17 266		HYDRAULIC INSTALLATION L. HAND
	The following items are common to both hydraulic installations.		
	71 09 312	1	.Oil tank assembly
1	71 09 282	1	..Oil tank
2	71 09 325	1	..Oil tank lid assembly
3	84 01 044	1	..Strainer
4	84 01 014	1	..Filler cap assembly
5	84 01 015	1	...Filler cap and neck
6	84 01 017	1	...Gasket
7	03 00 032	3	...Screws self tapping 3/16" dia x ½" long
8	85 81 159	1	..Blank plug 1" BSP
9	86 50 108	1	..Bonded seal 1" BSP
10	93 13 023	7	..Setscrew M6 x 12
11	84 01 026	1	..Instruction label
12	71 09 293	1	.Tank mounting bracket
13	71 09 125	1	.Clamp plate
14	02 11 446	2	.Bolt 5/8" UNF x 5½" long
15	02 11 566	2	.Bolt 5/8" UNF x 7" long
16	01 41 006	4	.'Clevelok' nut 5/8" UNF

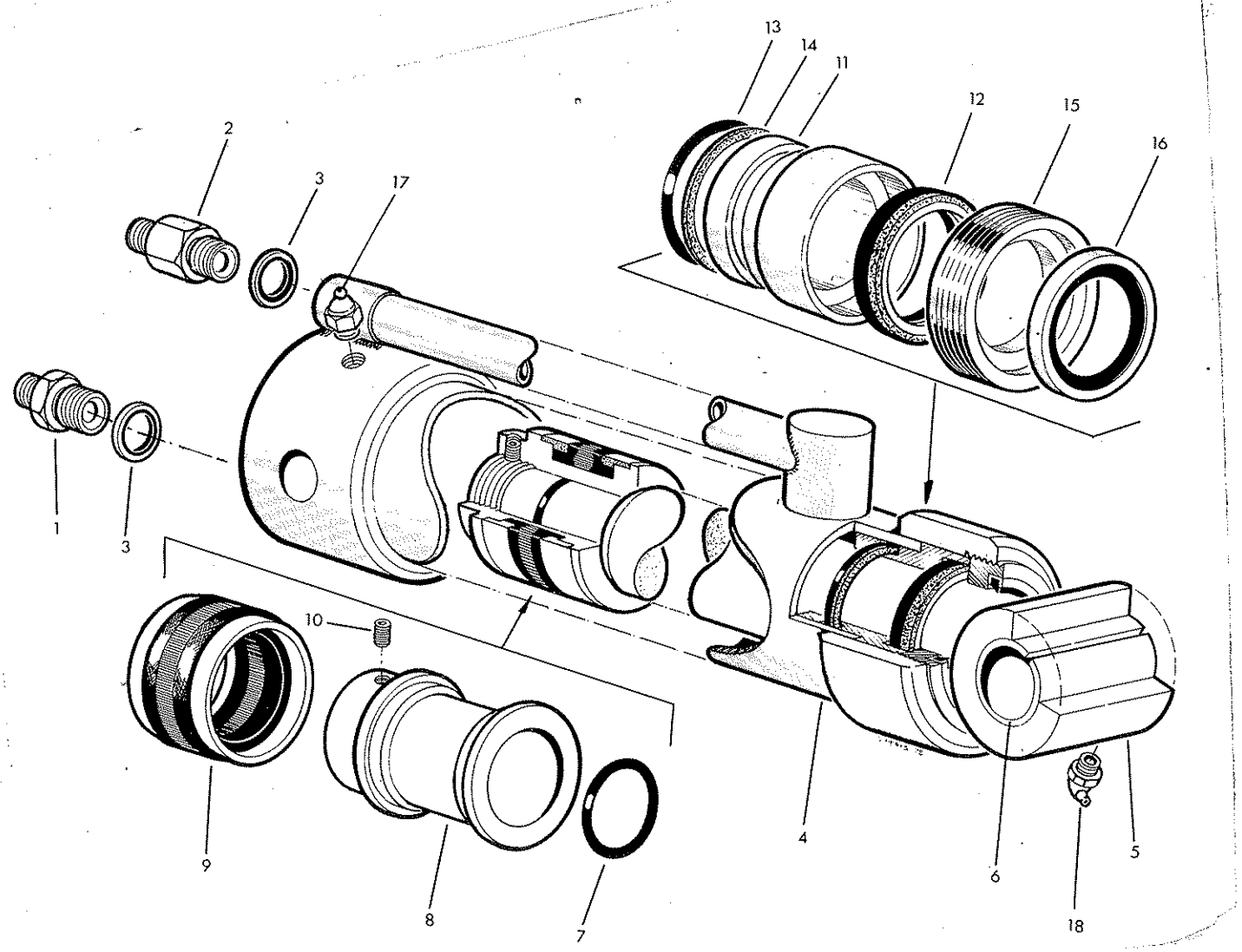
LIFT RAM ASSEMBLY



Ref	Part No	Qty	Description
	71 09 263	1	LIFT RAM ASSEMBLY complete
	71 09 264	1	.Lift ram comprising
2	71 09 265	1	..Ram barrel
3	71 09 266	1	..Ram rod c/w spirolox
4	04 03 260	1	...Spirolox ring
5	71 09 032	1	..Gland retainer c/w wiper
6	86 29 130	1	...Wiper ring
7	71 09 033	1	..Gland housing c/w seals
8	86 15 001	1	...Seal
9	86 00 312	1	...'O' ring
10	71 09 034	1	..Locking wire
11	85 81 145	1	.3/8" BSP-1/4 BSP Union
12	86 50 103	1	.3/8" BSP Bonded seal
13	71 05 050	1	.Bush
14	09 01 121	1	.1/8" BSP Greaser

Seal Kit 86 99 154 comprising ref. nos. 6, 8, 9.

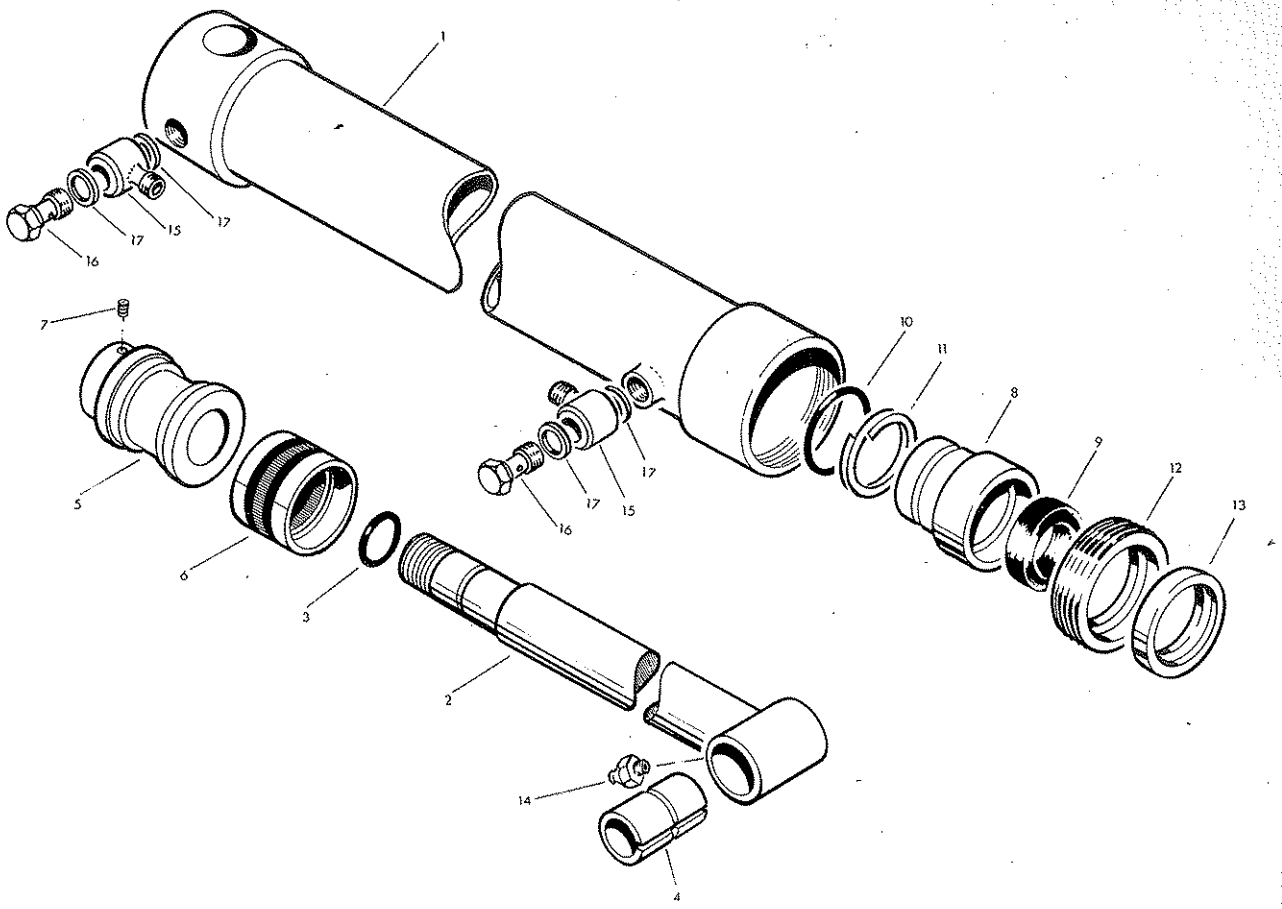
REACH RAM XL



Ref	Part No.	Qty	Description
	71 09 275		REACH RAM ASSEMBLY
1	85 81 145	1	.Union 3/8 BSP – ¼ BSP MM
2	85 81 146	1	.Union – long 3/8 BSP – ¼ BSP MM
3	86 50 103	2	.Bonded seal 3/8 BSP
	71 03 303	1	.Basic ram assembly
4	71 03 304	1	..Ram cylinder
5	71 01 095	1	..Piston rod c/w bush and '0' ring.
6	71 05 050	1	...Bush
7	86 00 119	1	...'0' ring.
8	71 01 165	1	..Piston c/w seal and grub screw.
9	86 36 131	1	...Piston seal
10	93 00 110	1	...Grub screw M6 x 8
11	71 01 099	1	..Gland housing c/w seal and '0' ring.
12	86 22 127	1	...Gland seal.
13	86 00 304	1	...'0' ring.
14	86 09 304	1	...Anti-extrusion ring.
15	71 01 100	1	..Gland nut c/w wiper
16	86 40 328	1	...Piston rod wiper
17	09 01 121	1	..Greaser 1/8" BSP – st.
18	09 01 123	1	..Greaser 1/8 BSP – angular 90°
	86 99 102		SEAL KIT

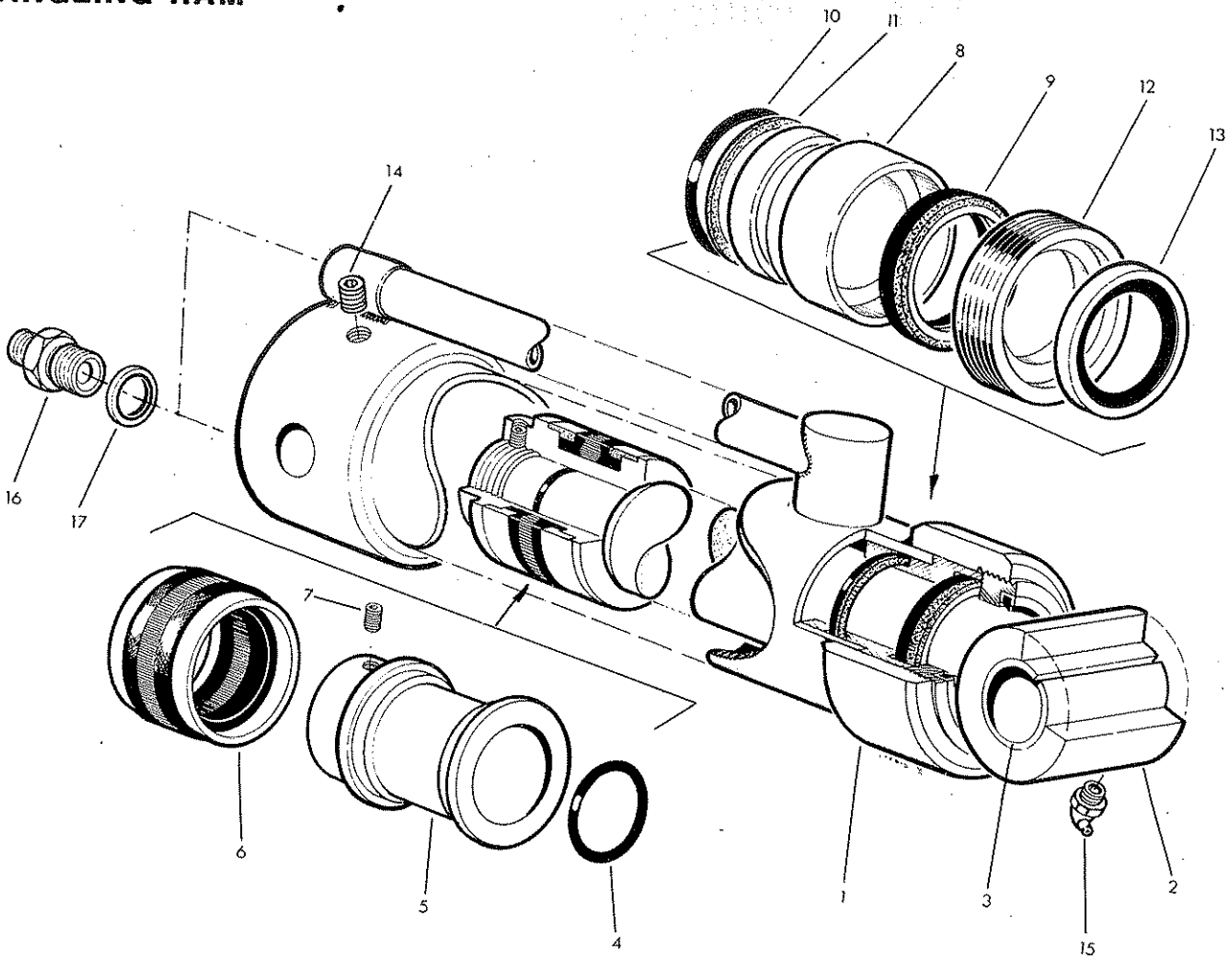
XL

BREAKAWAY RAM



Ref	Part No.	Qty.	Description
	71 09 274	1	BREAKAWAY RAM ASSEMBLY complete
	71 09 272	1	.Breakaway ram comprising:-
1	13 35 379	1	..Ram cylinder
2	72 12 004	1	..Piston rod assembly
3	86 00 119	1	...'0' ring.
4	71 05 050	1	...Bush
5	71 01 165	1	..Piston c/w seal and grub screw.
6	86 36 131	1	...Piston seal.
7	93 00 110	1	...Grub screw M6 x 8
8	71 01 099	1	..Gland housing assembly
9	86 22 127	1	...Gland seal.
10	86 00 304	1	...Gland '0' ring.
11	86 09 304	1	...Anti extrusion ring.
12	71 01 100	1	..Gland nut assembly c/w wiper
13	86 40 328	1	...Piston rod wiper
14	09 01 121	1	. 1/8"BSP greaser
15	85 81 147	2	.Banjo union
16	60 01 127	2	.Banjo bolt.
17	86 50 103	4	.3/8" BSP bonded seal.
	86 99 102		SEAL KIT.

ANGLING RAM

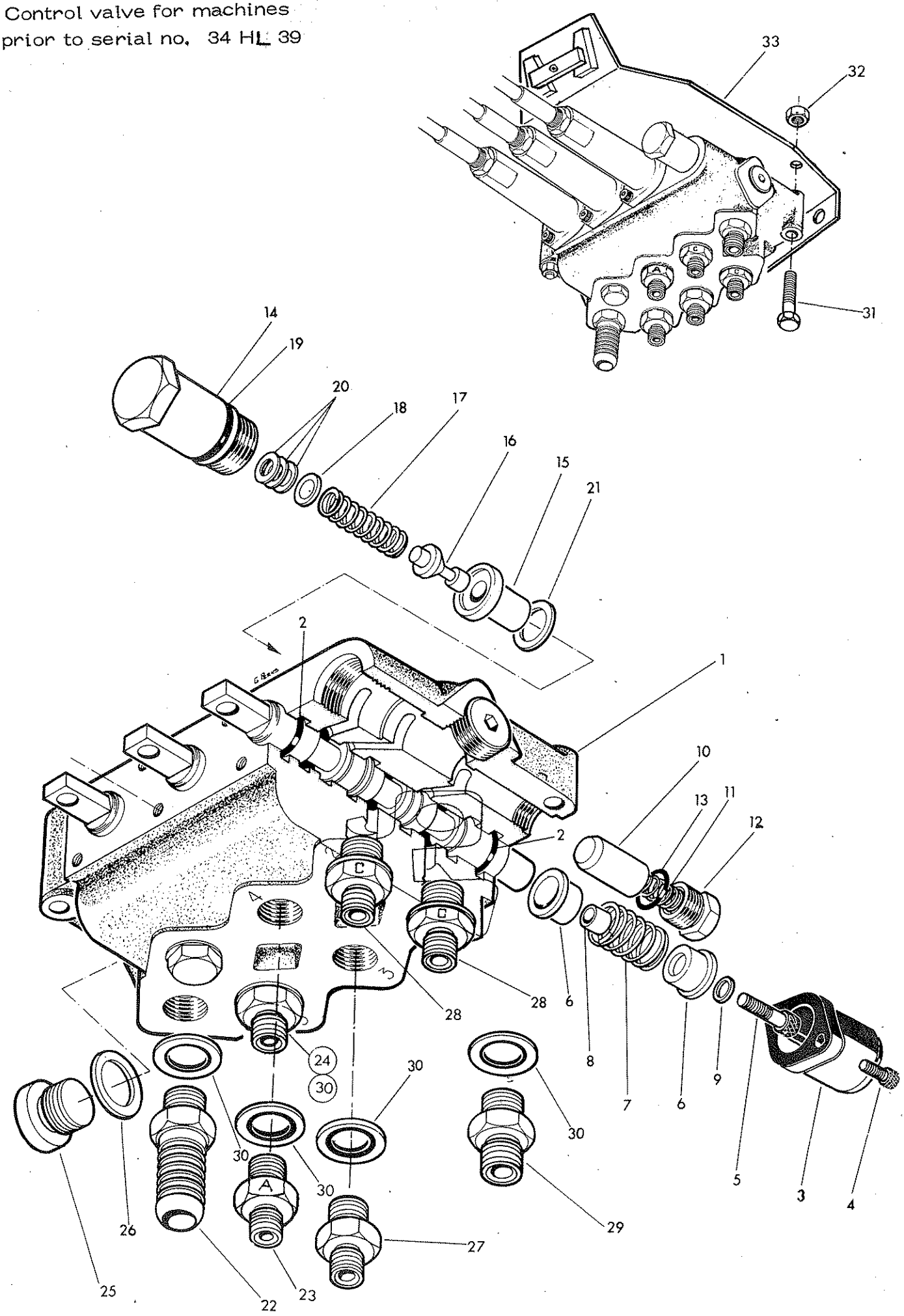


Ref	Part No.	Qty.	Description
	71 14 342		ANGLING RAM ASSEMBLY
	71 11 316	1	.Basic ram assembly
1	71 03 304	1	..Ram cylinder
2	71 01 095	1	..Piston rod c/w bush and '0' ring.
3	71 05 050	1	...Bush
4	86 00 119	1	...'0' ring.
5	71 01 165	1	..Piston c/w seal and grub screw.
6	86 36 131	1	...Piston seal.
7	93 00 110	1	...Grub screw M6 x 8
8	71 01 099	1	..Gland housing c/w seal and '0' ring.
9	86 22 127	1	...Gland seal
10	86 00 304	1	...'0' ring.
11	86 09 304	1	...Anti-extrusion ring.
12	71 01 100	1	..Gland nut c/w wiper.
13	86 40 328	1	...Piston rod wiper
14	85 82 041	1	..Taper plug 1/8" BSPT
15	09 01 124	1	..Greaser 1/8 BSP - angular 67½°
16	85 81 145	2	.Union 3/8 BSP - ¼BSP M-M
17	86 50 103	2	.Bonded seal 3/8 BSP

86 99 102		SEAL KIT

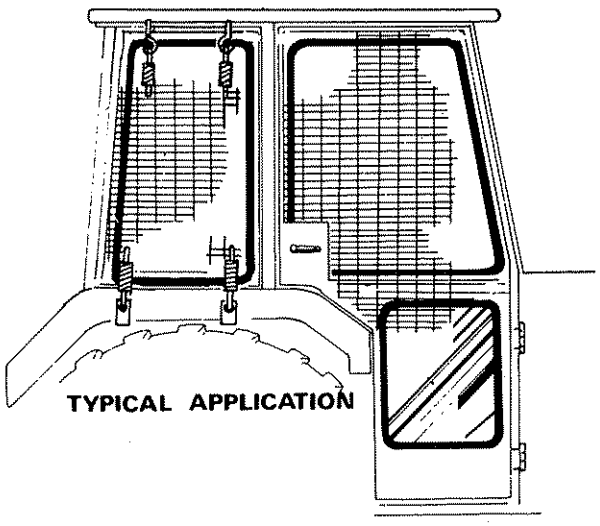
CONTROL VALVE

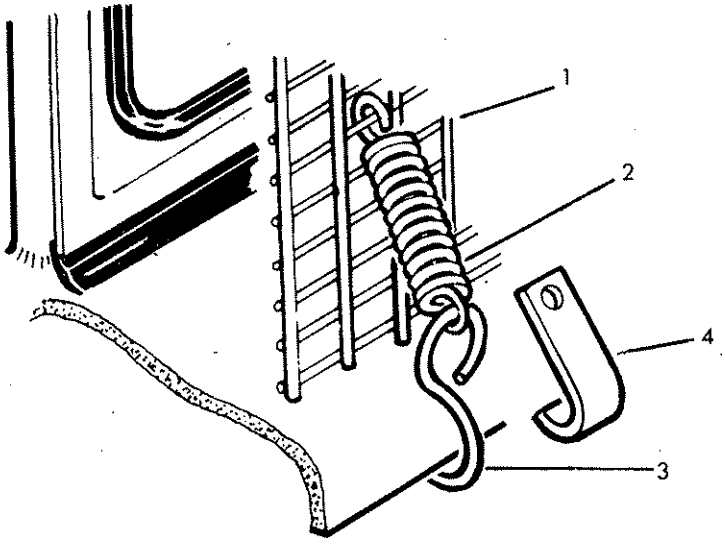
Control valve for machines prior to serial no. 34 HL 39



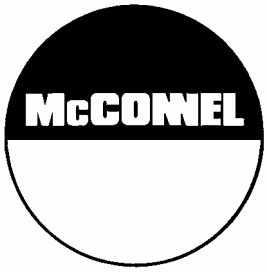
Ref	Part No.	Qty	Description
	81 30 259		HYDRAULIC CONTROL ASSEMBLY
	81 30 258	1	.Valve c/w connections
1	81 30 252	1	..Valve block c/w spools '0' rings
2	86 00 112	6	...'0' ring
3	81 30 002	3	..Centring spring cover
4	93 43 022	6	..Socket headed capscrew M5 x 12
5	93 83 043	3	..Set screw M6 x 20
6	81 30 003	6	..Centring spring cup
7	81 30 004	3	..Centring spring
8	81 30 005	3	..Distance piece
9	81 30 020	3	..Washer
	81 30 022	1	..Non-return valve assembly comprising:-
10	81 30 006	1	...Supply check valve
11	81 30 007	1	...Spring
12	81 30 008	1	...Plug
13	86 00 501	1	...'0' ring
	81 30 023	1	..Relief valve assembly
14	81 30 045	1	...Relief valve body
15	81 30 016	1	...Releif valve seat housing
16	81 30 015	1	...Relief valve needle
17	81 30 011	1	...Relief valve spring
18	81 30 044	1	...Washer
19	86 00 113	1	...'0' ring
20	81 30 043	As req'd	...Shim
21	81 30 017	1	...Sealing washer
22	81 25 008	1	..Return connection 5/8" bore
23	81 30 046	1	..Restrictor union 'A' ¼ BSP - 3/8 BSP
24	85 81 145	1	..Union 3/8" BSP - ¼" BSP M-M
25	81 30 061	1	..Cap
26	81 30 064	1	...Copper sealing washer
27	81 30 066	1	..Restrictor union ¼" BSP - 3/8" BSP
28	81 30 048	2	..Restrictor union 'C' ¼" BSP - 3/8" BSP
29	60 00 113	1	..Union 3/8" BSP M - M
30	86 50 103	7	..Bonded seal 3/8" BSP
31	92 13 114	3	.Bolt M8 x 55
32	91 43 004	3	.'Clevelok nut M8
33	81 30 080	1	.Valve mounting bracket
	86 99 163		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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